SHORE

Empower students as the agents of change

D2.1. Base analyses report each region

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List of acronyms

Acronym	Full name
AGU	American Geophysical Union
ANMSC	Australian National Marine Science Committee
ANSWER	ANtibioticS and mobile resistance elements in WastEwater Reuse

AR	Augmented Reality
ASLO	Association for the Sciences of Limnology and Oceanography
BL	Blended Learning
CEOP	The Climate Expert Online Platform
EC	European Commission
EMSEA	The European Marine Science Educators Association
EPA	Environmental Protection Agency
EU	European Union
EUKI	European Climate Protection Initiative
FAO	Food and Agricultural Organization
GII	Global Innovation Index
IMCC	International Marine Conservation Congress
IMO	The International Maritime Organization
IOC	Intergovernmental Oceanographic Commission
IODP	International Ocean Discovery Program
IOLC	International Ocean Literacy Conference
ISPRA	Higher Institute for Environmental Protection and Research
JODC	Japan Oceanographic Data Center
MARPOL	The International Convention for the Prevention of Pollution from Ships
MASLOWATEN	MArket uptake of an innovative irrigation Solution based on LOW WATer-ENergy
MBL	Marine Biological Laboratory
MIUR	The Italian Ministry of Education, University and Research
MONE	The Republic of Türkiye Ministry of National Education
MSC	Marine Stewardship Council
NASA	National Aeronautics and Space Administration

NCC or NAT	National Core Curriculum
NCCOS	National Centers for Coastal Ocean Science
NGO	Non-governmental Organization
NMEA	National Marine Educators Association
NOAA	National Oceanic and Atmospheric Administration
OL	Ocean Literacy
ÖWAV	Austrian Water and Waste Management Association
PCTO	Pathways for Transversal Skills and Orientation
PIL	Partners in Learning
SDG	Sustainable Development Goal
SEA	SEA Education Association
SOLAS	The International Convention for the Safety of Life at Sea
SUP	Single-Use Plastic
TUDAV	Turkish Marine Research Foundation
VET	Vocational Education and Training
VR	Virtual Reality
WCMB	World Conference on Marine Biodiversity
WHOI	The Woods Hole Oceanographic Institution
WP	Work Package
WWF	World Wildlife Fund

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Background about the SHORE Project

SHORE strives to increase ocean literacy by engaging students and teachers to implement the Mission Ocean's objectives through activities and collaborative projects in schools.
Within this project, the project partners will craft trainings and educational materials in line with blue curricula for schools located in the Baltic Sea, Black Sea, Mediterranean Sea, Danube River, and Rhine River. Participating schools will secure grants to support the implementation of their blue projects. The most outstanding school project will be awarded "Ocean Ambassador of the Year".
Beyond awarding grants, SHORE serves as a comprehensive resource hub and a bridge between researchers, local stakeholders, and schools in the regional areas.

Executive summary

This document is a deliverable of the SHORE Project, funded under the European Union's Horizon Europe research and innovation programme under the grant agreement No 101112815. The aim of Work Package 2, Task 1 (WP2.T1) within the SHORE project is to conduct base analyses in the regional areas to understand the current status of ocean literacy knowledge, public opinion, and local context. This task is focused on gathering essential information about the specific regional areas, including the Baltic Sea, Black Sea, Mediterranean Sea, Rhine, and Danube River Area, to inform the development and implementation of educational initiatives and activities related to the blue economy and ocean literacy.

This report's methodology uses a mixed-methods approach, combining quantitative and qualitative research methodologies to offer a thorough understanding of the topic. Component of Quantitative research part entails distributing standardized questionnaires that are intended to gather quantifiable information from a sizable sample size. Ensuring statistical validity and generalizability of the results is the aim. The purpose of the questionnaire items is to elicit quantitative replies so that the results may be supported by statistical analysis. Measuring the prevalence of particular trends or occurrences among the target population requires the use of this technique. A qualitative analysis is carried out concurrently with the acquisition of quantitative data. This comprises an extensive review of the literature. The literature evaluation identifies current knowledge gaps that the research attempts to fill and provides a theoretical framework for the investigation. It also helps to direct the qualitative data's theme analysis. A comprehensive examination of the study issue is made possible by the methodology's use of a mixed-methods approach. It makes it possible to quantify patterns and trends while investigating the causes and environments that give rise to them. This method offers a comprehensive grasp of the research issue while strengthening the validity and dependability of the research findings.

A survey was carried out to obtain opinions on important subjects concerning the sustainability of the ocean. Austria, Czechia, Estonia, Hungary, Italy, Romania, and Turkey were the eight European nations that were the subject of the 21-question online poll. Citizens of the nations that focused their outreach efforts on students, educators, and the general public interested in ocean sustainability had access to the online questionnaire. The voluntary and anonymous nature of participation guaranteed the impartiality and integrity of the information gathered. In order to measure public opinion

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on a range of topics pertaining to ocean sustainability and conservation, a survey was created to explore a number of important subjects. First, it evaluated public knowledge of ocean health and sustainability practices in an effort to assess the efficacy of current ocean literacy programs. This entailed assessing people's awareness of problems impacting maritime habitats and their familiarity with sustainable solutions to these problems. The questionnaire also sought to investigate the idea of "Sea Blindness," which denotes the general population's disinterest or lack of comprehension of the relationship between human activity and ocean health. By investigating this phenomenon, the survey sought to uncover the degree to which individuals perceive their reliance on healthy oceans and whether there exists a disconnect between people and the marine environment in their awareness and actions. In addition, the study sought to evaluate public opinions and views of the Emerging Blue Economy, which includes potential and sustainable economic activity based on ocean resources. This entailed assessing public knowledge of blue economy ideas and opinions on the possible advantages and difficulties of ocean-based sustainable development projects. Finally, this survey examined how climate change is affecting marine ecosystems, with the goal of assessing how well-informed the general public is about the serious effects of climate change on oceans and the need for adaptation measures. This involved evaluating the precise risks that climate change poses to marine biodiversity, ecosystems, and coastal populations as well as comprehending how people feel about how urgent and significant it is to solve these issues.

The purpose of the survey was to gather solid information for an in-depth review of these significant issues. The SHORE project's creative educational resources and programs are developed with input from the information gathered. The project aims to encourage sustainable behavior and contribute to a healthy future for our oceans by empowering kids with ocean awareness and developing their role as change agents. It was anticipated that the survey would provide insightful information about public perceptions, attitudes, and concerns about the sustainability and health of the ocean. These results serve as the foundation for the creation of useful teaching resources and tactics for the SHORE project, which will eventually enable students to effectively advocate for sustainable development and healthy oceans.

The Project acknowledges that in order to effectively involve multiple stakeholders, educational activities must be adapted to local cultural settings and collaborative partnerships must be fostered. It is clear from the research that there are substantial knowledge gaps and a lack of awareness of ocean health and sustainability measures throughout investigated countries. Educational activities can be more successfully customized to close these gaps and include people and communities in ocean stewardship by taking into account cultural variations and working with local communities.

The research's conclusions highlight the critical need for more initiatives to promote ocean literacy. Even if interest in ocean-related subjects is growing, there is still a shortage of knowledge, especially when it comes to ideas like the blue economy and how climate change affects marine ecosystems. This emphasizes the significance of programs like the Blue School concept, which tries to raise students' and teachers' understanding of the environment, especially as it relates to oceans. The project is to equip future generations with the information and skills required to become

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knowledgeable and proactive stewards of our oceans by encouraging the establishment of more Blue Schools and related educational activities.

The study also highlights the blue economy's potential as a route for sustainable development. The project aspires to contribute to the evolution of the blue economy through collaborative partnerships and educational activities. However, there is still room for improvement, notably in terms of public knowledge and perception. The initiative seeks to utilize the potential of ocean resources sustainably, supporting economic growth while guaranteeing the preservation and conservation of marine resources for present and future generations. It does this by encouraging awareness of and participation in the blue economy.

To sum up, the SHORE Project is an important step in the direction of promoting ocean literacy and sustainable ocean management throughout Europe. By means of customized educational programs, cooperative alliances, and the advancement of the blue economy, the project seeks to close knowledge gaps, heighten consciousness, and enable people and communities to take an active role in protecting our seas. In order to provide a sustainable future for our oceans and the communities that depend on them, the initiative aims to safeguard and conserve marine resources.

1. Introduction

1.1. Project Introduction

The SHORE project, which stands for "Student and school activities for the promotion of education on 'blue' sustainability and the protection of marine and freshwater ecosystems," aims to enhance ocean literacy among primary and secondary students and educators. The project focuses on engaging and mobilizing students, teachers, and schools to become eco-citizens and agents of change. SHORE seeks to achieve this by promoting international coordination and cooperation to equip individuals with the necessary skills and knowledge to contribute to the protection, preservation, and restoration of Europe's oceans, seas, and water. The project also aims to promote the Mission Ocean objectives at local, regional, and global levels through various activities, including open schooling methodologies, blue skills curricula, and community engagement.

The SHORE project is crucial in addressing the urgent need to protect marine and freshwater ecosystems, promote ocean literacy, and contribute to sustainable development goals. With marine and freshwater ecosystems rapidly degrading due to human activity, there is a pressing need to engage and empower citizens, particularly the youth, to take action and drive transitions through deliberate democracy, social innovation, citizen science, and awareness campaigns. The project aligns with the EU's Green Deal and Mission Restore Our Ocean and Waters by 2030 objectives, aiming to address the degradation of marine ecosystems that threatens European citizens' and societies' health, well-being, and prosperity.

Project Objectives: Work Package 2.1 (WP2.1) within the SHORE project plays a critical role in achieving the overall objectives of the project. The specific objectives of WP2.1 include:

Conducting base analyses in the regional areas to understand the current status of ocean literacy knowledge, public opinion, and local context.

Objectives are in line with the overall goals of the SHORE project, which include expanding and broadening ocean and water literacy knowledge and programs among children and youth, teachers, and schools. WP2.1 aims to provide the necessary groundwork and training to ensure that the school projects fit into the local context of the Blue Economy and foster lifelong learning. By improving educational curricula and adding open schooling practices, increased awareness of the oceans' importance and the blue economy can be achieved by exposing students to current challenges about ocean and water issues.

1.2. Importance of Local Contexts

The SHORE project holds significant importance in both local and global contexts, particularly in relation to the blue economy and ocean literacy. At the local level, the project aims to engage and mobilize students, teachers, and schools within specific regional areas, including the Baltic Sea, Black Sea, Mediterranean Sea, Rhine, and Danube River Area. By focusing on these regional areas, SHORE can address the unique challenges and opportunities present in each location, thereby contributing to the sustainable development of local communities and ecosystems.

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On a global scale, the project aligns with international efforts to promote ocean literacy, protect marine and freshwater ecosystems, and contribute to the United Nations Sustainable Development Goals (SDGs). By fostering a sense of global citizenship and environmental responsibility among students and educators, SHORE aims to create a broader impact that extends beyond individual regions and contributes to the overall health and sustainability of the world's oceans and water bodies.

2. Literature Review

2.1. Austria

2.1.1. Purpose and Scope of the Literature Review

The literature review in this report aims to thoroughly analyse existing research on ocean literacy, the blue economy, and sustainable development goals. The purpose is to comprehensively review and synthesize the body of knowledge in these interconnected fields. This examination is critical in understanding the current landscape of research and identifying potential gaps or areas for further study.

The scope of the review includes several key topics:

1. Ocean Literacy: Understanding the public's awareness and knowledge about the ocean's influence on them and their influence on the ocean.
2. Blue Economy: Examining sustainable use of ocean resources for economic growth, improved livelihoods, and jobs while preserving the health of ocean ecosystems.
3. Sustainable Development Goals (SDGs): Specifically, focusing on goals related to marine environments and how they intersect with ocean literacy and the blue economy.
4. Blue Schools: Examining the concept of blue school and conducting studies that will contribute to the literature.

2.1.2. Assessment of Existing Research

Water is a critical resource in Austria, a country renowned for its numerous lakes and rivers. Various scientific disciplines as well as federal government institutions contribute to our understanding of water-related issues, ranging from water quality and availability to the impacts of climate change and sustainable management practices.

Water Resources Management:

Sustainable management of water resources is a key concern for researchers in Austria. This involves evaluating the utilization of rivers, lakes, and groundwater while considering the environmental impact. Scientists in cooperation with the Federal Ministry of Agriculture, Forestry, Regions and Water Management work on strategies to balance the increasing demand for water with the need to protect ecosystems and ensure long-term resource availability.

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Example Study: Austria's Water Treasure - Protecting and using our groundwater sustainably[1]:

The comprehensive study "Austria's Water Treasure", initiated by the Federal Ministry of Agriculture, Regions and Tourism, serves as a guide for water management across Austria until 2050 in order to enable sustainable groundwater utilization in the future.

Climate Change Impacts on Water:

Austrian scientists explore the effects of climate change on water resources. This includes studying changes in precipitation patterns, the melting of glaciers, and the resulting impact on river flow and water availability. Understanding these dynamics is essential for developing adaptive strategies to mitigate the impact of climate change on water systems.

Example Study: 10 thesis of the Austrian water management concerning climate change[2]:

In order to be able to present the effects of climate change on water management in a scientifically sound way the Federal Ministry of Agriculture, Forestry, Regions and Water Management, Directorate-General Water Management commissioned, jointly with water management divisions of the Federal Provinces the study "Strategies of adaptation to climate change in Austrian water management". These 10 theses constitute the focus of the statements on the essentials.

Water Ecology and Biodiversity in the Danube River

Researchers in Austria investigate the ecological health of water bodies, examining the impact of human activities on aquatic habitats and biodiversity. Conservation efforts often stem from scientific findings that highlight the importance of preserving the unique flora and fauna that depend on healthy water ecosystems.

Example Research: Danube Sediment Management - Restoration of the Sediment Balance in the Danube River[3]:

Sediments are a natural part of aquatic systems. During the past centuries, humans have strongly altered the Danube River. Riverbed straightening, hydropower dams and dykes have led to significant changes in the sediment load. This sediment imbalance contributes to flood risks, reduces navigation possibilities and hydropower production. It also leads to the loss of biodiversity within the Danube Basin.

[1] https://info.bml.gv.at/service/publikationen/wasser/austrias-water-treasure---protecting-and-using-our-groundwater-sustainably.html
[2] https://info.bml.gv.at/en/topics/water/water-in-austria/climate-change---adaptation-strategies-for-austrias-water-management.html
[3] https://www.interreg-danube.eu/approved-projects/danubesediment

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Water Management in Agriculture

The sustainable use of water in agriculture and industry is a multidisciplinary research focus. Scientists explore innovative technologies and practices to optimize water consumption, reduce pollution, and enhance the efficiency of water use in these sectors while maintaining self-sufficiency and security in food supply. In Austria, the University of Natural Resources and Life Science is amongst the leading research institutions with several departments linked to water management covering a broad expertise in this field.

Example Report: Agricultural irrigation - opportunities for digitalization[4]:

Digital data and tools are increasingly part of agricultural practice and water management in Austria. Decision support systems can be used to control irrigation digitally and adapted to the agrometeorological conditions. Apps and web-based services (e.g. ada.boku.ac.at, eo4water.com) have been developed to facilitate irrigation planning using publicly available satellite, weather, soil and land use data (e.g. opendatacube.org, data.gv.at). Online sensors (e.g. ehyd.gv.at) enable the real-time display of groundwater levels or surface water runoff. Water withdrawals for irrigation purposes are recorded with varying degrees of information density via water information systems (e.g. online water registers of the federal provinces).

Water quality management and river basin engineering

The Technical University Vienna with its “Research Unit of Water Quality Management” deals with a broad range of the anthropogenic water system and the aquatic environment through teaching and research. They emphasis on biological, technical and operative aspects of wastewater treatment and address body immissions, water resource management and monitoring techniques. The Department provides a comprehensive overview of all publications[5].

Example Research: The occurrence and persistence of PFAS at riverbank filtration sites in the upper Danube basin[6].

PFAS are a class of synthetic chemicals used for many industrial and domestic purposes. However, once released in the environment, they are persistent, mobile and toxic. One of the most important transport routes to drinking water is through riverbank filtration. Although this is usually an effective strategy for removing many organic compounds, its effectiveness in removing PFAS is still unknown. The aim of this study is to investigate the occurrence, as well as the spatial distribution of PFAS at riverbank filtration sites and compare these to two pharmaceuticals and various chemical parameters.

[4] https://forschung.boku.ac.at/fis/suchen.projekt_uebersicht?sprache_in=de&menue_id_in=300&id_in=14649
[5] https://repositum.tuwien.at/cris/ou/ou00089?sort_byjournal=2&orderjournal=DESC&open=journal&locale=de#journal
[6] https://repositum.tuwien.at/handle/20.500.12708/189844

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Cross-disciplinary Collaboration

Collaborations between various (scientific) disciplines, including environmental science, hydrology, engineering, and biology, as well as social sciences and humanities, play a crucial role in addressing complex water-related challenges. Interdisciplinary approaches are key to finding holistic solutions that balance human needs with ecological sustainability.

- *Example Initiative: Austrian Water and Waste Management Association (ÖWAV[7]):*

The Austrian Water and Waste Management Association (ÖWAV) has represented the entirety of water and waste management in Austria since 1909. As a non-profit association, it is committed to achieving sustainable goals at national and international level.

The ÖWAV is currently divided into more than 50 specialist groups and working groups, all of which focus on national water, wastewater and waste management as well as preparing strategy and information papers. A comprehensive overview is available online[8]

European and transnational approaches in research

In addition to the exemplary selection of national research in the wider area of water ecology, aquatic ecosystems and the use of water in general, Austrian scientific research is heavily engaged in European funded programs.

Currently, the Cordis Database for example shows a number of more than 220 ongoing projects or such that were recently finished in the area of water ecology or water (re-)use in the wider sense which include an Austrian partner from academic research or applied research. Search terms were for example “water”, “water re-use”, “wastewater”, “water treatment processes”, “water loops”, “maritime and inland water research”, “aquatic systems” or “water education”.

In the following, an exemplary selection is presented which have involved a beneficiary from Austria, either completed or ongoing:

- ANSWER ANtibioticS and mobile resistance elements in WastEwater Reuse applications: risks and innovative solutions[9]

In response to the increasing problem of water shortage, the reuse of treated urban wastewater is considered the most suitable and reliable alternative for sustainable water management and agricultural development. In spite of the benefits associated with this practice, major concerns currently exist, related to the adverse effects regarding chemical and biological contaminants of emerging concern such as antibiotics and mobile antibiotic resistance elements such as antibiotic resistant

[7] https://www.oewav.at/%C3%96WAV/Wir-%C3%BCber-uns
[8] https://www.oewav.at/Publikationen?GotoPage=1#List
[9] https://cordis.europa.eu/project/id/675530

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bacteria and resistance genes. These are now considered as a serious public health problem by various international organizations and the European Commission, because of their spread in the environment, the food chain, drinking water, etc. To tackle these problems, scientists with an interdisciplinary research/training background are urgently needed. This ETN will train a new generation of ESRs to address the risks associated with such contaminants and wastewater reuse.

- HYDROUSA Demonstration of water loops with innovative regenerative business models for the Mediterranean region[10]

HYDROUSA will provide innovative, regenerative and circular solutions for (1) nature-based water management of Mediterranean coastal areas, closing water loops; (2) nutrient management, boosting the agricultural and energy profile; and (3) local economies, based on circular value chains. The services provided lead to a win-win-win situation for the economy, environment and community within the water-energy-food-employment nexus.

- MASLOWATEN MArket uptake of an innovative irrigation Solution based on LOW WATer-ENergy consumption[11]

The world of irrigation requires innovative solutions, less water and energy dependant. UPM developed in 2013 solutions for large power photovoltaic (PV) pumping systems at TRL5 that was successfully tested in a real Irrigators Community (IC) of Alto Vinalopó (Spain). The results showed great technical reliability (solving the problem of the variability of solar energy), matching the IC irrigation needs just with the solar electricity (thanks to sun-tracking systems) and reducing dramatically the cost of energy (60% regarding the conventional grid consumption)

In parallel, ELAIA has integrated systems with, in one hand, automatisms and ICT solutions that reduce the water consumption (30%) detecting in real-time the actual needs of the specific crop in a certain moment, and in the other hand, low pressure systems that reduce the energy needs.

This project proposes activities to integrate both developments at a TRL9 for the first application and market replication of a new green product at TRL9 consisting of PV pumping systems for productive agriculture irrigation consuming zero conventional electricity and 30% less water.

- ECOBREED Increasing the efficiency and competitiveness of organic crop breeding[12]

ECOBREED will improve the availability of seed and varieties suitable for organic and low- input production. Activities will focus on four crop species, selected for their potential contribution to increase competitiveness of the organic sector, i.e. common wheat, potato, soybean and common buckwheat. The project will develop (a) methods, strategies and infrastructures for organic breeding, (b) varieties with improved stress

[10] https://cordis.europa.eu/project/id/776643
[11] https://cordis.europa.eu/project/id/640771
[12] https://cordis.europa.eu/project/id/771367

resistance, resource use efficiency and quality and (c) improved methods for the production of high quality organic seed.

- AQUASENSE Innovative Network for Training in wAter and Food QUality monitoring using Autonomous SENSors and IntelligEnt Data Gathering and Analysis[13]

Training future researchers in water quality sensing technologies

Water quality deterioration is a major global concern. Scientists are seeking to mitigate poor water quality by developing tools that can monitor and take measurements of biogeochemical variables. In this context, the EU-funded AQUASENSE project will train 15 early-stage researchers in the fields of aqua/agriculture and sensing technologies to develop sensors for environmental monitoring. Autonomous underwater robots and drones will be used to improve the data gathering, and AI methods will be used to improve the data analysis. Hands-on project training will be supplemented with formal training courses in relevant fields, such as sensors fabrication, system integration and robotics. The overall aim of the project is to bring a step change in the field of water quality monitoring while training future research leaders.

- WATER-MINING Next generation water-smart management systems: large scale demonstrations for a circular economy and society[14]

Mining water & resources from desalination brines, urban & industrial wastewater streams

Water security is among the most crucial challenges for water management today. As a consequence, innovative water management solutions and alternative water resources are required. The EU-funded WATER-MINING project will exhibit and validate innovative next-generation water resource solutions at the pre-commercial demonstration-scale in accordance with relevant legislation, such as the Water Framework Directive, Circular Economy and EU Green Deal packages. It will combine water management services with the improvement of renewable resources such as mining water

- AQUACOSM-plus Network of Leading Ecosystem Scale Experimental AQUAtic MesoCOSM Facilities Connecting Rivers, Lakes, Estuaries and Oceans in Europe and beyond[15]

Promoting groundbreaking developments in mesocosm technology

Large enough to allow experiments on whole ecosystems in close to natural conditions, mesocosms are controlled and replicated experimental water enclosures. These facilities are useful in predicting effects of future environmental and anthropogenic pressures on the complex aquatic ecosystems. In this context, the EU-funded AQUACOSM-plus project represents a European network of aquatic experimental

[13] https://cordis.europa.eu/project/id/813680
[14] https://cordis.europa.eu/project/id/869474
[15] https://cordis.europa.eu/project/id/871081

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mesocosm facilities, with the mission to address the dramatic challenges aquatic ecosystems are facing. The project will work to increase competence in mesocosm science in Hungary and Romania. It will develop near-real-time open data flows and improved metadata, developing new technological capabilities for mesocosm research. Scenario testing will also be carried out for climate change-related pressures on aquatic systems from upstream fresh waters to the sea.

- SIM4NEXUS Sustainable Integrated Management FOR the NEXUS of water-land-food-energy-climate for a resource-efficient Europe[16]

Land, food, energy, water and climate are interconnected, comprising a coherent system (the 'Nexus'), dominated by complexity and feedback. The integrated management of the Nexus is critical to secure the efficient and sustainable use of resources. Barriers to a resource efficient Europe are policy inconsistencies and incoherence, knowledge gaps, especially regarding integration methodologies and tools for the Nexus, and knowledge and technology lock-ins. SIM4NEXUS will develop innovative methodologies to address these barriers, by building on well-known and scientifically established existing "thematic" models, simulating different components/"themes" of the Nexus and by developing: (a) novel complexity science methodologies and approaches for integrating the outputs of the thematic models; (b) a Geoplatform for seamless integration of public domain data and metadata for decision and policy making; (c) a Knowledge Elicitation Engine for integrating strategies at different spatial and temporal scales with top down and bottom up learning process, discovering new and emergent knowledge, in the form of unknown relations between the Nexus components and policies/strategies; (d) a web-based Serious Game for multiple users, as an enhanced interactive visualisation tool, providing an immersive experience to decision- and policy-makers.

All in all, Austrian research institutions show a vivid and outstanding participation in a plenitude of scientific fields and topics which are relevant for the SHORE objectives. Whereas the exemplary selection of EU funded projects illustrate the very active participation, is difficult to quantify the Austrian participation in relevant topical areas, as these are cross-cutting with several EU funding programs and thematic calls and as the current Horizon Programme - as the most relevant source of scientific research in Europe - is still ongoing.

However, it can be derived from evaluation data of the "Horizon 2020" funding period, which is already complete, that Austria showed an above-average participation and was in the position to benefit from the program in outstanding ways. From the EU research framework program H2020, running from 2014 to 2020, Austria secured over 1,65 billion Euro and participated in more than 2.700 funded projects. Austria received 3,18% of the total research funding from Horizon 2020. Of the eligible project proposals involving Austria, 16,07% were selected for funding from Horizon 2020, significantly surpassing the EU average of 12,01%.

Due to its central location and international connections, Austria benefits disproportionately from European research infrastructures. The achieved results,

[16] https://cordis.europa.eu/project/id/689150

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particularly in fields like environment, medicine and technology, benefit citizens across Europe.

Compared to the total number of 2.700 projects with Austrian participation, the number of those projects in the period under review (see above) which do have a connection with water bodies and water cycles count for up to 10% - which underlines the utterly high relevance of this scientific field in the Austrian context.

In conclusion, Austria's scientific community actively engages in diverse areas of water research, contributing valuable insights to local and global efforts aimed at addressing water challenges. The collaboration between different scientific disciplines underscores the complexity of water-related issues and emphasizes the importance of a comprehensive and integrated approach to water science. Ongoing research and advancements in this field will continue to shape sustainable water management practices in Austria and beyond.

2.1.3. Gaps in the Literature

- Social and Economic Impacts: Although mentioned briefly in the context of sustainable water use, deeper exploration of the social and economic impacts of water management strategies could enhance the understanding of holistic water sustainability.
- Water Governance and Policy: While the review discusses various water-related research initiatives, it does not delve into the existing policy frameworks for water education in Austria. A more explicit examination of governance structures, policy frameworks, and their effectiveness in water management could provide insights into the regulatory aspects of water use. Analyzing the current policies and their effectiveness would provide insights into shaping future strategies.
- Urban Water Management: Given the importance of water infrastructure, there could be a deeper exploration of innovations and challenges in managing water resources in urban environments, where population density and diverse water needs pose unique challenges.
- Water Quality and Human Health: While water quality is discussed, a closer look at the direct and indirect impacts of water quality on human health could strengthen the connection between water management practices and public health outcomes.
- Public Perception and Engagement: The literature focuses on scientific and institutional perspectives, but a gap in understanding public perceptions and engagement with water-related issues appears evident. Exploring how the general population’s views and engagement with water conservation and management could offer valuable perspectives.
- Inclusive Approaches in Water Management: The research emphasizes technological and scientific aspects of water management. However, there is a gap in addressing inclusivity, considering social, economic, and cultural dimensions. Investigating how water management practices affect different communities and demographics could enhance the overall understanding.
- Long-Term Impact Assessment: While various projects and studies are presented, there is a need for a comprehensive assessment of their long-term impacts.

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Understanding the sustained effects of initiatives, especially in areas like climate change adaptation and biodiversity conservation, would contribute to refining future strategies.

2.1.4. Lessons from Previous Similar Studies

The aforementioned samples of water-related studies illustrate the diversity of the thematic scope. Taking the results of this analysis and combining it with the listed studies, some conclusions and lessons learned may be of relevance regarding potential subject areas and the design of upcoming research.

Holistic Water Management Approach:

Comprehensive studies that address multiple facets of water issues provide a more complete understanding, allowing for effective and sustainable management.

Sustainable Water Resource Management:

Sustainable water resource management is critical. It involves evaluating utilization, understanding environmental impacts, and ensuring long-term resource availability.

Adaptation to Climate Change:

Understanding and preparing for climate change impacts on water systems are essential for developing effective adaptive strategies - with a clear focus on the interdependences of maritime and inland aquatic bodies.

Ecological Conservation and Biodiversity:

Human activities can significantly impact aquatic ecosystems, and conservation efforts should be guided by scientific findings to preserve biodiversity.

Innovative Technologies in Agriculture:

Innovation and technology, including digital tools, are crucial for optimizing water use in agriculture, promoting sustainability and food security.

Water Quality Management:

Lesson: Managing water quality requires a multi-faceted approach, including biological, technical, and operative aspects, along with addressing specific contaminants.

Cross-disciplinary Collaboration:

Complex water-related challenges demand interdisciplinary collaboration for holistic solutions.

European and Transnational Collaboration:

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International collaboration, particularly within European frameworks, amplifies the impact of water-related research, allowing for shared solutions and expertise.

Strategic Participation in EU Programs:

Actively engaging in European research programs can significantly contribute to a country's scientific achievements and address societal challenges.

In summary, the Austrian water studies provide valuable lessons on the importance of a comprehensive and sustainable approach to water management, emphasizing the need for innovation, interdisciplinary collaboration, and active participation in international research programs.

2.1.5. Survey and Public Perception

To gain more valuable insights about the public perception regarding ocean literacy, the Austrian Country Hub has approached stakeholders to participate in an online survey. The Blue School Studies survey in Austria aims to provide robust data for in-depth analysis of these crucial themes. The collected information will inform the development of innovative educational programs and resources within the SHORE project. By empowering students with ocean literacy and fostering their role as agents of change, the project seeks to promote sustainable behaviour and contribute to a healthier future for our oceans.

Content: Designed to explore key themes, including:

- Ocean literacy initiatives: Assessing public understanding of ocean health and sustainability practices.
- "Sea Blindness" phenomenon: Investigating the awareness of human dependence on healthy oceans and the disconnect between people and the marine environment.
- Emerging Blue Economy: Gauging public perceptions and potential opportunities associated with ocean-based sustainable development initiatives.
- Climate Change impacts: Evaluating public understanding of the far-reaching consequences of climate change on marine ecosystems and the need for adaptation strategies.

Expected Outcomes:

The Blue School Studies survey is anticipated to yield valuable insights into public knowledge, attitudes, and concerns regarding ocean health and sustainability. These findings will form the basis for developing effective educational tools and support strategies within the SHORE project, ultimately empowering students to become effective advocates for healthy oceans and a sustainable future.

With more than 50% of respondents being in the age group of 21-29 years, there is reason to believe that most of them are aware of the importance of ocean and water related topics, as further empirical data revealed that this age group is most sensitive

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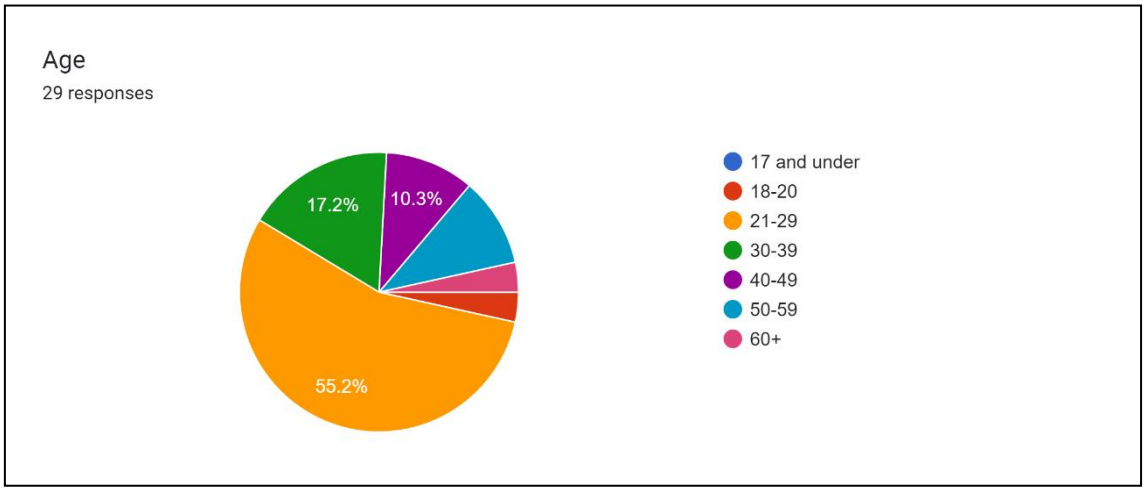
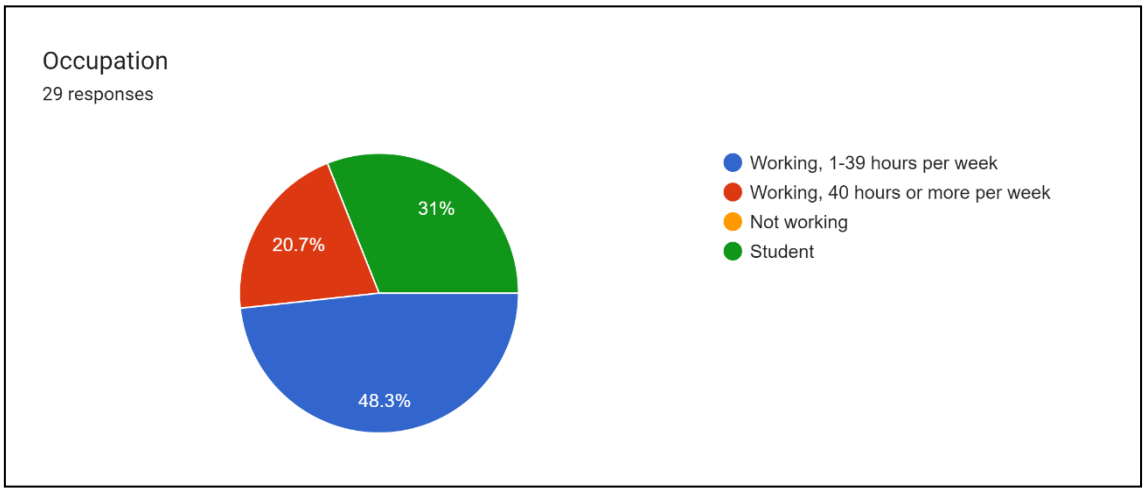
as for issues of sustainability, pollution control, climate change and ecology in general. This indicates the results of the survey as well.

Whereas most of the results of the survey are as expected, two results are interesting, especially when analysing and comparing them with the findings in chapter 5.

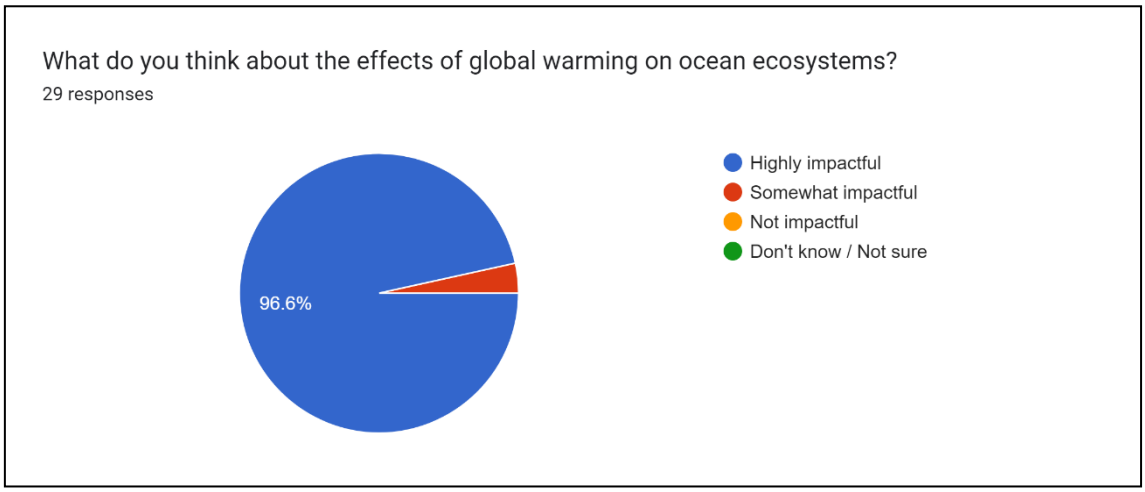
Graph 1 Age of Survey Participants - Austria



Graph 2 Working Status of Survey Participants - Austria

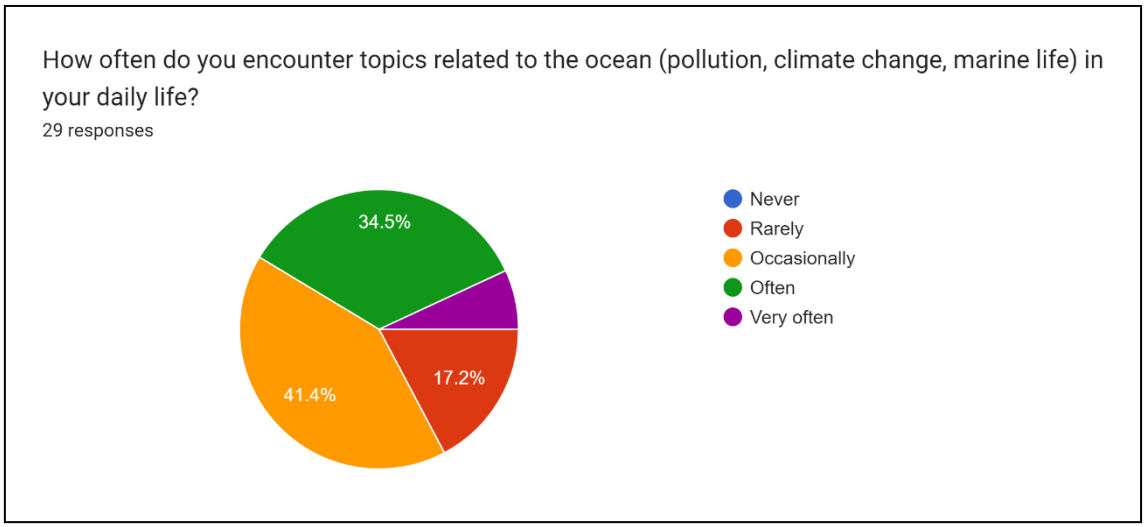


Graph 3 What do you think about the effects of global warming on ocean ecosystems? - Austria



The overwhelming response from Austria—96.6% of respondents said they thought global warming had a significant influence on ocean ecosystems—indicates that people there are well aware of the serious implications that climate change is having on the oceans. This almost uniform agreement demonstrates a common understanding of the serious and immediate risks that global warming poses to marine ecosystems. A small portion of the population may view the impact as less severe, as indicated by the lowest percentage (3.4%) saying somewhat impactful. The prevailing opinion, however, highlights how urgently climate change must be addressed in order to protect the sustainability and well-being of ocean environments. The data highlights the urgent need for coordinated action by showing a high degree of awareness and acknowledgment regarding the serious effects of global warming on ocean ecosystems.

Graph 4 How often do you encounter topics related to the ocean (pollution, climate change, marine life) in your daily life? - Austria



Firstly, drawing the connection to chapter ”5, Challenges and Opportunities” it is quite interesting to notice that 41.4% of the participants express they encounter topics

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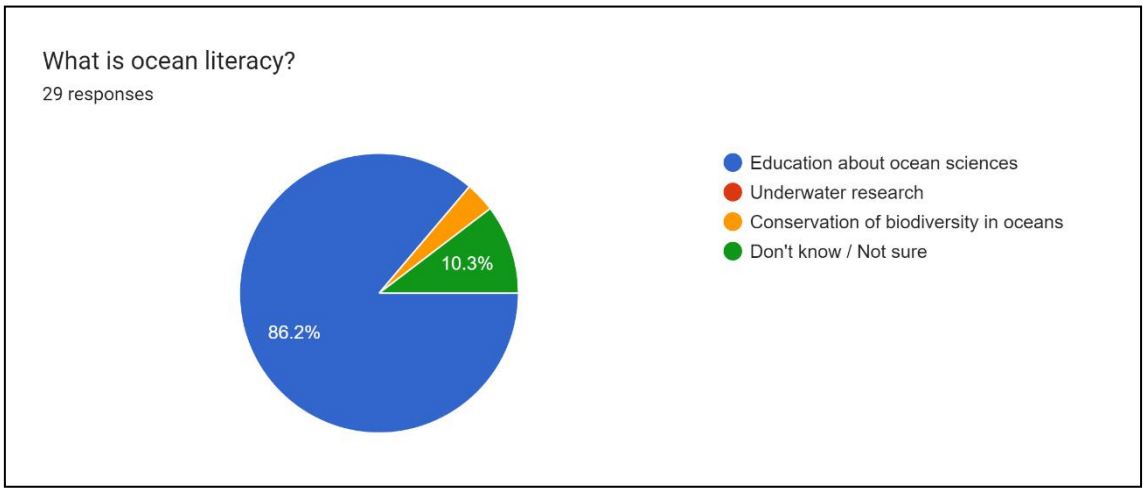
related to the ocean only occasionally. Contrasting their awareness for issues of ecology which is assumed to be generally higher, this discrepancy can be caused by a variety of reasons such as media consumption or attentional biases, which cause a lack of awareness and sensitivity regarding the interconnectedness and influence the oceans have on everyday life. Ocean blindness could be more severe in a landlocked country like Austria. Secondly, in comparison with chapter “4.5. Blue School Potential and Development” it is interesting that 92,9% of all participants have quite high regards towards the impact of the Blue Schools.

Graph 5 What is ocean literacy? - Austria



The vast majority (86.2%) of Austrians emphasize the significance of learning about diverse aspects of the seas and link ocean literacy to ocean science education. A more nuanced viewpoint is indicated by the smaller subset (3.4%) that associates ocean literacy with the preservation of marine biodiversity. 10.3% of respondents indicate they are unsure or don't know what the phrase means. All things considered, the information confirms the widely held belief that ocean literacy is primarily educational in nature, highlighting the importance of knowledge in encouraging appropriate interaction with ocean environments.

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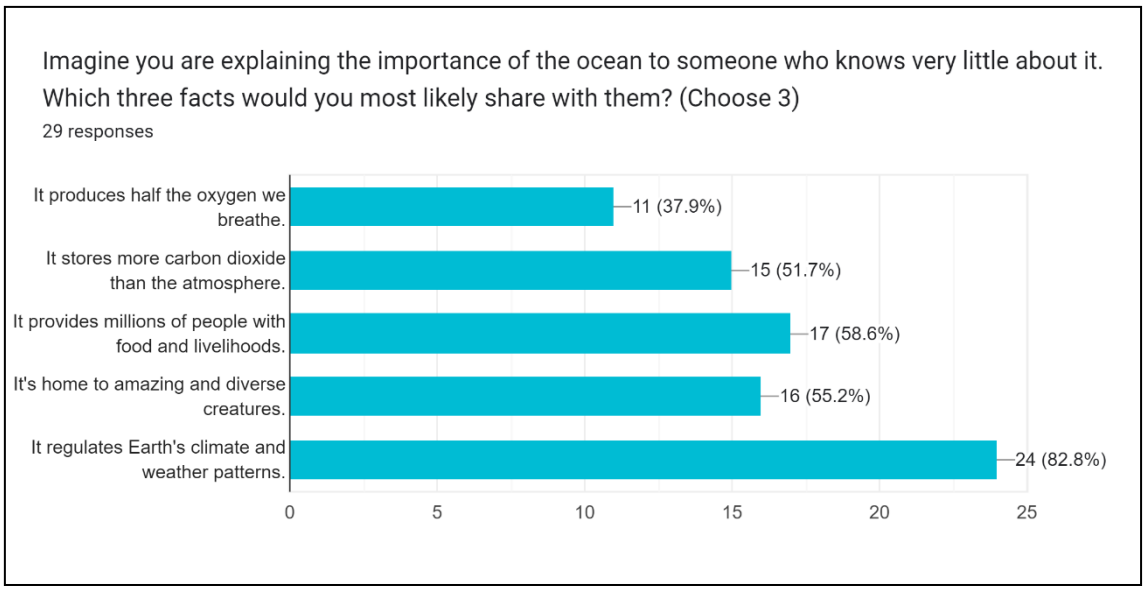
Graph 6 Imagine you are explaining the importance of the ocean to someone who knows very little about it. Which three facts would you most likely share with them? (Choose 3) - Austria



Speaking to someone with little knowledge, Austrian survey participants demonstrate a nuanced appreciation of the ocean's significance. First, a sizable majority—82.8%—understand the importance of the ocean in controlling Earth's climate and weather patterns. This demonstrates a shared understanding of the ocean's profound influence on the climate around the world, establishing it as a crucial component in preserving natural balance. Second, millions of people rely on the ocean for their livelihoods and sustenance, as highlighted by 58.6% of participants. In addition to illustrating the ocean's role as an ecological system and a key source of support for human societies worldwide, this highlights the economic value of marine resources. Thirdly, 55.2% of respondents focus on the ocean as a habitat for an extraordinary and diverse array of creatures. This highlights the biological diversity seen in marine areas and highlights how the ocean serves as a home to a wide variety of amazing animals. This ocean relevance factor is consistent with the idea that biodiversity preservation is essential to maintaining ecological equilibrium. The three facts that were emphasized together depict the ocean as a complex organism that has ecological, economic, and environmental significance, even though other facts were also mentioned, such as the ocean's function in creating oxygen and storing carbon dioxide. All in all, the Austrian participants' answers show a thorough understanding of the ocean's significance in many different contexts.

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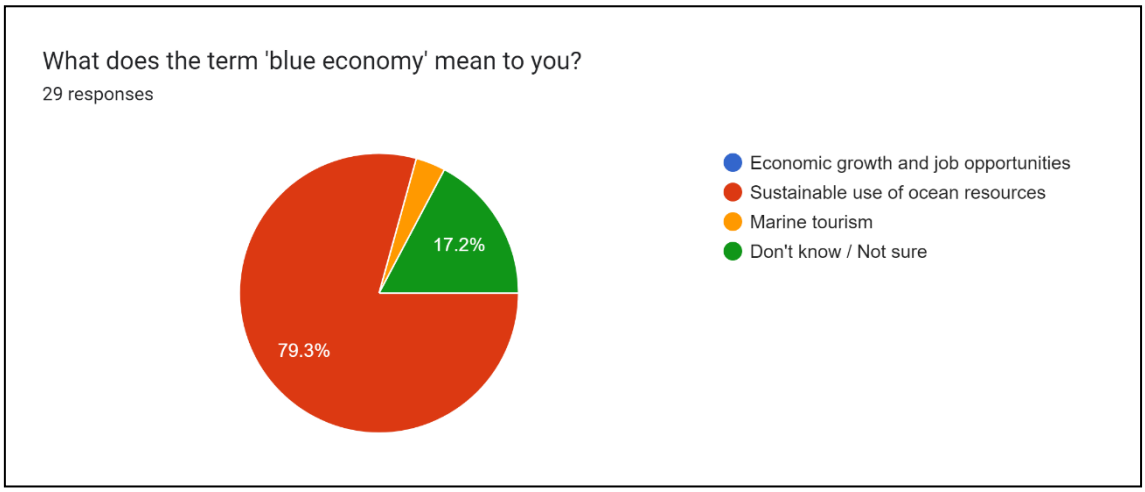
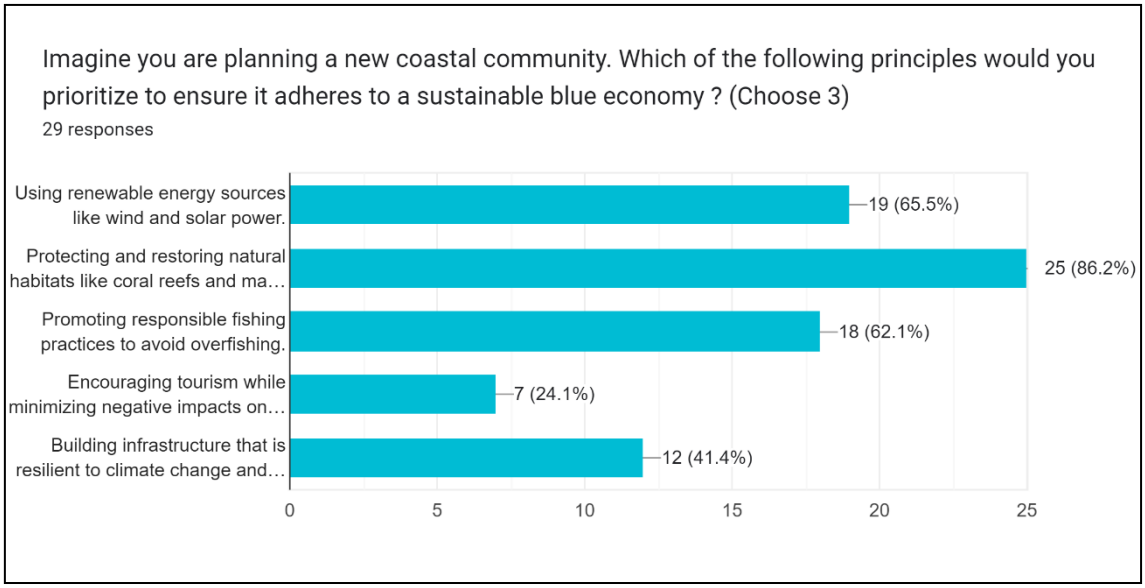
Graph 7 What does the term 'blue economy' mean to you? - Austria



According to 79.3% of respondents, the sustainable use of ocean resources is the main connotation of the term "blue economy" in Austria. There appears to be potential for awareness-building, as a significant portion (17.2%) indicate ambiguity or lack of information of the word. Just 3.4% of respondents connect the blue economy to marine tourism; none of them do so to economic expansion or employment creation. This indicates that the Austrian respondents placed a high value on using ocean resources in an environmentally friendly manner.

Graph 8 Imagine you are planning a new coastal community. Which of the following principles would you prioritize to ensure it adheres to a sustainable blue economy ? (Choose 3) - Austria



The responders in Austria prioritized important elements that provide a clear vision for a new coastal community based on a sustainable blue economy. According to 86.2% of respondents, safeguarding and rehabilitating natural habitats such as mangroves and coral reefs is of utmost importance. Given the critical role these habitats play in

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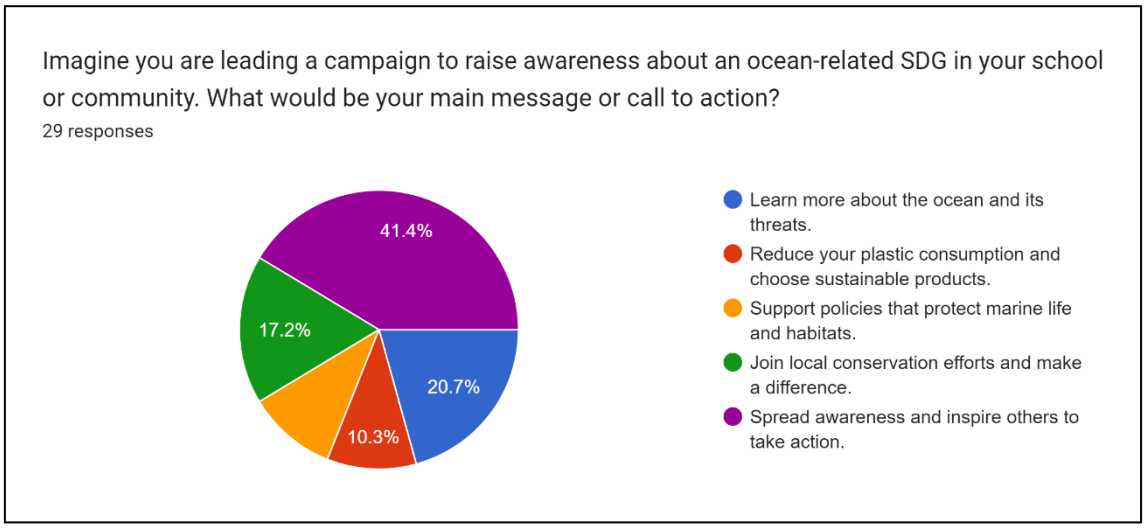
preserving biodiversity and the health of marine ecosystems, this shows a strong commitment to ecological preservation.

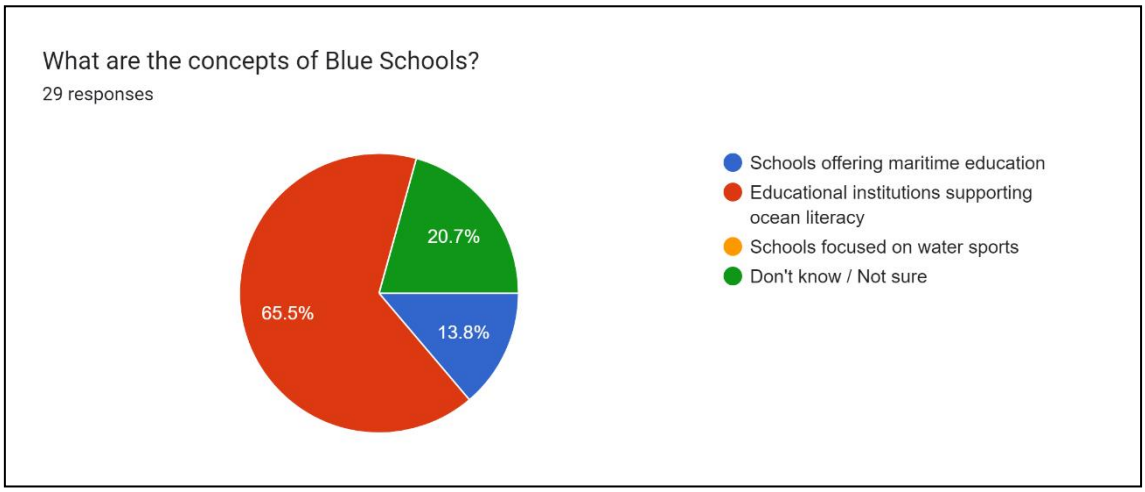
65.5% of respondents emphasized the use of renewable energy sources, such as solar and wind power, as another important concept. This demonstrates a dedication to mitigating the ecological consequences of energy usage in the coastal community, so conforming to wider sustainability objectives and stressing conscientious resource allocation. 62.1% of respondents said that sustainable fisheries management is important, making the promotion of ethical fishing methods to prevent overfishing a top priority. This emphasizes how important it is to strike a balance between commercial activity, the preservation of marine ecosystems, and the livelihoods of fishing-dependent people. Other concepts, such developing climate- and sea-level-rise-resistant infrastructure and promoting environmentally friendly travel, were also mentioned, although their percentages were much smaller.

Graph 9 Imagine you are leading a campaign to raise awareness about an ocean-related SDG in your school or community. What would be your main message or call to action? - Austria



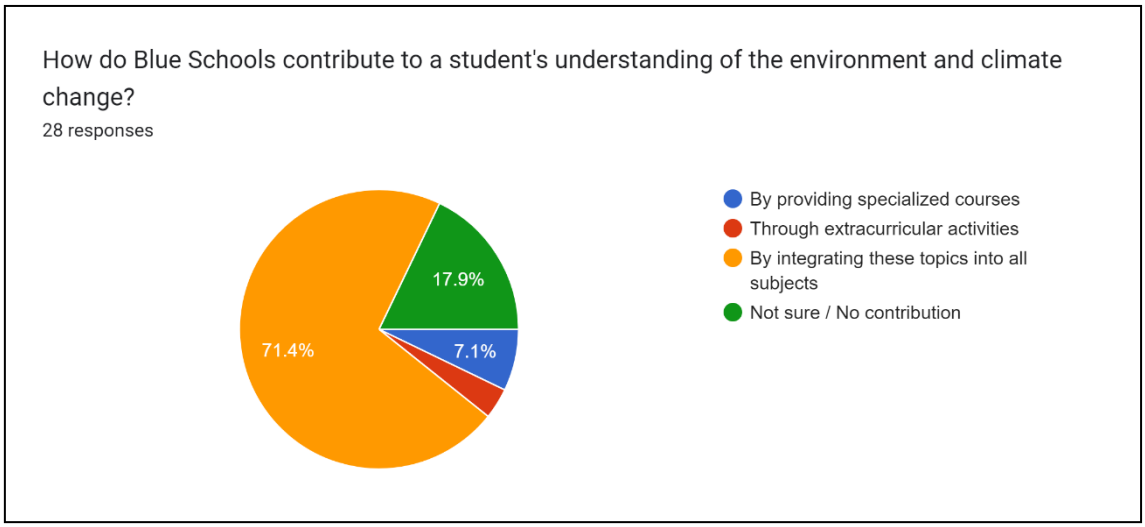
Respondents spearheading an SDG awareness campaign on the ocean in Austria place a high value on a diversified strategy. The majority (41.4%) emphasizes community engagement and supports raising awareness and motivating action. A sizeable portion (20.7%) emphasizes the value of education and calls on people to become knowledgeable about the risks facing the ocean. Furthermore, 17.2% support active participation in neighborhood conservation programs, acknowledging the significance of grassroots endeavors. While a similar amount emphasizes personal responsibility in reducing plastic consumption, a lower but noteworthy number (10.3%) emphasizes policy support for marine protection. This diverse approach demonstrates a comprehensive viewpoint on tackling issues related to the ocean.

Graph 10 What are the concepts of Blue Schools? - Austria



The majority of Austrian respondents link Blue Schools to schools that promote ocean literacy, indicating a dedication to incorporating marine education into formal education. There is a need for greater awareness and education about the concept of Blue Schools in Austria, as seen by the significant confusion expressed by a portion of respondents (20.7%), which may indicate a potential knowledge gap or unfamiliarity with the phrase. Some respondents (13.8%) drew a distinction between Blue Schools and organizations that provide maritime education, indicating a more nuanced interpretation that places an emphasis on a specialist approach to studying the ocean. Hence, even though there is a significant tendency to perceive Blue Schools as educational entities supporting ocean literacy, addressing the uncertainty and expanding awareness about the concept could further enhance the effectiveness of initiatives related to Blue Schools in Austria.

Graph 11 How do Blue Schools contribute to a student's understanding of the environment and climate change? - Austria



Respondents from Austria describe how Blue Schools help students learn about the environment and climate change. According to 71.4% of respondents, the most

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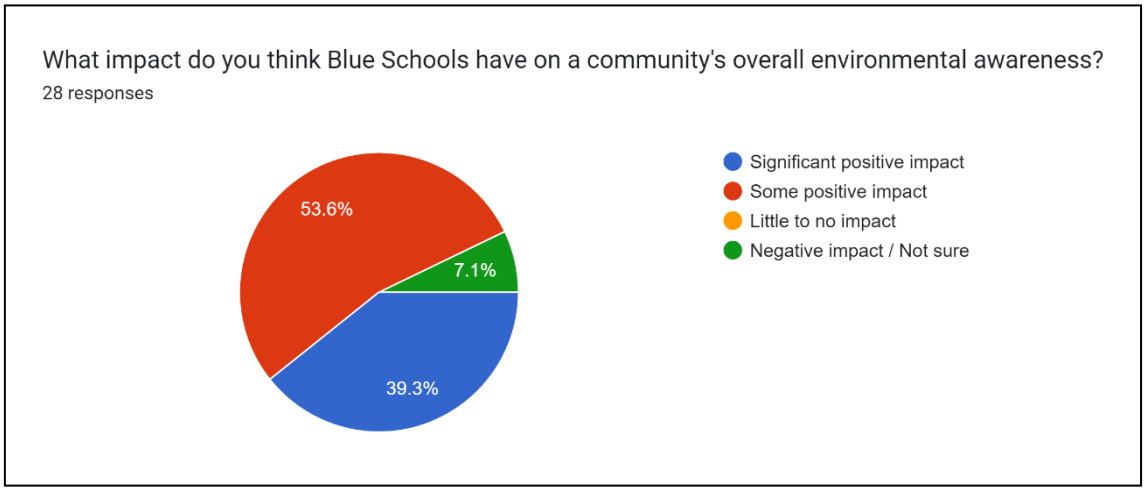
common opinion is that Blue Schools are essential because they incorporate these issues throughout all subject areas. This emphasizes how crucial it is to have an interdisciplinary approach to education in order to handle environmental challenges since they are tied to other academic disciplines. Still, a sizeable percentage (17.9%) indicate that they are unsure or believe that Blue Schools may not improve kids' comprehension of environmental and climate-related issues. This implies that there is a need for more information or understanding regarding the unique function and significance of Blue Schools in tackling these important subjects. A lower proportion of participants (3.6%) recognizes Blue Schools' potential impact. Furthermore, according to 7.1% of respondents, Blue Schools play a significant role in promoting environmental awareness by offering specialized courses. This suggests that students value this kind of targeted and focused education.

Graph 12 What impact do you think Blue Schools have on a community's overall environmental awareness? - Austria



Since Austria has currently only two registered Blue schools, these results could be shaped by personal expectations and inherent assumptions, since even many teachers stated in the interviews conducted for chapter “5, Challenges and Opportunities”, that they are unaware of the Network of European Blue Schools.

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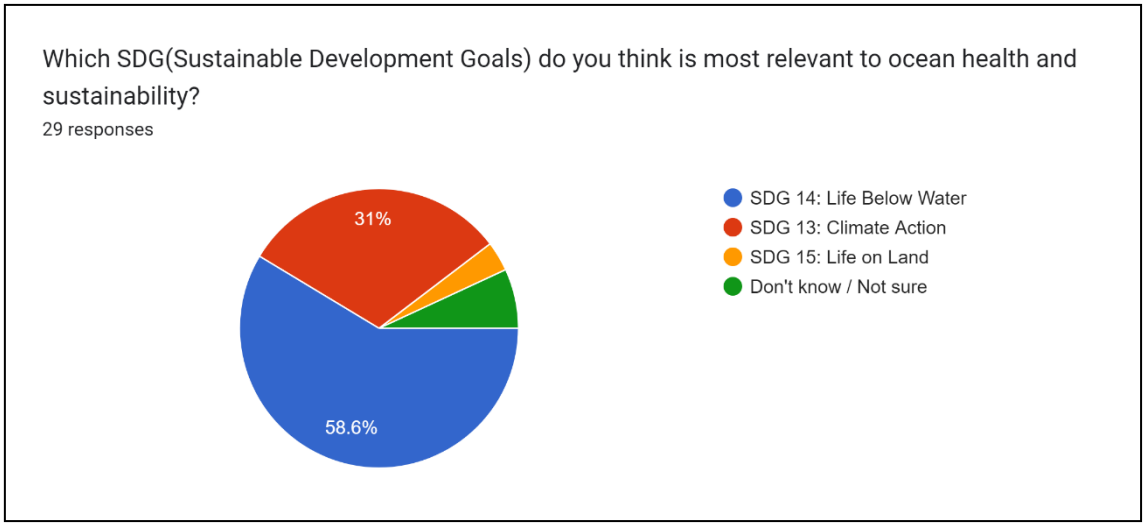
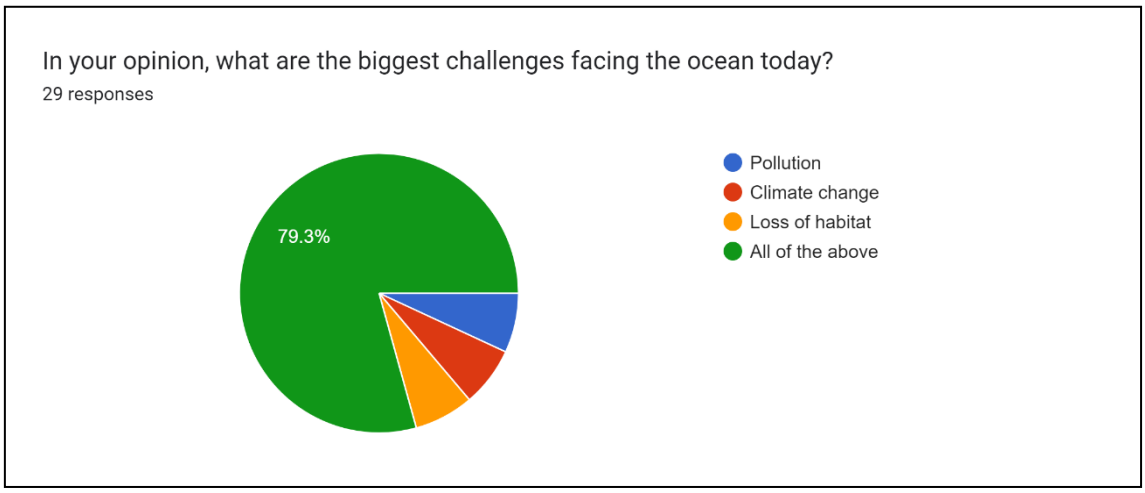
Graph 13 Which SDG(Sustainable Development Goals) do you think is most relevant to ocean health and sustainability? - Austria



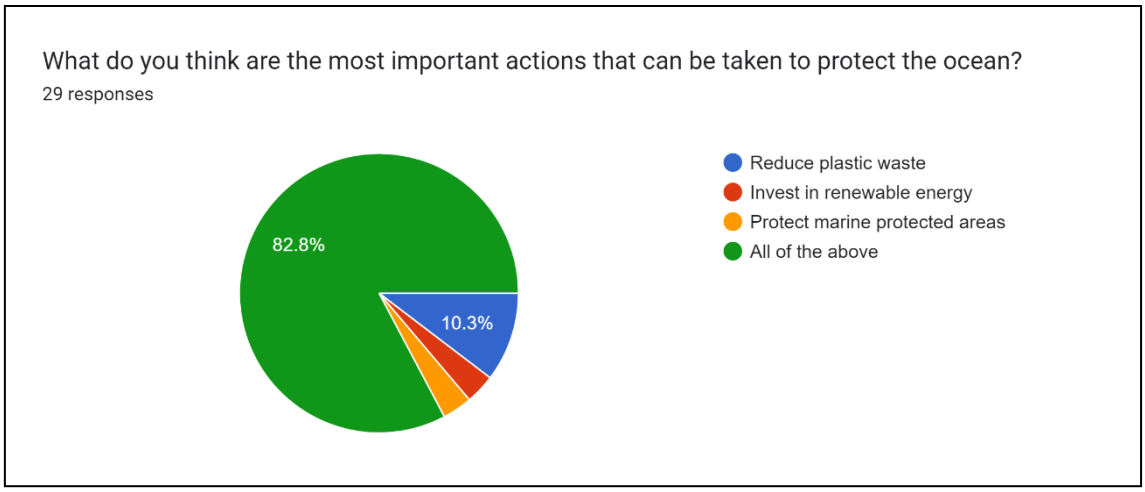
Respondents from Austria share their thoughts on the Sustainable Development Goal (SDG) that is most pertinent to ocean sustainability and health. SDG 14 (Life Below Water), according to 58.6% of respondents, is the most relevant objective. This highlights the general agreement that maintaining and managing ocean ecosystems effectively is crucial to achieving goals related to sustainability. Significantly fewer people—31%—think that SDG 13 (Climate Action) has the greatest bearing on ocean health. This viewpoint emphasizes how climate change and marine ecosystem health are interdependent, emphasizing the necessity of coordinated actions in both areas. Just 3.4% of respondents believe that SDG 15—Life on Land—has the greatest bearing on ocean health. Furthermore, 6.9% of respondents state that they are unsure or ignorant of the most pertinent SDG for ocean health. This implies that there might be a need for greater knowledge and instruction about the particular SDGs pertaining to marine conservation.

Graph 14 In your opinion, what are the biggest challenges facing the ocean today? - Austria



Respondents in Austria are in agreement that the ocean is facing a multitude of difficulties at the moment. A resounding 79.3% of respondents think that pollution, habitat loss, and climate change are the most important issues. The interconnectedness of various problems is highlighted by this collective viewpoint, which also highlights the necessity for comprehensive solutions to deal with the intricate problems that have an impact on marine ecosystems. 6.9% of respondents cite climate change as a top ocean issue. Concurrently, an additional 6.9% of respondents see habitat loss as a major obstacle, highlighting the significance of protecting and revitalizing a variety of maritime ecosystems. Furthermore, 6.9% of respondents cite pollution as a major concern, acknowledging the detrimental impacts of different contaminants on ocean health. Respondents express a comprehensive understanding of the multifaceted challenges confronting the ocean today, acknowledging the interplay of climate change, habitat loss, and pollution as critical issues demanding urgent attention and concerted efforts.

Graph 15 What do you think are the most important actions that can be taken to protect the ocean? - Austria



Respondents in Austria share a common understanding of the critical steps that must be taken to save the ocean. Significantly, 82.8% of participants support a comprehensive strategy and stress the significance of each recommended course of action. This group's collective opinion emphasizes the necessity of multimodal approaches that tackle several factors that contribute to maintaining the health of the ocean. 10.3%, a smaller but significant portion, explicitly highlights the elimination of plastic waste as a crucial measure. This is in line with international initiatives to mitigate the damaging effects of plastic pollution on marine environments. Furthermore, 3.4% of respondents emphasize the significance of funding renewable energy projects and safeguarding marine protected areas. These viewpoints demonstrate an understanding of the vital importance that designated conservation zones and sustainable energy techniques play in preserving the ocean. The majority of Austrian respondents advocate for a comprehensive approach, emphasizing the necessity of various actions to protect the ocean. While reducing plastic waste receives specific attention, the overall consensus reinforces the importance of holistic strategies to ensure the well-being of marine ecosystems.

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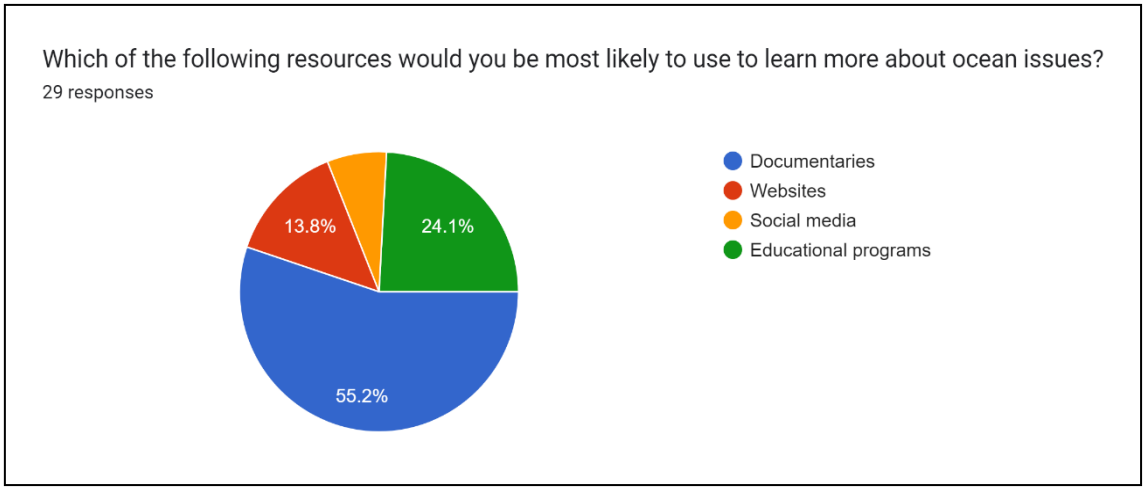
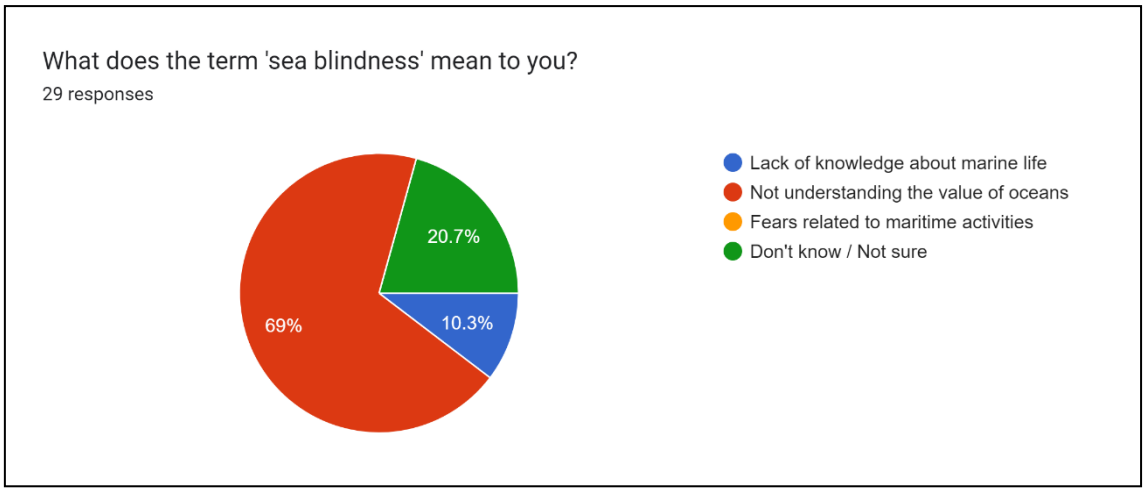
Graph 16 Which of the following resources would you be most likely to use to learn more about ocean issues? - Austria



In Austria, the majority of respondents (55.2%) say that documentaries are the best source of information when it comes to ocean-related topics. A lesser but significant percentage (24.1%), websites(13.8%), and social media(69.9%) indicate preferences for instructional content. This variety of options highlights the need of using a variety of media to effectively communicate ocean-related themes and suggests a multifaceted approach to information access on marine conservation.

Graph 17 What does the term 'sea blindness' mean to you? - Austria



69% of respondents in Austria believe that the phrase "sea blindness" mostly refers to a lack of knowledge about the importance of oceans. While 10.3% link the word to ignorance of marine life, roughly 20.7% of respondents say they are unsure or don't know what it means. Remarkably, in their interpretations, none of the responders bring up concerns about maritime activity. This emphasizes the necessity of educating people about the value of oceans and raising awareness of their significance.

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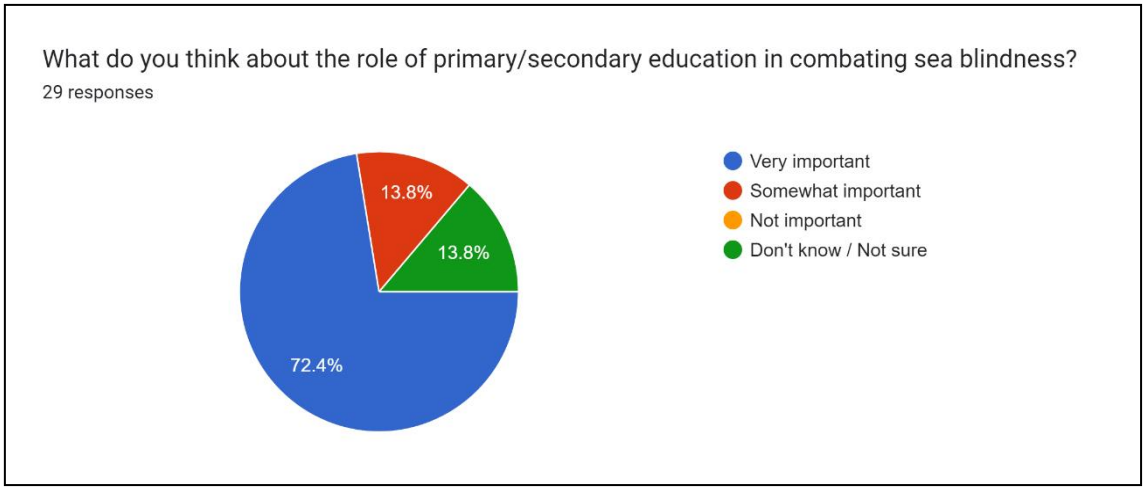
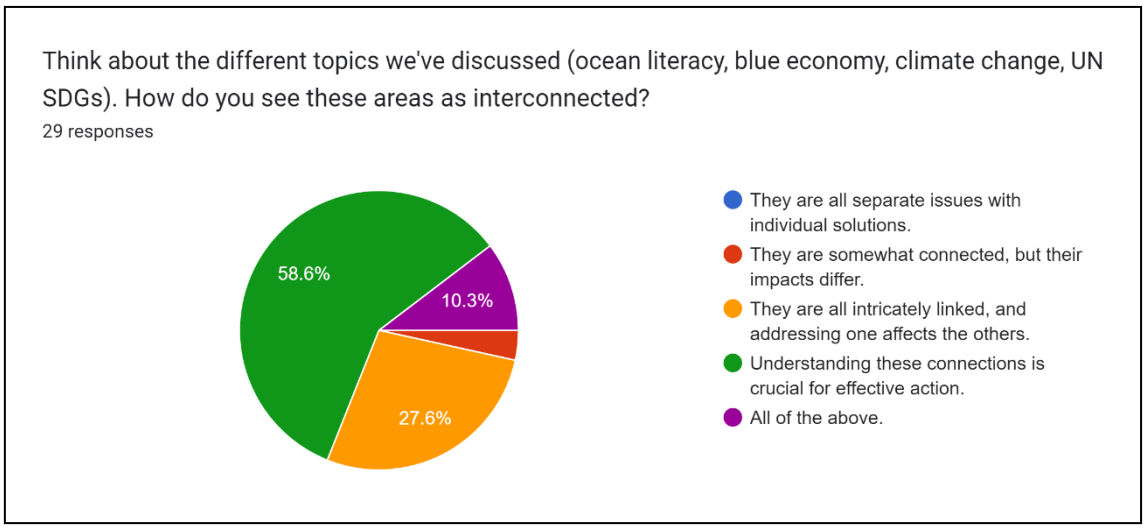
Graph 18 What do you think about the role of primary/secondary education in combating sea blindness? - Austria



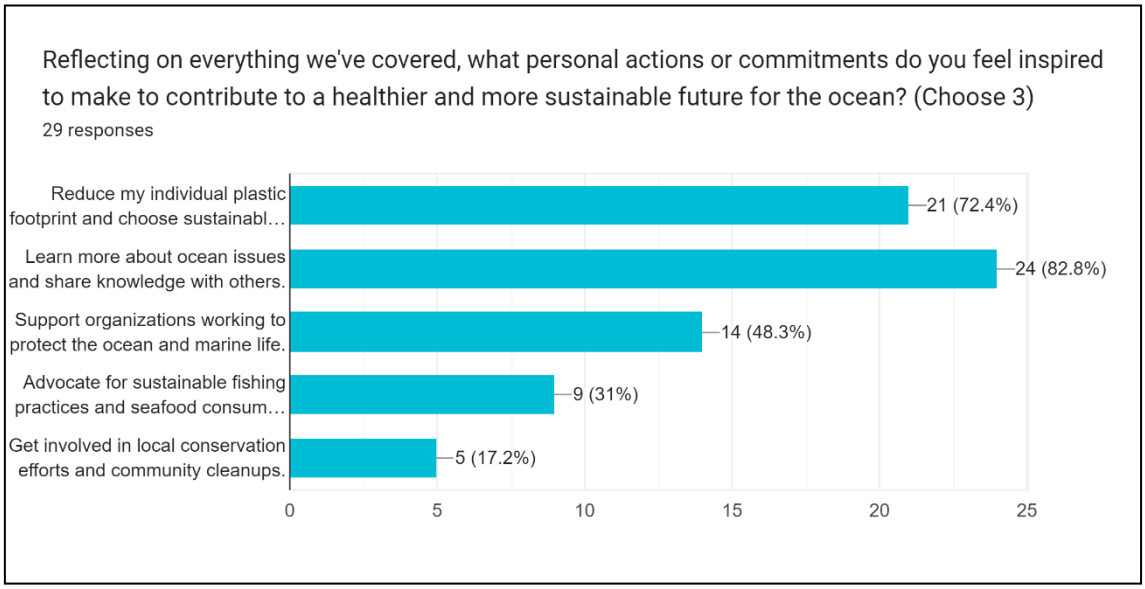
According to 72.4% of respondents in Austria, elementary and secondary education has a critical role in preventing sea blindness. 13.8% of respondents are unsure about its function, while 13.8% more think it is somewhat significant. Crucially, all of the respondents agreed that primary and secondary education has a good influence on preventing sea blindness. None of them thought it was trivial.

Graph 19 Think about the different topics we've discussed (ocean literacy, blue economy, climate change, UN SDGs). How do you see these areas as interconnected? - Austria



Most responders in Austria acknowledge how closely related ocean literacy, the blue economy, climate change, and UN SDGs are. The majority (58.6%) highlights how important it is to comprehend these linkages in order to take appropriate action. A smaller percentage (27.5%) believes that these subjects are closely related and that changes made in one area influence the others. Furthermore, 10.3% recognize the necessity for unique solutions in addition to interconnection. This sophisticated viewpoint demonstrates an understanding of the intricate relationships influencing issues pertaining to sustainability and the ocean.

Graph 20 Reflecting on everything we've covered, what personal actions or commitments do you feel inspired to make to contribute to a healthier and more sustainable future for the ocean? (Choose 3) - Austria



Respondents in Austria are committed to an ocean future that is sustainable. The majority (72.4%) emphasizes the individual effect on ocean health and pledges to cut back on plastic usage. Raising awareness about ocean issues is a top priority for a sizable number (82.8%) of people through learning and knowledge sharing. Furthermore, 48.3% said they intend to donate to groups that safeguard the oceans and marine life. These pledges demonstrate a group effort toward individual and group efforts for a more salubrious ocean environment.

In conclusion, the Austrian survey findings demonstrate a strong dedication to both individual and group efforts for a more sustainable and healthier ocean. Notably, participants are committed to cutting back on plastic use, prioritizing knowledge exchange, and assisting groups that work to conserve the ocean. This group's commitment shows a greater understanding of the problems affecting ocean health and a desire to actively participate in finding solutions.

In Austria, the idea of "Blue Schools" has great promise. The survey indicates that there may be benefits even though some respondents were unfamiliar with it. Blue Schools may be extremely helpful in raising awareness and knowledge because of their emphasis on promoting ocean literacy. Blue Schools may help by incorporating environmental and climate change-related subjects into their curricula. In addition, the poll emphasizes how important it is to spread knowledge about Blue Schools in order to address respondents' ignorance. Raising awareness about how Blue Schools may affect students' perceptions of the environment and climate change can encourage more involvement and support. All things considered; the Austrian answers demonstrate a readiness to take part in activities that support ocean conservation. These initiatives can be strengthened by highlighting the benefits of Blue Schools and filling in knowledge gaps, which will help Austria become a more ecologically conscious and ocean-literate nation.

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2.2. Czechia

2.2.1. Purpose and Scope of the Literature Review

This literature review aims to provide a rigorous examination of the prevailing research landscape concerning various critical aspects, namely ocean literacy, the blue economy, sea blindness, climate change, Blue Schools, and the implementation of sustainable development goals both internationally and within the Czech Republic. The purpose is to delve deeply into the existing body of knowledge, offering a comprehensive understanding of how these interconnected themes manifest and are addressed within the unique context of the Czech Republic.

By exploring academic articles, theses, reports, blogs, and other relevant sources from various countries, the review aims to provide a nuanced understanding of how these critical issues are addressed on an international scale. This inclusive approach ensures a broad perspective, capturing the diverse ways different regions engage with and respond to ocean-related challenges and sustainable practices.

In the context of the Czech Republic, this literature review is driven by the need to explore and understand how the nation, despite being landlocked, navigates ocean-related themes such as ocean literacy, the blue economy, sea blindness, climate change, Blue Schools, and sustainable development goals. Focusing on academic articles, theses, reports, blogs, and other locally produced sources, the review seeks to uncover the specific dynamics and initiatives within the Czech Republic. For the research, desk-based research on online databases is conducted with the key words ocean literacy, sea blindness, climate change, Blue Schools and sustainable development goals in Czech Republic. By doing so, it aims to contribute valuable insights into how a landlocked country addresses global ocean challenges and aligns with international sustainable development objectives.

The scope of this literature review is expansive, encompassing a comprehensive analysis of the existing body of research on a multitude of interconnected themes within the global context and specifically within the Czech Republic. The review spans critical topics such as ocean literacy, the blue economy, sea blindness, climate change, Blue Schools, and sustainable development goals. By including a diverse range of sources, including academic articles, theses, reports, blogs, and other relevant materials, the scope extends to capture the rich tapestry of perspectives, strategies, and initiatives employed internationally and within the Czech Republic.

Internationally, the review aims to uncover how different societies worldwide grapple with the challenges and opportunities associated with our oceans, offering a nuanced understanding of global responses. On a national level, the focus is on the Czech Republic, examining how a landlocked country engages with and addresses ocean-related issues. The geographic specificity ensures an in-depth exploration of the Czech context, shedding light on unique dynamics, initiatives, and challenges related to the themes under scrutiny. In summary, the scope extends across borders and localities, aiming to provide a holistic understanding of the diverse approaches to ocean-related issues on both the global and Czech stages.

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2.2.2. Assessment of Existing Research

Ocean Literacy and Education

With 71% of Earth's surface and 97% of the planet's water contained within its waters, the ocean is a massive system of immense importance. Its crucial functions emphasize how vital it is to maintaining human livelihoods and how important it is to many facets of our lives. The ocean is essential to maintaining the delicate balance of life on Earth because of its ecological, climatic, and economic roles, which go beyond its sheer immensity. The ocean is a fundamental component of our planet's interrelated ecosystems, influencing the health of many species, including humans, through its ability to regulate climate patterns and provide essential supplies.

The ocean is crucial to the world economy, even beyond its role in regulating the climate and weather and providing key ecological services. The ocean is essential to the world economy since over 90% of trade takes place over waterways[17]. Furthermore, the ocean provides millions of people with a substantial source of employment globally. Beyond its conventional functions, the ocean is seeing a growing range of innovative and new economic ventures, underscoring its dynamic role in forming modern economic environments and creating new avenues for sustainable development.

The ocean is responsible for the intricate management of Earth's climate and weather systems. It is a vast reservoir that transfers significant solar heat from the equator to the arctic regions. In addition to its thermal function, the ocean is the main and largest sink for atmospheric CO2, reducing the effect of emissions caused by humans. Since the beginning of the industrial revolution, the ocean has absorbed around one-third of the continuously rising CO2 emissions from industrial activity, highlighting the ocean's critical role in regulating the global carbon balance[18].

The ramifications of climate change on the ocean carry substantial economic and social implications worldwide, albeit with variations across sectors and regions. Particularly vulnerable are the livelihoods of the billions reliant on fishing and tourism, along with residents in coastal regions. While certain situations, such as changing fish distributions or diminishing sea ice, may present new economic prospects, it is essential to evaluate these opportunities meticulously. Unchecked pursuits of such opportunities could potentially contribute to heightened environmental degradation, both in local areas and beyond[19].

In short, ocean has a vital role in maintaining life on Earth in addition to its invaluable contribution to human welfare, benefits to economy, society, ecology and even psychology. It can be argued that many aspects of life – cultural, historical, biological and economic – are all inextricably linked to the ocean, affecting people's lives transcending geographical boundaries. Henceforth, all living creatures all around the world benefit from the ocean, even though they do not have any geographical proximity to it.

[17] https://www.oecd.org/ocean/topics/ocean-economy/
[18] Fauville, G. (2019). Ocean literacy in the twenty-first century. *Exemplary Practices in Marine Science Education: A Resource for Practitioners and Researchers*, 3-11.
[19] https://www.oecd.org/climate-change/net-zero-resilience/summary-OECD-resilience-and-ocean-climate-nexus-workshop-april-2021.pdf

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The inception of the Ocean Literacy movement dates back to the early 2000s in the United States and has since evolved into a global initiative. Though there are many successful marine education programs throughout Europe, different languages, curricular requirements, educational policies, and coastal lifestyles make it difficult to coordinate and disseminate these programs. In 2012, the European Marine Science Educators Association (EMSEA) was founded in recognition of the need for improvement in European marine education and closer international ties. The goal of this project was to give educators and teachers more materials, support, and engagement so they could improve the ocean literacy of European people. The European Marine Board then agreed that a consensus was required to increase ocean literacy throughout Europe.

Galway Statement on Atlantic Ocean Cooperation was signed between the EU, Canada and US as an agreement to increase the knowledge of the Atlantic Ocean, build a common path for sustainable management of this shared resource[20] and foster public awareness of the value of the Atlantic Ocean through promoting ocean literacy. Ocean literacy refers to an individual's comprehension of the reciprocal relationship between the ocean and people, encompassing the impacts of the ocean on human life and the influence of human activities on the ocean.

"The Climate Literacy Challenge" by Tomáš Miléř and Petr Sládek underscores the pressing need for climate literacy in the Czech Republic against the backdrop of environmental threats. Introducing a tailored three-year climate education course for upper primary school students, the authors aim to enhance the understanding of climate science among the Czech population. The curriculum spans meteorology, climatology, geological history, the carbon cycle, and climate change mitigation and adaptation measures. Emphasizing the integration of climate education into the existing educational framework, the authors stress the necessity for climate-literate leaders, journalists, and teachers in the Czech context. The article highlights the urgency of improving climate literacy to bridge the gap between scientific knowledge and public understanding, specifically addressing the challenges and opportunities in the Czech Republic. The authors propose a systematic approach to climate education, targeting prestigious Czech primary and secondary schools that are likely to produce future decision-makers, managers, journalists, and teachers. The article concludes by acknowledging the importance of assessing not only communicated knowledge but also students' skills and values in the Czech context through future research[21]. It is worth noting that the issue was taken under the title ‘climate literacy’, showing the negligence on ocean literacy due to the country's landlocked nature and lack of direct access to the ocean.

The article "Environmental Literacy of ISCED 2 Pupils in the Czech Republic and Slovakia" by Silvie Svobodová and Roman Kroufek focuses on assessing the environmental literacy of pupils in the second International Standard Classification of Education (ISCED 2) level in the Czech Republic and Slovakia, which have a common historical development with shared similar curricular documents and educational policies during the period of Czechoslovakia[22]. The study investigates the knowledge, attitudes, and behaviours related to environmental issues among this group of students. The research examines factors such as the effectiveness of environmental

[20] https://ec.europa.eu/commission/presscorner/detail/en/IP_23_3663
[21] Svobodová, S. (2020). Environmental literacy of pupils and its investigation in the Czech Republic. Sociální pedagogika| Social Education, 8(1), 88-104.
[22] https://files.eric.ed.gov/fulltext/EJ1363254.pdf

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education programs, the level of awareness, and the potential influence of socio-cultural contexts on environmental literacy. The study found that the relationship between the affective and behavioural dimensions of environmental literacy was significant, moderate, and positive, while the relationship with the cognitive dimension appeared negligible. Demographic variables such as gender, age, grade, and leisure activities were identified as important determinants of environmental literacy. Gender primarily affected attitudes and environmentally responsible behaviour, with girls scoring higher, consistent with findings from various studies highlighting women's greater receptivity and concern for environmental issues. Age was found to be essential in attitudes, behaviour, and sensitivity, with scores decreasing as age and grade increased. The research instrument used in the study demonstrated a significant relationship with respondents' leisure activities. Those who engaged in the activity of "staying in nature" exhibited the most positive outcomes, while respondents spending leisure time on computers recorded lower scores. Regular outdoor activities were found to positively impact the behavioural dimension of environmental literacy, supporting previous research. In the comparative analysis between the Czech Republic and Slovakia, minimal differences in environmental literacy values were observed between pupils from the two countries. Notable distinctions were found in gender and age, with girls from the Czech Republic scoring higher in attitudes, sensitivity, and behaviour compared to girls from Slovakia, while boys showed reversed results. Differences in the correlation between age and knowledge were also noted, with a positive correlation in the Czech Republic and a negative correlation in Slovakia.

In order to evaluate the advancement and collaborative tendencies in the subject of ocean literacy, the paper "Mapping Global Research on Ocean Literacy: Implications for Science, Policy, and the Blue Economy" makes use of scientific mapping and bibliometric analysis methods[23]. The study's analysis of publications from 2005 to 2019 shows a steady rise in publications as well as encouraging collaboration indicators across authors, nations, and institutions. Science and education are identified as important thematic areas, indicating an increasing emphasis on these topics in ocean literacy research. Despite advancements, there are still obstacles to overcome in the spread of knowledge about ocean literacy, especially in fields like the blue economy and in geographical areas like Latin America and Africa. The study emphasizes how crucial it is to promote interdisciplinary cooperation in order to aid the global ocean literacy movement. Fostering cross-disciplinary and cross-institutional collaboration amongst industry stakeholders, marine education networks, and research institutions is a pressing challenge that is necessary to support this significant development.

[23]https://www.researchgate.net/publication/353404326_Mapping_Global_Research_on_Ocean_Literacy_Implications_for_Science_Policy_and_the_Blue_Economy

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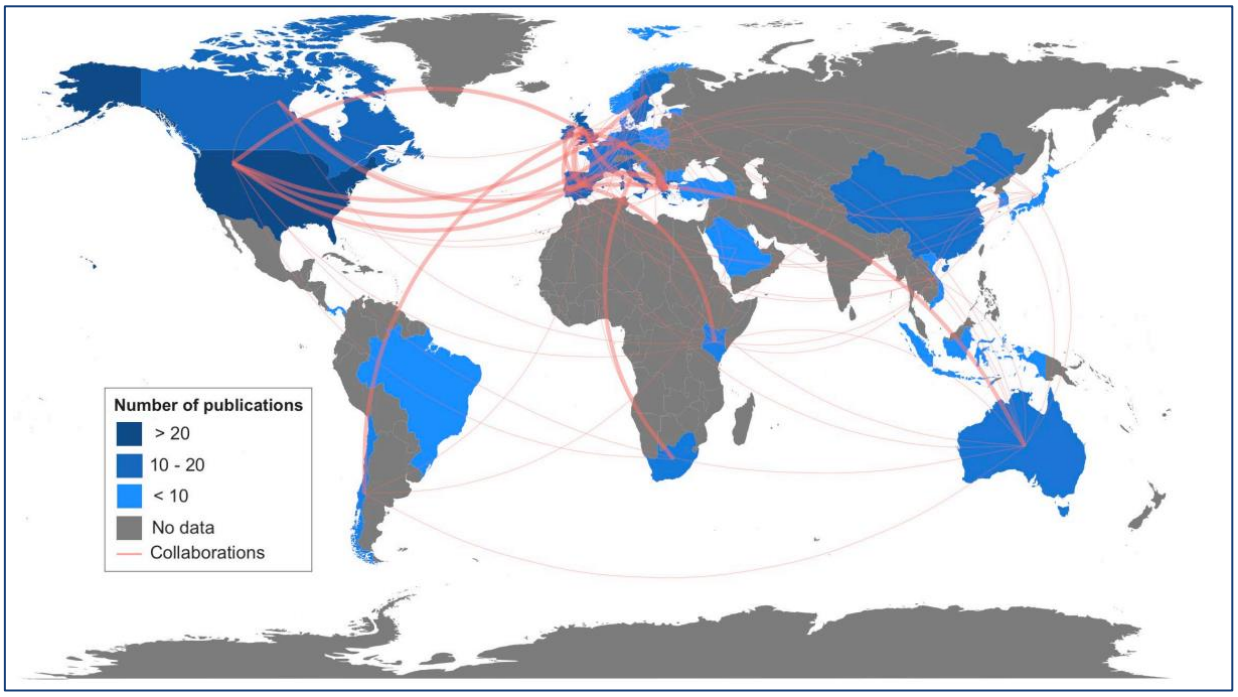
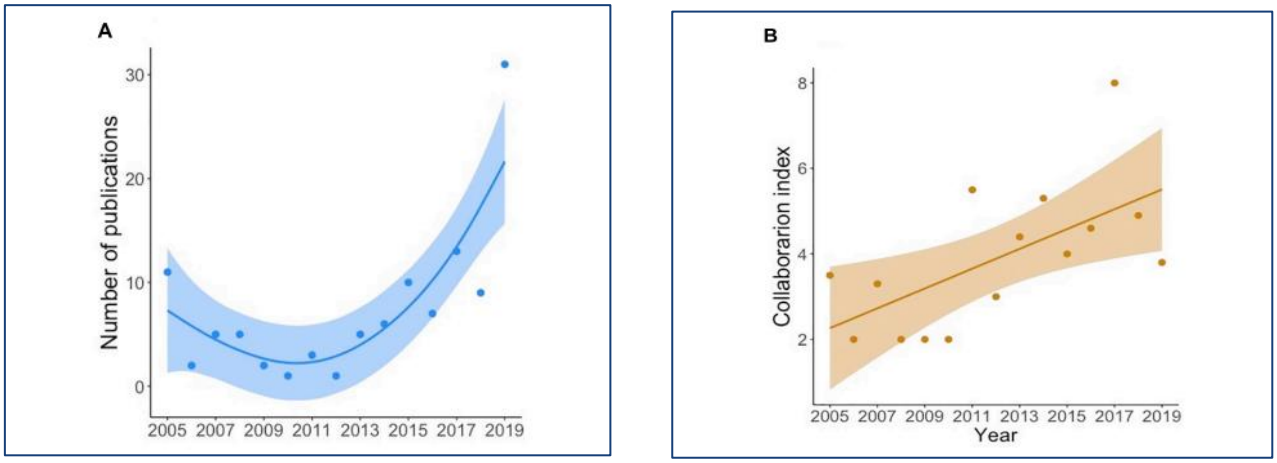
Map 1 Global collaboration on Ocean literacy research from 2005 to 2019



Source 1
https://www.researchgate.net/publication/353404326_Mapping_Global_Research_on_Ocean_Literacy_Implications_for_Science_Policy_and_the_Blue_Economy

Note: The blue gradient is proportional to the number of publications by country. Gray color indicates no data and red lines represent collaborations among countries. Line width is proportional to the number of collaborations.

Graph 21 Scatterplot showing the number of publications on Ocean Literacy



Source 2
https://www.researchgate.net/publication/353404326_Mapping_Global_Research_on_Ocean_Literacy_Implications_for_Science_Policy_and_the_Blue_Economy

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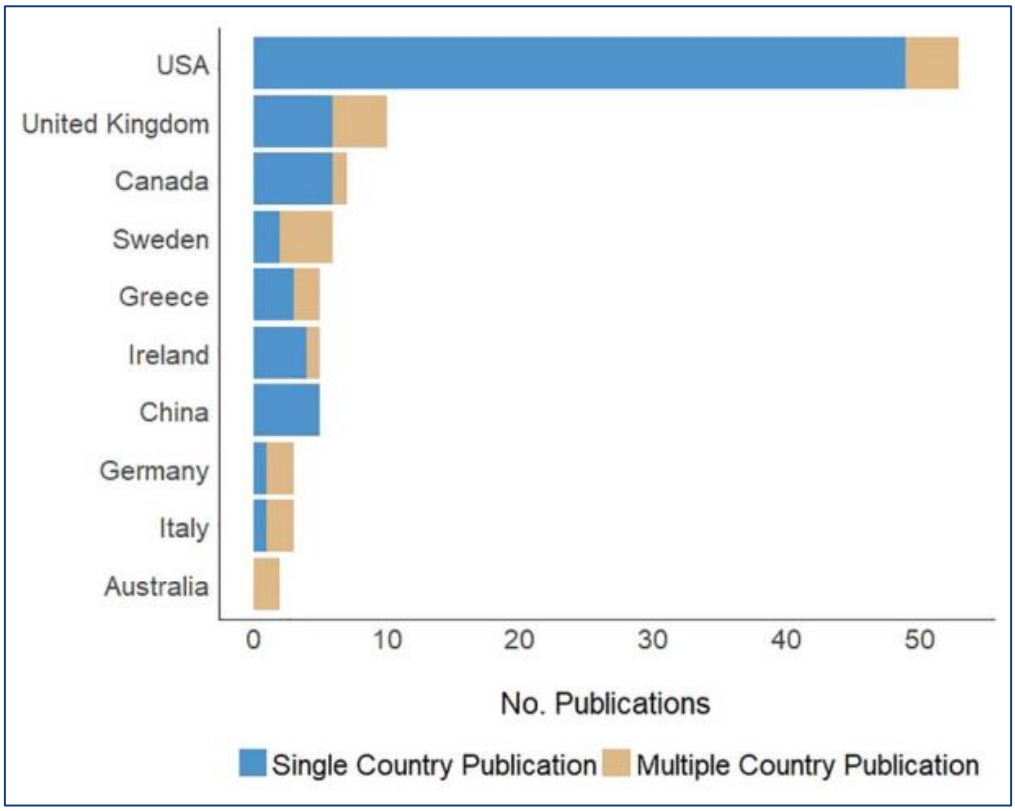
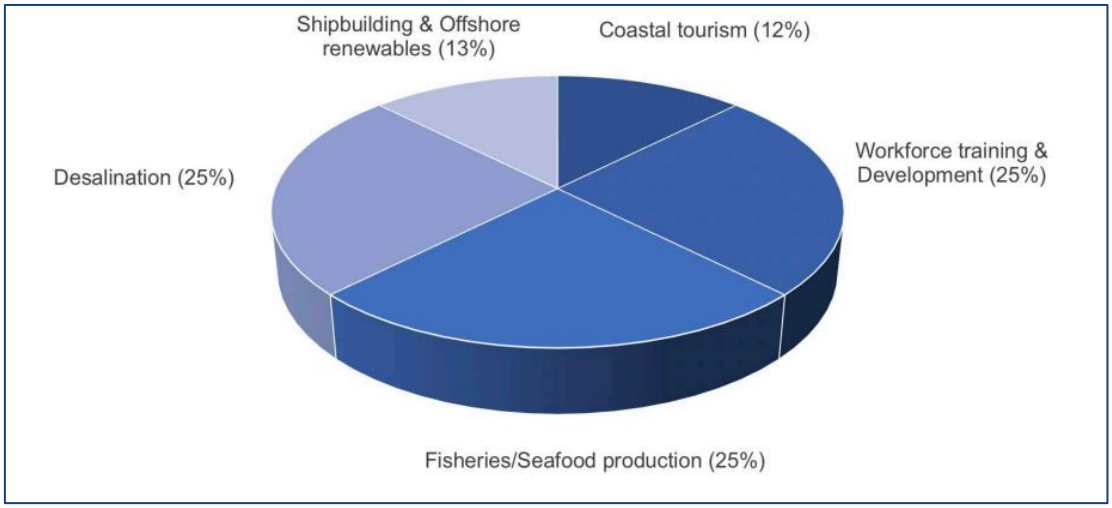
Graph 22 Top 10 publishing countries on Ocean literacy from 2005 to 2019



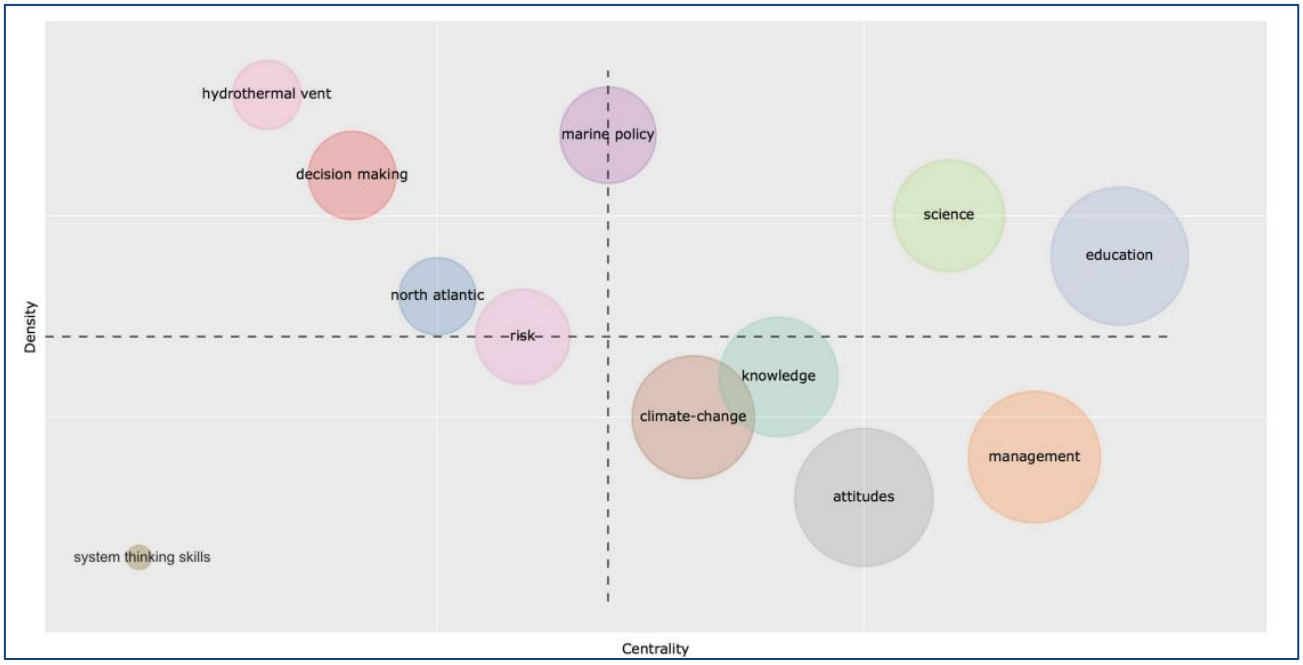
Source 3
https://www.researchgate.net/publication/353404326_Mapping_Global_Research_on_Ocean_Literacy_Implications_for_Science_Policy_and_the_Blue_Economy

Graph 23 Blue economy topics identified from publications on Ocean literacy for the period 2005–2019



Source 4
https://www.researchgate.net/publication/353404326_Mapping_Global_Research_on_Ocean_Literacy_Implications_for_Science_Policy_and_the_Blue_Economy

Graph 24 | Thematic map on Ocean literacy research for the period 2005–2019 obtained from co-word analysis



Source 5
https://www.researchgate.net/publication/353404326_Mapping_Global_Research_on_Ocean_Literacy_Implications_for_Science_Policy_and_the_Blue_Economy

Note: The upper-right quadrant indicates the motor themes, the lower-right quadrant indicates the basic themes; the lower-left quadrant indicates the emerging or disappearing themes and the upper-left quadrant indicates the very specialized/niche themes. The volume of the spheres is proportional to the number of publications corresponding to each keyword.

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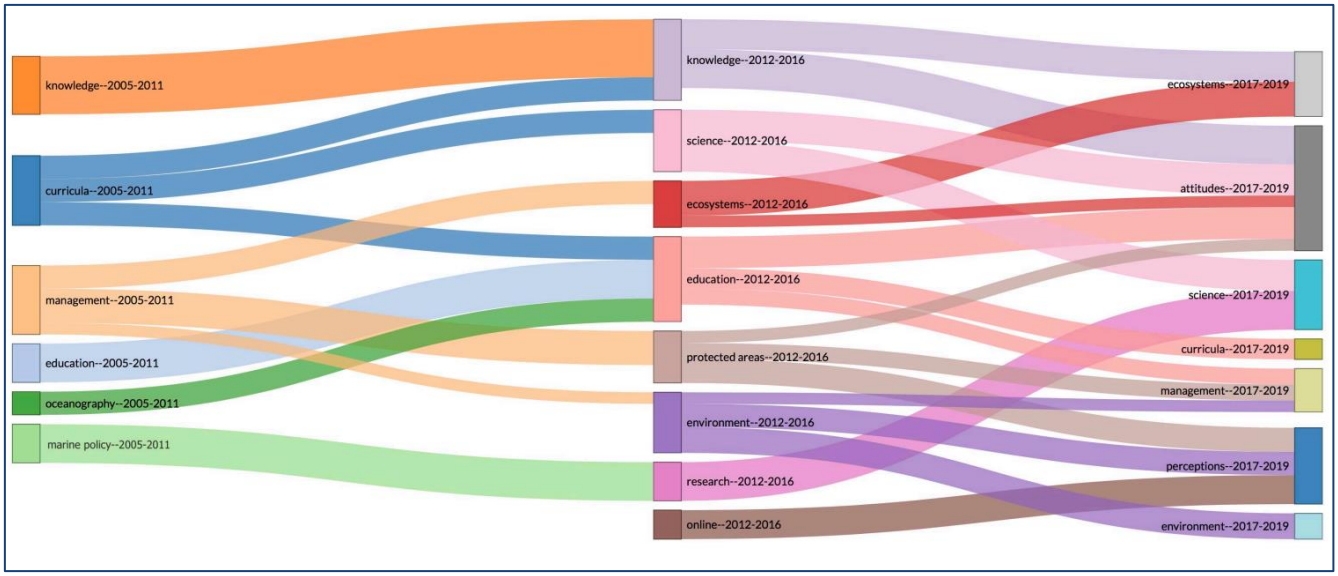
Graph 25 Evolution of Ocean literacy research themes for the periods 2005–2011, 2012–2016, and 2017–2019. Each color represents a research theme and the



Source 6
https://www.researchgate.net/publication/353404326_Mapping_Global_Research_on_Ocean_Literacy_Implications_for_Science_Policy_and_the_Blue_Economy

To offer thorough insights into a range of topics, the study “Research trends and content analysis of ocean literacy studies between 2017 and 2021” carries out a bibliometric analysis of ocean literacy (OL) studies published between 2017 and 2021[24]. The journal Frontiers in Marine Science is identified as the main outlet for publications on ocean literacy. The study also identifies the top nations for scientific contributions related to ocean literacy, with the UK, Italy, Canada, the USA, and Portugal holding acclaim. For most of these investigations, money from government budgets emerges as the main source. Important terms from the field of ocean literacy studies are identified through analysis, including "Global OL Perspectives," "Sustainability," "Citizen Science," "Students' OL Improvement," and others. The study emphasizes how important this research is to the advancement of ocean literacy studies and how it may affect informed policy decisions and public participation. Between 2017 and 2021, a comprehensive analysis was conducted on articles related to ocean literacy, encompassing bibliometric, content, and methodology aspects. The study delved into details such as the journals that featured ocean literacy-based articles, contributions from different countries, keywords, and content analysis, providing a thorough assessment. A total of 79 articles were identified in the Web of Science and Scopus databases, specifically chosen for incorporating the term "ocean literacy" in their abstracts or keywords sections, excluding conference papers. This criterion aimed to maintain a focused exploration of the subject matter, with a particular emphasis on the concept of "ocean literacy."

[24] https://www.frontiersin.org/articles/10.3389/fmars.2023.1200181/full

Table 1 Country score for publishing OL based articles between 2017 and 2021

2017		2018		2019		2020		2021	
Country	Score	Country	Score	Country	Score	Country	Score	Country	Score
Sweden	2,000	USA	1,210	Taiwan	4,000	Italy	2,428	Portugal	4,87
Greece	1,000	Portugal	1,010	UK	3,530	UK	2,032	UK	3,461
France	0,920	Canada	1,000	Ireland	3,000	USA	1,429	Australia	3,028
Canada	0,405	Australia	0,790	Italy	2,560	Canada	1,247	Greece	3,02
Netherlands	0,375	Italy	0,580	Canada	2,000	Croatia	1,124	Brazil	2,62
Spain	0,365	Sweden	0,445	Germany	1,570	Germany	1,019	Canada	2,39
Italy	0,150	S. Africa	0,420	Spain	1,510	Ireland	1,000	USA	2,07
Germany	0,070	Ireland	0,370	USA	1,370	Japan	1,000	Poland	1,75
Portugal	0,040	Denmark	0,070	Greece	1,120	Poland	1,000	Italy	1,41
Finland	0,015	Greece	0,040	Turkey	0,790	Slovenia	1,000	Taiwan	1
		Spain	0,030	Australia	0,770	Taiwan	1,000	Belgium	0,722
		UK	0,025	S. Africa	0,700	France	0,691	Switzerland	0,46
		Belgium	0,010	Sweden	0,420	Greece	0,428	Germany	0,432
				Japan	0,230	Mexico	0,067	Japan	0,32
				Portugal	0,150	Norway	0,044	Croatia	0,28
				Croatia	0,070	Belgium	0,029	Spain	0,22
				Estonia	0,070	Spain	0,021	Norway	0,22
				France	0,060	Australia	0,009	France	0,203
				S. Korea	0,050	Venezuela	0,009	N. Zealand	0,181
				Kenya	0,030	Brazil	0,002	B. Isles	0,1
				Vietnam	0,020	S. Africa	0,001	C. Verde	0,08

				Poland	0,010	New Caledonia	0,001	Estonia	0,07
						Senegal	0,001	Sweden	0,07
						Monaco	0,001	S. Korea	0,04
						Cape Verde	0,001	Cambodia	0,03
						Portugal	0,001	Kenya	0,03
						Kenya	0,001	Denmark	0,02
								Mexico	0,02
								Israel	0,019
								Morocco	0,014
								Egypt	0,01
								S. Africa	0,01
								Tunisia	0,006
								Vietnam	0,005
								Cyprus	0,001
								Malta	0,001

Source 7 https://www.frontiersin.org/articles/10.3389/fmars.2023.1200181/full

Figure 1 Word cloud of keywords used in ocean literacy based publications between 2017-2021

Source 8 https://www.frontiersin.org/articles/10.3389/fmars.2023.1200181/full

Although there is a growing literature on ocean literacy worldwide, the Czech Republic remains understudied. The research shows that ocean's enormous importance in our lives have not been deeply understood in the context of Czech Republic. There are very limited studies in the particular context. This proves the importance of integrating ocean literacy to Czech context and bringing people in Czech in closer connection with the ocean. Research conducted in 2017 illustrates that there is a huge gap in information about marine climate change, a comprehensive survey was conducted, engaging 10,000 European citizens across 10 countries. The survey aimed to assess the levels of awareness, concern, and trust across various demographic groups, including age, gender, and proximity to the coast, as well as different nationalities. The respondents demonstrated diverse degrees of self-proclaimed informedness and concern. Notably, citizens from Germany, Italy, and Spain reported higher levels of awareness regarding marine climate change issues, while those from the Czech Republic, Netherlands, and Estonia indicated lower levels of perceived information. This research sheds light on the varying public perceptions and awareness levels concerning climate change impacts on the marine environment in different European countries. Also, Czech, Dutch and Estonian respondents came out as being amongst

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the least concerned across the 15 issues covered with respect to marine climate change[25].

Table 2 Environmental protection expenditure and economic benefits from such activities by program focus - Czechia

Year	Total	Protection of ambient air and climate	Wastewater management	Waste management	Soil, groundwater and surface water protection and remediation	Noise and vibration abatement (excluding workplace protection)	Landscapes and biodiversity (species diversity) protection
2006	40,980,894	2,835,504	6,939,127	25,411,912	2,499,269	172,823	794,676
2007	49,693,385	3,151,929	8,089,160	33,776,706	2,611,035	136,324	923,034
2008	51,465,683	3,033,942	8,423,810	35,257,788	2,938,372	123,451	758,607
2009	48,749,956	3,210,255	8,215,608	32,133,424	3,127,873	84,682	1,040,512
2010	53,441,341	3,456,485	9,573,837	34,810,623	2,713,490	85,378	1,545,483
2011	59,019,618	3,411,691	10,468,203	38,845,776	3,463,650	81,994	1,288,328
2012	56,470,262	3,557,533	10,824,510	36,116,264	3,289,830	67,774	1,126,641
2013	56,458,521	3,315,797	10,877,177	35,993,867	3,703,468	115,700	1,172,298
2014	60,097,937	3,400,924	11,017,014	38,261,123	3,858,168	463,477	1,226,149
2015	56,069,202	3,302,156	11,133,947	34,456,444	3,303,157	167,009	1,212,891
2016	57,145,414	3,242,446	11,339,631	36,584,104	3,090,399	275,507	1,035,802
2017	61,306,944	3,576,833	11,324,583	40,219,641	3,143,431	181,158	1,226,382
2018	67,039,535	3,915,222	12,158,842	43,327,336	4,279,584	161,002	1,453,763
2019	70,556,400	4,255,278	14,358,006	44,910,093	3,324,131	143,804	1,956,775
2020	71,116,088	4,309,603	14,608,357	45,274,476	3,502,036	169,195	1,791,884

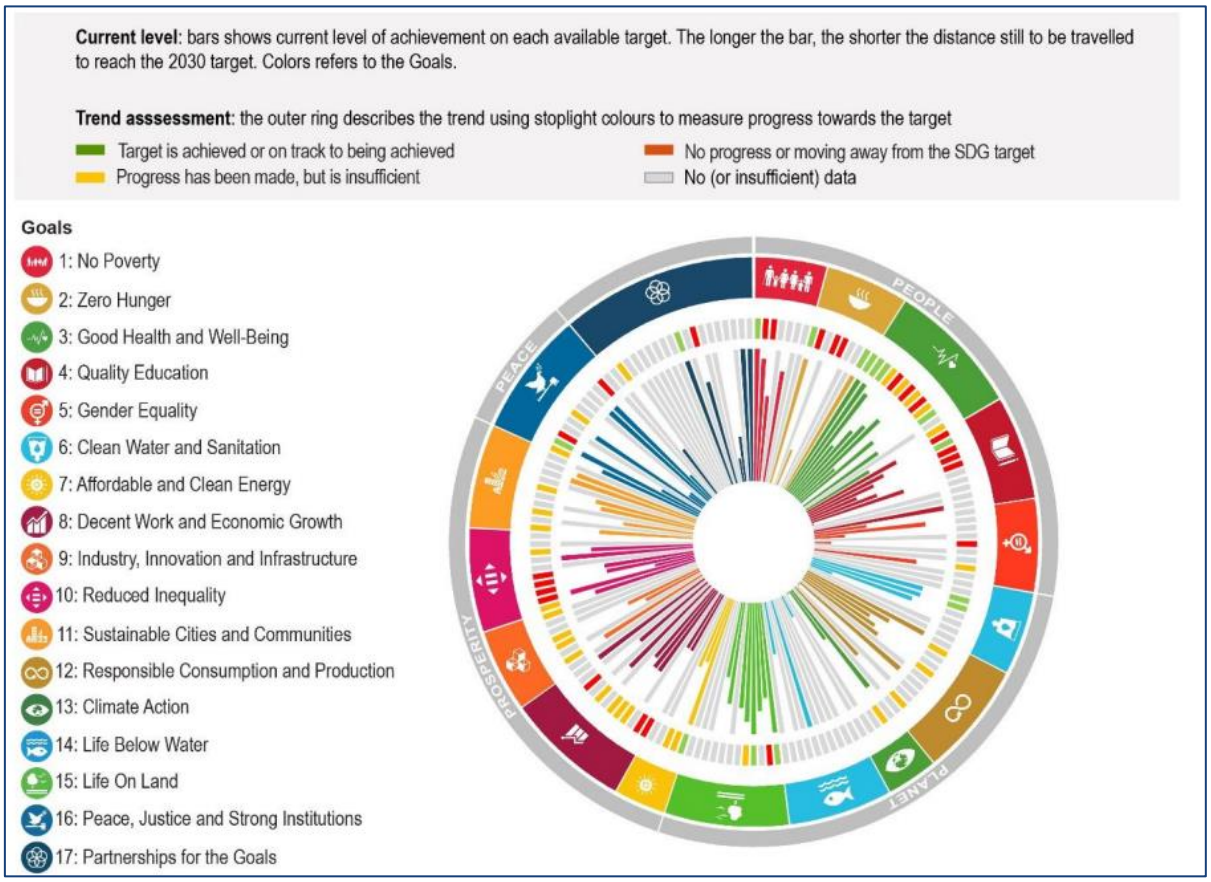
[25] https://www.frontiersin.org/articles/10.3389/fmars.2017.00206/full

2021	86,788,774	5,399,847	15,375,690	58,707,069	3,834,819	113,831	1,888,240
2022	91,519,524	6,053,760	17,010,571	60,722,310	4,094,908	179,568	1,886,608

Source 9 Czech Statistical Office https://vdb.czso.cz/vdbvo2/faces/en/index.jsf?page=vystup-objekt&z=T&f=TABULKA&katalog=30842&pvo=ZPR09&str=v33#w=

The Czech Republic's Progress on Sustainable Development Goals

Figure 2 The Czech Republic's distance from achieving SDG targets



Source 10 https://www.oecd.org/wise/measuring-distance-to-the-SDG-targets-country-profile-The-Czech-Republic.pdf

In terms of environmental issues, the Czech Republic performs well in projects pertaining to water (Goal 6) and biodiversity preservation (Goal 15). Notable developments include the extension of protected areas, which reportedly cover 22% of the land and exceed the 17% Aichi target. Almost all river, mountain, and terrestrial ecosystems that are essential to biodiversity are currently protected (Targets 15.1 and 15.4). In comparison to many OECD nations, the conservation situation of important species in the Czech Republic remains more positive (Target 15.5). Because to below average and declining abstraction levels, the nation maintains low water stress levels despite having limited freshwater resources (Target 6.4). In 2019, 83% of the population was connected to public sewage treatment plants thanks to support from EU subsidies, which is comparable to the OECD average. Water quality has benefited from

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easier access to wastewater treatment, although groundwater body conditions continue to provide difficulties (Target 6.3)[26].

Among OECD countries, the Czech economy is one of the most energy- and carbon-intensive due to its strong industrial sector and heavy reliance on coal. The manufacturing value added and the greenhouse gas emissions intensity per unit of GDP are both declining, but they are still very high (Targets 13.2 and 9.4). The population faces issues as a result of rising road traffic and energy-intensive industrial operations contributing to elevated levels of air pollution (Target 11.6). The Czech economy's material intensity is rather high, compared to the OECD average, but it is not the highest because of the country's heavy reliance on coal and building materials for production. Despite a rise in GDP, domestic material consumption has decreased since 2000, suggesting increased material productivity. Target 2.4 states that nitrogen fertilizer consumption per hectare of agricultural land exceeds the OECD average by 60%, indicating that intensive agricultural practices are a contributing factor to environmental concerns[27].

As with many other OECD countries, difficulties obtaining data are a frequent problem when evaluating targets' success. For the Czech Republic, information is available to assess 128 of the 169 targets in total. The degree of indicator coverage varies among the 17 targets, as shown in Figure 2 below. Nine targets in the Prosperity, Planet, and People categories have extensive coverage—they surpass 80% of their goals. But Goal 5, which is about gender equality, has covered only half of its aims; Goal 14, which is about life below the water, covers only 30% of its targets. This is because the Czech Republic is landlocked, so some of the Goal 14 criteria might not apply there[28]. The preservation and sustainable use of the seas, oceans, and marine resources are the focus of this goal. Its goals include protecting coastal and marine areas, combating overfishing, and addressing a variety of other challenges that have an impact on marine ecosystems. The objective highlights how crucial it is to preserve marine habitats' resilience and health in order to promote food security, biodiversity, and the way of life for populations that depend on the ocean for their livelihoods.

Goal 14 may not immediately apply to the Czech Republic because it is a landlocked country without direct access to coastal areas. These goals frequently have to do with maintaining sustainable fisheries, safeguarding marine biodiversity, and improving coastal ecosystems. Nonetheless, by supporting international collaboration on marine conservation, encouraging sustainable consumption, and lowering pollution, even landlocked countries help to achieve Goal 14. While the direct impact of Goal 14 may be limited for landlocked countries, their involvement in broader environmental measures is vital for attaining sustainable development globally.

[26] https://www.oecd.org/wise/measuring-distance-to-the-SDG-targets-country-profile-The-Czech-Republic.pdf
[27] ibid
[28] ibid

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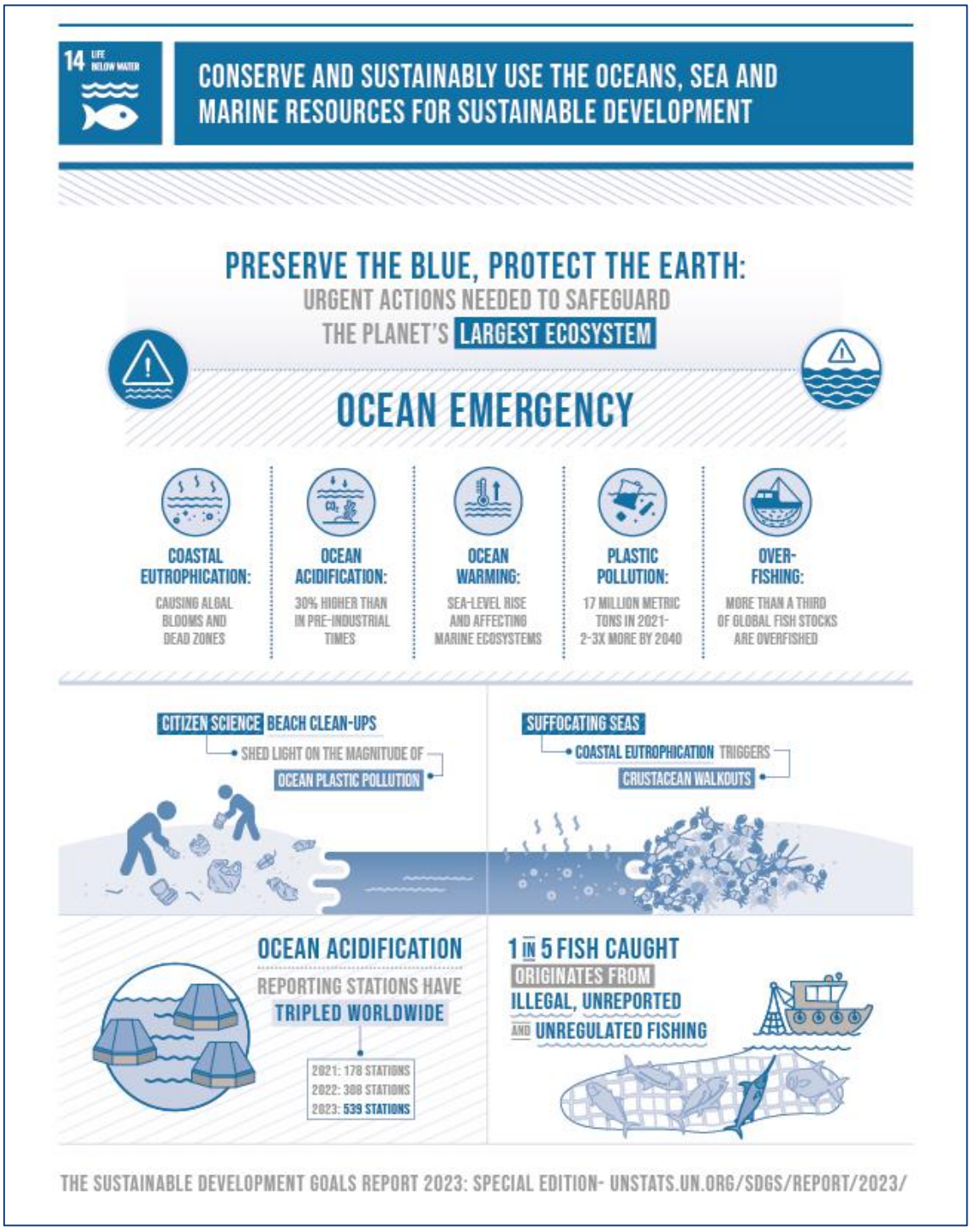
Figure 3 Infographic on Overview of SDG 14



Source 11 https://sdgs.un.org/goals/goal14

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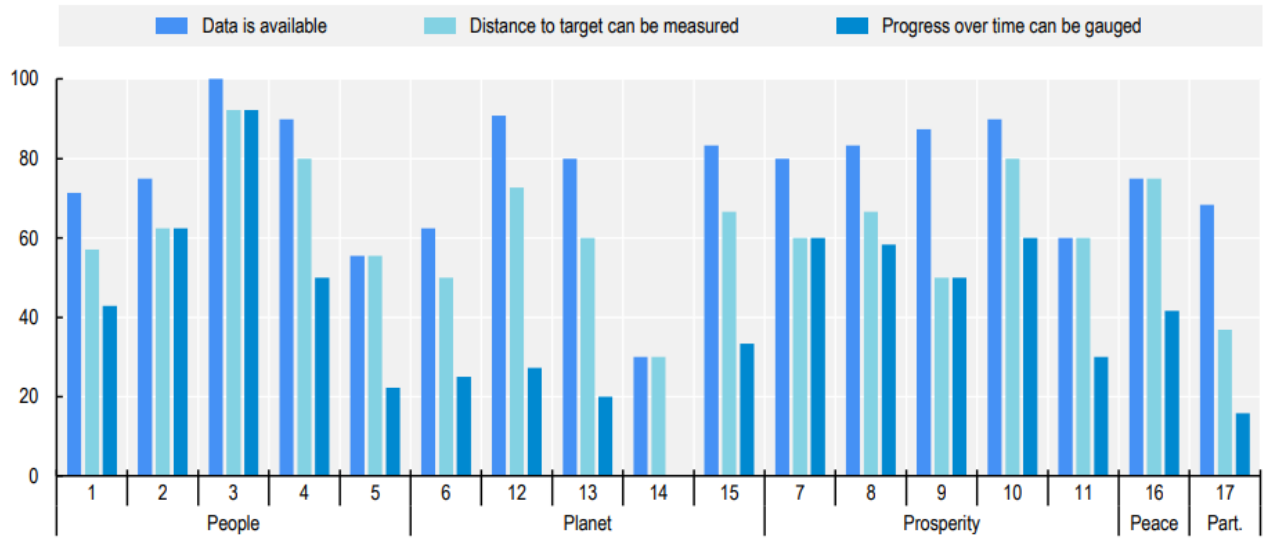
Graph 26 The Czech Republic's share of the 2030 Agenda's targets covered by at least one



Note: The figure represents the Czech Republic's share of targets covered by at least one indicator for each SDG. Numbers from 1 to 17 stand for the goals: 1 No poverty, 2 Zero hunger, 3 Good health and well-being, 4 Quality education, 5 Gender equality, 6 Clean water and sanitation, 7 Affordable and clean energy, 8 Decent work and economic growth, 9 Industry, innovation and infrastructure, 10 Reduced inequalities, 11 Sustainable cities and communities, 12 Responsible consumption and production, 13 Climate action, 14 Life below water, 15 Life on land, 16 Peace, justice and strong institutions and 17 Partnerships for the goals. These goals are grouped under five broad themes (the "5Ps"): People, Planet, Prosperity, Peace and Partnership. Beyond data availability, other statistical gaps such as timeliness or granularity also need to be considered. For instance, given the lag in available data, the effects of the pandemic on current distance and trajectories may not be reflected in the estimates.

Source 12 https://www.oecd.org/wise/measuring-distance-to-the-SDG-targets-country-profile-The-Czech-Republic.pdf

Table 3 Czech Republic distances to SDG 14 target and recent trends

Goal	Target	Short Label	Distance to Target	Trend assessment	OECD Average distance	OECD Trend Assessment
14	14.1	Marine pollution**	2.46	n.a.	1.84	Progress has been made, but is insufficient to meet the target
14	14.6	Harmful subsidies to fisheries*	0.00	n.a.	0.36	n.a.
14	14.b	Small-scale fisheries	1.80	n.a.	1.64	n.a.

Source 13 https://www.oecd.org/wise/measuring-distance-to-the-SDG-targets-country-profile-The-Czech-Republic.pdf

Second Voluntary National Review of the 2030 Agenda in the Czech Republic (2021) notes that:

14.1 Due to its landlocked status, the Czech Republic only partially addresses problems with ocean and marine pollution and river water quality. Even if the quality of the water has improved over time, many watercourses are still considered to be polluted.

14.2 (Protect and Restore Ecosystems) The Czech Republic actively contributes to international monitoring programs that evaluate pollution in the Danube and Black Sea basin, such as the Joint Danube Survey 4.

14.6 The Czech Republic does not participate in sea fishing because it does not have access to it.

14.a (scientific knowledge, develop research capacities and transfer marine technology) The Czech Republic promotes respect to the UN Convention on the Law of the Sea and works for freedom of passage in relevant areas[29].

Even though it is a country that is landlocked, the Czech Republic actively manages environmental issues pertaining to water quality inside its boundaries. Notwithstanding ongoing obstacles, the country is dedicated to enhancing the state of its waterways. In the Czech Republic, a large number of watercourses are still categorized as polluted (class 3 or worse), meaning that contaminants such as microplastics, phosphates, pesticides used in agriculture, nitrates, and medicines are present.

The Czech Republic is a participant in important international projects like the Joint Danube Survey 4[30], which is run by the International Commission for Protection of the Danube River (ICPDR) to address these challenges. This survey covers a significant area of the Black Sea basin and the Danube River.

[29] https://sustainabledevelopment.un.org/content/documents/279492021_VNR_Report_Czech_Republic.pdf
[30] https://www.icpdr.org/publications/danube-watch-2-2019-joint-danube-survey-4

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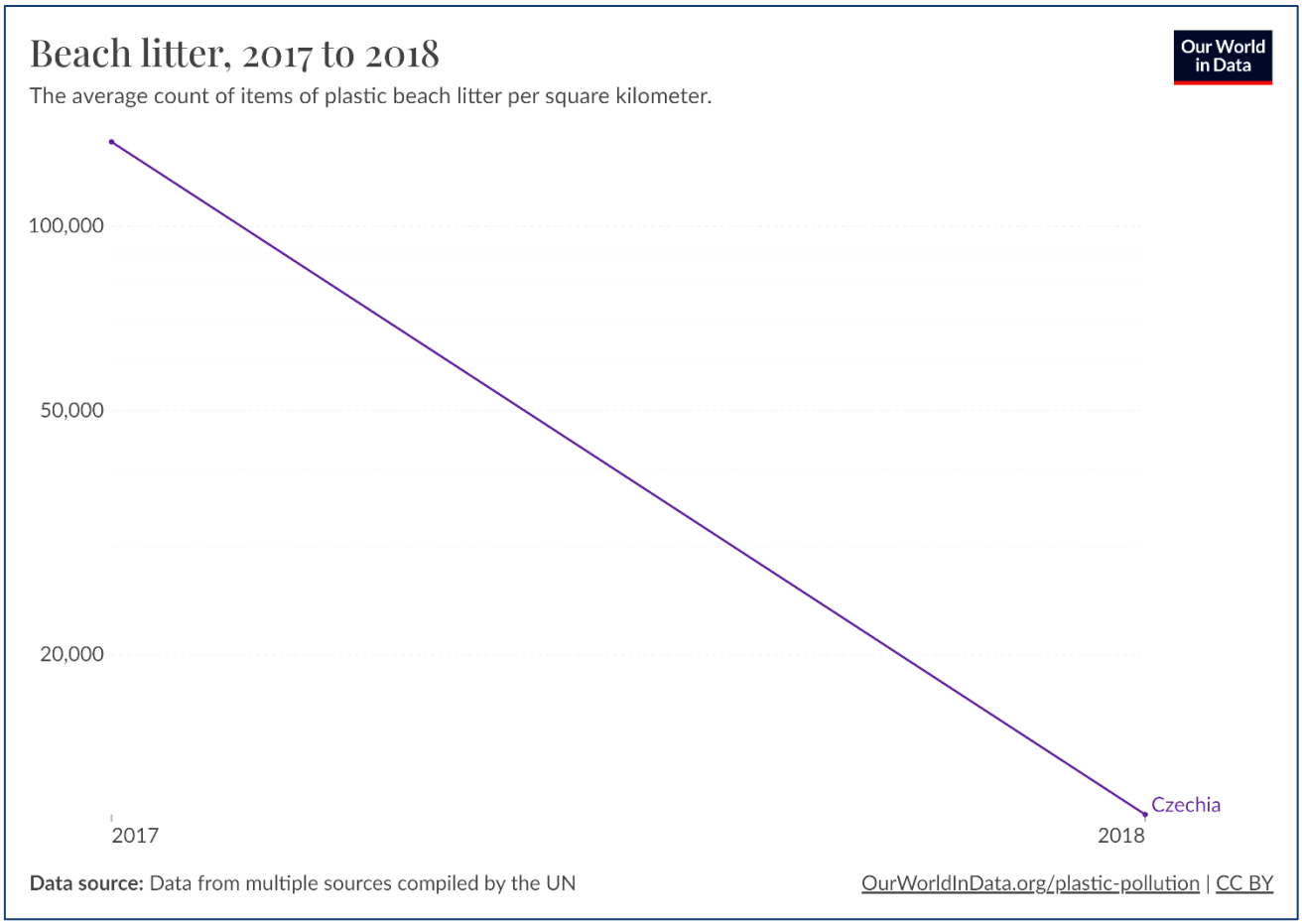
Graph 27 Beach litter



Source 14 https://ourworldindata.org/sdgs/life-below-water

Beach litter can be considered under the SDG indicator 14.1.1, reduce marine pollution, which shows a significant decreased between 2017 and 2018.

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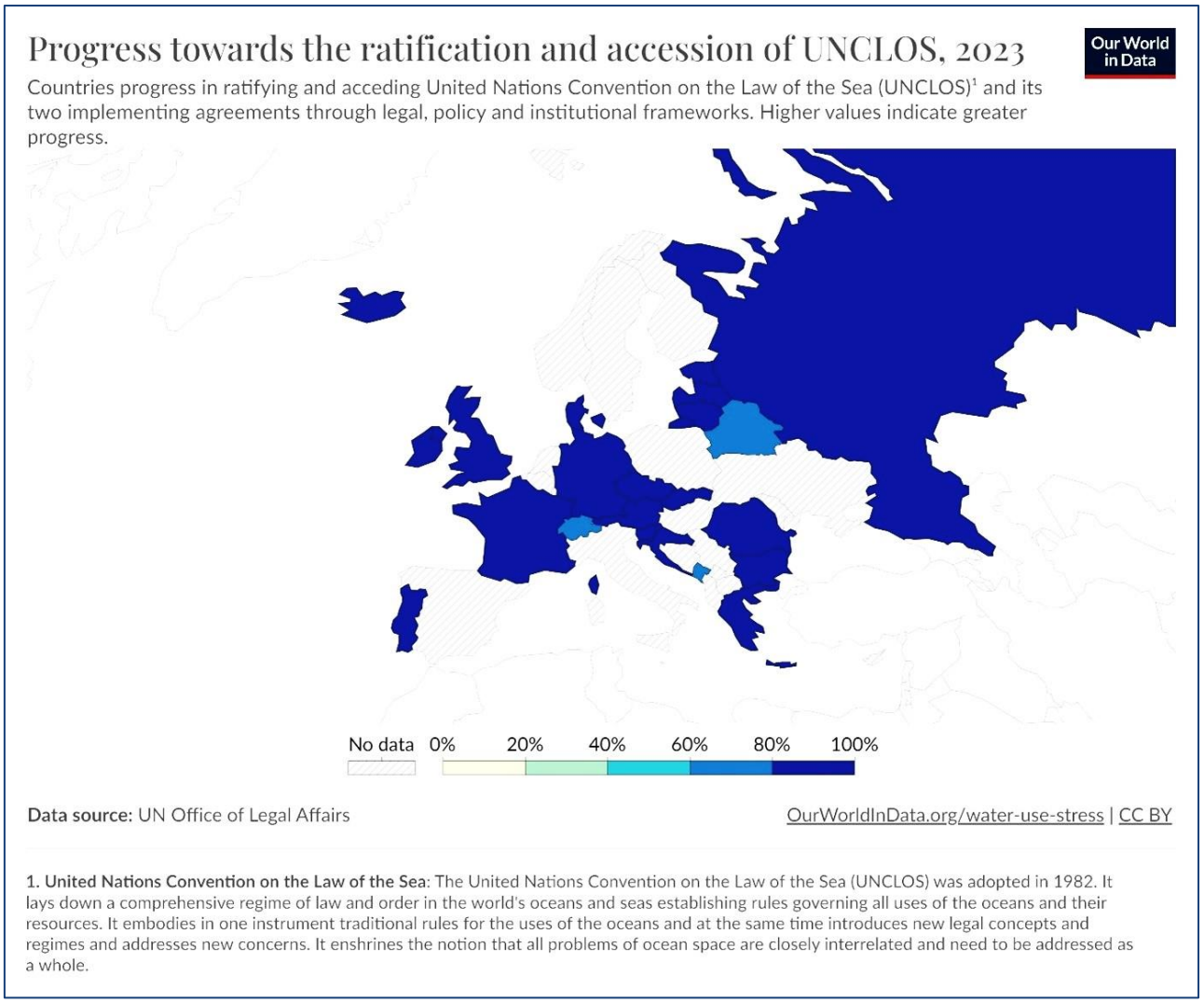
Figure 4 Progress towards the ratification of UNCLOS



Source 15 https://ourworldindata.org/sdgs/life-below-water

Indicator 14.c.1 is the “number of countries making progress in ratifying, accepting and implementing through legal, policy and institutional frameworks, ocean-related instruments that implement international law, as reflected in the United Nations Convention on the Law of the Sea” in the UN SDG framework.

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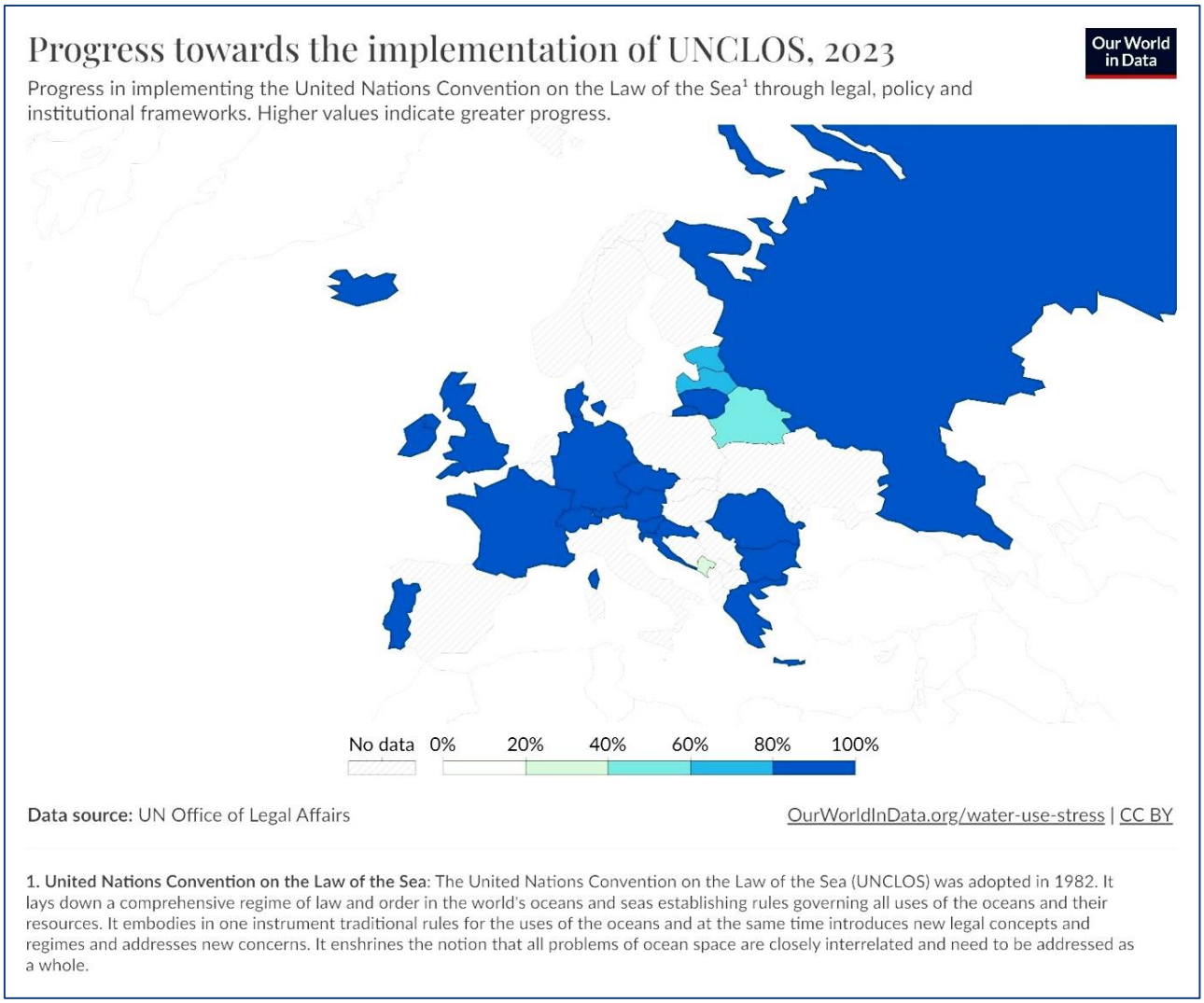
Figure 5 Progress towards the implementation of UNCLOS



Source 16 https://ourworldindata.org/sdgs/life-below-water

Indicator 14.c.1 is the “number of countries making progress in ratifying, accepting and implementing through legal, policy and institutional frameworks, ocean-related instruments that implement international law, as reflected in the United Nations Convention on the Law of the Sea” in the UN SDG framework. Czechia’s score is deported as 90%.

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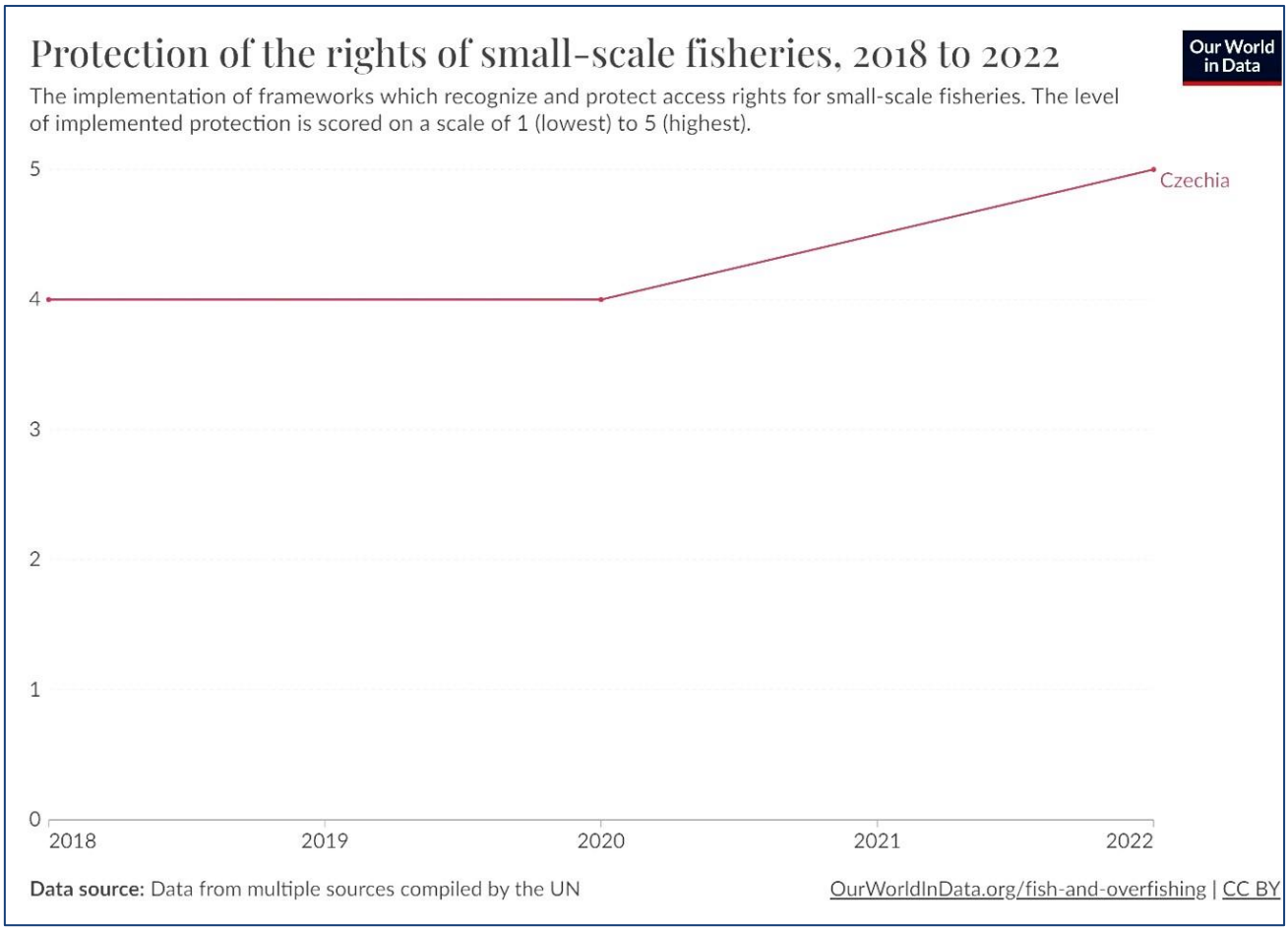
Graph 28 Protection of the rights of small-scale fisheries



Source 17 https://ourworldindata.org/sdgs/life-below-water

Indicator 14.b.1 is the “degree of application of a legal/regulatory/policy/institutional framework which recognizes and protects access rights for small-scale fisheries” in the UN SDG framework.

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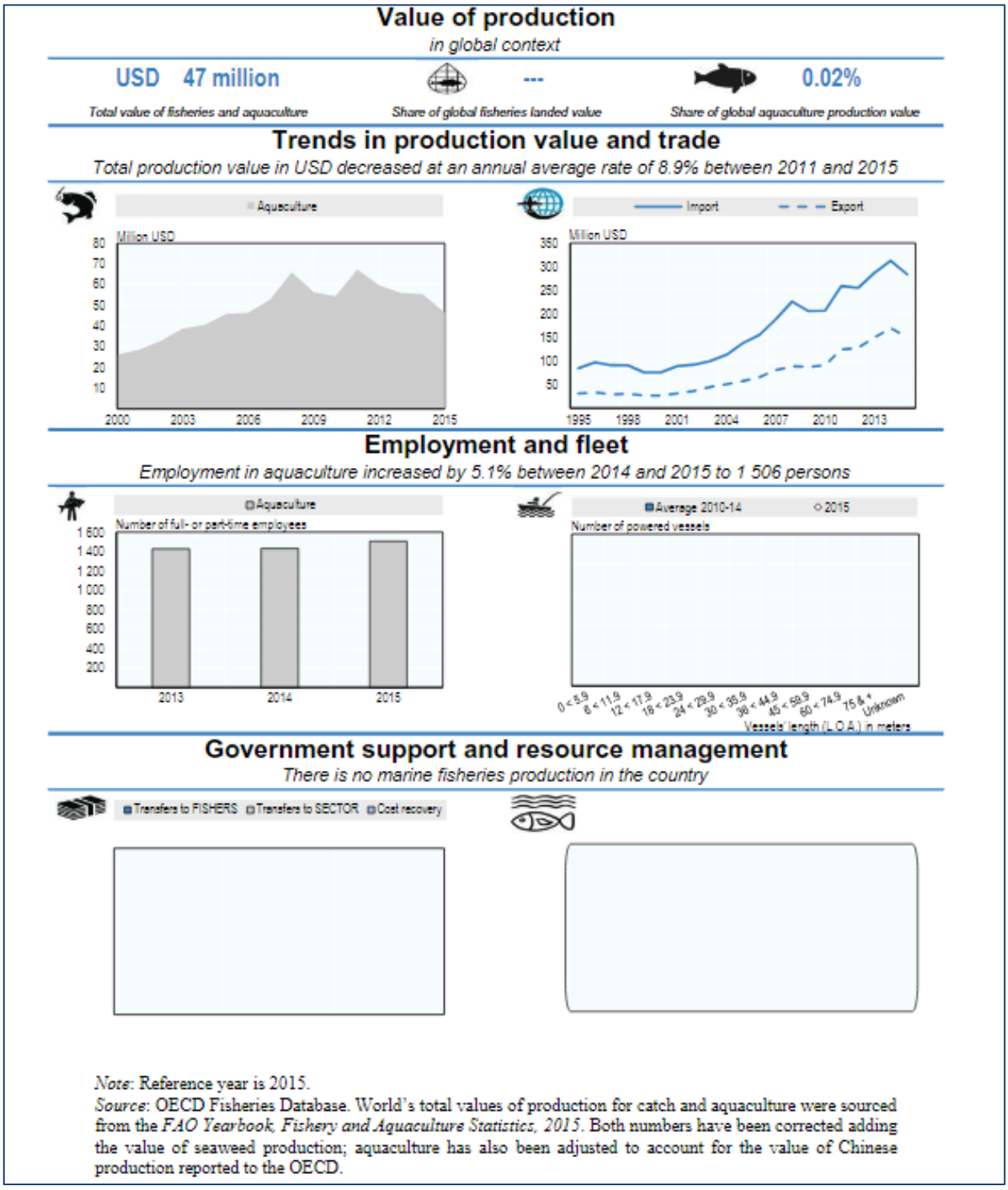
Graph 29 Fisheries and aquaculture statistics in Czech Republic



Note: Reference year is 2015.
Source: OECD Fisheries Database. World's total values of production for catch and aquaculture were sourced from the *FAO Yearbook, Fishery and Aquaculture Statistics, 2015*. Both numbers have been corrected adding the value of seaweed production; aquaculture has also been adjusted to account for the value of Chinese production reported to the OECD.

Source 18 https://read.oecd-ilibrary.org/agriculture-and-food/oecd-review-of-fisheries-policies-and-summary-statistics-2017/czech-republic_9789264282261-15-en#page2

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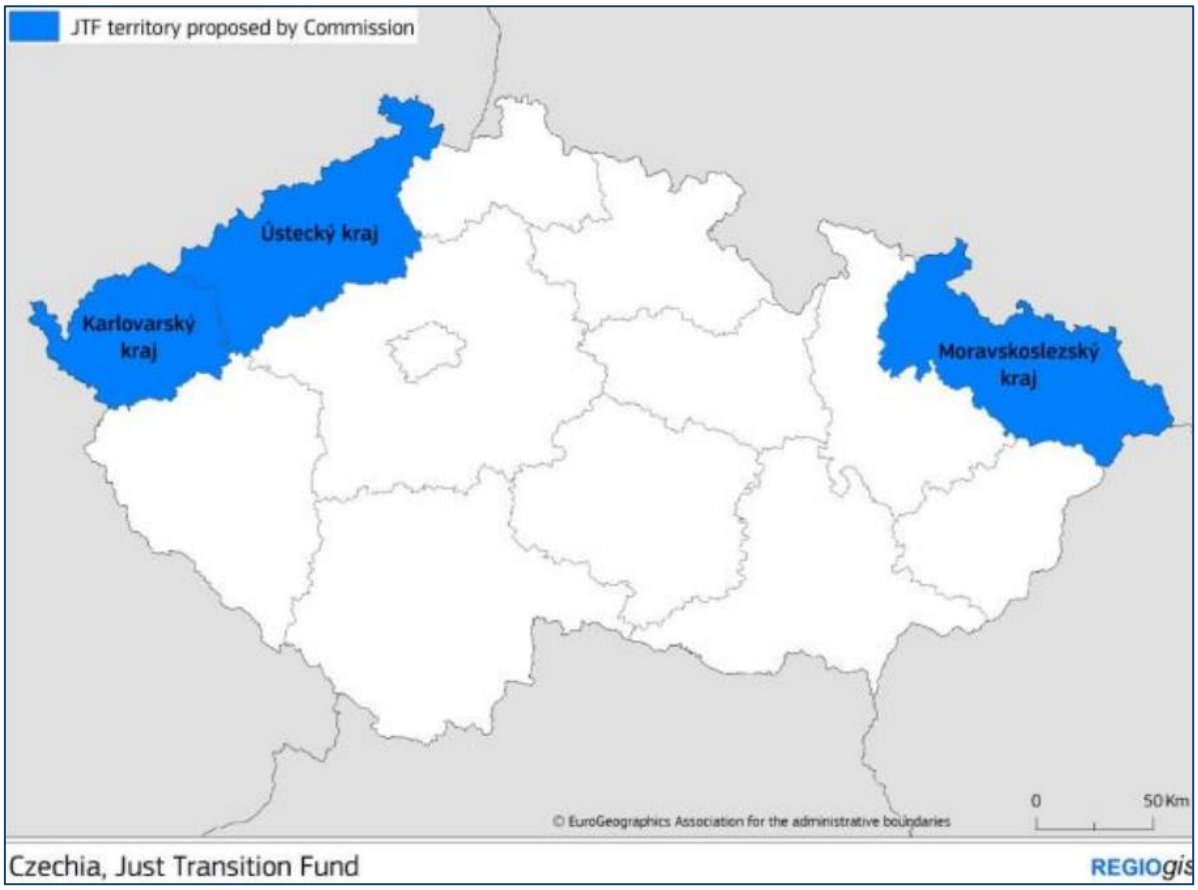
Map 2 Territories most affected by the climate transition in Czechia



Source 19 https://vlada.gov.cz/assets/evropske-zalezitosti/aktualne/2022-european-semester-country-report-czechia_en_2.pdf

According to Sustainable Governance Indicators 2022 Czechia Report, Czechia's environmental policy is mostly shaped by its obligation to comply with EU regulations, which also provides substantial financial support. The State Environmental Policy of the Czech Republic 2030 with an Outlook to 2050, which outlined 10 strategic objectives, was launched by the Babiš government in January 2021. On the other hand, the administration has come under criticism for previous initiatives, claiming a lack of dedication and an inability to guarantee the essential agency coordination. Water management techniques have come under criticism, particularly those related to treating urban wastewater, retaining water in agriculture, and managing stormwater. A noteworthy event involving an ecological catastrophe on the Becva River in September 2020 brought attention to shortcomings in the inquiry and responsibility. Due to the nation's substantial reliance on fossil fuels, air pollution is still a major problem, especially in North Moravia and North Bohemia. The delayed adoption of renewable energy and energy efficiency, which accounted for 16% of all energy in 2019, highlights the difficulties in moving away from fossil fuels. Concerns are raised by the planned phase-out of coal by 2038, with gas first taking its place. Joining France, Czechia advocated for nuclear energy to be classified as clean energy during the European Green Deal negotiations. Even though the Ministry for the Environment updated its biodiversity policy in 2016 after it was enacted in 2005, there are still issues with biodiversity, such as poor public knowledge and the effects of transportation and agriculture. Created in 2015, the Nature Conservation Agency for Czechia oversees a number of protected areas that account for sixteen percent of the nation's land area

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and actively monitors biodiversity. From being a passive recipient of EU environmental goals, Czechia's involvement in global environmental preservation has changed to strongly oppose increasingly ambitious ones. Concerns have been expressed about the nation's reliance on coal, its limited ability to fulfil its responsibilities under the EU, and how well it is doing so. In November 2021, Prime Minister Babiš made a proposal for substantial modifications to the EU Green Deal, expressing opposition to more stringent environmental regulations. Czechia's position on environmental policy is further demonstrated by the movement, backed by a number of other nations, to incorporate nuclear energy into EU sustainable financing regulations[31].

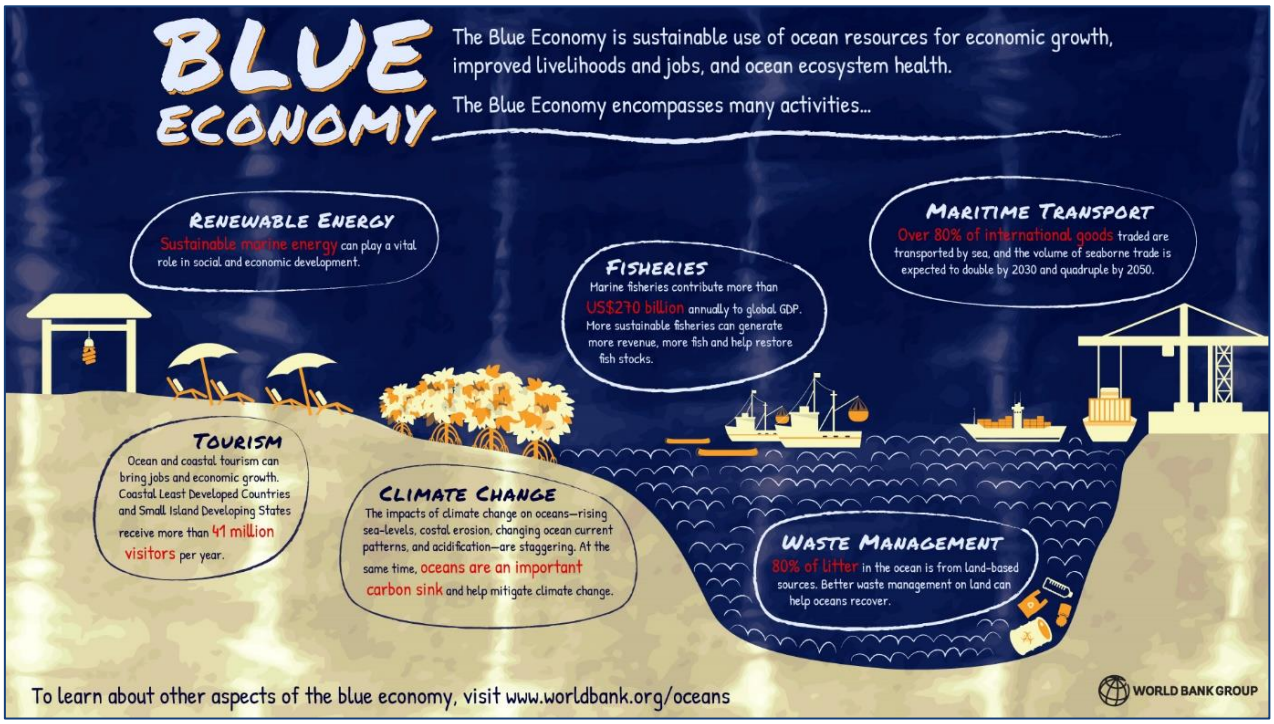
Between the two reporting years (2007-2012 and 2013-2018), there was a minor rise in the percentage of habitats and species in good conservation status inside the Natura 2000 network, which is protected by the Habitats and Birds Directives. On the other hand, fewer species had unaltered status, and a higher percentage of ecosystems were classified as having poor conservation status. Compared to the EU average, Czechia has a larger percentage of land that is cultivated organically. Since the early 2010s, there has been an increase in net agricultural emissions production, despite the fact that the agricultural sector's share of overall greenhouse gas emissions has remained stable (and far below the EU average). This is explained by an increase in agricultural soils and livestock emissions of non-CO2, known as enteric fermentation, in addition to a notable decline in the amount of CO2 that trees in the land use, land use change, and forestry (LULUCF) sector remove from the atmosphere. For the Czech farming industry, reducing ammonia emissions from agriculture is still a top priority. Net land take, a measure of changing land use and a significant stressor on biodiversity and the environment, including a concern for urban areas, decreased by almost half between 2006–2012 and 2012–2018, but it is still higher than the EU average. Under the United Nations Convention to Combat Desertification, Czechia has not committed to setting Land Degradation Neutrality targets. Reforms must be implemented quickly, including the inclusion of multigenerational forests in the national Recovery and Resilience Plan, to establish forests resilient to climate change[32]. With a water exploitation index score of 19.53%—just below the widely accepted threshold of 20%, which denotes water scarcity—Czechoslovakia has one of the lowest scores in the EU. Building resilience against increasing floods and droughts requires ensuring the excellent quality of surface and groundwater. Therefore, it is essential to make sure that drought management measures are widely adopted and expanded.

Blue Economy

The term "Oceans Economy" or "Blue Economy" is a relatively new concept that emerged from the United Nations Conference on Sustainable Development convened in Rio de Janeiro in 2012[33]. The term "blue economy" describes a sustainable and all-encompassing strategy for managing marine and ocean resources in order to promote economic growth, the creation of jobs, and better living standards while also protecting and maintaining the marine environment. The concept of the “Blue Economy” is directly linked to UN’s SDGs with priorities SDG 14 Life Below Water and 17 Partnership for the Goals and indirectly linked to SDG 15 Life on Land and 16 Peace, Justice and Strong Institutions.

[31] https://www.sgi-network.org/docs/2022/country/SGI2022_Czechia.pdf
[32] https://vlada.gov.cz/assets/evropske-zalezitosti/aktualne/2022-european-semester-country-report-czechia_en_2.pdf
[33] https://unctad.org/system/files/official-document/ditcted2014d5_en.pdf

Graph 30 Blue Economy Infographic



Source 20 https://www.worldbank.org/en/news/infographic/2017/06/06/blue-economy

The blue economy is commonly conceptualized with six dimensions: economic, social, environmental, technological, cultural and governance dimension[34]. For the purpose of prioritizing sustainability, the economic dimension concentrates on promoting economic growth and development. This dimension includes activities including fishing, aquaculture, tourism, shipping, marine biotechnology, and renewable energy. Developing sustainable business models that benefit local people, encouraging innovation, and extracting value from ocean resources are some of the guiding principles. Pertaining to equitable allocation of benefits of ocean resources the social dimension covers gender equality, labour regulations, human rights, and community development. The principles encompass forming alliances, engaging with local communities, and taking into account the social impacts of economic activities. With a focus on preserving ocean ecosystems, this dimension addresses pollution avoidance, biodiversity preservation, climate change adaptation, and ecosystem-based management. The goal of principles is to guarantee that the natural sustainability of ocean resources is not jeopardized by economic activities. The technological dimension pertains to the creation and implementation of cutting-edge technologies that facilitate the development of sustainable commercial ventures in the ocean. Among the topics are biotechnology, renewable energy technologies, artificial intelligence, sensors, and marine robots. Promoting innovation, technological transfer, and the sustainable application of emerging technologies are the goals of the principles. The cultural dimension covers customs like fishing, sailing, storytelling, and cultural tourism. It also addresses cultural heritage and traditional knowledge. The guiding principles place a strong emphasis on encouraging cross-cultural dialogue and collaboration, acknowledging the cultural aspects of ocean resources, and valuing cultural diversity. The governance dimension seeks to put in place efficient systems that facilitate the long-term, sustainable management of maritime resources. It includes

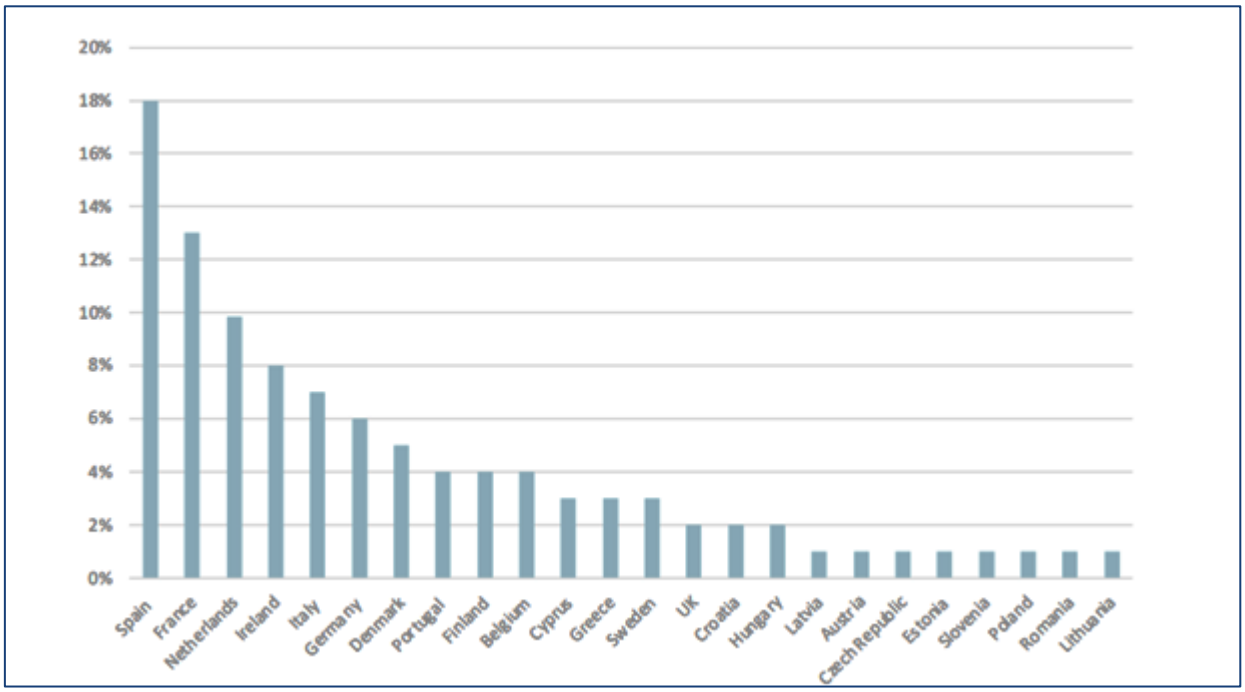
[34] https://www.researchgate.net/publication/369870650_Blue_Economy_Literature_Review

things like stakeholder participation, policy coordination, and institutional frameworks. The guiding principles centre on accountable, transparent, and participatory government systems. In order to find sustainable development paths that strike a balance between economic growth and environmental and social sustainability, research on the blue economy examines the linkages between these elements. Ocean governance, marine policy, ecosystem services, adaptation to climate change, and sustainable business models are important research areas. The ultimate goal of modern blue economy research is to establish a comprehensive framework enabling the sustainable use of ocean resources for the benefit of both present and future generations.

The EU Blue Economy Report 2022 by European Commission indicates that the Blue Economy in the Czech Republic contributes less than 0.4% of the national Gross Value Added (GVA) and employment. This aligns with the policies of other landlocked member states, including Slovakia, Hungary, Austria, and Luxembourg. In contrast, the employment proportion of Estonia is 6%, whereas the contributions of insular Member States like as Greece, Malta, Cyprus, Croatia, and Portugal are higher. The Blue Economy sectors of Spain, Denmark, Latvia, Ireland, and Bulgaria are also comparatively larger, accounting for 3% to 5% of the respective countries' GDP or employment[35]. For the Czech Republic, being a landlocked country, the findings emphasize that the Blue Economy is not a significant driver of economic output or job creation. The analysis highlights concern about possible approaches to economic diversification that landlocked nations, such as the Czech Republic, might take. There may be potential for indirect involvement, such as through innovation, technology transfer, capacity building or partnership with coastal states, as direct engagement in maritime activities is limited. Investing in education and training programs to build a skilled workforce with expertise in areas complementary to the Blue Economy can be a strategic move. This skilled workforce can then contribute to the development and implementation of innovative solutions. It becomes essential to form cooperative alliances with coastal countries. Working with coastal nations, the Czech Republic may use its knowledge in technology, engineering, and innovation to support the long-term growth of maritime activity. Mutually beneficial partnerships can be fostered through collaborative research initiatives, technology-sharing agreements, and involvement in international programs relating to ocean conservation or the development of the Blue Economy.

[35] https://oceans-and-fisheries.ec.europa.eu/system/files/2022-05/2022-blue-economy-report_en.pdf

Graph 31 Distribution of Member States' companies funded by BlueInvest[36]



Source 21 https://oceans-and-fisheries.ec.europa.eu/system/files/2022-05/2022-blue-economy-report_en.pdf

[36] BlueInvest is a European Commission initiative launched in 2019 with the aim to accelerate new ocean-based technologies and solutions to unlock innovation and investment opportunities in the sustainable blue economy. It is funded by the European Maritime, Fisheries and Aquaculture Fund (EMFAF). https://oceans-and-fisheries.ec.europa.eu/ocean/blue-economy/blueinvest_en

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Table 4 Sustainable Ocean Economy Stats of Czechia

Country				Czechia																					
Year				2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
Variable			**Unit**																						
Natural capital	Biodiversity and ecosystems: Coastal zone resources and ecosystems, Coastal land cover change	Built-up area, all land, sqkm	Square kilometres	2657,37	..	..	..	..	..	..	..	..	..	..	..	..	..	2954,43	..	..	..	..	..	..	..	..
		Built-up area, all land, as share of all land, %	Percentage	3,39	..	..	..	..	..	..	..	..	..	..	..	..	..	3,77	..	..	..	..	..	..	..	..
Environmental and resource productivity	Carbon and energy: CO2 Productivity, CO2 emissions from international maritime bunkers	International marine bunker CO2 emissions, thousand tonnes	Tonnes, Thousands	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	..	..
		International marine bunker CO2 emissions as share of CO2 emissions from total CO2 from fuel combustion and international bunkers, %	Percentage	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	..	..
Economic opportunities	Technology and innovation: Research, development and deployment (RD&D), Offshore/ocean renewable energy RD&D public budgets	Offshore wind technology (excl. low wind speed) RD&D, million USD 2021 PPP	US Dollar, Millions	..	..	..	..	..	0	0	0	0	0	0	0	0	0	0	0	0	0,11	0,15	0,12	0	0	..
		Tidal energy RD&D, million USD 2021 PPP	US Dollar, Millions	..	..	..	0	0	0	0	0	0	0	0	..	..	..	..	..	0	..	..	..	..	..	..
		Wave energy RD&D, million USD 2021 PPP	US Dollar, Millions	..	..	..	0	0	0	0	0	0	0	0	..	..	..	..	..	0	..	..	..	..	..	..
		Salinity gradient power RD&D, million USD 2021 PPP	US Dollar, Millions	..	..	..	0	0	0	0	0	0	0	0	..	..	..	..	..	0	..	..	..	..	..	..
		Other ocean energy RD&D, million USD 2021 PPP	US Dollar, Millions	..	..	..	0	0	0	0	0	0	0	0	..	..	..	..	..	0	..	..	..	..	..	..
		Unallocated ocean energy R&D, million USD 2021 PPP	US Dollar, Millions	..	..	..	0	0	0	0	0	0	0	0	..	..	..	..	..	0	..	..	..	..	..	..
		All ocean energy (excl. offshore wind) RD&D, million USD	US Dollar, Millions	..	..	..	0	0	0	0	0	0	0	0	..	..	..	..	..	0	..	..	..	..	..	..

		2021 PPP																								
		All ocean and offshore energy (offshore wind + ocean energy) RD&D, million USD 2021 PPP	US Dollar, Millions		..	..	..	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0,11	0,15	0,12	0	0	..
		All ocean and offshore energy (offshore wind + ocean energy) RD&D, share of total energy RD&D budget, %	Percentage		..	..	..	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0,07	0,09	0,05	0	0	..
		Total energy RD&D, million USD 2021 PPP	US Dollar, Millions		..	..	..	19,61	13,73	12,12	14,9	9,64	87,48	93,59	78,98	118,53	117,6	103,86	93,24	103,95	139,05	157,12	167,88	249,26	190,24	234,71	..
	Technology and innovation: Patents of relevance to ocean sustainability, Technology development (invention)	Ocean renewable energy inventions, number	Number		..	1	..	1	..	2	1	3	..	2	..	..	3	..	1	..	..	1	..	..	..	..	..
		Ocean pollution abatement inventions, number	Number		1	2	1	..	..	2	2	..	1	..	3	2	..	..	1	0,5	1	3	..	1	..	..	..
		Climate change mitigation inventions in maritime transport, number	Number		..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	1	2	..	..	..	..	..
		Desalination inventions, number	Number		..	..	..	..	..	..	..	..	..	0,25	..	..	..	1	1	..	..	..	1,5	..	..	..	..	..
		Climate change mitigation inventions in maritime fishing and aquaculture, number	Number		..	..	..	..	..	..	..	..	..	..	1,5	0,5	1	..	..	2	1	0,5	1	..	..	..	..	..
		Coastal adaptation inventions, number	Number		..	1	..	1	..	..	0,5	..	1	1	1	1	1	1	0,33	1	..	..	0,5	..	..	..	..	..
		Ocean-related ENVTECH inventions, number	Number		1	3	1	1	..	4	3,5	3	2	3,25	5,5	3,5	5	1	2,33	3,5	2	4,5	5	1	..	..	..
		Ocean-related high value ENVTECH inventions, number	Number		1	1	1	1	..	4	0,5	3	1	0,25	0,5	1	1	1	2,33	3,5	1	1,5	5	1	..	..	..
		Ocean-related ENVTECH inventions as share of total inventions, %	Percentage		0,16	0,51	0,17	0,14	..	0,56	0,46	0,34	0,22	0,34	0,55	0,36	0,45	0,08	0,2	0,3	0,19	0,42	0,5	0,1	..	..	..

		Ocean-related high value ENVTECH inventions as share of total high value inventions, %	Percentage		0,66	0,59	0,54	0,44	..	1,61	0,17	0,82	0,28	0,07	0,15	0,26	0,23	0,22	0,51	0,69	0,21	0,29	1,1	0,22	..	..	..
Policy responses	Market-based approaches, (economic) policy instruments: Taxes, fees and charges, tradable permit systems, subsidies, deposit refund schemes, etc. directed at ocean sustainability	Ocean-related taxes, number	Number		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
		Ocean-related fees or charges, number	Number		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
		Ocean-related tradable permit systems, number	Number		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
		Environmentally motived ocean subsidies, number	Number		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
		Ocean-related deposit refund schemes, number	Number		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
		Ocean-related voluntary approaches, number	Number		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
		Ocean-related policy instruments, number	Number		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
		Ocean-related policy instruments as share of all policy instruments, %	Percentage		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Market-based approaches: Payments to Government, Revenue from taxes relevant to ocean sustainability	Ocean-related tax revenue, million USD 2015 PPP	US Dollar, Millions		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	..
		Ocean-related tax revenue as share of environmentally related tax revenue, %	Percentage		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	..
		Ocean-related tax revenue as share of total tax revenue, %	Percentage		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	..
		Ocean-related tax revenue as share of GDP, %	Percentage		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	..
Socio-economic context	Fisheries and aquaculture	Total aquaculture production, marine and partly-marine species, thousand tonnes	Tonnes, Thousands		0,87	0,83	0,79	0,74	0,71	0,77	0,7	0,8	0,84	0,69	0,76	0,84	0,77	0,69	0,71	0,62	0,67	0,79	1,12	0,94	0,93	..	..

		Total aquaculture production, marine and partly-marine species, million USD	US Dollar, Millions		4,44	3,98	3,44	2,99	2,64	2,65	2,66	2,93	3,05	2,67	2,92	3,25	2,88	2,68	2,82	2,47	2,54	3,12	4,12	3,44	3,3	..	..
		People employed in aquaculture sector (marine and inland), total by occupation rate, thousands	Persons, Thousands		1,61	1,48	1,48	1,34	1,28	1,57	1,39	1,1	1,04	1,11	1,33	1,57	1,45	1,55	1,48	1,58	1,54	1,53	1,46	1,43	1,43	..	..
		People employed in fishery processing sector (marine and inland), total by occupation rate, thousands	Persons, Thousands		0,13	0,13	0,13	0,13	0,13	0,13	0,13	0,13	0,13	0,14	0,14	0,14	0,14	0,14	0,14	0,15	0,17	0,17	0,19	0,2	0,2	..	..
		Total exports of fisheries products, million USD	US Dollar, Millions		53,87	61	58,44	61,55	66,3	71,72	74,45	80,72	80,8	70,52	83,99	100,4	106,35	123,98	146,28	159,59	184,57	193,42	161,37	167,21	171,83	..	..
		Total imports of fisheries products, million USD	US Dollar, Millions		154,53	170,32	148,46	135,98	139,06	156,58	167,14	173,05	174,44	167,11	178,99	197,52	213,18	235,66	268,07	288,59	318,61	339,55	327,41	333,22	328,7	..	..
	Ocean-related tourism	International sea passenger transport expenditure, million USD	US Dollar, Millions		..	..	..	..	..	..	..	..	0,05	0,1	0	0	0	0,08	0,09	0,1	0,1	0	..	..	..	..	..
		International sea passenger transport receipts, million USD	US Dollar, Millions		..	..	..	..	..	..	..	..	0	0	0	0	0	0	0	0	0,2	0,19	0,17	0,17	0,08	..	..
		International sea passenger transport receipts as share of total international tourism receipts, %	Percentage		..	..	..	..	..	..	..	..	0	0	0	0	0	0	0	0	0	0	0	0	0	..	..
		International sea passenger transport expenditure as share of total international tourism expenditure, %	Percentage		..	..	..	..	..	..	..	..	0	0	0	0	0	0	0	0	0	0	..	..	..	..	..

Source 22 https://stats.oecd.org/index.aspx?datasetcode=OCEAN#

Impacts of Blue Economy

The Blue Economy has the capacity to fundamentally improve the management of maritime environments, reduce greenhouse gas emissions, advance fair health standards, and make a significant impact in the worldwide effort to combat climate change. The growing energy sector has experienced an unparalleled upsurge in the last few years, with maritime areas emerging as focal points for renewable energy initiatives. Utilizing a variety of energy sources, including tidal, hydro, and wind, is ideal for realizing the enormous potential of oceans[37]. The ocean's climate, chemical makeup, circulation patterns, sea levels, and ice distribution are all changing due to climate change. Since 1970, the ocean has warmed, and since 1993, the rate of warming has probably more than doubled. Deoxygenation has been brought on by this temperature rise, and acidity has been brought on by the increased absorption of CO2. Sea levels are rising more quickly at the same time that tropical cyclones and rainfall are increasing, which is making coastal hazards like floods more severe. These extraordinary changes in physical characteristics are having far-reaching and intensifying effects on many aspects of the natural elements that support the blue economy. This encompasses the diversity, composition, and efficiency of marine ecosystems.

Blue economy has enormous sustainable economic impacts. The blue economy's main goals are to preserve or improve livelihoods, promote social inclusion, and advance economic growth all at the same time in order to achieve environmental sustainability. The World Bank estimates that the Blue Economy in Europe supports around 5.4 million employment and creates about €500 billion in gross added value annually[38]. Each nation should determine the best possible balance between sustainability and economic expansion in order to create a blue economy that is both environmentally friendly and allows for the effective use of marine resources. Our goal in this study has been to highlight the Blue Economy's economic benefits through an examination of several important industries, such as offshore oil and gas, cruise tourism, aquaculture, and marine transportation. This significant contribution emphasizes how important maritime-related activities are to maintaining and improving economic well-being. The blue economy is a crucial element in helping governments manage the challenges of attaining sustainability. It provides a framework that allows them to profit from marine resources while protecting the environment. Also, blue economy enhances economic resilience and reduces dependence on traditional sectors with the newly emerging sectors like marine renewable energy, shipbuilding, and marine research contribute to job creation, supporting local communities.

Another key impact of blue economy is about research and innovation for deeper understanding of the oceans. Through collaborative research endeavours, countries can combine resources, exchange knowledge, and carry out extensive investigations on diverse facets of ocean health, biodiversity, and the effects of climate change. The collaborative approach makes it possible to evaluate the problems that maritime habitats face more comprehensively and makes it easier to come up with creative solutions. The global network of academics working towards common goals has been spurred by the Blue Economy, which encourages information exchange and collaborative investigations. In addition to advancing scientific understanding, this cooperative research establishes the groundwork for well-informed policymaking,

[37] https://unric.org/en/blue-economy-oceans-as-the-next-great-economic-frontier/
[38] https://thedocs.worldbank.org/en/doc/446441473349079068-0010022016/original/AMCOECCBlueEconomyDevelopmentFramework.pdf

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guaranteeing that countries can work together to address the intricate and interrelated problems plaguing our oceans.

By taking part in collaborative research projects, citizens can indirectly support international efforts to comprehend and resolve issues related to the ocean. Furthermore, developments in blue technologies—like offshore wind and other renewable energy sources—may have an impact on landlocked countries' sustainability and energy security strategies, as well as the larger energy environment. Citizens may find chances for engagement in adjacent industries, such as technological development and environmental innovation, so contributing to a more sustainable and integrated global community, even though the immediate economic rewards may be limited. By taking part in collaborative research projects, citizens can indirectly support international efforts to comprehend and resolve issues related to the ocean. Furthermore, developments in blue technologies, including offshore wind and other renewable energy sources, could have an impact on Czech Republic and other landlocked countries' sustainability and energy security strategies, as well as the larger energy environment. Citizens may find chances for engagement in adjacent industries, such as technological development and environmental innovation, so contributing to a more sustainable and integrated global community, even though the immediate economic rewards could be limited.

Blue Schools

Despite being a landlocked country, the Czech Republic might benefit greatly from the establishment of Blue Schools in terms of promoting sustainability and environmental consciousness. With their emphasis on social impact and community involvement, blue schools can work as catalysts to help local communities comprehend and tackle global environmental and marine concerns. Despite not having direct access to the sea, the Czech Republic may benefit from collaborations with a variety of scientific and cultural institutions by implementing the Blue School model. These collaborations have the potential to transcend national borders and link Czech communities with international networks devoted to ocean-related conservation and education initiatives. The creation of a Blue School network in the Czech Republic can enhance environmental literacy in the nation, motivating people to take part in cooperative research projects, advance sustainable lifestyles, and tangentially help the larger objectives of the Blue Economy. The Czech Republic can contribute to the global endeavour to establish networked and environmentally responsible communities by means of this initiative.

Czechia may gain a lot by incorporating ideas of the blue economy into the curriculum and improving teacher preparation through the use of Blue Schools. Environmental education is made immediately relevant to Czech pupils by focusing on local freshwater ecosystems, such as rivers, lakes, and wetlands, in the curriculum. Through the demonstration of the interdependence of environmental, economic, and social factors, this approach promotes cross-disciplinary learning. In line with Czechia's attempts to effectively manage its water resources, the curriculum might place a strong emphasis on sustainable practices, such as modules on water conservation and waste management education. Furthermore, incorporating instruction on cutting-edge technologies linked to sustainable land use and water conservation can get students ready for jobs in environmental science and technology. Including lessons about the importance of water in Czechia in the curriculum also helps to foster cultural awareness. Regarding the training of teachers, educators stand to get valuable insights into the local ecosystems of Czechia as well as practical educational approaches.

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Training ought to concentrate on doable methods for incorporating the concepts of the blue economy into many courses, promoting a comprehensive comprehension of environmental sustainability. Teachers may create an engaging and interactive learning environment by offering advice on planning field trips, hands-on activities, and inclusive teaching methods. In order to create a network of support for Blue School projects, teacher training should also place a strong emphasis on engagement with local communities and environmental education specialists. The ultimate goals of this all-encompassing strategy are to improve environmental education, empower law-abiding citizens, and support Czechia's sustainable growth.

Establishing research and collaboration efforts based on Blue Schools can considerably benefit Czechia by expanding scientific understanding, fostering community participation, and pushing sustainable behaviours. Research projects that concentrate on regional aquatic ecosystems and environmental issues can offer insightful information about the distinctive features of Czechia's water resources, supporting evidence-based conservation and policy decisions. In order to ensure a thorough understanding of the ecological dynamics at work, partnerships between academic institutions, environmental organizations, and local communities can build a strong network for data collection, analysis, and dissemination. Such partnerships can also help develop focused solutions to solve particular environmental problems that Czechia is facing, encouraging flexible and sustainable management techniques. Participating local communities in research projects improves citizen science by promoting involvement and raising knowledge of environmental challenges. By fostering a feeling of shared accountability, this strategy enables communities to play a part in the preservation and conservation of their natural environment. Collaborative projects can also help close the knowledge gap between academics and real-world applications by converting research results into practicable environmental protection strategies. In order to help Czechia become a resilient and environmentally conscious nation, Blue Schools can be extremely important in promoting a culture of cooperation and research-driven teaching.

By encouraging ecologically responsible behaviour, strengthening educational frameworks, and supporting environmentally sustainable practices, leveraging legislative influence based on Blue Schools can have a significant positive impact on Czechia. Blue school policies can push for the inclusion of comprehensive environmental education in national curricula, giving students the knowledge and abilities, they need to comprehend, value, and safeguard aquatic environments. Furthermore, encouraging regulations can encourage communities and schools to embrace sustainable practices, encouraging waste reduction, water conservation, and the wise use of natural resources. Policies can aid in the creation of a coherent and successful environmental education plan suited to the particular requirements of Czechia by promoting cooperation between educational institutions, governmental agencies, and environmental organizations.

These programs help to raise a generation of environmentally conscious citizens by offering programs that enable students to advocate for legislation that protect the environment. Students can take part in workshops on successful advocacy, learn about the legislative process, and use platforms to express their opinions and concerns. In addition, encouraging engagement with lawmakers creates a direct channel of contact between policymakers, educators, and students. Open communication facilitates the sharing of ideas, worries, and recommendations, which helps local and national policymakers make more inclusive and well-informed choices. Blue Schools in Czechia

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have a greater impact because of the coordinated efforts of Student Advocacy Programs and Engagement with Policymakers, which guarantee that student and instructor voices actively change the environmental policy landscape.

2.2.3. Gaps in Literature

Addressing research gaps in the context of ocean literacy and education highlights a number of important gaps in the body of literature, especially when looking at the particular instance of Czechia. A significant deficiency is the dearth of thorough research on ocean literacy programs in landlocked nations, with notably little attention paid to the particular difficulties and advantages that the Czech Republic has in promoting ocean awareness. Because Czechia is landlocked, there is a lack of academic interest in subjects related to the ocean, which makes it difficult to assess the value and effects of teaching ocean literacy in a nation that is geographically remote from maritime areas. The dearth of literature that specifically addresses the requirements and concerns of landlocked countries, such as Czechia, highlights the significance of this research vacuum and the need for tailored educational strategies that resonate with the local context.

The Czech population's lack of interest in and knowledge of topics pertaining to the ocean also adds to the research gap. The lack of research on the elements influencing public participation in landlocked areas' ocean literacy projects impedes the creation of successful instructional strategies. Designing focused programs that can overcome these obstacles requires an understanding of the Czech context's ocean literacy barriers to interest and participation. The potential to improve environmental education and awareness in Czechia—thereby promoting a feeling of global responsibility and interconnectedness—makes filling these research gaps crucial. The study intends to provide important insights by exploring the causes behind the paucity of literature on ocean literacy in landlocked nations and the unique difficulties faced by Czechia.

Identification of New Research Needs

A key new research need is the impact of blue economy on local communities. Examining the direct effects that marine industries, including fisheries and aquaculture, have on local employment, income levels, and means of subsistence and how economic gains are distributed, taking into account advantaged and disadvantaged groups require significant attention. Also, examining the wider social ramifications of blue economy projects, including adjustments to social well-being, cultural norms, and community dynamics, by looking into any unforeseen repercussions that might have an impact on local customs and ways of life, either positively or negatively is highly important.

It becomes clear that researching the long-term effects of student advocacy initiatives is an important topic worth academic study. Understanding the long-lasting consequences that go beyond the period of active participation is noticeably lacking. The goal of this research requirement is to examine the long-term effects of student advocacy programs, illuminating how these initiatives mold people over time and impact larger societal and policy contexts. The study should concentrate on tracing the transformative path taken by participants in student advocacy programs, monitoring their commitment to sustainable behaviours, civic involvement, and environmental

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consciousness over time. It is crucial to comprehend whether involvement in advocacy programs fosters a lifetime of civic duty and environmental care.

2.2.4. Lessons from Previous Similar Studies

Research has shown the need for an interdisciplinary curriculum covering meteorology, climatology, geological history, the carbon cycle, and climate change mitigation and adaptation. This approach ensures a comprehensive understanding of environmental issues. Interdisciplinary education closely matches the complexity of environmental issues encountered in the real world. Since climate change is a complex problem, understanding the ways in which different scientific fields contribute to the whole picture is necessary. With this method, students can learn to identify the relationships and interdependencies between various environmental elements, laying the groundwork for a more sophisticated comprehension of intricate ecological systems. The interdisciplinary method encourages students to evaluate and synthesize data from several fields, which fosters critical thinking abilities. Students develop a more robust problem-solving mindset by learning to make connections and recognize patterns instead of compartmentalizing knowledge. Ocean systems and climate are intrinsically linked. These links are acknowledged and utilized via an interdisciplinary curriculum. For instance, comprehension of the carbon cycle is necessary for deciphering climate patterns, and comprehension of geological history is vital for grasping climate change dynamics.

Important takeaways from the study “The Climate Literacy Challenge”, that was mentioned before, highlight how crucial it is to incorporate ocean and climate awareness within the current educational system. The writers stress the importance of specialized educational programs that address the unique opportunities and problems faced by the Czech Republic. The article's methodical approach, which focuses on elite institutions that train future journalists, educators, and leaders, provides a tactical framework for guaranteeing a wide-ranging influence on society. The study also emphasizes how critical climate literacy is to close the knowledge gap between the general people and scientists. The focus on measuring students' abilities and values in addition to their stated information suggests a more complex method of determining how effective educational initiatives are. This thorough analysis is essential to comprehending the long-term impact of climate and ocean literacy initiatives. The study shows the significance of multidisciplinary, customized programs for climate and ocean literacy, deliberate targeting of educational institutions, and thorough assessment techniques. These courses serve as a guide for upcoming research projects that will improve environmental literacy and promote sustainable behaviours in the Czech Republic and other countries.

Another key takeaway is the importance of tailored educational programs, which suit the specific challenges and opportunities within a specific context. This approach recognizes the diversity of learning needs, socio-cultural factors, and contextual nuances that influence the effectiveness of educational interventions. The body of research on ocean literacy that has been done thus far reveals a serious knowledge vacuum regarding the significance of the ocean in relation to the Czech Republic. Despite an increasing amount of study conducted worldwide, little is known about the unique peculiarities and awareness levels in the Czech Republic. The necessity of incorporating ocean literacy into the Czech context and strengthening the bonds

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between the Czech people and the ocean is highlighted by this deficiency of comprehensive understanding. A 2017 study that was mentioned in detail before, underlines even more how important gender-sensitive approaches are to closing this disparity. Ten thousand Europeans from ten different nations participated in the study, which measured their level of awareness, worry, and trust in marine climate change. The study found that various demographic groups, including age, had quite varying perceptions and awareness levels. These results point to a gendered component in the Czech Republic's ocean literacy awareness and concern levels. In order to close this gap, gender-sensitive solutions must be put into place. This means that policy interventions, awareness campaigns, and educational programs must be specifically designed to target the needs, viewpoints, and concerns that are specific to each gender. Ocean literacy programs in the Czech Republic can be more successful in promoting a deeper understanding of marine climate change issues and inspiring active engagement and concern among all segments of the community by recognizing and addressing these gender-specific variances.

2.2.5. Survey and Public Perception

A survey was conducted to gather insights on critical topics related to ocean sustainability. The survey was designed as an online questionnaire with 21 questions, with a focus on eight European countries – Austria, Czechia, Estonia, Hungary, Italy, Poland Romania and Türkiye. The online questionnaire was accessible to citizens of the those countries with targeted outreach efforts towards students, educators, and broader public interested in ocean sustainability. Participation was voluntary and anonymous, ensuring the integrity and objectivity of the collected data. It was designed to explore key themes including:

- Ocean Literacy Initiatives: Assessing public understanding of ocean health and sustainability practices.
- "Sea Blindness" Phenomenon: Investigating the awareness of human dependence on healthy oceans and the disconnect between people and the marine environment.
- Emerging Blue Economy: Gauging public perceptions and potential opportunities associated with ocean-based sustainable development initiatives.
- Climate Change Impacts: Evaluating public understanding of the far-reaching consequences of climate change on marine ecosystems and the need for adaptation strategies.

The Blue School Studies survey aimed to provide robust data for in-depth analysis of these crucial themes. The collected information informs the development of innovative educational programs and resources within the SHORE project. By empowering students with ocean literacy and fostering their role as agents of change, the project seeks to promote sustainable behaviour and contribute to a healthier future for our oceans. The Blue School Studies survey was anticipated to yield valuable insights into public knowledge, attitudes, and concerns regarding ocean health and sustainability. These findings form the basis for developing effective educational tools and strategies within the SHORE project, ultimately empowering students to become effective advocates for healthy oceans and a sustainable future.

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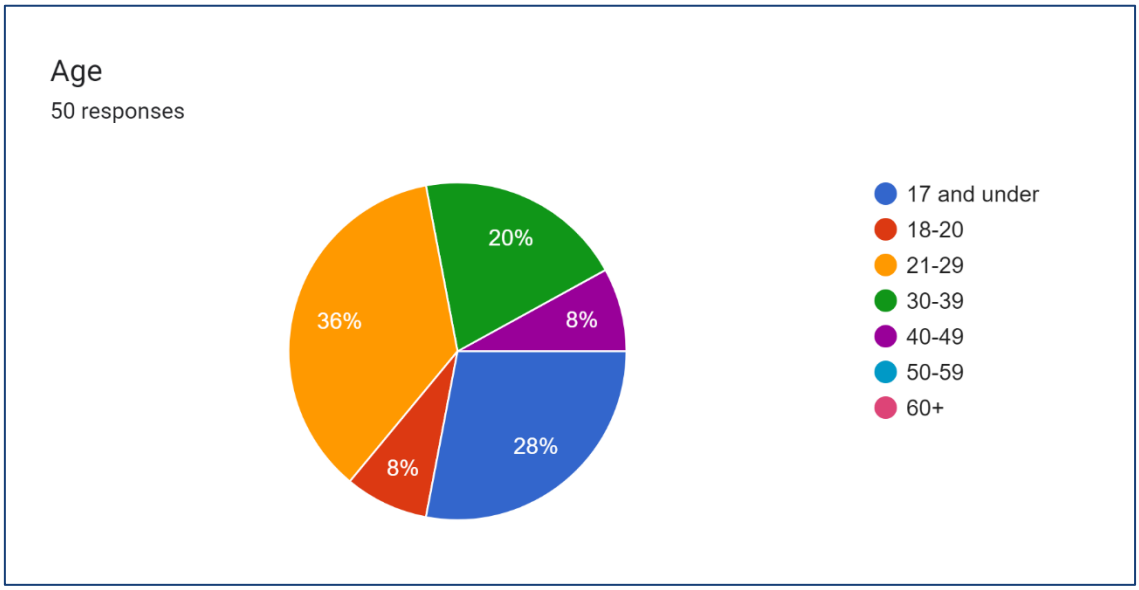
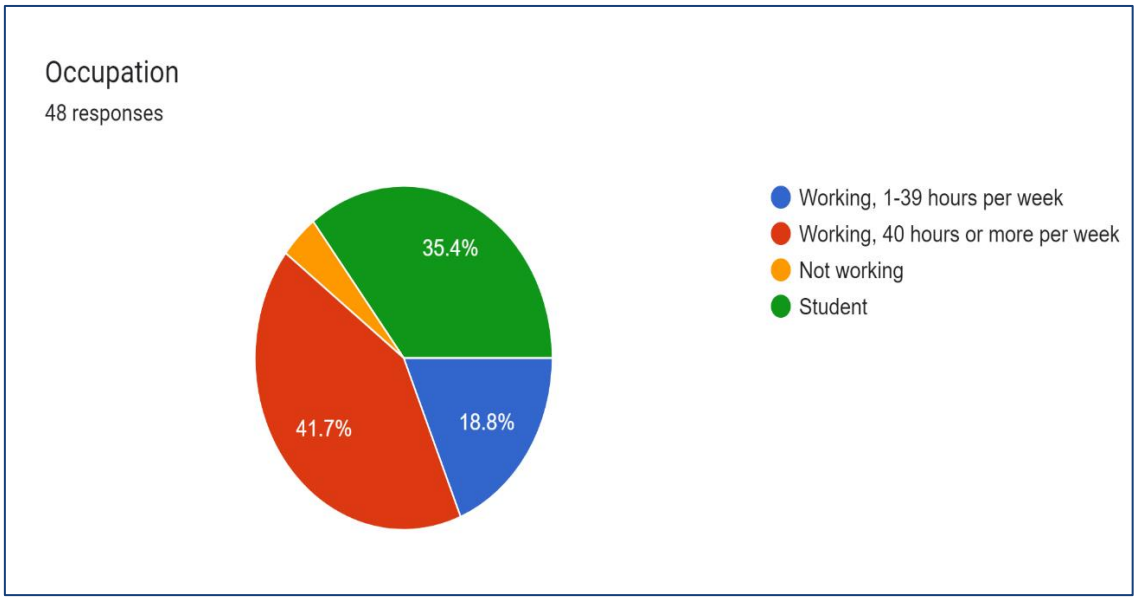
Below are the graphs of the survey participants from Czechia.

Graph 32 Age of Survey Participants - Czechia



Graph 33 Working Status of Survey Participants - Czechia



The survey provides insights into the diverse working statuses of the participants, with four distinct categories capturing the distribution of responses. The largest segment, comprising 41.7% of the total responses, represents individuals who are actively employed, dedicating 40 hours or more per week to their work. This suggests a significant proportion of participants engaged in full-time employment, possibly contributing to a broad range of professional sectors and industries. A notable 35.4% of respondents identify as students, indicating a substantial presence of individuals focused on educational pursuits. This diverse group of students may be enrolled in various academic levels, ranging from high school to higher education, each with unique perspectives and priorities.

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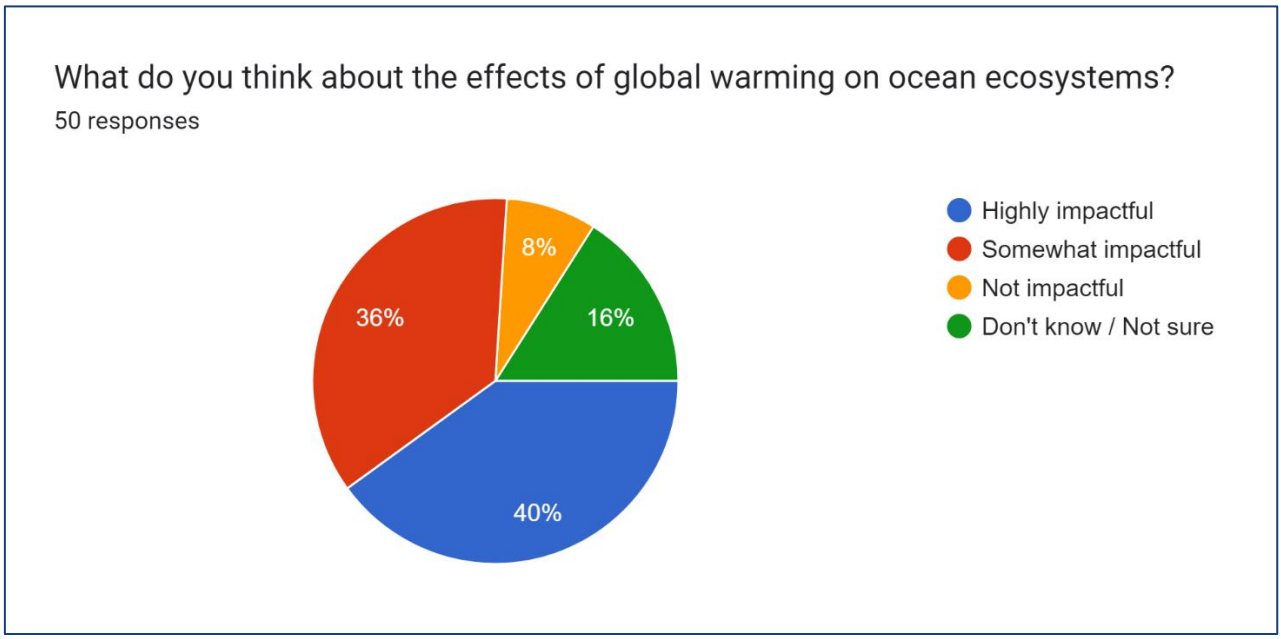
Another segment consists of participants who are working but for fewer hours per week. Approximately 18.8% fall into this category, suggesting a part-time work arrangement. This group may include individuals balancing work commitments with other responsibilities, such as education, family, or personal interests. Lastly, 4.2% of participants indicate that they are currently not working. This category encompasses a range of circumstances, including individuals currently seeking employment, those taking a break from the workforce, or those engaged in other non-employment activities. The data underscores the diverse occupational statuses of the surveyed population, encompassing full-time workers, students, part-time employees, and those currently not working. This variety in working status is essential to consider when interpreting survey results, as it can influence perspectives on topics such as ocean-related awareness, education, and environmental concerns.

Graph 34 What do you think about the effects of global warming on ocean ecosystems? - Czechia

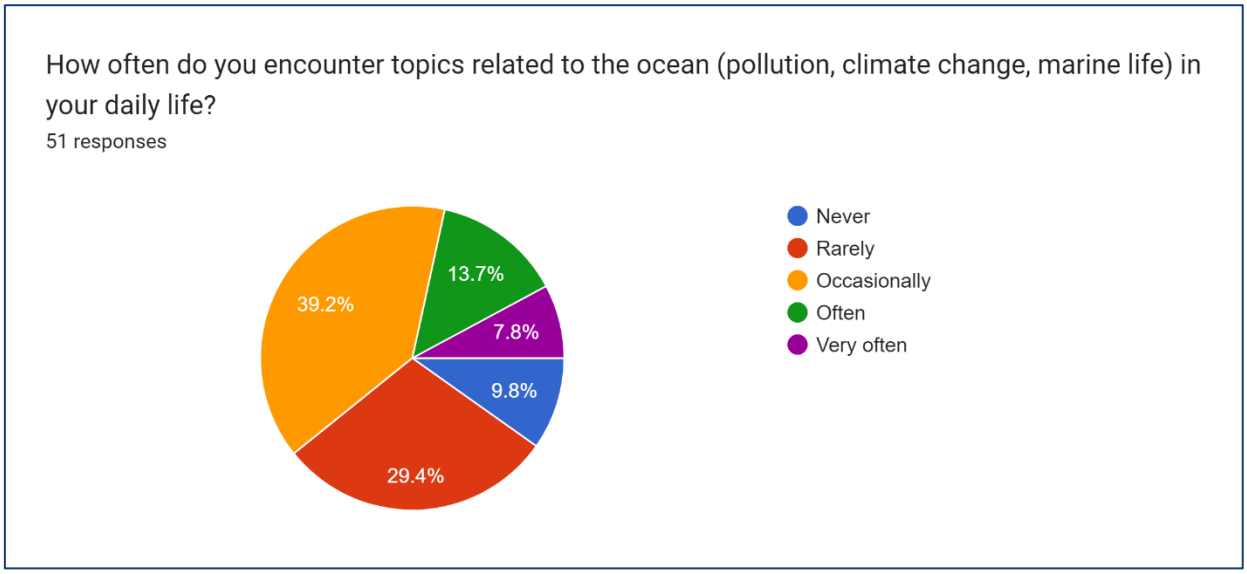


The data on participants' perceptions of the effects of global warming on ocean ecosystems reveals diverse opinions. A substantial portion, constituting 40% of respondents, believes that global warming has a highly impactful effect on these ecosystems. This suggests a heightened awareness among participants about the severe consequences that rising global temperatures may impose on the health and functioning of the world's oceans. In addition, 36% of participants express the view that global warming is somewhat impactful on ocean ecosystems. This group recognizes the influence of climate change but may not perceive it as overwhelmingly severe compared to the segment that views it as highly impactful. The nuances in responses reflect a spectrum of awareness and concern among survey participants.

Contrastingly, a smaller percentage, 8%, believes that global warming is not impactful on ocean ecosystems. This group may hold different perspectives on the relationship between climate change and ocean health, possibly suggesting a range of opinions within the surveyed population. The reasons behind this perception could vary, and it could be interesting to explore the factors influencing such views in further detail.

Furthermore, 16% of participants indicate uncertainty or lack of knowledge about the impact of global warming on ocean ecosystems. This group's responses underscore the importance of education and communication regarding climate change and its consequences, particularly within the context of ocean ecosystems. Overall, the survey data highlights the need for continued awareness and education about the critical role of global warming in shaping the health and sustainability of ocean ecosystems, as well as the diversity of perspectives held by survey participants.

Graph 35 How often do you encounter topics related to the ocean (pollution, climate change, marine life) in your daily life? - Czechia



The survey's data on the frequency of encountering ocean-related topics—such as pollution, climate change, and marine life—provides a window into the daily experiences and awareness of the participants. 39.2% of respondents, the majority, said they occasionally encounter these subjects in their daily lives. This implies that, while not always, conversations or information about the ocean are a regular part of the lives of a sizable segment of the population studied. Another significant group, at 29.4%, stated that they sporadically came across themes related to the ocean. This could mean that a significant percentage of the people who were polled don't often encounter conversations or information about ocean-related issues in their day-to-day lives.

Thirteen percent of the participants reported that they frequently come across subjects associated with the ocean. This shows that a portion of the population polled actively participates in or is frequently exposed to conversations, information, or news about the ocean, pollution, climate change, and marine life. 9.8% of respondents, a smaller group, said they never came across such subjects in their daily life. This would suggest that members of this specific group are not exposed to, interested in, or aware of conversations about the ocean and environmental issues.

Finally, 7.8% of participants reported that they frequently encountered themes linked to the ocean, suggesting that they were more exposed to and engaged with conversations, news, or information about the ocean, pollution, climate change, and marine life. Hence, the survey findings indicate varying degrees of exposure

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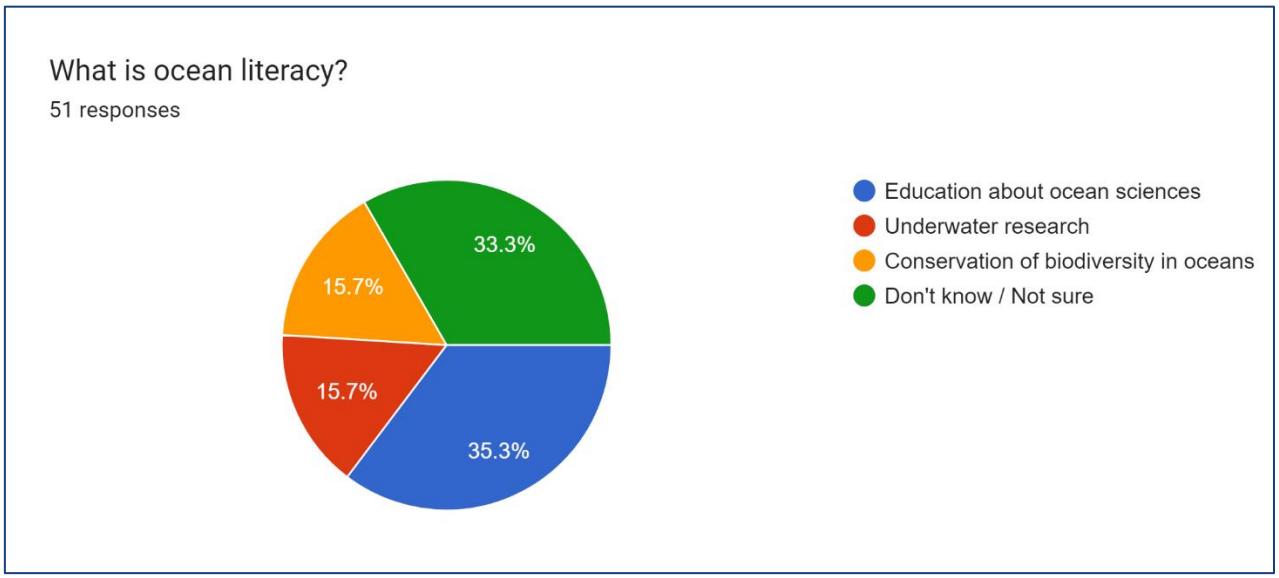
engagement with ocean-related topics among participants, underscoring the need for varied approaches in communication and education to address the range of awareness levels and interests within the surveyed population.

Graph 36 What is ocean literacy? - Czechia



The term "ocean literacy" carries connotations that may directly link to the vast expanses of oceans. t's important to remember, though, that the idea can apply to other water sources in addition to only oceans. According to the study results, there are differing opinions. For example, 35.3% of respondents linked ocean literacy to learning about ocean sciences. This implies a desire to comprehend the complex physical, chemical, and biological characteristics unique to oceans.

The significant portion of respondents (33.3%) who said they were "Don't know/Not sure" highlights the possibility of a more expansive interpretation or the need for more information. It is possible that participants are not entirely aware of the term's broad definition, which encompasses a variety of bodies of water, including rivers, lakes, seas, and other aquatic ecosystems.

The 15.7% correlations with conservation of biodiversity in oceans may point to an understanding of the variety of aspects of ocean literacy. This diversity highlights the significance of taking into account not just the size of oceans but also the connectivity of various water sources and the requirement for a comprehensive knowledge of aquatic ecosystems. Therefore, the concept of "ocean literacy" encompasses more than only oceans; it also refers to a deeper understanding of the disciplines associated to water. It is imperative to bridge this knowledge since it encompasses not just the huge oceans but also the complex interactions between different bodies of water, adding to a holistic view of aquatic environments.

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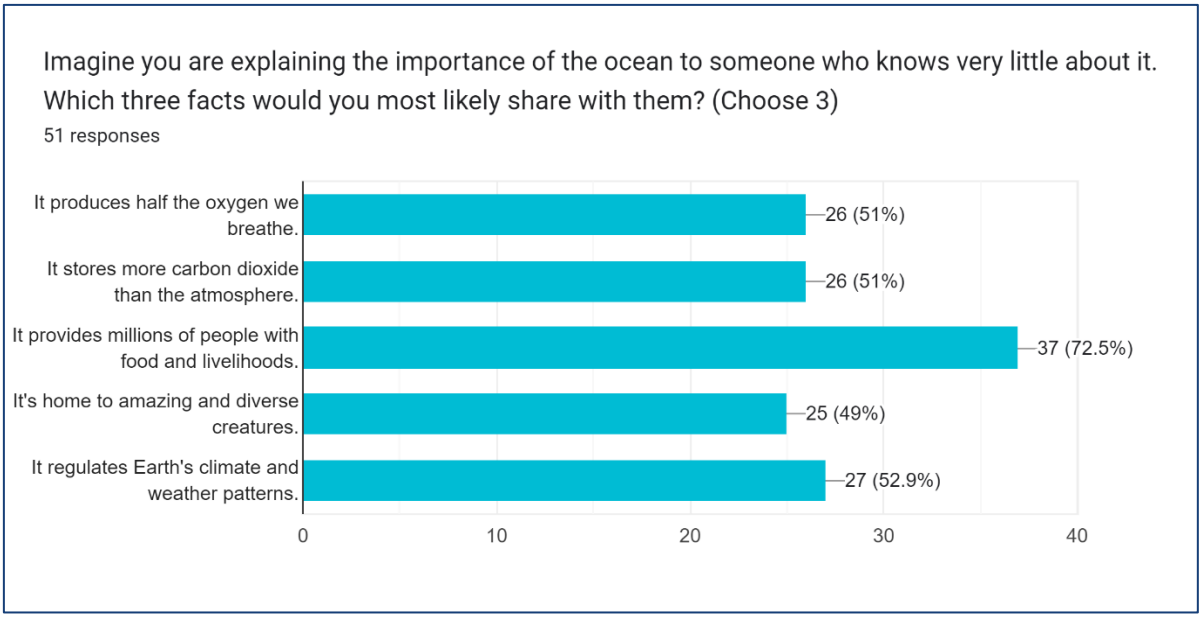
Graph 37 Imagine you are explaining the importance of the ocean to someone who knows very little about it. Which three facts would you most likely share with them? (Choose 3) - Czechia



Participants in the survey selected three salient facts about the ocean that they would probably share with someone who was not familiar with it. This data reveals interesting trends regarding the perceived importance of the ocean. The most important information, selected by 72.5% of respondents, emphasizes how vital the ocean is to millions of people's access to food and a living. This overwhelming choice highlights the importance of the ocean as a key resource and implies that participants are more conscious of the immediate effects of the ocean on human populations worldwide. The notion that Earth's oceans control the planet's climate and weather patterns came in second, selected by 52.9% of participants. This acknowledgement shows that a significant percentage of respondents were aware of the ocean's wider environmental effects in addition to its direct effects on human communities. The recognition of the ocean's function in regulating climate suggests an understanding of the ocean's interdependence with other planetary systems.

Notably, 51% of respondents chose the following two facts: "It produces half the oxygen we breathe" and "It stores more carbon dioxide than the atmosphere." This two-pronged approach represents a balanced understanding of the ocean's critical function in producing oxygen, reducing climate change, and sequestering carbon. This implies that participants have a complex awareness of the ocean's multifarious significance, which includes respiratory and environmental aspects. All things considered, the poll indicates a comprehensive understanding of the importance of the ocean in many different contexts. Participants demonstrate how it affects human livelihoods directly as well as more broadly in regulating the climate and essential processes like the generation of oxygen and the storage of carbon.

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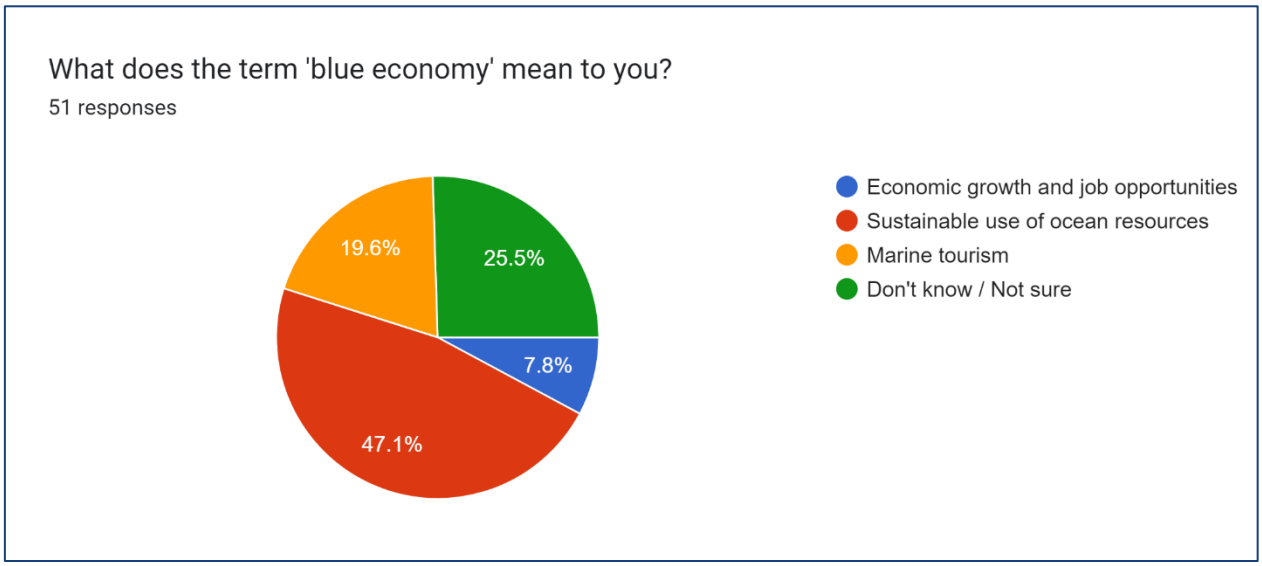
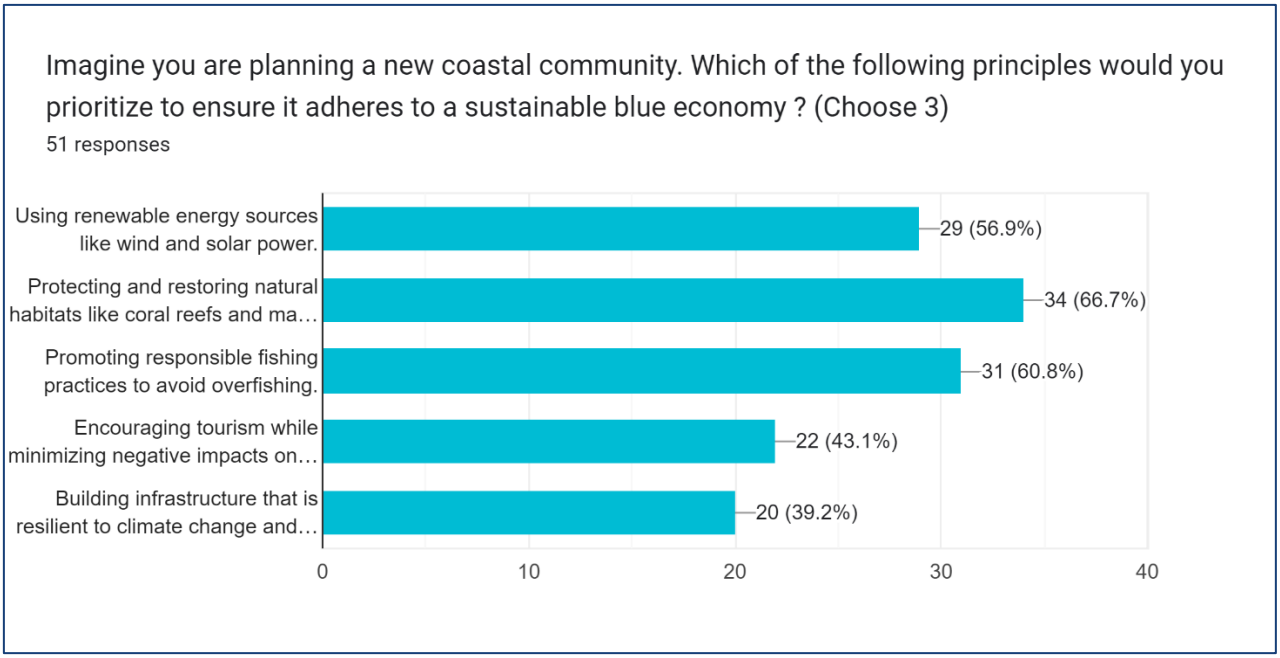
Graph 38 What does the term 'blue economy' mean to you? - Czechia



The survey's findings showed the various ways in which participants understood the phrase "blue economy," representing a variety of viewpoints. The 'blue economy' is most commonly associated with the sustainable use of ocean resources, according to 47.1% of participants. This implies a general consensus that is consistent with the idea's focus on the ethical and ecologically responsible use of marine resources for commercial purposes. A sizeable portion of respondents, or 25.5%, said they were "don't know" or "not sure," suggesting that they were unfamiliar with or highly unsure about the term "blue economy." This result highlights the need for additional training and explanation on the idea, since 25% of respondents could not be familiar with this economic model.

A little over 19% of participants associate marine tourism with the "blue economy," implying a connection between economic activity and tourism centred around the coast and the ocean. This interpretation incorporates elements of the tourism business that depend on the distinctive charms of maritime habitats, highlighting the variety of ways in which the term is viewed. 7.8% of respondents link the "blue economy" to employment and economic expansion. According to this view, the phrase should be understood in terms of promoting employment and economic growth through initiatives involving ocean resources. Therefore, different people's knowledge with and interpretations of the phrase "blue economy" are revealed by the poll results. Although a sizeable number links it to sustainable resource use, there are noteworthy percentages that express ambiguity or relate the idea to marine tourism and broader economic growth. Further education and communication on the 'blue economy' may help enhance understanding among the surveyed population.

Graph 39 Imagine you are planning a new coastal community. Which of the following principles would you prioritize to ensure it adheres to a sustainable blue economy ? (Choose 3) - Czechia



When envisioning the development of a new coastal community rooted in the principles of a sustainable blue economy, it becomes imperative to prioritize key aspects that ensure the long-term harmony of environmental, social, and economic dimensions. As indicated by 66.7% of respondents, the primary concept that would be given priority is the preservation and restoration of natural environments. This highlights a dedication to protecting important ecosystems, such as mangroves and coral reefs, acknowledging their inherent worth in sustaining marine biodiversity, climate resilience, and the general well-being of maritime settings. The encouragement of ethical fishing methods is another crucial idea worth taking into account, as indicated by the support of 60.8% of respondents. This emphasizes how crucial it is to prevent overfishing and make sure that fisheries are managed sustainably.. Setting responsible fishing as a top priority is consistent with the core principles of a sustainable blue economy, which balance economic activity with the need to protect marine resources for coming generations.

Alongside these environmental concerns, 56.9% of respondents support using renewable energy sources such as solar and wind power. This principle demonstrates a dedication to lowering the coastal community's carbon footprint, promoting energy sustainability, and helping to create an infrastructure that is more ecologically friendly. Including renewable energy is in line with the blue economy's philosophy, which aims to strike a balance between ecological responsibility and economic prosperity. In summary, the order of importance of these three tenets—preserving natural areas, encouraging ethical fishing methods, and making use of renewable energy sources—forms a thorough strategy for coastal community planning. By coordinating economic development with environmental stewardship, such a community can exemplify the principles of a sustainable blue economy, ensuring resilience, balance, and longevity in the face of evolving challenges.

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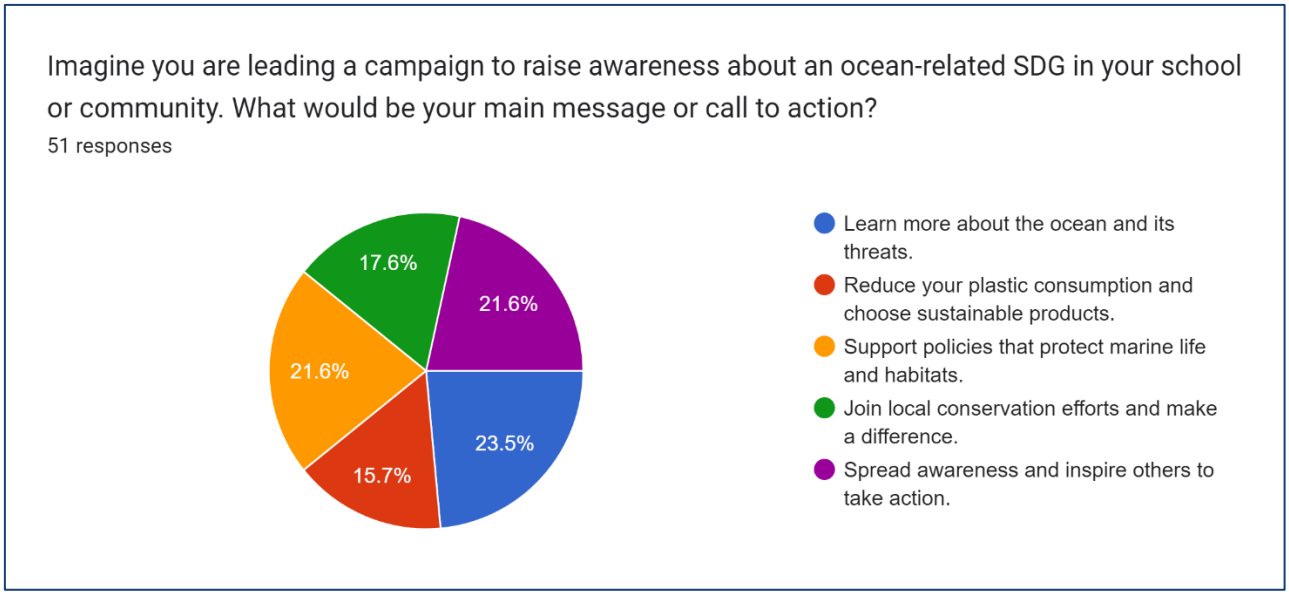
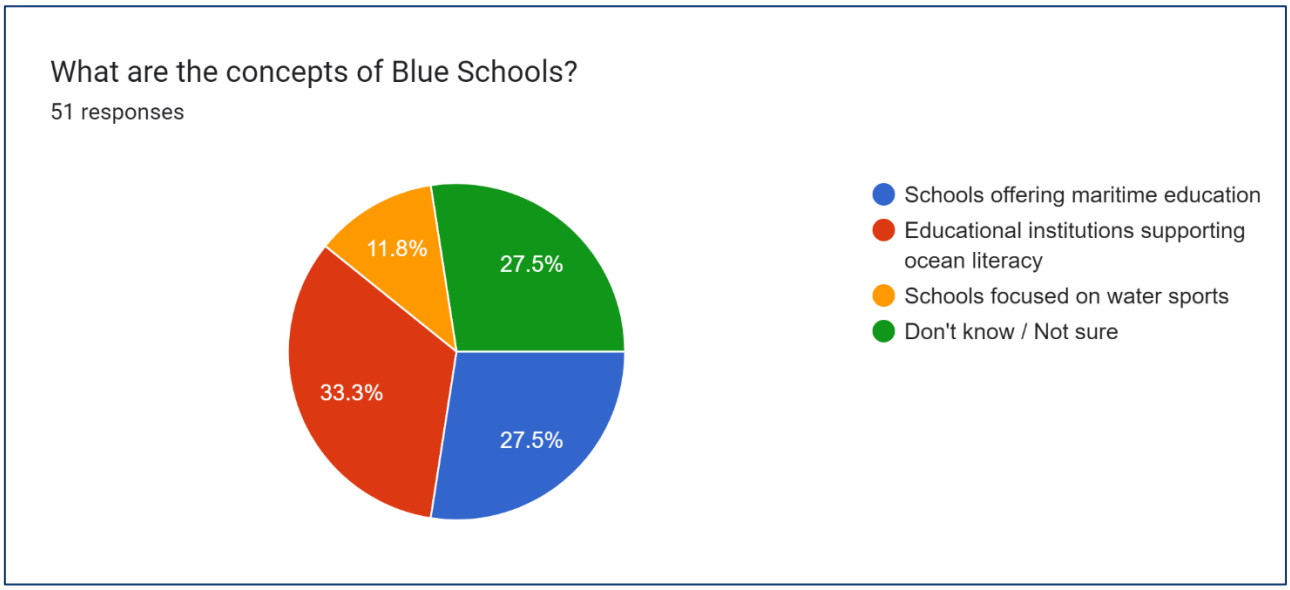
Graph 40 Imagine you are leading a campaign to raise awareness about an ocean-related SDG in your school or community. What would be your main message or call to action? - Czechia



The survey data offers nuanced insights into respondents' priorities and preferences with regard to the Sustainable Development Goals (SDGs) and call-to-action messages connected to the ocean. It is clear that a sizable 23.5% of respondents rank the theme of learning more about the ocean and its hazards as their top choice for the primary message. This demonstrates that participants acknowledge that raising awareness and educating others are essential first steps in tackling the intricate problems that marine habitats confront. 21.6%, an equally considerable number, highlights the key message of encouraging collective action and raising awareness. This is consistent with the knowledge that encouraging community involvement and cultivating a feeling of shared responsibility are essential to making a significant difference in ocean conservation initiatives. Additionally, 21.6% of respondents support policies that safeguard marine life and habitats, indicating a general understanding of the systemic adjustments required to address issues related to the ocean. Promoting policy support is consistent with the knowledge that policies are shaped by governments and that protecting marine habitats and sustainable practices are largely dependent on them.

The suggestion made by 17.6% of respondents to become involved in local conservation efforts and make a difference emphasizes the significance of community-based projects. This desire points to a willingness on the part of participants to get involved in community-based initiatives to protect and restore nearby marine habitats. Though slightly lower in percentage, 15.7% of respondents support the idea to choose sustainable products and cut back on plastic consumption, indicating serious concerns about the direct harm that plastic pollution causes to ocean ecosystems. This demonstrates how important it is to acknowledge that changing one's own conduct can lead to a more sustainable relationship with the water. Hence, the survey data provide a thorough picture of the many priorities and points of view held by the participants. The multimodal strategy, which includes community involvement, education, advocacy, and individual acts, emphasizes how complex the SDGs connected to the ocean are and how different approaches are required to properly address them.

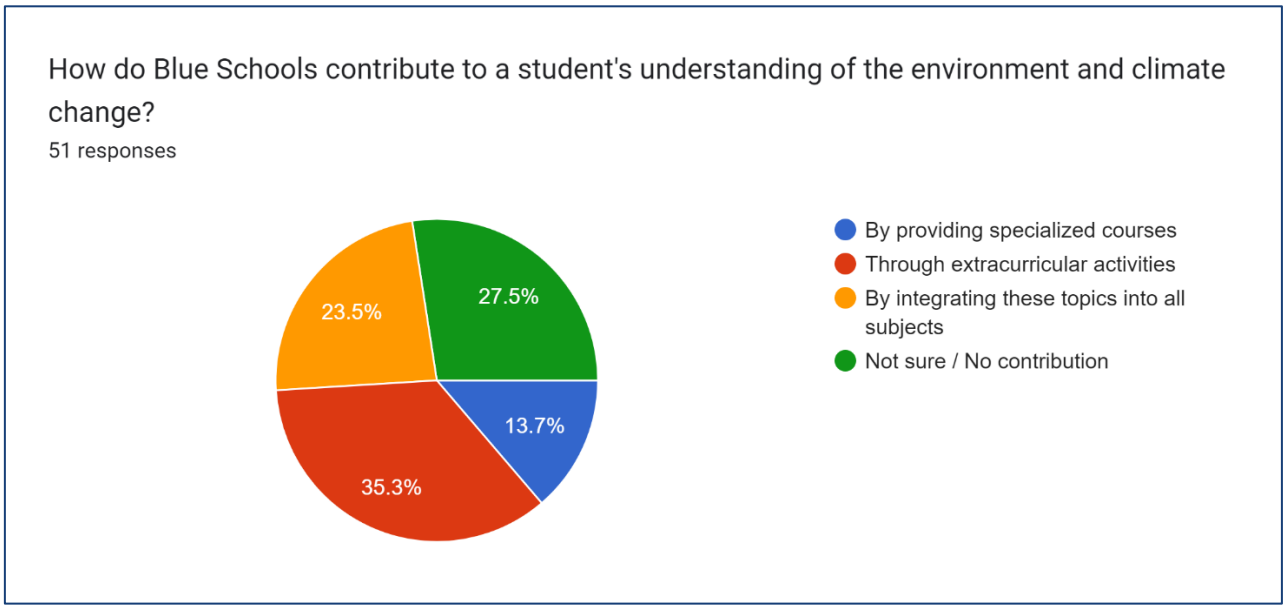
Graph 41 What are the concepts of Blue Schools? - Czechia



Different viewpoints regarding the idea of "Blue Schools" are revealed by the survey replies. A significant proportion of participants (33.3%) believed that Blue Schools corresponded with academic establishments that actively promoted ocean literacy. According to this perspective, it is acknowledged that, within an educational setting, Blue Schools contribute to raising students' knowledge and comprehension of the ocean, its ecosystems, and associated environmental challenges. Conversely, the same proportion of 27.5% links Blue Schools to establishments that provide marine education. This viewpoint emphasizes a link to educational institutions that offer specialized courses in maritime-related subjects, maybe including marine sciences, navigation, or other subjects connected to the maritime sector.

Unfortunately, 27.5% more respondents said they are unsure or unfamiliar with the idea of "Blue Schools." This identifies a sizeable segment of the public that could profit from more elucidation and information sharing regarding the definition of a Blue School and its goals. A lower but still significant 11.8% connects Blue Schools to water sports-related institutions. This explanation raises the possibility that students may believe Blue Schools place a greater focus on water-related leisure activities than only academics. The survey's findings emphasize the necessity of more thorough information sharing and instruction regarding the unique qualities and goals of Blue Schools. Although a few participants relate them to maritime education and ocean literacy, the ambiguity suggests a chance for more explanation and awareness-raising to foster a more common understanding of the idea.

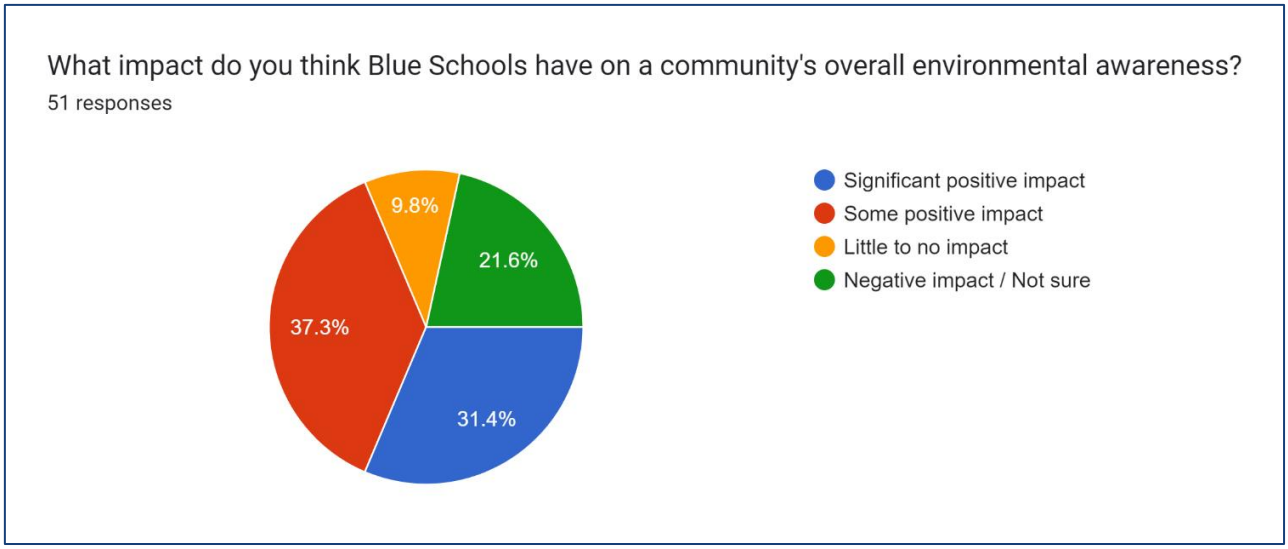
Graph 42 How do Blue Schools contribute to a student's understanding of the environment and climate change? - Czechia



The survey responses provide insights into the perceived contributions of Blue Schools to students' understanding of the environment and climate change. A sizable 35.3% of participants think that extracurricular activities at Blue Schools have a big impact. This implies that these establishments beyond conventional classroom instruction by providing students with real-world exposure, excursions, and programs that actively involve them in environmental concerns, thereby cultivating an experiential comprehension. Remarkably, 27.5% of respondents are unsure or believe that Blue Schools won't have a big impact on kids' knowledge of the environment and climate change. This research casts doubt on the knowledge and understanding of Blue Schools' function in tackling these important issues. It suggests that in order to improve comprehension and appreciation for the possibilities, more dialogue and instruction about Blue Schools are required. The survey illustrates the lack of knowledge about them, their content and possible contributions.

Notably, 23.5% of respondents think that Blue Schools make a difference by include environmental and climate change education in every subject. This demonstrates a respect for an interdisciplinary approach, in which these important ideas are skilfully integrated into a range of academic fields. Through this kind of integration, educational outcomes such as pupils' comprehension of the environment and climate change are guaranteed to be thorough and connected. In addition, 13.7% of participants recognize the value of Blue Schools' specialized course offerings. According to this viewpoint, these universities provide specialized academic courses in environmental science, research of climate change, or related topics. Students who enrol in specialized courses can get in-depth knowledge and proficiency in these important fields, enabling them to successfully solve environmental concerns. The survey's findings emphasize the importance of open interactions and learning regarding Blue Schools' contributions to students' environmental and climate change awareness. Some respondents place a strong emphasis on experiential learning and multidisciplinary methods, but others are unclear, indicating a need for more community awareness-raising initiatives.

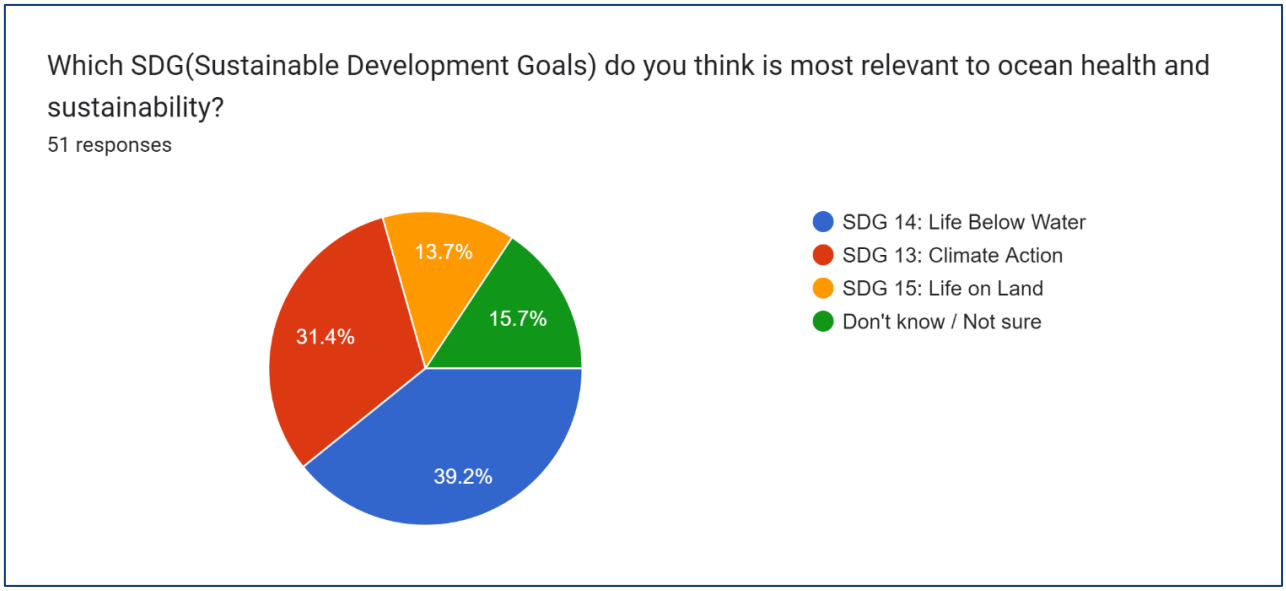
Graph 43 What impact do you think Blue Schools have on a community's overall environmental awareness? - Czechia



The poll results provide insightful information on how Blue Schools are perceived to affect a community's general environmental awareness. Remarkably, 37.3% of participants think that these educational establishments influence community consciousness in a beneficial way. This implies an acknowledgment that Blue Schools have an impact on raising community knowledge and comprehension of environmental issues, albeit in different ways. It's interesting to note that a far higher percentage—31.4%—expresses a stronger belief in the noteworthy benefits that Blue Schools provide. This suggests that a significant proportion of participants perceive these educational institutions as powerful facilitators of a heightened consciousness of environmental issues in the local community. The recognition of a significant positive impact raises the possibility that Blue Schools could act as catalysts for community-wide environmental consciousness.

On the other hand, 21.6% of respondents are unsure or believe that Blue Schools have a detrimental effect on a community's environmental consciousness. This research raises concerns about possible issues or knowledge gaps about the precise function and influence of Blue Schools in influencing community environmental consciousness. Furthermore, a smaller but noteworthy 9.8% of respondents think that Blue Schools have little to no effect on the general environmental consciousness of a community. This viewpoint raises the possibility that some respondents do not believe these institutions have made a substantial impact on raising environmental awareness in the community, indicating a need for further dialogue and involvement. Therefore, the poll results show a complex spectrum of perspectives on how Blue Schools affect a community's environmental consciousness. While a significant portion acknowledges positive contributions, there is also a notable percentage expressing uncertainty or perceiving limited impact. These findings underscore the importance of ongoing efforts to enhance awareness and communication regarding the role and potential of Blue Schools in shaping community attitudes toward environmental issues.

Graph 44 Which SDG(Sustainable Development Goals) do you think is most relevant to ocean health and sustainability? - Czechia



Different viewpoints on the most relevant Sustainable Development Goal (SDG) pertaining to ocean sustainability and health are revealed by the poll replies. 39.2% of respondents overwhelmingly felt that SDG 14, "Life Below Water," was the most relevant concept. Following closely, 31.4% of participants believe that SDG 13, "Climate Action," has a significant bearing on sustainability and ocean health. This point of view demonstrates an awareness of the complex interactions between climate change and its significant effects on maritime habitats. The recognition of the interdependence between ocean health and climate action underscores the need for comprehensive approaches to tackle these intricate problems.

SDG 15, "Life on Land," is identified by a smaller but significant number (13.7%) as having bearing on ocean health. This viewpoint may imply an understanding of the tenuous but significant connection between terrestrial ecosystem health and the health of marine environments. It emphasizes the knowledge that conservation initiatives and land-use decisions influence the general health of seas. On the other hand, a significant 15.7% of respondents said they are unsure or don't know which SDG is most important for ocean sustainability and health. This highlights the need for additional education and awareness-raising initiatives to define the precise objectives and aims addressing the particular problems that the oceans face. In conclusion, the poll results demonstrate the range of viewpoints on the most pertinent SDG for ocean health. The recognition of SDG 13 and SDG 15 highlights the interconnectedness of environmental goals, even while SDG 14 appears as a clear priority. Uncertainty indicates that more needs to be done to raise public awareness and educate people about the SDGs' contribution to improving ocean sustainability and health.

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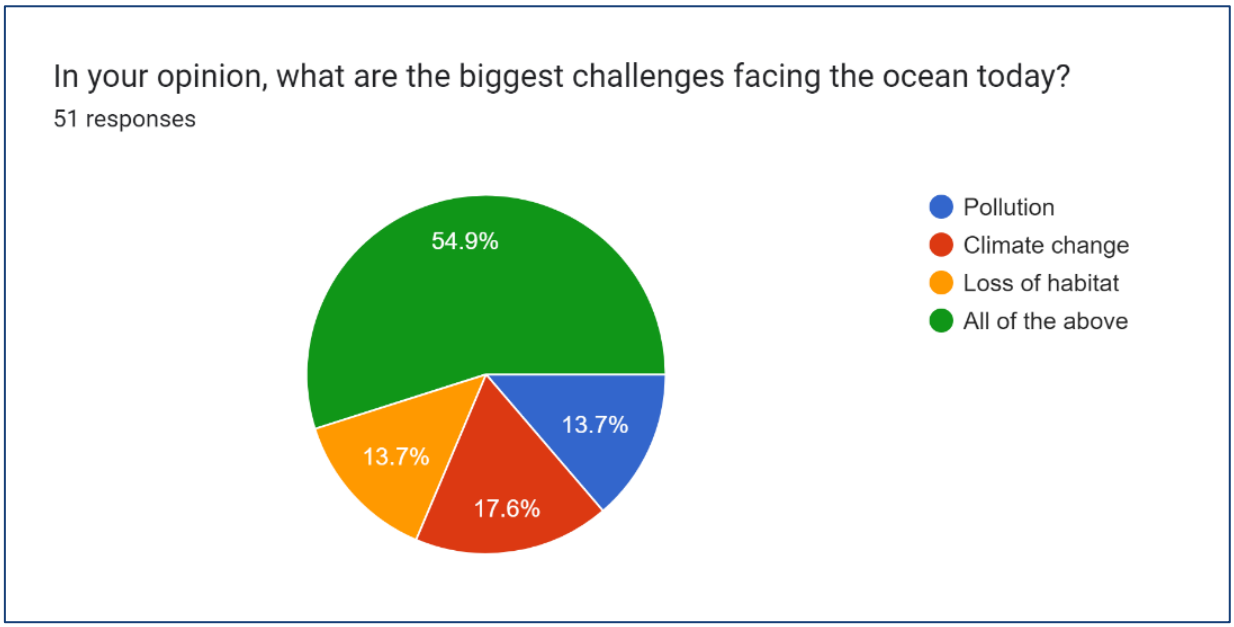
Graph 45 In your opinion, what are the biggest challenges facing the ocean today? - Czechia



The poll results demonstrate an informed understanding of the various issues that the ocean is currently facing. Significantly, 17.6% of respondents said that climate change poses a serious threat. This acknowledgement is in line with the expanding body of knowledge on the detrimental effects on marine ecosystems of rising sea temperatures, ocean acidification, and modified weather patterns. In a same vein, 13.7% more individuals highlight habitat loss as a major problem facing the ocean. This viewpoint emphasizes how crucial it is to protect and restore a variety of marine habitats, acknowledging that these areas are essential to maintaining biodiversity and the general health of the ecosystem. Meanwhile, 13.7% more respondents state that pollution poses a serious threat to the health of the ocean. This includes a variety of pollution types, such as chemical pollutants, oil spills, and plastic waste, all of which can have profound and deleterious effects on marine life and ecosystems.

Remarkably, the majority—54.9%—adopts an expansive view, acknowledging that the ocean faces a multitude of difficulties. It is well acknowledged that pollution, habitat loss, and climate change are interrelated problems that together pose serious risks to the health and sustainability of the ocean. The need for comprehensive solutions that address the interplay of these challenges is emphasized by this holistic perspective, which also highlights the complexity of the issues facing the ocean. Therefore, the survey results show that there is general agreement that the ocean faces a variety of difficulties, with pollution, habitat loss, and climate change being mentioned as the three main issues. This shared understanding emphasizes how complex the problems facing marine ecosystems are and how important it is to work together to find comprehensive solutions.

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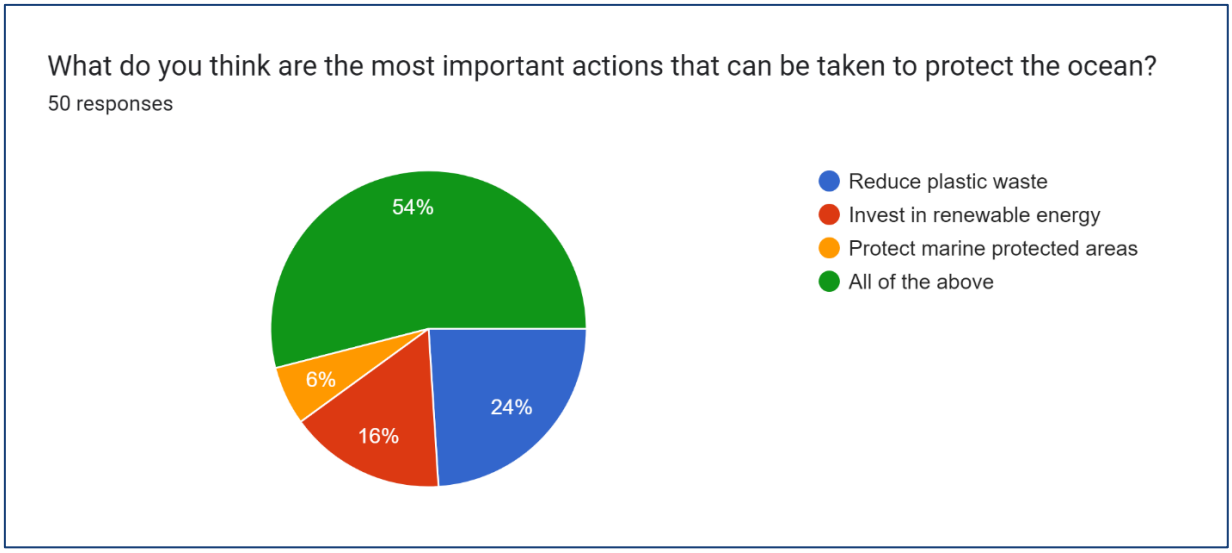
Graph 46 What do you think are the most important actions that can be taken to protect the ocean? - Czechia



The poll results provide a complex picture of the various but related steps needed to protect the ocean. The majority, or 54%, supports a complete approach by citing the significance of each recommended course of action. This exhibits a comprehensive viewpoint, realizing that tackling the ocean's many problems necessitate a multidimensional approach. This all-encompassing strategy acknowledges the need for a broad and integrated approach, which is in line with the complexity of the issues facing marine ecosystems. Reducing plastic trash is crucial for protecting the oceans, according to a significant 24% of respondents. This is in line with the growing understanding of the detrimental effects plastic pollution has on ecosystems and marine life. This all-encompassing strategy acknowledges the need for a broad and integrated approach, which is in line with the complexity of the issues facing marine ecosystems.

Reducing plastic trash is crucial for protecting the oceans, according to a significant 24% of respondents. This is in line with the growing understanding of the detrimental effects plastic pollution has on ecosystems and marine life. The need of implementing sustainable measures to stop this ubiquitous menace and protect the health of the ocean is highlighted by the recognition of plastic reduction as a priority. Moreover, sixteen percent of participants consider that a major step toward conserving the ocean is to invest in renewable energy. This perspective highlights the understanding that sustainable energy sources play a pivotal role in mitigating climate change, thereby positively impacting the health and resilience of marine ecosystems. The focus on renewable energy highlights how interrelated the world's environmental problems are and how comprehensive solutions are required.

A lower minority of respondents—6%—especially stress the significance of safeguarding maritime protected areas. This focused attention emphasizes how important it is to protect areas that have been declared as sanctuaries for marine biodiversity. Acknowledging these places' importance in preserving the health of ecosystems shows that one understands the necessity of deliberate conservation efforts. Hence, the poll results show that most respondents believe that effective ocean protection requires a combination of measures, such as minimizing plastic waste, funding renewable energy, and preserving marine protected areas. The answers

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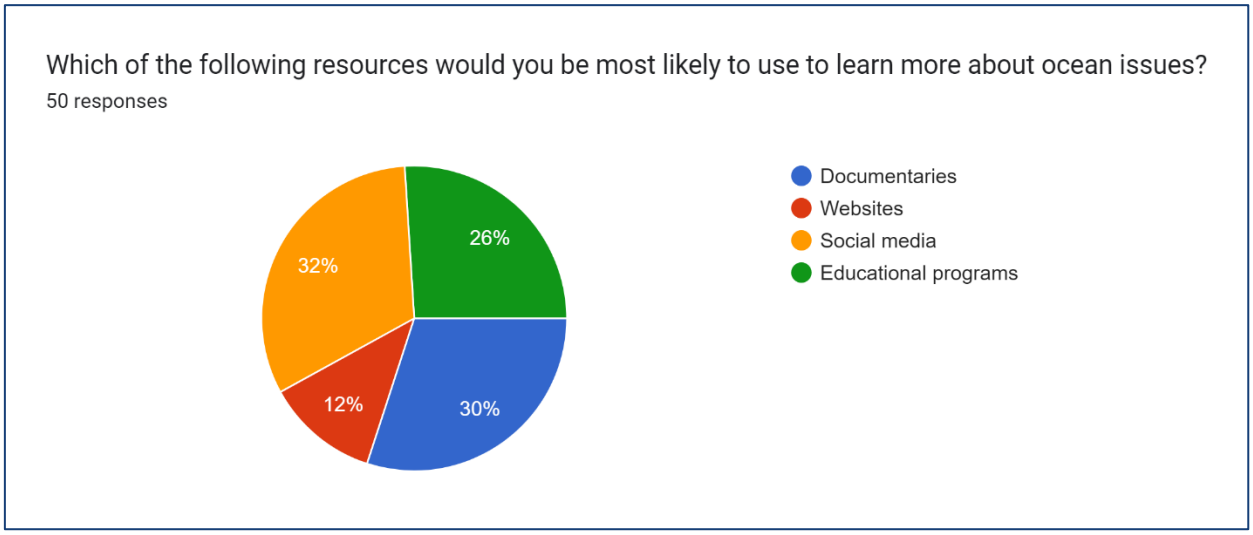
highlight how intricately linked and complicated the issues confronting the ocean are, and how crucial it is to take a multidimensional approach.

Graph 47 Which of the following resources would you be most likely to use to learn more about ocean issues? - Czechia

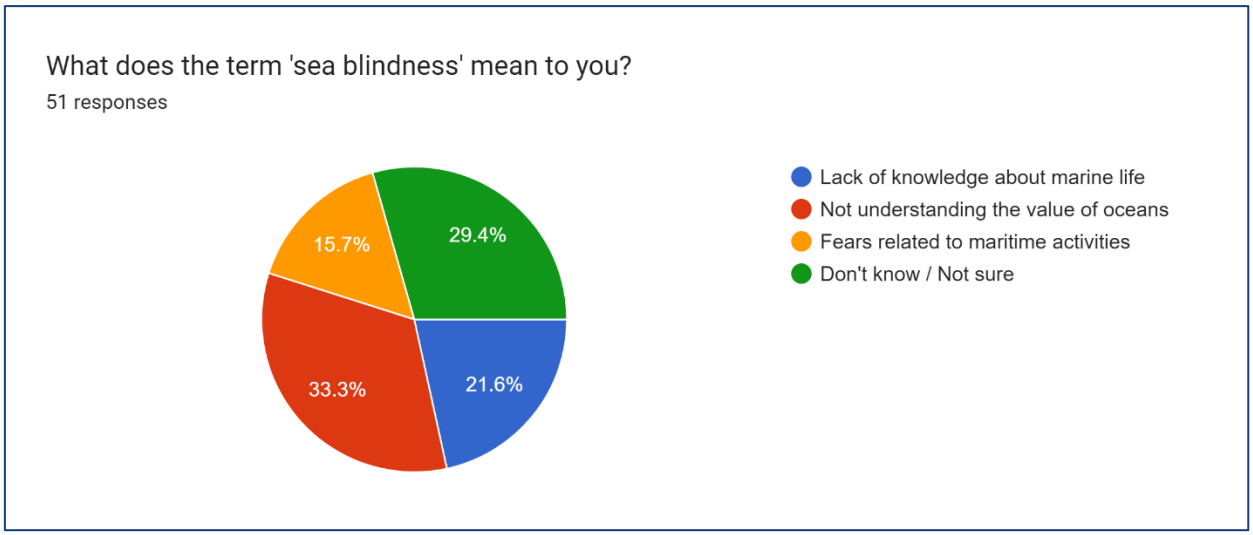


The poll results show a wide range of choices for areas that people would most likely utilize to learn about ocean-related concerns. With 32% of respondents, the greatest number suggests a strong preference for social media as a source of information. This emphasizes how ubiquitous social media sites like Twitter, Instagram, and Facebook are in influencing public opinion and spreading information on environmental problems, especially those that involve the ocean. Not far behind, thirty percent of participants indicate that documentaries are their preferred method of learning about marine issues. A visually stunning and absorbing medium, documentaries let viewers to delve deeply into the intricacies of marine ecosystems, conservation initiatives, and the problems confronting the world's seas. This choice indicates a respect for in-depth storytelling and visual narratives in conveying information about ocean-related topics.

Of the participants, 26% believe that educational programs are an important source for learning about issues related to the ocean. This acknowledgment emphasizes the value of formal education campaigns, seminars, and programs run by establishments or groups committed to raising public understanding of ocean conservation. The preference for educational programs points to a need for well-organized educational opportunities that offer in-depth knowledge and comprehension of ocean-related topics. On the other hand, 12% of respondents—a smaller but still significant portion—name websites as their go-to source. Websites from academic institutions, environmental organizations, and scientific organizations that compile data and resources on a range of ocean health-related topics may fall under this category. The preference for websites highlights how important digital platforms are for providing users with carefully chosen and trustworthy content to help them learn more about issues related to the ocean. Hence, the survey findings illustrate the diverse ways in which individuals seek information about ocean issues. From the dynamic realm of social media to the immersive experiences offered by documentaries and the structured learning provided by educational programs, respondents demonstrate a varied and multi-faceted

approach to staying informed about the challenges and conservation efforts related to the world's oceans.

Graph 48 What does the term 'sea blindness' mean to you? - Czechia



The poll results reveal a variety of ways in which the term "sea blindness" is interpreted, providing insight into the wide range of opinions held by the participants. According to 33.3% of respondents, the most common understanding of "sea blindness" is a lack of awareness of the importance of oceans. This implies a significant worry regarding people's lack of knowledge or acknowledgment of the vital ecological, economic, and cultural functions that the world's seas play. This perspective is widely held, which emphasizes the need for further education and awareness campaigns to emphasize the importance of ocean ecosystems.

A significant proportion of participants, namely 29.4%, indicated ambiguity or ignorance regarding the term "sea blindness." This result raises the possibility that the phrase is not commonly recognized or known among the population polled. In order to address this, there is a chance for educational initiatives to present and elucidate the idea of sea blindness, promoting a better-informed public conversation on ocean-related concerns. Moreover, 21.6% of interviewees connected a lack of understanding about marine life to sea blindness. This perspective emphasizes how crucial it is to comprehend the worth of oceans in general as well as the particular ecosystems and biodiversity they sustain. To remedy this, initiatives to improve marine literacy and disseminate knowledge about the variety of marine life types could be helpful. A smaller yet notable percentage, 15.7%, linked 'sea blindness' with fears related to maritime activities. The survey's findings highlight the necessity of all-encompassing approaches to combat sea blindness, including raising awareness of the importance of oceans, elucidating the term, providing information about marine species, and easing anxieties associated with maritime operations. These results offer insightful information that educators, communicators, and legislators can use to create programs that improve public awareness and enjoyment of the oceans and their significance.

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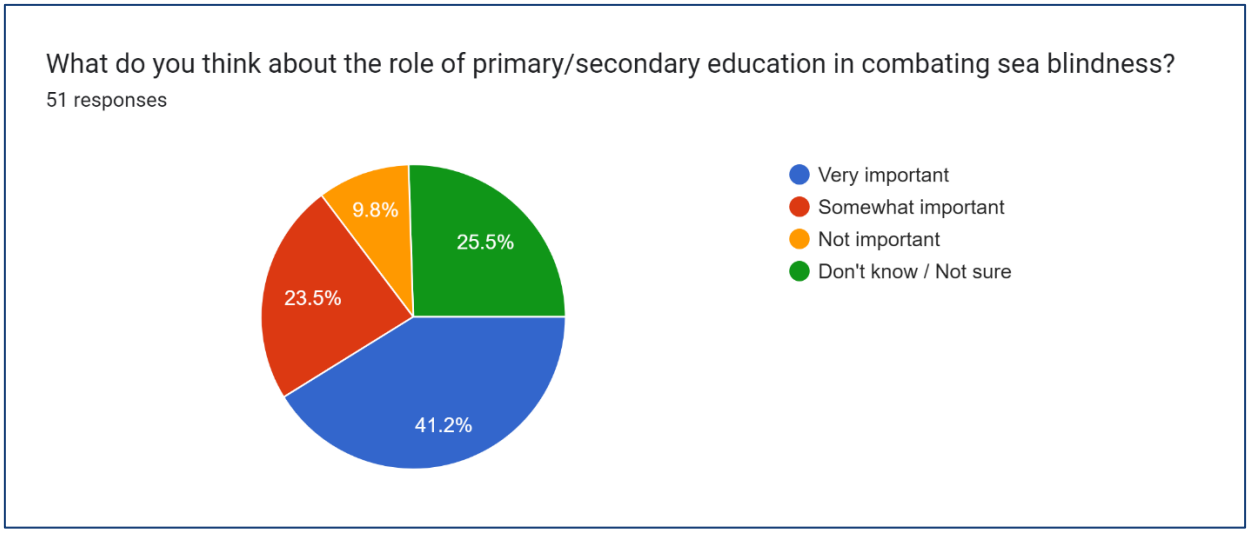
Graph 49 What do you think about the role of primary/secondary education in combating sea blindness? - Czechia



Diverse viewpoints regarding the perceived contribution of elementary and secondary school in preventing sea blindness are offered by the survey replies. Notably, 41.2% of participants state that early and formative education is thought to be crucial in treating sea blindness. This majority opinion is a reflection of a strong belief in the power of elementary and secondary education to influence people's knowledge, comprehension, and attitudes toward marine concerns. The emphasis placed on its importance indicates that there is widespread consensus that educational initiatives at this point have the capacity to promote long-term ocean literacy.

On the other hand, a sizable 25.5% are unsure or do not have an established view regarding the contribution of elementary and secondary education to the fight against sea blindness. This result points to a subset of respondents who might need additional data or thought before taking a firm position on the issue. It also highlights the need for more education and awareness-raising campaigns by highlighting a possible knowledge gap about the possible influence of educational initiatives on issues pertaining to the ocean.

Additionally, 23.5% of respondents believe that primary and secondary education plays a role in preventing sea blindness. This response indicates that there is a moderate level of recognition for the contribution that primary and secondary education provide to the public's understanding of maritime issues. Although this sector does not consider it to be very significant, there is nonetheless acknowledgment of the potential positive influence of education during these stages, albeit to a more moderate degree.

However, a smaller but significant portion of respondents—9.8%—believe that primary and secondary education is ineffective in the fight against sea blindness. This viewpoint presents an alternative viewpoint and can suggest doubts regarding the effectiveness of educational interventions during these formative years in addressing ocean-related difficulties. This point of view emphasizes how crucial it is to comprehend and take into account a variety of viewpoints while developing instructional strategies to successfully prevent sea blindness.

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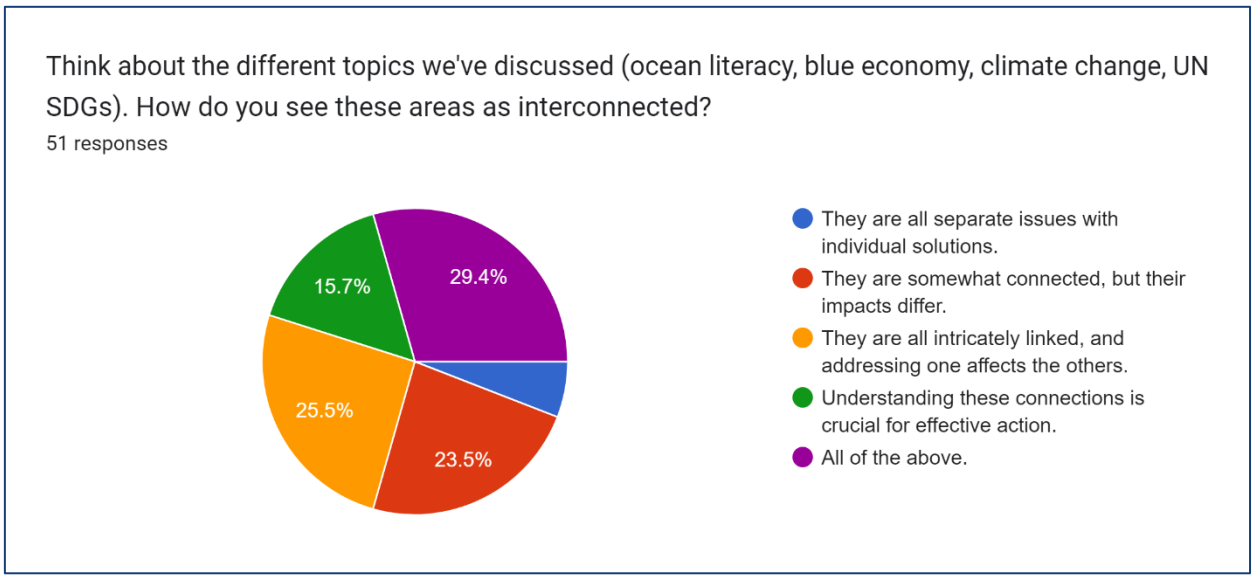
In conclusion, different perspectives on the contribution of elementary and secondary education to the prevention of sea blindness are highlighted by the survey results. Although a significant number of people highlight its importance, others express ambiguity or differing opinions. These findings highlight the intricate relationship between education and understanding of ocean-related issues, underscoring the necessity of customized and comprehensive strategies to promote effective ocean literacy.

Graph 50 Think about the different topics we've discussed (ocean literacy, blue economy, climate change, UN SDGs). How do you see these areas as interconnected? - Czechia



Diverse viewpoints on the linkages between the subjects covered—ocean literacy, the blue economy, climate change, and UN Sustainable Development Goals (SDGs)—are revealed by the poll replies. A significant proportion of participants—25.5%—state that these subjects are closely related, highlighting the fact that tackling one aspect always affects the others. This point of view is consistent with the knowledge that social, economic, and environmental factors are interrelated, which emphasizes the necessity of holistic strategies to fully address global issues. On the other hand, despite acknowledging some degree of relationship between these topics, 23.5% of participants also acknowledge that their impacts may vary. This nuanced view implies an understanding that, despite connections, every region has unique traits and impacts that call for focused strategies to deal with particular problems.

15.7% of the section emphasizes how important it is to comprehend the relationships between various subjects in order to take meaningful action. This point of view highlights the necessity of a thorough understanding in order to guide strategic interventions that take into account the intricate connections between economic activities, climate change, ocean health, and more general sustainability objectives. A smaller but significant 5.9% sees these subjects as distinct problems with distinct fixes. This viewpoint implies an understanding that regards every region as unique, with particular problems requiring customized answers.

It's interesting to note that the largest group, at 29.4%, supports the phrase "All of the above," indicating a holistic opinion that combines aspects from the previous choices. Respondents who take this position might be aware of the complex interrelationships

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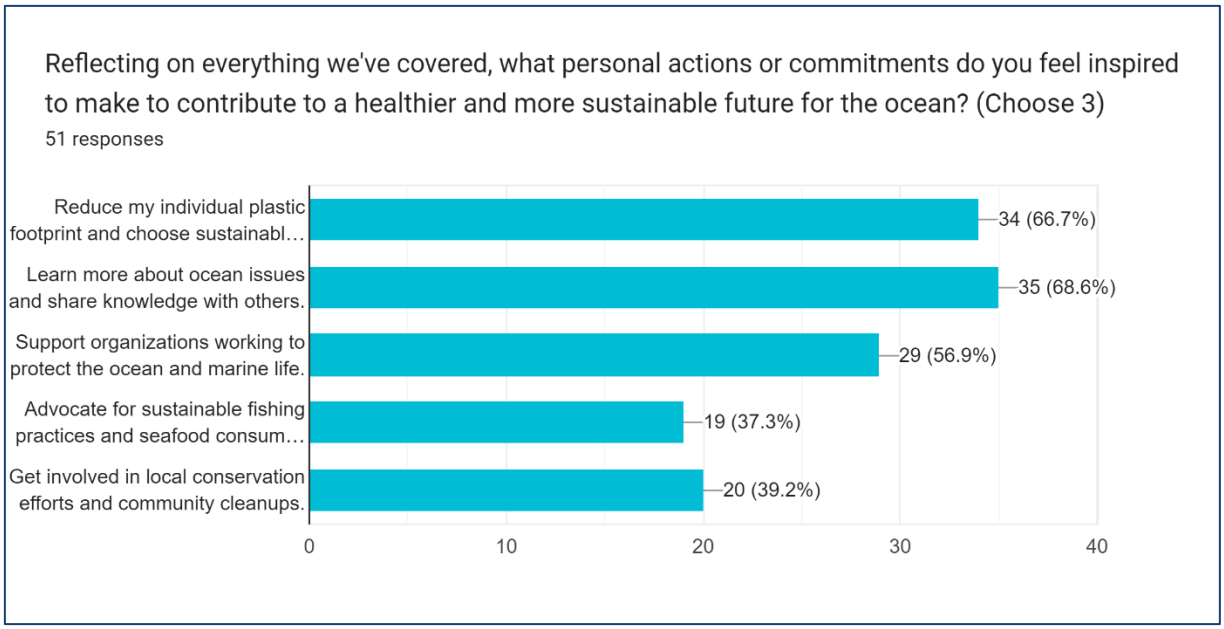
between various themes, including the intricate connections, the subtle relationships, the significance of comprehension, and the recognition of unique aspects with unique answers. The survey results, in summary, present a range of perspectives regarding the relationships between ocean literacy, the blue economy, climate change, and UN Sustainable Development Goals. The range of viewpoints illustrates how intricately these important issues are related to one another, emphasizing the need for integrated, comprehensive strategies to address the interrelated problems facing our planet.

Graph 51 Reflecting on everything we've covered, what personal actions or commitments do you feel inspired to make to contribute to a healthier and more sustainable future for the ocean? (Choose 3) - Czechia



A resounding 68.6% of participants declare that they are deeply committed to expanding their knowledge on ocean-related issues and educating others about them. This demonstrates a strong understanding of the critical role that awareness-raising and education play in tackling the problems confronting the ocean. People want to start a chain reaction of awareness and participation that will lead to a more sustainable and healthier ocean. To that end, they actively seek out information and share it with others.

Not far behind, 66.7% of participants feel motivated to choose sustainable options and lessen their personal plastic footprint. This pledge demonstrates a greater understanding of the harm that plastic pollution does to marine environments. Respondents understand the importance of taking individual steps to reduce plastic usage and promote a healthier and cleaner ocean environment. The emphasis on individual responsibility reflects a shared commitment to tangible steps that collectively lead to positive environmental outcomes.

Regarding active assistance, 56.9% of participants declare that they will provide financial support to groups that safeguard the ocean and its inhabitants. This decision demonstrates an awareness of the critical role nonprofits and advocacy groups play in bringing about significant change. Through their support, in the form of donations,

volunteer labor, or other activities, participants aim to assist the continued efforts of organizations that are actively striving to protect the sustainability and health of the ocean.

On a smaller note, 39.2% of participants said they will participate in community cleanups and conservation projects. This decision demonstrates a commitment to practical, neighbourhood-based projects that have a direct influence on the surrounding environment. Taking part in conservation and cleanup efforts shows a dedication to protecting the local environment and promoting a sense of environmental stewardship at the grassroots level. Finally, 37.3% of participants state that they would support sustainable methods of fishing and seafood consumption. This decision demonstrates knowledge of how human activity affects ecosystems and marine life. Through the promotion of sustainable practices, individuals seek to support the long-term health of the ocean, encourage responsible consumption patterns, and aid in the conservation of marine resources. In conclusion, the poll shows a wide spectrum of personal commitments, from active support for organizations and local community engagement to knowledge-sharing and individual lifestyle adjustments. Together, these diverse pledges offer a comprehensive strategy for creating a more sustainable and healthful ocean in the future.

According to the survey findings, Czechia offers a favourable environment for advancing ocean literacy and implementing Blue Schools programs. An important factor to consider is how frequently people discuss topics relating to the water; 39.2% of respondents said they occasionally do so in their daily lives. This provides the groundwork for future educational campaigns by indicating a baseline level of interest and awareness among the questioned group. Even though 30% of participants said they didn't know much about ocean literacy, 68.6% of respondents indicated in the poll that they were very interested in learning more about ocean-related topics. This offers a glaring chance to close the knowledge gap and get people involved in educational initiatives that highlight the value of oceans and their ecosystems.

Seventy percent of respondents associated the term "blue economy" with the sustainable use of ocean resources, indicating that this notion is already understood. This knowledge can be used to promote sustainable actions and behaviours that support the values of resource responsibility and ocean protection. The fact that 40% of participants believed that global warming had a significant influence on ocean ecosystems highlights the connection between ocean health and climate change. This common worry offers a strong justification for educational programs that discuss the wider environmental effects and promote environmentally friendly alternatives. 33.3% of respondents recognized Blue Schools as educational establishments that promote ocean literacy, demonstrating a basic comprehension of the idea. Moreover, the perception that extracurricular activities at Blue Schools enhance environmental understanding (35.3%) is consistent with the general desire to learn more about ocean-related concerns. The potential efficacy of Blue Schools in promoting student engagement and environmental awareness is further supported by this synergy. Furthermore, the belief that Blue Schools significantly improve community environmental awareness (31.4%) highlights the potential beneficial spillover effect of these kinds of programs outside of the classroom setting. This is consistent with the notion that informed people can promote environmental stewardship in their local communities and help bring about a more widespread cultural shift in favour of sustainability. In conclusion, the survey data depicts a population in Czechia that is

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open to learning about and engaged in issues pertaining to the ocean/water resources. The expressed interest in learning more and the current awareness provide a solid basis for promoting and carrying out Blue Schools and ocean literacy projects in Czechia. These initiatives have the potential to be extremely important in raising a new generation of informed, environmentally aware, and dedicated to sustainable methods for maintaining the health and preservation of the ocean.

2.3. Hungary

2.3.1. Purpose and Scope of the Literature Review

The literature review in this report aims to thoroughly analyse existing research on ocean literacy, the blue economy, and sustainable development goals. The purpose is to comprehensively review and synthesize the body of knowledge in these interconnected fields. This examination is critical in understanding the current landscape of research and identifying potential gaps or areas for further study.

The scope of the review includes several key topics:

1. Ocean Literacy: Understanding the public's awareness and knowledge about the ocean's influence on them and their influence on the ocean.
2. Blue Economy: Examining sustainable use of ocean resources for economic growth, improved livelihoods, and jobs while preserving the health of ocean ecosystems.
3. Sustainable Development Goals (SDGs): Specifically, focusing on goals related to marine environments and how they intersect with ocean literacy and the blue economy.
4. Blue Schools: Examining the concept of blue school and conducting studies that will contribute to the literature.

2.3.2. Assessment of Existing Research

SHORE is focusing on engaging and mobilizing students, teachers, and schools to implement the Mission Ocean objectives to increase ocean literacy with the help of community activities and cooperation projects.

Research on the awareness of "blue" issues - the importance, sustainable use and protection of water and oceans - among young people (6-18 years old) is very limited in Hungary. The main reason for this is that the share of the blue economy in the national economy, i.e. the use of waters and rivers, is very small in Hungary, below 0.4% (The EU Blue Economy Report 2022).

In Hungary there are research and development projects in the field of water protection and water use, the main aim of which is to carry out theoretical and practical developments for the economy, so the dissemination of results (and the subject) is limited and mainly addressed to adults.

Research and findings on the study of young people's attitudes towards the environment are presented in the Lessons from Previous Similar Studies section.

2.3.3. Gaps in the Literature

The knowledge of oceans, seas, large rivers is a part of environmental protection, but is limited due to the natural conditions in Hungary. In studies on the knowledge, attitudes and attitudes of young people, the "blue" themes do not appear separately, but only as part of general environmental protection and environmental awareness.

2.3.4. Lessons from Previous Studies

A non-representative study among young people (Takács-György, K., Domán, S., Tamus, A., Horská, E., & Palková, Z., 2015). What do the youth know about alternative energy sources-case study from Hungary and Slovakia. According to *Visegrad Journal on Bioeconomy and Sustainable Development*, *4*(2), 36-41: "Concerning the knowledge of concept of "green economy", "blue economy" and the "non-growth", it can be summarized that the awareness is evident but in many cases, there is just little information and weak knowledge connected with the terminology and practical consequences".

György Kónya, Gy. (2020) In his PhD dissertation, he dealt with the factors determining the environmental attitudes of Hungarian secondary school students (Kónya, Gy., 2020). PhD, University of Sopron) The main objective of the research was to identify the factors that play a role in the change of environmental attitudes of secondary school students. The main findings are:

- Graduation requirements in science subjects do not always make as much use of environmental education content as possible. None of the science A-levels with the new requirements contain significantly more environmentally relevant parts than before.
- Children's knowledge of the environment is more thorough when they tackle a topic from different angles in several subjects (project-based learning).
- The environmental attitudes of the pupils in the study are good.
- There is no significant difference in the environmental attitudes of students in each municipality.

At the end of the paper, he makes the following suggestions:

- In science subjects at intermediate and advanced level, the environmental aspects should be further expanded in the requirements for the baccalaureate.

- Teachers should be given as many opportunities as possible to learn and use new methods.

- Students should not only engage with the topics in class, but also experience the experiential way of learning.

The results confirmed that today's students have a lot of environmental knowledge, but their emotional attitudes and behaviour lag behind. There is a need to organise more in- and extra-curricular activities to influence students' behaviour and emotions.

2.3.5. Survey and Public Perception

A survey was conducted to gather insights on critical topics related to ocean sustainability. The survey was designed as an online questionnaire with 21 questions, with a focus on eight European countries – Austria, Czechia, Estonia, Hungary, Italy, Poland Romania and Türkiye. The online questionnaire was accessible to citizens of those countries with targeted outreach efforts towards students, educators, and broader public interested in ocean sustainability. Participation was voluntary and anonymous, ensuring the integrity and objectivity of the collected data. It was designed to explore key themes including:

- Ocean Literacy Initiatives: Assessing public understanding of ocean health and sustainability practices.
- "Sea Blindness" Phenomenon: Investigating the awareness of human dependence on healthy oceans and the disconnect between people and the marine environment.
- Emerging Blue Economy: Gauging public perceptions and potential opportunities associated with ocean-based sustainable development initiatives.
- Climate Change Impacts: Evaluating public understanding of the far-reaching consequences of climate change on marine ecosystems and the need for adaptation strategies.

The Blue School Studies survey aimed to provide robust data for in-depth analysis of these crucial themes. The collected information informs the development of innovative educational programs and resources within the SHORE project. By empowering students with ocean literacy and fostering their role as agents of change, the project seeks to promote sustainable behaviour and contribute to a healthier future for our oceans. The Blue School Studies survey was anticipated to yield valuable insights into public knowledge, attitudes, and concerns regarding ocean health and sustainability. These findings form the basis for developing effective educational tools and strategies within the SHORE project, ultimately empowering students to become effective advocates for healthy oceans and a sustainable future.

Below are the graphs of the survey participants from Hungary.

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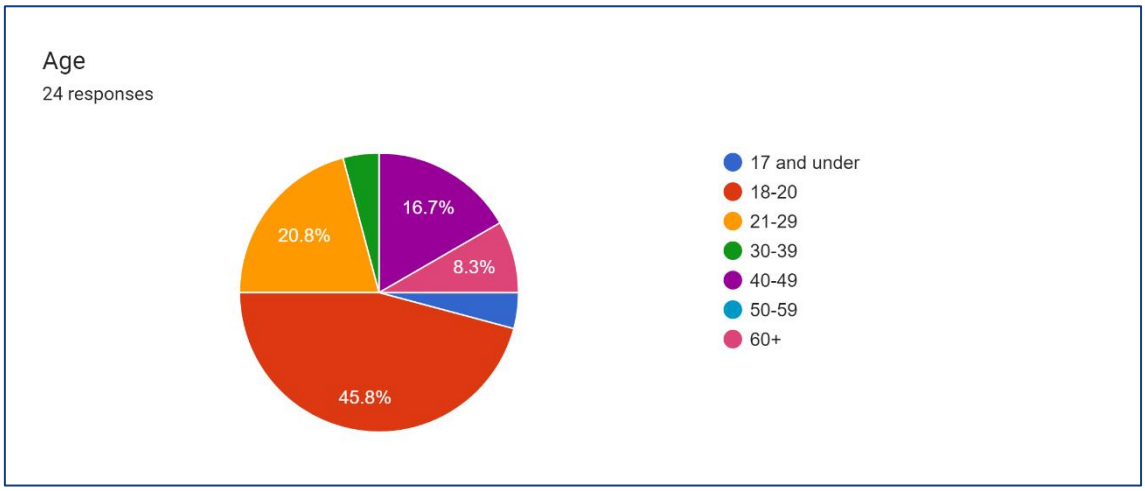
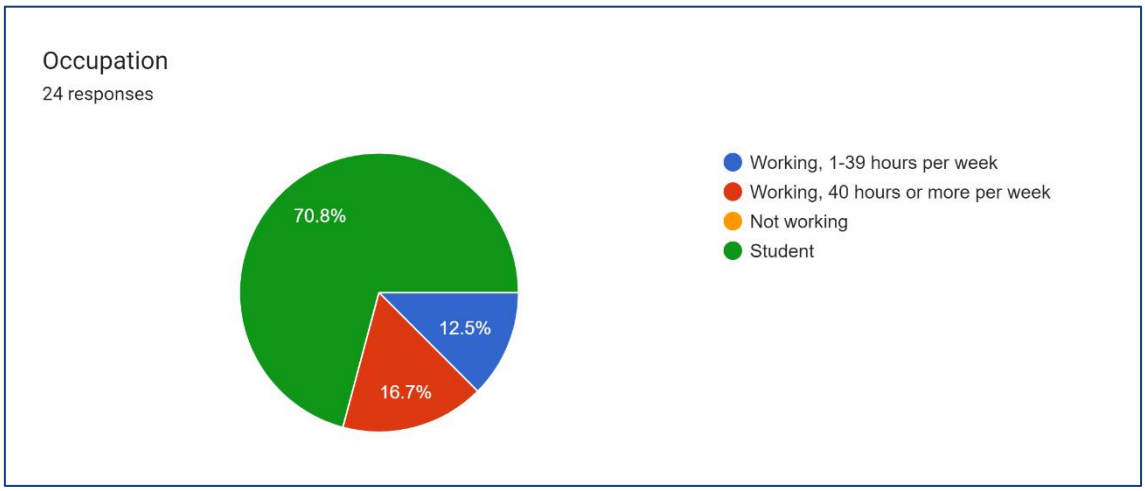
Graph 52 Age of Survey Participants - Hungary



Graph 53 Working Status of Survey Participants - Hungary



Based on 24 replies, the survey participants' working status breakdown offers insightful information on the demographics of the sample population. 70.8% of the responders identified themselves as students. This dominance indicates that a substantial fraction of those who are primarily pursuing education were contacted by the poll. Students make up a large portion of the sample, which may point to a younger population interested in ocean literacy-related projects and activities. 16.7% of those surveyed said they worked 40 hours or more a week. This indicates a portion of the sample population that is actively employed full-time. Their responses to the poll may indicate a professional interest in or concern about issues pertaining to the ocean, and their viewpoints may mirror those of a working demographic. Furthermore, 12.5% of respondents said they worked one to three and a half to forty-nine hours a week. This group covers people who work but might also have part-time responsibilities, enabling them to balance job and possible involvement in environmental or educational projects. Therefore, the survey sample's working status distribution shows a varied mix of students, full-time employees, and part-timers. Understanding the various viewpoints

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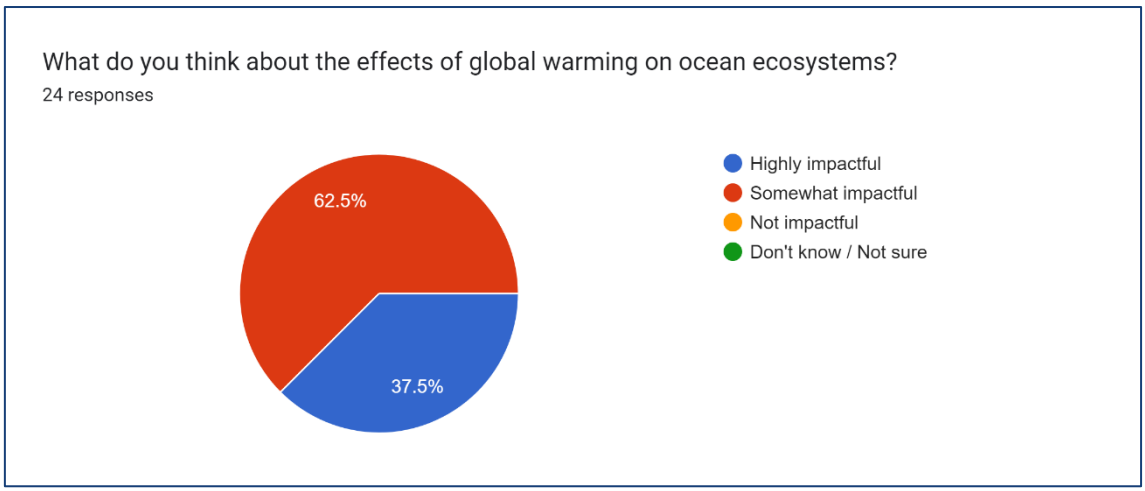
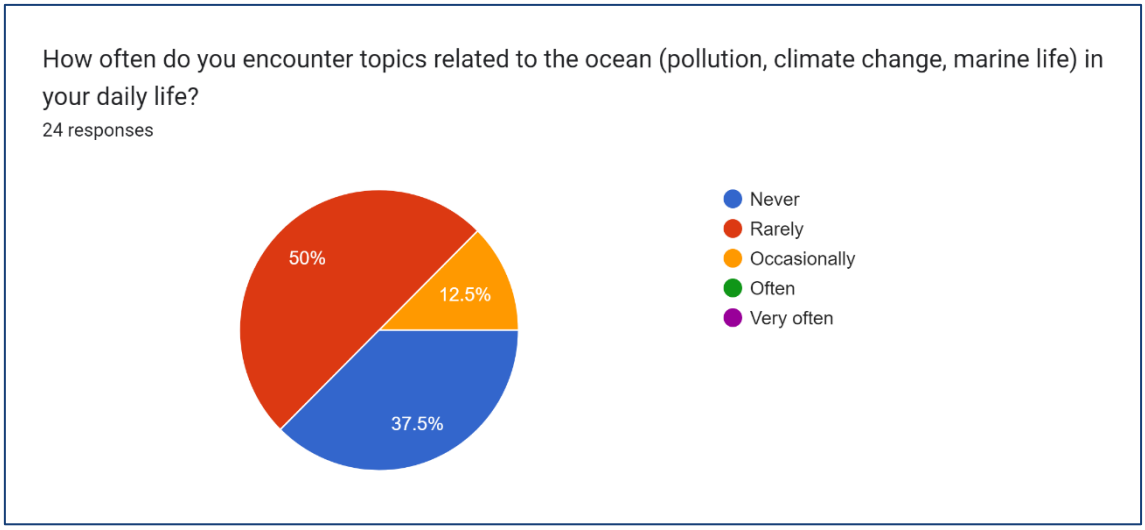
and potential receptivity to activities fostering ocean literacy and environmental consciousness within different segments of the community is made possible by this variance in occupational status.

Graph 54 What do you think about the effects of global warming on ocean ecosystems? - Hungary



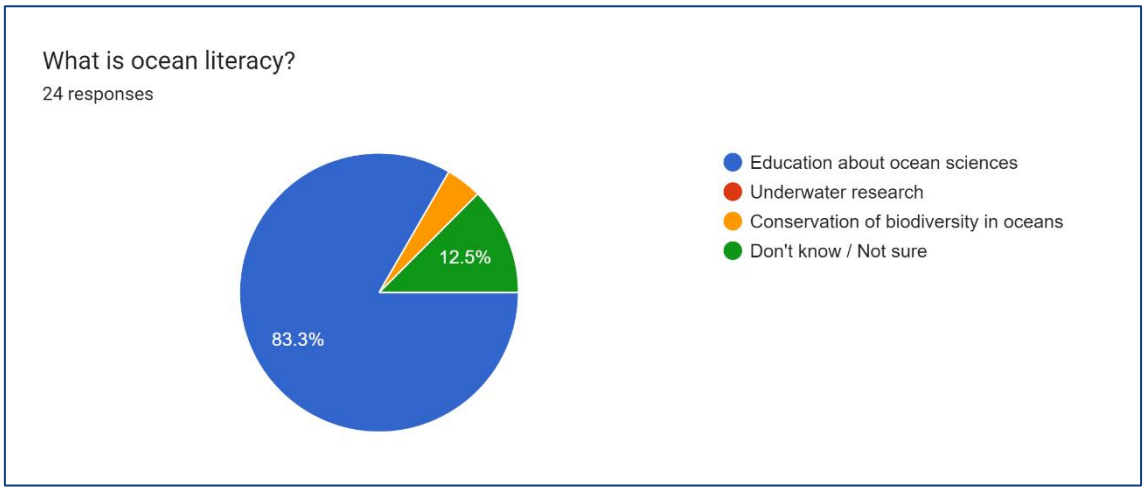
Regarding the perceived effects of global warming on ocean ecosystems, the respondents' responses reveal a promising understanding. The majority, 62.5%, thinks that ocean ecosystems are slightly impacted by global warming. This implies that while respondents find global warming to be a serious problem, there may be different degrees to which it has an impact on the stability and well-being of ocean ecosystems. 37.5% of those surveyed believe that global warming has a significant influence on ocean ecosystems. This subgroup probably takes a more proactive approach, highlighting the seriousness and urgency of the effects that climate change may have on the oceans.

Graph 55 How often do you encounter topics related to the ocean (pollution, climate change, marine life) in your daily life? - Hungary



The answers to the question about how frequently people come across themes relating to the ocean in their daily lives shed light on the population's awareness and exposure levels. Significantly, half of the respondents said they hardly ever deal with issues pertaining to the ocean in their daily lives, such as pollution, climate change, and marine life. This shows that conversations or knowledge on ocean-related issues are uncommon in the daily lives of half of the people polled. In contrast, 37.5% of respondents said they never come across these subjects in their day-to-day interactions. This suggests that a sizeable segment of the sample has not been exposed to or participated in conversations on issues relating to the ocean. Conversely, 12.5% of participants indicated that they sometimes come across subjects relating to the ocean. This lower percentage indicates that some members of the population polled are exposed to conversations or information about the water, even though they are not exposed to it frequently. The data illustrates that different people are exposed to and aware of different levels of ocean-related discussions in their daily lives; a significant percentage of the population is not exposed to these kinds of conversations very often. Determining these patterns of awareness is essential to creating focused educational programs that raise community understanding of environmental issues and ocean literacy.

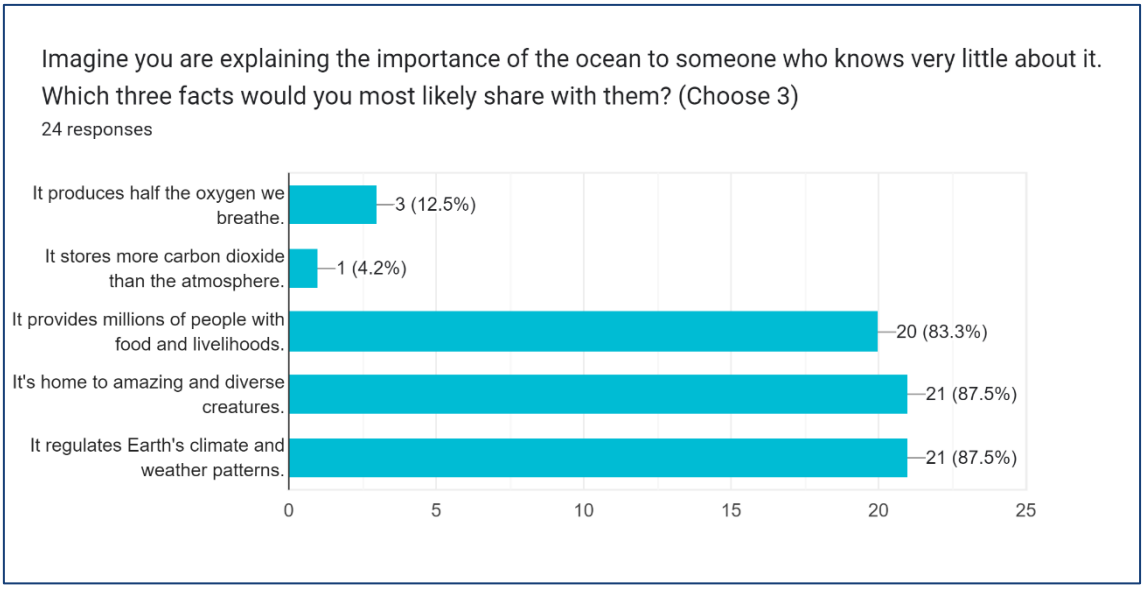
Graph 56 What is ocean literacy? - Hungary



The concept of ocean literacy is most commonly associated (83.3%) with learning about ocean sciences, according to the analysis of response to the question. This agreement emphasizes a shared understanding that learning about different facets of ocean sciences, such as ecosystems, marine life, and environmental processes, is necessary for ocean literacy. A possible need for additional clarification and instruction on the notion of ocean literacy is indicated by the 12.5% of respondents who expressed ambiguity or lack of awareness about it. There is a chance for focused efforts to raise awareness and give precise definitions of ocean literacy because of this knowledge gap.

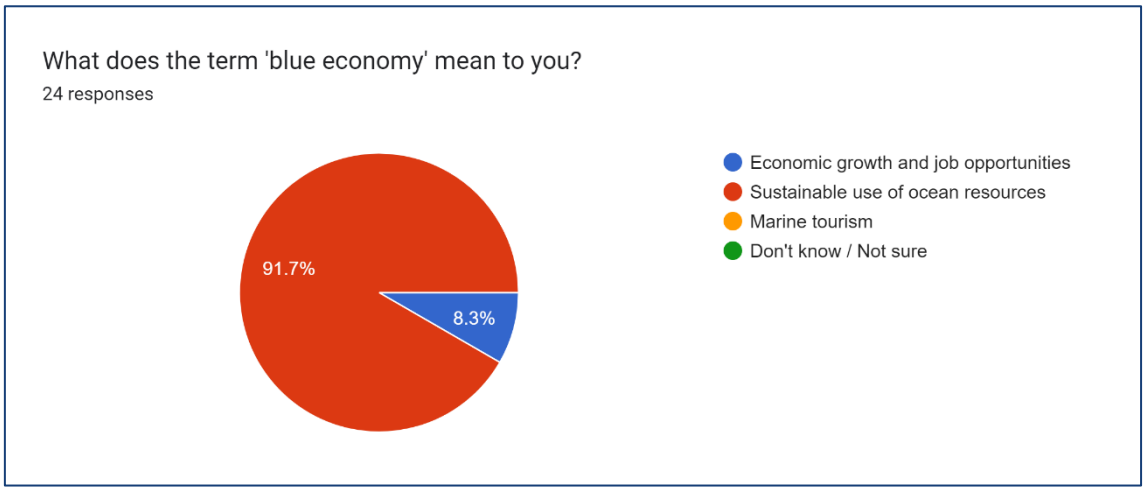
The lower fraction that links ocean literacy (4.2%) to ocean biodiversity protection suggests that there are differing opinions among those polled. It draws attention to a subset of people who believe that ocean literacy goes beyond mere knowledge acquisition and includes proactive actions to preserve and maintain marine biodiversity, even though this viewpoint is not shared by the majority. There is broad agreement regarding the need of ocean literacy education, some respondents feel that the term needs to be defined more precisely, and a group of respondents highlights the relationship between ocean literacy and conservation initiatives. By addressing these conceptual complexities, we may promote more holistic approaches to ocean literacy that include environmental stewardship as well as knowledge, and we can also contribute to more effective teaching activities.

Graph 57 Imagine you are explaining the importance of the ocean to someone who knows very little about it. Which three facts would you most likely share with them? (Choose 3) - Hungary



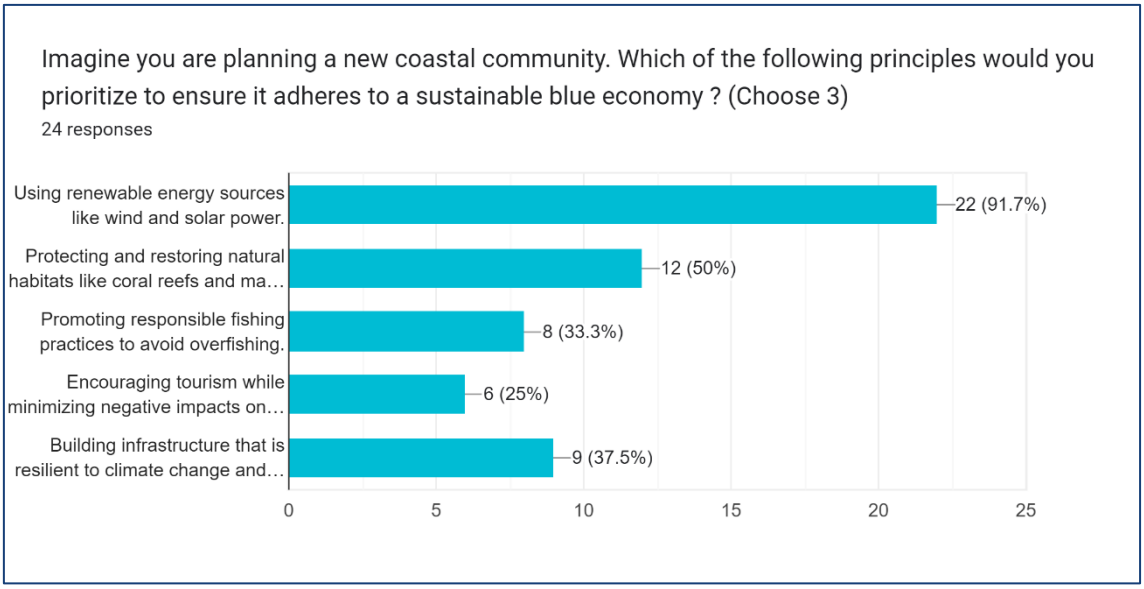
When explaining the importance of the ocean to someone with limited knowledge, three key points attract attention based on the survey responses. First of all, the overwhelming recognition by 87.5% of participants that the ocean is home to incredible and varied species emphasizes the unmatched richness present in its depths. The ocean provides habitat to an astounding diversity of animals, adding to the overall ecological richness of Earth, from complex coral ecosystems to the wide range of marine life. Second, the fact that 87.5% of respondents agreed that the ocean is essential to controlling Earth's temperature and weather patterns highlights the ocean's impact on the environment as a whole. The ocean is a dynamic factor that modifies temperature, precipitation, and other aspects of climate systems. The data highlights how the ocean and the overall climate are intertwined, highlighting the ocean's importance in preserving planetary stability. A significant proportion of responders (83.3%) recognized the importance of the ocean in sustaining millions of people's lives. This emphasizes how essential the ocean is to human societies economically and culturally, supporting fisheries, providing food for populations along the shore, and enhancing their quality of life. This fact emphasizes the ocean's vital role in sustaining human well-being and points to the complex interaction that exists between humans and the ocean. The selected data together depict the ocean as a complex organism with biological, climatic, and socioeconomic significance, even if the survey also revealed a lower emphasis on the ocean's role in producing oxygen and storing carbon dioxide.

Graph 58 What does the term 'blue economy' mean to you? - Hungary



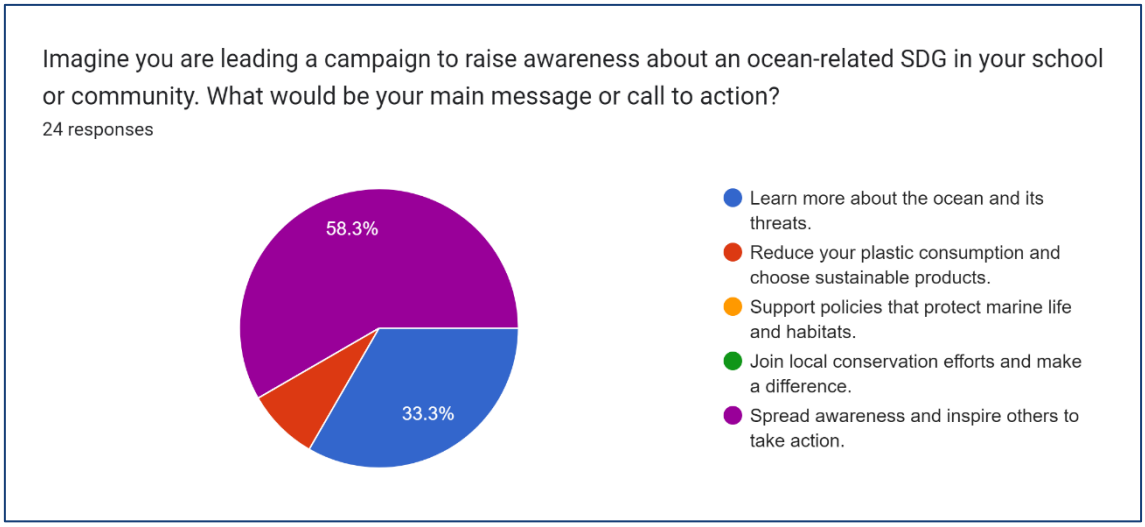
A definite consensus among the studied population is revealed by the survey results concerning how the term "blue economy" is interpreted. 91.7% of respondents, representing a sizable majority, relate the phrase to the sustainable use of ocean resources. This common view points to a general understanding among those polled of the significance of striking a balance between economic endeavours and environmental preservation in the context of the ocean. On the other hand, 8.3% of respondents, who are in the minority, saw the "blue economy" in terms of job prospects and economic growth. Although this viewpoint does exist, the population polled reflects a markedly lower prevalence of it. This minority opinion could represent a fraction that views the blue economy solely as a source of employment and economic development, possibly emphasizing less the necessity of sustainability and conservation. From an analytical standpoint, the widespread correlation between the 'blue economy' and sustainable use is consistent with current discourse, which highlights the necessity of responsible and eco-conscious methods when utilizing ocean resources. Overall, the results indicate that most of the population surveyed generally aligns with sustainable practices when it comes to using ocean resources.

Graph 59 Imagine you are planning a new coastal community. Which of the following principles would you prioritize to ensure it adheres to a sustainable blue economy ? (Choose 3) - Hungary



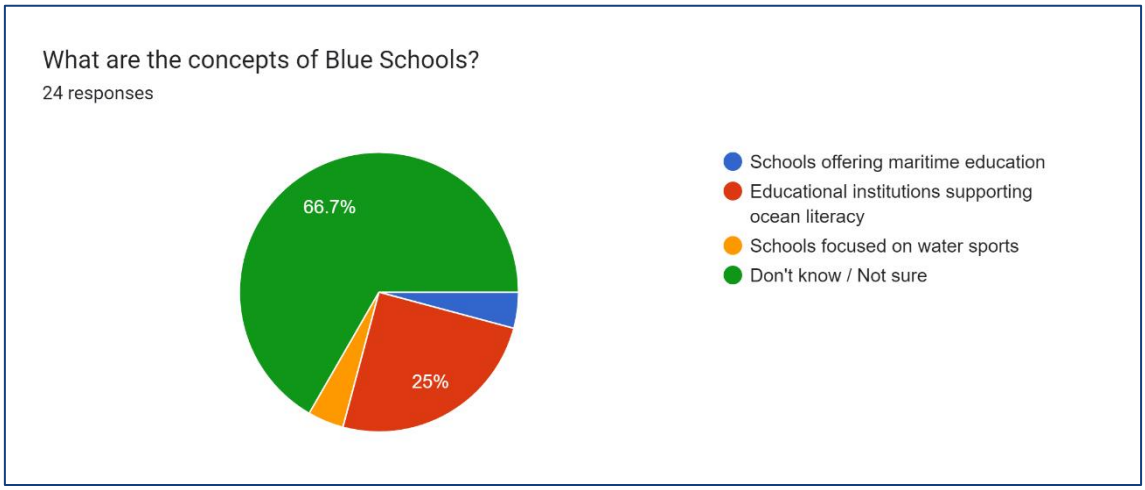
Three important factors are highlighted in the survey replies when imagining a new coastal community that is directed by the ideas of a sustainable blue economy. With 91.7% of respondents in favor, the integration of renewable energy sources like solar and wind power is the subject of broad accord. This commitment is in line with the general objective of a blue economy, which aims to achieve balance between ecological well-being and economic progress. It shows a clear intention to lessen environmental effect through the utilization of sustainable energy. Fifty percent of the respondents saw the importance of safeguarding and rehabilitating natural habitats, including mangroves and coral reefs, as another crucial element. Furthermore, 37.5% of respondents support the construction of infrastructure that is resistant to rising sea levels and climate change. This indicates a knowledge of the possible difficulties caused by the effects of climate change on coastal areas. In line with the fundamental principles of a blue economy, there is a proactive attempt to reduce risks and guarantee the long-term viability of the coastal community by integrating climate-resilient measures into community infrastructure. The overall focus on renewable energy, habitat preservation, and climate resilience highlights a comprehensive approach to creating a coastal community that balances economic development with environmental sustainability, even though environmentally conscious tourism (25%) and responsible fishing practices (33.3%) received attention.

Graph 60 Imagine you are leading a campaign to raise awareness about an ocean-related SDG in your school or community. What would be your main message or call to action? - Hungary



The poll results recommend a thorough approach to spearheading a campaign to raise awareness of a Sustainable Development Goal (SDG) connected to oceans. The majority (58.3%) support a message that prioritizes raising consciousness and motivating group action. A sizeable fraction (33.3%) emphasizes the value of education and calls on people to learn more about the ocean and the problems it faces. Furthermore, a smaller percentage (8.3%) places more emphasis on changing individual behaviors, including consuming less plastic and selecting sustainable products.

Graph 61 What are the concepts of Blue Schools? - Hungary

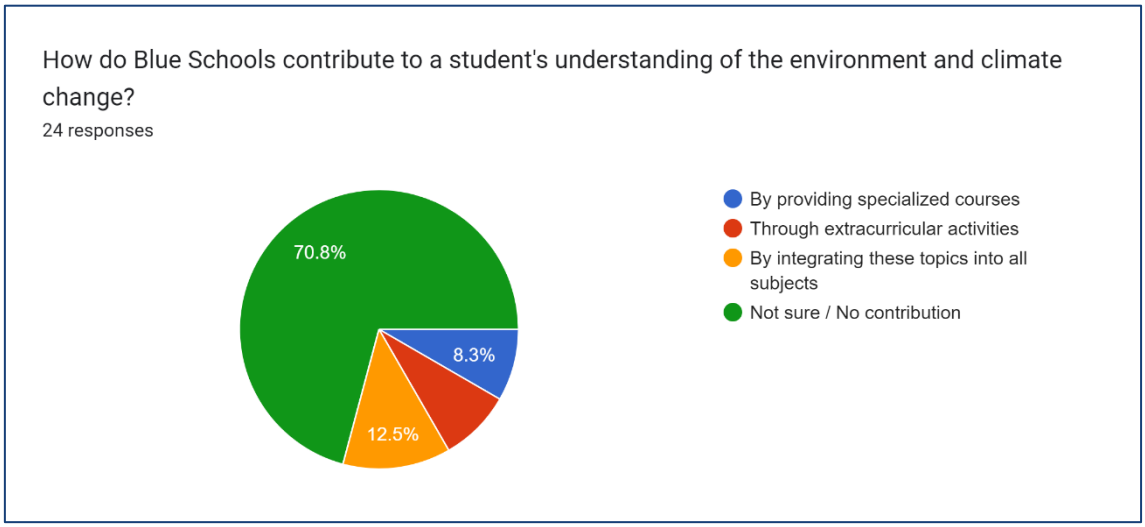


According to the survey, a sizable majority of participants (66.7%) are either unclear or uninformed about the idea of "Blue Schools." Of those who are aware, 25% link Blue Schools to academic institutions that promote ocean literacy. Furthermore, fewer respondents believe that Blue Schools emphasize sea sports (4.2%) or provide marine

education (4.2%). These results imply that Blue Schools might not be well known, pointing to possible areas for clarification and raising knowledge of their goals and purposes.

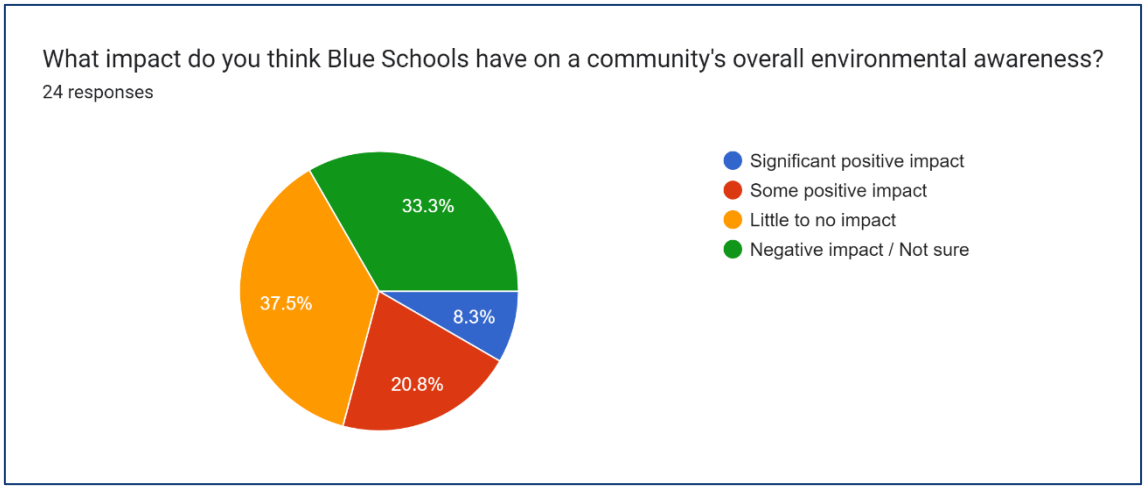
The survey's findings showed a considerable lack of information (66.7%) regarding Blue Schools point to a possible knowledge gap regarding the role that educational institutions play in encouraging sustainable practices and ocean literacy. It is imperative to promote and disseminate Blue School content in order to cultivate environmental responsibility in pupils and establish an ocean literacy culture among communities. This understanding is in line with the overarching objective of accomplishing Sustainable Development Goal 14: Life Below Water and is essential for tackling global issues pertaining to ocean health. Encouraging the adoption of Blue Schools' programs can help mold a generation of people who actively participate in ocean conservation, paving the way for a more resilient and sustainable future.

Graph 62 How do Blue Schools contribute to a student's understanding of the environment and climate change? - Hungary



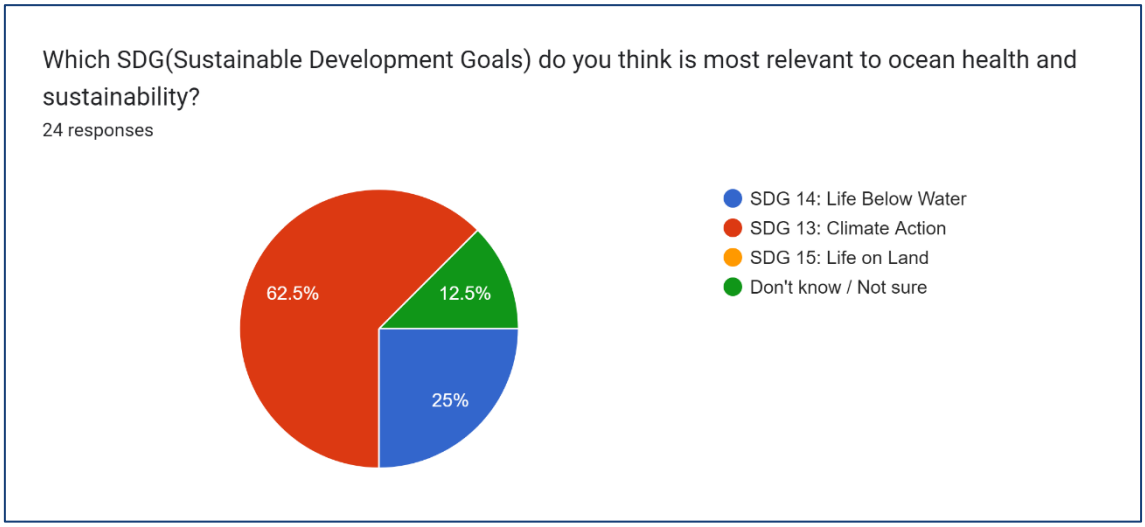
The survey reveals a prevalent lack of clarity or perceived contribution of Blue Schools (70.8%) to a student's understanding of the environment and climate change. While a smaller percentage recognizes potential contributions through integration into all subjects (12.5%), specialized courses (8.3%), or extracurricular activities (8.3%), the overall uncertainty points to an opportunity for clearer communication about the role Blue Schools play in enhancing students' environmental awareness and climate change understanding.

Graph 63 What impact do you think Blue Schools have on a community's overall environmental awareness? - Hungary



Different viewpoints on how Blue Schools affect a community's general environmental consciousness are presented in the survey replies. While a sizeable portion is unsure or believes there may be a negative influence (33.3%), a considerable percentage feels that Blue Schools have little to no impact (37.5%). A minority of respondents (8.3%) believe there has been a considerable positive influence, whereas other respondents (20.8%) admit some good impact. Lack of understanding about Blue Schools and its potential benefits may have an impact on these perceptions, indicating a need for more awareness-raising and communication to emphasize the important role Blue Schools may play in raising environmental consciousness throughout the community.

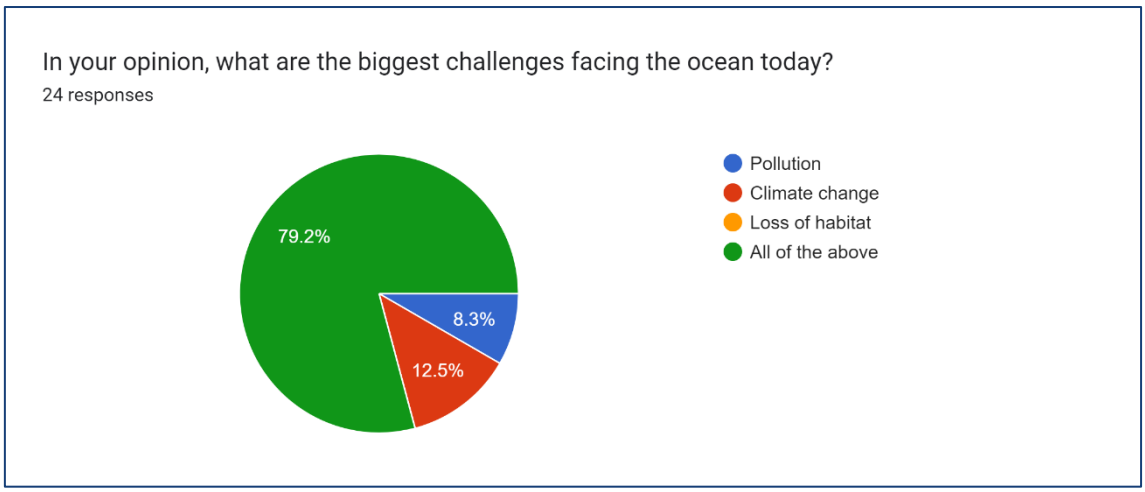
Graph 64 Which SDG (Sustainable Development Goals) do you think is most relevant to ocean health and sustainability? - Hungary



The majority of respondents to the study (62.5%) say that SDG 13 (Climate Action) has the biggest bearing on the sustainability and health of the ocean. SDG 14 (Life Below Water) is regarded as significant by a noteworthy amount (25%) of people, but 12.5% of people express uncertainty. These results point to a general understanding of the

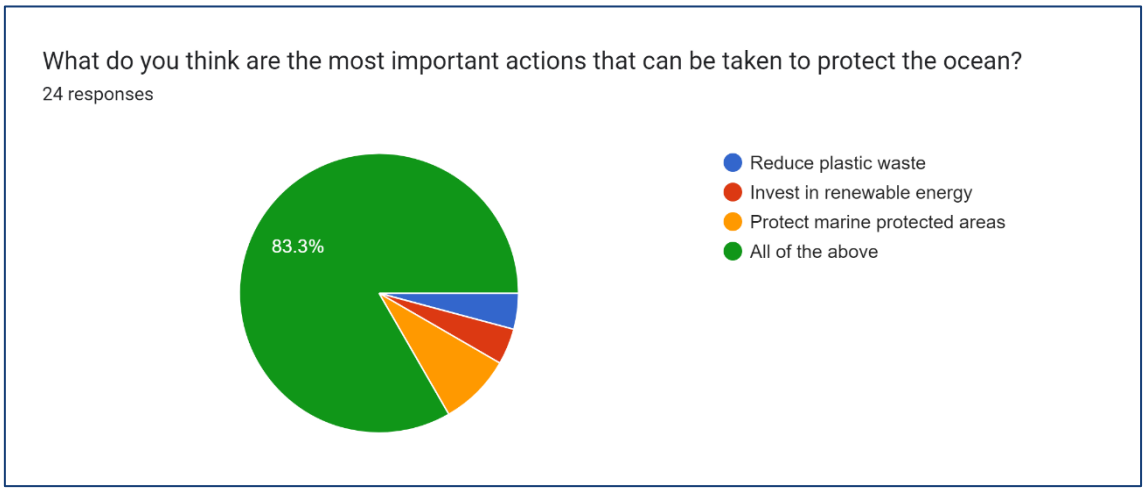
relationship between ocean health and climate action, with room for improvement in knowledge and instruction regarding the specific SDGs that deal with marine sustainability.

Graph 65 In your opinion, what are the biggest challenges facing the ocean today? - Hungary



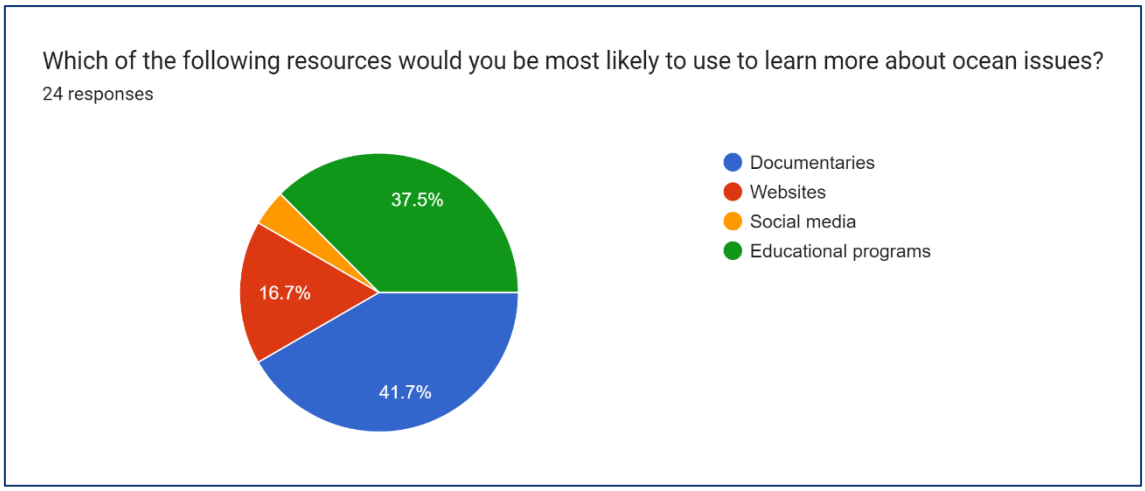
The survey's results show that respondents overwhelmingly agreed, with 79.2% saying that "All of the Above"—pollution, climate change, and loss of habitat—were the major problems the ocean is currently experiencing. This broad viewpoint demonstrates an awareness of the intricate relationships and variety of problems affecting marine ecosystems. The majority emphasizes how urgent it is to solve a number of issues in order to maintain the ocean's sustainability and general health. This increased awareness highlights the necessity of comprehensive plans and international collaboration to address the many issues facing maritime habitats.

Graph 66 What do you think are the most important actions that can be taken to protect the ocean? - Hungary



The results of the survey overwhelmingly support a comprehensive strategy for ocean protection, with 83.3% of participants saying that measures like investing in renewable energy, minimizing plastic waste, and preserving marine protected areas are all equally important. This shows that participants have a deep knowledge that tackling the intricate problems the ocean faces call for a multipronged approach. Although more people support an all-encompassing strategy, less people recognize the particular importance of particular initiatives. Remarkably, 8.3% of respondents stress the need to protect marine protected areas due to their vital function in maintaining marine biodiversity. Reducing plastic waste is cited as a crucial activity by an additional 4.2% of respondents, which is indicative of rising awareness of the detrimental effects of plastic pollution on marine ecosystems. In a similar vein, 4.2% emphasize the significance of investing in renewable energy, underscoring the interconnectedness of climate change and its consequences for ocean health. The respondents' emphasis on both targeted activities and a comprehensive strategy indicates a holistic mentality, underscoring the significance of taking into account the complex interaction of elements impacting maritime habitats.

Graph 67 Which of the following resources would you be most likely to use to learn more about ocean issues? - Hungary



The results of the survey show that people have a wide range of preferences when it comes to learning about ocean-related topics. The most popular option (41.7%) is documentaries, demonstrating a preference for narratively driven and visually striking content when explaining complex environmental subjects. Closely behind, at 37.5%, are educational programs, indicating a strong need for organized and instructive learning settings.

16.7% of users choose websites as a digital platform for accessing current and varied information. 4.2% of respondents listed social media as their preferred resource, indicating that some people value these platforms' real-time and interactive features for learning about themes linked to the ocean. This varied distribution of preferences underscores the importance of employing a multi-channel approach to disseminating

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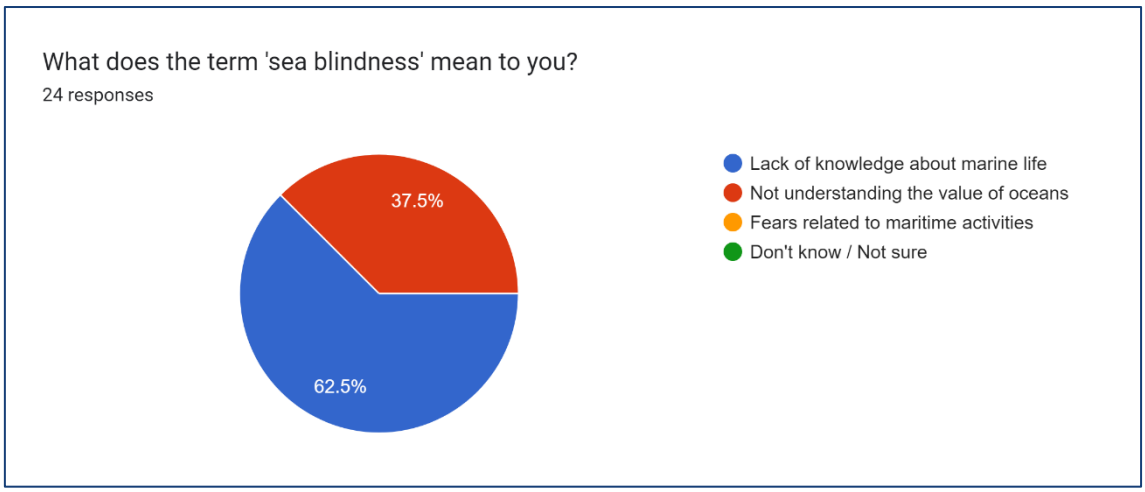
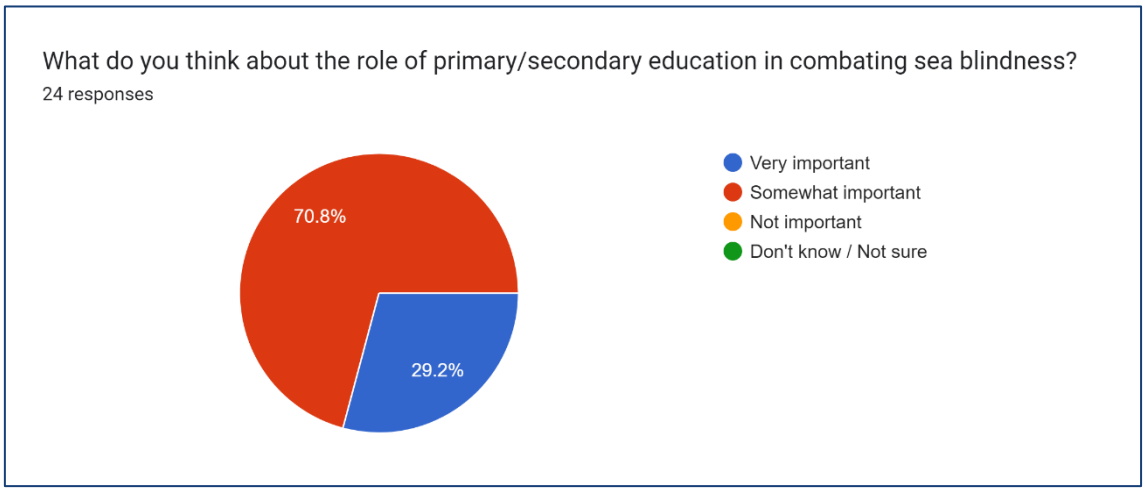
information about ocean conservation. By recognizing and catering to different learning styles and preferences, effective strategies can better engage a broader audience in understanding and addressing critical ocean-related issues.

Graph 68 What does the term 'sea blindness' mean to you? - Hungary



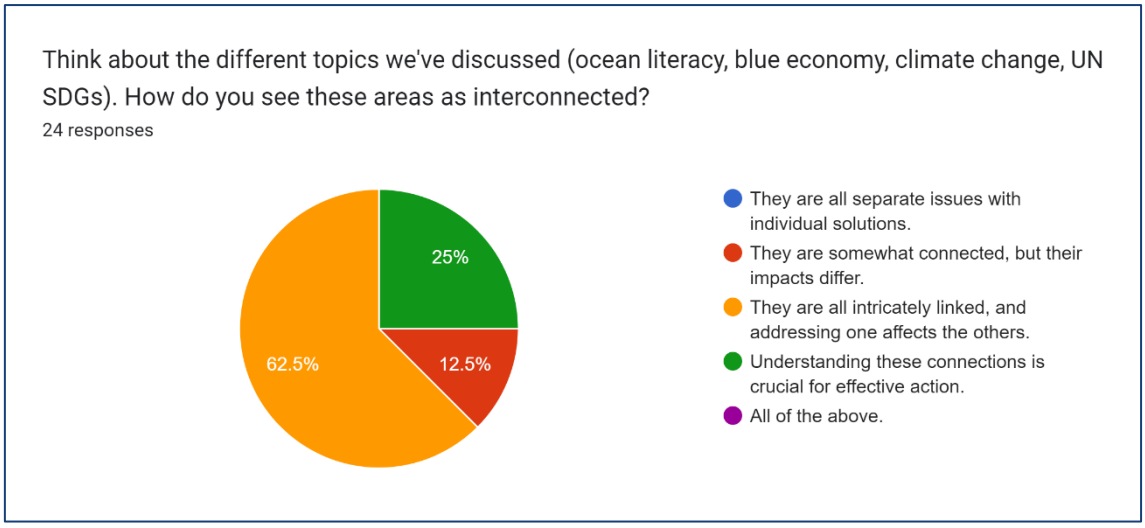
The results of the survey over the term "sea blindness" point to two possible interpretations. Notably, 37.5% of respondents link it to a lack of appreciation for the importance of the seas, highlighting a belief that the importance of the oceans is underestimated or ignored. On the other hand, the majority (62.5%) characterizes "sea blindness" as ignorance of marine life, which emphasizes the significance of educating people about the complexities of marine ecosystems. This complex understanding highlights the necessity of extensive educational initiatives and public awareness campaigns to close the knowledge and appreciation gap regarding the seas.

Graph 69 What do you think about the role of primary/secondary education in combating sea blindness? - Hungary



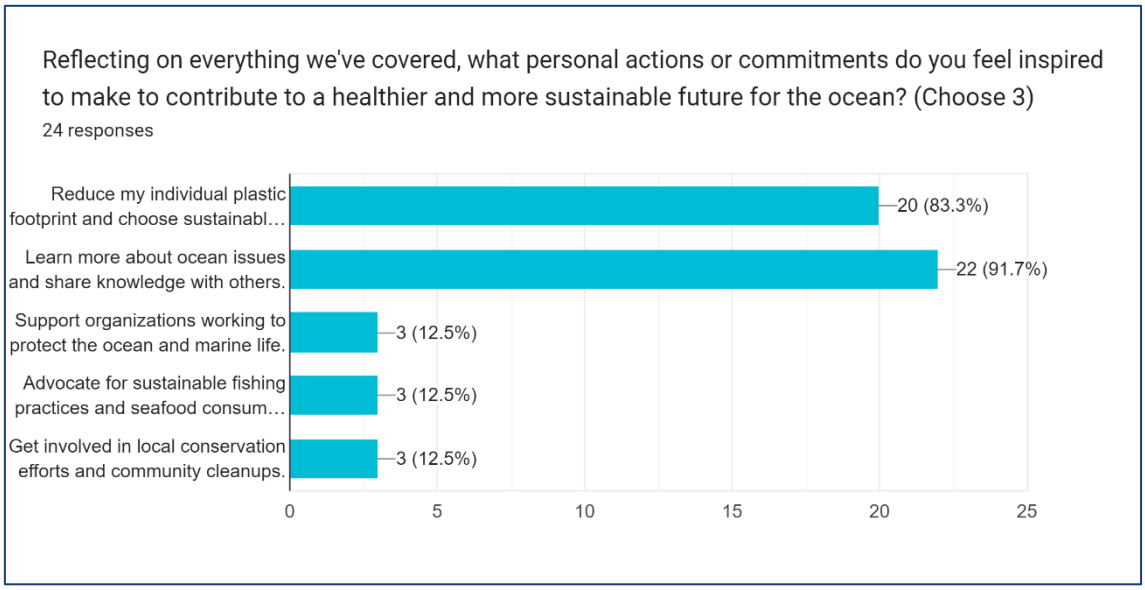
The survey's findings show that participants strongly agreed on the need of primary and secondary education in preventing sea blindness. The majority (70.8%) thinks it's somewhat essential, indicating that schools have a part to play in bringing attention to ocean issues. A sizable portion (29.2%) highlight the critical role that early education plays in treating sea blindness, highlighting the importance of educational initiatives in promoting a more profound comprehension of marine ecosystems. The lack of respondents expressing doubt or believing that elementary or secondary school is unimportant indicates that participants have a strong sense of confidence in the critical role that education plays in preventing sea blindness. This shared viewpoint highlights the surveyed individuals' perceptions on the efficacy of educational programs in influencing their attitudes and level of ocean knowledge.

Graph 70 Think about the different topics we've discussed (ocean literacy, blue economy, climate change, UN SDGs). How do you see these areas as interconnected? - Hungary



The survey results highlight a general understanding of the connections between the subjects covered, which include UN SDGs, ocean literacy, the blue economy, and climate change. The majority (62.5%) believes that these areas are closely related, emphasizing a sophisticated comprehension of their interdependencies and the recognition that treating one has a substantial influence on the others. A sizable portion (25%) highlights how important it is to comprehend these connections in order to take successful action, demonstrating a pragmatic grasp that well-informed approaches are required to traverse the intricate web of connections among various subjects. A smaller portion (12.5%) believes that these domains are somewhat related but have different effects, indicating a more nuanced perspective that takes into account the variations in how these subjects appear and interact with one another. Interestingly, there is agreement because none of the respondents think that each of these problems has a unique solution. This group's perspective indicates that participants have a common idea that tackling the problems presented by ocean-related issues, the blue economy, climate change, and UN SDGs calls for an integrated and comprehensive strategy.

Graph 71 Reflecting on everything we've covered, what personal actions or commitments do you feel inspired to make to contribute to a healthier and more sustainable future for the ocean? (Choose 3) - Hungary



The results of the study show that respondents are firmly committed to taking individual steps toward a healthy ocean. Most prioritize learning more about ocean issues (91.7%) and minimizing personal plastic footprints (83.3%). Intentions to assist organizations (12.5%), promote sustainable behaviours (12.5%), and participate in local conservation initiatives (12.5%) are expressed by smaller percentages. This group's dedication to ocean health and sustainability is the result of a multimodal strategy that includes community involvement, knowledge-sharing, and behavioural adjustments on an individual basis.

Hungary's study results demonstrate a high level of awareness of concerns related to the ocean, highlighting the necessity of programs like Blue Schools to close knowledge gaps. The dedication to lessening personal plastic footprints, increasing knowledge about ocean-related concerns, and lending support to organizations that promote ocean conservation highlights a rising understanding of the vital role that oceans play in ensuring global sustainability.

The survey results indicates that blue schools play a critical role in advancing our understanding of the ocean. The educational component of Blue Schools is supported by the high focus placed on learning about ocean issues and the significance of incorporating ocean literacy into curricula. These schools are essential in raising a generation of people who are aware of the problems facing the seas and the need of sustainable practices since they prioritize promoting knowledge on marine habitats. To sum up, the findings of the Hungarian survey underscore the importance of Blue Schools in improving ocean awareness and encouraging environmentally friendly behaviours. These organizations are vital in combating sea blindness, encouraging ocean literacy, and giving the next generation a sense of duty for the preservation of

marine environments. The dedication exhibited by the participants highlights the significance of educational programs such as Blue Schools in fostering a more knowledgeable and ecologically aware populace.

2.4. Italy

2.4.1. Purpose and Scope of the Literature Review

Explaining that the literature review is to analyse in depth the existing research on ocean literacy, blue schools, blue economy and sustainable development goals and to review the body of knowledge in this field. Identify the topics under review and research questions. Explain which areas are in focus and how they relate to the overall objectives of the project.

The literature review in this report aims to thoroughly analyse existing research on ocean literacy, the blue economy, and sustainable development goals. The purpose is to comprehensively review and synthesize the body of knowledge in these interconnected fields. This examination is critical in understanding the current landscape of research and identifying potential gaps or areas for further study.

The scope of the review includes several key topics:

1. Ocean Literacy: Understanding the public's awareness and knowledge about the ocean's influence on them and their influence on the ocean.
2. Blue Economy: Examining sustainable use of ocean resources for economic growth, improved livelihoods, and jobs while preserving the health of ocean ecosystems.
3. Sustainable Development Goals (SDGs): Specifically, focusing on goals related to marine environments and how they intersect with ocean literacy and the blue economy.
4. Blue Schools: Examining the concept of blue school and conducting studies that will contribute to the literature.

2.4.2. Assessment of Existing Research

In the 2021 campaign, 21 NGOs actively engaged in diverse initiatives across eleven Mediterranean countries to promote ocean literacy. The “2021 Mediterranean Action Day” focused on involving citizens and individuals in the Mediterranean region, with initiatives spanning different categories.

• **Marine citizen science activities, fostering the co-generation of knowledge and understanding about the current health of Mediterranean ocean systems:**
iSea (Greece) conducted a Bioblitz event at Axios Delta National Park, recording 233 observations on the iNaturalistGR platform and identifying 45 new species. A pre-event webinar emphasized the delta's ecological importance and introduced citizen science.

Participants addressed coastal degradation, proposed solutions, and contributed crucial data for marine ecosystem preservation.

ASOCIACION HIPPOCAMPUS (Spain) created a biota identification guide to document Mar Menor's biodiversity impacted by mismanagement and pollution. The guide, tested by volunteer divers, aims to enhance understanding and appreciation of the area's marine life. **AKTI** (Cyprus) mobilized 2,590 citizens for beach clean-ups, collecting 13.5 tons of litter globally. Results were presented to local authorities, emphasizing collaboration between the government and civil society to protect coastal areas from marine plastic pollution.

• **Incorporating arts into ocean literacy initiatives to portray the dynamic and complex nature of the human-ocean nexus:**

Makhzoumi Foundation in Lebanon organized a nationwide art contest to raise awareness of ocean literacy principles, encouraging young individuals to incorporate these concepts into their artwork and propose solutions to ocean-related challenges. **Oikotopia** in Greece addressed significant marine litter issues in protected estuaries through two successful cleanup events, collecting around 1 ton of marine litter. The subsequent art weekend in Veroia showcased impactful pieces made from collected waste, emphasizing the crucial role of civil society in addressing marine pollution and promoting ocean stewardship. **Posidonia Green Project** and **Posidonia Project** Carloforte hosted "Ocean Lovers" film festivals in Spain and Italy, aiming to raise awareness of the environmental, social, and cultural significance of marine ecosystems. These events engaged various sectors, using the arts to amplify ocean literacy objectives and foster a sense of responsibility toward the ocean. **ASMP** Kelibia in Tunisia celebrated the marine and coastal environment with conferences on socio-economic importance, risks from poor management, and the ocean's role as a climate regulator. An art competition and field visit to Kerkouane beach enriched the celebration, highlighting the importance of Kélibian heritage and the role of women in the sea.

• **Clean-up campaigns, actively involving the public in taking action for a cleaner ocean and identifying solutions to mitigate marine pollution**:

HEAD (Lebanon), **GREEK ECO PROJECT** (Greece), and **AOYE** (Egypt) undertook impactful initiatives to combat marine pollution and promote ocean sustainability. In Lebanon, HEAD focused on plastic waste upcycling in Byblos, organizing a cleanup that collected 5 tons of waste, including 1.3 tons of plastic. The bottle caps were transformed into coasters, demonstrating green job opportunities. The finished products were sold at Christmas bazaars, and a video produced by university students aimed to enhance ocean literacy, reaching a national audience and featuring at COP 22. GREEK ECO PROJECT in Greece rallied volunteers to remove 3 tons of litter from Epanomi's coastal lagoon, a vital area facing threats from plastic pollution. Clean-up activities involved over 80 participants and included awareness efforts such as children's signs and planting seedlings to protect biodiversity. AOYE in Egypt prioritized marine litter surveys and plastic pollution awareness. A public awareness event in Alexandria involved training 40 participants on beach litter monitoring, complementing AOYE's broader campaign with 50 NGOs advocating the ban of Single-Use Plastic (SUP) products and promoting eco-friendly alternatives. These projects collectively showcase diverse approaches, from upcycling plastic waste to coastal clean-ups and

awareness campaigns, contributing to a healthier and more sustainable ocean environment.

• **Advocacy, awareness-raising, and capacity-building activities, aiming to ensure widespread understanding of the diverse values and services of the ocean for human well-being, culture, and sustainable development. These activities also aim to identify and overcome barriers to behavioural change:**
EMSEA-Med organized educational workshops in Croatia, Italy, and Greece, introducing the "Let's meet the Med – Mediterranean Sea Literacy" initiative during the "2021 Mediterranean action day". Adapted to local contexts, the hands-on activities aimed at enhancing students' understanding of oceans. **EMSEA-Med** also developed a Mediterranean Sea Literacy guide in four languages. **EKO KVARNER** hosted the "Understanding the Adriatic Sea" conference to address stressors like pollution, overfishing, and climate change. Experts presented the ecological state, marine citizen science, and proposed a 12-point Action Plan for the Adriatic's sustainable development. **LHAP** in Jordan conducted a survey on marine pollution, recommending measures to authorities. Circolo Festambiente organized activities to raise awareness about marine invasive alien species, involving citizens of different age groups in excursions, educational labs, and surveys with fishermen. The initiatives emphasized public involvement in maintaining a healthy and diverse ocean for sustainability.

•**Research on** the **Blue Economy: Review studies on the development, applications and impacts of the blue economy concept.**
ECO-UNION organized the Blue Eco Forum 2021, focusing on sustainable blue food in the Mediterranean, aligning with MIO-ECSDE's MAD 2021. The forum featured discussions with 16 speakers from diverse sectors, aiming to raise awareness and propose solutions for sustainable Mediterranean Sea management. The Jordanian Society of Friends of Heritage (JSFH) organized a workshop emphasizing the diving industry's role in conserving the Gulf of Aqaba's marine life. The event showcased eco-friendly initiatives of Aqaba's diving centres and highlighted the importance of non-scientific professionals, like divers, in promoting ocean literacy. DelTa in Italy empowered 19 young advocates through the "Ocean Influencers" campaign, creating 36 videos on marine challenges, enhancing ocean literacy, critical thinking, and accessibility. CMED in Morocco emphasized integrating ocean literacy into formal education, organizing a seminar and a youth creativity competition. The success led to the establishment of an education club for sustainable development, supported by CMED. SCSEP in Syria used media channels for ocean literacy, conducting interviews and a beach clean-up campaign with over 500 participants. A workshop on Syrian National Environment Day addressed marine ecosystem challenges, involving experts and local organizations.

2.4.3. Gaps in the Literature

Despite the growing recognition of its importance, the existing literature on ocean literacy exhibits significant gaps that hinder our comprehensive understanding of the subject. A notable gap in the current literature is the scarcity of studies examining the

efficacy of educational interventions in promoting ocean literacy, particularly among students and teachers. While there are numerous programs aimed at increasing awareness, there is a limited focus on educational interventions and consequently a dearth of comprehensive assessments of their impact. Ocean literacy has primarily been spear-headed by marine scientists and educators, but it is a responsibility of all sectors of society. There is therefore a need to continue expanding collaborations beyond these stakeholders and, through networks, better bridge the gaps between science, policy, and society in a way that is locally relevant. Another significant gap is the lack of emphasis on collaborative projects within school settings. The majority of existing literature tends to focus on individual awareness and understanding rather than exploring the potential benefits of collaborative projects that involve both students and teachers. The current literature predominantly targets general audiences, overlooking the need for tailored approaches to diverse demographic groups. There is a lack of research exploring the effectiveness of ocean literacy initiatives among specific demographics, such as different age groups, socioeconomic backgrounds, and geographic locations. For the sustainable future of the Mediterranean Sea, there is an urgent need for advancing ocean literacy across the Mediterranean basin in order to empower diverse societies and cultures, with different behaviours and attitudes, to become informed and to understand critical issues associated with sea related topics (Mokos et al., 2021). Furthermore, the governmental agencies in charge to promote ocean literacy are providing tool kit, educational programme, frameworks, etc. without a practical and concrete debate with those living the education (teachers and students). This gap represents a barrier supporting top-down decisions which are not offering a comprehensive and pragmatic solutions. In fact, since its birth, ocean literacy has been involved in national and international conferences, in science communication events, in training courses (for journalists and teachers), in translation, and diffusion of educational resources but never involving the audience from the beginning (Mokos et al., 2022).

Addressing these gaps is imperative for several reasons. First, understanding the impact of educational interventions is crucial for designing effective programs that contribute to long-term ocean literacy. Second, incorporating collaborative projects in schools can enhance the engagement and learning experience for both students and teachers, fostering a more comprehensive and proper understanding of ocean-related issues and needs (Pendleton et al., 2020). Third, tailoring initiatives to diverse audiences ensures inclusivity and maximizes the reach and effectiveness of ocean literacy efforts. Finally, teachers and students must be included as active components in the decision-making activities which should follow a bottom-up approach.

The symbol of the “ocean” should inspire those working in ocean literacy to collaborate as a multidisciplinary network. To address these gaps is imperative to create a direct dialogue with stakeholders at any level adopting a multidisciplinary approach which is part of the SHORE partnership. An ocean-literate person is able to develop and provide evidence-based guidance for adaptation planning, implementation and evaluation (McCauley et al., 2019). The project’s key objectives include implementing targeted educational interventions, promoting collaborative projects in schools, tailoring initiatives to diverse audiences, create a multidisciplinary network among stakeholders.

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A rigorous evaluation of different educational interventions is needed to understand their impact on increasing ocean literacy. This research will contribute valuable insights into the most effective methods for enhancing understanding and awareness among students and teachers. Developing and implement collaborative projects in school settings can help in assessing their effectiveness in promoting ocean literacy. By engaging both students and teachers in hands-on, collaborative activities, SHORE aims to foster a deeper connection with ocean-related issues. Recognizing the importance of inclusivity will design and implement initiatives tailored to diverse demographic groups. This will involve understanding the specific needs and challenges faced by different audiences and customizing educational materials and activities accordingly.

Bridging the identified gaps in ocean literacy research is crucial for advancing our understanding of how to effectively promote awareness and understanding of the ocean. Through these efforts, it is possible to contribute new knowledge and insights that will not only fill existing gaps but also pave the way for more effective and inclusive ocean literacy initiatives in the future ensuring real changes in education, in the life of the new generation, and in the marine and terrestrial ecosystem.

2.4.4. Lessons from Previous Studies

As the field of ocean literacy continues to evolve, it is essential to not only identify existing gaps in the literature but also to extract valuable lessons from previous research and successful practices. Shedding light on the gaps in the current literature should summarize in parallel important lessons learned and successful strategies employed.

While many studies have evaluated short-term gains in knowledge and awareness, few have delved into the sustained influence of these programs on individuals and communities over time. The literature also lacks a sufficient exploration of the behavioural changes resulting from ocean literacy initiatives. While increasing knowledge and awareness are essential, understanding how these translate into tangible actions and environmentally responsible behaviours remains an unexplored territory. With the rapid advancement of technology, there is a discernible gap in the literature regarding the effectiveness of technological interventions in promoting ocean literacy. Integrating innovative technologies, such as virtual reality or interactive simulations, has the potential to enhance engagement and learning experiences but is currently underrepresented in the research.

One of the best practice examples is the EU4Ocean Platform, which is a part of the EU4Ocean coalition, that has the following objectives (Zielinski et al., 2022):

- Consolidate and build on existing initiatives in ocean literacy spanning different stakeholder sectors;
- Connect disparate and diverse stakeholders acting in ocean literacy to form an inclusive ocean literacy community network that stimulates an environment of concrete actions and commitments to create an “ocean-literate generation”;

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- Jointly identify in topic-oriented groups best opportunities in ocean literacy activities that can be scaled up to larger campaigns to raise awareness in wider society;
- Ensure the Youth are an integral and active part of ocean literacy activities;
- Act as a focal point for the European Ocean Literacy community for the preparatory planning to the UN Decade of Ocean Science for Sustainable Development, and in particular its ocean literacy components; and
- Build momentum for EU4Ocean to ensure growth and spreading of the initiative beyond the project lifetime.

Successful ocean literacy initiatives often involve active community engagement, so programs that integrate local communities into the learning process tend to be more effective in fostering a sense of stewardship and responsibility towards the ocean. Lessons from successful initiatives highlight the importance of interdisciplinary approaches. Integrating various subjects, such as science, art, and literature, into ocean literacy programs can provide a holistic understanding and appeal to a broader audience. Incorporating hands-on learning experiences has proven to be a successful strategy, whether through field trips, interactive workshops, or citizen science projects, engaging participants in practical activities enhances retention and application of ocean-related knowledge.

Some examples of innovative approaches and strategies are identified as follows. Gamification has emerged as an innovative strategy for enhancing engagement in educational contexts. Applying game-like elements to ocean literacy programs can make learning more enjoyable and effective, encouraging sustained interest and participation. Leveraging digital platforms and mobile applications offers a promising avenue for disseminating ocean literacy content. Interactive apps, virtual field trips, and online platforms can reach diverse audiences, providing accessible and engaging learning experiences for all abilities. Incorporating storytelling and narrative approaches into ocean literacy initiatives can make complex scientific concepts more relatable. Narratives have the power to evoke emotions and create memorable connections with the ocean, contributing to long-lasting awareness and understanding. Regarding the latter, it is essential to include in ocean literacy real life experiences, realities close to the audience who can feel engaged and part of the problem as well as the solution, and “ocean hero” stories that can offer the opportunity to meet real persons and the changes they have made throughout tangible methods. In this way, students are not only exposed to the complexity of marine ecosystems and related issues but also motivated to explore solutions, making their learning experience more meaningful and applicable. Whether studying coastal habitats, marine life, or pollution sources, hands-on experiences in the field deepen students’ connection to the ocean and enhance their problem-solving skills. Designing scenario-based learning modules can immerse students in simulated real-world situations related to ocean literacy. These scenarios can range from exploring the impact of human activities to devising strategies for sustainable management. This aligns with the multifaceted challenges presented by ocean literacy, where critical thinking is crucial for understanding and addressing complex problems like marine pollution, climate change, and biodiversity loss. Furthermore, as students work together to solve ocean-related problems, they develop teamwork and communication skills, mirroring the collaborative nature of scientific

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research and environmental conservation efforts. At various levels, this could be conducted including creativity as an emotional and free tool to engage participants into a practical activity and inspire real changes. Finally, in recent years Problem-Based Learning (PBL) has been adopted as an instructional method that places students at the centre of their learning experiences by presenting them with real-world problems that require investigation and resolution. Instead of traditional lecture-based instruction, PBL encourages students to actively engage with the material, fostering a deeper understanding and long-term retention of knowledge.

These important lessons and successful practices from previous research provide valuable guidance for future endeavours and can provide innovative and effective perspectives that can represent new approaches for guiding future research in ocean literacy. Incorporating innovative approaches can contribute to advancing the effectiveness of ocean literacy initiatives. The synthesis of past successes and forward-thinking strategies will play a crucial role in shaping a more informed and engaged global community with a deeper appreciation for the ocean resulting in real and tangible changes essential for the future of our planet.

2.4.5. Survey and Public Perception

A survey was conducted to gather insights on critical topics related to ocean sustainability. The survey was designed as an online questionnaire with 21 questions, with a focus on eight European countries – Austria, Czechia, Estonia, Hungary, Italy, Poland Romania and Türkiye. The online questionnaire was accessible to citizens of those countries with targeted outreach efforts towards students, educators, and broader public interested in ocean sustainability. Participation was voluntary and anonymous, ensuring the integrity and objectivity of the collected data. It was designed to explore key themes including:

- Ocean Literacy Initiatives: Assessing public understanding of ocean health and sustainability practices.
- "Sea Blindness" Phenomenon: Investigating the awareness of human dependence on healthy oceans and the disconnect between people and the marine environment.
- Emerging Blue Economy: Gauging public perceptions and potential opportunities associated with ocean-based sustainable development initiatives.
- Climate Change Impacts: Evaluating public understanding of the far-reaching consequences of climate change on marine ecosystems and the need for adaptation strategies.

The Blue School Studies survey aimed to provide robust data for in-depth analysis of these crucial themes. The collected information informs the development of innovative educational programs and resources within the SHORE project. By empowering students with ocean literacy and fostering their role as agents of change, the project seeks to promote sustainable behaviour and contribute to a healthier future for our oceans. The Blue School Studies survey was anticipated to yield valuable insights into public knowledge, attitudes, and concerns regarding ocean health and sustainability.

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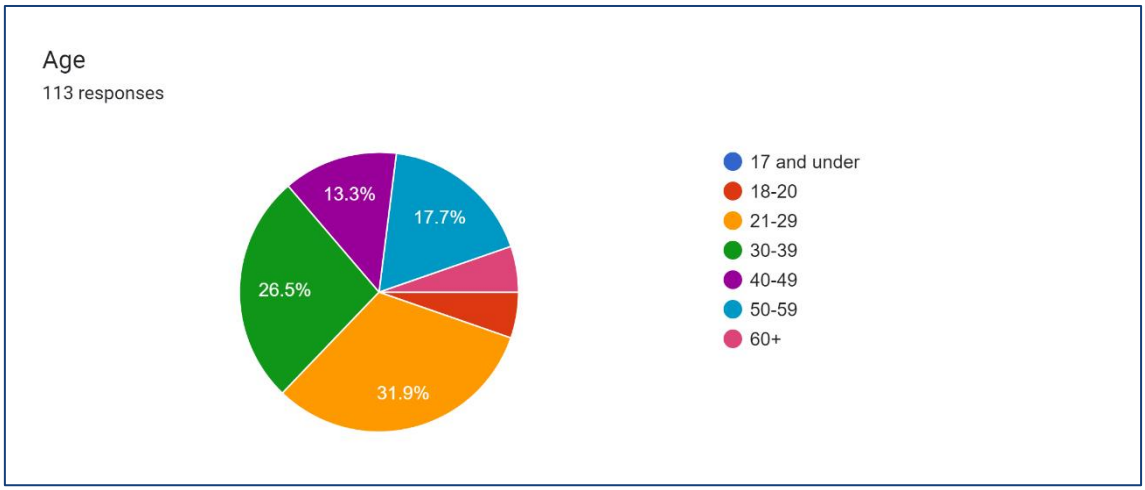
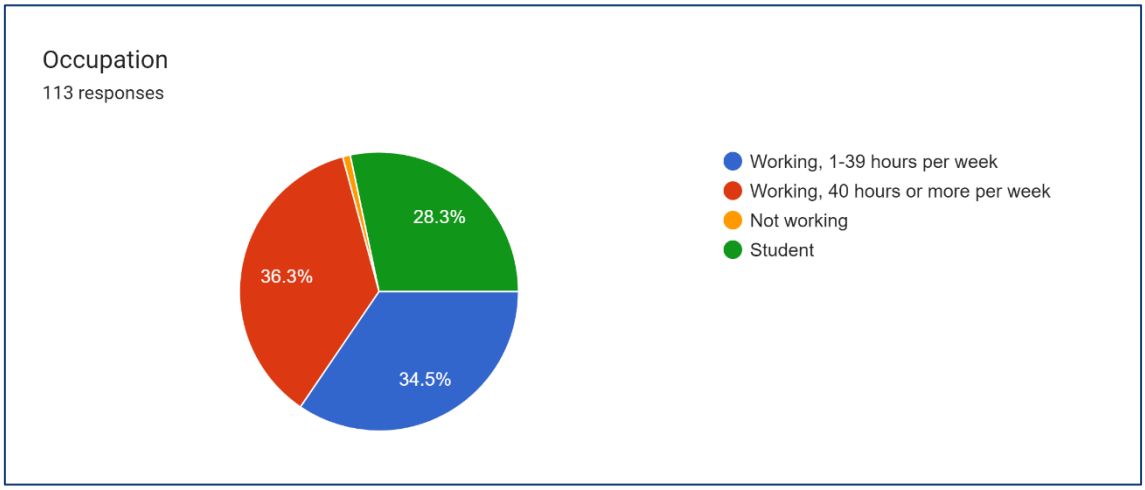
These findings form the basis for developing effective educational tools and strategies within the SHORE project, ultimately empowering students to become effective advocates for healthy oceans and a sustainable future.

The survey was conducted among the Italian population, garnering 113 responses from a diverse sample. The age distribution revealed that 31.9% of the respondents fell within the 21-29 age bracket, 26.5% were between 30 and 39, and 13.3% were aged between 40 and 49. In terms of employment status, 36.3% identified themselves as full-time workers, dedicating at least 40 hours per week to their professional commitments. Another 34.5% reported working less than 40 hours per week, signifying a part-time work arrangement. Notably, 28.3% of the respondents identified as students, emphasising the presence of an academic demographic within the surveyed population.

Graph 72 Age of Survey Participants - Türkiye



Graph 73 Working Status of Survey Participants - Türkiye



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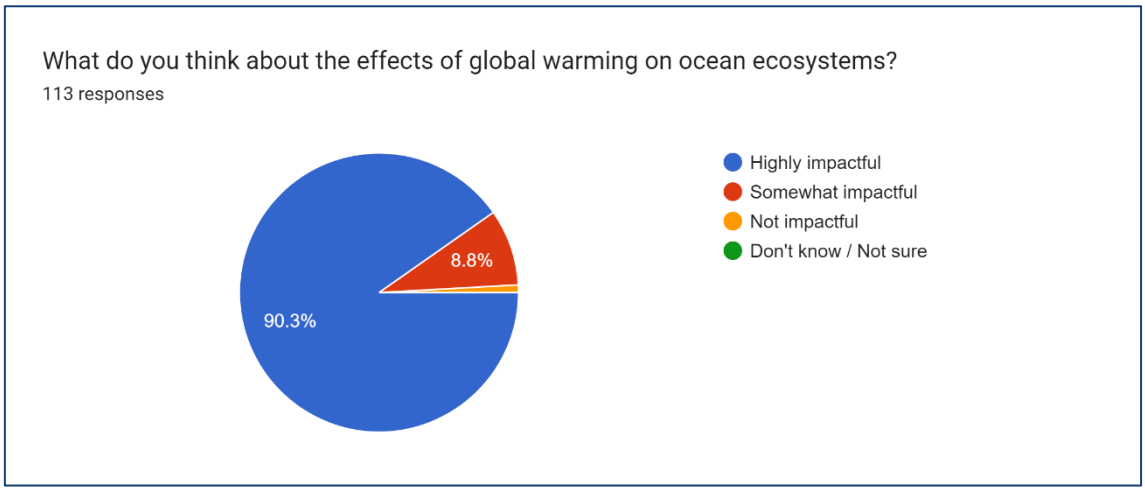
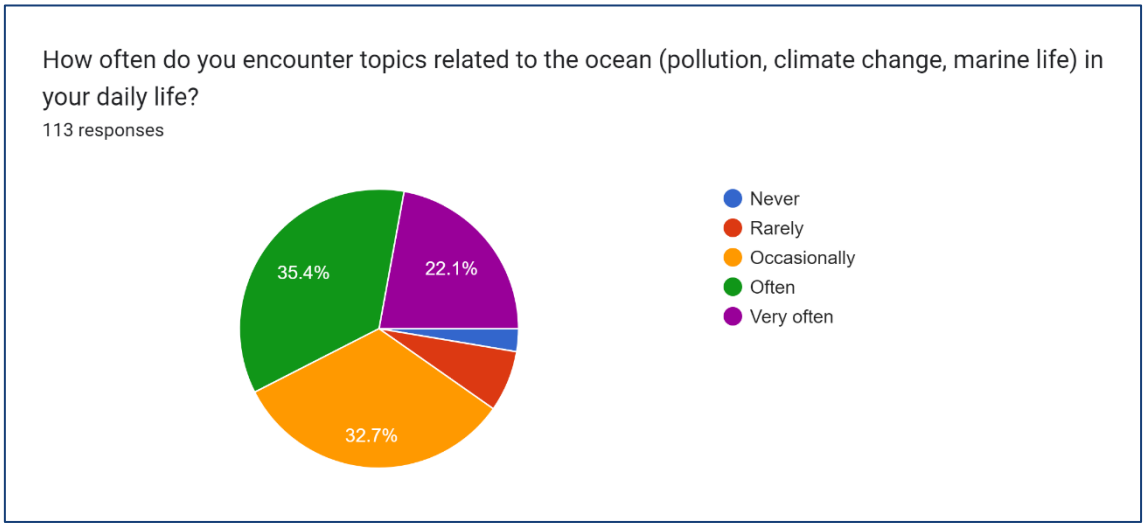
Graph 74 What do you think about the effects of global warming on ocean ecosystems? - Türkiye



While 90% of the survey participants are cognizant of the considerable influence of global warming on ocean ecosystems, which is coherent with previous findings, the remaining segment expresses a perception of relatively moderate impact (9%), and a negligible proportion (0.9%) believes that global warming has no discernible impact. While a notable percentage of participants affirm frequent discussions of ocean-related subjects in their daily interactions, 22% indicating very frequent occurrences, 35% reporting frequent discussions, and 33% experiencing occasional discussions around 10% concede to rarely or never encountering such topics.

Graph 75 How often do you encounter topics related to the ocean (pollution, climate change, marine life) in your daily life? - Türkiye



The Italian data indicates a high number of everyday encounters with issues related to the ocean. Notably, 35.4% of respondents said they frequently talk about such topics, demonstrating how commonplace conversations about ocean-related concerns are in their daily lives. These themes include pollution, climate change, and marine life. This

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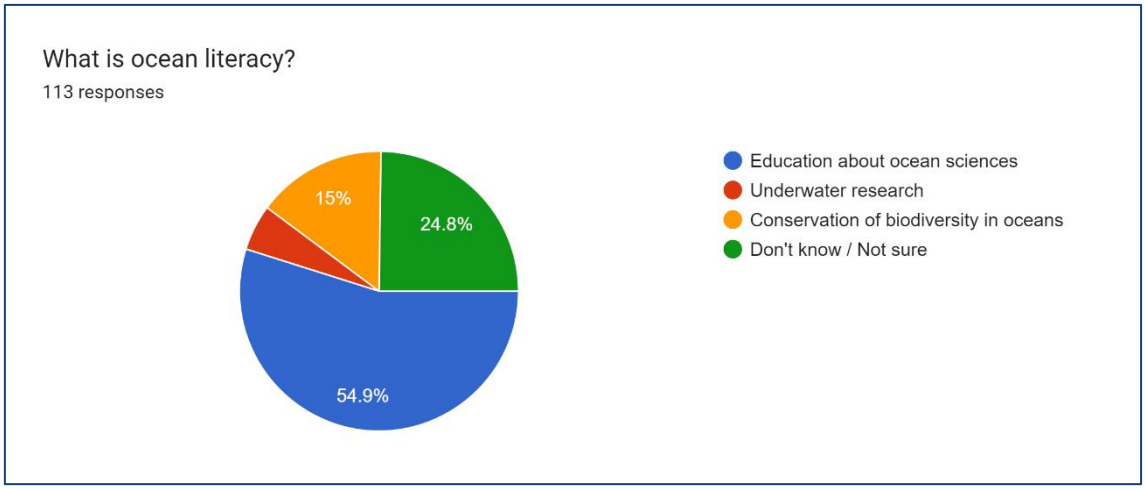
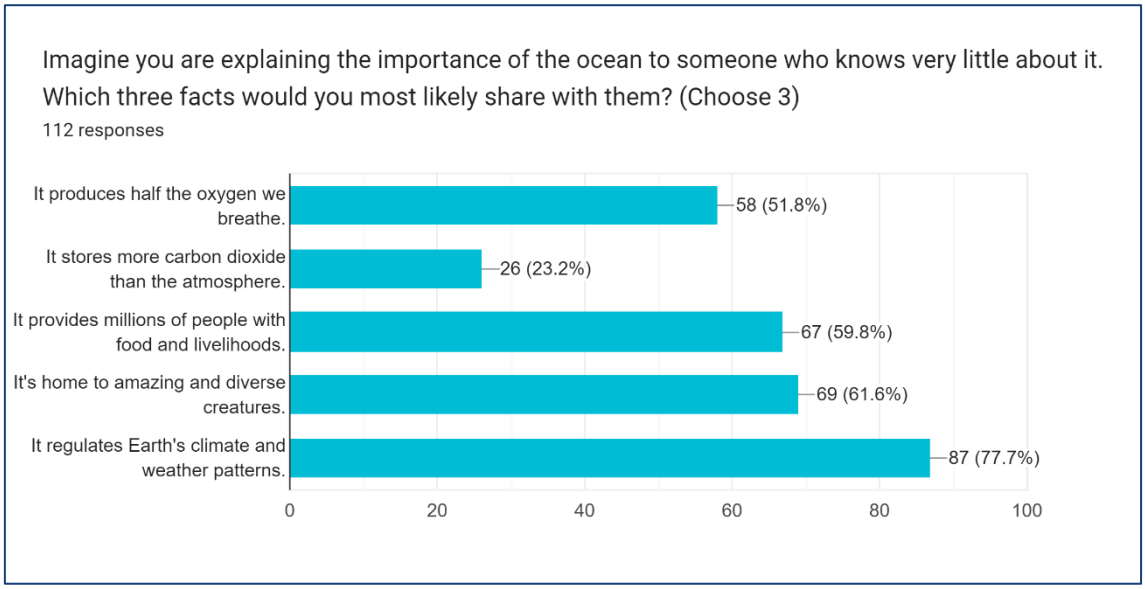
implies a significant degree of knowledge and involvement with these important issues. Furthermore, replies stating that respondents had occasionally (32.7%) and infrequently (7.1%) encountered subjects connected to the ocean serve to emphasize the importance of these concerns in public discourse. The fact that some people are not as involved in these topics as others highlights a baseline degree of awareness within the examined population. The information indicates that participants from Italy have a significant interest in and understanding of the significance of ocean-related topics.

Graph 76 What is ocean literacy? - Türkiye



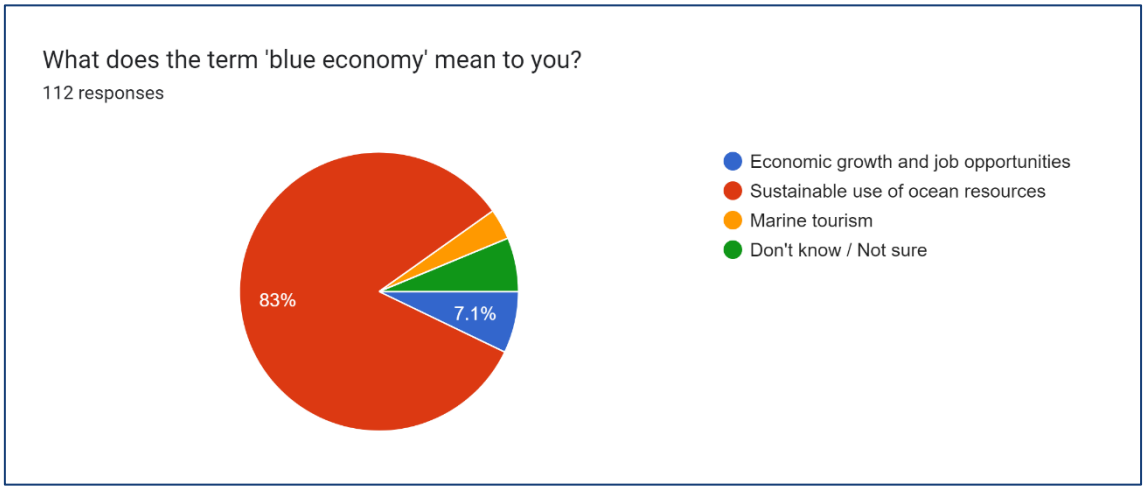
Specifically, approximately 25% of participants exhibited a lack of awareness regarding ocean literacy; whereas the 55% referred to the Education about ocean sciences and the 15% on conservation of biodiversity in oceans.

Graph 77 Imagine you are explaining the importance of the ocean to someone who knows very little about it. Which three facts would you most likely share with them? (Choose 3) - Türkiye



Nevertheless, the three most commonly desired pieces of information about the ocean that participants expressed interest in sharing with others are its influence on Earth's climate and weather patterns (87%), its role as the habitat for a myriad of amazing and diverse creatures (61,6%), and its significant contribution to providing sustenance and livelihoods for millions of people. Conversely, only 26% mentioned awareness of the ocean's capacity to store more carbon dioxide than the atmosphere and its role in producing half of the oxygen we breathe.

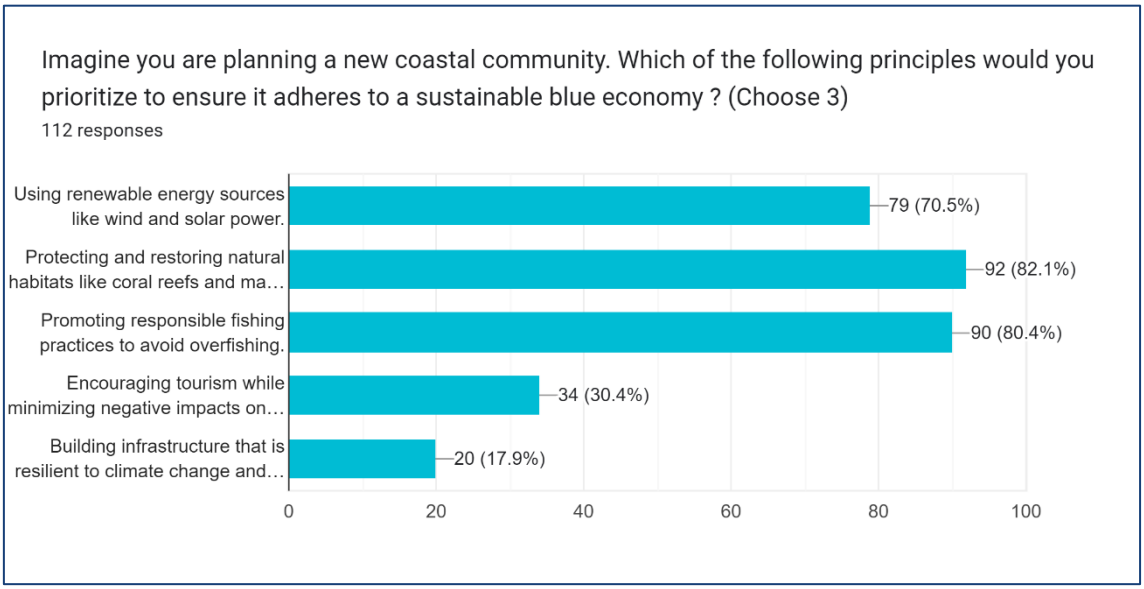
Graph 78 What does the term 'blue economy' mean to you? - Türkiye



In terms of the concept of the blue economy, 83% of participants defined it in the context of sustainable use of ocean resources. In contrast, fewer than 8% associated it with economic growth and job opportunities or expressed uncertainty or lack of

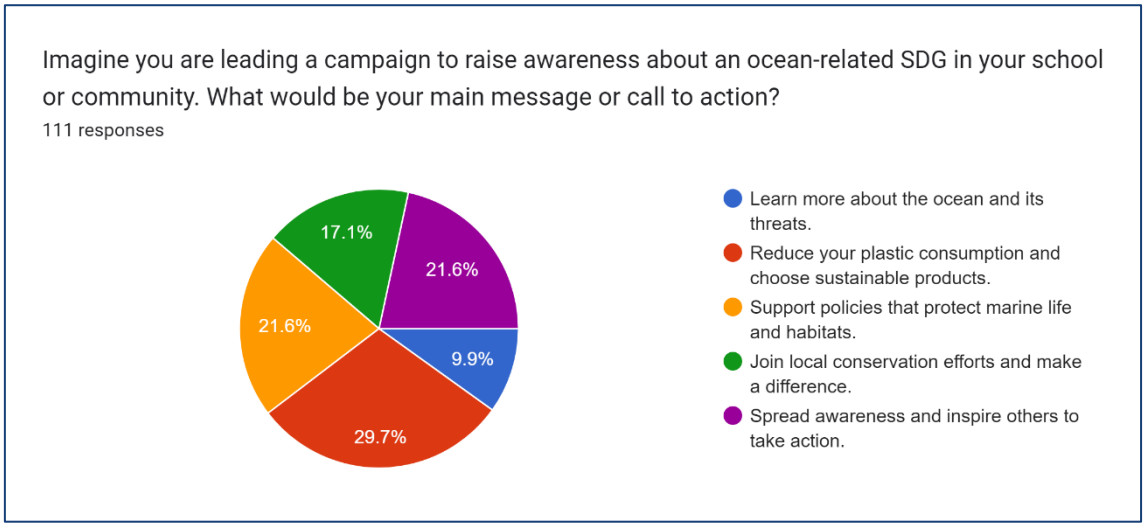
knowledge. Additionally, less than 4% mentioned marine tourism in their understanding of the blue economy.

Graph 79 Imagine you are planning a new coastal community. Which of the following principles would you prioritize to ensure it adheres to a sustainable blue economy ? (Choose 3) - Türkiye



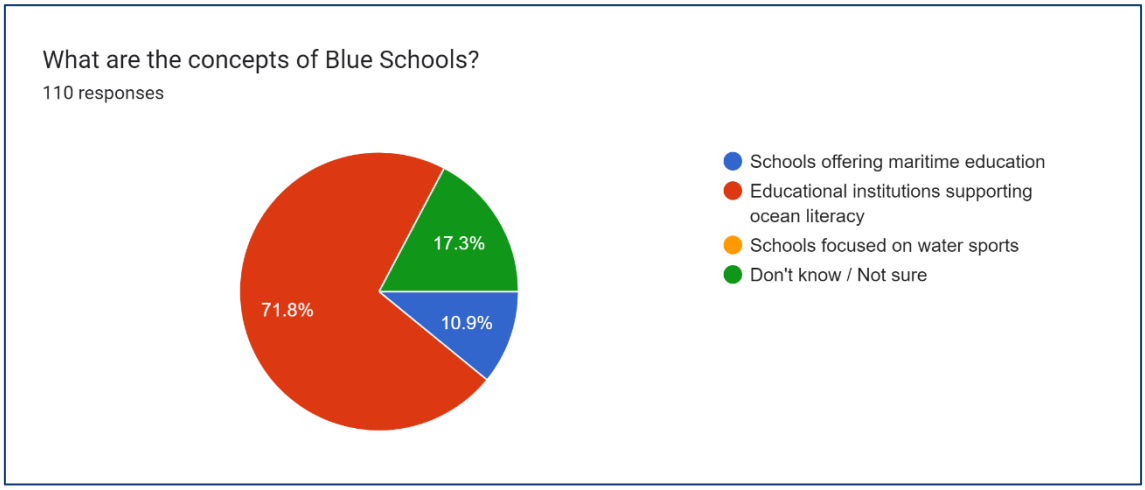
Nevertheless, the primary principles participants would prioritise for a sustainable blue economy include safeguarding and restoring natural habitats such as coral reefs and mangroves (82%), advocating for responsible fishing practices to prevent overfishing (80%), and embracing renewable energy sources like wind and solar power (70%). In alignment with the sustainable development goals, the predominant message or call to action revolves around the primary objective of decreasing plastic consumption (30%).

Graph 80 Imagine you are leading a campaign to raise awareness about an ocean-related SDG in your school or community. What would be your main message or call to action? - Türkiye



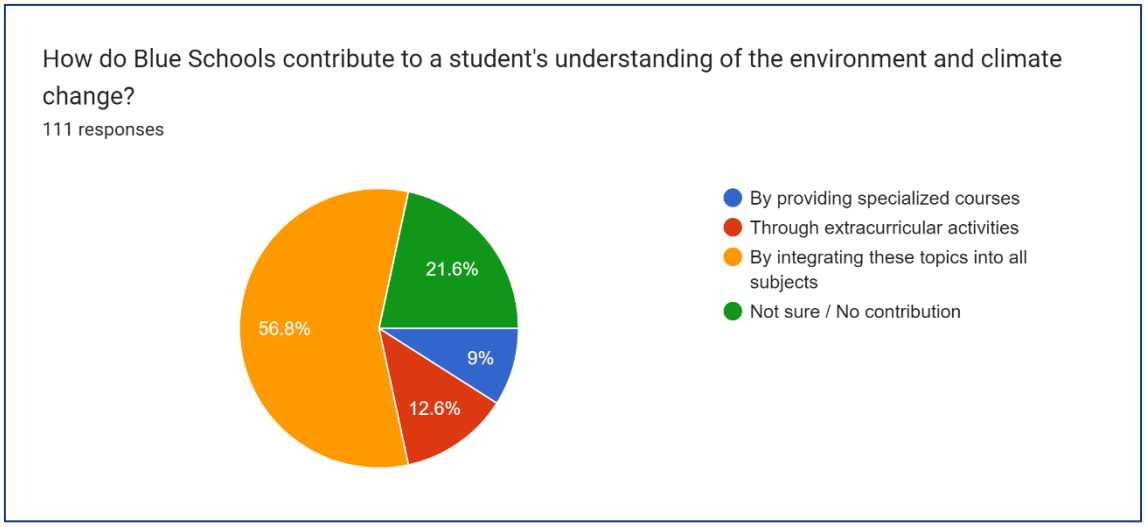
Additionally, participants expressed the importance of supporting policies aimed at safeguarding marine life and habitats (21%) and fostering awareness to inspire others to take meaningful action. A noteworthy 17% expressed the desire to actively participate in local conservation efforts to effect positive change. Conversely, only 10% indicated an interest in enhancing knowledge about the ocean and its associated threats.

Graph 81 What are the concepts of Blue Schools? - Türkiye



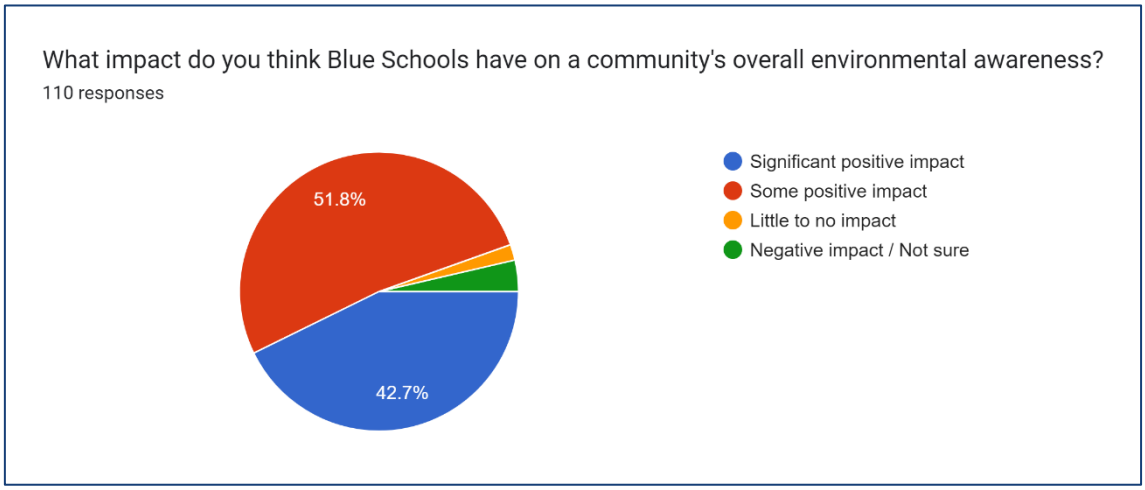
In accordance with the Blue Schools concept, 71% of participants associate it with educational institutions that promote ocean literacy. Conversely, 17% indicated a lack of knowledge regarding the concept, and only 10% linked it to schools that provide maritime education. Notably, no respondents mentioned schools specifically centered around water sports.

Graph 82 How do Blue Schools contribute to a student's understanding of the environment and climate change? - Türkiye



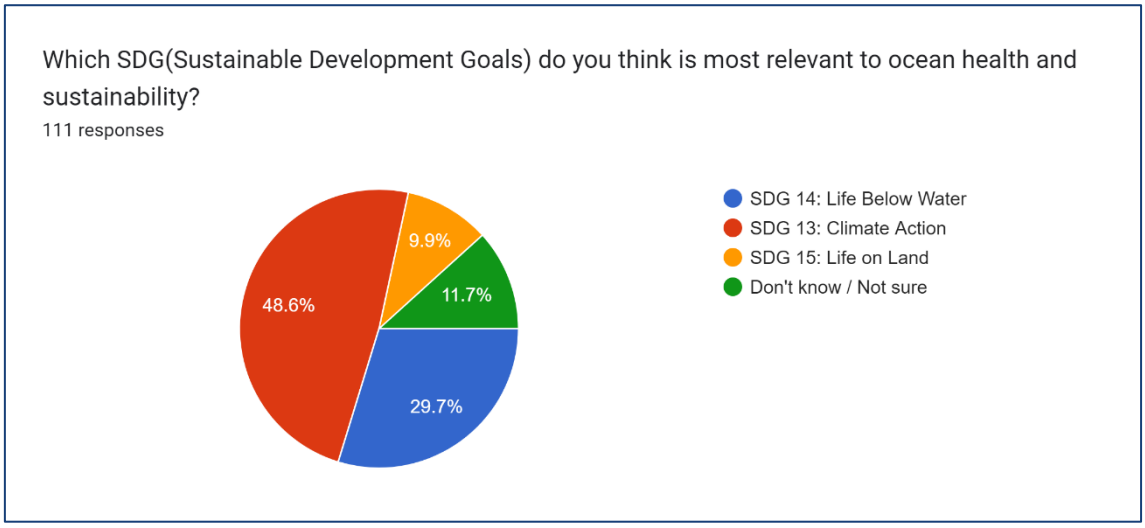
Participants perceive the primary contribution of blue schools to students' understanding of the environment and climate change in the integration of these topics across all subjects (56%). Approximately 21% expressed uncertainty or believed there is no discernible contribution, while 12% recognized the contribution through extracurricular activities. Less than 10% associated the contribution with specialized courses.

Graph 83 What impact do you think Blue Schools have on a community's overall environmental awareness? - Türkiye



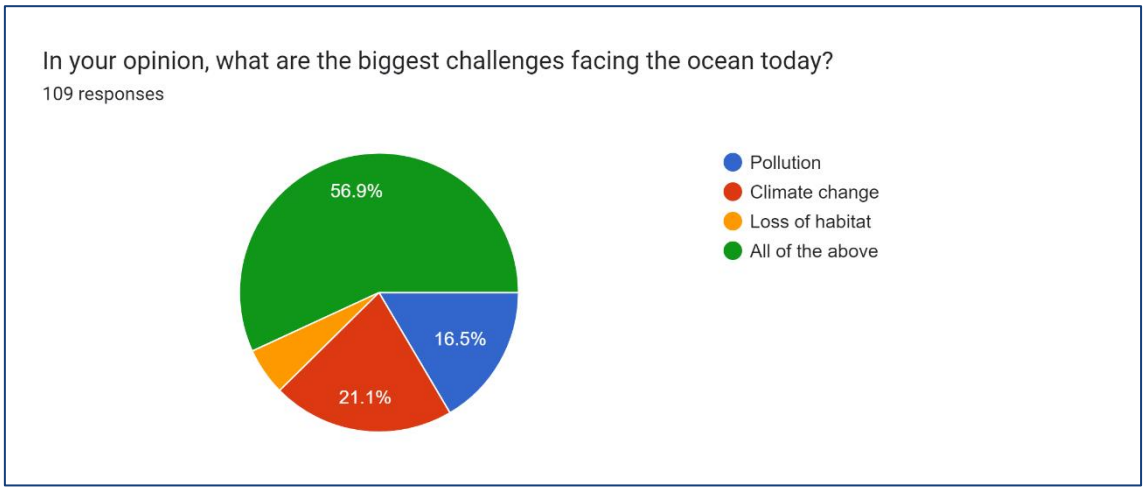
However, the community is conscious that blue schools have a positive impact on environmental awareness. Participants perceive blue schools as significantly contributing to the overall environmental awareness of the community, with an overwhelming majority (94%) noting a positive impact. Conversely, a small fraction (3.6%) indicates a negative impact, and a mere 1.8% suggest little to no impact.

Graph 84 Which SDG (Sustainable Development Goals) do you think is most relevant to ocean health and sustainability? - Türkiye



Participants hold the view that the sustainable development goals most pertinent to ocean health and sustainability are as follows: 48% identify climate action, 29% cite life below water, 11% express uncertainty or lack of awareness, and only 9.9% mention life on land.

Graph 85 In your opinion, what are the biggest challenges facing the ocean today? - Türkiye

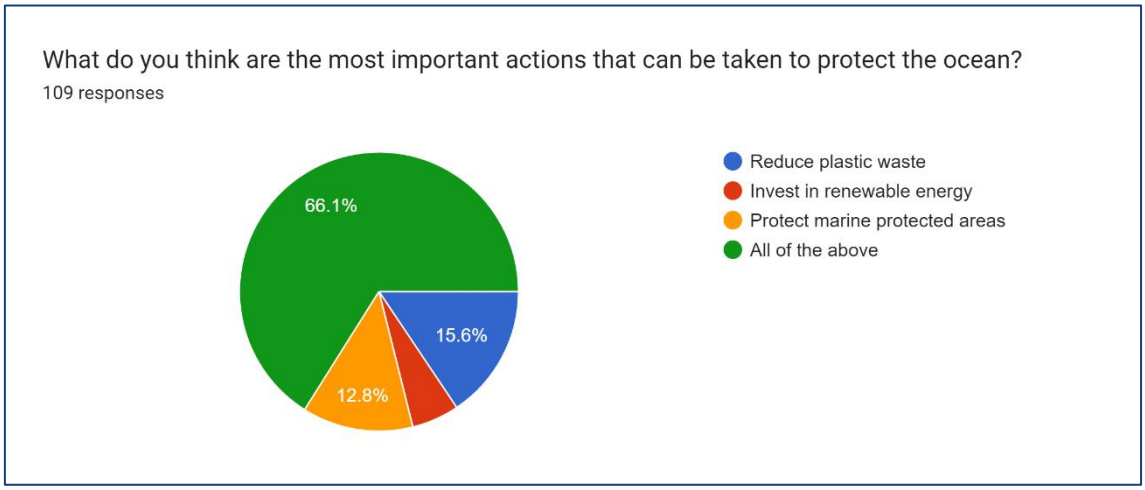


Additionally, they believe that the most significant challenge facing the ocean today encompasses all three proposed aspects — pollution, climate change, and loss of habitat. Regarding protective actions, 66% advocate for measures such as reducing plastic waste, investing in renewable energy, and safeguarding marine protected areas.

The data from Italy suggests that participants generally acknowledge that a variety of issues taken together represent a serious threat to the ocean. Pollution, habitat loss, and climate change are viewed by the majority (56.9%) as the three most urgent problems. This recognition of the interdependence of these issues is consistent with a comprehensive theory of ocean health. The emphasis placed on "All of the above"

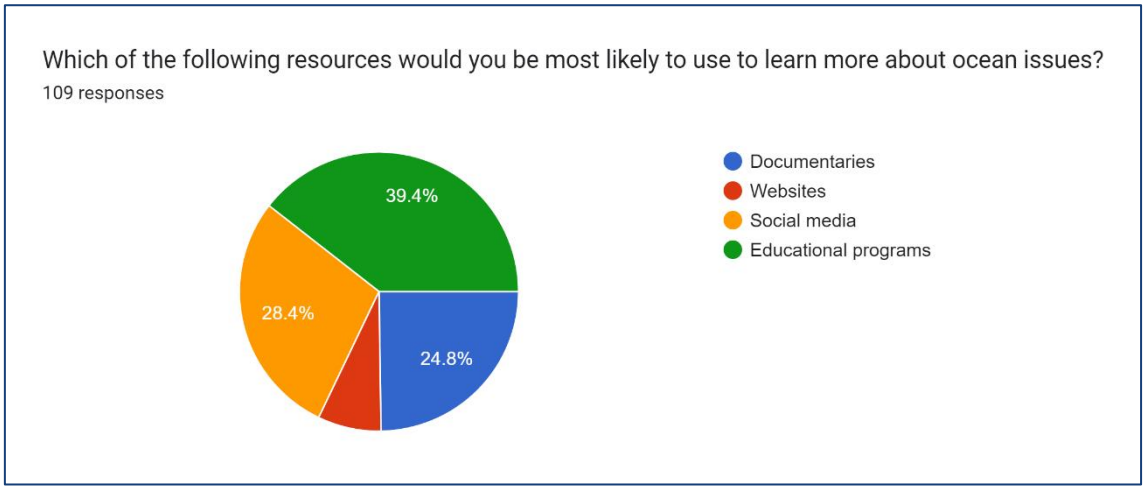
(56.9%) emphasizes the knowledge that these issues are interconnected and require a holistic approach to be addressed. To protect the wellbeing and sustainability of the ocean environment, it is necessary to find diverse solutions to the interconnected problems of pollution, habitat loss, and climate change. This response indicates that Italian participants are more cognizant of the complex nature of the threats facing the ocean. Tackling these challenges will require coordinated efforts, including policy initiatives, public awareness campaigns, and sustainable practices to address the interconnected issues of climate change, habitat loss, and pollution.

Graph 86 What do you think are the most important actions that can be taken to protect the ocean? - Türkiye



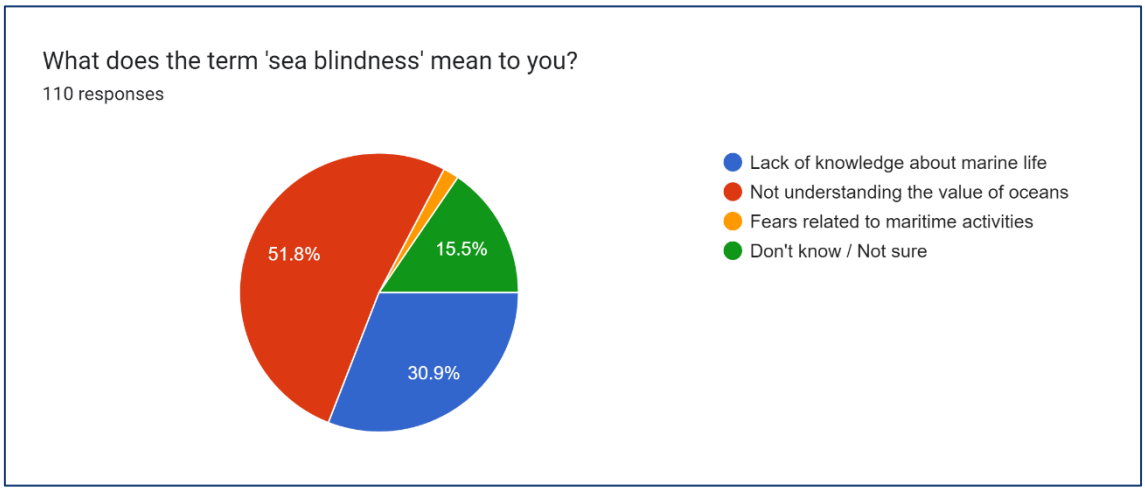
The majority of Italian respondents (66.1%) think that in order to safeguard the ocean, all of the recommended activities are necessary. This suggests that a broad consensus exists among those polled regarding the need for a multimodal strategy to tackle the many problems the ocean faces. A comprehensive approach to ocean conservation is highlighted by the recognition of the interconnectedness of many initiatives, such as safeguarding marine regions, investing in renewable energy, and cutting down on plastic waste. Additionally, particular replies show that targeted actions can make a major contribution to ocean protection, with 15.6% stressing the need to reduce plastic waste and 5.5% acknowledging the value of investing in renewable energy. This nuanced understanding suggests a well-informed and environmentally conscious perspective among participants in Italy regarding the actions needed to safeguard the ocean.

Graph 87 Which of the following resources would you be most likely to use to learn more about ocean issues? - Türkiye



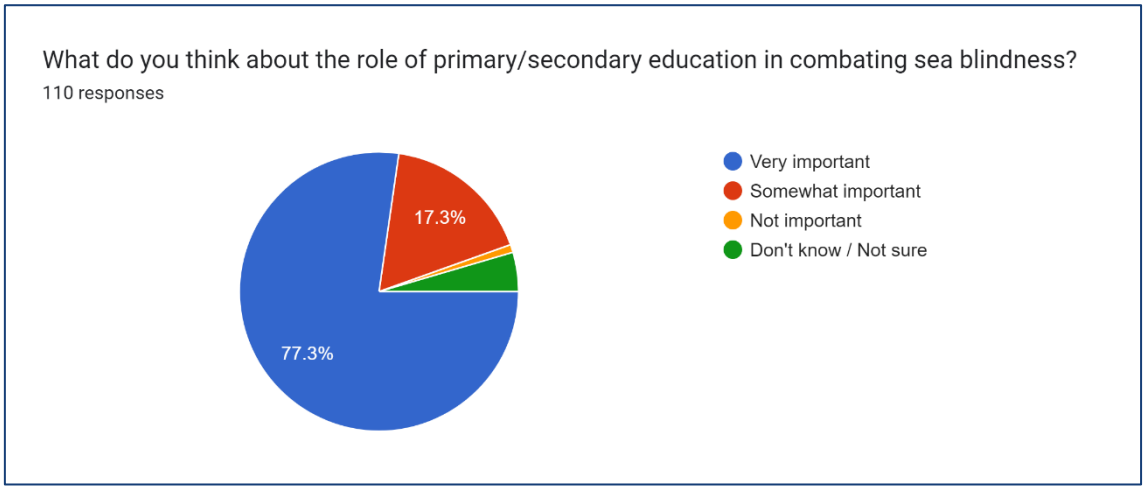
Furthermore, participants consider educational programs (39%) as the most crucial resource for gaining insights into ocean issues, followed by social media (28%) and documentaries (24%).

Graph 88 What does the term 'sea blindness' mean to you? - Türkiye



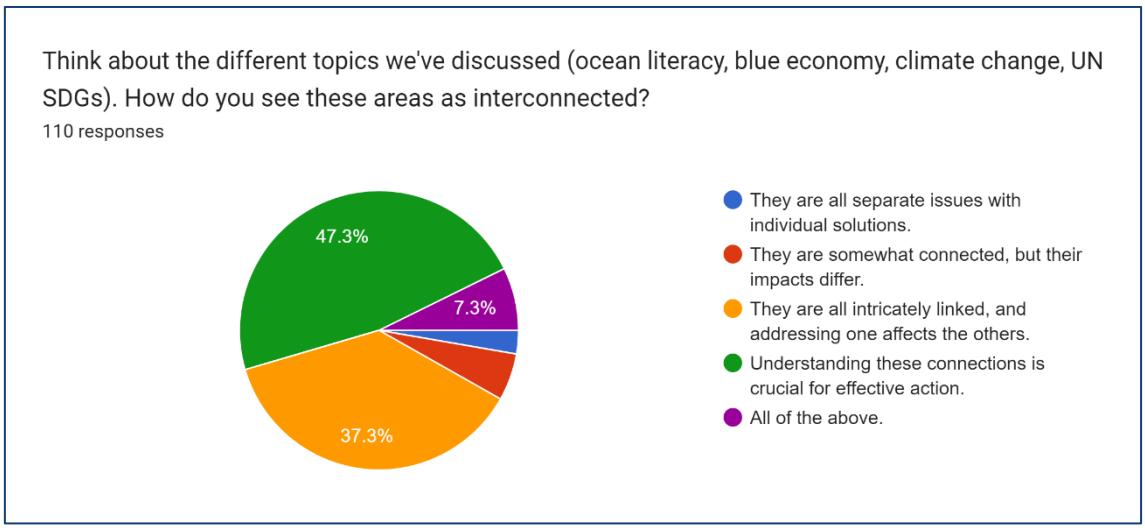
Concerning sea blindness, 51% of respondents indicated a lack of understanding of the value of oceans, 30% cited a lack of knowledge about marine life, and 15% expressed uncertainty or ignorance on the matter.

Graph 89 What do you think about the role of primary/secondary education in combating sea blindness? - Türkiye



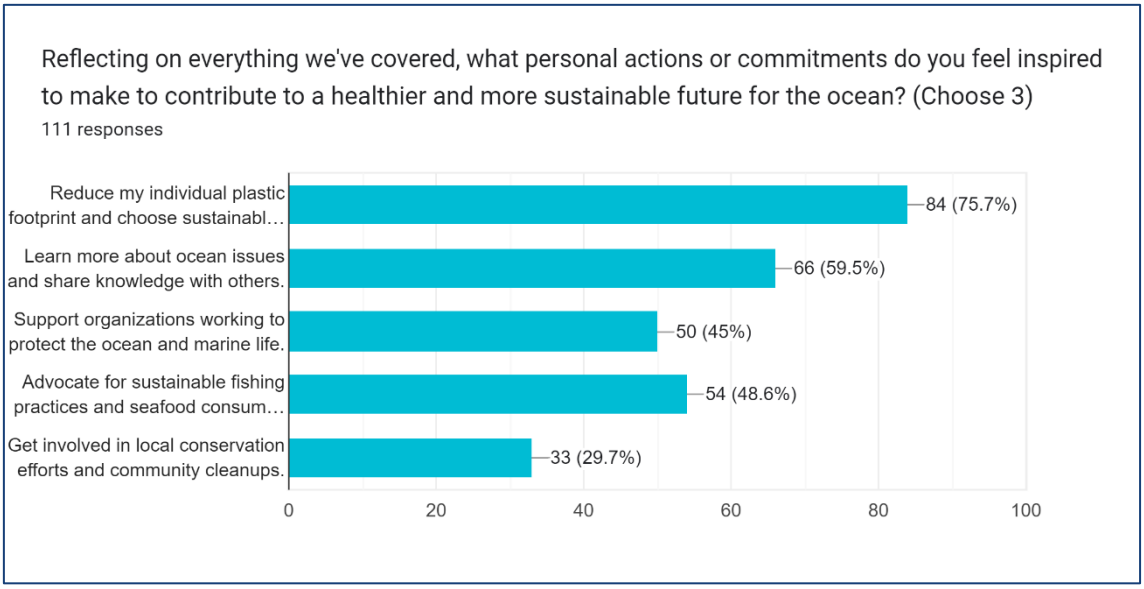
Regarding the role of primary/secondary education in addressing sea blindness, 94% of participants believe it is important, 4.5% are unsure or lack information, and 1% consider it unimportant.

Graph 90 Think about the different topics we've discussed (ocean literacy, blue economy, climate change, UN SDGs). How do you see these areas as interconnected? - Türkiye



Concerning the interconnection of ocean literacy, the blue economy, climate change, and UN SDGs, 47% recognize their crucial role for effective action, 37% understand that they are intricately linked, and addressing one affects the others, while 7.3% view all responses as correct.

Graph 91 Reflecting on everything we've covered, what personal actions or commitments do you feel inspired to make to contribute to a healthier and more sustainable future for the ocean? (Choose 3) - Türkiye



After considering various aspects in the survey, the personal actions participants feel inspired to take for a healthier and sustainable ocean in the future include: 75% opting to reduce their individual plastic footprint and choose sustainable alternatives, 60% expressing a desire to learn more about ocean issues and share knowledge with others, and 48% advocating for sustainable fishing practices and seafood consumption choices.

2.5. Poland

2.5.1. Purpose and Scope of the Literature Review

Since the beginning of Polish statehood, Poland encountered many facts proving of the fact that the rulers of Poland during their reign acted with greater or lesser commitment to gain or maintain access to the Baltic Sea. The fact that the possession of the coast and ports is an important element of the state's economy is evidenced by the number of wars and battles that were fought from Mieszko I to 1945. Maintaining a secure maritime border and sea transportation routes required the creation and development of a navy. Unfortunately, in Polish history, this problem was solved differently. Despite many external and internal adversities, the Poles were granted coastal and wide access to the Baltic Sea. But the functioning of the naval type of armed forces is determined by large financial resources, as well as the consciousness of society, which must realize the importance of access to the sea.

Ocean Literacy, is the understanding of how the ocean affects us and how we affect it. The concept originated as a result of the work of scientists, teachers and educators in the United States. In 2004, members of the National Marine Educators Association

(NMEA) concerned about the marginalization of marine education in schools began working on a national education campaign.

Soon the concept also reached Europe, where EMSEA (European Marine Educators Association), an association dedicated to popularizing marine knowledge in Europe, was founded. To implement the idea of ocean literacy, international cooperation of scientists, teachers and educators was established. The Gdynia Aquarium of the MIR-PIB is one of the organizations operating within the EMSEA and responsible for promoting the idea in Poland.

Marine Awareness is based on 7 assumptions. The way they are formulated illustrates the interdisciplinary nature of marine knowledge. The contents provide organization, consistency and coherence in the transfer of knowledge about the ocean.

The ocean covers most of our planet's surface, regulates weather and climate, provides most of the oxygen we breathe, and is a source of food. After decades of pollution, habitat degradation and unsustainable fishing, and now climate change and water acidification, the health of the ocean is under severe threat. The more public knowledge there is, the more readily ocean health activities are supported. Marine education of the public is an important aspect of solving multidimensional and critical problems.

2.5.2. Assessment of Existing Research

In Poland, due to the key role of the Baltic Sea for the country and the intensification of climate protection efforts in the context of a dynamic transition, we have significant progress in research and educational activities in this area, but there are still major gaps[39].

[39] Key works:

1. Anita Bokwa , Bożena Kicińska , Łukasz Kurowski , Luiza Wieczorek, CLIMATE CHANGE AS AN EDUCATIONAL CHALLENGE CLIMATE CHANGE AS AN EDUCATIONAL CHALLENGE.
2. Biernacki W. (2010). Man media environment. Kraków: Institute of Geography and Spatial Management, Jagiellonian University (http://denali.geo.uj.edu.pl/publikacje,000152?&page=rok; accessed 5.11.2022).
3. Bokwa A. (2003). Climatic issues in Polish printed mass media. In J. Pyka, M. Dubicka M., A. Szczepankiewicz-Szmyrka, M. Sobik, M. Błaś (eds.), Man and Climate in the XX Century. Acta Universitatis Wratislaviensis, 2542, Geographical Studies, 75: 645-652.
4. Bokwa A., Jezioro P., Wypych S., Walczak M. (2004). Problems of global climate change in teaching geography based on ESPERE-ENC materials. In: Z. Michalczyk (ed.), Geographical research in learning about the environment. Lublin: Wydawnictwo UMCS, pp. 727-731.
5. Climate Education in Poland (2021) (http://edukacjaklimatyczna.org.pl/wp-content/ uploads/2021/10/Report_Edukacja_klimatyczna_w_Polsce.pdf.
EEA (2018). Air quality in Europe - 2018 report (https://www.eea.europa.eu/publications/ air-quality-in-europe-2018; accessed 5.11.2022).
6. Erbel J. (2022). Leaning into the future. How to change the world for the better. Kraków: High Castle.
7. Jonderko F. (1995). Sources of ecological information, areas of threat, the problem of involvement. In K. Frysztacki, T. Soldra-Gwiżdż (eds.), Environment, ecology, social awareness (conceptual and empirical studies). Opole: State Scientific Institute, Silesian Institute in Opole, pp. 63-79.
8. Climate ABC (2021) (https://wuw.pl/data/include/cms//Klimatyczne_ABC_Budziszewska_M_Kardas_A_Bohdanowicz_Z_red_2021.pdf?v=1625481918966)
9. Kwiatkowski S.M. (2018). Competencies of the future. In S.M. Kwiatkowski (ed.), Competences of the future. Warsaw: FRSE Publishing House, pp. 15-29 (https://depot.ceon.pl/ bitstream/handle/123456789/18342/3-kwiatkowski-kompetencje-przyszlosci.pdf?- sequence=1&isAllowed=y;

In May 2021, Kurowski and colleagues conducted a CAWI-type survey on a representative sample of 1,000 national citizens. The authors analysed the respondents' level of knowledge, focusing on three issues related to climate change, namely its causes, mechanisms and effects. Additionally, in order to assess pro-environmental attitudes, the researchers examined the respondents' behaviour by selecting from a list of environmentally friendly practices available in the survey, which are used in everyday life. This list included, among others, saving water, segregating rubbish or using public transport instead of a private car. The results of the survey confirmed the significant impact of the level of knowledge about climate change on attitudes favouring climate change mitigation. In addition, it was noted that younger age groups showed lower climate change knowledge compared to older groups, highlighting the important role that climate education plays already at the primary and secondary school stage.

Research clearly confirms that both effective climate policy and technological advances have the potential to reduce greenhouse gas emissions. However, changing public attitudes in this area is equally crucial and should be implemented through climate education. This issue becomes particularly important, as simply being aware of environmental problems is not always enough to induce behavioural change. Biernacki (2010) summarised research on this topic. Rokicka (2000) provided an overview of research on an interesting issue related to the discrepancy between the emotional and behavioural component of attitudes towards the environment. In countries with a high media culture, there is a phenomenon where a very high percentage of the population, reaching up to 90% of those surveyed, expresses an interest in the environment. However, these declarations do not always translate into concrete actions indicating recognition of the good state of the environment as a real and desirable value. Confirmation of this inconsistency in Polish society can be found in research conducted by Gliński (1996), which revealed an anthropocentric and instrumental approach to natural values. Respondents showed significant concern for the natural environment, but at the same time, when making consumer decisions, they were not always guided by its welfare.

Surveys carried out in Poland clearly show that young people are willing to take pro-environmental measures, but that this does not always translate into their implementation in practice in everyday life. Therefore, climate education should occupy a special place in Polish society. Taking into account that the Polish economy is based mainly on high-carbon energy sources, the proper shaping of pro-climate attitudes is becoming crucial for carrying out an effective economic transformation. At the same time, research is being undertaken on the perception of local problems in a global context. In line with the findings of Biernacki (2010) and Jaeger et al. (1993), who analysed the inhabitants of Switzerland, knowledge of global phenomena turned out to be a less decisive factor influencing pro-environmental action than social factors, legal rules or criminal sanctions. Respondents from local communities prioritised organised

10. Rokicka E. (2000). Attitudes towards the environment and their correlates. From a study of residents of municipalities. Sociological Review, 49/1: 121-145.
11. Szkurlat E. (2022). Not only the sage "glass and eye", Education for climate in the assumptions of the geography core curriculum. Reflections, 2: 38-43.

action at the local level, considering it more effective in countering environmental change than individual efforts.

It has been noted that there is now a simultaneous existence of different sources of information on climate change, such as myths and scientific knowledge, with a dynamic increase in the number and role of information providers, especially the media, due to technological advances. These developments accelerate the pace and increase the amount of information provided, leading to an evolution of the perception of the geographical environment. As Biernacki (2010) notes, it is the media that plays a key role in orienting people in the world, becoming the main source of information about the past and present for many individuals. The relatively consistent coverage resulting from formal education does not always meet current information needs, especially in the age of developed independent media. The emergence of commercial television and radio stations in the 1980s reduced the influence of centralised media. For the average member of society, especially after formal education, the mass media become a key source of information about the world. Jonderko (1995), surveying secondary school students, emphasises that mass media, especially television, dominate as a source of information about the environment, more often than school. Also Biernacki's (2010) research confirms that mass media are the most frequently used source of information about natural phenomena by respondents. A much smaller share of obtaining information about natural extreme phenomena is declared by school, amounting to less than 4%, especially after education. Kurowski et al. (2022) indicate that the Internet dominates as the main source of information on climate change in all age groups, although the youngest age groups often acquire their knowledge on the subject at school. Therefore, adequate teacher preparation becomes crucial for the effective formation of appropriate attitudes towards climate change through climate education.

Research indicates that for the majority of the population, the mass media are the main source of information on climate, but unfortunately, such messages are not conducive to effectively raising public awareness in this area. Bokwa (2003) conducted a content analysis of 22 titles of the Polish press from 1989-2001, focusing on the presentation of information on climate phenomena. The greenhouse effect and the ozone hole appeared to be the most frequently covered topics. The results of the analysis showed that 74% of the examined materials presented a satisfactory level of factual correctness, 25% contained minor errors, while 3% conveyed erroneous information. Valuable articles most often came from specialists, while errors were most common in the texts of non-specialist authors writing for dailies. In turn, Biernacki's (2010) analysis of the content of radio and television messages on global climate change revealed a significant prevalence of low-quality messages in which natural phenomena were presented without a proper presentation of the mechanism of their formation and functioning.

2.5.3. Gaps in the Literature

As Szkurłat (2022) emphasises, "the most damaging thing for climate education is a high level of misunderstanding of the real changes, lack of basic climate knowledge, reproduction of myths, stereotypes far from the current state of knowledge, failure to

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distinguish facts from opinions". The juxtaposition of the above factors leads to the conclusion that the core curriculum should be regularly updated, and that the update should not just consist of adding new points. Some content needs to lose its previous prominence or disappear altogether from the records, while other content needs to appear or strengthen its previous prominence.

Although climate education is gaining prominence, there are still some areas that are less explored or insufficiently covered in the scientific literature and research. Below I outline some potential areas that may need more attention:

- Effectiveness of teaching methods: There is a lack of in-depth research on the effectiveness of different teaching methods in the context of climate education. It is important to understand which approaches are most effective in developing sustainable environmental awareness and attitudes.

- The role of emotions in climate education: Research on the impact of emotions on learning processes in the context of climate education is relatively limited. Understanding how emotions affect students' engagement and long-term attitudes towards climate issues may be crucial.

- Climate education differentiation: There is insufficient research on how to adapt climate education programmes to different age groups, educational levels or specific community needs. Differentiation can be a key element in tailoring messages to diverse audiences.

- Sustainability in the context of climate education: Less research focuses on integrating climate education with the concept of sustainability. Understanding how the two areas are linked and how these topics can be effectively integrated is still a research area.

- Community engagement: More research is needed in the context of community engagement in climate education processes. Research on effective methods to engage local communities and enhance their role in environmental action is key.

- Impact of climate education on practical action: Less research focuses on assessing the actual impact of climate education on the behaviour and practical action of individuals and communities. Research tracking whether and how education translates into concrete environmental action is needed.

- Global perspectives on climate education: Many studies focus on climate education in the context of specific countries, while a global perspective that takes into account cultural, social and economic differences is lacking.

- These areas are only general orientations, and a full analysis of the gaps in literature and research would require a more detailed review of recent scientific publications and reports in the field of climate education.

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2.5.4. Lessons from Previous Studies

In Poland, there has been an increase in the availability of climate education resources and tools over the years, with numerous project initiatives at local, regional and national levels. In many provinces, especially at the secondary school level, opportunities for cooperation with universities are emerging, which paradoxically became more important during the pandemic period. Significant development has been recorded especially in remote forms of education, such as online classes taught by university staff. This form of learning became particularly valuable for schools located in remote areas, allowing them to maintain academic links even after the main pandemic restrictions were lifted. This practice has become popular and continues after the major restrictions have ended. Schools that take advantage of such opportunities to collaborate with universities have the chance to enhance students' and teachers' knowledge, including climate science, without disrupting their standard work schedule. To establish such collaborations, teachers can check the climate education information available on the universities' websites. In addition, partnerships with various institutions that can support schools in enhancing students' knowledge of climatology are encouraged.

In a CAWI survey conducted by a team of researchers (Anita Bokwa, Bożena Kicińska, Łukasz Kurowski, Luiza Wieczorek) on a group of 120 teachers from all over Poland, teachers declared the many forms of climate education they already use:

- scientific circles dealing with climate and its change,

- trips to meteorological stations,

- organisation of school holidays - Earth Day, Water Day, Clean Air Day, World Meteorology Day,

- projects in cooperation with provincial environmental funds,

- participation in lectures given by university staff,

- projects in cooperation with local authorities,

- participation in nationwide projects, e.g. CEO (Centre for Citizenship Education), PAH (Polish Humanitarian Action).

A great opportunity for students is to participate in geographical educational projects organised by universities, which is another attractive pathway for climate education. Importantly, in some projects there is an opportunity to apply geographical knowledge, including climate knowledge, in practice. Many climate discussions focus attention on global climate change, highlighting how everyone can contribute to reducing it. While these issues are undoubtedly important, equally important are issues related to local climate and aerosanitary conditions, which are often strongly linked to global problems. With these issues, it is easier to see the relationship between the condition of a particular place and the actions taken there, which makes - if properly motivated - taking corrective action much more accessible. Pupils, capable of inference and action,

can become involved in the process of taking corrective action by making requests to local authorities, developing projects and seeking to implement them, also using the civic budget. In specific cases, they can even put these initiatives into practice themselves. The benefits of such activities are invaluable, not only improving local environmental conditions, but also developing the competences and social attitudes of young people. Online tools enable extensive cooperation between schools and colleges on a national level.

Major projects to date include:

- Sustainable Climate Education Ecosystem project - Poland, Germany, Czech Republic. The aim of the project, funded by the EUKI European Climate Initiative, was to develop a method to teach about climate in a practical way and to design an ecosystem of support for students and teachers in schools that want to actively develop environmental and technological competences. As part of the project, representatives from MWSLiT participated in a workshop on the creation of a new climate education model. The outcome of the project is the creation of a new climate education model, as well as the creation of the Climate Expert Online Platform (CEOP), which will provide an advanced space for the climate educator community to share knowledge.

- EUKI - 'Sustainable ecosystem for climate education'. The main objective of the project "Sustainable Ecosystem for Climate Education" is to build a new model for practical and actionable climate education, where students will learn tools and develop skills to prevent and adapt to climate change. The project kicked off in March 2022 and will run for 3 years in the Lower Silesian Voivodeship and adjacent municipalities in Germany and the Czech Republic. The project will be implemented by the Social Initiatives Forum Foundation in a partnership model with the Marshal's Office of the Lower Silesian Voivodeship, SEVER - Centre for Environmental Education from the Czech Republic and EuroSoc-digital GmbH (EUD) from Germany. The project is part of the European Climate Protection Initiative (EUKI) on behalf of the Federal Ministry for the Environment, Nature Conservation and Nuclear Safety (BMU). The aim and ambition of the project developers is that a flexible model for climate education, based on skills and proficiency, will emerge. Its versatility and potential for adaptation by teachers of different subjects is to be the basis for it to complement the core curriculum.

- Climate-friendly school. Model centre for climate change mitigation and adaptation education in the city

- Climate project (Centre for Citizen Education). The programmes, which are implemented using the student project method, aim to introduce the consequences of climate change in the world and in our immediate surroundings, and the possibilities for personal influence to reduce or mitigate them in a local and global perspective. The programme is an invitation to talk about climate change from different perspectives and for different audiences: school and local communities, among others.

- "Climate in the schools of the metropolis", which is implemented by the Gdańsk-Gdynia-Sopot Metropolitan Area. So-called 'green-blue investments' will be built on

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school grounds, teachers will be trained and pupils will gain knowledge about climate change mitigation measures.

- Support for schools and teachers is provided, among other things, by the implementation of ORE projects entitled 'Global Education. Leaders for Sustainable Development'. As a result of project activities, a network of regional global education leaders began to function, coordinating initiatives in a given province. Activities are undertaken in schools using a database of lesson plans for climate and environmental education; as well as the open resources of the Global Education platform. On the platform www.epodreczniki.pl, the Centre offers approximately 150 teaching materials for students and teachers for general education at all educational levels, including videos on climate change, interactive exercises and lesson plans.

- campaign "YES! for climate education", conducted jointly by UN Global Compact Network Poland, WWF Poland, Youth Climate Strike, Polish Ecological Club Mazowiecki District, IKEA Retail Polska and Onet.pl. The aim is to draw attention to the role and need for reliable climate education in schools - based on scientific data and implemented as part of the applicable subjects. A petition is available at www.edukacjaklimatyczna.com, through which thousands of people in Poland can express their support for this initiative. The "YES! for climate education" petition has been signed by more than 50,000 people.

Lessons learned from past projects (gaps and challenges):

1. action is needed to raise awareness of the causes and consequences of climate change not only among young people, but also among adults who significantly influence the decisions that shape society. Climate education should be an integral part of our social competence.

2. Technological progress and climate policy can be effective tools in the fight against climate change. Nonetheless, long-term successes require an increase in climate awareness in society, which translates into appropriate behaviour conducive to reducing climate change.

3 Young people, compared to older age groups, rate their knowledge of climate change as insufficient, which is why climate education should start as early as the first grades of primary school. Young people see school as one of the key sources of information on climate change.

4. there is a need to modify the current core curriculum for each educational phase, taking into account the content related to climate education.

5. there is a need to improve the qualifications of teachers responsible for providing climate education through appropriate training, seminars and postgraduate studies.

6.The emphasis should be on the cooperation of teachers of natural sciences in order to provide coherent climate education, using school educational projects.

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7. planning activities to increase cooperation between schools and universities in the context of climate education is essential. This initiative should involve both universities and schools.

8. work on extending economic education to include elements of climate education should be accelerated. In this way, climate education will contribute to shaping the attitudes of economists in line with the idea of sustainable development.

2.5.5. Survey and Public Perception

A survey was conducted to gather insights on critical topics related to ocean sustainability. The survey was designed as an online questionnaire with 21 questions, with a focus on eight European countries – Austria, Czechia, Estonia, Hungary, Italy, Poland Romania and Türkiye. The online questionnaire was accessible to citizens of the those countries with targeted outreach efforts towards students, educators, and broader public interested in ocean sustainability. Participation was voluntary and anonymous, ensuring the integrity and objectivity of the collected data. It was designed to explore key themes including:

- Ocean Literacy Initiatives: Assessing public understanding of ocean health and sustainability practices.
- "Sea Blindness" Phenomenon: Investigating the awareness of human dependence on healthy oceans and the disconnect between people and the marine environment.
- Emerging Blue Economy: Gauging public perceptions and potential opportunities associated with ocean-based sustainable development initiatives.
- Climate Change Impacts: Evaluating public understanding of the far-reaching consequences of climate change on marine ecosystems and the need for adaptation strategies.

The Blue School Studies survey aimed to provide robust data for in-depth analysis of these crucial themes. The collected information informs the development of innovative educational programs and resources within the SHORE project. By empowering students with ocean literacy and fostering their role as agents of change, the project seeks to promote sustainable behaviour and contribute to a healthier future for our oceans. The Blue School Studies survey was anticipated to yield valuable insights into public knowledge, attitudes, and concerns regarding ocean health and sustainability. These findings form the basis for developing effective educational tools and strategies within the SHORE project, ultimately empowering students to become effective advocates for healthy oceans and a sustainable future.

Below are the graphs of the survey participants from Poland.

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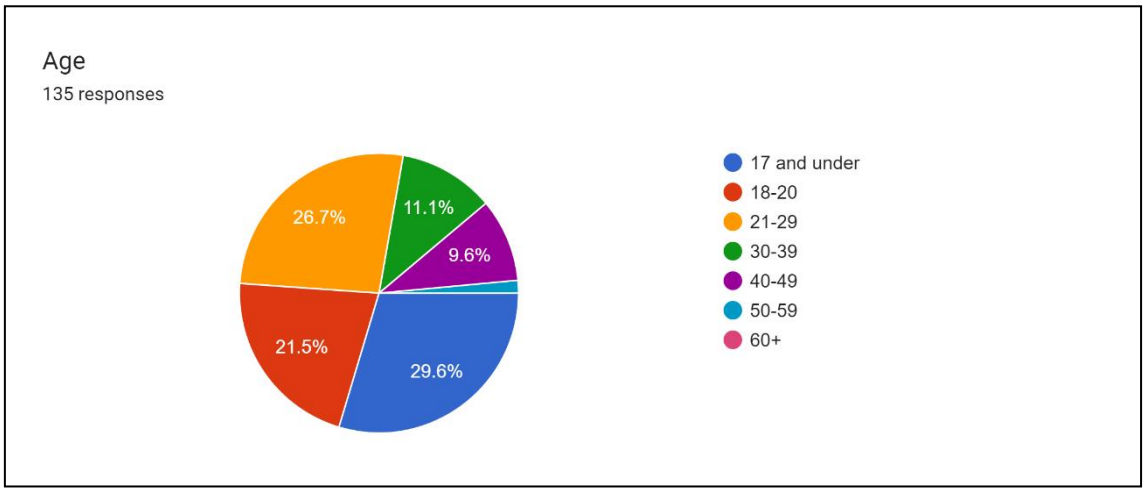
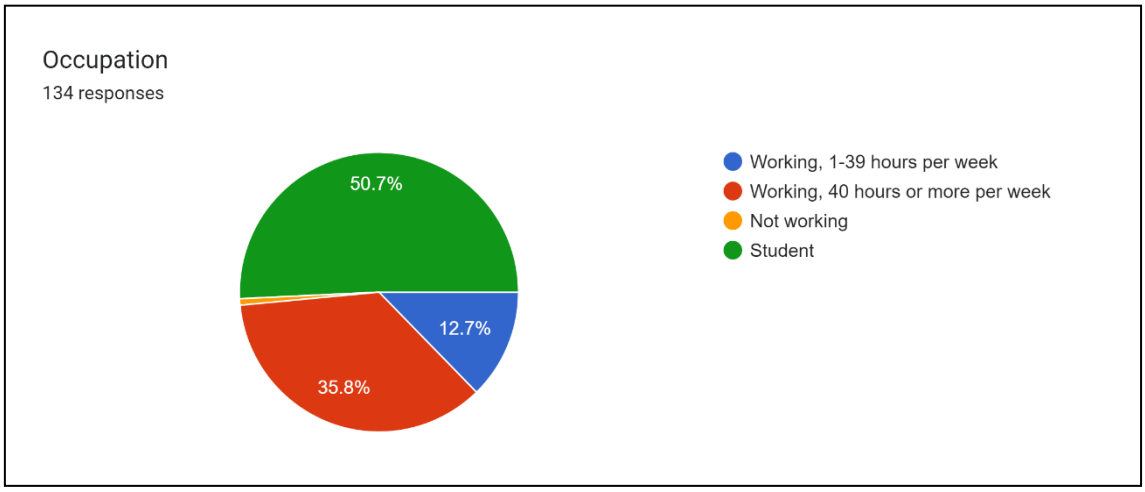
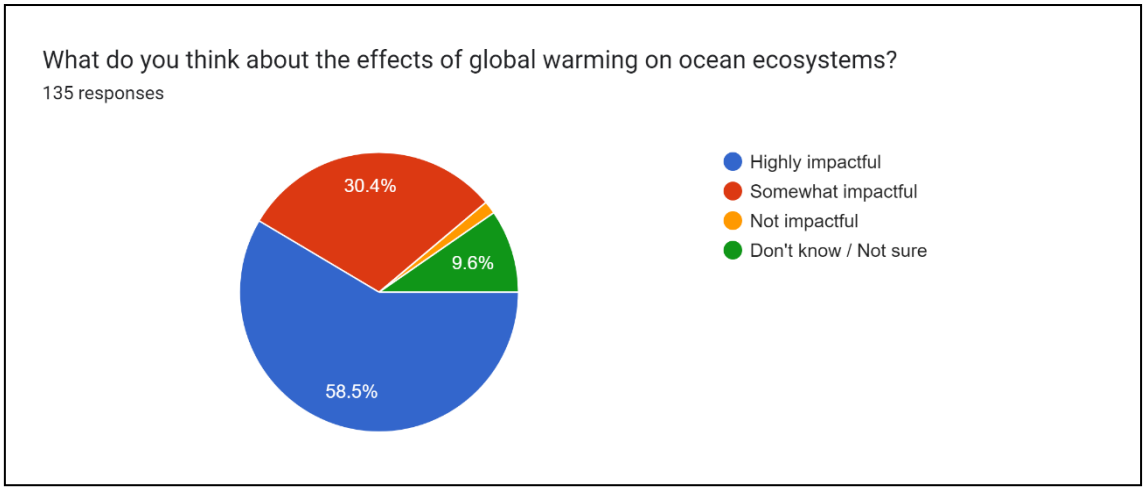
Graph 92 Age of Survey Participants - Poland



Graph 93 Working Status of Survey Participants - Poland

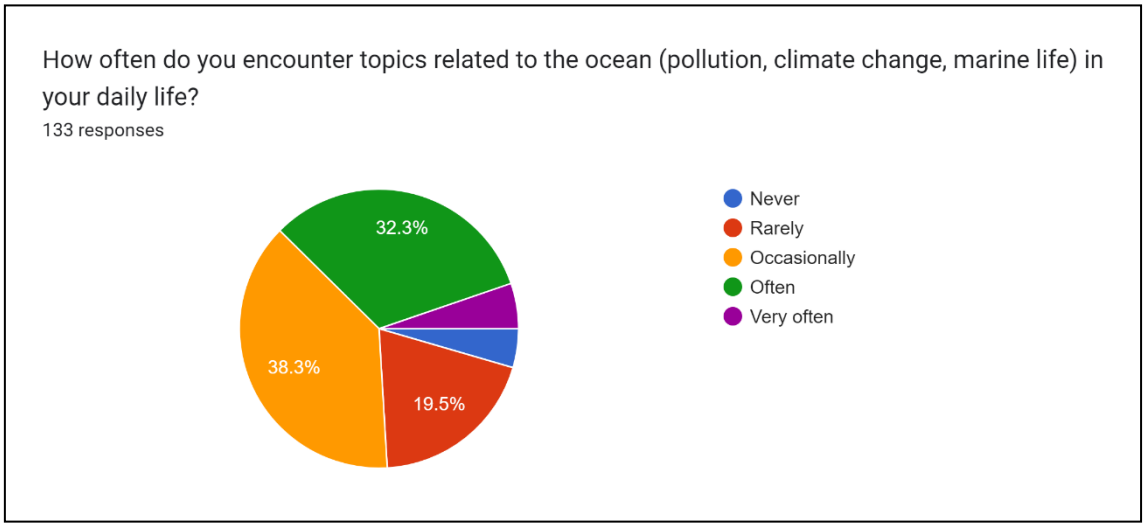


Graph 94 What do you think about the effects of global warming on ocean ecosystems? - Poland



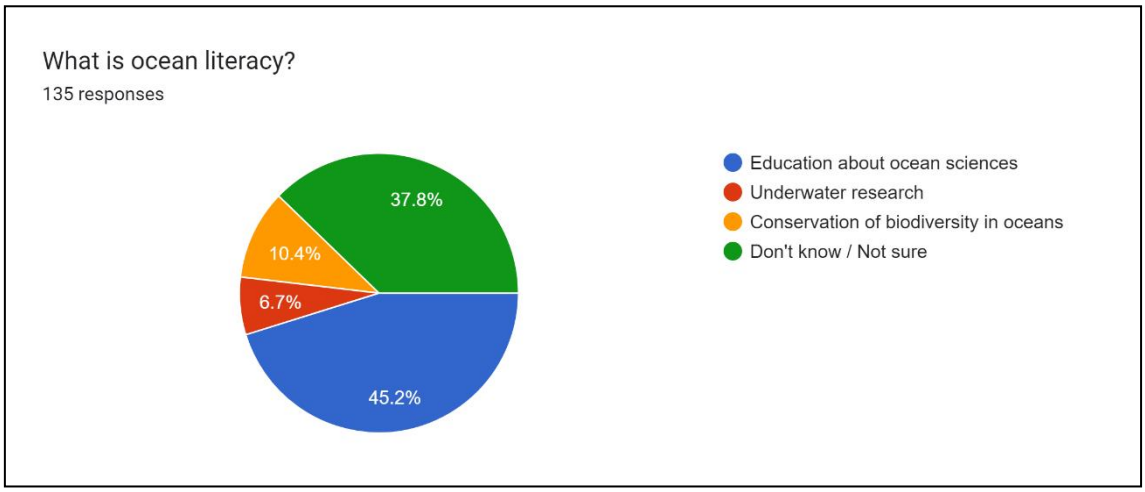
The impact of global warming on maritime ecosystems is widely acknowledged in Poland. 58.5% of respondents, or the vast majority of them, think that ocean ecosystems are significantly impacted by global warming. Thirty-four percent, another sizable portion, believes the impact to be somewhat significant. 9.6% of respondents give a "Don't know / Not sure" response, indicating uncertainty. Just 1.5% of people believe that global warming has no effect on ocean ecosystems. According to the survey, a considerable amount of respondents in Poland were aware of and concerned about the detrimental consequences of global warming on ocean ecosystems. The fact that most people believe there is a significant influence emphasizes how closely related climate change and ocean health are. The little proportion of responders who expressed uncertainty could suggest a potential opportunity for further education and awareness campaigns on the topic.

Graph 95 How often do you encounter topics related to the ocean (pollution, climate change, marine life) in your daily life? - Poland



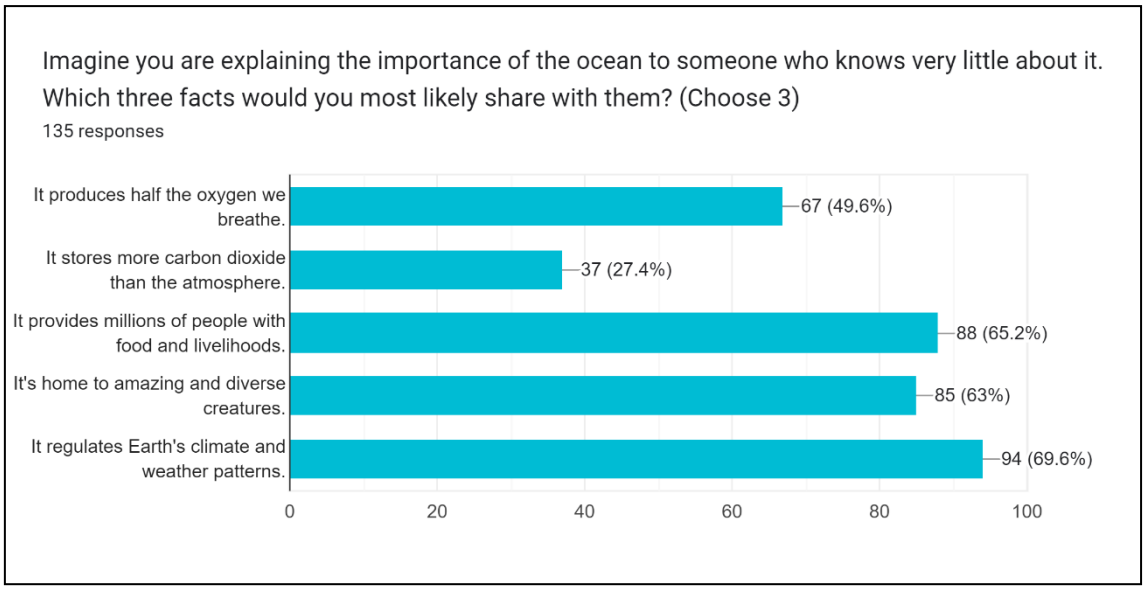
Respondents' experiences in Poland with ocean-related subjects, such as pollution, climate change, and marine life, differ. The majority, 38.3%, said they occasionally come into these subjects in their daily lives. Remarkably, 32.3% of respondents said they frequently have conversations about the ocean, which suggests a quite high frequency. Conversely, 19.5% report only infrequently encountering these subjects, and 4.5% report never encountering these conversations. Just 5.3% said they come across subjects relating to the ocean frequently. The distribution indicates that respondents in Poland had varying degrees of exposure and awareness. Even though a sizable fraction comes into contact with themes related to the ocean both frequently and seldom, a sizable portion is either less exposed or, in some situations, not at all. This diversity in responses may reflect varying degrees of public awareness and engagement with ocean-related issues in the Polish context.

Graph 96 What is ocean literacy? Poland



Of the responders in Poland, 45.2% primarily linked ocean literacy to learning about ocean sciences. Nonetheless, a noteworthy 37.8% indicate ambiguity or ignorance on the phrase. Ocean literacy is less strongly correlated with undersea research (6.7%) and ocean biodiversity protection (10.4%). The significant frequency of "Don't know / Not sure" replies points to a need for respondents to receive more education and knowledge regarding the idea of ocean literacy.

Graph 97 Imagine you are explaining the importance of the ocean to someone who knows very little about it. Which three facts would you most likely share with them? (Choose 3)- Poland

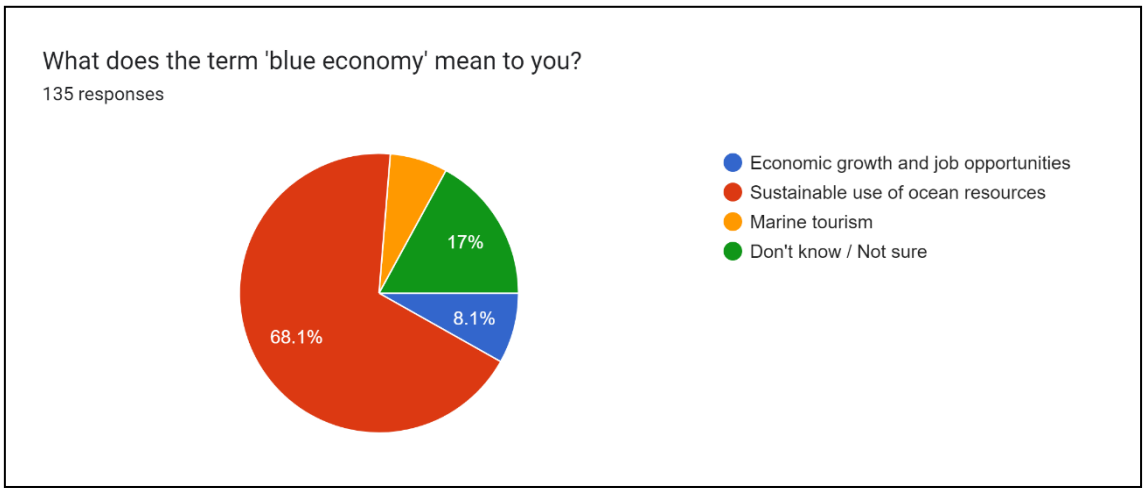


Respondents in Poland emphasize three main points when describing the significance of the ocean to people who are not familiar with it. First, 69.6% emphasize the ocean's vital role in controlling Earth's temperature and weather patterns, highlighting the ocean's influence on the ecosystem globally. Second, 65.2% highlight the ocean's economic and subsistence importance by highlighting how important it is to millions of

people's food and livelihoods. Thirdly, 63% highlight the ocean's role as a varied ecosystem that supports a wide variety of fascinating species.

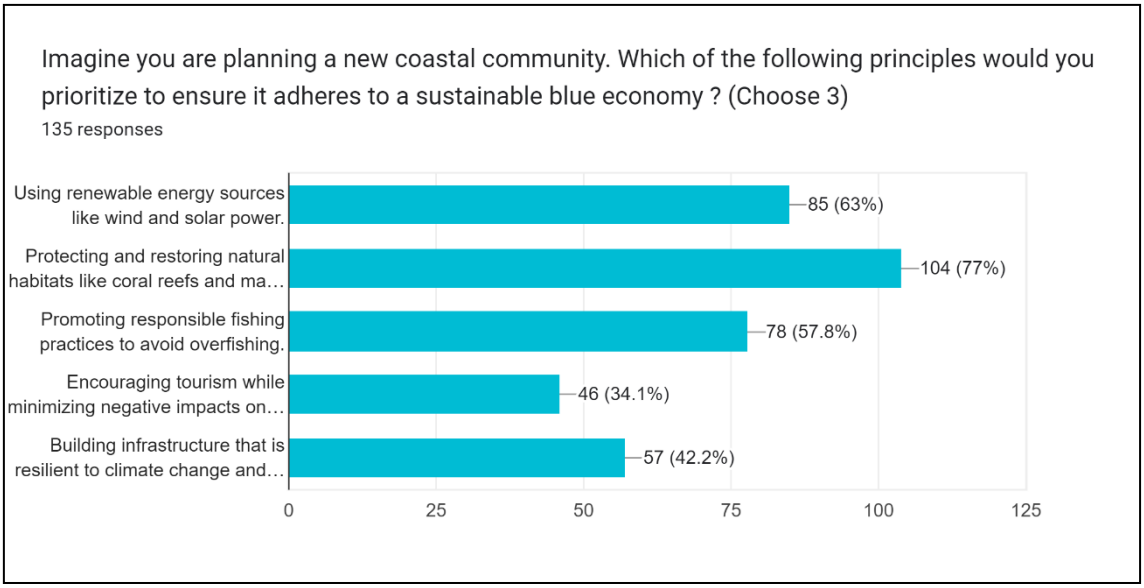
Although these are the main points of emphasis, a significant percentage acknowledges the ocean's role in storing carbon dioxide (27.4%) and its contribution to the generation of oxygen (49.6%). All of these answers demonstrate that respondents in Poland have a thorough awareness of the many and essential functions the ocean serves in maintaining environmental balance and human wellbeing.

Graph 98 What does the term 'blue economy' mean to you? - Poland



The sustainable use of ocean resources is how most respondents in Poland define the phrase "blue economy" (68.1%). This indicates a recognition of the importance of balancing economic activities with environmental conservation in ocean-related sectors. Notably, 17% of respondents indicate that they are unsure or do not know what the term means, indicating a possible area for educational campaigns to raise awareness of the blue economy concept. Furthermore, a lower proportion of respondents link the phrase to employment prospects and economic growth (8.1%) as well as marine tourism (6.7%). All of these answers point to a different view of the blue economy idea in Poland, with sustainability being the primary focus. Clearing up and raising awareness of the blue economy could help the general public become more knowledgeable.

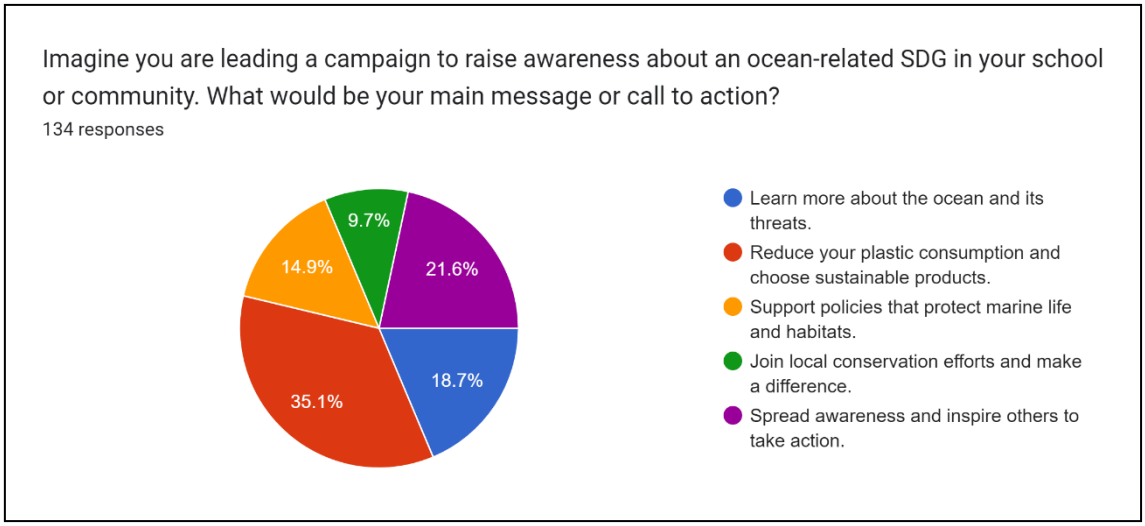
Graph 99 Imagine you are planning a new coastal community. Which of the following principles would you prioritize to ensure it adheres to a sustainable blue economy? (Choose 3) - Poland



In Poland, envisioning the development of a new coastal community aligns with a strong emphasis on principles that promote a sustainable blue economy. According to the survey results, a significant majority of respondents—77%—said that maintaining and restoring natural habitats, such as mangroves and coral reefs, is of utmost importance. This emphasizes a shared commitment to preserving coastal areas' biological diversity and ecological balance while acknowledging the interdependence of maritime environments. Energy options are another important consideration in the planning of the coastal community; according to 63% of respondents, employing renewable energy sources like solar and wind power is important. This demonstrates a dedication to energy-efficient methods and is in line with international initiatives to lessen the environmental impact of conventional energy sources.

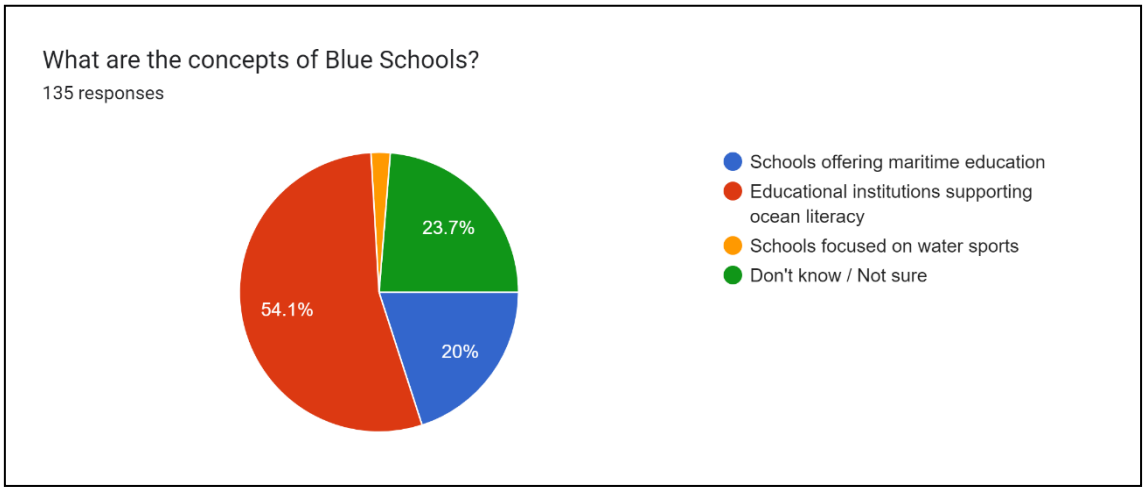
Furthermore, 57.8% of respondents said that encouraging responsible fishing is essential to preventing overfishing, placing a high priority on these activities. This acknowledgment emphasizes how important sustainable fisheries management is to maintain the long-term health of marine resources and sustaining the fishing-dependent populations' means of subsistence. The thought given to developing infrastructure resistant to climate change and sea level rise (42.2%) and promoting tourism while avoiding negative environmental effects (34.1%), although not chosen as top objectives, suggests a sophisticated approach to development. These factors demonstrate a knowledge of the difficulties caused by climate change and the significance of encouraging eco-friendly travel behaviors. All things considered, the answers point to a thoughtful and ecologically responsible approach to the design of a new Polish coastal community, emphasizing the preservation of ecosystems, the use of renewable energy sources, and the maintenance of sustainable fisheries management.

Graph 100 Imagine you are leading a campaign to raise awareness about an ocean-related SDG in your school or community. What would be your main message or call to action? - Poland



According to the survey, 35.1% of respondents place a high priority on the recommendation to "reduce your plastic consumption and choose sustainable products." This emphasizes how important personal accountability is to reducing plastic pollution. Furthermore, 21.6% place a strong emphasis on encouraging others and raising awareness, recognizing the group benefits of community involvement. Calls to "learn more about the ocean" (18.7%) and "join local conservation efforts" (9.7%) demonstrate a comprehensive approach to tackling ocean-related concerns, while advocacy for regulations preserving marine life (14.9%) supports these efforts.

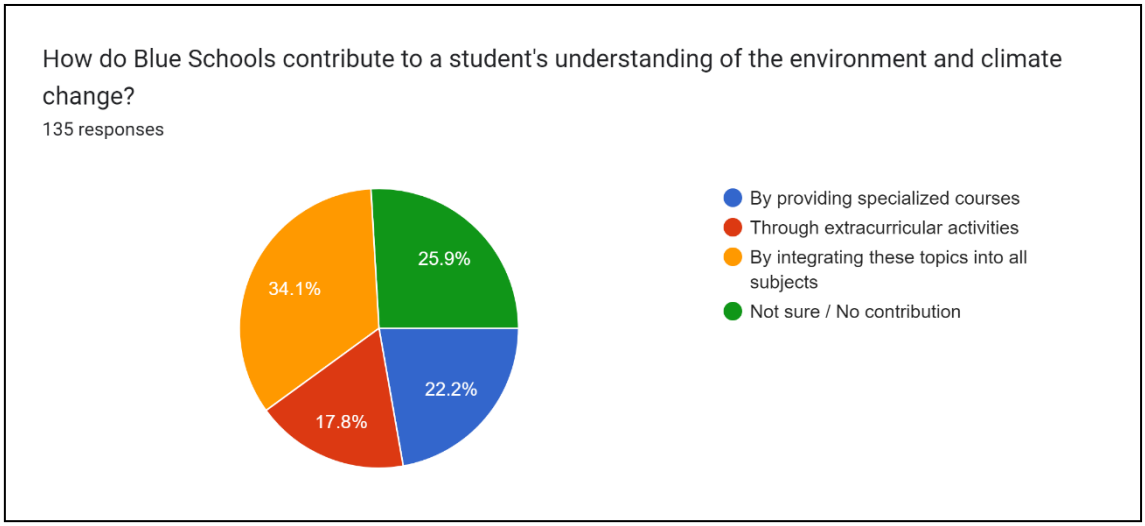
Graph 101 What are the concepts of Blue Schools? - Poland



There are differing opinions about Blue Schools in Poland. The majority (54.1%) links them to "educational institutions supporting ocean literacy," demonstrating the importance of schools in raising public knowledge of issues pertaining to the ocean. 20% of respondents associate Blue Schools with "schools offering maritime education". But a sizable portion (23.7%) have doubts about the idea, emphasizing the necessity for more explanation. Just 2.2% of respondents associate Blue Schools with "schools

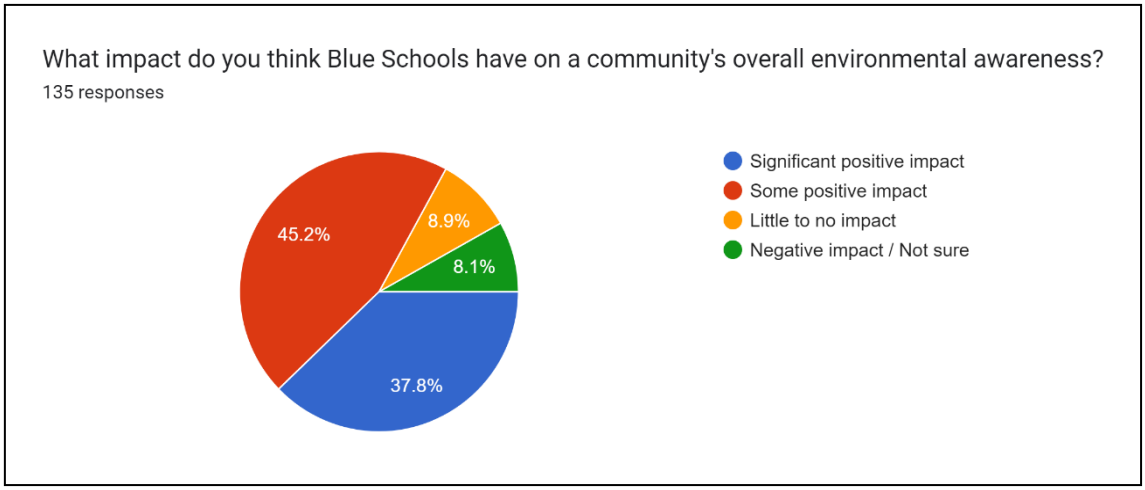
focused on water sports," which suggests that some people only associate them with recreational water activities. Overall, the replies highlight different points of view and stress how crucial it is to make the goals of Blue Schools clearer in order to encourage greater awareness and participation.

Graph 102 How do Blue Schools contribute to a student's understanding of the environment and climate change? - Poland



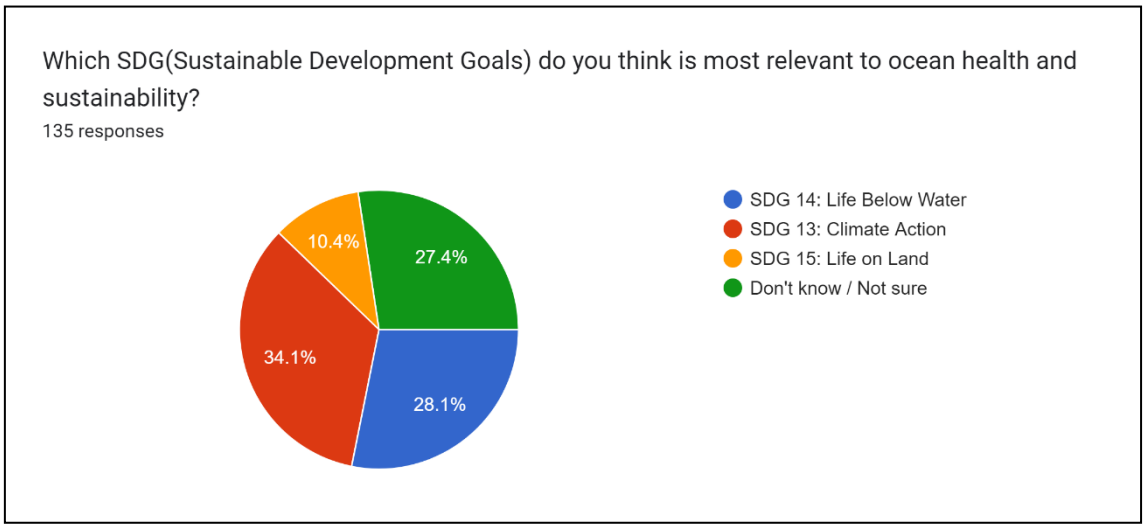
The poll sheds light on how Blue Schools in Poland help students comprehend the environment and climate change. A significant percentage (34.1%) acknowledges that Blue Schools accomplish this by "integrating these topics into all subjects," highlighting an all-encompassing strategy for bringing environmental and climate-related content into diverse subject areas. In the meantime, 17.8% of respondents say that "extracurricular activities" help promote environmental awareness, highlighting the value of practical learning opportunities outside of the classroom. But a sizable portion (25.9%) indicated ambiguity or thought they had made no contribution at all, answering with "Not sure / No contribution." This raises the possibility of knowledge gaps on the precise methods by which Blue Schools teach environmental education to their students. Furthermore, 22.2% mention Blue Schools' contribution through "providing specialized courses," demonstrating their awareness of certain educational initiatives inside these institutions.

Graph 103 What impact do you think Blue Schools have on a community's overall environmental awareness? - Poland



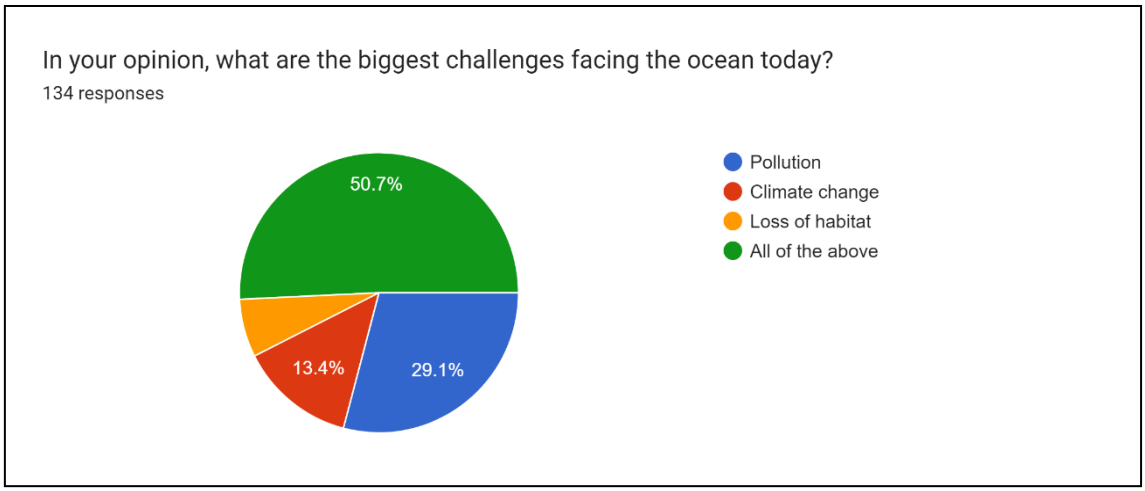
The poll conducted in Poland indicates that people there have favourable opinions about how Blue Schools raise environmental consciousness in their communities. Significantly, 45.2% of participants think that Blue Schools have "some positive impact," suggesting that they have a noticeable effect on community understanding of environmental issues. A more positive perspective is expressed by 37.8% of respondents, who claim that Blue Schools have a "significant positive impact." This implies that there is a general consensus that these educational establishments have a significant impact on raising community understanding of environmental issues. Merely 8.1 percent indicate uncertainty or a possible adverse effect, selecting "Negative impact / Not sure," while 8.9% believe there will be "Little to no impact." All in all, the answers point to a generally favourable correlation between Polish communities' environmental consciousness and Blue Schools.

Graph 104 Which SDG(Sustainable Development Goals) do you think is most relevant to ocean health and sustainability? - Poland



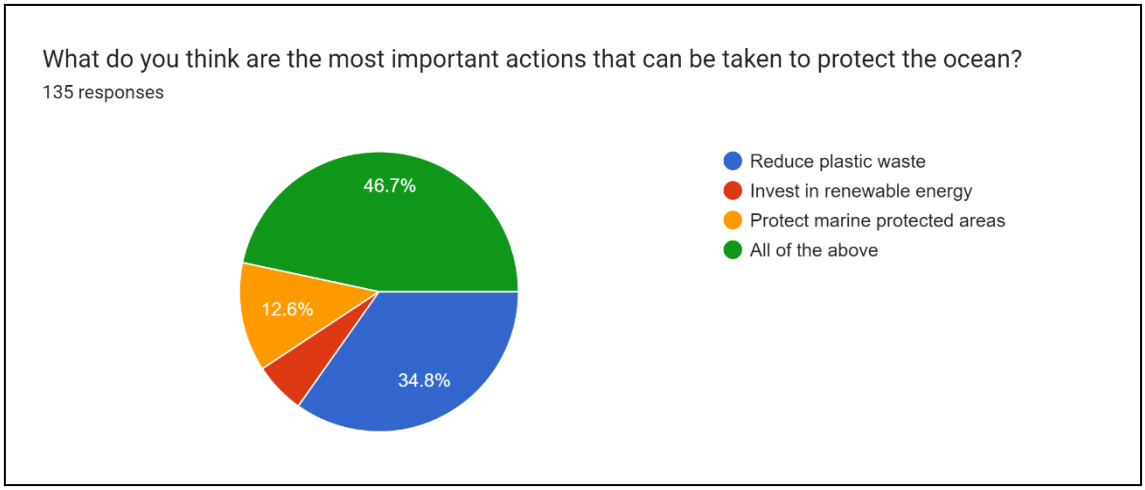
Diverse viewpoints exist in Poland over which Sustainable Development Goal (SDG) is most pertinent to ocean sustainability and health. SDG 13: Climate Action is the most relevant objective, according to a noteworthy number (34.1%), highlighting the connection between ocean health and climate challenges. SDG 14: Life Below Water is highlighted by 28.1% of respondents, indicating a realization of the direct impact of human activity on ocean ecosystems. SDG 15: Life on Land is regarded as relevant by a lower percentage (10.4%), which may indicate an awareness of the interdependence of terrestrial and marine ecosystems. Furthermore, 27.4% of respondents say they are unsure or do not have a choice, answering with "Don't know / Not sure." In the context of the SDGs, these diverse answers demonstrate the complexity and diversity of issues pertaining to ocean health and sustainability.

Graph 105 In your opinion, what are the biggest challenges facing the ocean today? - Poland



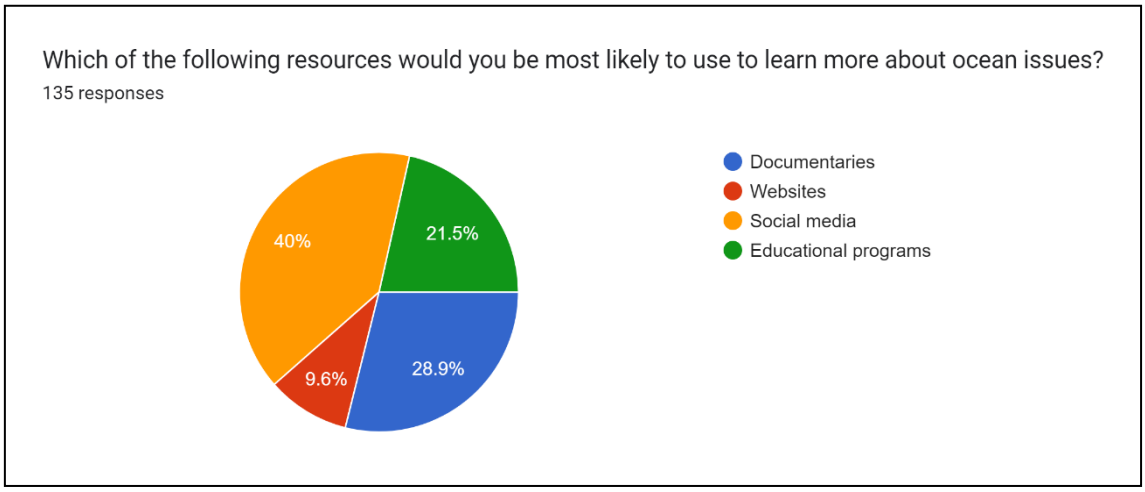
The survey respondents in Poland demonstrate a thorough comprehension of the problems that the ocean faces today. Significantly, 50.7% of respondents think that "All of the above"—which includes pollution, habitat loss, and climate change—represents the most urgent issues. This answer suggests a comprehensive understanding of the interrelated and complex nature of the problems influencing the health of the ocean. Furthermore, 29.1% expressly name "Pollution" as a significant obstacle, highlighting the harm that human activity causes to marine ecosystems. The fact that fewer people name "Loss of habitat" (6.7%) and "Climate change" (13.4%) as distinct threats highlight the wide spectrum of issues related to ocean conservation. The comments as a whole highlight how urgent it is to solve a number of issues in order to guarantee the health and sustainability of the ocean.

Graph 106 What do you think are the most important actions that can be taken to protect the ocean? - Poland



Participants in the survey in Poland clearly agree on the significance of implementing a comprehensive strategy to save the ocean. Significantly, 46.7% of respondents support "All of the above," indicating that they recognize that effective ocean protection requires tackling a number of factors, such as reducing plastic waste, investing in renewable energy, and protecting marine protected areas. Moreover, 34.8% particularly stress the significance of "Reducing plastic waste," underscoring the acknowledged role of plastic pollution as a major hazard to ocean health. Lesser proportions of respondents favor initiatives like "Investing in renewable energy" (5.9%) and "Protecting marine protected areas" (12.6%), suggesting a wide range of tactics that they believe are crucial to preserving the ocean. These answers imply a sophisticated understanding of the many approaches needed to minimize the challenges facing marine ecosystems.

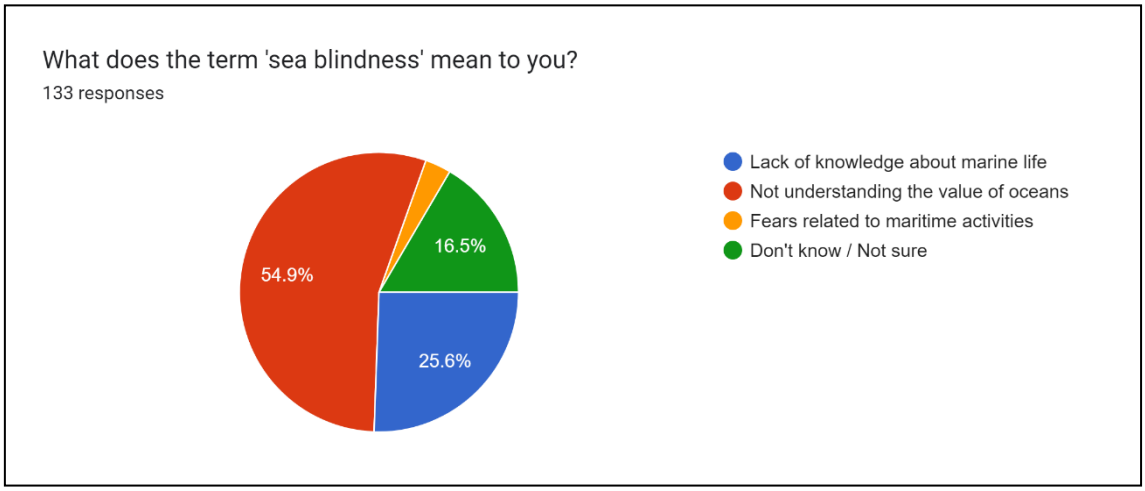
Graph 107 Which of the following resources would you be most likely to use to learn more about ocean issues? - Poland



The study indicates that there is a wide variety of recommended resources in Poland for learning about ocean-related topics. Significantly, forty percent of respondents said they prefer "Social media," demonstrating the impact of digital platforms on knowledge

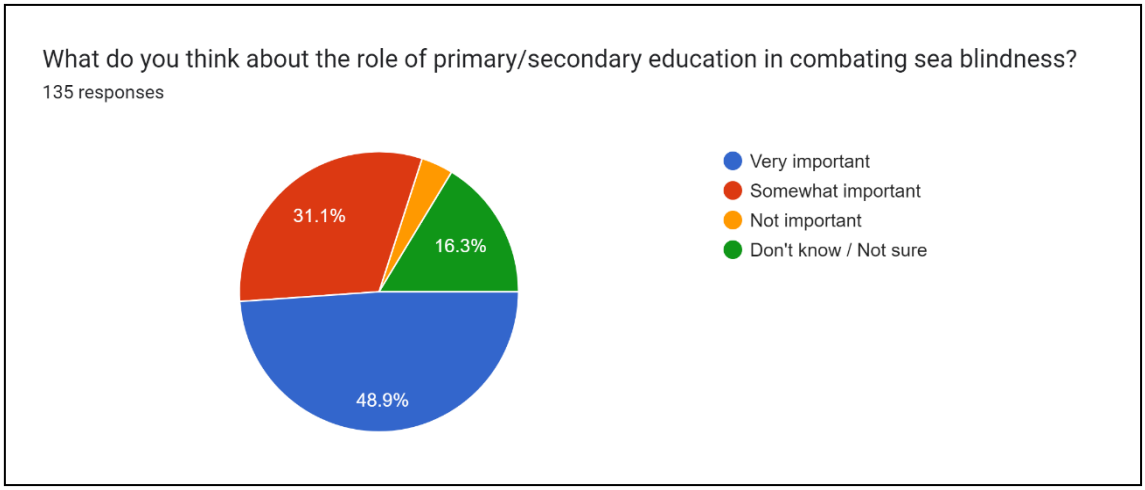
sharing and interaction with content on the ocean. A significant portion of the audience—28.9%—chooses documentaries as a visual aid to enhance their comprehension of ocean-related topics. 21.5% of respondents are drawn to educational programs, underscoring the significance of formal educational channels in the dissemination of knowledge. Conversely, 9.6% of respondents say they prefer to rely on "Websites" for information, highlighting the importance of internet platforms as easily available sources of content about the ocean. This uneven distribution of choices points to the necessity of using both conventional and digital media platforms for efficient ocean-related communication and education in Poland.

Graph 108 What does the term 'sea blindness' mean to you? - Poland



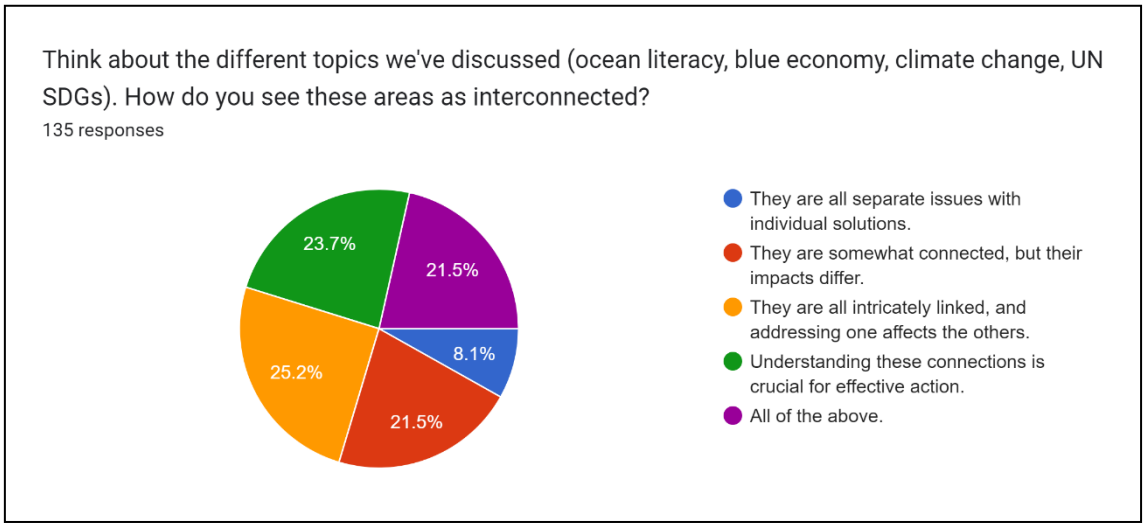
According to 54.9% of respondents, the phrase "sea blindness" is most commonly used in Poland to refer to a lack of awareness of the importance of oceans. This implies that a sizable segment of the populace understands the value of promoting awareness regarding the importance of oceans and their ecosystems. Furthermore, a noteworthy quarter of respondents (i.e., 25.6%) attribute sea blindness to a "Lack of knowledge about marine life," highlighting the necessity of education and information sharing to close the knowledge gap. Just 3% of respondents link sea blindness to "Fears related to maritime activities". In general, these answers highlight how crucial it is to raise public awareness and understanding of the seas in order to successfully overcome sea blindness.

Graph 109 What do you think about the role of primary/secondary education in combating sea blindness? - Poland



The critical role that primary and secondary education plays in preventing sea blindness is widely acknowledged in Poland. With 48.9% of the respondents rating it as "very important," it is clear that they strongly believe that educational institutions at these levels have an impact on promoting ocean awareness. Furthermore, a sizeable percentage (31.1%) considers it to be "somewhat important," underscoring the influence of early schooling in forming opinions toward the seas. As seen by the response "Don't know / Not sure," a lesser percentage (16.3%) is unsure of the relevance, and only a small fraction (3.7%) believes it to be "not important." This demonstrates the widespread agreement that, in order to successfully alleviate sea blindness, ocean-related education must be included in primary and secondary curricula.

Graph 110 Think about the different topics we've discussed (ocean literacy, blue economy, climate change, UN SDGs). How do you see these areas as interconnected? - Poland



Based on an analysis of respondents' perspectives from Poland, a significant percentage (25.2%) acknowledges the deep links between ocean literacy, climate

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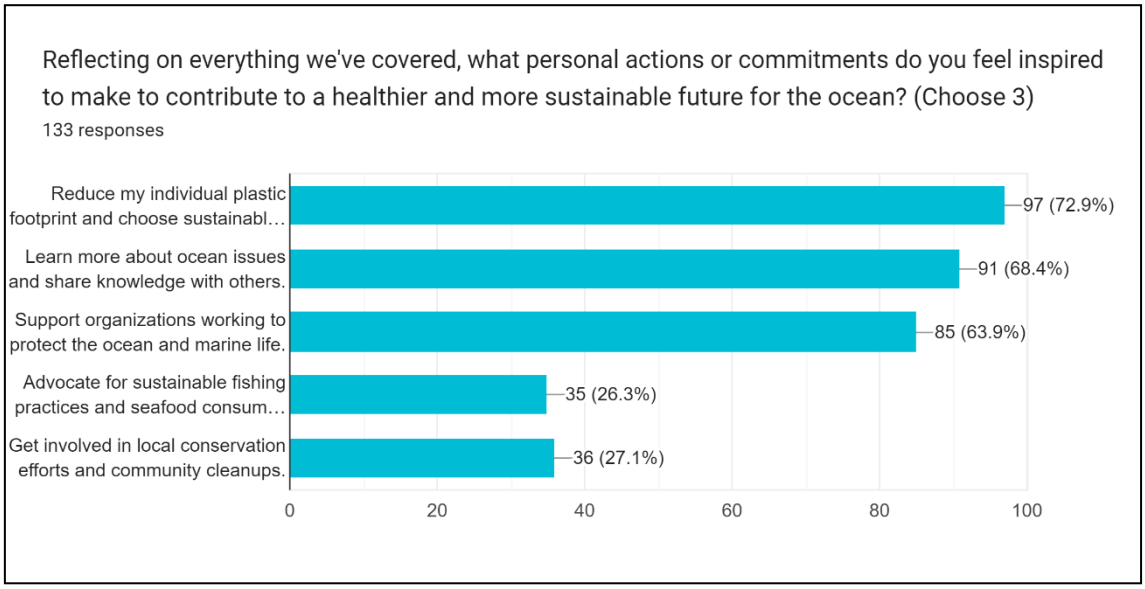
change, the blue economy, and the UN Sustainable Development Goals (SDGs). They also acknowledge that tackling one of these concerns often affects the others. A more complex perspective of how these elements interact is suggested by the 21.5% of respondents who think that while these areas are somewhat related, their effects are different. There is agreement that a comprehensive approach is required, as evidenced by another noteworthy portion (23.7%) that highlights the significance of comprehending these relationships for effective action. A significant number (21.5%) chooses "All of the above," demonstrating a varied variety of ideas on the interdependence of ocean-related challenges in the context of literacy, economy, and climate change. A smaller fraction (8.1%) views them as distinct issues with independent solutions.

Graph 111 Reflecting on everything we've covered, what personal actions or commitments do you feel inspired to make to contribute to a healthier and more sustainable future for the ocean? (Choose 3) - Poland



Taking into account the opinions shared by respondents from Poland, most of them pledge to take personal responsibility for making the ocean healthier and more sustainable in the future. The greatest priority is reducing one's own plastic footprint and choosing sustainable alternatives; 72.9% of respondents support this significant action. Closely behind, 68.4% are driven to increase their understanding of ocean-related concerns and to impart that information to others, highlighting the need of awareness and education. Furthermore, a noteworthy 63.9% indicate that they plan to assist groups that defend the ocean and marine life, highlighting the significance of advocacy and group activities. These answers demonstrate a strong preference for concrete steps, underscoring the participants' sense of accountability and involvement in Poland.

Poland's statistics shows a noteworthy interest in and awareness of ocean-related concerns; most people there are aware of how global warming affects ocean ecosystems. Ocean literacy could use some work, though, as several respondents had trouble understanding the word. Given that a sizeable portion of respondents indicated

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doubt regarding the ideas connected to blue schools, it would seem that there is a lack of awareness or information regarding blue schools. This implies a chance for educational programs to raise consciousness and comprehension of the part blue schools play in encouraging ocean literacy. Overall, despite the favorable trend toward sustainable practices and ocean conservation, focused initiatives are required to advance ocean awareness and the idea of Blue Schools in Poland. Campaigns for education and awareness about ocean-related issues could be very important in building a more knowledgeable and involved public.

2.6. Türkiye

2.6.1. Purpose and Scope of the Literature Review

Ocean literacy must be considered as being not only about increasing public awareness of the state of the ocean, our impacts upon it and its impacts upon us, but also about providing tools and approaches to transform ocean knowledge into behaviours and actions that promote ocean sustainability. For ocean literacy to be used effectively in policy development across the ocean-climate nexus, there is a need to have a better understanding of the link between ocean literacy and climate related behaviours.

The healthy marine ecosystems are the cornerstone of our planet. Unfortunately, they are threatened by a growing list of stressors with the climate change. Already, marine environments are under pressure by overfishing, illegal, unreported and unregulated fishing (IUU), invasive alien species, pollution, etc. These stressors demonstrate an urgent and escalating global need for improved understanding of the ocean and for sustainable management of the marine environment.

Understanding how to reduce and manage threats is one of the most important steps needed to protect marine wildlife. Increasing knowledge and awareness concerning ocean environments are at the heart of marine and coastal management and implementing the marine related Sustainable Development Goal 14 “Conserve and sustainably use the oceans, seas and marine resources for sustainable development”. These reasons also show the necessity of becoming “ocean and climate literate” of course in addition to political action.

Recent reports highlight the importance of multidisciplinary and integrated consideration of relevant issues for successful marine and coastal management. However, the difficulties of collecting data on marine environment are obvious. Given the vast scale of the ocean and the obvious limitations in terms of numbers of scientists active in marine research, there is enormous potential to harness the enthusiasm of interested citizens to contribute to the collection and analysis of data and the delivery of knowledge and information. Marine Citizen Science has the potential to not only influence the environmental impacts of society through behavioural education and knowledge, but also to empower citizens to engage constructively in the development and implementation of truly fit-for-purpose and evidence-based maritime policy.

When thinking about marine environment, what often comes to the minds are images of tragic scenarios, such as sea animals affected by plastic pollution and polar caps melting with a subsequent increase in the sea level. The ocean's worsening situation and its consequences urgently need to be taken into consideration in the climate change debate. At the same time, it is also extremely important to recognise the ocean as the source of solutions to combat the ongoing climate crisis, and, thus, how crucial it is to preserve it. The marine environment plays a critical role in our lives although most people remain oblivious to its crucial functions. Despite being the defining feature of our planet, the ocean continues to be predominantly unexplored and understudied primarily due to the expensive costs of oceanographic research.

In the context of climate change, the ocean plays a pivotal part, in fact the ocean is our best ally against climate change, against the climate crisis, also because, up until now, it has absorbed about 28% of the carbon dioxide emitted into the atmosphere due to antropogenic activities. It, therefore, becomes essential to raise awareness and disseminate knowledge on the importance of the ocean's well-being for our lives and for our planet. This can be achieved by investing more in education, which would lead to the ability to make more conscious and well-informed decisions.

The Ocean Literacy is highly relevant and useful in this context because it teaches us to understand our connection with the ocean. More importantly, having knowledge and greater awareness on the ocean's situation is fundamental to developing solutions to the current issues. Education and information, hence, become, central elements in the safeguarding of the ocean, and contributing to the United Nations Decade of Ocean Science for Sustainable Development, a ten-year initiative to better understand the ocean and bring solutions for its sustainability.

Understanding the interconnection between the ocean and human is highly important and it should create a sense of collective responsibility, leading each one of us to do their part and feel, which begins with sharing knowledge and raising awareness, followed by actions. The goal is to become a generation fully aware of the significance of the ocean for our planet and, above all, a generation capable of acting.

2.6.2. Assessment of Existing Research

The CONCEPT of a "blue economy" emerged at the 2012 United Nations Conference on Sustainable Development - or Rio+20. It is based on the premise that healthy and sustainable ocean ecosystems are more productive and essential for sustainable ocean-based economies and livelihoods. This concept promotes economic growth, social inclusion and improved livelihoods at the same time as ensuring the environmental sustainability of oceans and seas, thus resolutely building on the three pillars of sustainable development. Türkiye is one of the founding members of the United Nations. As a member state she is actively involved in the development and negotiations of agreements and conventions that have relevance to the Blue Economy. Definitions vary but, overall, the UN specifies Blue Economy as a range of economic activities related to oceans, seas, and coastal areas, and that are sustainable and socially equitable.

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Specialised Agecies and International Agreements

There are no specialized agencies nor international agreements specifically focusing on the Blue Economy. This is why we identified a sample of relevant agencies and agreements that touch upon key economic sectors within the blue economy.

The International Maritime Organization (IMO) is a specialized agency of the United Nations which plays a critical role in ensuring the growth of a sustainable blue economy. It is responsible for measures to improve the safety and security of international shipping and prevent marine pollution from ships. There are numerous conventions and several sub-committees within the IMO. The London Convention, SOLAS and MARPOL are among the most significant conventions for shipping and marine pollution.

The 1972 London Convention and its 1996 Protocol regulate dumping of wastes and other matter at sea, including assessing waste for which dumping at sea may be permitted, radioactive wastes, marine geoengineering and carbon capture and storage. Türkiye is a category C member along with 20 other States.

The International Convention for the Safety of Life at Sea (SOLAS) in an international maritime treaty implemented by the International Maritime Organization (IMO), requiring Signatory flag states to ensure that ships flagged by them comply with minimum safety standards in construction, equipment, and operation.

The International Convention for the Prevention of Pollution from Ships (MARPOL) is the main international convention covering prevention of pollution of the marine environment by ships from operational or accidental causes. Türkiye implements Marpol and its conventions.

Food and Agricultural Organization (FAO) of the UN

FAO plays a leading role in international fisheries policy. FAO also is a key player in regional fisheries policies especially in terms of setting the standards, monitoring, and reporting, preparation of guidelines.

The Paris Agreement is the first legally binding global treaty on climate change agreed at COP21, 2015. COP25 mandated the first Ocean and climate change dialogue, drawing upon the knowledge and scientific findings from the IPCC Special Report on the Ocean and Cryosphere in a changing climate. At COP 26, in the Glasgow Climate Pact 2021, governments strengthened ocean-based action under the UNFCCC. They invited the SBSTA Chair to hold an annual Ocean and climate change dialogue.

The SDGs adopted in 2015 and in particular SDG14 – life below water – remain a reference for the blue economy. The secretariat, UN-DESA, and its partners have provided substantive support and capacity-building for the goals. The 2021 publication entitled "Promotion and Strengthening of Sustainable Ocean-based Economies" is possibly the most relevant UN publication on the matter, investigating what are those conditions and safeguards that make ocean-based economies sustainable, highlighting

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case studies and lessons learned, to develop guidance that can help countries transition from theory to practice. Some key findings highlighted in the report include:

- The blue economy, or a sustainable ocean-based economy, has come to signify international interest in the growth of ocean-based economic development in a manner that is both environmentally sustainable and socially equitable.
- It is important that the blue economy aims to move beyond business as usual to consider economic development and ocean health as compatible propositions.
- Pursuing a blue economy requires access to affordable long-term financing at scale.
- Governments planning on sustainable development of the ocean and its resources must also consider the long-term health of ocean ecosystems if the benefits from ocean-based industries and the growth of those benefits, are to be sustained over long periods.
- The issues or equity and social justice have not received sufficient attention in the blue economy discourse.
- In order to achieve the goals of the 2030 Agenda, it is important that blue economy initiatives aim to leave no one behind and that coastal communities are able to equitably share in the benefits.
- A blue economy requires improved governance of individual sectors, as well as multisectoral governance of all ocean activities.

The current trend indicates a more holistic consideration of multiple sectoral activities through planned blue economy transitions, and through the use of cross-sectoral ocean governance mechanisms, such as marine spatial planning.

In addition, UN-led mechanisms and assessments point to the reliance on the blue economy as and engine of sustainable development, including:

- The Decade of Ocean Science for Sustainable Development, which goal is to enact a common framework to ensure that ocean science can fully support countries' actions to sustainably manage the oceans and to achieve the 2030 Agenda for Sustainable Development.
- The IPCC Special Report on the Ocean and the Cryosphere in a Changing Climate (SROCC) without mentioning the 'blue economy' refers the clear linkages between the ocean and the climate.

In the margin of the UN system, The High-Level Panel for a Sustainable Blue Economy (the Ocean Panel), an initiative of 14 world leaders building momentum for a sustainable ocean economy, calls for development in which effective protection, sustainable production and equitable prosperity go hand-in-hand. Türkiye is not part of the high-level panel and thus is not part of this international.

2.6.3. Gaps in the Literature

The most important gap in the literature of ocean-literacy in Türkiye is to have only 1 manuscript about this topic. The importance and relation of ocean-literacy with the

society must be enlightened. Scientist should consider about publishing more manuscripts about this topic.

Figure 6 Numbers of the distribution of the literacy-based thesis and manuscripts in Türkiye

3. Tablo 1. Türkiye'de Hazırlanan Tez ve Makalelerdeki Okuryazarlık Türlerinin Dağılıma İlişkin Bulgular

	Tez			
	Yl./Uzm.	Dr.	Makale	Toplam
Sağlık okuryazarlığı	146	15	150	311
Medya okuryazarlığı	24	80	200	304
Ekonomi/finans okuryazarlığı	123	17	150	290
Matematik okuryazarlığı	10	42	140	192
Bilgi okuryazarlığı	29	6	113	148
Dijital okuryazarlık	28	3	64	95
Çevre/Ekoloji okuryazarlığı	36	10	49	95
Görsel okuryazarlık	19	6	63	88
Fen okuryazarlığı	43	10	22	75
Erken okuryazarlık	30	7	30	67
Bilgisayar okuryazarlığı	9	3	40	52
Gıda ve beslenme okuryazarlığı	22	3	25	50
Bilimsel okuryazarlık	12	6	26	39
Değerlendirme okuryazarlığı	13	7	8	28
Duygusal okuryazarlık	11	3	10	24
Eğitim Programı Okuryazarlığı	3	-	15	18
Ruh sağlığı okuryazarlığı	3	-	11	14
Coğrafya okuryazarlığı	3	3	8	14
Politik okuryazarlık	3	3	7	13
Grafik okuryazarlığı	3	-	8	11
Eleştirel Okuryazarlık	2	5	4	11
Hukuk okuryazarlığı	-	-	9	9
Sosyal medya okuryazarlığı	6	-	2	8
Tarih okuryazarlığı	1	1	6	8
İslami finans okuryazarlığı	-	-	7	7
İşlevsel okuryazarlık	2	1	4	7
Müzik okuryazarlığı	1	1	5	7
Sayısal okuryazarlık	1	1	5	7

Source 23 https://dergipark.org.tr/en/download/article-file/2670096

Figure 7 Numbers of the distribution of the literacy-based thesis and manuscripts in Türkiye (cont'd)

Makale Başlığı (Times New Roman, 10 punto, Bold, Her Sözcüğün Baş Harfi Büyük, Mak. 12 Sözcük)

Ev okuryazarlığı	-	1	6	7
Biyoçeşitlilik okuryazarlığı	2	-	4	6
İstatistik okuryazarlığı	-	1	5	6
Tarımsal okuryazarlık	2	1	3	6
Afet/doğal afet okuryazarlığı	2	1	3	6
Genetik okuryazarlığı	-	1	3	4
Enerji okuryazarlığı	1	-	3	4
Reklam okuryazarlığı	-	2	2	4
Mali okuryazarlık	-	-	3	3
Din okuryazarlığı	-	1	2	3
Dijital medya okuryazarlığı	-	1	2	3
E-okuryazarlık	1	-	2	3
Ağız sağlığı okuryazarlığı	1	-	2	3
Su okuryazarlığı	-	-	3	3
Dijital reklam okuryazarlığı	-	1	1	2
Okyanus okuryazarlığı	1	-	1	2
Küresel okuryazarlık	-	-	2	2
Haber okuryazarlığı	-	1	1	2
Bilgisayar oyunu/ video oyunu okuryazarlığı	-	-	2	2
Akademik okuryazarlık	-	1	-	1
Dijital sağlıklı diyet okuryazarlığı	-	-	1	1
Kültürel miras okuryazarlığı	-	-	1	1
Kredi kartı okuryazarlığı	1	-	-	1

Source 24 https://dergipark.org.tr/en/download/article-file/2670096

Türkiye exhibits a significant utilization of marine resources in the realms of transportation, energy, and raw materials. Such extensive reliance underscores a strong dependence on marine ecosystems. To safeguard and conserve these ecosystems, fostering marine education and increasing awareness becomes crucial. Assessing the level of ocean literacy serves as the primary step in enhancing public awareness and knowledge about the oceans.

In the context of environmental and ocean literacy, Türkiye is a relatively recent participant. Existing research on ocean literacy in the country is limited, with a focus primarily on environmental literacy among Turkish students. A study by Erdogan and Ok (2011) delved into the environmental literacy of fifth-grade students, revealing that 61% exhibited a moderate level, while 27.3% demonstrated a high level of environmental literacy. However, there is a notable gap in understanding students' content knowledge and attitudes toward oceans. Identifying their sources of knowledge about ocean literacy is crucial for implementing relevant concepts effectively. Factors

such as habitat, gender, and educational programs also warrant investigation for broader implications.

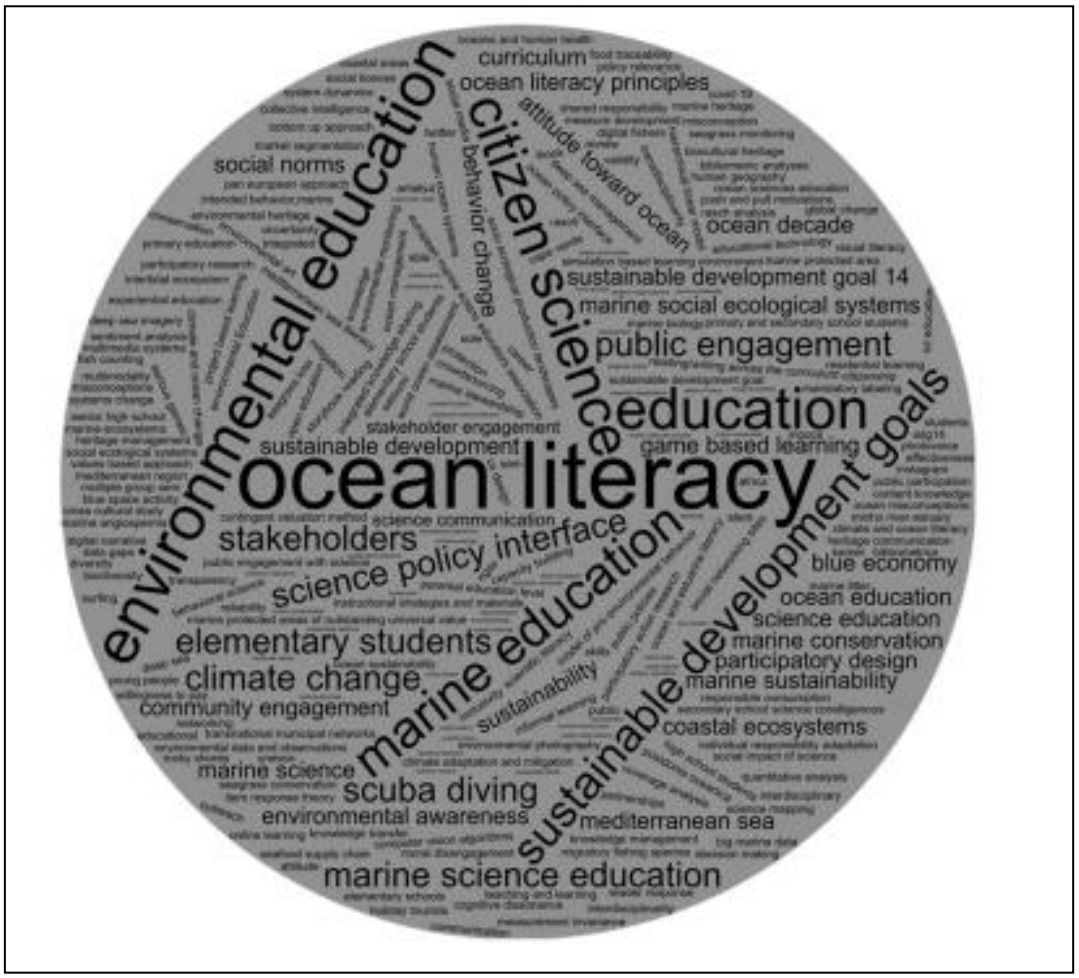
2.6.4. Lessons from Previous Studies

Ocean literacy emerges as a term that aims to improve the ocean human relationship and positively affect behaviours by raising awareness of individuals. The most common definition of ocean literacy currently in use was developed by the National Oceanic and Atmospheric Administration (NOAA). It focuses on understanding the influence of the oceans on human beings, as well as the impact of humans on the oceans. It is very important to make a general assessment to determine what dimensions ocean literacy has reached in the global sense, to see the missing points, and to reveal the current situation. The purpose of this study is to give a 5 years overview of progress on the completion and documentation of studies on ocean literacy from 2017 to 2021 using bibliometric analysis. Five-year bibliometric studies are essential for several reasons. Firstly, they provide valuable insights into the evolving landscape of research and scholarly communication. By analysing trends in citations, publication patterns, and authorship over this time frame, researchers and institutions can identify emerging areas of interest and measure the impact of their work. Secondly, these studies offer a means to assess the productivity and influence of researchers and institutions, aiding in decision-making processes for funding allocation, promotions, and collaborations. Lastly, 5-year bibliometric studies contribute to transparency and accountability in academia. They enable the evaluation of research output against established goals and benchmarks, promoting a culture of continuous improvement and innovation within the scholarly community. In a rapidly evolving academic landscape, these studies serve as valuable tools for informed decision-making and progress assessment. The current study used 5-year bibliometric study, however, more than 5 year data will also provide more meaningful conclusions for the further studies.

Table 5 Country score for publishing OL based articles between 2017 and 2021

2017		2018		2019		2020		2021	
Country	Score	Country	Score	Country	Score	Country	Score	Country	Score
Sweden	2,000	USA	1,210	Taiwan	4,000	Italy	2,428	Portugal	4,87
Greece	1,000	Portugal	1,010	UK	3,530	UK	2,032	UK	3,461
France	0,920	Canada	1,000	Ireland	3,000	USA	1,429	Australia	3,028
Canada	0,405	Australia	0,790	Italy	2,560	Canada	1,247	Greece	3,02
Netherlands	0,375	Italy	0,580	Canada	2,000	Croatia	1,124	Brazil	2,62
Spain	0,365	Sweden	0,445	Germany	1,570	Germany	1,019	Canada	2,39
Italy	0,150	S.Africa	0,420	Spain	1,510	Ireland	1,000	USA	2,07
Germany	0,070	Ireland	0,370	USA	1,370	Japan	1,000	Poland	1,75
Portugal	0,040	Denmark	0,070	Greece	1,120	Poland	1,000	Italy	1,41
Finland	0,015	Greece	0,040	Turkey	0,790	Slovenia	1,000	Taiwan	1
		Spain	0,030	Australia	0,770	Taiwan	1,000	Belgium	0,722
		UK	0,025	S.Africa	0,700	France	0,691	Switzerland	0,46
		Belgium	0,010	Sweden	0,420	Greece	0,428	Germany	0,432
				Japan	0,230	Mexico	0,067	Japan	0,32
				Portugal	0,150	Norway	0,044	Croatia	0,28
				Croatia	0,070	Belgium	0,029	Spain	0,22
				Estonia	0,070	Spain	0,021	Norway	0,22
				France	0,060	Australia	0,009	France	0,203
				S.Korea	0,050	Venezuela	0,009	N. Zealand	0,181
				Kenya	0,030	Brazil	0,002	B. Isles	0,1
				Vietnam	0,020	S. Africa	0,001	C. Verde	0,08
				Poland	0,010	New Caledonia	0,001	Estonia	0,07
						Senegal	0,001	Sweden	0,07
						Monaco	0,001	S.Korea	0,04
						Cape Verde	0,001	Cambodia	0,03
						Portugal	0,001	Kenya	0,03
						Kenya	0,001	Denmark	0,02
								Mexico	0,02
								Israel	0,019
								Morocco	0,014
								Egypt	0,01
								S. Africa	0,01
								Tunisia	0,006
								Vietnam	0,005
								Cyprus	0,001
								Malta	0,001

Figure 8 Word cloud of keywords used in ocean literacy based publications between 2017-2021



Forty-four out of the seventy-nine publications examined within the scope of the criteria determined between 2017-2021 received financial support. These publications are detailed in Most publications were funded by one or more national or international institutions, organizations, projects, or programs. Eleven of them were funded by European Union (EU) Horizon 2020 Project. Additionally, 2 publications were funded by the Erasmus+ Programme. Also, when previous studies are examined, it is seen that Türkiye's score for publishing on ocean literacy is quite low. Working on this issue in our country will increase both awareness and cooperation.

Successful Practices and Lessons Learned: A summary of important lessons and successful practices from previous studies. This section should guide future research. Innovative Approaches and Strategies: Evaluation of approaches and strategies found to be new and effective.

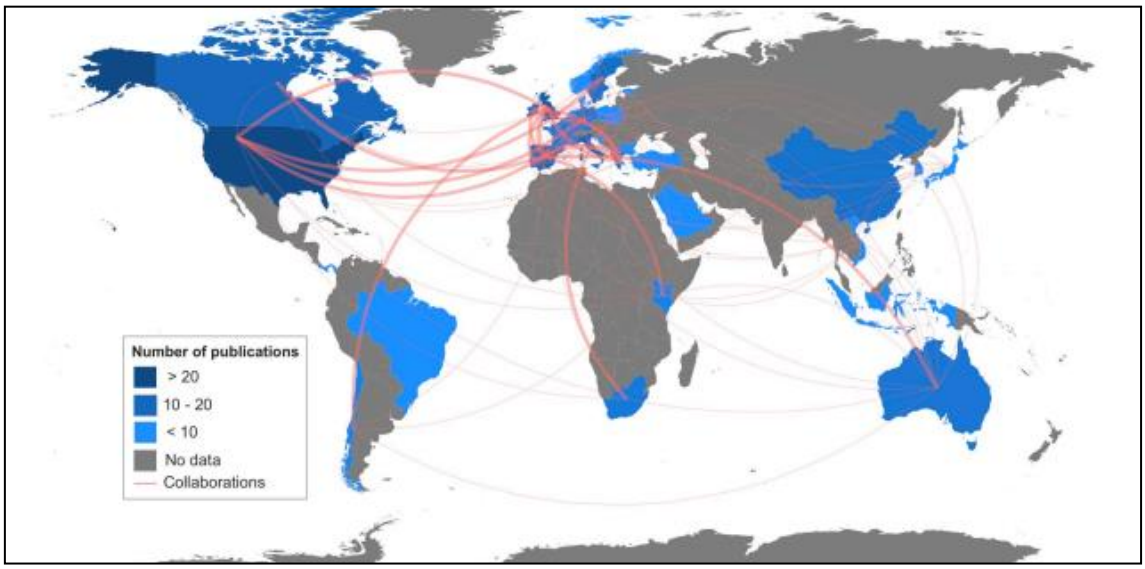
Turkish Marine Research Foundation (TUDAV)'s education efforts support increasing community resilience and also developing citizen science through multiple programs for 26 years. The development of Marine Citizen Science and increasing the extent of its usage cannot be achieved by one level of stakeholder alone; thus, TUDAV creates meeting points for stakeholders in science, policy and civil society at all geographical

scales, from local to international and transfer basic information to the society for them to make reliable scientific observations, and to increase social solidarity on these issues. TUDAV has attached great importance to social responsibility and awareness-raising activities in every project it has carried out to date, as well as scientific outputs. Among more than seventy publications published by TUDAV, there are books specifically on the effects of the climate change on our seas and also there are up-to-date scientific data on specific effects, including the alien species in regional books for Turkish Seas. For the same purposes, the online “Ocean Governance Course” for the “Conservation and Sustainability of the Marine Environment in Turkish Seas” is organizing jointly by Turkish Marine Research Foundation (TUDAV) and International Ocean Institute (IOI) to upgrade the Ocean Literacy, which was completed five times in two years (between the dates of 04 April - 16 May 2022; 14 November - 23 December 2022; 10 July - 18 August 2023 and 23 October - 23 November 2023; 11 December 2023 - 11 January 2024). 40 applicants were confirmed for their participation in each of these courses taking into consideration of the gender equality in advance of women; geographic distribution; and inclusion of representatives of different business sectors and institutions and priority was also given to people who applied to our previous courses. The sessions were realized by various experts using interactive tools such as presentations, discussions, readings, videos, etc. to explore new and emerging issues in marine conservation and sustainability. Participants who attend 80% of the sessions were entitled to receive the certificate. At the end of the course, each trainee becomes a part of a communication network in which they can contribute to marine sciences through citizen science and maintains their relationship with the sea in their daily life.

Figure 9 TUDAV Ocean Literacy Studies

2.6.5. Survey and Public Perception

Map 3 Global collaboration in ocean literacy research from 2005 to 2022



Publications are made from 33 different countries from 5 continents. Shown in map above.

In this section, an attempt will be made to evaluate Türkiye's situation in the context of the blue economy. However, it is emphasized that this study not only considers the economic dimension but also underscores the importance of the social dimension and the environment. The blue economy encompasses activities such as fisheries and aquaculture, marine tourism, renewable ocean energy (blue energy), extraction of resources for cosmetics and pharmaceuticals, maritime transportation, shipbuilding, deep-sea mining, marine biotechnology, research and development, and coastal development[40]. For activities to be classified as components of the blue economy, they must fulfil the following criteria[41]

Due to the global economic, social, and ecological crises, alternative solutions have been sought, leading to the emergence of concepts such as green economy, green growth, blue economy, and blue growth, all rooted in sustainable development. These developments can be attributed to the perception that conventional economic teachings are inadequate. The degradation of the environment and oceans, escalating global warming, intensifying climate crises, diminishing biodiversity, species extinction, growing inequality, and the incomplete achievement of social inclusivity all affirm the inadequacies of established economic approaches. The increasing severity of environmental issues poses a threat to all living beings.

[40] Sharma, B. ve Sharma, B. (2020). Blue economy: impact of corona pandemic. International Journal of Management, 11(09), 717-728. & Toplu Yılmaz, Ö. (2021). Türkiye'de sürdürülebilir mavi ekonomi için balıkçılık desteklerinin değerlendirilmesi. Ömer Halisdemir Üniversitesi İktisadi ve İdari Bilimler Fakültesi Dergisi, 14(3), 906-923;
[41] World Bank. (2017). The potential of the blue economy: increasing long-term benefits of the sustainable use of marine resources for small island developing states and coastal least developed countries.

Within this framework, the concept of sustainable development, aiming to improve society while preserving the environment, has become crucial. However, despite global efforts since the 1970s to address environmental protection through numerous conferences, summits, and treaties, current conditions suggest that these endeavours have been insufficient. While Türkiye, surrounded by three sides with seas and possessing significant geostrategic and geographical advantages, considers the blue economy a substantial source of income, environmental considerations should not be overlooked in conducting these economic activities. Key sectors in Türkiye contributing to economic growth and employment, particularly aquaculture, fisheries, and marine tourism, have great potential in the blue economy. However, practices such as overfishing, waste disposal, marine and coastal pollution jeopardize the health of seas while engaging in blue economic activities. Therefore, preserving biodiversity in oceans and seas, refraining from dumping waste, and ensuring proper waste recycling are imperative. Efforts to implement the blue economy should minimize environmental and social damages, and solutions addressing potential social and environmental risks arising from economic activities should be devised. Developing and effectively implementing environmentally friendly and employee-oriented policies are of great importance. As environmental issues are often human induced, the responsibility lies with people to find solutions. To achieve a healthy and secure life for all living beings by preserving the environment and nature, individuals must take responsibility. Early environmental education and increased awareness from an early age, along with more environmental activities, are crucial in fostering ecological awareness and encouraging individuals to be environmentally conscious. Additionally, addressing environmental issues with scientific applications through national and international cooperation is vital to minimize environmental impacts and ensure the continuity and cleanliness of the environment. Priority should be given to the conservation of ocean resources. Ignoring the environment while pursuing economic growth and development will lead to disastrous consequences in the long run. Growth and development policies that neglect the environment will not only cause further environmental degradation but also threaten the health and future of humans and all other living beings. Therefore, a shift in direction is necessary to leave a sustainable life for both current and future generations, avoiding further environmental disasters. This requires working on appropriate, coordinated strategies and policies.

A survey was conducted to gather insights on critical topics related to ocean sustainability. The survey was designed as an online questionnaire with 21 questions, with a focus on eight European countries – Austria, Czechia, Estonia, Hungary, Italy, Poland Romania and Türkiye. The online questionnaire was accessible to citizens of those countries with targeted outreach efforts towards students, educators, and broader public interested in ocean sustainability. Participation was voluntary and anonymous, ensuring the integrity and objectivity of the collected data. It was designed to explore key themes including:

- Ocean Literacy Initiatives: Assessing public understanding of ocean health and sustainability practices.
- "Sea Blindness" Phenomenon: Investigating the awareness of human dependence on healthy oceans and the disconnect between people and the marine environment.

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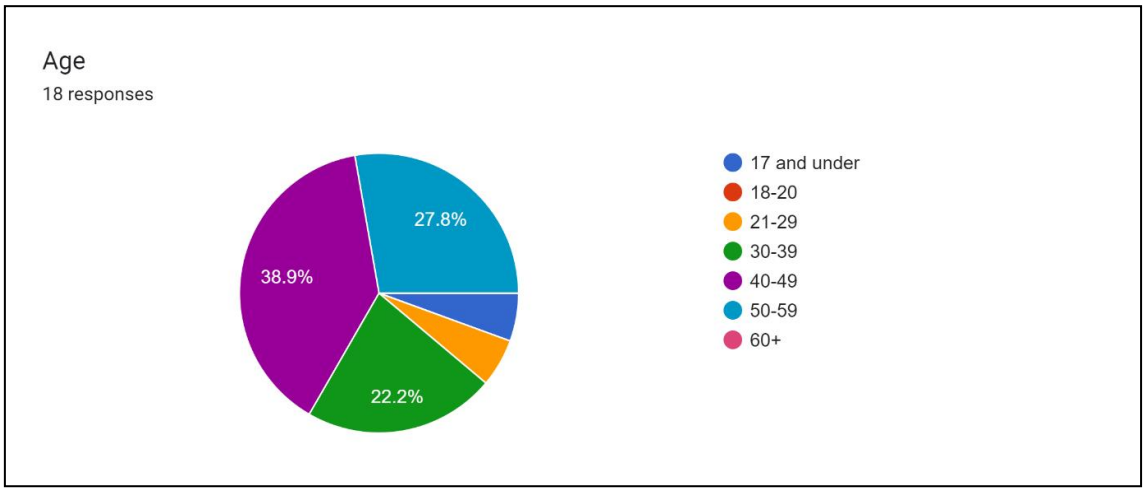
- Emerging Blue Economy: Gauging public perceptions and potential opportunities associated with ocean-based sustainable development initiatives.
- Climate Change Impacts: Evaluating public understanding of the far-reaching consequences of climate change on marine ecosystems and the need for adaptation strategies.

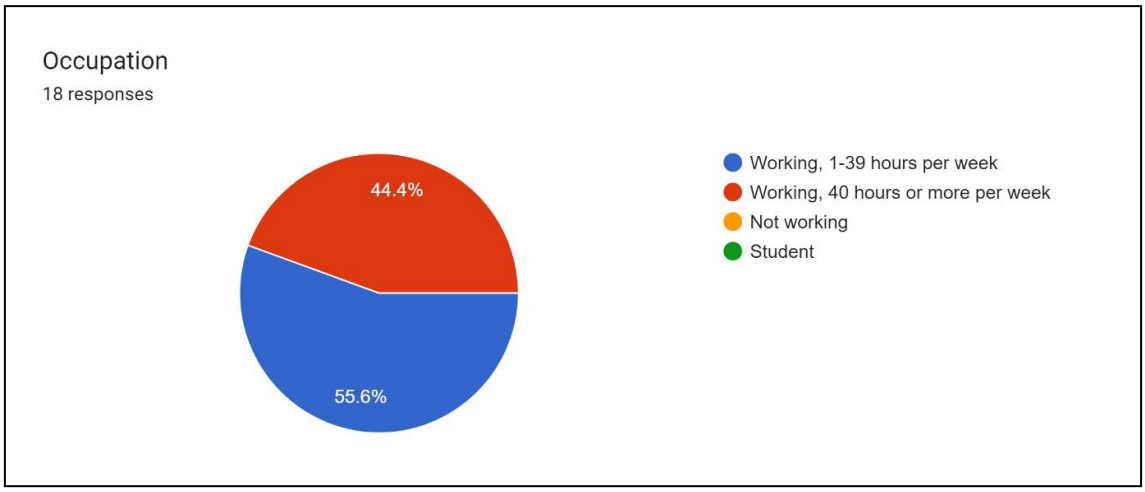
The Blue School Studies survey aimed to provide robust data for in-depth analysis of these crucial themes. The collected information informs the development of innovative educational programs and resources within the SHORE project. By empowering students with ocean literacy and fostering their role as agents of change, the project seeks to promote sustainable behaviour and contribute to a healthier future for our oceans. The Blue School Studies survey was anticipated to yield valuable insights into public knowledge, attitudes, and concerns regarding ocean health and sustainability. These findings form the basis for developing effective educational tools and strategies within the SHORE project, ultimately empowering students to become effective advocates for healthy oceans and a sustainable future.

Below are the graphs of the survey participants from Türkiye.

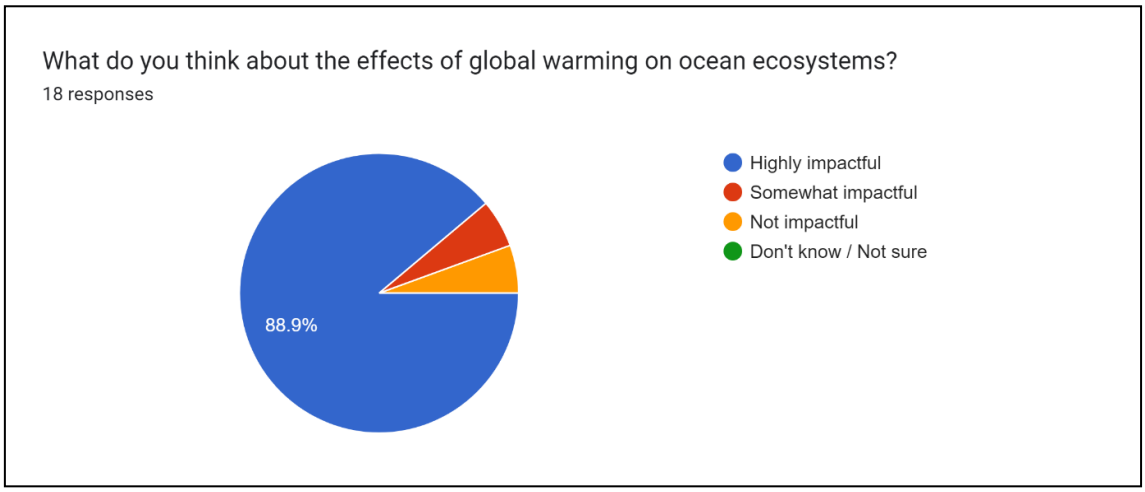
Graph 112 Age of Survey Participants - Türkiye



Graph 113 Working Status of Survey Participants - Türkiye

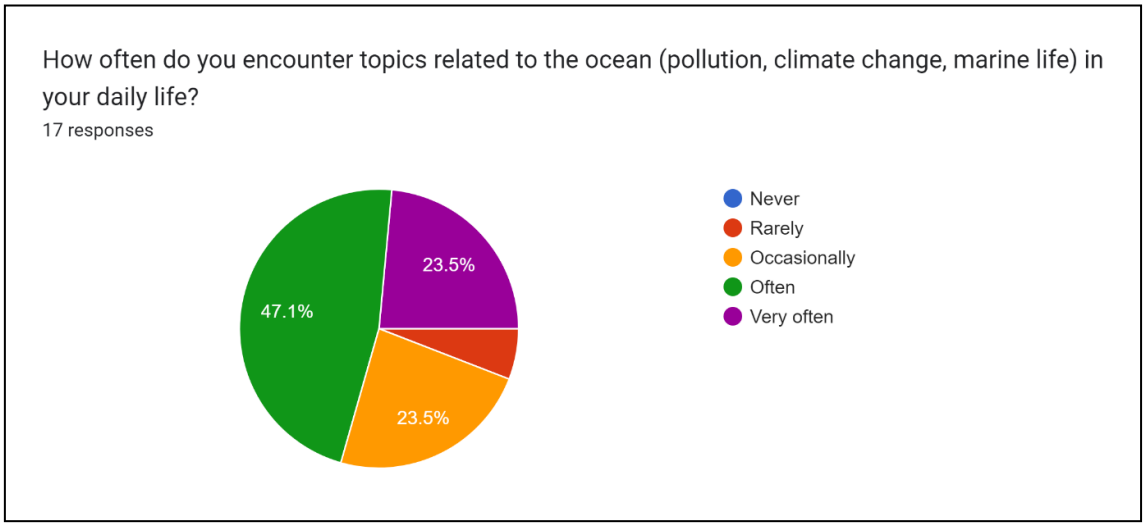


Graph 114 What do you think about the effects of global warming on ocean ecosystems? - Türkiye



According to an analysis of Turkish data, 88.9% of respondents strongly agree that global warming has a large influence on ocean ecosystems. Just 5.6% of respondents think these impacts have some bearing, and another 5.6% think they have no bearing at all. No responders expressed doubt (Don't know / Not sure) on how global warming will affect ocean ecosystems. The Turkish respondents' clear acknowledgement of the substantial impact points to a general understanding and worry about the effects of global warming on the oceans.

Graph 115 How often do you encounter topics related to the ocean (pollution, climate change, marine life) in your daily life? - Türkiye



47.1% of Turkish respondents said they regularly deal with issues pertaining to the ocean in their daily lives, such as pollution, climate change, and marine life. Another 23.5% said they came across these subjects frequently. This implies that the Turkish respondents to the poll had a high degree of awareness and involvement with issues pertaining to the ocean. The comparatively low proportions of participants who stated that they only infrequently (23.5%) or seldom (5.9%) encountered these subjects suggest that they actively participate in or are exposed to conversations about the ocean in their daily lives.

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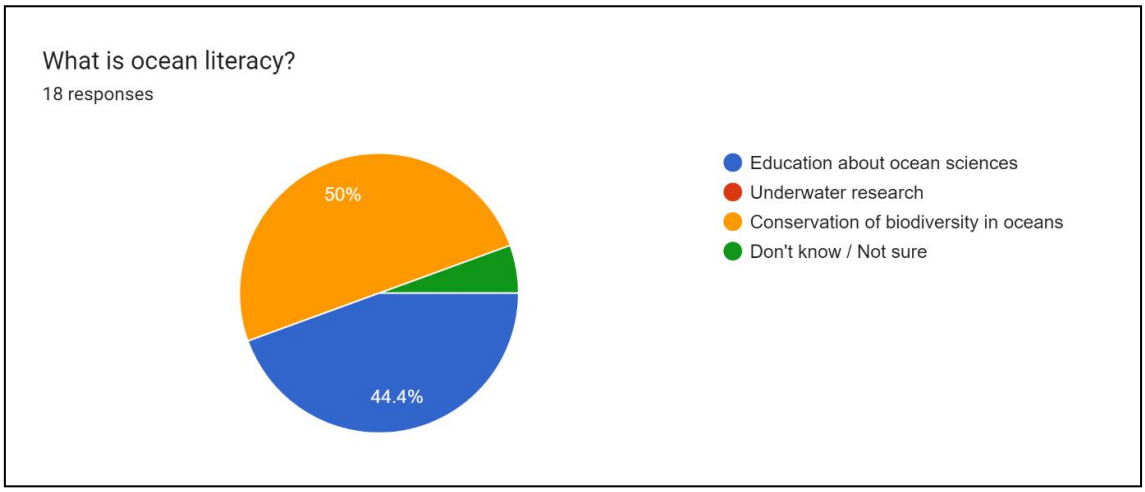
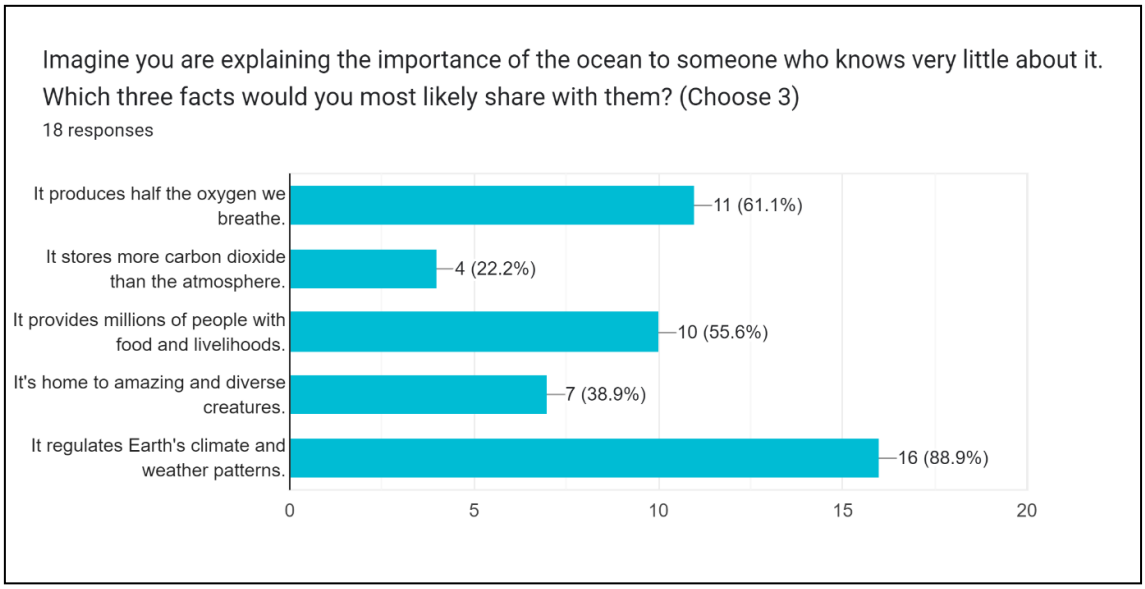
Graph 116 What is ocean literacy? - Türkiye



In Türkiye, 50% of respondents selected this choice overall, with 44.4% of respondents correctly identifying ocean literacy as knowledge of ocean sciences. A respectable degree of understanding about the idea of ocean literacy is indicated by the very small percentage of respondents who were unclear (5.6%), highlighting its link to ocean scientific education. This indicates that a sizable percentage of Turkish respondents to the poll acknowledge the value of comprehending ocean-related topics and their educational components.

Graph 117 Imagine you are explaining the importance of the ocean to someone who knows very little about it. Which three facts would you most likely share with them? (Choose 3) - Türkiye



According to the survey, 88.9% of Turkish respondents are aware of how global warming affects ocean ecosystems. Ocean-related themes are frequently encountered in daily life by respondents (47.1%), and their preferred knowledge sources are social media (47.1%) and documentaries (38.1%). Even though 44.4% of respondents

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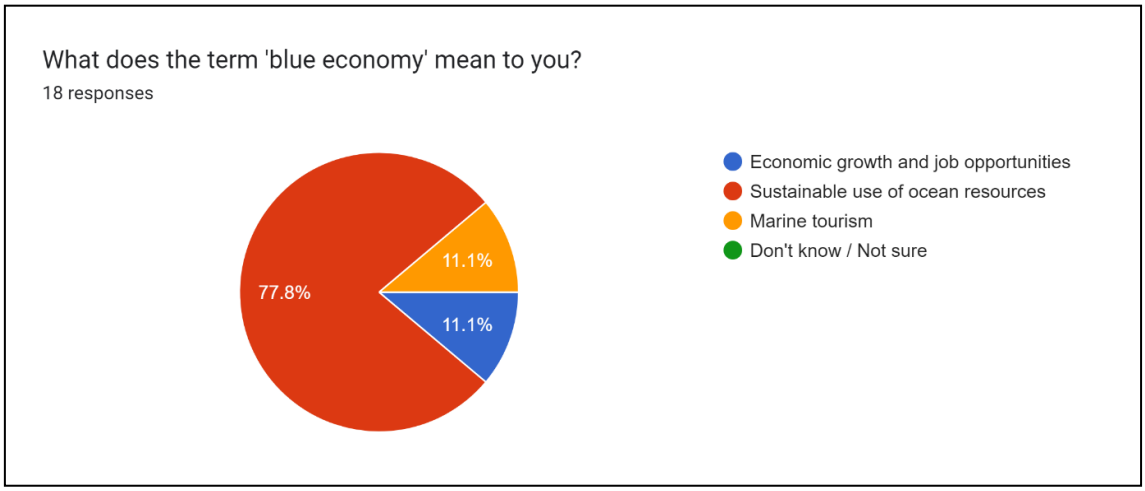
correctly identified ocean literacy, there is still opportunity for development. The significance of the ocean was widely acknowledged by the respondents, who highlighted its role in regulating climate (88.9%), sustaining human life (55.6%), and producing oxygen (61.1%). Regarding difficulties, 66.1% identified pollution, habitat loss, and climate change as a whole. In favour of a comprehensive strategy, the majority of respondents (66.1%) selected "All of the above" for ocean protection. Among those with "sea blindness," ignorance of marine life (fifty percent) stood out. In order to prevent sea blindness, primary and secondary education was thought to be crucial (59.5%). Recognizing the interconnectedness of ocean issues, 26.2% emphasized the need for integrated strategies. In terms of individual commitment, participants expressed a willingness to use less plastic (71.4%), educate themselves about the seas (52.4%), and assist organizations that safeguard the ocean (61.9%). The research indicates that there is a general favourable knowledge and engagement with ocean issues in Türkiye, indicating potential for further education and the adoption of sustainable practices.

Graph 118 What does the term 'blue economy' mean to you? - Türkiye



The majority of respondents in Türkiye (77.8%) properly link the sustainable use of ocean resources with the term "blue economy." The term is not associated with any doubt or lack of information (0%) and is equally associated with marine tourism (11.1%) and economic growth and job possibilities (11.1%). This demonstrates a keen understanding of the concept's emphasis on ecologically sustainable methods in the field of ocean resources, which is in line with the values of a responsible and equitable approach to ocean-related economic operations in the Turkish context.

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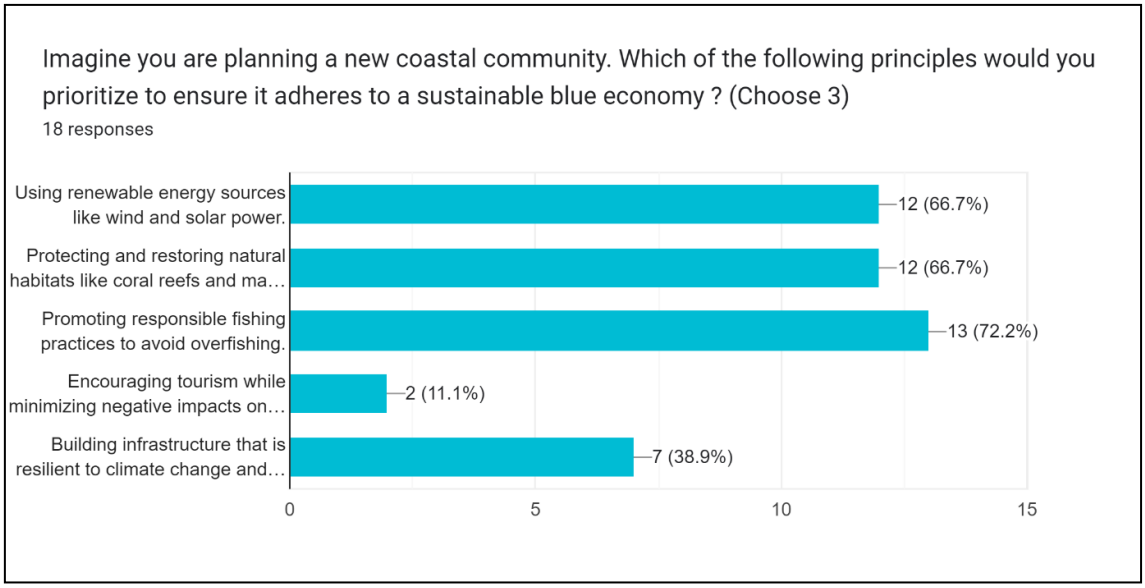
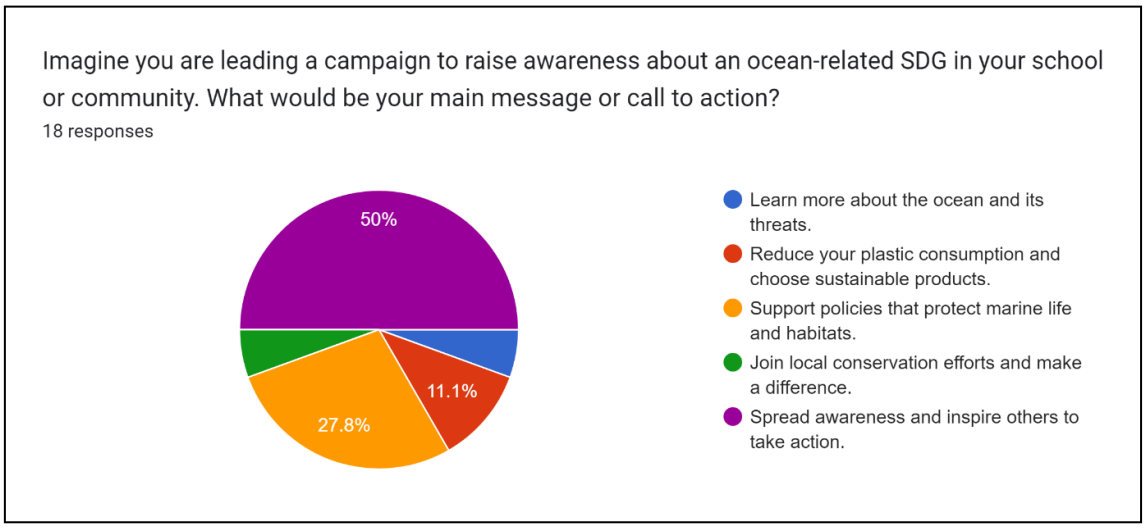
Graph 119 Imagine you are planning a new coastal community. Which of the following principles would you prioritize to ensure it adheres to a sustainable blue economy ? (Choose 3) - Türkiye



The majority of respondents choose three essential elements as priorities for developing a new coastal community in Türkiye in order to guarantee adherence to a sustainable blue economy. These include encouraging ethical fishing methods to prevent overfishing (72.2%), preserving and restoring natural habitats like coral reefs and mangroves (66.7%), and making use of renewable energy sources like solar and wind power (66.7%). These decisions demonstrate a strong commitment to resource conservation, clean energy integration, and environmental preservation; they also fit the blue economy's guiding principles, which aim to strike a balance between ecological sustainability and economic growth. Building climate-resilient infrastructure (38.9%) and promoting tourism while limiting negative effects (11.1%) are prioritized less. This suggests a sophisticated strategy to strike a balance between economic activity and environmental preservation in the coastal development context.

Graph 120 Imagine you are leading a campaign to raise awareness about an ocean-related SDG in your school or community. What would be your main message or call to action? - Türkiye



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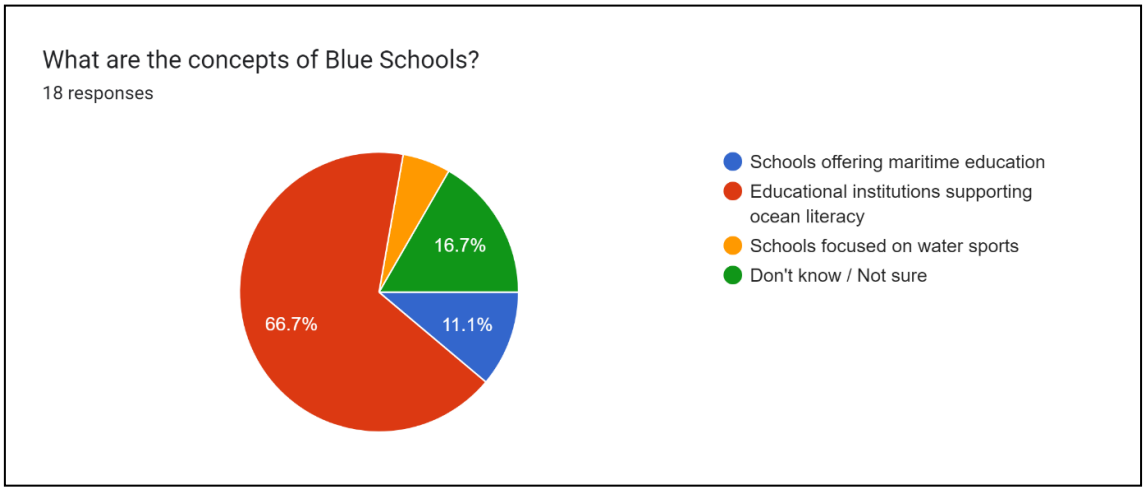
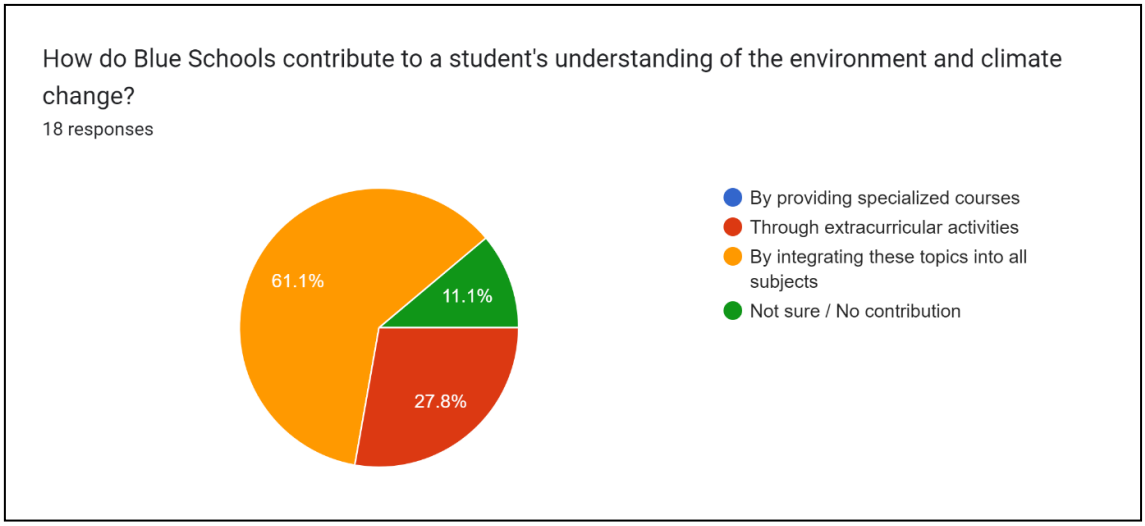
The main message and call to action of a campaign to create awareness about a Sustainable Development Goal (SDG) relating to the ocean in Türkiye would be to inspire collective action and promote awareness. This strategy is supported by a noteworthy 50% of respondents, who stress the value of educating people about issues pertaining to the ocean and motivating them to take an active role in finding solutions. This is in line with the overarching objective of encouraging a sense of collective accountability for marine conservation. Notably, 27.8% of respondents to the study favour policies that safeguard marine life and habitats, highlighting the significance of laws in attaining sustainable results. In this environment, other recommended actions—like supporting neighbourhood conservation activities, cutting back on plastic consumption, and selecting sustainable products—are given less weight. Overall, the data suggests that awareness campaigns and policy advocacy play crucial roles in mobilizing communities toward ocean-related SDGs in Türkiye.

Graph 121 What are the concepts of Blue Schools? - Türkiye



According to Turkish respondents, blue schools are mostly thought of as educational establishments that promote ocean literacy. A noteworthy 66.7% of respondents identify Blue Schools as organizations committed to promoting ocean literacy in learning environments. This highlights how important it is for schools to teach students about the ocean, its ecosystems, and associated environmental challenges. However, a lower percentage of respondents (11.1%) believe that Blue Schools provide maritime education, indicating that specialized education in maritime-related subjects is recognized. Merely 5.6% of respondents associate Blue Schools with a concentration on water sports, indicating a comparatively lower emphasis on recreational elements and a stronger pedagogical focus in their comprehension. Significantly, 16.7% of respondents say they are unsure or unaware with the idea of "Blue Schools," underscoring a potential need for greater dissemination of information about these initiatives in Türkiye.

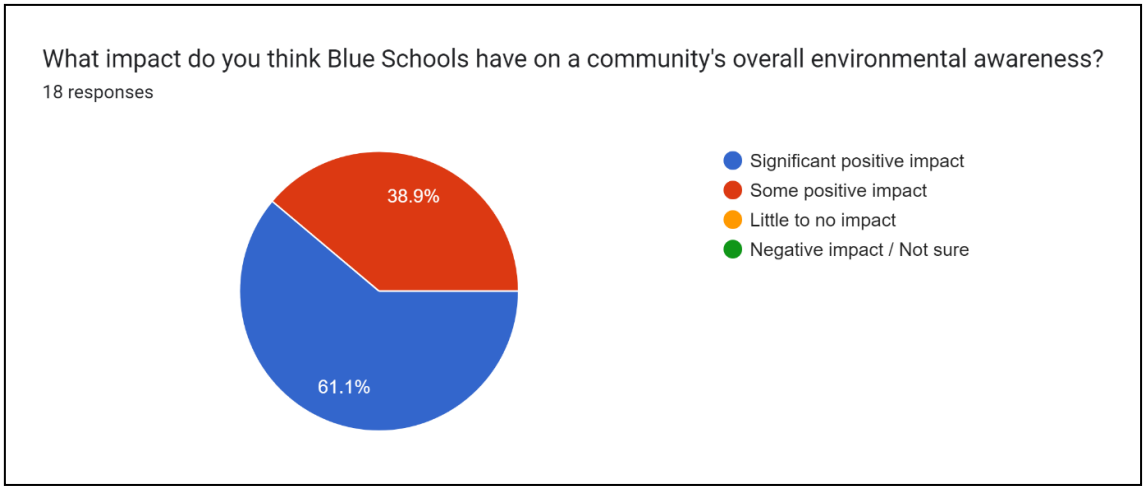
Graph 122 How do Blue Schools contribute to a student's understanding of the environment and climate change? - Türkiye



Respondents in Türkiye felt that Blue Schools made a big difference in their students' comprehension of the environment and climate change. A significant 61.1% of respondents think that environmental and climate change-related topics are incorporated into every course at Blue Schools. This award highlights the interdisciplinary approach of Blue Schools, implying that these establishments encourage a comprehensive awareness of ecological and climate-related challenges by seamlessly integrating environmental topics across many academic subjects.

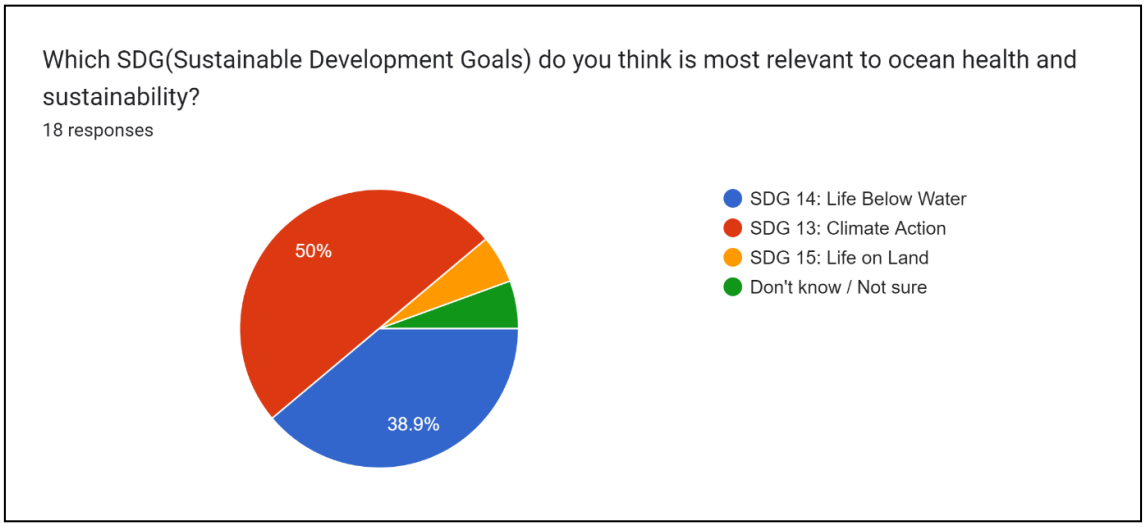
However, just 27.8% of respondents agree that extracurricular activities help kids become more environmentally conscious. This demonstrates how practical participation and hands-on learning outside of the classroom may significantly advance students' comprehension of environmental and climate-related concerns. Remarkably, not a single respondent chose the option saying that Blue Schools provide specialized courses, suggesting that the integration of environmental education is perceived as a comprehensive and pervasive approach across the entire educational spectrum rather than being confined to specific courses.

Graph 123 What impact do you think Blue Schools have on a community's overall environmental awareness? - Türkiye



According to Turkish research, Blue Schools primarily have a good effect on raising a community's general level of environmental consciousness. All respondents feel that environmental awareness is increased by Blue Schools; 38.9% say this has a substantial positive impact, and 61.1% say this has at least some beneficial impact. This suggests that there is a general consensus regarding the effectiveness of Blue Schools in raising environmental awareness in local communities. The lack of respondents who expressed doubt or a negative influence highlights how valuable and effective Blue Schools are seen to be in increasing community members' understanding of environmental issues. This resounding endorsement of Blue Schools' capacity to raise environmental consciousness highlights their potential as community-level accelerators for environmentally responsible conduct and stewardship.

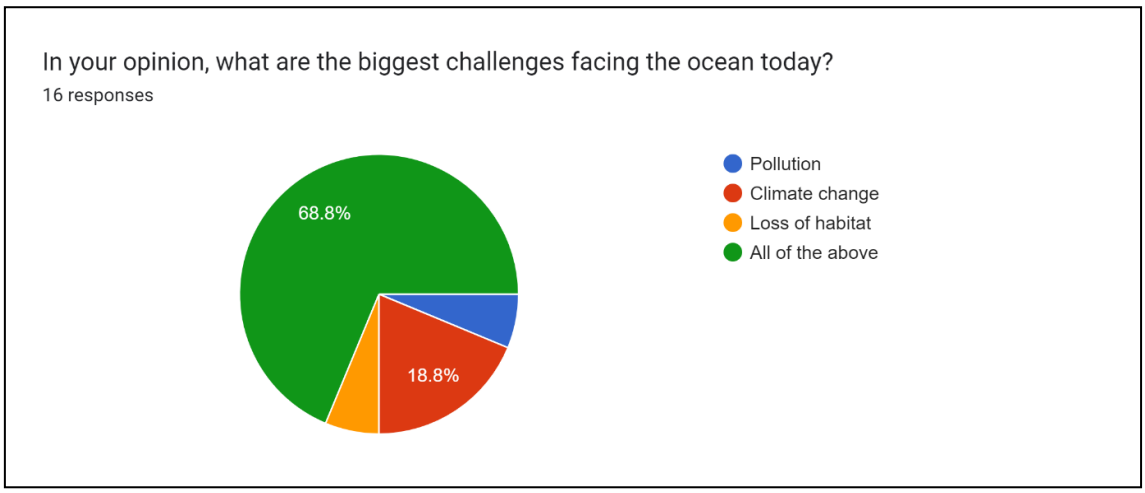
Graph 124 Which SDG(Sustainable Development Goals) do you think is most relevant to ocean health and sustainability? - Türkiye



Based on data from Türkiye, most respondents (i.e., 50% of respondents) choose SDG 13: Climate Action as the Sustainable Development Goal (SDG) that has the greatest

bearing on ocean health and sustainability. SDG 14: Life Below Water was selected by 38.9% of respondents, placing it just behind. This implies that respondents understood the connection between tackling climate change and ocean health, highlighting how important it is to do so in order to maintain the sustainability of ocean ecosystems. The comparatively small proportion of respondents who chose other SDGs or expressed ambiguity highlights the widespread recognition of the significance of climate action and marine conservation initiatives in advancing ocean sustainability and health.

Graph 125 In your opinion, what are the biggest challenges facing the ocean today? - Türkiye



According to the data from Türkiye, 68.8% of respondents said that "All of the above" constituted the biggest difficulty, demonstrating the broad recognition of the complex issues facing the ocean today among respondents. The interdependence of pollution, habitat loss, and climate change as major risks to ocean health is highlighted by this response. According to 18.8% of respondents, climate change is a particularly urgent concern because of the growing awareness of its far-reaching effects on marine ecosystems, including rising sea levels and ocean acidification. Pollution and habitat loss, which were both mentioned by 6.3% of respondents, are serious issues that worsen the health of ecosystems and marine biodiversity. Overall, the information highlights the critical need for extensive and well-coordinated efforts to address these interrelated issues and protect the health and sustainability of the ocean.

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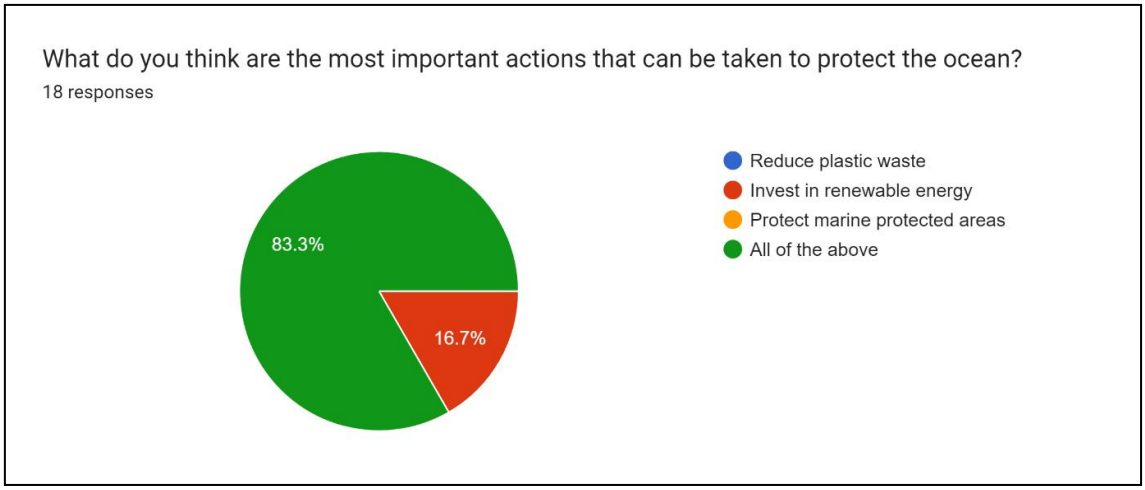
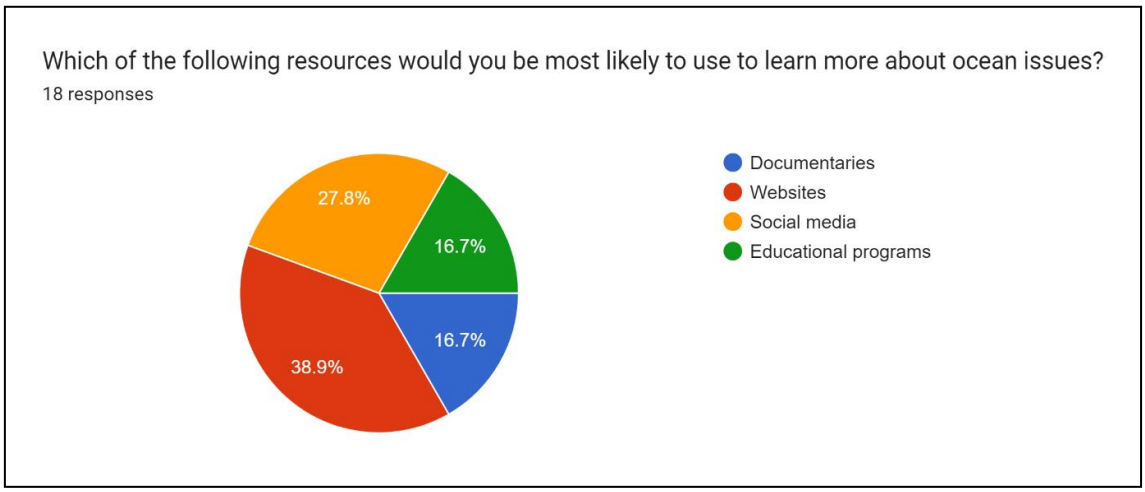
Graph 126 What do you think are the most important actions that can be taken to protect the ocean? - Türkiye



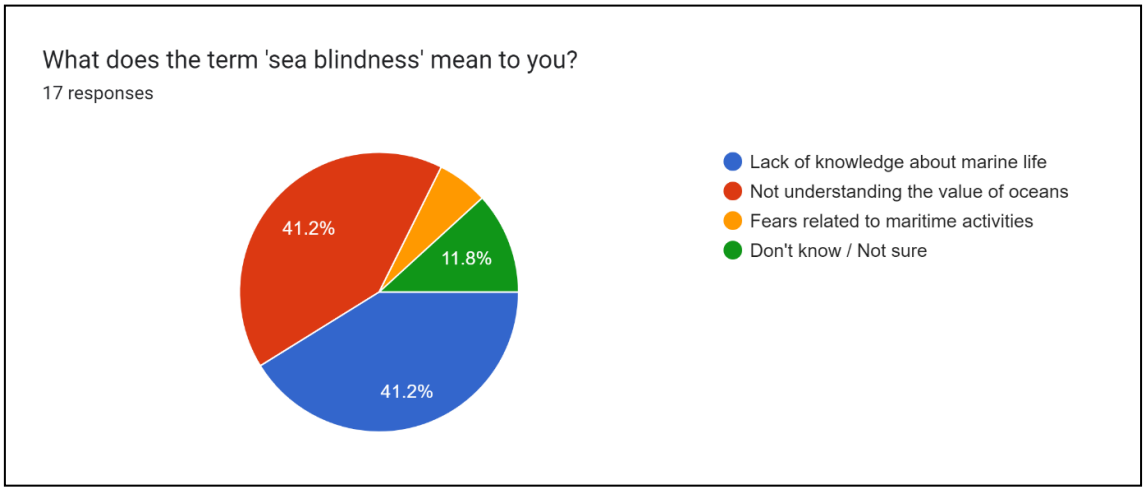
The majority of Turkish respondents, or 83.3%, chose "All of the above" as the most crucial course of action for protecting the ocean, endorsing a comprehensive approach to ocean conservation. This all-encompassing viewpoint highlights how different conservation initiatives—like cutting back on plastic trash, funding renewable energy, and safeguarding marine protected areas—are interrelated. The lack of answers that only address particular measures, like cutting back on plastic trash or safeguarding marine protected areas, points to an understanding of how complicated and multidimensional the problems facing ocean conservation are. It suggests that in order to make a significant and long-lasting difference, respondents believe that comprehensive methods that target several facets of ocean health at once are necessary. This emphasizes how crucial it is to have integrated strategies and teamwork involving multiple stakeholders in order to successfully safeguard the ocean's health and sustainability.

Graph 127 Which of the following resources would you be most likely to use to learn more about ocean issues? - Türkiye



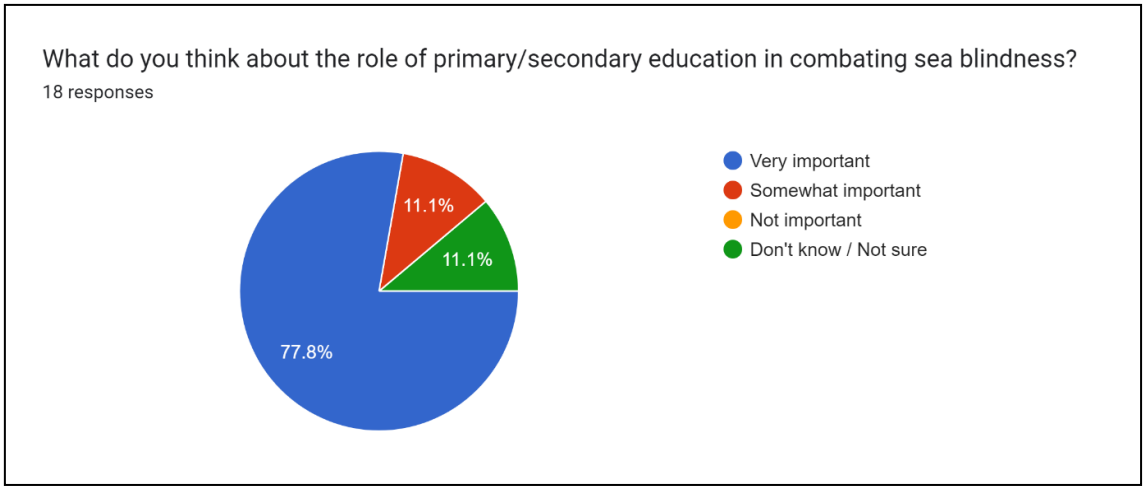
The resources that Turkish respondents prefer to use to learn about ocean-related issues vary; 38.9% of them cited websites as their main information source. This implies that obtaining thorough and current knowledge about subjects relating to the ocean will need using online resources. The use of social media, which was selected by 27.8% of respondents, is important for spreading knowledge and increasing awareness of ocean-related concerns. The selection rate of educational and documentary programs is lower, at 16.7% each, suggesting a preference for digital and interactive media over more conventional forms. The significance of utilizing digital platforms and online tools to effectively engage and educate the public about ocean conservation activities is highlighted by this distribution. Additionally, it emphasizes the necessity of easily navigable and user-friendly online platforms that offer precise and captivating content to foster greater awareness and understanding of ocean-related issues among diverse audiences.

Graph 128 What does the term 'sea blindness' mean to you? - Türkiye



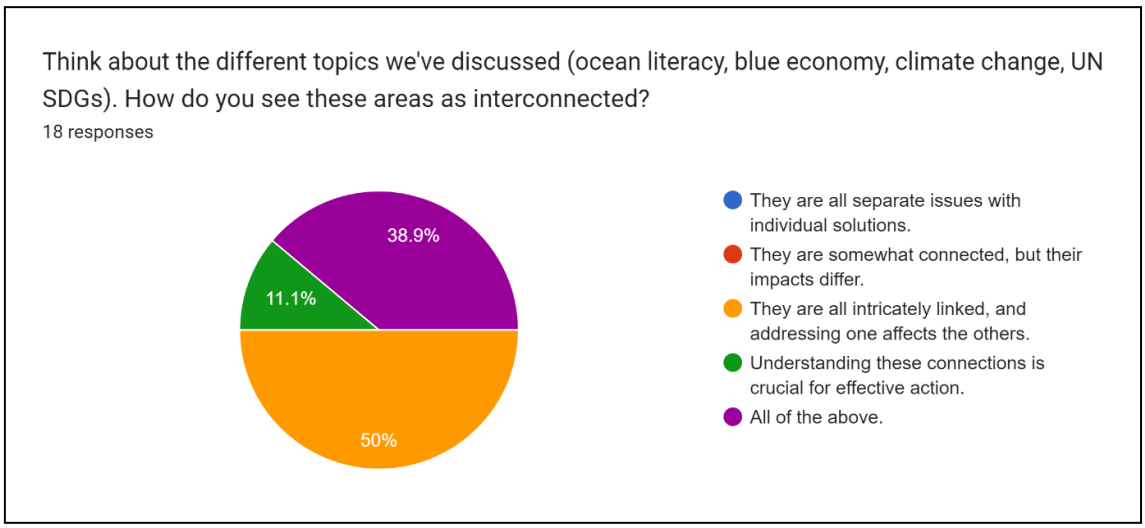
The phrase "sea blindness" seems to have a great resonance with respondents in Türkiye; 41.2% of them said it meant not appreciating the importance of the seas, while the remaining 41.2% said it meant not knowing anything about marine life. This shows that the public's knowledge and comprehension of the significance of oceans and their ecosystems are seriously lacking. Furthermore, 11.8% of respondents acknowledged that they were unsure of the term's definition, suggesting that more education and awareness initiatives may be necessary to close this knowledge gap. Merely 5.9% of respondents linked sea blindness to fears related to maritime activities. It may be essential to address this sea blindness by educational programs and awareness efforts to foster greater appreciation and stewardship of marine environments among the public in Türkiye.

Graph 129 What do you think about the role of primary/secondary education in combating sea blindness? - Türkiye



The resounding answer from participants in Türkiye—77.8% of them said that primary and secondary education is crucial to preventing sea blindness—highlights the critical role that educational institutions play in promoting awareness of ocean sustainability and conservation. This feeling emphasizes an awareness of how schools can impart information, attitudes, and practices that foster a greater comprehension and appreciation of marine environments. The 11.1% of respondents who expressed doubt might indicate that more information or clarity is required about the precise function that education can play in treating sea blindness. However, there is broad agreement regarding the significance of primary and secondary education, indicating that schools play a crucial role in preventing sea blindness and fostering a more educated Turkish community.

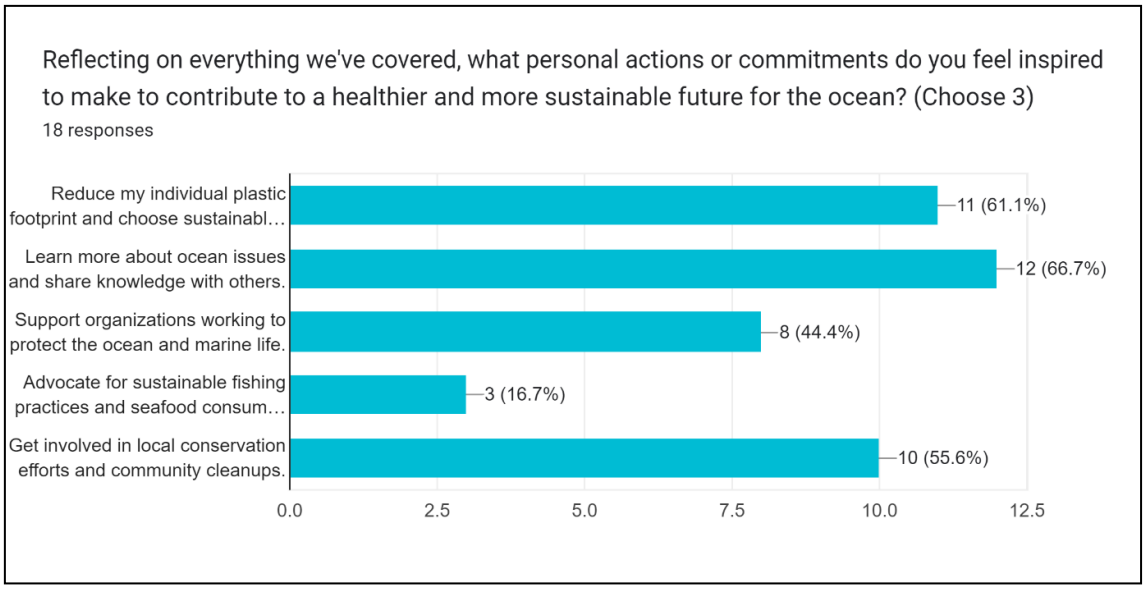
Graph 130 Think about the different topics we've discussed (ocean literacy, blue economy, climate change, UN SDGs). How do you see these areas as interconnected? - Türkiye



The data revealing that half of the respondents perceive the UN SDGs, ocean literacy, climate change, and the blue economy as closely intertwined points to a

comprehensive comprehension of the relationships within these domains. This viewpoint emphasizes the necessity for integrated and coordinated approaches to ocean conservation and sustainable development by acknowledging that solving problems in one area can have repercussions in other areas. In order to establish comprehensive solutions, it is important to recognize the intricate linkages among these challenges, as illustrated by the 11.1 percent of respondents who emphasized the importance of knowing these links for effective action. Furthermore, the 38.9% who chose "All of the above" recognize the complexity of the issues confronting the ocean and the interdependence of the initiatives being taken to address them, indicating a thorough and systemic approach to ocean sustainability.

Graph 131 Reflecting on everything we've covered, what personal actions or commitments do you feel inspired to make to contribute to a healthier and more sustainable future for the ocean? (Choose 3) - Türkiye



The answers show a clear preference for taking individual steps to lessen plastic pollution and support ocean conservation. There is a strong understanding of the negative effects of plastic pollution on ocean health and a readiness to solve this issue on an individual basis, as seen by the 61.1% of participants who prioritized reducing their personal plastic footprint and adopting sustainable alternatives. Comparably, 66.7% of respondents said they were committed to learning more about ocean-related issues and imparting their knowledge to others, which shows that they are taking the initiative to promote awareness and group action for ocean conservation. Furthermore, the 55.6% of respondents who said they would like to participate in neighbourhood cleanups and conservation projects show that they are willing to actively support the preservation of marine ecosystems and the development of a better maritime environment in Türkiye.

The data from Türkiye indicates that individuals have a considerable awareness of and concern for concerns relating to the ocean. There is broad recognition of the problems facing the oceans, with the majority of people acknowledging the effects of pollution, habitat loss, and climate change on ocean ecosystems. This emphasizes the

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significance of programs like Blue Schools, which are designed to promote ocean literacy. Because they incorporate environmental and climate change education into a wide range of subjects, Blue Schools are essential in helping students become more aware of these issues. The beneficial effect Blue Schools have on raising environmental consciousness in local communities highlights how crucial it is for them to promote a sustainable and conservation-minded culture. Furthermore, the data proves that Türkiye can benefit greatly from the blue economy concept. Coastal communities can reap economic benefits and preserve marine ecosystems simultaneously by giving priority to concepts like preserving natural habitats, encouraging ethical fishing methods, and investing in renewable energy sources. In conclusion, tackling the issues affecting Türkiye's seas depends on programs like Blue Schools and the development of the blue economy. They provide economic opportunities for coastal areas in addition to increasing awareness and encouraging environmental care, which eventually leads to a more sustainable future for the nation.

3. Methodological Framework

3.1. Definition of the Research Approach

The methodology for this report adopts a mixed-methods approach, integrating both quantitative and qualitative research techniques to provide a comprehensive analysis of the subject matter.

Quantitative Research Component:

This component involves the distribution of structured questionnaires, designed to collect measurable data from a significant sample size. The objective is to ensure statistical validity and generalizability of the results. The questionnaire items are crafted to elicit quantifiable responses, enabling a statistical analysis that underpins the findings. This method is essential for measuring the prevalence of specific phenomena or trends within the target population.

Qualitative Research Component:

In parallel to the quantitative data collection, a qualitative analysis is conducted. This includes a comprehensive literature review. The literature review establishes a theoretical framework for the study, identifying existing knowledge gaps that the research aims to address. It also aids in guiding the thematic analysis of qualitative data.

By employing a mixed-methods approach, the methodology enables a holistic analysis of the research topic. It allows for the quantification of trends and patterns while exploring the reasons and contexts behind these trends. This approach enhances the validity and reliability of the research findings, providing a well-rounded understanding of the research topic.

This methodology is selected for its ability to address the research objectives comprehensively, balancing the statistical strengths of quantitative methods with the

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detailed exploration offered by qualitative analysis. It is deemed the most suitable approach for this study, ensuring robust and insightful findings.

4. Site Selection and Contextual Overview

4.1. Austria

4.1.1. Region Selection Criteria and Process

The primary objective of this research is to assess the level of ocean literacy, explore the implementation of Blue School initiatives, and analyze regional responses to sea blindness, blue economy, and climate change in Austria, specifically at the primary and secondary school levels. The research will focus on the NUTS1 regions to provide a nuanced understanding of regional dynamics.[42] To achieve geographical representation, all NUTS1 regions of Austria have been included to capture diverse geographical and cultural contexts.

To achieve geographical representation, all NUTS1 regions have been included, ensuring a diverse geographical and cultural context for primary and secondary school students. Priority has been given to regions actively participating in Blue School initiatives and showcasing a strong integration of marine and environmental education in primary and secondary school curricula.

Regions have been selected to ensure a representative and diverse sample are formulated. This involves considering geographical, educational, economic, and climate-related factors, intending to create a comprehensive selection process that captures the multifaceted aspects of each NUTS1 region.

NUTS1 regions provide a level of geographical aggregation that allows for a comprehensive yet manageable scope of analysis. They represent larger entities compared to NUTS2 or NUTS3, enabling a macro-level understanding of regional dynamics. In addition, climate change impacts often manifest at a broader regional level. Analysing NUTS1 regions allows for a more holistic understanding of how climate change affects different aspects of life, including education, economic activities, and environmental awareness.

The region selection process involves initial desk research to gather information on Blue School initiatives, ocean literacy programs, blue economy activities, and regional climate change strategies specifically tailored for primary and secondary school education.

[42] the NUTS (Nomenclature des Unités Territoriales Statistiques) is classification system of the European Union with the purpose of assigning commensurable, comparable territorial units from area and population size point of view, in order to collect and produce uniform regional statistics.

Stakeholder consultation with key representatives, including primary and secondary school educators, administrators, and local education authorities, has been conducted to comprehend regional initiatives and challenges at these educational levels.

Quantitative data analysis, utilizing statistical data on educational indicators, economic activities, and climate parameters, has been employed to assess the relevance and impact of each region on primary and secondary school education.

4.1.2. Characteristics of the Region

Austria, officially the Republic of Austria, is a landlocked country in East Central Europe which borders the Czech Republic, Germany, Hungary, Italy, Liechtenstein, Slovakia, Slovenia, and Switzerland.

As a federal republic, Austria is divided into nine states, with the city-state of Vienna serving as the capital and the country's largest city. The country covers an area of 83,871 km². Austria has a population of nearly 8.9 million people, capital and largest city is Vienna, with a population of 1.9 million people.

The landscapes of Austria are dominated by the Eastern Alps, the Danube valley and river and the Bohemian Forest. Covering two-thirds of the country, the Alps are made of various peaks, the highest ranges being the Hohe Tauern, the Zillertal Alps and the Otztal Alps with peaks reaching more than 3,350 m (11,000 ft). The highest mountain in Austria is Grossglockner at 3,797 m (12,457 ft).

The Danube Valley is the most densely populated area in Austria as the land here is very fertile. The Danube River, the second-largest river on the European continent and the largest in the European Union, runs through parts of Austria, including the capital, Vienna. Finally, the Bohemian Forest in northern Austria covers 10% of the country. It consists of heavily forested mountains creating a natural border between the Czech Republic, Germany and Austria.

In terms of NUTS regions, Austria is divided into three hierarchical levels: NUTS1, NUTS2, and NUTS3. Austria is divided into 3 groups of states (Gruppen von Bundesländern) (NUTS 1), 9 States (Bundesländer) (NUTS2) and 35 groups of districts (Gruppen von Politischen Bezirken) counties (see Table 1).

Table 6 NUTS Regions of Austria

NUTS 1	Code	NUTS 2	**Code**	NUTS 3	Code
Eastern Austria (Ostösterreich)	**AT1**	Burgenland	AT11	Mittelburgenland	AT111
				Nordburgenland	AT112
				Südburgenland	AT113
		Lower Austria	AT12	Mostviertel-Eisenwurzen	AT121
				Niederösterreich-Süd	AT122

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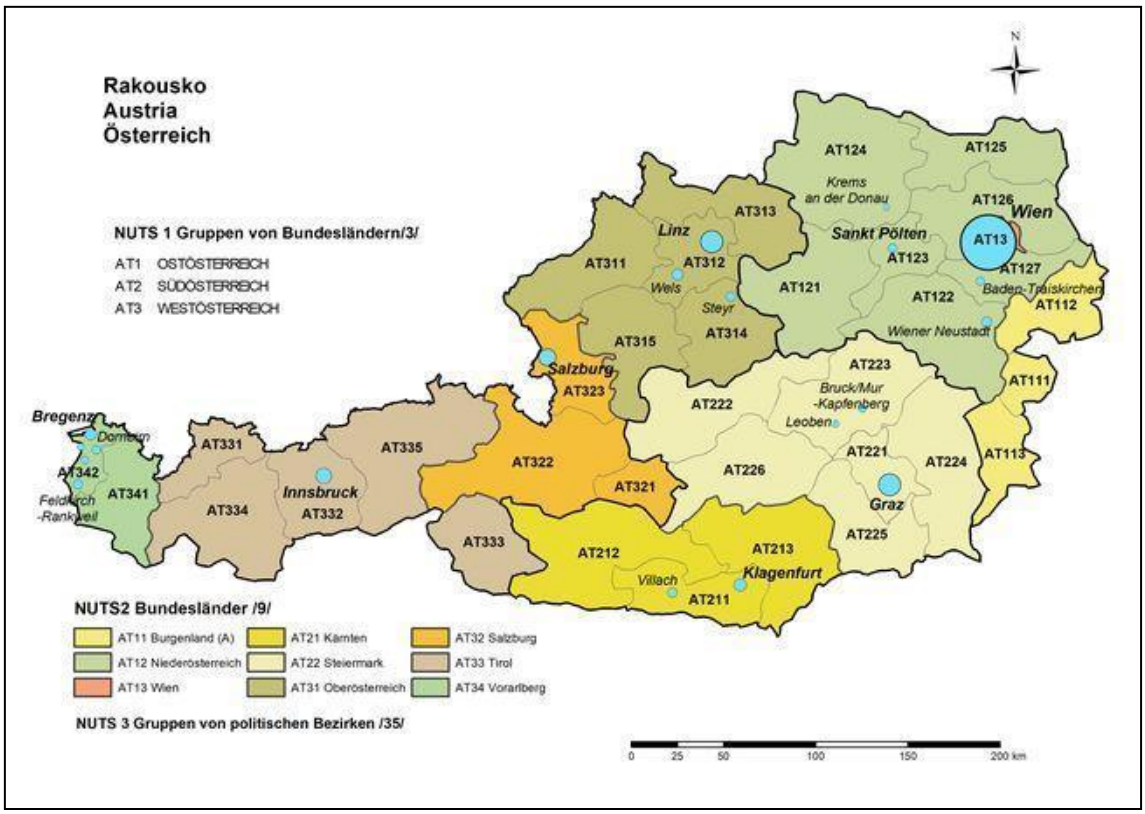
				Sankt Pölten	AT123
				Waldviertel	AT124
				Weinviertel	AT125
				Wiener Umland/Nordteil	AT126
				Wiener Umland/Südteil	AT127
		Vienna	AT13	Wien	AT130
Southern Austria (Südösterreich)	**AT2**	Carinthia	AT21	Klagenfurt-Villach	AT211
				Oberkärnten	AT212
				Unterkärnten	AT213
		Styria	AT22	Graz	AT221
				Liezen	AT222
				Östliche Obersteiermark	AT223
				Oststeiermark	AT224
				West- und Südsteiermark	AT225
				Westliche Obersteiermark	AT226
Western Austria (Westösterreich)	**AT3**	Upper Austria	AT31	Innviertel	AT311
				Linz-Wels	AT312
				Mühlviertel	AT313
				Steyr-Kirchdorf	AT314
				Traunviertel	AT315
		Salzburg	AT32	Lungau	AT321
				Pinzgau-Pongau	AT322
				Salzburg und Umgebung	AT323
		Tyrol	AT33	Außerfern	AT331
				Innsbruck	AT332
				Osttirol	AT333
				Tyrolean Oberland	AT334
				Tyrolean Unterland	AT335

		Vorarlberg	AT34	Bludenz-Bregenzerwald	AT341
				Rheintal-Bodenseegebiet	AT342

Source 25 Eurostat https://ec.europa.eu/eurostat/web/metadata/classifications

Map 4 NUTS Regions of Austria



Source 26 https://www.czso.cz/csu/czso/austria-nuts

Eastern Austria (Ostösterreich)

Eastern Austria, also known as Ostösterreich, is a captivating NUTS1 region that encompasses Vienna, Lower Austria, and Burgenland. This NUTS1 region plays a crucial role in Austria's overall development, with its unique environmental characteristics, robust economic activities, and a well-established educational infrastructure.

Vienna and most parts of Eastern Austria form part of the Centrope region, which spans a tri-state-area which overlaps Austria, Slovakia and the Czech Republic. Centrope covers an area of approximately 54.500 square kilometers and is home to around 7 million residents. The region includes the two capitals, Vienna (1.89 million residents) and Bratislava (0.43 million residents), as well as the second-largest city in the Czech Republic, Brno (0.37 million residents), which serves as a center for administration, economy, culture, and education. Today, Centrope, especially with its urban regions, is one of the economically and demographically most dynamic regions in Europe. Through the River Danube and its feedings rivers (Thaya), the Centrope area also shares the same aquatic ecosystem.

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Environmental Features

The diverse water resources in Eastern Austria, which include rivers, lakes, and aquifers, are integral to sustaining the region's environment, economy, and population. The Danube River traverses through the heart of the region, serving as a major watercourse with significant implications for both urban and rural areas. The Danube River also serves as a vital waterway. The river supports a diverse ecosystem and is crucial for the region's agriculture and transportation. Other notable rivers in Eastern Austria include the Thaya, Leitha, and March, contributing to the region's hydrological richness.

Lakes are also a distinctive feature, with Neusiedler See being the largest lake in the region. These water bodies contribute to the overall ecological balance and biodiversity. The Neusiedler See-Seewinkel National Park, located in Burgenland, is a UNESCO World Heritage site. The park's steppe lake, Neusiedler See, is a vital habitat for numerous bird species, including herons and avocets.

The lake also plays a vital role in regulating the local climate, making it a central component of the region's environmental stability.

On the other hand, Eastern Austria faces environmental challenges. Urbanization and industrialization, particularly in Vienna, pose threats to the region's natural balance. Addressing these challenges requires a proactive approach, and Eastern Austria has implemented various conservation initiatives to protect its environment. Sustainable development practices, such as green urban planning and eco-friendly infrastructure projects, are being adopted to mitigate the impact of human activities. In this context, the Austrian Strategy for Adaptation to Climate Change has been adopted by the government to avoid the adverse effects of climate change on the environment and society.

Economic and Social Structure

Eastern Austria is a powerhouse in the country's economic landscape, contributing significantly to Austria's overall prosperity. The region encompasses Vienna as the capital city and together with Lower Austria and Burgenland, it forms a thriving economic hub. Vienna serves not only as the political center but also as a crucial economic engine for the entire region.

In the region, GDP per capita is 34.900EURin Burgenland, 41.900EUR in Lower Austria and 56,600EUR in Vienna.

The service sector plays a dominant role in Eastern Austria's economy, particularly in Vienna. The city hosts numerous international organizations, financial institutions, and a vibrant cultural scene, fostering economic growth. Additionally, tourism plays a pivotal role, with Vienna attracting visitors from around the world, contributing substantially to the region's revenue.

The industrial sector in Eastern Austria is diverse and technologically advanced. Vienna, in particular, is home to a range of industries, including machine engineering,

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information technology, biotechnology, and pharmaceuticals. The city's strategic location at the crossroads of Eastern and Western Europe has facilitated a robust transportation and logistics sector.

Lower Austria boasts a strong industrial presence, especially in manufacturing and technology. The region's commitment to innovation has led to the establishment of research and development centers, fostering a culture of technological advancement.

Eastern Austria exhibits a varied agricultural landscape, with both traditional and modern farming practices. Lower Austria's fertile plains support the cultivation of crops such as cereals, fruits, and vegetables. Burgenland, known for its vineyards and wine production, contributes significantly to Austria's wine industry.

The socio-economic demographics of Eastern Austria reflect a diverse and well-educated population. Vienna with a 1,9 million population, being a melting pot of cultures, hosts a cosmopolitan society with a high standard of living. The city's educational institutions and research centers attract professionals and students from around the world. Total population of the region is 3,9 million.

Lower Austria, with its mix of urban and rural areas, presents a diverse demographic profile. The region values a balanced lifestyle, with a focus on both economic development and environmental sustainability. Burgenland, known for its picturesque landscapes, has a strong community spirit, contributing to a unique socio-economic fabric.

With a robust economy, diverse industrial activities, fertile agricultural lands, and a varied demographic profile, Eastern Austria stands as a key driver of Austria's overall prosperity.

Education Infrastructure and Resources:

Eastern Austria boasts a diverse array of educational institutions catering to various academic levels and disciplines. Vienna, as the capital, is home to prestigious universities, technical colleges, and vocational schools. Among these is the University of Vienna, founded as a full-university in 1365 and being the oldest university in the German-speaking linguistic and cultural area. With approx. 95.000 students enrolled, of which one third being international, it ranks among the biggest universities in Europe. Vienna is home of more than 200.000 student population in total, which makes it the biggest university city in Europe, compared to Berlin (approx. 175.000) or Munich (approx. 110.000).

Eastern Austria places a high priority on providing access to a wide range of educational resources. Either under the responsibility of the regional government or the federal state, the region's schools support both academic and vocational curricula. Vienna, with its concentration of research institutions, offers students access to state-of-the-art science and collaborative research opportunities.

Digitalization and technology integration are key components of Eastern Austria's education strategy. Schools in the region have embraced technology to enhance

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learning experiences, and efforts are made to bridge potential urban-rural disparities in access to educational resources.

Table 7 Schools, classes and students by type of school and federal province, school year 2019 - Burgenland

Type of school[1]	Burgenland						
	Schools	Classes	Students				
			all	female	female %	male	male %
Total for all types of schools (incl. statutes)	**266**	**1 823**	**34 520**	**16 626**	***48.2***	**17 894**	***51.8***
All mainstream schools	**258**	**1 786**	**33 837**	**16 194**	***47.9***	**17 643**	***52.1***
General schools (incl. statutes)	**239**	**1 341**	**24 246**	**11 977**	***49.4***	**12 269**	***50.6***
General schools	**233**	**1 324**	**24 010**	**11 871**	***49.4***	**12 139**	***50.6***
Compulsory schools, total	**222**	**1 049**	**17 900**	**8 519**	***47.6***	**9 381**	***52.4***
Primary schools	171	623	10 350	5 036	*48.7*	5 314	*51.3*
New secondary schools	38	365	6 829	3 254	*47.6*	3 575	*52.4*
Special (SEN) schools[2]	9	41	344	141	*41.0*	203	*59.0*
Pre-vocational schools	8	20	377	88	*23.3*	289	*76.7*
Academic secondary schools, total	**11**	**275**	**6 110**	**3 352**	***54.9***	**2 758**	***45.1***
Academic secondary schools, lower level, total	8	151	3 555	1 815	*51.1*	1 740	*48.9*
Academic secondary schools, upper level (all sub-types)	11	124	2 555	1 537	*60.2*	1 018	*39.8*
Other general schools (statutes)	6	17	236	106	*44.9*	130	*55.1*
Schools and Colleges for vocational education (incl. statutes)	**27**	**482**	**10 274**	**4 649**	***45.3***	**5 625**	***54.7***
Schools and Colleges for vocational education	**25**	**462**	**9 827**	**4 323**	***44.0***	**5 504**	***56.0***
Vocational schools for apprentices, total	4	115	2 187	545	*24.9*	1 642	*75.1*
Schools for intermediate & Colleges for higher voc. ed. (incl. statutes)	**23**	**367**	**8 087**	**4 104**	***50.7***	**3 983**	***49.3***
Crafts, technical and arts schools and colleges	6	124	2 804	580	*20.7*	2 224	*79.3*
Technical and crafts (in a narrower sense)	4	99	2 284	251	*11.0*	2 033	*89.0*
Schools and Colleges of clothing	1	1	40	40	*100.0*	-	.
Schools and Colleges of tourism	2	20	411	250	*60.8*	161	*39.2*
Schools and Colleges of arts and crafts	1	4	69	39	*56.5*	30	*43.5*
Schools and Colleges of business administration	8	125	2 650	1 383	*52.2*	1 267	*47.8*
Schools and Colleges of management and the service industries	6	73	1 539	1 295	*84.1*	244	*15.9*
Schools and Colleges for social professions	2	20	447	326	*72.9*	121	*27.1*
Schools and Colleges for agriculture and forestry	2	6	147	63	*42.9*	84	*57.1*
Schools and Colleges for pedagogy[3]	1	19	500	457	*91.4*	43	*8.6*
Schools and Colleges for other scopes	-	-	-	-	.	-	.
Schools for intermediate vocational education, total	**21**	**75**	**1 400**	**658**	***47.0***	**742**	***53.0***
Colleges for higher vocational education, total[4]	**16**	**272**	**6 240**	**3 120**	***50.0***	**3 120**	***50.0***
Other technical and vocational schools (statutes)	**2**	**20**	**447**	**326**	***72.9***	**121**	***27.1***
Federal sports academies[5]	-	-	-	-	.	-	.

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Table 8 Schools, classes and students by type of school and federal province, school year 2019 – Burgenland (continued):

Type of school	Burgenland						
	Schools	Classes	Students				
			all	female	*female %*	male	*male %*
Academic secondary schools, total	**11**	**275**	**6 110**	**3 352**	***54.9***	**2 758**	***45.1***
Academic secondary schools, full 8/9 year cycle	8	210	4 774	2 498	*52.3*	2 276	*47.7*
Academic secondary schools, lower level, total	8	151	3 555	1 815	*51.1*	1 740	*48.9*
Academic secondary schools, lower level	8	151	3 555	1 815	*51.1*	1 740	*48.9*
New secondary schools at Academic secondary schools	-	-	-	-	.	-	.
Academic secondary schools, upper level	7	59	1 219	683	*56.0*	536	*44.0*
Academic secondary schools, separate upper level	7	65	1 336	854	*63.9*	482	*36.1*
Academic secondary schools for people in employment	-	-	-	-	.	-	.
Add-on secondary schools	-	-	-	-	.	-	.
Vocational schools for apprentices, total	**4**	**115**	**2 187**	**545**	***24.9***	**1 642**	***75.1***
Vocational schools for apprentices	4	115	2 187	545	*24.9*	1 642	*75.1*
Vocational schools for agriculture and forestry for apprentices	-	-	-	-	.	-	.
Schools for intermediate & Colleges for higher voc. ed. (without statutes)	**21**	**347**	**7 640**	**3 778**	***49.5***	**3 862**	***50.5***
Schools for intermediate vocational education, total	**21**	**75**	**1 400**	**658**	***47.0***	**742**	***53.0***
Intermediate crafts, technical and arts schools	6	25	427	101	*23.7*	326	*76.3*
Intermediate technical and crafts schools (in a narrower sense)	3	15	258	15	*5.8*	243	*94.2*
Intermediate schools of clothing	-	-	-	-	.	-	.
Intermediate schools of tourism	2	6	100	47	*47.0*	53	*53.0*
Intermediate schools of arts and crafts	1	4	69	39	*56.5*	30	*43.5*
Intermediate schools of business administration	8	27	506	258	*51.0*	248	*49.0*
Intermediate schools of management and the service industries	6	16	293	211	*72.0*	82	*28.0*
Intermediate schools for social professions	-	-	-	-	.	-	.
Intermediate schools for agriculture and forestry	2	6	147	63	*42.9*	84	*57.1*
Intermediate schools for pedagogic assistants for early childhood	1	1	27	25	*92.6*	2	*7.4*
Colleges for higher vocational education, total	**16**	**272**	**6 240**	**3 120**	***50.0***	**3 120**	***50.0***
Higher crafts, technical and arts colleges	5	99	2 377	479	*20.2*	1 898	*79.8*
Higher technical and crafts colleges (in a narrower sense)	3	84	2 026	236	*11.6*	1 790	*88.4*
Higher colleges of clothing	1	1	40	40	*100.0*	-	.
Higher colleges of tourism	2	14	311	203	*65.3*	108	*34.7*
Higher colleges of arts and crafts	-	-	-	-	.	-	.
Higher colleges of business administration	7	98	2 144	1 125	*52.5*	1 019	*47.5*
Higher colleges of management and the service industries	5	57	1 246	1 084	*87.0*	162	*13.0*
Higher colleges of agriculture and forestry	-	-	-	-	.	-	.
Educational colleges	1	18	473	432	*91.3*	41	*8.7*
Higher colleges for early childhood pedagogy	1	15	413	382	*92.5*	31	*7.5*
Higher colleges of social pedagogy	1	3	60	50	*83.3*	10	*16.7*
Other schools (statutes), total	**8**	**37**	**683**	**432**	***63.3***	**251**	***36.7***
Other general schools (statutes)	6	17	236	106	*44.9*	130	*55.1*
Other technical and vocational schools (statutes)	2	20	447	326	*72.9*	121	*27.1*
New secondary schools (total for all types)	**38**	**365**	**6 829**	**3 254**	***47.6***	**3 575**	***52.4***
Schools and Colleges for the social and services sectors	**8**	**114**	**2 437**	**1 911**	***78.4***	**526**	***21.6***

Table 9 Schools, classes and students by type of school and federal province, school year 2019 – Lower Austria

Type of school[1]	Lower Austria						
	Schools	Classes	Students				
			all	female	*female %*	male	*male %*
Total for all types of schools (incl. statutes)	**1 216**	**10 325**	**202 038**	**96 667**	***47.8***	**105 371**	***52.2***
All mainstream schools	**1 172**	**10 185**	**199 880**	**95 443**	***47.8***	**104 437**	***52.2***
General schools (incl. statutes)	**1 085**	**7 956**	**149 763**	**73 548**	***49.1***	**76 215**	***50.9***
General schools	**1 048**	**7 846**	**148 271**	**72 839**	***49.1***	**75 432**	***50.9***
Compulsory schools, total	**991**	**6 227**	**110 795**	**52 131**	***47.1***	**58 664**	***52.9***
Primary schools	633	3 562	64 836	31 256	*48.2*	33 580	*51.8*
New secondary schools	256	2 056	39 168	18 524	*47.3*	20 644	*52.7*
Special (SEN) schools[2]	87	453	3 808	1 320	*34.7*	2 488	*65.3*
Pre-vocational schools	58	156	2 983	1 031	*34.6*	1 952	*65.4*
Academic secondary schools, total	**57**	**1 619**	**37 476**	**20 708**	***55.3***	**16 768**	***44.7***
Academic secondary schools, lower level, total	46	953	22 648	11 918	*52.6*	10 730	*47.4*
Academic secondary schools, upper level (all sub-types)	57	666	14 828	8 790	*59.3*	6 038	*40.7*
Other general schools (statutes)	37	110	1 492	709	*47.5*	783	*52.5*
Schools and Colleges for vocational education (incl. statutes)	**133**	**2 369**	**52 275**	**23 119**	***44.2***	**29 156**	***55.8***
Schools and Colleges for vocational education	**126**	**2 339**	**51 609**	**22 604**	***43.8***	**29 005**	***56.2***
Vocational schools for apprentices, total	22	835	16 674	4 970	*29.8*	11 704	*70.2*
Schools for intermediate & Colleges for higher voc. ed. (incl. statutes)	**111**	**1 534**	**35 601**	**18 149**	***51.0***	**17 452**	***49.0***
Crafts, technical and arts schools and colleges	28	559	12 570	2 794	*22.2*	9 776	*77.8*
Technical and crafts (in a narrower sense)	20	474	10 718	1 472	*13.7*	9 246	*86.3*
Schools and Colleges of clothing	3	17	351	338	*96.3*	13	*3.7*
Schools and Colleges of tourism	5	68	1 501	984	*65.6*	517	*34.4*
Schools and Colleges of arts and crafts	-	-	-	-	.	-	.
Schools and Colleges of business administration	24	347	8 246	4 569	*55.4*	3 677	*44.6*
Schools and Colleges of management and the service industries	22	299	6 835	5 431	*79.5*	1 404	*20.5*
Schools and Colleges for social professions	15	63	1 443	1 209	*83.8*	234	*16.2*
Schools and Colleges for agriculture and forestry	21	167	3 914	1 793	*45.8*	2 121	*54.2*
Schools and Colleges for pedagogy[3]	8	99	2 593	2 353	*90.7*	240	*9.3*
Schools and Colleges for other scopes	-	-	-	-	.	-	.
Schools for intermediate vocational education, total	**76**	**415**	**9 021**	**4 159**	***46.1***	**4 862**	***53.9***
Colleges for higher vocational education, total[4]	**74**	**1 089**	**25 914**	**13 475**	***52.0***	**12 439**	***48.0***
Other technical and vocational schools (statutes)	**11**	**30**	**666**	**515**	***77.3***	**151**	***22.7***
Federal sports academies[5]	**-**	**-**	**-**	**-**	.	**-**	.

Table 10 Schools, classes and students by type of school and federal province, school year 2019 – Lower Austria (continued):

Type of school	Lower Austria						
	Schools	Classes	Students				
			all	female	*female %*	male	*male %*
Academic secondary schools, total	**57**	**1 619**	**37 476**	**20 708**	***55.3***	**16 768**	***44.7***
Academic secondary schools, full 8/9 year cycle	46	1 405	32 777	17 771	*54.2*	15 006	*45.8*
Academic secondary schools, lower level, total	46	953	22 648	11 918	*52.6*	10 730	*47.4*
Academic secondary schools, lower level	46	953	22 648	11 918	*52.6*	10 730	*47.4*
New secondary schools at Academic secondary schools	-	-	-	-	.	-	.
Academic secondary schools, upper level	44	452	10 129	5 853	*57.8*	4 276	*42.2*
Academic secondary schools, separate upper level	16	192	4 198	2 645	*63.0*	1 553	*37.0*
Academic secondary schools for people in employment	-	-	-	-	.	-	.
Add-on secondary schools	3	22	501	292	*58.3*	209	*41.7*
Vocational schools for apprentices, total	**22**	**835**	**16 674**	**4 970**	***29.8***	**11 704**	***70.2***
Vocational schools for apprentices	20	820	16 418	4 846	*29.5*	11 572	*70.5*
Vocational schools for agriculture and forestry for apprentices	2	15	256	124	*48.4*	132	*51.6*
Schools for intermediate & Colleges for higher voc. ed. (without statutes)	**104**	**1 504**	**34 935**	**17 634**	***50.5***	**17 301**	***49.5***
Schools for intermediate vocational education, total	**76**	**415**	**9 021**	**4 159**	***46.1***	**4 862**	***53.9***
Intermediate crafts, technical and arts schools	19	123	2 473	378	*15.3*	2 095	*84.7*
Intermediate technical and crafts schools (in a narrower sense)	15	110	2 215	215	*9.7*	2 000	*90.3*
Intermediate schools of clothing	1	3	48	46	*95.8*	2	*4.2*
Intermediate schools of tourism	3	10	210	117	*55.7*	93	*44.3*
Intermediate schools of arts and crafts	-	-	-	-	.	-	.
Intermediate schools of business administration	20	78	1 874	924	*49.3*	950	*50.7*
Intermediate schools of management and the service industries	13	49	1 008	728	*72.2*	280	*27.8*
Intermediate schools for social professions	8	36	831	720	*86.6*	111	*13.4*
Intermediate schools for agriculture and forestry	18	129	2 835	1 409	*49.7*	1 426	*50.3*
Intermediate schools for pedagogic assistants for early childhood	-	-	-	-	.	-	.
Colleges for higher vocational education, total	**74**	**1 089**	**25 914**	**13 475**	***52.0***	**12 439**	***48.0***
Higher crafts, technical and arts colleges	21	433	10 043	2 390	*23.8*	7 653	*76.2*
Higher technical and crafts colleges (in a narrower sense)	13	364	8 503	1 257	*14.8*	7 246	*85.2*
Higher colleges of clothing	3	14	303	292	*96.4*	11	*3.6*
Higher colleges of tourism	5	55	1 237	841	*68.0*	396	*32.0*
Higher colleges of arts and crafts	-	-	-	-	.	-	.
Higher colleges of business administration	22	269	6 372	3 645	*57.2*	2 727	*42.8*
Higher colleges of management and the service industries	22	250	5 827	4 703	*80.7*	1 124	*19.3*
Higher colleges of agriculture and forestry	3	38	1 079	384	*35.6*	695	*64.4*
Educational colleges	8	99	2 593	2 353	*90.7*	240	*9.3*
Higher colleges for early childhood pedagogy	7	66	1 667	1 575	*94.5*	92	*5.5*
Higher colleges of social pedagogy	3	33	926	778	*84.0*	148	*16.0*
Other schools (statutes), total	**48**	**140**	**2 158**	**1 224**	***56.7***	**934**	***43.3***
Other general schools (statutes)	37	110	1 492	709	*47.5*	783	*52.5*
Other technical and vocational schools (statutes)	11	30	666	515	*77.3*	151	*22.7*
New secondary schools (total for all types)	**256**	**2 056**	**39 168**	**18 524**	***47.3***	**20 644**	***52.7***
Schools and Colleges for the social and services sectors	**38**	**447**	**10 130**	**7 962**	***78.6***	**2 168**	***21.4***

Table 11 Schools, classes and students by type of school and federal province, school year 2019 – Vienna

Type of school[1]	Vienna						
	Schools	Classes	Students				
			all	female	*female %*	male	*male %*
Total for all types of schools (incl. statutes)	**669**	**11 185**	**238 633**	**115 619**	***48.5***	**123 014**	***51.5***
All mainstream schools	**621**	**10 756**	**231 482**	**111 878**	***48.3***	**119 604**	***51.7***
General schools (incl. statutes)	**572**	**8 288**	**179 143**	**88 177**	***49.2***	**90 966**	***50.8***
General schools	**537**	**7 949**	**173 920**	**85 648**	***49.2***	**88 272**	***50.8***
Compulsory schools, total	**441**	**5 360**	**111 324**	**52 168**	***46.9***	**59 156**	***53.1***
Primary schools	284	3 333	72 926	35 050	*48.1*	37 876	*51.9*
New secondary schools	131	1 454	32 270	14 787	*45.8*	17 483	*54.2*
Special (SEN) schools[2]	44	458	3 482	1 210	*34.8*	2 272	*65.2*
Pre-vocational schools	13	115	2 646	1 121	*42.4*	1 525	*57.6*
Academic secondary schools, total	**96**	**2 589**	**62 596**	**33 480**	***53.5***	**29 116**	***46.5***
Academic secondary schools, lower level, total	88	1 439	35 941	18 489	*51.4*	17 452	*48.6*
Academic secondary schools, upper level (all sub-types)	95	1 150	26 655	14 991	*56.2*	11 664	*43.8*
Other general schools (statutes)	35	339	5 223	2 529	*48.4*	2 694	*51.6*
Schools and Colleges for vocational education (incl. statutes)	**96**	**2 844**	**58 349**	**27 031**	***46.3***	**31 318**	***53.7***
Schools and Colleges for vocational education	**83**	**2 754**	**56 421**	**25 819**	***45.8***	**30 602**	***54.2***
Vocational schools for apprentices, total	25	1 238	20 140	7 648	*38.0*	12 492	*62.0*
Schools for intermediate & Colleges for higher voc. ed. (incl. statutes)	**71**	**1 606**	**38 209**	**19 383**	***50.7***	**18 826**	***49.3***
Crafts, technical and arts schools and colleges	28	758	18 237	5 760	*31.6*	12 477	*68.4*
Technical and crafts (in a narrower sense)	19	579	14 032	2 695	*19.2*	11 337	*80.8*
Schools and Colleges of clothing	4	52	1 090	1 002	*91.9*	88	*8.1*
Schools and Colleges of tourism	5	91	2 198	1 364	*62.1*	834	*37.9*
Schools and Colleges of arts and crafts	4	36	917	699	*76.2*	218	*23.8*
Schools and Colleges of business administration	17	445	10 739	6 527	*60.8*	4 212	*39.2*
Schools and Colleges of management and the service industries	14	185	3 996	2 883	*72.1*	1 113	*27.9*
Schools and Colleges for social professions	8	58	1 378	908	*65.9*	470	*34.1*
Schools and Colleges for agriculture and forestry	1	10	158	81	*51.3*	77	*48.7*
Schools and Colleges for pedagogy[3]	10	144	3 575	3 114	*87.1*	461	*12.9*
Schools and Colleges for other scopes	2	6	126	110	*87.3*	16	*12.7*
Schools for intermediate vocational education, total	**47**	**331**	**7 901**	**3 572**	***45.2***	**4 329**	***54.8***
Colleges for higher vocational education, total[4]	**49**	**1 185**	**28 380**	**14 599**	***51.4***	**13 781**	***48.6***
Other technical and vocational schools (statutes)	**17**	**90**	**1 928**	**1 212**	***62.9***	**716**	***37.1***
Federal sports academies[5]	**1**	**53**	**1 141**	**411**	***36.0***	**730**	***64.0***

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Table 12 Schools, classes and students by type of school and federal province, school year 2019 – Vienna (continued)

Type of school	Vienna						
	Schools	Classes	Students				
			all	female	*female %*	male	*male %*
Academic secondary schools, total	**96**	**2 589**	**62 596**	**33 480**	***53.5***	**29 116**	***46.5***
Academic secondary schools, full 8/9 year cycle	88	2 319	55 846	29 553	*52.9*	26 293	*47.1*
Academic secondary schools, lower level, total	88	1 439	35 941	18 489	*51.4*	17 452	*48.6*
Academic secondary schools, lower level	79	1 296	32 521	16 785	*51.6*	15 736	*48.4*
New secondary schools at Academic secondary schools	9	143	3 420	1 704	*49.8*	1 716	*50.2*
Academic secondary schools, upper level	84	880	19 905	11 064	*55.6*	8 841	*44.4*
Academic secondary schools, separate upper level	21	215	4 662	2 727	*58.5*	1 935	*41.5*
Academic secondary schools for people in employment	1	55	2 088	1 200	*57.5*	888	*42.5*
Add-on secondary schools	-	-	-	-	.	-	.
Vocational schools for apprentices, total	**25**	**1 238**	**20 140**	**7 648**	***38.0***	**12 492**	***62.0***
Vocational schools for apprentices	25	1 238	20 140	7 648	*38.0*	12 492	*62.0*
Vocational schools for agriculture and forestry for apprentices	-	-	-	-	.	-	.
Schools for intermediate & Colleges for higher voc. ed. (without statutes)	**58**	**1 516**	**36 281**	**18 171**	***50.1***	**18 110**	***49.9***
Schools for intermediate vocational education, total	**47**	**331**	**7 901**	**3 572**	***45.2***	**4 329**	***54.8***
Intermediate crafts, technical and arts schools	22	139	3 224	722	*22.4*	2 502	*77.6*
Intermediate technical and crafts schools (in a narrower sense)	17	112	2 597	277	*10.7*	2 320	*89.3*
Intermediate schools of clothing	3	13	299	274	*91.6*	25	*8.4*
Intermediate schools of tourism	3	13	300	156	*52.0*	144	*48.0*
Intermediate schools of arts and crafts	1	1	28	15	*53.6*	13	*46.4*
Intermediate schools of business administration	16	122	3 018	1 680	*55.7*	1 338	*44.3*
Intermediate schools of management and the service industries	9	53	1 178	763	*64.8*	415	*35.2*
Intermediate schools for social professions	2	12	354	291	*82.2*	63	*17.8*
Intermediate schools for agriculture and forestry	-	-	-	-	.	-	.
Intermediate schools for pedagogic assistants for early childhood	3	5	127	116	***91.3***	11	***8.7***
Colleges for higher vocational education, total	**49**	**1 185**	**28 380**	**14 599**	***51.4***	**13 781**	***48.6***
Higher crafts, technical and arts colleges	18	598	14 546	4 776	*32.8*	9 770	*67.2*
Higher technical and crafts colleges (in a narrower sense)	10	459	11 317	2 345	*20.7*	8 972	*79.3*
Higher colleges of clothing	3	39	791	728	*92.0*	63	*8.0*
Higher colleges of tourism	5	70	1 654	1 098	*66.4*	556	*33.6*
Higher colleges of arts and crafts	3	30	784	605	*77.2*	179	*22.8*
Higher colleges of business administration	14	318	7 647	4 825	*63.1*	2 822	*36.9*
Higher colleges of management and the service industries	11	129	2 789	2 091	*75.0*	698	*25.0*
Higher colleges of agriculture and forestry	1	10	158	81	*51.3*	77	*48.7*
Educational colleges	10	130	3 240	2 826	*87.2*	414	*12.8*
Higher colleges for early childhood pedagogy	7	107	2 742	2 457	*89.6*	285	*10.4*
Higher colleges of social pedagogy	3	23	498	369	*74.1*	129	*25.9*
Other schools (statutes), total	**52**	**429**	**7 151**	**3 741**	***52.3***	**3 410**	***47.7***
Other general schools (statutes)	35	339	5 223	2 529	*48.4*	2 694	*51.6*
Other technical and vocational schools (statutes)	17	90	1 928	1 212	*62.9*	716	*37.1*
New secondary schools (total for all types)	**140**	**1 597**	**35 690**	**16 491**	***46.2***	**19 199**	***53.8***
Schools and Colleges for the social and services sectors	**27**	**404**	**9 067**	**6 487**	***71.5***	**2 580**	***28.5***

Southern Austria (Südösterreich)

Southern Austria, known as Südösterreich, is a captivating NUTS1 region that encompasses the provinces of Styria and Carinthia.

Environmental Features

The region is characterized by a variety of landscapes, including alpine meadows, dense forests, and pristine lakes. The Nockberge National Park in Carinthia is a prime example, offering a sanctuary for rare plant species and wildlife. The diverse ecosystems within Southern Austria contribute to the region's overall environmental health and biodiversity.

The region has abundant water resources, enhancing its environmental diversity and richness. The Carinthian Lakes, including Wörthersee and Ossiacher See, are stunning bodies of water which both serve an ecological and economical, as for example as drinking water reserves and as leisure area in tourism industry - and thereby also constituting potential conflicts of interest.

In addition to lakes, Southern Austria is home to the Drava River, which flows through Carinthia as a vital component of the region's environmental dynamics, supporting aquatic ecosystems and providing a scenic backdrop to the surrounding landscapes.

Despite Southern Austria's variety of landscapes, dense forests, and lakes, the region faces environmental challenges, including those arising from tourism and agriculture. To address these challenges, local administrations have implemented conservation initiatives focused on sustainable tourism practices, responsible agriculture, and habitat preservation.

Economic and Social Structure

Southern Austria plays a crucial role in Austria's economic landscape, contributing to the overall prosperity of the country. Styria, known as the "Green Heart of Austria," is a hub for innovation and technology. Carinthia is currently in pole position in Europe in terms of “sustainable economic activity”.

The capital, Graz, is home to numerous research institutions and technology companies, notably in the automotive sector and for wood and paper industry, driving economic growth. Carinthia has a strong tourism sector and a growing focus on renewable energy. Styria has automotive and engineering industries, with companies specializing in manufacturing and research. Carinthia's industrial activities range from metal processing to electronics, and the region has become a center for sustainable technologies.

In the region, GDP per capita is 43.600EURin Carinthia and 44.600EURin Styria.

Total population of the region is 1,8 million. As a part of the region, Graz, as the second-largest city in Austria, serves as a cultural and economic center, attracting a diverse population. The region values a high quality of life, with a strong emphasis on environmental sustainability and work-life balance. Carinthia attracts residents and tourists seeking recreational opportunities. Burgenland, included in parts of Southern Austria, contributes to the region's demographics with a mix of agricultural communities and emerging industries.

Education Infrastructure and Resources:

Major cities such as Graz in Styria and Klagenfurt in Carinthia have universities and technical colleges. Additionally, the region places importance on vocational education, providing students with opportunities to pursue practical skills alongside academic knowledge.

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In the more rural areas, smaller towns and villages in Carinthia host primary and secondary schools, ensuring that education is accessible to students across the region. In addition, efforts are made to ensure that students in rural areas have equal access to quality education. This includes the provision of transportation services and the implementation of educational initiatives in smaller communities. Special education services are provided to ensure that every student has the opportunity to thrive in the educational system.

Table 13 Schools, classes and students by type of school and federal province, school year 2019 – Styria

Type of school[1]	Styria						
	Schools	Classes	Students				
			all	female	*female %*	male	*male %*
Total for all types of schools (incl. statutes)	**826**	**7 400**	**146 448**	**69 806**	***47.7***	**76 642**	***52.3***
All mainstream schools	**808**	**7 279**	**144 226**	**68 455**	***47.5***	**75 771**	***52.5***
General schools (incl. statutes)	**720**	**5 331**	**105 189**	**51 788**	***49.2***	**53 401**	***50.8***
General schools	**707**	**5 269**	**104 076**	**51 266**	***49.3***	**52 810**	***50.7***
Compulsory schools, total	**658**	**4 046**	**75 061**	**35 383**	***47.1***	**39 678**	***52.9***
Primary schools	449	2 440	44 476	21 319	*47.9*	23 157	*52.1*
New secondary schools	166	1 437	28 175	13 334	*47.3*	14 841	*52.7*
Special (SEN) schools[2]	19	71	547	199	*36.4*	348	*63.6*
Pre-vocational schools	38	98	1 863	531	*28.5*	1 332	*71.5*
Academic secondary schools, total	**49**	**1 223**	**29 015**	**15 883**	***54.7***	**13 132**	***45.3***
Academic secondary schools, lower level, total	36	625	15 627	8 102	*51.8*	7 525	*48.2*
Academic secondary schools, upper level (all sub-types)	49	598	13 388	7 781	*58.1*	5 607	*41.9*
Other general schools (statutes)	13	62	1 113	522	*46.9*	591	*53.1*
Schools and Colleges for vocational education (incl. statutes)	**105**	**2 041**	**40 624**	**17 807**	***43.8***	**22 817**	***56.2***
Schools and Colleges for vocational education	**100**	**1 982**	**39 515**	**16 978**	***43.0***	**22 537**	***57.0***
Vocational schools for apprentices, total	17	972	16 625	5 426	*32.6*	11 199	*67.4*
Schools for intermediate & Colleges for higher voc. ed. (incl. statutes)	**88**	**1 069**	**23 999**	**12 381**	***51.6***	**11 618**	***48.4***
Crafts, technical and arts schools and colleges	21	403	8 869	1 895	*21.4*	6 974	*78.6*
Technical and crafts (in a narrower sense)	19	361	7 944	1 162	*14.6*	6 782	*85.4*
Schools and Colleges of clothing	1	15	297	282	*94.9*	15	*5.1*
Schools and Colleges of tourism	1	14	238	145	*60.9*	93	*39.1*
Schools and Colleges of arts and crafts	1	13	390	306	*78.5*	84	*21.5*
Schools and Colleges of business administration	16	228	4 758	2 639	*55.5*	2 119	*44.5*
Schools and Colleges of management and the service industries	17	173	3 933	3 421	*87.0*	512	*13.0*
Schools and Colleges for social professions	7	58	1 226	997	*81.3*	229	*18.7*
Schools and Colleges for agriculture and forestry	25	131	3 334	1 703	*51.1*	1 631	*48.9*
Schools and Colleges for pedagogy[3]	7	76	1 879	1 726	*91.9*	153	*8.1*
Schools and Colleges for other scopes	-	-	-	-	.	-	.
Schools for intermediate vocational education, total	**60**	**253**	**5 333**	**2 552**	***47.9***	**2 781**	***52.1***
Colleges for higher vocational education, total[4]	**49**	**757**	**17 557**	**9 000**	***51.3***	**8 557**	***48.7***
Other technical and vocational schools (statutes)	**8**	**59**	**1 109**	**829**	***74.8***	**280**	***25.2***
Federal sports academies[5]	**1**	**28**	**635**	**211**	***33.2***	**424**	***66.8***

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Table 14 Schools, classes and students by type of school and federal province, school year 2019 – Styria (continued)

Type of school[1]	Styria						
	Schools	Classes	Students				
			all	female	*female %*	male	*male %*
Total for all types of schools (incl. statutes)	**826**	**7 400**	**146 448**	**69 806**	***47.7***	**76 642**	***52.3***
All mainstream schools	**808**	**7 279**	**144 226**	**68 455**	***47.5***	**75 771**	***52.5***
General schools (incl. statutes)	**720**	**5 331**	**105 189**	**51 788**	***49.2***	**53 401**	***50.8***
General schools	**707**	**5 269**	**104 076**	**51 266**	***49.3***	**52 810**	***50.7***
Compulsory schools, total	**658**	**4 046**	**75 061**	**35 383**	***47.1***	**39 678**	***52.9***
Primary schools	449	2 440	44 476	21 319	*47.9*	23 157	*52.1*
New secondary schools	166	1 437	28 175	13 334	*47.3*	14 841	*52.7*
Special (SEN) schools[2]	19	71	547	199	*36.4*	348	*63.6*
Pre-vocational schools	38	98	1 863	531	*28.5*	1 332	*71.5*
Academic secondary schools, total	**49**	**1 223**	**29 015**	**15 883**	***54.7***	**13 132**	***45.3***
Academic secondary schools, lower level, total	36	625	15 627	8 102	*51.8*	7 525	*48.2*
Academic secondary schools, upper level (all sub-types)	49	598	13 388	7 781	*58.1*	5 607	*41.9*
Other general schools (statutes)	13	62	1 113	522	*46.9*	591	*53.1*
Schools and Colleges for vocational education (incl. statutes)	**105**	**2 041**	**40 624**	**17 807**	***43.8***	**22 817**	***56.2***
Schools and Colleges for vocational education	**100**	**1 982**	**39 515**	**16 978**	***43.0***	**22 537**	***57.0***
Vocational schools for apprentices, total	17	972	16 625	5 426	*32.6*	11 199	*67.4*
Schools for intermediate & Colleges for higher voc. ed. (incl. statutes)	**88**	**1 069**	**23 999**	**12 381**	***51.6***	**11 618**	***48.4***
Crafts, technical and arts schools and colleges	21	403	8 869	1 895	*21.4*	6 974	*78.6*
Technical and crafts (in a narrower sense)	19	361	7 944	1 162	*14.6*	6 782	*85.4*
Schools and Colleges of clothing	1	15	297	282	*94.9*	15	*5.1*
Schools and Colleges of tourism	1	14	238	145	*60.9*	93	*39.1*
Schools and Colleges of arts and crafts	1	13	390	306	*78.5*	84	*21.5*
Schools and Colleges of business administration	16	228	4 758	2 639	*55.5*	2 119	*44.5*
Schools and Colleges of management and the service industries	17	173	3 933	3 421	*87.0*	512	*13.0*
Schools and Colleges for social professions	7	58	1 226	997	*81.3*	229	*18.7*
Schools and Colleges for agriculture and forestry	25	131	3 334	1 703	*51.1*	1 631	*48.9*
Schools and Colleges for pedagogy[3]	7	76	1 879	1 726	*91.9*	153	*8.1*
Schools and Colleges for other scopes	-	-	-	-	.	-	.
Schools for intermediate vocational education, total	**60**	**253**	**5 333**	**2 552**	***47.9***	**2 781**	***52.1***
Colleges for higher vocational education, total[4]	**49**	**757**	**17 557**	**9 000**	***51.3***	**8 557**	***48.7***
Other technical and vocational schools (statutes)	**8**	**59**	**1 109**	**829**	***74.8***	**280**	***25.2***
Federal sports academies[5]	**1**	**28**	**635**	**211**	***33.2***	**424**	***66.8***

Table 15 Schools, classes and students by type of school and federal province, school year 2019 – Carinthia

Type of school[1]	Carinthia						
	Schools	Classes	Students				
			all	female	*female %*	male	*male %*
Total for all types of schools (incl. statutes)	**386**	**3 663**	**70 183**	**33 939**	***48.0***	**36 244**	***51.6***
All mainstream schools	**376**	**3 562**	**68 409**	**32 719**	***47.8***	**35 690**	***52.2***
General schools (incl. statutes)	**334**	**2 534**	**48 056**	**23 679**	***49.3***	**24 377**	***50.7***
General schools	**327**	**2 498**	**47 477**	**23 401**	***49.3***	**24 076**	***50.7***
Compulsory schools, total	**305**	**1 921**	**33 883**	**15 993**	***47.2***	**17 890**	***52.8***
Primary schools	227	1 217	20 468	9 895	*48.3*	10 573	*51.7*
New secondary schools	66	619	12 404	5 733	*46.2*	6 671	*53.8*
Special (SEN) schools[2]	26	52	330	124	*37.6*	206	*62.4*
Pre-vocational schools	7	33	681	241	*35.4*	440	*64.6*
Academic secondary schools, total	**22**	**577**	**13 594**	**7 408**	***54.5***	**6 186**	***45.5***
Academic secondary schools, lower level, total	18	328	8 134	4 221	*51.9*	3 913	*48.1*
Academic secondary schools, upper level (all sub-types)	22	249	5 460	3 187	*58.4*	2 273	*41.6*
Other general schools (statutes)	7	36	579	278	*48.0*	301	*52.0*
Schools and Colleges for vocational education (incl. statutes)	**52**	**1 129**	**22 127**	**10 260**	***46.4***	**11 867**	***53.6***
Schools and Colleges for vocational education	**49**	**1 064**	**20 932**	**9 318**	***44.5***	**11 614**	***55.5***
Vocational schools for apprentices, total	11	452	7 271	2 479	*34.1*	4 792	*65.9*
Schools for intermediate & Colleges for higher voc. ed. (incl. statutes)	**41**	**677**	**14 856**	**7 781**	***52.4***	**7 075**	***47.6***
Crafts, technical and arts schools and colleges	11	245	5 458	1 288	*23.6*	4 170	*76.4*
Technical and crafts (in a narrower sense)	8	202	4 536	626	*13.8*	3 910	*86.2*
Schools and Colleges of clothing	2	13	254	248	*97.6*	6	*2.4*
Schools and Colleges of tourism	1	16	342	223	*65.2*	119	*34.8*
Schools and Colleges of arts and crafts	2	14	326	191	*58.6*	135	*41.4*
Schools and Colleges of business administration	9	140	2 919	1 596	*54.7*	1 323	*45.3*
Schools and Colleges of management and the service industries	8	132	2 936	2 426	*82.6*	510	*17.4*
Schools and Colleges for social professions	5	70	1 273	1 013	*79.6*	260	*20.4*
Schools and Colleges for agriculture and forestry	9	65	1 636	879	*53.7*	757	*46.3*
Schools and Colleges for pedagogy[3]	2	25	634	579	*91.3*	55	*8.7*
Schools and Colleges for other scopes	-	-	-	-	.	-	.
Schools for intermediate vocational education, total	**29**	**145**	**3 100**	**1 217**	***39.3***	**1 883**	***60.7***
Colleges for higher vocational education, total[4]	**26**	**467**	**10 561**	**5 622**	***53.2***	**4 939**	***46.8***
Other technical and vocational schools (statutes)	**5**	**65**	**1 195**	**942**	***78.8***	**253**	***21.2***
Federal sports academies[5]	**-**	**-**	**-**	**-**	.	**-**	.

Table 16 Schools, classes and students by type of school and federal province, school year 2019 – Carinthia (continued)

Type of school	Carinthia						
	Schools	Classes	Students				
			all	female	*female %*	male	*male %*
Academic secondary schools, total	**22**	**577**	**13 594**	**7 408**	***54.5***	**6 186**	***45.5***
Academic secondary schools, full 8/9 year cycle	18	495	11 790	6 343	*53.8*	5 447	*46.2*
Academic secondary schools, lower level, total	18	328	8 134	4 221	*51.9*	3 913	*48.1*
Academic secondary schools, lower level	15	316	7 843	4 086	*52.1*	3 757	*47.9*
New secondary schools at Academic secondary schools	3	12	291	135	*46.4*	156	*53.6*
Academic secondary schools, upper level	16	167	3 656	2 122	*58.0*	1 534	*42.0*
Academic secondary schools, separate upper level	6	64	1 324	799	*60.3*	525	*39.7*
Academic secondary schools for people in employment	2	18	480	266	*55.4*	214	*44.6*
Add-on secondary schools	-	-	-	-	.	-	.
Vocational schools for apprentices, total	**11**	**452**	**7 271**	**2 479**	***34.1***	**4 792**	***65.9***
Vocational schools for apprentices	10	449	7 243	2 463	*34.0*	4 780	*66.0*
Vocational schools for agriculture and forestry for apprentices	1	3	28	16	*57.1*	12	*42.9*
Schools for intermediate & Colleges for higher voc. ed. (without statutes)	**38**	**612**	**13 661**	**6 839**	***50.1***	**6 822**	***49.9***
Schools for intermediate vocational education, total	**29**	**145**	**3 100**	**1 217**	***39.3***	**1 883**	***60.7***
Intermediate crafts, technical and arts schools	8	44	903	77	*8.5*	826	*91.5*
Intermediate technical and crafts schools (in a narrower sense)	8	40	779	65	*8.3*	714	*91.7*
Intermediate schools of clothing	-	-	-	-	.	-	.
Intermediate schools of tourism	-	-	-	-	.	-	.
Intermediate schools of arts and crafts	1	4	124	12	*9.7*	112	*90.3*
Intermediate schools of business administration	4	17	306	141	*46.1*	165	*53.9*
Intermediate schools of management and the service industries	7	27	570	397	*69.6*	173	*30.4*
Intermediate schools for social professions	2	5	78	71	*91.0*	7	*9.0*
Intermediate schools for agriculture and forestry	8	52	1 243	531	*42.7*	712	*57.3*
Intermediate schools for pedagogic assistants for early childhood	-	-	-	-	.	-	.
Colleges for higher vocational education, total	**26**	**467**	**10 561**	**5 622**	***53.2***	**4 939**	***46.8***
Higher crafts, technical and arts colleges	8	201	4 555	1 211	*26.6*	3 344	*73.4*
Higher technical and crafts colleges (in a narrower sense)	5	162	3 757	561	*14.9*	3 196	*85.1*
Higher colleges of clothing	2	13	254	248	*97.6*	6	*2.4*
Higher colleges of tourism	1	16	342	223	*65.2*	119	*34.8*
Higher colleges of arts and crafts	2	10	202	179	*88.6*	23	*11.4*
Higher colleges of business administration	9	123	2 613	1 455	*55.7*	1 158	*44.3*
Higher colleges of management and the service industries	8	105	2 366	2 029	*85.8*	337	*14.2*
Higher colleges of agriculture and forestry	1	13	393	348	*88.5*	45	*11.5*
Educational colleges	2	25	634	579	*91.3*	55	*8.7*
Higher colleges for early childhood pedagogy	1	20	526	488	*92.8*	38	*7.2*
Higher colleges of social pedagogy	1	5	108	91	*84.3*	17	*15.7*
Other schools (statutes), total	**12**	**101**	**1 774**	**1 220**	***68.8***	**554**	***31.2***
Other general schools (statutes)	7	36	579	278	*48.0*	301	*52.0*
Other technical and vocational schools (statutes)	5	65	1 195	942	*78.8*	253	*21.2*
New secondary schools (total for all types)	**69**	**631**	**12 695**	**5 868**	***46.2***	**6 827**	***53.8***
Schools and Colleges for the social and services sectors	**13**	**236**	**4 932**	**4 024**	***81.6***	**908**	***18.4***

Western Austria (Westösterreich)

Western Austria, or Westösterreich presents ecological diversity, encompassing Alpine landscapes, pristine lakes, and vital water resources. Nestled within the Austrian Alps, Western Austria is characterized by its stunning alpine landscapes, diverse ecosystems, The region consists of Vorarlberg, Tyrol, Salzburg, and Upper Austria.

Environmental Features

Western Austria hosts numerous protected areas and national parks, covering a significant portion of its land. For instance, Tyrol has the Hohe Tauern National Park, one of the largest protected areas in the Alps with an aerial extent of almost 2.000 square kilometres.

Western Austria is blessed with abundant water resources, including streams, lakes, and alpine feeding rivers. These resources not only contribute to the region's ecological balance but also serve as vital sources of water for various purposes.

However, Western Austria faces several challenges that require ongoing attention and sustainable solutions. The popularity of Western Austria for tourism, while boosting the economy, poses challenges to delicate ecosystems - and this is notably true regarding ski tourism and alpine sport in face of climate change. Urbanization and infrastructure projects may pose threats to natural habitats.

Economic and Social Structure

Western Austria, comprising Vorarlberg, Tyrol, Salzburg, and Upper Austria, is a region at the crossroads of economic innovation and cultural heritage.

The region has a high standard of living, low unemployment rates, and a thriving business environment.

Vorarlberg shows a robust and highly developed economic sector. It is considered one of Austria's wealthiest regions, with a strong emphasis on innovation and high-tech industries. Vorarlberg is a leader in precision engineering, machinery, and equipment manufacturing. The textile industry also plays a significant role, with Vorarlberg being a global leader in textile innovation. Additionally, tourism contributes substantially to the economy, as Vorarlberg has alpine landscapes and popular ski resorts, as well as cultural offers ashore Lake Constance, which is among the three biggest inland lakes in central Europe.

The emphasis on innovation and craftsmanship has established Vorarlberg as a prosperous economic region within Austria. The region's commitment to research and development has led to the establishment of numerous high-tech companies, making Vorarlberg an economic powerhouse. Vorarlberg has a well-educated population, with a strong emphasis on vocational training and higher education.

Tyrol, known for its stunning alpine landscapes, has a diversified economic structure. Tourism is a major contributor, drawing visitors with its ski resorts, hiking trails, wellness sector and historical sites. Apart from tourism, Tyrol has a thriving industrial sector. Traditional industries such as agriculture and forestry coexist with innovative sectors like technology and renewable energy. The region is known for its production of Tyrolean specialties and dairy products.

Salzburg's economy is diverse, with a strong focus on tourism and the cultural sector. The city's global reputation as a cultural hub and its historical significance contribute significantly to its economic prosperity. Moreover, Salzburg has a well-established cultural sector, including film production and the performing arts. The city is also home

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to innovative sectors, with investments in technology and research contributing to economic growth.

Upper Austria is an economic centre in Austria, with a diverse and thriving economy. The region's strategic location as a transportation hub, combined with a strong industrial base, contributes to its economic significance. Upper Austria is a leader in manufacturing, with industries such as machinery, steel, and automotive playing a crucial role. The region has been proactive in fostering a digital economy, with a focus on research and development, innovation, and technology. The socio-economic demographics of Upper Austria reflect a balanced mix of urban and rural lifestyles. The region places a strong emphasis on education and vocational training, contributing to a skilled workforce.

In the region, GDP per capita is 50.700EUR in Upper Austria, 58.900EUR in Salzburg 51.200EUR in Tyrol and 58.300EUR in Vorarlberg. Salzburg is the top region by GDP per capita in Austria. Total population of the region is 3,3 million.

Education Infrastructure and Resources

Western Austria (Westösterreich) places a significant emphasis on education, and its infrastructure reflects a commitment to providing quality learning environments. The region is equipped with area-covering school facilities, including primary and secondary schools, vocational training centers, and higher education institutions.

Table 17 Schools, classes and students by type of school and federal province, school year 2019 – Tyriol

Type of school[1]	Tyrol						
	Schools	Classes	Students				
			all	female	*female %*	male	*male %*
Total for all types of schools (incl. statutes)	**630**	**4 973**	**96 623**	**46 346**	***48.0***	**50 277**	***52.0***
All mainstream schools	**615**	**4 908**	**95 650**	**45 808**	***47.9***	**49 842**	***52.1***
General schools (incl. statutes)	**556**	**3 604**	**67 675**	**33 210**	***49.1***	**34 465**	***50.9***
General schools	**544**	**3 558**	**67 102**	**32 959**	***49.1***	**34 143**	***50.9***
Compulsory schools, total	**517**	**2 907**	**52 434**	**24 931**	***47.5***	**27 503**	***52.5***
Primary schools	362	1 678	29 067	14 118	*48.6*	14 949	*51.4*
New secondary schools	106	1 026	20 457	9 777	*47.8*	10 680	*52.2*
Special (SEN) schools[2]	27	123	1 316	464	*35.3*	852	*64.7*
Pre-vocational schools	32	80	1 594	572	*35.9*	1 022	*64.1*
Academic secondary schools, total	**27**	**651**	**14 668**	**8 028**	***54.7***	**6 640**	***45.3***
Academic secondary schools, lower level, total	18	309	7 503	3 884	*51.8*	3 619	*48.2*
Academic secondary schools, upper level (all sub-types)	27	342	7 165	4 144	*57.8*	3 021	*42.2*
Other general schools (statutes)	12	46	573	251	*43.8*	322	*56.2*
Schools and Colleges for vocational education (incl. statutes)	**73**	**1 339**	**28 335**	**12 930**	***45.6***	**15 405**	***54.4***
Schools and Colleges for vocational education	**70**	**1 320**	**27 935**	**12 643**	***45.3***	**15 292**	***54.7***
Vocational schools for apprentices, total	23	629	12 189	4 195	*34.4*	7 994	*65.6*
Schools for intermediate & Colleges for higher voc. ed. (incl. statutes)	**50**	**710**	**16 146**	**8 735**	***54.1***	**7 411**	***45.9***
Crafts, technical and arts schools and colleges	19	257	5 929	1 735	*29.3*	4 194	*70.7*
Technical and crafts (in a narrower sense)	13	173	3 990	471	*11.8*	3 519	*88.2*
Schools and Colleges of clothing	1	5	106	100	*94.3*	6	*5.7*
Schools and Colleges of tourism	4	52	1 196	761	*63.6*	435	*36.4*
Schools and Colleges of arts and crafts	3	27	637	403	*63.3*	234	*36.7*
Schools and Colleges of business administration	11	184	3 924	1 964	*50.1*	1 960	*49.9*
Schools and Colleges of management and the service industries	8	134	3 105	2 834	*91.3*	271	*8.7*
Schools and Colleges for social professions	3	19	400	287	*71.8*	113	*28.3*
Schools and Colleges for agriculture and forestry	6	66	1 554	816	*52.5*	738	*47.5*
Schools and Colleges for pedagogy[3]	4	50	1 234	1 099	*89.1*	135	*10.9*
Schools and Colleges for other scopes	-	-	-	-	.	-	.
Schools for intermediate vocational education, total	**33**	**174**	**3 734**	**1 775**	***47.5***	**1 959**	***52.5***
Colleges for higher vocational education, total[4]	**36**	**517**	**12 012**	**6 673**	***55.6***	**5 339**	***44.4***
Other technical and vocational schools (statutes)	**3**	**19**	**400**	**287**	***71.8***	**113**	***28.3***
Federal sports academies[5]	**1**	**30**	**613**	**206**	***33.6***	**407**	***66.4***

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Table 18 Schools, classes and students by type of school and federal province, school year 2019 – Tyriol (continued)

Type of school	Tyrol						
	Schools	Classes	Students				
			all	female	*female %*	male	*male %*
Academic secondary schools, total	**27**	**651**	**14 668**	**8 028**	***54.7***	**6 640**	***45.3***
Academic secondary schools, full 8/9 year cycle	18	488	11 135	5 905	*53.0*	5 230	*47.0*
Academic secondary schools, lower level, total	18	309	7 503	3 884	*51.8*	3 619	*48.2*
Academic secondary schools, lower level	18	309	7 503	3 884	*51.8*	3 619	*48.2*
New secondary schools at Academic secondary schools	-	-	-	-	.	-	.
Academic secondary schools, upper level	18	179	3 632	2 021	*55.6*	1 611	*44.4*
Academic secondary schools, separate upper level	13	124	2 636	1 673	*63.5*	963	*36.5*
Academic secondary schools for people in employment	1	35	805	408	*50.7*	397	*49.3*
Add-on secondary schools	1	4	92	42	*45.7*	50	*54.3*
Vocational schools for apprentices, total	**23**	**629**	**12 189**	**4 195**	***34.4***	**7 994**	***65.6***
Vocational schools for apprentices	22	624	12 055	4 137	*34.3*	7 918	*65.7*
Vocational schools for agriculture and forestry for apprentices	1	5	134	58	*43.3*	76	*56.7*
Schools for intermediate & Colleges for higher voc. ed. (without statutes)	**47**	**691**	**15 746**	**8 448**	***53.7***	**7 298**	***46.3***
Schools for intermediate vocational education, total	**33**	**174**	**3 734**	**1 775**	***47.5***	**1 959**	***52.5***
Intermediate crafts, technical and arts schools	13	54	1 094	261	*23.9*	833	*76.1*
Intermediate technical and crafts schools (in a narrower sense)	8	31	668	22	*3.3*	646	*96.7*
Intermediate schools of clothing	-	-	-	-	.	-	.
Intermediate schools of tourism	3	11	238	120	*50.4*	118	*49.6*
Intermediate schools of arts and crafts	2	12	188	119	*63.3*	69	*36.7*
Intermediate schools of business administration	10	38	752	365	*48.5*	387	*51.5*
Intermediate schools of management and the service industries	5	24	542	492	*90.8*	50	*9.2*
Intermediate schools for social professions	-	-	-	-	.	-	.
Intermediate schools for agriculture and forestry	5	58	1 346	657	*48.8*	689	*51.2*
Intermediate schools for pedagogic assistants for early childhood	-	-	-	-	.	-	.
Colleges for higher vocational education, total	**36**	**517**	**12 012**	**6 673**	***55.6***	**5 339**	***44.4***
Higher crafts, technical and arts colleges	14	203	4 835	1 474	*30.5*	3 361	*69.5*
Higher technical and crafts colleges (in a narrower sense)	9	142	3 322	449	*13.5*	2 873	*86.5*
Higher colleges of clothing	1	5	106	100	*94.3*	6	*5.7*
Higher colleges of tourism	4	41	958	641	*66.9*	317	*33.1*
Higher colleges of arts and crafts	1	15	449	284	*63.3*	165	*36.7*
Higher colleges of business administration	10	146	3 172	1 599	*50.4*	1 573	*49.6*
Higher colleges of management and the service industries	8	110	2 563	2 342	*91.4*	221	*8.6*
Higher colleges of agriculture and forestry	1	8	208	159	*76.4*	49	*23.6*
Educational colleges	4	50	1 234	1 099	*89.1*	135	*10.9*
Higher colleges for early childhood pedagogy	3	36	921	862	*93.6*	59	*6.4*
Higher colleges of social pedagogy	1	14	313	237	*75.7*	76	*24.3*
Other schools (statutes), total	**15**	**65**	**973**	**538**	***55.3***	**435**	***44.7***
Other general schools (statutes)	12	46	573	251	*43.8*	322	*56.2*
Other technical and vocational schools (statutes)	3	19	400	287	*71.8*	113	*28.3*
New secondary schools (total for all types)	**106**	**1 026**	**20 457**	**9 777**	***47.8***	**10 680**	***52.2***
Schools and Colleges for the social and services sectors	**15**	**210**	**4 807**	**3 982**	***82.8***	**825**	***17.2***

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Table 19 Schools, classes and students by type of school and federal province, school year 2019 – Vorarlberg

Type of school[1]	Vorarlberg						
	Schools	Classes	Students				
			all	female	*female %*	male	*male %*
Total for all types of schools (incl. statutes)	**288**	**2 832**	**54 486**	**26 250**	***48.2***	**28 236**	***51.8***
All mainstream schools	**281**	**2 795**	**53 888**	**25 870**	***48.0***	**28 018**	***52.0***
General schools (incl. statutes)	**258**	**2 112**	**39 416**	**19 418**	***49.3***	**19 998**	***50.7***
General schools	**255**	**2 105**	**39 311**	**19 368**	***49.3***	**19 943**	***50.7***
Compulsory schools, total	**241**	**1 772**	**31 708**	**15 113**	***47.7***	**16 595**	***52.3***
Primary schools	170	954	16 868	8 223	*48.7*	8 645	*51.3*
New secondary schools	60	639	12 005	5 834	*48.6*	6 171	*51.4*
Special (SEN) schools[2]	17	118	1 852	712	*38.4*	1 140	*61.6*
Pre-vocational schools	12	61	983	344	*35.0*	639	*65.0*
Academic secondary schools, total	**14**	**333**	**7 603**	**4 255**	***56.0***	**3 348**	***44.0***
Academic secondary schools, lower level, total	10	161	3 958	2 035	*51.4*	1 923	*48.6*
Academic secondary schools, upper level (all sub-types)	14	172	3 645	2 220	*60.9*	1 425	*39.1*
Other general schools (statutes)	3	7	105	50	*47.6*	55	*52.4*
Schools and Colleges for vocational education (incl. statutes)	**30**	**720**	**15 070**	**6 832**	***45.3***	**8 238**	***54.7***
Schools and Colleges for vocational education	**26**	**690**	**14 577**	**6 502**	***44.6***	**8 075**	***55.4***
Vocational schools for apprentices, total	8	361	6 592	2 068	*31.4*	4 524	*68.6*
Schools for intermediate & Colleges for higher voc. ed. (incl. statutes)	**22**	**359**	**8 478**	**4 764**	***56.2***	**3 714**	***43.8***
Crafts, technical and arts schools and colleges	7	135	3 091	914	*29.6*	2 177	*70.4*
Technical and crafts (in a narrower sense)	4	105	2 380	364	*15.3*	2 016	*84.7*
Schools and Colleges of clothing	1	5	124	120	*96.8*	4	*3.2*
Schools and Colleges of tourism	3	25	587	430	*73.3*	157	*26.7*
Schools and Colleges of arts and crafts	-	-	-	-	.	-	.
Schools and Colleges of business administration	5	111	2 742	1 568	*57.2*	1 174	*42.8*
Schools and Colleges of management and the service industries	7	65	1 543	1 522	*98.6*	21	*1.4*
Schools and Colleges for social professions	2	19	323	229	*70.9*	94	*29.1*
Schools and Colleges for agriculture and forestry	2	15	429	194	*45.2*	235	*54.8*
Schools and Colleges for pedagogy[3]	1	14	350	337	*96.3*	13	*3.7*
Schools and Colleges for other scopes	-	-	-	-	.	-	.
Schools for intermediate vocational education, total	**14**	**75**	**1 938**	**995**	***51.3***	**943**	***48.7***
Colleges for higher vocational education, total[4]	**15**	**254**	**6 047**	**3 439**	***56.9***	**2 608**	***43.1***
Other technical and vocational schools (statutes)	**4**	**30**	**493**	**330**	***66.9***	**163**	***33.1***
Federal sports academies[5]	-	-	-	-	.	-	.

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Table 20 Schools, classes and students by type of school and federal province, school year 2019 – Vorarlberg (continued)

Type of school	Vorarlberg						
	Schools	Classes	Students				
			all	female	female %	male	male %
Academic secondary schools, total	**14**	**333**	**7 603**	**4 255**	***56.0***	**3 348**	***44.0***
Academic secondary schools, full 8/9 year cycle	10	252	5 895	3 109	*52.7*	2 786	*47.3*
Academic secondary schools, lower level, total	10	161	3 958	2 035	*51.4*	1 923	*48.6*
Academic secondary schools, lower level	10	161	3 958	2 035	*51.4*	1 923	*48.6*
New secondary schools at Academic secondary schools	-	-	-	-	.	-	.
Academic secondary schools, upper level	10	91	1 937	1 074	*55.4*	863	*44.6*
Academic secondary schools, separate upper level	7	81	1 708	1 146	*67.1*	562	*32.9*
Academic secondary schools for people in employment	-	-	-	-	.	-	.
Add-on secondary schools	-	-	-	-	.	-	.
Vocational schools for apprentices, total	**8**	**361**	**6 592**	**2 068**	***31.4***	**4 524**	***68.6***
Vocational schools for apprentices	8	361	6 592	2 068	*31.4*	4 524	*68.6*
Vocational schools for agriculture and forestry for apprentices	-	-	-	-	.	-	.
Schools for intermediate & Colleges for higher voc. ed. (without statutes)	**18**	**329**	**7 985**	**4 434**	***55.5***	**3 551**	***44.5***
Schools for intermediate vocational education, total	**14**	**75**	**1 938**	**995**	***51.3***	**943**	***48.7***
Intermediate crafts, technical and arts schools	6	22	521	89	*17.1*	432	*82.9*
Intermediate technical and crafts schools (in a narrower sense)	4	20	475	51	*10.7*	424	*89.3*
Intermediate schools of clothing	-	-	-	-	.	-	.
Intermediate schools of tourism	2	2	46	38	*82.6*	8	*17.4*
Intermediate schools of arts and crafts	-	-	-	-	.	-	.
Intermediate schools of business administration	5	26	697	374	*53.7*	323	*46.3*
Intermediate schools of management and the service industries	4	16	386	380	*98.4*	6	*1.6*
Intermediate schools for social professions	-	-	-	-	.	-	.
Intermediate schools for agriculture and forestry	1	11	334	152	*45.5*	182	*54.5*
Intermediate schools for pedagogic assistants for early childhood	-	-	-	-	.	-	.
Colleges for higher vocational education, total	**15**	**254**	**6 047**	**3 439**	***56.9***	**2 608**	***43.1***
Higher crafts, technical and arts colleges	5	107	2 430	741	*30.5*	1 689	*69.5*
Higher technical and crafts colleges (in a narrower sense)	3	85	1 905	313	*16.4*	1 592	*83.6*
Higher colleges of clothing	1	5	124	120	*96.8*	4	*3.2*
Higher colleges of tourism	2	17	401	308	*76.8*	93	*23.2*
Higher colleges of arts and crafts	-	-	-	-	.	-	.
Higher colleges of business administration	5	85	2 045	1 194	*58.4*	851	*41.6*
Higher colleges of management and the service industries	4	44	1 127	1 125	*99.8*	2	*0.2*
Higher colleges of agriculture and forestry	1	4	95	42	*44.2*	53	*55.8*
Educational colleges	1	14	350	337	*96.3*	13	*3.7*
Higher colleges for early childhood pedagogy	1	14	350	337	*96.3*	13	*3.7*
Higher colleges of social pedagogy	-	-	-	-	.	-	.
Other schools (statutes), total	**7**	**37**	**598**	**380**	***63.5***	**218**	***36.5***
Other general schools (statutes)	3	7	105	50	*47.6*	55	*52.4*
Other technical and vocational schools (statutes)	4	30	493	330	*66.9*	163	*33.1*
New secondary schools (total for all types)	**60**	**639**	**12 005**	**5 834**	***48.6***	**6 171**	***51.4***
Schools and Colleges for the social and services sectors	**12**	**114**	**2 577**	**2 301**	***89.3***	**276**	***10.7***

Table 21 Schools, classes and students by type of school and federal province, school year 2019 – Upper Austria

Type of school[1]	Upper Austria						
	Schools	Classes	Students				
			all	female	*female %*	male	*male %*
Total for all types of schools (incl. statutes)	**1 007**	**9 903**	**196 645**	**92 937**	***47.3***	**103 708**	***52.7***
All mainstream schools	**981**	**9 783**	**194 656**	**91 712**	***47.1***	**102 944**	***52.9***
General schools (incl. statutes)	**876**	**7 208**	**136 636**	**67 127**	***49.1***	**69 509**	***50.9***
General schools	**860**	**7 146**	**135 779**	**66 721**	***49.1***	**69 058**	***50.9***
Compulsory schools, total	**811**	**5 908**	**107 400**	**50 544**	***47.1***	**56 856**	***52.9***
Primary schools	550	3 464	61 717	29 503	*47.8*	32 214	*52.2*
New secondary schools	232	2 094	41 271	19 430	*47.1*	21 841	*52.9*
Special (SEN) schools[2]	36	198	1 297	434	*33.5*	863	*66.5*
Pre-vocational schools	50	152	3 115	1 177	*37.8*	1 938	*62.2*
Academic secondary schools, total	**49**	**1 238**	**28 379**	**16 177**	***57.0***	**12 202**	***43.0***
Academic secondary schools, lower level, total	39	700	16 490	8 743	*53.0*	7 747	*47.0*
Academic secondary schools, upper level (all sub-types)	49	538	11 889	7 434	*62.5*	4 455	*37.5*
Other general schools (statutes)	16	62	857	406	*47.4*	451	*52.6*
Schools and Colleges for vocational education (incl. statutes)	**130**	**2 666**	**59 376**	**25 578**	***43.1***	**33 798**	***56.9***
Schools and Colleges for vocational education	**120**	**2 608**	**58 244**	**24 759**	***42.5***	**33 485**	***57.5***
Vocational schools for apprentices, total	25	1 152	25 231	7 898	*31.3*	17 333	*68.7*
Schools for intermediate & Colleges for higher voc. ed. (incl. statutes)	**107**	**1 514**	**34 145**	**17 680**	***51.8***	**16 465**	***48.2***
Crafts, technical and arts schools and colleges	39	642	14 422	3 393	*23.5*	11 029	*76.5*
Technical and crafts (in a narrower sense)	33	545	12 199	1 742	*14.3*	10 457	*85.7*
Schools and Colleges of clothing	2	21	378	360	*95.2*	18	*4.8*
Schools and Colleges of tourism	3	44	971	604	*62.2*	367	*37.8*
Schools and Colleges of arts and crafts	4	32	874	687	*78.6*	187	*21.4*
Schools and Colleges of business administration	18	322	6 994	4 279	*61.2*	2 715	*38.8*
Schools and Colleges of management and the service industries	17	265	5 963	5 397	*90.5*	566	*9.5*
Schools and Colleges for social professions	11	61	1 199	870	*72.6*	329	*27.4*
Schools and Colleges for agriculture and forestry	18	153	3 712	1 983	*53.4*	1 729	*46.6*
Schools and Colleges for pedagogy[3]	7	71	1 855	1 758	*94.8*	97	*5.2*
Schools and Colleges for other scopes	-	-	-	-	.	-	.
Schools for intermediate vocational education, total	**77**	**394**	**8 186**	**3 353**	***41.0***	**4 833**	***59.0***
Colleges for higher vocational education, total[4]	**62**	**1 062**	**24 827**	**13 508**	***54.4***	**11 319**	***45.6***
Other technical and vocational schools (statutes)	**10**	**58**	**1 132**	**819**	***72.3***	**313**	***27.7***
Federal sports academies[5]	**1**	**29**	**633**	**232**	***36.7***	**401**	***63.3***

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Table 22 Schools, classes and students by type of school and federal province, school year 2019 – Upper Austria (continued)

Type of school	Upper Austria						
	Schools	Classes	Students				
			all	female	*female %*	male	*male %*
Academic secondary schools, total	**49**	**1 238**	**28 379**	**16 177**	***57.0***	**12 202**	***43.0***
Academic secondary schools, full 8/9 year cycle	39	1 045	24 075	13 343	*55.4*	10 732	*44.6*
Academic secondary schools, lower level, total	39	700	16 490	8 743	*53.0*	7 747	*47.0*
Academic secondary schools, lower level	39	700	16 490	8 743	*53.0*	7 747	*47.0*
New secondary schools at Academic secondary schools	-	-	-	-	.	-	.
Academic secondary schools, upper level	39	345	7 585	4 600	*60.6*	2 985	*39.4*
Academic secondary schools, separate upper level	14	167	3 750	2 516	*67.1*	1 234	*32.9*
Academic secondary schools for people in employment	1	26	554	318	*57.4*	236	*42.6*
Add-on secondary schools	-	-	-	-	.	-	.
Vocational schools for apprentices, total	**25**	**1 152**	**25 231**	**7 898**	***31.3***	**17 333**	***68.7***
Vocational schools for apprentices	23	1 149	25 172	7 870	*31.3*	17 302	*68.7*
Vocational schools for agriculture and forestry for apprentices	2	3	59	28	*47.5*	31	*52.5*
Schools for intermediate & Colleges for higher voc. ed. (without statutes)	**97**	**1 456**	**33 013**	**16 861**	***51.1***	**16 152**	***48.9***
Schools for intermediate vocational education, total	**77**	**394**	**8 186**	**3 353**	***41.0***	**4 833**	***59.0***
Intermediate crafts, technical and arts schools	34	160	3 102	357	*11.5*	2 745	*88.5*
Intermediate technical and crafts schools (in a narrower sense)	30	143	2 738	179	*6.5*	2 559	*93.5*
Intermediate schools of clothing	1	3	44	39	*88.6*	5	*11.4*
Intermediate schools of tourism	3	9	192	70	*36.5*	122	*63.5*
Intermediate schools of arts and crafts	2	5	128	69	*53.9*	59	*46.1*
Intermediate schools of business administration	14	51	966	534	*55.3*	432	*44.7*
Intermediate schools of management and the service industries	12	50	971	833	*85.8*	138	*14.2*
Intermediate schools for social professions	1	3	67	51	*76.1*	16	*23.9*
Intermediate schools for agriculture and forestry	16	130	3 080	1 578	*51.2*	1 502	*48.8*
Intermediate schools for pedagogic assistants for early childhood	-	-	-	-	.	-	.
Colleges for higher vocational education, total	**62**	**1 062**	**24 827**	**13 508**	***54.4***	**11 319**	***45.6***
Higher crafts, technical and arts colleges	21	482	11 320	3 036	*26.8*	8 284	*73.2*
Higher technical and crafts colleges (in a narrower sense)	15	402	9 461	1 563	*16.5*	7 898	*83.5*
Higher colleges of clothing	2	18	334	321	*96.1*	13	*3.9*
Higher colleges of tourism	3	35	779	534	*68.5*	245	*31.5*
Higher colleges of arts and crafts	3	27	746	618	*82.8*	128	*17.2*
Higher colleges of business administration	18	271	6 028	3 745	*62.1*	2 283	*37.9*
Higher colleges of management and the service industries	16	215	4 992	4 564	*91.4*	428	*8.6*
Higher colleges of agriculture and forestry	2	23	632	405	*64.1*	227	*35.9*
Educational colleges	7	71	1 855	1 758	*94.8*	97	*5.2*
Higher colleges for early childhood pedagogy	5	66	1 766	1 684	*95.4*	82	*4.6*
Higher colleges of social pedagogy	2	5	89	74	*83.1*	15	*16.9*
Other schools (statutes), total	**26**	**120**	**1 989**	**1 225**	***61.6***	**764**	***38.4***
Other general schools (statutes)	16	62	857	406	*47.4*	451	*52.6*
Other technical and vocational schools (statutes)	10	58	1 132	819	*72.3*	313	*27.7*
New secondary schools (total for all types)	**232**	**2 094**	**41 271**	**19 430**	***47.1***	**21 841**	***52.9***
Schools and Colleges for the social and services sectors	**31**	**401**	**8 816**	**7 506**	***85.1***	**1 310**	***14.9***

Table 23 Schools, classes and students by type of school and federal province, school year 2019 – Salzburg

Type of school[1]	Salzburg						
	Schools	Classes	Students				
			all	female	*female %*	male	*male %*
Total for all types of schools (incl. statutes)	**373**	**3 877**	**75 742**	**36 391**	***48.0***	**39 351**	***52.0***
All mainstream schools	**359**	**3 800**	**74 399**	**35 542**	***47.8***	**38 857**	***52.2***
General schools (incl. statutes)	**318**	**2 712**	**52 164**	**25 737**	***49.3***	**26 427**	***50.7***
General schools	**311**	**2 672**	**51 517**	**25 419**	***49.3***	**26 098**	***50.7***
Compulsory schools, total	**285**	**2 094**	**37 912**	**18 047**	***47.6***	**19 865**	***52.4***
Primary schools	180	1 208	21 408	10 552	*49.3*	10 856	*50.7*
New secondary schools	71	696	13 933	6 601	*47.4*	7 332	*52.6*
Special (SEN) schools[2]	22	146	1 654	550	*33.3*	1 104	*66.7*
Pre-vocational schools	18	44	917	344	*37.5*	573	*62.5*
Academic secondary schools, total	**26**	**578**	**13 605**	**7 372**	***54.2***	**6 233**	***45.8***
Academic secondary schools, lower level, total	19	288	7 105	3 708	*52.2*	3 397	*47.8*
Academic secondary schools, upper level (all sub-types)	26	290	6 500	3 664	*56.4*	2 836	*43.6*
Other general schools (statutes)	7	40	647	318	*49.1*	329	*50.9*
Schools and Colleges for vocational education (incl. statutes)	**55**	**1 165**	**23 578**	**10 654**	***45.2***	**12 924**	***54.8***
Schools and Colleges for vocational education	**48**	**1 128**	**22 882**	**10 123**	***44.2***	**12 759**	***55.8***
Vocational schools for apprentices, total	12	528	9 087	3 018	*33.2*	6 069	*66.8*
Schools for intermediate & Colleges for higher voc. ed. (incl. statutes)	**43**	**637**	**14 491**	**7 636**	***52.7***	**6 855**	***47.3***
Crafts, technical and arts schools and colleges	14	257	6 045	1 815	*30.0*	4 230	*70.0*
Technical and crafts (in a narrower sense)	7	177	4 444	673	*15.1*	3 771	*84.9*
Schools and Colleges of clothing	2	22	447	421	*94.2*	26	*5.8*
Schools and Colleges of tourism	5	46	880	525	*59.7*	355	*40.3*
Schools and Colleges of arts and crafts	2	12	274	196	*71.5*	78	*28.5*
Schools and Colleges of business administration	10	144	3 025	1 590	*52.6*	1 435	*47.4*
Schools and Colleges of management and the service industries	9	124	2 708	2 448	*90.4*	260	*9.6*
Schools and Colleges for social professions	5	32	637	513	*80.5*	124	*19.5*
Schools and Colleges for agriculture and forestry	5	48	1 340	561	*41.9*	779	*58.1*
Schools and Colleges for pedagogy[3]	3	32	736	709	*96.3*	27	*3.7*
Schools and Colleges for other scopes	-	-	-	-	.	-	.
Schools for intermediate vocational education, total	**27**	**142**	**3 099**	**1 214**	***39.2***	**1 885**	***60.8***
Colleges for higher vocational education, total[4]	**30**	**458**	**10 696**	**5 891**	***55.1***	**4 805**	***44.9***
Other technical and vocational schools (statutes)	**8**	**37**	**696**	**531**	***76.3***	**165**	***23.7***
Federal sports academies[5]	-	-	-	-	.	-	.

Table 24 Schools, classes and students by type of school and federal province, school year 2019 – Salzburg (continued)

Type of school	Salzburg						
	Schools	Classes	Students				
			all	female	*female %*	male	*male %*
Academic secondary schools, total	**26**	**578**	**13 605**	**7 372**	***54.2***	**6 233**	***45.8***
Academic secondary schools, full 8/9 year cycle	20	455	10 899	5 785	*53.1*	5 114	*46.9*
Academic secondary schools, lower level, total	19	288	7 105	3 708	*52.2*	3 397	*47.8*
Academic secondary schools, lower level	19	288	7 105	3 708	*52.2*	3 397	*47.8*
New secondary schools at Academic secondary schools	-	-	-	-	.	-	.
Academic secondary schools, upper level	20	167	3 794	2 077	*54.7*	1 717	*45.3*
Academic secondary schools, separate upper level	12	98	2 210	1 307	*59.1*	903	*40.9*
Academic secondary schools for people in employment	1	25	496	280	*56.5*	216	*43.5*
Add-on secondary schools	-	-	-	-	.	-	.
Vocational schools for apprentices, total	**12**	**528**	**9 087**	**3 018**	***33.2***	**6 069**	***66.8***
Vocational schools for apprentices	11	525	9 030	2 988	*33.1*	6 042	*66.9*
Vocational schools for agriculture and forestry for apprentices	1	3	57	30	*52.6*	27	*47.4*
Schools for intermediate & Colleges for higher voc. ed. (without statutes)	**36**	**600**	**13 795**	**7 105**	***51.5***	**6 690**	***48.5***
Schools for intermediate vocational education, total	**27**	**142**	**3 099**	**1 214**	***39.2***	**1 885**	***60.8***
Intermediate crafts, technical and arts schools	10	58	1 189	188	*15.8*	1 001	*84.2*
Intermediate technical and crafts schools (in a narrower sense)	6	44	979	59	*6.0*	920	*94.0*
Intermediate schools of clothing	1	3	56	51	*91.1*	5	*8.9*
Intermediate schools of tourism	3	5	56	21	*37.5*	35	*62.5*
Intermediate schools of arts and crafts	1	6	98	57	*58.2*	41	*41.8*
Intermediate schools of business administration	7	26	473	221	*46.7*	252	*53.3*
Intermediate schools of management and the service industries	6	20	383	336	*87.7*	47	*12.3*
Intermediate schools for social professions	1	3	82	69	*84.1*	13	*15.9*
Intermediate schools for agriculture and forestry	4	35	972	400	*41.2*	572	*58.8*
Intermediate schools for pedagogic assistants for early childhood	-	-	-	-	.	-	.
Colleges for higher vocational education, total	**30**	**458**	**10 696**	**5 891**	***55.1***	**4 805**	***44.9***
Higher crafts, technical and arts colleges	9	197	4 803	1 592	*33.1*	3 211	*66.9*
Higher technical and crafts colleges (in a narrower sense)	4	132	3 441	595	*17.3*	2 846	*82.7*
Higher colleges of clothing	1	19	391	370	*94.6*	21	*5.4*
Higher colleges of tourism	4	40	795	488	*61.4*	307	*38.6*
Higher colleges of arts and crafts	2	6	176	139	*79.0*	37	*21.0*
Higher colleges of business administration	8	112	2 464	1 317	*53.4*	1 147	*46.6*
Higher colleges of management and the service industries	9	104	2 325	2 112	*90.8*	213	*9.2*
Higher colleges of agriculture and forestry	1	13	368	161	*43.8*	207	*56.3*
Educational colleges	3	32	736	709	*96.3*	27	*3.7*
Higher colleges for early childhood pedagogy	2	27	645	630	*97.7*	15	*2.3*
Higher colleges of social pedagogy	1	5	91	79	*86.8*	12	*13.2*
Other schools (statutes), total	**15**	**77**	**1 343**	**849**	***63.2***	**494**	***36.8***
Other general schools (statutes)	7	40	647	318	*49.1*	329	*50.9*
Other technical and vocational schools (statutes)	8	37	696	531	*76.3*	165	*23.7*
New secondary schools (total for all types)	**71**	**696**	**13 933**	**6 601**	***47.4***	**7 332**	***52.6***
Schools and Colleges for the social and services sectors	**19**	**224**	**4 672**	**3 907**	***83.6***	**765**	***16.4***

4.1.3. Assessment of Disadvantaged Regions

Austria is among OECD countries with the lowest regional disparities in GDP per capita and the gap in GDP per capita between the richest and poorest region have decreased further since 2000. In Burgenland and Salzburg, the poorest and richest Austrian regions, respectively, GDP per capita increased by almost 30% over the period 2000-18, while it remained stable in Vienna. However, Vienna is still the region (together with Salzburg) with the highest GDP per capita level in Austria.

In general, disparities among regions at NUTS1 level is relatively low in Austria. However, especially within certain rural sub-regions at the NUTS1 level, challenges are experienced in accessing economic, social, and educational opportunities. These sub regions can be considered as disadvantaged areas.

The Waldviertel in Lower Austria and the Mühlviertel in Upper Austria exemplify regions grappling with a range of challenges leading to disparities in education, economics, and social well-being. Educational disadvantages in these regions are evident due to limited access to quality education, primarily stemming from geographical remoteness and inadequate infrastructure. In addition, rural areas and agricultural landscapes of Styria, Burgenland and Carinthia can be considered as disadvantaged areas with similar rationale. These regions have a higher rate of early school leavers and the share of people with lower levels of education is significantly higher than in the more developed parts of the country.

There should be special approaches to these disadvantaged regions. Specific strategies and programs are required to promote ocean literacy and the blue economy in these regions.

4.1.4. Education System Analysis

Austria is a federal parliamentary republic consisting of nine provinces (Bundesländer), each with its own provincial government. German is the official language and the language of instruction used in almost all Austrian schools.

The school system in Austria is highly centralized. The Federal Ministry of Education, Science, and Research has overall responsibility for, secondary and tertiary education as well as partial responsibility for adult education. Kindergartens and primary education are mainly the responsibility of the provinces (Bundesländer). Education legislation is almost entirely a federal responsibility, including duration and entry age for compulsory education, duration and organization of school instruction, and formulation and approbation of curricula, textbooks, and other school material. Private schools may deviate from the mandated structure or contents but may have to prove the equivalency of their education approach.

The responsibility for implementation is divided between the federation (Bund) and the provinces. The provinces have responsibility for providing pre-primary and public sector compulsory education as well as part-time vocational schools for apprentices. They support local communities in establishing and maintaining these institutions via school construction funds and provision of support personnel. The federation is in charge of establishing, maintaining, and staffing federal schools, which comprise academic secondary schools as well as upper secondary VET schools and colleges.

In specific matters enumerated in the Constitution, the federation sets the framework, while detailed legislation is implemented by the parliaments of the provinces. The federation has overwhelming responsibility for the education system, including virtually all areas of school organisation, the organisation of school instruction, private schools

as well as the remuneration and retirement law governing education staff. Legislation and execution of all matters pertaining to universities and higher education is a federal responsibility. The freedom of scholarship and teaching, and the freedom of art, are guaranteed in constitutional legislation.

An important aspect of the Austrian school system is the strong diversification of programmes at all levels of education. Austria has put in place a strong vocational education sector.

Pre-primary education may be offered in crèches (up to age 3), kindergartens (from 3 years until school entry and in mixed-age facilities), or children's groups (mostly mixed-age), or by private childminders. Since 2009, all children at age 5 (i.e., in the year before starting primary school) are required to attend one year of kindergarten. Children reaching school age who are considered insufficiently mature for regular school must attend a preschool class at school for one year.

Compulsory schooling lasts nine years, starting at age 6 with attendance in primary school (Volksschule, ISCED 1).

Lower secondary education (ISCED 2) starts in Grade 5 and comprises four grades. It marks the beginning of academic tracking by division of schools into general secondary school (Mittelschule) and academic secondary school lower level (Allgemeinbildende Höhere Schule AHS Unterstufe, Gymansium). In recent years, Austria has reformed lower secondary education to enhance the permeability of the education system and to mitigate undesirable effects of early tracking and separation of educational pathways. The reforms included school organization, teacher education, education standards for all students, and reshaping of general secondary schools.

Upper secondary education (Grades 9 to 12) in Austria is highly diverse, spanning from one-year courses (pre.vocational school, ISCED 3G), to vocational schools for apprentices (3 to 4 years, ISCED 3V) or vocational schools for intermediate vocational training or health professions (2 to 4 years, mainly 3 years, ISCED 3V or 4V), to schools offering a secondary school leaving certificate (Matura) for admission to higher education. These institutions are either upper secondary academic schools (ISCED 3G) or colleges for higher vocational education (Grades 9 to 11, ISCED 3V; Grades 12 and 13, ISCED 5V).

Tertiary education institutions comprise universities, universities of applied sciences (Fachhochschulen), University Colleges of Teacher Education (Pädagogische Hochschulen), and schools for advanced vocational or professional education (Werkmeister-, Meister- und Bauhandwerkerschulen, ISCED 5V).

Higher education is provided by

Public Universities (the biggest sector),
Private Higher Education Institutions (HEIs),
Universities of Applied Sciences (Fachhochschulen),
University Colleges of Teacher Education (Pädagogische Hochschulen)

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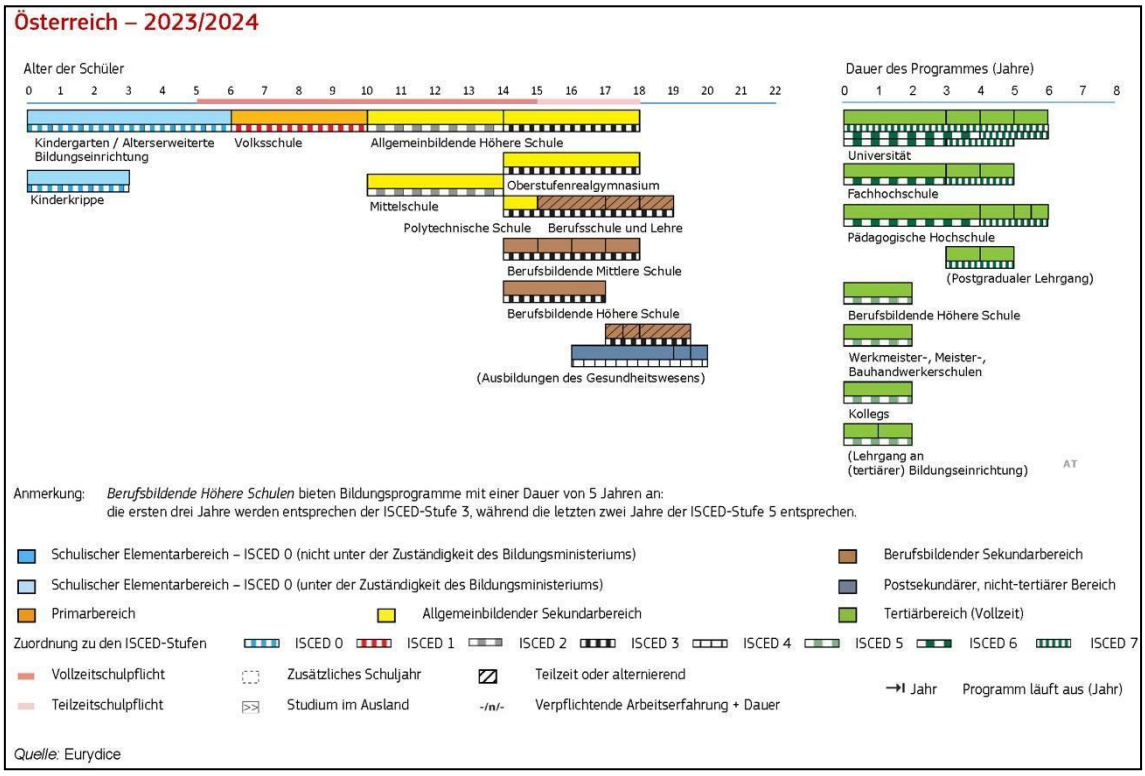
Adult learning programmes may lead to legally regulated qualifications (also called formal qualifications). They include second-chance programmes, for example programmes that aim at the acquisition of qualifications by adults in the formal education sector like

- the compulsory schooling qualification (Pflichtschulabschluss),
- the apprenticeship-leave certificate (Lehrabschlussprüfung),
- the final certificate from schools for people in employment (Berufsreifeprüfung)

Figure 10 Structure of the National Education System in Austria



Source 27 https://eurydice.eacea.ec.europa.eu/national-education-systems/austria/overview#:~:text=Stages%20of%20the%20Education%20System,-In%20September%202010&text=School%20education%20is%20compulsory%20for,Compulsory%20secondary%20school%20(Mittelschule)

Table 25 Number of Pupil and Students - Austria

Educational institution	Number of pupils and students
Primary School	351.276
Secondary School / Lower Secondary School	209.145
Special (SEN) School	12.830
Pre-Vocational School	14.361
Academic Secondary School – Lower Level	123.723

Academic Secondary School – Upper Level	85.246
Intermediate Technical And Vocational School	32.244
Higher Technical And Vocational School	118.210
Post-Secondary College	1.998
University	117.142
Other Formal Education	8.503
Pupils And Students Total	**1.074.678**

Table 26 Number of educational institutions in Austria

School type	Total	Public	Private
Compulsory School	4.42	4.236	193
Academic Secondary Schools	356	272	84
Other General Schools (Statutes)	149	0	149
Vocational Schools for Apprentices	143	137	6
Schools for Intermediate and Colleges for Higher Vocational Education (including statutes)	545	330	215
Federal Sports Academies	5	4	1
Schools for the Medical Services	300	181	119
Total for All Types of Schools	**5.921**	**5.157**	**764**

4.1.5. Blue Schools Potential and Development

Ocean literacy proposes to include ocean and marine environment-related content in school curricula. This topic has been deemed effective for citizens to develop actions and attitudes towards the health of marine and aquatic ecosystems. It plays a crucial role in fostering environmental consciousness and responsible citizenship among students and society in general.

The EU4Ocean Coalition, with the support of DG MARE, brings together organisations, projects and individuals committed to promoting ocean literacy across Europe. The DG MARE of EU recognises that the role of teachers is essential to the mission of the EU4Ocean Coalition.

To support teachers, a Network of European Blue Schools has been established. The concept of a European Blue School evolved from the marine education expertise gathered from consultations with teachers and educators across Europe. It acknowledges the variety of cultures and school communities from the 27 EU Member States and champions the concept of open schooling1 – encouraging the development of local partnerships to make the learning context relevant.

Map 5 Blue Schools in Austria

Source 28
https://ec.europa.eu/maritimeaffairs/atlas/maritime_atlas/#lang=EN;p=w;bkgd=770;theme=572:0.8;c=1591715.5239922956,5954659.336852785;z=7

The emergence of the Network of European Blue Schools marks a pivotal moment in promoting environmental education and sustainability across the 27 EU Member States. In Austria, the participation in this transformative initiative has been relatively limited, with only two schools actively involved, namely Gymnasium Draschestrasse Vienna Bilingual School - Junior High School – Vienna and BRGORG15.at -Senior High School – Vienna.

Table 27 List of Blue Schools in Austria

No.	Institution name	Level of education	Region	Country	Town
1	BRG/BORG15	Senior High School	Danube River	Austria	Vienna
2	Gymnasium Draschestrasse	Junior High	Danube River	Austria	Vienna

	Vienna Bilingual School	School			

In Austria, a landlocked country, the importance of ocean literacy and blue school may not be immediately apparent. However, the Danube River gives the interconnectedness of global water ecosystems. It's a link that connects 10 countries, tying Vienna to Bratislava, Budapest, and Belgrade like a string of capital-city pearls. Europe's second-longest river is a bustling thoroughfare for shipping and a tranquil refuge for summer holidays. It's an important source of hydropower and a haven for fish, birds, and amphibians.

Alongside the possibility of insufficient awareness about the importance of ocean and blue literacy in a global context, there seems to be little knowledge regarding the Network of the European Blue Schools. According to statements from local networks of schools and non-formal educational providers, this could be caused by a general absence of public awareness and visibility of the network.

The presumption of insufficient knowledge about the establishment of a Europe-wide network of blue schools was confirmed as SHORE project representatives in Austria (Austrian Country Hub) informed immediate partner schools about the possibility of becoming a member. They expressed a strong interest in joining and the possibility of networking with other European schools in order to strengthen ocean literacy in Austria and abroad.

The list contains a first overview of the schools which the Austrian Country Hub got in touch at the beginning of the SHORE project and who expressed their interest of joining the Network of Blue Schools.

Table 28 List of Potential Blue Schools Austria

No.	Institution name	Level of education	Region	Country	Town
1	Uno City Kindergarten	Kindergarten	Danube River	Austria	Vienna
2	OVS Am Kaisermühlendamm	Primary school	Danube River	Austria	Vienna
3	GTVS Alte Donau	Primary school	Danube River	Austria	Vienna
4	GEPS Marktgasse - VS im Lichtental	Primary school	Danube River	Austria	Vienna
5	VS Schubertschule	Primary school	Danube River	Austria	Vienna
6	GTVS Monte Laa	Primary school	Danube River	Austria	Vienna

7	GTVS Kolonizgasse	Primary school	Danube River	Austria	Vienna
8	VS Dunantgasse	Primary school	Danube River	Austria	Vienna
9	De La Salle Schule Währing	Primary school	Danube River	Austria	Vienna
10	OVS Zennergasse	Primary school	Danube River	Austria	Vienna
11	GTVS Krotti	Primary school	Danube River	Austria	Vienna
12	GTVS Breitenfurterstraße	Primary school	Danube River	Austria	Vienna
13	OVS Bertha von Suttner Gasse	Primary school	Danube River	Austria	Vienna
14	OVS Phorusgasse	Primary school	Danube River	Austria	Vienna
15	GTVS Knöllgasse	Primary school	Danube River	Austria	Vienna
16	OVS Schüttaustraße	Primary school	Danube River	Austria	Vienna
17	VS Salvatorgasse	Primary school	Danube River	Austria	Vienna
18	VS & SES Hahngasse 35	Primary school	Danube River	Austria	Vienna
19	OMS Glasergasse	Primary school	Danube River	Austria	Vienna
20	Mittelschule Walther von der Vogelweide	Middle school	Danube River	Austria	Aschbach
21	MS Kopp1	Middle school	Danube River	Austria	Vienna
22	MS Kopp2	Middle school	Danube River	Austria	Vienna
23	MS Wendstadtgasse	Junior High School	Danube River	Austria	Vienna
24	Bertha von Suttner Schulschiff	Junior High School	Danube River	Austria	Vienna

25	GRG21 Franklinstraße	Senior High School	Danube River	Austria	Vienna
26	Sperlgymnasium	Senior High School	Danube River	Austria	Vienna
27	BRG 9	Senior High School	Danube River	Austria	Vienna
28	Gymnasium am Augarten	Senior High School	Danube River	Austria	Vienna
29	Hertha Firnberg Schule	Senior High School	Danube River	Austria	Vienna
30	BORG3	Senior High School	Danube River	Austria	Vienna
31	BORG Pichelmayergasse	Senior High School	Danube River	Austria	Vienna

By focusing on tailored educational programs, community engagement and enhancing teacher training, advocacy, and resource mobilization, Austria can bridge this gap and also contribute to the global movement towards more sustainable and holistic education.

The potential of the Network of Blue Schools in Austria is considered significant, given the existing nationwide initiatives, such as the Wasserschule (waterschool), which focuses on creating awareness about the importance of drinking water. This initiative has been well-received all across Austria, with two-thirds of primary schools and half of secondary schools in Vienna are now registered as Wasserschulen. Remarkably, the Wasserschule initiative has been in operation for a decade, showcasing its enduring impact on promoting water-related awareness. Every school student receives a complimentary reusable water bottle to encourage practical application of the knowledge gained in the workshops. In addition, teachers participating in these programs receive valuable educational resources, including material on water literacy, health promotion and general educational materials. This holistic approach not only equips teachers with the necessary tools for effective teaching, but also reaches out to parents by providing further informational materials. By encouraging collaboration between schools, teachers and parents, the initiative ensures a comprehensive and sustainable commitment to water awareness and general wellbeing.

The success of this initiative is indicative of the positive reception and responsiveness of educational institutions to such programs. The emphasis on promoting the habit of drinking water is crucial for the overall well-being of school students. The fact that two-thirds of primary schools and half of secondary schools in Vienna have embraced the Waterschool designation speaks volumes about the effectiveness of the program in instilling a culture of water consciousness among students.

Furthermore, non-formal providers of water-related projects have also witnessed significant interest from schools. One noteworthy example is the Waterschool (not to be confused with the above-mentioned Austrian-wide “Waterschool” initiative) organized by the Municipal Department for Water of the City of Vienna (MA 31 - Wiener Wasser). This initiative offers free workshops during the school year, focusing on topics such as Global Water Supply, Vienna's Water System, and Historical Water Supply. The popularity of these workshops is evident, as the program is consistently fully booked for months in advance.

The participation of schools in such programs not only underscores their commitment to holistic blue school education but also demonstrates the receptiveness of school students to engaging and interactive learning experiences. The Network of Blue Schools in Austria can leverage the success of existing initiatives across Austria to expand its influence and impact. By tapping into the enthusiasm demonstrated by schools and students for water-related programs, the Network can create a ripple effect, inspiring more educational institutions to join the cause. The key lies in fostering collaboration, sharing best practices and highlighting the tangible benefits of incorporating water-centric initiatives into the curriculum.

The Water School's decade-long presence and sustained popularity underscore the enduring importance of water-related education. The fact that a considerable percentage of primary and secondary schools in Vienna and beyond actively participate in this initiative highlights the potential for widespread adoption and success of similar programs across the country. It also indicates a fertile ground for the Network of Blue Schools to sow the seeds of similar initiatives on a broader scale.

Beyond formal education, the interest generated by non-formal providers, such as the Municipal Department for Water's Waterschool project, adds another layer of evidence to the potential success of the Network of Blue Schools. The fact that their workshops on global water issues and local water systems are consistently oversubscribed implies a strong demand for knowledge in these areas. This presents an opportunity for the Network to collaborate with such providers, further enriching the educational landscape and ensuring a multifaceted approach to water-related education.

In conclusion, the potential of the Network of Blue Schools in Austria is indeed substantial, considering the success of many existing nationwide initiatives. The high level of participation and enthusiasm from schools and school students, coupled with the sustained popularity of such programs over the years, bodes well for the expansion and impact of the Network. By building on these successes, fostering collaboration, and capitalizing on the evident demand for water literacy, the Network of Blue Schools has a promising path ahead in shaping a generation of environmentally conscious and water literate citizens in Austria.

Nevertheless, more efforts are required to promote the Network of European Blue Schools within Austria and to explain the benefits of membership to those responsible. The opportunities to raise awareness of such initiatives through local formal and non-formal actors clearly demonstrate the importance of projects such as SHORE for Europe-wide networks. These projects not only promote a holistic understanding of

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ocean literacy, but also provide a single point of contact for schools to discuss challenges in the accreditation process and exchange ideas.

Strategies for Implementation in Disadvantaged Areas in Austria:

Tailored Educational Programs: Disadvantaged areas in Austria, characterized by economic, social, or educational challenges, require tailored educational programs aligned with the Blue School concept. Marine and environmental themes need to be integrated into the curriculum to foster ocean literacy and ecological awareness with a clear focus on the regional context in a global perspective. The effectiveness of the program will be enhanced by addressing specific challenges faced by these areas.

Community Engagement and Empowerment: Partnerships with local communities should be forged, ensuring their active involvement in the Blue School initiative. Residents need to be empowered to contribute to the program's success by organizing workshops, seminars, and clean-up campaigns. A sustainable approach to environmental education is fostered by cultivating a sense of ownership within the community through co-creative and community-led approaches.

Teacher Training and Resources: Comprehensive pre-service and in-service training should be provided for teachers in disadvantaged areas to equip them with the knowledge and skills necessary for the effective implementation of the Blue School concept The availability of resources, including educational materials, is ensured to facilitate engaging and impactful learning experiences.

In addition, targeted advocacy and awareness campaigns are required to highlight the benefits of the Blue School concept. Collaboration is established with educational authorities, environmental organizations, and local communities to disseminate information about the initiative. Clear communication on the positive impact of the program can attract more schools to join.

Moreover, incentive programs should be established to recognize and reward schools actively participating in the Blue School initiative by national and local authorities. Motivation for other institutions to join the cause can be achieved by acknowledging their commitment to environmental sustainability. A sense of pride and achievement for participating schools is supported by certifications, awards, and public recognition.

Collaboration with governmental bodies, NGOs, and corporate partners are expanded to amplify the reach of the Blue School concept. A network needs to be established to facilitate the sharing of best practices, resources, and expertise. The scalability of the initiative will be contributed to, and more schools will be encouraged to participate through collaborative efforts.

As the Blue School concept becomes entrenched in the educational landscape, schools witness the positive impact on student learning outcomes. Increasing awareness and concern about environmental issues globally contribute to a growing recognition of the significance of programs like the Blue School initiative. Schools recognize the urgency to equip students with the knowledge and skills to address environmental challenges, fostering a sense of responsibility and stewardship.

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As more schools successfully implement the Blue School concept, they become beacons of inspiration for others. Demonstrated success stories, coupled with tangible positive outcomes in terms of student engagement and environmental impact, serve as powerful motivators for schools considering participation.

4.2. Czechia

4.2.1. Region Selection Criteria and Process

Map 6 Map of Central Europe

Source 29 https://commons.wikimedia.org/wiki/File:Central_Europe_Regions.png

Central Europe is a region in the north of Europe. It includes Germany, Austria, Czechia, Slovakia, Hungary, Slovenia, Croatia, Bosnia and Herzegovina, Serbia, Montenegro and Albania. Central Europe is a region with a rich history and culture. In the Middle Ages, powerful empires and kingdoms ruled the region. These empires and kingdoms made important contributions to the region's architecture, art and culture. Central Europe is also an important industrial and economic center. The region is home to various industries such as automotive, machinery, chemicals and metallurgy. Central Europe is also famous for its natural beauty. The region is home to high mountain ranges such as the Alps, Carpathians and Dinar Mountains. These mountain ranges are famous for the region's spectacular landscapes. The Czech Republic is one of the largest countries in Central Europe. It is a modern country with a rich history and culture. The Czech Republic is located in the heart of Central Europe. Prague, the country's capital and largest city, is a magnificent medieval city. Prague is a UNESCO World Heritage Site.

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4.2.2. Characteristics of Each Region

Czechia is a landlocked country in Central Europe. The country is bordered by Poland to the north, Germany to the west, Austria to the south and Slovakia to the east.

Table 29 Population of Czechia

3. Population by age				
		Total	Males	Females
Population,		10.524.167	5.186.548	5.337.619
of which	0 - 14	1.691.760	866.322	825.438
	15 - 19	489.836	251.546	238.290
	20 - 29	1.078.231	555.938	522.293
	30 - 39	1.409.650	728.753	680.897
	40 - 49	1.735.533	893.989	841.544
	50 - 59	1.354.501	685.659	668.842
	60 - 64	616.608	300.966	315.642
	65 - 69	668.081	311.547	356.534
	70 - 79	1.037.997	442.963	595.034
	80 - 89	378.684	132.717	245.967
	90 - 99	62.639	16.037	46.602
	100 +	647	111	536

Source 30 Czech Statistical Office, 2024

The Czech Republic is a country located in Central Europe. The population of the country is 10,524,167 people as of 2023. Of this population, 49.4% is male and 50.6% is female.

Looking at the population pyramid, it is seen that the Czech Republic is a country with a young population structure. The 0-14 age group constitutes 16.1% of the population and the 15-29 age group constitutes 14.3% of the population. The sum of the population in these two groups corresponds to 30.4%.

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The 30-64 age group accounts for 48.7% of the population. This group constitutes the working age population of the country. The proportion of the population aged 65 and over is 20.8%. This group constitutes the country's elderly population.

The wide base of the population pyramid indicates that the Czech Republic has a large young population. This situation suggests that the country will have a more dynamic structure economically and socially in the future. However, the narrowing of the top of the population pyramid indicates that the country's elderly population will increase. This may cause further strain on the country's social security system and health services.

According to the data in the table, the age group with the largest population in the Czech Republic is the population aged 30-39. This group constitutes a significant portion of the country's working age population. The proportion of the population aged 20-29 is also quite high. This shows that the Czech Republic has a young and dynamic population structure. The proportion of the population aged 65 and over is 20.8%. This rate is slightly below the European average. However, it is expected to increase in the future.

The Czech Republic's young population structure suggests that the country will have a more dynamic structure economically and socially in the future. However, the increase in the proportion of the elderly population may cause more strain on the country's social security system and health services.

The Czech Republic is a landlocked country located in Central Europe. The country has a rich historical and cultural heritage, as well as a variety of ecological and environmental features. These features reflect the country's natural beauty and biodiversity.

The Czech Republic is a geologically diverse country. In the north of the country lies a mountain range called the Bohemian Massif. These mountains have been shaped by volcanic activity and glacial erosion. The massif is home to deep valleys, lush forests and breathtaking landscapes.

Šumava National Park: Located on the border with Germany, this park is one of the largest wild forests in Europe. The park is covered with spruce, fir and beech trees and is home to wild animals such as wolves, lynx and capercaillie.

Moravian Karst: This region is characterized by limestone caves, karst pits and underground rivers. The region is home to natural wonders such as the Macocha Cliff.

The Czech Republic is home to various ecological zones. The country's forested areas perform an important ecological function. These forests help regulate the climate, prevent soil erosion and provide habitat for various plant and animal species.

Třeboň Basin: This UNESCO Biosphere Reserve contains the largest system of fishponds in Europe. The basin is an important habitat for waterfowl and allows recreational activities such as fishing and birdwatching.

Bohemian Paradise: Located northeast of Prague, this protected area is characterized by sandstone rock formations, canyons and gorges. The area is a popular destination for hikers and mountaineers.

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The Czech Republic has rich water resources. The most important water resources of the country are as follows:

Elbe River: Forming the northwestern border of the country, the Elbe River is the longest river in the Czech Republic. The river supports various ecosystems and is an important waterway for transportation and recreation.

Morava River A sister river of the Elbe River, the Morava River flows through the Moravian region. The river feeds fertile farmland and is home to a rich aquatic habitat.

Lake Lipno: Built on the Vltava River, this artificial lake is a popular destination for water sports, fishing and relaxation. The lake offers spectacular views of the Šumava National Park.

The Czech Republic's water resources face various threats. These threats include uneven water distribution, seasonal fluctuations and pollution from agriculture and industry. Sustainable water management is critical for future water security.

The Czech Republic is making significant efforts to protect its natural resources. More than 15% of the country's territory is under protection, such as national parks, nature reserves and Natura 2000 areas. These areas help to preserve diverse ecosystems and biodiversity.

Some of the challenges the Czech Republic faces to protect its natural resources are:

Habitat loss due to agricultural expansion, deforestation and invasive species

Water pollution and climate change

The Czech Republic is working to address these challenges by focusing on sustainable practices. These practices include promoting eco-tourism, promoting renewable energy sources and implementing stricter environmental regulations.
Economic Situation

The Czech Republic has a developed market economy as of 2023. In 2023, GDP amounted to 282.2 billion dollars. The service sector accounts for about 60% of GDP, followed by important industrial sectors such as automotive, machinery, chemicals and pharmaceuticals. The country is a member of the European Union and is tightly integrated into the European economy. In recent years, the Czech Republic has recorded strong economic growth. GDP grew at an average annual rate of 3.5% in the period 2022-2023. The unemployment rate declined to 2.8% in 2023. Inflation amounted to 7.3% in 2023.

The Czech Republic has a diversified industrial base. The automotive sector plays an important role with local and international car manufacturers such as Škoda Auto. Other important industries include mechanical engineering, chemicals, pharmaceuticals and food processing.

The agricultural sector accounts for around 3% of GDP. In 2023, the total value generated by the agricultural sector amounted to $8.5 billion. Crops such as cereals, sugar beet, potatoes and fruit are produced. However, the country is not agriculturally self-sufficient and has to import some food products.

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The Czech Republic is divided into four historical regions: Bohemia, Moravia, Silesia and Prague. These regions differ socio-economically.

Bohemia: The most developed region of the country, with the capital Prague, has a strong service sector. Industry is also important and is dominated by sectors such as automotive, machinery and chemicals. In 2023, the Bohemian region had a GDP of $185.6 billion, a population of 6.3 million and an unemployment rate of 2.6%.

Moravia: Less developed than Bohemia, but still highly industrialized. Mechanical engineering, chemicals and textiles are important sectors. Agriculture is also more important in Moravia. In 2023, the Moravian region had a GDP of $67.2 billion, a population of 3.9 million and an unemployment rate of 3.1%.

Silesia: It is the least developed region of the country. Coal mining and the steel industry used to be important but have declined in recent years. In 2023, the Silesia region had a GDP of $29.4 billion, a population of 2.2 million and an unemployment rate of 4.1%.

Prague: The economic and cultural center of the country. The service sector, especially finance, technology and tourism, dominates. The cost of living is higher than in other regions. In 2023, the Prague region had a GDP of $20.1 billion, a population of 1.2 million and an unemployment rate of 2.2%.

Besides regional differences, within the Czech Republic there are also socioeconomic differences between urban and rural areas. Urban areas generally have higher income levels and more job opportunities. Rural areas, on the other hand, have lower income levels and fewer job opportunities.

When analyzing education in the Czech Republic according to the following data provided by the National Statistical Office of the Czech Republic

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Table 30 Numbers of schools, classes, children, pupils and students in the educational system of the Czech Republic by type of school

Type of school		School/academic year										
		2006/ 2007	2007/ 2008	2008/ 2009	2009/ 2010	2010/ 2011	2011/ 2012	2012/ 2013	2013/ 2014	2014/ 2015	2015/ 2016	2016/ 2017
Nursery school	Schools	4.815	4.808	4.809	4.826	4.880	4.931	5.011	5.085	5.158	5.209	5.20
	Classes	12.494	12.698	13.035	13.452	13.988	14.481	14.972	15.390	15.729	15.848	15.85
	Children	285.419	291.194	301.620	314.008	328.612	342.521	354.340	363.568	367.603	367.361	362.65
Basic school	Schools	4.199	4.155	4.133	4.125	4.123	4.111	4.095	4.095	4.106	4.115	4.14
	Classes	44.527	43.433	42.498	41.941	41.720	42.105	41.739	42.334	43.259	44.091	45.11
	Pupils	876.513	844.863	816.015	794.459	789.486	794.642	807.950	827.654	854.137	880.251	906.18
Secondary school	Schools	1.482	1.447	1.438	1.433	1.423	1.393	1.347	1.331	1.310	1.304	1.30
	Classes	23.416	23.379	23.357	23.260	22.904	21.986	20.918	20.192	19.771	19.546	19.38
	Pupils	576.585	569.267	564.326	556.260	532.918	501.220	470.754	448.792	435.542	427.107	424.84
	Pupils attending compulsory school education	42.901	42.829	42.330	41.639	41.152	40.885	40.549	40.419	40.409	40.495	40.98
Conservatoire	Schools	18	19	18	17	18	18	18	18	18	18	1
	Pupils	3.534	3.606	3.535	3.435	3.560	3.557	3.655	3.690	3.752	3.733	3.79
	Pupils attending compulsory school education	322	308	282	274	270	269	256	251	269	308	32
Higher professional school	Schools	174	177	184	184	182	180	178	174	174	171	16
	Study groups	1.201	1.154	1.115	1.071	1.053	1.012	1.002	998	994	947	90
	Students	27.650	28.774	28.027	28.749	29.800	29.335	28.980	28.332	26.964	24.786	22.00
Public or private university	Schools	64	69	71	70	69	70	69	69	69	66	6
	Public	25	26	26	26	26	26	26	26	26	26	2
	Students	316.177	343.943	368.050	388.992	395.984	392.039	380.891	367.768	346.799	326.423	311.04
	Students on public	285.148	303.133	319.154	333.149	339.361	339.039	333.284	324.944	308.212	292.432	280.17

Source 31 CZSO

The data covers the period from 2006/2007 school year until 2022/2023 school year.

The data includes information on the number of schools, number of classes, number of students, number of teachers and educational resources.

State of Education Infrastructure in the Regions

The data allows to analyze the state of education infrastructure in 14 regions of the Czech Republic. According to this analysis, educational infrastructure in all regions of the Czech Republic has developed significantly in recent years. The number of schools, classrooms and students has increased in all regions. However, some regions have more schools or teachers than other regions. This can lead to differences in the quality of education.

The data also examines the types of schools in the Czech Republic.

According to this analysis, there are three types of schools in the Czech Republic: pre-school, basic and middle school, and high school. Pre-school is the type of school that educates children up to the age of 6. Basic and middle school is the type of school that educates children aged 6-15. High school is the type of school for young people aged 15-19. In the school year 2022/2023, there are 4,815 pre-schools, 4,560 basic and middle schools, and 1,000 high schools in the Czech Republic. The number of pre-schools and basic and secondary schools is higher than the number of upper secondary schools. This indicates a high demand for early childhood education and compulsory school education.

According to this analysis, the number of students in the Czech Republic has increased significantly in recent years. The number of students increased from 285.419 in 2006/2007 to 1.007.778 in 2022/2023. The number of teachers has also increased in parallel with the increase in the number of students. The number of teachers increased from 108,860 in the 2006/2007 academic year to 250,834 in the 2022/2023 academic year. However, the increase in the number of students has been higher than the increase in the number of teachers. This has led to an increase in the number of students per classroom. In the 2006/2007 academic year, the number of students per class was 23.2. This number increased to 64.4 in the 2022/2023 school year. This increase may cause individual attention and support to become more difficult.

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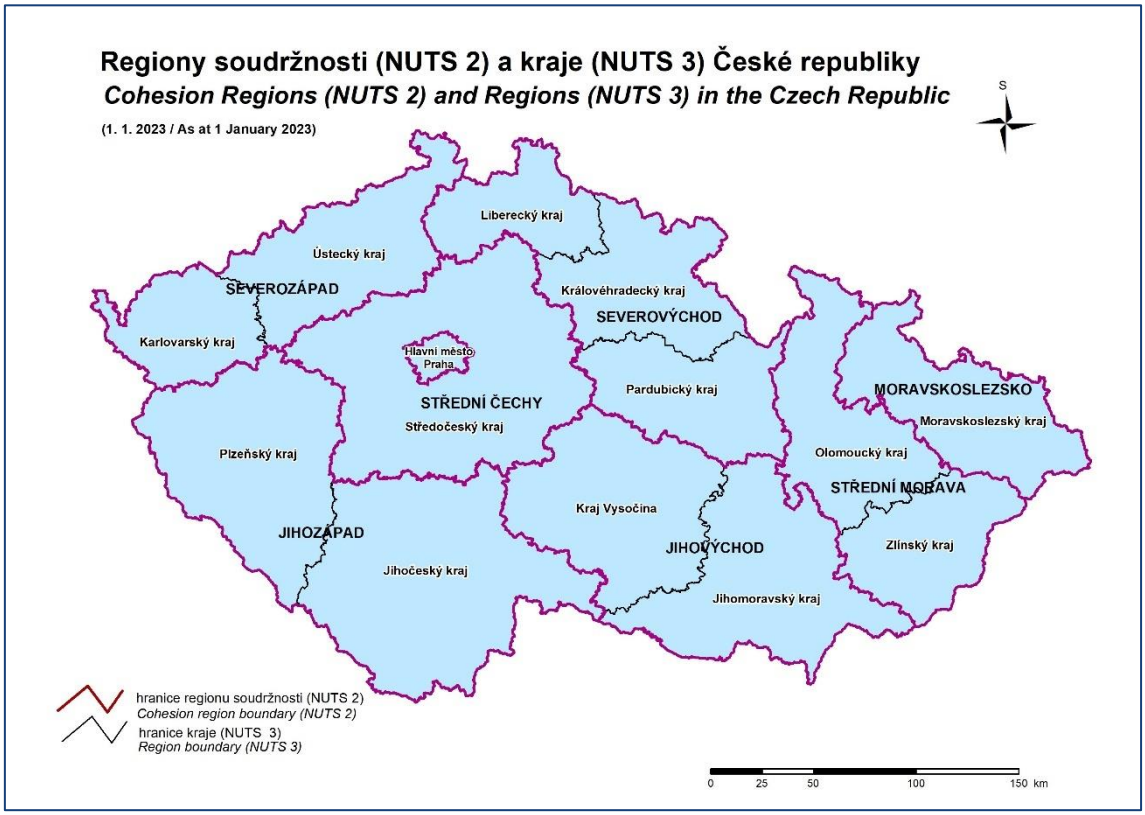
4.2.3. Assessment of Disadvantaged Regions

Map 7 NUTS2 and NUTS 3 Map



Source 32 CZSO

Disadvantaged Regions in the Czech Republic (NUTS2)

The disadvantaged regions in the Czech Republic can be ranked as follows according to the NUTS2 regional classification:

Moravian-Silesian region: This region is located in the east of the country and is a region of intense industrialization. However, this industrialization has led to environmental problems.

Pardubice region: This region is located in the east of the country and has an economy based on sectors such as agriculture and forestry. However, these sectors are vulnerable to economic fluctuations.

Olomouc region: This region is located in the east of the country and has an economy based on sectors such as agriculture and tourism. However, these sectors are vulnerable to economic fluctuations.

Kraj Vysočina region: This region is located in the southeast of the country and has an economy based on sectors such as agriculture and forestry. However, these sectors are vulnerable to economic fluctuations.

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East Bohemia region: This region is located in the east of the country and has a mountainous terrain. It is disadvantaged in terms of transportation and communication.

These regions are often disadvantaged for the following reasons:

Historical factors: These regions may have been affected by negative historical factors in the past, such as neglect or discrimination. For example, during the Communist era in Czechoslovakia, the east and south-east of the country were seen as lower priority regions for industrialization and economic development. This negatively affected the economic and social development of these regions.

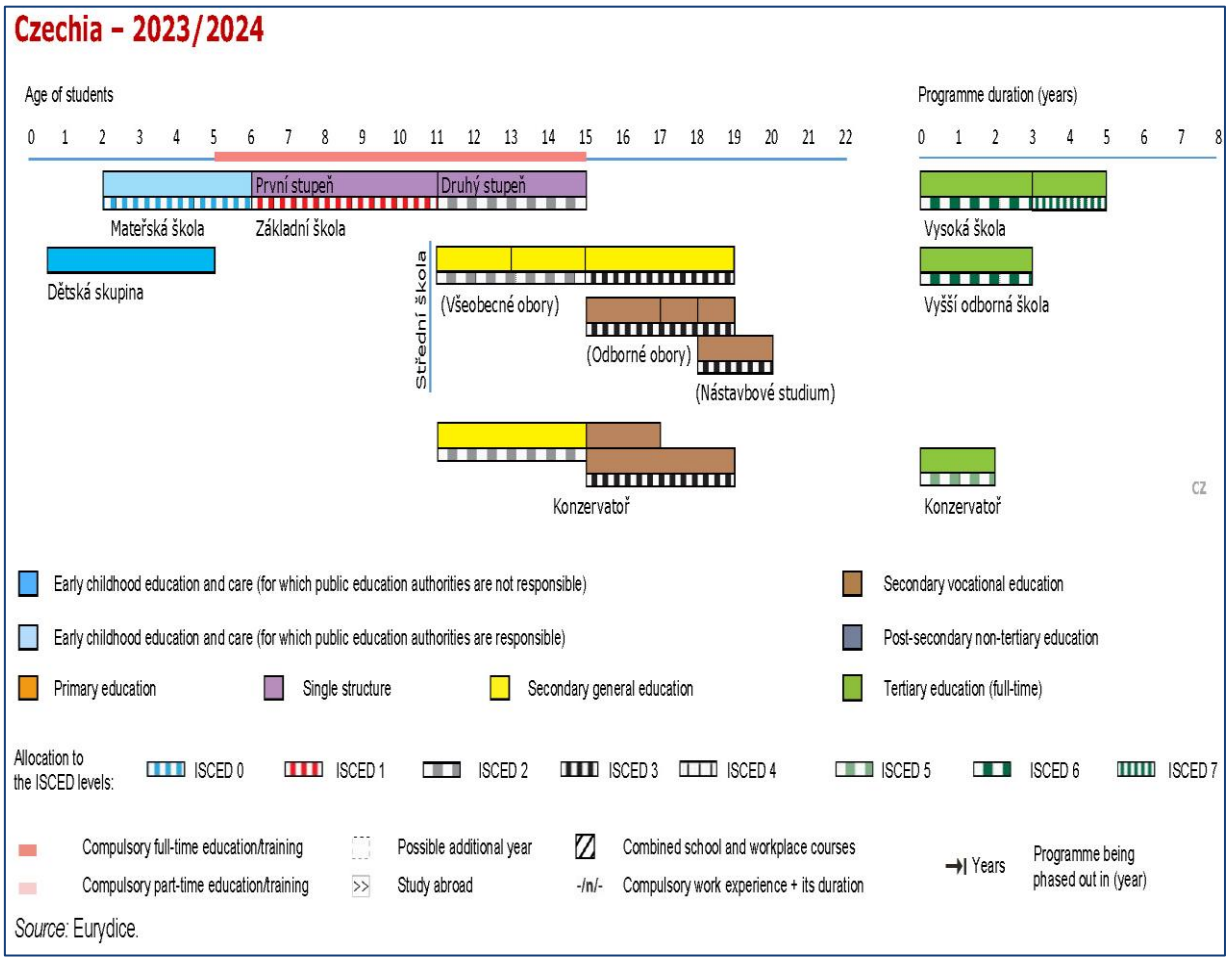
Geographical factors: These areas may have been affected by geographical factors, such as being difficult to access or lacking natural resources. For example, mountainous regions in the east of the Czech Republic are disadvantaged in terms of transportation and communication. This hinders the economic development of these regions.

Cultural factors: These areas may be influenced by different cultural values or traditions. For example, the Moravian region in the southeast of the Czech Republic has a distinct cultural identity. This makes the economic development of this region difficult.

Disadvantaged regions are an important part of society and the well-being of people in these regions is important for the overall well-being of the country. Special approaches to disadvantaged regions should be developed to promote ocean literacy and the blue economy of people in these regions.

4.2.4. Education System Analysis

Figure 11 Structure of the National Education System in Czechia



Source 33 Eurydice

System of Education

The Czech Republic boasts a comprehensive education system encompassing three core stages: elementary education, secondary education, and tertiary education. For children aged two to five, preschools offer invaluable early childhood development opportunities. While generally not state-funded until the penultimate year before elementary school, these institutions play a crucial role in fostering social and cognitive skills. Notably, while tuition fees are waived after preschool, the onus falls upon parents to provide essential materials like stationery and foodstuffs for their children's continued learning. A robust network of private schools exists across the nation, yet financial accessibility remains a significant barrier for many families. A pertinent contemporary debate centers around the potential introduction of tuition fees for university education, reflecting the dynamic nature of the system and its responsiveness to evolving societal needs.

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Elementary education is mandatory for children aged six to fifteen, ensuring a strong foundation in core academic disciplines. Upon completion, divergent paths emerge. Some individuals opt to conclude formal education, while others pursue specialized training at professional or vocational schools, catering to diverse talents and aspirations. Notably, enrollment figures in public schools are relatively high, although these statistics do not necessarily capture the nuances of active student engagement.

The Ministry of Education, Youth, and Sports oversees the Czech educational system, demonstrating the nation's commitment to nurturing its future generations. With a budget exceeding €4.6 billion in 2016, the ministry underscores the substantial resources allocated to this vital sector.

The Czech Republic's elementary school system, known as "základní škola," presents a multifaceted tapestry of educational opportunities woven across nine years, meticulously divided into two distinct stages. The first five years, constituting the initial stage, act as a crucible for foundational knowledge acquisition, nurtured by a single dedicated pedagogue. While core subjects like Czech language, mathematics, and basic sciences form the bedrock of the curriculum, a foreign language, typically English, begins to unlock the doors to intercultural understanding. Physical education, artistic expression through music and visual arts, and practical skills honing through handcrafts further enrich the student's experience. Notably, the smaller villages often consolidate classes, ensuring accessibility even in remote areas.

As students traverse the final four years of the second stage, compulsory education reaches its culmination. The curriculum undergoes a nuanced expansion, welcoming additional foreign languages, literature dedicated to fostering a love for the written word, and subjects like civics and physics that equip students with the tools to navigate the complexities of modern society. While some subjects become optional in the final two years, the core remains robust, preparing students for their onward educational journeys.

At this crossroads, students encounter a divergence in pathways. The majority opt to continue their studies within the familiar confines of their original elementary school, allowing for a seamless transition and continued nurturing by established relationships. Some, however, choose to embark on a more specialized path, enrolling in either an eight-year or a six-year academy. While eight-year academies often integrate a distinctive emphasis on physical education, the six-year variety might offer an immersive experience with foreign languages dominating the latter years. Interestingly, the eight-year academy utilizes Latin numerals to designate grade levels, adding a touch of classical elegance to the educational journey.

The Czech Republic's secondary education system offers a diverse array of pathways for students after their nine-year elementary education journey. For those seeking the prestigious "maturita" qualification, the gateway lies in specialized secondary schools. Since 2016/2017, these institutions have mandated entrance examinations in mathematics and Czech language, administered by the government agency CERMAT, ensuring a robust foundation for further academic pursuits.

The landscape of secondary education transcends the singular pursuit of the maturita, catering to varied aspirations and skillsets. Vocational schools, offering two- or three-year programs culminating in vocational certificates, equip students with practical skills

for immediate entry into the workforce. However, some ambitious vocational schools offer a dual track, granting both the vocational certificate and the coveted maturita, opening doors to university studies for motivated students.

For those seeking a blend of vocational and academic rigor, professional schools and lyceums present compelling options. Professional schools, spanning four years, offer maturita qualifications alongside specialized instruction in diverse fields like technical chemistry, agriculture, and internet technology. Lyceums, emphasizing a broader curriculum, delve deeper into academic subjects like history and geography compared to their professional counterparts. From technical lyceums fostering engineering prowess to pedagogical lyceums nurturing future educators, these institutions cater to a myriad of vocational aspirations.

For students with their sights firmly set on university admission, grammar schools provide a rigorous academic environment. These four-year institutions, accessible through either eight-year or six-year academy pathways or directly from elementary school, emphasize core subjects like mathematics, languages, and literature. While the curriculum mirrors that of the second stage of elementary school, grammar schools elevate the rigor by making these subjects mandatory only in specific years, allowing students to explore elective options that ignite their passions.

The maturita examination, the pinnacle achievement of secondary education, serves as the key that unlocks the doors of higher education. This standardized test, devised by CERMAT, encompasses Czech language and world literature, demanding proficiency in reading, writing, and oral communication. Additionally, students must master either mathematics or a foreign language to B1 level according to the Common European Framework of Reference for Languages, demonstrating not only linguistic competency but also intellectual agility. Each school further contributes two or three exams tailored to their unique curriculum, ensuring a multifaceted assessment of student preparedness.

Table 31 Basic School Education in Czech Republic

	Schools	Classes			Pupils				
		Total	by ISCED level		Total	by sex		by ISCED level	
			ISCED 1	ISCED 2		Girls	Boys	ISCED 1	ISCED 2
2006/2007	4.199	44.527	24.566	19.961	876.513	422.041	454.472	462.820	413.693
2007/2008	4.155	43.433	24.324	19.109	844.863	406.776	438.087	458.046	386.817
2008/2009	4.133	42.498	24.325	18.173	816.015	392.745	423.270	458.198	357.817
2009/2010	4.125	41.941	24.521	17.420	794.459	382.748	411.711	460.754	333.705
2010/2011	4.123	41.720	24.703	17.017	789.486	381.028	408.458	465.380	324.106
2011/2012	4.111	42.105	25.277	16.828	794.642	384.212	410.430	474.327	320.315
2012/2013	4.095	41.739	25.187	16.552	807.950	391.115	416.835	488.106	319.844
2013/2014	4.095	42.334	25.764	16.570	827.654	400.894	426.760	505.983	321.671
2014/2015	4.106	43.259	26.663	16.596	854.137	414.331	439.806	529.604	324.533
2015/2016	4.115	44.091	27.465	16.626	880.251	427.435	452.816	551.428	328.823
2016/2017	4.140	45.116	28.222	16.894	906.188	440.240	465.948	568.966	337.222
2017/2018	4.155	46.023	28.624	17.399	926.108	449.654	476.454	575.699	350.409
2018/2019	4.172	46.774	28.759	18.015	940.928	456.757	484.171	573.442	367.486
2019/2020	4.192	48.117	29.035	19.082	952.946	462.903	490.043	563.346	389.600
2020/2021	4.214	49.201	29.213	19.988	962.348	467.608	494.740	555.089	407.259
2021/2022	4.238	50.050	29.304	20.746	964.571	469.055	495.516	545.711	418.860
2022/2023	4.261	51.190	29.924	21.266	1.007.778	490.531	517.247	569.927	437.851

Source 34 CZSO

The trends and initiatives observed in basic school education in the Czech Republic between 2006 and 2023 are as follows:

General enrollment:

The total number of basic schools remained relatively stable, ranging from 4,199 to 4,261.

However, the total number of classes in these schools increased slightly, from 44,527 to 51,190.

Total student enrollment also increased steadily, from 876,513 to 1,007,778.

Gender distribution:

The data reveals a consistent gender imbalance, with female students outnumbering male students. This gap has remained stable between 40,000 and 50,000.

ISCED levels:

The data distinguish between ISCED 1 and ISCED 2 levels, possibly corresponding to primary and lower secondary education.

While the total number of students increased at both levels, the proportion of students in ISCED 2 relative to ISCED 1 appears to have decreased slightly. This may indicate a slight decline in student progression towards lower secondary education.

Trends and assessments:

Increasing total enrolment indicates a growing demand for basic education in the Czech Republic. This could be due to factors such as population growth or increased awareness of the importance of education.

The persistent gender imbalance is the subject of further research. Understanding the root causes of this disparity can help inform policies to promote equal access to ducation for all students.

The slight decrease in the proportion of students in ISCED 2 warrants further research, Understanding the possible causes of this trend, for example curriculum changes or student preferences, is critical to optimize the efficiency and effectiveness of the education Basic system.

Definition of the Framework Educational Programme for Basic (i.e. Primary and Lower Secondary) Education within the System of Curricular Document

> “In consonance with the novel curricular policy principles enshrined in the National Education Development Programme for the Czech Republic (the "White Paper") and further stipulated by the Education Act (encompassing preschool, basic, secondary, tertiary vocational, and other forms of education), a comprehensive curricular system for students aged 3 to 19 is being implemented within the Czech educational landscape. This revamped framework for learning is structured upon two distinct levels: national and school-based (as illustrated in Diagram 1).”

The national level, forming the bedrock of the curricular document system, comprises the National Education Programme and Framework Education Programmes (FEPs). The National Education Programme serves to delineate the entirety of initial education, establishing overarching goals and aspirations. Conversely, the Framework Education Programmes define binding educational standards across various developmental stages, encompassing preschool, basic, and secondary education.

At the school level, individual educational institutions develop School Education Programmes (SEPs). These school-specific documents translate the national directives into concrete operational plans, tailoring the curriculum to the unique needs and contexts of each learning environment. Notably, the National Education Programme, Framework Education Programmes, and School Education Programmes are all publicly accessible documents, readily available to both educators and the broader community.

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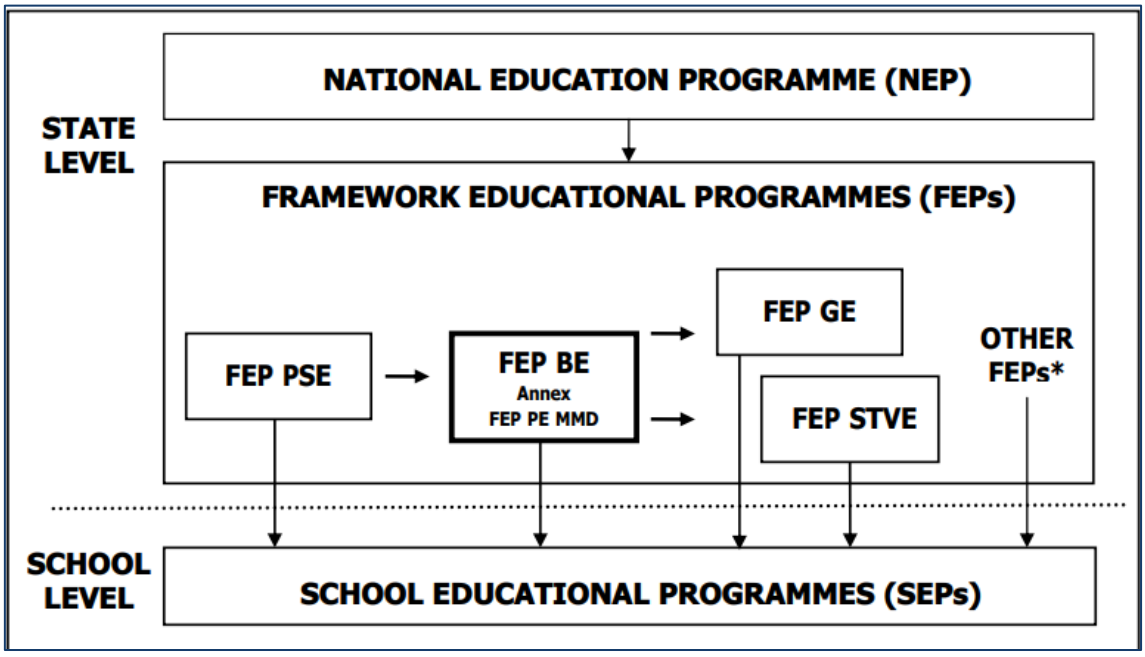
Figure 12 National Educational Programmes in Czechia



Source 35 The Ministry of Education, Youth and Sports

Foundation in New Education Strategy: Framework Educational Programmes (FEPs) are grounded in a transformative education strategy emphasizing key competencies. This strategy prioritizes the interconnectedness of these competencies with educational content, ensuring knowledge and skills are not only acquired but also effectively applied in real-world scenarios.

Lifelong Learning as a Guiding Principle: FEPs actively embrace the concept of lifelong learning. They encourage the development of skills and knowledge that foster continuous learning and personal growth beyond the confines of formal education.

Defining Expected Outcomes: FEPs meticulously formulate the expected learning outcomes for each educational stage. These outcomes serve as a benchmark for educational attainment, ensuring all students graduating from a specific stage have acquired the necessary knowledge and skills.

Empowering Schools and Teachers: FEPs promote the educational autonomy of schools, empowering them to adapt the curriculum to their specific context and student needs. This autonomy is coupled with teacher professional responsibility, encouraging educators to take ownership of their students' learning outcomes and continuously improve their instructional practices.

***Principles Of the Framework Educational Programme For Basic Education*:**

Continuity and Progression: The Framework Educational Programme for Basic Education (FEP BE) builds upon the established framework for pre-school education and serves as a cornerstone for the development of secondary education programmes.

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This ensures smooth transitions and progressive learning throughout the entire educational continuum.

Defining Common Pillars: The FEP BE establishes the essential and unifying elements that constitute the compulsory basic education system, encompassing both primary schools and the lower grades of grammar schools. This common core guarantees equal educational opportunities and foundational knowledge for all students.

Key Competency Benchmarks: The FEP BE explicitly outlines the expected level of key competencies students should achieve by the completion of their basic education. These competencies serve as crucial performance indicators and form the bedrock for lifelong learning and future success.

Specificity and Clarity: The FEP BE meticulously defines the educational content at two levels:

Expected Outcomes: These delineate the desired knowledge, skills, and attitudes students should acquire by the end of each educational stage.

Subject Matter: This specifies the core content domains and key concepts to be addressed within each subject area.

Cross-Curricular Integration: The FEP BE underscores the importance of integrating cross-curricular subjects with distinct formative functions. These subjects enrich the learning experience and contribute to the development of essential life skills, becoming mandatory components of the basic education curriculum.

Personalized Learning Approaches: The FEP BE advocates for a comprehensive approach to delivering educational content. This approach encourages:

Interlinking: Teachers have the flexibility to connect and integrate knowledge across various subjects, fostering deeper understanding and application.

Diverse Teaching Methods: The FEP BE encourages employing a variety of teaching procedures, methods, and formats to cater to individual student needs and learning styles.

Inclusivity and Differentiation: The FEP BE recognizes the diverse needs of learners and allows for tailoring the educational content to accommodate students with special educational needs. This ensures equitable access to quality education for all.

Guiding Secondary Education: The FEP BE serves as a binding document for secondary schools, setting clear requirements for entrance procedures. This establishes a cohesive transition from basic to secondary education while maintaining high academic standards.

Openness and Adaptability: Recognizing the dynamic nature of society and educational needs, the FEP BE is an open document. It undergoes periodic revisions to incorporate evolving societal demands, integrate teachers' experiences with school educational programmes, and respond to students' changing needs and interests.

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Educational Trends Promoted By The Framework Educational Programme For Basic Education:

Student-Centered Learning: The Framework Educational Programme for Basic Education (FEP BE) prioritizes adapting educational objectives to individual student needs and potential. This emphasizes personalized learning pathways and ensures all pupils have the opportunity to flourish.

Differentiation and Flexibility: The FEP BE encourages dynamic organizational structures and individualized approaches within the educational process. This includes embracing differentiated instruction, diverse teaching methods, and variable organizational patterns to cater to each student's unique learning style and pace.

Enrichment and Choice: The programme advocates for expanding the range of compulsory optional subjects that cater to diverse student interests and talents. This empowers students to actively shape their learning experience and cultivate individual potential.

Positive Learning Environment: The FEP BE underscores the importance of fostering a supportive and engaging learning environment. This emphasizes building social, emotional, and academic foundations through effective motivation, collaborative learning activities, and innovative teaching methods.

Assessment Reform: The programme promotes a gradual shift towards diagnostic assessments conducted on an ongoing basis. This encourages individualized feedback, formative assessment practices, and wider use of verbal evaluation to better guide and celebrate student progress.

Inclusive Classrooms: The FEP BE champions maintaining diverse student groups in mainstream classrooms. This prioritizes inclusive practices, minimizes unnecessary separation, and promotes peer learning and social harmony within classrooms and schools.

Enhanced Parent-School Collaboration: The programme places significant emphasis on strengthening cooperation and communication between parents and educators. This collaborative approach fosters shared responsibility for student success and creates a supportive learning ecosystem.

Key Competencies

Key competencies stand as the cornerstone of individual development and societal engagement. Encompassing a tapestry of knowledge, skills, abilities, attitudes, and values, they reflect the shared understanding of what equips individuals for personal well-being, success, and a stronger civil society. Education's mission lies in empowering all students with this foundational set, tailored to their individual strengths and potential, preparing them for continued learning and their future roles in the world. Acquiring these competencies is a lifelong journey, commencing in pre-school and weaving its way through basic and secondary education, continuously evolving and refining with each stage. While mastery at the end of basic education marks a

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significant milestone, it is merely the prelude to the ongoing development that shapes career readiness, personal fulfillment, and lifelong learning. Key competencies are not isolated entities but rather interconnected and multifaceted. They flourish within a comprehensive educational ecosystem, where diverse subjects serve as tools for mastering activity-oriented outcomes. Through this holistic approach, students gradually accumulate and integrate diverse abilities and skills, ultimately culminating in the effective application of these competencies across various life domains. The Framework Educational Programme for Basic Education (FEP BE) identifies six key competencies that act as guiding pillars for this essential journey: **learning, problem-solving, communication, social and personal, civic, and working competencies.** By fostering these intertwined facets, we equip individuals not only for academic success but also for thriving as responsible, adaptable, and engaged members of society.

Learning competencies;

> *‘’By the end of his or her basic education, the pupil:*
>
> *selects and uses suitable procedures, methods and strategies for efficient learning; plans, organizes and manages his or her own learning process; is willing to devote his or her time and efforts to additional study and life-long learning;*
>
> *searches for and classifies information, and based on their understanding, interlinking and systemization, uses them efficiently within the learning process in creative activities and real life;*
>
> *works with commonly used terms, signs and symbols; interlinks things with respect to their context; sets knowledge from different educational areas within a wider context, and based on this, forms a comprehensive view of mathematical, scientific, social and cultural phenomena;*
>
> *makes independent observations and experiments; compares the pieces of knowledge so gained, assesses them critically and draws conclusions from them for future use;*
>
> *recognizes the meaning and goal of learning; has a positive attitude towards learning; assesses his or her own progress and identifies obstacles or problems hindering his or her learning progress; makes plans as to how to improve his or her learning;*
>
> *makes a critical assessment of his or her own learning results and discusses them.’’*

Problem-solving competencies

> *‘’By the end of his or her basic education, the pupil:*
>
> *perceives the most diverse problem situations in school and out of school; recognizes and understands problems; considers discrepancies and their causes; considers and plans ways to address/solve problems based on his or her own reasoning and experience;*
>
> *seeks for information suitable for solving problems; identifies identical, similar and different features of pieces of information; makes use of acquired knowledge to discover/identify various ways to solve problems; is not discouraged by any failure and persistently seeks the best solution to the problem;*

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addresses problems independently; chooses suitable ways to solve problems; uses logical, mathematical and empirical methods to address/solve problems;

tests practically the adequacy of approaches to problem solving and applies proven methods when addressing similar or new problems; monitors his or her own progress in tackling problems;

thinks critically; makes prudent decisions and is able to defend them; is aware of the responsibility for his or her own decisions; evaluates the outcomes of his or her decisions.''

Communication competencies;

By the end of his or her basic education, the pupil:

formulates and expresses his or her ideas and opinions in a logical sequence; his or her oral or written expression is apt, coherent and cultivated;

listens to other people's utterances; understands then and responds to them adequately; participates effectively in debates; defends his or her opinion and uses appropriate arguments;

comprehends various types of text, record, visual material, commonly used gestures, sounds and other information and means of communication, considers them, responds to them and makes creative use of them for his or her own development and active engagement in social events;

uses information and means of communication and technologies for high-quality efficient communication with the outside world;

uses his or her acquired communication skills to form relations necessary for full-fledged coexistence and quality cooperation with others.

Social and personal competencies;

''By the end of his or her basic education, the pupil:

cooperates efficiently with other members of his or her group; participates together with teachers in setting up the rules of team work; helps teamwork to succeed based on recognising and accepting new roles in activities;

contributes to the creation of a friendly atmosphere in the team; contributes to a strengthening of interpersonal relations based on his or her consideration for others and respect for others; offers help or asks for help when needed;

contributes to discussions within a small group as well as to debate in the classroom; understands the need to efficiently cooperate with others when addressing a task; appreciates experience acquired by others; respects different opinions and learns from what other people think, say and do;

thinks of himself or herself in a positive way, thereby promoting his or her self-confidence and individual development; controls his or her behaviour so as to achieve a feeling of self-satisfaction and self-respect.''

Civil competencies

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‘’By the end of his or her basic education, the pupil:

respects the beliefs of others; has respects for personal values of others; is able to empathize; opposes oppression and any rude behaviour; is aware of his or her obligation to stand up against any physical or psychological violence;

understands the underlying basic principles of law and community standards; is aware of his or her rights and obligations in school and out of school; y makes responsible decisions based on the actual situation; offers adequate efficient help when needed; acts responsibly in critical situations, including situations threatening the lives and/or health of others;

respects, protects and appreciates national traditions and the country’s cultural and historical heritage; has a positive attitude to works of art; has a sense of culture and creativity, gets actively involved in cultural and sporting activities;

understands basic environmental issues and relationships; respects requirements for a goodquality environment; in his or her decisions takes into account the need to support and protect the health and sustainable development of society.’’

Working competencies

‘’By the end of his or her basic education, the pupil:

is able to safely and efficiently work with materials, tools and equipment; in his or her activities, complies with guidelines and rules; meets his or her obligations and commitments; adapts to changed or new working conditions;

takes into account, in addition to the aspects of quality of work, performance, cost, and importance for the community, the aspects of protection of his or her own health and the health of others, environmental protection and preservation of cultural and social values;

uses his or her knowledge acquired in the various educational areas for the benefit of his or her own development and preparation for the future; makes well-founded decisions regarding his or her future studies and/or profession;

has a notion of the basic activities needed to set up and implement a business plan; understands what it means to be an entrepreneur, what goals an entrepreneur pursues and which risks he or she faces; develops his or her entrepreneurial thinking.’’

Educational Areas

The content of basic education within the education framework is divided into nine, roughly defined educational areas.

Each educational area comprises one or more interlinked educational fields:

- Language and Language Communication (Czech Language and Literature, Foreign Language)
- Mathematics and Its Applications (Mathematics and Its Applications)

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- Information and Communication Technologies (Information and Communication Technologies)
- **Humans and Their World (Humans and their World)**
- Humans and Society (History, Civic education)
- **Humans and Nature (Physics, Chemistry, Natural Sciences, Geography)**
- Arts and Culture (Music, Fine Art)
- Humans and Health (Health Education, Physical Education)
- **Humans and the World of Work (Humans and The World of Work)**

Each educational area contains the characteristics of the educational area, the objectives of the educational area and its educational content.

4.2.5. Blue School Potential and Development

The European Blue School program is an initiative that aims to bring the ocean into the classroom and engage students with marine- and maritime-related topics. It is a component of the EU4Ocean Coalition, an initiative backed by the European Commission's Directorate-General for Maritime Affairs and Fisheries (DG MARE). The curriculum places a strong emphasis on project-based learning and aims to instil in students a sense of awareness and responsibility for the ocean.

A significant chance to actively interact with marine and maritime-related themes, promote awareness, responsibility, and involvement for the ocean, is provided by becoming a European Blue School for educators, schools, and students. The initiative, which is a component of the EU4Ocean Coalition, acknowledges that education about the ocean emphasizes the connectivity of the marine and terrestrial environments and cuts across national lines. The program promotes the development of 21st-century skills in children and produces a new generation of ocean-literate citizens who can address global concerns by empowering schools and teachers as change agents.

In this process of transformation, teachers are essential because they motivate students to become engaged citizens of Europe. Through the program, educators and schools can work together with an expanding network of colleagues and experts from around Europe. This cooperative setting encourages the sharing of experiences and information among educators, leading to the creation of cutting-edge approaches to maritime teaching. Educators and educators are further assisted in implementing successful ocean-focused teaching methods by the availability of resources, events, and professional development opportunities arranged by the EU4Ocean Platform, Youth4Ocean members, and other European organizations.

In order to facilitate cooperation with specialists from research institutes, environmental NGOs, and other groups, the project also attempts to close the gap that exists between ocean professionals and educational institutions. Incorporating real-world subjects and activities into the classroom gives students the chance to research issues and work with the community to find solutions. Through the display of their initiatives on prestigious venues like the Handbook for Teachers, the Maritime Forum of the European Commission, international conferences, and social media, the program raises awareness of the work of Blue Schools. This visibility promotes networking possibilities and brings attention to the accomplishments of educators, students, and schools.

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The certification procedure, which awards schools for creating BLUE PROJECTS effectively, is a crucial component of the program. This credential has value on a global scale, giving schools recognition, recognizing the exceptional work of teachers, and giving students a verifiable accomplishment. Acknowledgment like this not only makes students feel good about themselves, but it may also encourage them to consider professions in the maritime industry. Essentially, the goal of the European Blue Schools Program is to establish a dynamic community of educators committed to fostering a culture that is more aware of the ocean, with schools acting as catalysts for both sustainability and good change.

To guarantee the Blue School concept's efficacy and inclusivity, its implementation in underprivileged communities calls for a sophisticated strategy. It is essential to modify the curriculum to address issues that arise locally. The ocean becomes tangible and relatable when the curriculum is modified to speak to the unique needs and interests of students in these places. Partnerships and community involvement are also very important. Involving businesses, non-governmental organizations, and local communities promotes cooperation and guarantees that the project is in line with the community's experiences, instilling a sense of ownership.

Given the possibility of budgetary limitations, it is critical to provide easily available materials. To guarantee that money is not a barrier to participation, this may entail obtaining sponsorships, making use of freely available educational resources, and working with local organizations. It is also crucial to provide teachers in underprivileged regions with the knowledge and abilities they need. Providing chances for professional development and training enables educators to successfully include ocean literacy into their lesson plans.

Furthermore, experiential learning has the power to transform. Active participation is made possible by bringing the ocean into the classroom through the facilitation of hands-on activities, field trips, and virtual simulations. Lastly, it's critical to support students' leadership and empowerment. Encouraging kids to participate in community and environmental projects gives them a sense of agency and responsibility for making a difference in the world.

There are several reasons for the gradual rise in the number of Blue Schools in Europe. First and foremost, the impetus has come from a growing awareness of ocean issues. Global awareness of the ocean's importance in biodiversity, climate management, and human well-being has led to a rise in the popularity of educational programs like the Blue School idea. Encouraging experimental projects have contributed to a sense of assurance. Adoption momentum has been created by early adopters' success stories and positive outcomes, which have inspired further schools to join up.

Exchange of best practices and resources has been made easier by global networks and collaborations like the EU4Ocean Coalition. Schools are encouraged to adopt the Blue School model in order to gain from common experiences and knowledge, as well as to become a part of a larger movement. Support for policy is still another important element. Adoption of the Blue School concept can be greatly influenced by supportive educational policies, whether they are implemented at the national or regional level. Growth can be accelerated by providing rewards, acknowledgment, or even a requirement for ocean knowledge in curriculum.

The growth of Blue Schools has also been aided by more financial sources. More institutions are encouraged to participate when financial help, grants, or sponsorships

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are made available to schools so they can adopt the Blue School concept. This lowers resource obstacles. Campaigns for public awareness and the media have contributed to the change in society. Schools are influenced to give priority to environmental education and ocean literacy as part of their holistic education commitment by media coverage and campaigns highlighting these important subjects.

The Blue School concept's linkage with sustainable development goals offers schools a framework for participating in larger projects. This integration aligns with the global trend of educational policies placing a greater emphasis on sustainable development. In summary, the growth of Blue Schools reflects a collective effort driven by awareness, success stories, collaborations, policy support, funding opportunities, and a shared commitment to fostering ocean literacy and environmental responsibility among the younger generation.

Even though the Czech Republic is landlocked, the Visegrad Group—a partnership comprising the Czech Republic, Hungary, Poland, and Slovakia—exists and is important for the Blue School idea. Notably, Poland has a coastline along the Baltic Sea and is not landlocked like Czechia is. As members of the Visegrad Group, these nations acknowledge the value of environmental education, particularly ocean literacy, as a means of advancing their common goal of sustainability. Despite the fact that the Czech Republic is landlocked, the Visegrad Group's cooperative efforts can support the Blue School idea. Even in regions without direct access to the ocean, the regional framework offers chances for resource sharing, information exchange, and the creation of cooperative projects that address environmental concerns. The cooperative attitude of the Visegrad Group—which encompasses both coastal and landlocked nations—can stimulate creative ways to put the Blue School idea into practice, encouraging environmental awareness and responsibility in a variety of geographic circumstances.

Furthermore, the potential and growth of Blue Schools in Czechia can be greatly increased through twinning programs with Blue Schools abroad. Through the establishment of relationships, Czech Blue Schools can reap the benefits of cultural exchanges, shared experiences, and cooperative initiatives with schools situated in coastal regions or nations with vast marine environments. Through twinning, students in Czechia can benefit from a priceless platform for cross-cultural learning that gives them an understanding of various marine ecosystems and conservation strategies. This information sharing not only enhances the educational process but also promotes an international understanding of ocean literacy. Twinned Blue Schools can work together on collaborative initiatives to solve shared environmental concerns, which can foster a sense of shared responsibility and allow for the sharing of creative teaching approaches. Through international cooperation, Czech Blue Schools can leverage the strengths and experiences of their twinned counterparts, contributing to the holistic development of ocean literacy initiatives in Czechia.

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Map 8 Blue Schools in Czechia

Source 36 ec.europa.eu/maritimeaffairs/atlas/maritime_atlas

As can be seen from the map above, there are no private educational institutions in the Czech Republic, known as "blue schools". This is due to the fact that the education system of the Czech Republic is generally focussed on public and general education. This system focuses on providing a comprehensive and standardised curriculum in all schools. This approach ensures equal access for all and a strong foundation in core subjects, while leaving little room for distinctly "blue" educational niches.

Blue Schools transcend the traditional classroom, immersing students in an educational project permeated by oceanic principles. The very infrastructure reflects a commitment to sustainability, utilizing renewable energy, implementing robust waste management practices, and serving as a tangible model for responsible resource utilization. This practical exposure cultivates a visceral understanding of environmental responsibility, extending far beyond rote learning. Blue Schools go beyond mere awareness, empowering students to become active agents of change. Through integrated curricula that link academic disciplines to real-world challenges, students engage in projects that address water quality, marine debris, and coastal ecosystem preservation. This experiential learning fosters critical thinking, problem-solving skills, and a sense of civic responsibility, empowering young Czechs to become environmental stewards in their own communities.

Moreover, Blue Schools recognize the interconnectedness of the global environment. By connecting students with their maritime counterparts through exchange programs and collaborative projects, they bridge cultural divides and cultivate a sense of global citizenship. This collaborative approach underscores the shared responsibility for safeguarding the planet's oceans and emphasizes the necessity for collective action,

preparing Czech youth to navigate the complex environmental challenges of the future. Blue Schools offer a strategic investment in the Czech Republic's future. By equipping students with the knowledge, skills, and values necessary for sustainable development, they foster a generation of environmentally conscious citizens capable of driving green innovation and economic prosperity. In a world grappling with climate change and resource depletion, the Czech Republic has the opportunity to position itself as a leader in sustainable practices, and Blue Schools stand as a critical stepping stone on this path.

4.3. Hungary

4.3.1. Region Selection Criteria and Process

The primary objective of this research is to assess the level of ocean literacy, explore the implementation of Blue School initiatives, and analyse regional responses to sea blindness, blue economy, and climate change in Hungary, specifically at the primary and secondary school levels. The research will focus on the NUTS1 regions to provide a nuanced understanding of regional dynamics.[43] To achieve geographical representation, all NUTS1 regions of Hungary have been included to capture diverse geographical and cultural contexts.

To achieve geographical representation, all NUTS1 regions have been included, ensuring a diverse geographical and cultural context for primary and secondary school students. Priority has been given to regions actively participating in Blue School initiatives and showcasing a strong integration of marine and environmental education in primary and secondary school curricula.

Regions have been selected to ensure a representative and diverse sample are formulated. This involves considering geographical, educational, economic, and climate-related factors, intending to create a comprehensive selection process that captures the multifaceted aspects of each NUTS1 region.

NUTS1 regions provide a level of geographical aggregation that allows for a comprehensive yet manageable scope of analysis. They represent larger entities compared to NUTS2 or NUTS3, enabling a macro-level understanding of regional dynamics. In addition, climate change impacts often manifest at a broader regional level. Analysing NUTS1 regions allows for a more holistic understanding of how climate change affects different aspects of life, including education, economic activities, and environmental awareness.

The region selection process involves initial desk research to gather information on Blue School initiatives, ocean literacy programs, blue economy activities, and regional climate change strategies specifically tailored for primary and secondary school education.

[43] The NUTS (Nomenclature des Unités Territoriales Statistiques) is classification system of the European Union with the purpose of assigning commensurable, comparable territorial units from area and population size point of view, in order to collect and produce uniform regional statistics.

Stakeholder consultation with key representatives, including primary and secondary school educators, administrators, and local education authorities, has been conducted to comprehend regional initiatives and challenges at these educational levels.

Quantitative data analysis, utilizing statistical data on educational indicators, economic activities, and climate parameters, has been employed to assess the relevance and impact of each region on primary and secondary school education.

4.3.2. Characteristics of Each Region

Hungary is a landlocked country located in the Central Europe with many neighbours—Slovakia to the north, Ukraine and Romania to the east, Serbia and Croatia to the south, Slovenia to the southwest and Austria to the west. It covers 93,036 square kilometres and has 9.97 million inhabitants, with a population density of 107 people per square kilometre. The population is decreasing at a rate of 0.25 percent per year. It is characterized by diverse landscapes, including the Great Hungarian Plain, hills, and low mountains. The Danube River, one of Europe's major rivers, flows through the

In terms of NUTS regions, Hungary is divided into three hierarchical levels: NUTS1, NUTS2, and NUTS3. Hungary is divided into 3 regions (NUTS 1), 8 regions (NUTS2) and 19 counties and Budapest (NUTS 3 level) (see Fig 1 and 2). The size of the NUTS2 regions (in terms of spatial extension and population also) is similar. Central Hungary is the only exception with more than twice as much population as the other six regions.

Each level provides a different degree of granularity, offering insights into the country's diverse characteristics.

Table 32 NUTS Regions of Hungary

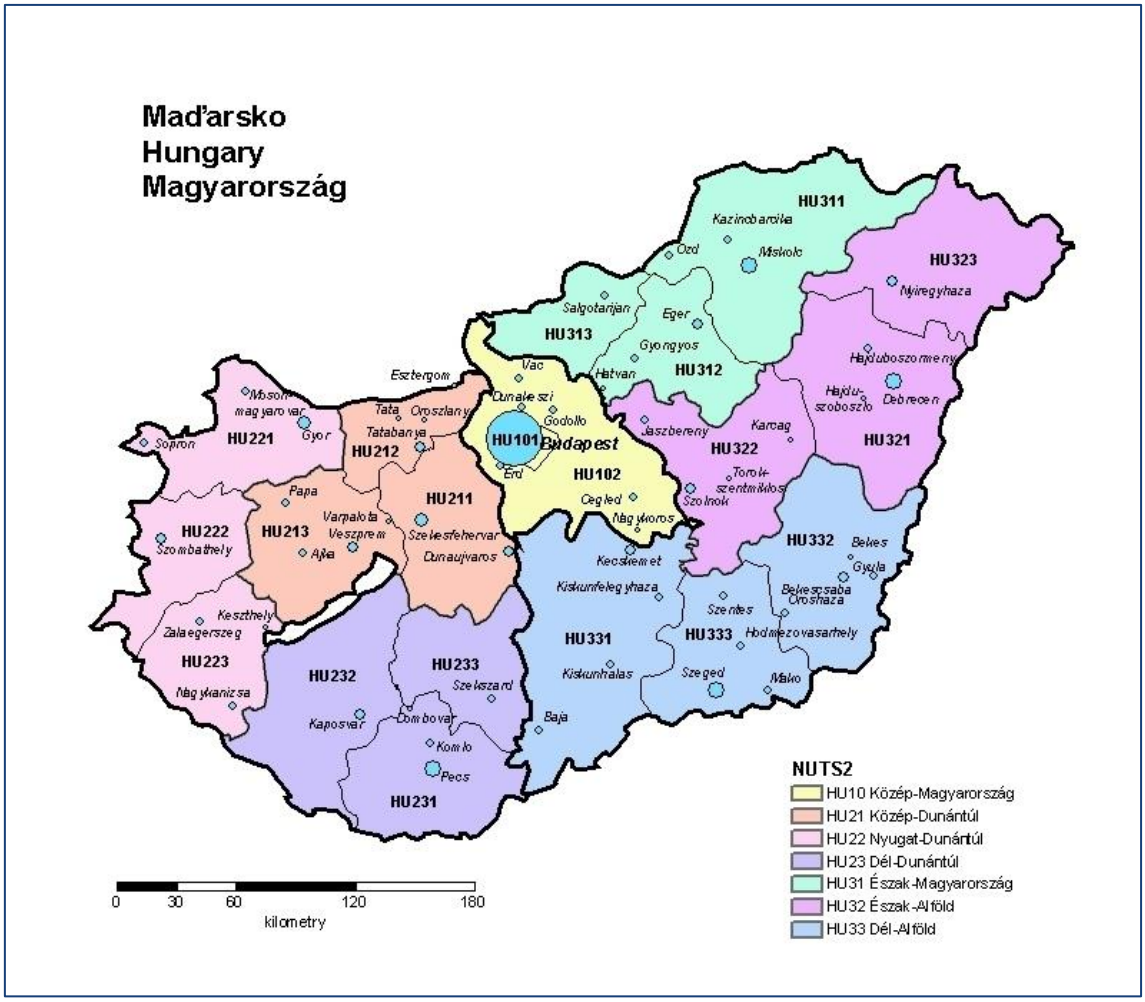
NUTS 1	Code	NUTS 2	Code	NUTS 3	Code
Central Hungary (Közép-Magyarország)	HU1	Budapest	HU11	Budapest	HU110
		Pest	HU12	Pest	HU120
Transdanubia (Dunántúl)	HU2	Central Transdanubia (Közép-	HU21	Fejér	HU211
				Komárom-	HU212

		Dunántúl)		Esztergom	
				Veszprém	HU213
		Western Transdanubia (Nyugat-Dunántúl)	HU22	Győr-Moson-Sopron	HU221
				Vas	HU222
				Zala	HU223
		Southern Transdanubia (Dél-Dunántúl)	HU23	Baranya	HU231
				Somogy	HU232
				Tolna	HU233
Great Plain and North (Alföld és Észak)	HU3	Northern Hungary (*Észak-Magyarország*)	HU31	Borsod-Abaúj-Zemplén	HU311
				Heves	HU312
				Nógrád	HU313
		Northern Great Plain (*Észak-Alföld*)	HU32	Hajdú-Bihar	HU321
				Jász-Nagykun-Szolnok	HU322
				Szabolcs-Szatmár-Bereg	HU323
		Southern Great Plain (*Dél-Alföld*)	HU33	Bács-Kiskun	HU331
				Békés	HU332

				Csongrád-Csanád	HU333

Source 37 https://ec.europa.eu/eurostat/web/metadata/classifications

Map 9 NUTS Regions of Hungary



Source 38 https://www.czso.cz/csu/czso/2-1373-05--19

Central Hungary serves as a focal point for economic, social, and educational activities in the country.

Environmental Features

Central Hungary, despite its urbanization, retains significant green spaces. Parks, forests, and protected areas contribute to the ecological diversity of the region. Central Hungary's water resources form a vital component of its environmental fabric, sustaining ecosystems, agriculture, and urban communities.

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The Danube River, flows through Central Hungary, impacting both the environment and socio-economic activities. The Danube, stretching over 400 kilometres through the region, serves as a crucial waterway for transportation and a source of irrigation for agricultural activities. The Danube contributes to approximately 60% of Central Hungary's surface water resources, playing a pivotal role in the region's water availability.

Central Hungary is adorned with over 300 lakes, contributing not only to the region's biodiversity but also serving as reservoirs for water supply and recreational spaces. Lake Balaton, the largest freshwater lake in Central Europe, is a notable feature, offering economic opportunities and acting as a source of drinking water.Lake Balaton alone accounts for 50% of the region's total lake surface area, supporting a diverse range of flora and fauna.

Central Hungary's socio-economic activities are intricately linked to its water resources. Agriculture relies on river and lake water for irrigation, industries use water for manufacturing processes, and urban areas depend on rivers for water supply and sanitation.

While abundant, Central Hungary's water resources face environmental challenges. Pollution from agricultural runoff, industrial discharges, and urban activities pose threats to water quality. Additionally, altered river flow patterns and potential impacts of climate change may affect the region's water availability.

Central Hungary's water resources are a cornerstone of the region's vitality, supporting diverse ecosystems and sustaining socio-economic activities. As the region progresses, it is crucial to implement sustainable water management practices, address pollution concerns, and adapt to potential environmental changes. This comprehensive analysis lays the foundation for informed decision-making, ensuring the responsible stewardship of Central Hungary's precious water reservoir.

Economic and Social Structure

Central Hungary, anchored by the bustling capital city Budapest, dominates economically, contributing over 60% to the national GDP. In 2023, the region's GDP per capita was 27,000 Euro, showcasing its economic prowess and significance in the national economic landscape.

The region serves as an industrial hub, hosting diverse sectors from manufacturing to technology. Industry and agriculture coexist in the region. The industrial sector employs over 40% of the working population, while agriculture remains a vital contributor to rural economies.

Central Hungary is characterized by a unique blend of urban and rural landscapes, with Budapest, the capital city, playing a central role. With a population nearing 3 million, Central Hungary experiences varying population densities, impacting resource distribution, infrastructure development, and social services. Urbanization rates in Central Hungary, particularly in Budapest, contribute to a distinctive social environment, shaping patterns of employment, lifestyle, and cultural preferences.

Education Infrastructure and Resources

Central Hungary boasts a robust education infrastructure that spans primary, secondary, and tertiary levels. An initial overview provides insights into the distribution of educational facilities, emphasizing the region's commitment to fostering a conducive learning environment. With 1.162 kindergarden, 782 primary schools and 587 secondary schools Central Hungary showcases a diverse educational landscape. However, disparities in educational infrastructure are evident, with urban areas often having denser networks of schools compared to rural counterparts.

Transdanubia (Dunántúl): The territory of the region is 38,000 km², and it comprises almost half of the whole territory of Hungary.

Environmental Features

The terrain is very varied with gentle hills, valleys, basins, mountains and plains. The main geographical formations are the Transdanubian Mountains, the southern half of the Little Alföld, the Alpokalja, the Transdanubian Hills, and the Mezőföld. The main rivers are the Danube, Drava, Rába, Zala, and Kapos. In the middle of Transdanubia lies the biggest freshwater lake of Central Europe, the Lake Balaton. Over 200 protected areas, including national parks and nature reserves, underscore Transdanubia's commitment to maintaining biodiversity and safeguarding natural habitats. Covering an expansive 600 square kilometers, Lake Balaton not only serves as a vital water source but also contributes significantly to tourism, recreation, and the cultural identity of Transdanubia.

The region faces challenges associated with climate change, leading to altered precipitation patterns and increased frequency of extreme weather events. This necessitates adaptive strategies to manage water resources effectively. In addition, the intensive nature of agriculture in Transdanubia poses a challenge to water management. Balancing agricultural needs with sustainability is crucial to prevent over-extraction and depletion of water resources. Furthermore, as urbanization continues, the demand for water in urban areas increases. Sustainable urban planning and water management practices are essential to prevent stress on water supplies.

Economic and Social Structure

Transdanubia's economic landscape is a mix of industries, agriculture, and tourism. Agriculture, including vineyards and orchards, plays a substantial role, contributing over 20% to the region's GDP. The region maintains a balance between traditional agriculture and modern industries. Approximately 30% of the population is employed in the industrial sector, showcasing economic diversity. Transdanubia includes 3 regions, 9 counties, 68 districts and 1,714 settlements. Its area is 37 thousand km², the number of its inhabitants is 2.9 million.

Education Infrastructure and Resources

There are 1.530 kindergarden, 1186 primary schools and 658 secondary schools in Transdanubia. There is a commendable effort to ensure that educational opportunities

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are widely available. The presence of vocational training schools contributes to a multifaceted education ecosystem. These institutions play a crucial role in skill development and fostering intellectual capital.

Great Plains and the North (Alföld és Észak)

Great Plains and the North includes the areas of Hungary east of the Danube. the Great Plains and Northern Region includes 3 regions, 9 counties, 88 districts and 1,253 settlements. Its area is 49,000 km², and the number of its inhabitants is 3.9 million.

Environmental Features

Among Hungary's great landscapes, the Northern Central Mountains and the Great Plains belong here. The Great Plains and the North regions are endowed with a network of rivers and lakes that contribute significantly to their water resources. The Tisza River, coursing through both regions, along with the Ipoly River, forms a crucial part of their hydrological systems.

The region is home to extensive grasslands and wetlands, fostering biodiversity as well as diverse forested areas and natural reserves.

The Tisza River and the Tisza Lake, a lifeline for the region, accounts for the majority of surface water flow, sustaining ecosystems and providing a vital resource for various human activities.

Given the significant role of agriculture in the regions, water is a linchpin for crop cultivation. Irrigation practices, often reliant on river and groundwater sources, underscore the agricultural dependence on water.

The expansion of urban centres and industrial activities increases the strain on available water supplies. The Great Plains and the North regions are not immune to the impacts of climate change. Altered precipitation patterns, extreme weather events, and rising temperatures pose challenges to water availability and management.

Economic and Social Structure

Historically, this region has been a stronghold for heavy industries. Cities like Miskolc have a legacy in metallurgy, mining, and heavy manufacturing. The mining sector, including bauxite and other minerals, has played a pivotal role in the industrial landscape. The Great Plain and North region also boasts a diverse industrial sector. In addition to heavy industries, there is a significant presence of food processing, automotive manufacturing, and electronics. Debrecen, one of the major cities, is home to various industries, contributing to economic development.

Moreover, it is known for its fertile soil, making it a vital agricultural region. Crops like wheat, corn, sunflower, and various vegetables are cultivated, contributing significantly to Hungary's agricultural output.

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Education Infrastructure and Resources

There are 1.916 kindergarden, 1.633 primary schools and 998 secondary schools in **Great Plains and the North region**.

4.3.3. Assessment of Disadvantaged Regions

Disadvantaged areas in Hungary can be characterized by a combination of economic, social, and environmental challenges that hinder their overall development. Typically, these regions experience lower economic growth, higher unemployment rates, limited access to quality education and healthcare, and a lack of essential infrastructure.

The economic and social role of Budapest in Central Hungary region is dominant. There are significant disparities between regions. In 2021, GDP per capita was more than three times higher in the capital region of Budapest than in any of the four least-developed NUTS-2 regions namely Észak-Magyarország, Észak-Alföld, Dél-Alföld and Dél-Dunántúl, which can be considered disadvantage regions. These four least developed regions have also experienced depopulation. The average annual decrease per 1000 residents between 2011 and 2020 was almost 9 in Észak-Magyarország and around 7 in Dél Dunántúl and Dél-Alföld and 5 in Észak-Alföld.

Table 33 Selected indicators at regional level in Hungary

NUTS Code	GDP per head	Productivity (GVA (PPS) per person employed)	Real productivity growth	Real GDP per head growth	Population growth	Unemployment rate	Early leavers from education and training	Regional Competitiveness Index	Severe material and social deprivation
	PPS, 2021	GVA (PPS) per person employed, 2020	Average % change on the preceding year, 2011-2020	Average % change on the preceding year, 2011-2020	Average annual change per 1000 residents, 2011-2020	% of active population, 2021	% of population from 18 to 24 years, 2021	Index - values range between 0 and 100, 2022	% of population, 2020
European Union	100.0	100.0	0.2	1.0	2.0	7.0	9.7	100.0	6.8
Hungary	74.0	67.0	0.6	2.5	-2.3	4.0	12.0	83.4	10.7
Budapest	156.0	71.0	0.2	2.1	0.2	2.9	5.4	105.5	7.4
Pest	61.0	71.0	-0.1	1.4	8.3	3.0	9.1	105.5	8.7
Közép-Dunántúl	70.0	65.0	0.8	2.8	-2.2	2.1	11.2	82.3	8.3
Nyugat-Dunántúl	68.0	69.0	0.7	1.9	1.1	2.2	6.8	83.9	5.2
Dél-Dunántúl	51.0	61.0	1.1	2.8	-7.4	4.8	13.2	69.9	12.4
Észak-Magyarország	52.0	63.0	1.3	3.5	-8.7	6.2	22.3	66.0	20.3
Észak-Alföld	49.0	61.0	0.7	2.7	-5.0	7.1	16.9	67.9	15.4
Dél-Alföld	54.0	62.0	1.1	3.3	-6.6	4.5	10.4	73.3	8.3

Source: EUROSTAT

These less developed regions have a higher rate of early school leavers and the share of people with low level of education is significantly higher in some of the less developed regions than in the more developed parts of the country. Regional disparities in educational attainment are significant. The rate of early school leavers was in 2021 as high as 22.3% in Észak-Magyarország and 16.9% in Észak-Alföld, but just 5.4% in Budapest and 6.8% in Nyugat- Dunántúl.

The higher rate of early school leavers and lower educational attainment in Hungary's disadvantaged regions affects a consequence of multifaceted challenges. Limited economic opportunities, insufficient infrastructure, and a lack of resources contribute to

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an environment where educational advancement becomes a formidable task. Breaking this cycle is crucial for empowering individuals and catalyzing comprehensive regional development.

Since there is higher rate of early school leavers and lower educational attainment in Hungary's disadvantaged regions, there should be special approaches to these regions. Specific strategies and programs require to promote ocean literacy and the blue economy in these regions.

4.3.4. Education System Analysis

Central educational governance basically are under the auspices of two ministries, namely the Ministry of Interior (public education) and the Ministry of Culture and Innovation (higher education, vocational education and training). The Ministry of Technology and Industry is responsible for adult education. Vertical governance is divided between the central (national), territorial, and to some extent, institutional levels in VET and public education. The maintenance of kindergartens is a municipal task.

The Government has established a national body, the Klebelsberg Center, to coordinate the maintenance of public education institutions. This Center brings together the School District Centers.A VET institution operating as part of a VET Center is an organizational unit of the VET Center with legal personality.

Public/general education institutions can be established and maintained by

- the state
- minority self-governments
- churches as legal persons
- religious associations or
- a natural person or an organization.

VET institutions can be established individually or jointly by

- the state
- minority self-governments
- churches as legal persons or religious associations
- business organizations
- foundations
- associations

Higher education institution can be founded independently or together with another entity, by

- the Hungarian state
- minority self-governments
- churches as legal persons
- business organizations with seat in Hungary
- foundations, trust foundations, public foundations, religious associations registered in Hungary.

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Levels of the Education System

Education and training can take place in general (kindergarten and school) education, vocational education and training, higher education and adult education. General education institutions, basically, are kindergartens (óvoda), basic schools (általános iskola), upper secondary grammar schools (gimnázium), upper secondary vocational grammar schools (szakgimnázium), vocational special schools (szakiskola) and skills development (special) schools (készségfejlesztő iskola). VET institutions can be technicums (technikum) and vocational schools (szakképző iskola). A higher education institution can be a university or a college.

Participation in education and training is compulsory between the ages of 3 and 16 (the academic year in which the student completes it). However, the completion of an International Standard Classification of Education (ISCED)[44] level 3 school program in a reasonable time, the acquisition of the first two professions, including the related preparatory years and participation in a school workshop programme, is free (for a maximum of three years in the case of the second profession). The state also provides the first vocational qualification related to vocational training free of charge until the first qualification exam.

The duration of the programmes:

- ISCED 0: 3 years
- ISCED 1: 4 years
- ISCED 2: 4 years
- ISCED 3: 2-5 years

The first institution that the child may attend is the crèche (bőlcsöde), whose provision is integrated in the basic child welfare care system (not public education) and undertakes the day care, the professional specialist care and the education of children aged between 20 weeks and 3 years. The kindergarten provides institutional education for children aged 3-6 years. Kindergarten education is compulsory from the age of three.

Compulsory school education starts at the age of six, provided that they have reached the necessary level of development -required to start their school education. Compulsory schooling lasts until the end of the school year in which the student completes the age of 16.

Basic education in Hungary is mostly provided in 8-year basic schools (single structure) and provides a foundation of general education for the 6–14-year-olds.

Successful completion of eighth grade certifies a basic education level. After completing primary and lower secondary level education, students can continue their studies at the secondary level: grammar school (gimnázium), vocational secondary school, or vocational school. Some general and vocational secondary schools offer preparatory training in the first year, in which students focus on learning a foreign

[44] **ISCED** is the reference international classification for organising education programmes and related qualifications by levels and fields.

language, supplemented with some mother tongue and mathematics lessons, before starting the actual four-year program. After that, students can continue their mainstream studies in an upper secondary institution (ISCED 3): in an upper secondary grammar school (gimnázium), an upper secondary vocational grammar school, a technicum and a vocational school.

The upper secondary grammar school (gimnázium) provides general education, mostly for 4-years (but there are also 6- and 8- grade/year high schools) and prepares for matura/upper secondary school leaving examination. This examination is also an admission test to higher education institutions.

Upper secondary vocational grammar schools (szakgimnázium) are educational institutions providing five year long programmes specialized in arts, pedagogy or general knowledge, in these schools general education and vocational education and training are provided in four grades/years, and only vocational education and training in the fifth year.

Technicums (technikum)

- provide general education, preparing student both for the matura examination and the vocational examination, and enables students to continue their studies in a higher education institution or to start working.
- or provide exclusively vocational education and training for student holding a matura certificate.

The number of grades to fulfil studies is included in the Register of Vocational Occupations.Technicum may organize two-year general education programme to help students obtain the matura certificate.

Vocational schools (szakképző iskolák)

- provide general education and vocational education and training required for the acquisition of a given profession, or
- prepares students for the VET exam only

The number of grades to fulfil studies is included in the Register of Vocational Occupations. The institutional system of higher education consists of public and non-public universities and colleges, which offer bachelor’s, master's and doctoral courses, as well as higher education vocational training courses. In the split training system, the 6-8 semester bachelor's degree training programme cycle is followed by the 2-4 semester master's degree training cycle. The first cycle provides degrees (baccalaureate, bachelor of science, bachelor of profession, bachelor of arts) and professional qualification. A master's degree (magister, master of science, master of profession, master of arts) and professional qualification can be obtained in the master's programme. The training is undivided (10-12 semesters) in some study fields, so e.g. in the medical, legal, or teaching profession sectors.

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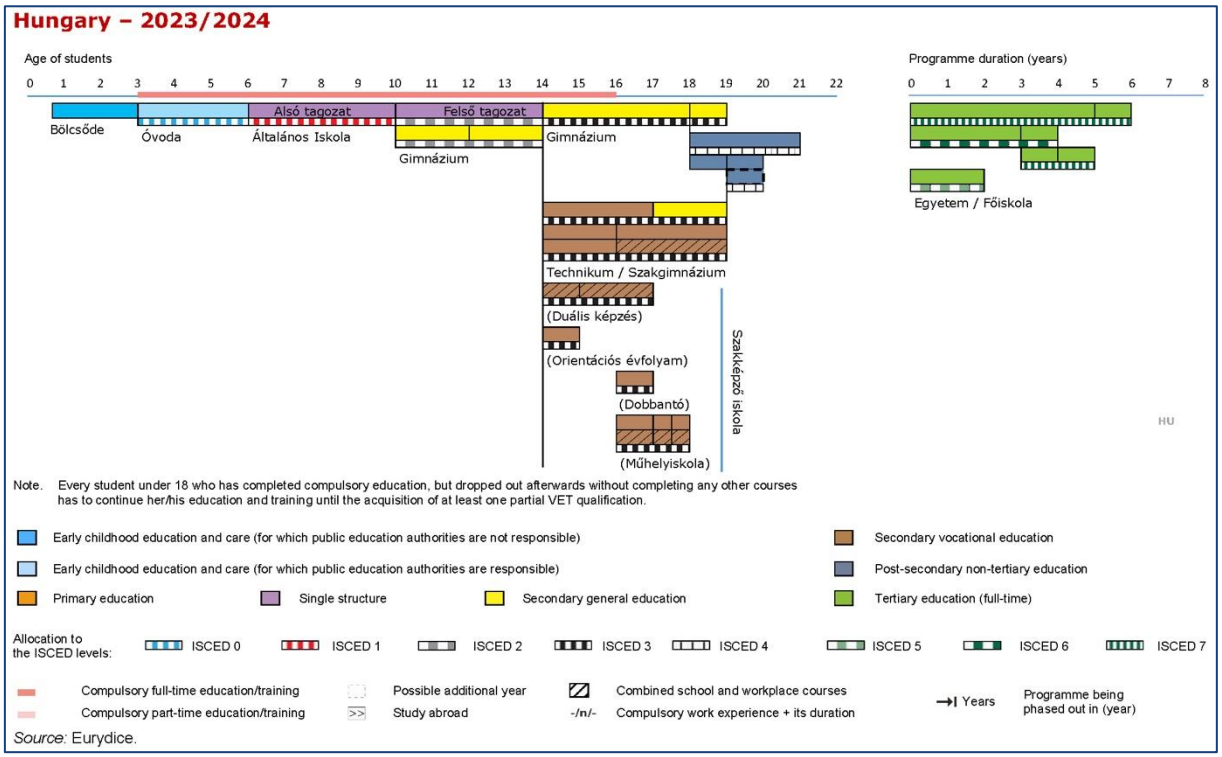
Figure 13 Structure of the National Education System in Hungary



Source 39 https://eurydice.eacea.ec.europa.eu/national-education-systems/hungary/overview

The government is authorized to regulate the education system and issue the national core curriculum. Public education institutions are professionally independent and can make decisions about their organization and operation on matters not regulated by law or by another entity.

National Core Curriculum

The government is authorized to regulate the education system and issue the national core curriculum. Public education institutions are professionally independent and can make decisions about their organization and operation on matters not regulated by law or by another entity.

The new National Core Curriculum (referred to as NCC or NAT) 2020 describes the general conceptual and content bases and frameworks of the curriculum, and defines the compulsory content for primary and secondary educational institutions. The NCC 2020 contributes to the content unity of school education. Besides describing the general content, the NAT strengthens the connection to the history of the nation, to intergenerational relations, common cultural roots, the use of mother tongue, and national identity.

The NAT also formulates the methodological principles around supporting effective learning, the importance of the learning environment, individualized learning opportunities, and the development of skills. The NAT emphasizes active learning within the learning environment, including the participation of students in learning activities, the organization of activity-based learning, and social learning. The NCC

emphasizes the need to adapt the learning environment to the individual characteristics of learners, to compensate for disadvantages, to use digital tools and methods, and to have teachers work together (e.g., joint teaching, joint planning, joint evaluation).

In support of capacity building, the NCC emphasizes the importance of evaluating student performance, i.e., data- and fact-based pedagogy. Within student assessment, the NCC emphasizes the importance of diagnostic and formative assessment in addition to summative assessment.

Based on the recommendations by the European Union and taking the Hungarian context into account, the NCC 2020 defines the key competencies for education related to school learning and teaching processes as follows:

1. Learning competencies
2. Communication competencies (mother tongue and foreign language)
3. Digital competency
5. Mathematical and thinking competencies
6. Personal and social competencies
7. Creativity, competencies of self-expression and cultural awareness
8. Employee, innovation, and entrepreneurial competencies

The NCC 2020 defines the number of basic hours in a two-year breakdown by study area and also defines the maximum number of hours that can be used in teaching. In primary level education (Grades 1 to 4), the maximum number of lessons per week is 24 (14 for Grades 1 and 2 and 10 for Grades 3 and 4). The subject of Hungarian language and literature comprises 7 lessons.

In accordance with the Public Education Act, all students are assessed annually regarding their reading, math, and science skills in grades 6, 8, and 10. Since 2015, an annual language assessment has also been conducted in English and German as the first foreign language in grades 6 and 8.

Every year, the Educational Authority organizes a (targeted) language assessment for students at bilingual schools in grades 6 and 8. Pupils in full-time school education annually take part in physical condition and fitness tests from the 5th grade onwards.

A central administration body responsible for VET carries out the external evaluation of the QA system of VET institutions. The Hungarian (Higher Education) Accreditation Committee is an independent national expert body established for the external evaluation of the operation of the internal QA system of the higher education institution.

In case of adult education providers, the central state administration body for adult education has control powers.

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Table 34 Number of Childeren, Students, Teachers in Hungary

Preliminary statistical data of initial and formal vocational education in the 2022/2023 school year

(persons)

School-sites	Number of children, students					Number of teachers in main job	
	in full-time education	in adult education, in part-time education	total	of which:			
				girls	students with special educational needs in mainstream education and in special groups, classes	total	of which: women
Kindergarten	322 868	–	322 868	154 686	11 578	30 649	30 501
Primary school	715 155	3 963	719 118	348 260	59 698	73 675	63 205
Vocational school and special skills development school	6 780	2	6 782	2 544	6 682	1 521	1 122
Vocational training school	59 766	25 871	85 637	29 384	8 500	5 302	2 626
Secondary general school	194 972	32 238	227 210	125 818	4 189	18 754	13 195
Technicum, upper secondary vocational school	166 107	31 269	197 376	97 475	8 950	16 845	10 579
Developmental education	2 618	–	2 618	1 072	2 618	453	433
Total	**1 468 266**	**93 343**	**1 561 609**	**759 239**	**102 215**	**147 199**	**121 661**

Source: Ministry of Interior, Ministry for Culture and Innovation (KIR-STAT, SZIR-KRÉTA).

Table 35 Number of school-sites in primary and secondary educational institutions in Hungary

School Type	Name of the Region (NUTS1)	Number of school-sites
Kindergarten	Central Hungary	1.162
	Transdanubia	1.530
	Great Plain and North	1.916
	Total	**4.608**
Primary school	Central Hungary	782

	Transdanubia	1.186
	Great Plain and North	1.633
	Total	**3.601**
Vocational school and special skills development school	Central Hungary	38
	Transdanubia	83
	Great Plain and North	80
	Total	**201**
Secondary vocational school	Central Hungary	93
	Transdanubia	173
	Great Plain and North	233
	Total	**499**
Secondary general school	Central Hungary	275
	Transdanubia	205
	Great Plain and North	378
	Total	**858**
Vocational grammar school	Central Hungary	181
	Transdanubia	197
	Great Plain and North	307

	Total	**685**

4.3.5. Blue School Potential and Development

Map 10 Blue Schools in Hungary

Source 40
https://ec.europa.eu/maritimeaffairs/atlas/maritime_atlas/#lang=EN;p=w;bkgd=770;theme=572:0.8;c=2175082.923864543,6000521.553823891;z=7

Ocean literacy proposes to include ocean and marine environment-related content in school curricula. Such a topic has been deemed effective for citizens to develop actions and attitudes towards the health of marine ecosystems. It plays a crucial role in fostering environmental consciousness and responsible citizenship among students.

The EU4Ocean Coalition, with the support of DG MARE, brings together organisations, projects and individuals committed to promoting ocean literacy across Europe. The DG MARE of EU recognises that the role of teachers is essential to the mission of the EU4Ocean Coalition.

To support teachers, a Network of European Blue Schools is being established. The concept of a European Blue School evolved from the marine education expertise gathered from consultations with teachers and educators across Europe. It acknowledges the variety of cultures and school communities from the 27 EU Member

States and champions the concept of open schooling1 – encouraging the development of local partnerships to make the learning context relevant.

As the Network of European Blue Schools gains momentum across the 27 EU Member States, it has come to light that no schools from Hungary are currently participating in this transformative initiative. This absence presents an opportunity for Hungary to not only join the network but also spearhead the implementation of the Blue School concept in disadvantaged areas.

In Hungary, a landlocked country, the importance of ocean literacy and bluse may not be immediately apparent. The Blue Economy's contribution to the national economy is very limited (below 0.4 %) in Hungary. However, Danube River give the interconnectedness of global ecosystems. It's a link that connects 10 countries, tying Vienna to Bratislava, Budapest, and Belgrade like a string of capital-city pearls. Europe's second-longest river is a bustling thoroughfare for shipping and a tranquil refuge for summer holidays. It's a muscular source of power and a haven for fish, birds, and amphibians.

As the Network of European Blue Schools gains momentum across the 27 EU Member States, it has come to light that no schools from Hungary are currently participating in this transformative initiative. This absence presents an opportunity for Hungary to not only join the network but also spearhead the implementation of the Blue School concept in disadvantaged areas. Blue schools will raise awareness and help students to build a sustainable future in the coast of Danube River and other rivers as well as lakes in Hungary and encourage them to participate actively in society and to engage with local stakeholder.

By focusing on local partnerships, customized curricula, teacher training, advocacy, and resource mobilization, Hungary can bridge this gap and also contribute to the global movement towards more sustainable and holistic education.

Strategies for Implementation in Disadvantaged Areas in Hungary:

Promoting Local Partnerships: Collaboration between schools, local communities, NGOs, and businesses need to be facilitated to establish partnerships that support the participating in the European Network of Blue School.

Customizing the Curriculum: The Blue School curriculum needs to be tailored to address the unique needs and challenges of disadvantaged areas in Hungary. Local cultural elements and real-life examples can be integrated into the curriculum to make it more relatable and engaging for students.

Teacher Training and Capacity Building: Comprehensive training programs for teachers is needed to provide to equip them with the skills and knowledge needed to effectively implement the Blue School philosophy.

Advocacy and Awareness Campaigns: Advocacy campaigns at local and national levels need to be launched to raise awareness about the benefits of the Blue School

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concept. Engagement with policymakers, educational authorities, and community leaders is essential to garner support for the integration of Blue School practices in disadvantaged areas.

Access to Resources and Funding: Collaborative efforts should be undertaken with government agencies and international organizations to actively secure funding and resources for the successful implementation of Blue School initiative.

4.4. Italy

4.4.1. Region Selection Criteria and Process

Map 11 Location of Italy

The Mediterranean Sea and Italy are important locations for promoting ocean literacy and protecting marine ecosystems, which are the objectives of the SHORE project. The Mediterranean is one of the most important marine ecosystems in the world. It has rich biodiversity, important fisheries resources and historical and cultural significance. Italy is one of the largest countries in the Mediterranean and has a long maritime history and culture.

The Mediterranean and Italy offer important opportunities for the SHORE project. Students, teachers and schools in this region can play an important role to increase ocean literacy and protect marine ecosystems.

4.4.2. Characteristics of Each Region

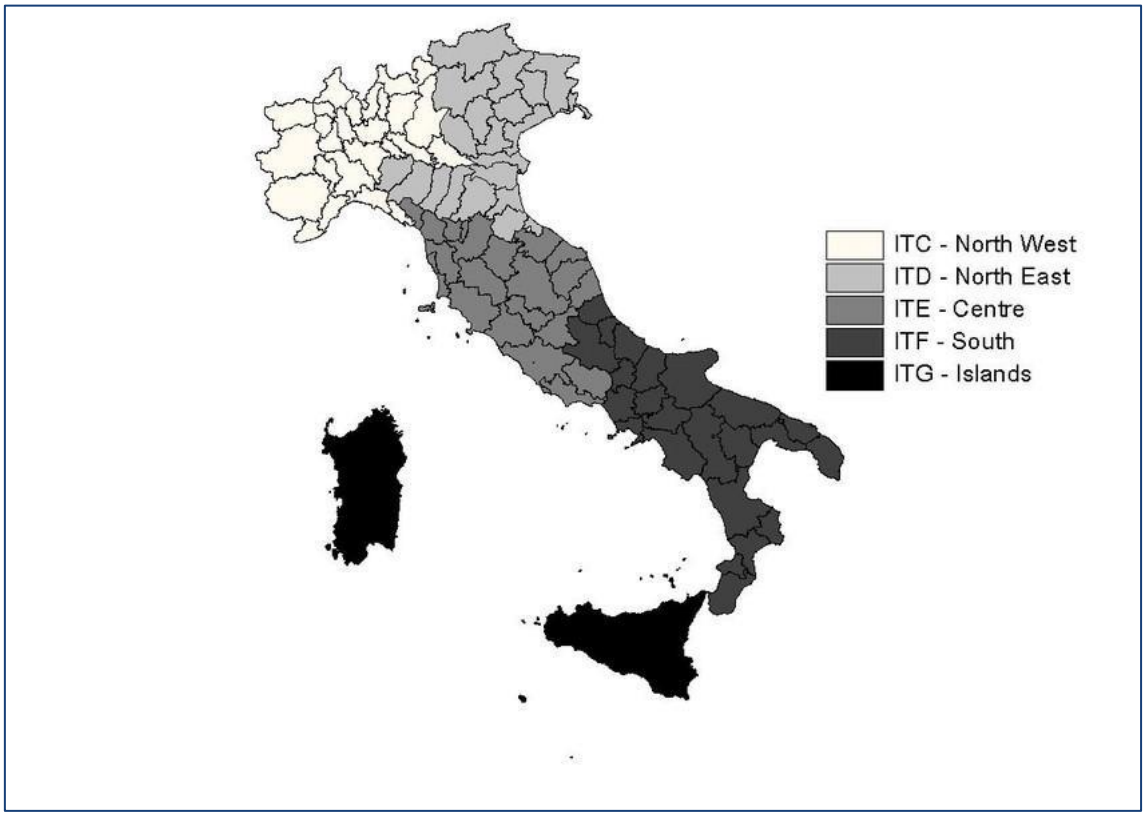
Environmental Features:

Situated within the Mediterranean cradle of Southern Europe, Italy's territory, largely coinciding with its namesake geographical region, stretches between latitudes 35° and 47° N and longitudes 6° and 19° E. Encompassing the entirety of the Italian Peninsula and cradling two of the Mediterranean's largest islands, Sicily and Sardinia, its territory is further embellished by a multitude of smaller isles scattered across its azure waters. Nestled within the embrace of the Alpine watershed to the north, Italy shares land borders with France, Switzerland, Austria, and Slovenia. Sovereign enclaves like San Marino and Vatican City add to the nation's intricate tapestry, while the enclave of Campione d'Italia in Switzerland extends its geographical reach beyond its mainland borders.

Italy's diverse landscape unfolds across a total area of 301,230 square kilometers, with 294,020 square kilometers of land and 7,210 square kilometers of water. Including its island jewels, Italy's coastline and borders unfurl for an impressive 7,600 kilometers, lapped by the Adriatic, Ionian, Tyrrhenian, and Ligurian Seas. The nation's highest point, Mont Blanc (4,810 meters), proudly crowns the majestic Alps along the northern border with France, while the Apennine Mountains form the peninsula's rugged backbone. Over 35% of Italy's terrain is sculpted by these awe-inspiring mountains, with renowned peaks like the Matterhorn (Monte Cervino), Monte Rosa, and the Dolomites add to its dramatic allure.

The Po River, the nation's lifeblood, snakes its way for 652 kilometers from the Alpine foothills to the Adriatic Sea, nurturing the fertile Po Valley – Italy's largest plain representing 70% of the nation's plains. Volcanic forces have also played a significant role in shaping Italy's terrain, with islands like Capraia and archipelagos like the Aeolians standing as testaments to their fiery past. Active giants like Mount Etna, Europe's largest, and Vesuvius, the only active volcano on mainland Europe, add a touch of fiery drama to the landscape. Italy's embrace extends beyond its mainland borders, with territories like Livigno and the Lampedusa Island defying typical categorization. These unique entities, nestled within the Danube and Rhine basins or perched on the African continental shelf, contribute to the nation's rich geographical tapestry. From snow-capped peaks to sun-drenched shores, from volcanic fury to glacial serenity, Italy's geography is a symphony of contrasts, forever captivating and enthralling.

Map 12 NUTS1 Region in Italy



Source 41 Spatial Hierarchtial Analysis of Italian Regions, Page 21

Table 36 Total Population of Italy

Territory	Males	Females	Total
Italy	28814832	301182369	58997201
Islands-ITG	3119642	3272520	6392162
South-ITF	6579017	6885652	13464669
Centre-ITE	5687171	6036051	11723222
NorthWest-ITC	7759911	8098715	15858626

NorthEast-ITD	5669091	5889431	11558522

Source 42 The Italian National Institute of Statistics,2023

Italy's total population is 58,997,201, with females slightly outnumbering males (30,182,369 vs. 28,814,832).

The NorthWest boasts the largest population (15,858,626), followed by the Centre region (11,723,222).

The South region (13,464,669) has the second-highest population, while the Islands region (6,392,162) has the smallest.

Economic and Social Structure:

Table 37 Gross domestic product (GDP) in Italy 2028

Year	in billion U.S. dollars)
1987	812,69
1988	900,39
1989	936,45
1990	1.168,72
1991	1.234,54
1992	1.310,02
1993	1.053,43
1994	1.086,54
1995	1.175,28
1996	1.312,78
1997	1.243,23
1998	1.271,70
1999	1.253,69
2000	1.147,18
2001	1.168,03

2002	1.275,87
2003	1.577,23
2004	1.805,72
2005	1.859,24
2006	1.949,66
2007	2.213,36
2008	2.408,39
2009	2.197,54
2010	2.137,85
2011	2.294,59
2012	2.088,28
2013	2.141,95
2014	2.162,57
2015	1.836,82
2016	1.876,55
2017	1.961,10
2018	2.092,88
2019	2.011,53
2020	1.895,69
2021	2.115,76
2022	2.012,01
2023*	2.186,08
2024*	2.284,08
2025*	2.365,54
2026*	2.443,49
2027*	2.508,64

2028*	2.571,50

Source 43 The Italian National Institute of Statistics,2023

This data illustrates Italy's Gross Domestic Product (GDP) from 1987 to 2022, with projections extending to 2028. GDP is a comprehensive measure encompassing the total market value of all goods and services produced within a country annually. It serves as a crucial gauge of a nation's economic prowess. In 2022, Italy's GDP reached approximately 2.01 trillion U.S. dollars. For a global perspective, refer to the global GDP comparison. Italy's economic landscape has witnessed fluctuations since the 2008 global economic crisis, despite notable year-over-year increases. As the third-largest economy in the European Union, Italy faced downturns attributed primarily to spending inefficiencies and leadership inadequacies.

An examination of Italy's budget balance, the net difference between revenues and spending, reveals a consistent negative balance or state deficit over the past decade. However, there has been noticeable improvement in the budget balance since 2009. Despite this, the national debt has continued to escalate annually, particularly between 2008 and 2009, extending into 2014. Unless Italy adopts measures to curtail spending or augment revenues, its reliance on external funding will perpetuate a growing debt burden. Notwithstanding the persistent economic challenges, Italy secured a position among the top 10 countries with the largest GDP in 2014, surpassing economically advanced nations like Canada and Australia. This suggests that Italy's economic struggles stem more from inefficient spending practices than a dearth of production.

Table 38 Distribution of gross domestic product (GDP) across economic sectors in Italy 2022

Year	Agriculture(%)	Industry(%)	Services(%)
2012	1,97	21,35	66,44
2013	2,14	21,17	66,69
2014	2	20,80	67,09
2015	2,07	20,86	66,97
2016	1,93	21,22	66,65
2017	1,97	21,30	66,43
2018	1,95	21,45	66,34
2019	1,91	21,53	66,25
2020	2,01	21,56	66,90
2021	1,90	23,19	64,75

2022	1,82	23,82	64,30

Source 44 The Italian National Institute of Statistics,2023

This data presents the breakdown of Italy's Gross Domestic Product (GDP) among various economic sectors from 2012 to 2022. In 2022, the contribution to the GDP was as follows: approximately 1.82 percent from agriculture, 23.82 percent from the industry, and the majority, 64.3 percent, from the service sector.

Table 39 Unemployment rate in Italy 2022

Year	Percentege
1999	11,69
2000	10,84
2001	9,60
2002	9,21
2003	8,87
2004	7,87
2005	7,73
2006	6,78
2007	6,08
2008	6,72
2009	7,75
2010	8,36
2011	8,36
2012	10,66
2013	12,15
2014	12,68
2015	11,90
2016	11,69

2017	11,21
2018	10,61
2019	9,95
2020	9,16
2021	9,50
2022	8,09

Source 45 The Italian National Institute of Statistics,2023

This data illustrates the unemployment rate in Italy from 1999 to 2022, with the rate standing at approximately 8.09 percent in 2022.

Italy's employment landscape has undergone significant shifts, particularly after 2011, following a decade-low in 2007. The roots of this trend can be traced back to the late 2000s recession, originally ignited by the global crisis. During this period, Italy witnessed a substantial increase in national debt (2007 to 2011), underscoring a growing dependence on external funding to sustain its economy. The escalating national debt is attributed to inefficient budgeting practices and leadership challenges. Coinciding with the economic crisis, Italy reported consistent trade deficits year after year, indicating an imbalance where imports exceeded exports. The peak of this trade deficit occurred in 2010, primarily driven by a decade-low in the trade balance of goods. In 2013, Italy secured a position among the top 20 leading import countries globally, outpacing notable exporters like Canada and Saudi Arabia. This suggests that Italy possesses the capability to produce and sell goods but relies on funding from other nations, contributing to an expanding national debt.

4.4.3. Assessment of Disadvantaged Regions

Table 40 Population at Risk of Poverty or Social Exclusion - Europe 2030, By Geographical Area And Household Characteristics

	Anno 2021				Anno 2022			
	Risk of poverty or social exclusion	Risk of poverty	Severe material and social deprivation	Very low work intensity	Risk of poverty or social exclusion	Risk of poverty	Severe material and social deprivation	Very low work intensity
Geographical area								
North-west	17,4	13,2	5,2	5,6	16,1	13,2	2,2	5,2
North-east	14,2	11,5	1,9	4,6	12,6	10,4	1,6	3,8
Centre	20,4	15,8	3,8	8,4	19,6	15,9	2,1	8,8
South and Islands	40,6	33,1	10,0	19,5	40,6	33,7	9,3	17,1
Household size								
One	30,3	25,6	7,2	17,6	29,0	24,3	6,1	15,9
Two	20,5	15,3	5,0	16,4	21,3	16,7	4,4	15,2
Three	22,0	16,0	4,6	10,9	21,5	16,1	4,1	11,8
Four	23,8	20,7	5,3	6,4	24,8	21,5	3,1	5,2
Five or more	40,7	32,8	11,2	9,8	31,2	28,9	6,7	5,1
Number of income earners								
One	42,7	37,3	9,0	20,3	42,4	36,9	8,3	17,8
Two	17,4	12,9	4,1	6,9	16,5	13,0	2,7	6,6
Three or more	15,9	9,9	5,0	5,7	13,6	9,3	2,0	4,8
Main income source								
Employee	17,7	14,6	4,5	1,9	17,2	15,3	3,2	1,6
Self-employment	22,5	19,5	3,4	2,2	19,9	17,9	1,1	3,1
Pensions and other public transfers	34,2	25,4	8,4	48,6	34,2	25,7	7,3	44,8
Other income	65,4	56,3	12,2	59,2	58,2	50,4	6,3	59,0
Household type								
Single person	30,3	25,6	7,2	17,6	29,0	24,3	6,1	15,9
-less than 65 years	34,1	27,5	8,6	17,6	29,5	22,9	6,8	
-65 years and over	26,0	23,3	5,6		28,3	25,9	5,2	15,9
Couples without children	15,4	11,6	4,3	9,7	17,3	14,2	3,5	9,8
-R.P. (b) less than 65 years	18,4	12,5	5,8	9,6	18,8	14,4	4,2	9,6
-R.P. (b) 65 years and over	12,8	10,8	3,1	13,7	15,9	14,0	2,9	26,5
Couples with children	24,6	20,7	4,7	7,6	23,8	19,9	3,8	6,7
-one child	20,5	15,1	3,9	9,3	21,3	15,8	4,0	11,3
-two children	22,7	19,7	4,7	6,0	23,4	20,2	3,0	4,5
-three or more children	42,4	39,7	7,4	8,9	32,7	30,9	6,0	3,5
Single parents	32,6	24,4	7,6	20,1	30,5	23,4	6,0	17,3
Other typologies	35,2	17,4	18,6	16,9	27,7	23,5	6,9	18,8
Number of minors								
One minor	24,0	21,1	4,7	6,9	23,4	19,8	4,9	8,8
Two minors	27,4	24,2	6,5	7,8	27,8	25,2	3,4	4,0
Three or more minors	45,8	40,2	12,6	9,1	39,4	37,7	8,1	5,0
At least one minor	28,1	24,7	6,4	7,5	27,0	24,0	4,6	6,3
Number of elderly								
One elderly	27,6	19,3	6,8	25,4	27,9	21,3	5,2	24,7
Two or more elderly	16,7	11,7	3,4	27,1	18,1	13,6	3,0	29,0
At least one elderly	22,7	15,9	5,3	25,8	23,4	17,8	4,2	25,9
Citizenship								
All Italian household members	22,8	18,1	4,7	11,2	22,6	18,3	3,7	10,1
At least one foreign household member	44,7	36,7	15,9	7,9	39,6	35,1	10,7	7,6

Source 46 The Italian National Institute of Statistics,2023

The data elucidates a discernible reality, as geographical incongruities in poverty and social exclusion profoundly delineate the Italian landscape. A marked dichotomy is evident between the Northern regions vis-à-vis the Southern regions and Islands, wherein risk factors exhibit notable escalation. These disparages permeate through

various societal strata, exerting discernible impacts on single-parent households, larger familial units, individuals dependent on specific income sources, and those contending with diminished work intensity.

North-South Divide:

- The risk of poverty or social exclusion nearly doubles in the South and Islands (40.6%) compared to the Northwest (17.4%). This translates to over 23% more individuals facing socioeconomic challenges in the South.
- Similarly, poverty rates follow suit, with over 33% of individuals in the South at risk compared to 13.2% in the Northwest. This means one in three individuals in the South struggle with income limitations.
- Even severe material and social deprivation, a crucial indicator of hardship, shows a stark difference. With 10% affected in the South and Islands, compared to 5.2% in the Northwest, access to basic necessities and social participation remains a substantial hurdle for many in the South.

Vulnerable Household Types:

- Single parents across all regions grapple with elevated poverty risks, exceeding 30% nationally. However, in the South, this figure jumps to 32.6%, highlighting the particular difficulties faced by single-parent households in disadvantaged regions.
- Larger families also face challenges. Households with three or more minors exhibit a national risk of poverty exceeding 40%, with the South seeing an even higher rate of 45.8%. This underscores the need for targeted support systems for families with multiple dependents.

Employment Challenges:

- Low work intensity is another major concern, especially in the South. Nearly 20% of individuals struggle to secure sufficient employment, compared to the national average of 11.2%. This limited access to work traps individuals in a cycle of economic disadvantage.
- Interestingly, the "other income" category shows a higher risk of poverty (58.2% in the South, 65.4% nationally) compared to other income sources like employment or pensions. This suggests that individuals relying on alternative income streams tend to be more vulnerable to economic instability.

Changes over Time:

- While direct comparison with previous years is challenging due to methodological changes, the data suggest some potential improvements. The

overall risk of poverty and social exclusion appears to have remained relatively stable between 2021 and 2022.

- However, concerns remain regarding severe material and social deprivation, which shows slight increases for certain household types like couples with children and single parents. This indicates a need for closer monitoring and targeted interventions to address these persistent vulnerabilities.

- North-West: 16.1% in 2022, significantly lower than any other region. Notably, this region exhibits the lowest rates of severe material and social deprivation (2.2%).
- North-East: 12.6% in 2022, also presenting a relatively low overall risk with a moderate level of deprivation (1.6%).
- Centre: 19.6% in 2022, demonstrating a slightly higher risk compared to the North. Here, low work intensity becomes a concern (8.8%).
- South and Islands: 40.6% in 2022, almost triple the risk observed in the North-West. This region faces significant challenges across all indicators, including high poverty rates (33.7%), severe deprivation (9.3%), and low work intensity (17.1%).

4.4.4. Education System Analysis

Table 41 Enrolment in kindergartens schools in Italy 2012-2020

Year	Number
2012/2013	1.686.095
2013/2014	1.663.955
2014/2015	1.637.110
2015/2016	1.599.777
2016/2017	1.535.493
2017/2018	1.491.290
2018/2019	1.450.793
2019/2020	1.415.006
2012/2013	1.686.095
2013/2014	1.663.955

2014/2015	1.637.110
2015/2016	1.599.777

Source 47 The Italian National Institute of Statistics,2023

Between 2012 and 2020, the number of children enrolled in kindergartens in Italy experienced a decrease. In the school year 2012/2013, about 1.7 million pupils were enrolled in kindergartens across Italy. Seven school years later, the number of children enrolled dropped to just over 1.4 million. There is an evident correlation between the declining enrolment numbers and Italy's consistently decreasing birth rate.

Table 42 Number of elementary schools in Italy 2012-2019

Year	Number
2012/2013	17.413
2013/2014	17.321
2014/2015	17.256
2015/2016	17.137
2016/2017	17.030
2017/2018	16.948
2018/2019	16.840
2012/2013	17.413
2013/2014	17.321
2014/2015	17.256
2015/2016	17.137
2016/2017	17.030
2017/2018	16.948
2018/2019	16.840

Source 48 The Italian National Institute of Statistics,2023

Between 2012 and 2019, the number of elementary schools in Italy experienced a constant decrease. In the school year 2012/2013, Italy counted 17.4 thousand primary schools. In the year 2018/2019, there were 16.8 thousand elementary schools nationwide.

Table 43 Primary/Secondary Schools

School level						
Data type	Schools			Enrolled		
Type of schools' management	Public	Private	Total	Public	Private	Total
Pre-Primary	15247	7229	22476	974805	363262	1338067
Primary	15310	1390	16700	2425042	163341	2588383
Lower Secondary	7417	640	8057	1639019	67463	1706482
Upper secondary	5290	1598	6888	2615982	114377	2730359

Source 49 The Italian National Institute of Statistics,2023

The educational framework operates in accordance with the principles of subsidiarity and institutional autonomy. Legislative authority over the general organization of the education system, encompassing aspects such as minimum educational standards, school personnel, quality assurance, and allocation of state financial resources, lies exclusively with the State. The Ministry of Education and Merit (Ministero dell'istruzione e del merito – MIM) and the Ministry of University and Research (Ministero dell'università e della ricerca – MUR) bear the responsibility for the overall administration of education at the national level within their respective domains. The MIM, in particular, maintains decentralized offices (Uffici scolastici regionali - USRs) tasked with ensuring the enforcement of general provisions, adherence to minimum performance requirements, and conformity to standards within each region. Regions share concurrent responsibility with the State in specific segments of the education system, such as the organization of Early Childhood Education and Care (ECEC) for ages 0-3, formulation of the school calendar, distribution of schools within their territorial boundaries, and the facilitation of higher-level studies. Exclusive legislative authority over the organization of regional vocational education and training systems (Istruzione e formazione professionale - IFP) rests with the regions. Local authorities assume responsibility for organizing educational offerings at the community level, encompassing activities such as premises maintenance, school mergers or establishments, and pupil transportation, extending from ECEC to upper secondary education. Schools, operating with a considerable degree of autonomy, hold the prerogative to define curricula, expand the educational repertoire, and structure teaching parameters, including school time and pupil groupings. Schools are mandated to formulate their Three-Year Educational Offer Plan (Piano triennale dell'offerta formativa - PTOF) every three years. At the tertiary level, universities, institutions of

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higher education for fine arts, music, and dance (Alta formazione artistica, musicale e coreutica - Afam), and Higher Technological Institutes (Istituti tecnologici superiori - ITS Academies) enjoy statutory, regulatory, teaching, and organizational autonomy.

The Italian educational framework predominantly constitutes a publicly administered State system. Nevertheless, private entities and public entities possess the capacity to establish autonomous educational institutions. These institutions, whether public or private, may attain a status equivalent to State schools under specific circumstances and are designated as "scuole paritarie." Notably, independent schools lacking parity with State institutions lack the authority to confer official qualifications. State schools receive direct financial support from the government, while scuole paritarie benefit from state contributions determined annually in accordance with established criteria set forth by the Ministry. The option of home education during the mandatory education period remains a viable alternative, subject to stipulated conditions. Students engaged in home education are obliged to undergo specific examinations as a means of substantiating their attainment of the prescribed competencies. Education, across all tiers, is mandated to extend its accessibility to a broad spectrum of individuals, encompassing Italian citizens and foreign minors from both European Union (EU) and non-EU nations. It is imperative to underscore that compulsory education is provided without charge.

The overarching principle of inclusion is extended to students facing diverse challenges, including those with disabilities, socio-economic disadvantages, and immigrant backgrounds. In instances involving such students, measures are implemented to emphasize personalized teaching methodologies, didactic flexibility, and, notably, linguistic support for immigrant pupils with limited proficiency in the Italian language. Furthermore, the State ensures the right to education for students confronted with impediments to conventional attendance, whether due to hospitalization, prolonged illness necessitating home confinement, or, for individuals aged beyond 14, detention (refer to the section titled 'Organizational Variations and Alternative Structures in Secondary Education' for further elucidation).

The Italian education and training system encompasses a comprehensive array of educational stages, namely Early Childhood Education and Care (ECEC), primary, secondary, post-secondary, tertiary, and adult education.

For children under three years of age, ECEC is provided through educational services, such as nurseries, playgrounds, centres for children and families, and home-based services. ECEC for children aged three to six years is administered in pre-primary schools known as "scuole dell'infanzia." Both offerings collectively constitute an integrated ECEC system, an integral component of the education system, albeit non-mandatory. The organization of ECEC (0-3) falls under regional jurisdiction, guided by regional legislation, within the overarching framework established centrally by the Ministry responsible for education, presently the Ministry of Education and Merit, which exercises full responsibility over ECEC offerings for older children (3-6).

Compulsory education commences at six years of age and spans ten years, encompassing primary, lower secondary education, and the initial two years of the second cycle of education. The final two mandatory years of the second cycle can be

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pursued either in general and vocational upper secondary schools or within the regional vocational education and training system. Pupils may fulfil compulsory education requirements in State schools, independent schools with parity (paritarie), or, contingent upon specific conditions, through private or home education. Moreover, individuals possess the right and obligation to receive education and training for a minimum of 12 years within the education system or until they obtain a three-year vocational qualification by the age of 18.

The initial cycle of education is obligatory and comprises primary and lower secondary education. Primary education initiates at six years of age and spans five years, while lower secondary education commences at eleven years of age and persists for three years. Transitions within the first cycle, from primary to lower secondary education, occur without examinations. Culminating the first cycle, students undertake a final exam, success in which facilitates direct progression to the second cycle of education, with the initial two years being mandatory.

The second cycle of education commences at the age of 14, presenting two distinct pathways: upper secondary school education and the regional vocational training system (Istruzione e formazione professionale - IeFP). The first two years of the second cycle are obligatory.

Upper secondary school education (istruzione secondaria di II grado) is structured into general (liceo), technical (istituto tecnico), and vocational (istituto professionale) schools, each with five-year courses. Successful completion of the final exam in upper secondary school awards students a certificate facilitating entry into tertiary education.

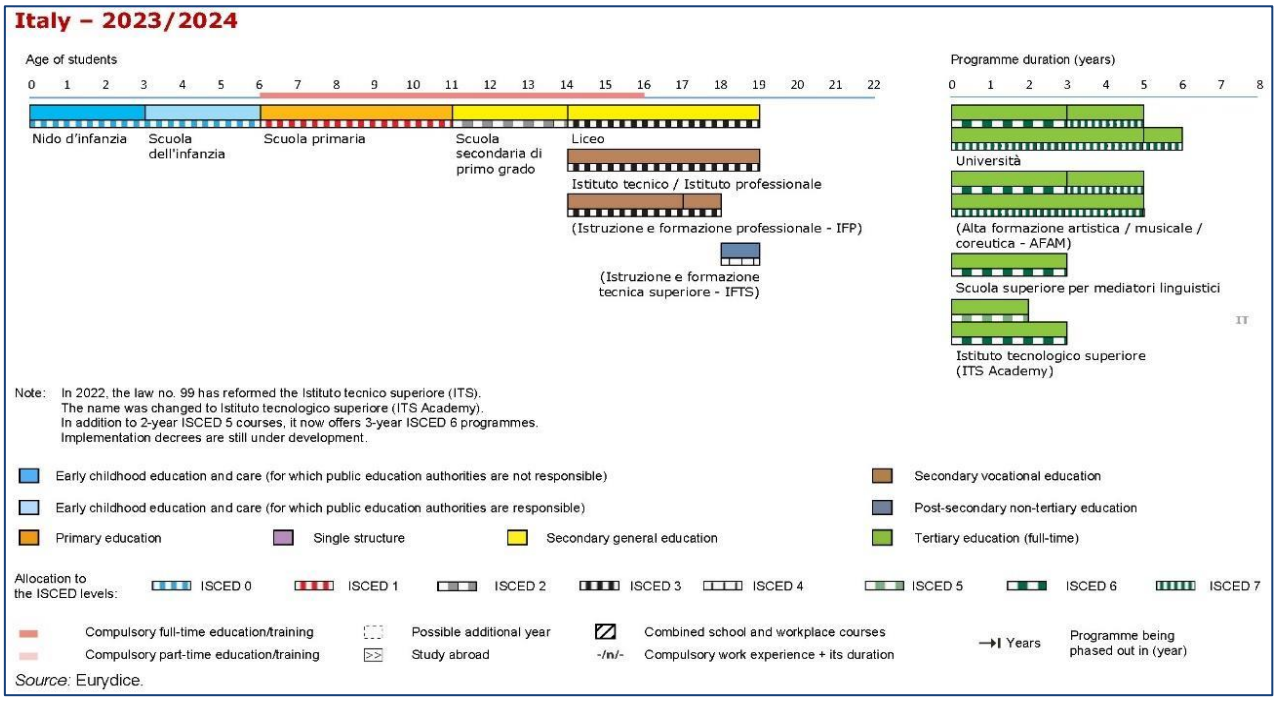
The regional vocational training system (IeFP) provides three- and four-year courses orchestrated by accredited training agencies or upper secondary schools. Upon completion, participants receive a qualification enabling access to second-level regional vocational courses or, under specific conditions, to programs at Higher Technological Institutes (Istituti tecnologici superiori – ITS Academies).

Institutions offering tertiary education include the following:

- Universities or Equivalent Institutions
- Institutes of Higher Education for the Fine Arts, Music, and Dance (Alta Formazione Artistica, Musicale e Coreutica - Afam)
- Higher Technological Institutes (Istituti Tecnologici Superiori - ITS Academies)

Access to tertiary education is extended to students possessing an upper secondary education leaving certificate. The Ministry of University and Research, in conjunction with individual institutions, establishes specific admission conditions. Notably, admission to courses at ITS Academies is open to students who have completed a four-year regional vocational course, followed by a designated additional course. Recent reforms have been instituted within ITSs, with detailed alterations expounded in the section addressing ongoing reforms in higher education, with the anticipation of decrees that will delineate the organizational structure of these courses.

Figure 14 Italian National Education Structure



Source 50 Eurydice

4.4.5. Blue School Potential and Development

European Blue Schools bring the ocean into the classroom. A Blue School is a school, which, through project-based learning, engages students with marine- and maritime-related topics to create awareness and a feeling of responsibility for our ocean.[45]

A Blue School must develop a comprehensive educational program that encompasses the entire institution, focusing on the functionality of its infrastructure, the dedication of its teaching staff, and the active involvement of its students. This entails the school adopting sustainable practices such as waste sorting and recycling, reducing greenhouse gas emissions, and conserving renewable energy. These practices should be integrated into a specialised curriculum that is woven into various subjects, and should be conducted in collaboration or partnership with the local maritime economy's ecosystem.

The program includes a mix of enjoyable activities and educational excursions, all aimed at educating about the environment and its conservation. It also emphasises the importance of local cultures, craftsmanship, maritime heritage, and employment opportunities in the sector. A Blue School's primary objective is to educate its students, typically aged between 12 and 16 years, about sustainable development. It actively encourages them to engage as informed and interested citizens on sustainability

[45]https://maritime-forum.ec.europa.eu/theme/ocean-literacy-and-blue-skills/ocean-literacy/network-blue-schools_en#:~:text=It%27s%20a%20school%2C%20which%20through,know%20would%20simply%20not%20exist.

issues, participating in the creation of local agendas that contribute to building a responsible future.

Map 13 List of Blue Schools in Italy

Source 51 https://ec.europa.eu/maritimeaffairs/atlas/maritime_atlas

Table 44 Blue Schools in Italy

No.	Institution name	Level of education	Region	Country	Town
1	Circolo didattico Nettuno	Primary school	Mediterranean Sea	Italy	Nettuno
2	ISIS del Rosso	Secondary school	Mediterranean Sea	Italy	Monte Argentario
3	Istituto comprensivo ISA2	Junior High School	Mediterranean Sea	Italy	La Spezia

4	Istituto comprensivo Cremona 1	Primary school	Mediterranean Sea	Italy	Cremona
5	A piccoli passi	Kindergarten	Mediterranean Sea	Italy	Villabate
6	St Louis, Colonna Campus	Junior High School	Mediterranean Sea	Italy	Milan
7	IIS Ramadù	Kindergarten	Mediterranean Sea	Italy	Cisterna di Latina
8	Liceo linguistico Ilaria Alpi	Senior High School	Mediterranean Sea	Italy	Cesena
9	IISS A. Vespucci	Technical school	Mediterranean Sea	Italy	Gallipoli
10	I.P.S.E.O.A. Marco Polo	Technical school	Mediterranean Sea	Italy	Genova
11	Istituto Remo Brindisi	Technical school	Mediterranean Sea	Italy	Porto Garibaldi
12	I.C. Gadda	Kindergarten	Mediterranean Sea	Italy	Quarto
13	I.C. Barbara RIzzo	Primary school	Mediterranean Sea	Italy	Formello
14	Regina Mundi	Primary school	Mediterranean Sea	Italy	Milano
15	Liceo Scientifico Leonardo Da Vinci	Senior High School	Mediterranean Sea	Italy	Poggio marino
16	I.C. Elio Vittorini Messina	Kindergarten	Mediterranean Sea	Italy	Messina
17	IC Francesco Riso	Middle school	Mediterranean Sea	Italy	Isola delle Femmine
18	Liceo Linguistico Carducci	Junior High School	Mediterranean Sea	Italy	Viareggio
19	IC Riva Ligure	Junior High School	Mediterranean Sea	Italy	Imperia
20	Enzo Zannini	Primary school	Mediterranean Sea	Italy	Golfo Aranci
21	Istituto Marymount	Primary school	Mediterranean Sea	Italy	Rome
22	Istituto Enrico Fermi	Junior High School	Mediterranean Sea	Italy	Alghero
23	IIS Capellini - Sauro	Secondary school	Mediterranean Sea	Italy	La Spezia
24	IC LIttardi	Primary school	Mediterranean Sea	Italy	Dolcedo
25	ITT Guglielmo	Senior High School	Mediterranean Sea	Italy	Forlì
26	Istituto Comprensivo Antonio	Middle school	Mediterra	Italy	Milano

	Scarpa		nean Sea		
27	Vite Sante Longo	Senior High School	Mediterranean Sea	Italy	Monopoli
28	I.C. Nodari	Middle school	Mediterranean Sea	Italy	Lugo di Vicenza
29	Yieschool	Primary school	Mediterranean Sea	Italy	Vedano al Lambro
30	St Louis, Caviglia Campus		Mediterranean Sea	Italy	Milano
31	Scuola Media Armando Diaz	Middle school	Mediterranean Sea	Italy	Golfo Aranci
32	Circolo didattico Nettuno	Primary school	Mediterranean Sea	Italy	Nettuno
33	ISIS del Rosso	Secondary school	Mediterranean Sea	Italy	Monte Argentario
34	Istituto comprensivo ISA2	Junior High School	Mediterranean Sea	Italy	La Spezia
35	Istituto comprensivo Cremona 1	Primary school	Mediterranean Sea	Italy	Cremona
36	A piccoli passi	Kindergarten	Mediterranean Sea	Italy	Villabate
37	St Louis, Colonna Campus	Junior High School	Mediterranean Sea	Italy	Milan
38	IIS Ramadù	Kindergarten	Mediterranean Sea	Italy	Cisterna di Latina
39	Liceo linguistico Ilaria Alpi	Senior High School	Mediterranean Sea	Italy	Cesena
40	IISS A. Vespucci	Technical school	Mediterranean Sea	Italy	Gallipoli
41	I.P.S.E.O.A. Marco Polo	Technical school	Mediterranean Sea	Italy	Genova
42	Istituto Remo Brindisi	Technical school	Mediterranean Sea	Italy	Porto Garibaldi
43	I.C. Gadda	Kindergarten	Mediterranean Sea	Italy	Quarto
44	I.C. Barbara RIzzo	Primary school	Mediterranean Sea	Italy	Formello
45	Regina Mundi	Primary school	Mediterranean Sea	Italy	Milano
46	Liceo Scientifico Leonardo Da Vinci	Senior High School	Mediterranean Sea	Italy	Poggio marino
47	I.C. Elio Vittorini Messina	Kindergarten	Mediterranean Sea	Italy	Messina
48	IC Francesco Riso	Middle school	Mediterranean Sea	Italy	Isola delle Femmine

49	Liceo Linguistico Carducci	Junior High School	Mediterranean Sea	Italy	Viareggio
50	IC Riva Ligure	Junior High School	Mediterranean Sea	Italy	Imperia
51	Enzo Zannini	Primary school	Mediterranean Sea	Italy	Golfo Aranci
52	Istituto Marymount	Primary school	Mediterranean Sea	Italy	Rome

4.5. Poland

4.5.1. Region Selection Criteria and Process

Oceans cover 71% of the Earth's surface. They shape the climate and have a significant impact on its changes by absorbing, storing and transferring heat, carbon and water. The oceans are the source of life on Earth and determine its diversity. Several hundred million people around the world are economically dependent on fisheries management. Human environmental, social and economic well-being is inextricably linked to the health of the seas and oceans.

There are nine countries on the Baltic Sea, and more than 20 major rivers flow into it. Municipal sewage, industrial pollutants, chemical fertilizers, pesticides and herbicides, detergents, contamination resulting from littering from an area of 1,700,000 square kilometres, with a population of about 80 million. It will take the lifetime of the next generation for all these pollutants to flow out of it. However, this will not restore the original state - already about 10% of the bottom area is sea deserts (lifeless areas), and within 25-30 years there could be a complete destruction of life in this sea. That is why it is so important to counteract further overexploitation of the Baltic Sea waters.

In Poland, studies of the Baltic Sea show what problems the coastal zones of the great oceans will face. In the publication " Science Advances", scientists from seven Baltic countries, write how important knowledge of the Baltic Sea can be for oceanographers.

According to economist Mikołaj Czajkowski, PhD, a professor at the University of Warsaw: "The Baltic is a relatively shallow sea, not very salty, enclosed and less diverse than other seas. In addition, all the countries around the Baltic are developed, heavily industrialized. Therefore, the human-induced natural changes in this body of water can be observed here much faster than in the oceans."

Scientists warn that while the average water temperature in the world's oceans has risen by 0.5 degrees C over the past three decades, the average temperature in the Baltic Sea has risen by as much as 1.5 degrees C. The authors of the publication further point out water acidification. Carbon dioxide, which enters the air as a result of human activity, dissolves more intensively in water, forming carbonic acid - unfavourable for many marine organisms.

Another problem is the so-called eutrophication of the Baltic Sea, that is, its "fertilization." If too many substances such as nitrogen and phosphorus from fertilizers

and sewage enter the water, blue-green algae blooms appear on the water. And they, among other things, block the possibility of development of marine biota, and in their decomposition, oxygen is consumed. The formation of oxygen deserts in the Baltic is also related to this problem. This is because there are areas in the sea where much less oxygen is dissolved. And yet dissolved oxygen in the water is necessary for aquatic organisms, including fish, to live. The situation of fish in the Baltic is also not good because of overfishing.

It is comforting to know that, according to scientists, the Baltic Sea is quite thoroughly studied - it has been dealt with for a very long time by many research teams from different countries. "As a result, we know what needs to be done to improve the current state of affairs. And a lot of measures have already been taken for decades." - asserts Dr. Czajkowski. According to him, improving the state of our sea still requires a lot of action.

The scientist points out that the problem of a dirty river, flowing into the sea due to one country - will become another country's problem in moments. "The Swedes, for example, have already made a lot of investments in reducing fertilizers. If they want to make the Baltic cleaner, investing in further improvements in their country will be expensive and bring little improvement. The same money could have a much greater effect on the Swedes themselves if invested here in Poland. Because there is a lot of work to be done in this regard in our country." - asserts Prof. Mikolaj Czajkowski.

The project demonstrates the need for international cooperation, which must also be based on the integration of policymakers, the scientific community, industry and relevant professionals. The importance of cultivating coordinated and interdisciplinary cooperation to achieve more robust and stable collaboration is growing. Collaboration and networking are significantly influencing the evolution of marine and ocean literacy research. International cooperation among scientists, universities and organizations is growing in importance.

The project's findings will provide important information for a worldwide discussion on sustainable ocean practices and knowledge. The SHORE project is tailored to the individual needs of environmental education programs in Poland and around the world. The focus on ocean-sensitive initiatives is consistent with broader societal goals.

Map 14 Map of Central Europe

Source 52 https://commons.wikimedia.org/wiki/File:Central_Europe_Regions.png

Central Europe is a region in the north of Europe. It includes Germany, Austria, Czechia, Slovakia, Hungary, Slovenia, Croatia, Bosnia and Herzegovina, Serbia, Montenegro and Albania. Central Europe is a region with a rich history and culture. In the Middle Ages, powerful empires and kingdoms ruled the region. These empires and kingdoms made important contributions to the region's architecture, art and culture. Central Europe is also an important industrial and economic centre. The region is home to various industries such as automotive, machinery, chemicals and metallurgy. Central Europe is also famous for its natural beauty. The region is home to high mountain ranges such as the Alps, Carpathians and Dinar Mountains. These mountain ranges are famous for the region's spectacular landscapes. Situated in the heart of the continent, Poland shares its borders with Germany, Czechia, Slovakia, Ukraine, Belarus, Lithuania, and the Baltic Sea to the north. Its strategic location has made it a key player in the region's historical, cultural, and economic development.

Poland has been a strong democracy in the modern era and has been a member of the EU since 2004. Warsaw, the nation's capital, is a thriving centre of both culture and commerce. Poland's economy has grown significantly, with industries including manufacturing, finance, and information technology boosting the country's wealth. Poland actively influences the political climate in Central Europe as a member of the

Visegrád Group. Poland, whose indomitable spirit has been shaped by centuries of history, is still changing and leaving a lasting impression on the political, economic, and cultural landscape of the area.

The three primary relief groups that make up Poland's varied natural terrain are the highlands, the lowlands, and the mountains. The remainder of the nation shares structural, climatic, and vegetative traits with western Europe; however the eastern areas have traits unique to eastern Europe. With more than 75% of the nation below 650 feet (198 meters) and an average elevation of just 568 feet (173 meters) above sea level, the country is dominated by lowland features. During the Pleistocene Epoch, which lasted from roughly 2,600,000 to 11,700 years ago, the movements of Ice Age glaciers created the geological formations that make up Poland's terrain. Part of the North European Plain, the extensive Polish lowlands are made up of relatively recent geological deposits that enclose a sizable structural basin.

The southern region, on the other hand, exhibits older and more diverse geological formations. The geography is dominated by the Carpathian Mountain range, which dates to the Paleogene and Neogene periods (between 65 and 2.6 million years ago). The Little Poland Uplands (Wyżyna Małopolska), the Sudeten, and the Bohemian Massif are among the structural basins that encircle the northern edge of the Carpathians and divide it from an older structural mass. The relief structure can be further divided specifically to identify east-west trending zones. The northern zone includes the dune and swamp areas along the shore of the Baltic Sea and is followed by a belt of mostly lake-filled morainic terrain. The southern edge of this belt represents the last ice sheet's maximum extent. The third zone consists of the middle lowlands, which have little relief and are sculpted by streams that originate from glaciers that are receding. The Polish heartland is a region that is conducive to agriculture, especially where the comparatively barren fluvioglacial deposits have been covered with loess. The fourth zone consists of the older highlands and mountains to the south, like the Carpathian and Sudeten ranges, which provide breathtaking views along the southern boundary of the nation[46].

4.5.2. Characteristics of Each Region

The Baltic Sea is undoubtedly unique - there is no other body of water on earth like it. The Baltic Sea connects as many as 9 countries with each other through its coastline. Poland, Germany, Russia, Latvia, Lithuania, Denmark, Finland, Sweden and Estonia. The Baltic Sea is surrounded by land on all sides. Only at the border with the North Sea can you find narrow straits. The Baltic is called the inland sea of northern Europe.

The Baltic Sea is a medium-sized sea - its approximate area is about 415,266 square kilometres. The catchment area is 1,721,233 square kilometres. The volume of the sea itself, in turn, is 21,721 cubic kilometres of liquid.

The coastline of the Baltic Sea, which is interesting and very extensive, and therefore also varied, is estimated at about 8100 km. The largest bays of the Baltic Sea are: The Gulf of Bothnia, the Gulf of Finland and the Gulf of Riga.

[46] https://www.britannica.com/place/Poland/History

Compared to other natural large bodies of water, the Baltic Sea is not very deep. The average depth of the Baltic Sea is estimated at about 53 meters, while at its deepest point it is about 459 meters. In Poland, at its deepest point, it is almost 120 meters deep (Gdansk Deep).

The Baltic Sea is classified as a semi-salty sea the average salinity of the water in the Baltic Sea is about 7 per mile.

4.5.3. Assessment of Disadvantaged Regions

In 1945-1989, as a result of the intensive development of many industries (mining, cement, metallurgy, chemicals, energy, etc.), areas with an adversely altered environment emerged in Poland. These have been named areas of ecological emergency (OEZ). The term was introduced in the appendix to Resolution No. 21/83 of the Council of Ministers of March 4, 1983 on the draft national social and economic plan for 1983-1985. As we read in the resources of the PWN Encyclopaedia: An area of ecological danger is a territory where, as a result of intensive human economic activity, degradation of the natural environment has occurred, leading to a violation of the state of ecological balance. This degradation is the result of, among other things, repeated and long-term exceedance of permissible doses of surface water and air pollution. Areas at particular risk are:

- Upper Silesian Industrial District (GOP),
- Legnica-Glogów Copper Belt,
- Kraków and surrounding areas,
- Tri-City and the Gdansk Bay region,
- Belchatow Coal Basin.

These areas, until recently, were characterized by a significant concentration of heavy industry, mining, fuel, chemical, energy industries. This resulted in significant environmental pollution. Today, despite the partial restructuring of industry and the reduction of dust and gas emissions (containing, among other things, hydrocarbons, heavy metals, carbon dioxide, sulphur dioxide, fluorine and nitrogen compounds), and despite the reduction of wastewater production, accompanied by improvements in air and water quality, pollution is still present, for example, in soils and vegetation.

The Tri-City and the Gdansk Bay region is an area in Poland that is particularly vulnerable to pollution. The area is part of the catchment area of the Baltic Sea, which in turn is a shallow, shelf sea, and is almost devoid of water exchange with the oceans because it is an almost closed sea. Toxic and harmful substances accumulate in organisms living in the sea, as well as in the water and substrate. Sewage and pollution from households is a major problem. Huge amounts of nitrogen runoff from areas bordering the bay, these substances come from surrounding agricultural areas and large cities. Another source of pollution in the bay is waste.

Industrial plants, power plants and internal combustion engines also emit huge amounts of pollution, especially heavy pollution. These include PCB and DDT contamination, although as a result of the phase-out of these substances, their concentrations in the environment have dropped significantly. An important source of

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toxic substances is the paints with which boats are painted. Into the waters of the Gulf of Gdansk, along with pollutants go heavy metals of various types, but among the particularly dangerous are mercury, lead, cadmium, zinc, copper, chromium and nickel. Heavy metals accumulate in the bodies of fish, especially in fatty tissue. Sometimes their concentration is so high that it makes fishing and fisheries management impossible. Pollution on beaches is also worsening, and can cover up to a dozen kilometres of coastline.

In Poland, some cities are also endangered as a result of pollution emissions. Such a situation is caused by the fact that numerous sources of pollution - dust and gas emitters, landfills, sewage discharges - are concentrated in a small area. Among the most polluted cities in Poland are: Opoczno, Zywiec, Rybnik, Krakow, Nowy Sącz[47].

Degraded land (Source: Report Environmental Protection 2023[48])

Degraded land means land whose agricultural or forestry use value has decreased, especially as a result of the deterioration of natural conditions or as a result of environmental changes and industrial activities, as well as defective agricultural activities. The largest amount of devastated and degraded land in 2022 was located in the province of:

- Greater Poland - more than 10 thousand ha,
- Lower Silesia - more than 6 thousand ha,
- Silesian, Łódź and Warmian-Masurian - about 5 thousand hectares each.

Mazovia is a highly polarized region. The area of dynamic development, offering the most opportunities in the field of education (in quantitative and qualitative terms), includes Warsaw along with its neighbouring municipalities.

Nowhere in the region (or even in the country) are there such opportunities to acquire, expand and use knowledge and skills. Much of the region is characterized by poor conditions for the development of human capital resources, intellectual. Through the "brain drain" they are deprived of important resources that can determine their future development. This is undoubtedly an important problem from the perspective of the functioning of the region as a whole. The need to create new functions for most areas, which are in economic stagnation, is not possible without improving the functioning of the entire system: education - knowledge resources - conversion of knowledge into economic resources.

This challenge is particularly relevant today, when we are dealing with the progressive processes of polarization on the line: opportunities to acquire knowledge - human capital resources - opportunities to use the knowledge possessed in the labour market. Polarization is taking place primarily between: Warsaw and its suburban zone (along with several urban centres of Mazovia) and areas distant from the main development core.

[47] Source - report - Poland's most polluted cities - https://ep2019.contentplus.io/x/DXKmzdmJr?lang=pl&wcag=
[48] https://stat.gov.pl/obszary-tematyczne/srodowisko-energia/srodowisko/ochrona-srodowiska-2023,1,24.html

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On the one hand, the core area has the best spatial accessibility to educational institutions at different levels of education, the highest quality of education expressed in better educational results, the widest range of cultural, training and educational institutions and the highest concentration of residents with high professional qualifications. On the other hand, these disparities have been diversifying even more strongly in recent years,

For example: in core areas, the availability and offer of various educational institutions is improving, students are obtaining better and better examination results, and the human capital of residents is being strengthened by the migration influx of people with secondary and higher levels of education. The observed process of polarization of most of the analysed determinants and effects of education is linked, in a close way, to the socio-economic transformations of the of the region, expressed in the dynamic development of Warsaw with its suburban zone and the much slower development of the rest of the region.

Regional "Socio-digital Exclusion" in Poland

There is a regional "Socio-digital Exclusion" in Poland. The phenomenon of permanent, structural limitation of life chances of individuals and local communities as a result of overlapping and mutually reinforcing social and economic disadvantages and deficits related to the ability to use digital services.

Adolescents (girls) from restructured areas who, due to lack of access to digital services, limited quality of these services, lack of skills necessary for their productive use, or cultural conditions (entrenched habits, beliefs, motivations) are at risk of social and economic exclusion.

These skills are crucial in the context of future careers and the creation of management cadres of modern enterprises and institutions that take into account gender parity.

Index of local exclusion:
(dimensions)
- social,
- economic,
- digital,
- educational.

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Places of highest incidence of such problems (according to various studies)[49]:

- Areas undergoing restructuring with a predominance in traditional industries (mining, metallurgy, rural areas). They are characterized by industrial monoculture, attachment to traditional cultural patterns and the resulting lack of motivation for economic-social-cultural transformation.

- Social and digital exclusion is a phenomenon that has its causes not so much in objective conditions, but in attitudes and motivations manifested in the abandonment of attempts to face exclusion despite the awareness that without new technologies it is impossible to participate in society today.

- In this context, the phrase "socio-digital exclusion" takes on a new meaning. In light of the considerations presented here, the term should be understood not only as a reference to the social conditions and consequences of digital exclusion, but also as an indication that it is not only about exclusion from society, but exclusion by society, i.e. social consent to the alienation of those who are unable to independently join the new digital community that is forming before our eyes.

- The most appropriate way to combat a key aspect of digital exclusion, i.e., motivational exclusion, is to build the need to use the Internet around an individual's broader life motivations, including, most importantly, professional motivations. For this, proper identification of such motivations is needed.

4.5.4. Education System Analysis

Education reform was carried out between 2017 and 2023, introducing the following school structure:

- 8-year elementary school
- 4-year general high school
- 5-year technical school
- 3-year industry school of the first degree
- 2-year industry school of the second degree
- 3-year special school adopting to work
- post-secondary school.

Structural changes are made on the basis of the Law of December 14, 2016. "Education Law" and on the basis of the Law "Regulations Introducing the Law - Education Law" of the same date.

[49] For the literature:
1. Bartol A., Herbst J., Pierścińska A.: Socio-digital exclusion in Poland. State of the phenomenon, trends, recommendations, Stocznia Foundation 2021.
2. GUS, Use of information and communication technologies in public administration units, enterprises and households in 2020, Warsaw 2021.
3. GUS, Information Society in Poland in 2020, Warsaw 2021.
4. UKE, Report on the state of the telecommunications market in Poland in 2020, Warsaw 2021.
5. Eurostat, 2020.
6. Use of digital services, Minds&Roses on behalf of Orange Polska, Omnibus survey, face2face interviews, number of interviews: 1018, persons 15+, implementation - September 2021.
7 Digital exclusion, Minds&Roses on behalf of Orange Polska, survey by GoldenEye methodology, online interviews (CAWI), number of interviews 1000, persons 15+, realization: October 7-15, 2021

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Compulsory education

Compulsory education in Poland lasts 9 years and includes the last year of preschool education and 8 years of elementary school.

The Polish education system separates compulsory schooling and compulsory education:

- Compulsory schooling (i.e., the obligation to attend an 8-year elementary school) applies to children and adolescents between the ages of 7 and 15.

- Compulsory education refers to young people up to the age of 18 (aged 15-18) and can be carried out in school or out-of-school form (e.g., through vocational preparation with an employer).

Stages of Education

Early education and care
Facilities for children aged 0-3 years:
- nurseries
- children's clubs.

Nursery attendance is optional. Crèches are not part of the education system, but fall under the Ministry of Family and Social Policy. Facilities for children aged 3-6:
- kindergartens,
- preschool departments in elementary schools,
- pre-school education complexes,
- preschool points.

Pre-school education is optional for children aged 3-5 and compulsory for 6-year-olds, who are required to undergo one-year kindergarten preparation. However, every 3-, 4- and 5-year-old has the right to use a place in a kindergarten in his or her municipality if his or her parents decide to use preschool care. Children 7 years old start compulsory education in the first grade of elementary school.

Primary education (ISCED 1+2)

The 8-year elementary school for students between the ages of 7 and 15 is a unified structure that includes ISCED 1 and ISCED 2 levels (elementary school + lower secondary school).

Education in an 8-year elementary school includes two stages:
- grades 1-3 (early childhood education),
- Grades 4-8 (subject-by-subject teaching).

The first stage of compulsory education in Poland is elementary school. Before the 2017 school reform, it lasted 6 years and consisted of two stages: early childhood education (grades 1-3) and subject-by-subject teaching (grades 4-6). As of the

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2017/2018 school year, eight-year elementary school was reinstated and now covers children between the ages of 7 and 15.

The first three years of schooling are integrated education. The teacher, who is also the class teacher, conducts early childhood education. It includes: polonics education, social education, science education, mathematics education and technical classes. The schedule for grades 1-3 also includes foreign language, music, art, physical education and computer classes. They can be taught by the same teacher or by others.

In grades 4-8, children learn Polish, two foreign languages, history, social studies, fine arts, music, nature, geography, biology, physics, chemistry, mathematics, computer science, technology, safety education and physical education. Schools also organize religion and ethics, which are attended by willing students. The classes are conducted by teachers of each subject.

According to the Polish education system, every student must take the eighth-grade exam, which is necessary for graduation, but there is no minimum passing threshold. This means that even with a low score, he or she will receive a basic education. From 2019-2023, the compulsory subjects are Polish, mathematics and a modern language. Starting in 2024, an eighth grader will additionally have to pass a subject of his choice - biology, chemistry, physics, geography or history. The result of the eighth-grade exam is taken into account when recruiting for high schools.

Secondary education (ISCED 3)

The vast majority of graduates of an 8-grade elementary school continue their education in general or vocational secondary schools, although it is not compulsory (students are only subject to compulsory education).

Secondary education in Poland covers young people between the ages of 15 and 20 and is divided into several types of schools:

- four-year general secondary school,

- five-year technical school,

- three-year industry school of the first degree,

- three-year special preparatory school,

- two-year industry school of the second degree,

- post-secondary school for those with secondary education or secondary industry education.

General high school

Before the 2017 reform, the education system in Poland provided for three years of general high school education. Today, high school students are educated for four years. This type of institution is supposed to prepare a young person for matriculation

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and then further study at universities. The curriculum is high, especially in specialized high schools, where the number of hours of humanities, natural sciences or science subjects is increased.

In addition to compulsory subjects, a high school student must choose a minimum of two and a maximum of four subjects at the extended level. These are Polish, history, geography, biology, chemistry, physics, history of music, history of art, Latin language and ancient culture and philosophy (240 hours each) or a modern foreign language, social studies, mathematics and computer science (180 hours each). Depending on the classes chosen, he or she may also be required to take supplementary subjects such as history and society, nature, art classes or economics in practice.

In the final year, most high school students take the high school diploma exam. Some high schools also allow students to take the International Baccalaureate. Graduates receive a secondary education - this includes those who did not take or did not pass the high school diploma.

Technical school

The new education system of 2017 extended the years of schooling at a technical school from four to five. Those interested in this form of education have a choice of several hundred professions from a wide range of industries. In addition to compulsory classes in compulsory education (including extended ones), students pursue theoretical and practical classes in vocational training. After graduation, they receive not only secondary education, but also a diploma confirming professional qualifications. At the technical school it is also possible to pass the baccalaureate.

Industry school of the first and second degree

An industry school of the first degree lasts three years. It includes general education and vocational training. In addition, students also undergo apprenticeships for several hours a week. A graduate of an industry school who successfully passes the vocational exam receives a basic industry education and a diploma confirming professional qualifications. He or she can start work or continue his or her education at a second-level trade school. This one makes it possible to continue training in a profession and receive the title of technician, as well as to pass the baccalaureate. Its graduates have a secondary trade education.

Special school adopting for work

Special schools for adoption to work are designed for students with multiple disabilities or intellectual disabilities of moderate and severe degree. It enables them to acquire practical skills necessary for employment in various professions. Young people learn such skills as housekeeping, gardening, carpentry work, office work, hand and machine sewing and handicrafts.

Post-secondary school

In the Polish educational system, post-secondary school is designed for people with a high school education. A high school diploma is not required to enroll. Establishments

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authorized as public schools allow you to take a vocational exam and receive a diploma confirming professional qualifications and the title of technician (or other equivalent). Depending on the chosen field of study, education can last from two to five semesters. Post-secondary schools also educate in the form of qualified vocational courses.

Exams

Students at general high school and technical high school can take the external matriculation exam after graduation. It enables them to obtain a high school diploma, and its possession is a prerequisite for admission to higher education. Pupils of an industry school of the second degree also have such an opportunity.

Students at an industry school of the first and second degree and a technical school may, during the course of their education or after graduation, take examinations confirming their qualifications in a given profession (old formula) or a vocational exam (new formula) and obtain a diploma confirming professional qualifications or a vocational diploma.

Higher education

Educational programs are provided by two types of universities:
- academic universities
- vocational universities.

Both types of universities provide first- and second-cycle studies, as well as unified master's degree programs, while only academic universities provide third-cycle (doctoral) studies and are authorized to award doctoral degrees. Vocational universities can also offer specialized education of a practical nature.

Studies can have two basic organizational forms: full-time and part-time. The duration of a first-degree program is:
- 3-4 years for a bachelor's degree
- 3.5-4 years for an engineering degree.

Possession of a bachelor's or engineer's degree entitles the student to pursue a second degree. Second degree studies last from 1.5 to 2 years, depending on the field of study.

Studies in selected majors are conducted as a unified master's degree program, which lasts 4-6 years. First- and second-cycle studies, as well as unified master's studies, end with a diploma exam, after passing which students receive a diploma of higher education. Possession of a master's degree entitles the student to practice the profession in question and allows admission to doctoral studies conducted at universities and scientific research institutions, lasting 3 to 4 years.

Adult education

This stage of education includes the completion of primary and secondary school education by adults, as well as the acquisition and completion of qualifications and

skills for professional and personal purposes. Education takes place in two forms (school and non-school) in:
- institutions of continuing and practical education
- in centres for further education and vocational training
- as part of postgraduate studies in higher education institutions.

Preschools in Poland

In the 2022/23 school year, there were 22,500 preschool education centres (0.3% more than in the 2021/22 school year), attended by 1534,200 children (4.2% more, respectively).

Elementary schools

In the 2022/23 school year, there were 14.1 thousand elementary schools for children and adolescents, including 5.9 thousand in urban areas and 8.2 thousand in rural areas. There were 2.0 million students in schools operating in cities, and 1.1 million in rural areas.

Secondary schools

- In the 2022/23 school year, there were 6.8 thousand secondary schools for young people (including special schools), with a total of 1671.2 thousand students (1547.6 thousand in the previous school year).

- In 2398 general secondary schools for young people, 726.4 thousand students were educated, among whom the majority were women (62.7%), while 1861 technical schools were attended by 711.1 thousand students, and here the majority were men (61.0%).

- There were 195.1 thousand students attending 1,672 industry first degree schools, among whom males accounted for 67.2%. Education in 226 industry second-degree schools was continued by 11.4 thousand students, of whom 10.8 thousand were in urban areas and 0.5 thousand in rural areas. For the first time, 0.9 thousand graduates of these schools were recorded - they accounted for 0.3% of secondary school graduates. Special schools for work are three-year schools designed for students with moderate or severe intellectual disabilities and students with multiple disabilities.

- Graduates of these schools receive a certificate confirming adoption for work. In the 2022/23 school year, the 560 schools in question were attended by 12,700 students.

- Among secondary schools, a separate group is made up of general art schools providing vocational licenses. In the 2022/23 school year, 14,500 students (1.7% fewer than in the 2021/22 school year) in 102 establishments of this type acquired a profession.

. For the majority of secondary schools, the governing body was local government units - 74.5%. In the 2021/22 school year, 362.0 thousand graduates completed their education in secondary schools for children and adolescents, 173.8 thousand of whom were women.

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Post-secondary schools

In the 2022/23 school year, there were 1,287 post-secondary schools with 234,800 students (0.9% more than in the 2021/22 school year).

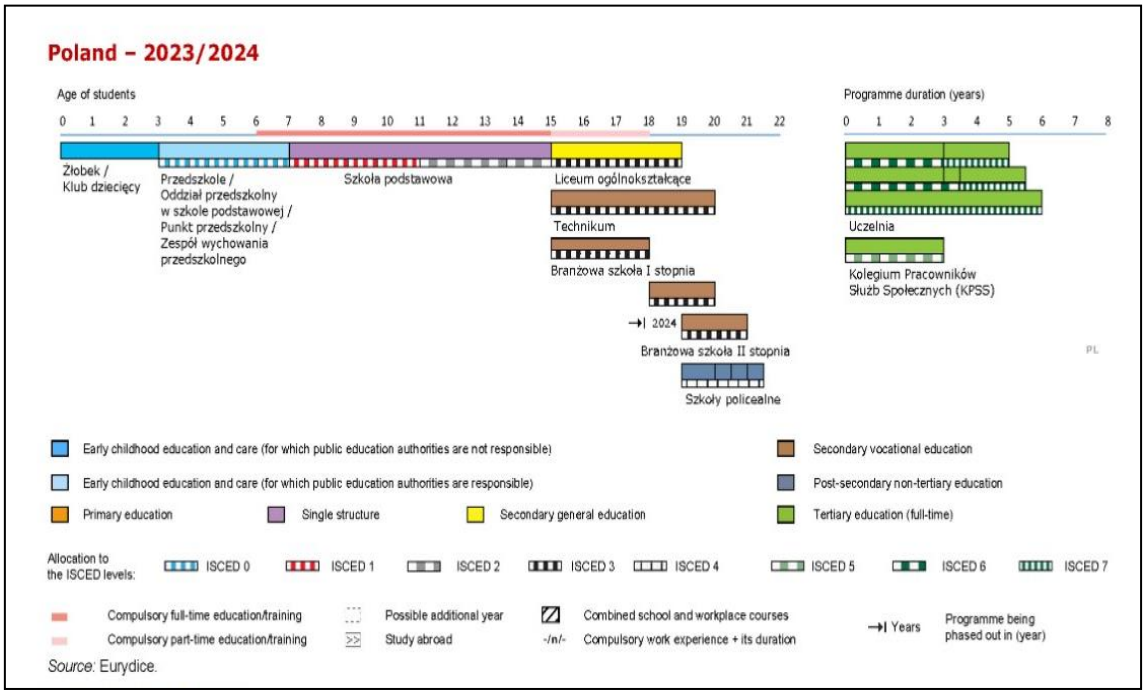
Schools for adults

In the 2022/23 school year, there were 816 adult schools with 88.6 thousand students (0.7% less than in the previous school year).

Teachers

In the 2022/23 school year, there were 512.1 thousand teachers (full-time equivalent).

Figure 15 Polish National Education System Structure



Source 53 Eurydice

4.5.5. Blue School Potential and Development

In Poland most of schools at Blue Schools Network is situated at the coastal area of Baltic Sea.

Table 45 List of Blue Schools in Poland

Name of the School	Level
Przedszkole nr 51 Jacek i Agatka w Gdańsku	Kindergarten
Szkoła Podstawowa no 37 Gdynia	Primary school
Primary School no 45 in Gdynia	Primary school
Primary School No. 12 in Gdynia	Primary school
Primary School no. 35	Primary school
Zespół Szkół Plastycznych w Gdyni	Senior High School
Primary School no. 8 Gdynia	Primary school
Primary School No. 34 with Integration Departments in Gdynia Leonid Teliga	Primary school
Gdynia Social School	Senior High School
Primary School no 21 in Gdynia	Primary school
Primary School no 48 Gdynia	Primary school
Defenders of the Coast's Primary School No. 44 in Gdynia	Primary school
Prywatna Szkoła Podstawowa 'Liber'	Primary school
Technikum Hotelarsko-Gastronomiczne w Gdyni	Vocational school
Complex Secondary Schools No. 6	Primary school
Primary School no. 40 Gdynia	Primary school
Kazimierz Nowak Primary School in Dąbrówka	Primary school
Przedszkole nr 51 Jacek i Agatka w Gdańsku	Kindergarten
Szkoła Podstawowa no 37 Gdynia	Primary school
Primary School no 45 in Gdynia	Primary school
Primary School No. 12 in Gdynia	Primary school
Primary School no. 35	Primary school

Only one Polish initiative for promotion of European Blue Schools Network was promoted in Gdynia.

In the period from April to December 2021, the Gdynia Aquarium MIR-PIB, together with the Department of Environment of the City of Gdynia, implemented a project of active education entitled "European Network of Blue Schools." They wanted to provide reliable information about the seas and oceans, support water conservation initiatives, awaken curiosity and sensitivity in the young generation, and create a space for participants of educational meetings to exchange thoughts, opinions and experiences.

They took 11 Gdynia schools on a journey whose element is water:

- Early Education Complex No. 1 (Elementary School No. 45)
- General Education School Complex No. 6 (Elementary School No. 53 and Elementary School No. 49 for Hearing Impaired Children)
- Elementary School No. 8 named after the Defenders of Hel

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- Elementary School No. 21
- Elementary School No. 34 with Integrative Branches named after Leonid Teliga
- Primary School No. 35 named after Captain Stanislaw Kosko
- Primary School no 37
- Elementary School No. 40 named after Capt. ż. w. Karol Olgierd Borchardt
- Primary School No. 48 named after Professor Kazimierz Demel
- Liber Private Elementary School
- Gdynia Community School.

4.6. Türkiye

4.6.1. Region Selection Criteria and Process

Türkiye is a nation situated at the crossroads of Europe and Asia, with a rich and diverse cultural heritage. It spans across the Anatolian Peninsula and a small portion of the Balkans, and it is surrounded by the Mediterranean, Aegean, and Black Seas. Türkiye holds a significant place in history, with influences from various civilizations, making it a fascinating region to explore. In antiquity, Türkiye was home to great empires, including the Byzantine and Ottoman Empires, which have left an indelible mark on the country's architecture, art, and culture. The Hagia Sophia and Topkapi Palace in Istanbul, once the capital of the Byzantine and Ottoman Empires, stand as testament to this rich historical legacy. Modern-day Türkiye is a thriving industrial and economic hub, encompassing sectors such as automotive, textiles, tourism, and agriculture. Istanbul, the country's largest city and economic centre, serves as a vibrant metropolis where East meets West. The city's skyline is adorned with a blend of modern skyscrapers and historic landmarks, showcasing Türkiye's dynamic economic development. Türkiye's natural beauty is equally captivating, featuring diverse landscapes from the Mediterranean and Aegean coasts to the Anatolian Plateau. The country is blessed with stunning mountain ranges like the Taurus and Pontic Mountains, offering breathtaking views and opportunities for outdoor enthusiasts. Ankara, the capital of Türkiye, embodies the country's modernity and political significance. As a bustling metropolis, it reflects the nation's forward-looking approach while still honouring its cultural heritage. Türkiye’s historical sites, such as Ephesus and Troy, contribute to its UNESCO World Heritage recognition, underlining the importance of preserving its rich past.

4.6.2. Characteristics of Each Region

The Black Sea

Fishing is the most dominant economic sectors within the Blue Economy of the region, whereby 76-80% of Türkiye's fish production is met from the Black Sea. The socio-economic implication of fishing is significant, it occupies a significant place in employment, with generations of families contributing to the fishing industry. Although it is a predominantly male sector women are also employed in areas such as processing. With regards to coastal development, road transportation between the provinces is provided by the roads built near or on coastal areas. Airports are also located on the

coast (Ordu-Giresun Airport, Samsun Çarşamba Airport, Sinop Airport, Trabzon Airport, Zonguldak Airport). Sea filling can be observed in these areas.

Pollution, overfishing, bycatch in fishing gears and invasion of alien species are major concerns regarding the marine biodiversity in the Black Sea. The impact of change in the biodiversity of the Black Sea extends far beyond the sea itself and also impacts nearby Mediterranean Basin water masses, particularly the Turkish Straits System.

The Sea of Marmara

The Sea of Marmara is a part of the Turkish Straits System (TSS) which is the Black Sea's only connection with the world oceans. This system thus plays a vital role in the protection of the biodiversity of the Black Sea, while its biological, physiographical, and hydrological characteristics combine to form a unique ecosystem between the Mediterranean and the Black Sea. The role played by the TSS in the biology of the Mediterranean and Black Sea basins is important as a biological corridor for some organisms, has seasonal migrations and serves as an acclimatization zone for Mediterranean species in transit to the Black Sea. Extensive economic activity and high settlement density are on the shores of the Marmara Sea with a huge impact on the marine environment. It is a hot spot for industrial activity and shipyards on the sea with significant impact to the marine environment. Various sources of pollution, overfishing, maritime accidents and heavy marine traffic all constitute major threats not only to the biodiversity of the straits system but also to the ecological balance of adjoining seas.

The Aegean Sea

The geological characteristics of the Aegean Sea is the existence of numerous small islands. Peculiar habitats around these islands host many marine organisms. While the northern part is productive due to the nutrient rich water from the Black Sea, the central and southern parts are poor in productivity. It is a high tourism destination and is faced with an influx of tourists during summer months Main concerns for biodiversity conservation in the Aegean Sea are similar to those in the Mediterranean Sea, such as invasion of alien species, impacts of tourism and aquaculture, heavy marine traffic.

The Mediterranean Sea

The Mediterranean Sea is the largest and deepest enclosed sea on Earth which is one of the most important global biodiversity hotspots. The marine fauna and flora of the Mediterranean Sea represent 28% of endemic species and 7.5% of the world's marine fauna and 18% of its marine flora.

Tourism is the largest sector of the blue economy in the Mediterranean Sea. Main concerns for biodiversity conservation in the Mediterranean Sea are similar to those in the Aegean Sea, such as invasion of alien species, impacts of tourism and aquaculture, heavy marine traffic

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Table 46 Profile of Türkiye related to marine/coastal areas (Adopted from Türkiye's Environmental Atlas, GEF-SGP Turkish National Strategy, World Resources Institute, A Global System of Marine Protected Areas, Türkiye's National Biodiversity Strategy Action Plan

Subject	Information
Coastal data	Length of coastline: 8,333 km Mediterranean coast: 1,577 km Aegean coast: 2,805 km Black Sea coast: 1,659 km Sea of Marmara coast: 663 km Area of continental shelf: 53,292 km^2 Area of territorial sea: 81,006 km^2 Area of claimed Exclusive Economic Zone: 176,643 km^2 Percent of population within 100 km. of the coast: 58% (2000)
Marine data	Area of the Mediterranean Sea: 2,966,000 km^2 Area of the Aegean Sea: 214,000 km^2 Area of the Black Sea: 586,000 km^2 Area of the Sea of Marmara: 11,500 km^2 Salinity: Mediterranean Sea: 0.038 Aegean Sea: 0.032 Sea of Marmara: 0.23 Black Sea: 0.018
Freshwater data	Total area of freshwater systems: 10,000 km^2 Number of river basins: 26 Number of natural lakes: 200 Total internal renewable water resources: 227 km^3 Area of natural lakes: 906,000 ha Area of artificial lakes (dams): 380,000 ha Annual river flows from other countries: 8 km^3 Annual river flows to other countries: 60 km^3
Species data	Number of known (& endemic) species: Higher plants: 8,947 (2,762), Mammals: 155 Fish: 472 (3), Birds: 454, Reptiles: 93 (2), Amphibians: 20 (1), Invertebrates: 120,000 Number of threatened species: Plants: 104, Mammals: 17, Birds: 14, Reptiles: 12 Amphibians: 3, Fish: 50 Number of freshwater fish species: 192

Source 54 TUDAV, 2022

4.6.3. Assessment of Disadvantaged Regions

Identification of Disadvantages

Disadvantaged areas in Türkiye can be defined as regions facing economic, social, and environmental challenges that hinder their overall development. These challenges may include high unemployment rates, limited access to education and healthcare, inadequate infrastructure, and environmental degradation. The reasons for considering

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these areas disadvantaged are often rooted in historical, geographical, and socio-economic factors.

Historical Factors

Historical factors may include a legacy of underdevelopment, while geographical factors can encompass remote locations or vulnerability to natural disasters. Socio-economic factors might involve a lack of economic opportunities, leading to poverty and limited social mobility. Understanding these complexities is crucial for developing targeted interventions and addressing the specific needs of each disadvantaged region.

Special Approaches to Disadvantaged Areas

Community Empowerment Programs

Implementing community-based initiatives that empower local residents to actively participate in decision-making processes. This can involve skill development, capacity building, and fostering entrepreneurship to enhance economic opportunities within the community.

Education and Skill Improvement

Investing in education and skill development programs to bridge the gap between disadvantaged regions and more developed areas. This includes promoting science, technology, engineering, and mathematics (STEM) education to prepare the local workforce for emerging opportunities in the blue economy.

Infrastructure Development

Prioritizing infrastructure projects in disadvantaged areas, such as improving transportation networks, energy supply, and telecommunications. Improved infrastructure can attract investments, facilitate trade, and create an environment conducive to sustainable economic growth.

Environmental Conservation and Sustainable Practices

Implementing policies and programs that encourage environmentally sustainable practices in the blue economy. This can include responsible fishing, marine conservation efforts, and the promotion of eco-friendly tourism, contributing to both economic development and environmental preservation.

Public-Private Partnerships

Encouraging collaboration between the public and private sectors to drive economic development in disadvantaged regions. Public-private partnerships can leverage resources and expertise to implement projects that foster ocean literacy and sustainable blue economy practices.

Research and Innovation Hubs

Establishing research and innovation centers focused on marine sciences and technology in disadvantaged areas. These hubs can drive advancements in ocean-related industries, creating job opportunities and positioning the regions as key players in the blue economy.

In conclusion, addressing the disadvantages in specific regions of Türkiye requires a multifaceted approach that considers historical, geographical, and socio-economic factors. By implementing targeted strategies and programs, Türkiye can promote ocean literacy and harness the potential of the blue economy to uplift disadvantaged communities and ensure sustainable development.

4.6.4. Education System Analysis

Education in Türkiye is made up of two main aspects: formal and informal education. Formal education covers pre-school, primary, secondary and higher education institutions, while informal education covers all education activities organized in addition to formal education activities. Education institutions are for everyone regardless of their language, race or religion. No individual, family, group or class is given any privilege in education. You have to be entitled to legally stay in Türkiye to benefit from the right of education in Türkiye.

Fundamental Principles of Turkish Education System

No person in Türkiye shall be deprived of the right to education guaranteed by the Constitution. In addition, compulsory education is free of charge in state schools. It is a crime to restrain a person's right to education. Fundamental principles of Turkish education system:

- ▸ Universality and equality,
- ▸ Fulfilment of social and individual needs,
- ▸ The right to choose
- , ▸ The right to education,
- ▸ A lifelong educational planning,
- ▸ Scientific approach.

Kindergartens and Day Care Centres

Education in Türkiye starts with the early childhood education under the re sponsibility of the Ministry of Family, Labour and Social Services and the Ministry of National Education. This type of education is available in kindergartens and day care centres for children aged 0 to 36 months. Kindergartens and day care centres are paid and registration is optional.

Preschool Education

Preschool education is offered by independent nursery schools for children aged 36 to 66 months and nursery classes as part of formal and informal education institutions for children aged 48 to 66 months. While education for children aged 48 to 66 months is

free in state schools, education for children aged 36 to 66 months is paid out of state schools.

Compulsory Education

Compulsory education in Türkiye lasts 12 years in three stages. The first stage is 4-year primary school. The second stage is 4-year secondary school. The third stage is 4-year high school. 12-year education is compulsory for all children from 6 to 17 years of age in Türkiye.

All children in Türkiye are entitled to access the fundamental training services offered by state schools. In addition to state schools, there are private schools affiliated with the Ministry of National Education. Unlike state schools, they are not free of charge and the education fee is determined by the school.

All primary schools in Türkiye have the same curriculum. Registration to religious vocational schools is optional for secondary education. High schools are called “lise” and include science high schools, social science high schools, Anatolian high schools, fine arts high schools, sports high schools, Anatolian religious vocational high schools, Anatolian Vocational and Technical high schools, multi-program Anatolian high schools, and Vocational Training Centres for apprenticeship, semi-skilled labour and craftsmanship training.

Students are placed to such schools based on their degree of success and interests in primary education. For further information about compulsory education system, you can visit www.meb.gov.tr or consult Directorates of National Edu cation in your province. There are special education schools for those who have special education needs in Türkiye.

A person is directed to the most suitable special education unit based on their disability, and their physical, psychological, and social development characteristics. You can refer to the Directorate of National Education in your province for further information.

Vocational Training Centres

Vocational Training Centres that offer 4-year education in total are included in formal education. Students attend the school for a day in a week and practice for the remaining 5 days in a workplace. Age restrictions do not apply to registrations. Registration is available year-round. They are paid at least 30 percent of the minimum wage during the period of education.

You can register to a Vocational Training Centre by registering to an A1 grade Turkish Language Course in a Public Education Centre if you hold a secondary school degree or above, or by completing A1 grade Turkish Language Course and registering to an A2 grade Turkish Language Course in a Public Education Centre if you are not able to document your educational background. If you already have a job, you can continue working and attend Apprenticeship Training at the same time.

School Registration

In order to register your child to any school, you need to have a document with your children's identity and foreigner identity number. If you hold a degree received from a country other than Türkiye, you can apply to the Equivalence Commission of the Directorate of National Education in your province to receive a certificate of equivalence and register to a relevant school with that certificate. If you are not able to prove your educational background with a certificate, you have to apply to the Equivalence Commission of the Ministry of National Education to take a placement test. The result of that test will be used for your placement.

Globalization approaches actively support and guide the science and technology policies of countries within the Organisation for Economic Co-operation and Development (OECD) that engage in economic competition. The OECD places a strong emphasis on fostering creativity and tapping into exploratory human resources. Institutional strategies and policies centred around innovation ensure the sustained performance of both employees and institutions, facilitating the generation of creative ideas to address emerging needs. Consistent support for innovation reduces the future risks for countries and organizations.

Innovation, essentially the embodiment of novel ideas or inventions, can be understood as the application of knowledge from various perspectives, leading to social and economic benefits and making it marketable. The Oslo guide (2005) suggests evaluating innovative approaches in a country based on indicators such as:

- Providing incentives to research and development (R&D) units
- Implementing reforms for quality education activities
- Examining patented inventions
- Considering international utility models
- Assessing the production of quality scientific articles and studies

The annual Global Innovation Index (GII) reports provide a platform for discussing and comparing the innovation levels of countries worldwide. These reports evaluate innovation through comparison indices and creative outputs. According to the 2019 data, Türkiye ranks 49th out of 126 countries in terms of its innovation capabilities. A reduction in the number of scientific publications, invention patents, and utility models suggests a notable impact on Türkiye's creativity and innovation landscape (Cornel University, 2019).

Another report, the American National Science Board Report, compares countries in relation to the connections between innovation and economic growth. In both the 2016 (Report A, covering 138 countries) and 2018 (Report B, covering 137 countries) reports, Türkiye does not secure a position within the top 50 concerning education and innovation criteria. Comparative data are presented in table below.

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Table 47 Comparing Countries Türkiye's place in the national science board report

	Report B	Report A
1. Quality of Education	101.	104.
2. School Management Quality	108.	112.
3. Existence of Specialty Training Services	93.	95.
4. Staff Training	102.	101.
5. Professional Management Assurance	80.	81.
6. Innovation and Sophistication Factors	66.	65.
7. Innovation	69.	71.
8. Innovation Capacity	74.	75.
9. R&D Expenses	69.	70.
Average	85.	86.

The data highlights a misalignment between innovation-related indicators and the targets outlined in the Ministry of National Education's Strategy 2003 document. Specifically, the indicator for innovation and sophistication factors is ranked 66th, while the innovation capacity indicator is positioned at 74th. Notably, both of these indicators fall below Türkiye's science and technology targets as outlined by TÜBİTAK in 2004.

Innovative policies, as illustrated in table below, drive a paradigm shift in education, shaping the information and communication society.

Table 48 Comparison of social paradigms

Comparison of social paradigms	
Industrial Society Paradigm	Information and Communication Society Technology
Lessons in the classroom	Individual research activities outside the classroom
Passive assimilation	Apprenticeship
Working alone	Learning with the team
All-knowing teacher	Advisor
A fixed content	Dynamic and flexible content
Homogeneity	Diversity / Difference

Modern educational institutions must adopt a model that redefines management, learning, and teaching processes. In this new educational paradigm, it is crucial to establish well-defined "innovative stages and success indicators." Education policies should also incorporate preventive measures against factors that could negatively impact the learning process. To foster an innovative culture in schools, policies should reward success, encourage change, and prevent stagnation. Schools need opportunities to take risks, rectify mistakes, and promote collaboration. Innovative education policies are instrumental in enhancing overall performance.

Managers, as leaders of corporate innovation, are expected to assume responsibility for risk and entrepreneurship. Innovative managers, by re-evaluating existing information with different perspectives and making predictions with limited information, keep employees creative through tasks that only provide hints. The positive relationship between innovation and leadership enhances the application of innovative ideas in business behaviour by stimulating organizational communication processes.

According to the OECD countries' "21st Century Cooperation Organization P21," schools are tasked with ensuring that academic knowledge contributes to real-life problem-solving (2018). The learning framework developed in 2002 aims to equip students with 4C (Critical Thinking, Collaboration, Communication, Creativity) thinking skills, considered essential in the 21st century. These skills encompass various aspects such as reading comprehension, mathematical and scientific thinking, media literacy, critical thinking, communication, collaboration, innovation, creativity, self-management, initiative, social and cultural awareness, leadership, and responsibility.

The Republic of Türkiye Ministry of National Education (MONE) introduced the National Quality Training Framework in 2014, with updates made since 2018. Eight basic competencies, including communication, digital and mathematical competence, social and civic skills, learning to learn, and entrepreneurship, have been identified to enhance education quality. Teachers imparting these competencies must possess the same skills, leading to collaborative efforts between higher education institutions and schools for teacher education. In 2009, designated as the "European Year of Creativity and Innovation," global focus shifted towards investing in knowledge, reconfiguring education systems, fostering a culture of innovation, thinking globally, and developing environmentally friendly economies. The European Union Strategy for 2020 emphasizes adding value to informational growth and empowering individuals. The key competence expected from school administrators and teachers is to support students in realizing their creative and innovative ideas by taking risks.

The importance of supporting teachers' creativity within education systems is highlighted, as creativity serves as the main source of innovation. Türkiye, in its teacher training and development process, collaborates with universities, the private sector, and civil society organizations. Innovative teachers, trained within programs like the Innovative Teachers Program (PIL-Partners in Learning), play a crucial role in guiding and assisting fellow teachers in fostering innovation within their schools.

4.6.5. Blue School Potential and Development

Robust connections at the local level by involving key stakeholders (students, schools, teachers, local communities, and citizens) in the execution of inventive, hands-on, and solution-focused educational projects and activities aimed at tackling ocean-related issues and challenges within the designated study areas are going to be striving to establish through the project. Just as, the project introduces a "Find the Blue Challenge," wherein specific challenges are identified for each ocean and river ecosystem at the regional level, empowering local schools to conceptualize and execute their projects. Moreover, as the Ocean Literacy course for the teachers within the aim of not only teaching the teachers about ocean literacy but also promoting the SHORE project as well as the Blue School concept held by the collaboration of IOI, Turkish Marine Research Foundation and Yıldız Technical University, more of this kind of activities are going to be organized.

The current number of the Blue School in Türkiye is 30 as today. Even though it started with only 1 school in 2019/2020 semester, it raised up the 6 and 28 schools in the following two semesters and reached to the 30 schools today. The Blue Schools in

Türkiye are located in 15 cities and distribution of them based on the regions is 3 from Mediterranean, 5 from Black Sea, 1 from Aegean, 5 from Marmara and 1 from Central Anatolia. However, there is no school from Eastern Anatolia and Southeastern Anatolia regions. As a result, it can be clearly said that the popularity of the Blue Schools is increasing day by day in Türkiye. This situation can be highlighted as the sign of the potentials of the schools in Türkiye on developing projects within the aim of the Find the Blue Challenge with an effective promoting of the Blue School concept.

5. Challenges and Opportunities

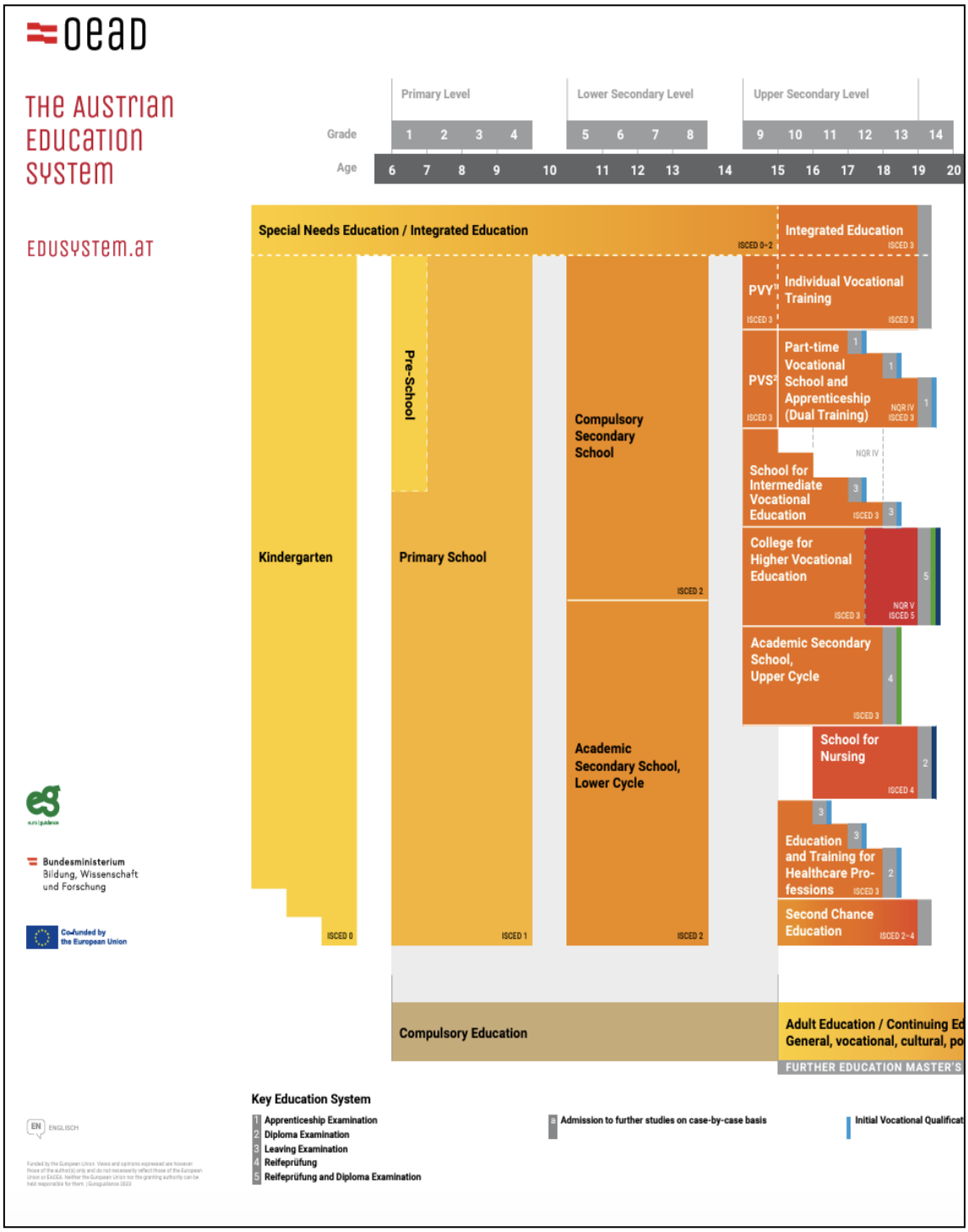
5.1. Austria

5.1.1. Analysis of Available Training Sources

In order to analyse the different ways of providing ocean literacy in Austria, it is essential to examine the primary and secondary school systems and the associated teaching materials at first. Analysing the curricula can shed light on the level of knowledge, but also the gaps, that students at the respective school levels shall obtain relating to water literacy as a whole. Based on this analysis, implications for future strategies in the area of ocean literacy can be developed.

Compulsory school starts in Austria by the age of six and lasts until the 9th grade. At the age of 10 (after grade 4, ISCED 1), the system divides pupils between those who attend compulsory secondary schools and those who continue in academic secondary schools. As compulsory education ends at the age of 14/15, it is important to acquire a level of marine/blue literacy by then in order to inform and raise awareness of these important issues for future generations.

Figure 16 Structure of the Austrian Educational System



As most non-formal educational institutions in Austria tend to align their thematic focus and material development with the official curricula, this analysis contributes significantly to linking formal and non-formal educational programmes and efforts towards a future-oriented blue education.

Curriculum Primary Level

According to the curriculum[50], water-related topics in primary school are dealt with in the two curriculum subjects: Sachunterricht (General studies) as well as Bewegung und Sport (Physical education and sports). It is further intended that teachers should enable interdisciplinary and cross-curricular learning when selecting topics and teaching materials.

Teachers in each of the four primary school levels have 3 teaching units per week at their disposal for the subject of general studies, which is an important opportunity for establishing water and ocean literacy as a subject. For physical education and sport, 3 units are planned for the first two and 2 units for the last two school levels.

Figure 17 Teaching units per week Primary School Level - Austria

	Schulstufen und Wochenstunden[1)]				
Pflichtgegenstände	**1.**	**2.**	**3.**	**4.**	**Gesamt**
Religion	2	2	2	2	
Sachunterricht	3	3	3	3	
Deutsch, Lesen, Schreiben	7	7	7	7	
Mathematik	4	4	4	4	
Musikerziehung	1	1	1	1	
Bildnerische Erziehung	1	1	1	1	
Technisches Werken Textiles Werken	1	1	2	2	
Bewegung und Sport	3	3	2	2	
Verbindliche Übungen					
Lebende Fremdsprache	x[2)]	x[2)]	1	1	
Verkehrserziehung	x[3)]	x[3)]	x[3)]	x[3)]	
Gesamtwochenstundenzahl	**20–23**	**20–23**	**22–25**	**22–25**	**90**
Förderunterricht[4)]	1	1	1	1	

Source 55
https://www.ris.bka.gv.at/GeltendeFassung.wxe?Abfrage=Bundesnormen&Gesetzesnummer=10009275&FassungVom=2023-08-31

Sachunterricht (General Studies)

The focus of the Sachunterricht curriculum is on raising awareness of social and real life facts in the children's immediate environment. School students are encouraged to understand and analyse their immediate surroundings and to act on the basis of this knowledge. An important goal is to expand and process their own learning experiences and perceptions of the environment through new techniques. Teachers should particularly focus on the following areas:

- Society and social relationships
- Local characteristics
- Historic-and cultural aspects
- Economy and business

[50]https://www.ris.bka.gv.at/GeltendeFassung.wxe?Abfrage=Bundesnormen&Gesetzesnummer=10009275&FassungVom=2023-08-31

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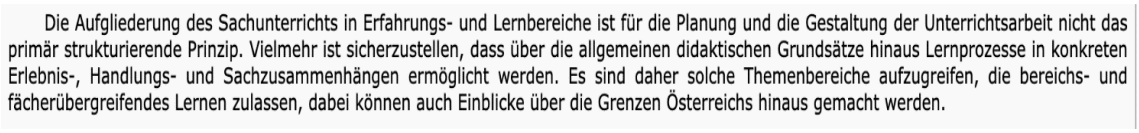
- Scientific correlations

This screenshot of the curriculum clearly indicates the interconnectedness the Austrian Government expects from the subject Sachunterricht:

Figure 18 Screenshot from the Sachunterricht Curriculum - Austria


Die Aufgliederung des Sachunterrichts in Erfahrungs- und Lernbereiche ist für die Planung und die Gestaltung der Unterrichtsarbeit nicht das primär strukturierende Prinzip. Vielmehr ist sicherzustellen, dass über die allgemeinen didaktischen Grundsätze hinaus Lernprozesse in konkreten Erlebnis-, Handlungs- und Sachzusammenhängen ermöglicht werden. Es sind daher solche Themenbereiche aufzugreifen, die bereichs- und fächerübergreifendes Lernen zulassen, dabei können auch Einblicke über die Grenzen Österreichs hinaus gemacht werden.

"*The structuring of subject lessons into areas of experience and learning is not the primary principle for planning and organising lesson work. Rather, it must be ensured that learning processes are facilitated in concrete contexts of experience, action and subject matter beyond the general didactic guidelines. Therefore, subject areas that allow interdisciplinary and cross-curricular learning should be addressed, allowing insights to be gained across Austria's national frontiers*."

While the connection of the subject Sachunterricht and blue education is evident at a first glance, the connection is less apparent for the subject of Bewegung and Sport. The aim in this subject naturally focusses on physical awareness and musculoskeletal system, aiming to promote having fun moving. Additionally, the curriculum includes reference to the holistic education concerning the human body. This can be exemplified by emphasizing the impact of drinking habits in relation to the own performance.

As the majority of ocean literature teaching in elementary school is centred in the subject Sachunterricht, we will take a closer examination hereon with a special focus on the above-mentioned areas:

Table 49 Topics related to water Sachunterricht - Austria

	1st and 2nd grade	3rd and 4h grade
Society and social relationships		> Knowledge of the importance of politically legitimized institutions (re. MA31 - Wiener Wasser)
Local characteristics	> know local bodies of water > be familiar with immediate surrounding	> geographical information and characteristics about the federal state
Historic and cultural aspects		> alteration (historical or present) of the local characteristics
Economy and business	> Awareness of essential	> correlation of producing

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	goods and how important the supply with these goods is for us	and consuming goods > dependency on certain goods
(Natural)-Scientific correlations	> understand the fundamentals of biodiversity > responsibility of humans regarding nature > know the effects of natural forces (wind/water energy) > Elements and forms of water	> experiments with plants, water etc. > environmental protection and the own behavior > complex technical system composed of multiple parts in the environment (e.g., water supply, wastewater disposal, heating systems) > recognizing essential components and their functions (e.g., water tank, water pipe, sewer)

Curriculum Compulsory/Lower Secondary Level

During primary school, ocean/water literacy is addressed through Sachunterricht. As school students progress to the lower grades of secondary school[51], they learn water related topics in different subjects.

The policy remains the same in both primary and lower secondary school: teachers are encouraged to teach ocean literacy as a cross curricular topic. School students are expected to realize the impact of this issue within their immediate surroundings and to understand the global context. The aim is to promote an understanding of how water affects their daily lives and to raise awareness of the wider global context.

The relevance of cross-curricular teaching and learning is illustrated by a statement in the curriculum on education for sustainable development, which features ocean/water/blue literacy prominently:

Figure 19 Screenshot Curriculum Compulsory/Lower Secondary Level - Austria

Bildung für eine nachhaltige Entwicklung muss als allgemeines Anliegen und Leitidee an der ganzen Schule gesehen werden. Für das als Standard geforderte integrative Denken der ökologischen, ökonomischen und sozialen Dimension sind sowohl fachspezifische als auch cross-curriculare Bezüge von großer Bedeutung. Bildung für nachhaltige Entwicklung, Politische Bildung mit ihren globalen Perspektiven, Global Citizenship Education, Friedenserziehung und Menschenrechtsbildung sowie weitere ausgeführte übergreifende Themen sind Bildungskonzepte, die einander ergänzend und unterstützend nachhaltige Entwicklung in all ihren Dimensionen pädagogisch aufbereiten. Im Lernprozess sollen Wissen, Kompetenzen und Fähigkeiten, Werte und Einstellungen erarbeitet werden, die junge Menschen befähigen, bei der Bewältigung der gesellschaftlichen, ökonomischen und ökologischen Herausforderungen auf lokaler bis hin zur globalen Ebene eine aktive Rolle einzunehmen.

"*Education for sustainable development is a general objective and guiding principle for the entire school. Both subject-specific and cross-curricular references are of great*

[51]https://www.ris.bka.gv.at/GeltendeFassung.wxe?Abfrage=Bundesnormen&Gesetzesnummer=20007850

importance for the integrative thinking of the ecological, economic and social dimensions required as standard. Education for sustainable development, civic education with its global perspectives, global citizenship education, peace education and human rights education as well as other cross-curricular topics are educational concepts that complement and support each other in the pedagogical treatment of sustainable development in all its dimensions. The learning process aims to develop knowledge, skills and abilities, values and attitudes that enable young people to play an active role in overcoming social, economic and ecological challenges at a local and global level"

The objective of embedding topics that have links to ocean literacy in a genuinely interdisciplinary and cross-curricular way illustrates the overview shown in the current curriculum.

Figure 20 Interdisciplinary topics compulsory/lower secondary level - Austria

	1. Bildungs-, Berufs- und Lebensorientierung	2. Entrepreneurship Education	3. Gesundheitsförderung	4. Informatische Bildung	5. Interkulturelle Bildung	6. Medienbildung	7. Politische Bildung	8. Reflexive Geschlechterpädagogik und Gleichstellung	9. Sexualpädagogik	10. Sprachliche Bildung und Lesen	11. Umweltbildung für nachhaltige Entwicklung	12. Verkehrs- und Mobilitätsbildung	13. Wirtschafts-, Finanz- und Verbraucher/innenbildung
Pflichtgegenstände													
Religion[1]													
Sprachen													
Deutsch	x	x	x	x	x	x	x	x	x		x		x
Deutsch als Zweitsprache für ordentliche Schülerinnen und Schüler				x	x								
Deutsch als Zweitsprache für außerordentliche Schülerinnen und Schüler im Deutschförderkurs					x					x			
Lebende Fremdsprache	x	x				x	x			x		x	x
Zweite lebende Fremdsprache	x	x				x	x			x		x	x
Latein	x			x	x	x	x	x		x			
Mathematik und Naturwissenschaften													
Mathematik		x		x	x	x	x	x		x	x	x	x
Geometrisches Zeichnen				x		x				x			
Digitale Grundbildung	x	x	x				x	x		x	x	x	x
Chemie	x	x	x	x		x		x		x	x	x	x
Physik	x	x		x				x		x	x	x	x
Biologie und Umweltbildung			x	x		x		x	x	x	x		
Wirtschaft und Gesellschaft													
Geschichte und Politische Bildung	x	x				x	x	x	x		x		x
Geografie und wirtschaftliche Bildung	x	x		x	x	x	x	x		x	x	x	x
Musik, Kunst und Kreativität													
Musik	x	x			x	x	x		x	x	x		x
Kunst und Gestaltung	x	x	x	x	x	x	x	x	x	x		x	x
Technik und Design	x	x		x		x		x		x	x	x	x
Gesundheit und Bewegung													
Bewegung und Sport	x	x			x		x	x		x	x	x	
Ernährung und Haushalt	x	x	x	x		x	x			x	x		x
Verbindliche Übungen													
Bildungs- und Berufsorientierung		x		x		x	x	x		x	x		x
Erstsprachenunterricht					x								

Source 56
https://www.ris.bka.gv.at/GeltendeFassung.wxe?Abfrage=Bundesnormen&Gesetzesnummer=20007850

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In many cases, the desire for interdisciplinary thematic teaching remains a theoretical one and is often contrary to school and teaching reality. This is clearly shown by the experiences of principals and teachers in school practice, which are presented in chapter 5.2.

Beside these cross-curricular areas, several topics of ocean literacy are part of single subjects. For the compulsory/lower secondary level these topics are mainly taught in physics, biology and environmental studies, Geography and - similar to primary schools - physical education and sports. These are, of course, just the most prominent examples of the curriculum.

Table 50 Water-related topics compulsory/lower secondary level - Austria

Grade	Physics	Biology	Geography
1st		> basic scientific education > environment of different species	> Impact of climate change > renewable energy sources > resource allocation
2nd	> lunar phases > sonic expansion	> biodiversity > microorganism > food chain	> sustainable use of energy and forces
3rd	> various experiments reg. electricity	> ecological relationships > oceans and fresh water > anthropogenic influences in freshwater > development of organisms	> transformation of regions > goods and services > social and ecological interdependencies
4th	> weather and climate	> ecological correlations > global circular cycle	> human impact on the environment > exceeding earth's resources
1st-4th	> theory of forces > energy > processes in nature and everyday life > environmental protection	> matters, forces and energy conversion	>analyze geographical and economic processes

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Source 57
https://www.ris.bka.gv.at/GeltendeFassung.wxe?Abfrage=Bundesnormen&Gesetzesnummer=20007850

Curriculum Upper Secondary Level

While the curriculum for compulsory/lower secondary level is aimed to establish a foundation for Education for Sustainable Development and the interdisciplinary topics jointly with the school students, the curriculum for upper secondary level[52] attempts to build on this foundation and systematically broaden the thematic areas of knowledge.

Figure 21 Screenshot Curriculum Upper Secondary Level - Austria

Schule und Unterricht tragen dazu bei, dass junge Menschen befähigt werden, bei der Bewältigung von gesellschaftlichen, sozialen, ökonomischen und ökologischen Herausforderungen eine aktive Rolle einzunehmen. Dazu gehört, dass Kompetenzen für eine nachhaltige Entwicklung angebahnt werden. Wesentliche pädagogische Bereiche, die diesen Kompetenzerwerb unterstützen, sind die Bildung für nachhaltige Entwicklung, Politische Bildung mit Global Citizenship Education, Friedenserziehung und Menschenrechtsbildung. Zusätzliche übergreifende Themen bereiten nachhaltige Entwicklung pädagogisch auf. Für das integrative Denken der ökologischen, ökonomischen und sozialen Dimension nachhaltiger Entwicklung sind sowohl fachspezifische als auch fächerübergreifende Bezüge von großer Bedeutung. Schülerinnen und Schüler und das gesamte Schulteam übernehmen gemeinsam Verantwortung, wodurch Schulen Modelle für eine zukunftsfähige Lebensgestaltung sind. Damit wird ein wesentlicher Beitrag zur Umsetzung der Sustainable Development Goals der Vereinten Nationen geleistet.

"*Schools and teaching contribute to empowering young people to play an active role in overcoming societal, social, economic and ecological challenges. This includes developing skills for sustainable development. Key pedagogical areas that support the acquisition of these skills are education for sustainable development, civic education with global citizenship education, peace education and human rights education. Additional interdisciplinary topics address sustainable development from an educational perspective. Both subject-specific and cross-curricular references are of great importance for the integrative thinking of the ecological, economic and social dimensions of sustainable development. School students and the entire school team jointly undertake responsibility, making schools models for sustainable living. This makes a significant contribution to the implementation of the United Nations Sustainable Development Goals.*"

[52] https://www.ris.bka.gv.at/GeltendeFassung.wxe?Abfrage=Bundesnormen&Gesetzesnummer=10008568

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Figure 22 Interdisciplinary topics upper secondary level - Austria

	1. Bildungs-, Berufs- und Lebensorientierung	2. Entrepreneurship Education	3. Gesundheitsförderung	4. Informatische Bildung	5. Interkulturelle Bildung	6. Medienbildung	7. Politische Bildung	8. Reflexive Geschlechterpädagogik und Gleichstellung	9. Sexualpädagogik	10. Sprachliche Bildung und Lesen	11. Umweltbildung für nachhaltige Entwicklung	12. Verkehrs- und Mobilitätsbildung	13. Wirtschafts-, Finanz- und Verbraucher/innenbildung
Pflichtgegenstände													
Religion[1]													
Sprachen													
Deutsch	x	x	x	x	x	x	x	x	x		x		x
Deutsch als Zweitsprache für ordentliche Schülerinnen und Schüler				x	x								
Deutsch als Zweitsprache für außerordentliche Schülerinnen und Schüler im Deutschförderkurs					x					x			
Lebende Fremdsprache	x	x				x	x			x		x	x
Zweite lebende Fremdsprache	x	x				x	x			x		x	x
Latein	x			x	x	x	x	x		x			
Mathematik und Naturwissenschaften													
Mathematik		x		x	x	x	x	x		x	x	x	x
Geometrisches Zeichnen				x		x				x			
Digitale Grundbildung	x	x	x				x	x		x	x	x	x
Chemie	x	x	x	x		x		x		x	x	x	x
Physik	x	x		x				x		x	x	x	x
Biologie und Umweltbildung			x	x		x		x	x	x	x		
Wirtschaft und Gesellschaft													
Geschichte und Politische Bildung	x	x				x	x	x	x		x		x
Geografie und wirtschaftliche Bildung	x	x		x	x	x	x	x		x	x	x	x
Musik, Kunst und Kreativität													
Musik	x	x			x	x	x		x	x	x		x
Kunst und Gestaltung	x	x	x	x	x	x	x	x	x	x		x	x
Technik und Design	x	x		x		x		x		x	x	x	x
Gesundheit und Bewegung													
Bewegung und Sport	x	x			x		x	x		x	x	x	
Ernährung und Haushalt	x	x	x	x		x	x			x	x		x
Verbindliche Übungen													
Bildungs- und Berufsorientierung		x		x		x	x	x		x	x		x
Erstsprachenunterricht					x								

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To get a more detailed insight which topics are relevant, we examine ocean literacy focus a little bit more:

Table 51 Water-related topics upper secondary school level - Austria

Grade	Ethics	Geography and Economy	Biology and Environmental Studies
1st	> nature and economy > global and local environmental issues/perspective > human rights/global justice	> interaction between climate, topography, soil, water… > limited resources and the political interests	> ecology and sustainability: (global) nutrition, various forms of agriculture. > healthy nutrition
2nd	> conflict management	> recognize natural conditions as opportunities for regional development > develop strategies for environmentally sustainable actions	> interconnected systems (ecology, economy and sustainability) > climate change and solutions
3rd	> consumption	> explore global change and its economic, social, and ecological causes > impact of economic globalisation	> biological diversity > sustainable development (regional and global examples)
4th	> accountability	> sustainability and urbanity	> evolution as the basis of diversity > biological procedures for sustainable development

New Challenges - Adapted Curriculum

The Ministry of Education, Science and Research has adopted a new pedagogical framework[53], including an adapted curriculum, aiming to prepare future generations for the rapidly changing world of life and work and to provide them with the tools to address global challenges.

The aim is to promote interdisciplinary skills and interdisciplinary school lessons and to teach contemporary content in everyday school life (e.g. sustainability). It is intended to

[53] https://www.paedagogikpaket.at/massnahmen/lehrplaene-neu.html

ensure that a subject is considered from several disciplines and perspectives. The task of the teachers should be to guide the educational process and accompany the school students. The curricula will be implemented in the individual school types from 2023/2024 in the first stage in ascending levels. Whether and how this will result in changes in everyday school life will therefore become apparent in a few years' time.

Whereas the curriculum is the underlying and theoretical framework for schools with the purpose of bridging the respective school levels, the textbooks used in everyday school life provide a better understanding of the level of knowledge school students obtain in Austrian schools.

Review of textbooks used in schools

The Ministry of Education, Science and Research, which is legally mandated for schools, is not prescribing which textbook they have to use. The schools are able to select from a wider range of textbooks which are available and officially accredited for a particular grade, allowing the schools' autonomy and priorities to be taken into account.

As part of this country base analysis, a closer examination of some examples of several of the most prominent textbooks used in geography and biology for compulsory/under secondary and upper secondary level to reveal to what extent topics regarding ocean literacy are deemed relevant.

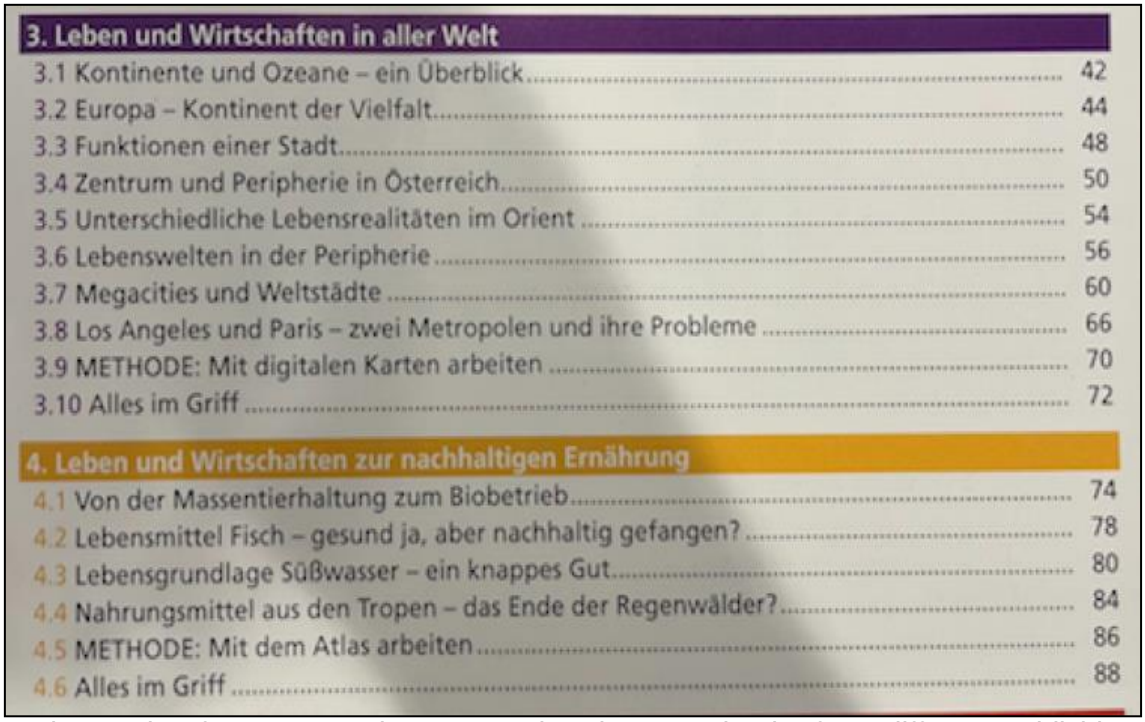
Compulsory/Under Secondary Level

Table 52 Example of Austrian textbooks in the subject Geography

Publisher	Veritas	öbv
Textbook	"Geo-Profi" ISBN: 978-3-7101-4422-6 and " MEHRfach Geografie" ISBN: 978-3-7101-4884 -2	"Unterwegs" ISBN: 978-3-209-11169-2
5th grade	> continents and ocean > ocean as the basis of life (drinking water/scarcity/sustainable use) > weather and climate	> blue planet/continent and oceans > water as a source of energy > recreational and economic area
6th grade	> oceans > sustainable nutrition > marine habitat > climate change/natural hazards	> access to drinking water > water and the production of goods > water and transportation / tourism
7th grade	> thematic focus on water as a recreational and economic area	> water supply Vienna > seas and ports > water and waste

8th grade	> water shaping landscapes and climate > drinking water / distribution conflicts > water footprint	> water and conflicts > climate change

Figure 23 Ocean Literacy in textbooks: Table of Content from Geo-Profi 1 - first grade - Austria



An interesting fact occurs when comparing these textbooks from different publishing houses: hereas schools which use the textbook “MEHRfach Geografie” from the publisher Veritas learn more about water as a recreational and economic area in the second grade, schools with the textbook “Unterwegs 1- Geografie” from the öbv publishing house learn the same topic as early as the first grade. From that it can be concluded that the topic priorities for the particular age groups is not strictly predetermined.

Table 53 Example of textbooks in the subject Biology Compulsory/Under Sec. Level - Austria

Publisher	Westermann	Veritas
Textbook	“Expedition Biologie” ISBN: 978-3-7055-4121-4	“MEHRfach Biologie” ISBN: 978-3-7101-4761-6
5th grade	> life underwater	> life underwater
6th grade	> biodiversity > fish and various animals > focus on lake and fish	> water habitats > zone of lakes

7th grade	> water shaping landscapes > ecosystems > fossils and animals	> ecosystems > soil, gardens > fossils and animals
8th grade	> urban planning > cities and oceans > life underwater > coral riffs > use of and threats to the sea	> contrasting ecosystems earth and seas > use and pollution of the sea

Whereas biology has a very broad range of topics to cover in the compulsory/under secondary level it is more interesting which topics the are not addressed: Although the textbook “Expedition Biologie” in the second grade emphasises the importance of lakes and fishes, they are not covering oceans a habitat and therefore they do not provide any holistic overview. Similarly, the textbook “MEHRfach Biologie 3” addresses the habitat of animals but does not cover species living in the water.

After analysing various textbooks and its topics of the compulsory/under secondary level, it can be stated that these align with many of the ocean literacy goals. However, it should be noted that the teaching material tends to focus more strongly on regional issues rather than emphasizing the interconnections between oceans, rivers and lakes and therefore provide an holistic approach to ocean literacy.

Upper secondary level

Table 54 Example of textbooks in the subject Geography Upper Secondary Level - Austria

Publisher Textbook	Westermann “Durchblick kompetent” ISBN: 978-3-7034-2435-9	öbv “Global” ISBN: 978-3-209-11573-7
9th grade	> water distribution/cycle > water and conflicts > climate change and natural events (El-Nino)	> interaction between water, climate and vegetation > allocation of resources > flooding
10th grade	> EU and economic policy	> agriculture > climate structure in Europe
11th grade	> energy industry in transition > natural features in Austria	> habitats in Austria
12th grade	> globalisation > strategies for sustainability	> opportunities and challenges re. climate change > ocean cleanup and pollution

Table 55 Example of textbooks in the subject Biology Upper Secondary Level - Austria

Publisher Textbook	öbv "Begegnung mit der Natur" ISBN: 978-3-209-09784-2
9th grade	> metabolic physiology/microbiology/botany/metabolism
10th grade	> ecology and sustainability > greenhouse effect and global warming
11th grade	no schoolbook for 11th grade
12th grade	> mechanism of evolution > human influence

Findings and conclusions of textbook analysis

The reviewed topic subjects in the teaching materials in use raise awareness for various fields linked to ocean literacy, however seem to lack a more global view on the topic itself, especially its interconnectedness with other related subjects. Furthermore, the focus seems to be more on acquiring knowledge than practical experience.

- Hands-on projects promoting ocean and water literacy are highly desirable, as these (in combination with deeper knowledge about the topic of Ocean Literacy) are known to challenge existing attitudes, values and encourage behavioural change and action.
- Based on the understanding that individuals seek to protect what they know and value, educational material in the field of ocean literacy should enable school students to experience water, river and ocean related topics in a variety of co-creative educational formats linked with real-life experience. Especially for landlocked countries like Austria with no direct access to the oceans, it is crucial to promote an understanding of how important the ocean is for us as well.
- A look at teaching materials for upper secondary level (regarding geography as a school subject) shows that economic topics are gradually given more weight and space across the school levels than those topics related to ocean literacy. The discussion of ocean and water literacy goals tends to fade between other key topics and is not being thought about, networked or considered in a wider context with other school subjects.

5.1.2. Identifying Local Challenges

The (local) challenges of ocean literacy in Austria is highlighted by the experiences and perspectives of various school teachers and headmasters. For this analysis, the Austrian Country Hub has conducted semi-structured interviews with them to get partial insights into everyday challenges regarding water literacy education as well as opportunities which they observe for educational practise. The concerns raised by

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educators from different regions and levels of education shed light on the gaps in water literacy education and the need for improvement in curriculum design, teacher training, and available learning material.

Teachers NUTS Region 1 (Primary School):

- Unfamiliarity with the term: The term "Ocean Literacy" is widely unknown, indicating a lack of awareness among primary school teachers.
- Curriculum challenges: Teacher training lacks a specific focus on bodies of water. The extensive curriculum of "Sachunterricht" makes it challenging to prioritize the topic of bodies of water.
- Teacher-dependent approach: How the topic of bodies of water is addressed varies widely among teachers. The lack of motivation is attributed to insufficient support, particularly in organizing teaching material independently.
- Curriculum: The current curriculum focuses mainly on local water bodies, neglecting regional and global perspectives until the 4th grade.
- Training programs: Limited availability of in-service training programs for teachers regarding water-related topics poses a significant hurdle.

Teachers NUTS Region 1 (Compulsory School - Geography):

- Lack of awareness: The teacher has not heard the term "water literacy" or "ocean literacy," indicating a general lack of awareness among educators.

- Insufficient learning material: There is a shortage of information and learning material related to oceans, seas, microplastics, and tourism. The focus is primarily on the strategic importance of water.

- Limited visualization: Visualization of acidification of rivers and seas in Austria is lacking, making it difficult for students to grasp global water-related issues.

- Material adjustment: The available accredited material is scarce, especially for compulsory/under secondary schools. The teacher emphasizes the need to adjust collected material to the complexity level for this grades.

- Topic disparity: While students learn about different fish species, there is minimal knowledge about waterpower plants and its influence regarding natural habitats, even in upper secondary school. The emphasis is on national aspects related to electricity supply, water quality, and health rather than a holistic biological or sustainability-oriented perspective.

- University teacher training: The relevance of non-formal knowledge providers not addressed in pre-servie teacher training. The focus at university level is on economics, and teacher training students learn more about organizing the subject than its content.

Teachers NUTS Region 3 (Upper Secondary School - Biology):

- Lack of theoretical foundation: The teacher mentions that the theoretical foundation of the study is not sufficient for addressing water literacy in everyday school life.

- Training opportunities decline: The teacher attended a training session regarding the local river but notes that the teacher training college is no longer offering such or similar water literacy trainings.

- Curriculum challenges: The biology curriculum is densely packed until the 10th grade, leaving little time to cover water-related topics. The focus is on regional specifics, and marine biology in general is not adequately addressed.

- Resource limitations: There is a lack of microscopes and laboratories, making it challenging to teach water-based content effectively.

- Unclear responsibility: Officials are unaware of who is responsible for water literacy, and there is a lack of proactive efforts from political institutions, with the State of Vorarlberg having its own office but not actively disseminating knowledge.

Teacher NUTS Region 1 (Upper Secondary School - Biology)

Lack of Awareness and Curriculum Specifics:

- Lack of awareness: He has never heard of the term "Ocean Literacy."
- Curriculum: The teacher points out that the curriculum lacks specificity regarding water-related topics, and its implementation depends largely on individual teachers. He emphasizes the importance of anchoring ocean literacy in the curriculum, aligning with existing teaching materials for more effective implementation.
- Local context: Water-related topics are taught with a focus on Austria's context, covering aspects like water quality, water maps, and energy generation. However, global ocean-related subjects, like ocean currents, are addressed sporadically.

Headmaster NUTS Region 1 (Compulsory School):

- Textbook Dependency: Textbooks include water literacy content, but most material comes from non-formal education providers. There is a need to shift from a local perspective to a global perspective on water.
- Opportunities in non-formal institutions: There is potential for collaboration with non-formal institutions, presenting opportunities for enhancing water literacy education.

Headmaster NUTS Region 1 (Primary School):

Parallel Challenges with Primary School Teacher:

- Teacher/Headmaster dependent approach: emphasizing the challenges tied to curriculum, teacher dependence, and the necessity for self-organized teaching materials.

- Curriculum Sachunterricht: The interdisciplinary nature of “Sachunterricht” is identified as a challenge, as it often results in topics like water being overshadowed unless explicitly prioritized by the teacher.

Common Themes and Recommendations:

1. Lack of awareness: Across all levels, there is a general lack of awareness about ocean literacy, indicating a need for broader dissemination of information and training programs.
2. Insufficient learning material: The scarcity of certified material and the need for adaptation for different difficulty levels highlight the importance of creating comprehensive and accessible educational resources.
3. Teacher training: The challenges in teacher training, both at university(pre-service) and in ongoing professional development (in service), suggest the need for a more holistic approach that includes theoretical foundations and practical training on water literacy.
4. Curriculum design: The crowded curriculum and limited time for specific topics, especially in biology, emphasize the necessity of revisiting and optimizing the curriculum to incorporate water-related subjects.
5. Resource limitations: The lack of resources, such as microscopes and laboratories, underscores the importance of investing in infrastructure and equipment to facilitate effective teaching.
6. Coordination and responsibility: The confusion regarding who is responsible for water literacy and the lack of proactive efforts from political institutions and educational authorities point to the need for better coordination and engagement from relevant bodies.
7. Collaboration Opportunities: The mention of opportunities for collaboration with non-formal institutions indicates the potential for partnerships to enhance water literacy education.

In conclusion, addressing the challenges of ocean literacy in Austria requires a multifaceted approach involving curriculum redesign, teacher training enhancements, resource provision, and improved coordination among educational institutions and relevant authorities.

5.1.3. Exploring Opportunities

In addition to the challenges of dealing with ocean/water literacy on a day-to-day basis, the interviewed teachers have identified a number of opportunities and possibilities to sustainably embed this important topic in schools.

Their comments are particularly relevant for international projects such as SHORE with its country hubs, training courses, curriculum development and open schooling

approach. Furthermore, all participants acknowledge the important role local stakeholders could have in filling the gaps and provide resources which schools and formal institutions are lacking:

Opportunities for non-formal institutions:

- Development of material: There is a wide range of material available for specific local circumstances, such as the Vienna Water initiative. Non-formal institutions can capitalize on this by developing materials tailored to regional contexts.
- Collaboration with schools: Non-formal institutions can engage in collaborative efforts with schools addressing specific gaps in learning/literature. This partnership can lead to the development of material that aligns with the school curriculum, fostering collaboration to enhance ocean literacy education.
- Engagement beyond school: Recognizing that middle school students eventually leave school, non-formal educational providers and local initiatives (including CSOs and NGOs) can play a more active role in reaching out to them. This involves creating programs or initiatives that extend beyond the classroom.
- Identify collaborative opportunities: Conducting a stakeholder mapping can help identify institutions interested in collaborating. Understanding what kind of information these institutions can provide aids in creating effective partnerships.
- Establishing networks: bundling expertise and linking the educational and networking activities of various stakeholders oriented towards the goals of ocean literacy and education for sustainable development.
- Hands-on projects: Non-formal educational institutions are able to support schools by developing tailored hands-on projects for schools.

Teacher training and cross-curricular material:

4. Teacher training courses: The non-formal education sector can contribute significantly by providing teacher training courses. This empowers educators to integrate ocean literacy effectively into their teaching methods and daily teaching scenarios.
5. Cross-curricular material: Developing training material that cut across various subjects, such as geography and biology, ensures a holistic approach to ocean literacy education.
6. Thematic anchoring in the curriculum: Integrating ocean literacy thematically into the curriculum can enhance its prominence and ensure its coverage in various subjects. This aligns with the comprehensive nature of ocean literacy, making it applicable across subjects like biology, geography, physics, and social studies.
7. Accredited material: Teachers need accredited material on ocean, river and water literacy that are appropriate for different school levels and create connections between various school subjects (cross-curricular ideas and inspiration for interdisciplinary learning often come from non-formal education materials).

Shift towards a global perspective:

- Global context focus: Given the regional focus in the curriculum and the textbooks, there is an opportunity to shift towards a more global perspective

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regarding ocean literacy. Providing worksheets and textbooks directly usable in schools can facilitate this transition.

Student enthusiasm as a potential:

- Despite the challenges, the teacher notes that students generally engage rapidly, which is an opportunity for effective ocean literacy education in all school levels.

Interdisciplinary approach and school student/teacher awareness:

- The teacher notes a growing awareness of environmental issues among school students and teachers, particularly among younger colleagues who integrate such topics more frequently in their teaching.

Opportunities regarding the curriculum:

The curricula across natural science, biology, environmental studies, geography, and technology/physics (or STEM in general) incorporate specific topics related to ocean literacy and the broader theme of water. These subjects present numerous opportunities to expand the scope of awareness towards water-related themes. Within these subjects, the curricula provide fertile ground for exploring life underwater, understanding water as a natural habitat and recognizing it as a vital natural resource. This interdisciplinary approach can contribute significantly to fostering a holistic understanding of water literacy.

In technology/physics the focus shifts towards the practical applications of water, emphasizing its role as a resource and exploring its physical characteristics. This knowledge is crucial for gaining a comprehensive understanding of water literacy, particularly in terms of how water can be harnessed for human use and energy generation.

Despite these opportunities within the curricula, the absence of mandatory or specific wording to ensure the consistent teaching of water-related topics poses a challenge. The curricula, while broadly formulated, place significant responsibility on the individual discretion of teachers to address specific themes related to water. This reliance on teacher discretion underscores the importance of raising awareness about the significance of water literacy within the teaching community.

To address this gap, it becomes imperative to alert teachers to the relevance of water-related topics and advocate strongly for their inclusion in teacher education programs. By emphasizing the importance of water literacy and integrating it into teacher training, educational institutions can better equip teachers to incorporate these crucial themes into their classes.

Partnerships of universities/scientists and schools

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Additionally, more and more universities and researchers are recognizing the potential of partnerships with schools:

A collaborative development on specific ocean related topics, has the potential to lead to an extremely productive exchange for both sides. The school students can actively contribute their ideas and with the help of scientific methods learn fascinating and important information about the oceans. On the other hand, the scientists benefit from the unbiased perspective of the school students, which enables new perspectives for them and provides valuable information at the same time. Teaching ocean literacy is particularly important for a landlocked country like Austria, where the importance of the oceans and their global impact on our daily lives is not always apparent.

5.1.4. Localization and Cultural Adaptation

The focus on water literacy in Austria is distinctly shaped by local specifications, with specific examples highlighting the importance of tailoring educational content to regional concerns. This is especially apparent when examining provided materials of non-formal educational material in the German speaking part of Europe, many of which are also used in school:

Regional materials

In Vienna (NUTS AT13), the emphasis is merely on drinking water, its quality and the urban services and wastewater routes[54] . The City of Vienna operates its own environmental education program, EULE Wien[55], which lists a large number of local stakeholders and their programs

Interesting example of a future-oriented approach is the famous “Haus des Meeres” (House of the Sea) in Vienna, where the visitors use an app to tour the house and solve quizzes and challenges. Initially developed for schools, it is now free to use for all visitors[56].

[54] https://www.wien.gv.at/umwelt/kanal/umweltbildung/
[55] https://www.eule-wien.at/Content/P%C3%A4dagogen-Angebot
[56] https://www.haus-des-meeres.at/zoo/erlebnis/schule

Figure 24 Hubqiuz App Haus des Meeres Vienna - Austria

Following the 2002 floods, initiatives in NUTS AT121 primarily concentrate on flood risk management and hands-on projects Forum Umweltbildung[57], whereas in NUTS AT341, the focus is mainly on the immediate surrounding areas, covering topics like swamps and mountain rivers: Naturpark Nagelfluhkette[58]. According to the findings from teacher interviews (see chapter 5.2), this regional limitation sometimes goes so far that not even the rivers Rhine or Lake Bodensee are covered.

Nationwide material

Besides the local emphasis on training materials usable in schools there are a lot of materials covering nationwide topics: The WWF Austria[59] developed worksheets to provide insights to Austrian rivers. Very popular and widely known among teachers and school heads are the training materials of Generation Blue[60] on behalf of the Federal Ministry of Agriculture, Forestry, Regions and Water Management as well as the materials provided by the Forum Umweltbildung[61] and the teaching materials of ÖKOLOG[62]. All of these resources contain a broad range of topics regarding ocean and water literacy.

Material in German

[57] https://www.umwelt-bildung.at/methoden?h=1&list=yes&sw=10323&sort=titel&headerid=54568&headerlayout=standard&layout=teaser-methode&pagesize=12&oder2=10336&suchstr=
[58] https://nagelfluhkette.info/bildung/naturparkschulen
[59] https://www.wwf.at/lehrende/fluesse/
[60] https://www.generationblue.at/schulservice/schulangebot.html/
[61] https://www.umweltbildung.at/praxismaterial/?_praxismaterialien_themen=wasser
[62] https://www.oekolog.at/f%C3%BCr-den-unterricht/nat%C3%BCrliche-umwelt/

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Examining teaching material from non-formal education institutions reveals a wide range of interconnected resources aligned with ocean literacy goals. Platforms such as Deutscher Bildungsserver[63] , the hands-on materials of the Bavarian Environment Agency[64] and Ocean Future Lab[65] provide materials on marine conservation, animal habitats, and topography. The World Ocean Review[66] publication offers insights into the current state of oceans, reflecting scientific advancements.

Local context is emphasized through projects like the River Schools in Interreg projects, promoting a holistic approach to ocean literacy goals. The 5-Länder-Biosphärenpark „Mur-Drau-Donau“[67] offers teacher training material and hands-on activities beyond the area “Mur-Drau-Donau” aligning with ocean literacy and Sustainable Development Goals (SDGs). Additionally, resources like "Living Waters"[68] and "Living Sediments"[69] provide a global perspective on river literacy, connectivity, and threats to fish populations.

The German GEOMAR center goes one step further than just providing worksheets. They provide picture books, games, films and materials[70] from project partners. Additionally to the WWF Austria, the German WWF subsidiary also supports schools with exciting materials regarding plastic pollution, life underwater and the human influence on oceans[71].

Online websites/platforms/TV documentaries

There is furthermore a vast amount of material available on online platforms or documentaries for primary and secondary schools, offering tailored digital approaches.

One Austrian example is the kinderuni.online platform, which focuses on climate and energy[72] and water-related topics[73] related to the local as well as the global context.

[63] https://www.bildungsserver.de/lebensraum-wasser-meere-und-ozeane-714-de.html
[64] https://www.lfu.bayern.de/wasser/wasserforscher/lehrmaterialien/index.htm
[65] https://www.oceanfuturelab.de/zukunftsbox-meere/
[66] https://worldoceanreview.com/de/wor-7/
[67] https://www.interreg-danube.eu/uploads/media/approved_project_output/0001/50/ae8a9d19531308a04d5de23071cd208ef80e53ee.pdf
[68] https://www.interreg-danube.eu/uploads/media/approved_project_output/0001/55/4f4a676f903930dff8bf3824eab93bcce9db3457.pdf
[69] https://www.interreg-danube.eu/uploads/media/approved_project_output/0001/55/4b69a35c3cc4649fdfb6d0adc34beca06f699252.pdf
[70] https://www.geomar.de/entdecken/schule/materialien-fuer-schulen#c37624
[71] https://www.wwf.de/aktiv-werden/bildungsarbeit-lehrerservice/downloadbereich/meere
[72] https://kinderuni.online/thema/klima-und-energie/
[73] https://kinderuni.online/thema/umwelt-pflanzen-und-natur/

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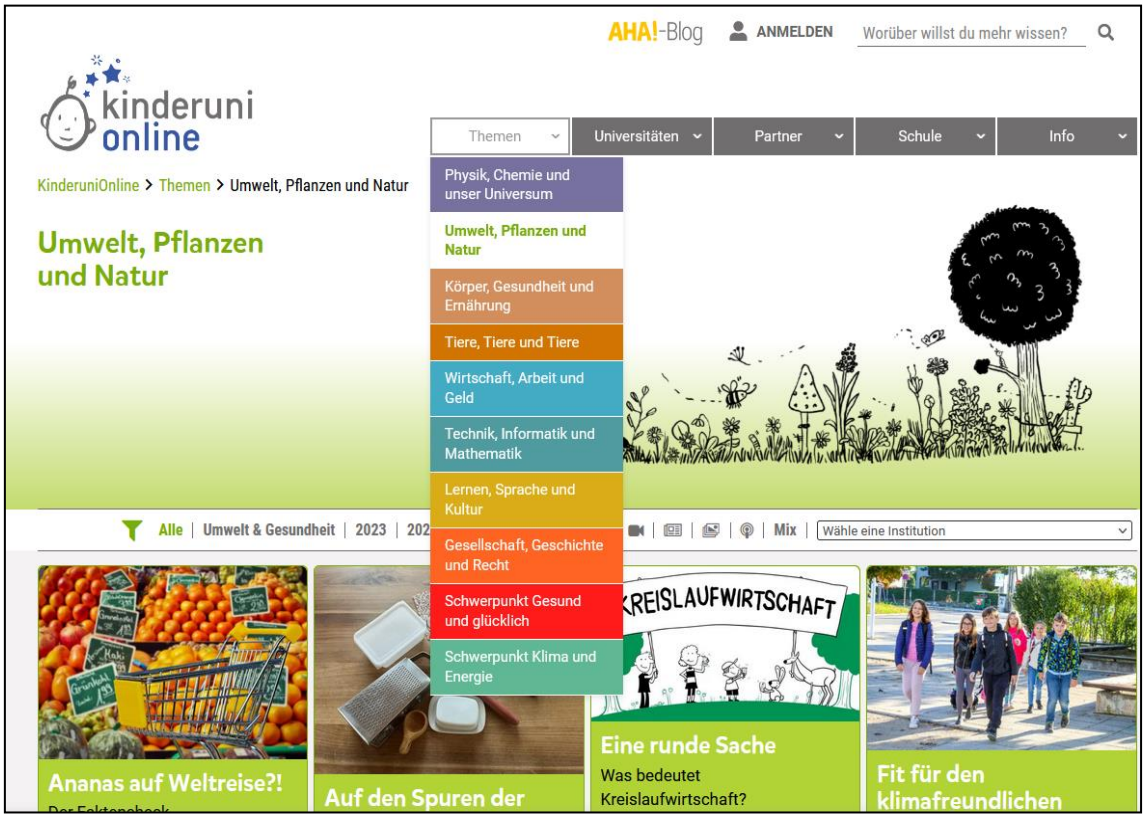
Figure 25 Screenshot kinderuni.online - Austria



Another example of a university managing a teaching and learning platform[74] is the University of Bayreuth. They provide materials covering aspects like microplastic, drinking water and more generally the water cycle.

Besides the typical learning material there are many documentaries and learning movies for schools to use. Similarly to the list above, the movies cover local bodies of water[75], reflect the global perspective on water[76] and can be used as accompanying booklet to the movie or reflect on the human influence and consumption behaviour[77].

This overview of the specifications is, of course, by no means complete, but shows the possibilities that are available to German-speaking schools and teachers when introducing Ocean Literacy. The analysis shows that there is sufficient literature from a wide range of non-formal educational institutions. Together with the feedback from the teachers, strategies for future-oriented teaching of ocean literacy can be drawn from the findings (more on this in chapter 5.6/5.7).

[74] https://www.bayceer.uni-bayreuth.de/wasser/?lang=de
[75] https://www.kulturundsprache.at/oer/land-der-gewaesser
[76] https://www.oekostation.de/docs/Ueber_Wasser_Unterrichtsmaterial.pdf
[77] https://www.kulturundsprache.at/oer/virtuelles-wasser

5.1.5. Stakeholder Analysis and Engagement

Environmental education/Ocean Literacy education plays a crucial role in fostering awareness and responsibility towards the environment. In Austria, several stakeholders contribute to this cause, offering diverse programs and resources.

This analysis provides a brief and far from complete overview of the broad variety of activities of key stakeholders involved in environmental and water education. Some of the stakeholders are already addressed throughout this analysis but given their influence it is important to list them in this chapter as well.

Eule Wien - Portal for environmental education of the City of Vienna[78]

Eule Wien serves as the central portal for environmental education in Vienna, offering a comprehensive overview of all environmental education activities within the city. It acts as a key organizer and facilitator, connecting various stakeholders and providing a centralized platform for information.

Municipality Department MA31 - Vienna Water[79]

The Municipality Department actively contributes to environmental education by operating the Wiener Wasserschule. This free of charge workshop for schools from 8-15 years are amongst the popular activities for schools in Vienna. Each workshop ends in the historic water tower, where the school students get insights in the historic water supply chain of Vienna.

[78] https://www.eule-wien.at/
[79] https://www.wien.gv.at/wienwasser/bildung/index.html

Figure 26 Historic Vienna Watertower - Austria

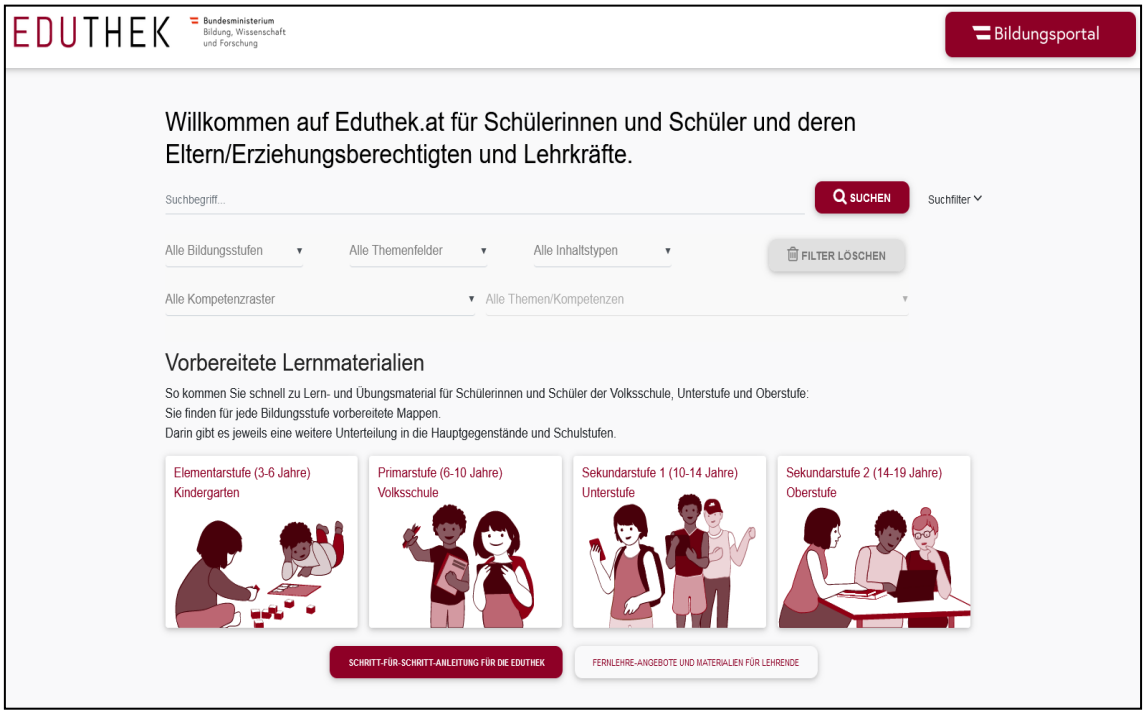
Furthermore, the department has been installing drinking fountains throughout Vienna, providing free and high-quality drinking water to the public and the tourists. Their initiative promotes the importance of water as a vital resource and encourages sustainable practices.

Federal Ministry of Education, Science and Research[80]

The Ministry provides a valuable resource, Eduthek[81], offering downloadable educational materials for teachers and students. This collaboration promotes the integration of environmental education into the formal education system, ensuring a broad reach and impact.

[80] https://www.bmbwf.gv.at/en.html
[81] https://eduthek.at/

Figure 27 Screenshot Eduthek for school students/teachers/parents - Austria



Federal Ministry of Agriculture, Forestry, Regions and Water Management[82]
This ministry focuses on creating public awareness about water resources, engaging the civil society through activities like Dialogrounds and awarding the Neptun Staatspreis to projects fostering water literacy across Austria. Additionally, the Ministry supports arts and cultural concepts targeting water issues and consult communities to shape their commitment regarding a sustainable and future-oriented water usage.

In addition to promoting civic engagement, the ministry-initiated water schools throughout Austria to highlight the importance of drinking water. This fundamental education of school students generates a multiplier effect and therefore raises awareness of preventive health care across generations.

Youth Red Cross Lower Austria[83]
The Youth Red Cross subsidiary of Lower Austria operates the annual "Wasserjugendspiele"(Youth water games) for schools, providing interactive experiences with rescue divers and energy suppliers. Expanding such a program to other federal states could greatly contribute to engaging the youth in environmental issues.

Universities/Universities of Applied Science

Universities/Universities of Applied Science and their academic outreach plays a crucial part in communicating ocean literacy in a scientific sense as well as transfers the present research findings into the everyday life of citizens. The researchers support local, national and global initiatives and contribute considerably to the public discourse.

[82] Screenshot Eduthek for school students/teachers/parents
[83] https://www.meinbezirk.at/tag/wasserjugendspiele

What is more, the involvement of schools/school students in science projects has increased in recent years. The role of schools in such projects is increasingly shifting from the dissemination of results to a participatory, sometimes even co-creative role from the very start.

Given the numerous ocean literacy projects at universities all over Austria, a representative science project by a palaeontologist who conducts collaborative research with school classes on the topic of corals and the sea is featured as an example of a current scientific project.

Save the corals - Co-Creating a project

This project introduces a detective game focused on coral reefs to students in the 7th to 10th grades. The game explores the formation of reefs, the diverse marine life inhabiting them and the current local and global threats they face. The ultimate objective is to instil a sense of responsibility by 'saving' the coral reef through the game. The project highlights the unique connection Austria has to the sea through elements found in the Austrian Alps.

The structure is designed to actively involve students in the development of the project, resulting in the exchange between students and scientists as the project evolves. This cooperative approach enables both parties to benefit from each other and removes the bubble that often occurs in scientific projects.

The commitment of schools actively participating in Ocean Literacy projects is visible when inviting schools to join. While there were only eight available slots for schools, a staggering 98 applied, highlighting the widespread interest in the program. However, integrating the coral reef theme into the standard curriculum faces challenges. The motivation of teachers is key to successful learning and the complex nature of the subject requires careful handling. Many teachers lack the necessary knowledge, underlining the importance of providing readily available teaching material and information.

In conclusion, all of the broad initiatives and (school/community) engagement from various stakeholders demonstrate the potential of engaging the civil society in water and environmental issues. As many of the listed stakeholders focus on the local area for strategic reasons, there are plenty of opportunities for international projects such as SHORE or other stakeholder groups to emphasize the global perspective in order to provide the public and schools with a holistic perspective on water/ocean literacy.

5.1.6. Policy and Implementation Recommendations

Ocean literacy education is a fundamental aspect of fostering environmental awareness and responsibility among school students as well as the civil society. However, despite the availability of valuable resources and initiatives in Austria, this analysis points out the need for a comprehensive policy framework to systematically embed and promote offerings to formal and non-formal educational providers. This

policy recommendation outlines key strategies to address existing gaps and enhance water-related literacy in Austria.

Centralized coordination and responsibility:

Establish a centralized coordination mechanism within each state department in Austria, responsible for overseeing and promoting water education initiatives in the respective areas to the wider public. This coordinator will act as a liaison between various stakeholders, ensuring effective communication and collaboration and is the contact persons for interested teachers for their requests.

***Strategic embedding of ocean literacy*:**
Develop a systematic and strategic approach to embed water education offerings in schools. This includes creating awareness among teachers and headmasters about the existing resources and programs, covering regional, national and global offerings. Utilize digital platforms and communication channels to disseminate information and encourage participation.

This systematic embedding of various projects and networks is especially important given the fact that the European Network of Blue Schools is widely unknown among Austrian Schools as well as other non-formal stakeholders.

Material standardization and accessibility:

- Approval and labelling: Establish a process for approving water education material for all age groups to ensure quality and accuracy. Clearly label approved material to make it easier for teachers to identify reliable resources.
- Overview list: Create a comprehensive overview categorizing material based on usability and adaptability for different school levels. This will help educators to identify and access relevant content more easily.
- Global context integration: Ensure that educational material incorporates a global context to broaden students' understanding of water-related issues beyond local and national perspectives.

Guidelines and repository for water projects:

Teacher guides: Develop comprehensive guidelines to assist teachers in planning and executing water-related projects. These guides should cover a range of topics and provide step-by-step instructions to facilitate project implementation.

Hands-On activities: Emphasize hands-on activities to make learning experiential and engaging. Encourage schools to incorporate practical experiments and field trips related to water conservation and sustainability.

Stakeholder mapping for open schooling methodology:

Develop a stakeholder mapping, to give visibility and engage relevant stakeholders in the ocean literacy environment. This approach will enhance collaboration that brings together schools, organizations, and experts to promote open schooling initiatives effectively.

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Many international projects, such as SHORE, are collecting relevant stakeholders at the beginning of the project or during the lifespan anyway. It could be beneficial to all the stakeholders involved to adjust and use different stakeholder mappings and merge it to create one mutual list.

Teacher Training:

- Incorporate in teacher training courses: Integrate ocean literacy into the teacher training courses. Ensure that young teachers are equipped with the necessary knowledge and skills to incorporate water-related topics and therefore are multipliers for the good cause.
- Continuing advanced training programmes: Develop and promote advanced teacher training programmes focusing on water-related subjects.

Global Perspective in education:

Emphasize the importance of a global and interconnected perspective related to water education. This approach will broaden students' perspectives and prepare them to address water-related challenges on a larger scale.

In conclusion, implementing these policy recommendations will contribute to a more effective and comprehensive water education system in schools and in non-formal settings. By addressing the existing gaps and promoting a holistic approach that integrates both local and global perspectives, we can empower the next generation with the knowledge and skills needed to address the challenges and opportunities.

5.1.7. Sustainability and Long-Term Impacts

Sustainability and Long-Term impact of SHORE

The long-term impact SHORE will have on the educational landscape in Austria is of course impossible to predict right at the start of the project.

In the first few months of the project, the Austrian Country Hub has already raised awareness for the global perspective of water by spreading the ocean literacy concept at numerous partner schools and promoted the membership in the Network of European Blue Schools. It’s fair to say that the existence of this network is widely unknown among Austrian stakeholders. Due to the Country Hubs promotional activities, all nine federal educational departments in Austria are sending information regarding SHORE, its Open Call and the Network to schools in their reach.

As shown in this analysis, there is already a wide range of water related projects and activities in Austria, both for schools and for broader society. Nevertheless, projects such as SHORE are very popular among schools - in particular, as they offer the opportunity to strengthen local cooperation and implement project ideas that would be difficult or impossible to conduct for schools on their own. In Austria, the teaching of water-related topics is still very much dependent on the commitment of individual

teachers and SHORE offers the opportunity to plan and implement projects together as a team, which empowers individuals to collaboratively contribute to a more comprehensive and impactful water education landscape.

The open schooling approach pursued by SHORE also enables companies, local initiatives or decision-makers to cooperate on a broader basis and therefore deepen the relationship between local stakeholders. The Austrian Country Hub has gained experience in the open schooling methodology for the last couple of years and benefits from the development of the network in Vienna, which will be expanded through the SHORE projects Austrian-wide. Therefore, the Austrian Country Hub is confident that SHORE will have long-lasting impact beyond the project lifespan.

Sustainability and long-term impact of initiatives like European Network of Blue Schools

Observing the genuine interest of students in hands-on projects emphasizes the need to spread such initiatives widely, fostering international connections. The network could serve as a starting point for teachers when developing projects, offering diverse educational resources that cater to the specific needs of Austrian classrooms. With the possibility to search for materials that resonate with curricular requirements and age groups, the network provides a comprehensive support system for teachers.

Furthermore, by participating in the Network of European Blue Schools, Austrian teachers engage in a global dialogue regarding sustainability. This international exchange not only broadens perspectives but also reinforces Austria's commitment to environmental consciousness and responsibility, contributing to a better informed and environmentally aware generation.

Sustainability and long-term impact of the global perspective of ocean literacy

In a landlocked country like Austria, the significance of oceans is obviously not immediately apparent for the society. However, the societal impact of initiatives like SHORE and the Network of European Blue Schools is profound, addressing the need for public awareness, highlighting the interconnected ecological and economical world and the role oceans have. The need to be aware of the global perspective is especially true for the threats of climate change. This perspective ensures that the urgency of environmental problems is recognized, facilitating the development and implementation of effective solutions. The responsibility relies on various stakeholders, including supra-national organizations like the EU, national policymakers, and formal and non-formal educational institutions to create a deeper understanding of ocean and ocean related issues.

The public perception of oceans must be cultivated through mutual efforts. This entails educating society about the relevance of oceans, even in landlocked regions. Stakeholders play a crucial role in shaping public perception and fostering an understanding for the interconnectedness of global ecosystems.

Providing future generations with the tools and resources needed to address current challenges and threats to humanity is instrumental in shaping a better tomorrow.

5.2. Czechia

5.2.1. Analysis of Available Training Resources

There is currently a lack of specialized research on ocean literacy in the context of Czechia. Nonetheless, the nation's educational system does include materials and tools that promote sustainability and climate literacy. It is not because there aren't any environmental education programs; rather, it appears that the emphasis is shifting toward more general ecological issues rather than ocean-specific study.

Even the word "ocean" literacy may have trouble finding resonance in a landlocked nation such as the Czech Republic. The term's immediate meaning could be restricted in the lack of direct access to oceans. But it's important to separate the phrase from its literal meaning. More broadly, 'ocean' literacy encompasses all bodies of water, rivers, lakes, and other freshwater resources, as well as the actual seas. It serves as a comprehensive framework to understand the intricate relationships between human activities and diverse aquatic ecosystems.

Even while the 'ocean' literacy may not seem very particular at first, the main ideas are in line with the objectives of environmental literacy in general. Despite being a landlocked nation, Czechia has demonstrated a dedication to and interest in teaching its citizens about climate change and sustainability. Even though they aren't specifically referred to as "ocean" literacy, the educational materials that are available help people gain a basic grasp of how ecosystems are interconnected, how humans affect the environment, and how important it is to conserve the environment.

When evaluating how well the resources at hand match the learning goals, the emphasis moves from a limited definition of "ocean" literacy to a broader assessment of environmental literacy. This entails realizing how interconnected ecosystems are, acknowledging how humans affect the environment, and encouraging a sense of group responsibility for the preservation of the broader natural world.

Czechia's endorsement of the European Green Deal demonstrates a commitment to attaining sustainable practices and climate neutrality. Czechia suffers difficulties with pollution and water scarcity, among other water-related issues, so implementing sustainable water management techniques is crucial. In line with Czechia's need to address its particular water-related difficulties, the European Green Deal places a strong emphasis on protecting water resources, enhancing water quality, and implementing sustainable water usage practices.

Two of the Green Deal's main tenets are ecosystem restoration and biodiversity conservation. This translates into programs in the Czech context that work to preserve and replenish water ecosystems. A larger commitment to biodiversity and ecological resilience necessitates the maintenance of rivers, lakes, and wetlands.

Another important point that the Green Deal emphasizes is climate resilience. Czechia should make a commitment to take steps to improve its capacity to deal with water-

related concerns brought on by climate change, such as tackling the difficulties presented by increasingly frequent droughts and extreme weather. Czechia has the chance to improve its water management sector's climate resilience measures thanks to the Green Deal's alignment.

The Green Deal promotes funding for environmentally friendly infrastructure, with an emphasis on initiatives pertaining to water. Czechia can use EU subsidies to incorporate green technologies, increase efficiency, and update its water infrastructure. This is consistent with the overarching objective of encouraging investments in sustainable practices and making the shift to a water infrastructure that is more robust and ecologically friendly.

The core tenet of the Green Deal is the circular economy, which encourages resource reuse and efficient usage. When it comes to water use, Czechia might pledge to implement policies that reduce water waste, promote recycling and reclamation, and encourage sensible water use habits. The water sector's application of circular economy ideas advances the Green Deal's broader sustainability objectives.

Czechia would have to incorporate water and environmental conservation-related EU directives and regulations into its national laws and policies in order to comply with the Green Deal. To ensure efficient cooperation and respect to European sustainability standards, this entails adopting and incorporating green principles into its policies pertaining to water.

In 2020, Ocean Conservation Trust (OCT) has launched the first 'ocean curriculum' in the UK for primary schools, a ground-breaking effort to include learning about the ocean into regular classroom instruction[84]. The 'Connecting us with our Ocean' project, created in partnership with five Plymouth pilot primary schools from the Connect Academy Trust, intends to immerse students in marine themes throughout foundational disciplines including literacy and arithmetic. By centring the ocean around children' learning experiences, this novel approach aims to inspire a passion for marine conservation, in contrast to the existing English primary school National Curriculum, which focuses mostly on terrestrial ecosystems.

This curriculum extension emphasizes the value of ocean protection in post-pandemic preparations, in line with international aspirations for a "blue recovery." The restoration of mangroves, the cessation of overfishing, and a greater emphasis on offshore wind energy generation are just a few of the economic advantages that come with ocean conservation initiatives, according to the High-Level Panel for a Sustainable Ocean Economy. The initiative acknowledges the significance of equipping kids for STEM careers associated with the ocean, thereby promoting a more comprehensive comprehension of environmental concerns and sustainable behaviours at a young age.

It is believed that teaching ocean literacy in schools is essential to producing a generation of people who are aware of the complex relationships that exist between people and the ocean, especially in light of the continuous global efforts to conserve the ocean and advance a sustainable future.

The UK's innovative model of incorporating an ocean-focused curriculum into primary schools has a lot to offer Czechia. First off, Czech students can gain a deeper

[84] https://www.euronews.com/green/2020/07/15/the-uk-s-first-ocean-curriculum-launches-in-primary-schools

comprehension of marine ecosystems, conservation principles, and the complex relationships among environmental systems by improving environmental education by incorporating ocean literacy. This information serves as the cornerstone for a deeper understanding of the problems facing the environment globally.

The UK curriculum's emphasis on sustainability is in line with more general environmental objectives. Czechia can be motivated to advance sustainable practices in critical domains such as waste reduction, water resource management, and biodiversity conservation, in addition to concerns pertaining to the ocean. This strategy encourages the populace to live sustainably and responsibly.

Czechia is home to a large number of international schools at different educational levels, which is evidence that new educational models—like the UK's curriculum that focuses on the ocean—can be applied there. These international schools provide a broad student body that frequently consists of foreign nationals and pupils from various cultural backgrounds. An openness to global viewpoints and a willingness to adopt contemporary teaching approaches are fostered by the international education environment.

An ocean-focused curriculum's adaptability can be especially helpful in foreign schools, where children may come from different areas with differing levels of exposure to the sea. A curriculum like this, which covers a wide range of environmental education topics, fits very nicely with the global and inclusive culture of Czech international schools.

These schools' global setting also encourages a collaborative approach to learning, making it the perfect environment for exchanging instructional materials, exchanging best practices, and putting creative teaching techniques into effect. Teachers can benefit from a multitude of worldwide experiences and knowledge while implementing an ocean literacy curriculum thanks to this collaborative atmosphere.

The integration of an ocean-themed curriculum in international schools is beneficial for students' environmental education and is consistent with the global consciousness and interconnectedness that these educational establishments foster. The potential to successfully use progressive curricula that are modelled after international best practices is becoming more apparent as long as Czechia is home to a thriving array of international schools.

For Czech students, new opportunities arise when STEM career awareness is incorporated into a curriculum with an ocean theme. A more diversified and qualified workforce in fields essential to sustainable development can result from students' exposure to opportunities in marine science, engineering, and environmental conservation.

Czechia has the chance to establish itself as a pioneer in environmental education by coordinating its teaching methods with current worldwide trends. This strengthens the nation's reputation as an active participant in international sustainability initiatives while also demonstrating a dedication to environmental management.

The curriculum's emphasis on equipping pupils to confront global issues like biodiversity loss, climate change, and environmental degradation is especially pertinent to Czech education. Comprehending the role of oceans in regulating temperature,

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weather patterns, and food supplies enables the next generation to contribute significantly to worldwide environmental endeavours.

A shift in Czech society's mindset toward environmental responsibility and conservation can be sparked by implementing an ocean-focused curriculum. Pupils who are raised with a high appreciation for the value of the ocean are likely to carry this viewpoint into adulthood and impact social attitudes toward sustainable living habits.

Through such instructional program, Czechia can establish connections and cooperative efforts with other nations, establishments, and environmental conservation organizations. International alliances make it easier to share best practices, exchange ideas, and take part in cooperative projects that support the global push for sustainability.

Putting the blue economy idea front and centre may help Czechia's economy. Even though it is landlocked, the nation may investigate technological advancements in fields like conservation, sustainable water management, and other fields that support the wise use of natural resources.

Last but not least, the interdisciplinary learning fostered by incorporating topics related to the ocean into a variety of courses helps Czech students to form a comprehensive viewpoint. This method helps students develop their critical thinking and problem-solving abilities, equipping them to handle challenging situations in the real world. Overall, embracing an ocean-focused curriculum aligns with global sustainability goals and positions Czechia for a more environmentally conscious and proactive future.

5.2.2. Identifying Local Challenges

Despite being a landlocked nation, Czechia has particular difficulties in advancing sustainable practices and ocean literacy. The geographic setting is one of the main obstacles, since the lack of direct access to the ocean may cause education about the ocean to be given less importance. This geographic restriction may impede attempts to foster a sense of responsibility for water conservation and environmental sustainability by obscuring the connection between inland water systems and the world's oceans.

Comprehensive ocean literacy projects may also be hampered by a lack of teaching materials designed for landlocked nations. One major challenge is the lack of curriculum that specifically addresses the complexities of maritime ecosystems and how they relate to the biological landscape of Czechia. The difficulty also extends to teachers' readiness, since teachers may not have access to specialized training programs focusing on ocean literacy.

Cultural differences make these problems even more difficult. There may be less pressure to integrate ocean-related subjects into mainstream education if there is no maritime culture or historical ties to the ocean. Promoting ocean literacy requires overcoming cultural inertia and cultivating an awareness of the ocean's significance in global systems as well as a sense of wonder.

The lack of direct contact to the ocean may have led to a historical emphasis on the study of inland ecosystems in the Czech educational system. Because of this, educational curriculum could be culturally biased and place less of an emphasis on

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biodiversity, marine ecosystems, and the interdependence of the world's water systems.

Lack of terminology pertaining to the ocean in common speech could lead to communication issues. It may be more difficult to communicate the significance of oceans and their place in global systems if there is no clear linguistic link to marine concepts. Effective communication requires creating a vocabulary that communicates topics connected to the ocean while also connecting with Czech culture.

In a landlocked nation, the general public's view on environmental issues might not give ocean conservation first priority. Instead, local worries about deforestation, water and air quality, and land-based conservation may be the main focus of environmental concerns. Educating people about the interdependence of all ecosystems, including the ocean, is a cultural problem that calls for focused awareness initiatives.

Lack of interest in or involvement with ocean-related causes may be attributed to indirect exposure to marine conservation movements and activities. The development of a sense of shared responsibility for the world's seas may be hampered in landlocked locations by the lack of chances for residents to actively participate in marine conservation initiatives.

Analyzing the difficulties in various Czech locations reveals subtleties shaped by regional features. Although there may be more awareness of water-related concerns in areas closer to bodies of water, these areas may also confront problems with pollution and excessive use of local water resources. Although coastal areas may value marine environments more, they may also face problems like habitat deterioration and coastal erosion.

Disparities between urban and rural areas also matter. Urban runoff and pollution from industrial operations can pose a threat to local water quality in urban settings. However, agricultural methods that have an impact on water systems may present difficulties for rural communities. Comprehending these regional differences is essential for tailoring educational programs and sustainable practices to address specific local concerns effectively.

Regional differences are influenced by economic considerations as well. Richer communities might be able to invest more in sustainable technologies and education, whereas economically poor areas might find it more difficult to carry out large-scale ocean literacy programs. In order to guarantee equitable access to educational resources and sustainable practices throughout all regions, it becomes imperative to bridge these economic gaps.

Furthermore, the effects of climate change differ geographically, which affects how serious the problems are. Prioritizing long-term environmental concerns over urgent problems may be difficult in areas vulnerable to catastrophic weather events like floods or droughts. A multifaceted strategy that takes into account local circumstances, involves communities, and customizes educational activities to meet the unique needs of each region is needed to address these regional differences.

Promoting ocean literacy in Czechia is made more difficult by the lack of direct access to the water. It's important to stress, nevertheless, that ocean literacy is not limited to areas where oceans are actually present. Ocean literacy transcends national borders

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and can cover more general water-related topics, such as lakes, rivers, and even problems with pollution, sustainable development, and water conservation. In a landlocked setting, ocean literacy can be reinterpreted to emphasize the significance of all bodies of water, regardless of their proximity to the ocean, by incorporating an awareness of linked water systems. The ideas behind ocean literacy also apply to the more general idea of water literacy, encouraging an understanding of the critical role that water plays in supporting life, regulating climate, and supporting ecosystems.

Redefining ocean literacy to encompass all water resources can help educational programs transcend geographical boundaries and connect with the unique cultural and natural context of the Czech Republic. This method recognizes that the health of rivers, lakes, and other inland water bodies is inextricably linked to the state of the environment worldwide, enabling a more encompassing understanding of water ecosystems. Thus, developing an awareness of ocean literacy is not hampered by the absence of oceans, despite the fact that it can be a local issue. Instead, it offers a chance to expand the reach of educational programs to include all water resources, promoting a thorough comprehension of water ecosystems and their importance within the larger framework of environmental stewardship and sustainability.

The difference in awareness levels between urban and rural communities adds another level of complexity to the endeavour to develop ocean literacy in Czechia. Higher population densities and easier access to educational resources are two characteristics of urban centres, which also tend to have more sophisticated environmental consciousness. This urban advantage is the result of a heightened awareness of global environmental challenges, cultural resources, and increased exposure to educational efforts. On the other hand, promoting ocean literacy in remote communities is more difficult due to factors including restricted access to educational resources and less exposure to environmental efforts. Urban-rural differences take many forms and have distinct effects on the advancement of ocean literacy. Access to established educational resources, such as libraries, schools, and environmental organizations, is generally better in urban settings. This makes it easier to include programs for ocean literacy into academic curriculum and extracurricular activities, which benefits the informed and involved urban populace. On the other hand, the lack of adequate educational infrastructure in rural areas frequently makes it difficult to carry out comprehensive programs that are cantered on sustainability and water ecosystems. The digital divide, which affects access to information and educational resources, is another crucial factor. Due to their increased connectivity, urban residents might gain from interactive materials, films, and online resources pertaining to ocean literacy. However, difficulties in obtaining these materials in rural regions may obstruct information-sharing and efforts to raise awareness, hence widening the awareness gap.

Promoting environmental awareness requires active community involvement. Because of their higher population, urban areas usually offer more chances for citizen involvement in environmental efforts. On the other hand, there can be less opportunities for participation in rural communities, which makes it difficult to promote a feeling of shared accountability for global environmental challenges, such as ocean protection. In remote areas, encouraging ocean literacy is more difficult due to a lack of direct contact to marine habitats. Residents may not have had as much first-hand experience with oceans as they would have due to physical distance, which lowers the perceived significance of themes related to the ocean in their daily life. Allocating

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resources is another challenge, especially in rural regions where resources are scarce and may favour short-term over long-term environmental challenges. Because of this obstacle, funding and resources for initiatives promoting ocean literacy may be seen as having less of an immediate impact on rural populations. In order to address these differences in awareness, specific techniques that take into account the particular requirements and difficulties of each context are needed. By localizing educational resources, launching community-based projects, and focusing outreach efforts, it is possible to close the awareness gap and promote ocean literacy that is in line with the unique priorities and circumstances of both urban and rural populations.

Addressing the youth dropout rates can be a major issue in the local context of fostering ocean literacy and sustainable practices in Czechia. The data regarding the number of individuals who leave education and training early, with a particular emphasis on the local people, highlights the need of addressing this issue as it may act as a barrier to the promotion of environmental awareness and ocean literacy. It is a worrying trend that the proportion of native early leavers from Czech education and training increased from 4.8% in 2011 to 6.2% in 2021[85]. This dropout rate suggests that some young people in the Czech Republic might not be finishing their education, which would limit their access to vital information and skills, such as those pertaining to environmental sustainability and ocean literacy. The ramifications of this dropout tendency are extensive, since it could impede the growth of an informed and ecologically aware populace. Young people could not have the essential knowledge of global environmental challenges, such as the importance of oceans and water ecosystems, if they do not have a strong educational background. The knowledge gap may make it more difficult to foster a sense of accountability for sustainable activities and environmental stewardship. Moreover, the dropout rates between the populations born in the EU and those born outside of it introduce further layers of complexity by illustrating potential differences in educational support and access. The rise in early leavers among EU-born individuals in Czechia (from 13.2% in 2011 to 17.2% in 2021) indicates that issues unique to this group need to be addressed. of a similar vein, while the decline of early leavers among non-EU-born individuals from an unknown number to 9.0% in 2021 may represent a favourable trend, care must still be taken to guarantee educational inclusion. It is therefore crucial that Czech local government and educational institutions carry out focused interventions in order to address these issues. efforts to pinpoint and address the underlying causes of early school dropout, such as socioeconomic issues, educational practices, and community involvement efforts, may fall under this category. Czechia can create a more environmentally conscious and literate populace that can comprehend and tackle urgent concerns such as ocean conservation and sustainability by guaranteeing that children and young individuals have the chance to finish their education.

Linguistic constraints are another major obstacle in the local context of fostering ocean literacy and sustainable practices in the Czech Republic. Addressing educational inequities is crucial, as seen by the data showing a rise in early leavers from school and training. Furthermore, adding to the complexity is the language barrier, especially with regard to the predominance of English in ocean literacy resources, which may exclude individuals who are not fluent in the language. The fact that most ocean literacy tools are available only in English could be a barrier for those in Czechia who don't speak the language fluently. This language barrier can make it more difficult for some people to access important educational resources, which keeps them from fully

[85] https://op.europa.eu/webpub/eac/education-and-training-monitor-2022/en/country-reports/czechia.html

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interacting with crucial knowledge about oceans, water ecosystems, and environmental sustainability. Lack of access to ocean literacy resources may result in a restricted grasp of global environmental challenges for individuals with weak English proficiency. Consequently, this may hinder the growth of a sense of accountability for sustainable behaviours and environmental stewardship, particularly those pertaining to the seas. Local efforts should concentrate on translating important ocean literacy resources into Czech or other languages that are commonly spoken in the area in order to solve this difficulty. Furthermore, producing materials in the original tongue that are attentive to cultural differences and pertinent locally might improve their usefulness and accessibility. Czechia can ensure that a more diverse and inclusive audience may participate in ocean literacy projects and have a deeper awareness of environmental issues by bridging the language divide.

5.2.3. Exploring Opportunities

The increasing global recognition of ocean literacy campaigns offers Czechia a significant chance to follow international trends and capitalize on the increasing consciousness of the significance of ocean ecosystems. There has been a noticeable increase in ocean literacy initiatives worldwide as a result of the growing understanding of the oceans as essential elements of Earth's health and the interdependence of the world's water systems. For Czechia, this worldwide momentum presents numerous noteworthy advantages and chances.

International networking and cooperation present a significant opportunity. Czechia has an opportunity to interact with international organizations, initiatives, and communities because to the widespread popularity of ocean literacy efforts worldwide. By facilitating the sharing of resources, best practices, and cooperative efforts, this involvement enhances Czechia's own ocean literacy initiatives.

Furthermore, the universality of issues pertaining to the ocean presents a chance for intercultural communication and cooperation. Czechia is able to promote cross-cultural relationships because of the similar concerns for ocean protection that unite people. Through this involvement, Czechia's understanding of environmental issues is broadened, and a sense of shared responsibility for tackling these problems as a group is encouraged.

Globally speaking, the growing acceptance of ocean literacy raises public awareness. Demand for sustainable behaviours and regulations is rising as more people become aware of the value of the seas. Czechia can take use of this increased awareness to spur regional projects, enticing citizens to join in national campaigns for ocean conservation and encouraging ecologically friendly conduct.

Countries that invest in ocean literacy stand to gain economically from the increased attention being paid to sustainable practices in the marine industry worldwide. Innovations in blue economy fields like marine tourism and sustainable fishing are becoming increasingly viable. Despite its landlocked status, Czechia may set itself up for economic success by supporting sustainable practices and encouraging innovation in fields that deal with water resources.

Global efforts to promote ocean literacy have a positive effect on the environment by reducing pollution, protecting marine biodiversity, and promoting sustainable resource management. Despite being a landlocked nation, Czechia can support international environmental goals by coordinating its laws and policies with the larger movement for the sustainable use and preservation of water resources.

Furthermore, the rise in popularity of ocean literacy has sparked innovation in education, leading to the creation of interesting resources, interactive websites, and chances for hands-on learning. By using and modifying these cutting-edge pedagogical strategies, Czechia can improve the efficacy of regional ocean literacy initiatives and give students more engaging educational experiences.

Essentially, the widespread acceptance of ocean literacy programs allows Czechia to take an active part in the global shift toward sustainable ocean practices. This movement offers chances for education, cooperation, and positive environmental effects on both a local and global level.

The possibility that Czechia will quickly have a European Blue Schools offers a strong chance for the smooth incorporation of ocean literacy into the country's educational framework. The European Blue School initiative simplifies the process for schools to include marine and maritime-related subjects into their curricula by providing an organized and easily understandable framework. This opportunity offers Czech schools an efficient and effective road by easing the administrative burden involved with implementing separate ocean literacy programs. Being a part of the European Blue School program is consistent with the overarching objectives of fostering a society that is more informed about the ocean, with schools acting as catalysts for change and sustainability. Students who participate in this program not only learn about marine ecosystems but also develop a sense of responsibility for the ocean. Czech educational institutions have the potential to significantly impact the development of a future generation that is not only knowledgeable about the sea and related subjects but also actively involved in environmental responsibility, tackling global issues like conservation and climate change.

Creating a network where instructors can exchange experiences and work together with other schools both domestically and abroad is one of the main draws for Czech schools to participate in the program. The quality and effect of ocean literacy projects are improved overall by this collaborative aspect. The sharing of concepts, materials, and best practices benefits Czech schools and creates a vibrant, global network of teachers committed to promoting ocean literacy.

The curriculum also emphasizes teacher professional development heavily, realizing that teachers play a critical role in making the ocean come to life in a variety of subject areas. The program makes sure that teachers in Czechia have the materials and training they need to successfully integrate marine-related subjects into a variety of subject areas. The ability of educators to provide interesting and educational ocean literacy lessons is improved by this professional development opportunity, which eventually benefits the pupils they instruct.

An additional motivator for involvement is the EU4Ocean Coalition's certification and recognition given to schools that effectively implement Blue Projects. This recognition not only gives school initiatives global exposure, but it also honors the exceptional achievements of educators. Furthermore, pupils may become more motivated as a

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result of the certification, possibly developing an interest in future careers in the blue economy.

Another strong incentive for Czech schools is access to materials, events, and professional development opportunities coordinated by the EU4Ocean Platform and other European institutions. With the help of these tools, schools may improve the calibre and scope of ocean literacy instruction, giving pupils a thorough and interesting education. Leveraging these resources helps schools stay up to date on the most recent advancements in ocean science and conservation.

Also, local relationships that make the learning context relevant are developed by Czech schools according to the open schooling principle, which fosters innovation. This adaptability lets educational institutions customize how they teach ocean literacy, encouraging ingenuity and tackling environmental issues that are relevant to their community. Despite being a landlocked nation, Czechia can seize this chance to be creative and make a significant contribution to the larger objectives of ocean literacy education. Hence, the European Blue School initiative offers Czech educational institutions a practical and effective way to include ocean literacy into their curricula. Simplified integration, network cooperation, career advancement, global recognition, resource accessibility, and innovation promotion put Czechia in a strong position to actively support the creation of a more ocean-literate society.

Collaboration with local non-governmental organizations (NGOs) and community groups appears to be a critical opportunity for Czech schools taking part in the European Blue School initiative. This cooperative strategy offers a number of strong advantages and incentives. Using local knowledge and experience is one important opportunity. Schools in the Czech Republic can gain a comprehensive awareness of local marine and environmental issues by working with non-governmental organizations. Through this partnership, the ocean literacy curriculum is enhanced with regionally relevant content, allowing students to have a greater awareness of the unique environmental concerns faced by the area.

Additionally, collaborating with local organizations increases community support and involvement for ocean literacy programs. Through active community involvement, Czech schools can make the most of available resources, fostering a sense of shared responsibility and guaranteeing the sustainability of ocean literacy initiatives. By strengthening the bonds between educational institutions and the communities in which they are located, this involvement promotes a common commitment to environmental care. NGOs frequently have networks for outreach and awareness campaigns that are well-established, giving Czech schools a chance to increase the effect of their ocean literacy initiatives. The effectiveness and reach of awareness campaigns are increased when local NGOs work together, as this guarantees that a larger audience is reached and raises community understanding of the value of marine conservation.

Getting practical assistance in carrying out projects relating to the ocean is another beneficial possibility provided by working with local NGOs. Czech educational institutions receive support in carrying out practical projects, which improves the efficacy of their efforts and gives students real-world exposure to marine and maritime subjects. This hands-on involvement enhances the immersion and impact of the learning process. Partnerships with non-governmental organizations (NGOs) facilitate the sharing of resources because these groups may have extra materials, contacts, or

resources that enhance school-based activities. Shared resources help Czech schools become more diverse and comprehensive in their ocean literacy education. Additionally, by working together, possible financial strains related to program implementation may be reduced.

Students are exposed to real-life conservation initiatives through interactions with local NGOs, which motivates them to take an active role in environmental stewardship. Students in the Czech Republic feel more empowered when they see real-world applications of ocean conservation, which inspires them to take an active role in protecting ecosystems and natural resources. Working with local groups also provides access to larger networking opportunities. Czech educational institutions have access to a larger network of environmental advocates, specialists, and enthusiasts. Through networking, a favorable environment is created for continued cooperation, knowledge sharing, and the exchange of best practices in the field of teaching ocean literacy.

In conclusion, implementing the European Blue School program offers Czech schools a variety of exciting prospects. Czechia is in a position to actively contribute to a more ocean-literate society thanks to the program's emphasis on professional development, community participation, and international collaboration, as well as its seamless integration of ocean literacy into curricula. In addition to making the procedure easier, the opportunity to become a European Blue School offers several benefits like global recognition, resource access, and the promotion of innovation. Additionally, working with local community groups and non-governmental organizations (NGOs) presents a strategic opportunity that gives Czech schools access to local knowledge, improves community involvement, broadens outreach, and provides useful assistance for project implementation. Through active community participation, this cooperative method not only ensures the sustainability of initiatives but also enriches the ocean literacy curriculum with knowledge specific to the region. These potentials are further enhanced by the widespread acceptance of ocean literacy, which gives Czechia a forum to exchange best practices, keep up with international trends, and support international marine conservation initiatives. The opportunities are made even more significant by the good environmental impact that comes from increased public awareness and the economic potential found in sustainable blue economy sectors. Essentially, the European Blue School program provides Czech schools with a complete framework to teach ocean literacy and to cultivate a feeling of environmental responsibility in their students through partnerships at the local and international levels. These chances put Czechia in a favourable position.

5.2.4. Localization and Cultural Adaptation

In order to ensure that educational programs are relevant to a variety of cultural and geographical contexts, localization and cultural adaptation are essential to the promotion of ocean literacy. The creation of localized approaches and the significance of matching training materials to regional cultural norms and values are discussed in this section. Developing strategies that are specifically designed to address the distinctive features of each cultural and geographical context is necessary for the effective promotion of ocean literacy. A one-size-fits-all paradigm might not be appropriate, and localized alternatives acknowledge the variation in perceptions, attitudes, and educational preferences.

Using localized techniques means that instructional materials are tailored to the needs of the area. Highlighting particular marine ecosystems, marine animals, or nautical customs that are important to the neighbourhood may fall under this category. In this way, ocean literacy transcends academia and takes on a life of its own, reflecting the significance of the surrounding environment. Educators, civic leaders, and environmental specialists are a few examples of the local stakeholders that must be included for localization to be successful. Working together with these stakeholders guarantees that the strategy takes into account local problems, is culturally appropriate, and integrates easily into the current educational framework.

Promoting ocean literacy while being culturally sensitive starts with a thorough grasp of local perspectives. This entails understanding the cultural value associated with seas as well as the interdependence of communities with marine habitats. Effective educational programs must take into account the ways that various cultures perceive and engage with the water.

Training aids and strategies need to take into account the cultural norms of the area. This calls for close examination of the narratives, symbols, and language employed in instructional materials. Initiatives promoting ocean literacy gain more relevance and relatability with the inclusion of culturally relevant features.

Due to the close relationship between education and sociocultural contexts, cultural sensitivity is essential for negotiating these complexities. Content that is in line with local norms, values, and sensitivities can be developed by having a thorough understanding of the socio-cultural dynamics of a certain area. Initiatives promoting ocean literacy can thus help to create a more engaging and culturally sensitive learning environment. Respecting and utilizing traditional knowledge about oceans is part of being culturally sensitive. Indigenous knowledge of marine ecosystems and rich maritime traditions are shared by many communities. By including these viewpoints in instructional materials, cultural sensitivity is increased, and the depth of the content related to ocean literacy is enhanced.

There may be opposition to adding new topics or themes to the curriculum. Localized strategies include addressing any resistance, showcasing ocean literacy's relevance to key courses, and smoothly incorporating it into already-existing curriculum. By overcoming institutional barriers, this integration guarantees that ocean literacy becomes a crucial component of the educational process.

Gender inequality can impact educational possibilities in specific cultural situations. Gender dynamics are taken into consideration by localized approaches, which guarantees that initiatives promoting ocean literacy are inclusive and empowering for people of all genders. Through culturally appropriate education, these programs challenge old gender conventions and contribute to wider societal reforms.

5.2.5. Stakeholder Analysis and Engagement

The Czech Ministry of Education is a key player in establishing educational standards, authorizing curriculum modifications, and advising schools. It is the central body responsible for formulating educational policies. The ministry's support is essential to the Blue Schools Project in order to include ocean literacy and blue economy ideas into

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the national curriculum. The project's success depends on the ministry's backing and support, which offer the essential foundation for curriculum modifications and guarantee compliance with federal educational requirements.

Other key players in charge of putting new curricula into effect are schools and other educational facilities. Teachers, administrators, and principals will work together to implement the Blue Schools project, integrate new resources, and lead ocean literacy-related learning activities. It is essential that administrators and schools support and carry out the Blue Schools initiative. The efficacy of the project is increased by their leadership in incorporating ocean literacy into routine activities.

The Blue Schools Project is being implemented by teachers on the ground. Their responsibilities include teaching ocean literacy, getting students involved in relevant activities, and creating a welcoming learning atmosphere. It is probable that educators will need to obtain training and materials in order to successfully incorporate new ideas into their lesson plans. By acting as project ambassadors, teachers have a direct impact on the educational experiences of their students. The success of the initiative is attributed to their passion, proficient content delivery, and integration of cutting-edge teaching techniques.

The Blue Schools Project's main beneficiaries are the students. Introducing future generations to the blue economy and involving them in ocean literacy activities will equip them with environmental awareness and knowledge. Their involvement is essential to the project's success. One of the keys to success is active student engagement. Students who actively participate in ocean literacy activities, adopt sustainable practices, and share their knowledge contribute to the project's long-term impact.

The Blue Schools Project benefits from the experience, resources, and lobbying that NGOs and environmental groups provide. They might provide instructional materials, run workshops, and assist in coordinating the initiative with international environmental objectives. Working with NGOs broadens the project's audience and increases its impact. NGOs contribute reputation, resources, and experience. Their participation broadens the project's audience, contributes more instructional resources, and guarantees that the project is in line with international environmental objectives.

Parents and local citizens are essential partners in the community. Their participation and support can help the Blue Schools program succeed. Workshops, awareness campaigns, and community engagement initiatives can encourage a sense of shared accountability for environmental preservation. The Blue Schools Project thrives in an atmosphere that is supported by the community. Parents' and residents' active participation contributes to a sense of collective responsibility and strengthens the project's impact.

Communication channels and media outlets are essential for spreading knowledge about the Blue Schools Project. They can aid in promoting public support for ocean literacy and the blue economy, presenting project activities, and increasing public knowledge of these issues. A vital part of information dissemination is done by media outlets. Good press and clear communication raise public awareness, foster support, and increase the Blue Schools Project's overall success.

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Environmental agencies are involved in offering advice on environmental policies, conservation tactics, and regulatory matters. Working together with these organizations guarantees that the Blue Schools Project is in line with more general national and global environmental objectives. The project's alignment with national environmental goals is ensured by collaboration with environmental agencies. The project's influence on sustainable behaviours is increased by providing guidance on rules and conservation techniques.

5.2.6. Policy and Implementation Recommendations

Policymakers are encouraged to take into account a multidimensional strategy in order to boost ocean literacy and the blue economy, which are based on research findings. There is an urgent need for changes to national education policies that prioritize economic, environmental, and social aspects, starting with the inclusion of blue economy themes in educational programs. This entails a plan for curriculum enhancement that promotes adjustments that smoothly incorporate the concepts of the blue economy into the current frameworks for education. Additionally, it emphasizes the importance of forming alliances with blue economy sectors in order to promote cooperation in the creation of teaching resources that mirror practical applications and enhance students' comprehension. Also, in developing the national education policies that are integrated to blue economy, partnerships with industries are highly essential. Collaborating with blue economy sectors help to develop educational materials that reflect real-world applications, fostering a deeper understanding among students.

The adoption of vocational guidance programs becomes a crucial part of educational policy in order to effectively promote blue economy career pathways in Czechia. These programs have a significant impact on students' career decisions because they give them thorough knowledge of the wide range of dynamic options that exist within the blue economy. These efforts have a strong focus on instilling a profound grasp of the sustainability and innovation ideas inherent in blue economy practices, going beyond merely raising awareness of careers. Programs for vocational advice work as informational and cooperative conduits between academic institutions and the blue economy sector. These programs assist students in matching their interests and abilities with the dynamic and ever-changing demands of the industry by educating them about the variety of job options available in the blue economy, with a specific focus on sustainability and innovation. Given the requirement for a workforce capable of navigating and contributing to sustainable solutions, as well as the worldwide trend towards ecologically responsible behaviours, the emphasis on sustainability is imperative. The blue economy sectors and educational institutions must work together to make sure that academic programs are tailored to the demands of business. Through the cultivation of partnerships and continuous discourse, institutions can acquire valuable insights into the dynamic environment of the blue economy. This partnership enables the creation of forward-thinking and pertinent academic curricula that equip students to handle the difficulties presented by the intricacies of sustainable blue economy procedures. Additionally, these cooperative efforts may result in the co-production of educational resources and materials that illustrate how the concepts of the blue economy are used in practical settings. This alignment guarantees that students' academic journeys are enhanced with real-world information, skills that are applicable to the industry, and a deep comprehension of sustainability. Through this

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kind of cooperation, academic institutions may help to create a workforce that is not only aware about the practices of the blue economy but also talented at incorporating sustainability and innovation into their work. Vocational guidance program implementation is essentially a calculated investment in Czechia's future labour force. It goes beyond conventional career advice, with the goal of developing a new generation of professionals dedicated to sustainable and creative practices, as well as being well-prepared for the demands of the blue economy. By use of these programs, Czechia can cultivate a labour force that will make a substantial contribution to the expansion and durability of the blue economy domain, thereby harmonizing academic objectives with the changing requirements of both the country and the environment.

Because of its landlocked status, Czechia presents a particularly complex challenge when it comes to sustainable fisheries and aquaculture activities. Customized policies are needed to take into account the special circumstances of the country's lack of direct access to maritime settings. In the area of fisheries and aquaculture, policymakers are strongly encouraged to develop and put into effect clear regulatory frameworks that give sustainability, ethical behaviour, and biodiversity conservation top priority. Since freshwater resources are crucial to the environment of the nation, these frameworks ought to be made to fit the inland water ecosystems that define Czechia. To ensure that aquaculture and fisheries practices support sustainability objectives and biodiversity protection, it is imperative to establish clear regulatory mechanisms. The emphasis should go beyond the coastal factors that are usually connected to marine settings, acknowledging the equally important role that inland water ecosystems play in maintaining Czechia's ecological balance. These rules ought to include precautions against overfishing, encourage ethical harvesting, and protect freshwater species' biodiversity.

The success and inclusion of environmental projects in Czechia must be ensured by tailoring them to the country's diverse demographic landscape. It is recommended that policymakers create focused programs that identify and cater to the unique needs and inclinations of the nation's various demographic segments. Creating and executing awareness campaigns targeted at particular demographics is a crucial tactic. Policymakers can create campaigns that resonate with target audiences by taking into account the diverse traits, issues, and interests of various groups. Campaigns can be tailored, for example, to take into account age groups, socioeconomic backgrounds, gender and educational attainment, making the material relevant and easily accessible to a broad range of people. Moreover, holding workshops tailored to specific regions is an essential part of this focused strategy. Geographical, economic, and cultural considerations may lead to distinct concerns with maritime climate change in different parts of the Czech Republic. Workshops tailored to individual regions offer an opportunity to interact directly with communities, comprehend their unique issues, and modify programs to successfully tackle these problems. Through these seminars, policymakers can have open discussions and learn from locals, community leaders, and experts. Policymakers may co-create solutions that are appropriate to the context and resonate with the unique difficulties that each region faces by developing a collaborative approach. Through localized involvement, environmental projects are made to be powerful and flexible in a variety of situations rather than one-size-fits-all.

Fostering a culture of dedication and sustainability in Czechia requires acknowledging and appreciating achievement in blue economy education. Legislators have the ability to implement award and recognition schemes that benefit students, instructors, and

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schools alike. These initiatives are essential to recognizing and celebrating the accomplishments of educational institutions, instructors, and students in advancing the ideas of the blue economy. Czech communities can encourage instructors and students actively involved in blue economy education by developing recognized programs of this kind. In addition to recognizing both individual and group efforts, this joyous approach fosters a supportive and upbeat atmosphere that motivates more stakeholders to actively engage with and promote the values of the blue economy. Collaboration and strategic planning are necessary to ensure the long-term viability of blue economy education in Czechia, in addition to recognized programs. To truly integrate environmental literacy—more especially, blue economy education—into the curriculum, it must be formally supported by the national education framework. The institutional acknowledgement of this kind of education signals to educators, students, and the community at large the importance of this kind of instruction. Among the most important factors in ensuring long-term funding for blue economy education programs are public-private collaborations. Mutually beneficial ties can result from collaborative efforts amongst the government, educational institutions, and blue economy sectors. These collaborations make it easier to share resources, share expertise, and create practical plans for incorporating the ideas of the blue economy into teaching methods. A critical first step in institutionalizing blue economy education is to push for environmental literacy to be included as a permanent part of national education programs. In order to guarantee that these ideas are not just accepted momentarily but rather endure and become an essential component of the educational program, policymakers should endeavour to incorporate these ideas into educational frameworks. Furthermore, obtaining specific financing pledges is necessary for the ongoing development and execution of environmental literacy programs in Czechia. Sustaining these initiatives' efficacy and longevity requires stable funding to guarantee the availability of resources, teacher preparation courses, and programs for blue economy education.

Training programs designed to improve research capacity should make use of web-based resources like virtual reality and Massive Open Online Courses (MOOCs) to promote knowledge sharing and information exchange. A sector-specific and interdisciplinary approach across the marine, maritime, education, social, and economic sciences is required because to the interdisciplinary nature of OL research, which is especially focused on the blue economy. Understanding people's knowledge, attitudes, behaviour, and wants is essential to managing the blue economy, necessitating tactics across multiple industries. For the purpose of assessing the success of programs and activities, not only for pupils but for other societal sectors associated with the ocean, such as maritime workers, benchmarking and ongoing monitoring of OL levels are essential. These initiatives support the Ocean Decade's main objective, which is to link ocean science with societal demands.

To put it briefly, the suggestions for Czechia centre on raising environmentally conscious citizens, promoting environmental literacy, and skilfully incorporating blue economy ideas into the educational system. them strategies, which place a strong emphasis on cooperation between academia and business, take many forms. Some of them include technological integration, community participation, sustainable fisheries, career counselling, and targeted programs for various groups. In spite of the landlocked status of the Czech Republic, responsible behaviour and biodiversity protection can be encouraged by well-defined legislative frameworks and awareness efforts. While long-term sustainability is guaranteed by formal endorsement, public-

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private partnerships, advocacy, and committed funding, recognition programs honour excellence. Together, these strategies will establish Czechia as a pioneer in environmental education and equip the next generation to deal with the challenges of a changing global environment.

5.2.7. Sustainability and Long-Term Impacts

Adopting sustainable strategies with a focus on educational content and digitalization is necessary to ensure the long-term impact of education and awareness-raising projects in Czechia. A fundamental first step is to incorporate environmental information into the national education framework. Developing an all-encompassing curriculum with toolkits made especially to raise ocean awareness provides a thorough and organized method. These toolkits may contain lesson plans, interactive exercises, and multimedia materials appropriate for a range of age and educational levels. Furthermore, for scalability and accessibility, utilizing digital platforms and technology is essential. Creating easily navigable web sites with interactive modules, webinars, and virtual field excursions expands the audience for instructional materials and guarantees that educators and students can easily access pertinent data. Creating instructional applications specifically for the Czech context can provide engaging and interactive learning experiences, making the subject matter more relatable and accessible to a broader audience.

The project's sustainability is enhanced by this digitization, which also conforms to contemporary trends in education. For educational content to be refined and improved over time, regular evaluations, feedback channels, and recurring assessments will be essential. Through this iterative process, the project's adaptability to changing educational demands is ensured, and potential obstacles are successfully addressed. To summarize, a sustainable approach includes using digital tools and technology to improve accessibility and engagement in addition to including complete educational content within the national framework. The initiative's long-term success and impact are enhanced by the ongoing assessment and enhancement of the material as well as the creation of customized toolkits. This fosters the growth of an environmentally conscious and sustainable practices-engaged generation in Czechia.

A thorough examination of the project's anticipated long-term effects reveals a diverse contribution that has the potential to favourably influence Czech society. The primary impact of the effort is to raise a generation of environmentally concerned people who have a deep comprehension of the concepts of the blue economy and ocean literacy. It is intended for this information to go beyond classroom settings and into many aspects of society, impacting decision-making and fostering a widespread sustainable mindset. Long-Term Impact Assessment: A thorough examination of the project's anticipated long-term effects reveals a diverse contribution that has the potential to favourably influence Czech society. The primary impact of the effort is to raise a generation of environmentally concerned people who have a deep comprehension of the concepts of the blue economy and ocean literacy. It is intended for this information to go beyond classroom settings and into many aspects of society, impacting decision-making and fostering a widespread sustainable mindset.

The project's goal is to create a skilled workforce that is ready to take on the difficulties presented by sustainable blue economy practices. This will have a long-lasting effect. The goal of incorporating blue economy ideas into education is to close the knowledge gap between theory and practice. Through this, the program hopes to create people who are not only environmentally literate but also possess the practical skills necessary for active and meaningful participation in the blue economy sectors.

The initiative aims to promote educated decision-making, especially in areas like sustainable consumption, with the expectation that it will have a transformative effect on societal behaviours. The project seeks to enable a constructive change in public knowledge and participation through focused efforts, campaigns tailored to specific demographics, and seminars tailored to particular regions. This strategy aims to inspire environmentally conscious decisions and cultivate a group commitment to sustainability by spreading throughout communities.

With the launch of the initiative's recognition programs, excellence in blue economy education will be honoured and encouraged. The goal of this strategic approach is to support the growth of a strong cultural shift toward sustainable behaviours. Acknowledging accomplishments at the individual, school, and community levels, these initiatives aim to create a normative culture that places a high importance on environmental literacy.

The program seeks formal recognition within the national education framework in order to guarantee long-term impact. Ensuring that environmental literacy and blue economy ideals are ingrained in school policies is contingent upon completing this essential step. Introduction of new schools to the Blue Schools Network will be very helpful in this regard. Through the institutional integration of these principles, the program aims to establish a durable legacy that will impact future generations and contribute to the long-term development of environmental literacy initiatives in the Czech Republic.

The field of ocean literacy research places significant focus on ongoing monitoring and evaluation as a means of guaranteeing the efficacy and durability of programs. Creating and applying assessment instruments is a proactive way to gauge the effectiveness of OL programs. These instruments capture shifts in knowledge, attitudes, and behaviours by delving into qualitative characteristics beyond simple quantitative measurements. In this regard, longitudinal studies play a crucial role by offering insights into the long-term effects of OL activities. Through monitoring the advancement of participants and comprehending the duration of information retention, researchers can enhance and customize instructional approaches for increased effectiveness. Furthermore, these longitudinal studies provide insightful information on the long-term behavioural shifts that occur among communities, illuminating the impact of ocean literacy on society.

The comprehensive long-term impact assessment essentially highlights the project's revolutionary potential. It imagines a civilization in which blue economy ideas and environmental literacy are not merely fads but essential elements influencing people's decisions, behaviours, and values for years to come.

5.3. Hungary

5.3.1. Identifying Local Challenges

Previous studies have shown that there is a need to raise awareness of 'blue' literature among young people.

The opportunities are mainly on school sites because:

- resources for education and awareness-raising are available
- the target group (young people) is "concentrated" and age-differentiated

And the dissemination of knowledge in schools depends largely on the attitude and actions of teachers. The SHORE project aims to offer guidance for the educators and schools on Blue Curricula, develop and implement projects inside school.

5.3.2. Exploring Opportunities

At the end of 2023, as part of the Shore project, information material was distributed to schools describing the objectives of the Shore project, the basic features of the Blue School network and the Danube Region's connection to the theme. As a result, 25 schools have indicated their intention to join the network, a significant number.

The distribution of schools by region and level (primary, secondary) is shown in the map and table below. It can be seen that the schools are located in several regions, mainly close to major water bodies (Danube, Tisza, Lake Balaton) where the school pupils (and teachers) are in daily contact with the "blue" natural resources.

Map 15 Map of schools indicating their registration - Hungary

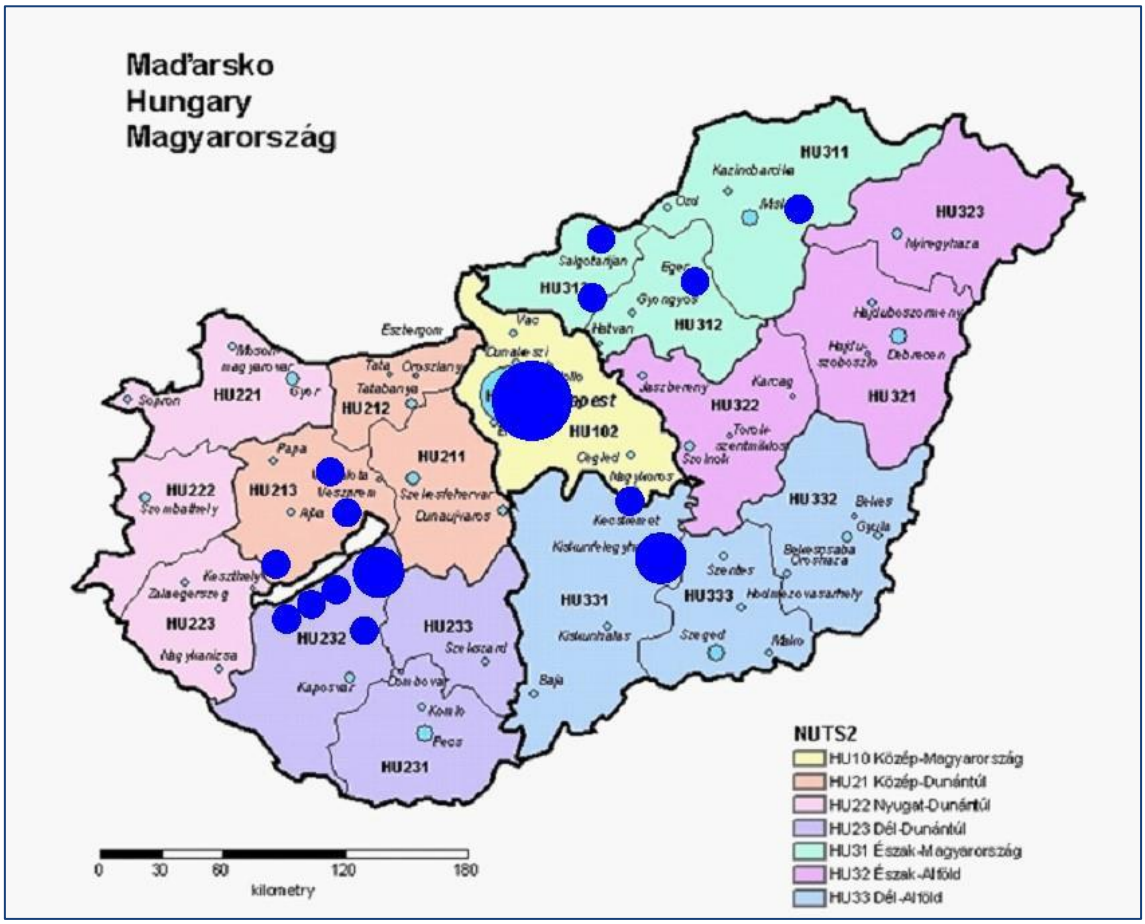

Table 56 List of schools registering their application - Hungary

NUTS 1	School level	School
Central Hungary	Primary school	Budafoki Herman Ottó Álalános Iskola
		Budapest IX. Kerületi Molnár Ferenc Magyar-Angol Két Tanítási Nyelvű Általános Iskola
		Molnár Ferenc Magyar-Angol Két Tanítási Nyelvű Általános Iskola
	Secondary school	Jaschik Álmos Művészeti Szakgimnázium és Technikum

		Szigetszentmiklósi Batthyány Kázmér Gimnázium
		Budapest X. Kerületi Zrínyi Miklós Gimnázium
		Budapest VI. Kerületi Kölcsey Ferenc Gimnázium
		Budapest VIII. Kerületi Vörösmarty Mihály Gimnázium
Great Plain and North	Primary school	Kecskeméti Lánchíd Utcai Sport Általános Iskola
		Kiskunfélegyházi József Attila Sportiskolai Általános Iskola
		Egri Pásztorvölgyi Általános Iskola és Gimnázium
		Legyesbényei Zalay Andor Általános Iskola
		Kiskunfélegyházi Platán Utcai Általános Iskola
	Secondary school	Salgótarjáni Bolyai János Gimnázium
		Mikszáth Kálmán Gimnázium és Kollégium
Transdanubia	Primary and secondary school	Veszprémi Báthory István Sportiskolai Általános Iskola
	Primary school	Boglári Általános Iskola és Alapfokú Művészeti Iskola

		Balatonszárszói József Attila Általános Iskola
		Siófoki Vak Bottyán János Általános Iskola és AMI
		Szigligeti Általános Iskola
	Secondary school	Mátyás Király Gimnázium
		Szekszárdi I. Béla Gimnázium
		Somogyvári Óvoda, Általános Iskola, Szakiskola, Készségfejlesztő Iskola, Fejlesztő Nevelést-Oktatást Végző Iskola, Kollégium, Egységes Gyógypedagógiai Módszertani Intézmény
		Siófoki Perczel Mór Gimnázium és Kollégium
		III. Béla Gimnázium, Művészeti Szakgimnázium és Alapfokú Művészeti Iskola

We conducted guided discussions and informal interviews with teachers from schools that showed interest. The main aim of the information gathering was to find out how the schools, teachers and students concerned relate to the "blue" topics and what activities they are involved in.

The results of the qualitative analysis are incorporated in the following subsections, alongside the processing of publicly available data and information.

5.3.3. Localization and Cultural Adaptation

In the National Curriculum, topics related to environmental protection and environmental awareness are included as knowledge. The "blue" topics are mainly related to rivers (Danube, Tisza) and drinking water, their conscious use and protection, because Hungary has no seas and coasts. The oceans and seas are only

mentioned in a selective way, as part of larger themes (e.g. environmental protection, water cycle, climate change).

Primary school level

In Years 1-8, the following topics appear in the curriculum in relation to the subjects:

Table 57 Primary school level subjects - Hungary

Grade	Subject	Learning outcomes/Suggested activities
3-4	Environmental knowledge	inanimate substances, environmental factors (air, water, soil), living creatures of the immediate environment
		water cycle in nature
		observations and experiments on water purity
		types of surface water, their characteristics
3-4	Visual culture	preparation of a plan for transforming the environment (forest, waterfront, park) and filling it with new functions
5-6	Natural science	recognizes and names the most significant standing and flowing waters in Hungary
		aquatic and coastal communities and their natural-environmental problems
7-8	Biology	basic knowledge of the most characteristic plant and animal species of continents and oceans
		getting acquainted with some species of marine plants and animals, the largest community of life on our planet lives in the oceans of the world

		performing simple air quality, water quality and soil tests, sampling and analysis
7-8	Geography	natural geographical processes and natural hazards determining social and economic life in Asia (floods, earthquakes, typhoons, sea level rise)
7-8	Chemistry	separation of mixtures of sand and water by sedimentation, decanting or filtration
		composition and pollutants of natural waters, water purification, drinking water production
		testing of water samples using laboratory water test kits, plant visit to local or regional wastewater treatment plant
7	Technology and design	the most important public utilities and public services of settlements
		savings in electricity, water, heating and other thermal energy

Secondary school level

In grades 9 to 12, the following topics appear in the curriculum in relation to the subjects:

Table 58 Secondary school level subjects

Grade	Subject	Learning outcomes/Suggested activities
9-10	Biology	know the sources of air, water and soil pollution, the types and examples of pollutants, and analyse their impact on biomes on the basis of specific cases
		analysis of factors influencing water quality

		in freshwater and marine habitats through examples
		physical, chemical and biological analysis of various water samples (nitrate/nitrite, phosphate, water hardness, pH, BISEL)
		study of the Earth's oceanic and marine ecosystems, analysis of some key examples, presentation of their values to be protected (e.g. coral reefs)
		analyses the impact of human activity on habitat changes based on examples, explaining the endangerment of certain species
		development of project work on ensuring healthy drinking water and wetlands
		discussion of waste recovery and wastewater treatment procedures
9-10	Geography	ideas to avoid environmental hazards and mitigate the impact of existing problems (e.g. ocean litter, oil spill, mine fire, deforestation, insect invasion)
		role and economic importance of fresh water with cooperative methods
9-10	Chemistry	humanity's most pressing global problems (global climate change, ozone hole, depletion of drinking water, depletion of energy resources) and their chemical aspects
		knows the types of natural waters, gives examples of water pollutants, their source, possible consequences of pollution, knows

		the basic steps of the water purification process, as well as how clean drinking water is produced
11	Natural science	collecting problems in the most vulnerable places on Earth (e.g. sea level rise)
		analysis of water quality status indicators, analysis of test data, analysis of the impact of water quality on biomes
		analysis of test data on drinking water quality, use, treatment and disposal of waste water
		understands the concept of ecological footprint (waste footprint, water footprint)
11	Biology	characterization of marine life, presentation of relationships between typical habitats, interesting species and populations
11	Geography	understands the strategic importance of adequate quality and quantity of water resources on Earth
		strives for environmentally conscious water use
		evaluates the relationship between the sensitivity and vulnerability of the water envelope
		causes and consequences of sea level rise

International days

Schools and teachers consider it an important task to orient students towards sustainable development, environmental protection and environmental awareness. In

most schools, some practical activities are linked to international days, such as Earth Day (22 April), World Water Day (22 March), World Animal Day (4 October), which complement the knowledge content of the National Curriculum. For these days, different themed activities are organised in schools. The activities usually take the form of project days, exhibitions, presentations and involve all pupils in the schools.

The themes of the World Water Day include the Danube as Hungary's largest river, the conservation of the diversity of the plants and animals living in its area, and the protection of nature and water. On these project days, children will take part in quizzes, create artworks from recycled and leftover materials, and attend presentations and demonstrations by external guests. Children work in groups, using a problem-solving approach to collecting and exploring materials, and learn about different areas such as the importance of water, lakes, rivers and seas, natural mineral waters and thermal waters.

In the final phase of the projects, students present their work, in most cases in creative forms, including posters, installations, drawings and presentations. Outstanding work will be specially rewarded.

This multi-faceted approach ensures that the learning experience goes beyond the traditional classroom environment and extends to the whole school community's engagement with the environment.

Project works

Many schools use project and group work, project days, as part of the local curriculum. The amount, frequency and theme of project work is essentially up to the teacher.

It is similar in implementation to the project work carried out during the International Days, but only the Department is involved and the presentation of the results is limited, in most cases to the Department and its immediate environment.

Blue Schools

There is currently no accredited Blue School in Hungary. The main reason for this is that the Blue School network focuses on the importance of protecting the seas and oceans, and Hungary has no maritime connection. This has naturally resulted in schools not joining the network.

You can join the Blue School network with existing or planned school activities. Most of the schools applying have been running activities for several years, usually in the form of student projects.

The material for joining the network is mostly prepared by teachers, probably at the initiative of the head teachers, as the information material is sent to the head teachers. This means that there is a personal interest and commitment (from principals or teachers) in the schools that want to join.

All of the schools (25 schools) that want to join the network are planning to participate in the Shore project.

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Extra-curricular activities

Every year, museums, institutes, companies and local authorities organise a range of out-of-school activities for children to mark World Water Day.

The most popular activities include lectures and visits. Every year, the Hungarian Museum of Natural History organises the Water Week, a series of events where children can visit educational exhibitions on our natural waters, as well as take part in lectures and interactive activities[86]. Spas in the capital and water towers and treatment plants in major cities will open their doors to visitors[87]. Popular activities include drawing competitions for children[88].

Other teaching materials and learning resources

Environmental organisations have produced several books on the subject. Among them, Csilla Gévai's book "The Very Blue Book" stands out (in terms of its subject). The book is the second volume in a series of books for children on developing environmental thinking. While the first part was about the environment in general, the "Very Blue Book" is about water: its state, past, present and future. The structure and language of the book is primarily aimed at primary school children.

The "Green Earth Textbook", produced by the Blue Planet Foundation, is intended for 9-12th graders[89]. The main topic is sustainable development (nature conservation, settlements, transport, health). The curriculum includes a workbook with exercises and activities.

A special solution is the teaching aid "Lake Tisza - a man-made paradise"[90], which is linked to a film. The activity plan is primarily designed for grades 3-4, who work on the theme of nature conservation in environmental education. The lesson plan includes film clips, word searches, puzzles, and stories.

In 2006, the International Commission for the Protection of the Danube River (ICPDR/IKSD) and Coca-Cola produced the Danube Box Teacher's Guide[91], a handbook of classroom and outdoor activities, using information and practical guides and worksheets, primarily for students in grades 5-13. The topics covered are:

1. The water cycle
2. The Danube Basin Ecosystem
3. Functions and values of pristine water bodies
4. Water uses in the Danube river basin
5. The Danube basin
6. Environmental efforts in the Danube basin

[86] http://www.nhmus.hu/hu/content/v%C3%ADz-vil%C3%A1gnapja-magyarorsz%C3%A1g-sek%C3%A9ly-viz%C5%B1-tavainak-%C3%A9l%C5%91vil%C3%A1ga)
[87] (https://muosz.hu/2023/03/27/viz-vilagnapja-2023/

[88] https://www.duol.hu/helyi-eletstilus/2022/03/a-viz-vilagnapja-volt-a-gyerekek-rajzoltak

[89] https://kekbolygoalapitvany.hu/oktatas/zold-fold-tankonyv-es-nevelesi-oktatasi-program/
[90] https://aktivmagyarorszag.hu/tisza-to-az-ember-alkotta-paradicsom-oktatasi-segedanyag/
[91] https://www.danubebox.org/)

For a few years, there has been a student team competition linked to the curriculum, most recently in 2016. There is no detailed information on the use of the curriculum in schools, and its use is probably limited.

Water Agent V 003, produced by the Global Water Partnership Central and Eastern Europe in 2019, aims to raise awareness about water management among pupils in three Central European countries.

The project is co-funded by the governments of the Czech Republic, Hungary, Poland and Slovakia through the Visegrad Foundation from the International Visegrad Fund. The mission of the fund is to promote ideas for sustainable regional cooperation in Central Europe.

The handbook[92] aims "to prepare the youngest generation to tackle the water problems that the Visegrad countries are already partly facing. In the context of climate change, the impacts may increase further. Emphasis is placed on making this material a useful tool for teachers in interactive education on the role of water at different levels, in order to raise awareness in the field of water management. The support materials cover three main themes: water in the household, water in the landscape and water in the city. Two additional games focusing on cooperation conclude the handbook."

The main advantage of the material developed is that each activity in the manual can be used on its own. This means that with a few selected shorter activities it is possible to introduce or make interesting a particular subject, after which the teacher can continue with his/her own teaching programme. It is not necessary to work with the whole module if there is not enough time available.

The handbook is recommended primarily as a supplement to the National Curriculum.

Dissemination of research and development projects

In Hungary, water conservation and water use have been and are being addressed in national and international projects, for example[93]:

- OPtimal strategies to retAIN and re-use water and nutrients in small agricultural catchments across different soil-climatic regions in Europe (2020-2025)

- The Human-Tech Nexus - Building a Safe Haven to cope with Climate Extremes (2022-2026)

- Restoration of the Danube River basin Waters for ecosystems and people from mountains to coast (2023-2027)

- Danube Foodplain (2018-2020)

- Drought Risk in the Danube Region (2017-2019)

[92] https://www.gwp.org/globalassets/global/gwp-cee_files/projects/water-agent/hu_water_agent.pdf
[93] https://www.gwp.org/en/GWP-CEE/WE-ACT/Projects

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Among the national projects, the National Laboratory for Water Science and Water Safety (RRF-2.3.1-21-2022-00008, 2022-2026) integrates the country's leading scientific and research sites around a research and development theme. Taking into account Hungary's location, water management and water resources, the project will carry out water science and water safety research that will contribute to the protection of water quality. Research activities will be carried out along 6 main pillars, covering rivers, lakes, groundwater, stormwater, urban management and river basin management. The main pillars have been further subdivided into sub-projects, resulting in a total of 40 sub-projects.

In the case of international projects, the topics (taking into account Hungary's location and characteristics) are mainly related to the Danube and the Danube river basin. Overall, the dissemination of research results is generally aimed at higher age groups, so the dissemination of results to the school age group is very limited.

5.3.4. Stakeholder Analysis and Engagement

Getting young people to understand "blue" issues is a complex, multi-stakeholder task.

The main stakeholders involved in achieving SHORE's objectives are:

- young people, students
- parents
- teachers
- school principals
- educational system policy makers

Table 59 Stakeholders and their characteristics - Hungary

Stakeholder name	Impact	Influence	Probability of success
Students in schools	High	Low	High
Teachers in schools	**High**	**High**	**High**
Parents of students	Medium	Low	Medium
School directors	**High**	**High**	**High**

Leaders of school districts and educational centers	Medium	Medium	Medium
Office of Education (Oktatási Hivatal)	Low	Low	Low
Associations and NGOs dealing with environment and water prevention	Low	Medium	High
National Laboratory for Water Science and Water Security	Medium	Low	Medium
National Research, Development and Innovation Office (NKFIH)	Low	Low	Low
Ministry of Interior	High	Low	Low

Achieving change in the educational system and content is a matter of sufficient importance, which is limited in the case of the "blue" topics due to Hungary's natural conditions.

Awareness raising and positive attitudinal change can be initiated mainly in schools, through extra-curricular and extra-curricular activities. Teachers and school principals are key players in this.

5.3.5. Policy and Implementation Recommendations

The main stakeholders are students (youngs) and their parents, though they cannot be reached and influenced directly. The most important way to reach them is through the educational system.

Achieving change in the educational system and its curricular content is a matter of sufficient importance, which is limited in the case of the "blue" topics due to Hungary's natural conditions. Changing the core educational materials is long-term and requires a lot of effort. The topics of environment and water protection are already in the national core curriculum.

Awareness raising and positive attitudinal change can be initiated mainly in schools, through curricular and extra-curricular activities. Teachers and school principals are key players in this.

Based on the information campaign launched at the end of 2023, it can be said that the key players (teachers) are open and that with the right information and background materials, their activity can be increased. Support for school projects, networking, the production of additional teaching materials and guides will provide a good basis for this. Another important way can be to include the “blue” mindset in teacher education, with providing lesson plans, resources, project topics etc.

Other stakeholders with low or medium impact, like associations and research projects, can positively influence awareness, but their impact is limited.

5.3.6. Sustainability and Long Term Impacts

Based on the related activities of the schools so far, it can be said that these activities (e.g. international days, project work, etc.) are carried out without additional external funding. With the completion of networking, teacher training materials, these activities are expected to be operational in the longer term and to be increasingly effective in orienting Hungarian youth towards the "blue" mindset.

Many water- and environment-related projects and activities already exist both for schools and for wider society. Projects and supported activites like SHORE are very popular among schools – especially because they implement project ideas that schools would find difficult or impossible to implement on their own and offer opportunities to strengthen collaboration between schools and other entities. Education on water-related topics in Hungary largely depends on the commitment of individual teachers, and SHORE offers the opportunity to plan and implement the projects. However, when projects are successfully completed, most of them become part of the local school (curricular or extra-curricular) activities, thus providing longer-term impacts.

In Hungary, the importance of oceans and ocean-prevention is not obvious. Projects and initiatives like SHORE and European Blue Schools can play an important role to positively impact the awareness of the society.

5.4. Italy

5.4.1. Analysis of Available Training Resources

Existing resources are numerous and sometimes adapted to school formats. In most cases however, there is little available material corresponding to the Italian context, except for that of some NGOs, and general information from government bodies. An integrated format aimed at Ocean Literacy in the Educational sector does not exist.

- UNESCO, through the Intergovernmental Oceanographic Commission (IOC), and the Education Sector, promotes Ocean Literacy internationally as a tool to promote the sustainable development of the sea and its resources. Educational resources and training courses aimed at students, teachers, companies and employees, institutions, artists, etc. are available on the portal. The portal promotes meeting, exchange of information and best practices.

- UNESCO Portal Oceanic Education ITALY[94]
- Ocean Education (Ocean Literacy) is a tool, a framework for action and, more generally, a mindset that considers the relationships between the ocean and all aspects of life on Earth. Ocean Literacy catalyses actions to protect, conserve and sustainably use the ocean by engaging society at large.
- UNESCO portal DECADE OF THE SEA Decade of Ocean Sciences for Sustainable Development 2021 - 2030[95]
- MIM MINISTRY OF EDUCATION AND MERIT
- Publication Ocean Education for All - Practical Kit - COI 80 manuals and guides.
  Published in 2020 by the United Nations Educational, Scientific and Cultural Organization.
- The publication presents the history of Ocean Education and its links to specific international programs, reports interviews done with marine scientists and educators with comments on their professional experiences in Ocean Education and their views on its future. It describes the current challenges for education on ocean-related issues, but also the path for developing successful Ocean Education activities in the United States in the context of Agenda 2030. Closing with an introduction to the methodological approach based on a multi-perspective scheme for SSE developed by UNESCO, 14 activities are presented, with tested examples and supporting implementation of Ocean Education initiatives, resources suitable for any type of student, age and background and/or learning context but to be adapted to the national or local context.

- SOFIA Portal - The Operating System for Training and Upgrading Initiatives for School Personnel. – MIM
- The portal offers the opportunity for tenured teachers to choose from the many training initiatives offered in the online catalogue by Schools and Subjects accredited/qualified by the Ministry of Education under Directive 170/2016.
- The training initiatives are collected by domains, ocean education falls under "knowledge and respect for natural and environmental reality."
- Ministry of Environment and Energy Security
- Publication ENVIRONMENTAL EDUCATION GUIDELINES OF THE - Pathway 1 - WATER AND SEA PROTECTION[96]
- Educational activities
- In implementation of the National Plan for Environmental Education, resulting from the agreement between MIUR and MATTM of December 6, 2018, environmental education initiatives have been funded, with the involvement of primary and secondary schools, including through notices of interest for the selection of proposals for environmental education activities consistent with the principles and commitments expressed in the Environmental Education Charter, approved on November 23, 2016 at the States General of the Environment and with the Plastic free Strategy.

[94] https://decenniodelmare.it/educazione-all-oceano/
[95] https://decenniodelmare.it/decennio-del-mare/
[96] https://www.mase.gov.it/sites/default/files/archivio/allegati/LINEE_GUIDA.pdf

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- In collaboration with ISPRA, a Collaboration Agreement on Environmental and Sustainability Education was signed in order to support the process of relaunching the national INFEA system (information, training and environmental education) through an agreed plan of integrated actions, including through the involvement of the Agencies (ARPA-APPA) of the National System for Environmental Protection (SNPA).
- ISPRA - Higher Institute for Environmental Protection and Research.
- Pathways for Transversal Skills and Orientation (PCTO) SU:

    - Marine Litter: from seabed exploration to beached microplastics.
    - Methods of investigating marine pollution
    - Marine sediments, archives of past events: tools for assessing the environmental characteristics of marine-coastal areas

- "ISPRA program of environmental and sustainability education initiatives," aimed at schools of all levels, PROGRAM 2023/2024[97]

- Collaboration agreement, to the program called "Map of the Educating City" (c.d. Map), promoted by Roma Capitale - School, Labor and Professional Training Department - Directorate of Support Services to the Educational and School System.

- Educational Tools[98]

- LEGAMBIENTE - SCHOOL AND TRAINING

- Legambiente Scuola e Formazione is the professional association of environmental teachers, educators and trainers, recognized by the Ministry of Education as a qualified body for the training of school personnel (DM 177/2000, decree 6/10/2005)[99].

- Dolphin as a Friend - Life DELFI project (2nd edition)[100] : The Life DELFI project was born out of growing concern within the international scientific community about the interactions of cetaceans with professional fishing activities and fishing gear. In order to inform and raise awareness of this issue among children as well, an educational kit has been created consisting of a teacher's manual with in-depth information, educational activities and workshops, and a cooperative card game where you win or lose all together!
- **WWF** - ONE PLANET SCHOOL: WWF is among the WWF is among the most important nature conservation organizations. One Planet School is the Italian environmental education portal of WWF Italy which gathers training courses, paths dedicated to teachers, operators, students and active citizens[101].
- **MAREVIVO**: Marevivo is an Environmental Foundation - ETS recognized by the Ministry of Environment and Safety since 1985 works for the protection of the sea and the environment, against pollution and illegal fishing, for the study of biodiversity, the promotion and enhancement of marine protected areas,

[97]https://www.isprambiente.gov.it/it/attivita/formeducambiente/educazione-ambientale/programma-di-iniziative-per-le-scuole/programma-iniziative-educazione-ambientale-ispra_as-2023_24-def-1.pdf
[98] https://www.isprambiente.gov.it/it/attivita/formeducambiente/educazione-ambientale/strumenti-educativi/flepy
[99]https://www.legambientescuolaformazione.it https://www.legambientescuolaformazione.it/formazione
[100] https://www.legambientescuolaformazione.it/articoli/dolphin-friend-ii-edizione
[101] https://oneplanetschool.wwf.it/corsi

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education in schools and universities for sustainable development and awareness on all issues related to the Sea[102].

- **Knowing the Sea**,

  Ocean Literacy Italia is the Italian Network on Ocean Literacy. It gathers educators, scientists, teachers, and representatives from the public and the private sector to promote a better knowledge of the ocean in Italy, and to connect with other similar networks around the world[103].

  PUBLICATION: Ocean Literacy in the Mediterranean: The Guide to Mediterranean Sea Literacy[104]

- **RAISCUOLA[105]**
- **ENEA National Agency for New Technologies, Energy and Sustainable Economic Development[106]**
- **CNR ISMAR[107]**

5.4.2. Identifying Local Challenges

The analysis of local challenges in Italy begins with an initial assessment of the perception of sustainable development and the social context to explore the inclination of Italian students towards topics primarily related to sustainable practices (as a pre-existing subject). Sustainability themes, particularly those related to the Sustainable Development Goals (SDGs), have become prevalent in society and schools in recent years, providing a basis for studying propensities and challenges at the local level.

Regarding Italy's framework of knowledge related to sustainable development and the main SDGs, at least 95% of respondents have heard of sustainable development (IPSOS 2022). Students appear to be among the most sensitive groups, particularly concerning the question: "Have you heard about the United Nations Sustainable Development Goals, to be achieved by 2030, before now?" They demonstrated the highest level of familiarity and knowledge. Additionally, the perceived importance of the four dimensions of the SDGs (environmental, social, economic, and institutional) primarily leans towards environmental significance.

Students identify certain actions as crucial for achieving the goals, such as choices made by adults and youth, decisions by major companies, actions of local public administrations (regions, municipalities), and primarily, actions by the state. However, there seems to be a perception among students that actions of the third sector and non-profit entities are less impactful. Nevertheless, individual behaviours, especially

[102] https://marevivo.it/attivita/educazione-ambientale/
[103] WWW.OCEANLITERACYITALIA.IT/
[104] https://ejournals.epublishing.ekt.gr/index.php/hcmr-med-mar-sc/article/view/23400
[105] https://www.raiscuola.rai.it/laboratori/oceani
[106]https://www.enea.it/it/per-la-scuola/per-le-scuole-elementari/il-mare-non-solo-vacanze-non-solo-estate.html
https://www.enea.it/it/per-la-scuola/per-le-scuole-medie-superiori/dalla-salute-delloceano-dipende-il-destino-della-terra.html
https://www.enea.it/it/per-la-scuola/per-le-scuole-medie/microplastiche-una-presenza-sempre-piu-diffusa-negli-ecosistemi-acquatici.html
[107] https://www.ismar.cnr.it/tematiche-di-ricerca/divulgazione-e-ocean-literacy/

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choices made by adults and youth, appear to be decisive for the success of the programs.

Despite this, there is a sense of resignation among the interviewed population regarding the need to act towards sustainable development, especially considering global crises such as the war in Russia, the COVID-19 pandemic, and climate change. However, interviewed students recognize a greater need to intervene, especially considering the evolving geopolitical landscape and the climate crisis.

The majority of Italians are aware of the concept of sustainability (95%), primarily defined as adopting measures to protect the environment (85%). Specifically, the need to reconcile economic development with environmental protection is mentioned by 34% of respondents, particularly by the business community (43%). Awareness of the Agenda 2030 and the SDGs logo is limited to one-third of Italians (34%); among them, knowledge sources are diverse, including the internet (45%), social media (29%), TV (29%), and print media (26%). Environmental issues are considered highly relevant by 36% of Italians, although 35% believe that each of the four dimensions must be addressed with equal priority.

When discussing the 17 SDGs, priorities include combating climate change (30%), ensuring clean and accessible energy (29%), and sustaining life on land (26%). The urgency to act towards sustainable development is largely influenced by climate change (85%), although political crises in Ukraine (75%) and health crises (74%) also play significant roles. Overall, the importance of the Agenda 2030 goals is universally recognized, with central or local government bodies identified as directly responsible for their achievement, along with major companies directly or indirectly influencing consumer behaviour. Additionally, a quarter of Italians have become aware that achieving the Agenda 2030 goals is the responsibility of everyone.

In this regard, students are among the most receptive targets for emerging sustainability-related issues. Blue culture and ocean literacy are relatively recent topics of discussion, especially in the Italian schools context.

One of the highlighted challenges in the international context concerns the dissemination of ocean-related culture and blue literacy in basic subjects, not only in closely related subjects such as science but also in arts, music, archaeology, culture, and geography. Definitions, principles, and concepts need to be adapted and developed to make them relevant at the local level. In the national context, it is evident that some deficiencies in basic knowledge (e.g., geography or history) may hinder the dissemination of ocean literacy. Despite Italy's extensive coastline, knowledge of the sea and its issues remains problematic. In some contexts, lack of knowledge or resistance to ocean literacy is linked to spatial distance from the coasts and the marine environment. However, the Italian social context and society express interest in the marine environment and coastal issues only regarding beach holidays or local economic problems (Squarcina and Pecorelli, 2017).

The Italian Ministry of Education, University and Research (MIUR) indicates that the Italian education system is hesitant to address sea-related topics and ocean literacy (MIUR, 2012; Squarcina and Pecorelli, 2017). Squarcina and Pecorelli (2017)

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conducted a particularly careful analysis, including ministerial acts, policy documents, interviews with Italian professors, and a review of school textbooks. A significant observation concerns the Citizenship perspective, primarily linked to the local and national territorial context, national culture, and not related to global impact or global dimensions. Ocean citizenship does not seem to be considered in these contexts, and sea-related topics are exclusively addressed as part of geography teaching. Other criticisms highlighted by the authors concern the imbalance in water-related topics, with a primary focus on freshwater compared to marine environments. A trivialization, scarcity, and rhetorical use of environmental and water-related themes are present in school textbooks, especially at the primary school level. However, this observation was partially confuted by a comparison with other regional teaching models as reported in the work of Mogias et al. (2019), where the performances shown by Italian students are higher than other Mediterranean countries considered.

More specifically, although there is no official reference to the sea in Italian elementary school science curricula, revealing a gap which is covered to some extent by the geography curriculum, sea-related topics are present in elementary school textbooks and therefore probably addressed by most teachers. This suggests that the specific training of educators is undoubtedly crucial for implementing correct ocean literacy. Accordingly, for in-service teachers who probably miss ocean sciences subject matter knowledge, they should be offered training seminars, especially in subject matters not widely encompassed into the school practice, as the ocean sciences issues, offered by professionals, such as marine scientists and marine educators. Finally, regarding teacher training programs, these should incorporate more intensive opportunities for the prospective teachers to acquire environmental knowledge in general and marine knowledge in particular, aligned with the lately introduced Education 2030 Agenda (UNESCO, 2017).

A similar finding of moderate knowledge was also observed in another study based on students in northeast Italy, where Italian students showed moderate performance, with correct responses exceeding 50% in different age groups. The study involved 12 primary school classes (9-11 years) and 9 secondary school classes (13-14 years) (Realdon et al., 2019).

Moreover, the comparative study conducted by Mogias et al. (2019), regarding blue literacy knowledge in Mediterranean countries, illustrated the level of students' ocean literacy on a sub-regional level, suggesting the development of guidance for a more focused and sound design, development, and implementation of marine-friendly curricula in terms of elementary school courses and textbooks, in-service teacher training, and pre-service teacher preparation programs. Elementary school students were found to possess a rather moderate level of ocean sciences content knowledge, with the highest level for Italian students. Among the contents that were subject to misconceptions are the role of the ocean to provide oxygen, the water recirculation and water cycle, intrinsically the connection of the sea with the ocean basin seemed impossible for a large part of students suggesting a low perception of "one ocean" and globalised concepts of the ocean. Particularly, the Tyrrhenian and the Adriatic seas for the Italians are solely connected with the Mediterranean Sea and not with the rest of all the world's oceans. Moreover, Italy with respect to other countries showed a

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progressive decrease in the knowledge from grade 4 (8-9 years) to grade 6 (11-12 years). Students who used to make use of TV documentaries for obtaining environmental information also demonstrated significantly higher knowledge scores. For the Italian case, results revealed that there was a significant difference among students' locations showing a trend that schools closer to the coast seem to demonstrate rather higher scores. Students who had participated in some kind of nature-related activities within their formal school settings revealed significantly higher mean of knowledge. These results are very important to define the challenges of the schools and the setting of teaching activities also in Italy, suggesting more hands-on activities, the context with the sea and the culture of the sea. More specifically, the Italian students turned up to have a relatively higher ocean-related knowledge level than the rest of their counterparts, but with a slightly decreasing trend in higher grades. This suggested that the actions could be strengthened especially according to the age of students, and reinforcement of concepts over time is required. Results about students' knowledge of the connectedness of all seas and of the global water cycle seem to highlight a common element: "environment" as referred to, is essentially conceived as a space surrounding pupils' life rather than a global milieu (Squarcina and Pecorelli, 2017). While in-school environmental activities promoting inquiry-based and authentic problem-solving learning have shown to increase various aspects of students, such as knowledge among others. Educational frameworks demonstrate that learning tends to be cumulative, gained via myriad experiences that include formal education in schools, universities, research institutions, as well as informal experiential learning.

Considering secondary school students, the analysis conducted by Realdon et al. (2019), revealed that 96% of students identified the Internet as their primary source of information about nature and the environment, followed by 60% who mentioned family. In comparison, teachers, books, friends, and television were mentioned less frequently as sources of information in this area (40%, 40%, 24%, and 22%, respectively). The average knowledge of students regarding ocean literacy was assessed at 55.9 %, indicating a moderate level of information on these topics. Students scored higher on principles such as ocean biodiversity (83% correct answers), the connection between the ocean and humanity (69%), the unexplored nature of the ocean (63%), and the ocean as a vital environment (52%). However, lower scores were observed on principles such as the shape of the ocean on Earth (48%), climate and weather (42%), and the perception of the ocean as a single body of water (41%).

The opinions of secondary school students were similar to those of primary school students regarding the need to study the sea to protect it (79% agreement) and the connection between individual behaviour and the marine environment (63%). Older students appeared to be more convinced of the influence of the sea on people living far from it (63%). Additionally, the majority of secondary school students (60%) recognized the importance of the blue economy, i.e., the creation of wealth and jobs in the maritime sector.

Regarding the outcomes of teaching activities, a significant improvement in knowledge was observed in the primary school sample but not among older secondary school students. This result could be attributed to the different organization of teaching

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between primary and secondary schools. Unlike secondary schools, where teaching is organized into subject areas managed by different teachers, primary schools have a more integrated approach. From informal feedback received from some participating primary school teachers, it is hypothesized that they may have been inspired by the activity and taken the opportunity to address other ocean-related issues. In secondary schools, the division between the teaching subjects involved in the project (science and technological education) probably did not encourage this kind of approach (Realdon et al., 2019).

Regional Differences: The OECD PISA report outlines the attitudes of Italian students, highlighting challenges at the geographical level (north-south divide) and among types of institutions in mathematics, reading, and science competencies. The Italian average in mathematics results is in line with that of OECD countries, with significantly better results in the macro-areas of Northwest and Northeast compared to the Center, South, and Islands. Among school types, high schools achieve higher scores, followed by technical institutes and finally professional institutes and vocational training centers. The performance differences between the various educational paths are wide, with a notable disparity between high schools and professional institutes. In reading, girls have higher average performance than boys, while in the scientific field, the gender gap is less pronounced. Scientific literacy in Italy is below the OECD average, with scores similar to those of other countries. Differences in the results of the Italian geographical macro-areas are significant, with a marked decrease in scores from North to South.

Promoting scientific literacy is important because it helps develop in citizens a critical understanding of the world around them, providing tools to evaluate and interpret natural and technological phenomena. A solid scientific literacy enhances the ability to solve complex problems, make informed decisions, and actively participate in public debates on scientific and technological issues crucial for social and economic progress. Moreover, it stimulates curiosity, creativity, and critical thinking, essential qualities for addressing global challenges such as climate change, public health, and technological innovation. A scientifically literate population is better equipped to contribute effectively to scientific research, innovation, and improving quality of life. The discrepancy between geographic areas, different educational paths, and gender should also be taken into consideration for the improvement of programs dedicated to ocean literacy. This holistic approach ensures that educational initiatives are tailored to address the diverse needs, backgrounds, and experiences of students across various regions, educational institutions, and gender identities. By acknowledging and addressing these disparities, ocean literacy programs can become more inclusive, effective, and impactful, fostering a deeper understanding and appreciation of marine environments among all students.

Furthermore, another challenge to consider is the varying patterns of foreign students in Italy compared to different regions. This aspect should be taken into consideration to define a more inclusive approach to communication and dissemination of ocean literacy. With approximately one million students holding non-Italian citizenship, constituting 11.3% of total enrolments. The majority are concentrated in state schools in Northern Italy, particularly in regions such as Piemonte, Veneto, Friuli-Venezia

Giulia, Emilia-Romagna, Lombardia, and Liguria, which host over 62.7% of the total. However, significant numbers are also present in Central Italy, comprising 22.1% of the total. Secondary schools enrol the largest number of foreign students, with Lombardia leading in regional concentration, followed by Emilia-Romagna, Veneto, and Lazio. Additionally, the presence of foreign students is notable in Southern Italy, especially in Campania.

Improving social engagement with ocean issues and enhancing community connections to the ocean are essential goals. In contrast, a lack of ocean literacy presents a significant obstacle to engaging society in environmentally sustainable behaviour. Connectedness to nature, i.e., feeling a connection or affinity to nature, influences attitudes and behaviours supporting the sustainable use of natural environments. For example, personal attachment to the marine environment is central to the development of marine citizenship. However, most people only spend a limited part of their life experiencing ocean environments. Growing coastal populations and associated urbanization are progressively reducing access to ocean environments. For example, as populations expand and become more urbanized, people are situated further from the coast.

Thus, a significant challenge in achieving ocean sustainability by 2030 is the development of strategies to enhance societal connections to the ocean (Kelly et al., 2022). The authors identified four drivers that can influence and improve ocean literacy and societal connections: (1) education, (2) cultural connections, (3) technological developments, and (4) knowledge exchange and science-policy interconnections.

The examination of local hurdles in Italy primarily emphasizes educational and cultural facets. Mediterranean nations, especially Italy, grapple with escalating demands and educational tasks, lacking adequate investment in human and economic resources. This shortage of resources results in insufficient time to tackle these emerging challenges effectively. Consequently, incentives, professional development initiatives, educational materials, and educator recognition become imperative for addressing these pressing issues (Alvisi et al., 2022).

In general, there is an absence of targeted strategies for student engagement and a close connection between citizenship and the development of marine protection. Some organizations, such as the Coast Guard, promote awareness campaigns; however, urgent and harmonious action is required in this regard. Involving different entities, museums, universities, and NGOs in ocean education is necessary to provide the foundations for both formal and informal ocean literacy education. These aspects should also be linked to cultural aspects related to the coastal environment, cinema, theatre, and local traditions, which enrich Italy's heritage, promoting not only cultural but also cognitive and emotional education.

Therefore, there is a need for greater interconnection with coastal areas, cultural and non-profit organizations, as well as a possible generational and cultural exchange problem. For ocean education to be truly effective, the inclusion of all voices and interested parties (individuals) is necessary. Given the regional differences in Italy, it is desirable for local traditions related to coastal environments to be considered. Italy offers a reservoir of knowledge and local traditions that could be integrated into ocean

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culture and literacy. The development of teaching phats linked to museums dedicated to fishing and traditions, with the rediscovery of aspects of environmental sustainability, and historical paths dedicated to discovering changes over the centuries, can provide insights into various challenges such as the rising salt wedge, new agricultural system resilience, depopulation, eco-tourism, and new territory-based teaching.

The decade from 2021 to 2030 has been designated as the decade of marine sciences for sustainable development, emphasizing the importance of the ocean and its resources for global well-being. In Italy, various institutions, including the Ministry of Education and the Italian Oceanographic Commission of the CNR, are actively engaged in promoting ocean literacy and raising awareness about marine sustainability issues. These activities include the celebration of the Day of the Sea, established in 2017, which involves students from all schools and aims to educate about the scientific, recreational, and economic value of the sea. Additionally, initiatives such as "The Sea at School" offer an educational project focused on the marine environment and coastal wetlands, promoting ocean citizenship and raising awareness about environmental challenges related to marine pollution and biodiversity loss[108].

5.4.3. Exploring Opportunities

Challenge: Teacher training programs dedicated to different educational levels (primary and secondary school) present a notable hurdle.

An identified challenge involves training and motivating teachers, starting with those in technical subjects and extending to educators in art, history, and other disciplines seemingly less connected to marine sciences. As noted in prior experiences within the Mediterranean context, teacher training is pivotal (Alvisi et al., 2022). Training Blue School instructors (including science animators) on ocean literacy principles and concepts, specifically focusing on Mediterranean-related issues, is imperative.

Teacher feedback, for instance, underscores a preference among many (particularly those venturing into ocean education for the first time) for well-defined reference frameworks with transparent evaluation criteria (Alvisi et al., 2022).

The differences between primary and secondary schools are probably due to thematic division and subject allocation, which could hinder the successful incorporation of ocean-related topics and literature. Overcoming individual engagement and attitudes is vital, necessitating the establishment of a structured pathway with easily replicable formats, particularly adaptable to primary schools but also in certain secondary curricula. Additionally, it's crucial to harmonize diverse backgrounds concerning geographic areas and different levels of engagement with scientific literature.

The available teacher training material, developed across various platforms and initiatives, often in English but also in Italian, could benefit from additional support in an

[108] https://www.miur.gov.it/documents/20182/4394634/16.%20Educazione%20allOceano%20per%20Tutti.pdf

autonomous training program. Identifying learning priorities, including addressing deficiencies noted in previous studies regarding oceanic roles and their global interconnectedness, is crucial. Certain themes may take precedence in training both primary and secondary school teachers.

For secondary schools, defining suitable settings tailored to specific institutions could mitigate communication and training disparities regarding cultural aspects of ocean literature. Technical secondary schools might benefit from transdisciplinary programs, while humanities-oriented or tourism-focused schools could leverage historical, cultural, and local elements to integrate marine sciences.

Creating targeted pathways and sample settings for teachers is pivotal for implementing ocean literacy within the Italian educational framework. Collaboration with other institutions and universities is essential to streamline and implement differentiated teacher training paths. Utilizing online platforms like Moodle could facilitate material distribution among teachers, specialists, and academia, with orientation meetings easily conducted through virtual systems.

Blended training systems are essential for fostering individual engagement, emotional learning, and teamwork. Active learning teaching methods should form the basis for training teachers across different disciplines and school levels.

The choice of a blended learning (BL) format is driven by its innovative and flexible learning tools, catering to diverse educational backgrounds and geographical areas. In the Italian context, BL reduces transportation costs and aligns with sustainable development goals, offering optimal learning planning for working professionals and individuals with specific needs.

BL will be structured to accommodate individual learning paces through synchronous and asynchronous remote activities, alongside in-person sessions. Platforms like Moodle, along with tools such as Wooclap, Padlet, and Zoom Class, will facilitate interactive learning and synchronous teacher training.

Challenge: Involvement in hands-on student programs

Aspects tied to the challenges revolve around the geographical distance from the sea and, consequently, the recognition of its significance. An opportunity lies in the multitude of local initiatives dedicated to preserving oceanic and coastal environments, alongside the rich cultural and historical heritage of coastal regions, which can serve as a backdrop for hands-on, reflective, and cost-effective educational endeavours. Italy boasts 29 marine protected areas, along with 2 submerged parks, safeguarding approximately 228,000 hectares of ocean and roughly 700 kilometres of coastline. However, it's important to highlight that the role of non-profit organizations and NGOs in this educational landscape, facilitating cultural exchanges within local communities, remains an often-overlooked opportunity. Data suggests that students with firsthand experience living near the coast exhibit heightened awareness and sensitivity toward these issues. Encouraging multidisciplinary excursions involving history, geography, and science educators, as well as experts in ocean literacy and marine science, alongside developing tailored educational packages encompassing the history of

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human interactions, fishing practices, aquaculture, and the intricate interplay between terrestrial and marine ecosystems, is imperative. Italy's diverse geographical terrain offers an extensive array of potential educational settings.

Involving students in hands-on programs is crucial, considering challenges stemming from physical distance from the sea and the resultant lack of awareness. Local initiatives for ocean and coastal protection, along with cultural and historical aspects, offer opportunities for practical, reflective, and cost-effective educational actions. These can be multidisciplinary and touch various aspects of the scholastic curriculum, integrating hands-on experiences with in-room theoretical concepts.

Implementing projects and activities in collaboration with universities and research centers, leveraging their territorial presence, can enhance local dissemination and interaction across educational levels. In the Italian context, the widespread presence of universities and research centers established in every territorial area represents a significant opportunity. This territorial dispersion could serve as an effective system for local knowledge dissemination, fostering contact, sharing of expertise, and facilitating meaningful interactions at all educational levels.

Identification of Opportunities:

- *Teacher Training Programs:* Tailored training programs for teachers at different levels (primary and secondary schools) can serve as an opportunity to enhance their knowledge and motivation. This includes training primary school teachers in technical subjects and involving teachers of art, history, and other disciplines less traditionally associated with marine sciences. Additionally, developing specific schemas for team-based learning, case studies, and problem-solving techniques is crucial. Creating tailored learning programs based on available training resources and guided by experts in blended learning (BL) can further enhance the effectiveness of teacher training initiatives.
- *Structured Training Schemes:* Developing structured training schemes with clear guidelines and transparent evaluation criteria can address the preferences of many teachers, especially those new to incorporating ocean literacy into their curriculum.
- *Utilization of Online Platforms:* Leveraging online platforms such as MOODLE for interactive exchange, resource sharing, and collaborative material creation can facilitate teacher training and resource dissemination.
- *Cross-Disciplinary Approach:* Embracing a cross-disciplinary approach in secondary schools by creating specialized settings for different subject areas can ensure comprehensive coverage of ocean literacy across various fields of study.
- *Local Community Engagement*: Encouraging engagement with local communities and leveraging local environmental initiatives can provide practical hands-on learning opportunities for students and foster a deeper connection to marine issues.
- *Multilevel Networks:* Building multilevel networks within school environments, local communities, and Mediterranean schools can facilitate collaboration and resource sharing, enhancing the effectiveness of ocean literacy initiatives.

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- *Creation of Shared Resources:* Developing shared ocean literacy resources and materials for use by teachers at both national and international levels can promote consistency and quality in education.
- *Encouragement of Critical Thinking*: Implementing approaches to encourage critical thinking, scientific inquiry, and citizenship skills among students can empower them to become active stewards of marine environments.
- *Alignment with Sustainable Development Goals*: Aligning educational pathways with the UNESCO Sustainable Development Goals can provide a broader context for ocean literacy initiatives and reinforce their importance in addressing global challenges.

Innovative Solutions:

- *Blended Learning Approach*: Adopting a blended learning approach can provide flexibility and accessibility in delivering educational content, catering to diverse student backgrounds and geographic locations.
- *Utilization of Online Tools:* Integrating innovative online tools such as Wooclap, Padlet, and Zoom Class can enhance student engagement and facilitate interactive learning experiences.
- *Hands-On Learning Opportunities*: Promoting hands-on learning experiences through field trips, expert seminars, and collaborative projects can enrich students' understanding of marine issues and foster practical skills development.
- *Peer Feedback and Collaboration:* Implementing peer feedback mechanisms and collaborative learning strategies can promote student interaction, teamwork, and the co-creation of educational materials.
- *Inclusive Educational Practices*: Ensuring inclusivity in educational practices by accommodating diverse student needs, including those with disabilities or specific circumstances as foreign students, can promote equitable access to learning opportunities.
- *Partnerships with Universities and Research Institutions*: Establishing partnerships with universities and research institutions can provide access to expertise, resources, and collaborative opportunities to enhance the effectiveness of ocean literacy initiatives.
- Overall, by identifying and capitalizing on these opportunities, Italy can strengthen its efforts to integrate ocean literacy into school curricula and foster a deeper understanding and appreciation of marine environments among students and educators alike.

5.4.4. Localization and Cultural Adaptation

Localized Approaches for Ocean Literacy Promotion:

Developing tailored and comprehensive approaches to promote ocean literacy in a localised context is essential for addressing the diverse cultural and regional backgrounds within Italy. By recognizing and adapting to the unique characteristics of

each community and its costal area, these approaches can effectively engage individuals and foster a deeper understanding and appreciation of the marine environment.

Several initiatives exist in the Italian context and are spread over the coastline and its communities. These local projects make use of the specificities of the terrain and adapt to the coast to propose a better understanding of their ecological relevance, and expose local communities to issues, critical points and mitigation strategies in implementation.

Examples:

Resilience of the Po Delta: In regions like the Po Delta, historical experiences such as land reclamation efforts and current challenges like climate change impacts can be incorporated into educational initiatives. Programs can highlight the environmental resilience of the delta and the importance of sustainable practices in mitigating future risks. Programs should be designed to address the ecological importance of the Delta area and its connection to the Mediterranean Sea.

*Coastal Communitie*s: Coastal communities, particularly those in regions like Liguria and Sicily, have a strong cultural connection to the sea. Educational activities can draw upon the existing knowledge such as local traditions, e.g., fishing practices or maritime festivals, to instil a sense of pride and stewardship towards marine environments. Given this, the creation of community-based projects to raise awareness about sustainable practices and marine conservation.

Lake regions: Inhabitants of lake areas, such as Garda Lake or Lake Como, have experienced direct contact with the aquatic ecosystem and possess an unique culture shaped by the specific environment and historical context of the region. Dissemination approaches should focus on emphasising the interconnection of these communities with a broader marine ecological system.

Inland Regions: Inland regions, such as Lombardy or Piedmont, may face different challenges and opportunities regarding ocean literacy. Initiatives in these areas could focus on exploring the interconnectedness of inland waterways with the ocean and highlighting the role of upstream actions in maintaining coastal health.

Regarding the geographical diversity among the country, further activities that might be applied to every location are to study how climate change is affecting coastal and marine areas around the country and its consequences.
Concomitantly, students, especially those not living in areas which are not in direct contact with aquatic ecosystems, could come into contact with different people, or even other students, living in distinct regions of Italy in order to collect information about marine phenomena (e.g., storms, seaquakes, etc,.) or coastal areas morphology and compare it with their personal experience.

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Cultural Sensitivity in Ocean Literacy Training:

Aligning training materials and methods with local cultural norms and values is crucial for ensuring that ocean literacy initiatives resonate with diverse communities across Italy. By incorporating cultural sensitivity into educational programs, it becomes possible to create inclusive learning environments that reflect the perspectives and experiences of all participants. Examples:

WWF and Coastal Conservation: Organisations like WWF Italia and Legambiente play an important role in promoting ocean conservation and sustainability. Collaborating with local chapters of WWF and other conservation groups can provide valuable insights into regional priorities and cultural perspectives on marine issues.

Capitanerie di Porto: Maritime authorities, such as the Capitanerie di Porto, are instrumental in enforcing regulations and safeguarding marine ecosystems. Educational partnerships with these entities can help students understand the importance of maritime governance and the role of law enforcement in protecting coastal resources.

Cultural Diversity in Schools: Schools with diverse student populations, including those with a significant number of foreign students, should tailor ocean literacy programs to accommodate different cultural backgrounds and languages. Multilingual resources and culturally relevant teaching materials can enhance accessibility and engagement among all students. Foreign perspectives can add fruitful comparative insights which can transform into real-life synergies.

Regional Disparities: Recognizing and addressing disparities between schools in different regions of Italy is essential for promoting equitable access to ocean literacy education. Initiatives should be tailored to meet the specific needs and challenges of each region, taking into account factors such as geographic location, socioeconomic status, and educational resources.

In summary, localised approaches and cultural sensitivity are integral to the effective promotion of ocean literacy in Italy. By embracing diversity, engaging local stakeholders, and tailoring educational strategies to regional contexts, it becomes possible to empower individuals and communities to become stewards of the marine environment.

5.4.5. Stakeholder Analysis and Engagement

Stakeholders at local and national level (e.g., educators, policy makers, civil society organisations) who can be influential in the success of the project.

Stakeholders at both the local and national level, such as educators, policy makers, and civil society organisations, play a pivotal role in the success of a project. Educators are key stakeholders as they have direct contact with the target audience and can provide valuable insights into the needs and preferences of the community. Policy

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makers, on the other hand, have the power to shape policies and allocate resources, which can greatly impact the implementation of a project. Additionally, civil society organisations often have established networks and expertise in advocating for social causes, making them influential partners in raising awareness and mobilising support for the project. By collaborating with these stakeholders, projects can benefit from their knowledge, resources, and influence, ultimately increasing their chances of achieving their goals and making a lasting impact in the community.

Identifying possible stakeholders of the project:

A non-exhaustive list of possible stakeholders comprises all the possible local and national organisms, teachers, and others with possible relationships who are affected by the project and by the diffusion of ocean literacy and, in general, blue economy and ocean science.
Internal stakeholders: Within the local group involved in the development of the project, members of Padova University and other related universities include scientists involved in these fields, comprising members of European networks (e.g., EuroMarine), several researchers, and professors of different disciplines including marine biology, veterinary science, animal production, economics, and pedagogical researchers.

External stakeholders: In this context, a large group of possible external stakeholders could emerge through analyses and identification of interest. This includes primary school teachers and administrators; secondary schools with thematic areas more prone to ocean literacy or with some interest in it; professionals in Maritime and Tourism sectors; organisations and businesses needing capacity building in innovation and entrepreneurship; professional high schools related to blue economy or other important high schools in the area; institutes related to food and wine culture, as well as those related to the quality of food and the "made in Italy" concept; scientific high schools, especially those of applied sciences; other institutes such as agricultural, commercial, and artistic institutes, as well as classical high schools; other research institutions at the local level such as CNR, ARPAV, VenetoAgricoltura.

Other possible stakeholders *are related to blue economy interests*: Ports and Marinas; associations of fishermen cooperatives (e.g., cooperatives of the Po Delta); aquaculture and bivalve mollusk producers; local authorities in towns related to the blue economy (e.g., the municipality of Chioggia); pre-established local business networks; regional innovative networks (RIBES-net, Smart Agrifood; INNOSAP – Innovation for Sustainability in Agrifood Production); producer associations. Local environmental volunteer associations are also particularly relevant (e.g., Lega Ambiente, WWF,FAI,).

Blue Economy:
Traditional sectors of the Blue Economy are separated in: Biological marine resources, Extraction of non-living resources, Maritime Transport, Harbour activities, Shipbuilding and repair, and Coastal tourism.
The Italian Blue Economy employs over 413,000 people and generates around €19.8 billion in GVA. About half of these jobs and 36% of this revenue comes from maritime

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tourism. Overall, the Blue Economy's contribution to the Italian economy has increased in recent years.

An important stakeholder in the Italian Blue Economy is the Federazione del Mare[109]: Founded in 1994, it aims to represent all the actors of the blue sector in Italy and represent Italian interests and culture.
A regular report on Italian blue activities is published: in 2020, 50 years of Italian maritime economy[110].

Prioritising Stakeholders:
Assessing their level of influence and interest in the project, water themes, and blue literacy is crucial.

- *High power, highly interested individuals*: It is imperative to fully engage these stakeholders and exert maximum efforts to satisfy them, as their support is foundational to the project's success. This category should include primary school teachers and a representative number of secondary school teachers, considering their alignment with the project themes. Additionally, non-profit environmental agencies and volunteers are extremely important actors for implementing practical, hands-on activities in schools. Other scientists involved in different institutions could also contribute to the project and bring a diverse and co-creative perspective.
- *High power, less interested individuals:* While it's essential to keep these stakeholders satisfied, it's important not to overwhelm them with excessive communication. These stakeholders may be more aligned with the blue economy than with education. Regional or local entities, municipalities, farmers, and fishermen fall into this category. They may have significant socioeconomic influences, especially on local developments. Their interest may stem from actions that are important and resonate in the media.
- *Low power, highly interested individuals*: Adequately informing these stakeholders and engaging in dialogue with them is crucial to address any potential issues that may arise. People in this category can often provide valuable support in the finer details of the project. This category may include environmentally conscious citizens, family members of students involved in schools, and consumers of seafood products. Representatives of students should also be consulted among these stakeholders.
- *Low power, less interested individuals*: While it's important to monitor these individuals, excessive communication may lead to disinterest. A portion of the Italian population may not be interested in the current themes.

Integrating the "Understand Key Stakeholders" phase within the SHORE project involves comprehensively assessing the perspectives and interests of the identified stakeholders. Here's how this phase could be applied to the stakeholders of the SHORE project:

[109] https://federazionedelmare.it/
[110] https://federazionedelmare.it/wp-content/uploads/2019/12/Premesse_volume_50_anni.pdf

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Educators and Schools:

- Understand their level of interest in ocean literacy and the potential impact of the SHORE project on their teaching objectives.
- Determine if they perceive the project positively or negatively and what motivations drive their engagement.
- Identify the most relevant aspects of the project for educators, such as curriculum alignment and professional development opportunities.
- Assess their current opinion of the project and address any misconceptions or concerns they may have.
- Recognize influential figures within the education community who can advocate for or against the project.

Researchers and Scientists:

- Gauge their interest in collaborating on educational initiatives and contributing scientific expertise to the project.
- Determine if they perceive the project as aligned with their research goals and if they see opportunities for knowledge dissemination.
- Identify the types of project information that resonate with researchers, such as data-sharing opportunities or interdisciplinary collaboration.
- Address any concerns or scepticism they may have regarding the project's scientific rigour or methodology.
- Engage influential researchers who can endorse the project and lend credibility to its objectives.

Policy Makers and Government Agencies:

- Assess their level of interest in promoting ocean literacy and supporting educational initiatives within their jurisdictions.
- Understand how the project aligns with their policy priorities and sustainability objectives.
- Identify key decision-makers who have the authority to allocate resources or implement policies that could impact the project.
- Provide relevant information about the project's objectives and potential benefits to inform policy discussions and decision-making processes.
- Address any regulatory or bureaucratic hurdles that may hinder project implementation and seek avenues for collaboration and support.

Community Organizations and NGOs:

- Determine their interest in promoting environmental awareness and engaging youth in conservation efforts.
- Understand how the project aligns with their organisational mission and strategic goals.
- Identify potential synergies between the SHORE project and existing community programs or initiatives.
- Address any concerns or competing priorities that may impact their level of engagement with the project.
- Collaborate with influential community leaders and organisations to amplify the project's reach and impact within local communities.

By systematically addressing the interests, motivations, and concerns of these key stakeholders, the SHORE project can enhance its effectiveness and ensure greater

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buy-in and support from all relevant parties involved in promoting ocean literacy and environmental stewardship.

Engagement and Collaboration Strategies: Strategies to encourage the participation of these stakeholders in the project and methods of collaboration.

To encourage the participation of stakeholders in a project, one effective strategy is to engage them from the early stages of planning. This can be done through stakeholder mapping, where project managers identify and prioritise key stakeholders based on their level of influence and interest in the project. By involving stakeholders early on, their input and perspectives can be integrated into the project design, increasing their sense of ownership and commitment.

Another strategy is to provide clear and regular communication channels with stakeholders. This can include organising regular meetings, workshops, and consultations where stakeholders can voice their opinions, ask questions, and provide feedback. Additionally, creating an online platform or using digital tools can facilitate ongoing communication and collaboration even in between face-to-face interactions.

Incentivizing stakeholder participation is also an effective method to encourage engagement. Providing recognition and rewards to stakeholders who contribute positively to the project can boost motivation and increase their willingness to get involved. This can be done through acknowledgments in project reports or public events, as well as offering opportunities for further professional development or networking.

Furthermore, strategic partnerships with stakeholders can enhance collaboration by leveraging each other's strengths and resources. For example, forming partnerships with local businesses or non-profit organisations can provide access to funding, expertise, and additional networks.

5.4.6. Policy and Implementation Recommendations

Protecting marine and freshwater ecosystems and transitioning towards a more sustainable utilisation of resources and services represent pivotal challenges for the upcoming decade. While the scientific literature underscores the growing recognition of water literacy within the scientific community, significant barriers still impede its widespread dissemination, particularly in domains like the blue economy. Establishing robust support for water literacy and the blue economy necessitates the development of a comprehensive and sustainable approach that integrates environmental, economic, and social considerations. Implementation demands collaborative efforts among government agencies, non-governmental organisations, research institutions, businesses, and local communities. Both top-down and bottom-up strategies should be adopted to adapt to the local realities and respond to all stakeholders needs and concerns, while maintaining a certain level of homogeneity.

Crucially, educating the younger generation about the significance of these issues is essential for cultivating a community committed to sustainable practices and capable of actively engaging in informed decision-making across all facets of water management.

Policies should be broad enough to encompass all stakeholders but adapted to the specific needs of local communities.

This scenario could be achieved by acting on several areas:

- *Educational policies*: Integrate water literacy comprehensively into national educational programs, ensuring the availability of suitable science materials for educators. Broaden the reach of water literacy through informal educational initiatives, such as integrating water sports with environmental education programs. In tandem with offering training and professional development opportunities for educators to enhance their understanding of water-related issues through lifelong learning, it is imperative to foster collaborations between educational institutions, universities, museums, and educational centres for robust curriculum development. Equally critical is the establishment of effective funding mechanisms to support educational endeavours in the realm of water literacy. Specific pathways through these integrated public partners associated with terrain experiences could help implement the change in interest and motivation of future blue citizens.

- *Marine conservation and blue economy development policies*: policies that promote the conservation of freshwater and marine ecosystems and biodiversity should be implemented and enforced, integrating and supporting sustainable blue economy initiatives, including aquaculture, sustainable fishing practices, marine tourism, and renewable energy. Incentives should also be provided for businesses that adopt environmentally friendly practices in the sector, and funds should develop awareness campaigns to inform the general public about the importance of the oceans, society's dependence on it, and the blue economy (e.g., encouraging citizens to engage with their children in the study of water literacy). Dedicated governmental bodies or task forces could be created at the governmental, local and national levels, responsible for coordinating related policies.

- *Research and Data Collection*: Allocating resources for scientific research on freshwater and marine ecosystems, biodiversity and sustainable resource management would enable the creation of databases, development of best practices and shareable results. In order to increase efficiency, it would be important to foster cooperation with neighbouring countries and international organisations and raising public-private partnerships to attract investment in marine conservation and sustainable development. The results of these efforts should form the basis of fact-based Educational and Marine conservation policies.

- *Monitoring and Evaluation Framework*: Developing a robust monitoring and evaluation framework is necessary to assess the effectiveness of water literacy and blue economy policies. A regular review and update of the policies based on scientific findings and changing circumstances.

- Based on the local and European objectives, an integration of the efforts should be made to ensure sufficient support in all bordering countries of the

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Mediterranean using succeeding strategies and examples in new and adhering states. Clusters of impactful initiatives such as the Pelagos Sanctuary could be used as a model to be implemented in other areas of the Mediterranean Sea. Educational strategies would follow the same pattern, with critical care added to specific national contexts.

5.4.7. Sustainability and Long Term Impacts

Ensuring the long-term sustainability of education and awareness-raising activities in water literacy requires thoughtful planning and ongoing efforts. McPherson et al. (2020) identified the availability of educational resources aligned with curricular strands and objectives as a crucial factor influencing teachers' incorporation of water-related topics into their lesson plans. Freitas et al. (2022) emphasised the efficacy of picture books as a valuable tool for teaching marine science in the classroom, while teacher-guided learning (Cotterell, 2021) remains one of the most widely adopted approaches. Despite the significance of theoretical knowledge in cultivating ocean-literate students, bridging the gap to the real world can be challenging. Field trips emerge as an engaging and alternative method to instil a connection and understanding of the local marine environment. Although the majority of teachers in the study acknowledged the effectiveness of such excursions in enhancing children's learning experiences, they also highlighted the logistical challenges in organising these trips, citing concerns related to insufficient funding and safety issues.

The integration of their carbon footprint in school projects and curriculum should be implemented, both in a spirit of sustainability, and for increased credibility in the context of education and responsibilities. Students, teachers and parents should get exposed to challenges and potential solutions in the organisation of trips and events as a community, which in turn, focuses on a global reduction in CO2 production, a factor of ocean health. Individual impacts and community impacts on CO2 production constitute a great start to discuss and understand the interconnectedness of the ocean and the environment. Disparities in opportunities linked to the distance from water sources or the coast need to be addressed. Inland schools are in a situation where ocean literacy teaching is more theoretical, despite material and virtual implementations. First-hand experiences such as school trips are necessarily more distant and require greater logistical efforts. Moreover, the carbon footprint of these trips is thus greater for inland schools compared to coastal schools. A solution could be to financially incentivise inland schools to reach the coast, but more elegant solutions exist. Twinning processes whereby local coastal schools could host inland schools and share knowledge on ocean literacy. These could be reciprocal and permit useful exchanges of perspectives. Additionally, to reduce the carbon footprint of inland school projects, additional projects such as crops and tree-planting can help mitigate their impact and provide an adequate topic of discussion to teachers, and a direct approach to sustainability. Finally, indirect exchanges in the form of films, letters, and other media can be exchanged between twin schools.

The integration of water literacy into formal education systems at national and regional levels holds the potential for long-term impact by systematically reaching students.

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However, achieving this goal requires a thorough review of education programs by the Ministry of Education and Merit. It's crucial to emphasise that the effectiveness of increasing water literacy is contingent on educators' knowledge and the availability of engaging teaching tools. To address this, there is a need to provide comprehensive training and education programs for teachers, and the support of educational governance.

As part of this initiative, the materials and practical activities developed through the project can be made freely accessible for use in both formal and informal training activities. This approach ensures broader dissemination and utilisation of resources to enhance water literacy across educational settings.

The enhancement of water literacy among lower-level classes, encompassing primary and lower secondary schools, can be achieved through the adoption of a non-formal didactic approach, leaning on the principles of self-governance regarding the curriculum and activities in the Italian Education system. This approach, developed within a user-friendly learning environment, facilitates the creation of connections between everyday experiences and scholastic knowledge. It provides students and teachers with an opportunity to explore concepts and teaching methods not extensively covered in traditional school programs, as noted by Merlino et al. (2015). Importantly, the emotional engagement of learners in this non-formal setting has the potential to overcome mental blocks and activate deep cognitive structures, fostering the development of stable knowledge.

Research indicates that virtual education programs, including real-time meetings, virtual reality experiences, and webinars, can serve as effective alternatives to impart water literacy. Virtual reality, in particular, has demonstrated a positive impact on participants' environmental behaviour, as highlighted by O'Brien et al. (2023). This suggests that innovative and technology-driven educational approaches can play a significant role in enhancing water literacy among students, making the learning experience more engaging and impactful. A critical strategy for ensuring the enduring sustainability of education and awareness initiatives is the development of content that embraces diverse educational approaches. Theoretical content can be enriched by incorporating digital elements such as educational apps, podcasts, Massive Open Online Courses (MOOCs), and serious games, suitable for application in both formal and informal learning environments. To promote Learning by doing, the creation of toolkits is envisaged, providing teachers with resources to conduct small-scale experiments within the classroom setting. This hands-on approach not only reinforces theoretical concepts but also cultivates a practical understanding of the subject matter among students. Furthermore, fostering collaboration between research institutions, museums, and schools emerges as a key component of this strategy. This collaborative effort facilitates the exchange of knowledge, resources, and expertise, creating a synergistic relationship that enhances the overall effectiveness of education and awareness initiatives. In addition to the aforementioned strategies, it is imperative to develop specific courses for teacher training. These courses would equip educators with the necessary knowledge, skills, and innovative teaching methods required to effectively impart water literacy. By focusing on the professional development of teachers, this strategy ensures a sustainable and widespread impact, as educators

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play a central role in shaping students' understanding and attitudes towards water-related issues. The courses can cover diverse aspects, including the integration of water literacy into existing curricula, effective use of educational technologies, and strategies for facilitating engaging and experiential learning in the classroom. This targeted approach recognizes the pivotal role teachers play in fostering a generation that is informed, engaged, and committed to sustainable water practices.

Analysis of the expected long-term impacts of the project and their potential contribution to society. Long term impacts of integrated educational policies promoting ocean literacy should form citizens aware of the impact of their everyday choices on their direct and indirect environment and on the water masses around them. Increased water literacy can foster a cultural shift where water is valued and respected as a precious resource. This cultural change has the potential to influence community resilience, daily habits, business practices, and societal norms.

Greater awareness and understanding of water issues can lead to a more environmentally conscious society. People become mindful of the importance of reducing water waste and actively contribute to the conservation of water resources. These reduce the costs associated with water purification, sustain and reduce the pressure on aquifers in land, on river basins locally, and eventually on the whole coastline. Associated costs such as beach cleaning, city cleaning, depollution can also be reduced. This, in turn, can result in improved policies, practices, and technologies for water conservation resulting from well reallocated funds, and public support. A heightened interest in water-related issues may drive research and technological innovation, leading to the development of new solutions for efficient use and sustainable development, particularly in sectors such as agriculture, industry, and tourism. Effectively ocean literacy long term effects could create a virtuous circle of awareness, increased value, care and action from citizens and governments, to achieve the goals of the EU parliament.

Recognizing the significance of clean and safe water can also lead to advancements in public health practices. Water literacy initiatives that emphasise equitable access to water resources can contribute to social justice. This involves ensuring that all communities, irrespective of socio-economic status, have fair and sustainable access to water.

Table 60 Challenges and Opportunities in water and sea proximity per region

Region	Challenges	Opportunities
Abruzzo	- Highest Apennines (remote) - Centre-South region	- Southernmost glacier (Calderone) - Maiella area on the Adriatic coast - numerous rivers - Wild landscapes and parks
Aosta Valley	- least populous and least densely populated region of Italy	- wettest valleys of the Alps - snow, mist, rivers and lakes in abundance

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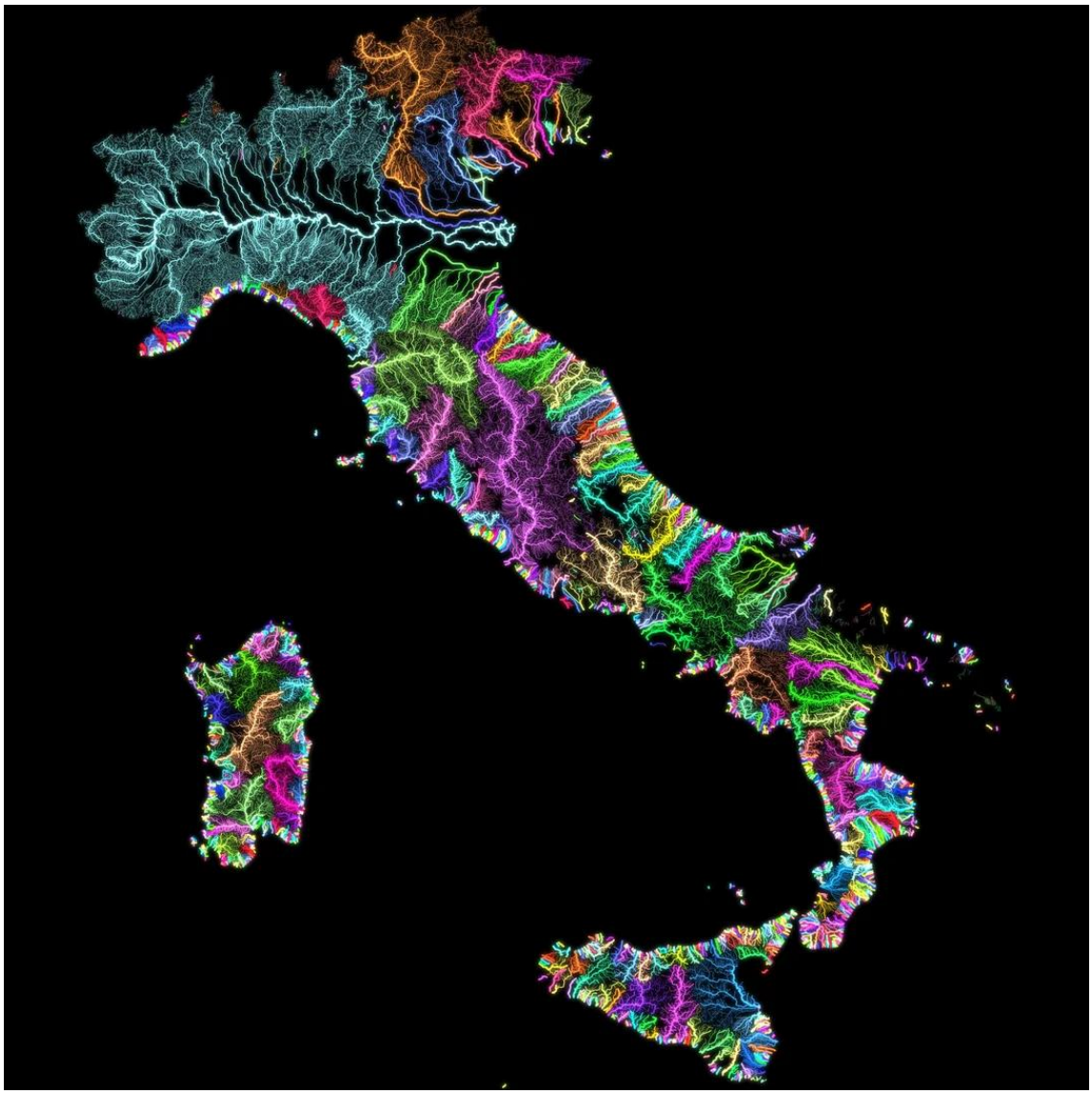
	- no access to the sea	
Apuglia	- South region - driest region in italy in the summer - sever hydrogeological strain due to economic growth - few rivers	- long coastline: Adriatic, Ionian seas - strait of Otranto - numerous cetacean populations - rich sea life - world's largest production of farmed mussels
Basilicata	- limited access to the sea - South region - South Apennines: most mountainous region of South Italy - most remote region of Italy	- both Ionian and Thyrrhenian sea access
Calabria	- South region - Gioia Tauro seaport - lowest satisfaction of potable water in Italy	- long coastline - strait of Messina - indigenous marine life from relatively low tourism
Campania	- High pressure on the coastal environment - waste management	- 500km of coastline - adjacent islands
Emilia-Romagna	- heavily altered landscape from ancient high population - soil sealing and water runoff	- Adriatic coast - part of the Po basin - soil sealing and water runoff
Friuli-Venezia Giulia	- Trieste harbour - mountainous locations (remote)	- miramare castle - numerous lakes - modern agriculture development from arid land - mountain and sea landscape - Carso hollow rivers and caves - Slovenian border - Trieste harbour
Lazio	- most populated region in Italy - Rome, largest city in Italy	- Tiber and Liri rivers - long coastline - marshlands, Maremma
Liguria	- densely populated - remote mountainous areas	- Essentially a coastline region entirely turned to the sea - Genoa seaport

	- heavy coastal overbuilding	
Lombardy	- no access to the sea - 40% of mountainous areas	- mountains and large lakes, glaciers - Po river - numerous rivers - wealthiest region in Italy - heavy agriculture
Marche	- mountainous and hilly mostly - heavy coastal overbuilding	- Adriatic coastline - numerous short rivers
Molise	- southern region - short adriatic coast - low population density	- Adriatic coastline -Volturno and Tammaro basin -numerous rivers -numerous lakes
Piedmont	- no direct access to the sea	- mountains and lakes, glaciers - numerous rivers - heavy agriculture - Po origin
Sardinia	- island - remote - uneven education and high rate of school drop-out	- island - heavily reliant on the sea - long coast - renown sea activity hotspot
Sicily	- uneven education and high rate of school drop-out - island - example of deforestation	- island - heavy reliance on the sea - inland rivers - marine life of the strait of messina
Trentino-South Tyrol	- no access to the sea - remote areas	- mountains and rivers - snow and glaciers - vast forests - Garda lake
Tuscany	- high population density in some areas - some apennines remote areas	- long sea coastline - variety of landscapes, wetlands, rivers, Maremma
Umbria	- No access to the sea - central italy - mountains and hills	- Tiber river, lakes - Clitorius and Umber lakes drainage as examples of manmade alterations

Veneto	- heavily built coastline - industrial area	- venetian lagoon - mountains, rivers, lakes - heavy fishing, farming tradition

Map 16 Color by main basin, size represent the distance from sea (bigger=near to the sea).



Source 58 Post-production in Illustrator/Photoshop.

Projection EPSG:32632

5.5. Poland

5.5.1. Analysis of Available Training Resources

Expected aims of climate education in Poland

i. to provide knowledge about the history of climate change on Earth, its effects on biodiversity and the role of biodiversity in climate processes, the relationship between natural factors and human well-being, and human activities and impacts on climate change and its consequences
ii. developing practical and social skills for climate change adaptation and mitigation, including for the future challenges posed by climate change
iii. shaping a society that is responsible for the actions it takes and the actions it does not take, and that is aware of the priorities of climate policy and the challenges it faces
iv. building a sense of cooperation and commitment to climate protection.

These objectives are in line with the approach adopted in the core curriculum and the Integrated Qualification System, taking into account the context of knowledge, skills and social attitudes in the learning process.

Currently in Poland, 'climate education' is not a separate, mandatory block of classes in schools, only the content is, in accordance with the autonomy of teachers, included as content of various subjects including, among others, geography, biology, Polish language, various inter-subject pathways. According to the Ministry's opinion, the requirements and content specified in the core curriculum are comprehensive and allow teachers to address the most relevant topics in this area. Regardless, schools have the opportunity to organize additional educational activities on topics such as climate and environmental protection, including those that correspond to the special interests of students. It should be borne in mind that the teaching content of the core curriculum is developed by teachers in their curricula, and they have certain opportunities to shape its specific content. It is the right of every teacher to make a free choice of teaching methods and teaching aids that correspond to his teaching concept.

As of the 2020/2021 school year, it has been made mandatory to implement issues such as climate and environmental protection during classes with an educator (Regulation of the Minister of National Education dated June 3, 2020). Relevant social problems should be discussed during classes with an educator in schools of all types. Also included in these activities are the activities of the Ministry of Climate and Environment leading to increased climate awareness and shaping the right attitudes of society as a whole. One of the results of cooperation between the two ministries is substantive support: the preparation and updating of educational materials placed on the platform of the Centre for Education Development, as well as the development of new materials containing lesson plans (https://www.gov.pl/web/klimat/materialy-edukacyjne)

The Ministry of Climate and Environment is making available the educational material "Friends of the Climate", which aims to introduce elementary school students to key

issues related to climate protection and measures to adapt to the ongoing climate change in an accessible way.

The content presented in the educational packages has a "baseline" dimension and, in addition to organizing basic terminology in the area of climate protection and adaptation to ongoing climate change, illustrates the causal dimension of ongoing climate change and adaptation actions (from an individual, local, national and global perspective).

The content presented in the educational packages has a "baseline" dimension and, in addition to organizing the basic terminology in the area of climate protection and adaptation to the ongoing climate change, illustrates the causal dimension of the ongoing climate change and adaptation measures (from an individual, local, national and global perspective).

Due to the interdisciplinary nature of the subject matter, the materials are of a universal nature, making it possible to implement the thematic lesson not only in natural science classes, but also in humanities classes.

We treat the material made available as a starting point for the preparation of further educational materials to support formal education in the field of climate protection.

Substantive support during the preparation of the presented materials was provided by Experts of the Ministry of Education and Science from the teams co-creating the content of the core curriculum.

A brief overview of the importance of ocean literacy in Poland

Ocean literacy is essential for understanding, appreciating, and being aware of the world's oceans. The importance of ocean literacy can be summarised in several vital points:

1. Global Impact: Oceans cover over 70% of the Earth's surface, regulate climate, absorb carbon dioxide, and influence weather patterns. An informed public is essential for addressing global challenges such as climate change, as oceans significantly contribute to the planet's health.

2. Biodiversity and Ecosystems: Oceans support vast marine life, constituting diverse ecosystems. Understanding ocean ecosystems is essential for preserving biodiversity, ensuring the balance of marine food chains, and impacting global food security.

3. Economic Significance: Oceans are vital for global economies, providing resources such as fish, minerals, and pharmaceuticals. Additionally, maritime trade routes facilitate international commerce. Ocean literacy is essential for sustainable resource management and the development of responsible and profitable marine industries.

4. Cultural and Recreational Value: Oceans are essential for coastal communities and nations, often influencing traditions, livelihoods, and recreational activities. An informed society is better equipped to appreciate and preserve the cultural heritage associated with the oceans.

5. Environmental Stewardship: Recognizing the impact of human activities on oceans is crucial for fostering a sense of environmental responsibility. Ocean literacy promotes sustainable practices, reducing pollution, overfishing, and habitat destruction, contributing to the long-term health of marine ecosystems.

6. Scientific Discovery: Oceans remain one of the least explored areas on Earth. Enhancing ocean literacy encourages scientific curiosity, leading to discoveries that can advance our understanding of marine life, geology, and climate processes.

7. Educational Opportunities: Incorporating Ocean literacy into educational curricula gives students a holistic view of the Earth's interconnected systems. This knowledge contributes to scientific literacy and inspires future generations to pursue careers in marine science and related fields.

8. Resilience to Natural Disasters: Understanding oceanography and coastal dynamics is essential for coastal communities to mitigate and respond effectively to natural disasters such as hurricanes, tsunamis, and storm surges.

Reason for Effective Training Resources of Ocean Literacy

Ocean literacy is critical to environmental stewardship, sustainable development, and global citizenship. It empowers individuals to make informed decisions that contribute to the well-being of our planet and ensures the preservation of the oceans for future generations.

The importance of developing and implementing comprehensive training resources on ocean literacy cannot be overstated. Oceans are essential to sustaining life on Earth, but they face unprecedented threats from human activities such as climate change, overfishing, pollution, and habitat destruction. Therefore, effective training resources are crucial to educate individuals about these threats, fostering a sense of urgency for conservation efforts.

Oceans are pivotal in regulating climate, supporting biodiversity, and influencing weather patterns. However, a lack of understanding about these interconnected systems hinders the ability of individuals and communities to contribute to global initiatives addressing climate change and environmental sustainability.

With the demand for marine resources increasing, educating stakeholders on sustainable practices becomes crucial. Training resources can provide insights into responsible fishing, aquaculture, and resource extraction, ensuring the long-term viability of ocean ecosystems.

Coastal communities and industries dependent on oceans for livelihoods require specialised knowledge to adapt to changing environmental conditions. Effective training resources empower these communities to make informed decisions, enhancing their resilience to sea-level rise and extreme weather events.

Training resources also contribute to scientific literacy by providing individuals with the knowledge and skills to understand oceanographic processes, marine biology, and the importance of ongoing research. Informed decision-making at the policy level is

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essential for enacting regulations that protect ocean ecosystems, and training resources on ocean governance and policy helps policymakers, legislators, and environmental agencies formulate effective measures to address marine conservation and sustainable use.

Practical training resources contribute to the preservation of cultural heritage by fostering an appreciation for the importance of oceans in diverse societies. They also serve as tools to raise public awareness, mobilise communities, and empower individuals to actively participate in initiatives promoting ocean conservation.

Including ocean literacy in educational curricula provides a foundation for students to develop a lifelong appreciation for the oceans. Therefore, effective training resources support educators in delivering engaging and accurate content, inspiring the next generation to become stewards of the marine environment.

The need for practical training resources on ocean literacy is driven by the urgency to address environmental challenges, promote sustainable practices, and empower individuals to make informed decisions that contribute to the health and resilience of our oceans.

There is a growing interest in finding ways to encourage people to use natural resources sustainably. One way to achieve this is to increase public awareness and knowledge about the ocean. This can help people feel more connected to the ocean and motivate them to change their behaviour to reduce the impact of human activities on marine environments and resources. In addition, involving society and communities in discussions about the ocean can lead to creating new knowledge and sharing non-scientific knowledge, such as local, traditional, and Indigenous knowledge. The ocean covers 71% of our planet and 97% of Earth's water. It is a vital ecosystem that encompasses most of the living space on our planet and plays several crucial roles that support the health of our planet and our livelihood. The ocean provides about 15% of the total protein consumed by people across the world, drives a significant portion of the global economy, regulates the climate and weather, and slows climate change by absorbing about 40% of the carbon dioxide that is being emitted into the atmosphere at an increasing pace by human activities since the beginning of the industrial revolution. The ocean supports life on Earth and provides tremendous economic, social, and environmental benefits. The sea is not just a resource for humans but also has its intrinsic value and benefits for its inhabitants. It is a source of life on Earth and provides significant economic, social, and environmental advantages. Recognising that the ocean has value beyond its usefulness to humans is crucial.

Despite its immense value, the ocean is exhibiting significant signs of change due to human activities. The average sea surface temperatures are rising, and the ocean's chemistry is changing, which impacts marine ecosystems and their services. Many commercially important fish stocks are either fully exploited, overexploited, depleted or recovering from depletion, putting marine biodiversity at risk. Additionally, the increasing human population's mounting environmental, social, and economic pressures have led to vast alterations of aquatic habitats.

The ocean is being modified, degraded, and contaminated at an increasing rate, which poses a direct threat to humankind. This puts at risk the many services, benefits, and aesthetic and spiritual values associated with it. Since this impact affects communities and nations worldwide and can be attributed to the choices, decision-making, and lifestyles of individuals, governments, and industry, every person must understand the importance of the ocean and the need to protect it by getting involved. For individuals to become thoughtful participants in the debate about solutions to marine environmental issues, they need to be ocean literate.

According to Fauville et al. (2019, 0. 239), Ocean Literacy is closely aligned with the goals of environmental education, which were defined by UNESCO in 1975. These objectives are fourfold:

i) Awareness - to help individuals and social groups develop an understanding of the global environment and the challenges it faces.

ii) Attitude - to instil values of environmental concern and motivate people to promote environmental protection and improvement actively.

iii) Skills - to equip individuals and social groups with the necessary skills to identify and solve environmental problems

iv) Participation - to provide opportunities for individuals and social groups to get involved at all levels in resolving environmental issues.

The following will form the analysis of the available training resources:

1. Online Courses and Webinars

Several popular platforms offer ocean literacy courses, catering to a diverse audience ranging from students and educators to professionals and enthusiasts. These platforms leverage online learning to provide accessible and engaging content related to ocean science, conservation, and sustainability. Here's an overview of some popular platforms:

Coursera: Coursera is a widely recognised online learning platform that partners with universities and organisations to offer a variety of courses. Some institutions provide courses related to marine biology, oceanography, and environmental science, covering topics such as ocean conservation and sustainability.

edX: Similar to Coursera, edX collaborates with universities and institutions worldwide. It offers a range of marine science and oceanography courses, often presented by experts in the field. These courses may cover marine biology, ocean ecosystems, and climate change impacts on the oceans.

Khan Academy: Khan Academy provides free online courses and lessons on various subjects, including marine biology and oceanography. While the depth of the courses may vary, Khan Academy is a valuable resource for foundational knowledge on ocean-related topics.

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National Geographic Learning: National Geographic offers educational resources, including courses and materials related to ocean science. These resources are often designed for educators and students, providing multimedia content and lesson plans to enhance ocean literacy.

MIT OpenCourseWare: Massachusetts Institute of Technology (MIT) OpenCourseWare provides free access to a wide range of MIT's course content. Some courses cover oceanography, marine biology, and related topics, allowing learners to access high-quality educational materials from prestigious institutions.

Ocean Wise: Ocean Wise, a Canadian organisation dedicated to ocean education and conservation, offers online marine science and sustainability courses. These courses cover topics such as ocean ecosystems, marine conservation, and the impacts of human activities on the oceans.

Ocean Exploration Trust: The Ocean Exploration Trust, founded by Dr. Robert Ballard, offers educational resources and online courses focused on ocean exploration. These courses often include content related to deep-sea ecosystems, underwater archaeology, and cutting-edge oceanographic research.

MarineBio Conservation Society: MarineBio provides a platform for marine education and conservation. They offer online courses covering marine biology, oceanography, and marine conservation, designed to enhance ocean literacy and promote environmental stewardship.

Blue Planet Academy: Blue Planet Academy is an online learning platform dedicated explicitly to ocean literacy. It offers courses on various topics, including marine biology, oceanography, and sustainable practices to protect the oceans.

UNESCO Ocean Teacher Global Academy: The UNESCO Ocean Teacher Global Academy provides online courses related to ocean science and marine technology. These courses are designed for educators, researchers, and professionals seeking to enhance their knowledge of ocean-related disciplines.

2. Educational Websites

There are several educational websites that focus on providing resources and information to enhance ocean literacy. These platforms offer a variety of content, including articles, interactive modules, videos, and more. Here is an overview of some educational websites dedicated to ocean literacy:

- NOAA Ocean Explorer: This comprehensive website developed by the National Oceanic and Atmospheric Administration (NOAA) features multimedia content, educational resources, and live expeditions that allow users to explore the deep sea and learn about marine life and ecosystems.

- Ocean Wise: This Canadian organization is committed to ocean education and conservation. Its website provides educational resources, including articles, videos, and lesson plans covering various aspects of marine biology, oceanography, and conservation.

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- National Geographic Ocean: This section of the National Geographic website is dedicated to ocean exploration and education. It features articles, photos, and videos covering diverse ocean-related topics, from marine biodiversity to the impacts of climate change.

- Smithsonian Ocean: This educational initiative by the Smithsonian Institution is focused on ocean science and conservation. The website provides articles, virtual exhibits, and educational resources for students, educators, and the public.

- The MarineBio Conservation Society: This online platform is dedicated to marine biology education and conservation. It offers a wealth of information on marine life, ecosystems, and conservation issues. The website also includes a comprehensive marine species database.

- SEA Semester - Sea Education Association: This website offers immersive educational programs at sea, and provides information about their programs, research, oceanography, and maritime studies resources.

- Ocean Portal - Smithsonian National Museum of Natural History: This valuable resource from the Smithsonian National Museum of Natural History features articles, videos, and interactive exhibits covering ocean-related topics, from marine biology to cultural connections with the sea.

- World Ocean Observatory: This platform focuses on ocean education, advocacy, and sustainable practices. The website offers articles, podcasts, and educational resources to promote a better understanding of the oceans and foster responsible stewardship.

- Exploring by the Seat of Your Pants - Oceans Edition: This website provides live virtual events connecting classrooms with scientists and experts in marine science, offering an interactive way for students to engage with professionals and learn about ocean-related topics.

- Ocean Literacy Network: This collaborative initiative connects educators and organisations committed to advancing ocean literacy. The website offers resources, tools, and information to support the integration of ocean literacy into educational programs.

These educational websites serve as valuable platforms for individuals, educators, and students to access reliable information, multimedia content, and educational materials to enhance their understanding of the oceans. Exploring these sites to discover a wide range of topics and resources related to ocean literacy is advisable.

3. Government and NGO Resources

Government agencies and non-governmental organisations (NGOs) are significant players in the development and dissemination of resources for ocean literacy. These resources usually include guides, fact sheets, reports, and multimedia content to increase public awareness and understanding of marine environments. Here's an overview of some notable government and NGO resources dedicated to ocean literacy:

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Government Resources:

1. National Oceanic and Atmospheric Administration (NOAA): NOAA provides various educational resources, including lesson plans, multimedia materials, and data sets related to oceanography, marine biology, and environmental science.

2. Environmental Protection Agency (EPA): The EPA's website offers resources on protecting oceans, coasts, and estuaries. It covers water quality, marine pollution, and ecosystem conservation.

3. National Aeronautics and Space Administration (NASA): NASA provides resources on oceanography, including satellite data, images, and educational materials. These resources highlight the role of space technology in studying Earth's oceans.

4. National Geographic - Ocean Initiatives: National Geographic collaborates with various partners to support ocean conservation initiatives. Their website includes resources on marine exploration, conservation projects, and educational materials.

NGO Resources:

1. World Wildlife Fund (WWF): WWF's ocean initiative provides resources on marine conservation, sustainable fisheries, and the protection of key marine habitats. It includes reports, articles, and multimedia content.

2. Oceana: Oceana offers educational resources, including fact sheets, lesson plans, and interactive tools focused on marine conservation issues.

3. Ocean Conservancy: Ocean Conservancy works on various initiatives to protect the ocean. Their website includes reports, articles, and resources on marine pollution, sustainable fisheries, and ocean policy.

4. Surfrider Foundation: The Surfrider Foundation focuses on coastal conservation. Their website includes articles and resources addressing coastal issues, including beach preservation and water quality.

5. Marine Stewardship Council (MSC): MSC provides educational resources on sustainable seafood practices. These resources include lesson plans and materials for educators and students.

6. The Ocean Foundation: The Ocean Foundation supports various ocean conservation projects. Their website includes reports, publications, and resources covering marine biodiversity and ecosystem restoration.

These government and NGO resources are valuable for educators, students, and the public seeking information on ocean literacy, marine conservation, and sustainable practices. Exploring these websites can provide a comprehensive understanding of current initiatives and challenges related to the oceans.

4. Educational Videos and Documentaries

Educational Video Platforms:

Below is a list of videos and documentaries related to the ocean and marine science that you might find interesting. These sources provide a range of perspectives on topics such as conservation efforts, environmental challenges, beautiful marine ecosystems, and the interconnectedness of ecosystems:

- OceanX YouTube Channel: OceanX produces captivating videos exploring marine science, oceanography, and conservation. The channel features content on deep-sea exploration, marine biodiversity, and the importance of understanding and protecting the oceans.

- SciShow YouTube Channel - Oceanography: SciShow's oceanography playlist offers informative videos covering various aspects of marine science, from ocean currents to marine biology.

- "Before the Flood" (National Geographic): While not exclusively focused on oceans, this documentary, produced and narrated by Leonardo DiCaprio, explores climate change and its impact on the environment, including rising sea levels and ocean health.

- "Ocean Warriors" (Animal Planet): This documentary follows individuals and organisations dedicated to marine conservation. It addresses issues such as illegal fishing, wildlife trafficking, and the challenges faced by ocean activists.

- "Albatross" (Vimeo): This documentary focuses on the impact of plastic pollution on albatross populations in Midway Atoll. It provides a powerful visual narrative on the consequences of marine plastic debris.

- "The Biggest Little Farm" (Hulu, Amazon Prime): While centred on sustainable farming, this documentary showcases the interconnectedness of ecosystems, including the role of soil health and water conservation in preserving the environment.

- "A Plastic Ocean" (Netflix): This documentary explores the issue of plastic pollution in the oceans. It highlights the environmental impact of plastic waste and the need for global awareness and solutions.

- "Oceans: Our Blue Planet" (BBC Earth): Narrated by Sir David Attenborough, this documentary takes viewers on a journey through the world's oceans, exploring marine life and the challenges underwater ecosystems face.

- "The Serengeti Rules" (Amazon Prime): While primarily focused on terrestrial ecosystems, this documentary explores the concept of ecological balance and how it applies to marine environments.

- "My Octopus Teacher" (Netflix): This documentary follows a filmmaker's journey of forming a unique bond with an octopus in a South African kelp forest. It provides insights into marine behaviour and the intricate relationships within ecosystems.

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These sources offer diverse perspectives on ocean-related topics, including conservation efforts, environmental challenges, and the beauty of marine ecosystems. They contribute to a holistic understanding of the oceans and inspire a sense of responsibility towards their preservation.

5. Workshops and Training Programs

Workshops and training programs on ocean literacy are essential to provide practical experiences, develop skills, and deepen the understanding of marine environments. Institutions, NGOs, and research centres often organize such programs. Here is an overview of some notable workshops and training programs related to ocean literacy.

1. SEA Education Association (SEA): The SEA Education Association provides immersive semester programs and workshops. These experiences allow students and educators to conduct oceanographic research, sail at sea, and gain first-hand knowledge of marine ecosystems.

2. Ocean Exploration Trust - Nautilus Exploration Program: The Nautilus Exploration Program provides training opportunities for educators, students, and early-career scientists. Participants join ocean exploration expeditions aboard the E/V Nautilus, a research vessel equipped with remotely operated vehicles (ROVs).

3. International Ocean Discovery Program (IODP): IODP - School of Rock is a workshop series organized by IODP. Educators can learn about scientific ocean drilling, including core sampling and data interpretation, to incorporate these experiences into their teaching.

4. National Centers for Coastal Ocean Science (NCCOS) Training: NCCOS Training provides workshops and training sessions on various coastal and marine science topics. These programs often focus on harmful algal blooms, coastal ecosystem monitoring, and marine spatial planning.

5. Project Oceanology: Project Oceanology conducts educational programs and workshops for students, teachers, and the public. The organization offers practical marine science experiences, including research cruises, laboratory activities, and coastal field studies.

6. Ocean Wise Education Programs: Ocean Wise Education organizes workshops and programs for educators, students, and the public. These programs cover marine science topics, including ocean conservation, biodiversity, and sustainable practices.

7. Marine Biological Laboratory (MBL) - Summer Courses: MBL Summer Courses offer intensive training in marine biology and related fields. Participants engage in laboratory work, field studies, and collaborative research projects, gaining in-depth knowledge from leading scientists.

8. Alaska Sea Grant - Marine Education Program: Alaska Sea Grant - Workshops conducts marine education workshops and training sessions, mainly focusing on the unique marine ecosystems of Alaska. These workshops cover topics such as oceanography, fisheries, and marine conservation.

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9. Ocean Networks Canada - Professional Development: Ocean Networks Canada - Professional Development offers training for educators and professionals. Participants gain insights into using ocean data, technologies, and research tools for educational purposes.

6. Educational Apps and Games

Educational apps and games are a great way to enhance ocean literacy interactively and engagingly. These apps and games focus on marine science, oceanography, and conservation, providing a fun and educational experience. Here's an overview of some of the best educational apps and games available:

A. Educational Apps:

i. Marine Missions:

Platform: iOS, Android

Description: Marine Missions is an interactive app that teaches players about marine life through games, quizzes, and challenges.

ii. Ocean Science:

Platform: iOS

Description: Ocean Science is an app developed by the American Museum of Natural History. Through interactive simulations, it provides users with information about ocean currents, marine life, and oceanography.

iii. Happy Blue Whale:

Platform: iOS, Android

Description: Happy Blue Whale is an app designed for younger audiences. It introduces children to marine life through various activities, including feeding and interacting with a virtual blue whale.

iv. Aquation: The Freshwater Access Game:

Platform: iOS, Android

Description: Aquation is a game that teaches players about freshwater ecosystems and the importance of water management. It combines strategy and education to address real-world water challenges.

B. Educational Games:

(i) Oceans & Seas: Quiz & Map:

Platform: iOS, Android

Description: Oceans & Seas is a quiz and map game that tests users' worldwide knowledge of oceans and seas. It includes interactive maps and questions to reinforce learning.

(ii) World Ocean Quiz - Oceanography, Sea life:

Platform: iOS, Android - Description: World Ocean Quiz is a trivia game focused on oceanography and marine life. Players can test their knowledge across various levels of difficulty.

(iii) Endless Ocean:

Platform: Nintendo Wii, Nintendo DS - Description: Endless Ocean is a simulation game that allows players to explore and interact with underwater environments. It provides a relaxing and educational experience, introducing marine life and ecosystems.

(iv) Ocean Science for Kids: Sea Creatures & Ocean Games:

Platform: iOS, Android- Description: Ocean Science for Kids is an app designed for younger audiences to learn about sea creatures through games, puzzles, and interactive activities.

(v) Fish Game - Aquarium Game:

Platform: iOS, Android - Description: Fish Game is a virtual aquarium game where players can care for and learn about various fish species. It combines elements of entertainment and education.

(vi) Tides: A Fishing Game:

Platform: iOS - Description: Tides is a fishing simulation game incorporating real-world data about tides, weather conditions, and marine life. It provides an immersive experience while teaching players about the dynamic nature of the ocean.

Educational apps and games offer a fun and interactive way to increase ocean literacy and appreciation for marine environments.

7. Scientific Publications and Journals

Access to scientific publications and journals is crucial for staying up to date with the latest research and advancements in ocean science, marine biology, and related fields. Here's a list of reputable scientific journals and publications that cover a broad spectrum of topics within marine science:

- Oceanography - The Oceanography Society: This journal publishes original research articles, reviews, and commentaries covering various aspects of oceanography.

- "Journal of Marine Research" - Yale University: This journal features original research articles and reviews in marine science, including physical, chemical, and biological oceanography.

- Marine Ecology Progress Series - Inter-Research: This publication publishes research on marine ecology, including population dynamics, community structure, and ecosystem functioning.

- Deep Sea Research Part I: Oceanographic Research Papers - Elsevier: This journal focuses on oceanographic research papers covering physical, chemical, and geological aspects of the ocean.

- Marine Biology - Springer: This journal publishes original research articles, reviews, and short communications covering various aspects of marine life.

- Frontiers in Marine Science - Frontiers Media: This open-access journal publishes research on marine science, including oceanography, marine biology, and fisheries.

- Limnology and Oceanography - Association for the Sciences of Limnology and Oceanography (ASLO): This publication covers a wide range of topics in aquatic science, including marine and freshwater

Elsevier: This journal publishes reviews and syntheses on various aspects of oceanography ecosystems.

- Progress in Oceanography -, including physical, chemical, and biological processes.

- "Annual Review of Marine Science" - Annual Reviews: This publication provides comprehensive reviews of key topics in marine science, including oceanography, marine biology, and the impacts of climate change.

- Aquatic Conservation: Marine and Freshwater Ecosystems - Wiley: This journal focuses on the conservation and management of marine and freshwater ecosystems, covering biodiversity, ecology, and sustainable practices.

Access to some of these publications may require a subscription or institutional access. Many universities and research institutions provide access to scientific journals for their students and faculty. Additionally, some journals offer open-access options or provide free access to particular articles. Looking for specific articles or topics, academic databases such as PubMed, Scopus, and Google Scholar can be valuable resources.

8. Ocean Literacy Frameworks

Ocean literacy frameworks are structured sets of principles, concepts, and fundamental understandings that guide educational efforts to enhance people's knowledge and understanding of the oceans. These frameworks are designed to promote ocean literacy across various age groups and educational levels. Several organizations and initiatives have developed ocean literacy frameworks to address the need for a comprehensive understanding of the marine environment. Here are some notable examples:

a. Ocean Literacy Principles - Developed by: The Ocean Literacy Network

The Ocean Literacy Principles outline fundamental concepts and principles related to the ocean, covering topics such as the Earth's interconnected systems, the role of the ocean in shaping climate, and the importance of marine biodiversity. The principles are designed to be applicable across different educational levels and disciplines.

European Marine Board's Framework for Ocean Literacy:

b. Developed by: European Marine Board

The European Marine Board's Framework for Ocean Literacy is designed to provide a foundation for educators, policymakers, and the public to understand and engage with the ocean. It emphasizes the interdisciplinary nature of ocean literacy and covers topics such as marine ecosystems, human-ocean interactions, and the role of the ocean in Earth's system.

c. NOAA's Ocean Literacy Framework:

Developed by: National Oceanic and Atmospheric Administration (NOAA)

NOAA's Ocean Literacy Framework is designed to increase awareness and understanding of the ocean's role in the Earth system. The framework includes seven essential principles covering topics such as the Earth's climate system, ocean currents, and the importance of marine life.

d. UNESCO's Intergovernmental Oceanographic Commission (IOC) Framework for Ocean Literacy:

Developed by: UNESCO's IOC

The IOC's Framework for Ocean Literacy aims to provide a global perspective on understanding and valuing the ocean. It emphasizes the importance of ocean literacy in achieving sustainable development and covers themes such as the ocean's influence on climate, marine biodiversity, and the cultural connections to the sea.

e. Australian National Marine Science Committee's (ANMSC) Framework for Ocean Literacy in Australia:

Developed by: ANMSC

The ANMSC's Framework for Ocean Literacy in Australia is tailored to the Australian context. It emphasizes the unique marine environments in Australia, covering topics such as the Great Barrier Reef, marine biodiversity, and sustainable marine resource use.

These frameworks serve as foundational documents that guide the development of educational programs, curricula, and initiatives aimed at enhancing ocean literacy. They provide a common language and set of principles for educators, policymakers, and the public to engage with the complex and interconnected aspects of the marine

environment. Additionally, these frameworks often align with broader science literacy initiatives to promote a holistic understanding of Earth's systems.

9. Social Media and Online Communities

Engaging with social media platforms and online communities is an effective way to stay connected with the latest developments in ocean science, marine conservation, and environmental advocacy. Here are some notable social media platforms and online communities dedicated to ocean-related topics:

1. Social Media Platforms:

a) Instagram:

Accounts to Follow:

i. @oceana: Oceana focuses on ocean conservation and marine life.

ii. @natgeo: National Geographic shares stunning photos and stories about the oceans.

iii. @marinebioconservation: MarineBio Conservation Society provides educational content on marine biology.

2. Twitter:

Accounts to Follow:

i. @OceanElders: Ocean Elders shares updates on ocean conservation initiatives.

ii. @Ocean_Wise: Ocean Wise focuses on ocean education and sustainable practices.

iii. @Scripps_Ocean: Scripps Institution of Oceanography shares research updates and ocean-related news.

3. Facebook:

Pages to Follow:

i. Ocean Conservancy: Ocean Conservancy shares content on ocean protection and conservation.

ii. Surfrider Foundation: Surfrider Foundation focuses on coastal and ocean conservation.

iii. The Ocean Cleanup: The Ocean Cleanup shares updates on efforts to remove plastic from the oceans.

4. YouTube:

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Channels to Subscribe to:

i. BBC Earth Ocean: BBC Earth Ocean features documentaries and educational videos on marine life.

ii. OceanX: OceanX shares videos on ocean exploration and marine science.

iii. Ocean Wise: Ocean Wise provides educational content on marine conservation.

5. Online Communities and Forums:

i. Reddit - r/ocean: Reddit's ocean community discusses a wide range of topics related to the oceans, including news, marine biology, and conservation.

ii. Ocean Exploration Forum: The Ocean Exploration Forum allows users to discuss ocean exploration, research, and discoveries.

iii. MarineBio Community: MarineBio hosts a community forum where members discuss marine biology, conservation, and related topics.

iv. The Scuba Board - Marine Life and Conservation: This forum on The Scuba Board is dedicated to discussions about marine life and conservation from the perspective of scuba diving enthusiasts.

v. Oceanography Society Community: The Oceanography Society's community forum facilitates discussions on various aspects of oceanography.

Engaging with these social media platforms and online communities provides opportunities to connect with scientists, researchers, educators, and fellow enthusiasts. It allows individuals to stay informed about ocean-related news, research findings, and conservation efforts while contributing to broader discussions on ocean science and environmental sustainability.

10. Virtual Reality (VR) and Augmented Reality (AR) Experiences.

Virtual Reality (VR) and Augmented Reality (AR) can provide immersive and interactive experiences that enhance ocean literacy. They enable users to explore marine environments and learn about ocean science in a unique way. Here are some noteworthy VR and AR experiences related to the oceans:

a) Virtual Reality (VR) Experiences:

i. TheBlu: It's a VR experience that allows users to explore the underwater world and encounter marine life in a visually stunning and realistic environment. It provides a sense of presence and connection with the ocean.

ii. Ocean Rift: It's a VR app that takes users on a virtual underwater safari. It features a variety of marine creatures, from tiny seahorses to large whales, providing an immersive exploration of diverse ecosystems.

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iii. Mission ISS: This VR experience allows users to experience a virtual spacewalk outside the International Space Station (ISS). While not exclusively focused on the oceans, it provides a unique perspective on Earth, including its oceans, from space.

iv. BBC Earth: Life in VR: This VR experience offers a series of VR experiences showcasing different ecosystems, including underwater environments. It brings users face-to-face with marine creatures and provides educational insights.

v. Underwater VR: It's a virtual reality experience that allows users to explore coral reefs and encounter marine life in a 360-degree immersive environment. It aims to raise awareness about the importance of ocean conservation.

b) Augmented Reality (AR) Experiences:

i. Google Expeditions AR: Oceans: This augmented reality experience offers a focus on oceans, allowing users to place virtual marine life and ecosystems in the real world, providing an interactive and educational experience.

ii. WWF Free Rivers AR: The WWF Free Rivers AR app uses augmented reality to illustrate the connection between rivers and oceans. It allows users to explore how rivers impact marine ecosystems and the importance of river conservation.

iii. Aquatic Reality - Ocean Education AR: This AR app is designed for educational purposes. It uses augmented reality to bring marine life into the classroom, allowing students to interact with and learn about various sea creatures.

iv. Ocean 4D+: This AR app combines educational content with augmented reality. It allows users to explore marine life through interactive 3D models and animations, providing an engaging learning experience.

v. AR Ocean Explorer: This augmented reality app enables users to learn about marine life by placing virtual sea creatures in the real world. It provides educational content about different species and their habitats.

These VR and AR experiences offer innovative ways to engage with ocean science and conservation. They provide a platform for experiential learning, allowing users to virtually dive into the oceans, interact with marine life, and gain a deeper understanding of the importance of ocean ecosystems. As technology continues to advance, these immersive experiences play a valuable role in promoting ocean literacy and environmental awareness.

11. Ocean Exploration Programs

Ocean exploration programs are crucial for advancing our scientific understanding of the world's oceans. These programs typically involve interdisciplinary research, cutting-edge technology, and collaborations between various institutions. Here are some notable ocean exploration programs:

- NOAA Office of Ocean Exploration and Research (OER): The NOAA OER conducts systematic ocean exploration missions to increase our knowledge and understanding

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of deep-sea ecosystems. It uses remotely operated vehicles (ROVs) and autonomous underwater vehicles (AUVs) to explore uncharted areas of the ocean.

- Ocean Exploration Trust - Nautilus Exploration Program: The Nautilus Exploration Program, led by the Ocean Exploration Trust, operates the Exploration Vessel (E/V) Nautilus. This program explores deep-sea environments and conducts telepresence-enabled research, which allows scientists and the public to participate virtually in real-time.

- Schmidt Ocean Institute: The Schmidt Ocean Institute operates the research vessel Falkor, equipped with advanced technologies for ocean exploration. The institute focuses on openly sharing data and outcomes to contribute to global oceanographic research.

- EVNautilus - Exploration Vessel Nautilus: The EVNautilus program, associated with the Ocean Exploration Trust, conducts ocean exploration expeditions using the E/V Nautilus. It engages scientists, educators, and the public in real-time exploration through telepresence technology.

- European Marine Board - EurOcean: EurOcean is a network of marine research organizations in Europe that collaborates on ocean exploration initiatives. It supports interdisciplinary research, technology development, and the dissemination of ocean knowledge.

- Japan Agency for Marine-Earth Science and Technology (JAMSTEC): JAMSTEC operates multiple research vessels, submersibles, and remotely operated vehicles for ocean exploration. Its missions include deep-sea research, marine geology, and the study of marine ecosystems.

- WHOI Deep Submergence Lab - Nereus Program: The Woods Hole Oceanographic Institution (WHOI) conducts deep-sea exploration through its Nereus Program. Nereus is a hybrid remotely operated vehicle (ROV) capable of exploring extreme depths in the ocean.

- Ocean Infinity: Ocean Infinity utilizes autonomous underwater vehicles (AUVs) and advanced technology for seabed exploration. The company conducts ocean surveys, mapping, and underwater investigations for various purposes, including environmental monitoring and resource exploration.

- Japan Oceanographic Data Center (JODC): JODC is involved in various oceanographic research activities, including the collection and management of oceanographic data, mapping of the seafloor, and supporting scientific expeditions in Japanese waters.

- Marine Institute Ireland - RV Celtic Explorer: The Marine Institute operates the RV Celtic Explorer, Ireland's primary research vessel. It is involved in various oceanographic research missions, including ecosystem assessments, fisheries research, and climate studies.

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These ocean exploration programs contribute to our understanding of the oceans, from mapping the seafloor and studying marine biodiversity to investigating geophysical processes. They often involve international collaborations and employ advanced technologies to explore and document the mysteries of the deep sea. The findings from these programs have broad implications for scientific research, environmental conservation, and the sustainable use of marine resources.

12. Citizen Science Initiatives

Citizen science projects are a vital way of involving the public in scientific research and data collection. Many such initiatives focus on marine and ocean-related topics, providing enthusiasts, students, and the public with opportunities to contribute valuable information. Here are some noteworthy citizen science initiatives related to oceans:

1. eBird - Coastal Bird Monitoring: This bird monitoring project by Cornell Lab of Ornithology involves coastal bird monitoring. Participants can contribute observations of seabirds, shorebirds, and other coastal species to help scientists understand population trends and distribution.

2. Marine Debris Tracker: This app allows users to log and track marine debris they find on beaches or in coastal areas. The data contribute to global efforts to understand the distribution and types of marine litter.

3. Secchi Disk Study: This initiative engages citizen scientists in monitoring water clarity using a simple Secchi disk device. Participants measure the depth at which the disk disappears, providing valuable information about water transparency.

4. Coral Watch: Coral Watch involves citizen scientists in monitoring the health of coral reefs. Participants use a colour chart to assess the bleaching level of corals, providing data that contribute to ongoing research on coral health.

5. Happywhale: This project encourages individuals to contribute whale and dolphin sightings. Participants can submit photos and information about their encounters, helping scientists track and monitor marine mammal populations worldwide.

6. GLOBE Observer - Mosquito Habitat Mapper: The GLOBE Observer app includes the Mosquito Habitat Mapper project, which allows users to report potential mosquito breeding sites. Understanding mosquito habitats is crucial for addressing public health concerns and disease prevention.

7. JellyWatch: This project invites citizen scientists to report jellyfish sightings and provide information on their abundance and behavior. This data contributes to understanding jellyfish populations and their ecological role.

8. CoCoast - Citizen Science for the UK's Coast: CoCoast involves volunteers in monitoring and collecting data on the UK's coast. Projects include shoreline surveys, intertidal zone monitoring, and recording marine life observations.

9. SeagrassSpotter: This project encourages citizens to document seagrass meadows by submitting photos and information about their locations. Seagrasses play a vital role in coastal ecosystems, and this initiative helps monitor their health.

10. Plankton Portal: Plankton Portal engages citizen scientists in the identification of plankton species from microscopic images. Understanding plankton diversity and distribution is crucial for marine ecosystem research.

These citizen science initiatives empower individuals to contribute to scientific knowledge, raise awareness about environmental issues, and actively participate in conserving marine ecosystems. Many of these projects leverage technology, such as mobile apps and online platforms, to make it easier for participants to get involved and share their observations with the scientific community.

13. Ocean Literacy Events and Conferences

Participating in ocean literacy events and conferences can be incredibly beneficial and provide valuable opportunities to connect with experts, researchers, educators, and enthusiasts. These events cover a wide range of marine science, conservation, and education topics. Here are some of the most notable ocean literacy events and conferences:

1. International Ocean Literacy Conference (IOLC): This global conference brings together educators, scientists, and policymakers to discuss and advance ocean literacy. It explores innovative teaching methods, research findings, and strategies for raising awareness about the importance of the oceans.

2. European Marine Science Educators Association (EMSEA) Conference: This conference focuses on marine science education and ocean literacy in Europe. It provides educators, researchers, and outreach professionals with a platform to share best practices, curriculum ideas, and initiatives to enhance ocean literacy.

3. National Marine Educators Association (NMEA) Annual Conference: This is a worldwide gathering of marine educators that covers diverse topics, including marine science, conservation, and effective educational strategies. It includes workshops, presentations, and networking opportunities.

4. Ocean Literacy Summit: This annual event, organised by the New England Ocean Science Education Collaborative (NEOSEC), focuses on advancing ocean literacy through collaboration, sharing resources, and exploring innovative approaches to education.

5. The Ocean Conference (UN): This United Nations conference provides a platform for governments, scientists, NGOs, and the private sector to discuss sustainable ocean development. It addresses critical issues such as marine pollution, climate change, and the conservation of marine biodiversity.

6. World Conference on Marine Biodiversity (WCMB): This global conference brings scientists, researchers, and policymakers together to discuss marine biodiversity. While

focusing on scientific research, the conference also addresses the importance of communicating marine science to the public.

7. International Marine Conservation Congress (IMCC): This conference gathers marine conservation professionals, researchers, and educators. It covers many topics, including ocean literacy, marine policy, and community engagement in conservation efforts.

8. Ocean Sciences Meeting: This significant conference covers various aspects of oceanography, including interdisciplinary research and education. It is organised by the American Geophysical Union (AGU), the Association for the Sciences of Limnology and Oceanography (ASLO), and The Oceanography Society.

9. Ocean Literacy for All: A Virtual Workshop Series: This workshop series, organised by the Ocean Literacy Network, focuses on advancing ocean literacy worldwide. It includes discussions, presentations, and collaborative sessions to strengthen ocean education initiatives.

10. Ocean Literacy in Action Webinar Series: This webinar series, organised by NOAA's Office of Education, provides insights into effective ocean literacy practices. It covers topics such as curriculum development, community engagement, and the integration of ocean science into formal and informal education.

These events offer a platform to share knowledge, exchange ideas, and collaborate on initiatives that promote ocean literacy. Many conferences have adapted to virtual formats, making it easier for a global audience to participate and contribute to the advancement of ocean education and conservation.

14. E-Learning Platforms with Certification

There are numerous e-learning platforms available that offer courses and certifications related to ocean science, marine biology, and conservation. These platforms allow individuals to enhance their knowledge and skills in a flexible and accessible manner. Below is a list of some e-learning platforms that provide courses and certifications related to ocean-related topics:

1. Coursera:
   Courses:
   - Marine Megafauna: An Introduction
   - Ocean Solutions
   Certifications:
   - The Science of Marine Life
2. edX:
   Courses:
   - Exploring Time and Space in the Ocean
   - Principles of Synthetic Biology
   Certifications:
   - Oceanography: Exploring Earth's Final Wilderness
3. Udemy:

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Courses:
- Introduction to Marine Biology
- Oceanography: Explore Earth's Final Wilderness

Certifications:
- Marine Biology - Comprehensive Course

4. FutureLearn:
   Courses:
   - Exploring Our Oceans
   - Introduction to Ecosystems

   Certifications:
   - Environmental Challenges
5. National Geographic Society Learning:
   Courses:
   - Introduction to Oceanography
   - Ocean Literacy: The Essential Principles of Ocean Sciences
6. Khan Academy:
   Courses:
   - Introduction to the Ocean
   - Marine Reserves and Fisheries Management
7. Ocean Wise Education:
   Courses:
   - Ocean Literacy Courses
8. Alison:
   Courses:
   - Diploma in Environmental Science
9. MIT OpenCourseWare:
   Courses:
   - Introduction to Biological Oceanography
10. Sea Grant:
    Courses:
    - Online Courses

Before enrolling in any course or certification program, it is advisable to check the course content, reviews, and the credibility of the issuing institution. These platforms offer a diverse range of courses, from introductory levels to more advanced topics, allowing individuals to tailor their learning based on their interests and background.

15. Educational Outreach Programs for Schools

Educational outreach programs are essential in promoting ocean literacy among students. These programs aim to engage schools, educators, and students in learning about marine science, ocean conservation, and environmental stewardship. There are several notable programs that schools can explore to enrich their curriculum with engaging and informative content related to marine science, oceanography, and conservation.

Ocean Wise Education, based in Canada, offers a variety of educational programs for schools. These programs provide hands-on activities, workshops, and resources that cover topics such as marine biology, ocean conservation, and sustainable practices.

The National Oceanic and Atmospheric Administration's (NOAA) Ocean Exploration Education Program provides educational resources and programs for schools. This initiative offers lesson plans, multimedia resources, and opportunities for students to connect with scientists and explorers.

The Monterey Bay Aquarium, located in California, offers a range of educational programs for schools, including virtual programs, field trips, and classroom resources that focus on marine science, marine life, and ocean conservation.

The SeaWorld Busch Gardens Conservation Fund provides free classroom resources for educators, including lesson plans, activities, and educational materials. These resources cover marine science, wildlife conservation, and environmental issues.

Scripps Classroom Connection, affiliated with the Scripps Institution of Oceanography, offers classroom resources and educational programs for K-12 students. The programs cover various marine science topics and provide opportunities for students to interact with scientists.

The Oceanography Society provides a collection of ocean education resources for teachers and students. These resources include lesson plans, activities, and multimedia content designed to enhance ocean literacy.

The Ocean Literacy for All initiative offers a variety of educational resources, including lesson plans, videos, and interactive activities, for teachers to incorporate ocean literacy into their teaching.

Project Oceanology, based in Connecticut, offers marine science programs for schools. These programs include hands-on activities, boat trips, and coastal field experiences to engage students in marine education.

Birch Aquarium at Scripps, affiliated with the Scripps Institution of Oceanography, provides educational programs for schools that cover marine science, marine biology, and ocean conservation.

The Algalita Marine Research Foundation offers educational programs and resources that focus on plastic pollution and its impact on marine environments. These programs aim to raise awareness and promote solutions to address plastic pollution.

By using these programs, schools can provide their students with informative content suitable for various grade levels. These programs offer hands-on activities to make learning about the oceans educational and enjoyable for students.

5.1.1. Identifying Local Challenges

An important document illustrating and summarizing the issue of climate education, including its strengths and challenges, is the report "Climate Education in Poland", developed by the United Nations Global Compact Network Poland.

85% of young people believe that climate protection content should be included in curricula[111]. In a Eurobarometer survey conducted in the fall of 2022, which showed, among other things, attitudes toward climate in EU member states, 81% of male and female residents of the EU expressed worry about progressive change. In Poland, the percentage was 77% when in Malta, Italy and Portugal each above 90%[112]. Other surveys conducted in Poland, however, show that 82% of Poles consider climate change an important issue[113]. When the poll asked the opinion of so-called "election rookies," those aged 18-21. 59% answered that they were worried about climate change, but only 1/3 about the personal consequences[114]. So the topic is present in the public consciousness, but it is relegated to the background in the face of other problems.

Above all, children and young people expect to learn about the climate not only on their own, drawing knowledge from various, not necessarily proven sources, but also at school. The scope of information and the way it is conveyed should be adapted to the different developmental stages and emotional levels of children. Currently, climate appears in school textbooks mainly in the context of weather phenomena, while a holistic view is missing. The issue of climate change is mentioned only at the high school level. The core curriculum in elementary school and general profiles in high school grades narrows environmental topics to issues such as excess plastic, saving water or light, or air pollution. Young people are told that this is where the biggest problem lies, but it can be easily remedied, for example, by using reusable bags.

The Roundtable for Climate Education has a special role in this topic. Several conclusions can be drawn about the report and recommendations:

- The concept of Wider Climate Education: The Roundtable for Climate Education emphasizes the need to look at climate education as an integral part of general education, not suggesting the introduction of new subjects, but looking for common ground between existing ones. It is an attempt to frame climate change science as an interdisciplinary issue.

- Participation of Multiple Stakeholder Groups: The report emphasizes that the Roundtable was open to a variety of perspectives, with the participation of teachers, parents, university presidents, representatives of business, local government, NGOs and youth. This indicates the need to include diverse opinions and experiences in the process of developing a climate education model.

- A Balanced Approach to Teaching Climate Change: The Roundtable emphasizes the importance of seeing climate education as more than just a natural science discipline. It recommends that teachers of different subjects be allowed to engage in teaching about climate change, making it easier for students to understand the interrelationships between different disciplines.

[111] 2022 Roundtable for Climate Education Summary Report: https://edukacjaklimatyczna.org.pl/raport-podsumowujacy-2022/)
[112] https://europa.eu/eurobarometer/surveys/detail/2932
[113] https://focusonbusiness.eu/pl/raporty/zmiany-klimatu-jak-postrzegaja-je-polacy/27157
[114] https://mlodziwyborcy.pl/

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- The Complex Nature of Climate Change Science: A statement by Roundtable representative M. W. highlights the difficulty of limiting climate change science to a single discipline. He notes that the subject is complex and covers a variety of aspects, making it difficult for even adults to understand all the environmental and climate relationships.

- The Role of Causal Relationships: The importance of facilitating young people's understanding of cause-and-effect relationships between different planes and domains in the context of climate is pointed out. This is a challenge for teachers who must effectively integrate diverse content in teaching about climate change.

In conclusion, the report points out the need for a broad view of climate education, involving various sectors of society, and highlights the difficulties of capturing the comprehensive nature of climate change science. The Roundtable's recommendations prioritize interdisciplinarity and an integrated approach to climate topics within general education.

5.5.2. Exploring Opportunities

According to Polish experts, climate education should be an interdisciplinary endeavor, involving different social groups and including emotional aspects and active involvement. It is the joint action of communities, schools, parents and local actors that can effectively contribute to building awareness and action for climate protection.

INITIATIVE CALLED: Not the Ocenic manual

This is a joint activity of the Institute of Oceanology of the Polish Academy of Sciences and the Gdynia Aquarium of the MIR-PIB, carried out in cooperation with the Sopot Scientific Society and Today We Have. It is a grassroots project resulting from the epidemiological situation in Poland, which has made it impossible to conduct marine education in its current form. The purpose of the Non Manual is not only to make the audience curious about topics related to the marine environment, or to explain basic phenomena occurring in nature. It is about arousing marine awareness and showing the inextricable link between each of the inhabitants of planet Earth and the All-Ocean.

Not an Ocean Handbook is a series of short videos addressing the most diverse issues related to the marine environment, from the ocean current system, to the relationship with the atmosphere, life in the Ocean, ecology, fisheries and the activities of international organizations such as the UN. Scientists and educators are shown in a completely different setting than lecture chairs, adding to the value of the project. Pandemic has made the films in homes and on the beach, bringing the audience closer to the broadcasters and disenchanting the image of scientific people as inaccessible figures.

The films are published on the Facebook profiles of the Gdynia Aquarium and the Institute of Oceanology of the Polish Academy of Sciences. You can also find them on

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YouTube. Episodes are published once a week, from September to June, on Thursdays.

5.5.3. Localization and Cultural Adaptation

The Ministry of Climate and Environment is making available the educational material "Friends of the Climate", which aims to introduce elementary school students to key issues related to climate protection and measures to adapt to the ongoing climate change in an accessible way.

The content presented in the educational packages has a "baseline" dimension and, in addition to organizing basic terminology in the area of climate protection and adaptation to ongoing climate change, illustrates the causal dimension of ongoing climate change and adaptation actions (from an individual, local, national and global perspective).

- Inclusion of the Whole Society: Climate education should be a comprehensive endeavour involving the entire society. It is not only the task of schools, but also of parents, local communities, businesses and local governments. Involvement of various sectors of society is needed.

- Role of Schools as "Command Centers." Schools can act as a central point from which climate education emerges. By organizing activities such as Climate Week, schools can inspire both students and their families and the local community.

- Importance of Parents' Role: Parents have a huge role to play in climate education. It is worth noting the need to increase parents' awareness of the seriousness of the climate issue, especially in the context of the influence of the media, which often downplays the issue.

- Learning "Through the Heart" and "Hands." Climate education should not focus solely on learning "through the head." Introducing learning "through the heart" means recognizing oneself as an integral part of nature, which can spur more responsible behaviour. Moreover, active action ("hands on") is a key component of effective climate education.

- Including Alumni, Local Governments and Business: the Week for the Climate should be a platform that attracts not only parents and students, but also other social groups such as alumni, local governments and local businesses. Collaboration between different entities allows for the exchange of experiences and learning from each other.

- Peer Activities and Mutual Education: the inclusion of different social groups, such as parents, alumni, local governments and businesses, in Climate Week activities creates a space for mutual learning. Each group can bring their own experiences and perspectives on climate issues.

5.5.4. Stakeholder Analysis and Engagement

Across most OECD countries, socio-economic status influences learning outcomes more than gender and immigrant status. In Poland, the proportion of children from the bottom quartile of the PISA index of economic, social and cultural status (ESCS) achieving at least PISA level 2 in reading in 2018 was 19% lower than that of children from the top ESCS quartile, a smaller share than the OECD average of 29%.

Gender inequalities in education and outcomes

In Poland, 1.3% of students in lower secondary and 3.8% in upper secondary initial education repeated a grade in 2019, compared to 1.9% and 3% respectively on average across OECD countries. Boys are more likely to repeat a grade at lower secondary initial education than girls. In Poland, 66% of repeaters at lower secondary level were boys, higher than the OECD average of 61%. At upper secondary level, the share of boys repeating a grade in Poland increases to 68%, compared to 57% on average across OECD countries.

Cross-regional disparities in education

National level data often hide important regional inequalities in children's access and participation to education. In general, inequalities across regions tend to widen at non-compulsory levels of education. For example, in the majority of countries, the variation in enrolment rate of 3–5-year-olds is often greater than the variation among 6–14-year-olds. This is not the case in Poland, where the enrolment rate of 3–5-year-olds varies from 85% in the region of Pomerania to 93% in the region of Swietokrzyskie whereas the enrolment of 6–14-year-olds varies from 92% to 100% across regions. Similarly, the enrolment rate of 15–19-year-olds varies from 80% to 100% in Poland.

COVID-19:

The spread of COVID-19 has continued to impede access to in-person education in many countries around the world in 2021. By mid-May 2021, 37 OECD and partner countries had experienced periods of full school closure since the start of 2020.

The number of instructional days when schools were fully closed since the start of 2020 due to the pandemic (excluding school holidays, public holidays and weekends) varies significantly between countries and increases with the level of education. Poland follows this pattern. In Poland, pre-primary schools were fully closed for an average of 49 days between 1 January 2020 and 20 May 2021. Meanwhile primary schools closed for 98 days, lower secondary for 190 days and upper secondary general schools for 190 days. In comparison, respective closures were 55, 78, 92 and 101 days on average across the OECD.

In many countries, schools did not fully close but remained open with reduced capacity. Schools at upper secondary (general) level in Poland for instance experienced 82 days of partial opening between January 2020 and May 2021, 78 of which occurred in 2020 and 4 in 2021. In total, this was higher than the number of days of partial opening in the

OECD on average (57 days), where there were 27 days of partially open instruction in 2020, and 30 days in 2021. When adding both the number of days where schools were fully and partially closed, learning in upper secondary general education was disrupted by 272 days in Poland between January 2020 and May 2021.

During periods of full school closure in 2020, 21 OECD and partner countries have opted to keep upper secondary general schools virtually open as a national level strategy, including Poland. However, in 4 countries, excluding Poland, each day of remote learning was not considered equivalent to a full day of in-person instruction. The way that online platforms have operated during school closures has varied between countries. In Poland, decisions on how online platforms should operate were made at the local level from pre-primary to tertiary education.

The impact of COVID-19 and school closures on educational equity has been a concern for many countries. 30 out of the 36 OECD and partner countries surveyed, including Poland, declared that additional measures were taken to support the education of children who might face additional barriers to learning during the pandemic. 22 of these countries, including Poland, stated that they had subsidised devices for students to help them access education. Measures to encourage disadvantaged or vulnerable students to return to school after closures were also implemented in 29 OECD and partner countries, including in Poland.

20 OECD and partner countries, including Poland, stated that the allocation of additional public funds to support the educational response to the pandemic in primary and secondary schools was based on the number of students or classes. At the same time, 16 countries targeted additional funds at socio-economically disadvantaged students as a way to ensure that resources targeted those that needed them the most, though this was not the case in Poland[115].

5.5.5. Policy and Implementation Recommendations

Climate education in Polish schools undoubtedly needs to be updated. With a view to the well-being of the young generation, who will have to face the challenges and opportunities of the climate crisis in their lifetime, it is necessary to equip society with the appropriate adaptation tools, as well as to impart knowledge and educate skills. Although various circles have for years been organising a number of events to raise awareness of climate change among Polish women and men, a reform of the core curriculum in schools is necessary in order to introduce widespread, interdisciplinary and comprehensive climate education.

1. Policies geared towards climate education. The environment points to the need to redirect the debate of the political world to talk about education reform related to climate change. Given the increased awareness of Polish women and men and the increasing acceptance of the science of the climate crisis by the public, pursuing efforts for comprehensive and widespread climate education will help

[115] https://www.oecd-ilibrary.org/sites/9399a67a-en/index.html?itemId=/content/component/9399a67a-en

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to authenticate the promises and declarations of those political parties that officially mention the existence and possibility of exacerbating climate change.

2. European exchange of experience. The need to educate the younger generation about climate change is recognised in the countries of the European Union, as demonstrated by such initiatives as the European Climate Pact and the European Education Area 2025. These programmes aim to involve governments, organisations and informal groups in actions for sustainable development and the achievement of climate neutrality, as well as to disseminate scientific knowledge about climate change. Using the good practices of Western countries and EU Member States, it would be beneficial to carry out European initiatives in Poland. It would also be worth creating a network of schools and educational centres that would enable the exchange of experience between these institutions, as well as allowing dialogue with European institutions. Popularisation and promotion of the Blue Schools network could also help to achieve this objective.
3. The role of young people. Young people have long inspired adults to take action to protect the planet. It is therefore necessary to listen to their demands and exhortations. Young people very often propose innovative solutions, bringing a unique perspective to the discussion. Drawing on their experience and ambition to introduce comprehensive and widespread climate education, government representatives should first and foremost establish a broader dialogue with the younger generation.
4. Reform of the educational law and supplementing the Core Curriculum. The Polish educational system should ensure the dissemination among children and young people of knowledge about the principles of sustainable development and climate change, and the shaping of attitudes conducive to active action in these areas on a local, national and global scale. A necessary step for the introduction of universal and comprehensive climate education in Poland is the reform of the core curriculum and the updating of the textbooks in force. The emphasis should be placed on emphasising the interdisciplinary nature of climate change by introducing the concept at every level of education, expanding the content in science and humanities subjects.
5. The key role of teachers. When taking action for climate education, policymakers must not forget the staff responsible for imparting sound climate change knowledge to the younger generation. It is necessary to conduct a series of training courses for male and female teachers aimed at both deepening their knowledge of climate issues and preparing them to teach interesting lessons.
6. Non-formal education. The reform of climate education in Polish schools cannot end with updating the content of textbooks and conducting appropriate training for teachers. The subject of climate change is inextricably linked to the environment around us. It is important to arouse this sense of unity and responsibility for our planet among pupils. It is therefore important to introduce practical and field activities that allow direct contact with nature.

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5.5.6. Sustainability and Long Term Impacts

Climate change is one of the most important problems facing the world today, and one that could have an exceptionally large impact on life across the globe and the fate of our civilization. It is a global problem, affecting many regions, which in the short term may become the most important factor affecting the further history of the world. Even if this phenomenon has various causes, one must be aware that one of them is irresponsible human economy, including our irrational lifestyle and excessive consumption.

In this context, it is extremely important to educate the public, especially young people shaping their habits, behaviour and general attitude to the world. It is definitely easier to build appropriate awareness than to change it. Meanwhile, the results of a study conducted in schools in the Silesian province, which can probably be regarded as representative of the entire Polish school system, show that the awareness of our students about climate change is at a very low level, and activities to explore this problem are practically not undertaken by them. It follows that, in the eyes of young people, this topic is neither cognitively important nor pragmatically relevant. The affliction of the Polish education system is the over-theorizing of education and the focus on certain, unquestionable, safe knowledge for the teacher and student. Geographical education at each level of education includes an extensive thematic section, within which the student acquires knowledge of both the climate of different regions of the globe and the factors that determine this variation. He learns a lot of detailed facts, but mainly belonging to the canon of well-established knowledge that has been passed down for many years. With the changes that the Polish school and the Polish teacher are experiencing, it seems that there is no longer enough time and energy for deeper modification of the content. Following the same educational path is simply easier and does not require investment in the development of teachers' knowledge and competence.

The second unfavourable characteristic of the Polish school is its reluctance to shape attitudes and, in fact, treating this task as a completely side thread. Certainly, this is partly the result of the indoctrination of our school, both in times past and in those quite close to us. There is a widespread belief that the school should stay away from influencing the beliefs and habits of young people, their consciousness in any sphere of life. The political hostility present in our space and the associated variability of educational philosophy depending on the ruling option heightens the caution in the implementation of socially and politically sensitive content. And such undoubtedly includes the topic of climate change, due to its inseparability from economic topics.

Referring to the conclusions of the report on students' attitudes towards the climate, one must admit that the authors of this study are one hundred percent right that the Polish school needs big changes. Climate education must enter every level of education, starting with kindergarten, where the formation of awareness should begin. Only that it is not enough here to simply change the educational curricula, because the content will be implemented ostensibly. It is necessary to crack down on the deeper problems of our education, such as the overgrowth of knowledge over practice, the dominance of descriptive approaches over problem-solving approaches, or the lack of

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openness to different cognitive perspectives and reluctance to engage with social issues.

Polish society also still holds the belief that nature's resources are unlimited and at our constant disposal. This is the result of the old style of perception of human-environment relations, but also of the modern social narrative. Such buzzwords as biodiversity, ecology, nature, climate mean little to the average citizen. Rather, they are attributed to the scientific sphere. What matters most in life is affluence and prosperity, their price is already much less important. The issue of climate change, therefore, is not a problem that spends sleepless nights for Poles. As long as we do not implement a coherent policy on social responsibility towards the climate, including securing funds for its implementation, even the most worthwhile school activities will have little effect. Admittedly, it is a fact that young people with the right knowledge and skills can change the habits of their parents, but this applies to a rather narrow range of activities. It is difficult to imagine that a child influences the family's strategic choices regarding technical solutions at home or commuting.

A major problem of a general nature, which affects the position and results of the school's work, is the low level of confidence of Polish society in science and its achievements. We are very eager to use the achievements of medicine because it directly serves our health, but the results of research on climate change or the environment in general, we reject. As a society that has experienced many iniquities on the part of social and political elites, we trust our own feelings more than external authorities, and we accept facts on faith rather than based on evidence and arguments. We are also unaccustomed to exploring issues on our own in a reliable, science-based manner, so that we perceive climate change rather flatly, as an increase in air temperature in our place of residence that is visible on the scale of individual months and years. If we do not notice such an increase in an obvious way, we reject the whole concept of climate change. We take one cooler year as evidence that scientists are wrong or exaggerating. This is a position found extremely often. Anyway, there is a bit of blame in this for scientists, because the knowledge they discover is not sufficiently disseminated at a level accessible to the average public. Under such conditions, the formation of climate awareness, or environmental awareness in general, faces difficulties. Students hear something different at school and something different at home. They experience cognitive dissonance and reject that truth which seems more difficult to them.

When talking about school climate education, it is important to keep these broad social conditions in mind. It should be remembered that in the 1990s, environmental education was introduced into Polish schools, first as part of the natural sciences, and then as a formally separate cross-curricular pathway, with assigned content. This solution did not bring the expected results, largely for the reasons mentioned above. On the occasion of one of the school reforms, the pathway was abolished. The school, it is true, is still obliged to form pro-environmental attitudes, but it does so with little effectiveness and without conviction, because the reality of real life outside the school classroom does not harmonize with the message of the core curriculum. To change this, it is necessary to align the school's activities with those taking place in the social space. If we want environmental education to be meaningful, we need to give students

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a chance to put the knowledge they've gained into practice, and most importantly, to apply it in everyday life.

The implementation of climate education is indispensable, and the research conducted confirms this. They show that young people, who are about to enter adulthood and make key decisions that affect the quality of our environment, are unaware of the problem. The school must therefore teach responsibility to the environment. However, this will not be possible without reevaluating the social narrative and without broader changes in all our lives.

5.6. Türkiye

5.6.1. Analysis of Available Training Resources

Addressing the incorporation of ocean education into high school science courses faces significant challenges, primarily stemming from curriculum restrictions and time constraints. The rigid structure of curriculum outcomes dictates teaching directions, and student success is measured by their ability to achieve these predefined outcomes. Assessment policies further bind teachers to align their assessments explicitly with these outcomes. Qualitative assessments reveal crucial factors influencing ocean-related behaviour, emphasizing the pivotal role of increasing knowledge and awareness of ocean environments. While coastal residents generally exhibit higher awareness, baseline ocean literacy remains low. Positive factors promoting effective ocean literacy include self-efficacy—the perceived ease or difficulty of performing ocean-friendly behaviours—and emotional involvement. Emotional reactions, both positive and negative, play a crucial role in fostering effective ocean literacy and behavioural change. External factors, such as socio-cultural influences, play a substantial role. Culture, religion, and social identities shape perceptions and behaviours towards the ocean. Recognizing the diversity in society's connection to the sea, considering variables like age, gender, social values, and proximity to the coast, is crucial for tailoring engagement campaigns effectively. Politico-economic factors also significantly impact sustainable ocean-related behaviour. Ideally, supportive government policies, innovative business practices, and civil society initiatives should work synergistically. However, implementation challenges often arise due to a lack of political will, as observed in instances where governments are slow to address marine-related issues and education. Achieving effective ocean literacy requires more than imparting knowledge; it necessitates activating sustainable, ocean-friendly behaviour. Recognizing the role of women in ocean issues and overcoming moral disengagement are crucial. Moral disengagement, a key determinant of harmful behaviours, can be addressed by promoting new social norms related to ocean-friendly behaviour and disseminating them through social networks. Researchers caution against relying solely on moral and educational approaches, suggesting that incentive- and community-based strategies alone may not produce significant change. The text emphasizes the importance of fostering a new social identity and accommodating lifestyles that prioritize ocean-friendly behaviours. Small individual changes, coupled with a sense of collective efficacy and a shared commitment to starting together, can lead to meaningful contributions to ocean health.

In conclusion, modifying lifestyle choices and behaviours is essential for avoiding harm to the oceans, collectively contributing to improved ocean health. The benefits of such changes extend beyond personal satisfaction to include enhanced resource options, aesthetic improvements to coastal areas, improved water quality, and ethical and moral benefits for citizens. A major challenge to the implementation of ocean education into high school science courses was a combination of curriculum restrictions and time constraints. Teachers use the curriculum outcomes to direct their teaching and success in a course is determined by how well students are able to achieve these outcomes. Assessment policies mandate that teachers build their assessments around the outcomes, often requiring teachers to explicitly state which outcomes are being addressed on each assessment.

Table 61 Directly and indirectly ocean-literacy related topics

Lesson	Grade	Topic	Detail
Education of Environment and Climate Change	6th 7th or 8th		Human and nature / Environment problems / Global climate change / Climate change and Türkiye / Sustainable developments and eco-friendly technologies
Sciences	3rd	The structure of the world	
Sciences	4th	Human and environment / All living creatures and life	Conscious consumer
Sciences	5th	The world of all living creatures / All living creatures and life	Learning all living creatures / Biodiversity / Correlation of human and environment / Destructive natural disaster
Sciences	6th	Material and heat / Material and nature of it	Sources (Renewable energy sources)
Sciences	7th	Substance and mixtures / Material and nature of it	Domestic waste and recycle
Sciences	8th	Seasons and climate / The world and the universe	Climate and air movement
Sciences	8th	Energy conversations and environment science / All living creatures and life	Food chain and energy flow / Energy conversations / Material cycle and environmental problems / Sustainable development / Conversation of electric energy
Life Science	1st	Life at home	Using of the home resources efficiently
Life Science	1st	Life at nature	Observation and protection of the animals and plants nearby / Importance of keeping the nature and environment clean / Recycle / Seasons, characteristics of season, effects of season on the nature
Life Science	2nd	Life at home	How to use the sources and staff of the school carefully

Life Science	2nd	Life at home	Contribution of the using sources at home to the family budget
Life Science	2nd	Healthy life	Healthy diet / Personal and environmental cleaning
Life Science	2nd	Safe life	Transportation ways and vehicle types
Life Science	2nd	Life in our country	Learning location of hometown and capital of the country on map / Productive activity around nearby
Life Science	2nd	Life in nature	Conditions for the survival of animals and plants / Importance of the feeding animals and agriculture of plants / Effects of the nearby natural factors and human life / Recycle of consumed materials / Learn nature events and disasters
Life Science	3rd	Life at home	Provide original suggestions for effective and efficient use of resources at home
Life Science	3rd	Healthy life	Efficient use of resources during personal clean / Conscious consumer / Healthy nutrition
Life Science	3rd	Life in our country	Learn natural places nearby
Life Science	3rd	Life in nature	Importance of animals and plants on human life / Conditions of agriculture / Effects of human on environment / Protection of the nature and environment / Effects of recycling on people's life and environment /
Human Rights, Citizenship and Democracy	4th		Definition of human right, freedom, responsibility, respect, equality, rules and living together / Correlation between these terms / Effects of these terms on our life
School Based Social Responsibility Activities (Elective Course)	6th, 7th, 8th	Social responsibility / Social awareness / Environment and sustainability / Social health / Social cooperation / Global problems	
Project Design and Practice (Elective Course)	5th, 6th and 7th	Science, research and project /	All necessary (topic, research, reasons, effects, flow chart, problem/solutions, planning, practice, report, output) things about the develop a project
Social Sciences	4th	Culture and heritage	Investigate and learn the historical and heritage places at nearby
Social Sciences	4th	People, Places and Environment	Observe weather event and report / Understand natural and anthropic

			staff at nearby
Social Sciences	4th	Science, Technology and Society	Learn and understand the technological devices at nearby / Compare the developments of usage of the technological devices during the time / Develop ideas to design unique products based on the needs in the environment / Usage of the technological devices in harmless way against the people, animals, environment and etc.
Social Sciences	4th	Production, distribution and consumption	Conscious consumer
Social Sciences	4th	Effective citizen	Advice necessary social activities at school
Social Sciences	4th	Global connections	Learn the other countries, the neighbouring countries of Türkiye and correlation between them, compare the differences between the other countries and Türkiye
Social Sciences	5th	Culture and heritage	Introduce the natural assets and historical places, objects and artifacts / Compare the similarities and differences between where they live and the other parts of the Türkiye / Analyze the position of the cultural elements on how people live together / Understand the historical development of the cultural elements on daily life
Social Sciences	5th	People, Places and Environment	Explain the landforms on the map, effects of season on human activities with examples from daily life, effects of natural and anthropic features on population and habitation with examples / Questioning about the reasons of natural disasters and nature problems occurs at nearby
Social Sciences	5th	Production, distribution and consumption	Analyze the economic activities, jobs based on these economic activities, effects of economic activities on social life of people, the network of production, distribution and consumption of basic needs / Develop new ideas about production, distribution and consumption with collabs / Rights of the conscious consumer
Social	5th	Effective citizen	Associates individual and social

Sciences			needs, and the institutions serve to meet these needs / Learn the basic duties of the local government unit
Social Sciences	5th	Global connections	Research the position of the current place on economic relations between Türkiye and the other countries / Discuss the effects of the communication and transportation technologies on the economical activities between countries / Explain the importance of tourism on the international relations / Give examples about the common heritages in different countries
Social Sciences	6th	Person and Society	Analyze the position and role of the social, cultural and historical connections on social association
Social Sciences	6th	Culture and heritage	Learn the geographical, political, economic and cultural features of first Turkish States in Middle Asia / Effects of the religion on the changes of political, social and cultural features / Analyze the process of Turks making Anatolia their homeland within the context of the 11th and 13th centuries / Explain the role of historical trade routes on the political, cultural and economic relations between the societies
Social Sciences	6th	People, Places and Environment	Definition of continents, oceans and geographical position of Türkiye by using position and related matters / Check the geographical formations, season features and vegetation cover of Türkiye on map / Check the basic anthropical geographic features of Türkiye on map / Try to understand the features of the seasons by estimating the life of the people from the different parts of the world
Social Sciences	6th	Science, Technology and Society	Give examples about the effects of social sciences on the life of the society by researches and results on social sciences / Research by using scientific research methods / Create ideas about the effects of scientific and technologic development on the future life
Social Sciences	6th	Production, distribution and consumption	Correlation of resources of Türkiye and economic activity / Analyze the

			effects of use of the sources unconscious on the life of living being / Prepare investment and marketing project proposals by considering geographical characteristics of Türkiye / Analyze the position and importance of qualified manpower in the development of the Turkish economy / Research the personality characteristics, skills and education process required by the jobs of interest
Social Sciences	6th	Global connections	Analyze the economic relations between the other countries and Türkiye / Analyze the cultural, social, political and economic relations of Türkiye the Turkish republics and neighboring countries / Analyze the roles of Türkiye assumes in the international arena depending on its political, military, economic and cultural characteristics / Question the effects of the popular culture on our culture
Social Sciences	7th	People, Places and Environment	Makes inferences about the factors effecting the localization from past to present through the examples / Comments on the demographic characteristics of Türkiye through the factors effecting the distribution of population in Türkiye
Social Sciences	7th	Production, distribution and consumption	Evaluates the effects of developments in production technology on social and economic life / Makes plans for job preferences with considering the new job types come up with the development in the world
Social Sciences	7th	Global connections	Gives examples of international organizations of which Türkiye is a member / Recognizes the economic regions and organizations with which Türkiye has relations / Develop ideas with friends to solve glolal problems
Our City (Elective Course)	5th 6th 7th 8th		Story of city / Life in the city / Learn the city / My city is working / My time in my city
Revolution History and	8th	Turkish foreign policy during the Atatürk period	Analyze of the developments in Turkish foreign policy during the

Kemalism of Rebuplic of Türkiye			Atatürk period (Montreux Convention)
Technology and Design	7th	Requirements and Innovation	Energy conversation and design / Explain technologies to produce clean and sustainable energy by using natural resources / Design a device/tool to produce energy by using natural resources
Technology and Design	8th	Built environment and product	From nature to design / Explain the biomimicry / Analyze a product designed by biomimicry / Design a product to solve a daily life problem by using biomimicry
Technology and Design	8th	Design and Technologic Solution	Transportation technologies / Explain the basic principles to design a transportation vehicle / Classify the transportation vehicles used on different environments by their features / Design a transportation vehicle to use on different environments
Basic Life Skills (Elective Course)	5th 6th 7th 8th		Conscious consumption / Healthy Life
Biology	9th	Life Science Biology	Biology and common characteristics of living creatures / Basic compounds of living creatures /
Biology	9th	World of The Living Creatures	Diversity and classification of living creatures / Kingdom and characteristics of living creatures / Explain the contribution of the living creatures on biologic period, economy and technology with examples
Biology	10th	Ecosystem Ecology and Current Environmental Problems	Ecosystem ecology / Current environment problems and mankind / Natural resources and preservation of biodiversity
Biology	11th	Community and Population Ecology	Community ecology / Explain the factors effecting the community structure / population ecology
Biology	12th	Energy Conversations of Living Creatures	Photosynthesis / Vitality and energy
Biology	12th	Phytobiology	Structure of the plants / Substance transfer in plants
Biology	12th	Living Creatures and Environment	Living creatures and environment / Explain the effects of the natural conditions on the sustainability of

			genetic changes
Geography	9th	Natural Systems	Explain the interaction of nature and human with examples / Explain the formation and distribution of climate elements / Infer on the characteristics and distribution of various climate types / Infer on the characteristics of the climate types of Türkiye
Geography	9th	Anthropic Systems	Analyze the factors effecting the development of the settlements / Explain the factors are effective in the formation of textures and types of settlements with examples (for Türkiye as well)
Geography	9th	Environment and Society	Give examples about the ways people use the natural environment / Evaluate the changes occur due to human influence in the natural environment by depending on their consequences
Geography	10th	Natural Systems	Classify water resources on earth according to their properties / Explain the main characteristics and distribution of water resources in Türkiye / Evaluate the effects of using the water resources in Türkiye efficiently on social, economic and cultural
Geography	10th	Global Environment: Regions and Countries	Analyze the international transportation lines in terms of their regional and global effects
Geography	11th	Natural Systems	Explain the factors effecting the formation and decreasing of biodiversity / Distinguish the component that create the ecosystem / Analyze the substance cycles and energy flows in terms of ecosystem sustainability / Explain the component and functioning of the aquatic ecosystem
Geography	11th	Anthropic Systems	Compare the cities by their functional properties / Interpret the global and regional effects of cities by functionality / Classify the cities in Türkiye depending on their functionality / Evaluate the natural and anthropic systems in terms of their impact on production, distribution and consumption / Evaluate the correlation between

			production, distribution and consumption on their contribution to the economy / Explain the position of agriculture on economy of Türkiye / Explain the distribution of energy sources and mines of Türkiye / Evaluate the impact of the active usage of energy sources and mines of Türkiye on economy of Türkiye/ Explain the characteristics of industry sector in Türkiye / Analyze position of the Turkish industry on economy of Türkiye
Geography	11th	Global Environment: Regions and Countries	Relate the raw materials, production, marketplaces with trade between countries and regions / Explain the role of the tourism on interactions between the countries / Evaluate an industrialized country in terms of industrialization processes / Analyze the agriculture-economy relation of countries with different development levels
Geography	11th	Environment and Society	Classify the environment problems according to their causes / Explain the effects of mines and energy sources on environment with examples / Analyze the consumption of nonrenewable energy sources in terms of exhaustibility and alternative resources / Evaluate the usage of natural resources in the countries with different development levels by their effects on environment / Analyze the global effects of causes of environment problems and diffusion process of them / Evaluate the sustainable usage of natural resources on recycle strategies
Geography	12th	Natural Systems	Explain the extreme situation and effects of nature events / Inference about the changes in natural system in the future
Geography	12th	Anthropic Systems	Analyze the effects of dominant economic sector on social and cultural life in a region / Interpret the impact of the relation of urbanization, migration and industrialization on society / Make

			inference about possible future changes in population, settlement and economic activities / Analyze the functional regions in Türkiye based on their characteristics / Evalueate regional development projects in Türkiye in terms of their economic, social and cultural impacts / Explain the relation of the service industry with economic development of Türkiye / Explain the factors effecting the development of the transportation system / Establish a relation between the transportation networks, settlements and economic activities / Explain the development process of the transportation system in Türkiye / Evaluate historical trade routes in terms of position of Türkiye / Analyze the foreign trade of Türkiye and its place in world markets in terms of tradable products / Explain the relation between the natural and cultural symbols in Türkiye with the places they exist / Explain the tourism potential and assets of Türkiye / Evaluate the tourism policies of Türkiye in terms for their environmental, cultural and economic impacts / Evaluate the place of tourism in economy of Türkiye
Geography	12th	Global Environment: Regions and Countries	Explain the change in the positional importance of continents and oceans with examples / Evaluate the regional and global effects of locations of the countries / Evaluate the geopolitical position of Turkiye in the historical process / Compares the economic characteristics of develop and developing countries / Evaluate regional and global relations of countries in terms of natural resource potential / Explain the impact of the world's major energy transmission lines on regions and countries / Relate locational elements that cause problems between the countries with conflict

			areas of today
Geography	12th	Environment and Society	Compare the policies and practices of countries with different development levels towards preventing environmental problems / Explain the effects of environmental organizations and agreements on environmental management and protection
Economy (Elective course)			Economic sources of Türkiye / Main industries in Türkiye / Environmental problems (Environment pollution, Environmental protection, Global warming / Sustainable developments
Physics	9th	Energy	Evaluate the advantages and disadvantges of renewable and nonrenewable energy sources
Physics	9th	Heat and Temperature	Develop projects for actions to be taken against the global warming /
Climate, Environment and Innovative Solutions (Elective Course)			Explain the causes of climate changes throughout the history / Interpret the environmental effects of the climate changes / Explain the importance of natural resources in human life / Interpret the relation between ecological footprint and biological capacity / Interpret the effects of human activities on natural environment / Analyze the environmental effects of the water pollution / Assess the environmental impacts of biodiversity loss / Explain the importance of awareness about the environmental rights in solving environmental problems / Analyze economic and social projects in terms of responsibilities brough by the international environmental agreements / Evaluate innovative project examples on environmental sustainability / Explain strategies to challenge with environmental problems / Empathize with stakeholders affected by an environmental problem / Define the working problems to develop innovative solutions to the identified environmental problem / Develop

			innovative ideas for the identified working problem / Design a model for the developed innovative idea
Sustainable Agriculture and Food Safety (Elective Course)			Explain the characteristic and development of agricultural activities / Define the structure of management and organization in agriculture / Distinguish the basic components of sustainable agriculture / Analyze the practice of sustainable agriculture / Refer to agricultural activities implemented in sustainable agriculture / Explain basic concepts related to the food safety / Explain the basis components of the food production process / Distinguish the current situation of food safety in the world and in Türkiye with examples / Analyze the steps and basic problems of the food value chain
History	9th	Early Periods of Humanity	Analyze the determining influence of geography and climate on people's lives and livelihood in the Ancient Age
History	9th	World in The Middle Ages	Explain the agriculture and trade were the common economic activities in the Middle Ages with examples
History	10th	Ottoman The World Power (1453-1595)	Analyze the conquest process of Istanbul in terms of its causes and strategic consequences / Analyze the land and sea policies of the Ottoman Empire
History	10th	Ottoman Regime in The Classical Age	Explain the importance of agricultural production in the Ottoman economic system / Analyze the place of the guild organization in the Ottoman economic system and social structure
History	11th	Ottoman Politics in The Face of Changing World Balances (1595-1774)	Analyze the impact of the transportation of maritime activities from inland seas to oceans on world politics and trade
Revolution History of Republic of Türkiye and Kemalism	12th	Kemalism and Turkish Revolution	Understand the developments in economy
Turkish World	10th	Elective Course	Geographical thought and

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Geography	11th		understanding in ancient Turks / Geographical terms in ancient Turks / Turkish world in various sources / Turkish world and the Great Silk Road / The blessed geography of the Turkish world / General geographical features of the Turkish world
Chemistry	9th	Nature and Chemistry	Explain the importance of the water / Develop solution suggestions to save water and protect water resources / Explain chemical pollutants that cause air, water and soil pollution
Chemistry	10th	Chemistry All Around Us	Explain the points to be considered when choosing and consuming take-home foods
Chemistry	12th	Energy Sources and Scientific Developments	Learn the alternative energy sources / Explain the importance of sustainable life and developments for the society and environment by associating it with the chemistry / Suggest solutions to reduce the harmful effects of fossil fuels on the environment

Source 59 https://mufredat.meb.gov.tr/Programlar.aspx

5.6.2. Identifying Local Challenges

Analysing the local challenges in promoting ocean literacy and sustainable practices in Türkiye involves a comprehensive examination of various factors. One significant challenge is the scarcity of appropriate educational resources aimed at enhancing ocean literacy. The shortage of up-to-date and comprehensive materials for teachers and students on topics such as marine biology, ecosystem conservation, and water sustainability can hinder educational progress in this field. Another challenge is the limitation in access to information, particularly in inland, rural, or economically disadvantaged areas. The difficulty in accessing information resources available in libraries, schools, or online platforms may impede the development of ocean literacy, especially in regions where access is constrained. Cultural barriers also play a role, as beliefs, traditions, and habits related to seas and oceans can influence interest or indifference towards marine education and sustainable practices. Overcoming these cultural barriers, such as a general lack of interest or insensitivity to these topics, is essential for progress in ocean literacy. The impact of regional differences adds complexity to the challenges. The geographic and climatic variations across different regions of Türkiye influence the utilization of marine resources and present distinct challenges. For instance, sustainable fishing practices on coastal areas may differ from water resource management challenges in inland regions. Lack of collaboration and coordination among various stakeholders, including local governments, NGOs, educational institutions, and industry representatives, is another challenge. Inadequate dialogue among these entities may hinder the adoption of sustainable practices at the local level, emphasizing the need for effective coordination. These challenges are likely to exhibit regional variations, reflecting differences in marine ecosystems and resource utilization

practices. Understanding these variations is crucial for developing effective strategies at the local level. Addressing region-specific issues, such as pollution in the Black Sea or overfishing in the Mediterranean, requires tailored approaches.

In conclusion, prioritizing the protection of ocean resources is crucial for sustainable development. Ignoring environmental considerations during economic growth could lead to disastrous consequences in the long run. To leave a sustainable legacy for current and future generations, a shift towards environmentally friendly and coordinated policies is essential, considering the unique challenges and dynamics of each region within Türkiye.

5.6.3. Exploring Opportunities

Exploring ocean literacy and integrating the blue curriculum into Türkiye presents numerous opportunities for educational advancement and sustainable practices. Educational initiatives can be implemented by incorporating specific courses or modules on marine biology, oceanography, and environmental sustainability into school and university curricula. Additionally, training programs for educators can be developed to enhance their knowledge and teaching methods related to ocean literacy. Public awareness campaigns are crucial in informing the general population about the importance of oceans, marine life, and the significance of adopting sustainable practices. These campaigns can highlight the interconnectedness of human activities with ocean health. Partnerships with non-governmental organizations (NGOs) and research institutions offer a platform for collaboration, facilitating the exchange of information and resources. This collaborative effort can enhance research capabilities and promote a holistic approach to ocean-related challenges. Organizing workshops and seminars on the blue economy can shed light on opportunities in fisheries, marine tourism, renewable energy, and sustainable development. These events serve as platforms for knowledge-sharing and networking among stakeholders. Integrating technology and innovative teaching methods into ocean literacy programs enhances engagement and effectiveness. Online platforms offering interactive learning materials, virtual laboratories, and educational games can cater to diverse learning styles, reaching a wider audience. Curriculum development for vocational education can focus on maritime-related sectors such as fisheries, aquaculture, and maritime services. This ensures that practical skills and knowledge are imparted to individuals pursuing careers in these fields. International cooperation is essential, and collaborations with international organizations, universities, and research centers specialized in marine sciences can contribute to a global exchange of expertise and best practices. Implementing environmental management programs in schools and communities, including activities like beach clean-ups and conservation projects, instills a sense of responsibility for marine ecosystems. Promoting sustainable marine tourism practices through initiatives that emphasize responsible travel and environmentally friendly activities contributes to the preservation of coastal environments. Encouraging participation in citizen science projects related to marine biology and oceanography allows citizens to actively contribute to scientific research and monitoring efforts. In summary, by capitalizing on these opportunities, Türkiye can foster a culture of ocean literacy and contribute to sustainable practices benefiting both the environment and the

economy. Successful implementation will require collaborative efforts between government agencies, educational institutions, NGOs, and the private sector.

5.6.4. Localization and Cultural Adaptation

Localization and cultural adaptation of ocean literacy and blue economy initiatives in Türkiye are of great importance to ensure that these programs resonate with the local population.

Educational materials, resources and communication materials can be translated into Turkish to ensure accessibility and understandability. The content can be adapted to suit Turkish cultural norms, values and traditions. Local experts, academics and practitioners should be involved in the development of educational materials and curricula. Educational tools and platforms can be customized to adapt to the preferences and learning styles common in Turkish culture. By integrating ocean literacy and blue economy concepts into existing national curricula, education standards and learning objectives can be aligned. Interaction with local communities can be encouraged by organizing workshops, seminars and community events.

5.6.5. Stakeholder Analysis and Engagement

Local and national educators hold a pivotal role in the successful integration of ocean literacy into the curriculum. Their engagement is critical for effectively imparting knowledge about the seas to students. National policymakers wield influence in shaping educational policies and promoting sustainable practices, making their endorsement crucial for integrating ocean literacy and blue economy initiatives into the broader national agenda. Civil Society Organizations (CSOs), particularly environmental NGOs, are key advocates for sustainable practices and public awareness. Collaborating with these organizations can amplify the impact of the project.

Local communities, especially those in coastal areas, directly interact with the ocean and are impacted by blue economy practices. Their involvement ensures that initiatives are culturally sensitive, and their feedback is crucial for project success. Engagement with representatives from fisheries, tourism, and other marine-related industries is vital, as their support is crucial for promoting sustainable business practices within the blue economy framework.

Collaboration with marine researchers and scientists contributes to the development of evidence-based educational materials and the implementation of sustainable practices. Media outlets play a significant role in influencing public opinion. Building relationships with journalists and media organizations ensures accurate and widespread coverage of the project, fostering public awareness.

Various engagement and collaboration strategies can be employed:

- Workshops and training programs for educators, policymakers, and CSOs can provide insights into the importance of ocean literacy and the potential benefits of the blue economy.
- Policy advocacy campaigns can target policymakers to emphasize the significance of integrating ocean literacy into the national curriculum, providing evidence of positive impacts on education and sustainable development.
- Community-based projects in collaboration with local communities ensure that initiatives align with local needs and values, fostering a sense of ownership and support.
- Partnerships with environmental CSOs can involve collaboration on awareness campaigns, beach clean-ups, and other initiatives to actively involve civil society in promoting ocean literacy and sustainable practices.
- Roundtable discussions with industry representatives can discuss the economic benefits of sustainable practices and encourage industry commitments to environmental responsibility.
- Scientific collaborations can ensure the accuracy and scientific validity of educational materials, with engagement in public outreach events enhancing credibility.
- Media partnerships can be forged for feature stories, interviews, and documentaries, leveraging media coverage to reach a wider audience and create a positive narrative.
- Public events and festivals centered around ocean themes engage the broader community and attract media attention, fostering a positive public perception of the project.

- Online platforms and social media campaigns can utilize interactive campaigns, engaging stakeholders through webinars, live sessions, and discussions for widespread participation and inclusivity.

- Implementing feedback mechanisms to continuously assess the impact of the project is crucial, regularly seeking input from educators, policymakers, and communities to adapt strategies based on real-time insights.

In summary, the success of the ocean literacy and blue economy project in Türkiye relies on a comprehensive stakeholder engagement strategy, involving educators, policymakers, civil society, local communities, industry representatives, researchers, and media. This inclusive approach can contribute to a more informed and sustainable approach to ocean-related practices.

5.6.6. Policy and Implementation Recommendations

Advocacy for the inclusion of ocean literacy and blue economy concepts in the national curriculum at all levels of education is essential for widespread integration. Special training programs can be designed to equip educators with the necessary knowledge and pedagogical tools for effective ocean literacy teaching, ensuring that they are well-prepared to deliver the curriculum. Encouraging interdisciplinary approaches is crucial, promoting teaching methods that seamlessly integrate ocean-related topics into various

subjects. This approach enhances the holistic understanding of the ocean's significance across different academic disciplines.

The development of educational materials plays a vital role in supporting the curriculum. Creating materials that align with the curriculum, are comprehensive, and culturally appropriate ensures that students receive relevant and engaging information about ocean literacy and the blue economy. Facilitating partnerships between educational institutions and private enterprises in maritime-related industries is another key recommendation. These collaborations enhance the practical applicability of ocean literacy concepts, providing students with real-world insights and opportunities. Allocating funding for research and development grants focusing on marine sciences promotes continuous advancements in understanding and teaching ocean-related topics. This financial support encourages researchers and educators to contribute to the knowledge base in marine sciences. Introducing economic incentives for businesses adopting sustainable practices within the framework of the blue economy is a proactive measure. Incentivizing sustainable practices aligns economic interests with environmental conservation, fostering a balance between growth and ecological responsibility. These policy and practice recommendations collectively aim to create an enabling environment for the successful integration of ocean literacy and the promotion of sustainable practices in Türkiye's blue economy. Collaborative efforts involving government bodies, educational institutions, businesses, and communities are deemed essential for the long-term success of these initiatives. By uniting diverse stakeholders, Türkiye can pave the way for a more informed, environmentally conscious, and sustainable approach to ocean-related education and practices.

5.6.7. Sustainability and Long Term Impacts

Ensuring the enduring presence of ocean literacy and blue economy concepts in the national curriculum involves their institutionalization within the education system. This includes embedding these topics in curriculum standards, textbooks, and teacher preparation programs, ensuring their seamless integration into the educational framework. Creating a framework for continuing professional development for educators is crucial for sustaining their knowledge and expertise in ocean literacy. This ongoing training ensures that educators remain well-informed about the latest developments and teaching methodologies in the field. Establishing a collaborative network among stakeholders, including educators, policy makers, NGOs, and industry representatives, fosters a collective approach to advancing ocean literacy and blue economy initiatives. This collaboration enables the sharing of resources, ideas, and best practices, enhancing the overall impact of these programs. Implementing a robust monitoring and evaluation framework is essential to assess the long-term impacts of ocean literacy programs. Regular evaluation provides insights into the effectiveness of educational initiatives, allowing for adjustments and improvements to ensure sustained positive outcomes. Aligning ocean literacy and blue economy initiatives with the United Nations Sustainable Development Goals (SDGs) ensures that these efforts contribute to broader global sustainability objectives. This alignment provides a framework for measuring the projects' impact on a larger scale. Establishing a research and

innovation centre dedicated to marine sciences and sustainable blue practices serves as a hub for ongoing research, technological advances, and the development of best practices. This centre can play a pivotal role in advancing knowledge, fostering innovation, and providing a resource for continuous improvement.

Promoting ongoing public-private partnerships for financing ensures sustainable financial support for ocean literacy and blue economy initiatives. Collaborative funding models involving both public and private sectors contribute to the long-term viability of these programs. In summary, sustainability and long-term impacts necessitate a comprehensive and adaptable approach that includes ongoing collaboration, continuous learning, and a commitment to integrating ocean literacy and blue economy practices into the fabric of Turkish society for generations to come. This holistic approach ensures the enduring success and positive influence of these initiatives over time.

6. Conclusion

6.1. Austria

6.1.1. Summary of Main Findings

The challenges of ocean literacy in Austria are evident through interviews with school teachers and headmasters, revealing gaps in water literacy education. School teachers express certain level of unfamiliarity with ocean literacy, which can be attributed to a notable lack of awareness. Curriculum challenges arise from its inherent complexity and shared responsibility for development, implementation and monitoring among several levels of public authorities, hindering the prioritization of water-related topics in an effective and timely way. Teachers' approaches vary, highlighting insufficient support and motivation due to a lack of well-organized and accredited teaching resources. The curriculum primarily focuses on local water bodies, neglecting global perspectives until the 4th grade. Limited in-service training programs exacerbate the issue.

Opportunities were identified in regard of collaboration with non-formal knowledge and education providers. The analysis emphasizes non-formal institutions' potential in material development, collaboration and engagement beyond schools and classrooms. Teacher training courses, cross-curricular material, and thematic anchoring of the curriculum emerge as impactful strategies. Shifting towards a global perspective, leveraging student enthusiasm, interdisciplinary approaches, and university-school partnerships present avenues for improvement, crucial in landlocked Austria for fostering ocean literacy.

The analysis shows that there is already a good level of knowledge about the relevance of water-related issues in a local context. This is not least due to the fact that the various stakeholder groups are actively involved in disseminating water projects.

There is a particular need to improve the international dimension in Austria: the global perspective regarding ocean literacy efforts need to be promoted in order to identify possible solutions for the present and upcoming challenges. One way of doing so is to support and promote international initiatives such as the Network of European Blue Schools among Austrian schools.

6.1.2. Impact and Contributions of the Project

As stated in Chapter 5.07 - Sustainability and long-term impacts, the impact of SHORE in the longer run is difficult to estimate.

Nevertheless, with the collaborative open schooling approach and the Open Calls to fund water-related projects, the implementation team in Austria is confident to achieve a long-lasting impact.

Beside the funding possibilities for schools, the Country Hub's community activities and events will be crucial to foster a shift from the mainly local to the international and global perspective in the community in Austria.

6.1.3. Recommendations for Future Research

The Austrian academic and non-academic research landscape is actively engaged in exploring national and international aspects of ocean literacy. The widespread international connections of Austrian research institutions provide a comprehensive overview regarding ocean literacy.

There are several possibilities for future research projects focusing on water. Firstly, there is a need to investigate how scientific knowledge can be effectively communicated to the broader society, ensuring that crucial points and the urgency of the matter resonate with the general population - also taking into consideration the implications of diversity and inclusion. These challenges extend beyond water-related issues and are fundamental to bridging the gap between science and society.

Secondly, additional research (see Chapter 2.3 - Gaps in literature) is required to understand the connections between water literacy and its incorporation into everyday school life. Exploring the preferences of (prospective) teachers regarding information, materials and support for a forward-thinking educational approach as well as identifying the topics most relevant to students is essential for enhancing water education in schools.

6.1.4. Implications for Policy and Practice

This base analysis underscores the crucial need for a comprehensive policy framework to enhance water-related literacy in Austria, despite existing valuable resources and initiatives. The proposed policy recommendations aim to bridge existing gaps and promote a holistic approach to water education.

From establishing centralized coordination to the strategic embedding of ocean literacy and providing accredited material and guidelines for everyday school life, the implications for policy and practice are manifold. Implementing such policies can create

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a comprehensive water education environment, empowering future generations to address water-related challenges effectively.

6.1.5. Limitations and Future Work

SHORE aims to deepen the knowledge and understanding of aquatic ecosystems and sustainable water management (blue literacy) among primary and secondary school teachers, educators and students.

However, the lack of studies and surveys on teachers' approaches, challenges and priorities in teaching ocean literacy topics results in gaps within this current analysis. Conducting surveys among teachers would be highly beneficial for any future comprehensive analysis of topics addressed in school. Such surveys are not limited to water-related topics but can be undertaken for most topics included in the curriculum. Understanding their needs, difficulties and aspirations in teaching ocean literacy can provide valuable insights to researchers and non-formal educational providers. This in turn will enable projects such as SHORE to tailor their initiatives more effectively, address specific concerns and improve the overall impact of their educational provision. The input and perspective of teachers is crucial for refining strategies, developing relevant materials and ensuring that their teaching practice aligns with the curriculum. By incorporating educators' perspectives in a co-creative manner, SHORE can address existing gaps and provide a more specific and impactful approach to water education in schools.

6.1.6. Applicability of Results

This base analysis clearly indicates the efforts that stakeholders have invested in promoting water literacy on the local level across Austria. As a result, there is a solid foundation for promoting awareness and understanding of water-related issues.

Despite the considerable efforts at the local level, sufficient opportunities remain for SHORE to make an important contribution. This is especially true for promoting the global dimension of ocean literacy. One striking observation is the apparent lack of a more holistic perspective towards ocean literacy in Austria, in schools and beyond. Shaping the understanding of the importance of the ocean and our world-wide water system regarding the everyday life is crucial for tackling (future) challenges. According to the base analyses, Czechia detected similar issues, which could be caused by the fact that both are landlocked countries and therefore ocean related issues are not as immanent. With its international consortium, SHORE provides an opportunity to address this gap effectively. By fostering collaboration with global partners, SHORE can bring different perspectives, experiences and best practices into focus. This international approach ensures that the initiatives taken by SHORE are not only regionally relevant, but also fit into the broader global effort to protect our oceans.

Furthermore, SHORE recognizes the importance of collaboration and the sharing of resources on an international scale. Through its initiatives, SHORE actively promotes and engages with international initiatives and alliances. By participating in global dialogues and partnerships, SHORE not only contributes to the broader discourse on

ocean literacy but also gains valuable insights and resources to strengthen its impact locally.

One of the key areas for improvement identified in the research is the need for educational materials and support for teachers. Educators play a critical role in developing the understanding of the next generation's understanding of environmental issues, including ocean and water literacy. As a core element, SHORE has committed to develop a comprehensive collection of resources and provide support for the implementation of projects under Work Package 2 and 3 (WP2/WP3). This enables teachers to "find the blue" – together with school students – and to seamlessly integrate ocean literacy into their lesson plans while promoting a sense of environmental responsibility in society.

In summary, while local efforts have established a solid foundation for ocean literacy, the global perspective remains a critical aspect that SHORE is uniquely able to approach. The international consortium, dedicated educators and the numerous local and global stakeholders in global initiatives make SHORE a powerful force in promoting ocean literacy. For the future, SHORE's commitment to a holistic and global approach in Austria may have a lasting impact in how the oceans are perceived, understood and will be protected.

6.2. Czechia

6.2.1. Summary of Main Findings

The findings highlight the growing importance of ocean literacy as a vital and developing subject of study. A notable increase in publications serves as evidence of the growing recognition of its importance. Ocean literacy encompasses a wide range of academic areas, from the ecological subtleties of oceans to the socio-economic effects of human activity on marine environments. In particular, the research acknowledges that in order to address current gaps, worldwide collaboration is required, and cooperative efforts involving researchers, practitioners, politicians, and industry are encouraged.

One striking finding is an absence of studies on ocean literacy that are specifically focused on the blue economy. The project emphasizes how important it is to conduct focused multidisciplinary research to close this gap. To fully address issues, collaborative studies combining economics, social sciences, and marine biology are emphasized as crucial. This signifies a crucial area for future research and underscores the interconnectedness of disciplines required for a holistic understanding of the blue economy.

Moreover, research topics are becoming more varied. The biological importance of oceans and the socioeconomic effects of human activity on marine habitats are just two examples of the diverse range of research topics. Furthermore, OL study investigates how well educational outreach initiatives contribute to a greater public awareness of marine habitats. Scientific Developments: Research examines state-of-the-art findings in oceanography, climate change, and marine biodiversity, contributing to robust scientific foundation.

Ocean literacy encompasses a broad range of research issues, including the biological importance of oceans, the socio-economic effects of human activity on marine habitats, cultural dimensions, and educational approaches. Scientists investigate the ecological significance of oceans, focusing on marine ecosystems, biodiversity, and the effects of climate change on ocean health. Research on the socio-economic effects of human activity on marine habitats, such as the economic value of oceans, sustainable resource management, and the effects of overexploitation, goes beyond ecological considerations. Research on how societies view and engage with marine environments also focuses on the cultural relevance of oceans. Furthermore, educational techniques that improve ocean literacy across a range of demographic groups are becoming increasingly important. These strategies incorporate technological advancements like virtual reality, online learning platforms, and digital tools.

The need for multidisciplinary cooperation has shown repeatedly during the project. This encompasses global author collaboration as well as the integration of decision-makers, the scientific community, industry, and relevant specialists. The results highlight the significance of cultivating coordinated and interdisciplinary cooperation in order to attain more robust and stable collaborations. The evolution of research on ocean literacy is significantly influenced by cooperation and networking. International cooperation between scholars, universities, and organizations has expanded as a result of OL's rise to prominence. In order to facilitate collaboration, networking platforms and conferences devoted to exchanging research findings and best practices have been established. In addition, blue economy-related industries are becoming interested in OL research, which opens up possibilities for collaborations that connect theoretical understanding with real-world implementations. Essentially, the growing emphasis on ocean literacy highlights a paradigm change in the way academic recognition is acknowledged, taking it from the margins to the centre and becoming a vibrant field. The wide range of study areas highlights how ocean literacy is complex, with ecological, socioeconomic, cultural, and technical aspects. This makes ocean literacy a comprehensive and interdisciplinary domain of study. All things considered, the synthesis of study results offers a broad overview of the complex terrain that is ocean literacy, the blue economy, and education. It functions as a thorough resource that condenses the complex insights obtained from the project's investigations, setting the stage for future research projects in these vital areas, policy formulation, and informed decision-making.

6.2.2. Impact and Contributions of the Project

In the areas of ocean literacy and the blue economy, the SHORE Project plays a key role in igniting substantial effects and contributions. An evaluation of the project's impact on society and science is given in this section.

The project has a variety of effects, but it especially advances ocean literacy and promotes a better comprehension of the blue economy. The project has been crucial in influencing educational perspectives and advancing sustainable practices in Czechia through focused initiatives. Students, teachers, and the general public today have a better understanding of the interdependence of ocean systems, the dynamics of climate change, and the financial implications of the blue economy.

The project's focus on creating multidisciplinary curriculum has served to make environmental education more comprehensive. The SHORE Project makes sure that participants have a thorough awareness of environmental issues by combining meteorology, climatology, geological history, the carbon cycle, and climate change mitigation and adaptation. The project's impact is further enhanced by the inclusion of customized educational activities that cater to particular challenges and possibilities in the Czech environment.

The SHORE Project produces knowledge that benefits not only its immediate members but also the scientific community and larger society. Scientifically speaking, the project has improved academic research by offering complex insights into the dynamics of environmental consciousness, the efficacy of ocean literacy initiatives, and the incorporation of blue economy ideas into the curriculum.

The project's conclusions provide important information to the worldwide conversation about sustainable practices and ocean literacy. Through its focus on the special opportunities and problems faced by the Czech Republic, the SHORE Project acts as a prototype for customized environmental education programs around the world. The focus on demographic-specific campaigns, regional workshops, and gender-sensitive initiatives shows a dedication to diversity and aligns with larger societal objectives.

The SHORE Project promotes environmental awareness and responsible citizenship at the social level. Through education and constructive behavioural adjustments, the project helps develop environmentally conscious people who can take an active role in sustainable practices. The ongoing incorporation of blue economy concepts into education and their subsequent impact on decision-making processes are expected to have a long-term social impact.

6.2.3. Recommendations for Future Research

One potential research area is integration of blue economy to the ocean literacy programs. This entails appreciating the economic importance of marine ecosystems as well as knowing how to successfully apply these ideas to educational initiatives to improve the general public's understanding. Further studies should Examine how instructional materials, modules, and curricular modifications that smoothly incorporate the concepts of the blue economy are designed and implemented and Examine how these improvements can improve the learning environment and give students a comprehensive grasp of the social, environmental, and economic aspects of the blue economy for the purpose of creating cutting-edge instructional resources that appeal to a variety of learners and resonate with different audiences.

Also, research should specifically focus on the Blue Schools; its potential, role, techniques and how to further develop it. It is essential to examine the ways in which Blue Schools might function as creative arenas for cultivating a profound comprehension of the social, environmental, and economic aspects of the blue economy. Furthermore, the research should examine how to include case studies and real-world applications pertaining to Blue Schools in teaching initiatives. And they should examine how, in the context of blue schools, exposure to real-world examples from the blue economy sectors might enhance students' learning and promote a

practical grasp of the economic activities associated with the seas. The distinctive function and influence of Blue Schools as cutting-edge instructional frameworks for advancing ocean literacy and the ideas of the blue economy can be explored in future research. The Blue Schools concept's scalability and replicability in light of its possible role in promoting the general adoption of sustainable practices and economic consciousness and the ways in which Blue Schools might act as catalysts for paradigm shifts in education and community involvement require further attention for future.

Another important research area is cultural relevance and adaptation. When developing a curriculum, taking into account the cultural context to make sure that the teaching materials are appropriate and relevant for the target culture is key. Examining how social norms and cultural narratives affect how the blue economy's tenets are embraced and integrated, especially in areas with a varied population would be highly beneficial. Moreover, designing instructional strategies that are culturally relevant to the area so that the material is more impactful and practical.

Another key point for research is how to incorporate ocean literacy and blue economy principles into educational programs with the use of technologically improved learning tools. Examining how well online simulations, interactive digital platforms, and virtual reality experiences can create immersive and interesting learning environments is very significant. Additionally, examining how technology, particularly for younger generations acclimated to digital learning, might support a greater ocean literacy and comprehension of blue economy themes would be beneficial.

6.2.4. Implications for Policy and Practice

Developing a sustainable and ecologically aware society in Czechia requires integrating ocean literacy and blue economy principles into educational policies in a seamless manner. It is recommended that policymakers take into account the distinct circumstances of Czechia, a nation that is landlocked, and devise approaches that give precedence to ocean literacy as a fundamental component of educational modifications. By including modules on the blue economy and ocean literacy into relevant disciplines, Czech educational policies should place a strong emphasis on meaningful curriculum improvements. Policies can especially address the interconnection of scientific understanding, economic principles, and environmental sustainability within the Czech context, given the country's landlocked status. Environmental and ocean literacy should be seamlessly integrated into all academic areas, in accordance with Czech educational policies. Guidelines for an interdisciplinary approach that takes into account the particular environmental setting of Czechia can be supported by policymakers. Enforcing teacher training programs with a primary focus on ocean literacy content in Czech schools will strengthen the country's overall environmental education agenda. It is essential to provide Czech educators with specific training on the concepts of the ocean literacy and blue economy. Its main goal is to provide educators with the information and abilities they need to teach blue economy topics. Developing e-learning modules that are available to educators and students alike will promote thorough comprehension and interaction with the tenets of the blue economy. Despite geographical limitations, these strategies guarantee that students gain a thorough awareness of global environmental concerns.

A crucial first step is to look for governmental support for ocean literacy and blue economy education inside Czechia's national governance system. To guarantee ongoing assistance, the government, academic institutions, and blue economy sectors should form public-private partnerships. Encouraging the incorporation of environmental literacy as an enduring element of national education policies, supported by specific financial pledges, will facilitate the ongoing development and execution of environmental literacy programs. Collaborations between Czech educational institutions and industries related to the blue economy should be decisively encouraged by policymakers. The integration of ocean literacy into policy frameworks can serve as a means for Czech policymakers to foster industry-acaalogous relationships. In order to give pupils a better awareness of the Czech Republic's involvement in sustainable practices, educational materials should highlight the particular uses and applicability of blue economy ideas to the Czech setting.

Within vocational guidance programs, Czech educational policy ought to emphasize the significance of ocean literacy. The incorporation of innovation and sustainability as essential elements of blue economy job pathways might be emphasized by policymakers. Through the prioritization of ocean literacy in career guidance programs, Czechia can guarantee that its labour force is proficient in navigating and contributing to the sustainable blue economy, aligning with global trends.

Policymakers should focus on targeted initiatives for various demographic groups. Awareness campaigns tailored to the unique needs and preferences of Czech people should be part of policy. To make sure that targeted initiatives related to ocean climate change issues are relevant to the various challenges faced by different places within Czechia, region-specific workshops can be incorporated into legislation.

International forums for collaboration on best practices in ocean literacy should be actively supported by Czech educational policies. Legislators should push for knowledge-sharing networks that facilitate the international sharing of effective tactics, resources, and best practices related to ocean literacy. In order to respect its own geographical setting and establish Czechia as an active member of the international ocean literacy community, collaborative research projects with other states are being undertaken. These specific policy ideas highlight how crucial it is to include ocean literacy at the centre of Czech educational changes. Czech policymakers can set the path for a generation of knowledgeable citizens prepared to contribute to a sustainable blue economy even in the absence of direct maritime environments by contextualizing the methods to the country's unique requirements and difficulties.

It takes strategic preparation and attention to the particular circumstances of the nation to integrate ocean literacy and blue economy concepts into the Czech educational framework. Comprehensive training materials covering the scientific elements of ocean climate change as well as practical communication techniques ought to be created for Czech teachers. Programs for ongoing professional development can guarantee that educators remain current with advances in environmental science and pedagogy, with a focus on the particulars of ocean literacy in the Czech setting.

Students and community members in Czechia can be engaged through the creation of user-friendly online platforms that provide interactive modules, webinars, and virtual field trips. It is advised to create digital learning platforms tailored to Czech blue economy education that include interactive information, case studies, and virtual tours.

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To promote lifelong learning, educational applications with interactive challenges, tests, and information readily available should be created. Geographical restrictions can be removed by using these digital tools to give Czech citizens immediate access to ocean literacy content. Also, to provide ocean literacy instruction in Czech schools a real-world component, partnerships with outdoor education providers can be formed to arrange field trips and nature-based learning opportunities. Promoting project-based learning in schools, where students actively work to solve authentic environmental problems, guarantees that ocean literacy is not only abstract but also deeply ingrained in practical applications.

Working together with Czech environmental organizations is crucial to getting access to workshops, expert speakers, and instructional materials. Together with practical environmental protection projects, joint collaborations with NGOs can integrate educational efforts. This approach complements Czechia's distinct environmental surroundings while simultaneously amplifying the impact of ocean literacy programs.

It's a proactive move to start a pilot Blue Schools program in a few Czech schools to examine how blue economy ideas can be incorporated into different topics. Despite geographical limitations, this project should incorporate experiential learning elements that give students real-world knowledge, like field visits and practical encounters in blue economy industries.

6.2.5. Limitations and Future Work

A significant constraint of the Blue Schools program in the Czech Republic is the possible obstacle presented by the slow curriculum reform in the nation's educational system. Adoption of the Framework Educational Program (FEP) in 2007 was the final major change to the Czech educational system. There haven't been many improvements to the curriculum since then, and any significant changes call for a methodical and lengthy procedure. Amending the curriculum may require several stages such as initiation and proposal, consultation and expert input, government approval, implementation planning, teacher training and such bureaucratic character may require a longer period of time that the project time period has.

Roadmap for Future Studies

The SHORE Project provides insightful information about possible topics for investigation and development, setting the stage for future research. Future research should think about using longitudinal designs to solve temporal restrictions. This will enable a deeper understanding of changes in ocean literacy and blue economy awareness over a longer period of time. This method may be able to more fully capture society changes, educational trends, and seasonal variations.

Increasing the research's geographic focus is essential to developing a comprehensive knowledge of ocean literacy. Subsequent research endeavours may include a more heterogeneous sample that encompasses different regions, urban and rural locations, and demographic subgroups within the nation of Czechia. This strategy would highlight regional variations in awareness, allowing for customized treatments for certain groups.

It is advised that research methodologies be continuously monitored and adjusted in order to reflect the dynamic character of educational policies and societal dynamics. Subsequent research endeavours ought to institute protocols for instantaneous data gathering, guaranteeing that conclusions sustain pertinence and correspond with the existing societal and pedagogical milieu. In order to promote a more responsive and adaptable approach to environmental literacy programs, collaborative efforts with educational institutions and policymakers can facilitate the incorporation of research findings into policy creation and instructional practices.

6.2.6. Applicability of Results

Although landlocked nations do not generally embrace the idea of "blue schools," neighbouring countries like Germany, Austria, and Switzerland have embraced cutting-edge teaching methods that incorporate sustainability and environmental themes. The implementation of blue schools in these adjacent nations can provide Czechia with ideas and a model for adaption. These landlocked countries have effectively developed initiatives that highlight the significance of water resources, conservation, and sustainability, even though they do not share direct access to maritime surroundings.

Even in a landlocked setting, the experiences of Austria, Germany, and Switzerland in creating water-related educational programs might provide Czechia important lessons. Czech educators and policymakers can adapt and implement similar techniques that emphasize the importance of water resources, such as rivers and lakes, and are in line with the local context by analysing the strategies, curricula, and outcomes of blue school programs in these adjacent countries.

The common dedication to environmental education, even in areas without direct access to the ocean, makes the blue school concepts from surrounding nations applicable to Czechia. In line with the general objectives of ocean literacy and environmental education, including these experiences into the Czech educational system can provide a greater understanding of aquatic ecosystems, conservation strategies, and sustainable development. This international learning exchange makes cutting-edge teaching strategies more applicable, which advances the larger objective of producing environmentally conscious and responsible citizens.

An essential component of enhancing Czechia's Blue Schools program is international cooperation and knowledge sharing. By forming alliances with other nations, particularly those that share landlocked features such as Germany and Austria, Czechia will have access to a multitude of knowledge and experiences related to environmental education. Geographical boundaries cannot impede collaborative efforts, which promote a dynamic exchange of concepts, strategies, and effective methods. Establishing collaborative research projects and efforts with academics, researchers, and politicians from Czechia and its neighbours is a crucial component. It is possible to set up shared platforms where researchers, educators, and creative ways to include ocean literacy into curriculum can share their discoveries. This cooperative strategy draws on the advantages and distinctive experiences of each participating nation to guarantee a varied viewpoint.

Incorporating local environmental features is a critical component of Czechia's Blue Schools initiative that improves the applicability and efficacy of ocean literacy initiatives. Students and their local ecosystems can have a deeper connection if

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educational materials are customized to suit the unique natural setting of Czechia. The emphasis on landlocked characteristics and the particular environmental difficulties encountered by a nation without direct access to the ocean is one important feature. Course materials might explore the interdependence of water systems, highlighting the significance of inland water bodies such as lakes and rivers within the larger framework of the global water cycle. This strategy not only respects the topographical reality of Czechia but also instils a sense of responsibility for the local environment.

The curriculum can also emphasize how local water ecosystems are impacted by human activity. The instructional content might include essential elements on subjects like biodiversity preservation in landlocked areas, freshwater resource conservation, and water pollution. This makes sure that students understand the general ideas of ocean literacy as well as how directly they relate to the environmental issues that Czechia is currently facing. Field trips to nearby water bodies are examples of experiential learning that can strengthen the link between classroom instruction and practical applications. Students can participate in practical projects such as monitoring ecosystems, assessing water quality, and local conservation efforts. These encounters broaden their awareness of environmental issues and provide them with the tools they need to take an active role in preserving the ecosystems in their communities.

Students may also find inspiration from the inclusion of regional case studies and success stories. The curriculum encourages students to take an active role in maintaining their local environment by highlighting individuals or communities in Czechia that have made significant contributions to environmental conservation. This develops a sense of pride among students. Essentially, the inclusion of regional environmental features guarantees that the Blue Schools program is firmly grounded in the unique possibilities and difficulties that exist in Czechia, while simultaneously being informed by global best practices. A more meaningful and long-lasting educational framework that connects with pupils and fosters a sincere commitment to environmental stewardship within their particular regional setting is produced by this localized method.

6.3. Hungary

6.3.1. Summary of Main Findings

Based on the analysis, the following conclusions can be drawn for Hungary:

1. The protection of oceans and seas and their environmentally conscious use are only tangentially addressed in the curriculum, with less emphasis than their importance.
2. Teachers present the topic of water protection (rivers, lakes) mainly through projects. Project days are popular with students and their importance cannot be disputed.
3. The Blue School network has been unknown to schools in Hungary, but there has been a relatively high level of interest and willingness to join. The school projects to be carried out in the Shore project could help to increase interest.
4. There is no comprehensive source of information or educational aid on the importance of the oceans and the major rivers that feed them in Hungary.

Based on the analysis, the following actions are proposed:

1. It is first of all the principals and teachers who need to be made aware of the issue, convinced and informed, and then they can introduce it into school activities.
2. Information should be provided to principals at the institutional level and to teachers at the student and class level.
3. The preparation and involvement of teachers is facilitated by an information material (curriculum) for students that is short, understandable and exciting. The material should be complemented by supporting materials for teachers (e.g. project ideas, lesson plans).

6.3.2. Impact and Contributions of the Project

Education on water-related topics in Hungary largely depends on the activities and positive support of individual teachers, and SHORE offers the opportunity to plan and implement these activities. When these activities and projects are successfully completed, most of them become part of the local school (curricular or extra-curricular) activities, thus providing longer-term impacts. Projects and supported activites like SHORE can contribute to implement project ideas that schools would find difficult or impossible to implement on their own and offer opportunities to strengthen collaboration.

6.3.3. Recommendations for Future Research

Based on the analysis provided earlier, we recommend the following future research on water literacy and societal attitudes:

1. Studies and surveys on teacher attitudes and approaches, challenges and priorities for water and ocean literacy and activities.
2. Study on the impact and attitude change of students and teachers involved in SHORE school projects.
3. Studies on the Blue Schools Network, its potential, challenges, results and how to further develop it.

6.3.4. Implications for Policy and Practice

Awareness raising and positive attitudinal change can be initiated mainly in schools, through curricular and extra-curricular activities. Teachers and school principals are key players in this.

The key players (teachers) are open to include water and ocean literacy into curricula and open school activities. With the right information and background materials, their activities and attitude can be increased. Support for school projects, networking, the production of additional teaching materials and guides will provide a good basis for this

6.3.5. Limitations and Future Work

SHORE aims to deepen knowledge and understanding of aquatic ecosystems and sustainable water utilization among primary and secondary school teachers, educators and students.

However, there is still lack of studies and surveys on teacher attitudes and approaches, challenges and priorities for water and ocean literacy and activities. Surveys among teachers should be useful for a comprehensive analysis, even on international level.

Understanding teacher opinions, needs, difficulties and aspirations can provide more valuable input for researchers and (formal or non-formal) educational entities.

6.3.6. Applicability of Results

The key findings of this study, focusing on Hungary, can be adopted to all landlocked countries. However, the situation can be slightly different for countries having sea and ocean shores.

The analysis and the findings are to support and align the concept of SHORE and similar projects. It will be very important to have feedback, analysis on the results of the activities in SHORE and other, literacy supporting projects.

6.4. Italy

6.4.1. Summary of Main Findings

Ocean literacy, encompassing interconnected ideas like the blue economy, marine life, ecology, and the vital role of water in human life, appears to be a widely embraced concept. This aligns with a basic awareness of the impacts of global warming and a growing interest in the sea. However, there is a lack of clarity in the details within these concepts.

While a significant portion of the Italian population recognizes the importance of safeguarding future generations, a notable 17% is ready to actively participate in necessary changes. Motivation, particularly among the younger demographic, is evident and ready to be harnessed. Despite this, specific goals and the means to achieve them remain somewhat abstract. The majority is unfamiliar with key elements, such as actors in the blue economy, policies promoting sustainable water and sea use, and individual actions beyond basic water conservation habits.

The concept of the Blue School, although not widely known, was well-received among respondents. It involves participating schools pledging to enhance environmental awareness, particularly regarding oceans. The community perceives education as crucial in addressing these issues, making projects supporting educational efforts align with public expectations.

Italy boasts a significant presence in the blue economy, although there is room for growth. According to the EU Blue Economy Report (2019), Italy falls within the EU average, trailing behind countries like Spain but surpassing other economically influential founding members. Its coastline, a major tourist attraction, hosts sought-after sightseeing locations. Coastal extraction of bioproducts, including mussels, and fishing activities, benefit from recent stock regrowth in certain sectors.

The Italian blue economy has emerged as a strength in the country's economic landscape, with most actors reporting growth and profits. However, the sector is diverse, comprising various maritime activities, making it challenging to obtain unified answers or positions. Any initiative related to ocean literacy must consider the local context and engage in meaningful dialogue to equip students and educators with the necessary insights to comprehend this multifaceted sector.

Major Themes and Trends: The predominant trend centres around the motivation of upcoming generations to enhance not only their own ocean literacy but also that of their peers. This collective effort could potentially cultivate a critical mass of water-literate citizens capable of influencing policies at various societal levels.

A substantial number of survey respondents expressed a keen interest in delving deeper into ocean-related knowledge. However, the absence of specific data makes it challenging to conclusively determine whether this interest pertains to local or global perspectives. Their limited awareness of key players in the blue economy, such as the tourism sector, underscores the substantial room for improvement in ambitious initiatives aimed at the general public.

The Italian education system presents an opportune framework for school-based initiatives. Individual schools benefit from considerable autonomy, complemented by overarching regional school governing bodies disseminating essential guidelines and core concepts. This flexibility proves advantageous in a country marked by diverse landscapes, nature, and varying material capacities for students. Although these disparities persist, consistent and purposeful support from the Ministry could help alleviate them. Special attention should be directed towards both the material capacities of schools and the geographical distances from water bodies.

While the Ministry has translated certain UN documents and promotes general ocean literacy, individual efforts within schools have not been idle. Many schools have introduced extracurricular activities that, while not exclusively focused on water, align with broader eco-conscious contexts relevant to local situations. Local non-governmental organizations (NGOs) have played a pivotal role by offering assistance and references to initiatives undertaken by schools and teachers. These NGO programs enjoy endorsement from state officials and often stem from grassroots initiatives. Consequently, the Italian education system stands to gain significantly from

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well-coordinated citizen awareness campaigns. Such initiatives should aim to provide financial and instructional material support to teachers spearheading projects, fostering a collaborative approach.

Anticipated responses from actors in the Blue Economy in Italy suggest a positive reception to educational projects aimed at enhancing student knowledge about the sector. These initiatives, encompassing both challenges and opportunities faced by the Blue Economy, hold the potential to garner support and cooperation from key industry players.

6.4.2. Impact and Contributions of the Project

The SHORE project aims to offer assistance and support to school systems interested in developing ambitious curriculum projects, thereby enhancing local awareness of water and the sea. Although the precise impact of the SHORE project remains uncertain, it is evident that the conditions conducive to achieving its objectives exist within the Italian context. The participation of Italian schools in the Network of European Blue Schools is relatively limited compared to other nations, and there is a lack of national coordination on ocean literacy. Consequently, the project's potential to garner widespread support, particularly through a platform providing financial aid to relevant initiatives, is substantial.

Notably, regions facing economic challenges stand to benefit significantly from financial support, with allocation proportional to wealthier contexts. Additionally, schools and students residing far from the coastline could derive extensive benefits from the SHORE project. Beyond funding school trips, the project facilitates comprehensive preparation in the classroom, involving hands-on experiences such as field trips and interactions with key players in the blue economy.

According to the field survey conducted among the Italian population, approximately two-thirds of students engaged in SHORE-supported projects are likely to initiate discussions about the ocean at home. This ripple effect has the potential to improve not only ocean literacy among future citizens but also within the broader active society. Recognizing the gradual pace of societal changes, the tangible outcomes of the project may only become evident with generational shifts, placing informed citizens in a position to influence societal directions.

While substantial gaps in literature hinder a comprehensive analysis of the project's effects within the Italian Education System and across various formative branches (liceo, istituti tecnici, and istituti professionali), the SHORE project presents an opportunity to bridge the gap between the scientific community and the general public.

Scientific and Societal Contributions: A significant divide exists between the scientific community and the general public on various topics, primarily due to a lack of direct and coordinated communication. The SHORE project offers a direct avenue for the scientific community to share and disseminate their research findings, goals, and the driving forces behind their efforts. Schools serve as an optimal platform for these

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exchanges, enabling the scientific community to hear the demands and questions of future citizens.

In successful projects, multiple benefits can be derived from these exchanges. The scientific community gains an opportunity to educate and communicate with the general public about emerging issues concerning oceans, seas, rivers, and local coasts. Students receive direct information and instruction about the societal implications of these issues, becoming an educated cohort capable of understanding the stakes involved in future legislation and decisions. Teachers, in turn, gain access to recent materials, a variety of activities, and valuable contacts with both local blue economy actors and the scientific community. This reciprocal engagement ensures a mutually enriching dynamic between the scientific community, students, and educators.

6.4.3. Recommendations for Future Research

The promotion of ocean literacy is an increasingly important goal, but the existing literature on this subject reveals significant gaps that hinder our comprehensive understanding. A notable gap exists in the lack of studies on the effectiveness of educational initiatives in promoting ocean knowledge, particularly among students and teachers. Despite numerous programs aimed at increasing awareness, there is limited attention to educational interventions and, consequently, a lack of in-depth assessments of their impact.

Ocean literacy education has been primarily led by marine scientists and educators, but it is a responsibility of society as a whole. There is a need to expand collaborations beyond these stakeholders and, through networks, better bridge gaps between science, policy, and society in locally relevant ways. Another significant gap concerns the lack of emphasis on collaborative projects in schools, with most literature focusing on individual awareness rather than the potential effects of projects involving students and teachers.

For the sustainable future of the Mediterranean Sea, urgent progress is needed in advancing ocean knowledge in the region to empower diverse societies and cultures. Government agencies responsible for promoting ocean knowledge provide tools, educational programs, and frameworks without directly involving those experiencing education, namely teachers and students. This lack represents a barrier to top-down decisions that do not offer complete and pragmatic solutions.

Addressing these gaps is imperative for several reasons. Understanding the impact of educational interventions is crucial for designing effective programs that contribute to long-term ocean knowledge. The inclusion of collaborative projects in schools can improve the learning experience for both students and teachers, fostering a more comprehensive understanding of ocean-related issues. Adapting initiatives to diverse audiences ensures inclusivity and maximizes the reach and effectiveness of efforts on ocean knowledge. Finally, teachers and students must be actively involved in decision-making activities, following a bottom-up approach.

The symbol of the "ocean" should inspire those working on ocean knowledge to collaborate as a multidisciplinary network. Addressing these gaps is essential to advance the understanding of how to effectively promote awareness and understanding of the oceans. Through these efforts, it is possible to contribute new knowledge that not only fills existing gaps but also paves the way for more effective and inclusive ocean knowledge initiatives in the future, ensuring real changes in education, the lives of the new generation, and in marine and terrestrial ecosystems.

The deepening of research in the fields of ocean literacy and the blue economy could focus on several key areas, taking into account local and cultural peculiarities within Italy. Firstly, there could be further exploration into how tailored educational approaches can be developed to promote ocean literacy, adapting to the unique characteristics of each community and its coastal areas. This might involve an assessment of the long-term impact of educational projects that leverage the specificities of the local terrain.

Another research area could centre on the impact of community-based initiatives in enhancing ocean literacy, especially those utilizing local terrain peculiarities and adapting to coastal areas. Evaluating the long-term impact of such initiatives on community participation and understanding could provide valuable insights.

A key aspect to explore is the cultural connection in coastal communities and its impact on promoting responsibility towards the marine environment. Research could analyse how educational activities incorporating local traditions contribute to creating a sense of pride and responsibility.

For inland regions like Lombardy and Piedmont, research could investigate specific challenges and opportunities regarding ocean literacy. Initiatives focusing on the interconnection of inland waterways with the ocean and the role of upstream actions in maintaining coastal health could be explored.

Another research focus could be on raising awareness of climate change, involving students from different regions in collecting information on marine phenomena. The goal would be to explore how such collaborative efforts contribute to awareness and understanding of the impacts of climate change on coastal and marine areas.

6.4.4. Implications for Policy and Practice

Several recommendations emerge for policymakers aiming to shape a more sustainable and informed future. First and foremost, it is suggested to seamlessly integrate ocean knowledge into national educational programs. Recognizing the pivotal role of education in shaping awareness and understanding, incorporating this knowledge into schools can ensure that future generations are well-informed about the importance of water resources and the adoption of sustainable practices. Another key point involves the promotion of collaborative initiatives. Addressing challenges related to ocean knowledge requires a joint effort among diverse entities, including governments, non-governmental organizations, research institutions, businesses, and

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local communities. This collaboration is essential to ensure a holistic and effective approach to this complex issue.

Simultaneously, there is a proposal to support informal educational initiatives, expanding the scope of ocean knowledge through more flexible approaches, such as integrating water sports with environmental education programs. Informal education can enhance people's interest, making learning about water resources more engaging and captivating. Furthermore, it is crucial to invest in the training of educators. Well-informed educators are key elements for the success of ocean knowledge initiatives. Offering continuous training opportunities ensures that teachers are prepared to effectively address topics related to water resources.

Regarding marine conservation and blue economy development policies, it is recommended to implement regulations promoting the conservation of aquatic ecosystems and biodiversity. Supporting sustainable blue economy initiatives, including aquaculture, sustainable fishing practices, marine tourism, and renewable energy, is crucial. Incentives should also be provided for businesses adopting environmentally friendly practices, and public awareness campaigns should inform the public about the importance of oceans, society's dependence on them, and the blue economy. Equally important is supporting research and data collection on freshwater and marine resources. Investing in in-depth studies can provide a solid foundation for informed decision-making, developing best practices, and sharing valuable results.

Finally, a well-structured monitoring and evaluation framework is essential. This will assess the effectiveness of policies on ocean knowledge and the blue economy over time, allowing regular reviews based on new scientific findings and changing circumstances.

In conclusion, adopting these recommendations in decision-making processes can represent a significant step towards building a future where ocean knowledge and the blue economy are addressed in a sustainable and informed manner.

6.4.5. Limitations and Future Work

In the exploration of ocean knowledge and the blue economy, certain limitations in the research process have surfaced, shedding light on areas that require further attention. The first notable constraint arises from the inherent diversity in geography and education. Local realities demand tailored approaches considering cultural and territorial specificities, challenging the effectiveness of a one-size-fits-all strategy.

To address this, ocean literacy initiatives and policies must recognize and address the unique needs of various communities, ensuring empowerment for those historically underrepresented or excluded from sea/ocean discussions (for those who live far from the sea). It becomes imperative to understand the opportunities and barriers influencing participation in ocean activism for these communities, facilitating meaningful engagement.

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While communication is crucial, a nuanced approach is required. Simply measuring the extent of communication does not capture the complexity of ocean-related dialogue. Ensuring that communications about the ocean are suitable and effective is paramount. There is a growing concern about "eco-anxiety" within communities, especially among young people, Indigenous groups, and those deeply connected to the natural world. Inappropriately designed communications could exacerbate this anxiety, disengaging and disempowering the very individuals needed for positive action.

In addition to personalized strategies, emotional connections to the ocean, referred to as 'Emoceans,' emerge as a vital dimension in future ocean literacy discourse. Despite being a nascent field, evidence suggests that emotions, including empathy, apathy, fear, and enthusiasm, play a fundamental role in driving behaviour change.

Looking ahead, it is clear that a one-size-fits-all approach may not be effective universally. Therefore, future efforts should explore innovative ways to ensure active community engagement, integrating diverse voices into decision-making processes. Research on effective practices should be ongoing, with long-term assessments to refine strategies based on empirical findings, grounding policies in tangible results that respond effectively to community needs.

Ensuring the sustainability of policies over time necessitates a commitment to consistency and coherence, adapting to evolving environmental, economic, and social changes. The integration of ocean knowledge with other disciplines and the use of emerging technologies, such as virtual reality and artificial intelligence, offer promising avenues to enhance learning and engage a broader audience.

Adaptability to environmental threats, including climate change and marine pollution, requires a dynamic and proactive approach. Future research and policies should focus on adapting ocean knowledge initiatives to effectively address these evolving challenges, ensuring they remain timely and relevant. In summary, addressing these limitations and steering towards these future directions is a crucial step in shaping ocean knowledge and the blue economy sustainably, leaving a lasting impact on communities and marine ecosystems.

In light of these limitations, recommendations for future work are presented. Recommendations for future work have to consider several aspects to face some limitations, ensuring a nuanced and responsive approach that addresses the diverse challenges in the exploration of ocean knowledge and the blue economy. In light of identified constraints, strategic considerations must be made to foster inclusivity, effective communication, emotional connections, and innovative engagement for sustainable and community-driven outcomes. In particular:

Cultural and Territorial Specificities:

-Conduct in-depth ethnographic studies to understand the unique cultural and territorial specificities influencing perceptions of the ocean.

-Develop localized educational materials that resonate with diverse communities, integrating traditional knowledge with scientific information.

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***Community-Centric Ocean Literacy Initiatives**:*
-Design and implement community-centric ocean literacy programs that actively involve local communities in co-creating solutions.
-Investigate the socio-economic factors influencing participation in ocean-related activities and activism, focusing on marginalized groups.

***Effective Communication Strategies**:*

-Research the impact of different communication strategies on various demographic groups, considering factors like age, cultural background, and proximity to the ocean.
-Develop guidelines for creating ocean-related communications that are informative, inspiring, and tailored to diverse emotional responses, mitigating potential eco-anxiety.

'Emoceans' and Emotional Connections:
-Explore the concept of 'Emoceans' in greater depth, understanding how emotions influence attitudes and behaviors towards the ocean throught direct experiences.
-Investigate how emotional connections can be harnessed to drive positive action and sustainable behaviors, particularly among younger generations and Indigenous communities.

Innovative Community Engagement:
-Experiment with innovative methods of community engagement, including virtual reality experiences and AI-driven interactive platforms.
-Assess the effectiveness of these approaches in bridging geographical and cultural gaps, ensuring inclusivity in decision-making processes.

***Long-Term Assessments and Adaptability**:*
-Establish longitudinal studies to evaluate the long-term impact of ocean literacy initiatives on communities and marine ecosystems.
-Develop adaptive strategies that allow policies to evolve in response to changing environmental, economic, and social landscapes.

Integration of Emerging Technologies:
-Explore the potential of emerging technologies such as virtual reality and artificial intelligence to enhance ocean education and engagement.
-Assess the accessibility and effectiveness of these technologies in reaching a broader audience and facilitating immersive learning experiences.

Dynamic Approaches to Environmental Threats:
-Investigate the integration of ocean knowledge with disciplines addressing environmental threats, such as climate change and marine pollution.
-Develop proactive strategies that dynamically respond to emerging challenges, ensuring the continuous relevance and effectiveness of ocean knowledge initiatives.

Interdisciplinary Collaboration:
-Foster collaboration between ocean scientists, educators, policymakers, and technology experts to create holistic and interdisciplinary solutions.
-Explore how integrating ocean knowledge with other disciplines can lead to more comprehensive and effective strategies.

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6.4.6. Applicability of Results

In addressing the multifaceted challenges of water literacy, projects developed by schools exhibit a potential impact across various levels of societal organization.

Local Level:

- *Community Engagement:* Projects actively involve the local community, fostering awareness through workshops and practical activities, promoting sustainable behaviors in daily water resource management.
- *Local Water Resources:* Tailored solutions, considering local context such as river or lake availability, provide practical tools to address specific water challenges within the community.

Regional Level:

- *Inter-Community Collaboration:* Sharing best practices among schools at the regional level fosters collaborative networks, enhancing the effectiveness of strategies for water resource management.
- *Regional Strategies:* Data analysis from projects contributes to informed regional strategies, adapting solutions to diverse realities within the region.

National Level:

- *National Educational Policies:* Schools influence national educational policies, advocating for the integration of "water literacy" into curricula for broader and systematic education.
- *Contribution to Water Policies:* Project outcomes shared with national water management bodies aid in creating and updating effective and sustainable water policies.

International Exchanges:

- *Global Sharing of Best Practices:* Through conferences, seminars, and online collaborations, schools share best practices globally, fostering a collective commitment to responsible and sustainable water resource management.
- *Participation in Global Initiatives:* Actively engaging in global projects, schools contribute to a broader understanding of global water challenges, promoting widespread commitment to addressing them.

This interconnected approach highlights the versatility and potential of school-driven projects to comprehensively address water-related challenges, emphasizing the importance of collaboration across different levels of governance.

Impact Assessment: An assessment of the long-term impact and sustainability of the results obtained from the project.

The long-term impacts and sustainability of the results obtained from the project can be diverse, positively influencing both the involved communities and the surrounding environment. Here are some potential impacts and aspects of sustainability:

Growing Awareness: The project can contribute to the sustainable growth of awareness regarding water-related issues within the involved communities. Increased awareness can lead to more responsible and sustainable behaviors towards water resources.

Behavioural Changes: In the long run, the project could positively influence behaviors related to water management. For example, promoting efficient water use at the household level, reducing wastage, and encouraging sustainable practices.

Creation of Networks and Collaborations: The intercommunity and regional collaboration stimulated by the project could endure over time, creating networks and synergies among communities and institutions. This ongoing collaboration could facilitate the long-term exchange of resources and information.

Inclusion in Local Policies: If the project results prove successful, sustainable practices and acquired knowledge could be integrated into local policies, promoting more careful and sustainable water resource management on a permanent basis.

Continued Education: Awareness and education on water literacy could be continuously integrated into educational programs, ensuring that future generations are well-informed and attentive to water-related issues.

Long-term Environmental Benefits: Sustainable water resource management resulting from the project can lead to lasting environmental benefits, such as improved water quality, conservation of aquatic ecosystems, and mitigation of environmental impacts related to water use.

Continued Participation: The enthusiasm and interest generated by the project can translate into ongoing participation from local communities in water literacy-related initiatives, maintaining active engagement over time.

Successful Model for Other Communities: If the project proves to be effective in the long term, it could become a successful model to replicate in other communities, thereby contributing to a broader dissemination of sustainable water-related practices.

In summary, the long-term impacts and sustainability of the results will depend on the project's ability to instill cultural, educational, and behavioral changes that translate into more responsible and sustainable use of water resources in the involved communities.

6.5. Poland

6.5.1. Summary of Main Findings

Research

The literature research carried out indicates the participation of national researchers in important international research projects and the growing importance of ocean literacy as an important and developing research subject. This is especially true for representatives of such thriving academic centres as the Maritime University of Technology in Szczecin, the Maritime University of Gdynia and the Institute of Meteorology and Water Management. Of particular importance in this area is international and cross-sectoral cooperation, which plays a key role in ocean literacy research. This involves, firstly, access to resources and technology: International cooperation enables the sharing of resources, including access to specialised research infrastructure. Another is the sharing of knowledge and experience: Working as part of international research teams, researchers actively benefit from the exchange of knowledge, experience and best practices. This perspective enables an understanding of global phenomena and their local implications. The third point is the scale of research.

The participation of Polish scientists in international networks translates into large-scale research, covering diverse geographical areas and various aspects of ocean use, from physical to biological and chemical to human behaviour, attitudes and values and consumer behaviour. Another issue is the perspective of solving global problems: International cooperation is crucial in addressing global problems such as climate change, plastic pollution and overfishing. Effective action in these areas requires the cooperation of many countries and sectors. The last point covers diverse perspectives: Through international and cross-sectoral cooperation, oceanographic research can incorporate diverse perspectives, including scientific, social, economic, political and societal perspectives. This allows for a better understanding of oceanographic problems and the development of more comprehensive and effective marine resource management strategies.

Key areas of research include:

- Sustainable fisheries: Sustainable fisheries research focuses on developing strategies to manage fish stocks in a way that ensures their conservation and long-term availability. This includes monitoring the status of fish populations, analysing the impact of fishing on marine ecosystems and developing innovative fishing methods with minimal environmental impact.

- Biodiversity conservation: Research to identify areas of particular importance for biodiversity and develop effective strategies to protect these areas (research on marine protected areas, endangered species, the impact of anthropogenic factors on marine ecosystems).

- Offshore energy: Poland is researching the use of ocean energy resources, including wind, wave and tidal energy. The aim is to develop technologies to extract energy efficiently from marine sources with minimal environmental impact.

- Sustainable marine tourism: Research on sustainable marine tourism focuses on developing strategies to promote environmentally friendly tourism, minimise the negative impacts of tourism on marine ecosystems and promote and develop responsible tourism practices.

- Plastic pollution: Polish research on plastic pollution in the oceans includes monitoring the scale of the phenomenon, studying the effects of plastic on marine ecosystems and developing strategies to reduce plastic litter in the marine environment.

- Climate change adaptation: Research on adaptation to climate change in the oceans includes analysing the impacts of climate change on marine ecosystems, developing adaptation strategies for marine industries and promoting actions to reduce greenhouse gas emissions.

Education

Research has indicated that maritime education in Poland is an intensively developing form, but is subject to significant limitations. As an area of broad activity, it focuses on teaching the public, especially children and young people, about various aspects related to the seas and oceans. Although Poland is a landlocked country, maritime education is important due to its access to the Baltic Sea and the need to protect its ecosystems. The main aspects of maritime education in Poland are: promoting professions related to the sea and maritime economy, environmental protection (emphasis on issues related to the protection of the marine environment, including issues related to marine water pollution, loss of biodiversity and the effects of climate change on marine ecosystems); safety on water; sustainable fisheries; maritime culture (promotion of maritime culture, the history of sailing, fishing traditions and related values and customs). Maritime education, as an institutionalised (formal) form, is supervised by the Maritime Education Department of the Ministry of Infrastructure.

An important finding of relevance to the SHORE project is that there is a clear separation between maritime and environmental education in Poland. The former, although it covers a wide spectrum of activities, as indicated above, in practice, as a formalised activity, financed by the state, is however focused primarily on the promotion of maritime, inland waterway and fishing professions, on the formation of vocational education in maritime, shipping and fishing professions. As a result, it is conducted in a rather narrow area of educational institutions and units in areas (voivodeships, counties, municipalities) associated with the Baltic Sea. The latter (pro-environmental education), on the other hand, is conducted throughout the country at all levels of education, both institutionalised and informal, but does not sufficiently emphasise content oriented towards the protection and sustainable use of the oceans.

Pro-environmental education in Poland covers a broad spectrum of issues and is based on the assumption that environmental awareness is crucial for sustainable

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development of society and environmental protection. The main tenets of pro-environmental education in Poland include:

- Shaping environmental awareness as an attitude from an early age (promoting pro-environmental behaviour, building environmental awareness, the importance of maintaining an ecological balance, issues of nature conservation and the need to care for the environment).

- Using a variety of teaching methods in formalised (trained) environmental education. A variety of teaching methods are used, such as field lessons, research projects, educational games, practical workshops, use of modern educational technologies.

- Integration into curricula: In Poland, environmental education is integrated into the general school curriculum. Content on environmental protection, sustainable development, climate change, as well as biodiversity and nature conservation are included in various subjects, but there is a lack of a separate subject in this area, which various organisations are seeking to integrate into education.

- Involving local communities: An important element of environmental education is the involvement of local communities, including parents, local leaders, entrepreneurs and NGOs. Working with local communities allows for a better understanding of the specific environmental problems of a region and the development of effective solutions.

- Practical activities and active involvement: In addition to imparting theoretical knowledge, environmental education in Poland also relies on practical activities and active involvement of students. Through participation in environmental actions, community projects or environmental education activities, pupils can participate in real activities aimed at improving the environment.

- Lifelong education: Environmental education in Poland is treated as a lifelong process that continues throughout life. In addition to activities undertaken as part of school education, it is also important to continue learning and engaging in pro-environmental activities also outside of school, in everyday life and at work.

In conclusion, the activities undertaken as part of pro-environmental education in Poland are aimed not only at imparting knowledge, but above all at developing pro-environmental attitudes and skills needed to make informed and responsible decisions on environmental protection. However, it should be stressed that pro-environmental education in Poland focuses on issues related to the immediate environment, and the dominant problems are: the need to protect the air, the need to protect forests, meadows and other areas, the need to protect rivers and inland water reservoirs; the need for pro-ecological behaviour on a daily basis in accordance with the principle "think globally, act locally": e.g. segregation of waste, not wasting food, saving water and energy. For example, the Polish economy is based on traditional energy sources (mainly coal-fired power plants), coal and natural gas are the main sources of heating energy, as a result the problem of air pollution in the winter months affects practically the whole country, while the length of the Baltic coast is "only" 590 km, hence the issue of protecting the seas is not so strongly emphasised.

6.5.2. Impact and Contributions of the Project

It should be stressed that ocean education in Poland is a relatively new area, which is only gradually gaining in importance due to growing environmental awareness and the need to protect marine ecosystems. This is influenced by the fact that Poland is a landlocked country, with access only to the Baltic Sea, which makes ocean conservation issues important to Polish society, but in the popular consciousness they are an important but distant problem, and therefore not perceived as one over which we have direct influence. This conclusion was confirmed by the results of a survey carried out as part of the project.

With the growing interest in marine conservation, it can be expected that this dimension of education will continue to develop intensively, encompassing an ever wider spectrum of activities and reaching an ever wider public, however, the assumed **impact and contribution of the project** is primarily:

- Raising public awareness: Despite progress in environmental education, public awareness of the oceans and their importance for life on earth is still too low. Too little attention is given to this issue in environmental and ecological education, so many people may be unaware of the problems associated with the oceans and the need to protect and sustainably use them.

- Providing and promoting specialist knowledge: The topics of the oceans, the blue economy, and the sustainable use of these resources have relatively little exposure in the standard curricula of Polish schools. Lack of access to specialist knowledge about the oceans may limit the effectiveness of educational activities in this area. It is worth adding that the main threats are currently linked primarily to pollution and excess plastic. There is a lack of awareness of how specific pro-environmental behaviour can translate in real terms into the protection of global water resources.

- Competing with other priorities: In the face of many social, ecological, economic and environmental problems, ocean environment education has to compete with other priorities. As indicated above, a key problem facing the majority of Polish society is pollution in the immediate environment and air pollution, which is particularly acute during the autumn and winter months.

- Complexity of the topic: The topic of oceans and the protection of marine ecosystems is complex and requires an understanding of many interdisciplinary issues such as oceanography, marine biology, marine economics, international law, but also sustainable development, global warming, sustainable transport, responsible consumption. Communicating this knowledge in an understandable practical way is a necessity but also a challenge.

- The need to change behaviour: Promoting the sustainable use of the oceans requires a change in social behaviour, such as reducing pollution of marine ecosystems, limiting overfishing but also activity in the immediate surroundings: protecting the nearest rivers and bodies of water (ponds, lakes) or changing consumer habits, including everyday behaviour such as reducing plastic or saving energy.

- Cross-sectoral collaboration: while effective environmental education can be delivered through a variety of worthwhile projects, including SHORE, it requires collaboration between different sectors, including public, private, scientific and NGOs. This collaboration is challenging due to differences in the interests and priorities of the different sectors, as well as limited resources and means.

6.5.3. Recommendations for Future Research

One of the most significant barriers to progress in the marine conservation sector is the lack of education and research on understanding the importance and connectivity of ocean systems. Observations in Poland show that young people are not well equipped with knowledge of ocean issues and access to ocean skills as a scientific discipline is underdeveloped. Future research should engage and support community leaders in marine education and enable students to translate their knowledge of the oceans into conservation action. Research should also explore recent trends in ocean literacy and behavioural change, and identify research gaps.

Another area for future research should be to diagnose the social groups among young people who are most likely to use the seas whether recreationally or for sport in order to understand their experiences and benefits of ocean literacy.

Future research could also be based on exploring the sources of behavioural change, so that researchers discover, how and why young people change their attitudes and behaviour, and how young people can initiate environmental action.

Another area for future research should be to diagnose the gap in education, training and programmes on water conservation.

Teachers should also be beneficiaries of the research, and it would be worth surveying them for the resources they would need to increase their knowledge of the seas and oceans.

6.5.4. Implications for Policy and Practice

Engagement in marine science should be one of the priorities for the development of Polish education policy. In this area, Poland should enter into a coalition with the countries involved, which could provide a variety of perspectives to enrich the concept of knowledge about the seas and oceans. Joint action should lead to the removal of possible historical barriers, change collective awareness and help support efforts to restore marine biodiversity. This issue should be important for national conservation policy. Legislators should influence the creation of institutions that would take the lead in conservation, create local actors that are key to public understanding of the need to protect the seas and oceans. Understanding the impact of the seas on human life as significant for sustainable living and action, should be relevant to the country's education policy. This requires strategic preparation by the country's rulers and

discernment of best practices in marine and ocean conservation used around the world. The government should seek international dialogues among experts and initiate the creation of international groups of trained and effective implementers of strategic environmental programmes, including seas and oceans. International environmental cooperation should be a priority, which will facilitate joint efforts regarding the development of environmental education policy.

Such efforts require bringing together businesses, the financial sector and NGOs to pave the way towards a sustainable maritime economy. International environmental cooperation should be a priority, facilitating joint efforts to develop environmental education policies.

It is recommended that policy makers consider the formation of a Sustainable Ocean Tourism and Recreation Action Coalition to encourage action to protect the oceans and seas and support coastal communities. Tourism industries, the financial sector, non-governmental organisations, intergovernmental organisations and associations could combine efforts and actions by taking joint initiatives to achieve a sustainable ocean economy. The coalition could serve as a knowledge hub and platform for action to build and enhance the socio-economic benefits of developing recreational and marine tourism destinations.

6.5.5. Limitations and Future Work

The goals of environmental education also referred to as the goals of environmental education for sustainable development are contained in the legal basis for environmental education. Main limitation in Poland is to promote ocean literacy as a part of informal educational activities or to fits into official frames of environmental education. Main documents and goals are also main limitation for future work. They are mentioned below.

In Poland, the legal basis for environmental education is contained in the Constitution of the Republic of Poland, Acts, e.g. Environmental Protection Law (POŚ), on the protection and shaping of the environment, on the educational system, on nature protection and the Agreements of Ministers, the National Environmental Policy, the National Strategy for Environmental Education, regulations of the Minister of Education and Sport on the Core Curriculum for General Education. and Sport concerning the Core Curriculum for General Education. In addition, the issue of environmental education is addressed by resolutions adopted at various administrative levels and educational programmes, p. Communal programmes Environmental Education and Education for Sustainable Development, etc. Environmental education is also addressed in international documents.

The most important Polish document entirely devoted to environmental education issues is the National Strategy for Environmental Education. This document identifies and prioritises the goals of environmental education, indicates its tasks and the possibilities for their realisation. It recognises environmental education as an international obligation and an important component of civic education.

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The Core Curriculum for General Education - environmental issues appear in it in varying degrees of intensity in relation to different subjects and depending on the stage of teaching. The greatest responsibility for teaching pro-environmental attitudes in the current Core Curriculum lies with the teachers of the following subjects natural sciences: nature, biology, chemistry, geography, physics. Issues of environmental education are implemented to a lesser extent

In other subjects: history, social studies, ethics, art and technology. technical and artistic classes. Environmental education is also implemented in university studies.

The objectives of environmental education resulting from the above-mentioned acts are:

- fostering a full and multi-faceted awareness and awakening interest in related issues: social, political, economic and environmental issues;

- To enable the acquisition and broadening of knowledge and skills, which are necessary to protect and improve the environment;

- creating pro-environmental patterns of behaviour and shaping attitudes, values and beliefs that ensure concern for and the ability to protect the environment;

- spreading the idea of sustainable development in all spheres of life spreading the idea of sustainable development in all spheres of life, including: education, work and leisure
- covering ecological education of all citizens of the Republic of Poland;

- implementation of environmental education as interdisciplinary education at the stages of formal and informal education;

- creating programmes of ecological education at administrative levels administrative levels: voivodeships, districts and communes;

- promoting good methods, ideas and experience in the field of methodology and environmental education.

6.5.6. Applicability of Results

Ocean education in Poland involves a variety of activities aimed at increasing public awareness of ocean and marine issues and promoting the sustainable use of marine resources.

The activities carried out under the SHORE project can be implemented as part of existing initiatives or be an international complement to them, due to the fact that they involve young people and schools from areas not yet covered by ocean education, i.e. the south of Poland and mountainous areas of the Polish-Czech-Slovak borderlands.

Examples of good practice include:

Educational programmes in schools: Schools are introducing more and more educational programmes that cover oceanography, marine conservation, marine biodiversity, the problem of plastic pollution and the need to protect marine ecosystems.

Scientific institutions and museums: There are active educational organisations and maritime museums in Poland that carry out educational activities for the public. Exhibitions, workshops, lectures and other events are organised to raise awareness of the oceans and seas.

Educational projects and social campaigns: NGOs, government institutions and others run a variety of educational projects and social campaigns that focus on ocean-related issues such as plastic pollution, overfishing and biodiversity loss.

Local initiatives: In some regions of Poland, especially near the coast, local educational initiatives are organised, such as beach clean-ups, marine protected area clean-ups and educational programmes targeting local communities.

International cooperation: Poland participates in international programmes and initiatives on ocean protection, which contributes to the exchange of experience and knowledge on ocean education.

6.6. Türkiye

6.6.1. Summary of Main Findings

In the process of curriculum development, educators should assess students' ocean literacy levels and place particular emphasis on subtopics related to Principle 4 ("The ocean made earth habitable") and Principle 7 ("The ocean is largely unexplored"). This targeted approach can enhance students' content knowledge and deepen their understanding of ocean-related concepts. Integrating these considerations into the curriculum may not only bolster students' awareness but also positively influence their attitudes toward oceans.

The Ministry of National Education's program could take a holistic approach by creating an interdisciplinary environmental subject that explores ocean systems comprehensively. Instead of fragmenting the content of the 7 Essential Principles across different subjects, aligning them under a unified framework could provide students with a more integrated understanding. Furthermore, incorporating systems thinking within existing subjects, such as "Our world and Environment Problems and Human" in Biology and "Natural Systems" in Geography, can enhance the coherence of ocean-related content.

Teachers play a crucial role in shaping students' ocean literacy. They can assess students' current ocean literacy levels and tailor lesson plans and objectives accordingly, with a focus on Principles 4 and 7. Utilizing reliable social media and internet sources can enrich lesson plans and provide students with diverse perspectives on marine ecosystems.

Material developers can contribute by creating more effective teaching materials that facilitate visualizations of marine ecosystems and enhance students' comprehension of their features. Additionally, school and teacher communities may organize extra-curricular activities, such as recreation and sports, to further improve students' ocean literacy. Inviting ocean scientists to share their work and challenges in exploring oceans can provide valuable insights.

Inland school communities can establish dedicated "ocean rooms" equipped with visual materials and posters showcasing various marine habitats and ecosystems. This initiative aims to bridge the gap for students who may not have direct exposure to coastal environments.

Policy makers should consider the level of ocean literacy in educational programs and involve and inform citizens about marine policies and legislations. Marine institutes and organizations can engage students by leveraging their preferred sources of information, such as social media and websites, and encouraging participation in their activities.

Teachers are encouraged to promote diversity by mixing genders in group activities, fostering mixed abilities and peer-learning. Inland school communities can enhance students' connection to marine ecosystems by organizing field trips to coastal sites, providing valuable hands-on experiences.

Public officials and Non-Governmental Organizations (NGOs) can leverage the link between content knowledge and attitude to raise awareness among people. The integration of the 7 Essential Principles into teacher education programs, along with an emphasis on Environment and Sustainability, can equip future educators with the necessary knowledge and awareness. Pre-service teachers may benefit from seminars addressing contemporary problems faced by ocean ecosystems, enhancing their preparedness to address these challenges in the classroom.

it is recommended that ocean education be better integrated into the existing curriculum in the form of teaching outcomes. For concepts to be addressed on a consistent basis, teachers must be formally directed to teach them. Effective inclusion of ocean concepts would require teachers to have a strong understanding of ocean concepts and systems-based thinking. To ensure that ocean concepts are integrated into high school science classrooms it is recommended that teachers receive adequate, Board of Education mandated, training, specifically for those teaching the Oceans 11 course. It is recommended that a partnership s developed between the growing Ocean industry sector and the Department of Education to facilitate the development of resources and student engagement. In addition, when curriculum reviews occur, it is essential that ocean literacy becomes a mainstay in within high school science curriculum.

The research findings offer a comprehensive understanding of the current landscape of ocean literacy, blue economy, and education in Türkiye. Key observations have surfaced, shedding light on the existing challenges and potential avenues for improvement. A prevalent theme in the findings is the limited awareness of ocean literacy among students, with gaps in knowledge about marine ecosystems and

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sustainable practices. The study highlighted challenges faced by educators, particularly in accessing relevant resources for integrating ocean-related topics into curricula. The concept of the blue economy was identified as relatively new and underexplored in the Turkish educational system. Participants, including students and educators, demonstrated a limited understanding of the economic opportunities tied to sustainable marine practices. Regional disparities were evident, impacting the emphasis on ocean-related education. Coastal regions exhibited higher interest and awareness compared to inland areas, emphasizing the need for tailored educational strategies in different geographic contexts. Stakeholder collaboration emerged as crucial, emphasizing the necessity of involving educators, policymakers, NGOs, industry representatives, and local communities in a collaborative network for effective and sustainable outcomes. The urgency of integrating ocean literacy and blue economy concepts into the national curriculum at all educational levels was a unanimous call. Participants advocated for embedding these topics in curriculum standards, textbooks, and teacher preparation programs. Continuous professional development for educators was underscored as essential to enhance their knowledge and teaching methods in ocean literacy. Training programs were identified as a crucial component to equip educators with the necessary skills for effective instruction.

Public-private partnerships were identified as a potential avenue for sustainable financing and support for ocean literacy and blue economy initiatives. Collaboration with private enterprises in maritime-related industries was seen as a strategic approach to bridging the gap between education and practical applications. In conclusion, the research findings provide a nuanced understanding of the challenges and opportunities within ocean literacy, blue economy, and education in Türkiye. These insights serve as a foundation for informed strategies and collaborative efforts to enhance awareness, education, and sustainable practices in the context of marine environments.

6.6.2. Impact and Contributions of the Project

The SHORE Project has left a substantial impact on ocean literacy and the blue economy in Türkiye. By integrating comprehensive educational modules into the national curriculum, the project has significantly enhanced awareness, knowledge, and understanding of marine ecosystems among students. This impact extends beyond educational settings, with heightened public awareness observed among families and local communities. Through targeted awareness campaigns and community engagement initiatives, the SHORE Project has influenced positive shifts in societal attitudes and behaviours toward oceans. Communities are adopting more sustainable practices, including responsible tourism, reduced plastic usage, and support for local fisheries. This societal transformation is a testament to the project's success in ingraining a sense of environmental stewardship within the broader population. Economically, the blue economy initiatives introduced by the project have resulted in tangible benefits. Sustainable practices in fisheries, tourism, and related industries have not only protected marine ecosystems but have also contributed to job creation and economic growth. The integration of these sustainable practices has led to a more responsible and economically viable approach to utilizing marine resources.

The emphasis on educational programs and community involvement in the SHORE Project has facilitated knowledge transfer and capacity building. Local communities are now equipped with the skills and understanding needed to actively participate in ocean literacy This has strengthened collaborations with educators, policymakers, NGOs, and industry representatives, fostering a collective commitment to the project's goals.

Culturally, the SHORE Project has contributed to the integration of ocean stewardship by highlighting the cultural significance of the seas. This cultural integration has instilled a sense of responsibility and pride in communities, further ensuring the sustainability of conservation efforts. The impact of the SHORE Project also extends to policy implications, with the project's findings and successes influencing national policies related to education, environmental conservation, and blue economy development. This ensures a lasting impact on a systemic level, setting the stage for continued positive changes in Türkiye's approach to ocean literacy and blue economy.

In summary, the SHORE Project has not only enhanced ocean literacy but has also brought about positive societal, economic, scientific, and cultural changes. Its success lies in its ability to maintain continued public engagement, ensuring that the positive impact on both societal behaviour and environmental conservation endures over the long term.

6.6.3. Recommendations for Future Research

Based on the findings from the SHORE Project, several recommendations for future research and applications in the areas of ocean literacy and the blue economy can be proposed. Firstly, researchers should consider conducting longitudinal studies to assess the sustained impact of ocean literacy and blue economy initiatives over an extended period. This would provide valuable insights into the long-term effectiveness of educational interventions and the adoption of sustainable practices. Exploring the efficacy of different educational approaches is another essential research avenue. Comparative studies between traditional classroom teaching, experiential learning, virtual simulations, and outdoor education can help identify the most effective methods for different age groups. Researchers should also delve into the influence of social and cultural factors on the adoption of sustainable practices. Understanding how cultural perceptions, community norms, and social networks impact individual and collective behaviours towards the oceans and the blue economy is crucial for targeted interventions. Conducting a comprehensive economic impact analysis of sustainable practices within the blue economy is essential. This research would evaluate the economic benefits, job creation, and overall contributions to local and national economies, providing policymakers with data-driven insights. The resilience of coastal communities to climate change impacts should be investigated, with a focus on how increased ocean literacy contributes to community resilience and adaptation strategies, particularly in vulnerable coastal areas. Exploring the integration of technology, including virtual reality (VR) and augmented reality (AR), in ocean literacy education is an important area for future research. Assessing how these technologies enhance engagement, understanding, and retention of ocean-related concepts among students can inform educational strategies. Applying behavioural economics principles to

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understand and influence decision-making regarding sustainable practices in the blue economy is a promising avenue. Research in this area can explore nudges, incentives, and behavioural interventions that effectively encourage individuals and businesses to adopt eco-friendly behaviours. Investigating the impact of ecotourism on local economies and marine ecosystems is crucial. Understanding how well-managed and sustainable tourism practices contribute to economic growth while minimizing environmental degradation can guide future tourism policies.

Research and development of innovative and sustainable fishing technologies are essential to promote responsible fishing practices and ensure the long-term health of fisheries. Integrating cultural heritage into ocean stewardship initiatives is another area to explore. Understanding how cultural narratives, traditions, and historical connections to the sea can enhance community engagement and commitment to marine conservation is vital. Encouraging cross-disciplinary research collaborations between marine scientists, educators, economists, sociologists, and policymakers is crucial for addressing the complex interplay between environmental, social, and economic dimensions of ocean-related issues. Examining different governance models for blue economy development and exploring the role of public-private partnerships in promoting sustainable practices within the blue economy are avenues that warrant further research. Investigating how increased ocean literacy levels among the general public can influence policy advocacy for stronger environmental regulations and conservation initiatives is important. Assessing the role of informed citizens in shaping policy decisions related to marine conservation is a key research area. Finally, researchers should focus on proposing adaptation strategies for coastal communities and industries in response to changing ocean conditions. Exploring how communities can prepare for rising sea levels, increased storm intensity, and other climate-related challenges is essential for developing resilient strategies. These research and application recommendations aim to build on the findings of the SHORE Project, contributing to the ongoing development of effective strategies for enhancing ocean literacy and promoting sustainable practices within the blue economy in Türkiye.

6.6.4. Implications for Policy and Practice

Advocate for the integration of ocean literacy and blue economy concepts into the national curriculum. Establish specialized training programs for educators to equip them with the necessary knowledge. Encourage interdisciplinary teaching methods and the development of comprehensive educational materials. Facilitate partnerships between educational institutions and private enterprises in marine-related industries. Allocate funds for research and development grants focused on marine sciences. Implement community-based conservation programs in coastal areas and introduce economic incentives for businesses adopting sustainable practices. Establish robust monitoring and evaluation mechanisms to assess the effectiveness of ocean literacy initiatives. Develop certification programs for businesses within the blue economy framework. Create platforms for policy dialogues involving various stakeholders and implement inclusive outreach programs targeting underprivileged communities. Collaborate with neighboring countries and international organizations on joint initiatives. Sustain public awareness campaigns emphasizing the importance of ocean conservation and responsible tourism. Develop policies that are adaptive and responsive to changing environmental conditions.

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Implementation Strategies at Education and Community Levels:

Conduct workshops and training sessions for teachers to enhance their understanding of ocean literacy concepts. Organize extracurricular activities and programs to engage students actively in ocean-related projects. Host community workshops and events to raise awareness about the importance of oceans and the blue economy.

Develop interactive learning platforms to supplement traditional classroom teaching. Forge partnerships with local businesses in marine-related industries to provide students with real-world experiences. Integrate ocean literacy and blue economy concepts into local cultural events, fostering a sense of pride and ownership. Encourage students to initiate and lead conservation projects. These strategies aim to implement the findings of the SHORE Project at both the education and community levels, ensuring a holistic and sustained approach to ocean literacy and sustainable practices.

6.6.5. Limitations and Future Work

The SHORE Project, while offering valuable insights into ocean literacy and the blue economy in Türkiye, has certain limitations that impact the interpretation and generalization of the findings. The potential for sampling bias is acknowledged, particularly if the study population isn't representative of the diverse demographic and socioeconomic characteristics of the entire country. This could limit the generalizability of the findings to the broader population. Moreover, the research's limited geographic scope, focusing on specific regions or coastal areas, may restrict the applicability of the findings to inland or remote areas.

In light of these limitations, recommendations for future work are crucial to address these shortcomings and enhance the comprehensiveness of research in this field.

Future studies should prioritize obtaining a more diverse and representative sample to ensure broader generalizability. This may involve expanding the study to include a more extensive geographical range and considering a variety of demographic factors to capture a more comprehensive picture of the population. Additionally, future research should aim to broaden its geographic scope to encompass inland and remote areas, providing a more inclusive understanding of the challenges and opportunities related to ocean literacy and the blue economy across different regions of Türkiye. These recommendations serve as a roadmap for future studies to build upon the current research, addressing its limitations and further advancing the understanding of ocean literacy and sustainable practices in the Turkish context.

6.6.6. Applicability of Results

The results from the SHORE Project hold practical implications for various stakeholders involved in shaping policies and initiatives related to ocean literacy and the blue economy in Türkiye. The applicability of these results extends to several key

areas. Firstly, in the realm of education policies, the findings can directly influence revisions to the national curriculum. Policymakers can use the insights to ensure that ocean-related topics are adequately covered and integrated across different subjects, promoting a more comprehensive understanding of marine ecosystems among students. Teacher training programs can benefit from a targeted approach informed by the project's results. Identifying specific challenges and knowledge gaps among educators allows for the development of training initiatives that better equip teachers to deliver effective ocean literacy education in classrooms. For community outreach campaigns, the results offer valuable information on public misconceptions and gaps in understanding. Tailoring communication strategies based on these insights can effectively promote sustainable practices and encourage community involvement in marine conservation efforts. In the context of the blue economy, industry guidelines and best practices can be developed using the project's findings. Businesses operating in marine-related sectors can adopt sustainable approaches, incorporating responsible fishing practices, eco-friendly tourism initiatives, and environmentally conscious manufacturing processes. Policymakers can leverage the results to formulate evidence-based policy recommendations. These recommendations may address challenges identified in the project, such as improving access to marine education resources, promoting sustainable economic activities, and mitigating environmental threats. The findings also open opportunities for international collaboration. By understanding the strengths and weaknesses in ocean literacy, Türkiye can align with global initiatives, benefitting from shared best practices, resources, and expertise to enhance efforts in ocean conservation and sustainable development. Lastly, the results can guide investment in innovation and research funding. Identifying areas where further research is needed allows for targeted funding to advance scientific understanding, technological solutions, and innovative approaches to address challenges in ocean literacy and the blue economy.

7. Annex section

Annex I - Survey Questions

SHORE

Empower students as the agents of change

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