sustainability

MDPI

Article

A Blueprint for Ocean Literacy: EU4Ocean

Tymon Zielinski [1,*], Izabela Kotynska-Zielinska [2] and Carlos Garcia-Soto [3,4]

[1] Institute of Oceanology Polish Academy of Sciences, 81-712 Sopot, Poland
[2] Today We Have, 81-712 Sopot, Poland; kotynska-zielinska@todaywehave.com
[3] Spanish Institute of Oceanography (IEO-CSIC), 39080 Santander, Spain; carlos.soto@ieo.es
[4] Plentzia Marine Station (PiE), University of the Basque Country, 48620 Plentzia, Spain
* Correspondence: tymon@iopan.pl

Abstract: In this paper, we discuss the importance of the efficient communication of science results to citizens across the world. In order for people to absorb information, we need to understand the principles and apply the best available means to facilitate the process of increasing global awareness of the changes. This explicitly applies to the verification of how we appeal to people with respect to various environmental issues and, hence, how we can modernize the educational approaches to challenge the global change. We state that, in order to follow the philosophy of sustainable development goals with respect to ocean issues, we need an attractive alternative to the existing areas of consumption. We also state that the ocean issues are at the core of any process aiming to secure sustainability. New methods and tools of education and scientific communication, especially those which are offered by non-formal approaches, are necessary, and we present here some of the activities of the EU4Ocean coalition as best practice examples.

Keywords: climate and ocean change; sustainable development; climate and ocean literacy; effective knowledge communication and education; EU4Ocean coalition

Citation: Zielinski, T.; Kotynska-Zielinska, I.; Garcia-Soto, C. A Blueprint for Ocean Literacy: EU4Ocean. *Sustainability* **2022**, *14*, 926. https://doi.org/10.3390/su14020926

Academic Editor: Anmin Duan

Received: 2 October 2021
Accepted: 11 January 2022
Published: 14 January 2022

1. Introduction: Main Ocean Issues and the Need for Ocean Awareness

Today, we observe that climate change is a global problem and has global consequences, most of which, such as, temperature increase and ocean level rise, are difficult to estimate; however, the long-term trends show that these problems are deepening [1,2]. Emissions of greenhouse gases from human activities continue to rise, resulting in further climate changes for decades to come [1]. These changes also have a profound impact on the condition of the ocean environment [2,3]. With oceanic coverage of over 70% of the planet's surface and with 95% of the biosphere, any modifications to the ocean environment must influence weather and climate systems [2,3]. Additionally, the ocean provides numerous benefits to communities worldwide, from natural aspects, such as mitigating climate changes and threats to food resources, to more civilization-related ones, including employment, transportation as well as recreation and cultural features [4]. All of these benefits strongly depend on the state of the ocean environment, biodiversity and related ecosystem services, and it is clear that the main threats to marine ecosystems come from a number of human activities, including pollution and the release of greenhouse gases [1–3,5,6].

Humans have always been very connected with the ocean, which is related to a number of factors, such as access to food resources, cheap transportation and effective means of trade [4]. The current reports show that almost 60% of the world's population live in areas within 60 km of the sea [2,3]. The United Nations (UN) estimate that almost 50% of the cities with populations over one million, which create important economic regions, are located in coastal areas [3].

Globally growing populations create a strong demand for goods and services, including energy consumption. In order to meet these demands, some regions/countries are developing plans for ocean-based economies (blue economy); however, these face a

number of limitations due to the worsening condition of the ocean [2,3]. These innovative approaches, but also pressures, result in outcomes for the ocean that are both positive, including more efficient energy production, and negative, connected with, e.g., overfishing [3,7,8].

Coastal regions deal with such human-induced threats as sea-level rise and extreme ocean storms and surges [2]. The climate change effects are not uniformly distributed, and some areas (e.g., the Arctic) are warming at higher rates than the planet average [2,9–11]. However, it is obvious that all coastal communities especially need to seek the resources to mitigate the climate change processes but also adapt to the changing reality [9].

We now realize that, without firm and quick actions devoted to climate and ocean change processes, we will soon lose control over the environmental pressures and drivers (with very complex and often difficult-to-predict linkages) and thus processes which govern the climate [1–3,6]. These actions require changes in lifestyles, including the rate of the global production of goods and thus the consumption levels, that directly apply pressures to the entire planet [5].

There are some positive examples of cooperation at various levels, including the international and regional actions, which lead to the reduction in different types of oceanic pressures [3,12,13]. However, regional circumstances often limit the transfer and further implementation of innovative approaches to managing the ocean [2].

Effective transfer of ideas, programs and technologies cannot be realized without provision of information that can be applied to address the ocean management requirements on all scales [3,14]. This requires the identification of ocean knowledge gaps, as well as the development of sustained observational systems, which are necessary for a proper understanding of the changes and needs of the ocean environment [2,3,9].

Elaborate support for ocean (climate) research and better means of technology transfer must be made available in order to increase the knowledge of the ocean processes and hence understand the exact state of the ocean and thus to secure effective management tools, which can help in achieving sustainable use of the ocean [15,16].

The United Nations Sustainable Development Goals idea provides the vision for holistic changes in human behavior, and the climate and ocean issues are among the 17 goals to consider [16,17]. All the 17 goals overlap on many levels, and they impact each other [3,14,18,19]. Therefore, in order to achieve any of the goals, citizens and especially decision makers need to fully comply with the holistic idea and follow the outlined steps. This cannot be done without wide provision of the means for up-to-date education and communication about the importance of sustainable development, which must be directed to all citizens, regardless of their social position and region of the world [18–20].

In this paper, we propose the United Nations Decade of Ocean Science for Sustainable Development (2021–2030) as the international framework for ocean literacy, discuss the importance of the efficient communication of the science results to citizens and finally present the EU4Ocean coalition as a best practice example to follow in other regions.

2. An International Framework for Ocean Literacy: The UN Decade of Ocean Science for Sustainable Development (2021–2030)

For decades, attempts to assess human impact on natural environment have been undertaken, and they have involved various approaches, means and tools. This also applies to the studies of the human–ocean interactions. In order to secure the sustainable use of the ocean, we must fully understand the processes which govern the ocean and thus its functioning, including knowledge of the impacts of human activities on the ocean. We need to strive for a predicted ocean where society understands and can respond to changing ocean conditions. We want an accessible ocean with open and equitable access to data, information and technology and innovation, an inspiring and engaging ocean where society understands and values the ocean in relation to human well-being and sustainable development.

To secure a safe planet, a priority is the management of the ocean as a "common good for humanity", which requires smarter observations to assess the state of the ocean and predictions about how it will change in the future. The ocean is a four-dimensional space that needs to be managed over time, and there is a need for management and conservation practices that integrate the structure and function of marine ecosystems into these four dimensions [4].

The UN Decade of Ocean Science for Sustainable Development (2021–2030) provides the framework and the means for holistic studies of the ocean environment [16]. The United Nations have announced the need for extensive research and action on the oceans to counter adverse processes in the ocean environment, and for all stakeholders to develop a common framework of actions that will ensure that ocean science can fully support world communities in creating better opportunities for implementation of the objectives of sustainable development of the seas and oceans [16].

One of the tenets of the decade is to facilitate global communication and mutual exchange of ideas and experiences between the research and educator communities and interested stakeholders, and its results aim to meet the needs of civil society [16]. This requires the development of new collaborative types of partnerships that can deliver more efficient, scientifically framed management of the oceans and their resources as well as the promotion of more targeted information flows and innovative ways of conducting and using ocean science [2,4,16].

We are still facing serious global disparities in infrastructure and professional capacities in ocean research [3]. To create a more comprehensive system of monitoring changes in environmental processes and their impacts on ecosystems and society, even deeper integration of multidisciplinary observation systems and improved models is required [3,16].

Therefore, the ocean science community must open itself to other fields of research, including social sciences, and use the best of networking and the coordination of various platforms, programs and cooperations. Such an approach can secure further development of global ocean observations, which will be cost-effective and user-friendly, along with greater participation of citizens.

This is especially important regarding the urgent global need for climate and ocean change mitigation and adaptation actions. According to the Intergovernmental Panel on Climate Change (IPCC), climate change adaptation means actions which are aimed at minimizing the adverse effects of climate change [21]. Climate change mitigation actions refer to the minimizing of anthropogenic sources of greenhouse gases or the enhancement of their ultimate sinks [22].

The global levels of the reduction and closing of emissions of greenhouse gases can be made through such approaches as, e.g., creating and applying innovative technologies and renewable energy, making older equipment and appliances more efficient, implementing modern management rules and most of all, changing consumer behavior.

In order to make appropriate plans and decisions to choose between the best available options, the adaptation to climate change requires initial assessments of the scale of the climate change impact on particular natural systems and societies now and in the future. Carefully developed plans allow one to avoid taking unnecessary actions and enhance sustainable development practices [21]. The adopted measures can then be implemented in the form of projects, programs or strategies, at various levels. Such measures involve particular, single processes or complex processes, which are fully integrated with policies and sustainable development plans. The UN proposed adaptation cycle is as follows [21].

Monitoring and evaluation of adaptation practices should be made throughout the adaptation process, to provide knowledge and experience that can be further used to strengthen greater effectiveness of the future adaptation actions [21].

The development of such approaches is not an easy task and requires substantial efforts, holistic management, which involves more effective transboundary cooperation, the strengthening of science-policy capacity, enhanced cooperation between natural and social sciences and between science and global society, as well as the use of traditional

knowledge, culture and social history [3,8]. This approach requires the engagement of the communities, hence the community-based management, which recognizes the cultural dimensions of the marine environment within ecosystem approaches to management.

Both mitigation and adaptation activities are being undertaken worldwide; however, these tasks are limited and still scarce, which is due to still common insufficient climate and ocean change awareness among citizens. The global level of awareness related to ocean importance in human daily lives and its relation to climate changes can be related to people's general preferences to deal with other, less abstract, sustainable development goals. It is easier to relate to, e.g., poverty or gender issues, the problems which are unfortunately still real to many societies across the world, rather than think about some remote and abstract problems of sea level rise and higher air temperatures.

It is a very urgent and important task to change peoples' approach to the ocean and make them aware about the importance of the ocean to all of us now and in the future. The world societies must understand how important the ocean is to our daily lives and how dependent we are on the ocean, also in relation to climate changes, and hence how important it is to treat the ocean with understanding and care.

In the remainder of this paper, we concentrate on three of the issues presented in Figure 1, i.e., raising awareness and ambition, sharing information, knowledge and guidance, and, to some extent, engaging a wide range of stakeholders.

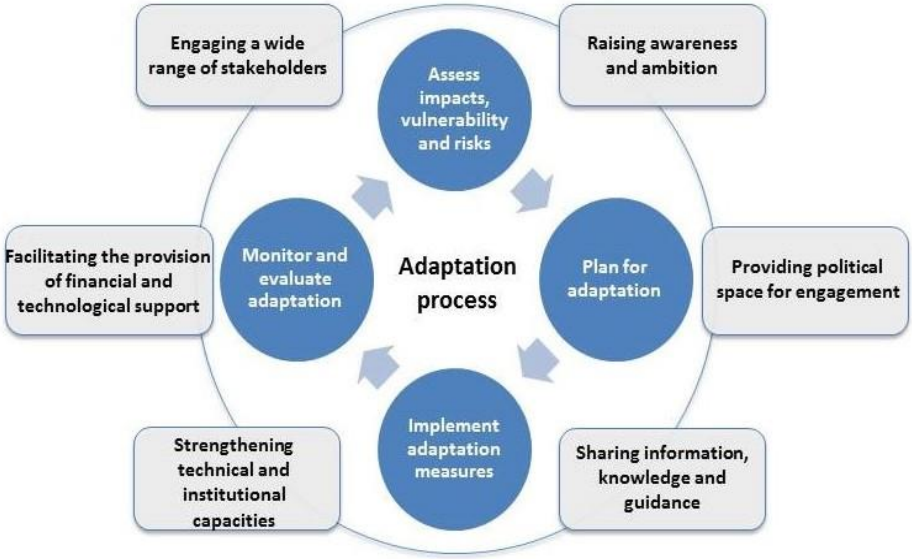

Figure 1. The adaptation cycle under the United Nations' climate change regime component [21].

3. How to Promote the Sustainable Approach to the Ocean: The Role of Effective Communication and Education at All Levels

From the previous considerations, it is obvious that the key to the sustainable and hence safer future for all humans is to be able to realize that we need to make a fundamental choice. This involves the understanding that what we do now has a profound impact on future generations and thus it is us who are fully responsible for the future generations and thus we must make the crucial decision about changing our lifestyles and start actively mitigating climate changes as well as start adapting to the changing reality. Humans must realize that their environmental responsibility involves all elements of human responsibility in general [23].

Hence, as Tlokinski stated [23]: "Invoking the care of the ecosystem as a fragment of the biosphere in the global and local perspective expresses a particular human responsibility whose duties add to its environmental perspective. Relating environmental responsibility to the temporal perspective means the human is currently shaping the future state of the natural environment." The recognition of such responsibility involves the continued

existence of humankind, responsibility for biological health of humankind, or responsibility for the environmental awareness of future generations [24,25]. Tlokinski further states [23]: "The implementation of this vision requires extensive knowledge of the environment and an awareness of the unique role of humankind in the community actions for the good of all beings on Earth". This is particularly true in the case of humans' attitude towards the ocean and its resources. Changing our relationship with the ocean is vital in the process of mitigating and adapting to climate change, and this requires enhanced educational activities with societies across the world.

The worldwide education system can be conventionally divided into formal, informal and non-formal education [5,19,26,27]. Formal education is primarily realized in all levels of schools, and as vocational training. The primary goal of this traditional master–learner relationship is to provide basic knowledge.

Informal education is a form of institutionally provided education, but outside of formal (registered) education and trainings, and as such it rarely leads to receiving a formal qualification degree [19].

The foundations for non-formal education, which is often called community education, are based on the principle of a continuous process of learning, shaping attitudes and forming values, and the continuous development of skills and knowledge using experiences related to the environment, which consists of many elements, such as family and friends, work environment, and all types of mass media. The increasing role of non-formal education in the education process, which we currently observe, is reflected by the very fast civilization and, hence, technological development, which requires us to continuously verify our knowledge in order to keep up with changes and to function in the fast and globally changing world.

In order to enable citizens to follow the changes and be able to make effective decisions related to these changes, humans must rely on the most recent scientific discoveries and the results of analyses of long-term environmental data and, thus, verified scientific knowledge. This can be achieved if both researchers and educators strengthen their collaboration to promote science and its role in the lives of citizens.

In this context, the great advantage of non-formal education is such that, as a rule, it is not based on rigid and long-term curricula, but is a form of practical education in which the key is that educated persons are at the center of the educational process, while the role of educators, to a large extent, comes down to supporting activities, and the practical elements in this education process enable easy use of the latest achievements of science and technology. Of course, in the case of formal education such activities are possible; however, they usually depend on a particular teacher's passion and who facilitates project work for his/her students rather than a school vision of progress. Cooperation with non-formal educators and university teachers, using state-of-the-art syllabuses help tremendously in such endeavors. Often, the outcomes of such actions are embedded in university-organized science-related open events and/or competitions or through some educational projects, which are promoted by the local school authorities. Many of these activities are also made in a form of e-learning courses and during the COVID-19 pandemic times have been moved into the online offer.

In non-formal education, it is the flexibility of curricula that guarantees that in the course of teaching one can use the best, up-to-date scientific knowledge, often available on the Internet, which is usually impossible in the rigid framework of formal education. In the case of knowledge transfer in the formal education system, schools often do not follow these developments and continue to teach in isolation from changes and from the experiences and skills of students, without further practical application of the acquired knowledge [10,11,25,27–29].

The UN Decade of Ocean Science for Sustainable Development (2021–2030), with its focus on global communication and the mutual exchange of ideas and experiences, sets the grounds for the development of new collaborative types of partnerships that can deliver

more efficient, scientifically framed management of the oceans and their resources. These must be supported by an increased awareness of the role of the ocean in humans' lives.

One of the modern approaches, which strives to fulfill the challenges of the UN Sustainable Development Goals and the UN Decade of Ocean Science for Sustainable Development, involves the concept of ocean literacy [30]. An ocean-literate person is aware and understands the key principles and concepts, can properly communicate ocean issues and what is crucial in mitigation and adaptation to climate and ocean change, and can make responsible, science-based decisions regarding the ocean, its resources and the coasts [30–32]. Such skills allow one to apprehend the complex processes that rule climate change and its interactions with the ocean (SDGs 13 and 14), and thus empower people with knowledge of how to work across all SDGs, which is a crucial issue for all societies, and particularly for coastal communities [29,32].

An ocean-literate person is able to develop and provide evidence-based guidance for adaptation planning, implementation and evaluation. Such a person is able to identify and address knowledge gaps, strengthen networks within and across science and policy, practice supporting knowledge sharing, research into use, and learning by doing, and promote capacity strengthening in adaptation among the research, policy and communities [29,31].

4. The EU4Ocean Coalition: A Best Practice Example

Ocean literacy activities are widely developed, and they take the form of local or regional projects up to global ones. One of the best examples of such regional activities, which combines all three types of education forms and ocean literacy principles is the newly operating EU4Ocean coalition, supported by the European Commission [33]. The EU4Ocean coalition, which consists of three working groups, Climate and Ocean, Food from the Ocean and Healthy and Clean Ocean, is focused on being an open hub for organizations, institutions and initiatives in order to connect, collaborate and mobilize efforts on ocean literacy [33]. The initiative provides: "a topic-oriented working environment that stimulates collaboration, exchange of practices and dialogue across the many different target groups leading to the creation of new ocean literacy partnerships and innovative actions, co-designed by organizations and youth" [33]. As of December 2021, it involves 124 members from 21 EU countries and over 260 experts from across the world. The objectives of the EU4Ocean Platform, which is a part of the EU4Ocean coalition, are as follows [33]:

- "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';
- 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".

Therefore, the activities within the platform involve all interested stakeholders. They are mostly of the non-formal education type; however, the other two types of education are welcome to join and benefit from the collaboration and/or resources. During the first 13 months of its existence, the platform made a real difference in the field of ocean literacy on the European scene and beyond. This is manifested through the organization of numerous meetings, trainings, workshops, public events and science days, as well as the preparation of films and materials [33,34]. The range of topics includes teacher trainings, ocean career trainings, and supporting ocean literacy events, among many others.

Here are three examples of the successful actions, which were undertaken within the framework of the EU4Ocean coalition between October 2020 and December 2021.

1. I live by the Sea Contest. Since 2016, this international film and photo competition was successfully run by the Polish company Today We Have. The contest is dedicated to young people of ages up to 21. The goal of the contest is to spread and share knowledge about marine environments and marine protection issues, as well as the exchange of information among users of different seas and marine-oriented regions but also those who live far from the sea, since all people have an important impact on the ocean. The idea is that, through their participation, the youth of different natural and cultural heritages get involved and share their views on marine issues in a creative way. Each annual edition of the contest usually attracted around 130 young participants on average, from a number of countries across the world. The 2021 edition, which was heavily supported by the EU4Ocean coalition partners, gathered 245 participants from 15 countries [35]. The contest reached participants from a number of new regions, including Lithuania, Turkey, Ukraine, Denmark and even outside of Europe, from Sri Lanka and Chile. All the works can be viewed at the contest website [35].
   Additionally, the concept of the I Live by the Sea initiative, due to the access to partners from various European countries, was transformed to the I Live by the Sea project, which now involves the above-described competition, the I Live by the Sea Ocean Action workshops, and summer schools [36]. A very good example of the use of the EU4Ocean resources is the I Live by the Sea spring school 2021 entitled: Towards an ocean friendly citizenship. This initiative was co-designed by Today We Have in collaboration with European partners and community representatives, BANOS CSA, Institute of Oceanology Polish Academy of Sciences (IO PAN), Mare Nostrum and Submariner Network for Blue Growth EEIG, members of the EU4Ocean coalition. It was built from four components: between 12 and 14 May 2021, 30-min long webinars were held with an online opportunity to ask questions and make comments on each of the days. Participants enjoyed extra materials and a quiz for these three webinar days. The 3-day-long block was followed by a live panel discussion that took place on 21 May 2021, during which participants had a chance to hear the moderated discussions between the presenters from Days 1–3. For each panel, two experts (recruiting from educators, communicators, researchers, activists, project officers from Poland, Romania and Germany) representing the Baltic and the Black Sea discussed the theme of the day. All the discussions were made with relation to the sustainability aspects focusing on the Baltic and the Black Sea, and so the participants had a chance to learn about both basins, their problems and challenges, as well as a number of interesting facts. The entire event was a part of the European Maritime Days 2021, and, as of January 2022, the total of all views amounted to 6800. The pan-European cooperation also led to the strengthening of the other leg of the project, i.e., the Ocean Action workshops. Until 2020, the workshop activities focused mostly on local learners from the area of Gdansk, Poland. Due to the cooperation with a Romanian EU4Ocean partner Mare Nostrum, a series of I Live by the Sea Ocean Action workshops were run among the Romanian students. Moreover, the methodology was applied during the Ocean@Home summer school, which is described below.
   Further, the I Live by the Sea project and its visibility through the EU4Ocean Platform attracted new students to participate in the Where the World is Heading Junior Conference, which was held online on 10 June 2021 [37]. The conference, normally held for local students, in 2021 attracted over 200 students from four countries (Poland, Romania, Spain and Morocco).
   The conference participants were able to present their projects in the form of a 3-min oral presentation, which could be of an arbitrary form: multimedia presentation, poster, PPT presentation, mock-ups, etc. The participants' projects are available on the Padlet platform; thus, they are still "alive" and can be commented on [38]. Those

mini lectures were preceded by an invited guest, in 2021, a person representing the WWF. The day ended with the announcing of the results for the best presentations and honoring the winners with prizes and diplomas. The award committee consisted of experts from various ocean-related fields and the evaluation criteria were as follows:

- Innovative approach to the subject;
- Content;
- Form of presentation;
- Presentation of the topic and the ability to convey your theses.

Since 2021, the I Live by the Sea project has been an official partner in the UN Decade of Ocean Science for Sustainable Development.

2. The Ocean@Home summer school [39], run with the support of the German-Polish Youth Organization. This 2-week-long (12 to 23 July 2021) online school gathered students of ages between 14 and 17 from Poland, Romania and Germany. The course was co-organized by GEOMAR (Helmholtz-Zentrum für Ozeanforschung Kiel) and the members of the EU4Ocean coalition and/or platform, i.e., IO PAN, Today We Have and Mare Nostrum, Alfred Wegener Institute. The aims of the course focused on crucial aspects of ocean and climate issues, with respect to the UN Sustainable Development Goals. The following dedicated topics were addressed:

   - Characteristics of the Baltic Sea and Black Sea.
   - Plastics in the Ocean.
   - Fisheries and Sustainability.
   - The Role of Computer Models in the Prediction of Climate Change.
   - Adaptation to a Changing Climate.
   - The United Nations Sustainable Development Goals.

   Ocean experts introduced the topics above in live online seminars. The students worked in international teams and received a task related to the topic of the day. These could be solved online or offline, in the house or outside, but always in close cooperation within the teams. Every day ended with a second web conference by all participants of the summer school to discuss their findings.
   In addition, every second day the students had their own meetings and worked on topics related to particular targets of the UN Sustainable Development Goals related to oceans and climate. They discussed specific issues and how they were apparent in their own reality, the Baltic, the Black Sea and in the relation to the ocean in general. Those activities culminated in group presentations and discussions at the end of the course.
   Such approach facilitated discussions on both very specific and general issues, with a good balance of educator influence versus students' own work time in multinational teams. This way provided supportive healthy conditions for the realization of the general idea of the school, i.e., the increased awareness of climate, ocean and SDG issues, through the co-creation process. A full summary of the course can be found here: [39,40].

3. Youth4Ocean Forum [41].
   The Youth4Ocean Forum is a free platform for young ocean fans of ages between 16 and 30, who want to contribute to the shaping of the future with a healthy ocean that sustains us all. The Youth4Ocean Forum provides the opportunity to stand up for the young generation, share the ideas, present projects and connect with like-minded young people and experts all over Europe. The Youth4Ocean Forum also offers a possibility to submit projects and obtain accreditation of EU Young Ocean Advocates (activists between 16 and 30 years old). EU Young Ocean Advocates can showcase their projects, participate and pitch ideas in European events, connect with mentors, network with leading European experts, participate in working groups along with stakeholders and decision-makers to address ocean challenges, and benefit from leadership resources to make a positive change [42].

Currently (as of 20 December 2021), the forum has 204 members and 100 Young Ocean Advocates representing 43 projects for the ocean. In 2021, the Youth4Ocean Forum members carried out 113 activities and were present and spoke up for youth at 17 conferences and workshops, including the COP 26 summit in Glasgow [43].

5. Conclusions

Fast-progressing consequences of climate and ocean changes are currently the most important environmental issues, and so, raising the level of citizens' environmental awareness should be the key challenge for scientists, science communicators as well as educators. They need to collaborate in order to enhance the effectiveness of the transfer of environmental knowledge and awareness of the change consequences to societies across the world.

Having this in mind, humans need to see their civic duties and attitudes towards social prosperity and the environment in a broad sense. The perspective applied to consider these issues should depict the connection between climate and the state of the economy, as well as, more broadly, between climate and societal well-being. Dealing with a wide spectrum of climate and ocean change issues, citizens require unique means of education for transferring a multitude of information to raise awareness of the need for changes in their lifestyles.

Currently, most commonly, social media and the Internet in general are the information sources reporting on these issues. These media often promote rather simplistic forms of information transfer, without deeper analyses of problems, usually without a broad perspective and without suggestions on the importance of the necessary actions, such as limitations in car use, recycling, etc.

It is of a key importance to educate citizens with a significantly larger, namely, global-scale, perspective. We need to "sell" a holistic vision of the changes and their global consequences, so that people can relate to these on many levels, from a local scale, and from the local ideas for progressive improvements to the ecosystem, to more broad aspects—the global biosphere. Local-scale perspective is understandable, as such a perspective is appropriate for the creation of environmental responsibility, and this will help to co-create the reality of global meaning. This relation is in line with the nature of wildlife understood as functional integrity and hence with a general philosophy of sustainable development.

The ocean literacy concept carries all the necessary means for creating such attitudes in the case of the ocean's role in global system awareness with an ocean-conscious citizen at its core while the picture of the ocean is very wide. This concept leads to the creation of many initiatives, including an EU4Ocean coalition, which is a best-case example of the multilateral approach to the ocean issues. The EU4Ocean complies with the philosophy of the UN adaptation cycle (Figure 1) in three of the six defined areas, namely, raising awareness and ambition, sharing information, knowledge and guidance, and engaging a wide range of stakeholders, who mostly represent areas of education and communication.

Author Contributions: Conceptualization, T.Z. and C.G.-S.; Formal analyses, T.Z., I.K.-Z. and C.G.-S.; Investigation, T.Z., I.K.-Z. and C.G.-S.; Validation, T.Z., I.K.-Z. and C.G.-S.; Writing original draft, T.Z. and C.G.-S.; Writing review and editing, T.Z., I.K.-Z. and C.G.-S.; Project administration, I.K.-Z. All authors have read and agreed to the published version of the manuscript.

Funding: This research received no external funding.

Institutional Review Board Statement: Not applicable.

Informed Consent Statement: Informed consent was obtained from all subjects involved in the study.

Data Availability Statement: Not applicable.

Acknowledgments: The authors want to thank Joachim Dengg from the School Cooperations at GEOMAR Helmholtz Centre for Ocean Research, Kiel, Germany, who led the Ocean@Home summer school and gave us feedback on the draft of this paper.

Conflicts of Interest: The authors declare no conflict of interest.

References

1. IPCC. Summary for Policymakers. In *Climate Change 2021: The Physical Science Basis. Contribution of Working Group I to the Sixth Assessment Report of the Intergovernmental Panel on Climate Change*; Masson-Delmotte, V., Zhai, P., Pirani, A., Connors, S.L., Péan, C., Berger, S., Caud, N., Chen, Y., Goldfarb, L., Gomis, M.I., et al., Eds.; Cambridge University Press: Cambridge, UK, 2021; (*in press*)
2. Garcia-Soto, C.; Cheng, L.; Caesar, L.; Schmidtko, S.; Jewett, E.B.; Cheripka, A.; Rigor, I.; Caballero, A.; Chiba, S.; Báez, J.C.; et al. An Overview of Ocean Climate Change Indicators: Sea Surface Temperature, Ocean Heat Content, Ocean pH, Dissolved Oxygen Concentration, Arctic Sea Ice Extent, Thickness and Volume, Sea Level and Strength of the AMOC (Atlantic Meridional Overturning Circulation). *Front. Mar. Sci.* **2021**, *8*, 642372. [CrossRef]
3. United Nations. *The Second World Ocean Assessment: World Ocean Assessment II, Vols. I and II United Nations*; United Nations: San Francisco, CA, USA, 2021; ISBN 978-92-1-1-130422-0.
4. Wisz, M.S.; Satterthwaite, E.V.; Fudge, M.; Fischer, M.; Polejack, A.; John, M.S.; Fletcher, S.; Rudd, M.A. 100 Opportunities for More Inclusive Ocean Research: Cross-Disciplinary Research Questions for Sustainable Ocean Governance and Management. *Front. Mar. Sci.* **2020**, *7*, 576. [CrossRef]
5. European Marine Board. *Navigating the Future V: Marine Science for a Sustainable Future*; Position Paper 24 of the European Marine Board: Ostend, Belgium, 2019; ISBN 9789492043757. [CrossRef]
6. Dumała, H.; Łuszczuk, M.; Piwowarczyk, J.; Zieliński, T. Transnational Municipal Networks as a Mechanism for Marine Governance Toward Climate Change Adaptation and Mitigation: Between Potential and Practice. *Front. Mar. Sci.* **2021**, *8*, 626119. [CrossRef]
7. Gaines, S.D.; Costello, C.; Owashi, B.; Mangin, T.; Bone, J.; Molinos, J.G.; Burden, M.; Dennis, H.; Halpern, B.S.; Kappel, C.V.; et al. Improved fisheries management could offset many negative effects of climate change. *Sci. Adv.* **2018**, *4*, eaao1378. [CrossRef] [PubMed]
8. United Nations. *The First Global Integrated Marine Assessment: World Ocean Assessment I*; Cambridge University Press: Cambridge, UK, 2017.
9. Pendleton, L.; Evans, K.; Visbeck, M. Opinion: We need a global movement to transform ocean science for a better world. *Proc. Natl. Acad. Sci. USA* **2020**, *117*, 9652–9655. [CrossRef]
10. Kotyńska-Zielińska, I.; Olenin, S.; Fornalewicz, K.; Prądzińska, A.; Węsławski, J.M. Perception of Arctic issues among young learners in Poland and Lithuania. *Oceanologia* **2020**, *62*, 576–587. [CrossRef]
11. Pakszys, P.; Zieliński, T.; Ferrero, L.; Kotyńska-Zielińska, I.; Wichorowski, M. Changing Arctic. Firm scientific evidence versus public interest in the issue. Where is the gap? *Oceanologia* **2020**, *62*, 593–602. [CrossRef]
12. Balke, T.; Herman, P.; Bouma, T.J. Critical transitions in disturbance-driven ecosystems: Identifying Windows of Opportunity for recovery. *J. Ecol.* **2014**, *102*, 700–708. [CrossRef]
13. Austen, M.C.; Andersen, P.; Armstrong, C.; Döring, R.; Hynes, S.; Levrel, H.; Coopman, J. *Valuing Marine Ecosystems—Taking into Account the Value of Ecosystem Benefits in the Blue Economy*; Future Science Brief 5 of the European Marine Board: Ostend, Belgium, 2019. [CrossRef]
14. Evans, K.; Chiba, S.; Bebianno, M.; Garcia-Soto, C.; Ojaveer, H.; Park, C.; Ruwa, R.; Simcock, A.J.; Vu, C.T.; Zielinski, T. The Global Integrated World Ocean Assessment: Linking Observations to Science and Policy Across Multiple Scales. *Front. Mar. Sci.* **2019**, *6*, 298. [CrossRef]
15. IPCC. *Climate Change 2014: Synthesis Report. Contribution of Working Groups I, II and III to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change*; Core Writing Team, Pachauri, R.K., Meyer, L.A., Eds.; IPCC: Geneva, Switzerland, 2014; p. 151.
16. Available online: https://en.unesco.org/ocean-decade (accessed on 23 December 2021).
17. Available online: https://www.un.org/sustainabledevelopment/development-agenda/ (accessed on 23 December 2021).
18. Evans, K.; Zielinski, T.; Chiba, S.; Garcia-Soto, C.; Ojaveer, H.; Park, C.; Ruwa, R.; Schmidt, J.O.; Simcock, A.; Strati, A.; et al. Transferring Complex Scientific Knowledge to Useable Products for Society: The Role of the Global Integrated Ocean Assessment and Challenges in the Effective Delivery of Ocean Knowledge to Society. *Front. Environ. Sci.* **2021**, *9*, 626532. [CrossRef]
19. Zielinski, T.; Bolzacchini, E.; Evans, K.; Ferrero, L.; Gregorczyk, K.; Kijewski, T.; Kotynska-Zielinska, I.; Mrowiec, P.; Oleszczuk, B.; Pakszys, P.; et al. Abundance of Environmental Data vs. Low Public Interest in Ocean and Climate Issues. Where Is the Missing Link? *Front. Mar. Sci.* **2021**, *8*, 51. [CrossRef]
20. Garcia-Soto, C.; Seys, J.J.C.; Zielinski, O.; Busch, J.A.; Luna, S.I.; Baez, J.C.; Domegan, C.; Dubsky, K.; Kotynska-Zielinska, I.; Loubat, P.; et al. Marine Citizen Science: Current State in Europe and New Technological Developments. *Front. Mar. Sci.* **2021**, *8*, 621472. [CrossRef]
21. Available online: https://unfccc.int/topics/adaptation-and-resilience/the-big-picture/what-do-adaptation-to-climate-change-and-climate-resilience-mean (accessed on 26 November 2021).
22. Available online: https://www.unenvironment.org/explore-topics/climate-change/what-we-do/mitigation (accessed on 26 November 2021).
23. Tłokiński, W. Lexis of climate phenomena in social sciences students' daily discourse. *Oceanologia* **2020**, *62*, 603–607. [CrossRef]
24. Marek-Bieniasz, A. Odpowiedzialnosc ekologiczna jako istotny obszar ludzkiej odpowiedzialnosci—wymiar lokalny i globalny. *Stud. Glob. Ethics Glob. Educ.* **2015**, *3*, 16–28. [CrossRef]

25. Kollmuss, A.; Agyeman, J. Mind the Gap: Why do people act environmentally and what are the barriers to pro-environmental behavior? *Environ. Educ. Res.* **2010**, *8*, 239–260. [CrossRef]
26. Peters, M.A. Digital socialism or knowledge capitalism? *Educ. Philos. Theory* **2020**, *52*, 1–10. [CrossRef]
27. Kopke, K.; Black, J.; Dozier, A. Stepping Out of the Ivory Tower for Ocean Literacy. *Front. Mar. Sci.* **2019**, *6*, 60. [CrossRef]
28. Donert, K. School on the Cloud: Connecting Education to the Cloud for Digital Citizenship. In *Handbook of Research on Educational Design and Cloud Computing in Modern Classroom Settings*; Koutsopoulos, K., Kotsanis, T., Eds.; Springer: New York, NY, USA, 2018. [CrossRef]
29. Jensen, E.; Gerber, A. Evidence-Based Science Communication. *Front. Commun.* **2020**, *4*, 78. [CrossRef]
30. Available online: https://oceanliteracy.unesco.org (accessed on 23 December 2021).
31. McCauley, V.; McHugh, P.; Davison, K.; Domegan, C.T. Collective intelligence for advancing ocean literacy. *Environ. Edu. Res.* **2019**, *25*, 280–291. [CrossRef]
32. Stoll-Kleemann, S. Feasible Options for Behavior Change Toward More Effective Ocean Literacy: A Systematic Review. *Front. Mar. Sci.* **2019**, *6*, 273. [CrossRef]
33. Available online: https://webgate.ec.europa.eu/maritimeforum/en (accessed on 21 December 2021).
34. Available online: https://webgate.ec.europa.eu/maritimeforum/en/frontpage/1482 (accessed on 21 December 2021).
35. Available online: https://todaywehave.com/Results_of_the_I_live_by_the_Sea_International_Youth_Photo_and_Film_Contest_2021.html (accessed on 21 December 2021).
36. Available online: https://todaywehave.com/index.php?langver=EN&langver=EN (accessed on 29 December 2021).
37. Available online: http://www.todaywehave.com/International_Junior_Conference_2021.html (accessed on 29 December 2021).
38. Available online: https://iopan1.padlet.org/iopanfb2/bqxmcp6wp6k6tzju (accessed on 29 December 2021).
39. Available online: https://www.geomar.de/ocean-at-home (accessed on 28 December 2021).
40. Available online: https://www.geomar.de/en/news/article/summer-science-camp-at-home (accessed on 28 December 2021).
41. Available online: https://webgate.ec.europa.eu/maritimeforum/en/frontpage/1484 (accessed on 30 December 2021).
42. Available online: https://webgate.ec.europa.eu/maritimeforum/en/node/5150 (accessed on 30 December 2021).
43. Available online: https://webgate.ec.europa.eu/maritimeforum/en/node/6870 (accessed on 30 December 2021).