



CHAPTER 1

The Agenda 2030 and the Imperative for Research and Education for the Climate and the Oceans

*Giuliana Panieri, Margherita Paola Poto,
and Emily Margaret Murray*

Abstract This chapter sets the scene and provides background information regarding the primary objective of the book: to contribute to the knowledge base for climate education and research, with a specific focus

Giuliana Panieri, Margherita Paola Poto, and Emily Margaret Murray with the participation of Olena Peftieva and Giuliano Bertolotto Bianc.

G. Panieri

Department of Geosciences, UiT The Arctic University of Norway, Tromsø, Norway

e-mail: giuliana.panieri@uit.no

M. P. Poto (✉)

Faculty of Law, UiT The Arctic University of Norway, Tromsø, Norway

e-mail: margherita.poto@uit.no

M. P. Poto · E. M. Murray

Department of Management, University of Turin, Turin, Italy

E. M. Murray

School of Law, University College Cork (UCC), Cork, Ireland

© The Author(s) 2024

G. Panieri et al. (eds.), *Emotional and Ecological Literacy for a More Sustainable Society*, https://doi.org/10.1007/978-3-031-56772-8_1

on the oceans and water. Within this framework, the chapter situates educational and research strategies that specifically focus on ocean literacy, developed and coordinated by the authors over the past years. Drawing upon the intersection of ecological literacy and inclusive learning, firmly grounded in sustainability and ocean literacy, the chapter describes the steps in developing an education and research platform that responds to the primary purpose of advancing knowledge and effectively contributing to climate knowledge-in-action. These steps encompass the ideation, development, and implementation of *The Ocean Senses Activity Book* (and connected outputs) as a pilot project for Ocean Literacy (OL) and its translation, validation, and application in various cultural contexts. *The Ocean Senses Activity Book* marks an important contribution in promoting OL in research and education settings. Some further reflections on the importance of OL stem from the experience of a student-led course on Agenda 2030, with a particular emphasis on Sustainable Development Goal (SDG) 14 on Life Below Water. Additionally, the chapter highlights how the preliminary conclusions of the Ocean Interconnectedness workshop sparked new ideas on how to develop cross-disciplinary research and educational tools on OL. To wrap up this introductory chapter, a general overview of the book's structure and conceptual framework is provided.

The editors and authors express their gratitude to the Faculty of Law, UiT The Arctic University of Norway (and especially to Lise Myrvang), and the Open Access Library Funds (Grete Overvåg) for their financial support towards the publication of this book. Additionally, they extend their appreciation to Irene Hadiprayitno, Anca Pusca, and the entire Palgrave MacMillan team for their steadfast support throughout the process.

The work was developed during the course on the “New Horizons of Administrative Law, The Agenda 2030 (with a specific focus on SDG 14 Life Below Water)” at the Department of Management, University of Turin, co-led by Poto and Panieri in the academic year 2022–2023. The core ideas were further developed during the interdisciplinary workshop “Ocean Interconnectedness”, organised on September 19 and 20, 2023, at the UiT The Arctic University of Norway. M. P. Poto coordinated the research, co-wrote Sects. 1, 2, 3, and supervised the last version of the work.

Keywords Research · Education · Climate · Ocean

1 INTRODUCTION: THE 2030 AGENDA AND THE URGENCY TO SAFEGUARD PLANETARY HEALTH

The 2030 Agenda for Sustainable Development, adopted by the United Nations in 2015 (hereinafter Agenda 2030),¹ marks a global milestone in the commitment to addressing imperative sustainability issues such as ending poverty, overcoming food insecurity, reversing climate change impacts, and reversing inequality and injustice.² At the core of the Agenda 2030 lies the fundamental acknowledgement that there exists a profound interdependence between our planetary ecosystem and the overall well-being of the human population, defined within the comprehensive framework recognised as “planetary health”.³ Yet, despite the unequivocal recognition of planetary health’s pivotal significance within the scientific community,⁴ which underscores the imperative for immediate action to safeguard both the planet and human health,⁵ the successful realisation of sustainability objectives remains elusive.

¹ The 2030 Agenda for Sustainable Development was adopted by the United Nations General Assembly (UNGA) on 25 September 2015, available on the official website: <https://documents-dds-ny.un.org/doc/UNDOC/GEN/N15/291/89/PDF/N1529189.pdf?OpenElement>, last access 3 October 2023.

² The literature on the Agenda is quite vast. Among the most recent contributions, it is worth citing the critical study of Kotzé, L. J., & Adelman, S. (2023). Environmental law and the unsustainability of sustainable development: A tale of disenchantment and of hope. *Law and Critique*, 34(2), 227–248. For an overview of the architecture of the Agenda 2030, see Poto M. P., Murray, E. M. (2022). The New Horizons of Law and Science through a systemic approach promoted through the lens of the Agenda 2030 on sustainable development. Some Emerging Issues, *Environmental Policy and Law*, pp. 1–14.

³ See Holden, E., Linnerud, K., & Banister, D. (2017). The imperatives of sustainable development. *Sustainable Development*, 25(3), 213–226.

⁴ Specifically on the role of planetary health in education and research see Brand, G., Wise, S., Bedi, G., & Kickett, R. (2023). Embedding indigenous knowledges and voices in planetary health education. *The Lancet Planetary Health*, 7(1), e97–e102.

⁵ Ortiz-Moya, F., Tan, Z., & Kataoka, Y. (2023). State of the voluntary local reviews 2023: Follow-up and review of the 2030 agenda at the local level. Institute for Global Environmental Strategies. <https://doi.org/10.57405/iges-13013>, last access October 2023.

In the words of António Guterres, UN Secretary General (UNSG), “The Doomsday Clock is now 90 seconds to midnight, which means 90 seconds to total global catastrophe. This is the closest the clock has ever stood to humanity’s darkest hour [...]. In truth, the Doomsday Clock is a global alarm clock. We need to wake up – and get to work”.⁶ And, in the words of Guterres, climate action is “the 21st century’s greatest opportunity to drive forward all the Sustainable Development Goals”⁷ and address such urgency. The UNSG explicitly anchors this call to climate action to the safeguard of water, “Our ocean is choked by pollution, plastics and chemicals. And vampiric overconsumption is draining the lifeblood of our planet — water. 2023 is a year of reckoning. It must be a year of game-changing climate action”.⁸ Vivid words that well depict the urgency to act for the climate.

Within this framework and in alignment with the overarching theme of this book, climate action in the context of ocean sustainability assumes a crucial role in both academic research and educational settings. This places a significant responsibility on scientists and educators to effectively act within their own fields of expertise, by developing knowledge frameworks that incorporate, promote, and facilitate effective responses to sustainability challenges.⁹

In conclusion, the primary objective of this book is to contribute to strengthening the ongoing efforts within the research community on advancing the framework for the planetary health research agenda,¹⁰ with

⁶ The complete discourse of the UNSG can be accessed online at: <https://www.un.org/sg/en/content/sg/speeches/2023-02-06/secretarygenerals-briefing-the-general-assembly-prioritiesfor-2023>, last access 3 October 2023.

⁷ Ibid. (see footnote 6).

⁸ Ibid. (see footnote 6).

⁹ For a thorough study on the interconnections between climate action and environmental education and research, see Trott, C. D., Lam, S., Roncker, J., Gray, E. S., Courtney, R. H., & Even, T. L. (2023). Justice in climate change education: A systematic review. *Environmental Education Research*, 1–38; Brownlee, M. T., Powell, R. B., & Hallo, J. C. (2013). A review of the foundational processes that influence beliefs in climate change: Opportunities for environmental education research. *Environmental Education Research*, 19(1), 1–20.

¹⁰ Biermann, F., & Kalfagianni, A. (2020). Planetary justice: A research framework. *Earth System Governance*, 6, 100049; Capra, F. (2007). Sustainable living, ecological literacy, and the breath of life. *Canadian Journal of Environmental Education (CJEE)*, 9–18.

a specific, even though not exclusive, focus on the ocean. Recognising that the well-being of our oceans is intricately linked to planetary health and in line with the vision and mission of the UN Ocean Decade to strengthen the knowledge base for transformative ocean science solutions that connect people and the ocean,¹¹ research and education initiatives focusing on ocean sustainability (within the umbrella concept of Ocean Literacy)¹² stand as vital contributors to formulating effective responses to sustainability challenges. According to the UN, the ocean is “the world’s greatest ally against climate change”¹³ due to the central role it plays in regulating global greenhouse gas emissions.

Human beings and non-human beings are impacted by the ocean daily, whether or not they are living in a coastal region. Developing accessible tools to improve OL among various ages is one step towards improving ecological literacy, and an area of literacy and understanding that we feel can have the greatest impact on climate action. After providing a definition of OL, in the subsequent sections, we will delve into the various steps that have contributed to the development of our research and educational strategies and tools, igniting transformative behavioural change and fostering action towards ocean sustainability.¹⁴

2 PILOT PROJECTS FOR OCEAN LITERACY (OL)

2.1 *Preliminary Remarks*

In Sect. 2, we describe the initiatives undertaken by our cross-disciplinary team towards the enhancement of Ocean Literacy for all: The Ocean Senses Activity Book,¹⁵ its interconnected outputs (Sects. 2.2 and 2.3);

¹¹ On the UN Ocean Decade and its role in igniting climate action for ocean sustainability see the official website <https://oceandecade.org/>, last access 6 October 2023.

¹² For the definition of Ocean Literacy (OL), see further Sect. 2.2.

¹³ <https://www.un.org/en/climatechange/science/climate-issues/ocean>, last access December 2023.

¹⁴ McKinley, E., Burdon, D., & Shellock, R. J. (2023). The evolution of ocean literacy: A new framework for the United Nations Ocean Decade and beyond. *Marine Pollution Bulletin*, 186, 114467.

¹⁵ Panieri G. et al., No. 1 (2023). The Ocean Senses Activity Book, Edited by Giuliana Panieri and Mathew Stiller-Reeve; Authored by Panieri, G., Savini, A., Willis, C., Oddone, D., Rosnes, Maric, F., Franchi, F., Zimmermann, H. J., Todd, J. E., Meyer, Losleben,

the student-led course on the New Horizons of the Agenda 2030 with a focus on SDG 14 (Sect. 2.4); and the preliminary results from the interdisciplinary workshop on Ocean Interconnectedness (Sect. 2.5).

2.2 *Ocean Literacy: A Concept Bridging the UN Ocean Decade with Oceanic Views*

In the development of a comprehensive conceptual framework that informs the research and education community on ocean sustainability, OL focuses on the reciprocal influence between the oceans and humankind.¹⁶ Our approach is rooted in this understanding. This concept aligns with the overarching vision of the international community, as articulated in the Ocean Literacy Framework (hereinafter OL Framework) by the Intergovernmental Oceanographic Commission for the United Nations Ocean Decade (2021–2030),¹⁷ while also incorporating the perspectives and insights of oceanic communities and oceanic Indigenous knowledge custodians and philosophers.¹⁸ The main overarching aim of our methodology consists of this: to achieve integration and mutual exchange of knowledge sets, combining the perspectives of the Ocean Decade and oceanic views, to promote well-being and inclusivity for all. The concordance observed between the definition outlined in the UN

L. K., Poto, M. P., Eilertsen, M. H., Stiller-Reeve, M. A., Clerici, M., R., Ramalho, S., Mohadjer, Aune, V., Os, V., Poddevin, V., & Holm, V. D. & Sancak Sert, Z. Contributions from: Panieri, G., S., Savini, A., Willis, C., C., Oddone, D., D., Rosnes, E., F., Maric, F., Franchi, F., Zimmermann, H. J., Todd, J. E., K. A., Losleben, L. K., Poto, M. P., Eilertsen, M. H., Stiller-Reeve, M. A., Clerici, M., R., Ramalho, S., Mohadjer, S., Aune, V., Os, V., Poddevin, V., Holm, V. D., Haule, A., Hayden, J., Pickering, R., Mandana Knust, TRINT Tromsø International School students & ECO_CARE project, An Exchange Program on Empathy, Compassion, and Care in Water Governance, from the Perspective of Integral Ecology. Graphics and Layout Heike Jane Zimmermann, in Septentrio Educational, No. 1, <https://doi.org/10.7557/se.2023.1>.

¹⁶ Ibid. (see footnote 15).

¹⁷ UNESCO-IOC. 2021. Ocean Literacy Framework for the UN Decade of Ocean Science for Sustainable development 2021–2030. Paris, UNESCO. (IOC Ocean Decade Series, 22), available at <https://unesdoc.unesco.org/ark:/48223/pf0000377708>, last access 6 October 2023; Ferreira, J. C., Vasconcelos, L., Monteiro, R., Silva, F. Z., Duarte, C. M., & Ferreira, F. (2021). Ocean literacy to promote sustainable development goals and agenda 2030 in coastal communities. *Education Sciences*, 11(2), 62.

¹⁸ Hau'Ofa, E. (2008). *We are the ocean: Selected works*. University of Hawaii Press.

Ocean Decade and the Pacific knowledge repositories does not necessarily imply the absence of disparities between them. Rather, it serves to corroborate and strengthen the notion that the most promising avenue for safeguarding the ocean lies in embracing a multifaceted, dialogical, hybrid, and relational approach.

In this vein, we see the concordance between the OL Framework of the UN Ocean Decade and the oceanic views of indigenous peoples.¹⁹ It is stated in the OL Framework that:

Ocean Literacy refers to the understanding of the ocean's influence on us and our influence on the ocean. Many people are unaware that the ocean is intrinsically linked to major global issues such as climate change and food security, human health and the global economy. The ocean also represents a range of social values for various cultures, as people from all over the world are able to recognize and relate to the ocean in different ways. To achieve sustainable development and well-being across the globe, everyone needs to understand our dependence on the ocean, and how we can contribute to its sustainability. In this context, Ocean Literacy has a twofold goal: to learn more about the world's oceans and to contribute to the co-design and co-delivery of solutions to the problems and threats it faces. In this way, Ocean Literacy becomes more than a tool for capacity development and knowledge generation.²⁰

This definition aligns with the oceanic perspectives, “Our most important role should be that of custodians of the ocean, and, as such, we must reach out to similar people elsewhere for the common task of protecting the seas for the general welfare of all living things. [...] The formation of an oceanic identity is really an aspect of our waking up to things that are already happening around us”.²¹

Reflecting on such need to adopt a relational approach between knowledge sets and towards the ocean, our educational tools and their overarching conceptual framework were co-created with the communities of learners to foster the understanding of the interdependence between

¹⁹ Ibid. (see footnote 18).

²⁰ UNESCO-IOC. 2021. Ocean Literacy Framework for the UN Decade of Ocean Science for Sustainable development 2021–2030. Paris, UNESCO. (IOC Ocean Decade Series, 22), available at <https://unesdoc.unesco.org/ark:/48223/pf0000377708>, last access 6 October 2023.

²¹ Ibid. (see footnote 20).

the ocean and humankind. Thus far, the co-creation process has involved the Chiquitano Indigenous Peoples from Mato Grosso²² and the schools from the Ruvuma Region, in the southern region of Tanzania, as well as the Bachelor students in Business and Management from an academic environment not directly connected to the sea, as in the case of the University of Turin in Italy.²³ In collaboration with our communities of educators and learners, we reflected on the interconnections between our lives, knowledge paradigms, and perceptions, validated by multisensory experiences, emotional responses, and life histories. This collective effort led to the co-creation of project ideas that underscore the imperative of planetary protection and the fostering of a responsible attitude towards it.

2.3 The Ocean Senses Activity Book: Developments, Outputs, Validation, and Application to Multicultural Contexts

As a first example of a co-created learning resource bridging ocean and people, The Ocean Senses Activity Book was developed by a group of scientists from different backgrounds (marine geosciences, philosophy, psychology, gender studies, education, environmental law) during the AKMA-Ocean Senses Research Expedition (11–23 May 2022).²⁴ The expedition was part of a research project aiming to advance knowledge of methane in the Arctic led by Giuliana Panieri, aboard the research vessel Kronprins Håkon to the Barents Sea and Arctic Ocean focusing on both science and education.²⁵ It had two overarching aims. First, to investigate and collect data from extreme environments such as “cold seep”, sites characterised by emission at the seafloor of deep-sourced fluids enriched in methane and hydrogen sulphide, to increase the ability of marine geoscientists to understand greenhouse gas dynamic in the past, present and predict the future. Second, to develop an educational platform for interdisciplinary collaboration with the goal of improving OL.

²² For a recount of this experience, see the blogpost (in Portuguese) at https://en.uit.no/project/ecocare/blogg/innlegg?sub_id=795326, last access 4 October 2023.

²³ For some examples of co-created projects from the students at the University of Turin, see <https://en.uit.no/project/ecocare/blogg>, last access February 2024.

²⁴ For more details, see <https://en.uit.no/project/akma/Akma2>, last access 4 October 2023.

²⁵ Ibid. (see footnote 24).

The Ocean Senses Activity Book was the project result of this latter aim. The marine geoscientists involved in the primary project activity (Advancing Knowledge on Methane in the Arctic) were paired with educators and (mainly) social scientists from different backgrounds. The project team was divided into five groups that worked together for educational resources that facilitate experiential learning using the human senses (touch, sight, smell, hearing, and taste). The diversity within and between these smaller working groups is reflected in the variety of the resulting lesson plans, compiled in the final Ocean Senses Activity Book, where multiple activities and different approaches and laboratories are promoted, varying from visual and touch-learning, to kinaesthetic to hands-on activities across sixteen comprehensive lesson plans. The learning resource, and the partnership developed among the different contributors and the target audiences (mainly but not exclusively school communities from partnering countries), address two major issues in scientific literacy in general, and in ocean sciences literacy in particular. First, the book responds to the increasingly urgent need for scientists to engage and communicate more effectively with the public about scientific issues.²⁶ Second, it provides an inclusive learning platform for diverse learning needs and cultural contexts. The idea to develop a multisensory approach to learning responds to the need for an inclusive quality education and to overcome learning barriers (physical, mental, cultural, and social).²⁷ Hence, the compilation of multisensory practical sessions and interactive activities, translated from English into multiple languages (including Chinese,²⁸

²⁶ O'Brien, M., Freitas, C., Venzo, P., & Francis, P. (2023). Fostering ocean literacy through informal marine education programs. *Marine Pollution Bulletin*, 193, 115,208; Freitas, C., Francis, P., Bellgrove, A., & Venzo, P. (2023). Adopting Ocean-Themed Picture Books to Promote Ocean Literacy in Primary Education. *Children's Literature in Education*, 1–16; McCauley, V., Davison, K., McHugh, P., Domegan, C., & Grehan, A. (2021). Innovative Education Strategies to Advance Ocean Literacy. *Ocean Literacy: Understanding the Ocean*, 149–168.

²⁷ Kamenopoulou, L. (2022). EBOOK: Inclusive Education for Learners with Multisensory Impairment: Best Practices and Research Priorities. McGraw-Hill Education (UK); Dede, C., Salzman, M. C., Loftin, R. B., & Sprague, D. (1999). Multisensory immersion as a modelling environment for learning complex scientific concepts. In *Modeling and simulation in science and mathematics education* (pp. 282–319). New York, NY: Springer.

²⁸ Panieri et al., No. 2 (2023). The Ocean Senses Activity Book (Chinese version by Giuliano Bertolotto Bianc) <https://doi.org/10.7557/se.2023.2>.

Ukrainian,²⁹ Italian, and Farsi) by local educators, serves the purpose of engaging teachers, learners, the researchers and communities at large in discussions and hands-on activities pertaining to ocean-related topics.³⁰

In the words of Olena Peftieva, translator of *The Ocean Senses Activity Book* into Ukrainian: “Translation is an art expressed with words. It is also the art of translating the untranslatable. The latter permeates the activity book ‘Ocean Senses’ by Giuliana Panieri and her team. Inspiration igniting others, devotion to profession, love of nature, and desire to protect it are all between the lines. It is an unusual methodological edition based on an interdisciplinary collaboration brought to the classrooms to tell students about the history of our planet, nature and its living creatures, and present-day environmental problems. Translation is also a science in that it requires extensive knowledge of the source language to understand the nuances of the text and find appropriate equivalents in the target language. However, translation is usually a combination of science and art, especially when it comes to poetry”.³¹

This view is shared by Giuliano Bertolotto Bianc, translator of the project into Chinese: “Following the interdisciplinary spirit of *The Ocean Senses Activity Book*, the translation into Chinese promotes the interconnection between the marine ecosystem and the Chinese speaking communities, broadening the audience on this topic of sensibilisation. Focusing mainly on the younger generations, the book aims at developing their knowledge interactively, using their senses, while indirectly educating them on the vital importance of environmental protection. This last factor is key, considering the impact that the People’s Republic of China have on a global level: the rush to environmental protection will have to go along with the decisions undertaken by such country. A sensibilisation of the youngsters could very possibly have a meaningful

²⁹ Panieri, G., et al. (2023). *Ocean Senses*. Сприйняття океану: Плани уроків. Пєфтїєва О, перекладач. Septentrio Educational, 2023(3). <https://doi.org/10.7557/sc.2023.3>. <https://septentrio.uit.no/index.php/SapEdu/issue/view/687/89>.

³⁰ On the importance of co-creation for inclusivity in education see Bovill, C., Cook-Sather, A., Felten, P., Millard, L., & Moore-Cherry, N. (2016). Addressing potential challenges in co-creating learning and teaching: Overcoming resistance, navigating institutional norms, and ensuring inclusivity in student–staff partnerships. *Higher Education*, 71, 195–208.

³¹ Panieri, G., et al. (2023). *Ocean Senses*. Сприйняття океану: Плани уроків. Пєфтїєва О, перекладач. Septentrio Educational, 2023(3). <https://doi.org/10.7557/sc.2023.3>. <https://septentrio.uit.no/index.php/SapEdu/issue/view/687/89>.

impact on the future of marine ecosystem protection, both nationwide and worldwide”.³²

From these work and testimonies, it emerges how the overall aim of this project is not only to enhance the collaboration between marine geoscientists, social scientists, and educators but also to jointly develop strategies that enable teachers, learners, the entire project team, and the involved community to collaborate effectively in supporting OL. Collective endeavours of scientists and educators have been emerging as outputs of this collaboration: the Teacher-Scientist Pairing Scheme and the Polaroid Project.³³ In particular, we adopted the Teacher-Scientist Pairing Scheme as a teaching pedagogy to bring together school teachers and scientists to collaborate, as equal partners, on developing and teaching lesson plans focused on topics relevant to the participating teachers and their pupils.³⁴ In particular, during the 2022 AKMA2/Ocean Senses expedition mentioned above, scientists and educators developed a science-informed and pedagogically engaging educational video about greenhouse processes in the Arctic Ocean.³⁵ The video follows a pedagogical model known as paired teaching. This approach enables scientists and teachers to create and instruct virtual lessons and activities carried out under the guidance of the in-class teachers in school classrooms. The video is designed to be viewed in short segments. In each video segment, the scientist asks questions that will be explored through hands-on activities and group discussions under the guidance of the classroom teacher in between segments.

The AKMA Polaroid project developed a communication process wherein the scientists and school classes communicated primarily via handwritten letters and polaroid photo albums made by the scientists during the AKMA2/Ocean Senses expedition. We experienced how

³² Panieri et al., No. 2 (2023): The Ocean Senses Activity Book (Chinese version by Giuliano Bertolotto Bianc) <https://doi.org/10.7557/se.2023.2>.

³³ <https://blogs.egu.eu/geolog/2022/11/25/a-pedagogical-dance-egus-teacher-scientist-pairing-scheme/>, last access 22 October 2023; see also Stiller-Reeve, M., Argentino, C., Waghorn, K. A., Vadakkepuliambatta, S., Kalenitchenko, D., & Panieri, G. (2023). Handwritten letters and photo albums linking geoscientists with school classes. *Geoscience Communication*, 6, 1–9, <https://doi.org/10.5194/gc-6-1-2023>.

³⁴ https://www.youtube.com/watch?v=kviu1s8I79Q&ab_channel=EuropeanGeosciencesUnion, last access 9 October 2023.

³⁵ Ibid. (see footnote 34), last access 9 October 2023.

using traditional media could make a science communication project personalised and tailored to the children's abilities and expectations and therefore less intimidating.³⁶

2.4 *A Student-Led Course on SDG 14*

In conjunction with the educational resources mentioned above, and in collaboration with the Department of Management at the University of Turin, Italy, we introduced a cross-disciplinary course on the New Horizons of the Agenda 2030, with a specific focus on Sustainable Development Goal (SDG) 14, addressing Life Below Water. The organisation of this course was a remarkable endeavour that brought together over fifty undergraduate students from various parts of the world (among the countries, Italy, the United Kingdom, Germany, China, Iran) each with a unique perspective and background. The students embarked on a journey to delve into the intricacies of SDG 14 and its associated targets, while also considering the interconnectedness of this goal with broader sustainability objectives.

Working collaboratively in diverse teams, the students took on the role as young researchers in action and were tasked with a challenging yet inspiring final project: to design and create impactful educational materials that help raise awareness on the importance to achieve the SDG 14. The materials that the students collectively created were carefully crafted to resonate with a chosen target audience, reflecting the students' creative freedom and adaptability. The objective was not only to enhance their own understanding of the critical need for legal protection of our oceans, grounded in science-informed decision-making, but also to convey this vital message effectively to their designated audiences. Throughout the course, the students engaged in active learning, exploring the multifaceted dimensions of sustainability and the integral role that scientific knowledge plays in fostering a sustainable ocean.³⁷ As they presented their projects to their peers, the students honed their communication skills and developed the ability to engage a diverse range of audiences on topics related to our oceans.

³⁶ <https://en.uit.no/project/akma/educations>, last access 9 October 2023.

³⁷ For a few examples of the projects co-created by the students, see the official website and blog of the project ECO_CARE <https://en.uit.no/project/ecocare/blogg>, last access 9 October 2023.

This unique course on SDG 14 showcased the power of active learning and embraced an interdisciplinary approach to sustainability issues. It empowered students to recognise the pivotal role of science in shaping our understanding of the oceans and encouraged them to become advocates for a more sustainable future. The results of their endeavours consisted in the creation of over ten interactive works, including podcasts, songs, social media content, as well as traditional presentations and essays. This diverse array of materials, showcased on social media platforms, not only demonstrated the students' commitment to the cause but also exemplified their innovative and inclusive approach to ocean education.

2.5 *The Ocean Interconnectedness Workshop*

On 19th and 20th September 2023, a workshop on “Ocean Interconnectedness” was convened at UiT The Arctic University of Norway, in collaboration between the Department of Geosciences and the Faculty of Law. The workshop aimed to synergise the multisensory and emotional elements cultivated within the aforementioned project with activities pertaining to planetary health, with a special focus on the ocean.³⁸

To set the stage for this experience, the workshop commenced with a Morning Concert featuring performances by G. Bertolotto Bianc, E. Isayevskaya, I. Tandberg, and R. Sosa Dal Pozzo. This musical interlude not only entertained but also served as an inspiring prelude to a broader audience, igniting a deep sense of commitment to ocean conservation, with a specific focus on the Arctic region. Approximately sixty participants attended the concert, and the organisers extended their gratitude to the supporting funding agencies (UArctic, UiT The Arctic University of Norway, the NFR, HKDIR, Erasmus+ via the Deep Network).³⁹

After the concert, around twenty-five participants from different backgrounds (law, global health, marine geosciences, sustainable tourism, education, communication) gathered in the Nunataken room at the

³⁸ Panieri, G., Poto, M. P., Bertella, G., Bertolotto Bianc, G., Médiçi, N., Murray, E. M., Pandeva, R., & Vita, L. (2023). Ocean Interconnectedness: An interdisciplinary workshop to learn from the ocean, through multisensory activities and reflections on the role of emotions in science and law: Senses & Science, Love & Law. *Septentrio Reports*, (1). <https://doi.org/10.7557/7.7271>.

³⁹ For a video of the concert see <https://youtu.be/J3I3ypiuV4Q>, last access 9 October 2023.

Department of Geosciences, UiT. The organisers welcomed the attendees, emphasising the pivotal role of OL in addressing pressing marine issues. The session then delved into the overarching concept of OL, exemplifying it through projects like Ocean Senses,⁴⁰ Follow Your Heart,⁴¹ and ECO_CARE.⁴²

Day 2 commenced with the launch meeting of The Ocean Incubator Network (OIN), a newly funded project by UArctic, featuring partners from UiT The Arctic University of Norway, the James Hutton Institute in Scotland, the University of Edinburgh, the Arctic Centre of the University of Lapland, Dalhousie University, and Women of the Arctic. The group discussed the idea of developing a pilot project aimed at fostering meaningful connections and approaches to ocean literacy by reshaping the manner in which academics plan workshops and roundtable discussions. This initiative begins with introspective reflections on their personal journeys, sharing experiences, and collaboratively devising innovative methods to convene and deliberate on topics related to ocean protection.⁴³

The second day continued with presentations from participants who offered diverse perspectives on ocean-related topics. Giovanna Bertella discussed sustainable tourism in the Arctic, exploring the emotional connection between humans and whale watching. Rada Pandeva shared insights into the Thalassophile Project, an Erasmus+ initiative aimed at making marine science accessible to all, with a particular emphasis on the D/deaf and blind communities.⁴⁴ The Thalassophile Project activities, described in the last chapter of this book, aim to show how more equitable access for adult learners to high-quality information on ocean sciences and literacy can be effectively achieved and at the same time, inspire and empower people and communities to join forces in making this goal a reality. In parallel with the project presentations, participants engaged in an interactive session titled “Developing methodologies for improving Ocean Literacy among adults”, involving Vita, Murray,

⁴⁰ For details on this project see <https://en.uit.no/project/akma/Akma2>, last access 9 October 2023.

⁴¹ For details on this project see <https://www.followyourhearteducation.org/>, last access 9 October 2023.

⁴² For details see <https://en.uit.no/project/ecocare>, last access 9 October 2023.

⁴³ Official website of the project The Ocean Incubator Network | UiT, last access 9 October 2023.

⁴⁴ More on this, in Chapter 10 of this book.

Pandeva, Bertolotto Bianc, Bertella, Ajebe Akame, and Brambilla. This session saw the commencement of work on an educational learning toolkit for Water Literacy, which continued on day 2. Furthermore, educators and young researchers within the group presented strategies for effectively engaging and motivating adults in ocean conservation topics, often involving children as mentors and learners.

Various learning materials, including copies of the book *Follow Your Heart: The School for Multipotentialites* (from the ECO_CARE research project)⁴⁵ and children's stories about foraminifera (from the Akma 2 Ocean Senses Research Project),⁴⁶ were shared with and made available to attendees.

The workshop yielded several outcomes, including a strong commitment among participants to integrate ocean conservation into their research, educational, and outreach efforts. Additionally, it established a network of dedicated educators and researchers focused on intergenerational ocean education, fostering ongoing collaboration. The event also generated recommendations for future research projects and educational resources. Social media content created by Kai Mortensen, Valentina Lanci, and Laura Vita heightened visibility for various projects, including footage of the opening Morning Concert. Furthermore, a mind map outlining the steps towards co-creating a Water Learning Toolkit was developed, and a preliminary outline for a co-authored publication on the workshop's theme was generated.

3 BOOK STRUCTURE AND CONTENT

This book is the project result of the “Ocean Interconnectedness” workshop. It aims to promote ecological and emotional research and education for sustainability by cultivating values and behaviours consistent with how nature makes us feel connected and nurtured. The book unfolds as a comprehensive exploration divided into two integral parts, each contributing distinct perspectives to the discourse on ecological literacy. The following outlines the book structure and a reasoned conceptual map of the topics and their interconnections found throughout this

⁴⁵ Poto M. P., Murray E. M., Russo V. (2022). *Follow Your Heart. The school for multipotentialites*, La Bussola.

⁴⁶ <https://en.uit.no/project/akma/Akma2>, last access 9 October 2023.

compilation of approaches to strengthening ecological and ocean literacy education and research.

Part I: Ecological and Emotional Literacy for All

Chapter 2: Achieving a Common Future for All Through Sustainability-Conscious Legal Education and Research Methods (Emily Margaret Murray, Margherita P. Poto);

Chapter 3: Methodological steps towards ecological and emotional education and research fostering multipotentiality (Margherita Paola Poto, Emily Margaret Murray, Laura Vita);

Chapter 4: Holistic Learning, Emotional Well-being, and Sustainable Development Action in LESPLAY (Learn, Speak, and Play) (Gilbert Ajebe Akame).

Part II: Ocean and Water Literacy: A Transdisciplinary Overview

Chapter 5: Ocean tourism: when emotions meet science (Giovanna Bertella);

Chapter 6: The Ocean Senses Activity Book: Enriching Ocean Literacy through a multisensory approach (Giuliana Panieri, Zeynep Sancak Sert, Filip Maric, Margherita Paola Poto, Emily Margaret Murray);

Chapter 7: The paths of Water and their relations: a dialogue between Brazil and Norway (Natalia Médiçi Machado, Margherita Paola Poto, Emily Margaret Murray);

Chapter 8: Arctic Vulnerability: Examining Biosecurity Risks Amidst Climate Change (Sareen Ali, Emily Margaret Murray, Margherita Paola Poto);

Chapter 9 Connecting with the Deep: Lifelong Learning (LLL) and Marine Sustainability (Caroline Johansen, Rhianon Williams, Ourania Xylouri, Giuliana Panieri);

Chapter 10 Universally accessible marine science and ocean literacy for all citizens: The Thalassophile Project (Rada Pandeva, Caroline Johansen, Rhianon Williams, Carolina Carotta, Giuliana Panieri).

The primary focus of Part I revolves around the pivotal role of emotional and ecological research and education in cultivating a profound ecological literacy. Chapters 2 (Murray and Poto), 3 (Murray et al.),

4 (Akame) illuminate the significance of these facets, weaving together insights from a multitude of areas including participatory methodologies, emotional intelligence, and children's rights.

In Part II, the narrative takes a specific turn towards water and ocean literacy, with a specific, yet not exclusive, focus on the Arctic environments. The six chapters in this part delve into the complexities of these crucial themes. One overarching theme that binds these chapters is the recognition of the inseparable link between research and education in ecological literacy. Chapter 5 (Bertella) serves as an insightful exploration of the transformative potential of effectively managed tourism. It underscores how tourism has the power to offer enriching experiences for human well-being and entertainment and can become a powerful tool for education, particularly in the critical realms of ocean protection and conservation.

In Chapter 6, the authors (Panieri et al.) contribute by advocating for inclusive toolkits and approaches, acknowledging the necessity of multisensorial methods to enhance comprehension.

Chapter 7 (Médici et al.), draws attention to the imperative of developing ecological research by focusing on Indigenous knowledge systems, emphasising inclusivity not only in methods but in knowledge sets as well.

In Chapter 8, Ali et al.'s contribution further reinforces the interconnectedness of these themes, urging us to think about planetary health by applying an integrated, multidimensional approach. Here, the chapters agree that understanding and addressing ecological challenges demand a comprehensive and interconnected approach, encompassing both emotional dimensions and inclusive methodologies. Chapter 9 (Johansen et al.) aligns with an ecological approach to research and education on the sea by framing marine sustainability within global and regional initiatives in lifelong learning and adult education. The authors emphasise the need for adults to recognise, engage with, and act upon economic, social, and environmental challenges to achieve the SDGs. Finally, in Chapter 10, Pandeva et al. emphasise the need to connect ocean literacy with accessibility and illustrate how theory is put into practice. The project illustrated in the chapter brings together a network of cross-sector practitioners, integrating marine research, education, and universal accessibility expertise.

In essence, with its rich fabric of contributions, the book not only champions the significance of emotional and ecological research and education but also advocates for a nuanced and inclusive approach,

echoing the imperative to consider diverse perspectives and methodologies.⁴⁷ This comprehensive exploration, rooted in Arctic contexts, serves as a valuable research and education resource for scholars, educators, and practitioners alike, inviting them to reflect on the intricate interplay between emotions, education, and ecological literacy in the broader context of planetary health.

⁴⁷ Dillon, J., & Herman, B. (2023). Environmental education. In Handbook of research on science education (pp. 717–748). Routledge; Andreoni, V., & Richard, A. (2023). Exploring the interconnected nature of the sustainable development goals: The 2030 SDGs Game as a pedagogical tool for interdisciplinary education. *International Journal of Sustainability in Higher Education*, 1–22.

Open Access This chapter is licensed under the terms of the Creative Commons Attribution 4.0 International License (<http://creativecommons.org/licenses/by/4.0/>), which permits use, sharing, adaptation, distribution and reproduction in any medium or format, as long as you give appropriate credit to the original author(s) and the source, provide a link to the Creative Commons license and indicate if changes were made.

The images or other third party material in this chapter are included in the chapter's Creative Commons license, unless indicated otherwise in a credit line to the material. If material is not included in the chapter's Creative Commons license and your intended use is not permitted by statutory regulation or exceeds the permitted use, you will need to obtain permission directly from the copyright holder.

