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Emotional and Ecological Literacy for a More Sustainable Society

Edited by

Giuliana Panieri
Margherita Paola Poto
Emily Margaret Murray

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Notes from the Editors

Coming from various academic backgrounds grounded in different epistemological and methodological approaches—environmental law, marine sciences, and global health—we see this contribution as proof that connecting with ourselves, each other, and the natural environment lies at the heart of a healthy and sustainable society. In an increasingly disconnected world, we feel it is essential to encourage and enable spaces that foster connection and emotion to generate the hope and motivation needed to find a better, more just way of living and being. Furthermore, in the face of unprecedented global climate change and pervasive environmental harm affecting both the human and more-than-human world, it is evident that we can no longer work within our siloed disciplines. Sustainable development challenges are complex and highly interwoven across all sectors; thus, it will truly take a village to co-create more just and caring ways to protect every part of nature, from the oceans and forests to the air we breathe.

This book brings together a group of scholars from across the globe working on ocean and other nature-related research in marine sciences, ocean governance, Indigenous law, global health, children's rights, accessibility education, and economics. After an inspiring interdisciplinary workshop hosted at the UiT The Arctic University of Norway in Tromsø, Norway, in September 2023, the workshop participants (many of whom are contributing authors in this book) felt connected through conversations around topics of ocean and ecological literacy and improving

accessibility in education and research, leading to the co-creation of this book. We are confident that this collection of innovative, participatory, and holistic ways of conceptualising research and education will inspire current students, academics, lawyers, educators, and policymakers to consider the impact their decisions have on the oceans and, more broadly, the environment as a whole.

From the bottom of our hearts, and on behalf of the contributing authors, we would like to express our 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. The research developed in this book was co-funded by UiT The Arctic University of Norway, The Ocean Incubator Network through UArctic (580512124), AKMA (NFR 287869), ECO_CARE (HKDIR UTF-2020/10084), and Deep Network (2022-1-DE02-KA220-ADU-000088137). We would like to extend our appreciation to Irene Hadiprayitno, Anca Pusca, and the entire Palgrave Macmillan team for their steadfast support throughout the process, and the anonymous peer reviewers who found the beauty and strength in this work. Our gratitude goes also to Igor Peftiyev, for the final editing help. Without all of you, this would not have been possible.

Cork-Tromsø
February 2024

Earth defenders, 2023 (Illustrated by Valentina Russo (@mucho__amor), this creative depiction of "Earth defenders" represents the collective care and love needed to protect and heal the planet. Each of these little characters are connected to many of the contributing authors—showing their dedication and unique ways of collectively working together to make the world a better place)

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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.

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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 Grosso[22] 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. Пефтієва О, перекладач. Septentrio Educational, 2023(3). https://doi.org/10.7557/se.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. Пефтієва О, перекладач. Septentrio Educational, 2023(3). https://doi.org/10.7557/se.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., Vadakkepuliyambatta, 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., Médici, 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 Médici 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.

PART I

Ecological and Emotional Literacy for All

CHAPTER 2

Ecological Literacy: Theory and Practice

Emily Margaret Murray and Margherita Paola Poto

Abstract This chapter introduces the concept of ecological literacy as an integral component of legal inquiry. Evolving to embrace interdisciplinary perspectives and a systems-thinking framework, ecological

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E. M. Murray co-wrote Sects. 1–4, especially contributing to the design and development of Sections 2, 3.4, and 4. She also proofread and edited the entire piece.
M. P. Poto coordinated the research, co-wrote Sects. 1–4 and supervised the last version of the work. This research is funded by ECOCARE (https://en.uit.no/project/ecocare/blogg) (HKDIR UTF-2020/10084) and is also a project result of the project The Ocean Incubator Network (https://en.uit.no/project/oceanincubator) (UArctic 580512124).

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literacy emerges as a fundamental element in the pursuit of environmental sustainability. The research asserts that incorporating an approach that advocates for eco-responsible behaviours is imperative for legal research and education centred on sustainability. This requires a departure from traditional dogmatic approaches in legal methodology towards a participatory dimension. The study lays down a theoretical groundwork aimed at redefining legal methodology to effectively integrate ecological literacy.

Keywords Ecological literacy · Legal research · Environmental sustainability

1 Ecological Literacy in Research and Education

1.1 Ecological Literacy in the Law Domain

This chapter introduces the concept of ecological literacy (EL), exploring how it can serve as a valuable pathway in legal research and education, encompassing theoretical and practical solutions towards sustainability. Originally coined as "environmental literacy" when Charles E. Roth, American environmentalist and educator, asked "how shall we know the environmentally literate citizen?",[1] EL has evolved over recent decades to encompass the interdisciplinary and systems-thinking approach necessary for achieving environmental sustainability.[2] In this regard, EL encompasses a broad array of activities and consequently outcomes, including: improved knowledge and understanding of various environmental concepts and issues; cognitive and socio-emotional understanding of humankind's position in altering the natural environment and the role humans play in repairing the damage; interest in learning about and

[1] Roth, C. E. (1968). "On the road to conservation". Massachusetts, Audubon: 38–41.

[2] McBride, B. B., Brewer, C. A., Berkowitz, A. R., & Borrie, W. T. 2013. Environmental literacy, ecological literacy, ecoliteracy: What do we mean and how did we get here? *Ecosphere, 4*(5), 67, 1–20.

embodying environmentally responsible behaviours; and skills such as critical systems thinking, communication and attitude to collaborative efforts towards a more sustainable local and global community.[3]

In this chapter, EL is treated as an umbrella term comprehensive of both legal education and research in academic settings. Preliminarily to the analysis, it is worth noting that within the legal domain, EL is a relatively unexplored field and must be expanded upon and better integrated into legal education for effective solution-oriented approaches and practices to complex sustainability challenges.[4] As highlighted by Nicole Graham and Kate Galloway's study,[5] embedding ecological literacy within the law curriculum is imperative to fostering future generations who care about the environment when drafting policies and legislation. In particular, the scholars emphasise how education holds a crucial yet often overlooked role in anthropogenic environmental change by shaping individuals into lawyers, judges, and policymakers.[6] The conceptual framework and taxonomy of law, as taught to law students, often perpetuate an unsustainable disconnect with the environment. This separation—one that is inherently Western and aligns with neoliberal agendas—typically segregates questions of entitlement *to* land and natural resources from questions of responsibility *for* them.[7] The implication of maintaining this division in law curricula is that successive generations of legal practitioners are unlikely to develop a coherent system of environmental law that aligns rights with responsibilities. Moving from this reflection, we argue that developing an approach to research and education that promotes eco-responsible behaviours is essential to sustainability-centred legal research and education. Such an approach requires rethinking the

[3] Kaya, V. H., & Elster, D. 2019. A critical consideration of environmental literacy: Concepts, contexts, and competencies. *Sustainability, 11*(6), 1581; Barnes, J. C. (2013). Awareness to action: The journey toward a deeper ecological literacy. *Journal of Sustainability Education, 5*(5), 1–5.

[4] Ardoin, N. M., Bowers, A. W., & Wheaton, M. (2023). Leveraging collective action and environmental literacy to address complex sustainability challenges. *Ambio, 52*(1), 30–44.

[5] Galloway, K., & Graham, N. (2023). Learning ecological law: Innovating legal curriculum and pedagogy. In *The Routledge handbook of law and the Anthropocene* (pp. 330–342). Routledge.

[6] Ibid. (see footnote 5).

[7] Ibid. (see footnote 5).

foundational pillars of legal methodology, moving away from the conventional dogmatic approaches constructed on the divide between education and research, and most importantly, conceiving this binomial in its participatory and active dimension.

This chapter therefore aims to offer a theoretical base and some practical examples of how the legal methodology can be rethought and reshaped towards an effective implementation of ecological literacy and therefore towards a more environmentally conscious approach to research and education within the legal domain.

1.2 Sustainability as a Frame of Mind

In this chapter, the terms education and research are used interdependently and are deeply interconnected to an active and collaborative dimension of the involved parties (educators, researchers, scientists, lawyers). When engaging in action research on sustainability, teachers and learners are seen as researchers[8,9,10,11] who have the unique opportunity to co-create ethically informed practices, enhance their response-ability, and strengthen their emotional knowledge, as well as advance their individual and collective coping strategies to sustainability challenges; hence, the interconnectedness between education and research.

The importance of education and research for sustainability emerges when realising that sustainability itself contains the elements of education and action research or, in the words of Michael Bonnett, can be conceived as "a frame of mind".[12] An integrated vision of sustainability as an education and research process helps us reflect on its essence and the core question that any law and policy development regarding sustainability should be concerned with: "What constitutes a right relationship with nature?" and "What should our basic stance towards the

[8] Bradbury, H., Lewis, R., & Embury, D. C. 2019. "Education action research." The Wiley handbook of action research in education: 7.

[9] Groundwater-Smith, S., & Mockler, N. (2016). From data source to co-researchers? Tracing the shift from student voice to student–teacher partnerships in Educational Action Research. *Educational Action Research, 24*(2), 159–176.

[10] Mertler, C. A. (2009). *Action research: Teachers as researchers in the classroom*. Sage.

[11] Somekh, B. (2005). *Action research*. McGraw-Hill Education (UK).

[12] Bonnett, M. (2002). Education for sustainability as a frame of mind. *Environmental Education Research, 8*(1), 9–20.

natural environment be?".[13] In the face of the climate change and environmental degradation, these questions are more timely than ever and provoke reflection on how humans have treated the natural environment and what must change to prevent further lack of responsibility. In other words, delving into sustainability as a frame of mind and guideline for law and policymakers implies posing a set of questions about the basic understanding of our human identity and our relationship with nature.

Though the scholarship seems to progressively agree on the importance of embedding sustainability in the academic curriculum, an effective education and research approach focusing on complex combinations of interdisciplinary knowledge, understanding, skills, and values are widely recognised as inherently challenging and therefore still hardly applied in practice.[14] More specifically, the scholarship has underlined how non-disciplinary views and approaches to achieving education and research in sustainability are nearly absent in the literature,[15] and only a few researchers have attempted to effectively develop non-traditional views of how students and academics can learn about sustainability and contribute to shaping sustainability solutions.[16] In particular, in their study on Paul Shrivastava, Ingrid Molderez and Kim Ceulemans observe how boldly, and pretty uniquely, the scholar Shrivastava promoted a culture of passion for sustainability, that "can be taught using a holistic pedagogy that integrates physical and emotional or spiritual learning with traditional cognitive (intellectual) learning about sustainable management".[17] This perspective suggests that it is possible to expand the field of education and research to sustainability by developing innovative approaches and methods that facilitate real integrated and cross-disciplinary thinking and offer concrete solutions, also in the field of education and research,

[13] Bonnett, M. (2002). Education for sustainability as a frame of mind. *Environmental Education Research, 8*(1), 9–20.

[14] Orr, D. W. 1990. Environmental education and ecological literacy. *Education Digest, 55*(9), 49–53.

[15] Molderez, I., & Ceulemans, K. (2018). The power of art to foster systems thinking, one of the key competencies of education for sustainable development. *Journal of Cleaner Production, 186*, 758–770.

[16] Ceulemans, K., Molderez, I., & Van Liedekerke, L. (2015). Sustainability reporting in higher education: A comprehensive review of the recent literature and paths for further research. *Journal of Cleaner Production, 106*, 127–143.

[17] Ibid. (see footnote 16).

to the sustainability challenges.[18] Furthermore, David W. Orr argues that building a sustainable society is strongly linked to improving EC and that the concept of sustainability itself "implies a radical change in the institutions and patterns that we've come to accept as normal".[19] Radical change, especially behavioural, is urgently needed to make a shift towards a more caring, eco-conscious society; and it is argued here that instilling a sustainability frame of mind in those involved in education and research can have a positive, long-lasting impact on both humans and the environment.

As hinted above, the importance of innovative and integrated educational and research approaches to sustainability becomes even more evident in the field of legal education and research to sustainability, where the tasks of lawyers and legal scholars consist of designing, drafting, implementing, and managing sustainable solutions to the wicked problems posed by the environmental crisis. In legal education and research on sustainability, Bonnett's definition of sustainability as a frame of mind[20] is perfectly fitting, as the law is expected to equip learners and researchers with education and inspiration for feasible solutions for sustainable living,[21] both in their personal and professional spheres, enabling them to develop a profound understanding of the interactions and consequences of actions and decisions. Enhancing EL within legal education and research which will eventually infiltrate into the legal system as a whole, thus instilling a sustainability state of mind, can foster decision-makers who have a greater sense of environmental stewardship and an awareness of how their actions can shape a sustainable future for all.

[18] Molderez, I., Baraniuk, D., & Lambrechts, W. (2021). The role of poetry in promoting a sustainability mindset: Walter Benjamin as a guide toward a slow journey. *Frontiers in Sustainability, 2*, 694317.

[19] Orr, D. W. (1990). Environmental education and ecological literacy. *Education Digest, 55*(9), 49–53.

[20] Bonnett, M. (2020). *Environmental consciousness, nature and the philosophy of education: Ecologizing education*. Routledge.

[21] Stone, M. K. (2010). A schooling for sustainability framework. *Teacher Education Quarterly, 37*(4), 33–46.

1.3 The Three Thematic Pillars of a Reimagined "Ecoliterate" Legal Education

The lack of effective and integrated legal education and research approaches to sustainability is the gap that this chapter addresses by offering concrete examples of how to frame and further develop a transformative approach to legal education and research. As will be further explained, and in line with the study conducted by Angela Moriggi et al.,[22] the transformative approach to legal education and research proposed in this study organises the education and research practices developed in academic courses and research groups' experiences through three main thematic pillars: (1) **ethically informed practices**, through instilling a "care" lens that allows humans to situate themselves about others and the planet; (2) **development of response-ability**, through recognising the vulnerability and interconnectedness of living and non-living beings and the planet; and (3) **emotional awareness**, through nurturing cognitive-emotional skills such as imagination, creativity, and intuition to give humans the capacity to better understand and hope for a better future. The approach is grounded on the need to develop a strong context of inter-relationships and connection to nature, overall focusing on the individual, community, and planet. This is in line with the core issue of sustainability that Bonnett defines as our relationship with nature and how it ultimately shapes sustainability education in three dimensions: the individual, the collective, and the planet.

For this purpose, the first part of the chapter examines how the complexity of the Agenda 2030 indirectly calls for composite responses merging education and research outcomes through its urgency for collaborative, community effort towards sustainability. The interconnectedness of the SDGs and the role that policy can play in implementing society-wide changes is connected to the legal discourse. In its second part, the chapter provides concrete examples of experiential learning and participatory research whose application contributes to equipping legal researchers with the ability to respond to sustainability challenges, before concluding with lessons learned and future directions.

[22] Moriggi, A., Soini, K., Franklin, A., & Roep, D. 2020. A care-based approach to transformative change: Ethically-informed practices, relational response-ability & emotional awareness. *Ethics, Policy & Environment, 23*(3), 281–298.

2 The Agenda 2030

The current global framework for achieving sustainability for all, which involves many sectors such as health, education, agriculture, industry, and the environment (to name a few), was unanimously approved in September 2015 by the United Nations General Assembly (UNGA). The document "Transforming our world: the 2030 Agenda for Sustainable Development" (hereinafter: The Agenda) identifies a set of 17 integrated global goals (the well-known Sustainable Development Goals (SDGs)), composed of 169 targets and 232 unique indicators, which were set to be achieved by 2030. The Agenda, recognised and in effect in all 193 United Nations (UN) member states, aims to achieve a set of ambitious goals and targets through interconnected actions while balancing the three dimensions of sustainable development: economic growth, social inclusion, and environmental protection.[23] As highlighted in Sect. 1.1, for the purpose of this chapter, the "environmental protection" dimension of sustainable development will be of main focus, drawing on the interconnected SDGs and how the objectives and indicators point towards education and research being powerful tools for achieving good environmental governance and sustainability.

In the Agenda, the SDGs and their respective objectives are preceded by two sections entitled Preamble and Declaration. In the Preamble, the UNGA enumerates the five pillars of the Agenda: people, planet, prosperity, peace, and partnership.[24] Through characteristics of coherence and integrity,[25] the five pillars set the foundation for the systemic and interconnected approach that must be taken when working towards

[23] Griggs, D., Smith, M. S., Rockstrom, J., Öhman, M. C., Gaffney, O., Glaser, G., Kanie, N., Noble, I., Steffen, W., & Shyamsundar, P. (2014). An integrated framework for sustainable development goals. *Ecology and Society, 19*(4), 1–25.

[24] Tremblay, D., Fortier, F., Boucher, J. F., Riffon, A., & Villeneuve, C. (2020). Sustainable development goal interactions: An analysis based on the five pillars of the 2030 agenda. *Sustainable Development, 28*(6), 1584–1596.

[25] Coopman, A., Osborn, D., Ullah, F., Auckland, E., & Long, G. (2016). Seeing the whole—Implementing the SDGs in an integrated and coherent way. Stakeholder forum, bioregional. Newcastle University, in https://Stakeholderforum.Org/Our-Publications-Sp-1224407103/Reports-In-Our-Publications/625-Seeing-The-Whole-Implementing-The-Sdgs-In-The-An-Integrated-And-Coherent-Way, accessed September 30, 2023.

sustainability, in any capacity.[26] The commitment to implement the SDGs in a coherently integrated way is grounded in the overall objectives which hope to: end poverty and ensure that all human beings can realise their potential[27]; protect the planet from degradation, adopt urgent measures against climate change, and ensure everyone a prosperous and satisfactory lifestyle; enhance economic and social progress in harmony with nature; promote peaceful, just, and inclusive societies, free from fear and violence[28,29]; and, finally, realise the potential of global solidarity, which includes the participation of all countries, stakeholders, and people.[30,31]

The Declaration follows with eight subsections, outlining that everyone must play a part in achieving sustainability and the importance of universal, collective action from stakeholders in low-, middle-, and high-income countries across the globe. More specifically, the Declaration urges that science and policy play a crucial role in finding solutions and implementing concrete actions for sustainability,[32] and although not explicitly stated, legal education and research—in their scientific dimension—also play an integral role in shaping the sustainability of the future. In the subsection *Our shared principles,* there are clear links made between achieving sustainability and international law, referring to the Charter of the United Nations, the Universal Declaration of Human Rights, and the Millennium Declaration, as well as to international environmental

[26] Barbier, E. B., & Burgess, J. C. (2017). The sustainable development goals and the systems approach to sustainability. *Economics: The Open-Access, Open-Assessment E-Journal*, 11, 8.

[27] Steiner, A. (2018). The extraordinary opportunity of the 2030 agenda for sustainable development. *The European Journal of Development Research, 30*(2), 163–165.

[28] Fisher, J., Arora, P., Chen, S., Rhee, S., Blaine, T., & Simangan, D. (2021). Four propositions on integrated sustainability: Toward a theoretical framework to understand the environment, peace, and sustainability nexus. *Sustainability Science*, 1–21.

[29] Sharifi, A., Simangan, D., & Kaneko, S. (2020). The literature landscape on peace—Sustainability nexus: A scientometric analysis. *Ambio*, 1–18.

[30] Spraul, K., & Thaler. J. (2020). Partnering for good? An analysis of how to achieve sustainability-related outcomes in public–private partnerships. *Business Research, 13*(2), 485–511.

[31] Pinz, A., Roudyani, N., & Thaler, J. (2018). Public–private partnerships as instruments to achieve sustainability-related objectives: The state of the art and a research agenda. *Public Management Review, 20*(1), 1–22.

[32] McBean, G. A. (2021). Integrating science to address food and health within Global Agenda 2030. *npj Science of Food* 5, 8.

law sources such as the Rio Declaration on Environment and Development.[33] The UNGA recognises that there are many challenges to achieving sustainable development, but points to the fact that we are currently living in a window of opportunity to create more interconnected knowledge societies (among other opportunities, i.e., further developing scientific and technological innovation). Addressing the gap of EL within legal education and research while promoting sustainable education is just a couple of ways to harness this "window" and therefore build a more environmentally aware society that makes decisions with a sustainability mindset.

Examining the individual SDGs more specifically, it is clear that education and research play an important (if not, central) role in making global progress towards the objectives and indicators set to be achieved by 2030. Inherently, each of the 17 global goals cannot be successfully achieved without integrated solutions that simultaneously target the objectives of multiple goals due to the complexity of the challenges we are facing today. For example, any practice or policy implemented to *end hunger, achieve food security and improve nutrition and promote sustainable agriculture* (SDG 2) must also consider the SDGs that have objectives and targets relating to poverty, human health, education, planetary health, and consumption patterns—virtually each of the 17 goals. It is overwhelming to realise the interconnectedness of the goals and the necessary collaboration that must be taken across all sectors and disciplines to truly reach a sustainable global society, yet empowering for the legal community who has the opportunity to shape education and research around instilling a sustainability mindset into those who will develop the policies and laws that lead to achieving the SDGs.

Consequently, legal education and research have the responsibility of developing methodologies, knowledge, and tangible solutions for the realisation of the overall vision and goals. The term "policies" is mentioned 32 times between the Declaration and 17 goals, with the overall theme of needing to implement national policies and programmes that fit under the framework of the Agenda while aligning with national policies and programmes. This reference makes it evident that the UNGA has the assumption that policies are the main tangible tool towards

[33] Meuleman, L., & Niestroy, I. (2015). Common but differentiated governance: A metagovernance approach to make the SDGs work. *Sustainability, 7*(9), 12295–12321.

realising global sustainability. However, even in the mention of important stakeholders in achieving such sustainability, the UNGA neglects to mention how lawyers and policymakers (i.e., those in the legal discourse) hold the responsibility to create such policies and legislation. As mentioned above,[34] current legal education and research practices instil a "dephysicalised" perspective of the environment and teach its students that the planet should be conceptualised as a "thing".[35] It is time to close the gap between the legal discourse and ecological literacy by recognising that the planet is an integrated ecological system with an infinite amount of living, moving parts and processes.[36] Carrying out educational and research activities that instil a sense of responsibility and care for the planet will influence future lawmakers and the subsequent policies they develop which (hopefully) consider the environment at all costs.

Along these lines, and with the intent to show some practical and effective applications of an innovative approach to integrated legal research and education, the following section expands on several examples of how to shift away from conventional legal teaching and research methods towards nature-based, participatory methods that foster a sustainability frame of mind.

3 Education and Research for Transformative Change in Sustainability

3.1 Introduction

The two sections of the Agenda described above (the Preamble and Declaration) contain statements that, if not accompanied by the assumption of responsibility and actual plans of action, risk remaining empty and rhetorical statements of principle.[37] This contribution shows how understanding and implementing the vision that emerges from the 17 SDGs

[34] Galloway, K., & Graham, N. (2023). Learning ecological law: Innovating legal curriculum and pedagogy. In *The Routledge handbook of law and the anthropocene* (pp. 330–342). Routledge.

[35] Meuleman, L., & Niestroy, I. (2015). Common but differentiated governance: A metagovernance approach to make the SDGs work. *Sustainability, 7*(9), 12295–12321.

[36] Ibid. (see footnote 35).

[37] Murray, E. M., & Poto, M. P. (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*, 1–14.

assign a new role to legal education and research, by requiring them to generate and disseminate knowledge to achieve sustainability. Following the three thematic pillars of transformative change as elaborated by Angela Moriggi et al.[38] and described above, this section offers practical examples of how legal education and research on environmental matters can offer tools for concrete implementation strategies to give substance to the objectives and overall mission of the Agenda. In particular, it will describe some education and research practices developed and adopted as implementing activities of the research project "An Exchange Program on Empathy Compassion and Care in Water Governance, from the Perspective of Integral Ecology".[39] The examples will be organised following the above-described matrix developed by Angela Moriggi et al.,[40] in the tripartite form of a care-based approach that leads to transformative change through (1) ethically informed practices; (2) response-ability; and (3) emotional awareness.

3.2 Ethically Informed Practices: A Story About Knowledge

As an example of ethically informed practice (1), the teaching and research developed from the two books "A Story About Knowledge"[41] (hereinafter, the handbook) and "A Story About Knowledge. Illustrated version",[42] (hereinafter, the silent book) show how, also in legal education and research, it has been possible to co-create ethically informed

[38] Ibid. (see footnote 22).

[39] ECO_CARE Project, 2023: https://en.uit.no/project/ecocare, last access February 2024.

[40] Ibid. (see footnote 22).

[41] Porrone, A., Poto M. P., Russo V. (2021). *A story about knowledge. A learning tool to engage with illustrated storytelling in law and global studies*. Aracne.

[42] Porrone, A., Poto, M. P., & Russo V. (2021). *A story about knowledge*. Illustrated Version. Aracne.

practices engaging with a legal context, embracing playful experimentation[43] and experiencing the tension towards empowerment, by reframing relations of powers.

The two books are educational and reflection-provoking resources rooted in an Arctic Indigenous story about the search for knowledge, which in the end turns out to be ecological and emotional knowledge. The story characters and plot belong to the Native American Anishnaabe storytelling tradition connected to the myth of Nanabozho, and its relationship with water.[44,45] As will be further explained, these resources have been applied to the research workshops and University curricula developed within the umbrella of the ECO_CARE project, in undergraduate courses as well as in Master's programmes. Moreover, the teaching materials were used to lead research seminars on the theme of situated knowledges: in 2022, in Bayreuth[46] and on a research expedition in the Northern Sea[47]; and in 2019–2020 as part of the core activities complementing first and second year students' doctoral training in Global Studies: Justice, Rights, Politics (University of Macerata, Italy, Department of Political Science, Communication and International Relations). Finally, the teaching methodology has also been adopted in an

[43] Fazey, I., Schäpke, N., Caniglia, G., Patterson, J., Hultman, J., van Mierlo, B., Säwe, F., Wiek, A., Wittmayer, J., Aldunce, P., Al Waer, H., Battacharya, N., Bradbury, H., Carmen, E., Colvin, J., Cvitanovic, C., D'Souza, M., Gopel, M., Goldstein, B., Harper, G., & Wyborn, C. (2018). Ten essentials for action-oriented and second order energy transitions, transformations and climate change research. *Energy Research & Social Science, 40*, 54–70.

[44] Smith, J. R. (2020). *1. The Trickster Aesthetic*. Writing Tricksters. University of California Press.

[45] Perkinson, J. W. (2019). *Water story around the bend: The Windigo Monster and the Nanabozho trickster in political spirituality for a century of water wars* (pp. 87–123). Palgrave Macmillan.

[46] Hayden J., Lohse E. J., Porrone A., & Poto M. P. (2022). Strategic Scientific Workshop "Co-production of knowledge in climate governance". Septentrio UiT The Arctic University of Norway, https://doi.org/10.7557/7.6568.

[47] Panieri, G., Bünz, S., Savini, A., Jensen, A., Løfquist, B., Olsen, B. R., Willis, C., Argentino, C., Bertin, C., Oddone, D., Kalenitchenko, D., Rosnes, E., Cusset, F., Maric, F., Franchi, F., Pawlowski, J., Zimmermann, J., Todd, J. E., Meyer, J. P., Waghorn, K. A., Losleben, L. K., Poto, M. P., Eilertsen, M. H., Stiller-Reeve, M. A., Clerici, M., Dessandier, P.-A., Moncelon, R., Ramalho, S., Mohadjer, S., Vågenes, S., Aune, V., Os, V., Poddevin, V., & Holm, V. D. (2022). "CAGE22-2 Scientific Cruise Report: AKMA 2/Ocean Senses. CAGE—Centre for Arctic Gas Hydrate". Environment and Climate Report Series, 10. https://doi.org/10.7557/cage.6755.

interdisciplinary Master's programme on Global Health, with a specific focus on Arctic Governance (McMaster University, Ontario, Canada 2021–2023).[48]

The story at the core of the two books follows the nested loops technique, enabling the core message ("Where can knowledge be found, hidden and preserved?") to be communicated and discovered through several narratives delivered within one story.[49] The story is chosen for its focus on the collective search; one that bridges human and non-human worlds with underlying principles of care and responsibility, for the best place to find and have custody of knowledge.

The story begins with a research question posed by the creator to the trickster spirit named Nanabozho, to find that place where knowledge can be found, and from the trickster spirit, the task is delegated to the animals of the Earth (symbolically represented by Arctic animals: a bear, an eagle, a salmon, and a mole). The search becomes an interactive, situated, and delocalised thought-provoking process. Each story character situates their answer based on their knowledge of the habitat they live in: the bear knows the mountains, and is sure that knowledge can be found, hidden, and treasured on top of them; the salmon is the knowledge keeper of the secrets of river courses and sea; and the eagle, created to soar above the heights, provides her knowledge of the high altitudes in the sky. In the unfolding of each animal's nest, the story leads to the conclusion of the mole, who seems to be the only one able to provide the correct answer to the trickster's question. Although the mole is not gifted with any apparent eyesight, she is gifted with great vision. In her view, knowledge is found and guarded in the heart of the earth.

The multi-layered theme of this story is found in the fact that there are potentially limitless interpretations of how the problem of the search for (ecological and emotional) knowledge can be solved, and these interpretations depend on the audience, the positioning of each member and also the relationship between the audience members. For example, among the

[48] See, for example, Faculty of Health Sciences, Global Health Office, Webinar Series 2021: https://globalhealthoffice.healthsci.mcmaster.ca/news-events/speaker-series/the-arctic-a-global-health-perspective/, last access February 2024.

[49] Petrovic, M., Bonanno, S., Landoni, M., Ionio, C., Hagedoorn, M., & Gaggioli, A. 2022. Using the transformative storytelling technique to generate empowering narratives for informal caregivers: Semistructured interviews, thematic analysis, and method demonstration. *JMIR Formative Research, z6*(8), e36405.

answers we collected through carrying out this activity with legal scholars, it was interesting to note that the scholars studying ecological restoration as a collective act, agreed on the fact that it was not the last animal that provided the answer, but rather the "right" answer blossomed out of a collective sum of the individual efforts of all the animals involved in the search.[50] Following the story plot, the handbook develops educational insights and stimulates a debate around each animal character, their roles, the relational aspects that are generated from their search, and their deep interconnectedness with nature, as well as with the community of readers and researchers engaging with the story.

In parallel with the lessons developed in the handbook, a co-created and illustrated book project, the silent book, based on the same story plot as above, continues along with the conceptual idea of the need to engage in conversations around the relational dimension of ecology.[51] In this latter case, the investigation process is situated in fictitious and coloured settings (the mountainside, airspace, waterside, and underground). Numerous art prototypes display the crucial moments of the animals' search for knowledge and the consequent full immersion in and interaction with their own environment. This silent book helps readers and learners engage in the search for knowledge by giving them a voice and transforming them into storytellers and interpreters of the story.[52]

Seminar series and academic lectures organised around these two books provide examples of ethically informed practices firstly by inviting the audience to develop a sense of engagement with the learning context; a sense of place, represented by the situated answers of each animal; and a sense of community, extending beyond the community of animals and embracing the community of learners, giving life to what the scholars call an eco-sociological model. The skills and lessons realised through this type of learning activity become foundational moments towards the development of sustainability values.

[50] Hayden J., Lohse E. J., Porrone A., & Poto M. P. (2022). Strategic Scientific Workshop "Co-production of knowledge in climate governance"". Septentrio UiT The Arctic University of Norway, https://doi.org/10.7557/7.6568.

[51] Poto, M. P., & Porrone, A. (2021). A Co-created Methodological approach to address the relational dimension of environmental challenges: When critical legal analysis meets illustrated storytelling. *Sustainability, 13*, 13212.

[52] Garan, E. M., & DeVoogd, G. 2008. The benefits of sustained silent reading: Scientific research and common sense converge. *The Reading Teacher, 62*(4), 336–344.

When workshops and lessons around "A Story About Knowledge" are carried out, the sense of place and community is further ignited by the education and research protocol of respect and mutual understanding that is instilled in the development of the learning and investigation experience.[53] At the beginning of each session, and following the Indigenous practice of acknowledging traditional territories hosting the human communities, an expression of gratitude to the hosting place is expressed by the session leaders.[54]

At times, the session may begin with the practice of story reading and storytelling; reading or telling the story aloud is also a tool to strengthen a multisensory connection with the space and the community audience.[55] Afterwards, space is dedicated to sharing and reporting back preliminary impressions, before initiating a deeper conversation around the subject matter. Before, during, and after the sessions, participants are encouraged to engage with the learning materials and stories by providing written answers, as well as their visual creativity. Creative answers brought forward through designing and colouring journaling prompts, are highly encouraged and recommended so that creativity becomes a fundamental tool of pedagogy for ecological education[56] by encouraging the learners to be engaged in conscious acts of gentle exploration of their abilities in their surrounding space.[57] Engaging with the learning toolkit through journaling exercises and prompts can be construed as part of a collective therapeutic process that brings awareness to the need to heal the planet by restoring our relationships and improving overall human health by creatively engaging with inner and outer conflicts.[58] The personal and community work outside the seminar room contributes to spurring

[53] Hayden, J., Lohse, E. J., Porrone, A., & Poto, M. P. (2022). Strategic Scientific Workshop "Co-production of knowledge in climate governance". Septentrio Reports (1). https://doi.org/10.7557/7.6568.

[54] Ibid. (see footnote 1).

[55] Fernández-Llamazares, Á., & Cabeza, M. (2018). Rediscovering the potential of indigenous storytelling for conservation practice. *Conservation Letters, 11*(3), e12398.

[56] Capra, F. (2007). Sustainable living, ecological literacy, and the breath of life. *Canadian Journal of Environmental Education (CJEE)*, 9–18.

[57] Inwood, H. J. (2008). At the crossroads: Situating place-based art education. *Canadian Journal of Environmental Education (CJEE), 13*(1), 29–41.

[58] Larsen, S. C., & Johnson, J. T. (2017). *Being together in place: Indigenous coexistence in a more than human world*. University of Minnesota Press.

new conversations, allowing us to discuss key issues in greater depth, and elevating the richness and complexity of mutual understanding. Through these continued conversations, which consolidated into ethically informed practices of education, the key underlying principles forming a common conceptual framework of integral ecology are identified through the relationship with the environment and the affected peoples.

The experience of delving into collaborative educational and research activities, and thus engaging in a reciprocal effort to co-create and look for solutions, shifts the conversation towards purpose, intention, and consciousness of the socio-ecological interdependencies. Discussing concerns for the biophysical environment including climate change threats, economic and social disparity, and inadequacy of the Western-centric legal approaches to overcome poor environmental governance, leads these ethically informed practices to reflective questions on the need to develop a sense of relational accountability and individual, collective, and planetary search for solutions are understood as part of a ceremony.[59]

3.3 Sustainability-Conscious Legal Education and Research and the Ability to Provide Responses: the Participatory Work with the Chiquitano People of Mato Grosso

Looking at the Agenda's commitments and objectives from the perspective of environmental response-ability is crucial to ensure that the sustainability vision is transformed into the ability to provide effective and practical *responses* to the many complex and interconnected challenges of sustainability. Rendering each other able to provide responses is the key role that legal education and research are asked to play within and beyond 2030, by raising awareness on the need to develop a sense of response-ability among individuals and community as a whole to repair the harm to the environment and build up different relational and ethical systems that prevent future harm.[60] Thus, teachers, learners, and researchers become effective ability trainers and response-givers to the sustainability challenges. Sustainability-conscious education and research aim to strengthen

[59] Wilson, S. (2008). *Research is ceremony. Indigenous research methods*. Winnipeg: Fernwood.

[60] Pali, B., & Aertsen, I. (2021). Inhabiting a vulnerable and wounded earth: Restoring response-ability. *The International Journal of Restorative Justice, 4*(1), 3–16.

this ability by enhancing awareness of the need to repair the harms and by building a relational sense of solidarity and mutuality.[61]

Developing the ability to connect with others, through environmental education and literacy, activates the capacity to "care about", an internal state of readiness, and a commitment to the possibility of caring for strangers or distant others, which precedes the actual practice of caring.[62] The ability of responsiveness builds upon multiple ethically informed practices of relationality: the more we engage in attentive relationships, developing a sense of place and a sense of community, the stronger our ecological identity becomes, building our feelings of empathy, compassion, and care for others.

An example of this collective experience of building up these three emotions and therefore strengthening responsiveness abilities is provided by one of the co-created activities carried out by the ECO_CARE research team with the Chiquitano Community of Mato Grosso, Brazil.

In collaboration with local scholars from Brazil, cultural mediators, law students, community representatives, and school communities, the ECO_CARE team created a series of visual and narrative materials on environmental participation with and for the Chiquitano People of Mato Grosso. The project, entitled "Legal Design and Visual Law in International Environmental Law: Conversion of the Escazú Agreement in Visual Materials for the Chiquitano People", was developed during the related academic course, throughout the year 2020, by the students of the Universidade Federal do Estado do Rio de Janeiro, Postgraduate Law Programme and with the active participation of the Chiquitano People from Mato Grosso (Brazil).[63] The objective of the project was to teach, in practice, an efficient method to create a knowledge base of participatory environmental law, as well as co-develop educational materials that could work as a tool for strengthening environmental participation. The project participants

[61] Bergmark, U. (2020). Rethinking researcher–teacher roles and relationships in educational action research through the use of Nel Noddings' ethics of care. Educational Action Research, 28(3), 331–344.

[62] Gruenewald, D. A. (2003). Foundations of place: A multidisciplinary framework for place-conscious education. *American Educational Research Journal, 40*(3), 619–654.

[63] Parola G., & Poto M. P. (2023). Legal design and visual law: The roadmap. In Poto Parola (Ed.), *Building bridges for effective environmental participation: The path of law co-creation*, The Chiquitano Multimodal Format for Disseminating the Escazú Agreement, Human Rights Interventions Series. Palgrave Macmillan. ISBN 978-3-031-52790-6.

were assigned to three thematic areas, corresponding to the three pillars of environmental participation, and critically revisited through the three mentioned emotions: respectively, access to information was associated with empathy, as the ability to feel for others; participation was connected to compassion, as the ability to feel with others; and access to justice was connected to care, as the ability to take restoring action.[64]

The leader of the academic team was a Chiquitano student and young scholar, Silvano Chue Muquissai, who holds membership in one of the communities the team has been working alongside.[65] Silvano has strong social and family ties to the *aldeia* ("village" in Portuguese) of Vila Nova Barbecho, as this is where he lived until he left for his post-secondary academic studies. The development of this community-based project therefore built upon a very strong base of relationships and kinship with the community members,[66] and was shared in a relational connection, which has been essential to all stages of our project, most particularly in its early development when it was crucial to build trust and gain community understanding of the project vision, scope, and long-term objectives. The education and research project formally began with many community meetings involving researchers, law students, residents, teachers and spiritual leaders (*pajé*, in Portuguese), and elders seeking to elicit local perceptions on key environmental issues among the Chiquitano communities in different villages in Mato Grosso. This resulted in various discussions with students and community members through meetings and focus group sessions that enabled a better understanding of local environmental concerns. The meeting point between the community needs and the project vision was found in the co-created version (in comics) of the Regional Agreement on Access to Information, Public Participation and Justice in Environmental Matters in Latin America and

[64] On the methodological steps followed in the project see Parola, G., & Poto M. P. (Eds.). (2023). *Building bridges for effective environmental participation: The path of law co-creation*. The Chiquitano Multimodal Format for Disseminating the Escazú Agreement, Human Rights Intervention Series. Palgrave MacMillan. ISBN 978-3-031-52790-6; ISSN: 2946-5117; series electronic ISSN:2946-5125.

[65] Chue Muquissai S., Parola G., Poto M. P., et al. (2023) The comic book. In Poto Parola (Ed.), *Building bridges for effective environmental participation: The Path of law co-creation*. The Chiquitano Multimodal Format for Disseminating the Escazú Agreement, Human Rights Interventions Series. Palgrave Macmillan. ISBN 978-3-031-52790-6.

[66] Desai, S., & Smith, H. (2018). Kinship across species: Learning to care for nonhuman others. *Feminist Review, 118*(1), 41–60.

the Caribbean (Escazú Agreement 2018). The community members took part in the project, actively becoming the protagonists and discussing the possibility of transforming the Escazú Agreement into an accessible format, where different understandings and concerns could be voiced, and the role of the Chiquitano People could become effectively visible. Thus, the community chose to imagine and develop a comic format for the Agreement (i.e., a manifestation of visual law): the voice was given to the community members who played an active role in participating in the creation of an accessible version of the Agreement, through the construction of co-developed dialogues. Accordingly, the legal provisions on participation of the Escazú Agreement, written in technical legal language, were cooperatively translated into an easily accessible dialogue, understandable by everyone. Each sentence in the comic dialogue was paired with pictures from the village, representing places and people that different individuals could recognise and relate to within the story. The pictures of the community were transformed into cartoons by students and community members and accompanied by corresponding speech bubbles. The final work consisted of three versions of the Agreement in comics, in Portuguese, English, and Spanish, where the Indigenous Chiquitano People of Vila Nova Barbecho converses on the individual and collective understanding and interpretation of environmental participation as regulated in the Agreement.[67]

As a final restitution act, the books were returned to the community, and a series of video documentaries on the process of co-creation, and the building of trust, mutual understanding, and empathy-building between the community of researchers, students, and the Chiquitano communities.[68] By strengthening the bond between the Indigenous community,

[67] The version in English: Parola, G., & Poto M. P. (Eds.). (2023). *Building bridges for effective environmental participation: The path of law co-creation*. The Chiquitano Multimodal Format for Disseminating the Escazú Agreement, Human Rights Intervention Series. Palgrave MacMillan. ISBN 978-3-031-52790-6; ISSN: 2946-5117; series electronic ISSN:2946–5125; the version in Spanish: Parola, G., & Poto, M. P. (Eds.). (2023). *Tendiendo puentes hacia una participación ambiental eficaz: el camino de la co-creación en Derecho*. El Formato Multimedia Chiquitano para la Difusión del Acuerdo de Escazú, Multifoco. ISBN 9786556112558; in Portuguese: Parola, G., & Poto M. P. (2021). O Acordo de Escazú Em Quadrinhos Feito Pelo e Para o Povo Chiquitano Um Projeto Co-criado de Legal Design e Visual Law ISBN/EAN 978-88-921-4267-1 (Portuguese version), pp. 1–80, Giappichelli, Torino.

[68] Chue Muquissai, S., Parola, G., & Poto, M. P. (2023). ECO_CARE Midterm Conference 2023: "Sharing of the co-created results"—journey of the ECO_CARE team:

its space, and the community of learners, a sense of ecological identity was developed and, through effective participation in education and research, a collective ability for responsiveness to environmental challenges was created.

This co-created approach to research education parallels the essence of situated and community-based education which aims to transform the Western conventional approach of educational institutions to include the spirit of community, a re-imagined relationship to nature and a commitment to the responsibilities that grow from that relationship.[69]

Central to the process of building responsiveness through the community practice of co-creating learning materials were the attributes of healing, participation, storytelling, categorising harm, and accountability. Healing and participation were closely correlated to the process of involvement and cooperation between the community of students and the Chiquitano community members. Conversations and collective brainstorming on the creation of the most accessible legal tool that could effectively give voice to the unvoiced led towards relational and emotional healing through the practice of "re-storying" the experiences, integrating and understanding both the root causes of the problems as well as the responses to them. Storytelling and identifying harms helped develop conversational empowerment and inclusion of perspectives, as well as situating events and persons in time and place, and therefore contributing to developing collective consciousness and accountability.[70]

3.4 Emotional and Ecological Awareness for a Sustainable Future: Follow Your Heart

Another example of practices towards transformative change in research and education is represented by programmes that stimulate emotional

Rio de Janeiro and Chiquitano Indigenous territories of Mato Grosso, Brazil. Septentrio Reports (1). https://doi.org/10.7557/7.7345.

[69] Chue Muquissai, S., Parola, G., & Poto, M. P. (2023) The comic book. In G. Parola & M. P. Poto (Eds.), *Building bridges for effective environmental participation: the path of law co-creation*. The Chiquitano Multimodal Format for Disseminating the Escazú Agreement, Human Rights Interventions Series. Palgrave Macmillan. ISBN 978-3-031-52790-6.

[70] Aarnio-Linnanvuori, E. (2019). How do teachers perceive environmental responsibility? *Environmental Education Research, 25*(1), 46–61.

intelligence and embed associated competencies as a central element to learning, to foster future generations with an awareness of the relationships with themselves, others, and their surrounding environment. Addressing the gap in EL within a legal education and research context is not possible without building emotional intelligence since EL requires the ability to integrate "empathy, seeing others' perspectives, and cooperation with an understanding of and respect for natural systems".[71] The co-creation of the education and research resource "Follow Your Heart: the school for multipotentialites" (hereinafter Follow Your Heart)[72] forms part of this scenario with a playful, yet scientific approach to improving emotional intelligence, ecological literacy, and an overall appreciation for creativity and mindfulness. The book project developed from the original idea of the illustrator, Valentina Russo, whose personal experiences led to the realisation and motivation for implementing more emotional literacy and creativity within elementary and secondary education, and potentially higher education as well.[73] Continuing on the path of creativity and participatory methods for education and research practices that instil a sustainability frame of mind, ECO_CARE supported and developed the original project plan (written in Italian) into an English teaching resource with a multipurpose scope (scientific, educational, and playful).[74] As mentioned above, the ECO_CARE research group develops education and research approaches that bring empathy, compassion, and care into the world of environmental law and sustainable development, and felt inspired to take on this project with the belief that focusing on emotional literacy in youth will lead to future generations with the emotional-cognitive skills to imagine and create a more sustainable society.[75]

[71] Jordan, R. (2013). Ecoliterate: How educators are cultivating emotional, social, and ecological intelligence by Daniel Goleman, Lisa Bennett and Zenobia Barlow. *Ecological Restoration, 31*(2), 230–231.

[72] Murray E. M., Poto, M. P., & Russo, V. (2022). Follow Your Heart. The school for multipotentialites, La Bussola: Rome. ISBN 979-12-5474-218-1.

[73] Ibid. (see footnote 71).

[74] Ibid. (see footnote 71).

[75] ECO_CARE Project, 2023: https://en.uit.no/project/ecocare, last access February 2024.

Through the iterative process of developing Follow Your Heart into a co-created and dynamic learning and teaching resource, and an educational philosophy overall, the authors structured the book in a way that speaks to the interests of young learners, educators, and researchers. Within the primary and secondary school systems, learners and educators might use Follow Your Heart as inspiration to reimagine their learning spaces and stretch the boundaries of traditional school curriculum to strengthen imagination and creativity—important skills to nurture in the case of improving emotional awareness.[76] For researchers and higher education, the themes, concepts, and activities of Follow Your Heart can be further explored through academic courses, community-based research, and interconnected outreach on emotional education, environmental awareness, compassion, ethics of care, and human rights.

With the aim to create space for the development of emotional education and support present and future generations in their effort to make the world a better place, the book is built upon solid research that supports the importance of co-created approaches for achieving a common future for all (the ultimate objective of sustainability).[77] One unique characteristic of Follow Your Heart is its dual participatory element, which is linked to the co-creation of sustainability approaches: the resource (1) encourages the participation of its target audience members as participants and co-creators of the educational resource itself and the subsequent materials that will continue to develop, and (2) describes a curriculum and teaching style that encourages the active participation of pupils and students in their learning to foster deeper engagement with learning outcomes, and a greater sense of autonomy and belonging.[78] Along with creating an environment that views participation as a central element in education and research, Follow Your Heart welcomes creativity, imagination, and multiple talents (elements lacking in the Western education context), which can shape the minds and hearts

[76] Ibid. (see footnote 22).

[77] Szetey, K., Moallemi, E. A., Ashton, E., Butcher, M., Sprunt, B., & Bryan, B. A. (2021). Co-creating local socioeconomic pathways for achieving the sustainable development goals. *Sustainability Science, 16*, 1251–1268.

[78] Billett, P., & Martin, D. (2018). Engaging students in co-creation of sociological knowledge and curriculum design as a form of deep engagement. *Journal of University Teaching & Learning Practice, 15*(5), 7.

of learners into eager citizens who remain hopeful in the face of difficult challenges and inspired to find sustainable solutions.[79]

Embedded in the first part of the Follow Your Heart book, a fully illustrated children's story called "The Story of Cora" visually demonstrates the pressure that comes from the question adults often ask children, "what do you want to be when you grow up?".[80] One of the themes in Follow Your Heart is to shift away from this question, which limits imagination and creativity while encouraging children to pick a linear path from an early age. The second part of the book contains evidence-based research supporting emotional education and gives examples of multipotentialites such as Malala Yousafzai and Wangari Maathai who have learned how to use their multiple talents and emotional intelligence to work towards a more sustainable future.[81]

The book's final part is a co-created "activities" chapter with contributions from various educators focusing on developing emotional awareness and an understanding of the interconnectedness between humans and nature and the responsibility we have to care for each other. Teaching pupils to care for others sets the foundation for strong interpersonal and social relations with all beings, including a sense of responsibility and care for the natural environment.[82] Overall, a curriculum that includes mindfulness activities, outdoor learning, multi-language and multi-age classrooms, while embodying and instilling relational thinking, has the potential to raise children with a sustainability mindset and the skills to tackle complex challenges; children who will become future lawyers, policymakers, and politicians who need the skills and self-awareness to create and implement innovative solutions to build a more sustainable society.

In the legal context, emotional intelligence programmes such as Follow Your Heart can and should be engaged with higher education since the acquisition of theoretical knowledge and technical skills, although necessary, are no longer sufficient for working with the complex challenges our society is currently facing. As with Follow Your Heart, there must also be

[79] Egan, K. (2015). *Engaging imagination and developing creativity in education* (K. Egan, G. Judson, & K. Madej, Eds.). UK: Cambridge Scholars Publishing.

[80] Ibid. (see footnote 71).

[81] Ibid. (see footnote 79).

[82] Sauvã, L. (1999). Environmental Education between Modernity and Postmodernity: Searching for an Integrating Educational Framework. *Canadian Journal of Environmental Education (CJEE), 1*, 9–35.

a paradigm shift in higher education towards recognising the multiple potentialities that exist within individuals and teaching them how to utilise their diverse talents (outside academic environments). Developing emotional and social intelligences and making time and space to give students to opportunity to re-discover their creativity, imagination, and autonomy (alongside the necessary university curriculum) will benefit the individuals themselves by giving them the confidence and skills to work cooperatively with others and their surrounding natural environment.

Thus, the resource encourages the development of intergenerational programmes on emotional awareness, especially starting from an early age. The typical Western education classroom is not usually viewed as a place to foster creativity, imagination, and emotions, but rather as academic excellence and discipline. Follow Your Heart promotes educational approaches that enhance emotional and ecological knowledge, recasting the role of children and teachers as agents of intergenerational learning in environmental and sustainably conscious education and research.[83]

4 Concluding Remarks

This chapter underscores the significance of investing in both ecological and emotional literacy as essential components of legal inquiry aimed at achieving environmental sustainability. The current legal education and curriculum predominantly emphasise theoretical and technical aspects, grounded in conventional (Western) knowledge frameworks. However, they fall short in fostering an ecoliterate mindset among lawmakers and policymakers, which is vital for integrating sustainability into all facets of their work. Therefore, advocating for ethically informed practices, cultivating a sense of responsibility, and promoting emotional awareness represent a threefold approach recommended to nurture caring, empathetic, and accountable graduates of legal education and research programmes. Beyond the realm of legal education, the examples presented in this chapter hold relevance across various disciplines, given the interconnected nature of social, political, economic, and environmental challenges confronting contemporary society.

[83] More in detail, on the research conducted by the Follow Your Heart team, see Poto, M. P., Murray, E. M., & Vita, L. (2023) Chapter 3, in this volume.

Examples of the three practices outlined in this chapter have been tested and implemented in various geographical academic settings and demonstrate a way forward in which education and research are committed to the achievement of "Our Common Future", following the ambitious indication of the Agenda 2030. Thinking of a way forward is, therefore, the second step after the establishment of education and research foundations based on ecoliteracy and emotions, which follow the direction of environmental experts such as David W. Orr who recommends the continuing development of experiential education and research, specifically informed by the interconnectedness of nature.[84] Attempts should be made to go beyond linear thinking and towards a system-thinking approach, both applied to knowledge systems and to the relational dimensions of the knowledge seekers (teachers and students).[85] Relational thinking instils situationality and allows citizens to understand their place in the current global vision of achieving sustainability for all. Essentially, improving ecoliteracy in across all education and research disciplines is, in a sense, "eco-designing" (seen, by David Orr, as a complementary activity of ecoliteracy)[86] a community of care, where individuals, communities, and the planet are part of the same learning experience—this is the main direction that must be followed in the preservation of our common home, the planet.[87] Without reshaping education and research to foster a sustainability state of mind, the environment will continue to be governed in such a way that does not reflect caring and responsibility, leading to further degradation.

In the future, the different practical examples developed and tested in the project activities described in this chapter as ecological literacy "in practice", can be upscaled and applied in other contexts and situations. Researching the long-term beneficial impacts of these practices on the restoration of the relational fabric of society can help to expand the evidence base supporting ecological education, especially within a legal context. Collaborating with educators, researchers, and academic institutions as a whole who have integrated emotional and ecological education

[84] Orr, D. W. (2015). Ecological literacy. In *Thinking about the environment* (pp. 227–234). Routledge.

[85] Ibid. (see footnote 83).

[86] Orr, D. W. (2011). *Hope is an imperative: The essential David Orr*. Island Press.

[87] Ibid. (see footnote 85).

within their programmes is another way forward, to develop a framework to guide those who want to reshape their curriculum. Additionally, students and educators may be surveyed in the future to investigate what aspects of the ecoliteracy curriculum should be further addressed and developed, which would also contribute to creating an overall framework or set of guidelines to reshape legal education with grounding principles of ecoliteracy and sustainability. Consequently, based on the consolidation of these practices and the research studies that come forth, policy-makers could be informed on the relevance of ecological and emotional education to provide concrete responses to complex sustainability challenges. Further research following this study, including a larger number of students, schools, and communities, is expected to be conducted in the near future to build upon the tools for developing ethically informed practices, response-ability, and emotional awareness.

Instilling a sustainability state of mind and integrating practices to strengthen ecological literacy is important across all disciplines and ages, and is a gentle step forward towards the co-creation of a common future for all.

CHAPTER 3

Methodological Steps Towards Ecological and Emotional Education and Research Fostering Multipotentiality

Emily Margaret Murray, Margherita Paola Poto, and Laura Vita

Abstract This contribution presents a systematic overview of the steps followed in co-creating the learning and research resource Follow Your Heart: The School for Multipotentialites for children, educators, and researchers. This resource promotes ecological and emotional research and education for sustainability by cultivating values and behaviours consistent with how nature makes us feel connected and nurtured. Built upon the intersection of ecological literacy and socio-emotional learning,

E. M. Murray co-wrote Sects. 1–6, especially contributing to the design and development of Sects. 1, 3, and 4. She also proofread and edited the entire piece.
M. P. Poto coordinated the research, co-wrote Sects. 1, 2, 3, 4, 6, supervised Sect. 5, and supervised the last version of the work.
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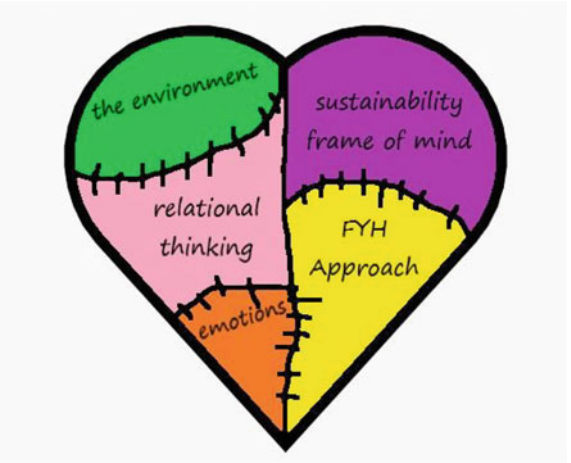
grounded in sustainability and relational thinking, the steps in developing this project from book to educational movement are outlined. The steps include educational workshops, book launches, translation into different cultural contexts and languages, an accompanying online platform, and international research collaborations. This work concludes by outlining the transition from a single resource into an educational movement and strategies for sustaining forward progress.

Graphical Abstract



The methodological approach as a stitched heart, vision of Laura Vita, 2023.

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Keywords Emotional · Ecological · Education · Research · Methodology

1 Introduction

1.1 Introductory Remarks and Chapter Structure

This contribution presents a comprehensive analysis of the methodological steps involved in the co-creation process of Follow Your Heart: The School for Multipotentialites (hereinafter referred to as FYH).[1] This endeavour is achieved by formulating a robust theoretical framework that investigates the intricate interconnections between sustainability, as delineated in the United Nations' 2030 Agenda for Sustainable Development (hereinafter Agenda 2030)[2] and emotional education (Sects. 1, 1.2–1.4). Subsequently, this chapter expounds upon the co-created and iterative process undertaken by the co-authors and contributing educators in the genesis of the book FYH, as outlined in Sect. 2. In Sect. 3, the analysis highlights how the book FYH has continued to develop as a research and education tool "in-action", through academic lectures, interactive workshops, and outreach activities, adopting a multilingual approach to improve accessibility and expand the educational reach of the Follow Your Heart teaching philosophy and concepts (Sect. 4). Then, the chapter narrows in on the work conducted by health education and global health practitioner Laura Vita (Sect. 5) on the need for emotional education in primary and secondary classrooms in Ontario, Canada, and the educator feedback initiative currently underway. In Sect. 6, the study shifts its focus to the forthcoming phase, encompassing the establishment of a digital education and research platform and an exploration of the long-term prospects for the FYH initiative both in research and education. This new phase aims to extend the initiative's reach and influence, propelling the promotion of ecological and emotional research

[1] Murray, E. M., Russo, V., & Poto, M. P. (2022). Follow Your Heart. The School for Multipotentialites, La Bussola.

[2] 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.

and education for sustainability. Additionally, it seeks to cultivate values that resonate with our innate connection, contentment, and nurturing experiences with nature.

1.2 The First Building Block of the FYH Approach: The Intersectional Element of Ecological Literacy (EL) and Socio-Emotional Learning (SEL)

The research constituting the theoretical framework of the multi-step process followed by the implementation of the FYH book activities and the subsequent evolution into a movement responds to the need for ecological literacy (EL) as a domain of inquiry aimed at expanding nature-protection-oriented knowledge and practices. The same research also intersects socio-emotional learning (SEL) as the process through which individuals develop essential skills, attitudes, and behaviours that enable them to understand and manage emotions, establish positive relationships, make responsible decisions, and effectively navigate social interactions. In this section, the two educational concepts will be analysed separately, and then commonalities will be underscored to demonstrate how both are vital components of a theoretical and practical research and education framework aiming to address sustainability challenges. This contribution will also highlight how FYH is developing as a movement that encompasses both EL and SEL competencies and their interactions.

EL is a concept dating back to the 1960s that has become a topical subject of investigation in recent years as the awareness of climate change education and achieving global sustainability within the Agenda 2030 has increased.[3] Environmental education programmes promote ecological literacy among individuals of all ages and enhance awareness, knowledge, and understanding of sustainability challenges. Thus, EL leads to the development of environmentally conscious behaviours, responsible

[3] Borsari, B., & Kunnas, J. (2022). Historical memory and eco-centric education: Looking at the past to move forward with the 2030 agenda for sustainable development. In *Handbook of sustainability science in the future: Policies, technologies and education by 2050* (pp. 1–15). Cham: Springer International Publishing. Goodwin, T. (2016). Educating for ecological literacy. *The American Biology Teacher, 78*(4), 287–291; Cardelús, C., & Middendorf, G. (2013). Ecological literacy: The educational foundation necessary for informed public decision making. *Frontiers in Ecology and the Environment, 11*(6), 330–331.

citizenship, and a collective commitment to sustainable practices.[4] In this sense, EL is a foundational element of environmental education that goes beyond simply transferring knowledge about environmental systems and processes. By deepening our understanding of ecological systems and their intricate connections, we can make informed decisions, develop sustainable practices, and contribute to the preservation of ecosystems, biodiversity conservation, climate change mitigation and adaptation, sustainable resource management, eco-conscious urban planning, ecological restoration, and environmental education and awareness. This type of literacy encompasses a broad array of competencies that connect to an overall improved comprehension of environmental issues; a holistic understanding and cultivation of the relationship between humans and the natural environment; critical thinking skills; and strengthening emotional and social intelligence to embody environmentally responsible behaviours.[5]

Alongside the need for focusing on the environment and creating a more sustainable society, the past few decades have seen increased awareness and funding initiatives towards SEL programmes within traditional educational curricula[6] to raise children with the confidence to perceive, understand, and express their emotions while developing healthy relationships with their peers. On top of improving academic performance, individuals with strong emotional and social skills also have greater well-being and social awareness and are known to make more responsible decisions.[7] In the face of society's complex environmental and socioeconomic challenges, acquiring knowledge and technical skills are no

[4] Berkowitz, A. R., Ford, M. E., & Brewer, C. A. (2005). A framework for integrating ecological literacy, civics literacy, and environmental citizenship in environmental education. *Environmental Education and Advocacy: Changing Perspectives of Ecology and Education, 227*, 66.

[5] The literature on environmental literacy is vast. For a comprehensive study, see McBride, B. B., Brewer, C. A., Berkowitz, A. R., & Borrie, W. T. (2013). Environmental literacy, ecological literacy, ecoliteracy: What do we mean and how did we get here? Ecosphere, 4(5): 1–20, cit.; Rowe, D. (2002). Environmental literacy and sustainability as core requirements: Success stories and models. Teaching sustainability at universities, 79–103.

[6] Mira-Galvañ, M., & Gilar-Corbi, R. (2020). Design, implementation, and evaluation of an emotional education program: Effects on academic performance. *Frontiers in Psychology, 11*, 1100. 10.3389/fpsyg.2020.01100.

[7] Borsari, B., & Kunnas, J. (2022). Historical memory and eco-centric education: Looking at the past to move forward with the 2030 agenda for sustainable development.

longer sufficient; thus, higher education institutions have also recognised the importance of developing emotional intelligence as a core competency.[8] Solid emotional intelligence goes beyond simply understanding one's emotions; it gives people the strength and perseverance to tackle challenges in both personal and professional domains. The ability to regulate emotions and cultivate an understanding of the emotions of others uniquely equips upcoming generations to navigate the ongoing and forthcoming impacts of the climate crisis on their lives. An integrated emotional education pedagogy, which FYH aims to be, is one that:

> […] help[s] to identify responsibilities, improve coping potential, and improve the future outlook. They [emotional educational pedagogies] can be characterized as caring (involving listening, dialogue, critical thinking, and meaningful connections between the student, their life, and the world), using knowledge for action, and as involving authentic experiences such as co-creation, authentic research, and outdoor education.[9]

Bringing emotional education and the environment into the same sphere, although their complementarity may not seem evident initially, is a reasonably novel topic in the Western world. As Dunlop and Rushton argue, "attending to the emotions in education is crucial in supporting constructive responses to climate change"[10] and "the design of appropriate, emotionally-engaged pedagogies may be considered one dimension of 'generational responsibility' whereby teachers play a role in ensuring that the next generation is left with at least as good as a planet as the previous one".[11] An education or upbringing that teaches about the environment in small units across various traditional school subjects, without

In *Handbook of sustainability science in the future: Policies, technologies and education by 2050* (pp. 1–15), cit.

[8] Gilar-Corbi, R., Pozo-Rico, T., Sánchez, B., & Castejón, J. L. (2018). Can Emotional intelligence be taught in higher education? A randomized experimental study of emotional intelligence training program using a multimethodological approach. *Frontiers in Psychology, 9*, 1039. 10.3389/fpsyg.2018.01039.

[9] Dunlop, L., & Rushton, E. A. (2022). Education for environmental sustainability and the emotions: Implications for educational practice. *Sustainability, 14*(8), 4441. p. 14.

[10] Dunlop, L., & Rushton, E. A. (2022). Education for environmental sustainability and the emotions: Implications for educational practice. *Sustainability, 14*(8), 4441. p. 2.

[11] Ibid. (see footnote 10).

instilling the notions of empathy, compassion, and care, will not create the connection to the natural world that warrants sustainable decisions.

Although the consciousness around instilling knowledge and skills in relation to the environment and emotions is a more recent endeavour, this approach is deeply rooted in the diverse histories of Indigenous communities and an integral component of their value and belief system, emphasising the importance of developing a sense of responsibility for the seventh generation.[12] Ecological literacy, the understanding of ecological systems and their interconnections, plays a vital role in promoting responsible environmental stewardship and sustainable practices. The principle of responsibility to the seventh generation is one such concept that highlights the profound relationship between ecological literacy and sustainable decision-making. This principle, rooted in Indigenous wisdom and worldview, emphasises the interconnectedness of all life forms and the importance of considering the long-term consequences of our actions on future generations. At the core of Indigenous worldviews is the understanding that humans are not separate from nature but an integral part of it. This perspective fosters a deep sense of responsibility and stewardship towards the environment, grounded in the recognition that our actions have far-reaching consequences for those who come after us. The principle of responsibility to the seventh generation emphasises the importance of considering the well-being and sustainability of future communities when making decisions in the present. EL, when influenced by Indigenous views, encompasses not only scientific knowledge but also an understanding of the ethical and spiritual dimensions of our relationship with the natural world. It involves recognising and valuing the interconnectedness of all living beings and the importance of living in balance and harmony with nature. By embracing Indigenous perspectives in EL, we gain a more holistic understanding of environmental issues and solutions, enabling a broader approach to environmental education and decision-making. Overall, it fosters a deeper appreciation for the diversity of knowledge systems and cultural practices that have sustained sustainable societies for centuries.

As reported by Linda Clarkson, Vern Morrissette, and Gabriel Regallet, the vision of sustainable development through the eyes and experience

[12] Clarkson, L., Morrissette, V., & Régallet, G. (1992). Our responsibility to the seventh generation: Indigenous peoples and sustainable development (p. 63). Winnipeg: International Institute for Sustainable Development.

of Indigenous peoples encompasses the need to acknowledge that we include women, elders, and children into consideration: "the prophecy tells us that what we do today will affect the seventh generation and we must bear in mind our responsibility to them today and always".[13] Indigenous knowledge and worldviews that integrate a holistic view of peoples, past and present, and the planet, can significantly impact the development of sustainable educational pedagogies.[14]

As a sustainable educational pedagogy, FYH is built around the many intersections between EL and SEL by fostering a deeper connection between individuals and the natural world while promoting empathy, environmental stewardship, sustainability, and a sense of responsibility towards nature and all living beings. One way in which these two types of literacy intersect is the connection between empathy and perspective-taking: EL encourages individuals to develop empathy towards the natural world and recognise the interdependence between human societies and ecosystems. This understanding nurtures a sense of compassion and empathy for living beings, promoting perspective-taking and considering the needs and experiences of other species and future generations. The second interaction deals with responsible decision-making, where EL empowers individuals to make responsible decisions that consider the ecological impacts and long-term consequences from their personal lives to their professional careers. SEL complements this process by enhancing critical thinking, problem-solving, and decision-making skills, enabling individuals to assess the ethical implications of their choices and align them with sustainability goals.

The third way EL and SEL interact is through the development of collaborative approaches to research and education. An individual with strong ecological literacy often finds solutions to sustainability challenges through collaborative approaches, which requires SEL skills such as communication, cooperation, and teamwork. These skills are vital in facilitating effective collaboration among diverse stakeholders and fostering shared responsibility and collective action towards environmental sustainability. Fourth, studying ecological systems and recognising environmental challenges can evoke a range of emotions, including concern,

[13] Ibid. (see footnote 12).

[14] Napoleon, V., & Friedland, H. (2016). An inside job: Engaging with Indigenous legal traditions through stories. *McGill Law Journal, 61*(4), 725–754.

frustration, or hope.[15] SEL supports the development of emotional regulation skills, helping individuals understand and manage their emotions in response to ecological issues. Emotional intelligence enables individuals to engage constructively in sustainability efforts and take appropriate action, rather than feeling emotionally overwhelmed by feelings sometimes summarised as "climate anxiety".[16] Fifth, the interaction contributes to building a sense of purpose and agency.[17] Ecological literacy combined with SEL helps individuals develop a sense of purpose and agency in addressing sustainability challenges.[18] By understanding their connection to the natural world and recognising their ability to make a positive impact, individuals feel empowered to take action and contribute to environmental well-being.[19] Last is environmental stewardship.[20] Ecological literacy fosters a sense of responsibility and stewardship towards the environment, and SEL complements this by nurturing a sense of personal and social responsibility, ethical decision-making, and a commitment to sustainable behaviours. Together, these elements encourage individuals to become active environmental stewards, advocating for sustainable practices and inspiring others to do the same.

[15] Russel, C. & Oakley, J. (2016). Editorial: Engaging the emotional dimensions of environmental education. *Canadian Journal of Environmental Education, 21*, 13–22.

[16] Dunlop, L. & Rushton, E. A. C. (2022). Education for environmental sustainability and the emotions: Implications for educational practice. *Sustainability, 14*, 4441. https://doi.org/10.3390/su14084441.

[17] McBride, B. B., Brewer, C. A., Berkowitz, A. R., & Borrie, W. T. (2013). Environmental literacy, ecological literacy, ecoliteracy: What do we mean and how did we get here? *Ecosphere, 4*(5), 1–20.

[18] Collado-Ruano, J. (2018). Cosmodern education: Emotional, spiritual, and ecological literacy to develop a sustainability mindset. In Developing a Sustainability Mindset in Management Education (pp. 133–157). Routledge.

[19] Khadim, M., Tahira, S. S., & Naz, B. (2023). Emerging trends and research developments in education for sustainable development: Shaping conceptions for a sustainable future. *Annals of Human and Social Sciences, 4*(2), 499–512.

[20] Tidball, K. G., & Krasny, M. E. (2011). Toward an ecology of environmental education and learning. *Ecosphere, 2*(2), 1–17.

By promoting empathy, responsible decision-making, collaboration, emotional regulation, a sense of purpose, and environmental stewardship, this intersection contributes to the holistic development of individuals who are knowledgeable about ecological systems and equipped with the social and emotional skills necessary to create a sustainable future.

Building off the importance of bridging emotions and the environment in education and research, we argue that developing ecological literacy with a strong focus on the emotional component should start well before post-secondary education.[21] FYH, as an integrated intergenerational educational pedagogy, focuses on the connectedness between the self, others, and the natural world, and instils sustainability as a frame of mind grounded in both the environment and emotions.

1.3 The Second Building Block: A Sustainability Frame of Mind

Education and research, in the quest to achieve sustainability and find solutions to complex societal and environmental challenges, are deeply interconnected.[22] In the twenty-first century, the overall outcomes and outputs of most fields of research are connected to sustainability, just as a common goal of the education system is to prepare children and adults with the knowledge and skills to work in different environments and create a prosperous life for themselves, the people, and the planet around

[21] Elias, M. J., Zins, J. E., & Weissberg, R. P. (1997). Promoting social and emotional learning: Guidelines for educators. Ascd.

[22] Maina-Okori, N. M., Koushik, J. R., & Wilson, A. (2018). Reimagining intersectionality in environmental and sustainability education: A critical literature review. *The Journal of Environmental Education, 49*(4), 286–296.

them.[23] In the words of Michael Bonnett,[24] instilling sustainability as "a frame of mind" is a way to link education and research as an integrated process that helps to answer the questions: "What constitutes a right relationship with nature?" and "What should our basic stance towards the natural environment be?". The educational philosophy and movement around FYH builds upon this idea, focusing on emotional intelligence and ecological literacy as crucial components of a sustainable future.

A "sustainability frame of mind" encourages learners to approach topics in a cohesive and integrated manner, which simultaneously works in favour towards achieving national and global sustainability frameworks, such as the 17 integrated Sustainable Development Goals (SDGs) as outlined by the Agenda 2030. The interconnectedness of the 17 SDGs seeks to address sustainable development across economic, social, and environmental dimensions,[25] impacting most (if not all) aspects of life

[23] Here are some references on twenty-first-century studies on sustainability: "Our Common Future: Report of the World Commission on Environment and Development" by the Brundtland Commission (1987); "The Limits to Growth: The 30-Year Update" by Donella H. Meadows, Jorgen Randers, and Dennis L. Meadows (2004); "Planetary Boundaries: Exploring the Safe Operating Space for Humanity" by Johan Rockström et al. (2009)—This paper defines a framework of nine planetary boundaries, including climate change, biodiversity loss, and freshwater use, within which humanity can safely operate to maintain a stable Earth system; "The Natural Step for Business: Wealth, Ecology, and the Evolutionary Corporation" by Brian Nattrass and Mary Altomare (1999)—This book offers insights into how businesses can integrate sustainability principles into their operations, emphasising the importance of systems thinking and long-term planning; "The Economics of Ecosystems and Biodiversity: Ecological and Economic Foundations" edited by Pushpam Kumar (2010)—This publication examines the interdependence between economic systems and ecosystems, emphasising the need to incorporate ecosystem services into economic decision-making for sustainable development; "Sustainable Development Goals: Their Impacts on Forests and People" edited by Pia Katila et al. (2018); "Doughnut Economics: Seven Ways to Think Like a 21st-Century Economist" by Kate Raworth (2017); "The IPCC Special Report on Global Warming of 1.5 °C" by the Intergovernmental Panel on Climate Change (2018). These references cover a wide range of topics related to sustainability in the twenty-first century, including sustainable development, planetary boundaries, business sustainability, ecosystem services, the Sustainable Development Goals, alternative economic frameworks, and climate change mitigation.

[24] Bonnett, M. (2002). Education for sustainability as a frame of mind. *Environmental Education Research, 8*(1), 9–20.

[25] UN General Assembly, *Transforming our world: the 2030 Agenda for Sustainable Development*, 21 October 2015, A/RES/70/1, available at: https://www.refworld.org/docid/57b6e3e44.html, last access December 2023.

on this planet; thus, implementing a sustainability mindset in early education becomes imperative. Education and research are interwoven among the different goals and targets, and the scientific and academic communities are even recognised as key players in achieving a sustainable society by 2030. Under SDG 4 *Quality Education,* there also lies a deep connection between adopting a sustainability frame of mind and promoting lifelong learning; as the planet and society are constantly changing, instilling sustainability through education enables flexible thinking and equips learners to handle challenges in their future professional lives. More specifically, target 4.7 outlines the expectation that students at all levels of education should acquire the knowledge and skills to promote "sustainable lifestyles, human rights, gender equality, promotion of a culture of peace and non-violence, global citizenship and appreciation of cultural diversity",[26] which all contribute to achieving the overall goal of *Quality Education*. Perhaps the basis of this knowledge and skillset is applying the appropriate state of mind, and education is the most important tool in encouraging a sustainability frame of mind.

However, despite the scholarship supporting the need to embed sustainability into academic curricula and the role education plays in achieving the SDGs, policies and programmes do not reflect these aspirations.[27] It is a complex task to develop sustainable educational approaches that combine the appropriate interdisciplinary knowledge, skills, and values and then implement them in a rigid academic system.[28] One scholar who has led his career promoting culture for sustainability, Paul Shrivastava, developed a holistic approach that combines physical and emotional learning in line with traditional educational pedagogies called "embodied learning". Furthermore, scholars such as David W. Orr argue that the concept of sustainability itself "implies a radical change in the institutions and patterns that we've come to accept as normal",[29] hinting towards the necessity for a shift in education and research that place

[26] Ibid. (see footnote 25).

[27] Dunlop, L. & Rushton, E. A. C. (2022). Education for environmental sustainability and the emotions: Implications for educational practice. *Sustainability, 14*, 4441. https://doi.org/10.3390/su14084441.

[28] Orr, D. W. (1990). Environmental education and ecological literacy. *Education Digest, 55*(9), 49–53.

[29] Orr, D. W. (1990). Environmental education and ecological literacy. *Education Digest, 55*(9), 49–53.

sustainability at the centre of their purpose. Raising children and teaching students (from primary to higher education) and researchers to feel connected to the natural environment and their own emotions fosters future generations who make decisions grounded in sustainability and environmental stewardship, with an awareness of how their actions affect both people and the planet.

1.4 The Third Building Block: Relational Thinking

An integrated approach to education that embodies emotional intelligence, ecological literacy, and sustainability, such as FYH, can be situated in a relational thinking framework; a thought process that treats systems as being made up of complex networks and relationships of living and non-living beings. Indigenous scholars, anthropologists, and geographers, among other emerging research fields, promote this systematic, relational approach that targets relationships when attempting to solve environmental and socioeconomic challenges.[30] Relational thinking, inherently linked to sustainability as a frame of mind, recognises that humans cannot be separated from nature while encouraging mindfulness, reciprocity, and care internally (the self) and externally (others and the planet). Furthermore, relational thinking can be found at the intersection between EL and SEL, where an awareness of the relationships between living organisms and their physical environment is supported by an emotional understanding of how one's actions impact the systems to which one belongs.

In terms of rethinking education and bringing this underlying principle of relational thinking into classrooms—supported through emotional and ecological literacy programmes and policies—focusing on relationality from an early age is critical to ensure that children grow up and maintain a sense of connectedness to the world around them. Naturally, humans are relational beings and have an innate capacity to empathise, care, and

[30] Eyster, H. N., Satterfield, T., & Chan, K. M. A. (2023). Empirical examples demonstrate how relational thinking might enrich science and practice. *People and Nature*, 1–15. https://doi.org/10.1002/pan3.10453.

draw connections; however, as children move through the Western education system, intuitive skills are often overridden by cognitive skills,[31] on top of spending more time in their classroom as opposed to being outdoors. As supported by the underlying FYH and other Early Childhood Education (ECE) research,[32] creativity and imagination must be sufficiently nurtured to support this relational, sustainable outlook on life. Developing a strong awareness of one's own emotions and sense of purpose leads to the capacity to relate and connect to other beings, and when those other "beings" go beyond human form, the natural world becomes an essential relationship to respect and maintain. Bringing EL, SEL, and sustainability into the same integrated education and research approach can be visualised as a three-dimensional concept (Fig. 1) in which the self, others, and environment interact through elements such as co-creation, participation, integral ecology, relationships, responsibility, and emotions. FYH, as an educational philosophy and research framework, focuses on these dimensions across several target audiences—an ambitious yet necessary approach to building a more sustainable, caring future.

2 Material and Methods: Follow Your Heart the Book (First Step)

The theoretical foundations of FYH's educational philosophy were laid in the book *Follow Your Heart: The School for Multipotentialites*,[33] an educational resource targeting children, educators, and researchers. The original idea, a school for multipotential children who have the freedom to create, imagine, and express as an integral part of their formal education, was envisioned by the book's illustrator, Valentina Russo. Moving from the original idea, the authors developed the manuscript into a tripartite book with (1) an embedded illustrated story for children, (2) evidence-based

[31] Wels, A. E. J. (2017). Sustainability by default: Co-creating care and relationality through early childhood education. *International Journal of Early Childhood, 49*, 155–164. https://doi.org/10.1007/s13158-017-0193-5.

[32] Davis, J. (2009). Revealing the research 'hole' of early childhood education for sustainability: A preliminary survey of the literature. *Environmental Education Research, 15*(2), 227–241.

[33] Murray, E. M., Russo, V., & Poto, M. P. (2022). Follow Your Heart. The School for Multipotentialites, La Bussola, cit.

Fig. 1 The three dimensions of education and research for sustainability ideated by Emily Murray and illustrated by Valentina Russo (2022)

research supporting the FYH educational philosophy for both educators and researchers, and (3) a chapter of co-created activities written by and intended for educators.

The embedded children's story, *The Story of Cora*,[34] presents the concept of multipotentiality and the anxieties linked to the question, "What do you want to be when you grow up?".[35] A multipotential person, as reported by Emilie Wapnick, has "many interests and creative pursuits"[36] and excels across a multitude of disciplines, yet is also someone who struggles with finding balance or meaning in their work because of the need to fulfil all of their passions. Multipotentiality, although it may be perceived or feel like a disadvantage because of the "specialist" and "linear" mindset our capitalistic society promotes, is a

[34] Original idea of and written by Emily Murray and illustrated by Valentina Russo.

[35] For an analysis of the Story of Cora, see Ali, S., *Exploring the origins of cora from follow your heart*, July 3, 2023, blogpost published in https://en.uit.no/project/ecocare/blogg/innlegg?sub_id=816760, last access July 4, 2023.

[36] Wapnick, E., & Buford, M. V. (2023). The rise of multipotentiality in a new landscape of work. In *Mapping the Future of Undergraduate Career Education* (pp. 155–166). Routledge.

core characteristic that—if nurtured—can be advantageous for making the world a better, more sustainable place.[37]

The second part of FYH establishes the knowledge foundations essential for grounding research on ecological and emotional education and exploring the concept of multipotentiality. Dedicated to researchers and educators engaged in emotional and ecological education research, this section maintains an element of playfulness that can effectively captivate and involve students as well. By intertwining scholarly rigour with interactive elements, this section serves as a valuable resource for researchers and educators seeking to deepen their understanding of the subject matter while fostering an engaging learning experience for students.

The concluding segment of the comprehensive educational resource, Follow Your Heart, embodies a participatory and co-creative approach. This chapter, specifically designed for teachers and their pupils, encompasses a range of activities that aim to cultivate emotional literacy, foster relational thinking, and nurture the development of multiple talents. Drawing upon a collaborative process, the authors worked closely with educators from Italy and Canada to co-create these engaging activities. The result is a diverse collection of lessons and exercises reflecting the insights and expertise of the authors and educators involved. Through this participatory approach, the activities are finely tuned to meet the needs and interests of students, ensuring a dynamic and interactive learning experience.[38]

Within this final part of FYH, readers and teachers find a wealth of valuable suggestions and practical guidance for seamlessly integrating these activities into their curriculum. Each activity is thoughtfully designed to promote emotional awareness, encourage critical thinking, and foster creativity. By embracing the spirit of participation and co-creation, this chapter empowers teachers and students to actively engage in the educational process, fostering a sense of ownership and collaborative learning.

[37] Wapnick, E. (2017). How to be everything: A guide for those who (still) don't know what they want to be when they grow up. HarperOne; see also Murray, E. M., Russo, V., & Poto, M. P. (2022). Follow Your Heart. The School for Multipotentialites, La Bussola, cit., 39 and ff.

[38] Murray, E. M., & Poto, M. P. (2023) Co-creation of educational spaces and curricula to develop an ecology of participation: an example from Follow Your Heart in Lohse, E. J., & Poto, M. P., Coproduction of knowledge in Climate Governance, Berliner Wissenschafts-Verlag, 2022, ISBN 978–3-8305–5538-4.

Moving beyond the physical book, Follow Your Heart is an integrated form of education, and has developed into an educational movement, taking shape through workshops[39] and outreach activities, as outlined in the following section.[40]

3 Follow Your Heart in Action (Second Step)

3.1 Three Educational Workshops Developing the Book Activities

Following the publication of the book, three book launches were organised, accompanied by a series of diverse activities and workshops each purposefully centred around the core values of ecological education, emotional intelligence, and the nurturing of multipotentiality.[41] The book launches have served as a vibrant platform to introduce the publication, bringing together individuals who share a deep appreciation for the interconnectedness of ecological and emotional education. Through the events hosted thus far (in the UK, Italy, and France), attendees were immersed in a captivating atmosphere that fostered an exchange of ideas, experiences, and insights. Moreover, several activities and workshops were thoughtfully curated to delve into the values at the heart of the book. Participants actively engaged in interactive sessions and hands-on experiences, all designed to promote a holistic understanding of ecological principles, emotional intelligence, and the cultivation of multiple talents. These gatherings provided a unique opportunity for participants to explore and deepen their knowledge in these critical areas in a safe, welcoming space open to out-of-the-box thinking. The activities and workshops encouraged reflection and the development of practical skills and sparked meaningful discussions around the transformative power of ecological education, emotional intelligence, and embracing one's

[39] Poto, M. P., Murray, E. M., Russo, V., & Vita, L. (2023). Third Book Launch, Workshop and Next Steps "Follow Your Heart. The School for Multipotentialites". Septentrio Reports, (1). https://doi.org/10.7557/7.7101; Poto, M. P., Murray, E. M., Russo, V., & Green, J. (2023). Second Book Launch and Creative Bilingual Workshop "Follow Your Heart. The School for Multipotentialites". Septentrio Reports, (1). https://doi.org/10.7557/7.7037; Poto, M. P., Murray, E. M., & Russo, V. (2023). Book Launch and Scientific Workshop "Follow Your Heart. The School for Multipotentialites". Septentrio Reports, (1). https://doi.org/10.7557/7.6986.

[40] Ibid. (see footnote 38).

[41] See reports cited in the footnote above.

multipotentiality. By combining the excitement of book launches with purposeful activities and workshops, these events became catalysts for building a community of like-minded individuals passionate about integrating ecological values, emotional intelligence and celebrating diverse talents into their personal and professional lives. Among the activities organised in the last workshop, we developed the reading of *The Story of Cora;* the development of the banner, co-created by all participants, around the theme of "What does Follow Your Heart mean to you?"; and the collection of books that constitute a multilingual library, meant to be expanded with a further study on resources connected to ecological and emotional education, as well as multipotentiality.

3.2 FYH as a Learning Resource for University Students

The FYH book has also been adopted as a valuable learning resource for the bachelor course programme in Business and Management at the University of Torino (Unito, Department of Management, University of Turin, academic year 2022–2023).[42] Its inclusion in the curriculum has proven to be instrumental in inspiring and guiding students towards success in their academic and professional pursuits and has been particularly influential in the context of student-led creative projects centred around the Agenda 2030. As part of their coursework, students have utilised FYH as an inspirational tool to delve into the challenges and opportunities associated with the global sustainable development goals outlined by Agenda 2030.[43] By reading the book and exploring its themes, students have gained valuable insights and perspectives on how individuals and organisations can contribute to a more sustainable and inclusive future through emotional and ecological education and by fostering multipotentiality from an early age. One of the notable outcomes of incorporating FYH into the curriculum has been the development of engaging roundtable discussions based on book reviews. After reading the book, students have been encouraged to critically analyse

[42] Inspired by FYH as a learning resource, the students developed their own projects along the lines of sustainability education within the Agenda 2030. For testimonies on their projects, refer to https://en.uit.no/project/ecocare/blogg, last access July 2023.

[43] See, for example, Mohammad Abniki, *Italiran: The story of inspiration*, July 7, 2023, in https://en.uit.no/project/ecocare/blogg/innlegg?sub_id=817034, last access July 2023.

its content, themes, and key messages, which have been followed by roundtable sessions where they have shared their insights and engaged in thoughtful discussions with their peers and faculty members. These roundtable discussions have provided a platform for students to articulate their opinions, exchange ideas, and deepen their understanding of the book's concepts. Through these interactive sessions, students have gained a broader perspective on the significance of following one's passion and incorporating legal and ethical considerations into future business endeavours.

The integration of FYH into the Business and Management curriculum at Unito has fostered a holistic approach to education, emphasising the importance of personal growth, value-driven decision-making, and sustainable development. By utilising the book as a learning resource, students have expanded their knowledge and critical thinking skills and been inspired to become agents of positive change within their communities and beyond. In conclusion, FYH has become an essential component of the bachelor course programme in Business and Management at Unito, enriching students' learning experiences, providing them with valuable insights, inspiring their creative projects related to Agenda 2030, and encouraging meaningful discussions through roundtable sessions. By embracing the messages and themes of the book, students have gained a deeper understanding of their role in shaping a sustainable and socially responsible future.

3.3 Outreach Activities with Primary School Pupils: The Experience Offered by the Initiative "Bambine and Bambini. Un giorno all'Universita'" (University of Turin, April 2023)

In April 2023, as part of the "Bambine and Bambini. Un giorno all'Universita'" initiative at the University of Turin, an impactful outreach activity was organised involving primary school pupils. Margherita Poto, Arianna Porrone, and Xhesika Nikolli facilitated this endeavour, utilising the resources provided by the book FYH to lead a thought-provoking session centred around fostering an emotional connection with the planet.[44] During this engaging activity, the children were encouraged to

[44] See https://en.uit.no/project/ecocare/nyheter/artikkel?sub_id=810378, last access July 4, 2023.

explore their creativity and imagination. Drawing inspiration from Indigenous traditions of the Arctic, they collectively constructed their own unique story that emphasised the significance of preserving and nurturing our planet. By incorporating elements from FYH, the children delved into the importance of following their passions and cultivating a deep connection with the environment. To further enhance their experience, the children collaborated to compose a song that captured the essence of their story. This process fostered teamwork and cooperation while allowing them to express their thoughts and emotions through music in a creative manner. Through the composition of the song, the children were able to develop a deeper understanding of the interconnectedness between individuals, the environment, and the need to take responsible actions. In addition to storytelling and song creation, the children also had the opportunity to showcase their artistic talents by creating their illustrations. By creating a visual representation of their ideas and concepts, they could portray their interpretations of the themes discussed during the activity through another mode of expression. This artistic aspect of the experience further reinforced the importance of nurturing individual talents and embracing creativity to foster a deeper connection with one another and the planet.

Overall, the outreach activity with primary school pupils proved to be a very formative experience; through their participation, the children gained a profound understanding of the significance of nurturing their talents, fostering positive relationships with others, and cultivating a deep and emotional connection with our planet. The integration of FYH resources into the activity provided a framework for exploration and reflection, giving the children the flexibility and freedom to invent their own stories, song, and illustrations, all while empowering them to become active agents of positive change in their communities and instilling in them a sense of responsibility towards the environment. From the teachers' feedback, the take-home message that emerged was that, through experiences like these, the seeds of awareness and compassion are surely planted, paving the way for a future generation committed to safeguarding our planet and promoting sustainable practices.

4 Expanding Reach and Improving Accessibility Through Translation and an Online Platform (Third Step)

Building on the knowledge and experience gained from the book launches, lectures, and outreach activities, the Follow Your Heart project team is expanding by focusing on the message of Cora and developing evidence-based research to support the need for an integrated emotional and ecological education. Through community interactions with the book, Cora has been well-received by all ages and has been identified as a central component to the Follow Your Heart project. *The Story of Cora* resonates with individuals in search of a meaningful career and life that makes space for their multiple talents and interests while simultaneously promoting the teaching resource Follow Your Heart. To reach a wider audience, *The Story of Cora* has been translated and contextually adapted into Chinese and Farsi by university students as part of research internships. Including personal touches and input from university students with varying educational backgrounds and skills has further contributed to the co-created, community-based approach that the Follow Your Heart team aims to embody in their work.

To further expand the reach of the book and development of the FYH project, the team has developed a website[45] to showcase the educational resource and create an online space that brings together ecological and emotional educational resources. As highlighted by Haleem et al. (2022), digital resources improve access to a wide variety of learning tools that enhance the educational experience for students and educators.[46] Incorporating digital learning into the classroom can foster creativity, giving students a sense of success and encouraging non-traditional ways of thinking. Digital classrooms are also accessible and interactive, offer flexible and personalised learning, help students develop teamwork and communication skills, and often provide collaboration opportunities for

[45] See https://www.followyourhearteducation.org/, last access February 2024.

[46] Haleem, A., Javaid, M., Qadri, M. A., & Suman, R. (2022). Understanding the role of digital technologies in education: A review. *Sustainable Operations and Computers*, *3*(3), 275–285. https://doi.org/10.1016/j.susoc.2022.05.004. Haleem, A., Javaid, M., & Singh, R. P. (2022). An era of ChatGPT as a significant futuristic support tool: A study on features, abilities, and challenges. *BenchCouncil Transactions on Benchmarks, Standards and Evaluations, 2*(4), 100089.

educators and students. The website will act as a resource hub for students, educators, and researchers with both original resources—crash-course style videos and a podcast series—and a curated collection of books, podcasts, videos, research publications, and other tools that align with Follow Your Heart and the educational philosophy.

Continuing to translate the themes and teachings of FYH into various forms of media (website, children's books, podcasts, short videos) will help to grow and strengthen the education and research community, integrating competencies of emotional and ecological literacy into the education system. The development of FYH, beyond a physical book, supports educational pedagogies that call for holistic, well-rounded teaching approaches that yield complex thinkers who will have the skills, knowledge, and confidence to address future challenges.

5 Application of Results in Ontario's Schools: A Case Study (Fourth Step)

Following a community-based, co-created approach to education and research, the book Follow Your Heart and future developments of this educational space involve international collaboration through diverse educator input and university student research internship programmes. Since the state of educational policies and programmes enforcing emotional and ecological-based learning themes and skills vary across the globe, and in most cases are absent or severely lacking, it is important to collaborate with students, educators, and researchers from various contextual settings to gain better insight to understand what is needed and how educational spaces and resources like Follow Your Heart can fill such gaps.

Despite the many intersections of SEL and EL, there are very few instances of these educational topics converging in the same policies and programmes and are usually conceptualised in silos. Through her experience as a public health nurse working to support elementary schools in Ontario, Canada, Laura Vita became aware of the gap in emotional education resources and training for educators. Following the COVID-19 global pandemic, teachers and school administrators highlighted mental health and well-being as key issues that needed to be addressed to support their students better. Many educational staff sought to obtain evidence-informed tools to promote social-emotional learning within their classrooms, in response to the challenges their students were experiencing. Fostering and strengthening social and emotional skills became

an area of importance because of its positive impact on mental well-being and its focus on developing tools to build resiliency. In Ontario, Canada, emotional education—in the form of social-emotional learning (SEL) skills—and environmental education are addressed differently in the Ontario Ministry of Education Curricula and treated as separate concepts, despite how interconnected they have proven to be. In 2009, the Ontario Ministry of Education published the "Acting Today, Shaping Tomorrow" policy framework for environmental education in Ontario schools, citing the critical need to help students understand the nature and complexity of environmental challenges and the knowledge and skills to take action. Additionally, they denote environmental education as a "cross-curricular and integrated learning" skill, indicating, through resource documents, that environmental education should be taught across all subject areas and grades because of the learning opportunities it presents to students. The resource documents for grades 1–8 and 9–12 outline lesson plans and activities that give educators inspiration for integrating environmental topics in subjects such as The Arts, French as a Second Language, French Immersion, Health and Physical Education, Language, Mathematics, Native Languages, Science and Technology, and Social Studies. However, the content of the resource guides is merely knowledge-based and does not suggest lessons and themes that would instil environmental responsibility and notions of caring and empathy which foster a sense of appreciation and connection to the natural environment.

Similarly to the way environmental education is addressed in Ontario, emotional education (in the form of SEL) is promoted as developing "cross-curricular and integrated learning" skills for both primary and secondary pupils; however, the scope of SEL is limited and mostly focuses on individual mental and physical well-being and building the capacity to learn and flourish.[47] These topics are lightly addressed in Ontario school curricula under the "Health and Physical Education in Grades 1–8" and suggest a few ways to integrate SEL skills into learning across three subjects: Active Living, Movement Competence, and Healthy Living. Currently, there is not yet a resource document from the Ministry of Education to support educators in implementing SEL in their classrooms,

[47] Ontario Ministry of Education. (2019). Social-Emotional Learning (SEL) Skills. Ontario.ca; Government of Ontario. https://www.ontario.ca/document/health-and-physical-education-grades-1-8/social-emotional-learning-sel-skills, last access July 4, 2023.

though the ministry website does promote School Mental Health Ontario as a resource. As outlined, there have been steps taken by the Government of Ontario through the Ontario Ministry of Education to promote both environmental education and emotional education; however, alongside this effort, it is imperative to support educators who bring the curriculum to life each day with their students by providing tools that support the implementation of ecological and emotional education.

From an international policy perspective, the Agenda 2030 for Sustainable Development states that the SDG goals and targets are "integrated and indivisible, global in nature and universally applicable, taking into account different national realities, capacities and levels of development and respecting national policies and procedures"[48]; thus, the tools and implementation strategies to address these goals and targets should also be universal in nature and applicable across multiple contexts (in contexts such as Ontario, Canada, and beyond). Systematic changes and creating a sustainable and healthy future can be supported through the intersection of SEL and EL programmes and policies, and further research should focus on how to better integrate these practical and life skills across traditional primary and secondary education curricula as a whole. FYH, as a physical book, educational philosophy, and movement, is a tool that aims to change the status quo by integrating these two very important topics in education. With the assistance of educational models such as the FYH approach, we can begin to change the education system to support both curriculum goals and broader societal goals such as the 17 SDGs, educating from a sustainability mindset and integrating different forms of knowledge. The Follow Your Heart book, philosophy, and movement apply co-creation principles to their research and development to support the creation of educational materials applicable across multiple contexts. As previously addressed, the FYH approach integrates emotional and ecological education to support students in developing into whole persons with the capacity for sustainable action. Integrating multiple intelligences and valuing the multiple potentials of every student is also a hallmark of the FYH approach.

[48] United Nations. (2015). Transforming our world: The 2030 agenda for sustainable development United Nations. In United Nations Department of Economic and Social Affairs. United Nations. https://sdgs.un.org/sites/default/files/publications/21252030%20Agenda%20for%20Sustainable%20Development%20web.pdf, cit., last access July 4, 2023.

To build upon the evidence-based research supporting Follow Your Heart, the project team has initiated a feedback initiative with educators in Ontario, Canada, to gain perspective from inside the classroom, specifically from those responsible for implementing the curriculum outlined above. For this feedback initiative, primary school educators have been provided with a copy (physical or PDF) of *Follow Your Heart: The School for Multipotentialites* and have been asked to review the content, apply it within the classroom with students, and share their experiences and activity ideas. Educators have been asked to identify strengths or areas of growth within the book and to provide an activity they have previously used to promote ecological or emotional education in their classrooms. Seeking this feedback is another step in further developing Follow Your Heart, allowing for the opportunity to integrate information from front-line educators to inform further developments in making this tool applicable across learning contexts. Additionally, the global research team assisting in developing the Follow Your Heart Project is an integral part of developing a programme that can be adapted and made applicable across different cultural contexts. The approach to the Follow Your Heart movement embodies relational thinking, teaching with an integrated instead of siloed approach supporting the growth of a whole child and a whole heart. *Follow Your Heart: The School for Multipotentialites* stands at the intersection of addressing local-level curricular needs and Agenda 2030 goals and targets; this type of tool epitomises the adage "think global, act local" and acts as an example for future education projects that support sustainable education.

6 Conclusions and Way Forward

The systematic overview presented in this article highlights how FYH has evolved into an educational movement that promotes ecological and emotional research and education for sustainability. With the original intention of publishing the book as an open-access tool for pupils in low-resource settings with a need for more English teaching materials, the subsequent development of resources and interactive, in-person community events were not originally planned but have been strongly supported by students, researchers, and educators and are fuelling the quite novel research. As discussed, the interconnections between research and education in sustainability, emotional education, and the relevance of encouraging multipotentiality in individuals of all ages constitute the

core of *Follow Your Heart: The School for Multipotentialites* and support a type of integrated educational philosophy. In particular, this chapter establishes a theoretical framework demonstrating the inherent linkages between sustainability and emotional education, as outlined in Agenda 2030. By fostering values and behaviours aligned with our connection to nature, emotional education can empower researchers, educators, and learners to contribute to developing an educational and research framework for sustainability literacy with ecological education and emotional and multipotentiality empowerment at its core.

Building off the foundational elements of emotional education, ecological literacy, sustainability, and relational thinking, this chapter describes the co-creative process applied at all stages of FYH, involving the collaboration between authors and contributing educators, underscoring the importance of cross-disciplinary and intersectional approaches and diverse perspectives. The continuous development and application of FYH as a research and education tool through academic lectures, workshops, and outreach activities have greatly expanded its reach and impact, generating feedback which enables the refinement and adaptation of Follow Your Heart teaching philosophy and concepts. This iterative process ensures the richness and effectiveness of the research and educational resource.

Additionally, FYH promotes the adoption of multilingualism in education and research. Multilingualism serves as a pivotal element in an educational approach that embraces and nurtures multipotentiality. By embracing multiple languages, pupils are equipped with holistic learning experience, expanding their perspectives, enhancing cognitive abilities, and fostering a profound appreciation for diverse cultures.[49] Multilingualism improves accessibility and expands the educational reach of FYH, demonstrating a commitment to inclusivity. The initial idea to promote multilingualism in an educational context has developed into the translation of the book into many languages (as of today: Chinese and Farsi)[50] to reach a broader audience by providing educational resources in multiple languages and cultural contexts, enabling individuals from diverse backgrounds to benefit from the Follow Your Heart teachings. Lastly, this multistep process from book to educational movement has

[49] See Murray E. M., Russo V., & Poto, M. P. (2022) Follow Your Heart, cit., p. 53.

[50] For the version in Farsi developed by Mohammad Abniki, see https://en.uit.no/Content/816869/cache=20230507133423/Follow_your_heart.pdf, last access July 2023.

highlighted the need for integrated emotional and environmental education in primary and secondary classrooms. In particular, the work of global health practitioner Laura Vita and the ongoing feedback initiative in Ontario, Canada underlines the importance of co-creating new tools and supports for educators who have the confidence and motivation to bring important novel topics into their traditional teaching routine and curricula. Integrating emotional intelligence and well-being into educational settings aligns with the principles and concepts promoted by FYH, fostering a nurturing and connected learning environment.

In conclusion, the insights gained from the study of the preliminary results of this research present promising avenues for the progression of the FYH initiative and its overarching support for emotional and ecological education. The integration of emotional and ecological learning represents a compelling opportunity to foster more holistic and sustainable educational approaches. The following key steps have emerged as potential ways forward for the success of the FYH initiative.

Firstly, continued research and development should remain a primary focus for the FYH initiative. Collaborative efforts with educators, researchers, and sustainability experts can enrich and refine the educational resources offered by FYH. Through the creation of these resources, a robust evidence base at the intersection of emotional and ecological education will be developed, which will be essential for advocacy efforts for policies and programmes that embrace more comprehensive, sustainable learning models. Secondly, the establishment of strong partnerships with educational institutions, organisations, and communities is critical for expanding the reach and impact of FYH. Engaging in alliances with like-minded entities can garner support, facilitate knowledge sharing, and leverage additional resources to enhance the influence and dissemination of the Follow Your Heart philosophy.

Thirdly, the creation of a digital education and research network, as discussed in Sect. 4, offers an exciting opportunity to improve the accessibility and scalability of FYH. This digital platform can serve as a centralised hub for educational resources, research materials, and interactive tools, enabling individuals worldwide to access and engage with the FYH initiative. Moreover, advocating for the integration of emotional education and sustainability principles into formal education systems is vital. Engaging policymakers, educators, and relevant stakeholders will be instrumental in driving the adoption of emotional education practices and sustainability initiatives within curricula, policies, and educational

frameworks. Lastly, ongoing monitoring and assessment of the long-term outcomes and impact of the FYH initiative are imperative. Rigorous evaluations, data collection, and obtaining feedback from educators, students, and participants will provide invaluable insights into the effectiveness of the initiative, fostering continuous improvement and refinement.

By embracing and implementing these strategies, the FYH initiative can realise its vision of nurturing emotionally aware and ecologically conscious citizens. Emphasising the symbiotic relationship between emotional intelligence and environmental consciousness, the FYH initiative seeks to contribute to the advancement of a more interconnected and sustainable society. As the movement progresses, its significance will resonate not only within primary schools in Ontario but also as a potential model for fostering more holistic and responsible educational practices worldwide.

In the face of worsening climate change and its far-reaching consequences, as well as the alarming increase in mental health issues among youth, including eco-anxiety, depression, and feelings of hopelessness, there is an urgent need for comprehensive and innovative approaches to address these complex challenges. Building upon and integrating resources such as FYH can help prepare the current and future generations for overcoming challenges in both their personal and professional lives. In the twenty-first century, shifting towards sustainable practices and making eco-conscious decisions is relevant across every sector, thus it is imperative that children value emotional and ecological health to develop into whole beings who protect the planet. By implementing these ways forward, the FYH initiative can further its mission of promoting ecological and emotional research and education for sustainability, fostering values and behaviours that align with our innate connection to nature.

CHAPTER 4

Holistic Learning, Emotional Well-Being, and Sustainable Development Action in LESPLAY (Learn, Speak, and Play)

Gilbert Ajebe Akame

Abstract This chapter explores the impact of holistic learning experiences on children's academic and professional outcomes, prioritising emotional well-being and multipotentiality. Through the LESPLAY pilot programme, aligned with the Follow Your Heart (FYH) model, the study advocates for transformative education in response to global challenges. Addressing the paradox of contemporary education systems, which produce future human capital while neglecting children's rights, the FYH model catalyses transformative approaches. LESPLAY, conceived with a recognition of these limitations, addresses not only their influence on creativity, social well-being, and entrepreneurship but also the economic realities within its context. Informed by research supporting socio-emotional learning, child participation, and co-creation, the study aligns with the citizen action agenda for the Sustainable Development

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Goals (Agenda 2030). Drawing from the encounter between FYH and LESPLAY, it offers a unique perspective on projects inspiring positive change. The chapter discusses methodologies, LESPLAY's origins, its convergence with FYH, and the conceptual underpinnings of children's climate actions, emphasising participation and knowledge co-creation. The research, employing qualitative analysis and participatory action research from 2018 to 2021, highlights LESPLAY's child rights-based, holistic approach. It underscores the potential of a childist approach in climate education, empowering children as active agents in shaping sustainable solutions.

Keywords Children's rights-based approach · Climate education · Emotional intelligence · Participation · Multipotentiality

1 Introduction

This chapter contributes to the advancement of knowledge by investigating the impact of holistic learning experiences on children's academic and professional outcomes, with a specific emphasis on emotional well-being and multipotentiality. Drawing insights from the pilot programme LESPLAY,[1] which centres on children's active engagement in after-school activities, the chapter explores methodologies and approaches aligned with the Follow Your Heart (FYH)[2] model and shows how such approaches can serve as a catalyst for challenging conventional educational structures, particularly those that limit the potential for meaningful impact in the lives of young individuals. The chapter also explores how

[1] LESPLAY is the acronym for Learn, Speak, and Play, where the power of play meets the beauty of potential. See the programme website LESPLAY Project page (https://sodei.org/learn-speak-play-lesplay/), last access September 20, 2023.

[2] Follow Your Heart: the school for multipotentialites is a co-created 3-part resource targeting multipotential children, educators, and researchers. Initiated by Valentina Russo (co-author and illustrator) who had the original idea to create a learning space that fosters multiple talents, creativity, and emotional intelligence; coordinated and authored by Margherita Paola Poto (research professor and coordinator of ECO_CARE) and Emily Margaret Murray (global health researcher and team member of ECO_CARE). See Murray, E., Poto, M. P., & Russo, V. (2022). Follow Your Heart. The school for multipotentialites, La Bussola, ISBN 979-12-5474-218-1.

by aligning to child rights-based, inclusive, and knowledge co-creation approaches, LESPLAY empowers children to contribute to sustainability initiatives.

The paradox of contemporary education systems, simultaneously producing future human capital while neglecting the rights of children,[3] forms a backdrop for this exploration. Amidst global concerns regarding education access and deficiencies in equipping children for success, this research supports calls for transformative approaches that challenge conventional educational structures.[4] The FYH model serves as a catalyst, challenging heavily structured and linear approaches that limit the potential of meaningful impact of young individuals.[5] LESPLAY, conceived with a recognition of these limitations, addresses not only their influence on creativity, social well-being, and entrepreneurship[6] but also the economic realities within its context.

Evidence from research has shown the benefits of nurturing children's social and emotional learning and indicates a growing shift towards more humanistic, holistic, and socio-emotional approaches to learning.[7] Informal learning environments, especially those incorporating play and enjoyable activities, have been seen to be instrumental in children's holistic development.[8] The chapter aligns with the citizen action agenda for advancing the Sustainable Development Goals (Agenda 2030), emphasising multipronged and inclusive approaches to unravel sustainable

[3] Biswas, T. (2023).

[4] 'Education is a human right,' UN Summit Adviser says, urging action to tackle 'crisis of access, learning and relevance'—United Nations Sustainable Development, https://www.un.org/sustainabledevelopment/blog/2022/09/education-is-a-human-right-un-summit-advisor-says-urging-action-to-tackle-crisis-of-access-learning-and-relevance/, last access September 26, 2023.

[5] Murray, E., Poto, M. P., & Russo, V. (2022). Follow Your Heart. The school for multipotentialites, La Bussola, ISBN 979-12-5474-218-1.

[6] Ibid. (see footnote 4).

[7] Cefai, C., & Cooper, P. (2009). *Promoting emotional education: Engaging children and young people with social, emotional and behavioral difficulties*. J. Kingsley Publishers.

[8] Lester, S., & Russell, W. (2010). *Children's right to play: An examination of the importance of play in the lives of children worldwide*. The Hague, Netherlands: Bernard van Leer Foundation; Bourdillon, M. (2011). A challenge for globalized thinking: How does children's work relate to their development? *South African Review of Sociology, 42*(1), 97–115.

solutions for the complex environmental and social challenges faced by young people daily.[9]

Inspired by the encounter between FYH and LESPLAY, two projects applying different yet similar methods with the common goal of inspiring young people to effect positive change, this chapter presents a unique perspective. The author's encounter with FYH during an interdisciplinary workshop on Ocean Interconnectedness underscored the interconnectedness of global challenges. The character Cora's journey in FYH[10] resonated with the engagement of LESPLAY participants in promoting environmental sustainability in Cameroon.

After setting the stage in this section, the chapter proceeds to a discussion on the research methods and sources employed. The subsequent focus on LESPLAY's origins, philosophy, and methodological approaches provides readers with a clear understanding of the programme's conceptual foundations. The narrative then proceeds towards the convergence of LESPLAY and FYH, delving into the significance of social and emotional learning (SEL) and multipotentialities within the context of LESPLAY. The exploration of conceptual underpinnings related to young people's climate and sustainability actions, emphasising participation, co-creation, and childist approaches, enriches the discourse. The chapter concludes by highlighting results stemming from LESPLAY's inclusive and co-created actions, emphasising the collective and multipotential voices of children as crucial in advocacy for sustainability causes.

[9] Transforming our world: The 2030 Agenda for Sustainable Development, Department of Economic and Social Affairs (https://sdgs.un.org/2030agenda), last access September 26, 2023.

[10] Cora is an illustrated character in FYH book. Her character sets the stage in the 3-parts resource where her worries about growing up and societal influence, subsequent discovery of what it means to be a 'multipotentialite' and eventual connection with nature are perfectly illustrated to open the discussions on the FYH methodological approaches and teaching philosophy. See Murray, E. M., & Poto, M. P. (2023). Co-creation of educational spaces and curricula to develop an ecology of participation: An example from Follow Your Heart in Lohse, E. J., Poto, M. P., Coproduction of knowledge in Climate Governance, Berliner Wissenschafts-Verlag, 2022, ISBN 978-3-8305-5538-4.

2 Methods

This chapter employs a qualitative analysis based on participatory action research[11] for which the author carried out at various intervals from 2018 to 2021.[12] Upon developing the LESPLAY concept whose aim was to provide an alternative learning platform for children to explore multipotentialities, develop skills and talents, and during this period, the author immersed himself into the afterschool activities organised by SODEI in the Southwest region of Cameroon, gaining first-hand insights into how participants fostered emotional well-being and multipotentiality.[13] He also engaged with participants in activities and observed their active participation in creative learning through peer-to-peer, mentoring, arts and presentations of various kinds. Programme reports for LESPLAY were also analysed for insights on reflections from participant and facilitators. A close review of the FYH book was conducted to gain a deep insight into the methodologies and approaches referenced in this chapter.

The activities that resulted to this paper were conducted with due regard to applicable ethical considerations. Research and related activities with children within the context of armed conflict presupposes specific considerations.[14] The confidentiality and anonymity of all participants was assured and informed consent obtained for all tools applied. Relevant information such as age and gender were collected during this process but only nicknames for the participants are used in this paper.[15] The United Nations Convention on the Rights of the Child (CRC) Article 36 is to the effect that children must not be harmed or exploited through taking part in research or related activities. SODEI, the organisation under which the

[11] Participatory Action Research (PAR) is concerned with an agenda for social change that involves pooling knowledge to define or resolve a problem (Cathy McDonald, 2012). PAR is viewed as "systematic and orientated around analysis of data whose answers require the gathering and analysis of data and the generation of interpretations directly tested in the field of action" (Greenwood & Levin, 1998, p. 122).

[12] See LESPLAY pilot report, https://sodei.org/wp-content/uploads/2021/04/LESPLAY.pdf, last access October 11, 2023.

[13] See LESPLAY pilot report (see footnote 12).

[14] Ennew, J., with Abebe, T., Bangyani, R., Karapituck, P., Kjørholt, A. T., & Noonsup, T. (2009) *The right to be properly researched. How to do rights-based scientific research with children*. Black on White Publications, Knowing Children.

[15] Driskell, D. (2002) *Creating better cities with children and youth: A manual for participation*. UNESCO and Earthscan Publications Ltd.

PA research was conducted has in place safeguarding policy and guidelines to which all LESPLAY facilitators adhere.[16]

3 Unveiling LESPLAY

The concept of LESPLAY was born during a field trip to Cameroon in late 2018 when the author was researching about young peoples' participation in decision-making within family and school systems. The research was conducted with children in the English-speaking regions of Cameroon who have been experiencing disruptions in normal functioning of school due to the so-called "Anglophone crisis" which broke out in late 2016.[17] The young participants involved in the research, whose education was disrupted by conflict, all expressed their desire to be in school, to learn and play with their peers. Based on their feedback and subsequent meetings with some of the children involved in the research, the concept of LESPLAY was born. The aim was to provide a platform to empower children and young people by advancing social and emotional learning and recognising and nurturing their innate skills and multipotentials. LESPLAY is more than just a project; it's a holistic learning experience that celebrates individuality, creativity, and personal growth through interactive and enjoyable activities.

The outbreak of violence in the English-speaking regions of Cameroon in September 2016 forced thousands of children of school going age out of school. About 100 schools were destroyed, 90% of primary and 77% secondary schools closed down impacting about 900,000 children during

[16] Safeguarding Policy and Guidelines (As amended 2021) Solidarity and Development Initiative (SODEI), https://sodei.org/safeguarding-policy/, last access October 11, 2023.

[17] The so-called Anglophone has a long historical origin rooted in Cameroon's colonial history and heritage. The recent conflict started with a 'sit-in strike' initiated by lawyers on the 11 of October 2016 and later joined by teachers a month later. The action was aimed at protesting against perceived assimilation of the Anglophone education and legal traditions inherited from the British. Wider protests soon broke across the entire region against alleged systemic marginalisation of the English-speaking minority and has since morphed into a complex socio-political conflict. School boycotts has remained one of the main weapons used by the separatist groups to mount pressure on the government and call for international attention. See Human Rights Watch Report (December 15, 2021). Retrieved from Cameroon: Armed Separatists' Attack on Education, Human Rights Watch (https://www.hrw.org/news/2021/12/15/cameroon-armed-separatists-attack-education), last access November 26, 2023.

the peak of the crisis in 2019.[18] The crisis resulted in decreased enrolment and an increase in the number of out-of-school children, and consequently jeopardising the economic and social development. The effects of the crisis only exacerbated the already existing problems of poor classroom conditions, inadequate student to teacher ratio, limited student follow-up, inadequate learning materials, stress-filled learning environments affecting children's learning.[19] LESPLAY emerged as a citizen action to contribute to overcoming these barriers to access to quality education and opportunities for young people, grounded on a child rights-based, holistic approach.

3.1 LESPLAY: A Child Rights-Based Approach

LESPLAY like FYH addresses the deficiencies of contemporary education systems by providing an opportunity for SEL and exploration of the multipotentials, to better prepare children and young people for contemporary global challenges. It was originally aimed at children experiencing disruptions in normal functioning of schools due to conflict, providing an alternative platform to engage them in creative informal learning and a safe space for peer interaction and play. A child rights-based approach was applied as a foundation based on the CRC framework of norms, and as an inclusive and participatory process with an outcome to empower young people, provide the opportunity to explore and achieve their full potentials.

Civil society has and continues to play a key role in promoting the CRC and its application in a range of different contexts.[20] The application of

[18] UNICEF. (2019, November 5). More than 855,000 children remain out of school in North-West and South-West Cameroon [Press release]. Retrieved from https://www.unicef.org/press-releases/more-855000-children-remain-out-school-north-west-and-south-west-cameroon, last access October 26, 2023.

[19] Akame, G. A., Crockett, J., & Anoma, R. A. B. (2021). Baseline research: Education in crisis in the Anglophone regions of Cameroon. Solidarity and Development Initiative (SODEI). https://www.researchgate.net/profile/Gilbert-Akame/publication/349297440_Baseline_Research_Education_in_Crisis_in_the_Anglophone_Regions_of_Cameroon_Prepared_by/links/60290253299bf1cc26c42baa/Baseline-Research-Education-in-Crisis-in-the-Anglophone-Regions-of-Cameroon-Prepared-by.pdf, last access October 26, 2023.

[20] Alston, P. & Tobin, J. D. M. (2005). Laying the Foundations for Children's Rights, *Innocenti Insights*, UNICEF. ISBN: 88-89129-19-0. https://digitallibrary.un.org/record/556558?ln=en.

a child rights-based approach to LESPLAY requires a consideration of relevant children's rights under the CRC, with the aim of ensuring their rights wherever applicable and doing no harm. Hence, LESPLAY was modelled according to three important rights from the CRC: the right to education, the right to play, and the right to have a voice.[21] LESPLAY was also a citizen action towards advancing the SDGs, with a specific focus on SDG 4.

Grounded on the desire to advance children's right to access to quality education, reference is made to CRC Article 28 which recognises the right of every child to education and Article 29 which provides for purposes of education. These purposes include among others: the development of the child's personality, talents, and mental abilities. According to Article 29, the goal of education is to "empower the child by developing his or her skills, learning and other capacities, human dignity, self-esteem and self-confidence".[22]

The right to meaningful participation is also a vital element for children's learning and development.[23] LESPLAY emerged in a context whereby children had no say in the school boycott decisions that impacted them.[24] This is despite having during my research encounter in 2018, expressed their desire to be in school and play with friends if given the opportunity.[25] Hence, it was imperative to consider children's right to participation in designing the programme. The CRC Article 12 provides for the right of the child who can form views to freely express those views

[21] UN General Assembly, *Convention on the Rights of the Child*, 20 November 1989, United Nations, Treaty Series, vol. 1577, p. 3.

[22] See CRC Article 29.

[23] Akame, G. A. (2019). Young peoples' participation in educational decision making: The case of social unrest and school boycotts in the English-speaking regions of Cameroon. Norwegian Centre for Child Research.

[24] *The Guardian*. (2021). 'They punished me for having books': Schools in Cameroon terrorised by armed groups, Global development, https://www.theguardian.com/global-development/2021/dec/16/they-punished-me-for-having-books-schools-in-cameroon-terrorised-by-armed-groups, last access October 30, 2023. *See also* International Crisis Group Report. (2022). Cameroon's Anglophone conflict: Children should be able to return to school, Crisis Group, https://www.crisisgroup.org/africa/central-africa/cameroon/cameroons-anglophone-conflict-children-should-be-able-return-school#:~:text=Pressure%20from%20Anglophone%20civil%20society,are%20often%20damaged%20or%20overcrowded, last access October 30, 2023.

[25] Akame, G. A. (see footnote 19).

in all matters affecting him or her and for those views to be given due weight in accordance with the age and maturity of the child. Article 12 forms one of the general principles for the interpretation and realisation of all CRC rights.[26]

LESPLAY is grounded on the understanding of the importance of leisure and play in children's learning and development.[27] Article 31 of the CRC sets out children's right to rest, leisure and play, cultural life, and the arts (the "Article 31 rights"),[28] widely acknowledged as central to children's health, development, and happiness.[29] CRC General Comment No. 17 emphasises the holistic understanding of Article 31 stating that: "Each element of Article 31 is mutually linked and reinforcing, and when realised, serves to enrich the lives of children".[30]

There is a clear interrelationship between the right to play, to education, and to participation. Play is essential for children's learning and development. Meanwhile, children's ability to form views in line with Article 12 is predicated on their development of such capacities. The UNCRC recognises this interdependence as well the equal importance of the Convention rights including the rights to play, education, and participation.[31] While these are all separate rights enacted under the Convention, the United Nations Committee on the Rights of the Child has, for example, grouped the right to education with the right to play within the State Party reporting procedures.

[26] UN Committee on the Rights of the Child (CRC), *General comment No. 12 (2009): The right of the child to be heard*, 20 July 2009, CRC/C/GC/12.

[27] Bourdillon, M. (2011). A challenge for globalized thinking: How does children's work relate to their development? *South African Review of Sociology, 42*(1), 97–115.

[28] Art. 31 CRC.

[29] CRC General Comment No. 17.

[30] Ibid. (see footnote 29).

[31] The Committee has underlined the importance of the interdependence and interrelatedness of children rights, like other human rights in multiple general comments and concluding observations. See for example the concluding observations on the combined fifth and sixth periodic reports of Norway (July, 2018).

3.2 *Cultivating Emotional Intelligence and Multipotentialities in LESPLAY*

Young people need to cultivate social and emotional intelligence and the multiple inner talents to complement their education.[32] Salovey and Mayer define emotional intelligence as "*a set of skills associated with monitoring one's own and others' emotions, and the ability to use emotions to guide one's thinking and actions*".[33] Emotions have an impact on attention, memory, our ability to build relationships with others, and our mental and physical health.[34] Emotional intelligence is a vital component of children's development as it influences their social and emotional well-being, academic success, and overall life satisfaction. Parents, caregivers, and educators can play a significant role in nurturing and promoting emotional intelligence in children through open communication, and providing opportunities for emotional growth and self-awareness.[35]

In Chapter 3, E. M. Murray, M., P. Poto, & L. Vita, on expanding the methodological steps involved in the co-creation process of FYH, define SEL as "*the process through which individuals develop essential skills, attitudes, and behaviours that enable them to understand and manage emotions, establish positive relationships, make responsible decisions, and effectively navigate social interactions*".[36] Growing research and development initiatives have established the impact of SEL on children's learning outcomes, including in developing social competences and overall wellness.[37] Ahmed et al., in a quasi-experimental pre-test/post-test design conducted with 270 secondary school students divided into an experimental and control group, found that the group taught through SEL

[32] Murray, E., Poto, M. P., & Russo, V. (see footnote 5).

[33] Salovey, P., & Mayer, J. D. (1990). Emotional intelligence. *Imagination, Cognition and Personality, 9*(3), 185–211. https://doi.org/10.2190/DUGG-P24E-52WK-6CDG.

[34] Ibid. (see footnote 33).

[35] Tominey, S. L., O'Bryon, E. C., Rivers, S. E., & Shapses, S. (2017). Teaching emotional intelligence in early childhood. *YC Young Children, 72*(1), 6–14.

[36] E. Murray, M., P. Poto, & Vita, L., Chapter 3, in this volume.

[37] Hromek, R., & Roffey, S. (2009). Promoting social and emotional learning with games. *Simulation & Gaming, 40*(5), 626–644. https://doi.org/10.1177/1046878109333793.

demonstrated significant social and emotional competence over the one taught using the traditional teaching approach.[38]

Despite not expressly articulating SEL in its programming, LESPLAY encompasses all the attributes of SEL. LESPLAY was established based on the need to show compassion and love for children experiencing fear and instability as a result of war and widespread violence. It provided an alternative for them to experience and share compassion for one another, express their feelings, and create healthy relationships in a safe environment. The emphasis on storytelling, self-expression, role-playing, and interactive games provides an opportunity for children taking part in LESPLAY to not only express their emotions but also develop a deeper understanding of their own and others' feelings. Through these activities, participants undergo a transformative journey, transitioning from initial states of shyness, lack of confidence, and sometimes fear to actively engaging and contributing to individual and group endeavours.[39]

LESPLAY, like FYH, embraces multipotentiality as a driver of innovation and ideas. Multipotentiality as defined by Barbara Kerr is "the ability to select and develop any number of career options because of a variety of interests, aptitudes, and abilities".[40] Meanwhile children's lives unfold within cultures that encourage pursuing a single passion and interest at the expense of multipotentiality. The question "*what do you want to be when you grow up?*", as analysed and illustrated in FYH, often becomes internalised and contributes to defining children's future decisions.[41] Multipotential children possess a diverse range of skills and talents and are often attracted to multiple disciplines, hence the limitations such a question could pose. At LESPLAY, creativity, play, and arts-based learning unite to empower children and young people to reach their full potential. The programme strategically incorporates arts-based approaches, such as drawing, sketching, and storytelling, fostering creativity and allowing children to explore and showcase their multipotentials. LESPLAY adheres to the belief that diversifying after-school activities including subjects such as

[38] Ahmed, I., Hamzah, A. B., & Abdullah, M. N. L. Y. B. (2020). Effect of social and emotional learning approach on students' social-emotional competence. *International Journal of Instruction, 13*(4), 663–676. https://doi.org/10.29333/iji.2020.13441a.

[39] See LESPLAY pilot report (see footnote 12).

[40] Kerr, B. A., & Gahm, J. (2018). Developing talents in girls and young women. In *APA handbook of giftedness and talent* (pp. 399–415). American Psychological Association.

[41] Ibid. (see footnote 36).

math and IT support, reading, journaling; combined with sewing, baking and complemented with arts, play, and other leisure activities, would add value to children's learning experience and increase their chances of success.[42] The blend of emotional intelligence activities and the encouragement of multipotentialities in LESPLAY not only contributes to the participants' personal growth but also aligns with the overarching goal of providing a holistic learning experience that celebrates individuality and diverse talents.

4 Participation and Co-creation Approaches

4.1 Child Participation and Related Challenges

LESPLAY pays special attention to child participation and inclusiveness in the expression and enhancement of potentials for children in line with the child rights-based approach. This serves not only as principle but also instrumental in observing the immediate impact on the community and for sustainable development, acknowledging that children have been historically relegated to a position of powerlessness, being isolated and their voices left unheard.[43] Also noting the paradigm shift in research and development practice involving children today, whereby they are predominantly viewed as social agents capable of taking active part and contributing to societies in which they live.[44] Conceptualised as a continuum, children's participation can vary from no or little participation to higher levels where they initiate and share decisions with adults.[45] Concerning decision-making, many have the perception that children's

[42] Meece, J. L. and Eccles, J. S. (2010). After-school program participation and children's development. In *Handbook of research on schools, schooling and human development* (pp. 397–415). Routledge. https://doi.org/10.4324/9780203874844-37.

[43] Liebel, M., & Saadi, I. (2012). Cultural variations in constructions of children's participation. In M. Liebel (Ed.), *Children's rights from below* (pp. 162–182). London: Palgrave Macmillan.

[44] James, A., & Prout, A. (2015). *Constructing and reconstructing childhood: Contemporary issues in the sociological study of childhood*. London: Routledge.

[45] Hart, R. (1992). *Children's participation: From tokenism to citizenship*. UNICEF; Shier, H. (2001). Pathways to participation: Openings, opportunities and obligations. *Children & Society, 15*(2), 107–117.

participation can be tokenistic.[46] Children are often seen at local and international stages making speeches, in Children's Parliaments, yet many question the impact of such involvement.[47] Demonstrating the paradox of questioning children's capacity to participate in political life, Clodagh Harris shows examples of institutions and processes in which children actively engage.[48] Yet, they note that despite such active engagement, the impact of Youth Parliaments on policy transformation which are "ubiquitous" across the EU remains limited. Many researchers contend that for children's participation to be considered effective, children must be seen as full members of the society capable of being consulted and given consideration in matters concerning them.[49]

The situation becomes more concerning when considering the gaps in child participation between global north and global south contexts. Some countries, especially in the global north, are taking steps to directly include children and young people in deliberations leading to decisions on tackling climate change. In Europe, countries such as France, Ireland, Scotland, and the UK have established citizens assemblies where citizens including children are called upon to deliberate on climate emergency challenges directly with experts and stakeholders.[50] Despite the observed absence of children's voices in these assemblies such as in the case of Ireland, mostly due to certain practical arrangements,[51] it can be argued that it is a step in the right direction. Meanwhile, children in some African countries are still confronted with cultures, traditions, and systems

[46] Sinclair, R. (2004). Participation in practice: Making it meaningful, effective and sustainable. *Children and Society, 18*, 106–118.

[47] Crowley, A. (2014). Evaluating the impact of children's participation in public decision-making. In J. Westwood, C. Larkins, D. Moxon, Y. Perry, & N. Thomas (Eds.), *Participation, citizenship and intergenerational relations in children and young people's lives: Children and adults in conversation*. London: Palgrave Pivot.

[48] Harris, C. (2021). Looking to the future? Including children, young people and future generations in deliberations on climate action: Ireland's Citizens' Assembly 2016–2018. *Innovation*, *34*(5), 677–693 (Abingdon, England).

[49] Montgomery, M., & Burr, R. (2003). Learning outcomes. *Changing Childhoods: Local and Global, 1*(89), 45.

[50] Ibid. (see footnote 47).

[51] Ibid. (see footnote 47).

that inhibit their participation.[52] In her research searching for common grounds among local communities in Ghana found that in some communities, Twun-Danso Imoh argues that more emphasis is placed on the duty to and responsibility of children to be obedient, humble and respect adults, and not expected to challenge them.[53] These values are reflected in Article 31 of the 1990 African Charter on the Rights and Welfare of the Child which imparts duties and responsibilities on children.[54] To children in Twum-Danso's community, what constitutes "rights" includes their duty to respect and obey and to contribute to the maintenance of the household. Most of the adults involved in her research did not see the right to participate in decision-making as a right. However, factors such as respect could earn children the right to participate in family decision-making.[55]

With the *status quo*, it therefore becomes obvious that young people in Africa and other parts of the world are forced to improvise new ways to clamour for change and make an impact. Being deeply concerned about the current state of poverty, violence, and climate change, and losing trust in adults and world leaders to make good decisions for them, they seek to be part decisions influencing their destinies.[56] Many youth initiatives fostering the SDGs have emerged since the dawn of the Agenda 2030. The SDG flagship symbol has taken over activism and can be seen displayed in schools and events promoting the SDGs. Campaigns, such as the SDG Action Campaign in Sri Lanka, mobilise young people to advocate for and work towards SDGs.[57] Furthermore, young people seem to be taken to leadership in climate action and have been seen

[52] Imoh, A. T.-D. (2011). Searching for a middle ground in children's rights in Ghana. *Journal of Human Rights, 10*(3), 376–392. https://doi.org/10.1080/14754835.2011.596067; Okewumi, E. O., & Akanle, O. (2022). Children's Participation in decision making within the family context of Yoruba culture. *Child Indicators Research, 15*(1), 235–247. https://doi.org/10.1007/s12187-021-09866-5.

[53] Ibid. (see footnote 52).

[54] Organization of African Unity (OAU), *African Charter on the Rights and Welfare of the Child*, 11 July 1990, CAB/LEG/24.9/49 (1990).

[55] Imoh, A. T.-D. (see footnote 52).

[56] UN Encourages Children to Take Over, Nathalie Risse, SDG Knowledge Hub, https://sdg.iisd.org/commentary/generation-2030/un-encourages-children-to-take-over/, last access November 9, 2023.

[57] https://sdg.iisd.org/commentary/generation-2030/youth-initiatives-foster-sdg-implementation-peace-and-security/, last access November 9, 2023.

championing worldwide climate change strikes.[58] Young climate activists like Greta Thunberg, founder of Fridays for Future Youths Climate Strike Movement[59] and Xiuhtezcatl Martinez, Earths Guardians Youth Director,[60] have taken the lead in championing the cause for a sustainable environment.

Greta Thunberg has particularly taken youth activism to elevated heights and has become an inspiration to young people around the world. Her support of climate youth battles became evident when she put schooling on a halt to protest outside the Swedish parliament at the failure of the government to act on climate change,[61] her recent outings when she joined the Sámi youth in Norway protesting the non-implementation of Norway's Supreme court judgement in the Fosen case.[62] Her climate strike movement coordinated massive protests of young people and adults in 150 countries on 20 September 2019.[63] She has since challenged adult's leadership and inspired young people's climate leadership potentials in her famous speeches in various international climate gatherings and events:

[58] Vox Media (September, 2019), *What the youth climate strike looks like around the world*, https://www.vox.com/energy-and-environment/2019/9/20/20875523/youth-climate-strike-fridays-future-photos-global, last access November 9, 2023.

[59] About FridaysforFuture, https://www.fridaysforfuture.org/about, last access November 11, 2023.

[60] Earth Guardians Xiuhtezcatl Martinez, https://www.earthguardians.org/xiuhtezcatl, last access November 11, 2023.

[61] Lehmann, J. (2019). Climate change action—It's a welfare responsibly too. *Children Australia, 44*(3), 99–102. https://doi.org/10.1017/cha.2019.36.

[62] The case where Norway's Supreme court ruled that the erection of wind turbines at Storheia and Roan in the Fosen region of central Norway, considered Europe's largest onshore wind farm, was invalid as it interfered with Sami herders' cultural rights under international conventions. See also Artic Today (February 27, 2023) Thunberg, Indigenous protesters block Norway energy ministry over wind farms, Thunberg, Indigenous protesters block Norway energy ministry over wind farms—ArcticToday, https://www.arctictoday.com/thunberg-indigenous-protesters-block-norway-energy-ministry-over-wind-farms/, last access November 15, 2023.

[63] Vox Media (September, 2019), *Greta Thunberg is leading kids and adults from 150 countries in a massive Friday climate strike*, https://www.vox.com/2019/9/17/20864740/greta-thunberg-youth-climate-strike-fridays-future, last access November 15, 2023.

> I've learned that you are never too small to make a difference and if a few children can get headlines all over the world just by not going to school then imagine what we could all do together if we really wanted to.
>
> We have come here to let them know that change is coming whether they like it or not. The people will rise to the challenge. And since our leaders are behaving like children, we will have to take the responsibility they should have taken long ago.[64]

Research shows that children and young people's climate activism may not only serve to counter the negative sense of hopelessness in them regarding climate change, but also influence the attitudes and behaviours of others, thus expanding their real-world impact.[65]

4.2 Towards a Childist Approach to Climate Education and Awareness

In his work "Ethics in the Light of Childhood", Wall advocates for a profound re-evaluation of societal norms in response to the experiences of children.[66] He introduces the concept of "childism" as the moral agency inherent in children that adults should aspire to emulate. Wall perceives the contemporary wave of children's agency and voice in childhood studies as a "second wave" of childism, criticising the failure to insist on a child-inclusive view of human beings for all.[67] This paradigm suggests an equalisation of rights and roles between children and adults, challenging the historically hierarchical structures in education and positioning children as active agents in shaping their worldview.

Within the realm of climate education, a childist approach is advocated, recognising children as pivotal stakeholders with unique perspectives, insights, and the potential to instigate change.[68] The childist lens

[64] FridaysforFuture, *Greta Thunberg speech to UN secretary general António Guterres in Katowice: "Our leaders behave like children"*—December 3 2018, https://www.fridaysforfuture.org/gretaspeeches#greta_speech_dec3_2018, last access November 16, 2023.

[65] Trott, C. D. (2021). Youth-led climate change action: Multi-level effects on children, families, and communities. *Sustainability, 13*(22), 12355 (Basel, Switzerland).

[66] Wall, J. (2010). *Ethics in light of childhood* (1st ed.). Georgetown University Press.

[67] Ibid. (see footnote 66).

[68] Sporre, Karin. (2021). Young people—Citizens in times of climate change? A childist approach to human responsibility. *HTS Theological Studies, 77*(3), 1–8.

promotes a departure from didactic models, urging the adoption of participatory methodologies that empower children to contribute meaningfully to climate awareness. Children, with their innate curiosity and openness, are seen as valuable contributors offering a fresh and unfiltered viewpoint to intricate issues like climate change. When their agency is harnessed, it becomes a potent force for positive change.

The 2018 Fridays for Future school strikes exemplify the assertion of young "citizens" assuming socio-political responsibility, recognising the interdependence of their destinies with their capacity to exercise human agency when politicians fall short.[69] These strikes have sparked a crucial debate about positioning children on an equal footing with adults in the realm of democratic representation. To enable children to act as political agents and ensure their democratic representation based on their unique concerns, it is argued that new thought structures are imperative.[70]

Children, facing diverse circumstances, have raised their voices against injustice, human rights violations, and marginalisation. Instances like the open letter from children advocating for safe schools in the Sahel[71] and protests against abuses in the separatist conflict in Cameroon[72] exemplify children's resilience in challenging adversity. Moreover, children have questioned the purpose of attending school in the face of a jeopardised future. When Greta Thunberg launched the climate movement that spiralled to over 1,500 cities, it questioned the very foundation of the global education agenda that confines children to school, especially in the context of worsening climate conditions. Fridays for Futures made the point on their website stating that: "*School children are required to attend school but, with the worsening Climate Destruction, this goal of going to school begins to be pointless. Why study for a future, which may not be there?*

[69] Ibid (see footnote 68).

[70] Wall, J. (2011). Can democracy represent children? Towards a politics of difference. *Childhood, 19*(1), 86–100. https://doi.org/10.1177/0907568211406756.

[71] See Plan International (October, 2021) Open Letter from Children: We need safe schools in the Sahel Now!, Plan International Cameroon (https://plan-international.org/cameroon/blog/2021/10/25/open-letter-children-safe-schools-sahel/), last access November 30, 2023.

[72] See Kindzeka, M. E. (2022). Cameroonian children protest abuses in separatist conflict, https://www.voanews.com/a/cameroonian-children-protest-abuses-in-separatist-conflict-/6606832.html#:~:text=Several%20hundred%20children%20marched%20through,children%20stemming%20from%20the%20fighting, last access November 30, 2023.

Why spend a lot of effort to become educated, when our governments are not listening to the educated?".[73]

As children increasingly assume shared human responsibility, particularly in addressing climate change, there is a growing necessity for their concerns to be acknowledged and for them to be granted an equal opportunity at the decision-making table.

4.3 Knowledge Co-creation for Climate Education

Knowledge co-creation as a facet of methodology for educational programmes and research with children and other disadvantaged groups has been deemed ground-breaking for its focus on collaboration, participation, and respect for all involved.[74] In their approach to co-creation in educational spaces, Murray and Poto refer to Alfred North Whitehead's approach which focuses on reconceptualising the relationship between subjects and objects in learning exchanges, promoting reciprocal relations and interconnectedness. The focus is on nurturing relationships between humans and nature within educational spaces.[75] Their approach challenges traditional classroom dynamics and emphasises inclusive spaces. They argue that this inclusive space not only situates learners and teachers within a broader social context but also provides a sense of belonging.[76] The co-creation of knowledge approach in researching with children changes research focus from "…*one that is inherently informed by traditional modes of scientific research to one that is informed by a collective and collaborative approach*".[77] Drawing parallels with community-based participatory research (CBPR), Murray and Poto contend that participatory learning offers autonomy, empowerment, and ownership, fostering a greater sense of accountability among students. This approach, rooted

[73] From https://fridaysforfuture.org/, last access November 16, 2023.

[74] Murray, E. M., & Poto, M. P. (2023) Co-creation of educational spaces and curricula to develop an ecology of participation: an example from Follow Your Heart in Lohse, E. J., Poto, M. P., Coproduction of knowledge in Climate Governance, Berliner Wissenschafts-Verlag, 2022, ISBN 978-3-8305-5538-4.

[75] Ibid. (see footnote 74).

[76] Ibid. (see footnote 74).

[77] Ibid. (see footnote 74).

in inquiry through open dialogue and active listening, promotes critical, creative, and caring thinking.[78]

Knowledge co-creation has emerged as a transformative approach suitable for tackling the complexities and uncertainties relating to climate questions as it advances equity for all parties involved.[79] Initiatives such as the United Nations Decade of Ocean Science for Sustainable Development (The Ocean Decade) through its Ocean Decade Action Framework, advances inclusiveness and representativeness in its approach to oceans science.[80] In responding to calls for inclusiveness and equity in scientific knowledge production and sharing, real-world laboratories, such as LivingLabs,[81] have been conceived.[82] These are well structured and robust approaches to attend to complex societal challenges, providing highly participatory and experimental methods for real-world interventions. In conceiving the real-world laboratories approach, Franke et al. highlight the importance of greater openness in participation, and the need to listen to opinions, knowledge, and ideas that may not always align to dominant views and desires.[83]

Drawing from Franke et al.'s insights, it is important to highlight the transformative yet challenging nature of such initiatives. Real-world laboratories encompass co-design, co-production, and co-evaluation phases, demanding scalability, transferability of results, and inclusivity. This aligns in part with the overarching aim of this chapter, emphasising the importance of considering diverse perspectives, particularly those of young people, in collaborative projects related to climate education. The LESPLAY initiative is a pertinent example within the discourse of knowledge co-creation. The programme, designed to address a learning gap identified through consultation with the children it serves, prioritises their perspectives on climate change and environmental protection.

[78] Ibid. (see footnote 74).

[79] Ibid. (see footnote 74).

[80] Franke et al. (2022). Making the UN ocean decade work? The potential for, and challenges of, transdisciplinary research and real-world laboratories for building towards ocean solutions. *People and Nature*. https://doi.org/10.31219/osf.io/6sfe8.

[81] Leal Filho, W., Ozuyar, P. G., Dinis, M. A. P., et al. (2023). Living labs in the context of the UN sustainable development goals: State of the art. *Sustainability Science, 18*, 1163–1179.

[82] Ibid. (see footnote 80).

[83] Ibid. (see footnote 80).

LESPLAY exemplifies a co-creative learning approach centred on listening and understanding the unique viewpoints of participants. By incorporating children's worldviews into the production of knowledge, LESPLAY (like FYH) is an educational model for fostering collaboration and co-production that aligns with the principles of inclusivity and equity in climate education.

5 Combining Knowledge Co-creation and Participation for Sustainable Development Action: Results from LESPLAY

From its inception, LESPLAY has prioritised the active participation of children for which the programme was destined. A student-centred approach whereby beneficiaries of LESPLAY are themselves involved in the planning, choice of topics and lead discussions during sessions. LESPLAY is "a project for children by children". The idea of LESPLAY came about during the authors research with children in Cameroon and specifically, during his stay and engagement with children in two schools whose education was heavily disrupted by conflict. Children who participated in his research all expressed their desire to be in school, to learn and play with their peers[84]; some of them in the process of creating LESPLAY.

LESPLAY has also prioritised children's perspectives and worldviews in the production of knowledge. Our learning approach has focused predominantly on listening and carefully understanding their perspectives on various subjects impacting their lives, including climate change, environmental protection, child rights, etc. Knowledge generated from the activities have been published in our reports of activities.[85] Using arts, storytelling, and role-play, LESPLAY participants communicate their knowledge and understanding of issues affecting them. Sometimes, their perceptions of things are not in line with the predominant adult views. For example, during sessions on children's rights, participants stated their understanding of rights that included those not covered by the CRC. When asked what they understand by children's rights, some responded: "the right to cross the road", "the right to sleep", "the right to eat", and so on. When asked about their right to participation in family settings,

[84] Akame, G. A. (see footnote 19).

[85] See LESPLAY Pilot Report (see footnote 12).

some stated that their understanding of participation was limited to helping their parents with house chores and not in decision-making. In this regard, Hanson and Nieuwenhuys[86] remark about children's "living" rights in that children make their own meanings of rights which is often different from those enacted for them or imposed by other people's interpretations. Hence why it is crucial to take children's perspectives into consideration in knowledge construction processes affecting their lives.

As an integral part of our research project, the LESPLAY workshops played a pivotal role in fostering holistic learning, emotional well-being, and sustainability action among participants aged 10 to 18. Organised weekly on Saturdays and led by dedicated programme volunteers, these sessions delved into themes suggested by SODEI volunteers, carefully selected to address critical issues affecting the community.

Themes such as environmental preservation, gender equality, gender-based violence, body image, bullying in schools, violence against women and children's rights were at the forefront. Each theme unfolded across two sessions, with the initial phase involving dynamic discussions between participants and facilitators. The subsequent session witnessed participants expressing their understanding and ideas through various art forms, providing a unique and engaging medium for their voices to be heard.

The focus on environmental preservation spanned five sessions, addressing topics ranging from an introduction to the environment to the significance of plant and animal life, the impacts of human interference, and methods of protection, preservation, and conservation. Participants gained insights into the protection of fauna and flora, alongside the importance of recycling.

In collaboration with CAMHELP, empowerment seminars expanded the scope of learning beyond LESPLAY's regular themes. Workshops on "ankara" designs, bead making, and cookery empowered participants with practical skills. The positive feedback received from participants highlighted their deepened understanding of the subject matter, the acquisition of new knowledge, and the significant impact of these sessions on their personal development.

[86] Hanson, K. & Nieuwenhuys, O. (2013). Introduction: Living rights, social justice and translations. In K. Hanson & O. Nieuwenhuys (Eds.), *Reconceptualizing children's rights in international development: Living rights, social justice and translations* (pp. 3–27). Cambridge: Cambridge University Press.

This multifaceted approach aligns seamlessly with the research project's emphasis on holistic learning experiences, emotional well-being, and sustainability action. The combination of thematic exploration, artistic expression, and practical skill development fosters a comprehensive educational environment, empowering participants to not only understand but actively contribute to positive change in their communities and beyond.

LESPLAY participants work both individually and as a team to develop and present solutions to community problems. This girl participants of LESPLAY played an active role in the development of SODEI's gender-based violence (GBV) guidelines by brainstorming on the causes, consequences, and actions to stop GBV. Gideon (LESPLAY participant) who believes that littering can be controlled through recycling and reward, developed a plan for a community recycling plant. Jesse and Harmony (LESPLAY participants) illustrated the importance of conservation and protection of plant and animal species for sustainability. Jesse stated during a LESPLAY session that "when trees are in an environment, harmful effects like soil erosion will be limited". Ako, another beneficiary of LESPLAY, is a fan of community engagement. He stated: "*When communities come together through initiatives such as clean-up campaigns, it helps to maintain a clean and sustainable environment…*".[87]

5.1 The Story of ATRAA

The story of a little girl named ATRAA[88] deprived of school as a result of the conflict, and later introduced to our LESPLAY, resonates with the illustrative character Cora from The Story of Cora in the first part of the FYH book. This story, based on the realities of children and youth involved in LESPLAY programming, shares an inspiring narrative of how involvement with SODEI has empowered and improved the lives of children in conflict areas of Cameroon.

Disheartened by the turn of events, she decided to assist her parents with household chores. However, her fate would change when a team from the NGO SODEI visited her family and spoke to her parents about their after-school programme LESPLAY, suggesting that ATRAA attend.

[87] See LESPLAY Pilot Report (see footnote 12).

[88] ATRAA, like other names used in this chapter are nicknames to substitute the real names of the LESPLAY participants involved.

ATRAA became captivated by the idea that she could be more than just a student; she could be a change-maker. In the following couple of months, she attended weekly Saturday LESPLAY sessions, bonding and interacting with her newfound friends, enjoying her time in the safety of friends and learning about children's rights, climate change, and other important social issues she enjoyed. With a deep passion for nature, ATRAA decided to use her newfound knowledge and passion to champion the cause of environmental protection. Along with her LESPLAY friends, she began organising small clean-up and awareness campaigns in her community, teaching their peers as well as adults about the importance of preserving the environment. Slowly, more and more children joined her and friends in this mission.

6 Conclusion and Ways Forward

In conclusion, this chapter illuminates the profound impact of holistic learning experiences on children's academic and professional outcomes, with a particular emphasis on emotional well-being and multipotentiality within the LESPLAY programme. Joining forces with the transformative Follow Your Heart philosophy, LESPLAY challenges conventional educational structures and addresses the paradox of contemporary systems that often neglect children's rights. The chapter aligns with a citizen action agenda for the Sustainable Development Goals, advocating for inclusive and sustainable solutions to complex environmental and social challenges. Through qualitative analysis and participatory action research, the research sheds light on the success of LESPLAY in empowering conflict-affected children, providing an alternative learning platform that celebrates creativity, social well-being, and entrepreneurship. By emphasising children's rights, emotional intelligence, and multipotentiality, LESPLAY not only enriches participants' learning experiences but also nurtures their capacity to effect positive change. The convergence of LESPLAY and FYH serves as a beacon for transformative education, encouraging collective voices and efforts to champion sustainability causes. This research underscores the importance of innovative, child-centric approaches in shaping a brighter and more sustainable future.

ATRAA's transformative journey within the LESPLAY programme serves as a compelling narrative illustrating the impact of holistic learning experiences on young individuals. Her story epitomises the intersection of emotional intelligence, multipotentiality, and the empowerment

of children within unconventional educational frameworks. ATRAA's commitment to environmental protection, sparked by her LESPLAY experience, not only showcases the programme's success in nurturing diverse skills but also emphasises its potential to instil a sense of responsibility and activism in young minds. The stories of ATRAA, Cora, and their friends demonstrate how initiatives like LESPLAY, grounded in children's rights and participatory learning, contribute to the development of conscientious and empowered youth.

Moving forward LESPLAY plans to collaborate with FYH to promote joint initiatives to inspire young minds with the stories of ATRAA and Cora and accompany them in their mission to change the world. Such a collaboration would emphasise the interconnectedness of individual stories in the pursuit of sustainable change.

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PART II

Ocean and Water Literacy: A Transdisciplinary Overview

CHAPTER 5

Ocean Tourism: When Emotions Meet Science

Giovanna Bertella

Abstract This chapter delves into the author's contemplations of ocean tourism, i.e., tourism occurring in marine environments, as a potentially transformative activity capable of fostering a profound respect for the ocean and its inhabitants. Despite our feelings of fascination and interconnectedness with the ocean, many human activities, including tourism, continue to damage the marine ecosystem. However, effectively managed tourism has the potential to provide enriching experiences for human well-being and entertainment and serve as a powerful tool for educating and engaging tourists in the crucial realms of ocean protection and conservation. Drawing on the author's extensive research on whale watching in northern Norway over the past years, this chapter employs the concept of empathy to explore the challenges and potentials inherent in this specific case and the possible role of academics. It advocates for a relational approach to the natural environment, particularly in the context of the whales, and proposes actionable insights for improvement.

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> The sea, once it casts its spell, holds one in its net of wonder forever.
> *Jacques Y. Cousteau, ocean explorer*

> We are tied to the ocean. And when we go back to the sea — whether it is to sail or to watch it — we are going back from whence we came.
> *John F. Kennedy, U.S. president*

> … for Indigenous people, when they jump into the ocean, it's a feeling of being connected to culture and feeling a sense of belonging when that first wave washes over you.
> *Otis Carey, surfer*

1 Introduction

The recognition that the health of our species is intrinsically tied to the well-being of the planet is widespread, with the ocean playing a pivotal role in addressing pressing challenges, notably climate change.[1] As the epigraphs reported above show, the ocean is often perceived as a fascinating place for adventures and discoveries: across time, places, and cultures, humans have connected to the ocean, searching for and experiencing intense emotions. Despite our deep fascination and interconnectedness with the ocean, our relationship with it has become problematic due to detrimental human activities (e.g., overfishing) and various types of pollution (e.g., microplastic, chemical, and noise) stemming from such activities.[2]

It can be assumed that at the basis of such a challenging situation is a dominant view of the ocean merely as a pool of resources for humanity

[1] UN Climate Change. (n.d.). *The Ocean*. https://unfccc.int/topics/ocean, last access 30 November 2023; UNESCO (2021). *United Nations Decade of Ocean Science for Sustainable Development (2021–2030)*. https://en.unesco.org/ocean-decade, last access 30 November 2023; UN Climate Change (2023). *New Historic UN Treaty on Oceans Can Help Climate Action*. https://unfccc.int/news/new-historic-un-treaty-on-oceans-can-help-climate-action, last access 30 November 2023.

[2] UN (2022). *Oceans in danger: The threats they face*. https://unric.org/en/oceans-in-danger-the-threats-they-face/, last access 30 November 2023.

rather than an integral component of the interconnected web of life shared by humans and numerous other species. To find alternative views and viable practices, some scholars critically point to the fundamental anthropocentrism implicit in the Western dominant view of nature. They advocate for a paradigm shift that underscores the relationships among all inhabitants of the land and seas on our planet.[3] According to these scholars, this shift in mindset is crucial for moving beyond the current environmental challenges and fostering a more harmonious coexistence with the diverse life forms that share our planet.

Exploring non-anthropocentric views of non-human entities is an exciting and crucially important endeavour in which brilliant thinkers such as deep ecologist Arne Naess and posthuman philosophers Rosi Braidotti and Donna Haraway have engaged.[4] Recently, such challenging and provoking views, tied to the necessity for inner changes towards more inclusive mindsets, have permeated various disciplines, including sustainable science.[5] For example, Cielemęcka and Daigle describe sustainability

[3] Washington, H., Taylor, B., Kopnina, H., Cryer, P., & Piccolo, J. J. (2017). Why ecocentrism is the key pathway to sustainability. *The Ecological Citizen, 1*(1), 35–41; Kopnina, H. (2020). Anthropocentrism: Problem of human-centered ethics in sustainable development goals. In W. Leal Filho, A. M., Azul, L. Brandly, A. Lange Salvia, & T. Wall (eds.) *Life on land. Encyclopedia of the UN Sustainable Development Goals* (pp. 48–57). Cham: Springer International Publishing.

[4] Naess, A. (1988). Deep ecology and ultimate premises. *Ecologist, 18*, 128–131; Naess, A. (2005). The deep ecology movement: Some philosophical aspects. In A. Drengson & H. Glasser (Eds.), *Selected works of Arne Naess* (pp. 33–55). Springer. https://openairphilosophy.org/wp-content/uploads/2019/02/OAP_Naess_Deep_Ecology_Movement.pdf, last access 20 November 2023; Braidotti, R. (2013). *The Posthuman*. John Wiley & Sons; Haraway, D. (2016). *Staying with the trouble: Making kin in the Chthulucene*. Duke University Press.

[5] Abson, D. J., Fischer, J., Leventon, J., Newig, J., Schomerus, T., Vilsmaier, U., von Wehrden, H., Abernethy, P., Ives, C. D., Jager, N. W., & Lang, D. J. (2017). Leverage points for sustainability transformation. *Ambio, 46*(1), 30–39. https://doi.org/10.1007/s13280-016-0800-y; Cielemęcka, O., & Daigle, C. (2019). Posthuman sustainability: An ethos for our anthropogenic future. *Theory, Culture & Society*, *36*(7–8), 67–87; https://doi.org/10.1177/0263276419873710; Ives, C. D., Freeth, R., & Fischer, J. (2020). Inside-out sustainability: The neglect of inner worlds. *Ambio, 49*(1), 208–217. https://doi.org/10.1007/s13280-019-01187-w.

not solely referring to the perpetuation of the human species,[6] as traditionally established in perspectives as the ones discussed in the Brundtland report[7] and the framework elaborated by the Stockholm Resilience Centre,[8] but as the thriving of *all* life.

This chapter adopts a practical stance in exploring non-anthropocentric views of the natural environment. It contemplates the challenges and potentials of ocean tourism, i.e., tourism occurring in marine environments, in cultivating a relational mindset that can encourage and support respectful ways to think about and act upon the ocean and its inhabitants. Additionally, it considers the potential role of academics in this context. Extensive literature acknowledges tourism as an essential source of transformative experiences of self-discovery and growth[9] and, for nature-based tourism, an enhancer of environmental knowledge and consciousness.[10] These considerations, coupled with considerations about the concept of empathy and its adoption in the case of whale watching, form the foundation of this chapter. Furthermore, in line with the overall objective of this book, this chapter provides a clear example of how tourism, as a free-choice learning activity (i.e., education occurring outside a formal classroom setting), uses experience and emotion to instil a deeper understanding of the interconnectedness between human activity and the health of the planet's ecosystems—in this case, the ocean.

[6] Cielemęcka, O., & Daigle, C. (2019). Posthuman sustainability: An ethos for our anthropogenic future. *Theory, Culture & Society, 36*(7–8), 67–87. https://doi.org/10.1177/0263276419873710.

[7] World Commission on the Environment and Development (WCED). (1987). *Our common future*. Oxford University Press.

[8] Rockström, J., Sachs, J. D., Öhman, M. C., & Schmidt-Traub, G. (2013). *Sustainable development and planetary boundaries*. Sustainable Development Solutions Network. https://www.jstor.org/stable/pdf/resrep16114.pdf?acceptTC=true&coverpage=false&addFooter=false, last access December 2022.

[9] Ateljevic, I., Sheldon, P., & Tomljenovic, R. (2016). *Global report on the transformative power of Tourism*. UNWTO; Sheldon, P. J. (2020). Designing tourism experiences for inner transformation. *Annals of Tourism Research*, *83*, 102935. https://doi.org/10.1016/j.annals.2020.102935.

[10] Fennell, D., & Weaver, D. (2005). The ecotourism concept and tourism-conservation symbiosis. *Journal of Sustainable Tourism, 13*(4), 373–390. https://doi.org/10.1080/09669580508668563; Richardson, N., & Insch, A. (2023). Enabling transformative experiences through nature-based tourism. *Tourism Recreation Research, 48*(2), 311–318. https://doi.org/10.1080/02508281.2021.1952396.

Section 2 discusses whale watching as a transformative experience that educates people about the ocean and engages them in its protection and conservation, and as an activity that requires collaboration across various stakeholders. Section 3 starts by presenting the main features of how whale watching has emerged as an important form of tourism in the Troms and Finnmark county (northern Norway) and the author's engagement in this regard. The section progresses with the author's reflections on what she has observed about the way the whales are considered, in exploitative terms (as resources) or relational terms. It also explores the dimensions of empathy represented in the reasoning and actions of diverse stakeholders. Section 4 closes the chapter by offering insights into how academics can harness relational thinking and empathy to shape tourism in a way that can truly contribute to ocean protection and conservation.

2 Whale Watching and Ocean Protection and Conservation

The potential of whale watching to educate tourists and engage them in ocean protection and conservation is extensively explored in the literature, along with the sustainability of the sector and potential benefits for local communities hosting this form of tourism.[11] The premise is that experiencing encounters with wild marine megafauna can inspire tourists and lead to positive outcomes, in terms of entertainment, well-being, education, and environmentalism. Such an argument hinges on the strategic planning and implementation of whale watching within the framework of a responsible way to conduct tourism activities.[12] The latter implies the collaboration of various actors, including tourism operators, governmental agencies, research institutes, NGOs and the local communities, and networks with nonlocal actors. Some scholars suggest that science,

[11] Jacobs, M. H., & Harms, M. (2014). Influence of interpretation on conservation intentions of whale tourists. *Tourism Management*, *42*, 123–131. https://doi.org/10.1016/j.tourman.2013.11.009; Bricker, K. S., & Kerstetter, D. L. (Eds.). (2020). *Effecting positive change through ecotourism: The future we want*. Routledge; Suárez-Rojas, C., Hernández, M. G., & León, C. J. (2023). Segmented importance-performance analysis in whale-watching: Reconciling ocean coastal tourism with whale preservation. *Ocean & Coastal Management, 233*, 106453. https://doi.org/10.1016/j.ocecoaman.2022.106453.

[12] Higham, J., Bejder, L., & Williams, R. (2014). (eds.). *Whale-watching: Sustainable tourism and ecological management*. Cambridge University Press.

particularly science communication, and academics can play a pivotal role in fostering collaboration among these stakeholders.[13]

The notion that knowledge is central to responsible whale watching tourism and plays a crucial role in the overall experience is well-established in the literature. Building on Becken and Coghlan, it can be proposed that elements beyond knowledge are also pivotal for promoting and achieving sustainable transformations of the tourism system.[14] Specifically, the emotions that tourists and, importantly, other relevant stakeholders harbour in relation to whales should be considered alongside their knowledge. In this context, empathy, understood as the ability to understand others' perspectives as well as the emotional and behavioural response associated with this understanding,[15] can play a key role. Discussing tourism in the post-COVID Anthropocene, Jamal et al. emphasise the necessity of critical and empathic "doing", encompassing cognitive empathy ("mind"), affective empathy ("heart"), and conative empathy ("hands").[16] Applying such concepts to whale watching, it can be argued that the whale watchers' emotions towards the animals and their knowledge about their world should be considered alongside their actions: these three components are essential for fostering a relational approach to thinking about and practising tourism, and overall, protecting and caring for the environment.

[13] Finkler, W., & Higham, J. E. (2020). Stakeholder perspectives on sustainable whale watching: A science communication approach. *Journal of Sustainable Tourism, 28*(4), 535–549. https://doi.org/10.1080/09669582.2019.1684930.

[14] Becken, S., & Coghlan, A. (2022). Knowledge alone won't "fix it": building regenerative literacy. *Journal of Sustainable Tourism*, 1–17. https://doi.org/10.1080/09669582.2022.2150860.

[15] Brown, K., Adger, W. N., Devine-Wright, P., Anderies, J. M., Barr, S., Bousquet, F., … & Quinn, T. (2019). Empathy, place and identity interactions for sustainability. *Global Environmental Change, 56*, 11–17. https://doi.org/10.1016/j.gloenvcha.2019.03.003; Jamal, T., Kircher, J., & Donaldson, J. P. (2021). Re-visiting design thinking for learning and practice: Critical pedagogy, conative empathy. *Sustainability, 13*(2), 964. https://doi.org/10.3390/su13020964.

[16] Jamal, T., Kircher, J., & Donaldson, J. P. (2021). Re-visiting design thinking for learning and practice: Critical pedagogy, conative empathy. *Sustainability, 13*(2), 964. https://doi.org/10.3390/su13020964.

3 Whale Watching in Northern Norway: Facts and Reflections

Tourists visiting northern Norway can choose among various ways to meet the whales, including tours with big vessels, small boats, and rigid inflatable boats, as well as close encounters by kayaking and snorkeling. While whales have been observed in specific areas of northern Norway for an extended period, it is only since around 2011 that numerous pods of whales have visited other areas, particularly Tromsø and Skjervøy, to feed on herrings. The local tourism industry has capitalised on this phenomenon, leading to the emergence of numerous companies offering whale watching experiences. Alongside the increasing number of companies and tourists, discussions and sometimes rather heated debates have ensued regarding the safety of whale watching, for both humans and animals and its relevance to the local economy and the destination image. Many actors have engaged actively in such discussions, and this resulted in two sets of voluntary guidelines and a set of governmental regulations.

This chapter's author has conducted extensive research on regional whale watching tourism, exploring different aspects through various approaches.[17] Some of the key areas of focus in the studies include:

[17] Bertella, G. (2011). Wildlife Tourism and Natural Sciences knowledge: Challenges and Critical Factors. *Scandinavian Journal of Hospitality and Tourism, 11*(1), 97–114. https://doi.org/10.1080/15022250.2011.540794; Bertella, G., & Vester, H. I. (2015). Whale watching in Norway caught between more traditional hunting canons and the lucrative promise of seismic airguns. *Tourism in Marine Environments, 11*(1), 73–77. https://doi.org/10.3727/154427315X14398263718510; Bertella, G. (2017a). Factors of peripherality: Whale watching in Northern Norway. In Y.-S. Lee, D. Weaver & N. Prebensen (Eds.), *Arctic tourism experiences production, consumption and sustainability* (pp. 130–139). CABI; Bertella, G. (2017b). Well-being in wildlife experiences: feeling good for the animals? In N. Prebensen and J. Chen (eds.), *Nature Tourism* (pp. 23–33). Routledge; Bertella, G., & Acquarone, M. (2018). Reply to 'Swim encounters with Killer Whales (Orcinus orca) off Northern Norway: Interactive behaviours directed towards Human Divers and Snorkellers obtained from opportunistic underwater video recordings'. *Journal of Ecotourism, 17*(2), 184–191. https://doi.org/10.1080/14724049.2017.1368272; Bertella, G. (2019a). Participatory action research and collaboration in CSR initiatives by DMOs. *Journal of Ecotourism, 18*(2), 165–173. https://doi.org/10.1080/14724049.2018.1482904; Bertella, G. (2019b). Close encounters with wild cetaceans: Good practices and online discussions of critical episodes. *Tourism in Marine Environments, 14*(4), 265–273. https://doi.org/10.3727/154427319X15719407307721; Bertella, G., Fumagalli, M., & Williams-Grey, V. (2019). Wildlife tourism through the co-creation lens. *Tourism Recreation Research, 44*(3), 300–310. https://doi.org/10.1080/02508281.2019.1606977; Bertella, G. (2020). Interspecies communication and encounters with

- the rapid emergence of whale watching tourism in an unregulated context;
- the coexistence of whale watching and other activities (oil exploration, experiments on wild whales);
- collaborative actions to regulate whale watching tourism;
- the experiential value of the whale watching experience in terms of empathy towards the animals;
- the social media's role in creating expectations about the whale encounters.

Regarding the adopted approaches, some of the conducted studies were based on close collaboration with biologists and NGOs representatives. A creative approach was adopted in a few studies to reflect on the animal agency and consider the animals as stakeholders entitled to express their viewpoint on tourism and, ultimately, influence the sector. An action research approach underpinned the development of a set of local (area surrounding the city of Tromsø) guidelines and three letters of concern by various actors (destination management organisation, companies, NGOs, academics) targeting the responsible governmental agency.

Despite the passage of several years since the initial study, one constant element is the recurring discussions about the need for further and stricter regulations. Such discussions are usually sparked by episodes of irresponsible behaviour by some whale watchers. For example, in a research note, the author reported a 2018 post on the Facebook page "Whales in the North" showing concern and irritation about whale watchers swimming close to fishing vessels and commenting critically on "the horrible lack of ethics and standards by boat users this season, practices like this just worsens [worsen] the situation".[18] Consulting regularly, this Facebook page reveals a mix of posts expressing enthusiasm for animals and nature, alongside some negative sentiments. The latest observation of disagreements refers to two posts dated November 2023 indicating an ongoing debate about the safety of swimming activities and the respect towards the animals ("being in the water with the whales can perfectly

orcas. In G. Bertella (Ed.), *Wildlife tourism futures: Encounters with wild, captive animals* (pp. 98–111). Channel View; Bertella, G. (2021). Tourism actors' engagement and logics of whale protection and conservation in Norway. *Tourism in Marine Environments, 16*(4), 239–246. https://doi.org/10.3727/154427321X16342876434256.

[18] Bertella 2019a, p. 270.

be done respectfully, without disturbing them", 10.11.2023; "I don't think the impact of snorkelling is so big…", 20.11.2023; "swimming tourists around a pod of orcas, feeding, I find it, personally, disturbing the animals", 20.1.2023).

Through her research and having the opportunity to talk with a variety of stakeholders over the years, the author has noted that the comments observed in the online discussions reflect the main points of discussions in other forums. Most people engaged in these discussions, including operators, tourists, researchers, and NGO representatives, are deeply fascinated by the whales and the ocean. Some stakeholders, primarily researchers, have a good understanding of the animals, and other stakeholders are actively improving their knowledge about them. For example, many operators attend courses, employ biologists as guides, and join discussions, showing commitment and passion to learn more about the whales. However, a crucial distinction lies in how this fascination translates into behaviour. While some stakeholders exhibit self-restrictive behaviour, adhering to voluntary and mandatory regulations and, in some cases, advocating for stricter controls and/or rules, others seek close encounters, expressing concerns about potential limitations on their freedom in whale interactions. The expression "love to death" has sometimes been used by the former group of people to describe the emotional drive of the latter, and some have emphasised how such "love" may involve risky adrenaline-driven quests for intense emotions, sometimes reinforced by commercial interests.

Examining this situation through the lens of empathy, it becomes apparent that similar emotions and interests lead to different actions based on the strength and alignment of the three dimensions of empathy. For example, while excitement is generally considered a positive emotion, when not aligned with any of the empathy dimensions, it can lead to a pursuit of close encounters that pose high risks both for humans and animals. For instance, over the years, some people joining the discussions about whale watching have reported episodes of boats driving too fast and/or too close to the animals and snorkelers entering the water "on the animals" while feeding. Similarly, emotional empathy without knowledge can lead to actions, for instance, petting and foraging the whales, which was observed in one case, that can cause negative effects both for the humans (risk of zoonosis) and the animals (getting accustomed to the proximity with boats and people). When the emotions, invoked through interactions with animals, are not complemented by a deep understanding

and empathy towards the animal and its natural environment, then well-intended actions end up being detrimental to the health and well-being of the animal.

Apart from cases of irresponsible behaviours that were judged negatively by most stakeholders, in several cases, the author has noted empathy towards the animals, but it often seemed a rather shallow form of empathy. A good example is a dialogue in which the author assisted an NGO representative, who holds a PhD in biology and is specialised in marine mammals, and an experienced operator specialised in whale watching and working in various areas worldwide. While the NGO representative expressed concern for what they considered of paramount importance, namely taking into consideration what the specific animals could gain from the operator's activity, the latter admitted candidly that the specific animals had nothing to gain. This operator specified that the way the whale watching was performed by their company did not harm the animals and offered the tourists a memorable experience, with important educational outcomes, and that was the focus that they, as a tourism operator, had. The operator's comment on the harmless conduction of whale watching indicates some empathy across all dimensions but remains somewhat shallow, rooted in a view of the animals as resources that excludes any form of mutual benefits indicative of relational thinking.

In recent years, a clear emerging trend has added to the challenges of fostering a relational mindset: the importance placed on visually capturing whale encounters and, often, disseminating such images through social media. A representative episode occurred during a workshop when an operator sarcastically commented on the average tourist's desire to get as close as possible to animals for a selfie. The trend of photographing and filming whales and whale encounters not only contributes to unrealistic expectations but also reflects a self-centred and distorted approach to wildlife encounters. According to the latter, possible relations with whales are viewed in markedly anthropocentric ways and, it can be argued, that whale encounters become a means to amplify a person's digital ego.

4 Conclusion

This chapter has provided insights into the author's reflections on ocean tourism, based on her engagement with whale watching in northern Norway over the years. Such insights point to the need to approach the

management of ocean-based activities from a perspective where knowledge and emotions are combined. The context of tourism is particularly suitable for promoting such a combination. About the specific case of whale watching in northern Norway, while acknowledging significant challenges, the reflections presented in this chapter also highlight the potential of tourism to catalyse cultivating a relational mindset that aligns the cognitive, affective, and conative dimensions of empathy.

Noteworthy potentials emerge from stakeholders who willingly adapt to existing regulations and, in certain instances, advocate for enhanced animal protection and more responsible tourism practices through increased oversight and/or stricter regulations. Apart from a few exceptions, these stakeholders have been commented on in this chapter as still holding a rather utilitarian view of the animals. The latter is quite far from the relational type of mindset discussed by some philosophers and sustainability scholars, and it is still rooted in a view of nature and wildlife as resources for humanity. To foster a deeper alignment of the empathy dimensions and the emergence of more relational thinking, emphasis could be put on the interplay between the emotional and cognitive dimensions of empathy. A close collaboration between researchers and artists, leveraging traditional and modern artistic forms such as storytelling, music, theatre, and virtual reality, can channel emotions such as awe and excitement into responsible and respectful behaviours. The author believes that art offers a unique avenue for letting people explore the animals' perspectives on tourism encounters, for example, the physical, behavioural, and emotional effects of the noise from boat engines or the interferences of snorkelers during vitally important situations such as feeding.

The major challenge for the emergence of a relational mindset is evident in the concern by some stakeholders about losing the possibility to experience and let other people experience memorable extraordinary encounters, and, for some commercial stakeholders, exploit the animals for profit. In addressing this challenge, advocating for the realism of promoting a relational mindset becomes complex. The author contends that the most promising practical approach involves framing tourism within a well-regulated context.

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CHAPTER 6

The Ocean Senses Activity Book: Enriching Ocean Literacy Through a Multisensory Approach

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Abstract This chapter outlines the development of "The Ocean Senses Activity Book" integrating a multisensory approach to ocean education for pupils and the general public. Originating from an expedition in the

M. P. Poto contributed to the editing phase and to the conceptualisation of part of Sect. 3, specifically focusing on the development of The Ocean Senses Activity Book (she was assigned to the team "Touch").

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G. Panieri et al. (eds.), *Emotional and Ecological Literacy for a More Sustainable Society*, https://doi.org/10.1007/978-3-031-56772-8_6

Arctic Ocean, the project aimed to cultivate more effective cognitive approaches to ocean literacy education and communication. It bridged the gap between scientific exploration and public engagement, immersing learners in a multisensory, experiential educational experience. This innovative approach intended to enhance understanding and foster a deeper connection to ocean science, transcending traditional cognitive methodologies. The book's development is traced from the conceptualisation stage before and during the expedition, where scientists, educators, and creative professionals collaborated to design learning activities engaging the human senses. The development process involves interdisciplinary collaboration across multicultural and multilingual settings, ensuring an inclusive and immersive experience for diverse audiences.

Keywords Multisensory · Arctic Ocean · Education · Ocean literacy · Accessibility

1 Introduction

Ensuring accessibility in Ocean Literacy (hereinafter, OL)[1] involves making information, resources, and educational opportunities available to a diverse audience, including those with disabilities or limited access to teaching material and sources. In the context of OL, this could include providing alternative formats other than written content or relying on the use of extensive resources related to digital learning. In geoscience

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[1] 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).

research and academia, accessibility is promoted by open access to scientific publications and data and the FAIR principles.[2] Open access allows a broader audience, including researchers, educators, and the public, to access and use scientific information freely, and the FAIR (Findable, Accessible, Interoperable, and Reusable) principles outline a set of guidelines to enhance the usability and impact of digital resources in scientific research. By adopting both Open Access and FAIR principles, the scientific community can establish a more inclusive and collaborative research environment, ensuring that knowledge is free to access and presented in a structured and reusable format, promoting the advancement of science.

Nonetheless, ocean conservation needs to involve and engage diverse communities in addition to academia, like the general public, locals and Indigenous communities, non-profit and advocacy organisations, primary and secondary education, adult education, industry and business sectors, and communities in the arts and humanities, among others.[3,4] Involving diverse stakeholders ensures the longevity and effectiveness of conservation initiatives by fostering a culture of environmental stewardship.

This chapter will describe and discuss the development of learning activities that use the five human senses to immerse learners in a multisensory, experiential educational experience, included in The Ocean Senses Activity Book (OSAB).[5] The backdrop for the development of the book lies in the profound understanding that fostering a deeper connection to the ocean necessitates a departure from traditional cognitive methodologies. This co-created learning resource exemplifies the power of interdisciplinary collaboration, fostering a bridge between the intricate world of ocean science, the general public, and especially pupils. The activity book was developed during the AKMA2-Ocean Senses Research

[2] Wilkinson, M., Dumontier, M., Aalbersberg, I., et al. (2016). The FAIR guiding principles for scientific data management and stewardship. *Scientific Data, 3*, 160018. https://doi.org/10.1038/sdata.2016.18.

[3] Kelly, R. S., Mendham, D. S., & Pecl, G. T. (2018). Social licence for marine conservation science. *Frontiers in Marine Science*, 5. http://doi.org/10.3389/fmars.2018.00414.

[4] Kim, M., & Mason, D. P. (2018). Representation and diversity, advocacy, and nonprofit arts organizations. *Nonprofit and Voluntary Sector Quarterly, 47*(1), 49–71. http://doi.org/10.1177/0899764017728364.

[5] See further Chapter 1, as well as Sect. 3 of this chapter.

Expedition in May 2022,[6] which focused on expanding knowledge of extreme environments in the Arctic Deep Sea. The Expedition received endorsement from the UN Ocean Decade,[7] and a number of our objectives and goals aboard relate to the UN Sustainable Development Goals (SDGs)[8] which are calls to action for all countries to "*improve health and education, reduce inequality, and spur economic growth – all while tackling climate change and working to preserve our oceans and forests*". The Ocean Senses Activity Book demonstrates the synergy achieved when scientists and scholars from diverse backgrounds join forces to foster improved science education and communication in Ocean Literacy, Marine Science, and Ocean Conservation (Fig. 1).

2 Background: The AKMA Project

The Ocean Senses Activity Book was developed during the AKMA2-Ocean Senses Research Expedition part of the AKMA project, Advancing Knowledge on Methane in the Arctic,[9] funded by the Norwegian Research Council. The scientific focus of the project was aimed at understanding the processes involved in methane formation and migration and the impacts of climate change, with a specific focus on the Arctic. Methane, a potent greenhouse gas, has the potential to accelerate global warming, and the Arctic's delicate ecosystems are particularly susceptible to its effects due to increased bottom and air temperature. The project's multidisciplinary approach combined cutting-edge research, technological innovation, and the development of new approaches and content for university students. In addition to its scientific advancement, AKMA embarked on a parallel mission of advancing ocean education through the development of educational initiatives involving school pupils, early career scientists, and artists, to improve OL. This is where The Ocean

[6] Panieri, G., & Stiller-Reeve, M. (Eds.). (2023). *The Ocean Senses Activity Book*. Septentrio Educational, 2023(1). https://doi.org/10.7557/se.2023.1.

[7] https://oceandecade.org/, last access 10 December 2023.

[8] https://sdgs.un.org/goals, last access 10 December 2023.

[9] For more details, see https://en.uit.no/project/akma/Akma2, last access 10 December 2023.

Fig. 1 "United by the AKMA project": The participants of the AKMA 2 Ocean Senses expedition aboard the RV Kronprins Haakon. The team of dedicated researchers and professionals set sail into the Arctic Ocean, embarking on a voyage of scientific discovery and development of new learning activities involving the human senses

Senses Activity Book comes into play, born from the collective efforts of marine geoscientists, educators, and social scientists.[10]

[10] Panieri, G., & Stiller-Reeve, M. (2023). Introduction. In G. Panieri & M. Stiller-Reeve (Eds.), *The Ocean Senses Activity Book* (pp. 7–8). Septentrio Educational, 2023(1). https://doi.org/10.7557/8.7046© The Author(s) CC BY 4.0.

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

3.1 Developments

The development of The Ocean Senses Activity Book was grounded in the AKMA expedition being joined by a dynamic, international group of highly interdisciplinary scientists and students from diverse fields, including the marine geosciences, philosophy, psychology, gender studies, education, health sciences, and environmental law. The cruise leader assembled the team by selecting and coordinating project partners whose collective expertise aligned seamlessly with the expedition's primary goals and research expectations while, simultaneously, bringing a vastly different perspective to it, in addition to varied expertise on the human primary senses. Divided into five working groups, the teams worked to create educational resources to facilitate experiential learning through (1) sight, (2) taste, (3) touch, (4) smell, and (5) hearing. Each group paired marine scientists (e.g., biologists, geochemists, or geologists) with university students, science teachers, and participants with expertise or distinct interest in each respective sense (e.g., a musician joined the "hearing" group, a visual artist joined the "sight" group, a physical therapist for the group on "touch", etc.). This diverse composition ensured a multidisciplinary approach, drawing on varied disciplinary expertise, educators' pedagogical insights, and students' fresh perspectives in crafting educational initiatives that brought the wonders of the ocean to life. Every day, after the scientific operations, the groups met to create immersive experiences that would connect individuals with the ocean through multisensory learning activities. These experiences were additionally shared in a variety of blog posts created during each day of the cruise (Fig. 2).[11]

3.2 Outputs

The OSAB comprises sixteen interdisciplinary lesson plans and ideas that encourage and facilitate learning about the ocean and connecting to it via the human senses. The activities were developed to cater to a diverse

[11] https://en.uit.no/project/akma/Akma2, last access December 2023.

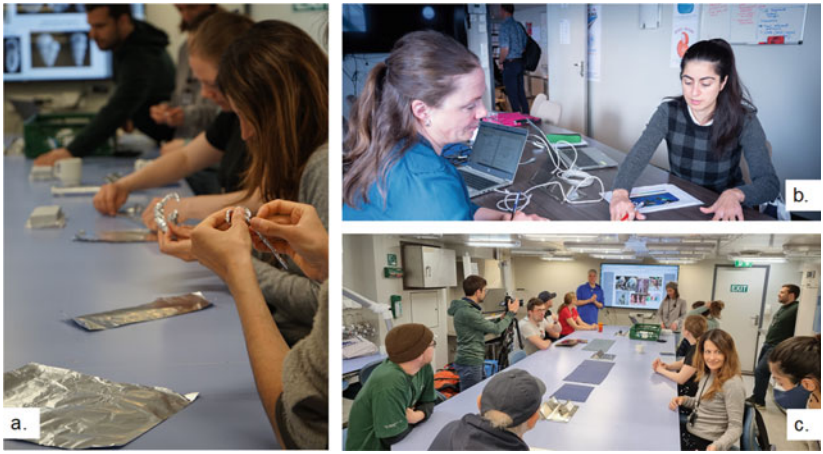

Fig. 2 "Engaging with the human sense": A triptych of dedication during the AKMA2 Ocean Senses cruise during which participants collaborated in developing the activities for The Ocean Senses Activity Book. In (a) and (c) the team was crafting and testing immersive experiences using the touch senses then resulted in the "Sculpting foraminifera" activity.[12] In (b) a scientist and a schoolteacher work together in developing an activity involving the taste sense[13]

audience: for teachers spanning the educational spectrum,[14] from kindergarten to high school; for parents that could engage their children in some of the activities; or even for older pupils to engage with younger pupils at school or science fairs.[15] But while certain senses seemed to lend themselves easily to developing engaging activities, others posed

[12] Maric, F., Poto, M. P., Zimmermann, H. J., & Panieri, G. (2023). Sculpting foraminifera. In G. Panieri & M. Stiller-Reeve (Eds.), *The Ocean Senses Activity Book* (pp. 91–93). Septentrio Educational, 2023(1). https://doi.org/10.7557/8.7060© The Author(s) CC BY 4.0.

[13] Mohadjer, S., Aune, V., Panieri, G., & Oddone, D. (2023). A journey to a cold seep. In G. Panieri & M. Stiller-Reeve (Eds.), *The Ocean Senses Activity Book* (pp. 53–69). Septentrio Educational, 2023(1). https://doi.org/10.7557/8.7053© The Author(s) CC BY 4.0.

[14] Mohadjer, S., Aune, V., Panieri, G., & Oddone, D. (2023). A journey to a cold seep: How scientists study methane in the Arctic ocean: A paired teaching lesson plan. *Septentrio Educational* (1), 53–69. https://doi.org/10.7557/8.7053.

[15] https://uit.no/tavla/artikkel/823967/forskningsdagene_i_sentrum.

more difficulties for the team members. Vision, the most relied-upon sense in traditional education, readily seemed to lend itself to developing engaging activities.[16] The vast oceanic landscapes, teeming with vibrant marine life, offer an expansive canvas for visual exploration. While initially challenging to capture, the auditory realm of the ocean becomes a compelling arena for learning with the right resources. Audio narratives,[17] interviews with marine experts,[18] and recordings of underwater soundscapes[19] offered useful elements for learners to engage with the symphony of the sea, but even the age-old device of song[20] finally proved a powerful tool for increasing teacher and student engagement and learning. The sense of touch lends itself naturally to tactile engagement with learning materials.[21,22,23,24] Hands-on models,[25] sculpturing,[26] and temperature changes provide learners with a tangible experience of the ocean, even when it is not directly at hand. This aspect of OL proved to be both intuitive and effective, making the tactile dimension the sense under which

[16] Os, V., Zimmermann, H. J., & Panieri, G. (2023). Exploring the Arctic deep-sea by color filters. *Septentrio Educational* (1), 15–25. https://doi.org/10.7557/8.7048.

[17] Losleben, L. K., Clerici, M., Holm, V., & Panieri, G. (2023). Cold seeps symphony. *Septentrio Educational* (1), 40–46. https://doi.org/10.7557/8.7051.

[18] Oddone, D., & Panieri G. (2022). Akma 2-Ocean Senses Expedition on RV Kronprins Haakon. https://www.youtube.com/watch?v=QV7LbXPK0Z0, last access December 2023.

[19] Losleben, L. K., Clerici, M., Holm, V., & Panieri, G. (2023). Cold seeps symphony. *Septentrio Educational* (1), 40–46. https://doi.org/10.7557/8.7051.

[20] Holm, V., Losleben, L. K., Zimmermann, H. J., Clerici, M., & Panieri, G. (2023). The foraminifera boogie. *Septentrio Educational* (1), 47–51. https://doi.org/10.7557/8.7052.

[21] Maric, F., Poto, M., & Panieri, G. (2023). Where is the (ancient) ocean floor? *Septentrio Educational* (1), 71–73. https://doi.org/10.7557/8.7054.

[22] Maric, F., Poto, M., Zimmermann, H. J., & Panieri, G. (2023). Ocean floor diorama. *Septentrio Educational* (1), 85–87. https://doi.org/10.7557/8.7058.

[23] Maric, F., Poto, M., & Panieri, G. (2023). Under pressure. *Septentrio Educational* (1), 78–80. https://doi.org/10.7557/8.7056.

[24] Maric, F., Poto, M., & Panieri, G. (2023). Arctic Ocean temperatures. *Septentrio Educational* (1), 81–84. https://doi.org/10.7557/8.7057.

[25] Maric, F., Poto, M., Zimmermann, H. J., & Panieri, G. (2023). Sculpting micro-, meio-, and macrofauna. *Septentrio Educational* (1), 88–90. https://doi.org/10.7557/8.7059.

[26] Maric, F., Poto, M., Zimmermann, H. J., & Panieri, G. (2023). Sculpting foraminifera. *Septentrio Educational* (1), 91–93. https://doi.org/10.7557/8.7060.

the largest proportion of the activities were developed.[27] While conceptually fascinating, introducing taste and smell into the realm of ocean literacy presents unique challenges. Taste and smell are easy to feel at sea. When removing water from the top of samples collected at the seafloor, a common method involves siphoning the water using a plastic tube and collecting it in small vials. In some cases, while creating a vacuum allowing the water to descend the tube, the scientists suck in the tube and might drink some water. Regarding the sense of smell, oxidised marine sediments are often characterised by a distinct and pungent odour reminiscent of rotten eggs that are associated with the presence of hydrogen sulphide gas, which is a by-product of microbial activity during the decomposition of organic matter in anaerobic (low oxygen) conditions. When sediments undergo oxidation, sulphur compounds are released, giving rise to the characteristic smell of hydrogen sulphide. Despite the challenges of reproducing those characteristics, the team successfully developed a unique and engaging activity that conveyed these sensory experiences in more common learning environments and brought the sensory elements of taste and smell to life within the context of ocean literacy.[28]

3.3 Applications to Multicultural Contexts

The OSAB has been translated into several languages so far (English, Chinese, Ukrainian, Farsi).[29,30] The translation primarily focuses on the teaching instructions for each activity to ensure that the instructions, when translated, effectively convey the holistic, experiential aspects of the activities, enabling participants to engage and benefit from the multisensory focus regardless of the language they speak. Recognising the importance of translating the OSAB into different languages resulted from several reasons: the international team of scientists and students on

[27] Panieri, G., & Stiller-Reeve, M. (Eds.). (2023). *The Ocean Senses Activity Book*. Septentrio Educational, 2023(1). https://doi.org/10.7557/se.2023.1.

[28] Stiller-Reeve, M., Rosnes, E., Eiliertsen, M., Ramalho, S., Poddevin, V., & Panieri, G. (2023). Life from bad smells. *Septentrio Educational* (1), 27–33. https://doi.org/10.7557/8.7049.

[29] https://septentrio.uit.no/index.php/SapEdu/issue/view/682, https://doi.org/10.7557/se.2023.2.

[30] https://septentrio.uit.no/index.php/SapEdu/issue/view/687, https://doi.org/10.7557/se.2023.3.

board the research vessel; the expedition's goal of reaching scientists and the public worldwide; and the willingness to contribute to the central and transformative promise for the 2030 Agenda for Sustainable Development (Agenda 2023) and its Sustainable Development Goals (SDGs) to "leave no one behind".[31] "Leave no one behind" represents the unequivocal commitment of all UN Member States to "eradicate poverty in all its forms, end discrimination and exclusion, and reduce the inequalities and vulnerabilities that leave people behind and undermine the potential of individuals and of humanity as a whole".[32]

Our multilingual approach has far-reaching benefits that extend beyond the act of translation itself. For the OSAB it was very important for several reasons described below:

Global audience: We wanted to give access to the booklet to a wider audience, making the content accessible to children and adults from diverse linguistic backgrounds. Making the booklet available in multiple languages ensures that a broader and more international audience can benefit from the multisensory approach to OL afforded by The Ocean Senses Activity Book.

Cultural relevance: Language is closely tied to culture. Translating the book allows for cultural nuances and specific references to be tailored to each target audience. This enhances the book's relevance and resonance with readers in different regions, fostering a deeper connection with the material. Overall, multilingual books can also facilitate cultural exchange.[33] Children from different linguistic backgrounds can share their perspectives and learn from one another's experiences, creating a richer and more interconnected global community.

Inclusivity and equity: Multilingual translations promote inclusivity and equity by ensuring that children from various linguistic and cultural backgrounds have equal opportunities to access educational resources about

[31] Leaving No One Behind: Equality and Non-Discrimination at the Heart of Sustainable Development. The United Nations System Shred Framework for Action. 65 pp. https://unsceb.org/sites/default/files/imported_files/CEB%20equality%20framework-A4-web-rev3.pdf, last access November 26, 2023.

[32] Leaving No One Behind: Equality and Non-Discrimination at the Heart of Sustainable Development. The United Nations System Shred Framework for Action. 65 pp. https://unsceb.org/sites/default/files/imported_files/CEB%20equality%20framework-A4-web-rev3.pdf.

[33] Kümmerling-Meibauer, B. (2013). Multilingualism and children's literature. *Bookbird: A Journal of International Children's Literature*, *51*(3), iv–x.

the oceans. This is particularly important for marginalised or underrepresented communities.[34] In addition,[35] climate change and the consequent sea level rise will impact coastal areas ever more profoundly,[36] making OL for people living in coastal areas a matter of paramount importance.

Global collaboration: Another important aspect of the OSAB translations is the global collaboration that might encourage cross-cultural collaboration among educators, parents, and children. Collaborative efforts among people from different language backgrounds can lead to more holistic approaches to education and action for ocean stewardship.[37]

Environmental awareness[38]: Translating the book helps disseminate knowledge about the oceans and ocean conservation on a global scale, fostering a sense of shared responsibility among the global citizenry. By exploring the intricate world of the oceans through sensory experiences, "Ocean Senses", has the potential to encourage readers to appreciate the interconnectedness of marine ecosystems and instil a sense of responsibility towards preserving our oceans.

[34] Pazoto, C. E. P., Silva, E. L., & Duarte, M. R. (2022). Ocean literacy in Brazilian school curricula: An opportunity to improve coastal management and address coastal risks? *Ocean & Coastal Management, 219*, 106047. http://doi.org/10.1016/j.ocecoaman.2022.106047.

[35] Pazoto, C. E. P., Silva, E. L., & Duarte, M. R. (2022). Ocean literacy in Brazilian school curricula: An opportunity to improve coastal management and address coastal risks? *Ocean & Coastal Management, 219*, 106047. http://doi.org/10.1016/j.ocecoaman.2022.106047.

[36] Martinich, J., et al. (2013). Risks of sea level rise to disadvantaged communities in the United States. *Mitigation and Adaptation Strategies for Global Change, 18*(2), 169–185. http://doi.org/10.1007/s11027-011-9356-0.

[37] Child, J. (2001). Trust—The fundamental bond in global collaboration. *Organizational Dynamics, 29*(4), 274–288. https://doi.org/10.1016/S0090-2616(01)00033-X.

[38] Gadenne, D. L., Kennedy, J., & McKeiver, C. (2009). An empirical study of environmental awareness and practices in SMEs. *Journal of Business Ethics, 84*, 45–63.

4 Importance of Multisensorial Learning in Ocean Literacy

The oceans and their multiple ecosystems, which cover more than half of the submerged surface of our planet, are explored by scientists on diverse levels. However, bringing the deep sea closer to the public can be challenging due to limited educational tools, the absence of ocean literacy in formal education systems, and a general lack of public awareness.[39,40,41] The dissemination of knowledge about deep-sea ecosystems is vital for societal recognition and protection.[42]

Starting from early childhood, children are taught stories and facts about the miraculous blue deep waters and various sea creatures by the grown-ups around them. It is interesting for the children and adults to talk about deep waters, including the huge ocean animals like whales, seals, and octopuses, and small marine life species like shrimps, clownfish, and plankton. Yet, for the general public, obtaining detailed but comprehensible information about vital ecosystem services that the ocean provides takes work. Due to the lack of integration of ocean literacy in the formal education systems, a great deal of society needs to gain awareness and valuable knowledge that the scientists prove through their research.[43] This gap is filled mostly by the informal marine education programmes and/or educational tools that better equip the teachers, parents, or caregivers in ocean literacy so that the children and youngsters can benefit from it. The OSAB represent a tool that fits the gap.

The book offers various activities to explore the ocean systems and these activities are designed with a multisensory teaching approach, which

[39] Salazar, J., Dominguez-Carrió, C., Gili, J. M., Ambroso, S., Grinyó, J., & Vendrell-Simón, B. (2019). Building a new ocean literacy approach based on a simulated dive in a submarine: A multisensory workshop to bring the deep sea closer to people. *Frontiers in Marine Science*, *6*, 576.

[40] O'Brien, M., Freitas, C., Venzo, P., & Francis, P. (2023). Fostering ocean literacy through informal marine education programs. *Marine Pollution Bulletin*, *193*, 115208.

[41] Thistle, D. (2003). The deep-sea floor: An overview. *Ecosystems of the Deep Oceans*, 5.

[42] Ibid. (see footnote 40).

[43] Salazar, J., Dominguez-Carrió, C., Gili, J. M., Ambroso, S., Grinyó, J., & Vendrell-Simón, B. (2019). Building a new ocean literacy approach based on a simulated dive in a submarine: A multisensory workshop to bring the deep sea closer to people. *Frontiers in Marine Science*, *6*, 576.

is advantageous in many aspects. Multisensory learning appeals to a wide range of age groups from preschool children to adults, accordingly the activities in the book connect various groups allowing them to have the same experience no matter their age or background. Shams and Seitz[44] suggest that the human brain has evolved to function and develop ideally in multisensorial environments where behaviour is guided by the information that is integrated across multiple sensory modalities. Multisensory training tools reach the natural settings of the human brain better than unisensory protocols and therefore, the learning experience becomes more efficient and persistent. During the learning experience, the multi-sensory approach involves different parts of the brain in the learning process simultaneously, which provides the learner to make multiple connections, comprehend multiple concepts, and maintain better memory performance.[45] The OSAB utilises this process with its various multisensorial activities by creating an engaging immersive training environment. This provides the learners hands-on learning experience by creating an artificial environment that reflects real-life scenarios where they can learn and master new skills. In this way, The OSAB offers a worthwhile approach to ocean literacy as the activities facilitate the use of senses and emotions for various types of learners. Delivering OL and understanding its fundamentals is crucial for all levels of society to raise awareness on ocean-related topics.

5 Conclusion

In the face of the climate crisis and the complex social, economic, and environmental challenges we are experiencing as a global society, it is important to create accessible educational resources that engage the general public (children and adults) to foster a deeper sense of understanding and care towards the environment and in the context of this chapter, the oceans. For many, the ocean is a place of vast beauty and curiosity; yet there is a lack of accessible resources on OL and a disconnect between the scientific community and the general public when it

[44] Shams, L., & Seitz, A. R. (2008). Benefits of multisensory learning. *Trends in Cognitive Sciences*, *12*(11), 411–417.

[45] Okray, Z., Jacob, P. F., Stern, C., Desmond, K., Otto, N., Talbot, C. B., … Waddell, S. (2023). Multisensory learning binds neurons into a cross-modal memory engram. *Nature*, 1–8.

comes to understanding the delicate aquatic ecosystems. As a result of the AKMA2-Ocean Senses Research Expedition, marine scientists, educators, and social scientists came together to address this knowledge gap by co-creating an interdisciplinary, multisensory activity book centred around the oceans.

As highlighted throughout the chapter, The Ocean Senses Activity Book addresses the pressing need for scientists to communicate scientific issues more effectively with the public.[46] The OSAB aims to go beyond Open Access by incorporating FAIR principles to ensure the OL resources are not only accessible but also findable, interoperable, and reusable. Educational resources like the OSAB even go beyond the current goals and targets of the SDGs, offering an effective strategy for including the general public in efforts towards ocean conservation. Surprisingly, SDG 4 *Quality Education* and SDG 14 *Life Below Water* fail to mention the importance of making scientific research more accessible to the public and the importance of OL and other forms of ecological education. Translating the intricacies and density of scientific research into multisensory learning programmes for all, such as the OSAB, offers an effective approach to engaging citizens with ocean science and fostering a more engaged population with the knowledge and awareness to take action towards protecting the oceans.

Furthermore, the OSAB offers a learning platform that caters to diverse needs and cultural contexts. Developing a multisensory learning approach meets the demand for inclusive, quality education and overcomes various learning barriers. The book's multisensory sessions and interactive activities, translated into multiple languages (to date Chinese,[47] Ukrainian,[48] English, and Farsi), engage teachers, learners, researchers, and communities in ocean-related discussions and hands-on activities, fostering ocean literacy and stewardship.

[46] O'Brien, M., Freitas, C., Venzo, P., & Francis, P. (2023). Fostering ocean literacy through informal marine education programs. *Marine Pollution Bulletin, 193*, 115208; 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.

[47] 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.

[48] Паньєрі Дж, Стіллер-Рів М, редактори. Сприйняття океану: Плани уроків. Пефтієва О,перекладач. Septentrio Educational, 2023(3). https://doi.org/10.7557/se.2023.3.

CHAPTER 7

The Paths of Water and Their Relations: A Dialogue Between Brazil and Norway

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Abstract The formation of ethnic groups is a result of interactions among group members and those from the outside, influencing criteria for valuation. Ethnicity, considered a part of human interaction, shapes the cultural specificities of ethnic groups through the experiential nature of ethnic relations. However, it is not only human interaction that shapes culture—the analysis of human societies should take into account interactions between humans and non-humans, challenging the modern view that attributes agency solely to humans. The environment, with an emphasis on the human-water relationship, plays a crucial role in human life and territory construction, reflecting a recent ontological shift in sociology and parallels with indigenous worldviews. The article explores the profound relationships between humans and non-humans, focusing on two Indigenous communities in Latin America and the Arctic. The two cases include the Aldeia (Village) Maraka'nà in Rio de Janeiro, Brazil and the Alta case in Northern Norway (Sápmi), illustrating issues of ethnicity, autonomy, and territory. Emphasising water's integral role, it challenges traditional notions of territory, offering a richer understanding rooted in Indigenous cosmogonies. The study enriches existing sustainability frameworks, notably the SDGs, highlighting the importance of including Indigenous knowledge in sustainability research. Promoting a decolonising approach to research and an inclusive approach to planetary health, the chapter advocates for the recognition of Indigenous perspectives.

Keywords Human-water relationship · Decolonising approach · Planetary health

1 Introduction

1.1 The Interactions That Shape Human Society

The history of human societies is a history of their interactions. The formation of social groups, such as ethnic groups, is based upon interactions established within the group itself, sharing valuation and judgement criteria, and between actors outside the group, from where distinctions

are fixed.[1] The concept of ethnicity itself can be understood as an aspect of human interaction, in addition to a property of this particular social formation, which is ethnic groups. The cultural specificities—also understanding culture as an aspect of this continuous interaction—of these ethnic groups are influenced by the experiential nature of ethnic relations.[2]

Some of these interactions also occur in the relationship between human and non-human beings. Humans and non-human beings interact daily, from something as simple as turning on the shower to the intricacies of the hunting and gathering practices that Indigenous communities carry out and rely on for their sustenance. Despite these interactions, from a Western perspective, it is only human actors who are endowed with agency and are considered as producers of knowledge.[3] However, to better understand humans and their societies, especially in the context of implementing sustainable behaviours and actions to limit environmental degradation, it is necessary to understand their multiple relationships with non-humans. An analysis of the interactions that form ethnic groups, focused only on human relationships, does not necessarily consider the reality of all human communities since many define themselves based on their relationships with the non-humans that make up their surrounding environment as well.[4]

Human reality is enveloped by the environments in which it unfolds.[5] This environment threatens, involves, allows life, creates differentiation and belonging, or, in other words, establishes relationships between its (non-human) elements and with humans. A fundamental aspect and element of this environment is water and the interaction that humans establish with it. The human-water relationship can be understood as providing a natural resource that is essential to life, placing water as a central non-human element that maintains a constant relationship with

[1] Barth, F. (1976). *Los grupos étnicos y sus fronteras* (Vol. 197, No. 6). México: Fondo de cultura económica.

[2] Eriksen, T. H. (1991). Os contextos culturais das diferenças étnicas. *Revista Man, New Series, 26*(1), 127–144.

[3] Latour, B. (2012). *Reagregando o social: uma introdução à teoria do ator-rede*. Edufba.

[4] Houdart, S. (2015). Humanos e não humanos na antropologia. *Ilha Revista de Antropologia, 17*(2), 013–029.

[5] Ibid. (see footnote 4).

human actors. This perception of non-humans as being in constant relationship with humans is a relatively recent ontological turn in sociology that moves beyond the traditional views of human society as defined by the Anthropocene and modernity. However, it is important to note that special attention to the relationships between humans and non-humans has been present in different native cosmogonies since time immemorial.

These relationships between humans and non-humans are usually the very basis of native or Indigenous worldviews and cosmogonies which shape their territories, ways of knowing, culture and collective identities. However, such a view does not involve a legal-political notion of territory and ownership, which results from a specific conception inherited from the Modernity of the nation-state. Rather, it is a concept of territory as a set of objects and actions, synonymous with human and inhabited space, which can be formed in the contemporary period by contiguous places and networked places. Therefore, this territory is a political and historical construction, it is the ground plus the identity, with territoriality being a quality of belonging to this ground added to the identity.[6] In other words, non-human elements such as water constitute what some human communities consider as territory but not in an individualistic sense that implies ownership—water is territory that forms part of their cultural identity, language, and ways of knowing.

This article seeks to explore the relationship between humans and non-humans to highlight the interconnectedness between humans and the natural environment, a concept that is clear within a planetary health framework and among Indigenous communities but not entirely present or obvious within the Sustainable Development Goals (SDGs). Despite the interconnectedness of the SDGs and the awareness of the complex interplay between economic, social, and environmental factors that impact human societies, the failure to include other types of knowledge (i.e., Indigenous knowledge) in sustainability frameworks does not uphold the promise of leaving no one behind. Indigenous peoples across the globe have lived in harmony with the natural environment and have been protecting and preserving ecosystems since time immemorial, yet their knowledge and worldviews have not been given the platform they rightfully deserve. Focusing on two cases that are situated in Indigenous communities in South America and the Arctic, the relationship between

[6] Santos, M. (2002). Por uma outra globalização. Do pensamento único à consciência universal.

humans and a non-human element (i.e., water) will be defined and explored to demonstrate how human society and culture are heavily influenced by interactions with non-human beings. The first case will look at the relationship between the Sámi population of Máze (the Arctic, Sápmi) and the Alta River. The second case will explore the relationship between Aldeia Maraka'nà and the Maracanã River (Brazil). Understanding how these relationships shape issues of ethnicity, autonomy, and territory (which all contribute to the make-up of human society) is crucial to building awareness of the integral role the natural environment plays on shaping human communities and the central aspect these relations play in Indigenous culture.

In this chapter, I will present the relationship between the two communities and the rivers within their territory, travelling between the Sapmi territory, the Alta's case, and the Aldeia Maraka'nà, in Rio de Janeiro. The structure of the chapter also aims for an ontological shift where the focus of the narrative is not on the human aspect of the water-human relationship but on water itself. As a result, the organisational structure of the article follows the physical states of water, flowing from the solid state, snow, to the liquid state, rivers, and finally to evaporation. This, however, does not mark the end, as it is a cycle, but also a new beginning.

1.2 Aldeia Maraka'nà and the Maracanã River

The South American case study focuses on Aldeia Maraka'nà[7] ("aldeia" is Portuguese for "village"), an urban multi-ethnic Indigenous occupation located in the north of the city of Rio de Janeiro. Neighbouring the Maracanã stadium, this occupation has been taking place in an old building known as the "Old Indian Museum" since 2004, although the space's connection with Indigenous culture predates the museum's creation.

The occupation began, albeit in its early stages of gaining traction and support, in 2004. The year marks the first attempt to occupy the land, motivated by a search for "relatives", as other Indigenous people commonly call them, and in search of a space to discuss public policies

[7] The name, Maraka'nà refers to the football stadium to which the *aldeia* is neighbouring, the Estádio Journalista Mário Filho, better known as Maracanã. This is a name of indigenous origin, meaning the bird that made a noise similar to the *maraca*, a native instrument played through shaking. It also names the entire surrounding neighbourhood because of the Maracanã River, which bathes the region.

for native peoples in the city of Rio de Janeiro. However, due to a lack of adhesion among the organising group,[8] it only came to fruition in October 2006 after an Indigenous congress at the State University of Rio de Janeiro, next to the building of the former Indian Museum, was conducted by a group of Indigenous people and supporters. Since then, the occupation has gone through several stages: in 2010, the government of the state of Rio de Janeiro began making plans to demolish the mansion to reformulate the Maracanã stadium, neighbouring the occupation of the same name. The construction works were necessary to carry out the 2014 Football World Cup. At the time, the occupation received its current name of "Aldeia Maraka'nà". In 2013, the building was vacated by police forces and then it was once again occupied by Indigenous people in 2017. The status of the occupation and those present have ebbed and flowed since its inception, but the Indigenous community has continued to persist and show resistance.

Neighbouring the polluted Maracanã River, which has the Tijuca Massif as its mouth and flows into Guanabara Bay, the issue of access to water has always been an important point in the life and permanence of the occupation. Before the eviction, the Indigenous people depended on the donation of water and electricity by LANAGRO, a unit of the National Agricultural Laboratory (LANAGRO), linked to the former Ministry of Agriculture, Livestock and Supply (MAPA), which shared the former land of the Indian Museum with the occupation. However, after the eviction in 2013 and the demolition of the LANAGRO unit as part of the urban plan for the region, the Indigenous people, upon returning to occupation in 2017, began to depend on water trucks for their activities. As a result, daily bathing, cooking, and use of the bathroom were dictated by the availability or otherwise of water from the water truck, which was periodically shared between Indigenous people and supporters of the Aldeia.

1.3 The Sámi and the Alta River

The case of human and non-human relations in the Arctic region narrows in on the area of Alta in northern Norway, which has been inhabited by the Sámi since at least the sixteenth century, according to records from the

[8] Santos, V. P. D. (2016). A resistência da Aldeia Maracanã: um ponto de oxidação pela "revolução ferrugem".

early 1700s of commercial fish exchanges between Sámi and the western part of northern Finnmark. During this period, the Sámi economy began the process of modifying its structure, combining fishing with reindeer herding, changing the ancient custom of hunting these animals.[9]

It is also possible to find even older records of the Sámi presence in the Alta region, especially in the Alta River, where migration records from 1593 indicate the Sámi migration from the Alta fjords to the river for salmon fishing.[10]

It can be noticed, then, that the Sámi's relationship with the Alta region is very old and deeply intertwined in their culture and ways of knowing. The Sámi collective identity itself is intimately related to the narratives created about these common spaces where the Sámi circulated in Sápmi, their territory, and go beyond a national identity that is linked to the modern concept of the nation-state.[11]

This special relationship between the Sámi and the Sápmi territory of Alta was the motivation for a series of protests between 1979 and 1982 against the creation of a hydroelectric plant in the region, which would imply the construction of a large dam in the place of a Sámi community, the village of Mazé. This act of resistance was the first great act for the right to Sámi self-determination and is considered a landmark for the formation of contemporary Sámi collective identity.[12]

Unfortunately, the hydroelectric plant was eventually built, after intense protests and legal battles, but on a much smaller scale that originally planned. Furthermore, the mobilisation and formation of Sámi political activism was considered to be a great political victory, gaining high visibility within Norway and across the globe.

[9] Hansen, L. I. (2017). Perspectives on Sámi historiography. *Arktika i Sever* (27), 103–126. http://doi.org/10.17238/issn2221-2698.2017.27.117.

[10] Ibid. (see footnote 9).

[11] Viallon, M. (2018). "We Are the Land and the Land Is Us"—Analyzing the Construction of Sami National Identity in Sami Political Discourse on Land and Natural Resources.

[12] Viallon, M. (2018). "We Are the Land and the Land Is Us"—Analyzing the Construction of Sami National Identity in Sami Political Discourse on Land and Natural Resources.

2 Muohta[13]: The Snow on the Ground and What It Tells

Glaciers can be understood as history books. The different layers of ice in an ancient glacier show us climatic, soil, and temperature conditions from distant times. This happens because ice forms differently depending on temperature, pressure, pollution, solar radiation, winds, and other weather conditions.

Ice, snow, frost, glaciers, freezing, and blizzards are an important part of the Sámi culture and way of life. According to them, the location of the Sápmi ancestral territory, on the northern border of Norway, Sweden, Finland, and Russia, favours this close relationship with water in its most solid state and low temperatures and has enabled their traditional way of life since time immemorial.

This relationship with ice has yielded an ancient traditional knowledge system about the region's climatic conditions that underpins and enables the Sámi way of life in the place. The climate and snow are decisive for the survival condition of reindeer, an animal whose herding is fundamental in the Sámi social organisation, and for this reason, they are watched very closely.[14]

Knowledge about ice and snow, the ability to read the weather daily, predict the snowfall season, and observe the herd's relationship with the snow and their grazing location are essential for successful reindeer herding. This knowledge, passed from generation to generation, forms a system of knowledge about ice and snow that is unique to the Sámi.

To communicate this system, they use the Sámi language, which expresses all the complexities of traditional knowledge regarding ice. It has at least 318 concepts related to ice and snow, with words to designate different types of snow and snow conditions.[15] In this sense, this relationship established between the Sámi people and the snow in their territory influences the cultural specificities of their ethnic group, influencing their way of life, their traditional system of knowledge, and their language.

[13] Muohta is a northern Sámi word that can be translated as "snow in the ground".

[14] Eira, I. M. G. (2022). Understanding Sámi reindeer herders' knowledge systems of snow and ice. *The Sámi World*, 181–196.

[15] Eira, I. M. G. (2022). Understanding Sámi reindeer herders' knowledge systems of snow and ice. *The Sámi World*, 181–196.

Understanding ice also includes the knowledge system about reindeer herding, as this would not be possible without a deep awareness of the climatic conditions. They shape a Sámi way of thinking, encompassing a range of disciplines such as geology, geography, meteorology, hydrology, biology, topography, animal welfare, herding, and adaptation strategies to climate and terrain.[16]

Therefore, each type of snow conceptualised by the Sámi language provides unique knowledge about the environment in which they are and how this snow affects the herd, bearing in mind that snow is enormously affected by climatic conditions such as wind, temperature, atmospheric pressure, and solar radiation. Accurate analysis of the first snowfall of the season, for example, is essential to understanding what winter will be like, since the conditions in which the snow first precipitates provide distinctive layers of ice on the ground. This affects the pasture where the snow falls in different ways. In addition, reading the different layers of snow and ice that cover the ground in different areas during different times of the year is also essential. It is worth highlighting that both snow and ice are dynamic concepts that vary concerning time, climatic conditions, and location, reflecting the holistic understanding of Sámi regarding these elements in their territory.[17]

The freezing of lakes and rivers is also an important part of this knowledge system. For years, Sámi groups have monitored the freezing of these bodies of water in their territories, categorising different types of phenomena, according to the possibility of commuting over the ice or danger to livestock and their shepherds.[18]

This close relationship with ice and snow, as well as the observance of the climatic conditions in which they form, makes the Sámi a group especially attentive to climate change. Such variations in the Arctic Circle tend to be greatly felt by communities and their animals, affecting the period of snowfall, the temperature at which the ice that covers the ground forms, the freezing of bodies of water, and the depth and duration of snow layers on the ground.

[16] Ibid. (see footnote 13).

[17] Ibid. (see footnote 13).

[18] Ibid. (see footnote 13).

According to interviews held with Sámi, there is a consensus that the thickness of snow layers, the freezing of bodies of water, and the temperatures at which the first snowfalls occur have been greatly affected in the last 20 years. These changes affect both Sámi history, considering the melting glaciers as lost history books, and the ability of the Sámi to maintain their territory within a traditional way of life.

3 Yby[19] and Johkta[20]: The River and Its Resources

As seen so far, access to water is a condition for survival and building autonomy for any given indigenous community over its territory. However, it is important to note that the view of water as a mere natural resource to be used is closer to a modern and anthropocentric worldview, to which elements of nature matter to the extent that they serve human communities.

In the context of Indigenous communities outlined in this chapter, the meaning of water goes beyond the capitalistic, western notion of a "natural resource"; water is a non-human element in close relation to humans that is capable of influencing how people experience the territory, and how they conceptualise their collective identities and define their belonging to it. The interactions between people and water, as seen with the Aldeia Maraka'nà and the Sámi people, contribute to the culture, community values, and social organisation of their societies, in addition to its property as a natural resource. This section intends to tell the story of the relationship between people and water, highlighting the interconnectedness between humans and the environment and the impact they both have on the well-being of each other.

[19] Yby is the Tupi word for river.

[20] Johkta is the northern Sámi word for river.

3.1 Ỹby

Water and bodies of water have always played an important role in the lives of Indigenous peoples, especially Tupi groups[21] living in the tropical forest. Rivers were and are a privileged habitat, providing food and means of transport. An example of this relationship is demonstrated by the Tupinambá, one of the Tupi groups from the Rio de Janeiro region, in the sixteenth century, considered by missionaries and colonisers to be excellent swimmers and fishermen. The *piracema* season—the time for the reproduction of fish—was associated with a period of festivals in the *aldeias*, highlighting the river as a source of food.[22]

This characteristic of *piracema* being associated with festivals in the *aldeia* also highlights the influence that this non-human actor had on the cultural specificities of this group. In addition to the festivals associated with *piracema*, we could also cite as an example the Enchanted of rivers and bodies of water that populate the narratives of coastal Tupi groups regarding their relationship with rivers, seas, lakes, and lagoons, such as Ipupiara,[23] Iara,[24] and Baétata.[25]

The influence is also seen in the toponyms of places, as is the case of the Maracanã region, named after the Maracanã River that bathes the entire area. Despite being a polluted river nowadays, it is possible to imagine the importance of this watercourse for the Tupi populations that inhabited the Guanabara region during the Portuguese invasion, the Temiminós and Tamoios groups.

In this sense, the pollution of the Maracanã River is also an obstacle to the construction of collective autonomy in Aldeia Maraka'nà. The lack of access to the river as a source of food, water, and transportation, and the denial of access to the municipal water and sewage network after

[21] Indigenous groups along the coast of Brazil who spoke languages from the same linguistic family (Tupi-Guarani) and often shared similar cultural traits.

[22] Prezia, B. A. G., & Dick, M. V. D. P. D. A. (1997). Os indígenas do planalto paulista: etnônimos e grupos indígenas nos relatos dos viajantes, cronistas e missionários dos séculos XVI e XVII.

[23] According to Tupi oral tradition, Ipupiara was a seaman who lived on the coast of Brazil. His name can be translated as "he who is in the water".

[24] According to Tupi oral tradition, Iara or Mãe d'Água, meaning "mother of water", seduced men and drowned them in rivers.

[25] According to Tupi oral tradition, Baétata is a creature resembling a fire snake that appeared on beaches at night. Its name can be translated as "fire thing".

the demolition of LANAGRO imposed the need to purchase water from water trucks for consumption, altering the cultural specificities of ethnic groups that occupy the space. A recurring joke among them is the need to "go fishing on the Extra River", in reference to buying fish at the nearby supermarket instead of fishing them.

Even so, despite some of the occupants' disbelief in the viability of river water, a well was built in the *aldeia* and is capable of capturing groundwater. Despite not being suitable for human consumption, it is not as contaminated as river water and can be used for household chores, the bathroom, watering plants, and offering it to pets, reducing the need to purchase water trucks.

However, even with access to water through the well, the occupation still faces difficulties. As stated by one of the occupants, it is possible to tell the story of Aldeia Maraka'nà only through the water. Pumps, considered the "heart of the Village" and necessary to take water from the well to water tanks that supply the bathrooms, are frequently stolen. Hence, building autonomy becomes a dynamic process both from the relational point of view of collective construction and from the practical point of view of the need to obtain resources for the survival of the occupation.

3.2 Johkta: Ellos Eatnu

The Johkta River in Alta, Sápmi region, shared a comparable history with the Yby. Similarly to the Yby River, The construction of the dam on the Alta River affected both the reindeer herds, salmon fishing, and the quality of the river, and impacted the lives of the residents of the Mazé village and the local ecosystem.

The dam construction project represents both this difference in the modernist worldview of the Norwegian state, of the river only as a resource to be used, and the developmental and neo-colonial project undertaken by this state in the Sápmi region, marginalising other worldviews and knowledge.

The Norwegian State understood the Alta River valley as an empty area, not used for agriculture, not linked to any particular form of life,

and, therefore, worthless. With that, flooding wouldn't be a problem.[26] This point of view is contested by Sámi in the region:

> Sometimes land is not used for some time, but it may be used again at some point. It does not cease to be part of the territory because it is not used. Sometimes it is used only as a passage, but it also has its importance.—E.V., 73 years old, Sámi resident[27]

The village of Mazé was responsible for large reindeer herds, a pastoral activity closely linked to the Sámi identity, and the Alta River was part of the migration route of approximately 40,000 reindeer. The flooded areas were used as a nursery by these reindeer.[28]

Furthermore, the construction of the hydroelectric plant involved the construction of transport infrastructure, roads, and highways, which had secondary effects on the migration route of reindeer in the area.[29]

The Sámi notion of territoriality is notably distinct from the 'Western' concept. For the Sámi, tracing boundaries between different places is a complex task, as their activities are intrinsically linked to the changing circumstances of nature. This means that the areas in which they carry out their activities can extend and overlap with territories belonging to other groups. Furthermore, social reciprocity plays a fundamental role in everyday life and activities.[30]

Siida, understood as a territorial concept, represents this deep connection with the environment and the community. Within Sámi circles, ecological factors such as animal behaviour, climatic conditions, snow, and pastures are essential elements in defining the territory. Likewise, social factors such as kinship and partnerships play a significant role in

[26] Briggs, C. M. (2006). Science, local knowledge and exclusionary practices: Lessons from the Alta Dam case. *Norsk Geografisk Tidsskrift/Norwegian Journal of Geography, 60*(2), 149–160.

[27] Interview conducted by Natalia in November 2023.

[28] Briggs, C. M. (2006). Science, local knowledge and exclusionary practices: Lessons from the Alta Dam case. *Norsk Geografisk Tidsskrift/Norwegian Journal of Geography, 60*(2), 149–160.

[29] Briggs, C. M. (2006). Science, local knowledge and exclusionary practices: Lessons from the Alta Dam case. *Norsk Geografisk Tidsskrift/Norwegian Journal of Geography, 60*(2), 149–160.

[30] Helander, E. (1999). Sami subsistence activities—Spatial aspects and Structuration. *Acta Borealia, 16*(2), 7–25.

how the Sámi understand and establish their territory. Combining these aspects shape a unique perspective on territoriality, where the relationship between the natural environment and social relations is intrinsically intertwined.[31]

However, the slogan of Sámi activists against the construction of the dam was not so much about the impact on human life, but rather the impact on the river itself. The words "Ellos Eatnu" in Sámi, or "la elva leve" in Norwegian, can be translated as "river runs", exemplifying this other Sámi relationship with the river.

Sámi spirituality emphasises the physical and spiritual relationship and connection between humans and elements of nature. It understands the human not as opposition, but as part of the so-called nature, which, for them, is a relational concept that implies reciprocity and indivisibility of the human being with nature.[32]

The need for movement is also a very present idea in Sámi cultural specificities. Originally a semi-nomadic people who followed the migration of wild reindeer, even after their sedentarisation, influenced both by the colonisation of the Scandinavian states and by socioeconomic changes, they continue to follow the migration of their herds.

Nomadism in the Arctic is closely linked to the issue of indigeneity. This way of life generates a different relationship with the territory, understanding humans as part of that territory, whereas the relationship established between sedentary settlers is fixed and centralised in the metropolis.[33]

The sedentarisation of the Sámi population was also a state enterprise. In the eyes of the public authorities, sedentarisation in the nineteenth century separated the Sámi population from the "civilized" population. This sedentarisation occurred in an intergenerational process of assimilation.[34]

[31] Ibid. (see footnote 28).

[32] Porsanger, J. (2010). Indigenous Sámi religion: General considerations about relationships. In *The diversity of sacred lands in Europe: Proceedings of the third workshop of the delos initiative–Inari/Aanaar* (pp. 37–46).

[33] Weld, S. P. (2020). Sámi Selves in the Northern Landscape: Nomadism and indigeneity in Swedish classics for children. *Barnelitteræ rt forskningstidsskrift, 11*(1), 1–12.

[34] Kortekangas, O. (2020). The nomads, the settlers and the in-betweens: Nordic clergymen on Sámi livelihoods in the early nineteenth century. *History and Anthropology*, *31*(4), 510–525.

We can also understand *joik* as a phenomenon of this understanding of the need for movement. *Joiks* are specific Sámi ways of singing and talking about a relationship. A *joik* attempts to represent the essence of a person, place, or animal through a vocal expression, a melody, not necessarily a fixed lyric.[35]

> When you are joiking you are not joiking about the mountain or the wolf, you are joiking the wolf itself. That's why the joik is unique, each one has their own, like a fingerprint. Whether I joik for you is different than how I joik for my mother. Joik also has a lot of its relationship with joiking.—E. V., 73 years old, Sámi resident[36]

The lyrics of a *joik*, if any, change, but not its melody. The lyrics may change depending on who sings and who imprints on them their relationships with what is being sung, be it a place, a person, plants, or animals, but the melody remains the same. *Joik* is a way of both singing and talking about the lives and relationships of these *singers* with the melody and the object of the song.

Like a river, the waters change but their route remains the same; fluidity and permanence go together, as do the migratory flows of the reindeer and Sámi population in the region.

4 Evaporation: A Drought That Brings Rain

This chapter has demonstrated how the effects of Anthropogenic climate change are felt most abruptly in latitudes in the extreme north and south of the globe, impacting the daily lives of Indigenous communities and the way they relate to the land and water (i.e., non-human elements). The effects of climate change are especially noticeable in these regions due to the increased acceleration of rising water temperatures, biodiversity loss, and changing weather patterns in the north and south.

Aside from the scientific evidence that supports climate change and the rising surface and sea temperatures, this sentiment is deeply felt and experienced by the communities who inhabit these places such as

[35] Hämäläinen, S., Musial, F., Salamonsen, A., Graff, O., & Olsen, T. A. (2018). Sami yoik, Sami history, Sami health: A narrative review. *International Journal of Circumpolar Health, 77*(1), 1454784. http://doi.org/10.1080/22423982.2018.1454784.

[36] Interview conducted by Natalia Medici in November 2023.

the Sámi people in northern Norway. The increase in temperature and, consequently, the reduction in frozen areas and the thickness of snow layers affect the reindeer herds cared for by the Sámi. The harsh climatic conditions of the Arctic have created natural selection that is unique and very sensitive to change. The people who live in these environments also develop unique knowledge systems about the territory they inhabit and build their collective identities based on their relationship with the environment. These changes affect both the climate and the social organisation of these communities.

The changes are also felt in different ways in latitudes closer to the Equator. In particular, the population is affected by the effects of river pollution that mark the relationship of modern society with the non-human elements of its environment, seen as resources. Pollution, consequent sedimentation, and reduction of the Maracanã River are obstacles to the construction of collective autonomy for Aldeia Maraka'nà. It changes the way of life and cultural specificities of groups that were once fishermen and are now forced to buy fish and water from external suppliers.

These Sámi and Aldeia Maraka'nà experiences with climate change also refer to other common experiences of these two groups: colonisation, marginalisation, exploitation, and forced assimilation. The changes brought about by colonisation, both environmental and societal, resulted in the marginalisation of these minority groups, exploitation of land and people, and involuntary assimilation of these people. However, as Mignolo[37] points out, the oppressive logic of coloniality also produces energy in marginalised, invisible, and expropriated peoples of distrust and reaction to domination. This energy can be expressed in different forms of resistance, more or less open to colonial logic.

Some of these forms of resistance common to both the Sámi and the Aldeia Maraka'nà are ethnic resurgences, resumptions, and revitalisations of culture. In recent years, the Sámi have experienced a movement to revalue cultural specificities and relations with the territory. Likewise, the Indigenous movement in Brazil has carried out actions to regain territory, also structured by recovering ethnic identity.

[37] Mignolo, W. (2008). El pensamiento des-colonial, desprendimiento y apertura: un manifiesto. *Revista Telar* ISSN 1668-3633, (6), 7–38.

These movements imply a change in the way we see the world. It is no longer a Modern and anthropocentric way of looking at the environment, seeing it as a resource. It is a more relational and holistic logic of understanding the world, overcoming the hierarchical opposition between man and nature. With this, they establish other relationships with the environment that affect non-human elements and shape the collective identities of human groups. Considering the need to combat climate change to guarantee the survival of humanity as a species, this change in perspective is increasingly urgent and necessary.

This chapter set out to follow the path of water in its varied physical states: ice, water, and, finally, evaporation. It is clear how evaporation and resulting drought affect life in different parts of the globe. However, more than the drying up of rivers and the sublimation of glaciers, the Anthropocene also brought drought and the disappearance of forms of life through colonialism and the forced assimilation of peoples.

Recent indigenous mobilisations for recovery and revitalisation, however, remind us that evaporation is not the end of water, but part of a cyclical movement that brings precipitation. Hence, movements to resume and revitalise other forms of life can show the way towards establishing new sustainable relationships with nature and, like rain, allow the continuity of life on the planet.

5 Conclusions

This chapter delves into the intricate dynamics between human societies and non-human beings, emphasising the interconnectedness that is foundational to Indigenous worldviews. By undertaking a comparative exploration of two distinct Indigenous realities, situated in the Arctic region and Latin America, the study sheds light on the profound implications of human interactions with a vital non-human element: water.

In the realms of Indigenous cosmogonies, the relationships between humans and non-humans extend far beyond mere resource provision.[38] These relationships form the very essence of Indigenous territories, ways of knowing, language, culture, and collective identities. This perspective challenges conventional notions of territory as a legal-political construct,

[38] Napoleon, V. (2012). Thinking about Indigenous legal orders. In *Dialogues on human rights and legal pluralism* (pp. 229–245). Dordrecht: Springer Netherlands.

introducing a richer understanding of territory as a dynamic dimension of objects, actions, and identity. The articulation of the human-water relationship is paramount in this research, portraying water not merely as a natural resource but as a constant and integral participant in the human experience.[39] This approach aligns with the ontological shift in ecological legal research that recognises the inextricable ties between humans and their environments, surpassing the Western-centric views rooted in the Anthropocene and the dominance of human beings over nature.[40]

This research proposes a re-reading and enriches the ultimate goal of the Agenda 2030, striving to leave no one behind. By spotlighting Indigenous cosmovisions and their significance in shaping human society and non-human interactions, the study contributes to the ongoing discourse on decolonising research. It calls for a re-evaluation of sustainability frameworks to include Indigenous knowledge, recognising its pivotal role in fostering an integrated and inclusive understanding of planetary health.

As a crucial component of future research endeavours, it is recommended to continue amplifying Indigenous voices, ensuring their knowledge and worldviews are given due recognition and influence. This approach aligns with the principles of inclusivity and acknowledges the valuable contributions Indigenous communities can make towards a sustainable and interconnected future for all.

[39] Along these lines, see Archambault, D. (2021). The indigenous perspective on water: A source of life, not a resource. *Sustainable Industrial Water Use: Perspectives, Incentives, and Tools*, 15.

[40] Poto, M. P. (2022), Environmental Law and Governance: The helicoidal pathway of participation. A study of a nature-based model inspired by the Arctic, the Ocean, and Indigenous views, Giappichelli, Torino, p. 159.

CHAPTER 8

Arctic Vulnerability: Examining Biosecurity Risks Amidst Climate Change

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M. P. Poto supervised the first draft of this research and provided insights on how to refine and shape this project idea into educational and research content.
E. M. Murray proofread the chapter and added to the conclusions to connect the case of the Arctic region, One Health and biosecurity to the overall objectives of the book.

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Abstract Building on the objectives of a working paper, this chapter explores the intricate relationship between the Arctic Circle, climate change, and One Health. The Arctic is exceptionally susceptible to climate change, warming three times faster than the global average, leading to increased melting of snow, ice sheets, and permafrost. These changes heighten the vulnerability of flora, fauna, and Indigenous communities that thrive in this ecosystem. Additionally, thawing permafrost releases numerous toxins and revives dormant microorganisms, increasing biosecurity risks to human, animal, and plant health. Urgent enhancement of health surveillance is essential to identify and contain potential zoonotic disease outbreaks promptly. Informed by the One Health approach which emphasises the interconnection of environmental, animal, and human well-being, this working paper aims to enrich existing literature by systems mapping diverse One Health surveillance systems in this region. The overarching goal is to improve public health outcomes in the Arctic Circle by fostering transdisciplinary collaborations and addressing challenges associated with implementing the One Health framework in this vast and unique landscape. Aligned with the United Nations 2030 Agenda for Sustainable Development, emphasising transformative actions for planet protection, this paper advocates for the successful integration of the One Health framework to improve the holistic health of the ecosystem. In doing so, it supports ecological education and contributes to the overall goal of safeguarding the planet.

Keywords Sustainability · Research · One Health · Arctic

1 Introduction: Overview of the Working Paper and Case Study

Human-induced climate change is irreversibly transforming the world, and these effects are even more accelerated in the Arctic Circle where warming temperatures are melting snow, icesheets, and permafrost that

have protected and supported this environment for centuries.[1] Unfamiliar transformations of the ecosystem are increasing the vulnerability of the flora, fauna, and Indigenous residents who live in this region, and compromising their ability to adapt and thrive. Thawing permafrost is concerning because biogeochemical toxins that have laid frozen for millennia are now being reintroduced into the environment.[2] Additionally, microorganisms adapted to extreme temperatures are also being revived, posing potential threats to the region's ecosystem.[3] The focused case study elaborates on this phenomenon and expands on the biosecurity risks to human, animal, and plant health. To mitigate these risks, there is an urgent need to enhance health surveillance in this region so that zoonotic disease outbreaks can be quickly identified and contained.

An important component of an efficient and successful health surveillance programme for the Arctic is the One Health framework.[4] This framework recognises that the health of the people, animals, and ecosystem are intimately interconnected and that holistic strategies need to be embraced for building resistance against the devastating effects of climate change and to restore balance and well-being to this region. Although research in this field is gaining traction, there is currently a knowledge gap on what the existing pathways for human, animal, and environmental disease surveillance are within the various countries in the Arctic Circle. This is largely because of the geopolitical vastness of this region, as well as complex challenges associated with implementing the framework.[5] In the capacity of a working paper, the goal is to enrich the existing literature by systems mapping the diverse One Health surveillance systems currently in place. Through the creation of a comprehensive visual representation of these systems, the aim is to promote the One

[1] For more detailed look at climate change statistics in the Arctic, see Norsk Polar Institute. Climate Change in the Arctic. Available at https://www.npolar.no/en/themes/climate-change-in-the-arctic/#toggle-id-1, last access 28 October 2023.

[2] See Miner, K. R., D'Andrilli, J., Mackelprang, R., Edwards, A., Malaska, M. J., Waldorp, M. P. & Miller, C. E. (2021). Emergent biogeochemical risks from Arctic permafrost degradation. *Nature Climate Change, 11*, 809–819.

[3] Ibid. (see footnote 1).

[4] For more information on the One Health approach, see Reynolds, A., Kutz, S., & Baker, T. (2022). A holistic approach to one health in the Arctic. In M. Tryland (Ed.), *Arctic One Health*. Cham: Springer.

[5] Ibid. (see footnote 2).

Health approach in the region. This involves identifying opportunities for transdisciplinary collaborations and elucidating strategies for successful integration to improve public health outcomes in the Arctic Circle.

2 Background

2.1 Arctic Circle and the Arctic Council

The Arctic Circle denotes an area of exceptional natural beauty and harsh environmental circumstances. It is an imaginary line that circles the Earth at roughly 66.5 degrees latitude north (precise coordinates vary depending on the Earth's axial tilt). Geographically, the Arctic Circle passes through several countries and regions, including parts of Norway, Sweden, Finland, Russia, the United States (Alaska), Canada, Greenland, and Iceland. The vast region encircled by the Arctic Circle is home to a multitude of ecosystems ranging from the Arctic Ocean to frozen tundra and icy landscapes, all of which support unique and resilient plant and animal life. Apart from its geographical relevance, the Arctic Circle bears cultural, ecological, and geopolitical significance. These northern regions have been home to generations of Indigenous peoples who have adapted their ways of life to meet the unique opportunities and challenges presented by the Arctic environment.

The Arctic Council which was originally established to protect the environment and people of this region, consisting of eight Arctic states (Canada, Finland, Denmark, Iceland, Norway, the Russian Federation, Sweden, and the United States) and six permanent participants as represented by the Indigenous Peoples of the Arctic.[6] Regional diplomacy was severely impacted by the invasion of Ukraine by the Russian Federation in 2022 which directly resulted in the suspension of Russia from the Council and, motivated the historically neutral countries of Finland and Sweden to join the North Atlantic Treaty Organization (NATO).[7] These fractured political relationships add a layer of complexity and constraint to the

[6] More information on the Arctic Council can be accessed online at https://arctic-council.org/about, last access 28 November 2023.

[7] McVicar, D. (2022). How the Russia-Ukraine war challenges Arctic governance. Council on Foreign Relations. https://www.cfr.org/blog/how-russia-ukraine-war-challenges-arctic-governance, last access 27 November 2023.

climate-change-related biogeochemical transformation that this region is currently undergoing.

2.2 *Effects of Climate Change on the Arctic Ecosystem*

The Arctic region is extremely sensitive to global warming, making it a key reference point for studying the effects of climate change on Earth.[8] Traditionally, the Arctic has been covered in snow, ice, and permafrost, forming a reflective surface that collectively deflects 80% to 90% of the sun's radiation through the albedo effect.[9] This phenomenon helps preserve cooler temperature ranges in the region. With the acceleration of global warming, there is a melting of these elements, leading to the expansion of land and water areas that absorb heat, thereby contributing to Arctic heating. In fact, it is warming three times faster than the global average, and it is predicted that within the next three decades, summers in the Arctic will become completely ice-free leading to irreversible consequences both locally and globally.[10] This has profound implications for the delicate ecological balance that exists between the flora, fauna, and Indigenous Peoples of this region.

The Arctic tundra biosphere is characterised by a region of low-growing, treeless vegetation that is cold-resistant, extending from the Arctic Ocean in the North to the boreal forests in the South. Historically, extreme living conditions in the Arctic region have been inhospitable to most life forms and only the sturdiest of species have evolved and adapted to this unique ecosystem. Recent decades of global warming, accompanied by the rapidly melting sea ice evoked physical and biological changes in this region resulting in "the greening of the Arctic".[11] These developments along with human influences through transportation networks, are

[8] For more detailed look at climate change statistics in the Arctic, see Norsk Polar Institute. Climate Change in the Arctic. Available at https://www.npolar.no/en/themes/climate-change-in-the-arctic/#toggle-id-1, last access 28 October 2023.

[9] To read more about albedo effect, see NSIDC. Sea Ice. https://nsidc.org/learn/parts-cryosphere/sea-ice/quick-facts-about-sea-ice, last access 28 October 2023.

[10] On the key trends and impacts of climate change in the arctic, see the following policy brief: Arctic Monitoring and Assessment Programme. (2021). *Arctic Climate Change Update 2021: Key Trends and Impacts*. https://oaarchive.arctic-council.org/server/api/core/bitstreams/952ce558-b096-458c-9bed-89e1cc9129ba/content.

[11] Frost, G. V., Macander, M. J., Bhatt, U. S., Berner, L. T., Bjerke, J. W., Epstein, H. E., Forbes, B. C., Goetz, S. J., Lara, M. J., Phoenix, G. K., Serbin, S. P., Tømmervik,

encouraging the influx of non-native plant life into the Arctic environment. This, in turn, enables the migration of alien animal species and insects to the tundra, significantly impacting the ability of indigenous species to survive and flourish in this area.[12] Arctic biosecurity issues are further amplified because these intruders carry new parasites and diseases that pose a threat to existing biodiversity and place numerous species at immediate risk of disease and extinction.[13]

For centuries, the Indigenous people of the Arctic have thrived in this region, forming deep connections with its various elements such as the land, water, snow, ice, animals, and plants. The delicate balance of this interconnected system is disrupted when any one component is affected. Recent climate changes have wreaked havoc within this intricate ecosystem, severely impacting the traditional knowledge and practices that have been passed down through generations.[14] These practices are mostly weather- and environment-sensitive, both of which have become erratic due to global warming. Daily activities like hunting, fishing, and reindeer herding have become riskier as journeys over sea ice are now more unpredictable, with thawed and frozen water bodies coexisting in close proximity.[15] Similarly, the availability of traditional foods such as

H., Walker, D. A., & Yang, D. (2022). Arctic Report Card: Update for 2022. *NOAA*, 1. http://doi.org/10.25923/g8w3-6v31.

[12] For more details on the zoonotic diseases, see Waits, A., Emelyanova, A., Oksanen, A., Abass, K., & Rautio, A. (2018). Human infectious diseases and the changing climate in the Arctic. *Environmental International, 121*(1), 703–713.

[13] To explore the impact of climate change on polar ecology, see Rew, L. J., McDougall, L., Alexander, J. M., Daehler, C. C., Essl, F., Haider, S., Kueffer, C., Lenoir, J., Milbau, A., Nuñez, M. A., Pauchard, A., & Rabitsch, W. (2020). Moving up and over: Redistribution of plants in alpine, Arctic, and Antarctic ecosystems under global change. *Arctic, Antarctic, and Alpine Research, 52*(1), 651–665. http://doi.org/10.1080/15230430.2020.1845919.

[14] For more in-depth analysis on the relationship between Indigenous peoples in the Arctic and climate change, see Almonte, M. P. (2023). Vulnerability in the Arctic in the context of climate change and uncertainty. The Arctic Institute. https://www.thearcticinstitute.org/vulnerability-arctic-context-climate-change-uncertainty/, last access 30 November 2023.

[15] Ibid. (see footnote 12).

berries, herbs, whales, seals, etc. is also negatively influenced by temperature changes and Arctic greening which further cripples the ability of Indigenous residents to live healthy lives.[16]

2.3 One Health

To protect the holistic health of the region, an innovative approach needs to be embraced. One Health is a comprehensive and coordinated strategy that aims to optimise the health of people, animals, and ecosystems in a sustainable way by acknowledging and respecting the deep interconnections that exist between them.[17] One Health is particularly suitable for the vastness of the Arctic region since it recognises the importance of working at the local, regional, national, and global levels, rather than a siloed approach.[18] Furthermore, the interconnectedness between people, animals, and their ecosystems constitutes a worldview that is reflective of and in alignment with Indigenous teachings and experiences.[19] The Arctic Council's Sustainable Development Working Group along with multinational stakeholders such as The Canadian Arctic One Health Network[20] and others, have been promoting One Health initiatives in this region. The goal is realised by establishing a platform for transdisciplinary communication and collaboration among experts in human, animal, and environmental sciences, as well as other stakeholders, including policymakers. The primary objective is to monitor and mitigate public health threats arising from the transmission of diseases among humans, animals, plants, and the environment. The challenges to implementing One Health in this region arise from the complex geopolitical relationships that exist within the vast Circumpolar North.

[16] Ibid. (see footnote 12).

[17] See World Health Organization. (2017). One Health. https://www.who.int/news-room/questions-and-answers/item/one-health, last access 29 November 2023.

[18] See Centers for Disease Control and Prevention. (2023). One Health Basics. https://www.cdc.gov/onehealth/basics/index.html, last access 5 December 2023.

[19] The parallels between Indigenous worldview and One Health framework are further elaborated in Hueffer, K., Ehrlander, M., Etz, K., & Reynolds, A. (2019). One health in the circumpolar North. *International Journal of Circumpolar Health, 78*(1), 1607502. https://doi.org/10.1080/22423982.2019.1607502.

[20] More on The Canadian Arctic One Health Network can be accessed on https://arcticnet.ulaval.ca/project/the-canadian-arctic-one-health-network/, last access 30 November 2023.

3 Case Study

3.1 Thawing Permafrost and Arctic Biosecurity

Rising temperatures from global warming are contributing to the accelerated and erratic thawing of the region's permafrost which is a layer of soil that has remained frozen for at least two consecutive years. It functions as an extensive reservoir for biological, chemical, and radioactive materials that have been preserved for millions of years.[21] In fact, permafrost has been labelled as one of the most significant carbon reservoirs on Earth. With continued thawing, primitive, extreme-temperature resistant microorganisms are reawakened, potentially impacting the health of the arctic ecosystem, increasing the risk of zoonotic diseases, and posing an immediate biosecurity risk to plant, animal, and human health in this region and beyond.[22]

What is particularly concerning to researchers is that even small pockets of permafrost contain a substantial variety of active, unknown microbial and viral species which cripples the ability of scientists to perform risk assessments because of the vast expanse of this region.[23] Most viruses and bacteria found in permafrost so far mostly infect non-human hosts, such as plants and microorganisms. Even though the chances of human transmissions are statistically low, exposure of naïve immune systems to even one of these pathogens is deeply concerning because of the catastrophic potential to initiate a novel pandemic.[24] This scenario has been candidly labelled by the World Health Organization (WHO) as Disease

[21] For an insightful article that elaborates on the mechanisms behind permafrost melting and their potential impact on Arctic ecosystem, see Miner, K. R., D'Andrilli, J., Mackelprang, R., Edwards, A., Malaska, M. J., Waldorp, M. P., & Miller, C. E. (2021). Emergent biogeochemical risks from Arctic permafrost degradation. *Nature Climate Change, 11*, 809–819.

[22] Ibid. (see footnote 19).

[23] Further information on biosecurity risks can be accessed on National Academies of Sciences, Engineering, and Medicine. (2020). *Understanding and Responding to Global Health Security Risks from Microbial Threats in the Arctic: Proceedings of a Workshop*. Washington, DC: The National Academies Press. https://doi.org/10.17226/25887.

[24] Fears, R. (2020). Arctic warming and microbial threats: Perspectives from IAP and EASAC following an international academies' workshop. The InterAcademic Partnership. https://www.interacademies.org/59586/Arctic-warming-and-microbial-threats, last access 28 November 2023.

X.[25] Disease X is included to signify an unidentified pathogen with the potential to trigger a severe global epidemic.

Moreover, genomic testing on human and animal mummies that have resurfaced from ancient burial grounds because of melting permafrost, have revealed genetic material capable of causing historically destructive pandemics such as the smallpox and influenza ones. An outbreak of Anthrax in reindeer herds in the Yamal Peninsula in the Russian Federation in 2016 was attributed to the exposure of herds to Anthrax spores from thawing permafrost.[26] This outbreak resulted in the death of more than 2,000 reindeer and one child. Our experience with the recent Coronavirus pandemic and the ability of pathogens to transcend species and international borders is a stark reminder of the devastating global repercussions of local epidemics. As elaborated above, the effects are even more immediate for the Indigenous peoples of the Arctic, whose lives and livelihoods are impacted daily by the effects of global warming and the resulting biogeochemical threats that fill their environment.

3.2 The One Health Approach

The One Health approach is a vital element for developing an effective and successful health surveillance programme in the Arctic.[27] This approach recognises and emphasises the interconnectedness of people, animals, and the environment, understanding that the health of one is intricately linked to the health of others. By considering these elements as an integrated whole, the One Health approach provides a comprehensive framework for understanding and addressing health challenges in complex ecosystems like the Arctic. While research in the One Health field is gaining momentum, there exists a notable gap in understanding

[25] See World Health Organization. (2022). *WHO to identify pathogens that could cause future outbreaks and pandemics*. WHO. https://www.who.int/news/item/21-11-2022-who-to-identify-pathogens-that-could-cause-future-outbreaks-and-pandemics, last access 27 November 2023.

[26] For more on Anthrax outbreak in the Arctic, see Stella, E., Mari, L., Gabrieli, J., Barbante, C., & Bertuzzo, E. (2020). Permafrost dynamics and the risk of anthrax transmission: A modelling study. *Scientific Reports, 10* (16460).

[27] For more information on One Health strategy in the Arctic, see Ruscio, B. A., Brubaker, M., Glasser, J., Hueston, W., & Hennessy, T. W. (2015). One Health—A strategy for resilience in a changing arctic. *International Journal of Circumpolar Health, 74*, 27913.

and establishing the existing pathways for human, animal, and environmental disease surveillance specifically tailored to the Arctic region. The unique environmental conditions, the presence of Indigenous communities, and the distinct wildlife in the Arctic necessitate a specialised and integrated surveillance system. Understanding these pathways is crucial for identifying potential health threats and ensuring a timely and effective response to emerging issues.

The current lack of integration in disease surveillance pathways poses challenges to public health in the Arctic. Bridging this gap requires a systematic approach to mapping and understanding the existing One Health surveillance systems in place. This working paper aims to contribute to the scientific literature by undertaking a comprehensive system mapping exercise. By delineating the structures and functions of various One Health surveillance systems currently operational in the Arctic, the paper aims to provide insights into the strengths, weaknesses, and potential areas for improvement. Such an analysis is essential for fostering collaboration between diverse disciplines, facilitating knowledge exchange, and ultimately enhancing the overall effectiveness of One Health in the Arctic region. The findings and recommendations from this working paper could inform future strategies for health surveillance, contribute to policy development, and strengthen the resilience of Arctic communities against emerging health challenges.

4 Conclusion

Climate change has destabilised the Arctic landscape, and its effects are threatening to impact the health and well-being of humans, animals, and the environment. The consequences of health risks, affecting both Arctic populations and those beyond, underscore the need for extensive and varied collaborations among stakeholders. These collaborations aim to deepen our fundamental understanding of emerging health threats and foster the creation of joint initiatives that reduce vulnerabilities for human and animal communities, as well as the environment. Recognising the interconnected existence of these elements, it is necessary to amplify the health surveillance programmes within the Arctic to recognise zoonotic outbreaks and to facilitate immediate response to contain them. Through systems mapping, this research will aim to create a visual representation of health surveillance within the region so it can facilitate more meaningful transdisciplinary collaborations.

Emphasising and fortifying ties with Indigenous communities in the Arctic is crucial for biosecurity initiatives. These communities hold invaluable knowledge and spiritual connections deeply ingrained in the region. Incorporating their insights into health surveillance efforts is not just essential but also a matter of respect, considering their traditional lifestyles and expertise in navigating the land and sea. Indigenous communities serve as vital stewards of the Arctic environment, and their perspectives can greatly enhance our understanding of the intricate dynamics at play.

The United Nations 2030 Agenda for Sustainable Development emphasises the necessity for global communities to dedicate themselves to transformative actions aimed at safeguarding the planet. This chapter seeks to further the Agenda 2030 by actively advocating for the One Health approach in the Arctic region and beyond. Incorporating the One Health approach as a strategy to strengthen biosecurity in the Arctic region simultaneously contributes to several Sustainable Development Goals (SDGs) and draws attention to the interconnectedness of the goals themselves, such as SDG 3 Good Health and Well-Being, SDG 13 Climate Action, SDG 14 Life below water, SDG 15 Life on land, SDG 16 Peace, justice, and strong institutions, and SDG 17 Partnerships for the goals.[28,29] Mitigating the negative effects that the changing Arctic environment has on the health of humans and animals requires action across multiple levels of government and transdisciplinary collaboration between various stakeholders[30] to better protect the natural ecosystems that constitute the Arctic region.[31] Improving the health of the environment consequently improves the health of humans and animals, and instilling an awareness of the risks that environmental degradation plays

[28] Hossain, K. (2022). Climate change challenges in the Arctic. In *The Palgrave Handbook of Global Sustainability*. Palgrave Macmillan.

[29] For an overview of The 2030 Agenda for Sustainable Development, see https://www.un.org/development/desa/jpo/wp-content/uploads/sites/55/2017/02/2030-Agenda-for-Sustainable-Development-KCSD-Primer-new.pdf, last access 28 November 2023.

[30] Sjöberg, Y., Bouchard, F., Gartler, S., Bartsch, A., & Zona, D. (2023). Focus on Arctic change: Transdisciplinary research and communication. *Environmental Research Letters, 18*, 010201.

[31] Ruscio, B. A., Brubaker, M., Glasser, J., Hueston, W., & Hennessy, T. W. (2015). One Health—A strategy for resilience in a changing arctic. *International Journal of Circumpolar Health, 74*(1), 27913.

on human and animal health has the potential to create a more sustainable human society that makes decisions with a mindset that embodies the characteristics of the One Health approach.

Using this as an example and moving beyond the Arctic, this chapter demonstrates how holistic, transdisciplinary frameworks such as One Health can promote and facilitate effective responses to sustainability challenges while also respecting Indigenous populations and other communities who are disproportionately affected by the changing climate (i.e., low-lying coastal communities).[32] Further, it commits to endorse ecological education on this subject, ultimately contributing to the overarching goal of safeguarding the planet. Although One Health has been conceptualised as an approach specific to optimising health and protecting people and animals from biosecurity and other public health threats, it can be translated into an ecological approach to climate education—one that recognises the interconnectedness of all life forms.[33] Expanding climate education programmes to include topics embodied within One Health such as good governance, public health, systems thinking, and the interconnections between humans, animals, plants, and nature can foster future generations who approach global health and climate change challenges with a holistic, transdisciplinary focus that protects human and non-human communities from harm.[34]

[32] Sjöberg, Y., Bouchard, F., Gartler, S., Bartsch, A., & Zona, D. (2023). Focus on Arctic change: Transdisciplinary research and communication. *Environmental Research Letters, 18*, 010201, cit.

[33] On the One Health approach applied to research and education in the Arctic, see Tryland, M. (Ed.). (2022). *Arctic One Health: Challenges for Northern animals and people*. Springer Nature.

[34] Windsor, S., Maxwell, G., & Antonsen, Y. (2022). Incorporating sustainable development and inclusive education in teacher education for the Arctic. *Polar Geography, 45*(4), 246–259.

CHAPTER 9

Connecting with The Deep: Lifelong Learning (LLL) and Marine Sustainability

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Abstract This chapter frames marine sustainability within ongoing global and regional initiatives in lifelong learning and adult education. The authors of this chapter argue that to achieve the ambitious targets set out in the SDGs, our adult population must be able to recognise, engage with, and act upon economic, social, and environmental challenges. The authors of this chapter present the many barriers that adult learners experience and acknowledge the challenges of participation in non-formal education. We review current research into how we can effectively use

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learning, information, and messaging and see if this can help overcome some challenges, and effectively motivate adult learners to actively participate in pro-climate action and marine sustainability. The authors present The Deep Network, an adult education initiative which brings together multidisciplinary practitioners who support adults to become ocean literate in various ways. We detail the conclusions of The Deep Network meetings and show how practitioners learnt from and with each other to build capacity in marine sustainability and adult education. We conclude by making recommendations for future practice.

Keywords Deep Ocean · Adults · Education · Research · Inclusivity

1 Sustainable Development and Lifelong Learning: Framing the Discussion

In the wake of the COVID-19 pandemic and from the midst of the climate change crisis, governments and policymakers are perhaps becoming more appreciative of the value of a well-informed adult population who are active citizens, engaged employees, critical consumers, and committed community members. Certainly, achieving buy-in at the national and ground-level for the 17 Sustainable Development Goals (SDGs) with 169 targets demands that the acquirement of knowledge, skills, and competencies does not stop when one leaves the formal, standardised education provided by a school system.

Most of the knowledge and skills we need, we learn informally with families, at work, or while socialising.[1] However, at least some of the skills and competencies required for community-level stakeholders to achieve the economic, environmental, and social sustainability outlined in the SDGs will also be learnt by means of non-formal education.[2] Non-formal education (NFE) follows a programme to achieve specific learning goals but is not formally evaluated. There are recognised interrelatedness, crossovers, and grey areas between the terms informal, non-formal, and

[1] Jeffs, T., & Smith, M. K. (1999). The problem of 'youth' for youth work. *Youth and Policy*, 45–66.

[2] UNESCO. (1997). International Standard Classification of Education.

formal adult education, particularly in the labour market.[3] Less disputed, is that adults outside of school and formal learning environments are notoriously hard to engage (particularly through formal or non-formal education) and that NFE offers a real opportunity to change educational outcome, both for societies, and for individuals.[4]

1.1 The Challenge of Participation

Part of the challenges—and the opportunities—are the many, layered factors that determine propensity and likelihood of adult educational participation. A predisposition to autonomous motivation has been shown to drive individuals to complete non-formal programmes,[5] yet recent research on adult education systems as a whole is starting to suggest that this motivation may not just come from within, but maybe a self-perpetuating socioeconomic cycle. Despite a highly developed adult education system, a recent U.S. study showed that 90% of adults aged 20 years and older considered the least educated were those who had not recently participated in formal or non-formal education. Determining factors of participation in this study, as in others, were situational reasons (e.g., increased age, low income), psychological reasons (e.g., low social trust, difficulties in connecting with new ideas), and institutional reasons (e.g., unaffordable fees).[6]

These and numerous other studies tell us that transversal factors continue to have a strong influence on adult education participation. The Incheon Declaration and Framework for Action for the implementation of Sustainable Development Goal 4 sets out in the Education 2030 Agenda[7] to ensure inclusive and equitable quality education and promote

[3] Cameron, R., & Harrison, J. L. (2012). The interrelatedness of formal, non-formal and informal learning: Evidence from labour market program participants. *Australian Journal of Adult Learning*, 52.

[4] Romi, S., & Schmida, M. (2009). Non-formal education: A major educational force in the postmodern era. *Cambridge Journal of Education, 39*(2), 257–273.

[5] Rothes, A., Lemos, M. S., & Gonçalves, T. (2017). Motivational profiles of adult learners. *Adult Education Quarterly, 67*, 3–29. http://doi.org/10.1177/0741713616669588.

[6] Patterson, M. B. (2018). The forgotten 90%: Adult nonparticipation in education. *Adult Education Quarterly, 68*, 41–62. http://doi.org/10.1177/0741713617731810.

[7] Council Resolution on a strategic framework for European cooperation in education and training towards the European Education Area and beyond (2021–2030)

lifelong learning opportunities for all, highlighting that significant gender gaps continue to exist in many educational settings with regard to access, achievement, and uptake. Studies like Boeren's remind us that even when women and men pick up educational opportunities at the same participation rate, psychological and societal factors influence the skills and competencies learnt.[8] For example, this research found that the subjects men choose to study in their NFE are more likely to benefit from their participation in the labour market, while women are more likely to learn skills for the household.[9] Similarly, other demographics are known to experience further barriers to participation in adult education, including migrants, refuges, and the elderly, as well as accessing closed groups such as adults in detention or in long-term care settings. Fortunately, new teaching and learning approaches, such as online learning, are helping to mitigate these barriers from adults accessing non-formal education. While access to digital educational initiatives have the capacity to level some of these barriers, reviews of adult learners participating in online distance education demonstrate that common challenges are still faced by those accessing non-formal courses, depending on their age, gender, knowledge, and skills,[10] and situational tensions (where and when to study, and how to fit this around work and family) still remain.[11]

1.2 A Transversal Commitment to Adult Education Rights, Resources, and Standards

National and local governments have recognised the opportunities (and challenges) of NFE, both as a stand-alone response to SDG 4, but also necessary to provide society with the skills, competencies, and knowledge required to work towards the specific targets and goals of the SDGs and

2021/C 66/01. https://op.europa.eu/en/publication-detail/-/publication/b004d247-77d4-11eb-9ac9-01aa75ed71a1.

[8] Boeren, E. (2011). Gender differences in formal, non-formal and informal adult learning. *Studies in Continuing Education, 33*(3), 333–346.

[9] Ibid. (see footnote 7).

[10] Kara, M., Erdogdu, F., Kokoç, M., & Cagiltay, K. (2019). Challenges faced by adult learners in online distance education: A literature review. *Open Praxis, 11*(1), 5–22.

[11] Selwyn, N. (2011). 'Finding an appropriate fit for me': Examining the (in) flexibilities of international distance learning. *International Journal of Lifelong Education, 30*(3), 367–383.

achieve sustainable development. Beyond SDG 4, education—particularly non-formal, informal, and lifelong learning—is inherently linked to the success of other SDGs and is marked as a transversal commitment across five other SDGs (SDG 13 Climate action, SDG 14 Life below water, SDG 5 Gender equality, and SDG 15 Life on land). Further, improving access to quality education in various contexts is central to the global partnership targets of Goal 17. Education, especially adult education, plays a crucial role in achieving this goal by promoting capacity-building, knowledge-sharing, and fostering collaboration among countries, organisations, and individuals.

The global partnership for improving adult learning and education was recently solidified at the Seventh International Conference on Adult Education on 17 June 2022 where the Marrakech Framework for Action was adopted. Representatives of over 140 countries came together in a commitment to translate the vision of a right to lifelong learning into reality. Each country committed to significantly increasing adult participation in learning and recognised the need for increased financial investment in adult learning and education. In the European Union (EU), lack of participation in adult learning has been identified as a work focus of the European Education Area for the period 2021–2030,[12] so that international initiatives like the Marrakech Framework fit into an existing and longstanding EU commitment to the right to education, training, and lifelong learning, as enshrined in the European Pillar of Social Rights (principle 1). UNESCO Institute for Lifelong Learning[13] has also been working for decades to build capacity, networks, and awareness in lifelong learning, particularly as these align with global challenges.

[12] The European Pillar of Social Rights in 20 principles. https://ec.europa.eu/social/main.jsp?catId=1606&langId=en, last access December 2023.

[13] UNESCO Institute Lifelong Learning. https://www.uil.unesco.org/en/, last access December 2023.

2 What Do Adults Need to Learn About the Ocean, and Does Participation in Learning Change Our Behaviour?

In making these commitments to improve access to resources and training for adult education and lifelong learning, a focus on the climate and the connection between human activity and environmental degradation is important when considering the knowledge, skills, and capacities needed to reach a truly sustainable society. However, at the government level, it is acknowledged that simply knowing that human actions will have a negative consequence on the environment is not enough to actually change our behaviour.

In fact, pro-environmental thoughts and behaviours are weakly linked, and we tend to be surprisingly inaccurate about the environmental impact of our everyday actions.[14] The importance of our seas and oceans has been increasingly recognised in recent years by people who strive to understand climate change and the role humans play. However, the high seas—the waters situated beyond the border of any one country conceptualised as a common-pool resource without clear property rights—can be more difficult for stakeholders to invest in and connect to. Decades of monitoring sustainability policies in common-pool resources have demonstrated that the policies used until now are only effective when they fit with the local culture and institutional environments of those who depend on ecosystems for their livelihood.[15]

Still, despite advances in Education for Sustainable Development (ESD),[16] climate change in general and marine sustainability in particular are not standard among the core curriculum for European students. Indeed there is some evidence that marine education is among the most marginalised in formal school education.[17] As adult learners and teachers,

[14] Wyss, A. M., Berger, S., & Knoch, D. (2023). Pro-environmental behavior in a common-resource dilemma: The role of beliefs. *Journal of Environmental Psychology, 92*. http://doi.org/10.1016/j.jenvp.2023.102160.

[15] Ostrom, E. (2008). The challenge of common-pool resources. *Environment: Science and Policy for Sustainable Development, 50*(4), 8–21.

[16] What you need to know about education for sustainable development. https://www.unesco.org/en/education-sustainable-development/need-know.

[17] Gough, I. (2017). *Heat, greed and human need: Climate change, capitalism and sustainable wellbeing*. Edward Elgar Publishing.

most of us are under-informed not only on how important the seas and oceans are to achieve climate goals but also on what that means to us and what we can do about it. Even tools to ascertain how much we know—such as The Blue Survey of Ocean Literacy Among Adults—are in their infancy.[18] Yet few studies have been conducted on community marine education showing a more positive attitude towards this common resource, in addition to greater compliance with measures put in place to protect it.[19]

Finally, we review what the UNESCO Institute for Lifelong Learning (UIL) has already put in place to strengthen the capacities of Member States to build effective and inclusive lifelong learning policies and systems, in line with SDG 4.

2.1 Climate Change and Altering Human Activity: Current Research

The authors have already noted the extent to which identifying behaviours, and demographic or psychological differences make a difference to adults' participation in education. In this section, we move on to highlight the recent studies that could inform decision-makers, educators, and scientists to predict how a specific sustainability message will make an impact, therefore helping educators to become more effective in designing education and communication to promote climate-positive beliefs and actions. We go on to note that studies show that being close to nature helps promote empathy and action and that communication and sharing of experience is a powerful means for change. Finally, we respond to the question: when we are designing educational initiatives for adults, how can we use all dimensions of learning and engagement to evoke change?

Without the benefit of a curriculum, encouraging adult climate action requires adjusting communication techniques and creating different "entry points" to fit each audience. Surveys are good tools to determine

[18] Paredes Coral, E., Deprez, T., Mokos, M., Vanreusel, A., & Roose, H. (2022). The Blue Survey: Validation of an instrument to measure ocean literacy among adults. *Mediterranean Marine Science, 23*(2), 321–326.

[19] Leisher, C., Mangubhai, S., Hess, S., Widodo, H., Soekirman, T., Tjoe, S., … Sanjayan, M. (2012). Measuring the benefits and costs of community education and outreach in marine protected areas. *Marine Policy, 36*(5), 1005–1011.

the overall behaviour and attitudes of a population while simultaneously collecting data on relevant information like demographics and political preferences.[20] Currently, it seems that there is not much known about the ocean among the general adult population, and many adults outside of the scientific community are not aware to what extent the ocean's role is in climate change.[21] In a recent study by Kácha et al.,[22] it was found that 42% of European adults were "indifferent" to climate-change-related issues ($n = 22{,}189$), signifying that they had low belief, concern and motivation in regard to taking action to mitigate the impacts of climate change. Although they are not denying it, a large proportion of the population admits to not acknowledging and/or even thinking about the issue.

If we, as a society, are to achieve the ambitious sustainable development goals and improve social, economic, and environmental outcomes for all, we need to develop strategic, engaging ways to improve ocean literacy (and ecological literacy in general) among adult learners to move this 42% of the unmotivated population into a more participatory role in a sustainable society. Grund and Brock found that one of the main approaches to shifting mindsets leading to sustainable behaviour and attitudes is fostering a connection to nature. If we feel connected to something and care about it, there is an increased likelihood that we will want to protect it—linking our actions directly to our emotions.[23] This important connection between action (behavioural) and emotion (emotional) has been recognised by the United Nations Educational, Scientific and

[20] Calculli, C., D'Uggento, A. M., Labarile, A., & Ribecco, N. (2021). Evaluating people's awareness about climate changes and environmental issues: A case study. *Journal of Cleaner Production, 324*, 129244.

[21] Cooley, S. R., Bello, B., Bodansky, D., Mansell, A., Merkl, A., Purvis, N., … Leonard, G. H. (2019). Overlooked ocean strategies to address climate change. *Global Environmental Change, 59*, 101968.

[22] Kácha, O., Vintr, J., & Brick, C. (2022). Four Europes: Climate change beliefs and attitudes predict behavior and policy preferences using a latent class analysis on 23 countries. *Journal of Environmental Psychology, 81*, 101815.

[23] Grund, J., & Brock, A. (2020). Education for sustainable development in Germany: Not just desired but also effective for transformative action. *Sustainability, 12*(7), 2838.

Cultural Organization (UNESCO)[24] as part of the three different dimensions of learning for ESD: cognitive (understanding challenges and information presented), behavioural (ability to take practical action), and social and emotional (building core values and attitudes, cultivating empathy and passion for humanity and the planet). However, the information presented for ESD falls heavily on the cognitive dimension of learning at 48%, with the behavioural dimension and the emotional dimension falling behind at 27% and 23%, respectively. Levelling out these different dimensions of learning by incorporating the behavioural and emotional components into adult education, especially on topics such as the ocean and climate change, promises transformative change in the uptake of information, with new ways of understanding challenges and transforming core beliefs and values around the environment. Then, consequently, ESD would move beyond the cognitive dimension of learning towards the emotional dimension that leads to increased participation, structural changes, and new opportunities for action.[25]

Thus, in designing educational initiatives for adults, we must find a balance between all learning dimensions to evoke change in a person's attitude and behaviour in relation to the environment. Regardless of the project, or specific target group, these dimensions and recommendations should be taken into consideration when designing curriculum and programmes for adult and lifelong learning opportunities. The responsibility to bring these emotional and behavioural dimensions into the learning lies in the hands of those providing the information (i.e., scientists, educators, policymakers), however, it is more effective when these stakeholders collaborate with practitioners in other disciplines to exchange knowledge and experience on who should be educated, where and how the learning takes place, and with what ocean literacy goals in mind. It is within this multidisciplinary space for shared exchange that The Deep Network project came to be. The overall objective of The Deep Network project is to share ocean-relevant information and collaborate across disciplines with a common aim to improve the accessibility and uptake of information among the lay adult audience and to nudge this 42% of the indifferent adult population into marine sustainability action.

[24] UNESCO. (2020). Education for sustainable development: A roadmap. http://doi.org/10.54675/YFRE1448.

[25] UNESCO. (2020). Education for sustainable development: A roadmap. http://doi.org/10.54675/YFRE1448.

In the following sections we will outline how The Deep Network partners curated and shared responsibility for this exchange with network members.

3 Connecting Marine Sustainability with SDG 4 in Practice: The Deep Network, a Pathway to Promote Change

Within the context of the SDG framework, its commitment towards improving education, and recent research regarding climate change messaging, this section provides an outline of the approach taken by The Deep Network to bridge the gap between marine science, marine sustainability, and adult education.

The Deep Network is an informal and open collaboration between marine researchers, educators, and activists comprised of over 40 active participants from more than 10 countries who meet regularly to present educational initiatives, develop new partnerships, and curate an online library of inspiring practice. We will go through the results of our first three network meetings, including the peer learning and mutual understanding which has taken place between the different disciplines. Finally, we will outline next steps for the network.

The aim of The Deep Network project is to put into practice this shift towards engaging non-formal learners to go beyond learning and begin participating in pro-climate action. To accomplish this The Deep Network is founded on a need to understand the needs and interests of adult learners, and formulate learning objectives based on this. The key to developing the right teaching methods, materials, and resources is to evaluate the learning experience and assess the need for continued learning based on what has been presented.[26] By building an interdisciplinary network of adult educators, ocean scientists, activists, and members within the ocean tourism branch, The Deep Network brings together stakeholders and provides a space for a cross-sectional exchange of information for exactly this purpose. One of the benefits of working in interdisciplinary groups is the sharing of new knowledge that broadens the perspective

[26] Blondy, L. C. (2007). Evaluation and application of andragogical assumptions to the adult online learning environment. *Journal of Interactive Online Learning, 6*(2), 116–130.

and opens the conversation to more creative and innovative approaches to addressing a problem.[27]

The initial phase of The Deep Network's commitment to lessening the gap in ocean literacy consisted of three interactive online sessions attended by marine researchers, educators, and scholars interested in addressing three different topics: (1) develop a learner profile, (2) determine what learning methods work best, and (3) how to tell if there has been behavioural change (Fig. 1). The experience and feedback of the hub meetings confirms the notion that many of societies challenges go beyond the boundaries of one discipline and that we can learn valuable skills of communication for both academic and non-academic audiences.[28]

During The Deep Network Hub meetings, there were interactive group discussions on different educational initiatives presented by the participants that provided various examples of how to approaching improving ocean literacy among adult learners. Overarching consensus in post-meeting evaluations showed that learning about the different types

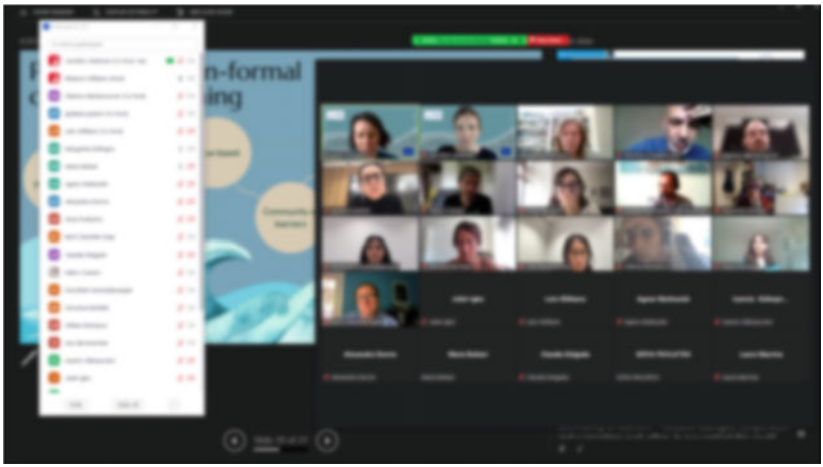

Fig. 1 A screenshot of The Deep Network Hub Meeting. Image has been blurred out of respect for data protection and privacy of participants

[27] Fitzgerald, D., & Callard, F. (2015). Social science and neuroscience beyond interdisciplinarity: Experimental entanglements. *Theory, Culture & Society, 32*(1), 3–32.

[28] Ibid. (see footnote 27).

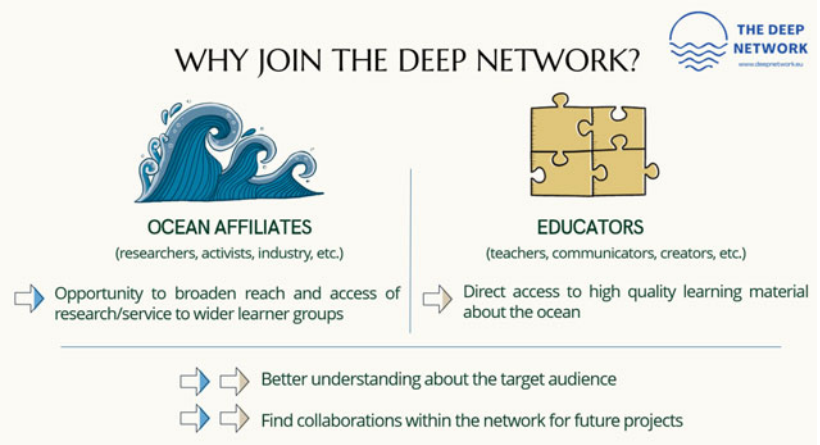

Fig. 2 The benefits for both ocean affiliates and educators for being a part of The Deep Network

of initiatives was inspiring and gave participants hope and motivation to continue developing much needed educative materials for adult learners. This is also a strong motivator for participants to use The Deep Network as a springboard for future interdisciplinary collaborations. Figure 2 highlights the benefits of The Deep Network for its members. In the following sections, we will outline the results of each of the meetings, and how the peer learning and mutual understanding has taken place between the different disciplines.

3.1 Deep Network Hub 1: Profiling the Ocean Literate Adult

The first Hub meeting was held on 3rd June 2023. It was attended by 29 multidisciplinary participants from marine research institutes, marine conservation initiatives, non-profit organisations working to increase marine awareness, cruise ship community outreach and adult education practitioners. To start, participants were asked to define "responsibility". We developed a common understanding of responsibility as awareness of the consequences of one's own actions on others. This awareness, however, is not passive and requires "taking charge" and acting, based on what you know and how you define your role. Additionally, participants

noted that responsibility also has a legal definition in terms of obligation, as a moral or legal duty that requires us to act, with potential penalties for the failure to do so. With this definition of responsibility in mind, participants were broken down into three smaller break-out groups to draw the profile, barriers, and opportunities for adults to learn about the ocean, as well as specific learning outcomes.

Adult learners were categorised into three different groups: young adults, adults/families, and older adults. For each group we discussed how they may access learning, what could be a barrier, and what would be needed to support them in accessing quality information about the ocean. Since the majority of participants had themselves run ocean literacy initiatives, they shared practical information about what had worked with these particular beneficiaries:

- **The young adult group** identified social media as the primary information source. **Young adult barriers to learning** included were largely considered to be psychological, such as the large spatial and long-time scales upon which science works which makes it challenging to compact all the research into a 30-second reel. **Ways to support young adult learners** include making learning fun and make use of technology through virtual reality, gamification, or interactive learning platforms.
- **The adults/families group** also considered that social media is a main artery for information, but supplemented with documentaries, lifelong learning initiatives, and online courses. **Barriers for adults/families** identified by this group included lack of interest, lack of time, motivation, work overload, and family obligations. **Ways to support adults and families** included focusing on developing scientifically accurate visuals that are quick to read and easy to understand, and incorporating science information booths at local community events.
- **The older adult group** was profiled to access information mostly through mainstream media, magazines, or newspaper articles. Here the barriers that could be faced by this group included misinformation, limited access to high-quality learning material and the idea that economic benefits are "more important" than long-term conservation. Solutions to support this group include promoting a

friendly EU policy on tourism; provide more educational opportunities specifically for older adults and to use role models in social media ads.

Common learning barriers for all three groups, and what continues to be one of the most challenging aspects of science communication, is the challenge of presenting information in a way that it is pertinent to their individual lives: "If doesn't affect me, why should I care!?".

With this basic profiling activity behind us, each break-out group was given a different topic to explore (sea floor, ocean, and tourism) in more detail. Participants were asked to put themselves in the place of non-scientist adult learners and answer the questions of: Why do I need to know about this topic, what pre (or mis) conception might I have about this, and why do I need to take responsibility?

We noted that responses to the first question could also address the "why should I care?" mentality which had been a common barrier to learning identified in our profiling activity. Interestingly, for all three topics, the misconceptions about the ocean were generally the same: that the ocean will always be there for us, and that it can take care of/clean itself.

For the final activity in the first Deep Network Hub, we asked participants to list what type of skills would be necessary for adult learners to successfully make a change in their behaviour after learning about the ocean. The broad responses participants gave covered media literacy, active citizenship, community network, critical thinking, time management, decision-making skills, and communication skills.

Conclusions for Deep Network Hub 1 We reach a consensus on the different barriers to ocean literacy, and the most effective methods of making ocean information available to different adult learners' age groups. We agreed that these should be well defined, according to the type of educational initiative. All practitioners stressed that relevancy to the beneficiary is central to the impact on them, and to the success of the initiative.

3.2 The Deep Network Hub 2: Effective Educational Methodologies for the Ocean Literate Adult

The second Hub meeting was held on 1st September 2023, and focused on the best method of learning that should be used, and to determine exactly what themes would be most important and relevant to the adult learner. Participants first agreed on which front-line organisations could support in disseminating an education-based call-to-action. They proposed non-profit organisations, local museums, universities, recreational businesses/organisations (scuba diving clubs, sailing clubs, tour boat operators, etc.), ocean literacy programmes, and social media influencers. We went on to discuss how educational initiatives should be delivered, dividing at this point into two groups where practitioners shared inspiring practice in hands-on, and hands-off activities:

- **Hands-on activities** proposed were in-person courses, workshops, and exhibitions at universities or museums to engage people's emotions, multi-sensory activities such as beach clean-ups and coral plantings, 4-sensory stimulations on tourism tours, interdisciplinary conferences.
- **Hands-off activities** proposed were social media campaigns, gamification, online courses, documentaries, live streaming from scientific expeditions, visualisations of local underwater species with simple—jargon-free—information.

Finally, we used an interactive online whiteboard (JAMBOARD Fig. 3) to characterise what people need to know into four groups:

1. Biodiversity—people need to understand the importance of biodiversity and how each organism in the ecosystem has a specific role and is dependent on the other.
2. Human health—people should not underestimate the benefits of the sea on one's physical and mental health.
3. Economic and cultural significance—many communities depend on the services from the ocean for their livelihood, we need people to know that these communities are being threatened because of human impacts on the ocean.
4. Human impact on the ocean—there needs to be a realistic conversation about the consequences our impact is having on the ocean,

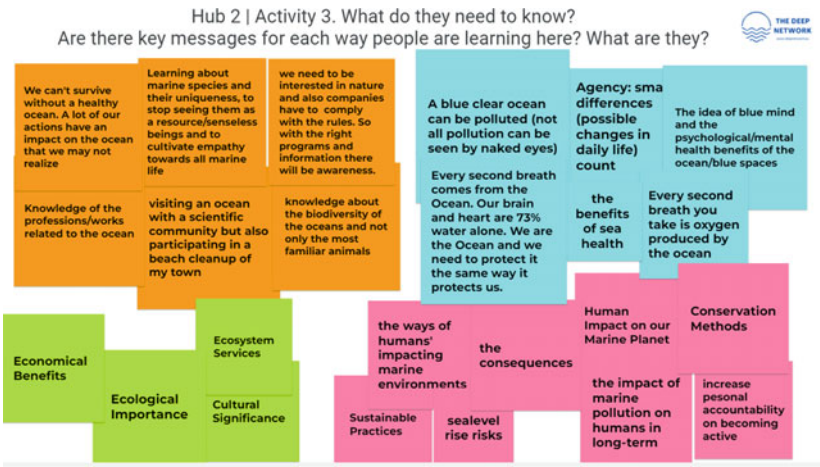

Fig. 3 Jamboard interactive discussion notes for Hub meeting 2, activity 3. "What they need to know" could be characterised into 4 main groups: Biodiversity (orange), Human health (blue), Economic and cultural significance (green), and Human impacts on the ocean (pink)

juxtaposed with mitigating solutions including the importance of sustainable practices, conservation methods, marine protected areas, etc.

Conclusions for Deep Network Hub 2: Alongside concrete conclusions on educational methodologies for adult learners, this hub meeting ended in an inspiring and open space where participants shared related to organisations, projects, or research that is already active in these areas or working towards this goal.

3.3 The Deep Network Hub 3: Assessing the Ocean Literate Adult

The third Hub meeting was the final in this series, and was held on 3rd November 2023. The goal of this meeting was to share methods to evaluate behavioural change in adult learners who have engaged with ocean literacy content. To set the stage, we presented some data about Europe-wide attitudes towards climate change and discussed the three dimensions of learning outlined by UNESCO (2020). We asked participants if they

had examples from their own experiences about how they may have changed the behaviour or attitudes of their target groups. These answers could be categorised into 3 groups: (1) Interacting directly with non-scientific groups and getting real-time feedback through engagement, discussion, or questionnaires; (2) Education, with a focus on how children can influence the mindset of their adults; (3) Social media campaigns with engagement and positive feedback.

Participants reached a consensus that the most effective way to actually evaluate whether or not the messaging has been received and acted upon by the target group would be to have people fill out initial evaluations, and then have a re-evaluation at a later date. Some solutions about how to actually implement this included having groups on WhatsApp or monthly meet-ups to hold each other accountable, and to implement surveys into any activity, whether it be gaming, an online course, webinar, or monthly challenges (i.e., Plastic-free July) directly after the event and then a follow-up survey sometime later. This way survey results can be compared to qualitatively see if there is a difference in a person's behaviour and/or attitude. This does bring more responsibility on the parties developing and disseminating the information, and requires more resources to implement evaluation methods. However, these results were considered by participants as key to determining whether or not the methods were really effective, and for evidencing this effectiveness to funders and stakeholders.

4 Concluding Remarks

SDGs provide relevance, accountability, and a connection to a global community: Using frameworks such as those provided by the SDGs are an opportunity for educators, marine scientists, and policymakers to create greater trust and accountability in their initiatives. In communicating the SDG that you align with as part of your strategy, you can show adults beneficiaries that they are part of a global movement for change in the biggest societal, economic, and environmental challenges of our times.

Research your local, regional, and national initiatives in lifelong learning and non-formal adult education: Non-formal adult education is becoming of greater value. If you are beginning, or building, an initiative, look to see what your regional and national resources and advocacy for adult learners and adult educators is, and whether you can link into existing networks, funding or training pathways. When you communicate with funders, policymakers, and stakeholders in education, remember to

stress that marine-literate, proactive communities are not just nice to have; they are also proven to be more compliant with sustainable development policies.

Build capacity—and multidisciplinary partnerships—in adult education methods and skills: In The Deep Network we introduced our members to some basic tools for NFE, such as learning needs analysis, learner profiling, setting relevant learning objectives, and consistent use of learning assessment methods. We strongly recommend that if you are building on or designing a new initiative for ocean literacy, your organisation either teams up with other practitioners who specialise in adult education, or you build your own capacity in-house. Particularly assessment and feedback methods, firstly so that you can monitor and improve your initiative, and ensure it remains relevant, and secondly so that you can provide evidence of its effectiveness to stakeholders and funders.

Educators use specific methodologies to produce compelling narratives that underscore the oceans' significance and marine sustainability using established communication techniques (some of which we showcase in The Deep Network) and incorporating recent research findings on effective climate change messaging. Very often, practical examples and case studies are the successful approaches that resonate with diverse adult audiences, so curating past and present initiatives is important to inspire new ones.

Build a network of local knowledge: Take the plunge and try out The Deep Network method in your local context. Set up your own short, informal meetings of marine sustainability champions. Ask a broad range of people with scientific, consumer, community, environmental and educational knowledge of the ocean, and provide a space for them to learn from and with each other, and for new collaborations to thrive. Alternatively, join The Deep Network—our doors are always open!

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CHAPTER 10

Universally Accessible Marine Science and Ocean Literacy for All Citizens: The Thalassophile Project

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Abstract The Thalassophile Project is dedicated to universal accessibility in marine science and ocean literacy, with a focus on the d/Deaf and

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visually impaired communities. By emphasising accessibility, and illustrating how theory is put into practice, the project brings together a network of cross-sector practitioners, combining marine research, education, and universal accessibility expertise. In this way, the authors propose to foster global awareness of marine sustainability put forward in the Sustainable Development Goals targets. Equally, the Thalassophile Project aims to raise awareness within adult education institutions of the significant number of citizens unable to gain access to information, and a corresponding lack of experience and competence in adult educators in producing barrier-free "Blue Education" resources. The project's practical initiatives address this gap in educational resources by intertwining SDGs 4, 13, and 14 and aligning with international frameworks such as ESD 2030 and UNESCO guidelines. Activities include creating introductory "episodes" as educational tools, an online resource database, and user-friendly factsheets for specific audiences. The theoretical Common Accessibility Framework forms a baseline for all activities, rooted in Universal Design for Learning. These first pilot activities 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. Finally, this chapter describes outreach efforts, including presentations at international conferences.

Keywords Accessibility · Inclusion · Education · Research · Ocean

1 Introduction

Thalassophile (n.) A lover of the seas and Ocean. Thalassophile is a word derived from the Ancient Greek θάλασσα (thálassa, "sea"), and φίλος (phílos, "dear, beloved").

1.1 Practical Initiatives to Implement International Frameworks

The core objective of Thalassophile Project[1] is to promote the concept of universal accessibility to marine science, marine conservation, and the so-called Blue Education[2] (referring to ocean literacy). Within the scope of the project, universal accessibility refers but is not limited to, hard of hearing, d/Deaf, blind, and partially sighted people. In this chapter, we will use the terms d/Deaf and visually impaired individuals.

If society is to overcome the growing challenges posed by climate change, our collective action must first be stimulated by education and evidence-based information that is available to all.

International standards provide a framework for governments to increase universal accessibility in a systematic way. The Education for Sustainable Development (ESD) 2030 Roadmap (UNESCO, 2020) is linked to Sustainable Development Goal (SDG) 4 (Quality Education) and gives us a Framework for Action which provides guidance for the implementation of ambitious climate change goals and commitments. The UNESCO Institute for Lifelong Learning[3] is similarly monitoring of normative and legal frameworks to reduce inequality as a way of promoting inclusive, lifelong access to learning. UNESDOC states that the "ESD employs action-oriented, innovative pedagogy to enable learners to develop knowledge and awareness and take action to transform society into a more sustainable one". Transforming sustainable development learning environments, building capacities of educators, and accelerating inclusive local-level action are all priority areas for the ESD 2030 Roadmap. But how are educators, marine researchers, and conservationists supposed to implement universal accessibility in practice, in outreach and ocean literacy initiatives?

The Thalassophile Project is a response to this question. The Thalassophile Project brings together marine researchers and experts in a first step towards a network of cross-sector practitioners promoting universal accessibility in ocean literacy. The particular focus in this project is on

[1] The Thalassophile Project: Accessible marine science and conservation for all citizens © 2022-2024 by The Thalassophile Project Partnership, Erasmus+ Project Number 2022-1-DE02-KA210-ADU-000082213; https://www.thalassophileproject.org/.

[2] https://www.bluemarinefoundation.com/2020/03/25/blue-education-resources/.

[3] UNESCO Institute Lifelong Learning. https://www.uil.unesco.org/en/.

producing tailored resources for students with sensorial disabilities that are also useful across disciplines.

The project partnership was conceived as a contribution to the global effort to promote educational equality and aims to make marine science and conservation material in adult education environments more accessible to visually impaired and d/Deaf adults, thereby including this target group to learn about the importance of the Ocean and what we can all do to sustain it. This provides a multifaceted approach for all participants involved and is elemental for ocean science to be accessible for all. The outputs of the project include high-quality content on marine sustainability, with pioneering methods to practise accessible pedagogical approaches.

A transversal objective of the Thalassophile Project is to raise the awareness of adult educators and organisations that develop marine science and conservation educational material. Only by bridging the gap between adult education, educational authorities, and marine research can we ensure that people of all ages with hearing and/or sight loss are reliably informed about marine science and conservation, with engaging and accessible material.

1.2 Connecting Communities with Marine Sustainability

The Ocean covers 70% of the Earth's surface (Schmitt, 1995). Our Ocean feeds us, regulates our climate, and generates most of the oxygen we breathe (Pandey et al., 2021). Therefore, it is pivotal that accurate and engaging information is accessible to the widest number of people to achieve a critical mass of citizens who are ready and able to change their behaviours for the better. Everyone has the right to be able to explore, study, and have access to the tools and resources to preserve the Ocean and be a part of the solution.

- Changing hearts and minds and inspiring climate action begins with education, and a pre-requisite for education is access to engaging information which shows how each one of us can make a difference.
- Marine scientists do not reflect the same diversity of perspectives and experiences of the world as the communities who bear the largest burden for implementing—or adverse consequences for failing to implement—conservation action (Smith et al., 2017).

- Climate literacy, in its complexity and with geopolitical connotations, is already a challenge for educational institutions at all levels. This project will fully open doors and will inspire change by providing competence and material for adult educators to react to barriers.

Against the backdrop of these challenges, the barriers to universal accessibility of marine sustainability can seem insurmountable. With marine science and conservation not being a requirement in European school curricula, the responsibility of informing adult learners about the importance of the Ocean falls to museums, conservation centres, higher education institutes and universities. While these institutions have made significant efforts in increasing the quality and quantity of formal and informal "Blue Educational" material, however, there is almost no adult education material on marine conservation and marine science that is available, in Braille and/or signed formats, and a corresponding lack of awareness in organisations and institutions on how to develop these types of services. The lack of competence and understanding of adult educators of this target group translates into a lack of inclusive educational environments (Braun et al., 2018). By curating suitable educational material and by piloting new content, the Thalassophile Project aims to ensure barrier-free access for all citizens to information about how the health of the Ocean is related to climate change, and what we can all do to support sustainability: climate and ocean literacy begins with education, and this gap needs to be filled.

2 Who Benefits from the Thalassophile Project Approach?

In a 2015 census,[4] the European Federation of Hard of Hearing People (EFHOH) believed there to be 51 million hard-of-hearing people in the European Union, with Spain having the highest number of registered deaf people (3.5 million). That is approximately one in ten of the EU population. Yet, it is not common to find marine science and conservation material interpreted into sign language or other mediums for the hard of hearing.

[4] European Federation of Hard of Hearing People 2015 Annual Report.

There are approximately 30 million blind or partially sighted people living in Europe today. One of the key recommendations of the 2022 European Blind Union (EBU) Statement on Access to Reading and Using Braille[5] is for general educational offers and learning material to be made available to blind people in Braille.

The Thalassophile Project addresses these target groups by creating a framework for overcoming some of these barriers and moving in the direction of providing accessible information for all.

3 Project Activities

Four key activities have been agreed on to promote the concept of universal accessibility in marine science, marine conservation, and "Blue Education" (Fig. 1). At first a theoretical common accessibility framework was developed to outline what should be considered when preparing educational materials. This framework was then applied to educational pilot episodes that are tailored to the needs of the user. Finally, adult educator factsheets were created to detail what was learned in this process and create a quick and easy information sheet for replicability. Throughout the project, transversal activities involved networking with institutions and organisations in the field to learn from and provide a platform to showcase other accessible resources.

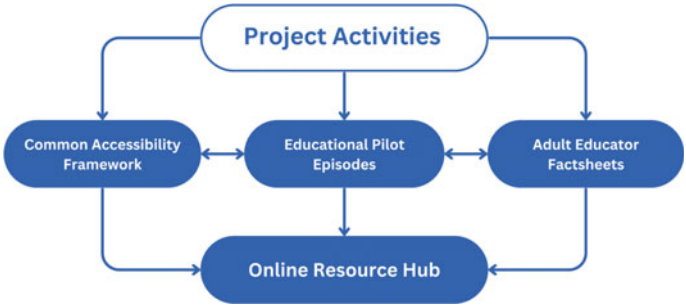

Fig. 1 Infographic showcasing the Thalassophile Project Activities

[5] EBU Statement on Access to Reading and Using Braille—2022.

3.1 Common Accessibility Framework

This framework serves as a guide in the selection of what material is collated and curated in the project's online database. It forms the guidelines for creating original, engaging material tailored to provide effective "Blue Education" opportunities to d/Deaf and/or visually impaired people (Fig. 2).

The Universal Design for Learning: A design for all[6]

Universal Design for Learning (UDL) is a teaching approach aimed at providing equal opportunities for the success for all learners. The fundamental principle of UDL is that there isn't a "standard" person, and that each individual learns differently based on their personal story and growth, and on multiple other factors: physical, emotional, behavioural, neurological, and cultural. The aim of Universal Design for Learning is therefore to improve the educational experience of all by introducing more flexible methods of teaching and assessment and creating truly inclusive materials that can be adapted to all types of people.

In other words, UDL promotes the use of a variety of methods and design in order to remove any barriers to learning and ensure that people learn in ways they are most comfortable with. Each person has specific ways of engaging and specific methods of acquiring information, for example, while some enjoy reading a text, others learn by listening. UDL is rooted in Universal Design: it is a methodology which aims to conceive flexible products and accessible environments in order to be possible for all to participate in an equal way.

Universal Design's principles are:

1. Equitable Use—The design should be useful and marketable to people with diverse abilities.
2. Flexibility in Use—The design should accommodate a wide range of individual preferences and abilities.
3. Simple and Intuitive Use—User-friendly approach, regardless of the user's experience, knowledge, language skills, or current concentration level.
4. Perceptible Information—Effective communication of information necessary to the user, regardless of ambient conditions or the user's

[6] https://udlguidelines.cast.org/.

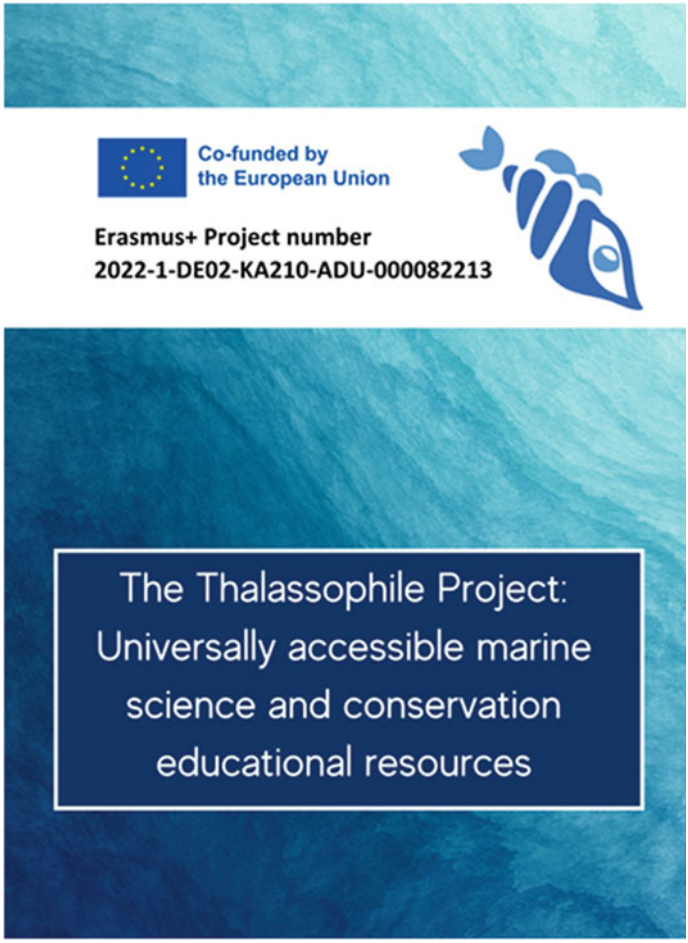

Fig. 2 The Thalassophile Project: Common Accessibility Framework[7]

sensory abilities. For example, a video that includes audio and subtitles.

5. Tolerance for Error—The design should minimise accidental or unintended risks in the environment.

[7] https://www.thalassophileproject.org/the-framework.

6. Low Physical Effort—The design should be efficient, comfortable, and with a minimum of fatigue.
7. Appropriate Size and Space for Approach and Use—Size and space should be accessible for all regardless of physical characteristics such as size or mobility. The goal of Universal Design is to maximise usability by individuals with a wide variety of characteristics.

3.2 Original Pilots of Accessible "Blue Education" Material

Educational pilot videos for adult education institutions have been created to showcase how accessibility can be incorporated in their programmes. The educational material is being designed both to directly inform its target audience of d/Deaf and visually impaired people, and to promote barrier-free access to marine science and conservation to adult educators (Fig. 3).

The co-creation brings together scientific and conservation experts with experts in multisensory education and will help visually impaired and d/Deaf adults to understand:

Fig. 3 Excerpt from the translation of the educational pilot episodes in International Signs

1. the importance of our seas and Ocean in the context of climate change;
2. marine biodiversity;
3. the human impact on our seas and Ocean; and
4. what each of us can do to increase marine sustainability.

These four topics were chosen to be highlighted in our original educational pilot episodes because they support the 2030 Agenda for Sustainable Development (United Nations, 2015). These results are also reflected in the outcomes of The Deep Network project (Chapter XX).

Each episode presents current research in its specific field and through this collaboration, the Thalassophile Project encourages scientists to consider accessibility in their own work.

3.3 Online Resource Hub of Existing Accessible "Blue Education" Material

An online resource hub has been curated to create a network of organisations in marine science and conservation and to showcase good practice in accessibility. This hub includes organisations that support educational initiatives for d/Deaf and visually impaired, providing an online database of existing educational material that helps promote the availability and use of accessible marine content to adult educators and adult education institutions. The online content is organised by the specific needs of visually impaired and d/Deaf learners and categorised into the four themes of marine conservation priorities, as stated previously, with links to marine conservation and advocacy information, academic marine science information, and local initiatives.

As the network expands, and marine scientists begin to appreciate and incorporate visually impaired and d/Deaf learning requirements into their own workflow, the hope is that the momentum of inclusivity for all can continue allowing for more alternative and complex research-based teaching material to be made available on the database.

Some examples of Ocean-oriented organisations, initiatives, and good practices that are showcased in our resource hub include:

1. The Ocean Senses Activity Book (Panieri & Stiller-Reeve, 2023);
2. EGU General Assembly Accessibility and Inclusiveness[8];
3. Accessible Oceans: Exploring Data Through Sound[9];
4. Abecedarium: the Ocean in Sign Language[10]; and
5. EcoSpectrum.[11]

Each of these initiatives demonstrate different approaches to address, some, if not all of the learning requirements for d/Deaf and visually impaired, that are outlined in our framework. It is important to showcase what different organisations are developing and implementing in this field in order to provide concrete evidence that the general trend is moving towards more inclusivity.

3.4 User-Friendly and Digestible Factsheets to Improve Adult Education Competencies in Accessible "Blue Education" Material

The factsheets were created as the project progressed to include the lessons learned along the way of what works well and what not so much. These experiences and information are consolidated into user-friendly and easily digestible factsheets, designed primarily for the use of adult educators. The factsheets combine the accessibility framework, original content from the pilot episodes and the existing accessible content, collated in the online hub, to improve the skills and competences of adult educators and organisations who inform adults about marine science and conservation.

In addition to gaining an understanding of what is necessary in terms of "Blue Education" literacy for d/Deaf and visually impaired individuals, this activity communicates what is proven to work, and gives examples of how to produce the content with plenty of online resources and content that is readily available in one place.

The factsheets are aimed squarely at adult educators and will address:

[8] https://egu23.eu/about/accessibility_and_inclusiveness.html.

[9] https://accessibleoceans.whoi.edu/.

[10] https://www.ocean-space.org/education/abecedarium-lis.

[11] https://www.instagram.com/eco.spectrum/.

- How and why high-quality information on "Blue Education" should be provided in their institutions (including information on the UNESCO call to governments to act to educate all citizens in climate literacy as a first step to action);
- Guidance provisions to facilitate access to participation;
- Tips on how to improve visibility of the gains resulting from educating all adults in climate literacy;
- How to ensure a better match between the demands of d/Deaf and visually impaired individuals and supply of engaging educational material;
- How to network with other adult educators/education institutions addressing "Blue Education", and how to connect with expert organisations representing visually impaired and d/Deaf communities.

4 Thalassophile Outreach and Networking

To reach the intended audience Thalassophile Project has disseminated the project in different settings to make sure the framework is available and accessible for use. In this section, the different Thalassophile Project presentations and outreach activities are described, reaching both target groups: scientists and adult educators who could use the output of this project to make their work more accessible.

The Thalassophile Project has been presented at various events and conferences such as the 1st International Conference on Ocean Education & Training in Ghent, Belgium (Jan. 2023), and at workshops such as the Ocean Interconnectedness: Senses & Science, Law & Love (Sept. 2023) (Fig. 4). Overall, this initiative was received with high praise for its innovation and ambition.

The Framework has already been used by various projects (Into the Deep,[12] Deep Network[13]) as well as to support the accessibility of the

[12] Into the Deep, Marine Image Analysis Hub for Citizen Scientists; Project number: 2022-1-DE02-KA220-ADU-000088137.

[13] Deep Network, Curating and co-producing quality ocean-education information for adults; Project number: 2022-2-DE02-KA210-ADU-000097962.

Fig. 4 Thalassophile Project at the Ocean Interconnectedness Workshop in Tromsø, Norway (From left to right: Giuliana Panieri, Rada Pandeva)

"Alive, Alive, O! Calling the Blue Mussel Home to the Exe" film.[14] Additionally, the project has been recognised by the EU4Ocean Coalition.[15] In 2024 the Thalassophile Project will be presented to scientists at the Alfred Wegener Institute for Polar and Marine Science in Bremerhaven, Germany, and has applied to present at the 2024 Ocean Decade Conference in Barcelona.

[14] "Alive Alive O! Calling the Blue Mussel Home to the Exe." www.youtube.com/watch?v=pz7lai2m86A.

[15] https://maritime-forum.ec.europa.eu/node/5512_en.

5 Concluding Remarks

The Thalassophile Project contributes to Sustainable Development Goals 4 (Quality education), 13 (Climate action), and 14 (Life below water), serving as a beacon for making marine science and ocean literacy universally accessible. The aim of the project is to ensure that knowledge about the Ocean and conservation reaches every corner of society.

Over the course of project activities, it has become apparent to the authors that there is a clear need to fill the gap in accessible educational resources, to ensure that "Blue Education" is available to all. Only in this way can we hope for all adults to understand the Ocean as a resource, to adjust practices in their daily lives, and to support others around them to do the same.

In response to a growing trend within the scientific community towards enhanced accessibility in figure presentation, the Thalassophile Project not only builds upon existing practices but also establishes connections across disciplines. However, steps need to be taken by leading figures within the community to promote the use of simple tools (such as those in the Thalassophile Project Common Accessibility Framework) to ensure that the maximum possible number of learners benefit from accessing their research.

Within the educational community, anyone designing information, resources, or messaging on the Ocean for the adult community should be aware of the nature of different barriers to learning. Educators should be trained in different methods of delivery and support for accessibility practice, information communication, sensory access, and delivery of direct instruction for educational activities. Specific spaces should be made available for these learning needs, which might need to be distinct from other learning environments.

On the level of policy, resources need to be committed to both educational and research organisations to ensure that scientists and educators are trained in the needs of all adult learners. Within this training, both groups should be introduced to simple tools and methods to ensure their work is easy to read and understand. Delivering interdisciplinary training with both groups could be one way to promote the kind of information-sharing that could sustain long-term initiatives in this sector.

Finally, the Thalassophile Project and authors of this chapter welcome and encourage the widespread use of the framework and factsheets so that

the momentum for this movement for universal accessibility within ocean science continues.

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