



Marine and Inland Waters Research Symposium

former Panhellenic Symposium on Oceanography & Fisheries

2022

PROCEEDINGS

AKS Porto Heli Conference Center, Porto Heli, Argolida, Greece
16-19 September 2022



Supported by the
HCMR Researchers Association and the
Panhellenic Association of the HCMR Employees



Under the auspices of the
Hellenic Centre for Marine Research

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MAPPING THE OCEAN LITERACY MOVEMENT: EXPERIENCES FROM THE PAST, PRESENT INITIATIVES, AND FUTURE EXPECTATIONS

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Abstract

This study portrays in brief the history of marine education movement from its beginning in the late '60s till the present day. Information is provided regarding how it started in the US, its parallel development with Environmental Education during the next two decades, its "fall" in the '90s and rebirth in the dawn of the new century. More details are given for the actions taken over the last 15 years with the communication and acceptance of the novel Ocean Literacy framework outside the boundaries of its birthplace, as well as the first attempts of introducing and adapting Ocean Literacy to national contexts and the specificities of certain regions; the Mediterranean Sea Literacy guide is presented as a pioneering example of such an adaptation. Finally, recommendations are provided to meet the requirements of contemporary Agendas towards a sustainable protection and conservation of the blue planet.

Keywords: Ocean Literacy, Mediterranean Sea Literacy, Principles, Environmental education.

The volume of water and the surface it occupies is so vast that, if our predecessors knew, they would have called our planet *Ocean* and not *Gaia* (Earth). This is exactly the reason that made this planet unique in terms of life, as it is the marine environment where life first appeared 3.5-4 billion years ago and where it exclusively evolved for the next 3 billion years. The global ocean produces almost half of the oxygen and absorbs huge amounts of atmospheric carbon dioxide, regulates weather and climate, supports a great diversity of life, and provides food and minerals (Cava *et al.*, 2005). At the same time, however, it is treated as a place of easy deposition of the modern societies' wastes, while a complete lack even of basic knowledge regarding its functions and values has come to light.

Side by side with the birth and development of Environmental Education (EE), another type of education, focused on the marine world, arose in the late '60s. It was the time when we received the first photos of the Earth from outer space, revealing the magnitude of how blue our planet is, and at the same time how limited its capabilities can be. It was only then when the British writer Arthur C. Clark pointed out *how inappropriate is to call this planet Earth when it is quite clearly Ocean*. Moreover, space exploration events had become a daily routine to the modern world to such a degree that Slonin (1977 in Fortner & Wildman, 1980) elegantly described that *we know more about the backside of the moon than we do about the drop of water upon which each of us, and all living organisms, depend for survival*.

In light of the increasing pressures on the aquatic world, mainly from human activities, the need to understand this environment and how it functions became imperative and should concern not only the scientists and/or the maritime sector, but also the general public. Goodwin and Schaadt (1978) used the term "Marine and Aquatic Education" which was generally adopted for the next couple of decades. In parallel with the progress in EE, Marine and Aquatic Education followed a similar path of development and maturation in the '70s and '80s through a series of grassroots publications (e.g., Charlier & Charlier, 1971; Schweitzer, 1973; McFadden, 1973; Goodwin & Schaadt, 1978; Fortner & Wildman, 1980; Madrazo & Hounshell, 1980; Picker, 1980; Dresser & Butzow, 1981; Rakow, 1983/1984; Picker *et al.*, 1984; Fortner, 1985;

Fortner & Lyon, 1985; Fortner & Mayer, 1989). The conditions were ideal for its rapid establishment and development, basically on the west side of the Atlantic. Towards this direction, important decisions were taken such as the foundation of the National Marine Educators Association (NMEA) and the launching of the ambitious Sea Grant College Program.

However, in the mid-'90s it was highly marginalized, and when the new National Science Education Standards were launched in 1996 in the USA, an unjustified absence of ocean-related issues was revealed. That said, a new systematic crusade began, originally from the National Geographic Society (NGS) and the College of Exploration (CoE) to develop a guide with detailed ocean content that could be used to teach Geography, triggering all the upcoming actions and events that led to a new era of marine education. An in-person workshop in 2000 sponsored by the National Science Foundation (NSF) from which the Centers of Ocean Sciences Education Excellence (COSEE) emerged, and a virtual workshop that took place in 2004, co-organized by NGS, CoE, NMEA, the National Oceans and Atmospheric Administration (NOAA) Office of Education, the Lawrence Hall of Science, University of Berkeley, the COSEE and the NOAA's Sea Grant College Program, brought together educators and scientists to share their ideas regarding the important concepts everyone should know about the ocean (e.g., Mokos *et al.*, 2022; Payne *et al.*, 2022).

These ideas were the basis for conceptualizing the new framework, called *Ocean Literacy* (OL), organized under some essential principles and fundamental concepts. This framework contained (a) the definition of OL as *the understanding the ocean's influence on you and your influence on the ocean*; (b) the description of an ocean-literate person as the one who *understands the essential principles about the ocean, can communicate about the ocean in a meaningful way and is able to make informed and responsible decisions regarding the ocean and its resources* (Cava *et al.*, 2005); (c) a set of seven principles (Table 1) and 44 concepts (revised to 45 in March 2013); (d) a Scope and Sequence, a pedagogical tool to serve as conceptual guidance as to what students should be taught along the K-12 school grades (NMEA, 2010; NOAA, 2013). This huge attempt coincided with the respective reports released by the Pew Oceans Commission in 2003 and the US Commission on Ocean Policy in 2004, revealing, among others, the Americans' low level of content knowledge about the ocean (Payne *et al.*, 2022).

Table 1. Ocean Literacy principles (OLp).

OLp1: The Earth has one big ocean with many features
OLp2: The ocean and life in the ocean shape the features of the Earth
OLp3: The ocean is a major influence on weather and climate
OLp4: The ocean makes Earth habitable
OLp5: The ocean supports a great diversity of life and ecosystems
OLp6: The ocean and humans are inextricably interconnected
OLp7: The ocean is largely unexplored

The OL guide proved to be so successful in terms of acceptance by several actors, that became a model for other literacy guides, in the United States and all over the world, not only within the context of the water world (e.g., Great Lakes Literacy, Estuarine Literacy, Mediterranean Sea Literacy), but within other targeted environmental contexts such as Climate, Energy, Earth science, and Forest literacy. NMEA with a history that goes back more than 40 years now, under the prism of the new OL framework helped to spread the word for the creation of respective associations and networks around the world that could facilitate the integration and enhancement of OL guide to the specificities of the various regions. As such, the International Pacific Marine Educators Network (IPMSN) was formed in 2007, while the first association outside the US appeared in Europe, where the European Marine Science Educators Association (EMSEA) was founded in 2011. Soon after that, the Canadian Network for Ocean Education (CaNOE) was formed in 2014, a year later the Asia Marine Educators Association (AMEA), and the Latin American

Education Network for the Ocean (RELATO) followed. In parallel to the above, several corresponding initiatives have taken place from 2016 till the present day at the regional and/or national level, such as the Korean Marine Education Association, the EMSEA regional groups (EMSEA-Baltic, EMSEA-Atlantic, EMSEA-Northern Seas, EMSEA-Med), and the Ocean Literacy Italia (Mokos *et al.*, 2022; Payne *et al.*, 2022). The EMSEA-Med serves as a pioneering example of the efforts to adapt the OL guide to the specific features of a regional sea, resulting in the development of the Mediterranean Sea Literacy guide, that comprises seven principles and 43 concepts (Table 2) (Mokos *et al.*, 2020) (see also www.emsea.eu/regional-groups/mediterranean-sea, www.emsea.eu/ocean-literacy/publications).

Special thrust towards the direction of mobilizing the modern societies around marine issues was given by several political initiatives such as the “Galway Statement” signed in 2013 by the EU, USA, and Canada to promote transatlantic ocean research cooperation; the Atlantic Ocean Research Alliance (AORA) was also launched during the same period to coordinate research efforts, while in 2014 the Rome Declaration reinforced the concept of responsible research and innovation. In 2017, the Belem Statement was launched with the aim of uniting research in the north and south Atlantic through enhancing cooperation between Brazil, South Africa, and the EU. This is the time when the United Nations declared the Decade of Ocean Science for Sustainable Development (2021-2030), seeking to contribute to the achievement of the Sustainable Development Goal 14 of the UN Agenda 2030 and to extend its scope to fill the gap from “the ocean we have” to “the ocean we want”

Table 2. Mediterranean Sea Literacy principles (MSLp).

MSLp1: The Mediterranean Sea, semi-enclosed by land of three continents, is part of one big ocean and has many unique features
MSLp2: The Mediterranean Sea and its living organisms shape the features of the Mediterranean region and its adjacent landmasses
MSLp3: The Mediterranean Sea has a major influence on the climate and weather of the Mediterranean region
MSLp4: The Mediterranean Sea made the Mediterranean region habitable through its richness of life thus becoming the cradle of western civilization
MSLp5: The Mediterranean Sea is a marine biodiversity hotspot, with a high level of endemism
MSLp6: The culture, history, economy, lifestyle, health, and well-being of the peoples of the Mediterranean region are inextricably interconnected
MSLp7: Although the Mediterranean Sea has been explored for centuries, it still remains largely unknown

Despite all the above major actions undertaken basically during the last decade at national, regional, and international levels, what remains a big challenge is the financial support for OL research, initiatives and activities. Long experience from the US provides useful morals, as Payne *et al.* (2022) beautifully describe *what was once a well-funded initiative with a strong network of partners, now falls on the shoulders of few members of NMEA, and the financial and institutional support once provided has now waned tremendously*. This becomes even harsher for most of the cases in which OL receives no legal validation or serious endorsement of its existence. Towards this direction the European Union, for example, became active in 2014 when, under the Horizon 2020 programme, funded two large and ambitious multinational projects, ResponSeable and SeaChange to enhance OL, as well as the EU4Ocean Coalition since 2020. Moreover, in 2019 the European branch of the Global Ocean Observing System (EuroGOOS) of the Intergovernmental Oceanographic Commission (IOC) of UNESCO launched the EuroGOOS OL Network, emphasizing OL as a strategic activity area in oceanography (Eparkina *et al.*, 2021). Most recently another promising initiative launched by the EU Commission, but still in pursuit of financial support, is

the establishment of the European Blue Schools Network engaged in OL.

Regarding the information presented earlier, no one can reliably evaluate the progress that has been achieved in OL over the last couple of decades without turning to the research efforts realized so far. Paredes-Coral *et al.* (2021), in their attempt to map global research on OL from 2005 to 2019, portrayed the existence of a rather low number of relevant publications with a slow-growing pattern especially during the first years, indicating that this field is not yet adequately cultivated. This could probably be attributed to the absence of common measurement tools which have to take into consideration not only the knowledge/awareness factor but, according to Santoro *et al.* (2017), the multi-perspective dimension of OL as well. In any case, important baseline studies to portray some of these perspectives, namely content knowledge, attitudes, and behaviour have been made so far on a global scale, while good practices of regional collaborations have also emerged, such as the EMSEA-Med group being the leader with its publications (e.g., Boubonari *et al.*, 2013, Mogias *et al.*, 2015; 2019, Realdon *et al.*, 2019; Mokos *et al.*, 2020; Koulouri *et al.*, 2022).

In conclusion, important steps have already been made towards disseminating OL, but many others remain to be achieved. Translations of the OL guide into several national languages are on the way (see www.marine-ed.org/ocean-literacy/translations), while respective guides focusing on the specificities of certain sea basins have to be developed, according to the example of the MSL guide. Moreover, systematic collaborations among different actors (i.e., scientists, educators from both formal and non-formal educational settings, other stakeholders, policy and decision-makers) coming from governmental and non-governmental agencies are considered imperative for jumping to the next step of actually meeting the requirements of the UN Agenda 2030 and the Decade of Ocean Science for Sustainable Development (2021-2030).

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