Spreading Ocean Literacy in Japan

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1. Background

1.1 What is Ocean Literacy ?

Covering a large area of the earth, the oceans regulate weather and climate on the planet's surface and provide food for many people. The oceans also absorb the CO_2, pollutants, garbage, and effects of overfishing that are produced by human society. However, the health of our planet's oceans is being threatened like never before. The threats include extreme phenomena exemplified by rising sea levels and marine heatwaves that are caused by global warming associated with rising atmospheric CO_2. Others are ocean acidification and anoxia, the loss of biodiversity due to habitat degradation, and the spread of microplastics. Evaluating these changes in terms of "planetary boundaries" (e.g., Rockström et al., 2009; Steffen et al., 2015) shows that current values of biogeochemical flows and change in biosphere integrity exceed the limits of a safe operating space for humanity and that climate change and land-system change have also reached unstable realms. As a result, the changes are directly impacting people's lives—ranging from coastal and island communities up to national and global populations—and have become a factor in decisions made with respect to individual lifestyles as well as by governments and industries.

When people attempt to share concerns about complex ocean problems and the effects of the ocean's health, the challenge becomes knowing how to understand and perceive the oceans, which have great offshore depths that cannot be seen from the shore. People who are well-educated about the oceans—in other words, ocean-literate person—will be needed to lead society in a way that transforms our lifestyles, thinking, and actions and ensures that the oceans remain sustainable (Fauville et al., 2019).

In its original sense, the word "literacy" simply refers to the ability to "read and write." However, it has since come to indicate the ability to understand the terminology of a particular field and use it in a meaningful way. UNESCO (2005) expands the "literacy" concept to include "a continuum[1] of learning in enabling individuals to achieve his or her goals, develop his or her knowledge and potential, and participate fully in community and wider society" (UNESCO, 2005, p21). Various types of literacies, such as scientific literacy, earth science literacy, climate literacy, and digital literacy, also refer to important skills in

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[1] This means that there are no discontinuous boundaries in the sense of completed/cannot do, for example.

today's world that exceed the conventional meaning of reading and writing (Fauville et al., 2019).

The Ocean Literacy discussed in this paper is defined as "an understanding of the ocean's influence on you—and your influence on the ocean" (National Geographic Society et al., 2005). It can also be stated as common education on the oceans (Center for Ocean Literacy and Education, The University of Tokyo Ocean Alliance, 2014) and as broad and basic knowledge of the oceans.[2] As an individual who recognizes the interdependence of the ocean and human society, an "ocean-literate person":

· understands the Essential Principles and Fundamental Concepts 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.

(National Geographic Society et al., 2005)

What, specifically, is the Ocean Literacy that we should acquire to achieve these aims? The following sections present *Ocean Literacy*, a proposal by the National Marine Educators Association (NMEA)[3] of the United States, and *Ocean Literacy for All*, a strategy prepared by the Intergovernmental Oceanographic Commission (IOC) of UNESCO (IOC-UNESCO),[4] as representative examples.

1.2 Ocean Literacy

A factor behind ocean literacy's development in the United States is the existence of the National Science Education Standards (NSES).[5] At the time the NSES were announced in 1996, they made no mention of the oceans. And state standards contained few items relating to the oceans, coastal areas, or river basins. As a result, marine sciences were not taught in the kindergarten to Grade 12 (K-12)[5] curricula of most schools, except for some innovative programs that incorporated ocean science content and hands-on education and rare lessons taught by passionate instructors. It was then that educators and researchers with an interest in the oceans began to recognize that they would be left out of scientific education without a framework integrating the concepts and purposes of ocean study.

Discussions on marine science education began in 2002. The College of Exploration[6] and

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[2] Website of the Faculty of Oceanology, Kobe University (accessed on January 16, 2021)
[3] National Marine Educators Association https://www.marine-ed.org/
[4] UNESCO Intergovernmental Oceanographic Commission
[5] "Ocean Literacy" http://oceanliteracy.wp2.coexploration.org/
[5] Education in the United States is provided over 13 years that begin with kindergarten and end with high school graduation.
[6] the College of Exploration http://www.coexploration.org/

National Geographic Society[7] held an online conference titled "Oceans for Life" that later led to the drafting of the basic principles for Ocean Literacy. Between 2003 and 2004, the Center for Ocean Sciences Education Excellence (COSEE)[8] in New England prepared a set of concepts considered most important when learning about the region's oceans, and the COSEE Network established ocean literacy as a high-priority issue. Additionally, the efforts of multiple organizations within the NMEA produced synergetic effects. One example was the establishment of a committee to address scientific education standards with the aim of incorporating more ocean-related standards into K-12 curricula.

In October of 2004, the College of Exploration organized a two-week online workshop.[9] Some 100 representatives were invited, including public and private school teachers, researchers in various marine science-related fields, education policymakers (AAAS[10] and NSTA[11]), science coordinators affiliated with state and regional education departments, and educational and outreach representatives of federal agencies. The workshop resulted in the establishment of seven Basic Principles (Table 1) and 44 Basic Concepts. The principles and concepts underwent a peer review by the marine science education community and then were published in the form of a landmark document titled *Ocean Literacy: The Essential Principles of Ocean Sciences K-12* (hereinafter *Ocean Literacy*) (National Geographic Society et al., 2005) in October 2005. Additionally, a matrix was created that ties the seven Basic Principles of *Ocean Literacy* into the NSES concept. However, identifying which concepts to teach at which grade presented a difficult challenge to instructors and curriculum developers, as study of *Ocean Literacy* would end at the completion of Grade 12. This led to the development of the "Conceptual Flow Diagrams: Ocean Literacy Scope and Sequences" (hereinafter CFD), which classifies the 13 grades into four stages and presents teachers with a format for teaching that encourages full understanding of the seven Basic Principles at each stage (Figure 1). The CFD presents the content to be taught on the Basic Principles and Basic Concepts according to students' level of understanding at each grade (K-12). It is designed so that students can acquire scientific knowledge of the oceans through a cascading program.

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[7] National Geographic Society https://www.nationalgeographic.org/
[8] The Center for Ocean Sciences Education Excellence. New England州COSEEサイト https://www.neosec.org/
[9] Ocean Literacy Through Science Standards http://www.cosee.net/files/coseeca/OLit04-05FinalReport.pdf
[10] American Association for the Advancement of Science https://www.aaas.org/
[11] National Science Teaching Association https://www.nsta.org/

Table 1: The seven Basic Principles of "Ocean Literacy"

Principle 1	The Earth has one big ocean with many features.
Principle 2	The ocean and life in the ocean shape the features of Earth.
Principle 3	The ocean is a major influence on weather and climate.
Principle 4	The ocean makes Earth habitable.
Principle 5	The ocean supports a great diversity of life and ecosystems.
Principle 6	The ocean and humans are inextricably interconnected.
Principle 7	The ocean is largely unexplored.

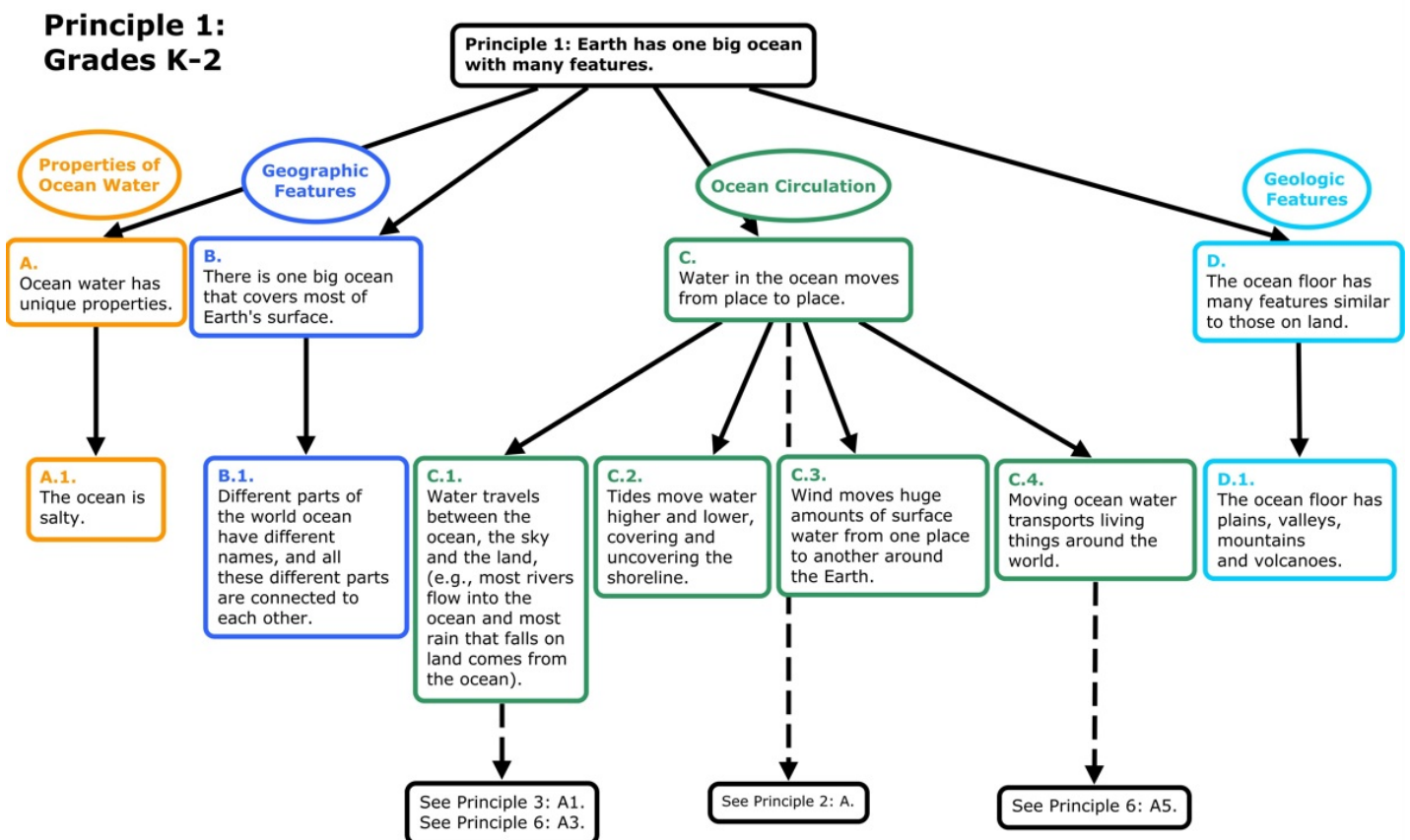(Source: https://www.marine-ed.org/ocean-literacy/overview)

Figure 1: CFD sample. Learning flowchart for Principle 1 in K-2 (kindergarten to Grade 2) education.

Although *Ocean Literacy* was prepared based on the educational situation of the United States, it is also being applied in ways that fit regional circumstances around the world. For example, with European marine scientists and educational experts coming to recognize the importance of incorporating marine science into public education, Portugal became the first European country to introduce an ocean literacy framework. A Portuguese version[12] of *Ocean Literacy* was prepared in 2011. The European Marine Science Educators Association[13] (EMSEA) was launched as a sister association of the NMEA to promote effective reforms and international collaboration among marine educators in Europe. In Asia, *Ocean Literacy* has been translated into Japanese[14] and Chinese. The Asian Marine Educators Association[15] was established in 2015, and a workshop on ocean literacy was held at the Tokyo University of Marine Science and Technology in 2016.

Ocean Literacy has been revised twice as of the end of 2020. For the second edition, which was published in March 2013, the number of Basic Concepts for Principle 4 was expanded from two to three, bringing the total of Basic Concepts for *Ocean Literacy* as a whole to 45.[16] In connection with science education, a separate correspondents table for the Next Generation Science Standards[17] (NGSS), which were also presented to the public in 2013, and the seven Basic Principles of *Ocean Literacy* was prepared for the second edition to ensure linkage with the NGSS. On the other hand, the third edition, which was published in February 2020, contains no major revisions to the Basic Principles or Basic Concepts. However, its foreword provides an overview of ocean literacy as a form of integrated science, the implementation of the International Ocean Literacy Survey[18] (IOLS), and the international development of *Ocean Literacy*.

1.3 *Ocean Literacy for All*

Activities to disseminate the ocean literacy concept began in the United States and are now spreading to Pacific countries, Europe, and Asia. As these activities are promoted by organizations and associations in individual nations and regions, cooperation among nations and regions and the sharing of tools, materials, and good practices for marine education

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[12] "Conhecer o Oceano - Os Princípios Essenciais das Ciências do Mar." The content is the same as the first edition. https://academia.cienciaviva.pt/recursos/recurso.php?id_recurso=404
[13] European Marine Science Educators Association,
[14] The leaflet for "Ocean Literacy" (2nd edition) contains a Japanese translation introducing the first edition. As of December 2020, a Japanese translation of the second edition is posted on the website of the Marine Learning Center. https://www.marinelearning.org/image/OceanLiteracy_ver.2.pdf
[15] Asian Marine Educators Association
[16] Notations on marine science and science education in the other six Basic Principles were revised based on the latest research findings available at the time.
[17] Next Generation Science Standards
[18] International Ocean Literacy Survey

have become necessary. To address this need, UNESCO is making an international drive to promote the ocean literacy concept and framework through the IOC and its Education Sector. In December 2017, IOC-UNESCO published *Ocean Literacy for All—A Toolkit* (hereinafter *Ocean Literacy for All*) (Santoro et al., 2017) based on *Ocean Literacy*. Its purpose is to be distributed to as many marine educators as possible in both the formal and nonformal spheres,[19] to present the US's ocean literacy framework and proven and effective practices from around the world, and to assist in the provision of marine education. *Ocean Literacy for All* consists of two parts. Part 1 provides a history of efforts to disseminate ocean literacy, commentary on the seven Basic Principles inherited from *Ocean Literacy* and the Basic Concepts that are associated with them, and a look at the way forward and global framework for ocean literacy activities. Part 2 summarizes leading practices in ocean literacy education from around the world. One of the initiatives it introduces involves the Heigawa River in Iwate Prefecture, conducted through a partnership among the Tokyo University of Marine Science and Technology, Iwate University, and Kitasato University.[20] A Japanese translation of Part 1 was made public by the Center for Ocean Literacy and Education, Graduate School of Education, The University of Tokyo (COLE)[21] in 2020.

2. IOC-UNESCO, SDG 14, and Ocean Literacy

Ocean literacy has attracted international interest largely because it has been developed to systematically tackle interdisciplinary ocean study in both formal and non-formal science education. Moreover, as ocean literacy—both as a concept and an approach—evolves into a tool that induces society as a whole to take action toward ocean sustainability,[22] it maintains an important relationship with IOC-UNESCO and SDG 14 ("conserve and sustainably use the oceans, seas and marine resources for sustainable development"), which is tied to the "UN Decade of Ocean Science" that began in 2021.

In recent years, marine science has made dramatic advancements while the oceans' health and marine ecosystem services have come under threat. Thus, the challenges of sustainable

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[19] Formal education: Education that is highly institutionalized, structured by age, hierarchically organized, and extending from elementary school to university. Public education and school education. Non-formal education: Organized and systematized educational activities that provide learning in certain forms for specific groups outside the framework of school education. Non-school education.

[20] The "Heigawa Masu Salmon MANABI Project," a regional collaborative education project of the Project for Formation of the Research and Education Center of SANRIKU Fisheries.

[21] A center affiliated with The University of Tokyo's Graduate School of Education that was newly established in 2019 to inherit the results of the Center for Ocean Literacy and Education, The University of Tokyo Ocean Alliance.

[22] IOC-UNESCO (2020) DRAFT STRATEGY: Ocean Literacy for the UN Decade of Ocean Science for Sustainable Development. https://oceandecade.org/resource/76/OCEAN-LITERACY-DRAFT-STRATEGIC-PLAN----Ocean-Literacy-for-the-UN-Decade-of-Ocean-Science-for-Sustainable-Development

development are growing. IOC-UNESCO, which lists human resources development as one of its important missions, was faced with the urgent task of developing human resources capable of responding to these challenges.

The IOC will celebrate its 60th anniversary in 2021. As the only international organization dedicated to science, projects, and human resources development pertaining to the oceans, it has promoted international cooperation for the continuation of ocean observation; prepared ocean data products designed to extract the maximum benefit possible from new knowledge; and brought about mutual interaction among research sites, data users, and decision-makers. In such areas as human resources development in Africa and the Small Island Developing States (SIDS) and gender equality, the IOC has aimed to mainstream natural and social science approaches. Within this strategic framework, the IOC proposed a Capacity Development Strategy[23] in September 2015 that consists of six outputs (concerning, for example, human resources development and physical infrastructure) and 13 activities to be tackled between 2015 and 2021. Activities for the fifth output, "visibility and awareness [of oceans] increased" are "5.1 Public Information" and "5.2 Ocean Literacy." Activity "5.1 Public Information" means disseminating research findings as public information that is more accessible to the general public. The strategy states that publicly funded marine research, in particular, must more robustly demonstrate that their research findings have great significance for society. Activity "5.2 Ocean Literacy" involves fostering the development of an IOC ocean literacy program as a community to share and practice experiences within and across regions. The end of Section 79, which pertains to the activity of 5.2, mentions that ocean literacy efforts are underway in several regions and that practical experiences are being shared. This suggests that ocean literacy initiatives, including the *Ocean Literacy* efforts of the US and Europe, were included in the IOC-UNESCO's perspective.

Between 2015 and 2017, IOC-UNESCO, COSEE, and the College of Exploration jointly organized Global Ocean Science Education (GOSE) workshops on three occasions. It was argued there that the ocean literacy community can contribute to the realization of an international ocean policy as well as leadership and planning, as ocean-related environmental problems are global in nature and understanding them requires that people acquire ocean literacy (i.e., become a literate public). It was also proposed that a multilingual online platform should be developed to encourage the sharing of teaching materials and practices.

During a UN Ocean Conference held in June 2017, UNESCO presented *Ocean Literacy for All: A Global Strategy to Raise the Awareness for the Conservation, Restoration, and*

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[23] IOC/INF-1332. In documentary form: IOC-UNESCO(2016) IOC Capacity Development Strategy, 2015-2021.

Sustainable Use of our Ocean as a voluntary commitment. Paragraph 13 of a document issued at the end of the conference titled "Call for Action" mentioned strengthening awareness of the ocean and fostering ocean-related education to promote ocean literacy and a culture of conservation, restoration, and sustainable use of the ocean as steps for maintaining healthy ocean ecosystems and achieving Sustainable Development Goal 14. Six months later, in December 2017, an international conference on Ocean Literacy for All was held by UNESCO and the European Commission. Thirty countries, including Japan, participated. The conference featured the presentation of *Ocean Literacy for All—A Toolkit* and a three-year roadmap for the UN Decade of Ocean Science, which started in 2021.

IOC-UNESCO launched a portal website[24] in July 2018 to spread ocean literacy worldwide and promote the sharing of ocean-related knowledge around the world, thereby helping people engage in international ocean activities aimed at protecting the global environment. Serving as a one-stop shop for ocean literacy, the site allows users to download *Ocean Literacy for All* free of charge, use related images and materials, and register and share new approaches to ocean literacy education. Although the site is not multilingual in the way that was proposed at the GOSE workshops of 2015-2017[25], the fact that its home page features seven languages seems to imply that it eventually will be.

3. The Draft Ocean Literacy Strategy for the UN Decade of Ocean Science

In its draft Ocean Literacy Strategy for the UN Decade for Ocean Science (hereinafter the Draft Strategy) announced in 2020, IOC-UNESCO states that ocean literacy must be integrated in a broader context with practices in more educational frameworks—such as those pertaining to sustainable development, climate change, biodiversity, sustainable lifestyles, disaster risk reduction, and the environment.[26] The ocean literacy framework contained in the Draft Strategy consists of four elements: (1) Societal outcomes,[27] (2) Learning opportunities, (3) Contributions, and (4) Stakeholders (Figure 2).[28]

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[24] Ocean Literacy Portal https://oceanliteracy.unesco.org/
[25] http://www.unesco.org/new/en/media-services/single-view/news/global_ocean_science_education_how_we_can_work_together_to/
[26] See footnote 23.
[27] As of January 2020, when Figure 3 was prepared, there were six target outcomes. However, as of July 2020, "an inspiring and engaging ocean" has been added to make seven.
[28] IOC-UNESCO (2020) in footnote 22 states that this is "a non-exhaustive view." It is anticipated that this will be revised soon.
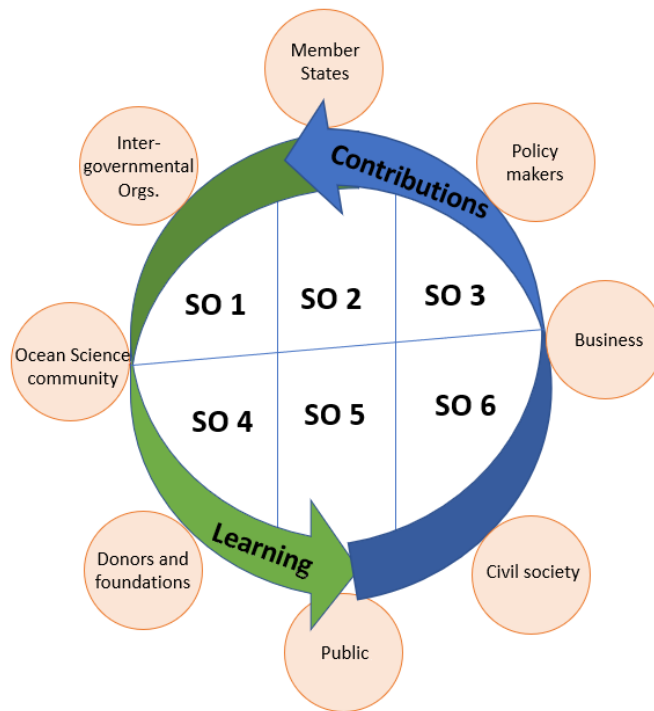
Figure 2: Conceptual diagram of the ocean literacy framework for the UN Decade of Ocean Science

These four elements of the ocean literacy framework are, in fact, interrelated and intricately connected. For example, societal outcomes can be dependent on each other, and stakeholders themselves form part of complex social connections. Moreover, all stakeholders are linked to each of the societal outcomes, both through their specific learning needs/opportunities and their concrete contributions.

The Global Ocean Literacy Strategy[29] was prepared upon this framework with the aim of facilitating and further expanding action in all social sectors associated with ocean sustainability to accelerate fundamental changes in the ways oceans are managed. As can be seen in Table 2, targets and indicators for those targets are established for four priority areas—Advancing Policy, Formal Education, Corporate Action, and Community Engagement. Examples of activities to reach each target are provided in the table along with their relationships to (1) to (3) of the aforementioned four framework elements.

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[29] Global Ocean Literacy Strategy

Table 2: Priority areas, targets, and indicators

PRIORITY AREAS	TARGETS	INDICATORS
Advancing Policy	·By 2025, Ocean Literacy is integrated into the curriculum and education policies of formal education systems around the world, with 70% of countries possessing an approved National Ocean Literacy Strategy.	·Number of policies developed, number of countries with National Ocean Literacy Strategy
	·By 2028, Ocean Literacy policies are adequately implemented, monitored and measured.	·Progress by countries in the degree of implementation of Ocean Literacy policies.
	·By 2025, governmental representatives and officials possess the knowledge, capacity, skills and commitment to incorporate ocean sustainability in local, national and regional policies.	·Number of representatives
Formal Education	·By 2025, schools across the world will have access to quality up-to-date Ocean Literacy educational resources and materials, delivered in their own language and relevant to global issues as well as their specific context.	·Number of resources and materials
	·By 2030, 70% of formal educators worldwide receive continuous training in Ocean Literacy and pedagogical tools to incorporate Ocean Literacy in the classroom.	·Progress by countries in the proportion of teachers trained
	·By 2030, 70% of students worldwide are educated in Ocean Literacy and are provided with opportunities to contribute to Ocean sustainability.	·Progress by countries in the proportion of students educated. ·Progress by countries in the proportion of students engaged in Ocean sustainability actions
	·By 2030, formal education institutions worldwide exhibit a whole-institution approach towards Ocean Literacy, in which Ocean sustainability is incorporated at each level of the administration including school governance, teaching/learning content and methodology, campus and facility management, community engagement and partnerships.	·Number of schools meeting whole-institution approach criteria for Ocean Literacy

(Source: "OCEAN LITERACY DRAFT STRATEGIC PLAN - Ocean Literacy for the UN Decade of Ocean Science for Sustainable Developmen", https://oceandecade.org/resource/76/OCEAN-LITERACY-DRAFT-STRATEGIC-PLAN)

Table 2:（cont.）

Corporate Action	・By 2030, Ocean Sustainability is strongly incorporated into strategic planning mechanisms, regulations and policies for the corporate sector around the world.	・Number of businesses with policies, regulations and plans that incorporate Ocean sustainability
	・By 2030, companies across the world enhance and incorporate actions for Ocean sustainability within their regular operational processes, including in technological development, elaboration and provision of products and services, investing strategies, impact measurement and transparency.	・Progress by companies in reducing environmental impact from their operations to benefit ocean sustainability. ・Progress by companies in fostering positive environmental impact through their operations to benefit ocean sustainability.
	・By 2025, employees and investors of the corporate sector worldwide receive training in Ocean Literacy, understanding the connection of their operations with the ocean and receiving opportunities to engage in sustainable actions for the ocean.	・Number of employees and number of investors trained ・Number of companies offering Ocean Literacy training to their employees and investors
	・By 2025, partnerships are developed and enhanced among companies, and between companies and other sectors, to strengthen ocean sustainability.	・Number of Corporate Social Responsibility and Philanthropy actions dedicated to Ocean Sustainability ・Budget allocated to actions directly focused on supporting Ocean sustainability
Community Engagement	・By 2030, Ocean Literacy is built into non-community regulations, policies and governance structures around the world.	・Number of policies, governance structures and regulations ・Progress in the degree of implementation of policies and regulations
	・By 2025, multi-stakeholder networks and collaborations are built and operate at a local level, fostering sustainable action for ocean issues.	・Number of collaborations developed through networks ・Number of people indirectly reached through implementation of collaborations
	・By 2028, coastal and non-coastal community members have increased opportunities to receive education and engage in Ocean sustainability actions.	・Number of community members educated ・Number of community members engaged in Ocean sustainability actions
	・By 2025, there is an increased recognition and incorporation of traditional knowledge in Ocean Literacy efforts.	・Progress by countries in the degree of implementation and application of policies/institutional frameworks that recognize Traditional knowledge in Ocean Literacy efforts ・Number of documented Ocean Literacy efforts incorporating traditional knowledge

At the end of the Global Ocean Literacy Strategy is a concrete description of comprehensive implementation mechanisms for promoting the strategy. They include establishing national ocean literacy strategies; developing collaborations, partnerships, and networks; showcasing and endorsing ocean literacy efforts; and increasing research, monitoring, and evaluation. A number of actions are encouraged, including designating an organization in each nation to share information on ocean literacy performance with IOC-UNESCO, engaging in cross-sectoral partnerships and collaborations at a variety of levels, showcasing and endorsing initiatives through the portal site, and evaluating and studying ocean literacy efforts and behavioral changes.

4. Ocean Literacy in Japan

The previous sections dealt with the expansion and development of ocean literacy on the international stage. It deserves noting, however, that ocean literacy has likewise been discussed in Japan in a parallel manner.

It is believed the first use of the term *kaiyo riterashi* (ocean literacy) in Japan was in study material for an observation exercise that was conducted as part of a hands-on learning program called "*Kenkyu-sen de Umi wo Manabo*"[30] (learning about the sea on a research vessel) in 2007. Ocean literacy was defined in this material as "understanding the impacts sea has on us, and the impacts we have on the sea." Although no source was given, seven basic principles corresponding to the Basic Principles of the 2005 version of *Ocean Literacy* and associated keywords[31] were provided. A research report submitted in 2009 titled "*Wagakuni ni okeru Kaiyo Riterashi no Fukyu o Hakaru tame no Chosa Kenkyu*"[32] (research study to promote ocean literacy in Japan) made points that echoed the sense of crisis the NMEA felt in 1996, stating that because "ocean science is holistic"[33] and "multiple factors are intricately intertwined," it is "essential to provide ocean science education at the elementary and secondary school levels and raise understanding of this field throughout Japanese society as a whole." The report summarized changes in Japan's marine education from the end of World War II to 2009, the results of an ocean literacy questionnaire survey that targeted high school students studying earth science, and "seven basic principles (constitution) for ocean literacy" that were prepared based on the seven Basic Principles of *Ocean Literacy*.

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[30] Implemented between 2006 and 2010 as a Nippon Foundation project that was sponsored by the Japan Science Society and co-organized by the Oceanographic Society of Japan and Tokai University.
[31] Some words were not mentioned in the initial version of Ocean Literacy (e.g., ozone, average depth of 3,800 m). Other than the basic principles, it appears that the material was based on the ideas of the creator, the late Professor Emeritus Shizuo Tsuogai.
[32] http://www.ur21.net/ur21/pdf/2009zenpen.cyousakennkyuhoukokushopdf.pdf
[33] Meaning "encompassing" or "global."

Later, a concept called "aquatic marine environmental literacy" (Sasaki, 2011) was prepared in 2011. It consists of eight main principles and 66 sub-items that were developed by adding traditional knowledge that is based on Japan's fish-eating culture to *Ocean Literacy*. Like the NMEA's *Ocean Literacy* and the NSES's matrix, aquatic marine environmental literacy is linked to science instruction for elementary, junior high, and high schools described in government curriculum guidelines. Additionally, aquatic marine environmental education that is based on "aquatic marine environmental literacy" is a system through which people (mainly university students) who have studied "aquatic marine environmental literacy" promote collaboration and cooperation with communities as aquatic marine environmental education leaders. Learning content is tailored to the area in which education is provided, from coastal to inland areas. The system has built up a store of practical examples.

In 2014, a "National Ocean Literacy Survey" was conducted that targeted elementary and junior high school students throughout Japan. Its report summarized the relationship between ocean literacy and school-based marine education, the effects that including ocean literacy in government curriculum guidelines has had, and various studies that included a review of advance research on ocean literacy in Japan (Center for Ocean Literacy and Education, The University of Tokyo Ocean Alliance, 2016). Recently, in February of 2020, COLE issued a Japanese translation of Part 1 of *Ocean Literacy for All*.

Looking at international connections, beyond the Japanese translation of *Ocean Literacy*[34] prepared by the Marine Learning Center and the translation of *Ocean Literacy for All* by COLE are efforts to promote ocean literacy by IPMEN[35] and AMEA, of which Professor Tsuyoshi Sasaki of the Tokyo University of Marine Science and Technology, the originator of the "aquatic marine environmental literacy" concept, is a leading figure.

5. The Future of Ocean Literacy in Japan

It is anticipated that the global dissemination of ocean literacy will proceed based on the Draft Strategy mentioned in Section 3 during the UN Decade of Ocean Science, which began in 2021. However, as is mentioned in *Ocean Literacy for All*, ocean literacy can have different meanings depending on the country or culture. It is therefore important to ascertain national philosophies vis-à-vis the oceans rather than simply accepting *Ocean Literacy for All* as is and striving to achieve the strategy's objectives.

As was discussed in Section 4, despite the fact that ocean literacy has been discussed from various angles for more than a decade, the kind of systematic approach to ocean literacy

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[34] A Japanese translation of the second edition of "Ocean Literacy" is available as of December 2020.
https://www.marinelearning.org/image/OceanLiteracy_ver.2.pdf

[35] International Pacific Marine Educator Network

seen in the United States—namely, the CFD, based upon which ocean literacy is studied from kindergarten to high school—has yet to be developed in Japan. Two points deserve attention when thinking about diffusing ocean literacy into Japan's educational settings: What should Japanese ocean literacy convey? And how should ocean literacy be incorporated into the school curriculum?

This first point involves confirming the knowledge that Japanese citizens should have as a result of common education on the oceans. Course units relating to the oceans in government curriculum guidelines that were issued in 2017 concern geography (such as the names of national territories and ocean basins) and industry (such as fishery and trade). Here, oceans are treated as places visible on maps or as settings and backdrops for industry. Scientific knowledge of the oceans is provided along with that for the atmosphere in lessons on weather and climatology in junior high school science. However, when it comes to the oceans alone, no learning opportunities exist until marine science, environment, and biology are covered in the specialized subject of fisheries in high school. If the dissemination of ocean literacy throughout the country in line with the targets of Table 2 were to be undertaken, the best time for it would be during the compulsory education period of elementary and junior high school. However, as it stands, current education is inadequate, even if one only considers the seven Basic Principles.

The second point also has a relationship with IOC-UNESCO's Draft Strategy. If one takes a nationwide perspective, integrating ocean literacy into the school curriculum amounts to integrating it into the Course of Study. However, the Course of Study is revised on a roughly ten-year cycle, and thus achieving this will take time. If the focus will be at the school level, it would be possible to proceed if ocean literacy were actively addressed as cross-subject study through "curriculum management."[36] However, ocean-related content in the current Course of Study is insufficient, particularly in terms of scientific knowledge, and must be developed as the common education on the oceans that was mentioned in the first point. Rather than plucking out items of ocean knowledge to fit with study items of the Course of Study, it would be better for learning based on the ocean literacy concept to build the knowledge necessary for understanding the oceans within the contexts of science, humanities, and the social sciences—including the role that the oceans play in climate change—in step with students' development.

The Third Basic Plan on Ocean Policy states that Japan will aim to provide marine education in all municipalities by 2025. This makes it necessary to return to the discussion of what will be taught in marine education, what "ocean" means in education that will be

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[36] This refers to the improvement of curriculum-based education quality and the maximization of learning effects by appropriately allocating educational content and time, securing the necessary human and material resources, and making improvements based on the circumstances of the education provided.

provided even in mountainous areas, and what ocean knowledge should be acquired by the Japanese public through shared education. The plan mentions "the use of supplementary readers to deepen scientific understanding of the oceans" and "explaining and disseminating information on the latest research and development according to the developmental stage of students." However, the government's perspective should not be limited to the latest research findings. It is important to reconsider the fact that extremely basic scientific knowledge on the oceans—namely, that even though the oceans are globally connected, temperature, salinity, and other aspects of water properties differ depending on region and depth[37]—is not included in the Course of Study.

Even in Japan, a nation surrounded by the sea, connecting people with SDG 14 (one of the Sustainability Development Goals, a set of global goals that are gaining increasing attention in society) and directing their perspectives and behaviors toward achieving it will provide an impetus for gaining an understanding of the oceans, whose offshore depths can be difficult to conceive in everyday life, and for better recognition that the oceans are a "personal matter" for all of us. Additionally, the UN Decade of Ocean Science will likely provide an excellent opportunity for building shared ocean literacy throughout Japan. Taking such diffusion throughout society into account, it is clear that efforts to promote ocean literacy must continue even after the UN Decade of Ocean Science and 2030, the target year of the Sustainable Development Goals. It is hoped that, as each individual acquires ocean literacy and comes to understand the ocean, Japan will become a country that can live in harmony with a sustainable ocean.

[37] In the CFD that accompanies "Ocean Literacy," this distribution of water quality is content learned in grades 3 to 5 of elementary school.

References:

Fauville, G., C. Strangb, M.A. Cannady and Y.-F. Chen (2019) Development of the International Ocean Literacy Survey: measuring knowledge across the world. Environ. Educ. Res, 25, 238-263. doi:10.1080/13504622.2018.1440381.

National Geographic Society, National Oceanic and Atmospheric Administration, Centers for Ocean Sciences Education Excellence, and National Marine Educators Association and College of Exploration (2005) Ocean Literacy: The Essential Principles of Ocean Sciences K-12. Silver Spring, MD: NOAA.

Niwa, Y., Taguchi, K., Kato, D. and Kajikawa, M. (2020) Ocean Literacy for All—*Kaiyo Riterashi Honyaku* (ocean literacy translation) (First Edition).
https://www.cole.p.u-tokyo.ac.jp/wp/wp-content/uploads/2020/02/Ocean-Literacy-for-All%E7%BF%BB%E8%A8%B3%E3%80%90%E7%AC%AC%E4%B8%80%E7%89%88%E3%80%91.pdf

Rockström, J., et al. (2009) Planetary boundaries: Exploring the safe operating space for humanity. Ecol. Soc. 14, 32. http://www.ecologyandsociety.org/vol14/iss2/art32/

Santoro et al. (eds.) (2017) Ocean Literacy for All − A Toolkit, IOC/UNESCO & UNESCO Venice Office, Paris (IOC Manuals and Guides, 80 revised in 2018).

Sasaki, T (2011) Theory and Practice of Japanese Aquatic Marine Environmental Education, Seizando-Shoten, 201-207.

Steffen, W., et al. (2015) Planetary boundaries: Guiding human development on a changing planet. Science 347 (6223), 1259855. doi: 10.1126/science.1259855

Center for Ocean Literacy and Education, The University of Tokyo Ocean Alliance (ed.) (2016) *Zenkoku Kaiyo Rierashi Chosa-Saishu Seika Ronbun-shu* (national ocean literacy survey: a collection of papers detailing final results).

UNESCO (2005) Aspects of Literacy Assessment: Topics and Issues from the UNESCO Expert Meeting. Paris: UNESCO.