



**Asia-Pacific  
Economic Cooperation**

# **APEC Blue Citizen Guidebook**

**APEC Ocean and Fisheries Working Group  
October 2024**





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# Chapter I. Preface

A thriving ocean is crucial to the overall health of the planet. Surrounding the Pacific Ocean, the world's largest and deepest ocean, APEC region is home to about 37% of the world's population, 62% of the world's GDP, and 47% of the world's trade. Also, APEC economies have the richest biodiversity and ecosystems <sup>[1]</sup>. The ocean is central to our cultures, providing food, income, employment, transportation, and avenues for economic development. It serves both as a connector and a barrier, providing sustenance while also posing a potential threat to our very existence, which have continuously prompted collaborative efforts to enhance human well-being. As the common home for mankind, the ocean's preservation is imperative for all. By jointly protecting and sustainably managing our ocean, we can secure its continued benefits for future generations.

## 1.1 Progress in Promoting Ocean Literacy

Recognizing the lack of ocean-related subjects in formal education, a group of ocean scientists and education professionals in the United States initiated a collaborative and bottom-up process to develop a comprehensive framework in 2002 <sup>[2]</sup>. This framework aims to encourage the inclusion of ocean sciences into domestic standards, and for more teaching about the ocean in K-12 classrooms <sup>[3]</sup>. Ocean Literacy has historically been described as “the understanding of the ocean's influence on us and our influence on the ocean” and articulated through seven core principles <sup>[3, 4]</sup>. The ocean literacy campaign has since spread around the world with the establishment of associations of marine science educators in Australia; Canada; Europe; and Asia.

In 2016, the Intergovernmental Oceanographic Commission of UNESCO (IOC/UNESCO) initiated a comprehensive study on ocean literacy to further strengthen the global network for marine science education by facilitating interactions among governments, businesses, and the marine research and education sectors <sup>[5]</sup>. The importance of enhancing ocean literacy worldwide has been emphasized in several United Nations documents, including the 2030 Agenda for Sustainable Development <sup>[6]</sup> and the publication “Ocean Literacy for All: A Toolkit” <sup>[7]</sup>. The significance of ocean literacy has been emphasized during the global and regional planning workshops of the UN Ocean Decade <sup>[8]</sup>, reflecting its role in addressing the challenges outlined in the Ocean Decade Challenge 10 <sup>[9]</sup>, i.e. Change humanity's relationship with the ocean: Ensure that the multiple values and services of the ocean for human well-being, culture, and sustainable development are widely understood, and identify and overcome



barriers to behavior change required for a step change in humanity's relationship with the ocean.

A research study (Appendix), including questionnaires, was conducted to shed light on the current status and challenges of ocean literacy in the APEC region. The study aims to gather information on the current status, limitations, and opportunities for capacity building in marine education across APEC economies, in order to strengthen participatory mechanisms, enhance support, and make better policies for the Blue Citizen development. The findings from this study, along with the results from the APEC Training Workshop on Capacity Building for Blue Citizen in September 2023, have informed the development of this guidebook.

## **1.2 Link to the Global Agenda**

The ocean is a vital source of life, and human society's well-being is deeply dependent on its health. However, 40% of the world's ocean is severely impacted by human activities, including biodiversity loss, environmental pollution, especially trans-boundary pollution, global warming and sea level rise, and frequent marine disasters. Ocean and coastal areas are extremely vulnerable to a wide range of environmental and anthropogenic threats <sup>[10-12]</sup>. To address the multiple challenges facing the global ocean, the United Nations has proposed global programs such as the 2030 Agenda for Sustainable Development <sup>[6]</sup>, the United Nations Decade of Marine Science for Sustainable Development (2021-2030) <sup>[13]</sup>, and its Ocean Literacy Strategy <sup>[14]</sup>.

In the 2030 Agenda for Sustainable Development and the Sustainable Development Goals, leaders of the economies emphasized the urgency of taking action to improve marine conservation and sustainable utilization of the ocean. Among them, Sustainable Development Goal 14 (SDG 14) is dedicated to promoting the conservation and sustainable use of oceans, seas, and marine resources. Furthermore, the United Nations Decade of Marine Science for Sustainable Development has highlighted the importance of understanding the ocean for sustainable management and development, championing the vision of "The Science We Need for The Ocean We Want." This initiative emphasizes that global ocean governance and cooperation can help ensure the health, productivity, sustainable utilization, and resilience of our ocean, thereby securing our collective future. All signatories of the Paris Agreement have pledged to set a global goal to enhance adaptive capacity, strengthen resilience, and reduce vulnerability to climate change. Additionally, the Convention on Biological Diversity (CBD) asserts that marine biodiversity and ecosystems form the foundation of planetary and social health. It calls for the protection of at least 30% of the world's

land and ocean areas by 2030 <sup>[15]</sup>. Raising awareness and taking actions about the critical need for global ocean protection and the benefits of cooperative action is vital for achieving these ambitious objectives.

The effective management of human activities is intrinsically linked to the sustainable development of the ocean, taking into account the crucial role of human beings in marine protection, and those linkages are complex and constantly evolving. From climate change to plastic pollution and Illegal, Unreported, and Unregulated (IUU) fishing, many unprecedented threats to our ocean are related to human activities. The situation becomes particularly important for global change and human activities have far-reaching impacts on climate change, ocean dynamics, and ecosystems. Therefore, we need to take an integrated and holistic approach to the management of human activities, guided by the ecosystem and precautionary approaches, the principles of inclusiveness and equity, while ensuring it is favorable ecosystems and communities. Achieving the goals set by the UN and APEC requires a collaborative effort between authorities and individuals. To promote a positive transition from ordinary individuals to responsible Blue Citizens, it is essential to emphasize the crucial role of public empowerment in fostering ocean literacy. Ocean literacy involves understanding the complex interactions between the ocean and human activities, which significantly influence people's behavior. However, ocean literacy education is still in its early stage, especially in developing economies, which hinders the road to achieve United Nations and the APEC goals.

The Blue Citizen initiative is a call for action proposed to promote the necessary changes in human behavior to better contribute to the implementation of major initiatives and plans. The various levels of effort to develop Blue Citizens will directly or indirectly contribute to implementing the 2030 Agenda for Sustainable Development and implementing the Sustainable Development Goals. Cultivating Blue Citizens are not only based on learning about the ocean but also on taking a step forward to emphasize more on connecting to the ocean and protecting the ocean. Blue Citizens are also willing to explore the ocean and take action for a healthy and productive ocean. Blue Citizen initiative will recruit more members and help raise public awareness about the sustainable utilization of the ocean and its resources.

### **1.3 Link to APEC Vision**

The Asia-Pacific Economic Cooperation (APEC) is a regional economic forum established to create greater prosperity for the people of the region by promoting balanced, inclusive, sustainable, innovative, and secure growth and by accelerating

regional economic integration. Working towards goals to achieve inclusive and sustainable development, APEC adheres to a cooperative format featuring consensus-building, non-binding agreements, voluntary participation, cooperation, and flexibility. APEC economies have contributed to the conservation and sustainable use of marine resources as well as committed to promoting sustainable and inclusive growth across the Asia-Pacific region through collaboration with entities such as the APEC Oceans and Fisheries Working Group (OFWG) and other sub-fora. The APEC Putrajaya Vision 2040 and the Aotearoa Plan of Action will intensify inclusive human resource development as well as economic and technical cooperation to better equip our people with the skills and knowledge needed for the future to support “an open, dynamic, resilient, and peaceful Asia-Pacific community by 2040”. The Xiamen Declaration (The 4<sup>th</sup> APEC Ocean-Related Ministerial Meeting 2014) advocates the cooperative reduction of marine debris and recommends APEC members to raise public awareness of ocean-related issues through programs on community awareness, capacity building, public communication, etc. OFWG is dedicated to supporting APEC’s mission to foster sustainable economic growth, development, and prosperity in the Asia-Pacific region. The group focuses on facilitating free and open trade in the region and promoting the sustainable use of fisheries, aquaculture, and marine ecosystem resources and related goods and services. OFWG aims to foster cooperation among its members, governments, academia, private industry, and regional and international organizations to advance these objectives<sup>[16]</sup>.

APEC has prioritized capacity-building, women engagement, and the sharing of best practices on ocean literacy. “Creating a resilient and sustainable future for all” is the overarching theme of APEC 2023, and one of its priorities is to create an innovative environment for a sustainable future. The Peruvian theme proposed for APEC 2024 is “EMPOWER, INCLUDE, GROW” and it covers three priorities: 1) Trade and investment for inclusive and interconnected growth, 2) Innovation and digitalization to promote the transition to the formal and global economy, 3) Sustainable growth for resilient development. Therefore, we have confidence in APEC’s outstanding leadership, effectiveness, and efficiency in the Blue Citizen development throughout the APEC region, considering the important role the ocean plays in APEC region.

# Chapter II. Blue Citizen: Overview

## 2.1 Introduction of Blue Citizen

As highlighted in the preceding chapter, it is crucial to enhance ocean literacy for all. Therefore, individuals who have learned about blue services from the ocean and are willing to explore the ocean, and take actions for the beautiful ocean, are essential in fulfilling global commitments, promoting sustainable ocean development, fostering harmonious coexistence with the ocean, and building a maritime community with a shared future.

The development of “Blue Citizens” centers on enhancing ocean literacy, grounded in the basic principles and concepts outlined in the Ocean Literacy Framework (OLF) <sup>[17]</sup>. These citizens appreciate the ocean's benefits for human well-being through the perspectives on ecosystem services and the dynamic interactions between the ocean and human communities—often referred to as “Blue Services.” An ocean-literate individual recognizes the deep connections between humans and the marine environment and strives to strengthen these ties within individuals, communities, and societies. They are action-oriented, eager to explore and experience the ocean, and enjoy developing a close, respectful relationship with marine settings. Consequently, Blue Citizens advocate for the responsible sharing of oceanic benefits. They make informed decisions about the use and stewardship of ocean resources, adhering to principles of respect and minimal impact, all in pursuit of maintaining a beautiful and healthy ocean.

## 2.2 The Relations between Blue Citizen and Ocean Literacy

Ocean Literacy is defined by “the understanding of the ocean’s influence on us and our influence on the ocean”. An ocean-literate individual grasps the core principles and essential concepts concerning the ocean, enabling them to engage in meaningful discussions and make informed, responsible decisions regarding ocean resources. It is vital that everyone completes high school with a comprehensive understanding of Ocean Literacy to cultivate a society knowledgeable about the ocean. Educators play a crucial role in this process, utilizing the Ocean Literacy Framework to equip students with the necessary knowledge. This framework outlines the scope and sequence for learning about ocean literacy, ensuring a structured educational experience.

The Ocean Literacy Framework encompasses several key components: The Ocean Literacy Guide, the K-12 Ocean Literacy Scope and Process Guidelines Manual, the Alignment of Ocean Literacy with Next Generation Science Education Standards, and the International Ocean Literacy Survey. The Ocean Literacy Guide articulates seven crucial principles of the ocean:

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

These principles are further elaborated through 45 fundamental concepts, providing a comprehensive foundation for understanding the ocean's role in the natural world and in human society.

In order to address the multiple challenges including biodiversity loss, environmental pollution, climate change, frequent marine disasters, and IUU fishing confronting the global ocean, the United Nations has put forward global initiatives including the 2030 Agenda for Sustainable Development, the UN Decade of Ocean Science for Sustainable Development (2021-2030) and its Ocean Literacy Strategy. Achieving these ambitious goals requires the collective effort of society as a whole. With this in mind, we propose the idea of Blue Citizen initiative.

The Blue Citizen initiative is an appeal designed to cultivate ocean-literate Blue Citizens who will responsibly co-share the benefits of the ocean. Central to this effort is the promotion of a knowledge system anchored by the Ocean Literacy Framework, which aims to strengthen the bond between people and the ocean through an understanding of ecosystem services and ocean contributions for the human well-being. This initiative seeks to enhance the personal connection that individuals feel toward the ocean, emphasizing well-being, accessibility, and safety. It encourages proactive engagement at all societal levels to maintain and improve ocean health. Additionally, the initiative resonates with the call for individuals “to take greater personal responsibility for the ocean, as well as to enable them to act as citizens,

working through partnerships and networks, sharing ideas and experiences and developing new approaches and initiatives in support of ocean literacy” [7].

## **2.3 The Growth Process of Blue Citizens**

Cultivating Blue Citizens is a gradual, lifelong process. It begins with individuals' desire to become ocean literate and improve themselves through continuous learning and interaction with the marine environment. People from diverse backgrounds can enhance their understanding of the ocean literacy system by exploring the concept of blue services—learning about the ocean benefits through the perspectives of ecosystem services. Additionally, firsthand experiences and exploration of the ocean play crucial roles. Blue Citizens are systematically cultivated along this pathway, embodying four key dimensions of characteristics. Firstly, they possess scientific rigor, exercise rational thinking, and boast a wealth of knowledge in ocean literacy. Secondly, they exemplify humanistic values, displaying deep affection and empathy towards the ocean. Thirdly, they maintain an open and inclusive mindset, spearheading diverse partnerships and collaborations. Lastly, they are proactive in initiating responsible actions and measures, ensuring the enjoyment of marine benefits while safeguarding the well-being of the ocean. These characteristics forming step by step not only deepen individuals' knowledge but also contribute to foster “meaningful society-ocean connections are strengthened, driving increased motivation, capability, and opportunity for people, across all sectors of society, to make decisions, act, and behave in ways that ensure a healthy ocean” [9].

The following table shows (Table 1) the growth process of Blue Citizens:

**Table 1: The Growth Process of Blue Citizens**

	<b>Knowledge</b>	<b>Emotions</b>	<b>Attitudes</b>	<b>Actions</b>
I	Knowing that ocean literacy constitutes the foundational knowledge framework for education about the ocean.	Caring for the ocean; recognizing the ocean is the essential source of life and the ocean makes the planet habitable.	Recognizing that the ocean exhibits diverse characteristics and serves as a global connector; acknowledging the ocean's inclusiveness and the necessity for a comprehensive conservation by integrated landscape and seascape approach.	Expressing a keen interest in ocean experience and exploration; understanding that ocean threats are an outcome of human behavior. and affirming the critical necessity of the ocean protection.
II	Capable of defining and introducing the ocean guided by the seven foundational principles of the Ocean Literacy	Experiencing profound affection for the ocean; recognizing the essential link between the ocean and humanity, and the dynamic interactions between them.	Experiencing how the ocean nurtures life and culture; having an open spirit of exploration; advocating for an open and inclusive approach to ocean management; promoting cross-sectoral and	Engaging with the ocean and experiencing the excitement of exploration; respecting the ocean; understanding and adhering to the principle of minimal impact, and acquiring the necessary skills to ensure

	Framework.		multidisciplinary collaborations among various stakeholders.	the ocean protection.
III	Understanding the seven foundational principles and forty-five essential concepts of Ocean Literacy; further advancing the study of the detailed content of the Ocean Literacy Framework through the perspectives of ecosystem services.	Recognizing the intrinsic connection between the ocean and human beings, characterized by a profound sense of intimacy and reverence; understanding that the ocean not only supports populations and regulates climate but also meets various human needs and nurtures diverse cultures.	Understanding, exploring, and disseminating the traditional cultures and local knowledge related to the ocean; acknowledging, respecting, and embracing cultural diversity.	Actively participating in, organizing, and contributing to activities and initiatives related to ocean conservation; fostering an interest and habit of exploring the ocean while minimizing human impact.



IV	<p>Developing a systematic approach to thinking based on acquiring ocean literacy; building an understanding of the ocean as interconnected, vast, and complex eco-systems; and enhancing the ability to discuss and promote ocean topics in an inspiring manner and in a meaningful way.</p>	<p>Embracing a deeply love for the ocean, Understanding the ecological processes that underpin the services the ocean provides for mankind; acknowledging the vital role the ocean plays for human and planetary well-being.</p>	<p>Promoting cultural exchanges and mutual learning, while upholding the values of equality, mutual appreciation, communication, and inclusiveness to respect differences and foster harmony amidst diversity.</p>	<p>Engaging enthusiastically in ocean-related activities; Proactively making decisions, taking action, and advocating for behavioral changes to safeguard the health of the ocean in daily life.</p>
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V	Being well-informed by empirical science and guided by rational thinking, possessing a solid grasp of ocean literacy, and cultivating a deep understanding that shapes human interactions with marine environments.	Motivated by profound empathy and a commitment to the public good, possessing a strong willingness and the necessary capacity to foster connections with the ocean. Appreciating the aesthetic and intrinsic values of the ocean while deeply recognizing and promoting its essential role in sustaining human life.	Advocating for an open and inclusive approach to ocean management, embracing cooperation and communication across diverse contexts through engaging multiple stakeholders, fostering international and cross-sectoral collaborations, and honoring local wisdom and heritage to ensure that all voices are heard and that shared experiences enrich collective efforts towards a healthier ocean.	Being dedicated to taking decisive and effective actions to responsibly share the ocean's benefits and protect ocean health. Being keenly aware of the urgent need for conservation and responsible management to sustain the ocean's prosperity for the future generations.
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To facilitate the development of Blue Citizens from Level I to Level V, we will implement a structured monitoring and evaluation process. This process includes the use of question banks that correspond to the seven principles of Ocean Literacy, with each principle detailed through 10 specific metrics. These questions will be translated into local languages to ensure broad accessibility. In addition to these metrics, we will introduce an extra 30 metrics that evaluate attitudes and behaviors towards the sustainable use of ocean resources. Participation in a formal training course is not a prerequisite for becoming a Blue Citizen, as individuals can also opt to study independently. To qualify as a Blue Citizen, an individual must pass a quiz consisting of 50 questions randomly selected from the question bank, achieving a score of 60% or higher. This assessment ensures that candidates have a robust understanding of and commitment to ocean literacy and sustainable practices.

Additionally, it should be emphasized that the growth stages of Blue Citizens do not restrict individuals' daily actions. Blue Citizens are consistently encouraged to make decisions and take actions that contribute to ocean health, both in their personal lives and at work. A systematic understanding of the ocean literacy knowledge framework enables Blue Citizens to make more informed and responsible judgments. While many marine conservation efforts highlight the need for public behavioral changes, Blue Citizens are expected to have a comprehensive understanding of the Ocean Literacy Framework (OLF). They should deeply engage with this framework, learning from it with a focus on ecosystem services and recognizing how the ocean benefits both people and the planet. It is important for people to enhance their appreciation of the ocean's contributions to their sense of happiness, achievement, and security, acknowledging the significant impact humans have on marine environments and the critical need to maintain ocean health.

### **【CASE】 Spontaneous Rescue Efforts for Stranded Whales in China**

*On 25 June 2015, a 2-meter-long and 80-centimeter-thick finless porpoise was stranded on the beach in Pingtan, Fujian Province, China. Villagers reported the situation to the local marine and fishery law enforcement team. After inspection, it was found that there were no major injuries to the entire body of the finless porpoise. While watering it, the staff and villagers slowly pushed it towards the deep sea area. The finless porpoise regained its sense of direction and swam deeper into the sea, about 50 m offshore. On 19 April 2022, fishermen found a sperm whale about 20 meters long stranded in the waters near Xiangshan County, Ningbo City, Zhejiang Province, China. They immediately reported to the county fishery administration, and the government departments immediately coordinated with firefighters, volunteers, marine experts, and*

*other forces to carry out emergency rescue (see Figure 1). On 20 April 2022, under the traction and escort of a fishing boat, the stranded sperm whale successfully escaped and returned to the sea.*



Figure 1. Rescuers Joined Forces to Rescue the Sperm Whale

# Chapter III. Approaches to Developing Blue Citizen

The effective development of a Blue Citizen requires collaboration across multiple sectors and the efficient mobilization of material, human, socio-organizational, cultural, and ethical resources. Figure 2 illustrates the stakeholders involved in nurturing Blue Citizens committed to a healthy ocean and the responsible sharing of its benefits. This collaborative framework is essential for fostering an informed and proactive community that supports sustainable ocean initiatives.

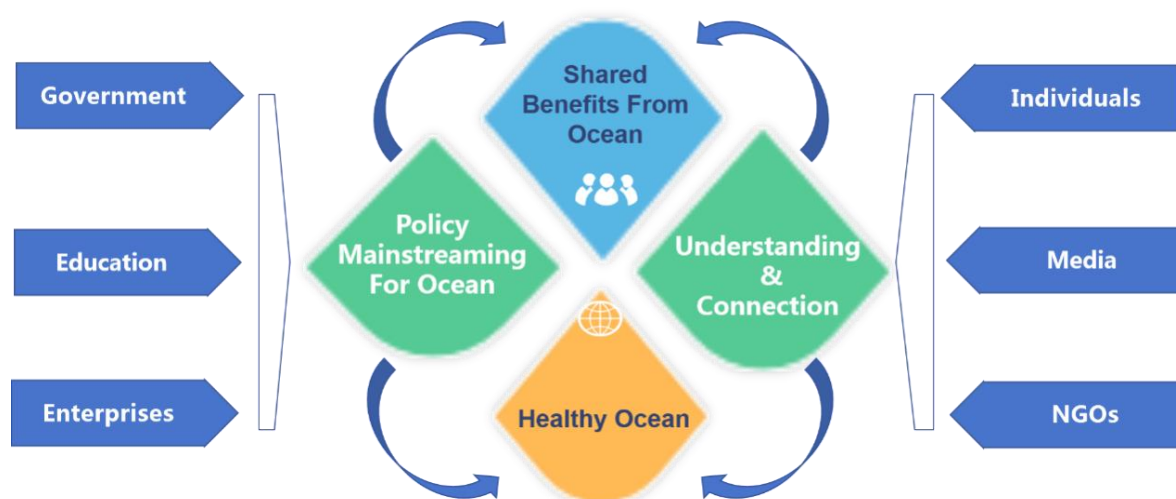


Figure 2. Multi-stakeholders to Foster Blue Citizen for the Healthy Ocean and for Responsible Sharing the Benefits from the Ocean

## 3.1 Policy Coordination

Public sectors play a pivotal role in the Blue Citizen development. Not only can they supply financial resources through appropriations, but they are also well-positioned to mobilize human and socio-organizational resources, among others. This comprehensive support is essential for the action's success, enabling a well-rounded approach to fostering ocean literacy and sustainable practices.

To advance the Blue Citizen development, it is crucial to identify relevant government agencies and departments that can leverage political and financial resources. Typically, the lead roles are assumed by environmental or marine and educational agencies, such as the Ministry of Natural Resources and the Ministry of Education. Other

government departments, such as the Ministry of Culture and Tourism and the Ministry of Human Resource Development, can also contribute valuable resources. Government departments interested in participating must collaborate closely. We encourage all relevant government branches to join this collective effort, as different departments may focus on various aspects of the initiative, seek different resources, and launch distinct projects. Establishing cross-sectoral partnerships at the domestic, regional, and local levels will enhance efficiency in fulfilling political or financial commitments and in the effective utilization of resources. Moreover, aligning proposed activities with the funding cycle schedules of these agencies is essential. Maintaining effective communication with all stakeholders is also crucial for the development of a successful and sustainable action plan.

First of all, it is the priority for the central and local governments to make policy coordination to favor Blue Citizen education and publicity. For instance, involve the Blue Citizen policy formulation in the agenda. These policies will guarantee the financial resources at various levels to support Blue Citizen education. As a result, these investments will in turn provide more human resources to the Blue Citizen development. Financial resources are the basis for supporting the development of the Blue Citizen. Both central and local governments can allocate a special budget for such activities. It would be useful for central and local governments to develop five-year plans to establish funding sources for detailed timetables and targets.

Secondly, it is essential to encourage policymakers, government, and research funding agencies to increase investment and attention in marine science. There is a need to organize cooperation between the scientific community, public organizations, and the private sector. Therefore, forming joint forces of action among various departments, and combining scientific and technological innovations and environment-friendly ways will help achieve marine ecological protection and sustainable economic development with both speed and balance.

**【CASE】 Jellyfish (Medusae) Monitoring & Outreach Program in the Tourist Attractions of Penang, Malaysia Conducted by Centre for Marine & Coastal Studies (CEMACS), Universiti Sains Malaysia (USM)**

*Penang island of Malaysia, lying in the Strait of Malacca off the northwest coast of peninsular Malaya. To most, the name Penang is enough to elicit images of a tropical idyll; all white beaches, cerulean seas, and rainforest-cloaked mountains. Recently, jellyfish sting cases in Penang have captured the public's attention which caused the siblings. Very few studies of jellyfish were conducted in the Penang waters. To make up for the scarcity, a monitoring program of Jellyfish (Medusae) species in the coastal*

waters of Penang, Malaysia will be planned & conducted for 18-months at tourist attractions around the coastal waters of Penang. The jellyfish will be sampled with a research boat where a custom-made trawl net. Physical and chemical parameters of seawater around the sampling sites will be collected and measured to determine the effects of exogenous environmental factors on the monthly distribution and abundance of jellyfish species in Penang Island. Outreach programs such as jellyfish workshops to the public and hotel reception were be conducted with the medical experts during the project period (see Figure 3). This project aims to enrich the public, tourist, involved agencies & local authorities with the knowledge and understanding of jellyfish species and their ecological role in the coastal waters of Penang (see Figure 4).

## Blue Citizen Promotion Public Talk & Seminar



Figure 3. Blue Citizen Campaign of the Jellyfish (Medusae) Monitoring & Outreach Program

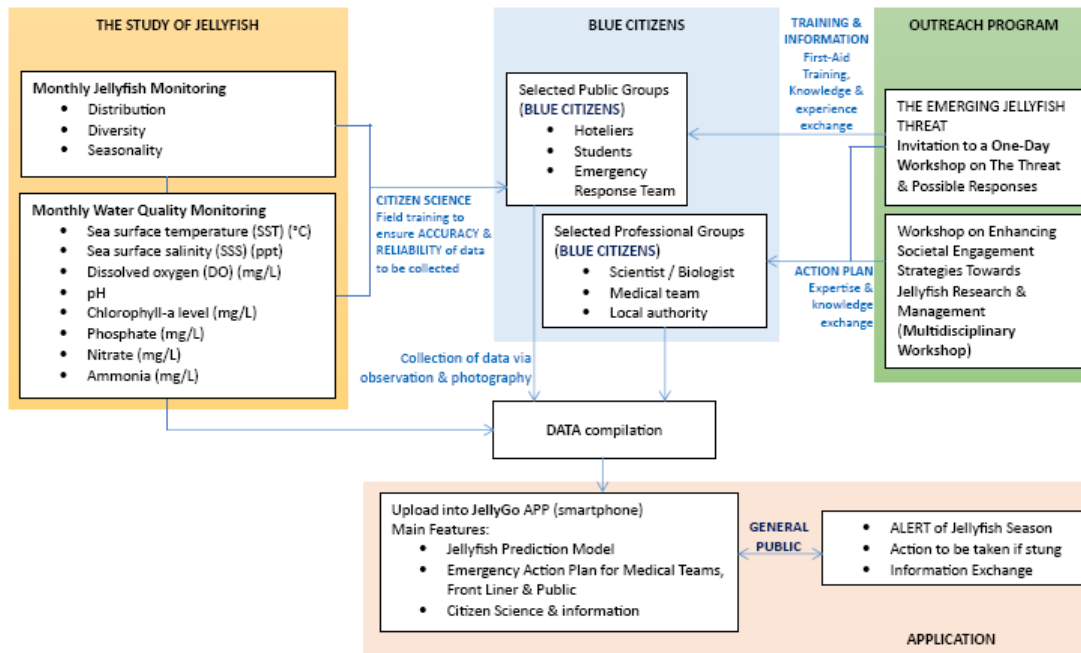


Figure 4. The Correlation between the Jellyfish Research and Blue Citizens

Thirdly, it is critical to encourage economies and international organizations to build up Blue Partnerships and promote sustainable global marine development. These partnerships will be built through the exchange of experiences, sharing of data, and collaborative research on the Blue Citizen development, alongside practical demonstrations in diverse regions.

### 3.2 Blue Citizen Education

Ocean literacy aims to foster an understanding of the ocean's influence on us and our impact on it. The Ocean Literacy Framework, developed through seven core principles and 45 foundational concepts, offers lesson plans tailored for different age groups starting from kindergarten. Blue Citizen education builds foundational knowledge of marine ecosystems by teaching these principles and concepts. It emphasizes the significance of the oceans to climate and Earth systems, the ecosystem services they provide, and encourages behavioral changes to improve human-ocean relations.

Formal education is a key avenue for cultivating Blue Citizens. Blue Citizen education can be incorporated into existing curricula at all educational levels, from elementary schools to universities, or through the development of new programs. To this end, educational groups and public organizations must collaborate to design appropriate curricula for various student levels. The education sector is encouraged to integrate Blue Citizen programs either as standalone courses or within existing frameworks.



In primary and secondary education, schools should adapt ocean literacy and Blue Citizen education to their local context and specific conditions. This adaptation will lead to the creation of a school-based Blue Citizen curriculum system that is progressive, clear in its objectives, engaging in delivery, and effective in fostering learning. Regional expert groups, primarily composed of school teachers, should be convened to develop these tailored courses, establishing a strong foundation for young students to build ocean literacy from an early age and achieve widespread educational engagement.

Moreover, Blue Citizen education seeks to expand through both formal and informal channels. It promotes integrating ocean literacy into school curricula and training programs, underlines the importance of continuous and workplace education, and advocates for extracurricular educational bodies to offer Blue Citizen curricula through study tours and online or field experiences. This comprehensive approach aims to enhance ocean literacy across society and support the development of informed, responsible Blue Citizens.

In addition to the formal education system, the non-formal education system serves as a valuable complement for young people and those who have missed out on formal education. Non-formal education, ideally provided by social institutions and organizations that operate science venues, should be encouraged to participate in Blue Citizen activities targeting the general public, especially youth and children. This system encompasses various formats, including exhibitions, guest speakers, and field trips, allowing individuals to enhance their ocean literacy and actively engage in citizen science, monitoring efforts, and scientific research, thus deepening their understanding of Blue Citizen principles.

In the continuing and in-service education system, ocean literacy training can be integrated into training plans and certification systems in marine professions and vocational training. Programs should be developed to systematically train Blue Citizen teachers and guides, focusing on specialized knowledge, organizational and management skills, lecturing techniques, safety management, and emergency response related to Blue Citizen education and ocean literacy.

In terms of non-formal education such as extracurricular educational institutions, venues, and study bases, these entities can increase their social impact by developing distinctive Blue Citizen and ocean literacy courses and activities. They can also attract public participation through study tours, online experiences, and on-site activities. Effective implementation of Blue Citizen education should emphasize diverse teaching approaches and practical experiences, taking the following aspects into consideration:

- 1) **Inquiry learning.** Teaching programs should encourage self-exploration, allowing students to explore marine ecosystems and the ocean. This approach promotes active learning and develops students' abilities to think independently and solve problems.
- 2) **Integration of science and technology into teaching.** As science and technology advance, Blue Citizen education should incorporate these tools to enhance learning outcomes. For instance, the use of virtual reality (VR) and virtual experiments can diversify teaching methods and foster interest in the subject matter.
- 3) **Cooperative learning.** This method involves teamwork, enabling students to collaborate to complete tasks and goals. Not only does this improve learning outcomes, but it also enhances students' ability to work cooperatively and interact with others. Instructional designs should encourage this kind of collaboration and discussion among students.
- 4) **Field experience.** The design of the Blue Citizen teaching program should be tailored to local conditions, enabling students to learn about the ocean through direct field experiences. This not only helps students gain a practical understanding of marine systems but also fosters behavioral changes in human-sea relationships.

### **【CASE】BLUE LAB-Oyster Reef Youth Docent Programme**

*TNC (The Nature Conservancy) launched BLUE LAB to engage more youth in urban conservation work, which not only shares knowledge with the youth through nature education but also provides access to professional training, helping youth to take more actions on climate change adaptation.*

*In 2023, Under the guidance of the Urban Management and Comprehensive Law Enforcement Bureau of Bao'an District, Shenzhen, The Nature Conservancy (TNC) in collaboration with the Shenzhen Taohuayuan Ecological Protection Foundation and other units, jointly organized a public welfare science exhibition "Revive Oyster Reef - The Greater Bay Area Resilient Plan", and in parallel to the exhibition, a youth development program is launched to train students as guides at the exhibition. The exhibition focuses on oysters as the main content and aims to train young students as guides for the general public. The exhibition is composed of three sections, connecting "Present Status", "Future State", and "Path of Evolution" of oyster reef habitat in the Pearl River Delta region. Through science popularization exhibition boards, pictures, and videos, it showcases the ecological service functions and values of oyster reefs, calling on the public to pay attention to a healthy coastal ecological system and*

*participate in the construction of safer, more resilient, and more dynamic urban coastal zones. The youth development project convened more than 20 student participants through open recruitment, who later received professional explanation and training. (Figure 5) Finally, through the trial session, 5 excellent young guides for the exhibition were selected and a long-term volunteer program mechanism was developed, including issuing certification, providing timely performance feedback, building into Shenzhen's volunteer hour requirements, etc. which all ensured the student guides continued staying engaged. They already served as tour guides for this exhibition for over 6 months and still ongoing, explaining and imparting relevant knowledge about oyster reefs to visitors to the exhibition.*



Figure 5. The Youth Development Project in the BLUE LAB

### **3.3 Engagement of the Enterprises**

Enterprises are crucial to the domestic economy and play a pivotal role in economic development. In the era of globalization and digitalization, the engagement of global enterprises in sustainable development has become essential. Today, businesses go beyond just seeking profits; they embrace the responsibility to advance social progress and environmental harmony. Environmental, Social, and Corporate Governance (ESG) has become a key metric for assessing a company's performance, reflecting its long-term sustainability and commitment to social responsibility. Sustainability-driven businesses are poised to contribute to a cleaner and healthier ocean.

It is necessary to train corporate decision-makers to become Blue Citizens, urging

enterprises to take on significant roles in preventing and controlling marine debris, protecting and restoring marine ecosystems, and enhancing their social responsibility for sustainable ocean development. By promoting research, development, and innovative business models, companies can mitigate negative impacts on marine ecosystems and aid their recovery.

Maintaining a healthy marine environment is essential for the long-term viability of businesses and offers a vital opportunity to tackle contemporary challenges. Supporting enterprises to participate in Blue Citizen activities across their product value chains and at the social responsibility level is crucial. Encouraging investment in high-quality blue infrastructure and related sectors can provide more public goods and job opportunities for Blue Citizens, increase revenues from sustainable ocean development, and create new economic benefits. Additionally, expanding educational and training opportunities can develop a blue workforce knowledgeable about the ocean, thereby enhancing employment prospects and promoting ocean well-being for people.

### **3.4 Individuals Development**

The success of the Blue Citizen development hinges on the active engagement of individuals from all societal sectors, each contributing through their unique motivations. Diversity in motivations and actions is encouraged and appreciated.

Individuals at various levels have distinct roles to play. Marine scientists, equipped with essential knowledge, are encouraged to popularize marine science, convert research into accessible, high-quality courses, and serve as informal education speakers and ambassadors for the Blue Citizen development. Blue Citizens who complete specific courses or activities can receive certification from recognized social organizations. This certification grants them privileges and serves as an incentive for further involvement. They are also expected to deepen their ocean literacy, recognize the ocean's invaluable benefits to humanity, and promote the conservation, restoration, and sustainable use of marine resources.

Enhancing ocean literacy among women is crucial to increase their participation and elevate their status within the Blue Citizen education. Parents and children are encouraged to connect with the ocean through direct experiences like exploration, diving, and beach cleaning. It is also vital to foster interest among youth in maritime-related careers and expand their employment opportunities.

Individuals are urged to change harmful behaviors, adopt environmentally friendly and

responsible lifestyles, reduce plastic pollution, and lower carbon emissions. Coastal communities, which often depend on marine resources but can negatively impact the ocean, are encouraged to raise awareness about marine and coastal ecosystems, especially marine protected areas, to ensure sustainable resource use. These communities are strongly motivated to actively participate in and benefit from the Blue Citizen development.

The expansion of the Blue Citizen population necessitates strengthening community capacity in ocean literacy, establishing a talent training system, and creating supportive frameworks for the Blue Citizen development. This program promotes active learning, the spread of ocean literacy, and the formation of sustainable development actions by using ocean literacy as a knowledge framework and fostering an emotional connection with the ocean through ecosystem services.

By enhancing community capacity to provide pro-ocean literacy services, the public will be encouraged to acquire basic ocean knowledge and adopt resource-saving, eco-friendly, and low-carbon lifestyles. We urge all individuals to actively promote, practice, contribute to, and benefit from the preservation of a clean and unpolluted ocean.

**【 CASE 】 Community and ecosystem-based conservation approaches on preserving and managing Pak Nai's (Hong Kong, China) ecologically important and sensitive biodiversity**

*From May 2021, The Nature Conservancy (TNC) conducted scientific research by working with community, academic and NGO partners to better preserve Pak Nai's (Hong Kong, China) unique mudflats. Research includes habitat and species mapping, as well as sediment and reef data collection and monitoring. Findings were shared with relevant government departments and local communities to guide science-based recommendations for improved protection and management. This project increased public awareness of Pak Nai's ecological, cultural and social importance, and influenced behavioral change for the benefit of people and nature. Public outreach includes school field trips, hands-on habitat management work, knowledge-sharing sessions, and interactions with local communities and tourists (Figure 6).*



Figure 6. Public Outreach and Community-based Conservation Project in Pak Nai

### 3.5 Engagement of the Social Organizations

The involvement of social organizations, particularly NGOs, is critical to advancing the Blue Citizen development. These organizations, including public and non-public foundations, typically have stable funding from donated assets and may also receive sporadic donations from enterprises and individuals, providing consistent financial support for Blue Citizen activities. They play a crucial role in outreaching the initiative by enhancing capacity building.

It is vital to support economies in encouraging the participation of social organizations such as NGOs, nonprofit organizations, and foundations. These organizations excel at mobilizing social forces, integrating resources, and providing professional services based on voluntary principles. They are expected to meet public expectations for a clean and healthy ocean and a better quality of life, serve the community, champion positive social momentum, and inject new energy into economic and social development. With their professional expertise and role as social connectors, these organizations are indispensable in promoting and implementing the Blue Citizen initiative.

Social organizations can also complement the educational system by popularizing marine science through exhibitions, lectures, technical training, and online outreach. Moreover, they should engage the public in marine environmental protection efforts, introducing new concepts and methods, and enabling hands-on learning experiences.

This involvement helps to build public enthusiasm for participating in sustainable ocean development.

Furthermore, social organizations are pivotal in promoting the spirit of the Blue Citizen. By spreading information and increasing awareness about marine environmental protection, they enhance public understanding of sustainable ocean practices and encourage community involvement in Blue Citizen activities. It is crucial to not only disseminate marine science and culture but also to improve ocean literacy broadly.

Social organizations, deeply integrated within communities, have a direct connection to the masses and are uniquely positioned to promoting Blue Citizen development. They can guide the public in engaging with Blue Citizen activities and participating in marine ecological protection. Utilizing extensive feedback from these activities, they can assess public needs and concerns related to the ocean, aiding in the development of policy recommendations for enhancing ocean literacy and public involvement in ocean governance. Additionally, their participation in creating organizational mechanisms for Blue Citizen activities provides a positive force for furthering the initiative.

#### **【CASE】 Dive4love Reef Protection**

*To protect coral reef areas with ecological value, explore a model for marine social public welfare protection areas. Empower divers to become citizen scientists for coral conservation, promote the participation of coastal community enterprises in coral reef ecological protection on the spot, provide a basis for government decision-making on nearshore marine areas, and create conditions for coral reef ecological restoration.*

*So far, Dive4love (DIVE FOR LOVE: Shenzhen Dapeng Coral Conservation Volunteer Federation) has trained a group of divers with coral cultivation and survey capabilities (Figure 7), joined hands with the government to establish 2 pilot marine coral protection areas, promoted the planting of more than 6,000 corals in Daya Bay, and rescued more than 334 coral branches. A total of over 5,000 kilograms of seabed marine debris have been collected. Of this, more than 2 tons of marine debris were cleaned up during nearly 80 morning dive marathon events held from December 2020 to September 2021 (Figure 8).*

*Over the past decade of conservation work, Dive4love have come to realize that relying on the efforts of divers alone is far from enough to solve the problem. We need to mobilize the attention and support of all sectors of society and work together from multiple dimensions in order to achieve our goals. As a social organization, Dive4love acts as a bridge of communication, actively mobilizing all sectors of society and*

*inspiring public attention and participation through various forms, thus making positive contributions to marine protection.*



Figure 7. Coral Cultivation and Investigation Capability Building for Divers



Figure 8. Divers are Cleaning up Fishing Gears



### **3.6 Media Publicity**

The media plays a pivotal role in disseminating information about the ocean to inspire the public and foster a harmonious relationship between people and the ocean. By adopting innovative technologies and popular communication strategies, the media can guide the public to a deeper understanding and appreciation of the ocean, motivating collective care and protection efforts. It is vital to enrich media content, leverage various media resources and platforms, and engage in vigorous publicity campaigns. Providing materials for new media product design can help form a diverse array of media offerings, achieving broader dissemination and greater impact.

Diverse publicity methods and interactive approaches enable the public to grasp the principles of ocean literacy and the Blue Citizen actions, promote marine culture and traditional knowledge, and compellingly narrate influential stories about the ocean. These efforts raise societal awareness about marine ecological protection and sustainable usage, embedding the ideals of "knowing the ocean, loving the ocean, and caring for the ocean" as widespread, voluntary commitments across all societal sectors.

Moreover, it is imperative to appoint ambassadors for the Blue Citizen campaign. These individuals could be celebrities, athletes, professors, officials, or other influential figures who would actively promote the values of Blue Citizens on significant occasions such as World Ocean Day and Earth Day. These ambassadors play a key role in amplifying the reach and impact of the initiative, galvanizing public engagement and support.

# Chapter IV. Evaluation and Assessment

## 4.1 General Strategies

Assessment should be designed and implemented as an integral element of the Blue Citizen development. Sufficient resources must be allocated to ensure its effectiveness and maintain the high quality of the assessment process. The assessment approach should be adaptable based on the age group of the target audience, allowing for variation in approach, methodology, and content, while still maintaining a rigorous, thorough, and actionable evaluation framework. To gauge the effectiveness of Blue Citizen courses, activities, and meetings, assessments can be conducted on participant groups or by comparing two randomly selected groups. This evaluation process aims to identify whether variations in courses, activities, methodologies, and the facilitation of these courses lead to different outcomes.

## 4.2 Progress Evaluation

The Blue Citizen concept was introduced within APEC in 2019. Since then, its impact has expanded through various workshops, training programs, bilateral cooperation projects, outreach efforts, and the sharing sessions of knowledge, tools, and practical experiences.

The APEC Marine Sustainable Development Center can serve as a hub for fostering and coordinating exchanges and collaborations across various facets of the Blue Citizen initiative. Encourage APEC economies to participate in ocean literacy projects.

As the Blue Citizen development progresses, the promoting effectiveness and its evaluation are essential to identify the content of related projects, plans, and programs.

## 4.3 Assessment of Individual Development

While Blue Citizen courses and activities in both formal and non-formal education contribute to the development of the Blue Citizen, assessment and evaluation tools are essential for effectively promoting the initiative, achieving targets, and informing future improvements. Growth assessments of the Blue Citizen can be conducted across six dimensions: knowledge, attitude, emotional connection, behavior change, contact and experience, and information sharing. These assessments provide constructive guidance for refining curriculum, activities, and teaching programs, and are

instrumental in enhancing future developments. This assessment method can be applied to students, adults, and facilitators during the teaching process and can be conducted at the level of a school, community, city, or specific population through sampling methods. Combining qualitative and quantitative methods can yield richer insights into these dimensions across different groups.

1) **Knowledge** encompasses a person's understanding of ocean-related topics and the interconnections among them. This includes decision-making about the ocean, participation opportunities, and sources of information on marine issues. Knowledge is recognized as a key factor in fostering ocean stewardship and encouraging broader environmental actions.

2) **Attitudes** are increasingly acknowledged for their impact on perceptions and viewpoints concerning marine management and conservation, as well as the social acceptability of governance and policy decisions. Human attitudes and cognitive insights are important indicators for designing effective ocean literacy initiatives.

3) **Emotional Connection** involves the feelings and emotional responses individuals experience when engaging with ocean, coastal, and marine issues. Recognizing the importance of emotional connections is essential for understanding the complex human-ocean relationship and driving behavior changes.

4) **Actions** relates to decisions, choices, behaviors, and habits. Behavior Change occurs as individuals participate in Blue Citizen courses and activities, enhancing their understanding of ocean literacy and the dynamics of marine ecosystems. Monitoring these changes through observations, interviews, and tests is vital for evaluating the effectiveness of the Blue Citizen growth process.

5) **Access and Experience** relate to a person's direct or simulated interactions with the ocean, such as through virtual reality, and the ways these experiences are accessed. Assessing these dimensions can help identify obstacles to accessing Blue Citizen knowledge and experiences, thereby informing strategies to enhance engagement.

6) **Information Sharing** in the digital age facilitates easier access to necessary data, supporting an information-sharing network that provides real-time updates. The accuracy, transparency, and trustworthiness of information are paramount. Transparency in information dissemination ensures public participation and input, empowering a more engaged and informed community.

# Chapter V. Conclusion

The Blue Citizen initiative seeks to cultivate Blue Citizens with ocean literacy for their responsible sharing the benefits from the ocean. To make decisions and take actions in a manner to protect the healthy ocean through enhancing the connection between the ocean and society, understanding the importance of the ocean, and increasing dynamics, capacity and opportunity. This is vital for advancing major global initiatives and strategic plans. The various efforts to develop Blue Citizen will contribute to the implementation of the 2030 Agenda for Sustainable Development and the achievement of the Sustainable Development Goals. In addition, the efforts make the concrete actions to the implementation of the UN Decade of Ocean Science for Sustainable Development (2021-2030) and its Ocean Literacy Strategy and The APEC Putrajaya Vision 2040 and the Aotearoa Plan of Action.

Blue Citizens are ocean literate individuals with scientific and rational mentality. They are humanistic characters who shows profound feelings and empathy for the ocean. Blue Citizens intends to take the lead in diversified partnership and cooperation with open and inclusive attitude, and they are action-oriented in taking responsible measures to explore and protect the ocean. The growth of Blue Citizens is a gradual process benefiting for the health of the ocean, and for improvement of physical and mental health of individuals. By enlarging the number of group, and making collective efforts, Blue Citizens will wield significant influence, making tangible strides towards nurturing a flourishing and resilient ocean ecosystem.

The multi-stakeholders can provide various support and approaches to promote the growth and development of Blue Citizens. By policy making, education prioritization, private sector engagement, and public outreaches, Blue Citizen initiative will contribute to an ocean literate society.

This APEC Blue Citizen Guidebook is important to help raise public awareness and deepening knowledge about the ocean and its intricate ecosystems, improving human-ocean connections from the perspectives of eco-services, adopting people-centered considerations in enhancing the benefits of the ocean, as well as enhancing the health of the ocean in an action oriented mentality. By elucidating the core principles of ocean literacy and unveiling the multidisciplinary framework of the Blue Citizen concept, this guidebook empowers individuals with the aforementioned characteristics to become stewards of the ocean, fostering a collective responsibility for its preservation and sustainable use. It ignites a passion for experiential learning centered around human-ocean connections, fostering a culture of responsibility and reverence for our marine

environment.

As the readership of the APEC Blue Citizen Guidebook embraces its transformative message, a powerful ripple effect ensues. Armed with newfound knowledge and a sense of purpose, individuals become champions of ocean conservation, driving meaningful behavioral change within their communities and beyond. Through collaborative efforts and unwavering commitment, we pave the way for a future where the marine ecosystem thrives, fisheries flourish, and humanity coexists harmoniously with the Ocean.

# Appendix: Survey Report of Ocean Literacy in APEC Economies

## 1. Research Objectives

The study intends to collect information about the status, limitations, and capacity building of ocean literacy in the APEC economies, in order to strengthen mechanisms for participation, enhanced support and better policies. In conducting this research and delivering on this intent, the specific aims of this research are to:

- 1) Identify the current status and progress of ocean literacy in APEC economies.
- 2) Discover the limitations of ocean literacy education in APEC economies.
- 3) Explore the drivers for addressing and improving ocean literacy in APEC economies.
- 4) Bring attention to the public of ocean literacy in APEC economies.

## 2. Research Methodology

This study is based on a questionnaire survey mainly, which constitutes 15 questions covering the topic of the current status, limitations and drives of ocean literacy in APEC economies. Briefly, seven questions are classified in the current status sector, including seven principles and three dimensions of ocean literacy, a specialized department in charge of ocean literacy, relevant regulation/plan/program on ocean literacy, policy that support ocean literacy and ocean literacy course in the formal and informal education system; three questions are classified in limitations sector, including groups mostly needed to possess ocean literacy, activities to improve public ocean literacy in the annual Ocean Day, and the relationship between humans and the ocean; and five questions are classified in drives sector, including those need to be taken in account for ocean literacy initiatives, good ocean governance, the capacity building crucial for improving the public's ocean literacy, the popular ways for the public to improve ocean literacy, and the key factors in addressing the challenge of the "Ocean Decade".

The structure consists of a literature review, raw data collection, questionnaire analysis, and case study. The questionnaire for this study was actively sent by researchers and disseminated through the APEC Secretariat. The analysis of the data from the

questionnaire is conducted using descriptive statistics to organize, explain, and summarize the characteristics of the data. In addition to collecting and analyzing data, this study also gathers case data and obtain first-hand information on this topic from the representatives of industry, government, academia and individuals. These data were supplemented by result of questionnaires for comparison, and further used to provide policy recommendations.

### 3. Ocean Literacy in the APEC Region

A questionnaire was distributed to government institutions, research institutes, public welfare institutions, non-governmental organizations and individuals in APEC economies. A total of 51 responses were received from seven APEC economies, including Chile; China; Indonesia; Malaysia; Thailand; Chinese Taipei; and Viet Nam (Figure A1), with the majority (36) from China. Among them, 10 responses came from the government, 9 from NGOs and 3 from researchers, respectively.

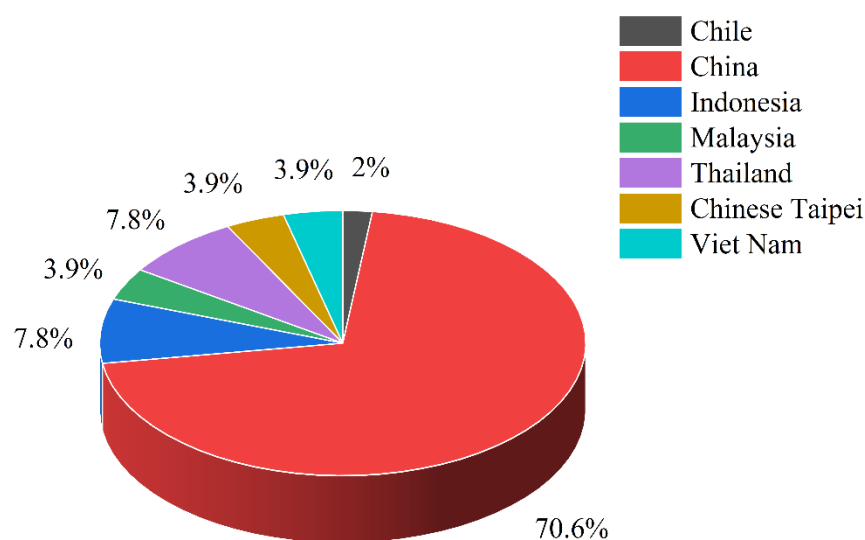


Figure A1. Responses from APEC Economies

#### 3.1 Current Status of Ocean Literacy in the APEC Region

A total of seven questions are classified in the current status sector, including the understanding of ocean literacy, capacity building and education of ocean literacy. In terms of the seven principles of ocean literacy, all of the responses failed to provide correct answers completely, especially “The ocean makes the Earth habitable” and

“The ocean is largely explored”, further highlighting the necessity of ocean literacy education. All responses are correct regarding the three dimensions of ocean literacy, but as previously reported, these questions are much easier thus the weight values need to be reduced.

Most surveyed APEC economies have specialized department in charge of ocean literacy, including the Publicity and Education Center of the Ministry of Natural Resources, China; the Department of Marine and Coastal Resources, Ministry of Natural Resources and Environment, Thailand; Environmental Protection Administration, Chinese Taipei; Domestic Research and Innovative Agency, Indonesia; Department of Marine and Coastal Resources, MNRE, Viet Nam; Ministry of Environment, Chile.

Most APEC economies have relevant regulations/plans/programs on ocean literacy, including Work Plan for Popularizing Science and Technology of Natural Resources in the Fourteenth Five-Year Plan, China; Action Plan on Marine and Coastal Resources of Thailand (2023-2027); Royal honor Guidelines for Implementation Indonesia Marine; Program on Sea and Ocean communication to 2030 in Viet Nam; Domestic Oceanic Program, Sustainable Oceanic Plan, Chile 2023. Most APEC economies are also actively involved in projects under the umbrella of the UN Ocean Decade and IOC/WESTPAC.

Most APEC economies have formulated policies that support ocean literacy, such as The Fourteenth Five-Year Plan for the Ocean Awareness Publicity and Education and Cultural Construction in China; the Economy Reform Plan on Marine and Coastal Resources (marine debris) under 20 Years Domestic Strategy in Thailand; Domestic Ocean Policy of Chile.

In terms of ocean literacy courses in the formal education system, most responses are positive but the level of education system can vary from elementary school to University, implying disagreement about which age groups are mostly needed for ocean literacy (Figure A2). The informal education system is also widely established in APEC economies, including foundations, science and technology museums, museums, aquariums, and marine parks through government and NGOs. There are also some programmes to promote and encourage students and the public on marine and coastal conservation in Thailand.



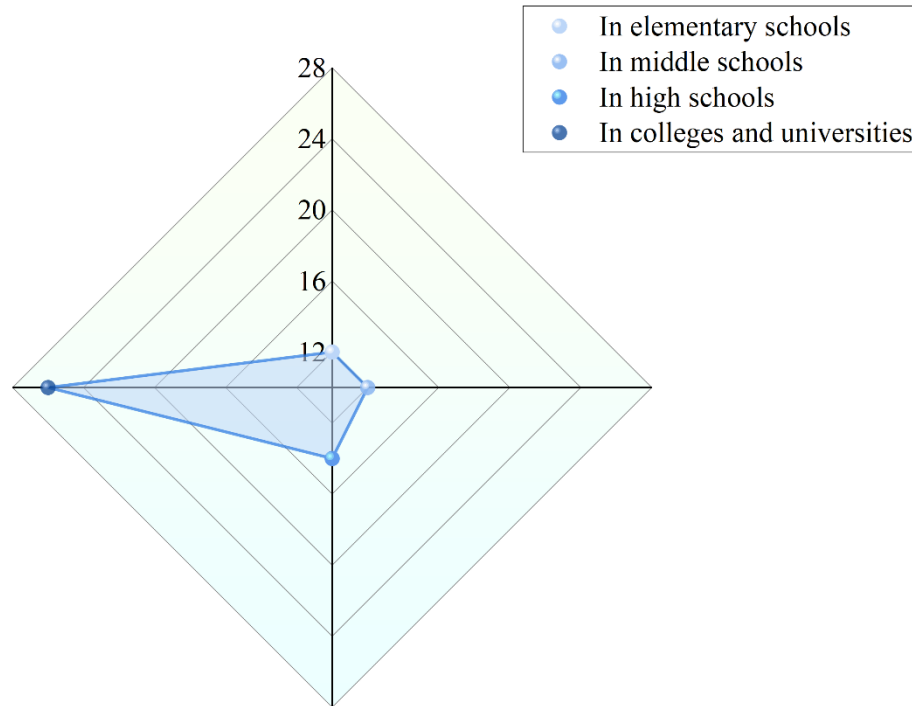


Figure A2. Proportion of Ocean Literacy Courses in the Formal Education System

### 3.2 Limitations of Ocean Literacy in the APEC Region

There is controversy regarding which groups are most needed to possess ocean literacy. Most responses prefer the youth and a few point out that all age groups need ocean literacy. In practical terms, it is relatively easier to educate children and teenagers about ocean literacy, as related curricula can be integrated into the formal education system. However, it is the adults, not the young people to make policies that will have a profound influence on the marine environment. Therefore, scientific knowledge needs to be communicated in plain language to these policymakers, to ensure that new ocean policies are not misleading and based on scientific facts. Therefore, it is critical to introduce regional and international legal entities with updated information on climate change, marine conservation, and the sustainable use of marine areas. However, the science-policy process is often complex and limited by multiple barriers that include the disconnect and poor engagement between science and policy-makers, and the fact that marine issues are multi-faceted, complex, and uncertain <sup>[18]</sup>.

Most economies carry out activities to improve public ocean literacy during the annual Ocean Day, including beach clean-up, releasing marine animals for resource conservation (turtles, shrimps, and crabs), and exhibitions by government and private

organizations and non-governmental organizations. Besides Ocean Day, beach clean-up, mangrove re-plantation, and marine species release are also performed in the rest of the year.

The relationship between humans and the ocean varies from poor to excellent, as indicated by the survey (Figure A3). However, it is important to note that the responses primarily come from Asian economies, most of which are developing. Therefore, it remains unclear whether a better relationship between humans and the ocean exists in other regions or developed economies.

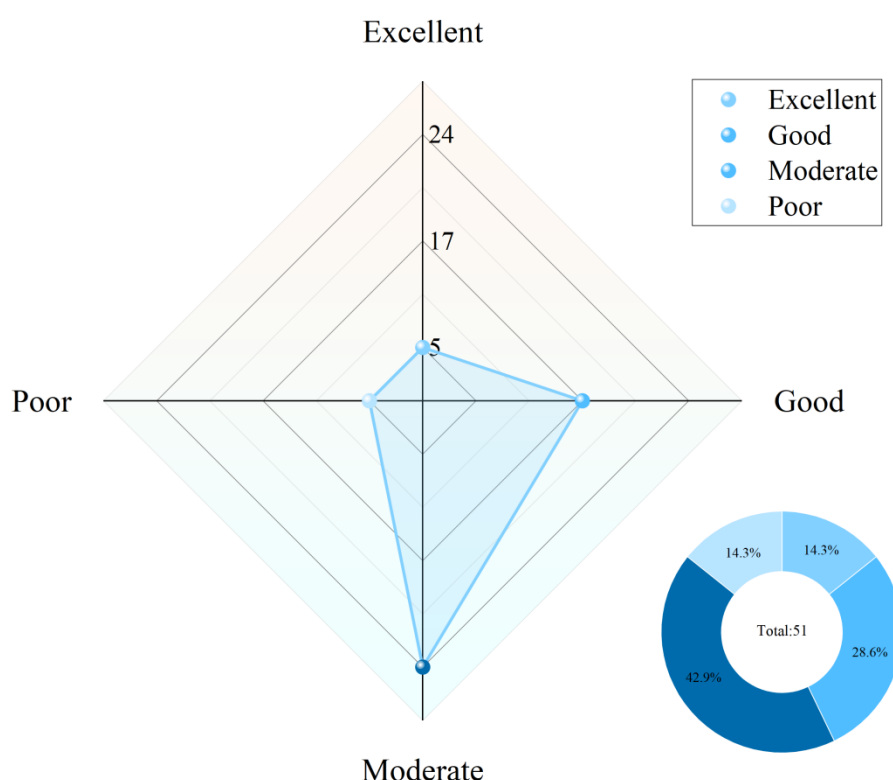


Figure A3. Relationship between Humans and the Ocean

### 3.3 Drivers of Ocean Literacy in the APEC Region

A total of five questions are classified in the drives sector, including initiatives, governance, capacity building, approaches, and key factors crucial for improving the public's ocean literacy.

For those that need to be taken into account for ocean literacy initiatives, most responses provide complete and correct answers. However, a few missed local and traditional knowledge implying the importance of a comprehensive understanding of ocean literacy. Cultural values, traditional knowledge, and approaches to using marine

environments have received wide recognition and have been incorporated into regional marine management [19].

In terms of good ocean governance, most responses agree that multiple factors are needed, including stewardship of life-support systems and ecosystem services, domestic and local governmental commitment, interdisciplinary coordination and cooperation, the development of integrated ocean policies, and good ocean literacy for all. This highlights that the government has to play a key role in ocean literacy.

Most responses also agree that numerous capacity building is crucial for improving the public's ocean literacy, including Ocean Museums, Ocean and Coastal Scenic Areas, Marine Protected Areas, Coastal and island communities, Marine formal education classrooms, and Informal Marine Education Field Experience Sites. Most of this capacity building relies on the investment of the government, further supporting the importance of official approval.

Nearly all responses recommend that a variety of popular ways are needed for the public to improve ocean literacy, including publications and reading, tourism experience, film and television, publicity, digital experience, and international cooperation and exchange visits (Figure A4). Games are controversial since they may have effect on youth.

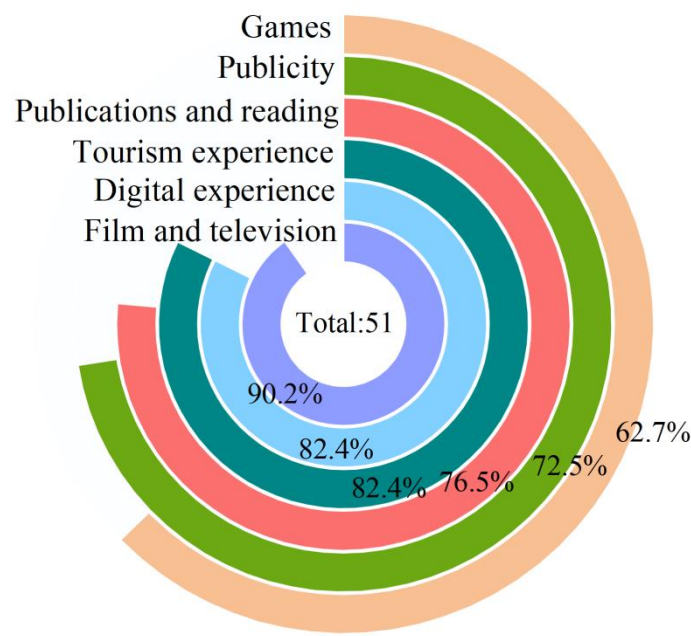


Figure A4. The Popular Ways for the Public to Improve Ocean Literacy

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