Asia-Pacific
Economic Cooperation

APEC Marine Sustainable Development Report III

APEC Ocean and Fisheries Working Group
December 2024

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Prepared by:
APEC Marine Sustainable Development Center (AMSDC)
Website: http://apecmsd.org.cn/

Third Institute of Oceanography (TIO)
Ministry of Natural Resources
People's Republic of China
Website: http://www.tio.org.cn/

Co-Prepared by:
China Institute for Marine Affairs (CIMA)
Ministry of Natural Resources
People's Republic of China
Website: http://www.cimamnr.org.cn/

For
Asia-Pacific Economic Cooperation Secretariat
35 Heng Mui Keng Terrace
Singapore 119616
Tel: (65) 68919 600
Fax: (65) 68919 690
Email: info@apec.org
Website: https://www.apec.org/

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Foreword I

Ms. CHEN Danhong

Director-General, Department of International Cooperation of the Ministry of Natural Resources, People's Republic of China

For APEC and its member economies, the most significant geographical feature is that all of us live in the rim of Pacific. Linked by the largest ocean of the world, our fate, our future of development and prosperity are naturally bounded with the productivity and sustainability of this ocean. Thus, one of the core responsibility for APEC Ocean and Fisheries Working Group (OFWG) is to improve our understanding of the Pacific and other relevant oceans and seas, particularly their sustainability that is vital to the region and its people, and galvanize bold actions to implement the APEC goals and address the challenges we face together. That is one of the reasons China proposed the programme of APEC Marine Sustainable Development Report more than 10 years ago.

Another important consideration is that we would like to do our best to bridge the UN 2030 Agenda for Sustainable Development, especially Goal 14, and relevant key efforts led by UN and the work we are doing under the framework of APEC. Without the engagement and contribution of member economies, the progress of these mainstreaming procedures would fall short of the expectations.

Meanwhile, the stocktaking of regional marine sustainable development would also give us opportunities to identify where we can find more to be done collectively and encourage us to place in order the different urgency of measures , rather than name and shame some individual deficiency. As the Chinese aphorism goes that taking history as a mirror we can know the rise and fall, the APEC Marine Sustainable Development Report would be a mirror to revisit our effort in OFWG and APEC.

Obviously, the active engagement and cooperation among all the member economies stand out like gemstone of this Report. It is not an easy job to bring together the representatives of 11 Economies to work together in the last challenging year for a single task. Both the cooperation and collaboration embody the values we would like to advocate when drafting of APEC Marine Sustainable Development Report.

Thanks to the long-standing support of all OFWG members and the APEC Secretariat, the third APEC Marine Sustainable Development Report is ready to be circulated in OFWG. After more than 10 years, as we reflect upon our original intention of this Report, it is encouraging that we are still on the right track. Also the Report has become one of the flagship efforts made by OFWG and APEC in ocean related cooperation. In the report, we work to present the big picture of our progress and also problems in marine ecological environment, blue economy, coastal welfare, marine science and technology and ocean governance in APEC region,with the aim of advancing the sustainable management and conservation of ocean and coastal resources and ecosystems and sustainable development, and contributing to the implementation of the UN 2030 Sustainable Development Goals and implementing APEC Putrajaya Vision 2040 and the Aotearoa Plan of Action.

On this occasion, please allow me, on behalf of Department of International Cooperation, Ministry of Natural Resource of China and Chinese OFWG team, to express our sincere appreciation to our co-sponsors, Peru; Russia; Thailand and the United States, our counterparts in the core expert group, all the members of OFWG and our professional PD and Secretariat, and the APEC Marine Sustainable Development Center. Your contribution is invaluable to the Report. It is without the doubt that the Report III will not be the destination, but just one milestone of our work, the continuous support and engagement are warmly welcomed in future.

Foreword II

Rojas Noack Monica
Lead Shepherd, APEC OFWG

Healthy oceans and coasts are critical for food security, poverty eradication, sustainable and equitable economic growth, as well as preserving traditional culture and promoting trade in APEC. The 21 APEC economies are linked by the Pacific Ocean, which is endowed with rich resources and from which the economies gain high value, including both economic and non-market benefits. There is a fact that APEC members share one ocean, and they account for over 80% of global aquaculture production, and more than 65% of the harvesting and processing of the world's capture fisheries. In addition, the ocean is an important conduit for 90% of world trade, and connects people, markets and livelihoods, as well as provides ecosystem services and plays an important role towards fulfilling economic recovery and prosperity of the Asia Pacific region, especially in the current process of recovery post COVID-19.

To reverse the decline of marine ecosystems and resources, many APEC economies have initiated concrete measures on implementing SDG 14 through policies, on marine pollution control, marine and coastal ecosystem conservation and restoration, conservation of marine and coastal areas, fisheries management, and development of marine economy. Consistently with this importance, since May 2014 a common view within the APEC Ocean and Fisheries Working Group (OFWG) upon Blue Economy has been reached, as an approach to advance in the sustainable management and conservation of ocean and coastal resources and ecosystems, in order to foster economic growth.

Formed in 2011, the mission of OFWG is to support APEC's mission to foster sustainable economic growth, development and prosperity in the Asia-Pacific region. The OFWG works to facilitate free and open trade in the region and promotes the sustainable use of fisheries,

aquaculture, and marine ecosystem resources and related goods and services.

Under the framework of the OFWG, APEC Marine Sustainable Development Report III aims to promote the information sharing on conservation and sustainable use of the oceans, seas and marine resources in the region. Though this, APEC provide an opportunity to enhance the understanding of the recent progress, and share the best practices in the fields of marine debris prevention, combating IUU Fishing, Small Scale Fisheries and Aquaculture (SSFA) development, blue economy, coastal resilience, etc. We are so happy to see that the APEC Marine Sustainable Development Report III was proposed by China with the co-sponsorship of Peru; Russia; Thailand and the United States, and that the compiling work involved Australia; Chile; China; Hong Kong China; Indonesia; Malaysia; New Zealand; Peru; Chinese Taipei; Thailand and the United States, among others.

We hope this report will contribute and show you the importance of sharing the path, experiences and best practices to move forward a sustainable future of the oceans and coastal communities, a harmonious integration between prosperity and environmental well-being.

Foreword III

Dr. CAI Feng

Director-General, APEC Marine Sustainable Development Center;
Director-General, Third Institute of Oceanography, Ministry of Natural Resources, People's Republic of China

As one of the most dynamic regions in the world's economic development, the APEC region has emerged as a key driver of global economic growth. We all know that the ocean is our common home and wealth, however, marine resources and the marine environment in the APEC region are under increasing pressure. All APEC economies need to work together and strengthen cooperation to promote marine sustainable development.

Given the significance of protecting the marine resources and marine environment, in alignment with the missions of APEC and the OFWG, the APEC Marine Sustainable Development Center has been dedicated to strengthening marine environmental protection and ecosystem conservation, promoting blue economy, enhancing capacity building for ecosystem-based marine and coastal management, and increasing public ocean literacy in the APEC region through policy research, decision-making consultations, training, communication and cooperation, as well as through various projects and activities. The compilation of the APEC Marine Sustainable Development Report is one of the main tasks of the Center to contribute to the OFWG and information sharing among APEC economies.

The Xiamen Declaration of the Fourth APEC Ocean-related Ministerial Meeting calls for "Direct the OFWG to update the APEC Marine Sustainable Development Report".As the Director-General of the Center, I have actively promoted this Sustainable Development Report and hope to make it the flagship product of the Center and the OFWG. China has proposed the compilation of the APEC Marine Sustainable Development Report III, which was co-sponsored by Peru; Russia; Thailand and the United States. With the strong support of the APEC Secretariat and the APEC economies, the Core Expert Group of the Report was established. The Center is committed to developing the Report in collaboration with the

Core Expert Group across APEC economies. We would like to express our gratitude to the Core Expert Group and the advisory experts, the participants from APEC economies, APEC Secretariat and OFWG Lead Shepherd for their efforts and contributions to this Report.

To support the Putrajaya Vision of strong, balanced, secure, sustainable and inclusive growth in the Asia-Pacific, APEC member economies make endeavors to maintain and restore a healthy ocean and leverage the potential of ocean as driver of economic growth. We hope that the Report, which has proposed a conceptual analytical framework for APEC marine sustainable development that contributes to the achievement of the Putra jaya Vision 2040, will showcase the contributions and progress made by APEC economies in promoting the marine sustainable development, as well as the call for collective action in the areas of blue infrastructure for resilient development, blue community for inclusive development, blue technology for innovative development, blue growth for common prosperity, and blue partnership for a shared future.

Acknowledgment

The APEC Marine Sustainable Development Report III is a product of the generous dedication and extraordinary investment of numerous individuals, institutions and organizations, whose knowledge, expertise and insight helped shape this important body of work.

APEC Marine Sustainable Development Center acknowledged the contributions, which have made by the individuals, institutions and organizations, listed in the Editorial Committee and below units towards the preparation, creation, development and publishing of this report.

Department of Climate Change, Energy, the Environment and Water, Australia;

Undersecretariat for Fisheries and Aquaculture, Chile;

Ministry of Natural Resources, China;

The Institute of Agricultural Resources and Regional Planning of the Chinese Academy of Agricultural Sciences;

South China Sea Fisheries Research Institute, Chinese Academy of Fishery Sciences;

Taihu Basin-East China Sea Ecological Environment Supervision Management Bureau, Ministry of Ecology and Environment, China;

Environment and Ecology Bureau, Hong Kong, China;

Ministry of Marine Affairs and Fisheries, Indonesia;

Department of Fisheries, Malaysia;

Maritime Administration of Mexico;

Ministry for Primary Industries, New Zealand;

Ministry of Production, Peru;

Instituto del Mar del Perú (Institute of Marine, Peru);

National Fisheries Authority, Papua New Guinea;

Ocean Affairs Council, Chinese Taipei;

Department of Marine and Coastal Resources, Thailand;

Department of State, the US;

National Oceanic and Atmospheric Administration (NOAA), the US;

APEC Policy Support Unit (PSU);

The Nature Conservancy (TNC).

Editorial Committee

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Abbreviation

AELM	APEC Economic Leaders' Meeting
AOMM	APEC Ocean-related Ministerial Meeting
AMSDC	APEC Marine Sustainable Development Center
BCG	Bio-Circular-Green
ENVMM	Environment Ministerial Meeting
GSCPI	Global Supply Chain Pressure Index
HLPD-FSBE	High Level Policy Dialogue on Food Security and Blue Economy
IOC	Intergovernmental Oceanographic Commission
IPCC	International Panel on Climate Change
IRENA	International Renewable Energy Agency
IUCN	International Union for Conservation of Nature
IUU	Illegal, Unreported, Unregulated fishing
KBAs	Key Biodiversity Areas
LSCI	Liner Shipping Connectivity Index
LSBCI	Liner Shipping Bilateral Connectivity Index
MSP	Marine Spatial Planning
OECD	Organization for Economic Co-operation and Development
OFWG	APEC Ocean and Fisheries Working Group
OMM	Ocean-Related Ministerial Meeting
PPFS	APEC Policy Partnership on Food Security
SDGs	Sustainable Development Goals
SSA	Small-Scale Aquaculture
SSFA	Small-scale Fisheries and Aquaculture
TNC	The Nature Conservancy
UNEP	United Nations Environment Programme
UNCTAD	United Nations Conference on Trade and Development
UNDESA	United Nations Department of Economic and Social Affairs
UNESCAP	United Nations Economic and Social Commission for Asia and the Pacific
UNESCO	United Nations Educational, Scientific and Cultural Organization
WCMC	World Conservation Monitoring Centre

Executive Summary

For people lived in the APEC region, the vast Pacific Ocean is the link of interconnection, the frontier of economic development, the basis of the well-being of coastal communities, and an inexhaustible source of cooperation and innovation. The ocean, with its rich natural resources and diverse ecosystem services, has contributed to maintain a long-term stable growth in the APEC region. At the same time, our ocean is also facing multiple threats and challenges such as environmental pollution, biodiversity loss, climate change and natural disasters. It still has a long way to go to achieve the goal of marine sustainable development. The Putrajaya Vision 2040 endorsed by APEC leaders in 2020 depicts the blueprint of the Asia-Pacific Community and shows the ambition of "for a sustainable planet". It also manifests the common ideal and beautiful pursuit of the Asia-Pacific family for the sustainable development of the region.

Based on the collected efforts and contributions by APEC economies, this report looks into the overall progress and achievements in the fields of marine ecological environment, blue economy, coastal welfare, marine science and technology and ocean governance in APEC region in recent years from a comprehensive perspective. At the same time, it compiles and shares new best practices and successful experiences at the economy and local levels through case studies.

Key Messages

Based on the study, there are some Key Messages listed as following:

- This report provides an analytical framework for APEC marine sustainable development contributing to the achievement of the Putrajaya Vision 2040 Vision into 5 pillars, namely, marine ecosystem; marine econo-my; costal community welfare; marine science and technology and ocean governance.

- The report shares 36 cases from 19 APEC economies to show the progress made in the mentioned 5 pillars.

- Since 2019, various actions and measures have been taken in marine debris control, marine ecological protection and coastal resilience improvement, and they have shaped the positive prospects for the sustainable development of marine society, people's livelihood and economy in APEC region.

- For marine economy growth, marine aquaculture and offshore wind energy have shown relatively steady growth.

- Oceans in APEC region provide the employment and nutritious food sources for the people and play a significant role in promoting social well-being.

- In terms of the development and innovation of marine science and technology, APEC region is also a world leader in innovation-driven development, and this advantage is gradually expanding.

- Sustainable ocean governance is the guarantee of marine cooperation and sustainable development in the APEC region.

- According to the survey, the major problems or challenges in the ocean and coastal areas since 2019 for APEC economies were coastal hazard and other disasters, marine habitat loss or degradation and marine debris.

- According to the survey, most economies consider that climate change will have negative impacts on marine ecological environment, coastal protection, resource conservation and utilization, social culture and people's livelihood.

- According to the survey, most economies consider that it is difficult to determine or too early to explain the impacts of the COVID-19 pandemic on marine sustainable development, especially on marine ecological environment, carbon sink capacity and coastal disaster prevention.

- According to the survey, the policy coherence and coordination across levels of government, dedicated financial resources and political will are the three major gaps or challenges from economies to achieve the *Strong, Balanced, Secure, Sustainable and Inclusive* marine development.

Challenges and Opportunities

- Marine health and productivity are facing various pressures and challenges, especially climate change and the COVID-19 pandemic in the past few years.. Many obstacles remain on the road to the marine sustainable development goals we want.

- It is critical for APEC economies to further leverage the potential of the marine sectors to effectively address multiple challenges. Ocean-based climate action and contribution to recovery provide opportunities for shaping a resilient and sustainable ocean.

Future Actions

Looking forward to 2030 and even 2040, in order to further consolidate the good situation of marine economic growth, trade connectivity and multilateral cooperation in the APEC region, and at the same time overcome the existing difficulties and adopt a more comprehensive, inclusive, balanced and sustainable way to govern the Pacific oceans, this report finally puts forward some recommendations for future cooperative actions in five pillars as following to achieve marine sustainable development:

- **Enhance blue recovery and resilient development**. Enhance the resilience of coastal ecosystems and people who depend on them through wide restoration or blue infrastructure which help improve

the function of coastal ecosystems to withstand pressure and risks, particular from climate change. Apply area-based marine protection and management tools, in order to reverse the further loss and degradation of typical habitats and improve the status of marine biodiversity. Effectively prevent, reduce and control all kinds of land-based and marine pollution. Enhance education and capacity building on disaster reduction to help coastal communities to better respond to marine disasters, and promote a more active role of the private sector in disaster response and relief efforts.

•**Promote high–quality blue growth and common prosperity**. Promote recovery from COVID-19 pandemic and mitigate its potential long-term impact on the social systems. Build sustainable marine economy by stimulating sustainable high-quality growth and releasing potential of digital innovation in marine sectors. Invest in blue economy for strong, balanced, secure, sustainable and inclusive growth of APEC. Support sustainable consumption and production and encourage environmentally friendly technology and policies through implementation of ocean-related APEC Roadmaps.

•**Empower local communities and people to promote inclusive development**. Adopt a comprehensive protection scheme to support the resilience of community livelihoods for climate change, disasters and possible future health emergencies. Enhance resilience of coastal community and society as a whole. Connect and mobilize a wide range of stakeholders and raise awareness on ocean sustainability. Scale up Blue Citizen Initiatives to engage with private sectors, civil society and local communities in the Asia-Pacific region to promote ocean literacy for ocean conservation and ocean welfare and enhancing their ability to cope with current environmental problems and new crises in the future.

•**Promote development and transformation driven by scientific and technological innovation**. Promote ocean data, observations and knowledge supporting for future sustainable development solutions that meet environmental, social and economic imperatives and climate action. Improve the database and information sharing platform for marine sustainable development. Strengthen the incubation of marine technological innovation and the upgrading of innovative facilities. Promote the transformation and application of marine scientific research results. Promote technological cooperation and innovation sharing among economies. Improve regional capabilities and levels in monitoring, evaluating and predicting marine ecosystem protection and blue economy development.

•**Enhance blue partnership and promote mutual benefit**. Establish an open and inclusive sustainable Asia-Pacific blue partnership cooperation network and provide a flexible cross-disciplinary exchange and cooperation forum. Strengthen the partnership between developed and developing economies. Strengthen support for science and technology and capacity building of developing economies, and share the achievements of blue growth. Encourage APEC economies to take measures to speed up marine mainstreaming processes and support joint programs between the Ocean and Fisheries Working Group (OFWG) and other relevant sub-fora.

Chapter 1
Introduction

Sustainable development is a global priority issue, and marine sustainable development is the core component of the global sustainable development process. The comprehensive and balanced realization of the marine sustainable development goals is not only the common welfare of the coastal areas but also concerning the interests and the future of all mankind.

1.1 Background

The SDG framework adopted in September 2015 embraces five key pillars of People, Prosperity, Planet, Peace, and Partnership which also reflected in the three underlying core dimensions of growth, inclusiveness, and environmental sustainability. The overarching theme of the SDG framework is balancing the three dimensions while upholding the mantra of "no one left behind". The Sustainable Development Goals (SDGs) emphasize the critical nature of our ocean. The marine economy has become one of the most dynamic and resilient areas of economic growth in coastal areas, and is accelerating its transformation towards a green and low-carbon blue economy. SDG 14 of Agenda 2030 aims to protect and sustainably utilize the ocean and marine resources to promote sustainable development through strengthening marine cooperation. The realization of this goal will support the implementation of other relevant SDGs, which is of great significance to promote the comprehensive, balanced and overall realization of the three pillar dimensions, as well as advance regional development and stability. However, since 2019, the realization of sustainable development goals related to the ocean has become more challenging. Various risks and shocks have impacted the economic and social development of coastal areas, particularly affecting vulnerable groups in developing economies and disadvantaged areas. As a result, the need to accelerate recovery and sustainable development has become even more urgent.

As home to up to 80 percent of all life in the world, the ocean nurtures unimaginable biodiversity and produces food, jobs, mineral and energy resources needed for life on the planet to survive and thrive. However, the ocean is facing unprecedented threats such as climate change, food insecurity, diseases and pandemics, diminishing biodiversity etc. Marine ecological environment protection and sustainable utilization of resources have increasingly attracted the high attention of the international community, and a series of consensus and action initiatives have been reached, such as important progress has been made in the global treaty on plastic pollution in recent years; the 2022 UN Ocean Conference reaf-

firmed the strong commitment to conserve and sustainably use the ocean, seas and marine resources[1]; adopted during the fifteenth meeting of the Conference of the Parties (COP 15) , the Kunming-Montreal Global Biodiversity Framework (GBF) aims to catalyze, enable and galvanize urgent and transformative action by Governments, and local authorities, with the involvement of all of society, to halt and reverse biodiversity loss, to achieve the outcomes it sets out in its Vision, Mission, Goals and Targets, and thereby contribute to the three objectives of the Convention on Biological Diversity and to those of its Protocols[2]; The Agreement under the United Nations Convention on the Law of the Sea on the Conservation and Sustainable Use of Marine Biological Diversity of Areas beyond National Jurisdiction (BBNJ) , which is adopted on June 19, 2023, aims to ensure the conservation and sustainable use of marine biological diversity of areas beyond national jurisdiction, for the present and in the long term, through effective implementation of the relevant provisions of the Convention and further international cooperation and coordination[3]. These new agendas will open up a new chapter in global marine sustainable development.

Marine and coastal areas offer a wealth of ecological products and services, which play a crucial role in improving food security, eliminating poverty, driving economic growth, enhancing social and cultural well-being, and fostering regional trade development in the APEC region, which has maintained the fastest economic growth in the world. However, according to the progress report of global sustainable development goals released by the United Nations, the progress speed or scale of global and regional marine sustainable development goals is far from achieving the goals set in the 2030 Agenda. In particular, although the APEC region has made some progress in the marine field, it still faces conflicts between ecological protection and resource utilization, and there are problems such as uneven progress in various goals among regions. Many economies are still facing significant challenges or problems such as coastal hazard and disasters, marine habitat loss or degradation and marine debris, as well as climate change since 2019. Therefore, in the key “Ocean Decade” since 2020, it is urgent to take more effective, transformative and collective actions to push the process of marine sustainable development in the APEC region into the accelerated track of the 2030 Agenda, and at the same time, to play a leading role of the APEC region for the global goal. A series of “Ocean Decade” action plans and initiatives promoted by the United Nations provided a science-based roadmap for promoting interdisciplinary and cross-sector actions at the regional level, especially providing opportunities for economic members, governments, academics, private enterprises and other public and private entities to support APEC in achieving regional sustainable development and common prosperity.

1.https://documents-dds-ny.un.org/doc/UNDOC/GEN/N22/389/07/PDF/N2238907.pdf?OpenElement
2.https://www.cbd.int/gbf/introduction/
3.https://treaties.un.org/doc/Publication/CTC/Ch_XXI_10.pdf

The "Putrajaya Vision 2040" and its Aotearoa Plan of Action reached by APEC members in 2020 set the strategic goal of building "an open, dynamic, resilient and peaceful Asia-Pacific community by 2040 for the prosperity of all our people and future generations", which provided a new direction for the future sustainable development in the marine field. Promoting "strong, balanced, secure, sustainable and inclusive growth" is the three major drivers to realize this vision. "Supporting global efforts to compre-hensively address all environmental challenges, including climate change, extreme weather and natural disasters, for a sustainable planet" is an important task to promote the realization of the vision. In order to implement the Putrajaya Vision 2040, the APEC Ocean and Fisheries Working Group (OFWG) further emphasized in its strategic action plan to promote the sustainable utilization of fisheries, aquaculture, marine ecosystem resources and related goods and services, so as to promote innovation, prosperity and sustainable growth and support comprehensive recovery from the impact of the pandemic. There-fore, in the critical period of APEC, we need to understand the current situation of sustainable development in the marine field more accurately and evaluate the impact of new situations on the marine sustainability of APEC region. The output of this work is crucial to determine the relevant policies of APEC's cooperation route in the marine field, and then implement the long-term goal of building an "Asia-Pacific community".

Based on the above background, this report will focus on the efforts and progress of APEC members and communities in promoting the protection and management of marine ecosystems, the conservation and sustainable utilization of fishery resources, the development of blue economy, and scientific and technological innovation under the guidance of OFWG. It also shows the experience and potential of the APEC family in maintaining marine health, promoting high-quality growth of marine economy, improving people's livelihood and food security, stimulating marine innovation and enhancing marine governance capabilities, with a view to providing information and guidance for building a more inclusive and sustainable APEC marine future.

APEC PUTRAJAYA VISION 2040

In 2020, members endorsed the Putrajaya Vision 2040:

"Our vision is an open, dynamic, resilient and peaceful Asia–Pacific community by 2040, for the prosperity of all our people and future generations."

Remaining committed to APEC's mission and its voluntary, non-binding and consensus-building principles, APEC will achieve this Vision by pursuing the following three economic drivers:

- Trade and Investment
- Innovation and Digitalization
- Strong, Balanced, Secure, Sustainable and Inclusive Growth

On Strong, Balanced, Secure, Sustainable and Inclusive Growth:

To ensure that the Asia-Pacific region is resilient to shocks, crises, pandemics and other emergencies, we will foster quality growth that brings palpable benefits and greater health and wellbeing to all, including MSMEs, women and others with untapped economic potential. We will intensify inclusive human resource development as well as economic and technical cooperation to better equip our people with the skills and knowledge for the future. We will promote economic policies, cooperation and growth which support global efforts to comprehensively address all environmental challenges, including climate change, extreme weather and natural disasters, for a sustainable planet.

The Aotearoa Plan of Action

A plan for implementing the Putrajaya Vision 2040 recognised the commitment of APEC members to promoting economic policies, cooperation and growth, which support global efforts to comprehensively address all environmental challenges, including climate change, extreme weather and natural disasters, for a sustainable planet.

1.2 Purpose

The 2030 Agenda for Sustainable Development acknowledge the importance of the regional and sub-regional dimensions, regional economic integration and interconnectivity in sustainable development. It also emphasizes that regional and sub-regional frameworks can facilitate the effective translation of sustainable development policies into concrete action at the economy-wide level. The evaluation and research at different levels based on their policies and priorities is a necessary supplement to the global SDGs assessment process. As one of the most influential economic integration organizations in the APEC region, the phased follow-up assessment of marine sustainable development practices is not only an important contribution to the global 2030 agenda to support the regional actions of the "Ocean Decade", but also can be used as an information collection and technical assessment mechanism for implementing APEC Putrajaya Vision 2040 in the marine field. The series of publications "APEC Marine Sustainable Development Report" (AMSDR) was compiled in 2014 and 2019 respectively. Through continuous work on these reports, a wealth of information materials has been accumulated, and extensive and close cooperative partnerships have been established. Furthermore, the preparation of this new report will review the progress, experience, challenges and opportunities of APEC economies in implementing the marine sustainable development objectives in recent years, especially since 2019, on the basis of the previous research. Specifically, this report aims to:

·Provide information to enhance our comprehensive understanding of the progress of marine sustainable development in the previous stage and strengthen the practice and efforts of regional marine sustainable development.

·Enhance a deep understanding of the role of ocean in promoting sustainable development in the APEC region and globally, so as to improve our ability and efficiency in formulating comprehensive solutions.

·Promote the formation of a regional approach for economies to share best practices, information and public participation within the APEC framework, incubate cooperation initiatives and actions, seek innovative measures and partnerships, and determine our efforts for the implementation of the 2030 global roadmap and for the Putrajaya Vision 2040.

·Provide insight into future challenges and opportunities, understand the weakness and key areas that need more investment and accelerated reform in the next step, as regional action and support for the global problem-solving process, and provide meaningful reference for economies and social sectors to adopt sound policy tools and precise implementation actions in the context of multiple crises.

1.3 Scope and Methodology

Based on the close relationship between the global sustainable development framework and the priorities and policies of ocean and fisheries affairs under the APEC framework, this report has established an analytical framework of marine sustainable development with APEC characteristics. The present study extends previous editions (2014, 2019) by offering greater factors coverage, more up-to-date data, and closer linkage to SDG 14 and related goals. It will comprehensively summarize and show APEC's contribution and potential in the related fields of marine sustainable development on the basis of extensive data and information, and support the implementation of relevant priorities and the solution of key issues under the APEC framework.

1.3.1 Scope

This report depicts the concrete picture of APEC Putrajaya Vision 2040 under the theme of marine sustainable development, developing and clarifying the connotation and scope of APEC marine sustainable development. The establishment of the analytical framework (Figure 1.1) is mainly based on two consider-ations: (1) APEC Putrajaya Vision 2040 is a cross-disciplinary goal, and the vision of marine sustainable development needs to be mainstreamed into this overarching vision. (2) The interrelated pillar areas are intrinsically consistent with the concept and dimension of SDGs, which provides us with an international background and rationality for the comprehensive study of marine sustainable development in the APEC region. At the same time, considering that the issue of marine development has spillover effect, it is closely related to many multi-goal indicators, such as hunger eradication (SDG 2), gender equality (SDG 5), climate response (SDG 13), biodiversity (SDG 15) and partnership goal (SDG 17) under the SDGs system. However, the resource allocations towards SDG 14 is the least of the 17 SDG goals（with 0.4 % of total in 2021, 0.5% in 2022 and 0.6% in 2023 so far)[4]. Taking into account this broad internal correlation will help to ensure that the issues covered in this study better reflect the core concerns of APEC members. Specifically, marine species protection is positively related to biodiversity goals; the protection of typical coastal ecosystem has positive social benefits in coping with natural disasters related to climate change; the contribution of marine fishery products to food security and nutrition has become unprecedented[5]; the blue economy sectors provide employment and livelihood security for coastal communities and women; ocean management capacity building and international cooperation depend on extensive partnership networking.

4.Based on the graphics illustrated in the website of UN INFO, https://uninfo.org/, accessed on 2023-11-23.
5.FAO. The State of World Fisheries and Aquaculture 2022. Rome, 2022.

Figure 1.1 A conceptual framework for APEC marine sustainable development contributing to the achievement of the Putrajaya Vision 2040

Note: The health and resilience of marine ecosystem functions is the basis to support the marine sustainable development, and it is also the driving force to enhance social and economic resistance to the current and future global crises. The high productivity of the ocean provides abundant products and services for maintaining the dynamics of economic growth, and plays an important role in ensuring food security. Open and inclusive development requires systematic mobilization of actions, as well as improving opportunities and capabilities for vulnerable groups to actively participate in the development process, so as to promote the fair sharing of ocean-based benefits and ensure that "no one is left behind". The ocean is a natural connection in the APEC region. The sustainable security and prosperity of the ocean require good governance and inclusive partnership to improve the ability to adapt to and respond to various natural disasters and uncertain challenges, so as to maximize the socio-economic and ecological benefits. The innovation of marine science and technology is essential to support achieving high quality and sustainable development in all related fields of the marine environment, economy and society.

1.3.2 Methodology

(1) Data sources and collection methods

This report uses open data from the governments in APEC economies and international public sources on marine ecological environment, blue economy, social well-being, scientific and technological innovation and management to analyze and show the development status of specific fields. The data sources for the study included, but were not limited to, UN statistical database, World Bank, UNCTAD, UNEP, FAO, IOC-UNESCO, OECD, IUCN, APEC database and official reports of APEC economies.

In order to further strengthen the evidence base of this research and analysis, this report initiated a process of investigation and consultation to mobilize a wide range of public and private entities to supplement public data and international data at the economic level. The purpose of this survey is to collect the opinions, information and suggestions of stakeholders on the progress of marine sustainable development, as well as best practice cases. The questionnaire consists of 9 questions, a best practice case form and free comments, including open and closed questions. Feedback questionnaires and case materials, as well as valuable suggestions and comments, were collected from Australia; Chile; China; Malaysia; Mexico; New Zealand; Papua New Guinea; Chinese Taipei; Thailand and the United States . Annex I provides survey information and a brief analysis of the responses.

(2) Workflow

The preparation of this report is carried out according to the workflow shown in Figure 1.2. During the work, desk analysis, field investigation and case study are supported by the latest literature data from reliable and traceable sources.

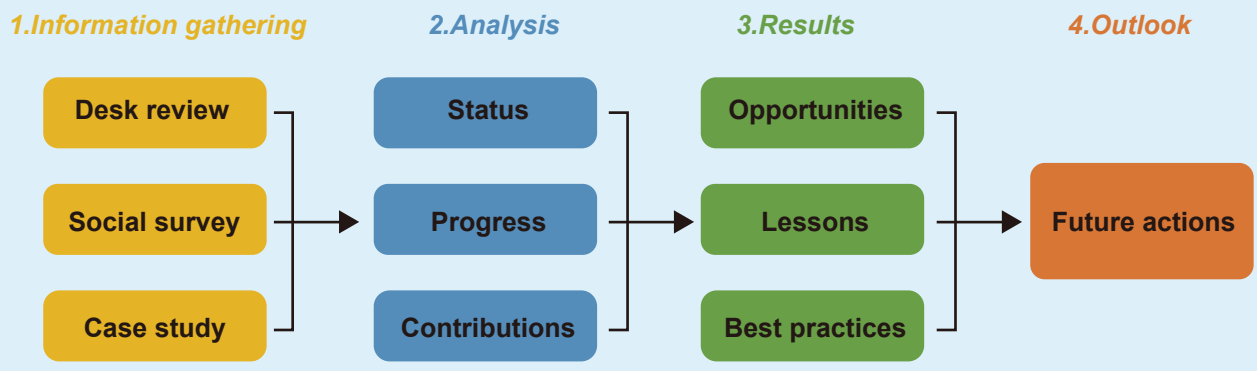


Figure 1.2 The work flow

(3) Compiling process

This project "APEC Marine Sustainable Development Report III (AMSDR III)"was proposed by China and approved by OFWG in 2023 with the project number OFWG 01 2023S and the co-sponsorship from Peru; Russia; Thailand and the Untied States.

The AMSDR III was drafted on the data and materials from member economies, and the expertise and inputs from the Editorial Committee members especially the Core Expert Group (CEG) and the consulting experts with diverse academic backgrounds.

In April 2023, the CEG was established and composed of experts nominated by 8 APEC economies, namely, Australia; Chile; China; Malaysia; Peru; Chinese Taipei; Thailand and the United States. During the 1st CEG Workshop convened by APEC Marine Sustainable Development Center (AMSDC) with the participation from 11 APEC economies, a draft outline of AMSDR III was developed.

By May 2023, the Project Overseer ("PO") team received the materials from 9 APEC economies on the progress and best practices of coastal and marine sustainable development from 2019. These materials has been the important part of the report to introduce the progress on marine sustainable development in APEC region. In June 2023, 10 APEC economies, including Australia; Chile; China; Malaysia; Mexico; New Zealand; Papua New Guinea; Chines Taipei; Thailand and the United States have participated the survey and offered elaborate information the questionnaire needed, and these information has been a key part of source of reference to draft the report.

In October 2023, after an intensive work by the CEG, the ZERO draft of the report was completed. The 2nd Core Expert Group (CEG) Workshop was conducted and discussed among the participants from CEG and member economies for comments. Meanwhile, throughout the process of the report preparation, AMSDC organized a series of expert reviews and stakeholder consultations (Figure 1.3). The draft report was revised and improved based on the feedbacks from November 2023 to April 2024.

In May/June 2024, the first draft of the report was developed and shared among APEC economies for comments.On 28th June, 2024, the Report was endorsed by OFWG.

Figure 1.3 Working meetings and CEG workshops group photos

Preliminary data were collected through extensive desk studies and then verified or selected through consultation with the economic experts and researchers in various fields. For example, data integration in marine economy is not sufficient, which needs to strengthen close coordination and cooperation with cross-fora institutions inside and outside the APEC framework. It is necessary to involve a wider range of public and private stakeholders in order to enhance relevant knowledge and enrich comprehensive scientific data and information. Also, due to the limitations of the questionnaire method, the collected data are descriptive in nature and do not cover all factors that reflect the effectiveness of existing relevant policies. Moreover, due to the limited space of the report, some collected cases and practice progress information cannot be presented in the report. In view of this, and taking into account the future development momentum of marine sustainable development issues in research and data, the analytical framework and parameters followed in this report are kept open as a learning system, so as to integrate new knowledge and scientific information.

1.4 Report Structure

The comprehensive report, which is structured as follows.

The first chapter is a brief introduction to the background, purpose and methods of this report.

The second chapter summarizes the natural and socioeconomic conditions of the Asia-Pacific Economic Cooperation (APEC) region's ocean and coastal area, and updates the knowledge of marine ecosystem services and values. Then, the relationship between the sustainable development of the global ocean and APEC Putrajaya Vision 2040, the Aotearoa Plan of Action and other policies is sorted out, and then the efforts made by member economies to promote sustainable development of the oceans are updated and summarized through text review.

The third chapter comprehensively analyzes the main performances and trends of APEC and its member economies in promoting marine sustainable development since 2019, and provides the best practice cases in related fields, so as to fully reflect the importance and role of APEC in promoting the marine sustainable development.

The fourth chapter points out multiple challenges and the current and potential impacts of the global crisis on regional marine sustainable development process, and especially shows the successful practices and enlightening attempts at the economy level.

The fifth chapter looks forward to the future and puts forward the priority action directions of key areas to promote the marine sustainable development.

Annex I provides the questionnaire circulated during the preparation of this report and results analysis documents. Annex II lists the ocean-related projects carried out by APEC in recent years.

Chapter 2

Overview of Marine Sustainable Development of APEC in a changing context

All members of the APEC family are located in coastal areas and share one ocean — the Pacific Ocean. It is the largest marine system on Earth, carrying a unique ecosystem and rich marine resources, providing a basic material source for the production and life of people in the APEC region. The social and natural and social conditions in APEC region has paved a picture for marine sustainable development.

2.1 The Ocean in APEC region at a Glance

2.1.1 State of Marine Environment in APEC

Compared to any other region in the world, the APEC region has the greatest global marine biodiversity, with half of the world's largest islands and the world's longest and most diverse coral reef systems, more than half of the world's mangrove areas, and the world's highest diversity of seagrass.[6,7] , These marine and coastal ecosystems are the most valuable natural resources. Not only can they withstand some of the toughest environmental conditions and provide habitats for terrestrial and marine biodiversity, they are also able to provide a wide range of ecosystem services related to carbon sequestration, coastal protection, natural products and tourism. For example, Australia; Indonesia; Mexico and other economies are some of the largest areas of mangrove forests in the world. Mangroves act as natural wind and wave barriers, preventing more than USD65 billion in property damage each year and reducing flood risk for some 15 million people. Mangroves convert carbon dioxide into organic carbona t a faster rate than almost any other kind of habitat on Earth. By 2020, global mangroves store carbone quivalent to more than 21 gigatons of carbon dioxide[8]. The high productivity of mangroves supports a rich food web and provides habitat for numerous animal communities, including more than 340 internationally endangered species. Mangroves support fisheries for local consumption, and in

6.IPBES. The IPBES regional assessment report on biodiversity and ecosystem services for Asia and the Pacific. Karki M, Senaratna Sellamuttu S, Okayasu S, and Suzuki W (eds). Secretariat of the Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services, Bonn, Germany. 2018, 612 pages.

7.GIRI C, OCHIEN E, TIESZEN L L, et al. Status and distribution of mangrove forests of the world using earth observation satellite data. Global Ecology and Biogeography, 2011, 20(1), 154–159. https://doi.org/10.1111/j.1466- 8238.2010.00584.

8.SPALDING M D, LEAL MARICÉ (editors). The State of the World's Mangroves 2021. Global Mangrove Alliance, 2021.

many economies, more than 80% of small-scale fishers rely on them[9]. Coral reefs are found in more than 100 economies and regions around the world, although they occupy only 0.2% of the oceanfloor, they support atleast 25% of marine species and underpin the safety, coastal protection, wellbeing, food and economic security of hundreds of millions of people. The value of goods and services provided by reefs is estimated at USD2.7 trillion per year, including USD36 billion in coral reef tourism[10].

The APEC region has historically been the most vulnerable to natural disasters and extreme events such as tropical cyclones, flash or seasonal floods, droughts, tides, earthquakes, tsunamis and volcanic eruptions. In 2021, 432 catastrophic events related to natural hazards occurred worldwide, resulting in 10,492 deaths, affecting 101.8 million people, and causing an estimated USD 252.1 billion in economic losses. Asia was the most affected, suffering 40 percent of all disaster events, accounting for 49 percent of all deaths and 66 percent of all people affected. Globally, while the number of deaths and the number of people affected is lower than the average of the past 20 years, the number of disaster events in 2021 has increased and economic losses are significant. Five of the top 10 most economically costly disasters in 2021 occurred in the United States, causing a total of USD112.5 billion in economic losses[11].

Some of the highly bio-diverse coastal and marine ecosystems in the APEC region are under increasing natural and anthropogenic stresses. They have some adverse effects on marine ecosystems such as coral reefs, seagrass beds, shellfish reefs and kelp forests. Changes or declines in the structure and function of coastal ecosystems can indirectly lead to the loss of food sources and economic opportunities. At the same time, the negative impact and effect of coastal natural disasters are intensified. Change in marine biodiversity are mainly caused by overexploitation, pollution,harmful algal blooms, low oxygen level and habitat destruction, or indirectly through climate change and related marine biogeochemical perturbations[12]. At the same time, the cumulative impact of waste from land- and sea-based sources and ocean warming and acidification is also a common challenge for marine species and population restoration, coastal habitat conservation and restoration, and marine ecosystem management in the Asia-Pacific coastal region. There is a need for systematic and region-wide assessments of marine biodiversity resources and coastal habitats in the region to aid conservation, management and restoration.

9.ERMGASSEN zu P S E, MUKHERJEE N, WORTHINGTON T A, et al. Fishers who rely on mangroves: Modelling and mapping the global intensity of mangrove associated fisheries. Estuarine, Coastal and Shelf Science, 2020:106975.

10.SOUTER D, PLANES S, WICQUART J, et al. Status of Coral Reefs of the World: 2020 (Executive Summary). GCRMN, 2020.

11.CRED. 2021 Disasters in numbers. Brussels: CRED, 2022. https://cred.be/sites/default/files/2021_EMDAT_report.pdf.

12.IPBES. The IPBES regional assessment report on biodiversity and ecosystem services for Asia and the Pacific. Karki M, Senaratna Sellamuttu S, Okayasu S, and Suzuki W (eds). Secretariat of the Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services, Bonn, Germany, 2018.

In recent years, the total amount of marine debris pollution has continued to increase globally,and the APEC region is also facing this problem. Marine litter and pollutants are mainly land-based, where plastic and microplastic waste can have significant negative impacts on marine ecosystems and human health. At an ecological level, the impact of plastics on plankton and marine, freshwater and terrestrial systems can also indirectly alter the global carbon cycle. Plastics can break down in the marine environment and end up in the marine food chain. Humans may absorb large amounts of microplastics through seafood, posing a threat to coastal and indigenous communities that rely on seafood as a major food source. At an economic level, marine debris and plastic pollutants pose a serious threat to coastal communities' sources of income, as well as to shipping and port operations. Large amounts of plastic waste can also lead to an increase in illegal disposal of domestic and international waste[13]. As of 2020, less than 10 percent of the 7 billion tons of plastic waste generated globally has been recycled[14]. The most pressing issue is how to reduce the amount of uncontrolled or mismanaged waste streams entering the ocean and how to increase recycling levels.

2.1.2 Socio-economic Development of APEC

Coastal areas are home to most of the world's population. Most major cities are located in coastal areas and deltas, and more than 40 percent of the world's population lives within 100 kilometers of a coast[15]. By 2021, 2.95 billion people will live in the APEC region, accounting for 38% of the global population. Between 2015 and 2020, the total population of APEC economies increased by about 885 million people[16], with more than half of them living in coastal areas. In addition, 15 of the world's 46 megacities are located in the coastal areas in APEC economies[17].

In 2021,the GDP of APEC economies is USD59 trillion, accounting for 62% of global GDP, an increase of USD9.4 trillion compared to 2015 . China and the US together account for 69% of the region's GDP and 42% of world GDP. In 2021, the APEC region accounts for 48% of global trade in goods and commercial services. China; Japan and the US together account for more than a quarter ofglobal trade and about 55% of APEC trade (see Figure 2.1). APEC economies have maintained high GDP

13. United Nations Environment Programme. From Pollution to Solution: A global assessment of marine litter and plastic pollution. Nairobi, 2021.

14. GEYER R. Production, use and fate of synthetic polymers in plastic waste and recycling. In Plastic Waste and Recycling: Environmental Impact, Societal Issues, Prevention, and Solutions. Letcher T M (ed.). Cambridge, MA: Academic Press, 2020, pp13-32. https://www.sciencedirect.com/science/article/pii/B9780128178805000025?via%3Dihub.

15. IOC/UNESCO, IMO, FAO, UNDP. A Blueprint for Ocean and Coastal Sustainability, An Inter-agency Paper toward the Preparation of The UN Conference on Sustainable Development (Rio+20). Paris, London, Rome and New Your: IOC/UNESCO, IMO, FAO, and UNDP, 2011.

16. Calculation based on population data from APEC, StatsAPEC, http://statistics.apec.org/index.php/key_indicator/index.

17.UNDESA.The World's Cities in 2016. New York: United Nations, 2016.

growth rates compared to the global average. In 2015-2019, GDP per capita growth in APEC economies ranged from 3.9% to 4.4%. Due to the impact of the COVID-19 pandemic, APEC's GDP growth rate in 2020 was negative, at -1.9%, but overall it was still higher than the global average of 2.2% to 3.0% in the same period. APEC's GDP growth recovers to 5.7% in 2021[18]. The GDP per capita for APEC economies in 2021 ranges from USD2,655.2 to USD66,176.4. Among them, Australia, Singapore and the United States have per capita GDP of more than USD50,000, while Indonesia; Papua New Guinea; the Philippines and Viet Nam have per capita GDP of less than USD5,000, which shows that there are huge differences in economic development among APEC member economies. From 2015 to 2021, GDP per capita in the APEC region was between USD15,592 and USD17,886. This average is about half higher than the world's average per capita GDP in the same period[19].

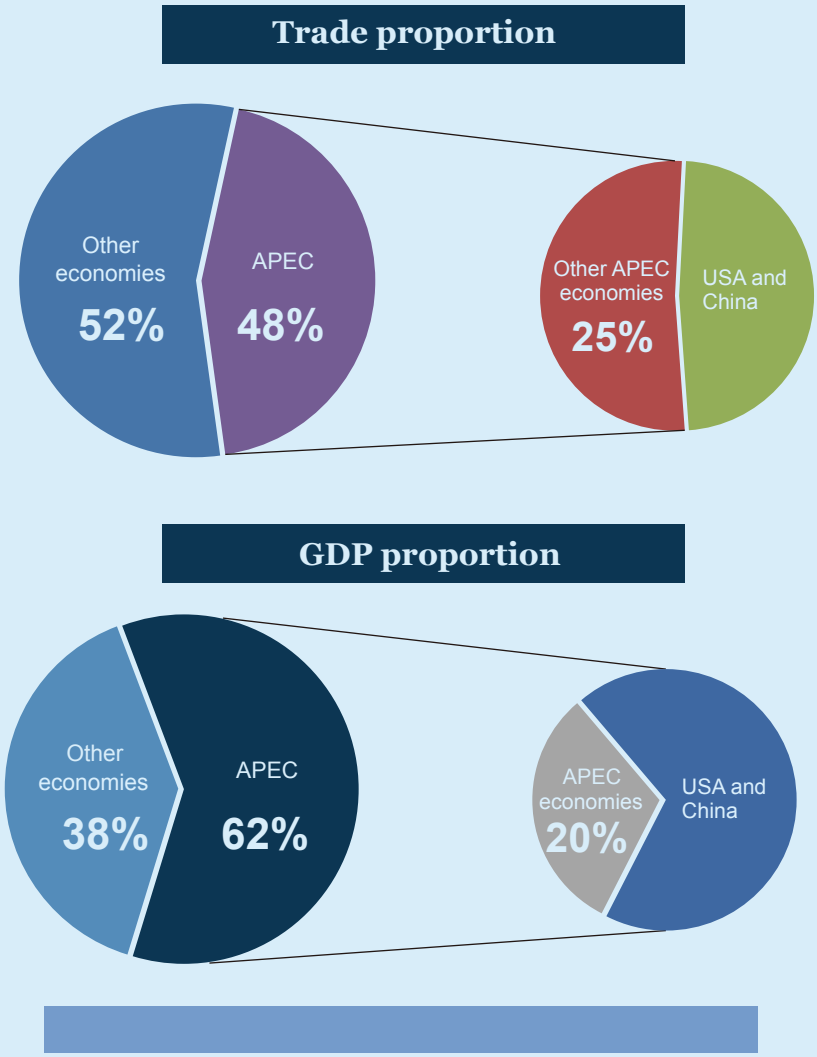


Figure 2.1 GDP and trade ratio of APEC economies[20]

18. Calculation based on APEC. APECstat Data, http://statistics.apec.org/index.php/apec_psu/glossary.
19. Calculation based on APEC. APECstat Data, http://statistics.apec.org/index.php/apec_psu/glossary.
20. APEC Policy Support Unit. APEC In Chart 2022. Singapore: APEC Secretariat, 2022.

With the huge economic value of its natural capital, the marine sector has become an important field supporting the socio-economic development of the APEC region. Since the "Blue economy" was proposed at the Fourth APEC Ocean-Related Ministerial Meeting in 2014, all economies have been promoting the development of blue economy with actions. In terms of "gross ocean product", the oceans contribute at least USD24 trillion worth of goods and services each year[21].

2.2 New Vision and Strong Engine for Marine Sustainable Development in APEC Region

The Putrajaya Vision 2040 and its Plan of Action "Aotearoa Plan of Action: A plan for implementing the Putrajaya Vision 2040" offer the new guide for APEC economies to promote marine sustainable development. To achieve the vision, the policies and the actions implemented by APEC Oceans and Fisheries Working Group and other across-fora will become the strong engine for promoting marine sustainable development in APEC Region.

2.2.1 Linkage between the Putrajaya Vision 2040 and Sustainable Development Goal 14

The topic of marine sustainable development is one of the priorities for APEC economies. Seoul Oceans Declaration in 2002 pointed out that "Improve the conservation and sustainable management of important and critical coastal and marine habitats and related ecosystems". And since 2015, the Leaders' Declaration and Ministerial Statements have repeatedly emphasized the importance of marine sustainable development. The 22nd APEC Economic Leaders' Declaration: Beijing Agenda for an Integrated, Innovative and Interconnected Asia-Pacific and Xiamen Declaration in 2014 call for "the establishment of more integrated, sustainable, inclusive and mutually beneficial partnership through ocean cooperation among APEC members, that implement previous commitments, and focuses efforts on collaborated and concerted actions in the following four priority areas: (1) Coastal and marine ecosystem conservation and disaster resilience; (2) The role of the ocean on food security and food-related trade; (3) Marine science, technology and innovation; and (4) Blue Economy." APEC Putrajaya Vision 2040 endorsed in 2020 will pursue "Strong, Balanced, Secure, Sustainable and Inclusive Growth" through "promoting economic policies, cooperation and growth which support global efforts to comprehensively address all environmental challenges, including climate change, extreme weather and natural disasters, for a sustainable planet" which guide the work for the next twenty years in APEC. These policies issued and consensus achieved promote the progress of marine sustainable development in APEC and provide the strong engine for marine sustainable development in APEC Region.

21.HOEGH-GULDBERG O, et al. Reviving the Ocean Economy: the Case for Action—2015. Gland: World Wide Fund For Nature, 2015.

SDG 14 is a global framework of marine sustainable development goals in the Agenda for Sustainable Development in 2030, which contains all aspects of the vision and goals of marine environment, economy and social development, and represents the global vision of "the ocean we want". The vision of marine sustainable development in APEC region is an important embodiment of the vision of the global marine sustainable development. Therefore, in order to explore the interaction between APEC Putrajaya Vision 2040 with its Plan of Action "Aotearoa Plan of Action" and SDG 14, this report excavates two texts and matches certain parts of the document with some related SDG 14 (see Table 2.1). It can be seen from the alignment in the above table that the two documents have similarities, and the implementation of SDG14 specific target policy actions will support the realization of APEC Putrajaya Vision 2040, and in turn, the realization of the Vision will help achieve sustainable development goals in a much broader and deeper ways.

Table 2.1 Alignment of APEC Putrajaya Vision 2040 with SDG14

Aotearoa Plan of Action: A plan for implementing the Putrajaya Vision 2040		SDG 14 of Agenda 2030
Our Vision is an open, dynamic, resilient and peaceful Asia-Pacific community by 2040, for the prosperity of all our people and future generations.		Conserve and sustainably use the oceans, seas and marine resources for sustainable development
Three Economic Drivers		**Targets and Indicators (simplified)**
Trade and Investment	**Economies will:** ●Support implementation of WTO disciplines arising from negotiations, including in prospective areas such as harmful fisheries subsidies, and agriculture Negotiations. ●Advance capacity building programs to support the implementation of and adherence to WTO rules, including transparency and notification obligations.	●14.6 By 2020, prohibit certain forms of fisheries subsidies, eliminate subsidies that contribute to illegal, unreported and unregulated fishing; ●14.b Provide access for small-scale artisanal fishers to marine resources and markets.

Innovation and Digitalisation	**Economies will:** ●Identify ways to support resilience and recovery by utilizing science, technology and innovation systems, including through capacity building; ●Adopt new and emerging technologies to stimulate growth, connectivity and digital transformation; ●Strengthen digital infrastructure, accelerate digital transformation, narrow the digital divide, as well as cooperate on facilitating the flow of data; ●Support the identification and integration of new and emerging sustainable transportation and mobility technologies and services;	●14.4 By 2020, effectively regulate harvesting and end overfishing, illegal, unreported and unregulated fishing and destructive fishing practices and implement science-based management plans to restore fish stocks at least to levels that can produce maximum sustainable yield; ●14.a Increase scientific knowledge, develop research capacity and transfer marine technology, to enhance the contribution of marine biodiversity to the development of developing and least developed areas.
Strong, Balanced, Secure, Sustainable and Inclusive Growth	**Economies will:** ●Advancing gender equality and the economic empowerment of women, particularly through accelerating the full implementation of the actions in the La Serena Roadmap for Women and Inclusive Growth and building on them; ●Ensure lasting food security, food safety and improved nutrition for all, as well as reducing food waste and loss in the region by promoting agricultural and food trade, agricultural sustainability and innovation, and implementing the Food Security Roadmap Towards 2030; ●promoting sustainable growth across sectors and the development of cost effective low and zero emissions technologies, sustainable finance and, if appropriate, carbon pricing mechanisms; ●sustainable infrastructure and transport; ●Seek to deliver existing Leaders' commitments on energy issues: particularly to accelerate progress towards the 2030 target of doubling the share of renewable energy in the APEC energy mix, including in power generation, from 2010 levels by 2030; and to deliver a plan to reduce aggregate energy intensity by 45%, from 2005 levels, by 2035; ●Work towards the sustainable resource management of agriculture, forestry and marine resources and fisheries, including by implementing the APEC Roadmaps on Marine Debris, and Combatting Illegal, Unreported and Unregulated (IUU) Fishing, and commitments to combat illegal logging and associated trade.	●14.1 By 2025, prevent and significantly reduce marine pollution of all kinds, in particular from land-based activities, including marine debris and nutrient pollution; ●14.2 By 2020, sustainably manage and protect marine and coastal ecosystems to avoid significant adverse impacts, including by strengthening their resilience, and take action for their restoration in order to achieve healthy and productive oceans; ●14.3 Minimize and address the impacts of oceanacidification, including through enhanced scientific cooperation at all levels; ●14.4 By 2020, effectively regulate harvesting and end overfishing, illegal, unreported and unregulated fishing practices and implement science-based management plans to restore fish stocks at least to levels that can produce maximum sustain-able yield; ●14.5 By 2020, conserve at least 10 per cent of coastal and marine areas; ●14.7 By 2030, increase the economic benefits from the sustainable use of marine resources, including through sustainable management of fisheries, aquaculture and tourism; ●14.c Enhance the conservation and sustainable use of oceans and their resources by implementing international law as reflected in United Nations Convention on the Law of the Sea.

2.2.2 Policy Framework of APEC Marine Sustainable Development

Since the establishment of APEC, a variety of ocean-related mechanisms and forums have been established, including Ocean-Related Ministerial Meetings and high-level policy dialogue meetings, as well as Roadmap and Action Plans, covering cross-cutting issues such as fisheries and aquaculture, marine debris prevention and marine pollution control, food security and blue economy, etc., which has promoted the cooperation and exchanges between OFWG and other APEC foras, and facilitated the process of mainstreaming Ocean-Related Issues so as to promote the marine sustainable development APEC region.

Since 2019, the process of APEC Marine Sustainable Development included: in 2019, APEC approved and released two documents, namely, APEC Roadmap on Marine Debris (MD) and APEC Roadmap on Combatting Illegal, Unreported and Unregulated (IUU) Fishing; in 2020, APEC proclaimed the APEC Putrajaya Vision 2040 pursuing Strong, Balanced, Secure, Sustainable and Inclusive Growth and endorsed the implementation plans of APEC Roadmap on Marine Debris and APEC Roadmap on Combatting Illegal, Unreported and Unregulated (IUU) Fishing; in 2021, APEC released the Aotearoa Plan of Action: A plan for implementing the Putrajaya Vision 2040; in 2022, APEC endorsed the Bangkok Goals on the Bio-Circular-Green (BCG) Economy as a comprehensive framework to further APEC's sustainability objectives, "Promoting environmental conservation, sustainable use and management of natural resources, as well as halting and reversing biodiversity loss by: (i) Enhancing conservation and sustainable use and management of coastal and marine resources and ecosystems as well as sustainable fisheries and aquaculture, including preventing, combatting and working towards ending illegal, unreported, and unregulated (IUU) fishing and implementing the APEC Roadmap on Combatting IUU Fishing; (ii) Continuing work to prevent and reduce marine debris and plastic pollution, including through the implementation of the APEC Roadmap on Marine Debris" and approved the Ocean and Fisheries Working Group Road Map on Small-scale Fisheries and Aquaculture (SSFA).

The development of mechanism on marine sustainable development since the establishment of APEC

●**APEC Economic Leaders' Meeting (AELM)**. The AELM was first conducted by the US in Seattle in 1993. The APEC Leaders Economic Vision Statement in 1993 pointed out that "Our environment is improved as we protect the quality of our air, water and green spaces and manage our energy sources and renewable resources to ensure sustainable growth and provide a more secure future for our people", and in 1997 in Canada, the 5th AELM statement considered that "Achieving sustainable development remains at the heart of APEC's mandate"[22]. APEC take the sustainable development as its important part. Recently, the 27th, 28th and 29th APEC Economic Leaders' Meeting respectively in 2020, 2021 and 2022 all highlight the "sustainable" planet, growth or recovery in the statements.

●**Environment Ministerial Meetings (EMM)**. Until 2023, there were 3 EMM conducted respectively in 1994, 1997 and 2012. And in the Statement of the 2012 APEC Meeting of Ministers Responsible for the Environment, the ministers recognized that "efficient and sustainable use of natural resources is fundamental to economic growth. When they are well managed, renewable resources such as forests and fisheries – and non-renewable resource sectors such as mining – can make significant and sustainable contributions to growth and prosperity in the APEC region[23]."

●**Ocean-Related Ministerial Meetings (OMM)**. Until 2023, there were 4 OMM conducted respectively in 2002, 2005, 2010 and 2014. Particularly in 2014, the APEC Ocean-Related Ministers, call for the establishment of more integrated, sustainable, inclusive and mutually beneficial partnership through ocean cooperation among APEC members, that implement previous commitments, and focuses efforts on collaborated and concerted actions in the following four priority areas: (1) Coastal and marine ecosystem conservation and disaster resilience; (2) The role of the ocean on food security and food-related trade; (3) Marine science, technology and innovation; and (4) Blue Economy[24].

●**High Level Policy Dialogue on Food Security and Blue Economy (HLPD-FSBE)** [25]. HLPD-FSBE was conducted in 2015 in the Philippines, and the meeting circulated the Plan of Action of APEC High Level Policy Dialogue on Food Security and Blue Economy: Sustainable food supply chains from resilient resources for inclusive growth, emphasizing that "Acknowledging the importance of conservation, protection and sustainable management of

22.Declaration of the 5th APEC Economic Leaders' Declaration in 1997: "Connecting the APEC Community".
23.Statement of the 2012 APEC Meeting of Ministers Responsible for the Environment in 2021.
24.http://mddb.apec.org/Documents/2014/MM/AOMM/14_aomm_jms.pdf.
25.http://mddb.apec.org/Documents/2016/OFWG/OFWG1/16_ofwg1_027.pdf

habitats, biodiversity, oceans, and fishery resources through Blue Economy and other means for food security[26].

- **APEC Ocean and Fisheries Working Group (OFWG)[27].** OFWG was formed in 2011, following a decision to merge the Marine Resource Conservation and the Fisheries working groups (in operation since 1990 and 1991, respectively). The OFWG's mission is to support APEC's mission to foster sustainable economic growth, development and prosperity in the Asia-Pacific region. The OFWG works to facilitate free and open trade in the region and promotes the sustainable use of fisheries, aquaculture, and marine ecosystem resources and related goods and services.

- **APEC Policy Partnership on Food Security (PPFS).** The APEC Policy Partnership on Food Security (PPFS) was established in 2011 to strengthen public-private cooperation to address food security issues in the region. In 2021, PPFS developed a Food Security Roadmap Towards 2030 (Roadmap 2030) and endorsed it at the Ministerial Meeting on Food Security. The Roadmap is aimed at enhancing an open, fair, transparent, productive, sustainable and resilient APEC food system that ensures access to sufficient, safe, affordable, and nutritious food to meet the dietary needs and food preferences for an active and healthy life. The Roadmap has six key action areas: digitalization and innovation, productivity, inclusivity, sustainability, public-private partnership and SMART goals[28].

2.2.3 Ocean-related Actions under the Framework of OFWG

In recent years, the OFWG took "sustainable use of the marine environment" as one of its priority work areas, with the view of promoting the protection and conservation of the marine environment and the sustainable use of fisheries, and aquaculture and ocean ecosystems in the APEC region to ensure long-term economic benefits, optimizing access to the economic benefits derived from sustainable use of the ocean and enhancing the understanding of the role of oceans, sustainable fisheries, responsible development of aquaculture and sustainable use and management of marine resources to regional food security[29]. Driving by the objectives, OFWG implemented lots of projects with the aims including but not limited to increasing support for development of collaborative solutions to fisheries, aquaculture, and marine ecosystem resource management challenges in the APEC region.

Thus, to understand the actions taken by APEC to promote the marine sustainable development, the

26.http://mddb.apec.org/Documents/2015/OFWG/HLPD-FSBE/15_hlpd-fsbe_jms.pdf

27.https://www.apec.org/groups/som-steering-committee-on-economic-and-technical-cooperation/working-groups/ocean-and-fisheries

28.https://www.apec.org/groups/other-groups/policy-partnership-on-food-security

29.See the OFWG Strategic Plan 2021-2023, downloaded from APEC Information Management Portal on July 2023.

project endorsed by OFWG is one of the direct ways. From 2019 to 2023, a total of 46 projects were endorsed by OFWG and implemented by APEC economies (Figure 2.2) (as of June 2023) (please find the Annex II for the list of projects during 2019 to 2023). In addition to the active promotion of various economies, there are also the active participation from other APEC foras such as PPFS and other platforms or institutions. In the future, it is necessary to further maintain and enhance the opportunities and convenient conditions for the participation of public and private partners in the APEC region. From the project themes endorsed by OFWG, it can be seen that in recent years, there are many projects related to marine debris prevention, fisheries, aquaculture, and marine conservation accounting for 41%, 9%, 6% and 13% respectively (Figure 2.3). In the implementation process of SDG14, the OFWG has played an important platform role in promoting regional marine litter control and fisheries management.

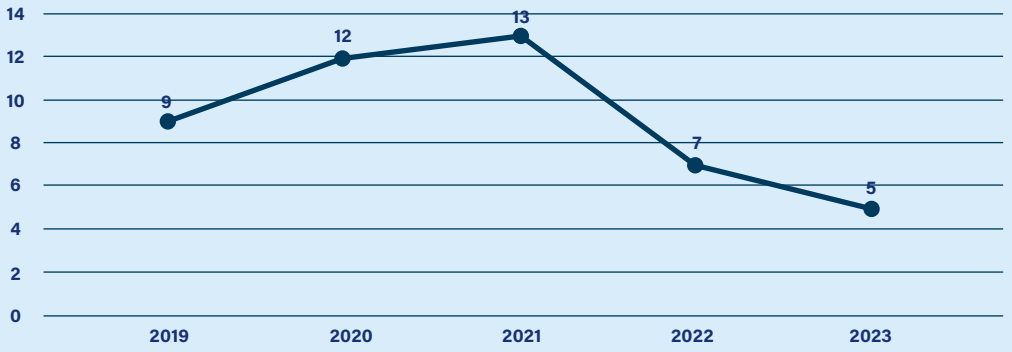


Figure 2.2 Number of projects endorsed by OFWG (2019-2023)

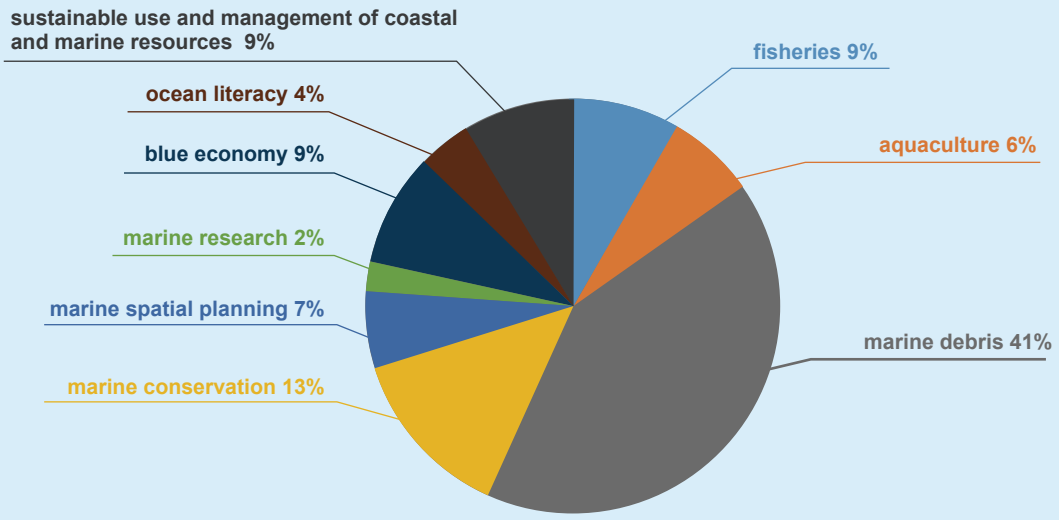


Figure 2.3 Proportion of topics involved in the Projects endorsed by OFWG (2019-2023)

2.3 Efforts and Contribution of APEC Economies for Marine Sustainable Development

The member economy is the core to promote the marine sustainable development in APEC region. Recently. All member economies actively participate in and lead the actions of regional and even global marine sustainable development, and make beneficial progress and positive contributions.

2.3.1 Mechanisms and Policies of APEC Economies

Coordinated mechanisms and specific action strategies or plans are key pillars for the implementation of the marine sustainable development goals at the economic level.

(1) Mechanisms

APEC economies actively implement and follow-up the progress of marine sustainable development, and constantly improve themselves in mechanism setting and development in the field of marine sustainable development in order to facilitate coordination among different departments. The cross-sector coordination mechanisms at the economic level provide an organizational framework for the coordination of ocean-related affairs. According to UNSTATS, 16 APEC economies has established the coordination mechanism, and in accordance with the messages and questionnaire collected, 16 APEC economies has shared its plans on marine sustainable development (Table 2.2).

Table 2.2 Update of coordination mechanisms of APEC economies

Economy	Coordination mechanism
Australia	An interdepartmental group of senior officials co-chaired by the Department of the Prime Minister and Cabinet (PM&C) and the Department of Foreign Affairs and Trade (DFAT) provides coordination on how to give effect to the 2030 Agenda.
Brunei Darussalam	Special Committee for the Implementation of the SDGs' comprising of senior officers from relevant ministries and agencies in 2016; Special Committee, co-chaired at the ministerial level by the Ministry of Finance and Economy (MOFE) and Ministry of Foreign Affairs (MFA) in 2020
Chile	National Council for Implementation of the 2030 Agenda for Sustainable Development
Canada	Honourable Jean-Yves Duclos, Minister of Children, Families and Social Development, to lead Canada's implementation of the 2030 Agenda. An SDG Unit is being established to coordinate, monitor and report on activities related to the implementation.
China	An inter-ministerial mechanism to ensure implementation of the 2030 Agenda; an International Research Center of Big Data for Sustainable Development Goals
Indonesia	National Coordination Team (consists of Steering Committee, Implementing Team, Working Groups, Experts Team and SDGs Secretariat)

Japan	the SDGs Promotion Headquarters
Malaysia	National SDG Council; Working Committee Environment &Natural Resources
Mexico	National Council for the 2030 Agenda for Sustainable Development
Papua New Guinea	The Department of National Planning and Monitoring (DNPM)
Peru	National Centre for Strategic Planning (CEPLAN)
The Philippines	The Philippines Council for Sustainable Development (PCSD)
Russia	the Inter-Agency Working Group on Climate Change and Sustainable Development at the Administration of the President of the Russian Federation (Inter-Agency Working Group); a specialized working group "Business and Biodiversity" established under the auspices of the Ministry of Natural Resources and Environment of the Russian Federation in May 2019.
Singapore	the Inter-Ministry Committee on SDGs (IMC-SDG)
Thailand	The National Committee for Sustainable Development (CSD)
Viet Nam	National Council for Sustainable Development and Competitiveness Improvement

Sources: https://unstats.un.org/sdgs and the Questionnaire submitted by economies

(2) Plans

Planning is very important for implementing the related goals of marine sustainable development. The integration of marine objectives into the planning system reflects the mainstream of marine policies in economies and in turn reflects the main concerns and action areas of these economies (Table 2.3).

Table 2.3 Marine sustainable development related medium and long-term development plans (partial)

Economy	Tile of ocean-related long-term development plan	Time
Australia	Marine Nation 2025: Marine Science to Support Australia's Blue Economy; Australia Sustainable Ocean Plan 2025	2025
Brunei Darussalam	Wawasan Brunei 2035; National Plan of Action to Prevent, Deter and Eliminate Illegal, Unreported and Unregulated Fishing（2011）	2035
Canada	Federal Sustainable Development Strategy (FSDS); Oceans Protection Plan	2016

Chile	Action Plan for the Protection of Marine and Marine Island Biodiversity; Climate change adaptation plans for fisheries and aquaculture and biodiversity; Chile's domestic marine policy	
China	13th Five-year Plan and 14th Five-year Plan; The 14th Five-Year Plan for the Protection of the Marine Ecological Environment; Action Plan for the Development of Seawater Desalination Utilization (2021-2025)	2016-2025
Indonesia	"Nawacita" (Indonesia's domestic development vision), National Long Term Development Plan (RPJPN) 2005-2025; National Medium-Term Development Plan (RPJMN) 2015-2019; Presidential Decree on SDGs	2005-2025 2015-2019
Japan	SDGs Implementation Guiding Principles	2016-2030
Malaysia	The National SDG roadmap	2016-2030
Mexico	The National Strategy for the Implementation of the 2030 Agenda	
Papua New Guinea	Medium Term Development Plan III 2018-2022, and the succeeding Plans in the coming decades; PNG Vision 2050; PNG Development Strategic Plan (DSP) 2010-2030; National Strategy for Responsible Sustainable Development (StaRS)	2018-2022 2022-2050 2010-2030
Peru	National Strategic Development Plan	
Russia	Strategy for the Development of Marine Activities 2030	2019-2030
Singapore	Integrated Urban Coastal Management	2009-
Chinese Taipei	Chinese Taipei Sustainable Development Goals	2019-
Thailand	Sufficiency Economy Philosophy (SEP); SEP and SDGs have been integrated in the 20-Year National Strategy Framework and the 12th National Economic and Social Development Plan (2017-2021). Thailand's SDGs Roadmap;	2017-2021
The United States	Ocean Climate Action Plan; National 5-Year Strategy for Combatting IUU Fishing	2023- 2022-2026
Viet Nam	National Action Plan for Implementation of the 2030 Agenda for Sustainable Development; 2016-2020 Social and Economic Development Plan (SEDP); 2021-2030 Socio-Economic Development Strategy (SEDS) and 2021-2025 Social and Economic Development Plan (SEDP)	2021-2030

Sources: the VNR Reports and the Questionnaire submitted by economies

2.3.2 Voluntary Commitments in APEC Region

As important stakeholders in promoting the global and regional ocean action initiatives, most APEC economies have submitted Voluntary Commitments focusing on the marine sustainable development. In addition to the ocean actions taken by governments of member economies, most entities such as the civil society organization also actively responded to the ocean actions to submit the voluntary commitments in order to promote the marine sustainable development in APEC region. According to the statistics released by the UN (as of June 26, 2023), the number of Voluntary Commitments related to SDG 14 is 2086, of which about 640 are in the pacific[30]. In terms of entity types in Pacific areas, the NGO is the most active entity, followed by the private sector and civil society organization (Figure 2.4); in terms of community of ocean action in Pacific areas, the "marine and coastal ecosystems management" was highly emphasized, followed by Scientific knowledge, research capacity development and transfer of marine technology, sustainable fisheries and Marine pollution (Figure 2.5). With the COVID-19 pandemic, although APEC economies has taken various actions, according to Progress towards the Sustainable Development Goals by the UN on April 29, 2022, "Owing to the initial lockdowns arising from the COVID-19 pandemic, most economies experienced a 40 to 80 percent decline in fish production, with small-scale fisher communities hardest hit. The pandemic also led to a dramatic reduction in tourism, causing substantial income losses for coastal and island communities; the eutrophication indicator shows an increasing trend; Ocean acidification is the consequence of uptake of atmospheric CO2 by the ocean, resulting in a decreasing pH level and increasing acidification of the ocean, thereby negatively affecting marine organisms and ocean services", the implementation of SDG 14 faced some difficulties[31]. There are lots of work needed to be done such as the awareness- raising, the best practices sharing etc[32].

30.https://sdgs.un.org/partnerships/action-networks/ocean-commitments

31.SACHS J D, et al. Sustainable Development Report 2022: From Crisis to Sustainable Development: the SDGs as Roadmap to 2030 and Beyond. United Kingdom: Cambridge University Press, 2022.

32.United Nations. Assessment of the Impacts of the United Nations Ocean Conference Voluntary Commitments. New York, 2022.

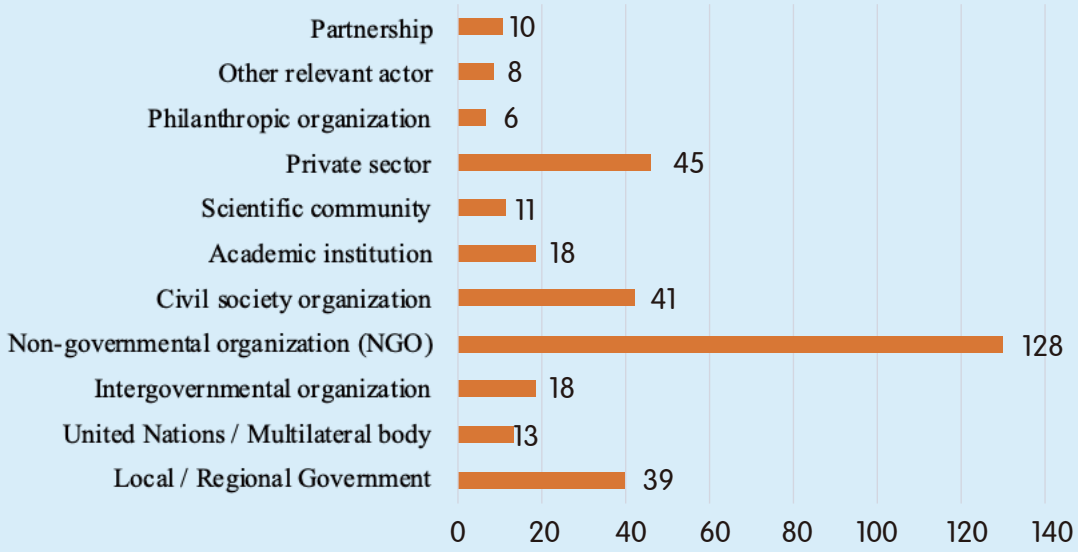


Figure 2.4 Number of Voluntary Commitments in Pacific proposed by Entity Types

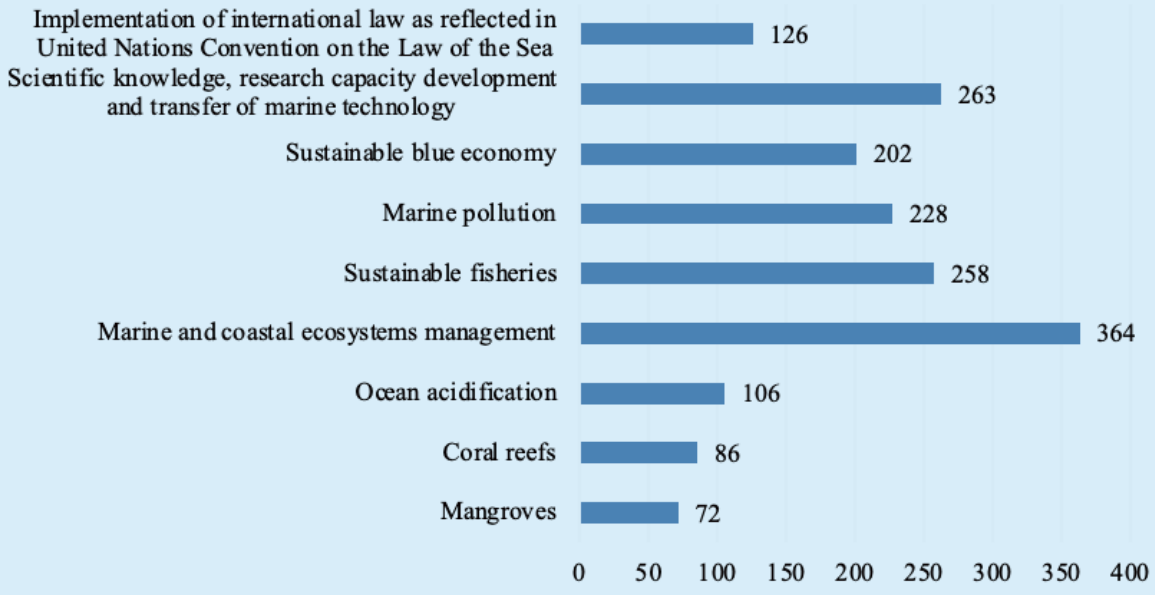


Figure 2.5 Number of Voluntary Commitments in Pacific of each community of action

Chapter 3

Progress of Marine Sustainable Development in APEC Region

Marine sustainable development is an inclusive and balanced development system, with a healthy and resilient marine ecosystem, dynamic and strong blue economy growth, open and inclusive community welfare, sustainable ocean governance, and innovative technology. It is necessary to make a regular and comprehensive inventory of the progress in various fields for updating the understanding of marine ecosystems and their services and accumulating knowledge.

3.1 Marine Ecosystem: Healthy and Resilient

Marine and coastal environment and resources are the sources of space, material and energy for social and economic development. The situation, changes, influences or pressures of the marine ecological environment indirectly affect the potential of marine activities. The analysis of the health status of the marine eco-environment in the APEC region in this section is the natural background for further understanding the development process and trends of marine industry and social development.

3.1.1 Marine Pollution Prevention and Control

The ocean is the blue home where all mankind lives. Protection of the marine environment is the essential of human beings to achieve sustainable development. The marine environmental quality in the APEC region is facing multiple and cumulative pressures or risks arising from human activities and global changes, such as marine debris, marine plastic pollution, and the discharge of land- and sea-based pollutants, or harmful and radioactive substances into the sea. The problem of marine pollution and its prevention and control is a global concern, especially activities that can cause regional or trans-boundary marine environmental pollution or may seriously threaten food safety and human health.

The prevention and control of marine environmental pollution is a priority of APEC in the ocean field, especially land-based pollution and trans-boundary pollution. Due to the dense population, marine plastic pollution is a hot topic in APEC region. Marine pollution not only affects the health of the marine ecological environment, but also damages the production and life of coastal communities, threatening the development of the blue economy and food security. The economic, social and environmental costs

of marine pollution issues are increasing, which include the direct economic costs of cleaning, the loss of income from tourism and fisheries, and social and health costs.

APEC endorsed the APEC Roadmap on Marine Debris in 2019, and started several rounds of consultation on the implementation plan of the roadmap from 2020 to continuously promote the cooperation process and capacity building of marine debris prevention and control. Many economies have made promises or actions to tackle plastic waste, such as Indonesia's commitment to handling plastic waste in the sea with a target of reducing plastic waste by 70% by 2025. In general, the economies' policies and willingness to cooperate on marine debris and plastic pollution, as well as taking responsible actions related to the marine environment, are the core of keeping the Asia-Pacific Ocean blue. Science-based decision-making and stakeholders' fully participation in the solutions is crucial for effective deal with environmental problems from land to the sea at the regional level. Promoting joint research, risk assessment, impact assessment and monitoring, information sharing, stakeholders' consultation, regulatory transparency and coordinated local action support on this issue are important means to cooperate on addressing common environmental issues and other major concerns.

Box 3.1 Diversified path of marine debris management

Chile's case: Sustainable Alliance for Fishing Waste Management. *A new milestone was produced for sustainable fishing and a great advance for the Program "Redes de América", through the signing of the agreement between the Latin American Alliance for Sustainable Fishing and Food Safety (ALPESCAS) and the Professional Certification Company (CERTPRO) at the facilities of Comberplast and Atando Cabos plant in Santiago-Chile, with the representatives of the National Society of Fishing (SONAPESCA). In this way, the Economy will be the first to implement this certification seal that seeks to formalize the management and recovery of waste, promote the circular economy and encourage sustainability through recycling, addressing initiatives to mitigate the impacts of the activity on the environment. (Source: economy shared)*

China's case: Beach garbage disposal operation carried out in various forms. *Xiamen City of China has established a marine sanitation system, and established a marine cleaning team, that is, a marine environmental sanitation management station, which integrates the cleaning of beach garbage and floating garbage at sea into the daily sanitation work and garbage classification system to realize marine collection and land disposal. In the process of marine environmental sanitation management, Xiamen has stepped out of a "smart model", that is, strengthening the construction and application of the "ecological cloud" platform, building a monitoring and early warning system for marine floating garbage, and adopting video image recognition and hydrodynamic numerical simulation technology to realize the daily prediction of the drifting trajectory and distribution area of marine garbage and support accurate cleaning. (Source: economy shared)*

Case of Hong Kong, China: A multi-pronged approach for protecting and improving environmental water quality. *The government of HKC adopts a multi-pronged approach for protecting and improving environmental water quality: controlling pollution at source, planning control through environmental impact assessment (EIA), planning and provision of sewerage infrastructures for collecting and treating sewage, and regional water quality management collaboration. It develops Sewerage Master Plans for planning of sewerage infrastructures and facilities and also regularly reviews and updates these plans. Effectively protect and improve the quality of shared water bodies through close liaison with neighbor regions and the implementation of joint actions or program plans. (Source: economy shared)*

Thailand's case: Reduce marine debris in marine and coastal ecosystems. *Under the framework of Integrated Marine Debris Management Project, the Department of Marine and Coastal Resources (DMCR) aims to reduce marine debris in marine and coastal ecosystems, prevent land-based litter from entering the seas as well as raise awareness and promote community participations through the activities as follow: 1) Cleaning up the existing marine debris from major marine ecosystems by coastal communities, volunteers, and private sectors. 2) Propose community-based measures to reduce waste in target areas by coastal communities, artisanal and commercial fishing communities, and tourism sector. 3) Collect the solid waste from waterways by litter booms, litter traps and garbage collection boats, partially with local communities' participation. (Source: economy shared)*

3.1.2 Marine Ecosystem Conservation

The marine ecosystem is the most important ecosystem in the world, and its sustainability, efficiency, harmony and self-regulation are the prerequisites for people to live in harmony with the ocean. The APEC region is one of the hotspots of marine biodiversity in the world, and the sustainability of marine species and biological resources is the material basis for maintaining the high yield of marine ecological products. Fishery has provided great benefits for APEC in terms of food supply, economic and cultural value. APEC Oceans and Fisheries Working Group (OFWG) works to facilitate free and open trade in the region and promotes the sustainable use of fisheries, aquaculture, marine ecosystem resources and related goods and services[33]. In 2019, APEC endorsed the APEC Roadmap on Combatting Illegal, Unreported and Unregulated (IUU) Fishing with objectives of building capacities in APEC Economies and enhancing cooperation between member Economies[34]. The efforts of APEC in the protection and sustainable utilization of fishery resources are in step with the implementation of SDG 14.4, 14.6, 14.7 and 14.b in the Agenda for Sustainable Development in 2030. According to the data in the United Nations Sustainable Development Report in 2023, the average level of biological sustainability in the Pacific Ocean (69.45%) is higher than the global level of 64.6% and the average level of other seas (Figure 3.1).

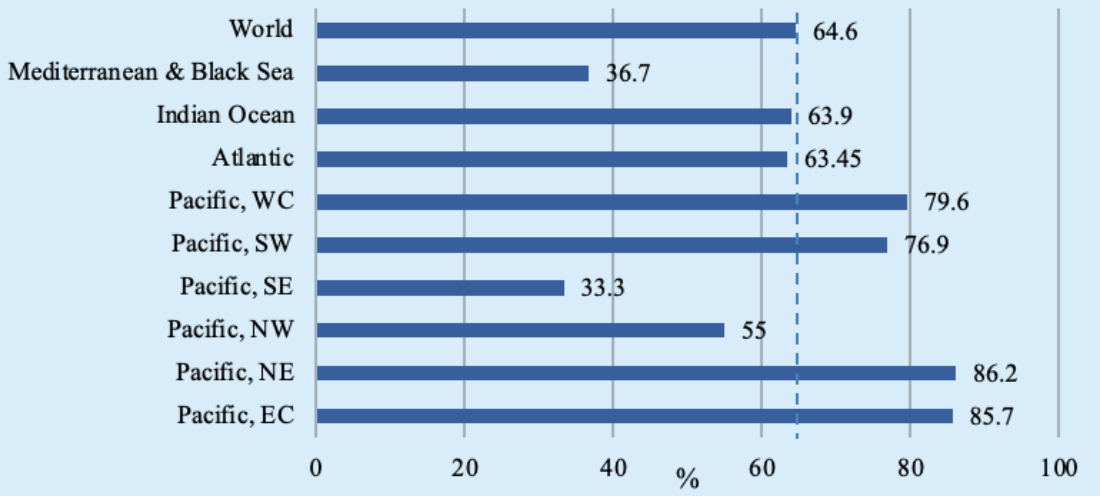


Figure 3.1 Proportion of fish stocks within biologically sustainable levels in 2019 (%) [35]

Note: Within biologically sustainable levels means that the abundance of world fish stock is at or higher than the level that can produce the maximum sustainable yield.

33.https://www.apec.org/Groups/SOM-Steering-Committee-on-Economic-and-Technical-Cooperation/Working-Groups/Ocean-and-Fisheries.
34.https://www.apec.org/meeting-papers/annual-ministerial-meetings/2019/2019_amm/annex-c.
35.United Nations Economic and Social Council. Progress towards the Sustainable Development Goals - Report of the Secretary-General at High-level political forum on sustainable development (Supplementary Information), E/2023/64, 2023.

Box 3.2 Marine ecosystem protection for harmony between people and ocean

China's case: Regime of marine ecological protection redlines. *The ecological redline regime refers to the institutional arrangement for designating areas with important marine ecological functions, ecologically sensitive areas and ecologically fragile areas as key control areas and implementing strict categorical control in order to maintain marine ecological health and ecological safety. China has completed the delineation of marine red lines in 11 coastal provinces (autonomous regions and municipalities) by 2023, and more than 30% of the coastal sea areas and more than 35% of the continental coastlines have been included in the scope of redline control. Outside the core protected areas of nature reserves within the redlines, construction activities are prohibited, except some activities that do not cause damage to ecological functions. Indigenous residents and other legitimate stakeholders are allowed to carry out fishing, aquaculture (excluding reef-type marine ranching and sea aquaculture), construction of production and living facilities without expanding the scale of existing utilization of marine islands and aquaculture. The redline regime is an important renovation of ocean governance tools, and it will contribute to the protection of coastal ecosystems, and the safety of coastal community in the face of sea level rise. (Source: economy shared)*

Mexico's case: Bottom-up multi-sectoral protection process. *Since 2011, civil society organizations have cooperated with coastal communities in Mexico to establish and operate 37 fishery reserves. COBI participated in the establishment of 86% of these areas. The planning and management of this marine protected area is carried out through a bottom-up multi-sectoral process, including local knowledge and the best available scientific information; Always focus on a more sustainable future. COBI's cooperative communities include nascimento Island, an island in the northern Pacific of Mexico, whose residents are mainly engaged in fishing. Two marine reserves have been established to protect the populations of commercial species such as grandfather, lobster, snail and row upon row. The nascimento community cooperated with scholars from Stanford University and COBI to share their experiences with neighboring communities and promote this tool as an effective method to manage fishery resources and protect biodiversity.*


(Source:PANORAMA.https://panorama.solutions/en/solution/reservas-marinas-comunitarias-completamente-protegidas)

The Philippines' case: Community-based Mangrove Conservation and Rehabilitation. *On Panay Island, protection of remaining mangroves and rehabilitation of degraded areas is carried out by local communities and supported by local governments. With the PO-NGO-LGU networking efforts, thousands of hectares of mangroves and abandoned ponds have been turned over to the local government and protected by a municipal ordinance that also established a fish sanctuary. Aside from LGU involvement, enabling factors were the empowerment of the community itself through NGO support, effective IEC (e.g., training courses, billboards), and conversion of poachers and illegal pond operators to mangrove conservationists. Two decades of mangrove and coastal resource management initiatives have stopped mangrove cutting and illegal fishing; restored fish and wildlife diversity, increased fisheries catches and fishers' income, and allowed women to harvest shellfish once more and men to fish in the safety of municipal waters.*
(Source:https://panorama.solutions/en/solution/community-based-man-grove-conservation-and-rehabilitation)

Thailand's case: Community-led marine ecosystem protection and resource protection. *The community-led approach in Thailand has achieved remarkable results in the conservation and sustainable utilization of marine and coastal resources. LMMA (Locally Marine Managed Areas) is one of the categories in OECMs, which is of great significance to achieving the target of 30 by 30 guideline. Currently, marine rangers have more than 15,200 volunteers in 24 coastal provinces. Together with government agencies, they*

play an important role in the protection of marine and coastal resources and monitoring any situation that may affect them. They are also involved in raising people's awareness of the problems that affect local marine and coastal resources, and can make plans to solve problems that are suitable for each area. In addition to marine rangers, other voluntary organizations have also helped to promote the implementation of sustainable development goal 14, such as crab bank group, which has members in more than 532 communities and plays an important role in restoring and protecting the resources of blue crabs. There are also some special volunteer groups that gather together to carry out specific activities, such as diving to collect marine garbage, beach cleaning and garbage collection and classification. (Source: Thailand 2021 SDG National Voluntary Report)

The effective protection and management of marine ecosystems is the basis to ensure the sustainable utilization of the ocean, and it is also the purpose and goal of ocean related works in APEC. The efforts of various economies in improving the effectiveness of regional-based marine protection measures are consistent with SDG 14.5, and support the global goals of marine biodiversity protection. According to the statistics of the World Conservation Monitoring Center (WCMC) of the United Nations Environment Programme (UNEP), the number and spatial scope of the world's marine protected areas (MPAs) have expanded rapidly in the past few years, with the growth rate in the Asia-Pacific region exceeding 19%. The coverage of global marine protected areas has reached 29,583,945 square kilometers (accounting for 8.16% of the marine area) as of July in 2023[36]. Mean proportion of marine Key Biodiversity Areas (KBAs) covered by protected areas (%) of APEC economies is more than 30% (Figure 3.2). In the future, more efforts are needed for the construction of a sound marine protected area networks, the improvement of protection effectiveness and its scientific measurement, so as to enhance the diversity, stability and sustainability of important marine ecosystems.

36.www.protectedplanet.net.

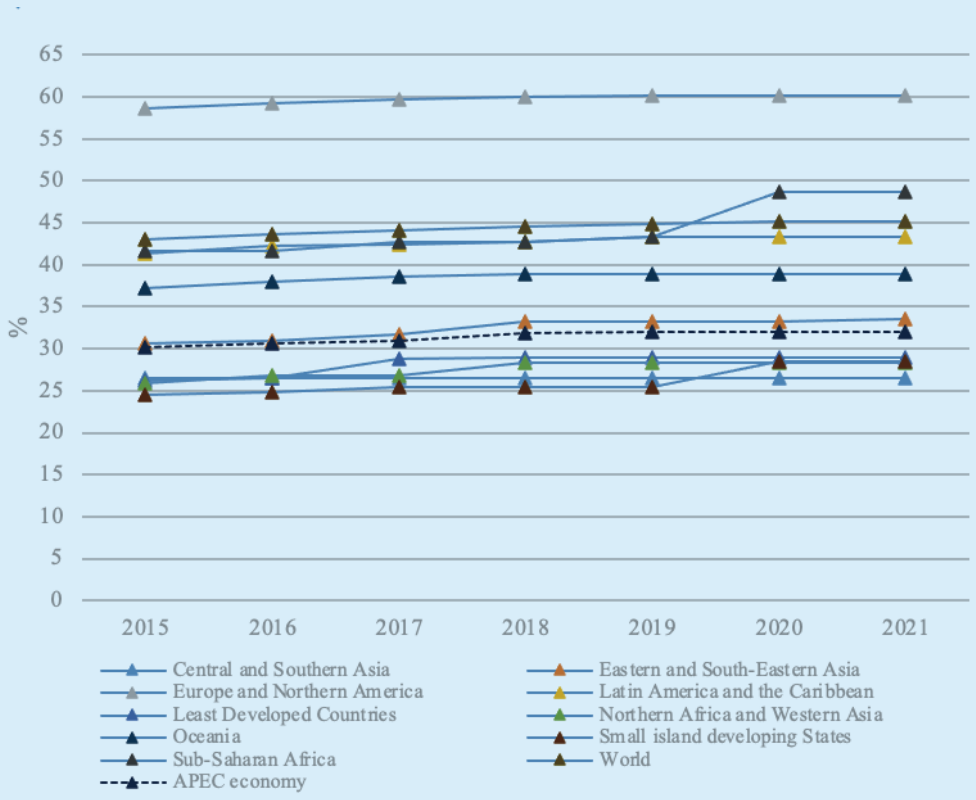


Figure 3.2 Mean proportion of marine Key Biodiversity Areas (KBAs) covered by protected areas (%)[37]

3.1.3 Coastal Resilience Enhancement

The resilience of coastal zone refers to the ability of coastal zone systems to recover and maintain its functions while resisting disaster, which can provide a new theoretical source and analytical perspective for coastal zones to cope with the combined risks of global climate change and human activity pressure, and is of great significance for ensuring the sustainable development and safety of coastal zone. According to the existing research, the comprehensive risk index of the APEC region is at a medium level in the world, which is mainly affected by tropical cyclones. There is a huge gap between developed economies such as Australia; Canada; Korea; New Zealand and Singapore, and developing economies such as Indonesia; Mexico; Papua New Guinea; Peru and the Philippines in terms of vulnerability and coping ability[38].

"Sustainably managing and protecting marine and coastal ecosystems to avoid significant adverse impacts, including by strengthening their resilience, and take action for their restoration in order to

37.Based on UNSTATS database of SDG 14, https://unstats.un.org/sdgs/dataportal/database, 2022.

38.Inter-Agency Standing Committee and the European Commission. INFORM REPORT 2022; Shared evidence for managing crises and disasters, EUR 31081 EN, Publications Office of the European Union, Luxembourg, 2022, doi:10.2760/08333, JRC129343.

achieve healthy and productive oceans" has been listed as an important target of SDG 14. APEC Putrajaya Vision 2040 endorsed in 2020 AELM pursued the "Strong, Balanced, Secure, Sustainable and Inclusive Growth" through "promoting economic policies, cooperation and growth which support global efforts to comprehensively address all environmental challenges, including climate change, extreme weather and natural disasters, for a sustainable planet, and "further implementing the APEC disaster risk reduction framework" has been an action needed to be taken by APEC economies confirmed in the Aotearoa Plan of Action released by 2021 AELM. The OFWG is committed to strengthen cooperation among other APEC bodies on emergency preparedness, disaster risk reduction and related issues and increase cooperation/collaboration among APEC members on the research initiatives that measure the impact of natural disasters on coastal communities[39]. In order to implement the mentioned objectives and requirements, various economies pay more and more attention to the restoration of marine and coastal ecosystems, including typical ecosystems such as mangroves, coral reefs, salt marshes and seagrass beds, which can provide significant coastal protection value, and at the same time restore coastlines and beaches on the basis of nature, and strengthen the natural protection and adaptability of coastal zones.

Take mangroves for example, the average length of coastline under protection of mangroves in the densely populated coastal areas of APEC economies is close to 17%[40] . Efforts to protect mangroves have risen around the world, and about 42% of mangroves have been included in protected areas. The restoration technology of mangrove has gradually matured. Previously, according to the global mangrove observation, in the 20 years before 2016, the global net loss of mangroves was about 4.3%, and the net loss area of APEC economies (3648 km2) accounted for nearly 60% of the global loss area (6081 km2), while the loss areas of Indonesia and Mexico accounted for 28% and 14% of the global total respectively. China is one of the few economies with a net growth of mangrove area. A study by IUCN and The Nature Conservancy (TNC) shows that major economies still have great potential for restoration (Figure 3.3), which can provide scientific reference for related restoration and protection capacity building in the future.

As far as seagrass beds are concerned, the area of seagrass beds in Asia is the largest, accounting for 31% of the world's total area of seagrass beds. In 2021, 18.18% of seagrass beds in Asia were protected and listed as marine protected areas.

39.OFWG Strategic Plan 2021- 2023.
40.Global Mangrove Watch,www.globalmangrovewatch.org, 2022.

Mangroves: the "Coast Guard"

•The Asia-Pacific region is one of the distribution centers of mangroves forests in the world. The distribution area of APEC economies accounts for about 47% (136,000 km²) of the world, of which mangroves in Southeast Asia account for nearly one third, and Indonesia alone accounts for nearly 20%. It is estimated that mangroves prevent more than USD 65 billion in property losses and reduce the flood risk of about 15 million people every year. The major beneficiary economies include China; Mexico and the United States. Every year, 7 million people in Viet Nam are protected by mangroves from floods. In the United States, mangroves protect over USD11 billion worth of property every year, while in China, the figure is about 8.6 billion.

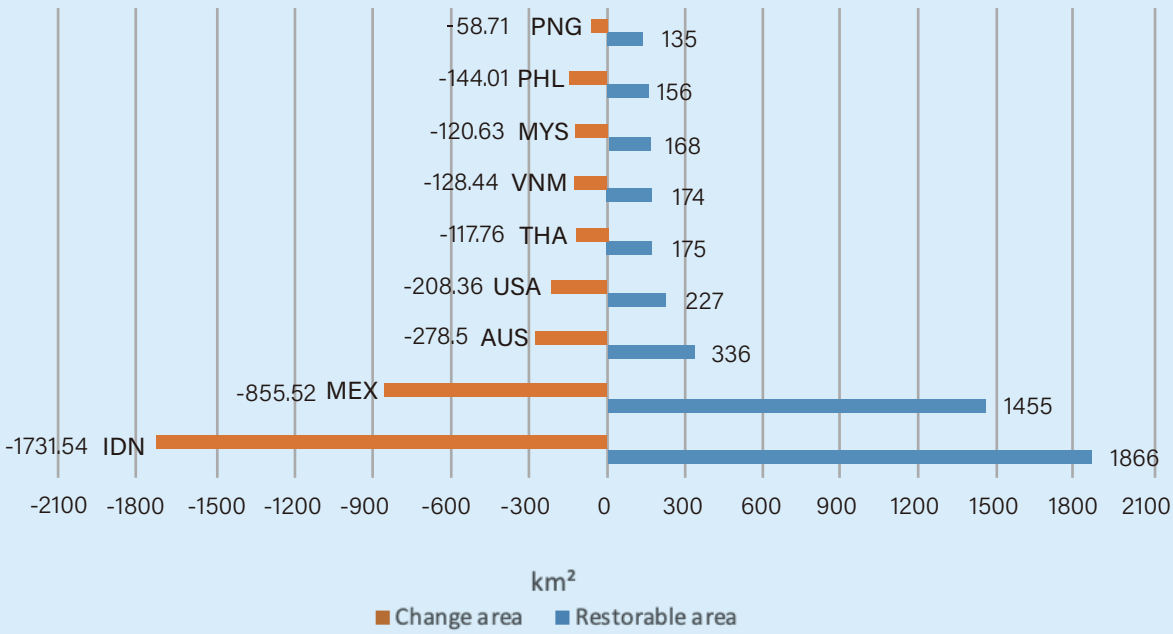


Figure 3.3 Change and restorable area in APEC economies[41]

41.WORTHINGTON T, SPALDING M. Mangrove Restoration Potential A global map highlighting a critical opportunity. 2018. https://www.iucn.org/sites/dev/files/content/documents/mangrove-tnc-report-final.31.10.lowspreads.pdf

Box 3.3 Shoreline resilience improvement through restoration

Australia's case: Living Seawalls - bringing biodiversity back to coastal infrastructure. *Seawalls are essential for shoreline protection, recreational activities and renewable energy generation but often lack the structural complexity required to support rich biodiversity. The Living Seawalls project, founded in Sydney, Australia, builds on marine research to design and produce modular 'habitat tiles' that mimic the living surface of marine plants and animals. The tiles can be attached to shoreline infrastructure to facilitate the colonisation of intertidal species such as oysters, barnacles, seaweeds and mussels. These species start the growth of an ecosystem by providing food and habitat for marine species and maintaining water quality. The Living Seawall Projects increases awareness of urban expansion impacts on biodiversity in our oceans. The Living Seawall project offers an example solution to remediate the environmental impacts of widespread marine construction and the declining rates of marine biodiversity.*

(Source: https://www.livingseawalls.com.au/)

China's case: The natural shoreline restoration project to enhance the coastal disaster prevention function. *The coastal areas of China are facing the threats and challenges of coastal erosion. Beach maintenance is the best way to restore the eroded sandy coastline. In recent years, China has intensified its coastal restoration efforts, invested in disaster prevention and mitigation, beautified the coastline and supported coastal ecological restoration. For example, the coastline in the southeast of Xiamen City has been seriously degraded by sand mining activities and the construction of beach-occupying structures since the 1970s. After 2007, the municipal government cooperated with the Third Institute of Oceanography of the Ministry of Natural Resources, and through the implementation of a number of tidal flat restoration projects, the environment and tidal*

flat functions in the southeast sea area were greatly improved, resources such as clam and amphioxus were greatly restored, and tourism income was also greatly increased, forming the "Xiamen experience" for tidal flat restoration. (Source: economy shared)

Photos of Xiamen beach before (left) and after (right) restoration

New Zealand's case: Restoring coastal dune ecosystem in coastal parks. *In New Zealand, there is an urgent need to conserve the biodiversity of coastal dune ecosystems as a consequence of human development patterns. Methods for dune protection and restoration have been developed but community buy-in is essential to securing lasting gains. Spatial planning and the protected area design have key roles to play. The restoration and protection of biodiversity in coastal parks to address dune degradation can provide solutions to other issues. In New Zealand these include protection against coastal hazards, providing culturally important plant fiber resources, and improving the natural character and amenity values of the coastline. The key to securing the best range of benefits is a place-based and community centred approach that first identifies how parks management can assist local communities.*

© Shane Orchard

(Source: PANORAMA. https://panorama.solutions/en)

Box 3.4 Monitoring and restoration of coral reef

Monitoring and management of coral reef: case of Malaysia and Thailand.

To monitor changes in the marine ecosystem, Malaysia carries out annual reef health survey in collaboration with local NGO and communities using Reef Check Survey Method. As of 2022, the annual survey program covered 325 sites around Malaysia within marine protected areas and outside of marine protected areas. This is to enable management interventions should any drastic change is detected. Malaysia started this effort since 2007. To date, we have 16 years' worth of reef health data. (Source: economy shared)

Thailand has deployed temperature data loggers (7 stations) in both of Gulf of Thailand and Andaman Sea to monitor the risk of coral bleaching, to assess the coral bleaching situation in key areas. They report coral bleaching through the website, so as to issue early warning and management measures in case of serious situation. The collected biological data affect the resilience of coral reefs, such as resistance, recovery, exposure, sensitivity and adaptability, including physical and management factors. (Source: economy shared)

Reef Restoration Program: case of Australia and the U.S.

Climate change is the biggest threat to the Great Barrier Reef and reefs worldwide. Australia is taking increased action on climate change. They are also investing in projects to help the Reef adapt and be more resilient in the face of warming oceans. The Reef Restoration and Adaptation Program (RRAP) is working on a range of projects which provide exciting prospects for the future of coral reefs. Some of these collaborative projects are led by scientists from Australian Institute of Marine Science (AIMS). (Source: economy shared)

The US has provided funds to leverage for habitat conservation and restoration projects in the United States. NOAA is recommending more than USD265 million in funding for 38 projects through the Bipartisan Infrastructure Law with funding. They are recon-necting rivers to their historic floodplains, outplanting corals to rebuild reefs, building living shorelines that will protect coasts from erosion and sea level rise, and more. (Source: economy shared)

3.2 Marine Economy: Open and Dynamic

The prosperity and open development of the marine economy are of great significance to the economic growth, social development and environmental protection of the APEC region. The APEC region has a vast sea area and abundant marine resources, which provides huge space and potential for the high-quality development of marine economy. Benefiting from the free and open trade environment and policy tools of APEC, the major marine economic sectors have played a greater driving role in APEC economic growth. At present, the development of APEC marine fisheries and aquaculture, marine shipping, marine tourism, marine renewable energy and other industries has injected new impetus into the economic growth of economies, and become an important economic growth engine in the APEC region. From the perspective of the contribution of marine economic growth to GDP, the differences between major economies are obvious. Economies such as China; Indonesia; Malaysia; Thailand and Viet Nam have a higher proportion of their marine economy[42] .

3.2.1 Blue Economy Growth

Maintaining the steady growth of the blue economy is a powerful engine for common prosperity, and it is also the key to ensure that APEC region becomes the most dynamic region in the world. APEC economies have taken a series of measures to promote open, dynamic and sustainable marine development by formulating marine economic development plans, promoting the greening and modernization of marine fisheries, and promoting the development of artisanal fisheries and eco-tourism. Since 2011, the AMSDC, with the support of OFWG, has held the APEC Blue Economy Forum and launched the APEC Blue Economy Demonstration Project. In order to achieve APEC's goals and promote economic growth,

42.MCLLGORM A, RAUBENHEIMER K, MCLLGORM D E, et al. The cost of marine litter damage to the global marine economy: Insights from the Asia-Pacific into prevention and the cost of inaction. Marine Pollution Bulletin, 2022, 174: 113167.

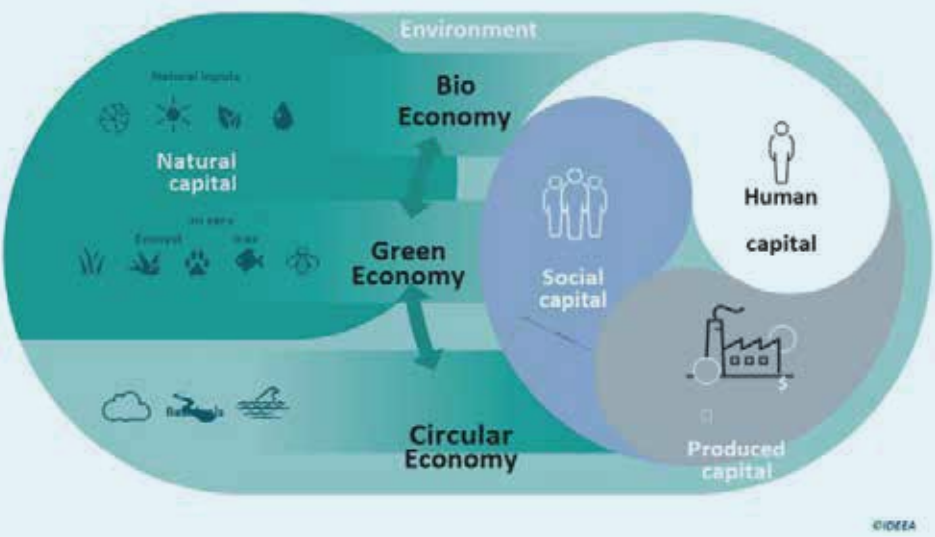
since the third APEC OFWG Working Group Meeting in 2014, the OFWG views Blue Economy as an approach to advance sustainable management and conservation of ocean and coastal resources and ecosystems and sustainable development, in order to foster economic growth[43] . In November 2018, the Fifth APEC Blue Economy Forum discussed and put forward the "APEC Blue Economy Development Approach Ningbo Initiative" to promote the practical demonstration of the blue economy concept.

Box 3.5 Bio-Circular Green (BCG) Economy in Thailand

The Bio-Circular Green (BCG) Economy concept, championed by the Royal Thai Government for the APEC policy dialogues, represents a post-pandemic growth strategy where science, innovation and technology are applied to efficiently use resources, maintain and restore our ecosystems, and reduce waste to build a system where government and business can thrive, contributing to the global efforts of comprehensively addressing all environmental challenges, including climate change, extreme weather and natural disasters, for a sustainable planet.

By integrating three different approaches including the Bio-Economy, the Circular Economy, and the Green Economy, the BCG concept provides a common framing of sustainability. Figure below shows a working model of the BCG economy that integrates the four types of capital. All policy actions undertaken to influence the BCG Economy can be represented as investments in capital within a given economy or region.

43.http://mddb.apec.org/Documents/2014/MM/AOMM/14_aomm_jms.pdf



BCG capital investment in practice

(Source: IDEEA Group. Bio-Circular-Green (BCG) Economy Model (Working paper). The Asia Foundation, 2022.)

Marine fisheries and aquaculture are important pillar economic sectors in the APEC region. They provide the best economic value for promoting sustainable fisheries and aquaculture and are in line with APEC's long-term strategy to promote the blue Economy in the region. The Asia-Pacific region is the world's largest producer of fish. According to FAO statistics, the total production of aquatic products in APEC economies was 100 million tons in 2020, an increase of 12.6% compared with 87.69 million tons in 2015. In 2020, the 21 APEC member economies account for 62% and 82% of global marine catch and aquaculture production, respectively. For example, in 2022, Chile produced 3.85 million tons of fish, which accounts for about 3% of world fishery production and 1% of world aquaculture production volume[44]. Driven by the global context of conservation and sustainable use of marine fisheries resources, marine aquaculture is regarded as the main driving force for the transformation of fisheries and aquaculture industry. From 2015 to 2020, the average share of marine aquaculture value of output in GDP of APEC economies increased from 0.22% in 2015 to 0.28% in 2020, with Chile reaching nearly 4% (2019) and other economies below 0.5%[45]. Technological advances are playing an increasingly critical role in enabling the rapid and sustainable development of marine aquaculture.

44.The data was shared by economy.
45.Marine aquaculture production value data from FAOSTAT, http://www.fao.org/faostat/, 2022.

Box 3.6 New development of green and modern marine aquaculture methods

China's case: Deep-water marine aquaculture platform. *Deep-water cage culture is an important measure to change the growth mode of fishery in the new era. The development of China's deep-sea and offshore marine aquaculture platform has completely subverted the traditional farming model. It also integrates wind power generation, 5G base stations, waste water collection, high-definition monitoring of fish activities and other technologies, and only two or three people can farm tens of thousands of high-quality deep sea fish. Farmers can automatically monitor the pH, salinity and dissolved oxygen content of seawater through the mobile APP, and all data can be transmitted to the mobile terminal.*

(Source: Sea and Island Environmental Science and Technology Research Institute.)

Case of Hong Kong, China (HKC): Modern mariculture technology and demonstration. *In order to lead the marine fish farming industry in HKC to modernization and sustainable development, the Agriculture, Fisheries and Conservation Department (AFCD) has set up a modern marine fish farming demonstration farm in Donglongzhou. The demonstration site adopts semi-submersible truss deep-water cage design, which has the advantages of wind resistance, current resistance, big waves resistance and durability. Large-scale culture can be carried out in open waters with good water flow. With the help of modern equipment management, such as real-time monitoring system, real-time water quality monitoring, automatic feeding system, wind power and solar power generation system, the water body can be used more effectively and the production efficiency can be improved. AFCD is conducting marine fish culture research in the demonstration area to collect data for future reference. At present, the Hong Kong Polytechnic University, with the support of the Fisheries Sustainable Development Fund, is implementing a plan to promote the modernization and sustainable development of mariculture in the demonstration area, providing classroom theoretical and practical training for traditional mariculturists and those who are interested in mariculture, so as to help the local mariculture industry develop a modern and sustainable mariculture model. (Source: Website of Agriculture, Fisheries and Conservation Department of Hong Kong, China.)*

Marine tourism was developing rapidly, especially cruise tourism. According to the Cruise Line International Association statistics, from 2009 to 2019, the number of global cruise travel continued to grow. Since 2010, the global cruise market has expanded year by year, driven by the APEC region. The number of cruise passengers in Asia Pacific peaked at 4.26 million in 2018. In 2019, the number of cruise passengers was 4.02 million, down 5.63% from 2018. A total of 306 destination ports in the APEC region hosted cruise ships in 2019, 18 more destinations than in 2018. The number of attachments reached 7,154,15 fewer than in 2017. The top four economies with the most attachments are Japan; China; Malaysia and Thailand (see Figure 3.4).

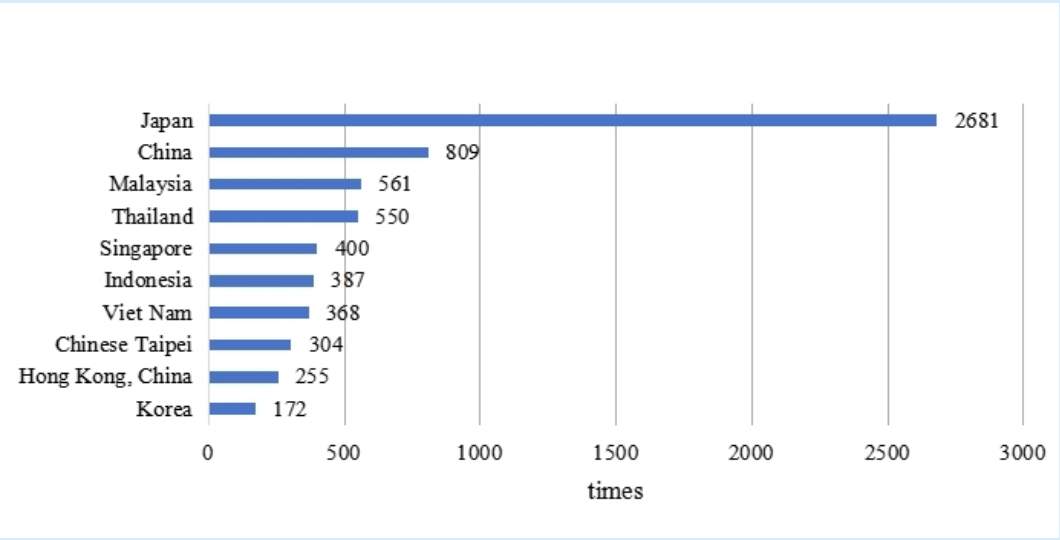


Figure 3.4 The TOP 10 cruise voyages of ports in APEC region in 2019[46]

According to data released by the World Travel and Tourism Council, globally, both the change in the total value of travel and tourism and the total amount of employment in the tourism industry show a significant decline in 2020. The direct contribution of travel and tourism to GDP in the APEC region drops by 49.1% in 2020 from (9.4% to 4.9% of total GDP). Meanwhile, travel and tourism directly supports 163 million jobs in the APEC region (10.7% of total employment). In 2020, the number of jobs decreases to 133 million (9.0% of total employment). The change in international tourist spending in APEC decreases from USD696.1 billion (6.0% of total exports) in 2019 to USD177.9 billion (1.7% of total export) in 2020. Domestic tourist spending in APEC economies also halves, from USD2,642.3 billion in 2019 to USD1,457.2 billion in 2020[47]. However, as the impact of COVID-19 gradually slows down and related travel restrictions in the APEC region are gradually lifted, marine tourism will usher in a rapid recovery in 2023[48].

46.Cruise Lines International Association (CLIA). State of The Cruise Industry Outlook 2021. https://cruising.org/-/media/research-updates/research/2021-state-of-the-cruise-industry_optimized.ashx.

47.World Travel and Tourism Council. Travel and Tourism Economic Impact APEC 2021. London: World Travel and Tourism Council, 2021. https://wttc.org/Research/Economic-Impact.

48.United Nations World Tourism Organization. Global Tourism Barometer, 2023.

Box 3.7 Ecotourism

Peru's case: Empowering artisanal fishermen in manta ray ecotourism. *The Giant manta ray is a vulnerable species exposed to unmanaged fisheries in Peru. To promote protection of mantas, local fishermen are empowered through manta ray ecotourism. Activities include workshops, financial and technical support, and promotion of ecotourism services, which aim to achieving awareness and appreciation for manta conservation, while promoting alternative incomes for local communities.*

Workshops were organized in multiple communities in the region, in order to raise awareness on manta ray conservation status among artisanal fishermen. Fishermen were invited to monthly workshops focused on building capacity regarding business and tourism management. Local professionals (e.g. Coast Guard, Tourism authorities, etc.) were invited to give presentations, showcasing local knowledge. Meetings also encouraged fishermen to design their own business plans and strategies to implement ecotourism services, and enabled the selection of the most committed fishermen who would receive funding and personalized support. Two fishermen groups were selected to receive funding to develop ecotourism services, and receive support to acquire the required tourism permits. Regular meetings with fishermen provided follow-up and personalized mentorship regarding ecotourism development and environmental leadership. Partnerships were also established with local tourism agencies and the regional government to promote these services.

(Source: PANORAMA.

https://panorama.solutions/en/solution/empowering-artisanal-fishermen-manta-ray-ecotourism.)

Russia's case: Commander Islands. *Located in the Bering Sea east of the Kamchatka Peninsula, this biosphere reserve consists of two islands including marine areas. It includes tundra ecosystems such as mountains, grassy meadows, wetlands, coastal and marine areas. The flora and fauna of the islands are notable because of the unusual combination of species of Asian and American origin. Its coastal ecosystems are unique due to their diversity of birds and marine mammals.*

The Green Commander Islands project targets all sorts of dangerous wastes, such as fishing gear, batteries, lamps, plastics and many more. To speak about this issue freely and creatively, a small Waste Museum have been created in the visitor center. The exhibits are constructed of waste found on Bering Island (the major island of the group) and show alternatives of how it

can be recycled and why recycling is a good idea. Tourist trails and installation of information boards on Severo-Zapadnoye rookery were constructed. Traditional regional trades of Aleuts were protected. For example, collecting of seabirds eggs by grunting quotas for the indigenous people.

(Source: www.islandbiosphere.org; komandorsky.ru.)

Maritime shipping is an important support for international trade. More than 80% of global trade volume and more than 70% of total trade are shipped and handled by seaports around the world[49]. The APEC area is the busiest by transport volume. Since 2015, the container port throughput of APEC economies and their share in the world have increased year by year (Figure 3.5). In 2020, the APEC economy's container port throughput was 526 million TEU, accounting for 66% of the world's total[50]. In 2020, Asia has nearly two-thirds of its throughput, maintaining its position as a global container port transportation hub. Three-quarters of the world's top 20 container throughput ports in 2020-2021 will come from the APEC region. Shipbuilding is a major industry in some APEC economies. In 2020, the shipbuilding industry shrank due to the impact of the COVID-19 pandemic, with deliveries falling by 12%. In 2021, ship deliveries increased by 5.2% to 60,779,648 GT, but were still lower than in the 2014-2017 period and 2019. The majority of ships delivered were bulk carriers, followed by oil tankers

49.UNCTAD. Review of Maritime Transport 2021. Geneva: UNCTAD, 2021.
50.Calculation based on data from UNCTAD statistic center, https://unctadstat.unctad.org/wds/ReportFolders/reportFolders.aspx.

and container ships. China; Korea; Japan and the Philippines are the largest economies in ship building volume, accounting for more than 95% of global deliveries in 2021 and more than 98% of the total APEC economies (Figure 3.6).

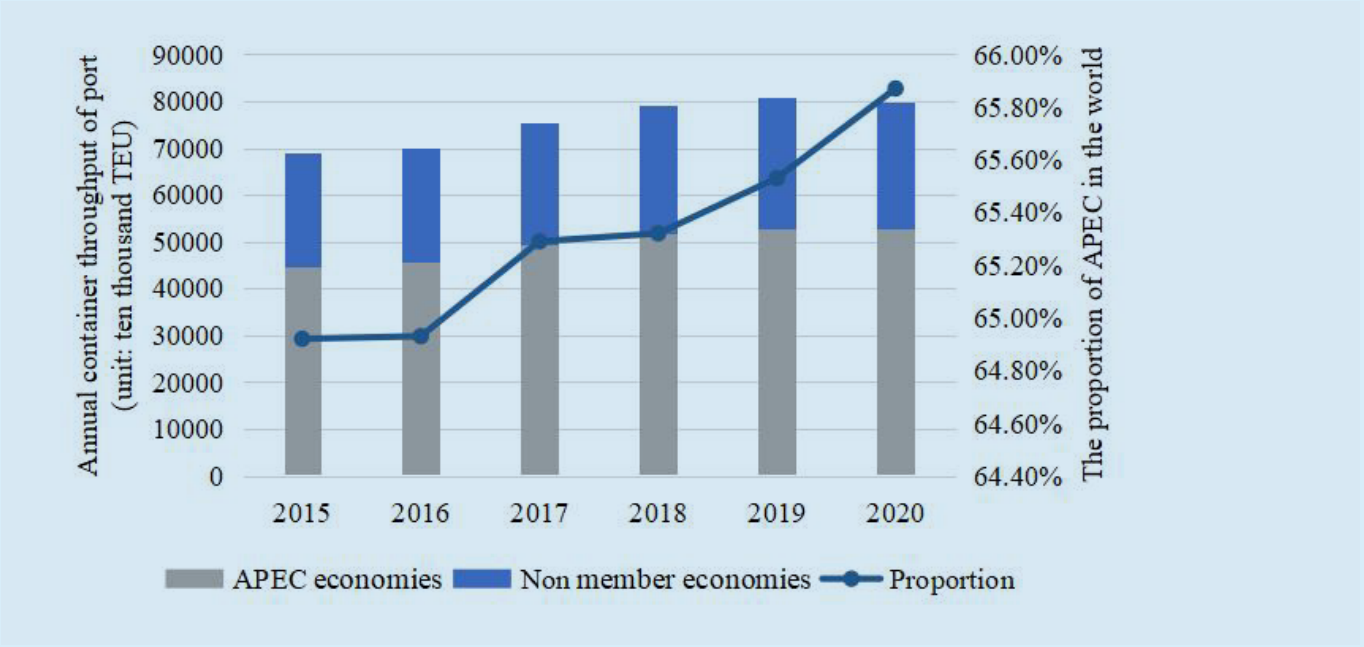
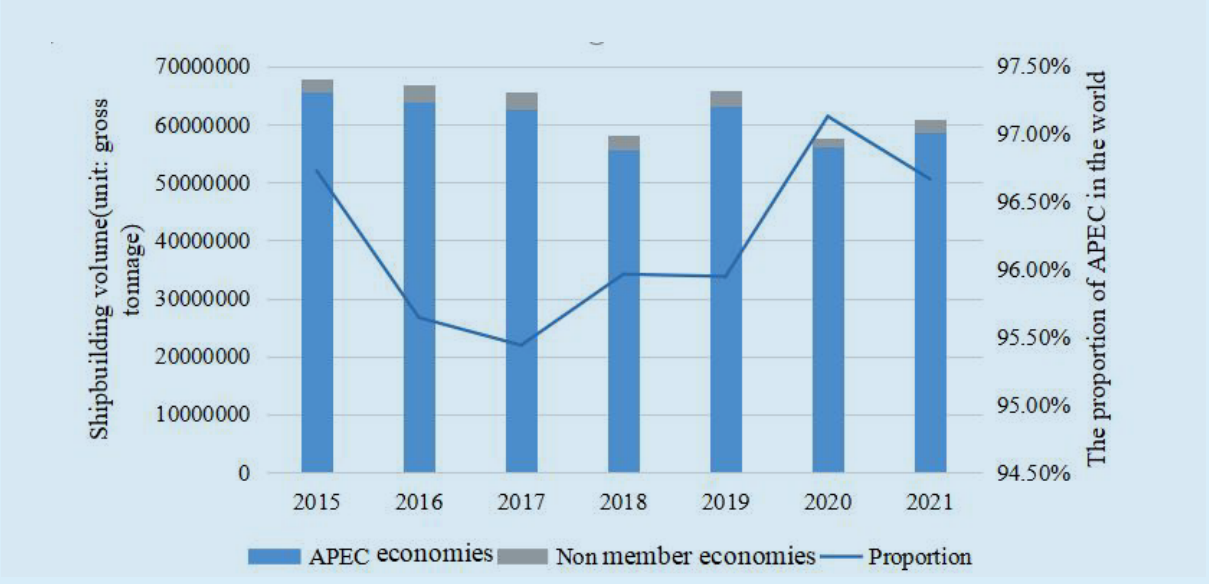


Figure 3.5 Container port throughput and proportion of APEC economies [51]



51.UNCTAD. Review of Maritime Transport 2022. Geneva: UNCTAD, 2022.

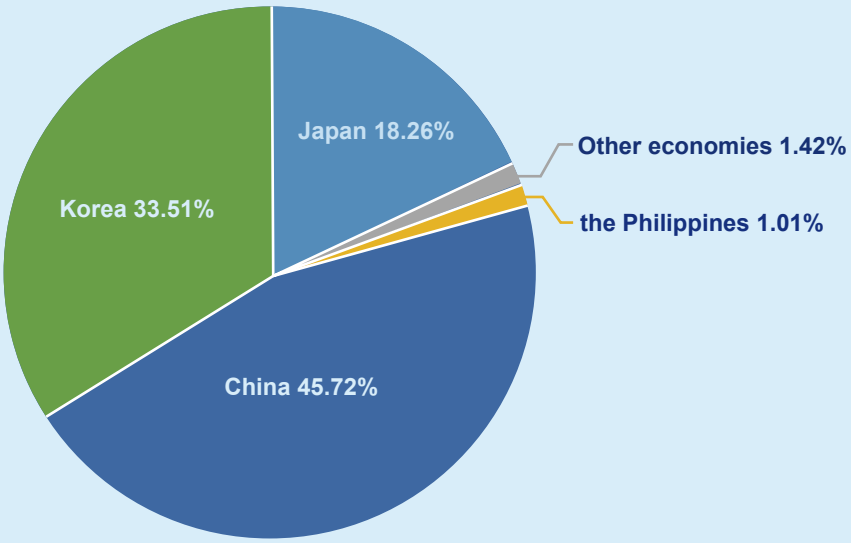


Figure 3.6 The volume and proportion of shipbuilding in major APEC economies[52]

3.2.2 Green and Low-carbon Transformation

Green and low-carbon is the key to achieving high-quality and sustainable economic development in the APEC region and the world. APEC supports economies in implementing low-carbon, circular economy and energy transition policies and actions to meet their carbon neutrality commitments. Emissions reduction and the energy transition are key drivers for achieving economic and regional goals, especially in the context of unprecedented challenges to global and regional energy security. In 2019, APEC set a strategic goal of "doubling the share of renewable energy in APEC's energy mix by 2030 from 2010 levels". Achieving this goal will require significant efforts from key sectors to support economies in identifying and integrating new sustainable energy, transportation and other technologies and services.

52.UNCTAD. Review of Maritime Transport 2022. Geneva: UNCTAD, 2022.

Box 3.8 Singapore's Green Shipping Incentives

Singapore's Maritime and Port Authority (MPA) has updated environmental incentives. The Revised Green Ship Programme under the Maritime Singapore Green Initiative released on April 22, 2022, announced registration fee discounts for low emission vessels. The May 1, 2022 circular, Enhancement of the Maritime Singapore Green Initiative–Green Port Programme (GPP), outlined port due cuts for ships using low or zero carbon fuel. Both incen-tives run May 1, 2022 to December 31, 2024.

Singapore - flagged ships exceeding the IMO's Marpol Annex VI Phase 3 Energy Efficiency Design Index (EEDI) by 10% or more get 50% off initial registration fees (IRF) and a 20% annual tonnage taxes (ATT) rebate. Vessels using primarily LNG, or fuels with lower conversion factors, enjoy a 75% IRF reduction and 50% ATT discount. Vessels using primari-ly zero carbon fuels are exempt from IFR and receive a 100% ATT rebate.

Port dues are cut by 30% for using zero carbon fuel in the Port of Singapore; a 25% port dues reduction applies for using low carbon fuels other than LNG and exceeding IMO Phase 3 EEDI requirements by 10%. An additional 10% port dues reduction is available for vessels serviced by harbour craft using low carbon fuel in port.

(Source: SINGAPORE: New Green Shipping Incentives Introduced. Hong Kong Trade Development Council, see: https://research.hktdc.com/en/article/MTA2MTEwMDQ2OQ, 2022-5-13.)

The development of renewable energy represents a great opportunity for APEC to balance energy demand with environmental protection and economic growth. Marine renewable energy is growing rapidly. Since 2015, the total installed power capacity of offshore wind energy in major APEC economies (China; Japan; Korea; Chinese Taipei; the United States and Viet Nam) has increased from 12440MW to about 95737MW in 2022, an increase of nearly seven times, and its share in the global capacity of offshore wind energy has increased from 6.2% in 2015 to 51.5% in 2022 (Figure 3.7). Among them, China's offshore wind has a rapid development from 2015 (559MW) to 2022 (30460MW) with more than 53-fold increase, accounting for about 94% of the total offshore wind capacity in Asia and 48% of

the world. Also, Viet Nam's capacity increased to 1094MW in 2022, a 10-fold increase from 2015. In addition, Korea (256MW) and Canada (21MW) have larger marine energy capacity than other economies. The capacity progress reported as of 2022 reflects ongoing regional and global efforts to transform the power sector, and also shows more potential to increase the role of marine renewables.

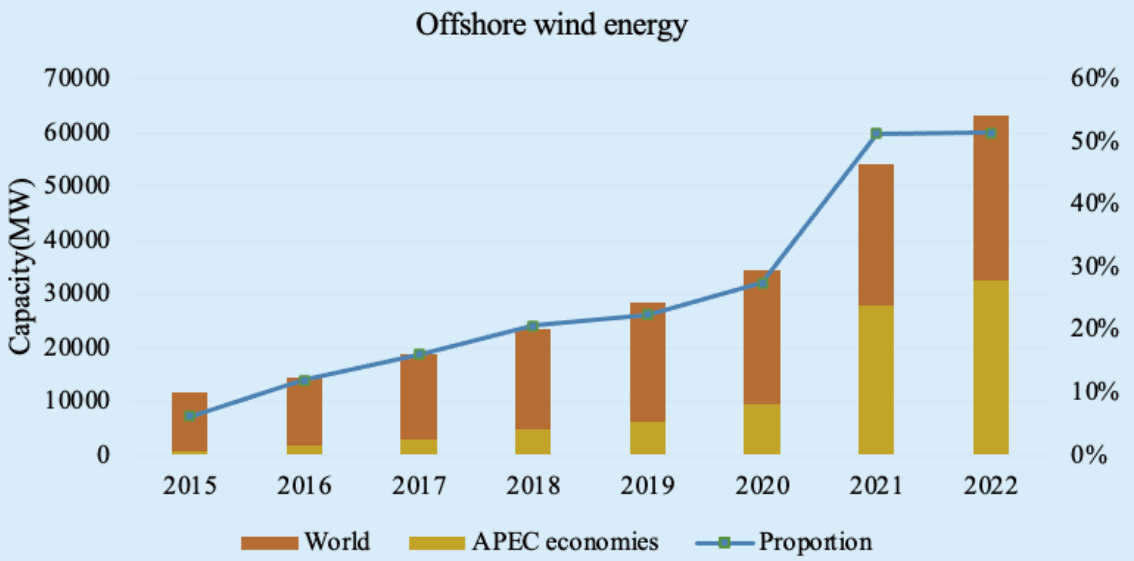


Figure 3.7 Offshore wind energy capacity of APEC economies [53]

As of January 2023, most APEC member economies have formally committed to achieving net-zero emissions commitments over the next few decades (Table 3.1). To achieve net zero emissions, annual global investment in clean energy will need to more than triple to about USD4 trillion by 2030. By 2050, the global energy industry will be largely based on renewable energy, requiring increased international cooperation between economies. Especially when it comes to new energy sources such as wind in the marine sector, it is important to ensure that developing economies have the finance and technology needed to reach net zero in a timely manner. This could simultaneously create millions of new jobs and significantly boost global economic growth [54].

53. IRENA. Renewable Energy Statistics 2023. The International Renewable Energy Agency, Abu Dhabi, 2023.
54. IEA. Net Zero by 2050 - A Roadmap for the Global Energy Sector. Net Zero by 2050, 2021.

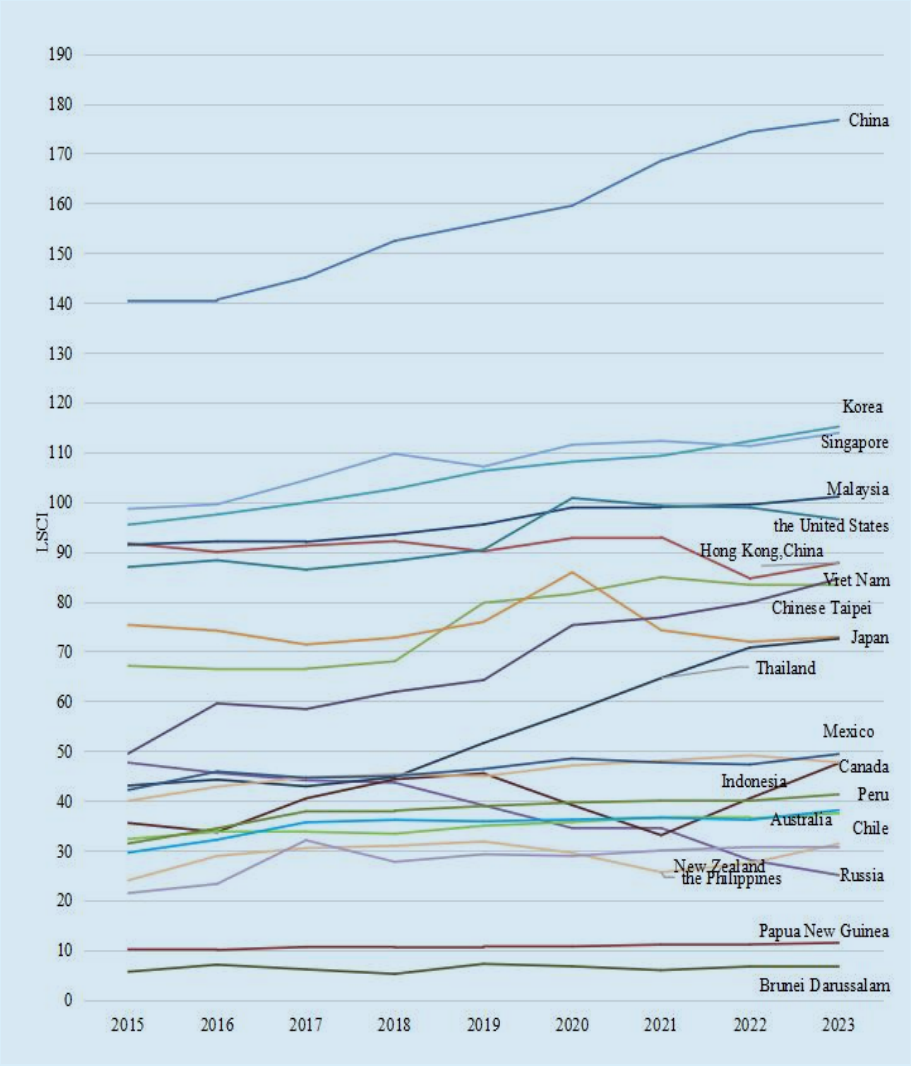
Table 3.1 Net-zero/Carbon neutral commitments by APEC economies, as for June 2023

Economy	Net-zero by
Australia	2050
Canada	2050
Chile	2050
China	2060
Hong Kong, China	2050
Indonesia	2060 (Proposed / In discussion)
Japan	2050
Korea	2050
Malaysia	2050
Mexico	2050 (Proposed / In discussion)
New Zealand	2050
Papua New Guinea	2050
Peru	2050
Russia	2060
Singapore	Second half of the century
Chinese Taipei	2050
Thailand	2065
the United States	2050
Vet Nam	2050

Source: Our World in Data based on the Global Carbon Project; APEC energy overview 2021; Energy & Climate Intelligence Unit | Net Zero Scorecard (eciu.net)

3.2.3 Marine Trade Connectivity

Trade liberalization and facilitation is one of the driving forces to ensure that the APEC region remains the most dynamic and integrated regional economy in the world. Marine transport connectivity and trade cooperation are not only important industrial sectors supporting the development of the blue economy, but also important ways to help realize the APEC Connectivity Blueprint (2015-2025). Maintaining close maritime connectivity and maritime trade cooperation is the most remarkable manifestation of APEC's liberalization and openness.



Maritime shipping connects more than 80 percent of global trade and plays a key role in stabilizing and growing trade flows in the APEC region. The Liner Shipping Connectivity Index (LSCI) reflects the level of international open connectivity of the oceans. Figure 3.8 shows the overall trend of gradual increase of LSCI in APEC economies. Figure 3.9 on the average state of the Liner Shipping Bilateral Connectivity Index (LSBCI) among APEC economies reflects the degree of marine connectivity within the APEC region. In the past two years, affected by the COVID-19 pandemic and other factors, the growth has slowed down or declined.

Figure 3.8 Liner Shipping Connectivity Index (LSCI) [55]

55. Calculate the average UNCTAD Liner Shipping Connectivity Index, the 2023 data is the average of the first two quarters, https://unctadstat.unctad.org

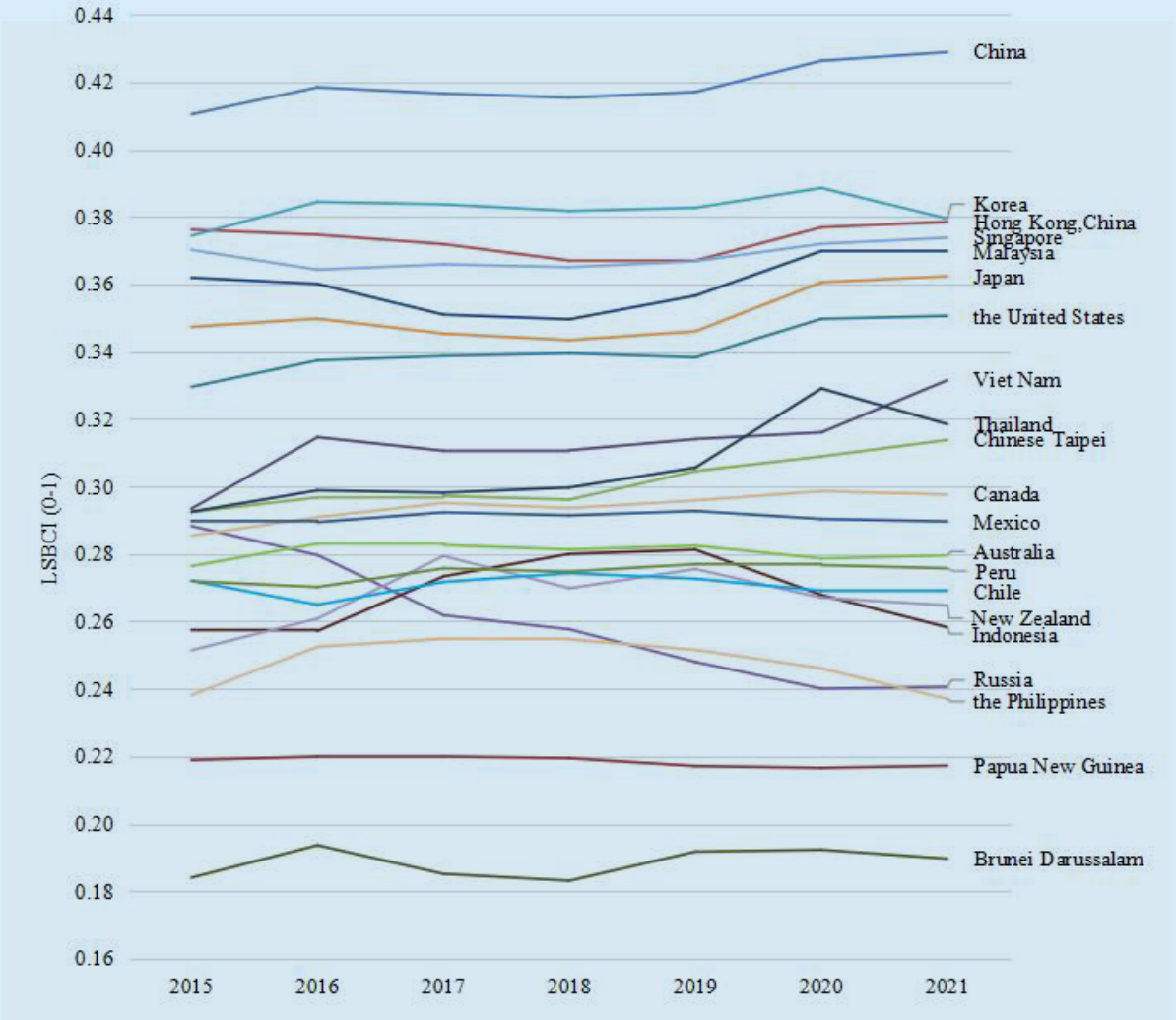


Figure 3.9 Liner shipping bilateral connectivity index of APEC economies [56]

Marine trade is the engine of regional marine trade growth. Thanks to the collective efforts of APEC regional economic integration, the economies' total international trade volume of marine products increased from more than USD606 billion in 2015 to USD647 billion in 2020, an increase of 6.7%. The proportion of the trade volume of marine products in the international trade volume of commodities is between 3.4% and3.7% (Figure 3.10). In terms of the dependence on marine trade in the APEC region, the average proportion of marine trade within the APEC region in the global marine trade of each economy exceeds 73% (Figure 3.11). This shows the importance of trade cooperation in the APEC region to the stable growth and prosperous development of international marine trade of all economies.

56.Calculate the average bilateral connectivity between each economy and other APEC economies based on UNCTAD Liner Shipping Bilateral Connectivity Index, https://unctadstat.unctad.org.

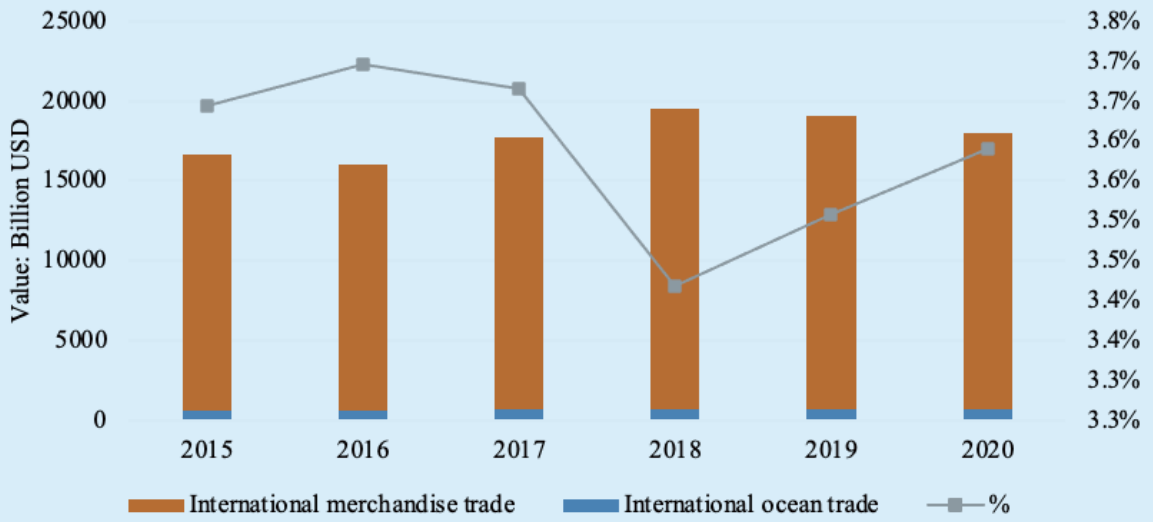


Figure 3.10 The proportion of APEC international marine trade in its international merchandise trade[57]

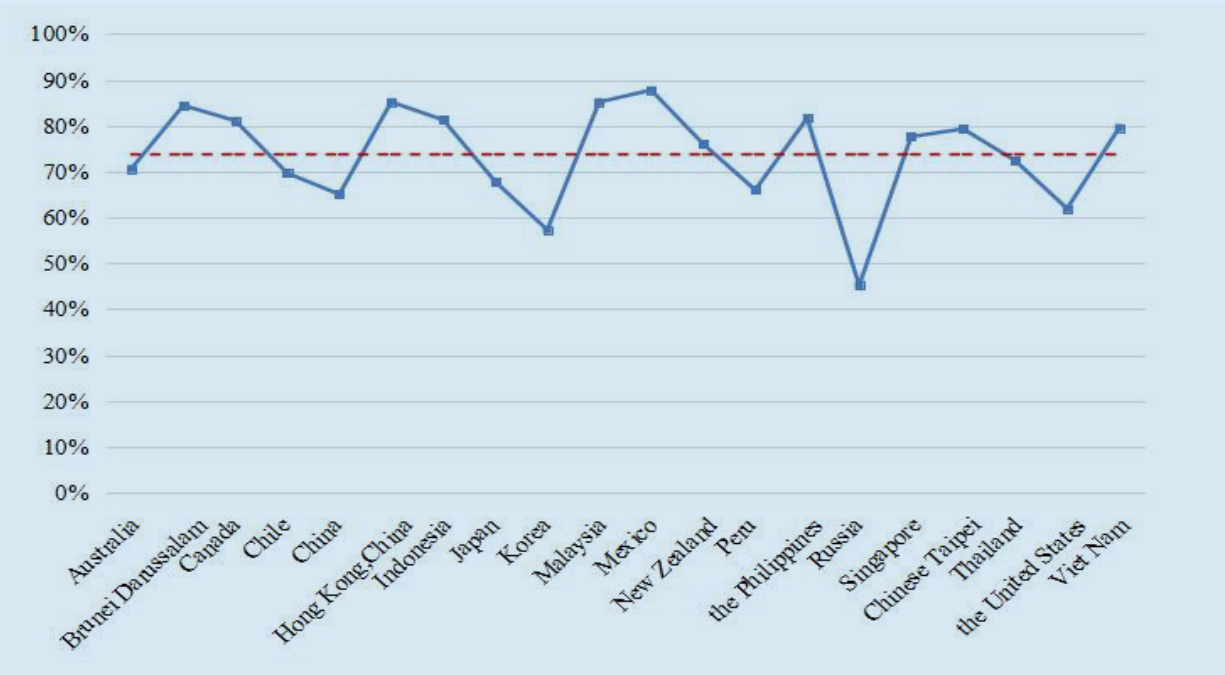


Figure 3.11 The proportion of international marine trade with APEC economies in its total international merchandise trade in 2020[58]

57.Calculation based on data from UNCTAD statistic center, https://unctadstat.unctad.org/wds/ReportFolders/reportFolders.aspx, 2022.
58.Calculation based on data from UNCTAD statistic center, https://unctadstat.unctad.org/wds/ReportFolders/reportFolders.aspx, 2022.

Note: This figure estimates the approximate share of each economy's marine trade within the APEC region in the economy's international marine trade in 2020.

In terms of the structure of maritime trade, ships and port equipment, high-tech products and marine fishery products are the main products of export and import marine trade of APEC economies (Figure 3.12). The five main types of marine trade products account for about half of the total global marine trade, reflecting the important role of various areas of APEC marine trade in the growth of global marine trade (Figure 3.13).

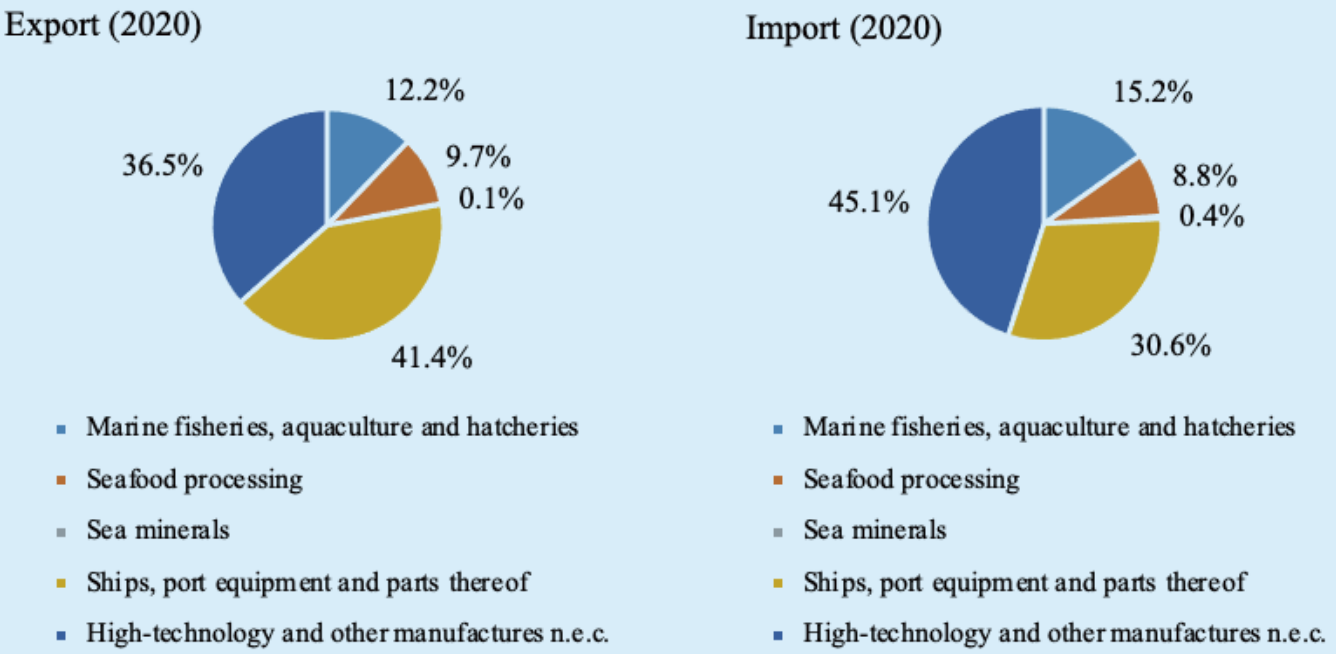


Figure 3.12 Structure of APEC marine trade in 2020 [59]

59.Calculation based on data from UNCTAD statistic center, https://unctadstat.unctad.org/wds/ReportFolders/reportFolders.aspx, 2022.

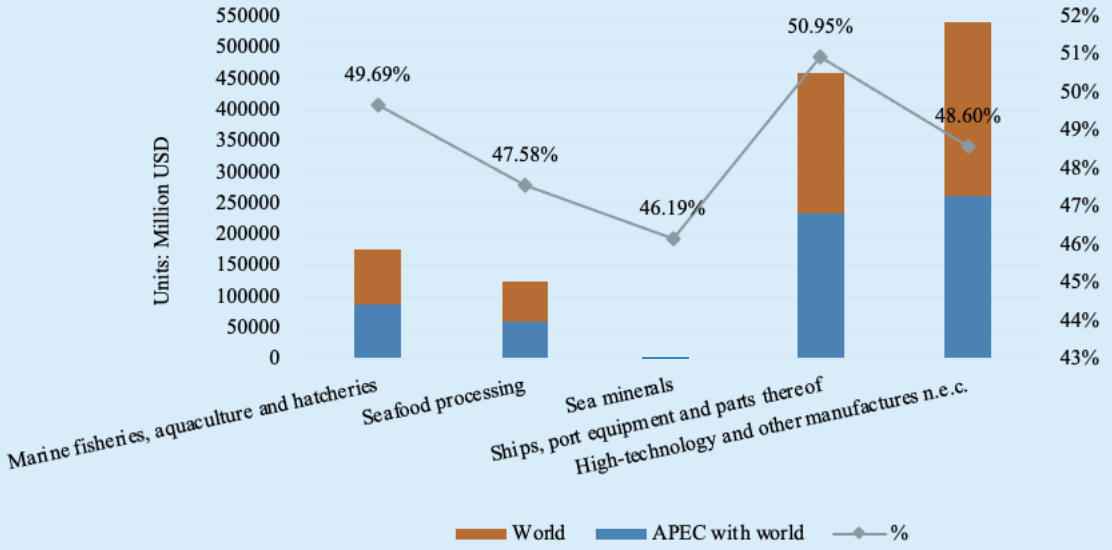


Figure 3.13 Share of APEC marine trade in world total marine trade in 2020 [60]

3.3 Coastal Community Welfare: Inclusive and Balanced

Marine resources and marine industries that depend on them have played a key role in maintaining food security, nutrition and health and people's livelihood and employment in the coastal areas of the APEC region. The high-quality and inclusive growth of APEC economies aims to bring maximum economic benefits and greater health and well-being to all people, which is in line with the mantra of "leaving no one behind" of global sustainable development process.

3.3.1 Ocean as Source to Ensure Food Security

The issue of food security has received increasing attention from many APEC economies and even the world. In order to respond to the challenges related to food supply and demand faced by APEC economies, the Kazan Declaration (2012), the Beijing Declaration (2014) and the Piura Declaration on Food Security (2016), Fifth APEC Ministerial Meeting on Food Security (2019) and Sixth APEC Ministerial Meeting on Food Security (2021) have outlined action plans to solve food security problems since the Niigata Declaration on Food Security in 2010, which was the first comprehensive plan to ensure food security in APEC. In 2021, APEC developed "Food Security Roadmap for 2030" focusing on digitalisation and innovation, productivity, inclusivity and sustainability and identifies actions and targets which

60.Calculation based on data from UNCTAD statistic center, https://unctadstat.unctad.org/wds/ReportFolders/reportFolders.aspx, 2022.

APEC economies will pursue together to achieve our goal of sufficient, safe, nutritious, accessible and affordable food for all [61].

Blue foods are important for the economies, livelihoods, nutritional security and cultures of people in coastal area, especially contribute to the health, wellbeing and livelihoods of many rural communities [62]. Maintaining the productivity of fisheries is essential to ensure a stable ocean-based food supply. With the growth of aquatic products in APEC region, the improvement of food security has promoted better nutrition and a more balanced diet for people in the region. Since 2019, the fish consumption per capita of APEC economies has increased significantly, and the fish and seafood food supply quantity per capita per year has remained at about 32kg, which is higher than the global supply of about 20kg. The higher-level economies include Hong Kong, China; Indonesia; Japan; Korea and Malaysia (Figure 3.14) . In 2019, the ratio of daily energy provided by fish and seafood per capita to animal energy supply (about 11%) and the ratio of daily protein per capita to animal protein supply (about 21%) were higher than theglobal ratios (about 7% and 17% respectively) [63]. Among them, the proportion of Indonesia; Japan; Malaysia and Thailand is at a high level, reflecting the remarkable contribution of fish and sea food to meeting their nutritional needs.

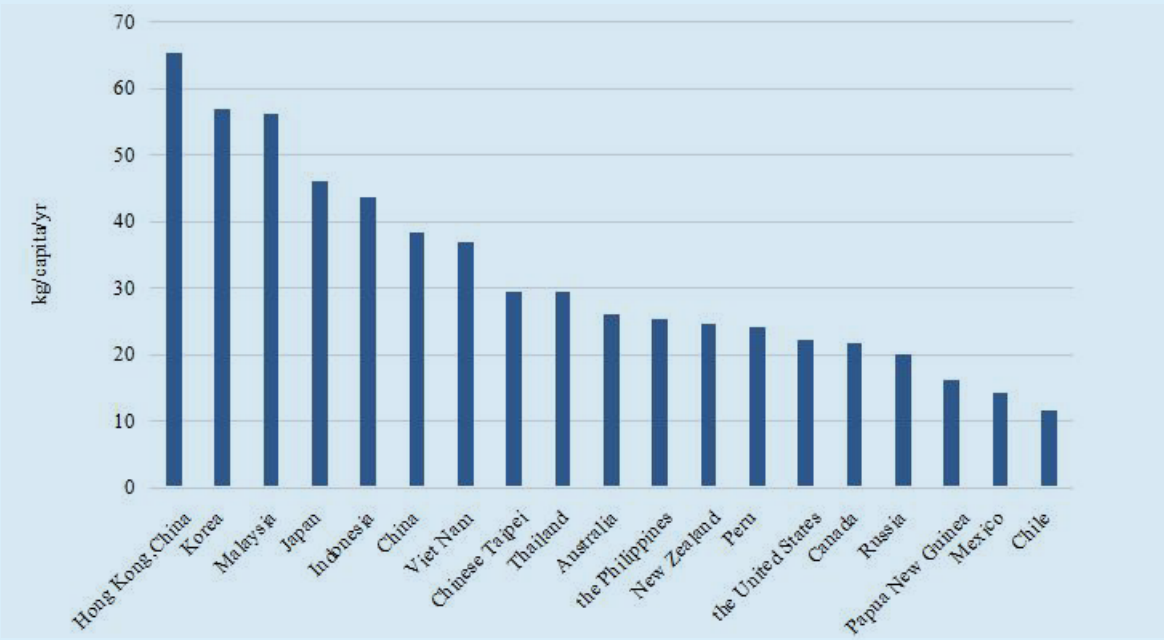


Figure 3.14 Fish and seafood food supply quantity per capita per year [64]

61.http://mddb.apec.org/Documents/2021/MM/FSMM/21_fsmm_jms.pdf

62.CRONA B, WASSÉNIUS E, JONELL M, et al. Four ways blue foods can help achieve food system ambitions across nations. Nature, 2023, 616:101-112.

63.Calculation based on FAOSTAT Food Balances database of FAO, http://www.fao.org/faostat/en/#data/FBS, 2022

64.Calculation based on FAOSTAT Food Balances database of FAO, http://www.fao.org/faostat/en/#data/FBS, 2022

Box 3.9 Enhancing Sustainable Fisheries Management to Support Food Security of Malaysia

Malaysia's fisheries sector is one of the main contributors to ensure food security as well as support the livelihood of coastal communities. However, when the COVID-19 pandemic struck in 2020, the supply chain was interrupted in the fisheries sector, and the limited business activities, especially those in the food and beverage sector, led to a decrease in the demand for raw material such as fish, and there was a disconnect between producers and consumers. In addition to the existing challenges such as resource degradation and climate change, these are just a few of the many challenges that has prompted the government to emphasize the priority and take drastic measures to ensure food security.

The National Agrofood Policy of Malaysia outlined 8 key goals for the fisheries sector in order to increase production and alleviate the livelihood of fishermen and farmers. These measures include setting fishery production targets consistent with expected population growth, improving the level of self-sufficiency and raising the average income of stakeholders. At the same time, the policy also emphasizes sustainable production and the conservation and sustainable utilization of fishery resources. The objectives related to conservation and sustainable utilization of fishery resources include reducing dependence on fishing by increasing aquaculture, increasing marine protected areas, phasing out trawlers in coastal areas, encouraging deep-sea fishing and ensuring safe, traceable and sustainable fish and fisheries products. (Source: economy shared.)

3.3.2 Supporting Livelihood to Coastal Communities

Fishery and aquaculture activities provide important sources of income and livelihood opportunities for people in coastal communities. The traditional fishery along the coast also contains rich cultural values. In APEC region, fishery is the leading sector in some APEC economies. For example, in Peru, fishery is the third largest contributor to its GDP. According to the data of OECD and related economies in 2019, the total number of employees engaged in marine fishing, mariculture and processing in APEC region exceeded 16.3 million, a decrease of 6% compared with 2015, accounting for about 1% of the total employed population. Among them, fishery employment has made great contributions to the total employed population of the economies, including: Viet Nam (about 5%), the Philippines (about 5%), Indonesia (about 4%), Japan (about 3%) (Figure 3.15).

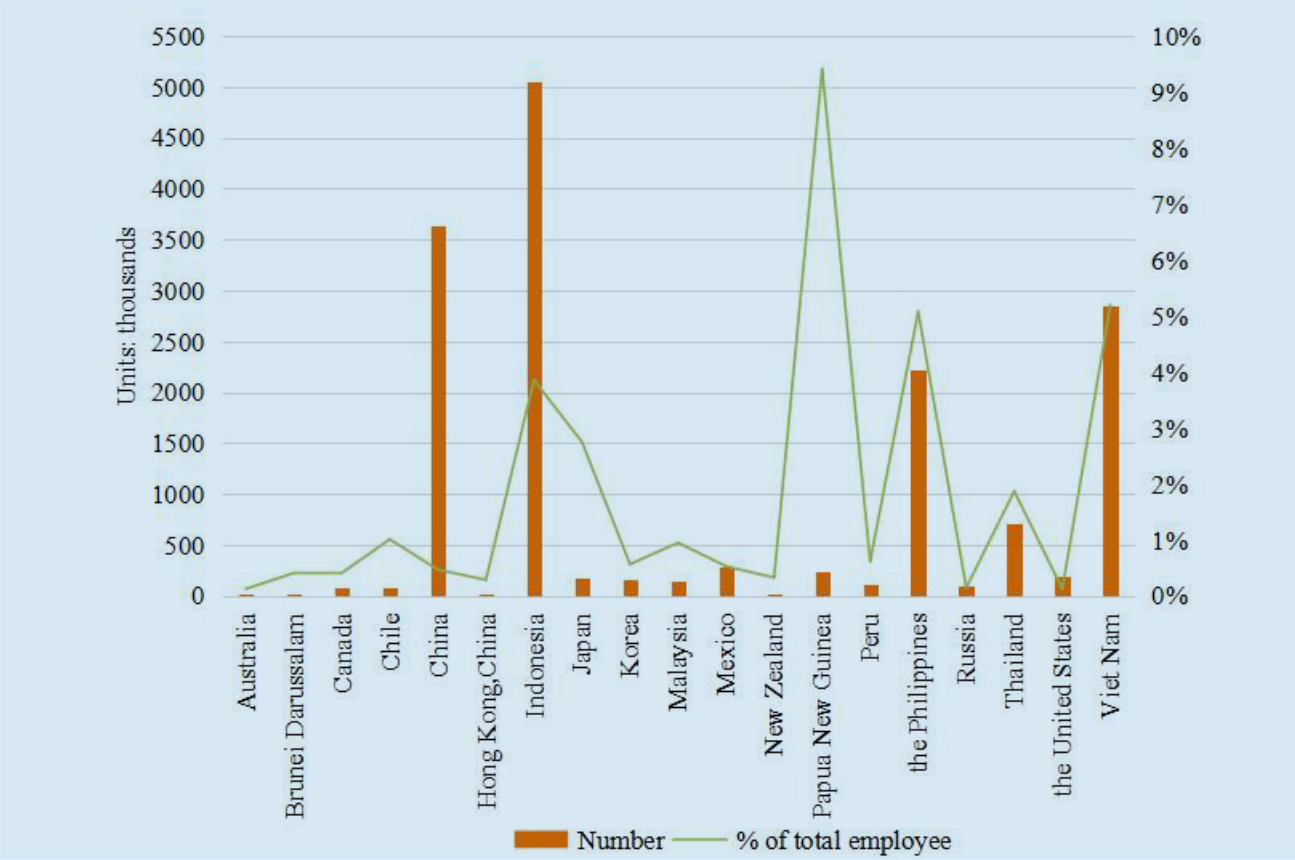


Figure 3.15 Employment in fisheries, aquaculture and processing (except inland waters fishing) and its share in total employee in 2019 [65]

3.3.3 Empowerment of People for Inclusive Development

Supporting sustainable farming methods and traditional small-scale fisheries can help to balance the pressure of marine fishing on fishery resources. In some economies, women are an important labor force in the fishery sector (especially small-scale fisheries), accounting for a high proportion of fisheries employment in Thailand and Chile (Figure 3.16). The important foundation of APEC to support women's empowerment is La Serena Roadmap for Women and Inclusive Growth (2019-2030), which seeks to provide directions and catalyze policy actions across APEC that will drive greater inclusive economic development and participation of women in the APEC region [66].

65.Calculation based on the OECD database of Sustainable Ocean Economy and economies' data, which includes aquaculture, marine fishing and other processing employment, excluding the number of inland fishing employees, https://stats.oecd.org/Index.aspx?. DataSetCode=FISH_EMPL#. Data of total employed population come from statistics of the International Labour Organization, https://www.ilo.org/. The data of China comes from the number of marine fishery employees in the Yearbook of Fishery Statistics. Brunei fishery employment data comes from FAO database. Hong Kong's data comes from the Annual Report of Agriculture, Fisheries and Conservation Department, which includes the number of marine fish caught and the number of aquaculture licensees.

66.http://mddb.apec.org/Documents/2019/SOM/CSOM/19_csom_005.pdf

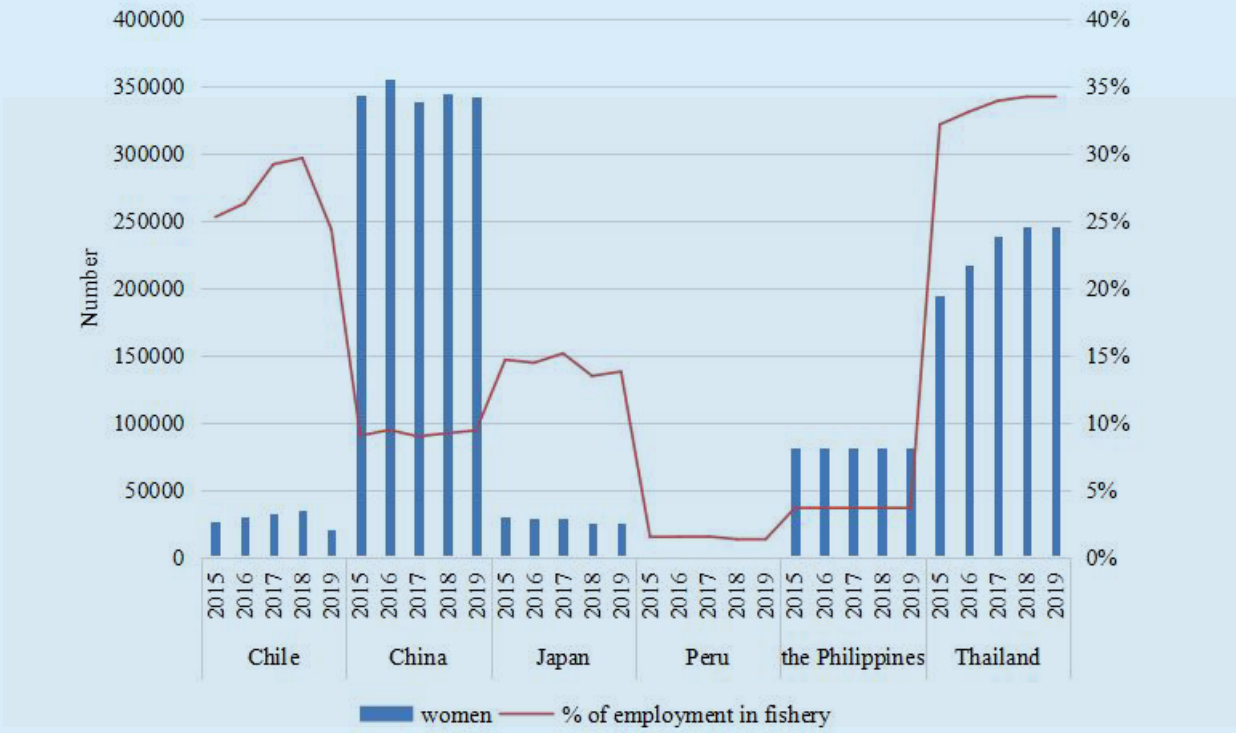


Figure 3.16 Proportion of women in total employment in fisheries, aquaculture and processing (except inland waters fishing) in several economies [67]

Box 3.10 Local fisheries and ecosystem conservation support livelihoods and women development

Chile's case: Fisheries and aquaculture support employment and livelihoods. *Regarding fishing and aquaculture, direct employment in 2021 accounted for 80,466 people, classified in 10,252 jobs in aquaculture (8,141 men and 2,111 women); 32,608 people employed in marine waters classified as 30,628 people in artisanal fishing and 1,980 people in industrial fishing; 37,606 people in the processing sector; 19,873 men and 17,733 women. In 2021, Chile adopted a law on gender equality in the fishing and aquaculture sector, establishing equality criteria in the integration of fishing and aquaculture organizations, and related activities were recognized, that is, traditional or ancestral trades carried out by women in the coves. The artisanal fishing activity represented around 32% of landings in 2022, with an annual increase of 6%. This generated direct and indirect employment for around 90,000 people distributed in a universe of 465 coves, and*

1,786 fishing organizations. (Source: economy shared)

***Papua New Guinea's case: Women Guardians of the Mangroves**. Mangroves are the breeding and feeding grounds for fish & shellfish that many PNG communities rely upon. It also protects coral reefs and seagrass from being submerged by mud, and buffers the community's influence on the extraordinary tides and storm surges caused by climate change. However, mangroves are threatened by being cleared for housing, logging, aquaculture & over-harvested for timber 6 firewood, which has negative impact on people's lives. In order to deal with these problems, women set up an organization called "Mangrove Market Women" to sustainable manage the mangroves and by trying business and conservation concepts to improve profits. The focus is on supporting women to identify their needs, and then create opportunities for them to acquire leadership, financial knowledge, business and competency maturity models, thus creating much-needed income and employment opportunities. These efforts have created long-term solutions for mangroves, linking local efforts, eco-tourism and blue carbon. Through innovative methods, the sustainable local markets was established, and mangrove products were harvested, which promoted the eco-tour-ism. (Source: economy shared)*

3.4 Marine Science and Technology: Developing and Innovative

Scientific and technological development and innovation is the driving force to improve productivity and economic vitality, and it has been identified as one of the important driving forces in APEC Putrajaya Vision 2040 and the Aotearoa Plan of Action. New scientific knowledge and new technology are gradually infiltrating into all fields of the marine industry, bringing changes to the traditional marine industry and inspiring new potential. Facing the future, marine science and technology innovation can also support the determination of sustainable recovery methods, help to cope with climate change and other major environmental challenges, and is a key approach to achieve a sustainable and resilient future.

3.4.1 Input and Output of Marine Science and Technology

APEC Putrajaya Vision 2040 emphasizes the implementation of structural reforms and sound economic policies to promote innovation as well as improve productivity and dynamism, and the Aotearoa Plan

of Action (APA) calls for identifying ways to support resilience and recovery by utilizing science, technology and innovation systems, including through capacity building; sharing best practice, and promote approaches for a digital economy that fosters competition and promotes innovation[68], and so on.

At the end of 2017, the 72nd session of the United Nations General Assembly approved a resolution designating the period from 2021 to 2030 as the United Nations Decade of Ocean Science for Sustainable Development, also known as the "Ocean Decade", The implementation of this initiative is being carried out by UNESCO-IOC. The implementation plan of the "Ocean Decade" was formally launched on January 1, 2021, focusing on ten challenges. As of June 2023, the IOC has received 47 contributions (87 in total) and endorsed 19 programme (48 in total) and 135 projects (276 in total) led by APEC economies[69]. APEC members will play an active leading role in the new global marine science and technology revolution. The implementation of these cooperation programs and projects will help promote the promotion of scientific knowledge, information and data sharing and technological innovation.

From the overall development of global marine science and technology, the investment in research and development (R&D) funds and human resources of marine science and technology is still insufficient. According to IOC global data, from 2013 to 2021, only 1.1% of research budgets were allocated for marine science. Many APEC economies face the issue of inadequate statistics in obtaining relevant data. For the number of published marine scientific papers, the number of academic papers published by marine scientists in APEC economies has been increasing in recent years (Figure 3.17). From the perspective of marine technology patents, the technology patents related to marine sustainable development in APEC region only account for a small part of all patents (about 1.2%) (in 2019), which is still higher than the global average (0.2%), and the relative advantages of technological innovation are gradually expanding, highlighting the global leading position driven by marine scientific and technological innovation in this region. The economies are very active in international cooperation in marine science and technology, such as cooperation in patent application (Figure 3.18), and the developing economies have greater cooperation space and development needs. The interconnection of marine activities makes the openness and smoothness of marine knowledge dissemination and technology diffusion related to the vitality of marine socio-economic development and the speed and breadth of change. In the future, marine technology innovation will continue to play a key role in improving the efficiency and productivity of marine industries such as scientific research, ecosystem assessment, fisheries, shipping and energy, and optimizing the cost structure.

68. http://mddb.apec.org/Documents/2021/AELM/AELM/21_aelm_dec_anx.pdf.
69.https://www.oceandecade.org/, 2023.

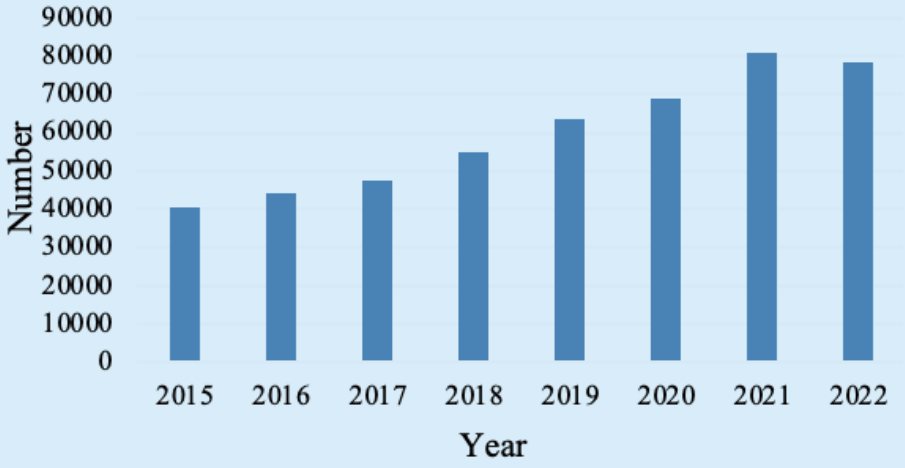


Figure 3.17 Changes in the number of marine scientific papers published by scholars of APEC economies[70]

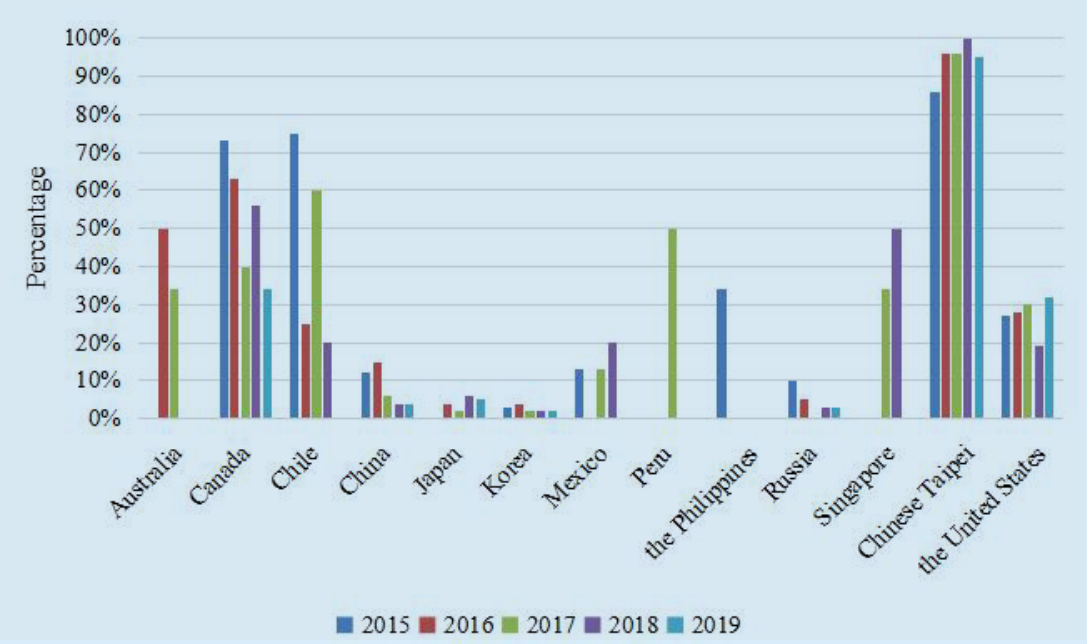
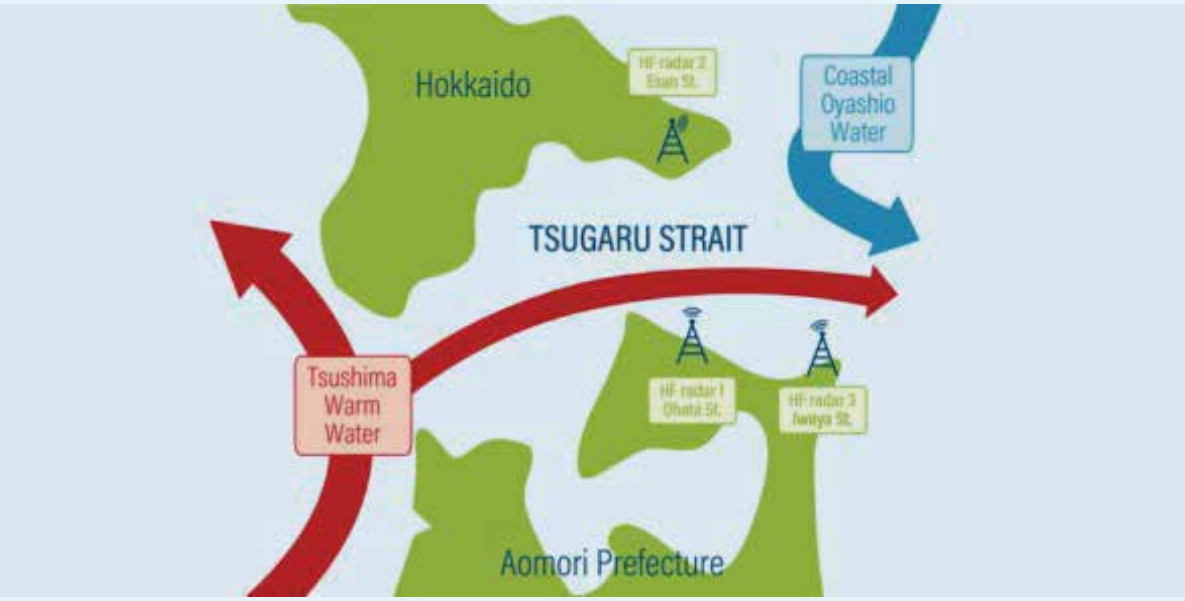


Figure 3.18 Percent of co-inventions of patents in technologies related to sustainable ocean economy of selected APEC economies[71]

70. Estimated according to the number of papers searched on the Web of science with marine and ocean as key words.
71.Based on data of OECD database, https://stats.oecd.org/index.aspx?datasetcode=OCEAN#, 2022.

Box 3.11 New technology contributes to the sustainable use and protection of the ocean

Japan's case: Technology Deployment by JAMSTEC to Prevent Bycatch. *Japan Agency for Marine-Earth Science and Technology (JAMSTEC) uses high-frequency (HF) radar data to understand the relationship between the sea state and the small Pacific bluefin tuna (< 30 kg) catch by the setnet. JAMSTEC has been observing the spatial distribution of surface current velocity in the eastern Tsugaru Strait and the surrounding area since 2014 with an HF ocean radar system (See the Figure below of Locations of the HF Radars). The observations are acquired in quasi real time, every 30 minutes, and are posted immediately (usually within one hour) as a surface current map on JAMSTEC website. These setnets are able to register when current patterns are likely to lead to mass bycatch of restricted tuna and alert the local fishers of the potential risk of young tuna entering their setnets in large numbers. The setnet fishers can, therefore, prepare themselves for releasing the young tunas based on the alert.*



By Mutsu Institute for Oceanography (MIO)/RIGC/JAMSTEC 2019

(Source: Leape J, M Abbott, H Sakaguchi, et al. Technology, Data and New Models for Sustainably Managing Ocean Resources. Washington, DC: World Resources Institute, 2020.)

Korea's case: Eco-friendly Biopolymer for Sustainable Coastal Erosion Prevention. *Korea National Park Service (KNPS) succeeded in restoring the eroded coast of Gwanmae-do Island, Jindo-gun, in the Dadohaehaesang National Park with eco-friendly technology using biopolymer-based natural paving materials. The existing techniques to prevent coastal erosion, using cement concrete structures or natural stone masonry, cause physical problems, such as dislocation and cracking over time after construction. In addition, cement structures loose toxic substances, which destroy the surrounding ecosystem and adversely affect nearby landscapes. A biopolymer-based natural paving material is the blend of high-molecular compounds extracted from plants and natural aggregates such as gravels. It contains many pores on the surface and inside. Therefore, when a strong wave hits the surface, seawater is dispersed between the pores, which significantly lowers the wave energy and increases the durability of the structure. The use of biopolymer-based natural paving material has been piloted, tested and monitored by the Dadohaehaesang National Park since October 2012. Biopolymer hardens underwater, which helped to consolidate the construction. The strength of the material does not decrease, even when exposed to seawater for a long time and even severe typhoons. The erosion prevention effect was also excellent, and it even played a role in protecting the forest of Pinus thunbergii located at the back of the coast. KNPS continues to promote restoration projects by using biopolymer-based eco-friendly method, and plans to expand eco-friendly restoration projects to other areas such as trails.*

(Source:PANORAMA
https://panorama.solutions/en/solution/eco-friendly-biopolymer-sustainable-coastal-erosion-prevention)

3.4.2 Promotion of Ocean Literacy

Ocean literacy is an integral part of scientific literacy, and marine cultural awareness is an important part of community awareness. Promoting the public, especially local communities, women and young people's marine scientific knowledge, skill development and cultural awareness will help to promote people's comprehensive understanding of marine value and innovative decision-making. Therefore, the establishment of activities, projects, training and leadership-related efforts required for ocean literacy at all levels in the Asia-Pacific region will help to promote the formation of a collaborative network for the improvement of blue community literacy in the Asia-Pacific region.

Activities and education to improve the public's ocean literacy are one of the basic objectives of the APEC Roadmap on Marine Debris, and also important efforts to support the priorities of APEC OFWG. In order to deal with the problem of marine debris, the AMSDC, together with Thailand and other economies, put forward the "Blue Citizen Initiative" in 2019, which was included in the implementation plan of APEC Roadmap on Marine Debris and will be dedicated to promoting capacity building and public-private partnership. On 22 June, 2022, AMSDC and Marine and Coastal Resource Research and Development Institute of the Ministry of Natural Resources and Environment (MNRE), Thailand together with other partners held China-Thailand Joint Project: *Blue Citizen Engagement: Promoting Marine Debris Reduction and Blue Economy* in Xiamen, China and Trat, Thailand with more than 300 citizens, participated in this activity. It is a concrete action adhering to the concepts of openness and inclusiveness, with exchanges and discusses among all stakeholders, including coastal cities, marine reserves, partner foundations, relevant universities and enterprises, organizations and institutions, to gather more international partners to promote the development of blue citizens. The Blue Citizens Initiative will play an increasingly key role in promoting coastal community welfare for sustainable Marine development.

3.5 Ocean Governance: Sustainable and Cooperative

Good governance with full participation and deep cooperation among stakeholders has been an important components for APEC to continuously improve its mechanisms and has also served as the organizational basis for maintaining APEC's unique position as an important forum for regional economic cooperation. Sustainable ocean governance in the APEC region is promoted by the effective implementation of regional policies related to ecosystem-based integrated ocean and coastal management.

3.5.1 Sustainable Ocean Management

The OFWG is dedicated to facilitating free and open trade in the region while advocating for the sustainable utilization of fisheries, aquaculture, marine ecosystem resources and associated goods and services[72]. Moreover, the OFWG places significant emphasis on the capacity of economies to design and implement appropriate management tools, fostering knowledge exchange in areas such as ecosystem-based management techniques, coastal and marine spatial planning and marine protected areas. All of these strategies contribute to the sustainable marine economic growth. Most economies, including China; Indonesia; Korea; Malaysia; the Philippines; Russia; Thailand and Viet Nam, have applied diversified and innovative ecosystem-based approaches for marine and coastal management [7]. Among them, marine spatial planning (MSP) stands out as a pivotal instrument accelerating the development of blue economy and reducing and avoiding the adverse effects of human activities on coastal zones and oceans. In fact, Canada; China; Indonesia;Korea; Mexico and the Philippines have formulated MSP schemes or plans at the economy level or the sub-economy level, and some other economies have also carried out MSP pilot projects at the local level[74].

Since 2015, under the guidance of OFWG, the AMSDC has held five APEC training workshops on MSP, with nearly 300 marine officials, researchers, experts and scholars from 14 APEC economies participated. The continuing training and exchange activities will help enhance the best practice sharing on MSP, promote the demonstration of building healthy communities in coastal areas, and advance the level of integrated ecosystem-based ocean management in APEC economies.

72.https://www.apec.org/groups/som-steering-committee-on-economic-and-technical-cooperation/working-groups/ocean-and-fisheries

73.Based on the statistical results of UNSTATS on SDG 14.2.1, https://unstats.un.org/sdgs/dataportal/database

74.Based on the mspglobal2030 website information, www.mspglobal2030.org/msp-roadmap/msp-around-the-world.

Box 3.12 Marine spatial planning (MSP)

China's case: Integrated land-sea spatial planning*. China is currently advancing a new phase of marine spatial planning reform. Under the China's territory spatial planning system, marine spatial planning encompasses overall planning (marine component), special planning (coastal protection and utilization planning) and detailed planning at the same time. Coastal zone protection and utilization planning encompasses all responsibilities of marine spatial planning, providing necessary guidance and regulatory provisions for certain associated land spaces. This approach instills ecosystem-based management through a paradigm shift in planning concepts and methods, fostering the harmonization of development and conservation, meticulous three-dimensional management, and integrated land-sea management. Specifically, the planning objectives aim to realize the high-quality development in coastal areas, comprehensively enhance industrial layout, and promote holistic ecological protection and restoration. At the core lies the comprehensive layout and regulatory policies governing coastal and associated land areas. The planning scope encompasses sea regions, islands, coastlines and relevant land areas. Regarding spatial control zoning, the ocean is classified into six primary categories and several secondary categories, while associated land areas are integrated into zoning and management plans. In recent years, coastal provinces and cities in China have actively propelled the three-dimensional planning and utilization of sea areas. They are expediting the*

transformation of sea area management from a "flat" perspective to a "three-dimensional" perspective, with the goal of enhancing the efficiency of sea area resources utilization. (Source: Xiang Wenxi. Coastal zone spatial management based on ecosystem. 2021 Seminar on marine spatial planning and blue economic development, Xiamen City, November 2021.)

***Indonesia's case:** Indonesia's marine spatial planning dictates the resource development process of each planning unit. Concurrently, it establishes the spatial structure and model within the planning area. This includes identifying permitted and prohibited activities, as well as those necessitating licenses and/or permits. These actions lay the foundation for situating, managing, and licensing sea area utilization activities. The MSP practice in Indonesia offers several insights, including the significance of minimizing overlaps and potential conflicts in marine space utilization across sectors. Cooperation among stakeholders at all levels proves essential, as does the integration of data. Additionally, the inclusion of marine protected areas into marine protection plans is deemed necessary. (Source: Arief Widianto. Presentation of Marine Spatial Planning in Indonesia: Policy, Current Status, and Future Direction. 2019 APEC Coastal and Marine Spatial Planning Training Workshop, 2019-11-02.)*

The effective implementation of internationally recognized standards and guidelines in the realm of sustainable ocean management, along with measures adopted by economies, forms the foundation for enhancing regulatory capacity and governance standards. This aligns with the strategic goals of the APEC Roadmap to Combat IUU Fishing and the specific targets of SDG 14 within the 2030 Agenda, aimed at enacting international instruments to combat IUU fishing and protect the access rights of small-scale fisheries. Compared with other regions in the world, the APEC region maintains a relatively favorable average implementation level (ranging from 1 as the lowest to 5 as the highest) for relevant norms designed to combat IUU fishing and ensure access rights for small-scale fisheries, while the implementation level of some regions has also improved (Figure 3.19). Furthermore, bolstering the legal protections for small-scale fisheries will provide support for the livelihood of community fishermen and contribute to the equitable and sustainable advancement of the fisheries sector. Looking ahead, expanding comprehensive collaboration in sustainable and ecosystem-based fisheries management capacity across the Pacific region, including engagement with small island groups, may serve as a requisite approach to rectifying the global imbalance in sustainable fisheries development among diverse regions.

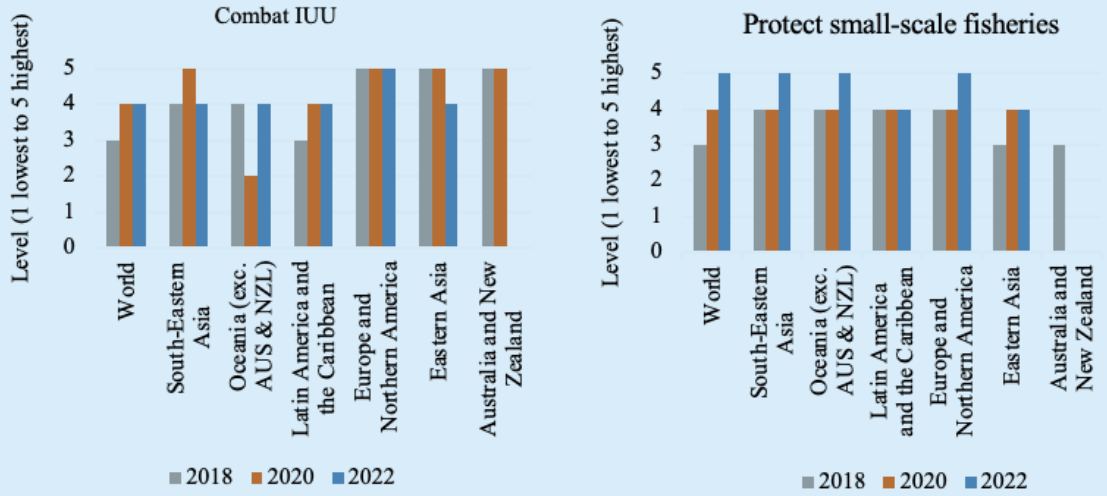


Figure 3.19 Degree of implementation of legal instruments to combat IUU and protect access rights for small-scale fisheries (implementation level: 1 being the lowest, 5 being the highest) [75]

Box 3.13 Approaches for sustainable fisheries management

Chile's case: Right-based Fishery management. *In 1991, Chile initiated a transformative governance process with the enactment of its Territorial Use Rights in Fisheries (TURF) policy. This policy laid the foundation for a network of TURF areas, spanning a broad geographic scope and established by various fishers' associations under a unified instrument: Chile's Fisheries and Aquaculture Law. The artisanal fisheries sector plays a vital role in providing employment within Chile's coastal communities, and their catches are a pivotal source of nutritional sustenance for many rural areas. Any registered fishing association within Chile has the opportunity to become a TURF holder under the legal framework. This inclusivity fosters voluntary engagement in the program, a pivotal element of adaptive governance aimed at building a more resilient system. The TURF network has not only enhanced the knowledge of fishermen but also facilitated their access to education. This expanded understanding has contributed to cultivating a sense of resource stewardship among the fishery community. The Chilean TURF model endows fishers with rights and empowers them with a more potent, collective voice in the long-term management of the*

75.Based on the statistical results of UNSTATS on SDG 14.6 and 14.b, https://unstats.un.org/sdgs/dataportal/database, 2022

resource. This aspect is integral to their adaptability and responsiveness in the face of evolving social-ecological dynamics.

(Source: Swilling M., M. Ruckelshaus, T. Brodie Rudolph et al. 2020. The Ocean Transition: What to Learn from System Transitions. Washington, DC: World Resources Institute. www.-oceanpanel.org/blue-papers/ocean-transition-what-learn-system-transitions.)

Mexico's case: Action Plan on Preventing Illegal Fishing Trade. *The Mexico Government's Action Plan on Preventing Fishing and Illegal Trade of Totoba and Its Parties and/or Rights to Protect Seagoing Ships includes 7 action lines and 34 specific targets: (1) According to the regulatory agreement (September 2020), monitor the effective compliance of authorized boarding and landing places. (2) Stop the ship from entering the zero tolerance zone and get rid of the tangled net together with the Vaquita refuge zone. (3) Strengthen intelligence operations to combat illegal trafficking in transnational organized crime. (4) Implement the alternative fishing gear plan and the small vessel marking and fishing gear plan. (5) Monitoring the marine cowboy population. (6) Raise awareness of illegal trade in Tokaba and its protective consequences. (7) Tripartite liaison group on law enforcement action. (Source: economy shared)*

Peru's case: Fisheries management measures in Peru. *The National Fisheries Society (SNP) of Peru discussed with local fishers various management measures, which are now part of the participatory actions linked with the National Maritime Strategy (2019). A first measure was to ensure consistency between fishing efforts (the number of vessels and their capacity) and the amount of fishing that can be undertaken in relation to a given species. When full exploitation is reached in a certain region of Peru, regulators may stop issuing permits, so as not to increase fishing effort beyond a reasonable level. A second measure was to set fishing quotas. Regulators establish how much the Peruvian fleet can fish during a certain period in a specific loca-*

tion. The third measure was to set individual quotas per vessel by establishing a proportion of fishing for each of the vessels that have a permit, and to determine what fraction of the overall quota they may fish during a given period in a specific location. Finally, regulations and enforcement measures were put in place to ensure that only those with permits (or licenses) fish up to their quota in the specific fishing area.

(Source: UNESCO-IOC/European Commission. MSPglobal International Guide on Marine/Maritime Spatial Planning. Paris, UNESCO, 2021.)

3.5.2 Capacity Building

Sustainable ocean and fisheries management is a dynamic process that demands consistent attention to emerging scientific insights that can guide management strategies. The public service to access and gather ocean-related data constitutes the foundational capability necessary for enhancing comprehension of both natural and socio-economic aspects of the ocean. The continuous improvement of marine management infrastructure and data statistics capabilities has created favorable conditions for cooperation in marine ecological protection, economic growth, inclusive development and technological innovation. A comprehensive network of observation systems to monitor and understand the state of the ocean and coastal environments is crucial to providing data on water quality, weather, climate, and other factors that support sustainable management and informed decision-making. Strengthening the construction of the regional marine information sharing service platform and the regular supply of public products is important for enhancing the capacity building and application cooperation of the regional blue infrastructure.

The mechanism of ocean data collection and information dissemination within APEC economies predominantly occurs through governmental departments and non-governmental organizations [76].Most economies have annual reports/bulletins, online databases or portals for information sharing, and have established a marine sustainable development assessment and reporting or coordination mechanisms (see Annex 1.2) on marine sustainable development. In order to improve the understanding of the ocean in the future and support the progress review and action update of marine science and technology for sustainable development at the regional and economic levels, it is still necessary to further strengthen

76.Refer to the feedback information obtained from the questionnaire survey of APEC Marine Sustainable Development Report II (2019) and the supplementary information fed back from the questionnaire survey of this report.

investment in capacity building related to ocean governance and cooperation in building big data platforms, technological innovation and digital ocean systems.

Based on the APEC survey, many APEC economies are facing challenges or gaps that require significant improvement to achieve marine sustainable governance (Figure 3.20), among which the policy coherence and coordination across levels of government, dedicated financial resources and political will are the three main aspects of problems or needs in almost half economies, which reflect the core role of government decision-making and resource allocation in marine affairs. Several economies also encounter hurdles related to supporting systems such as legislative means, data statistics and management (see Annex 1.2).

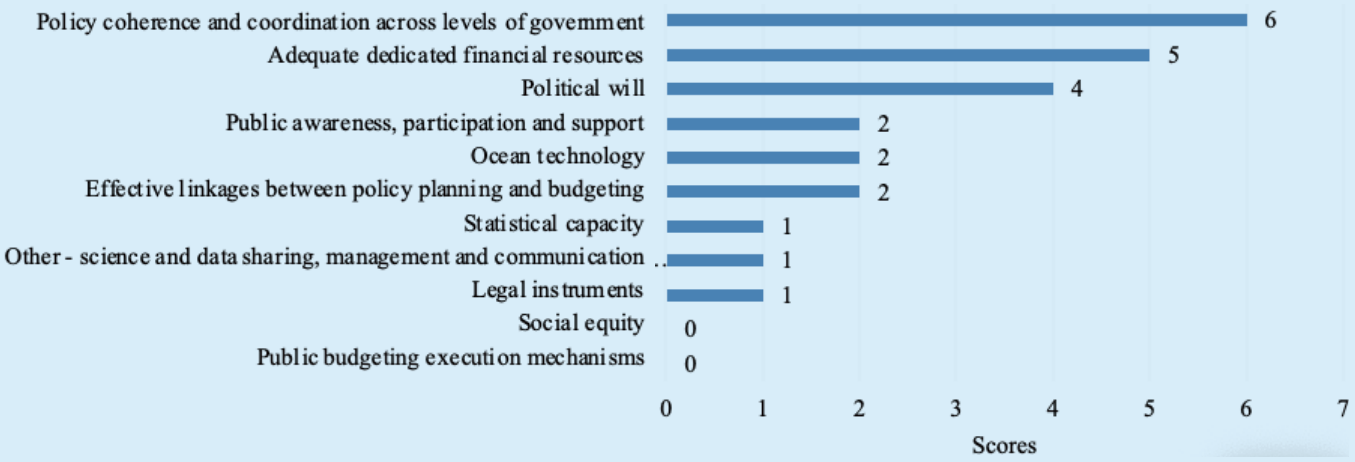


Figure 3.20 Gaps or needs of economies to promote marine sustainable governance

Since 2015 (as of June 2023), China; Indonesia; Korea; New Zealand; Peru and other economies have actively held capacity-building activities or training courses for the region on marine spatial planning, marine debris prevention, aquaculture, and combating IUU fishing (Figure 3.21), which has played a positive role in promoting the improvement of marine governance capacity in the APEC region.

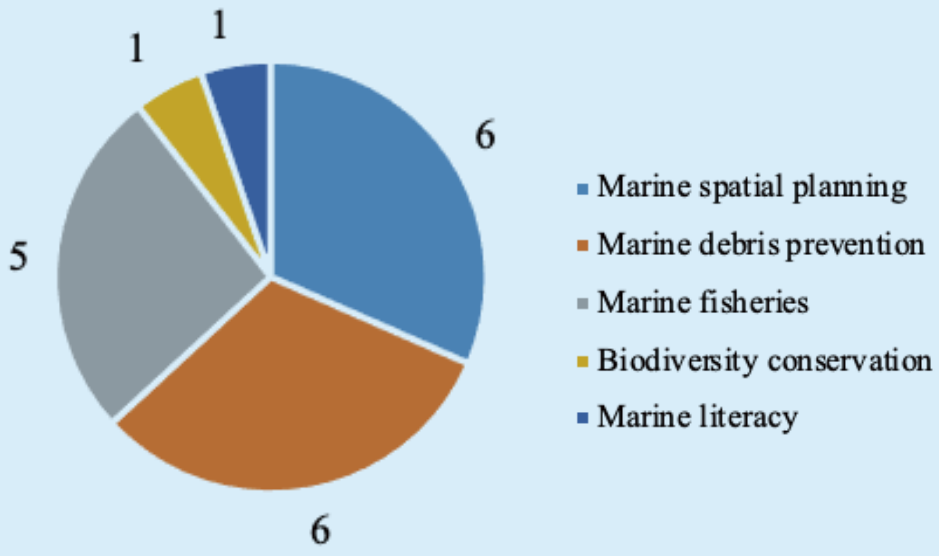


Figure 3.21 Quantitative distribution of capacity-building activities on major themes [77]

3.5.3 Blue Partnership

The improvement of public participation and cooperation of multiple stakeholders such as academia, industry, social organizations, enterprises and individuals are the social foundation of marine sustainable development. This collaborative involvement serves to bolster the rationality, inclusiveness and legitimacy of solutions to marine challenges. Especially, based on the existing multilateral forums and platforms, mobilizing a wide range of public and private sectors to actively participate in and invest in various forms of collaborative actions can not only supplement the government's public resources, but also stimulate new development potential to facilitate the widely sharing of benefits arising from blue development to the people, especially those in developing economies.

APEC OFWG and member economies attach importance to the partnership of a wide range of social entities at different levels and in different fields, which is also an important part of their governance capacity building, including encouraging citizens, students and stakeholders to participate in voluntary actions for marine environmental protection and the implementation of marine management plans.

77.Based on the APEC website information, https://aimp2.apec.org/sites/PDB/default.aspx

Box 3.14 Public-Private Partnership in Ocean Planning and Actions

Canada's case: Marine Plan Partnership (MaPP)*. The MaPP initiative is a partnership between the Province of British Columbia and 17 First Nations member organisations, which developed and is implementing marine use plans for British Columbia's North Pacific Coast. The MaPP initiative used the best available science and local and traditional knowledge to develop four subregional plans and a regional action framework. Marine stakeholders representing multiple sectors provided input and advice to the planning process via advisory committees. In addition, a science advisory committee provided expert technical and scientific knowledge and advice. Stakeholder consultation is ongoing as the marine plans are implemented. The MaPP plans provide recommendations for key areas of marine management, including uses, activities and protection. The plans inform decisions regarding the sustainable economic development and stewardship of British Columbia's coastal marine environment. (Source: UNESCO-IOC. MSPglobal International Guide on Marine/Maritime Spatial Planning. Paris, UNESCO, 2021.)*

China's case: Beach-cleaning Campaign. *In recent years, under the guidance of the Ministry of Natural Resources of China and sponsored by the China Ocean Development Foundation (CODF), coastal provinces and cities in China have gradually established an economy-wide beach-cleaning action network and an inclusive public-private partnership, in which local governments, marine environmental NGOs and the public work closely together. In specific, annual beach-cleaning activities launched by the CODF aim to mobilize a wide range of stake-holders and people to participate in shoreline cleaning activities and enhancing public aware-ness and behavior of reducing garbage pollution. The campaign covers over 30 cities along the coast of China. During the process of project implementation, more and more relevant government departments, enterprises, research institutes, non-governmental organizations, social groups and people actively participate in and provide support. More than 100,000 volunteers involved, and more than 300 kilometers of coastline were cleaned. (Source: economy shared.)*

Indonesia's case: *The Love the Sea Month. The Love the Sea Month action is a joint initiative by all parties involving the central role of all Ministries/Agencies, Local Governments, Partners/NGOs, Garbage Activist Communities in an effort to educate the awareness of fishermen and the community and campaign for the importance of keeping the sea clean so that the marine ecosystem becomes Healthy. In implementing the Love the Sea Month Action, fishermen enactively participate in collecting, sorting and weighing the collected plastic waste in the sea.*

The Love the Sea Month Action was proclaimed as the "National Movement for the Love the Sea Month" which involved 1,721 fishermen starting on 1-31 October ,2022 simultaneously in 14 locations throughout Indonesia's coastal and marine areas. (Source: economy shared.)

New Zealand's case: Seafood Sustainability Awards. *The New Zealand Seafood Sustainability Awards recognise and celebrate those throughout industry and our communities who are dedicated to ensuring the sustainability of New Zealand's fisheries and aquaculture. These individuals and groups may have been involved in innovation, science, leadership, or community engagement promoting the present and future sustainability of New Zealand's seafood sector. The Awards are organised and run every year by Fisheries New Zealand, a part of the Ministry for Primary Industries. (Source: economy shared.)*

Chinese Taipei's case: Public-Private Cooperation to Protect Rivers and Marine Ecology. Chinese Taipei *encourages citizens to participate in water environmental patrol and river protection, clean rivers with public resources, reduce pollution and strengthen water environment education. At present, there are 22 water environment patrol teams in the city, covering more than 109 kilometers, covering Danshui River, Keelung River, Xindian River, Jingmei River and other areas, forming a monitoring network. Patrol volunteers often patrol the river on foot or by bike, check any abnormality of the river, and check the water quality of the river with simple water quality testing tools. In addition, there is a student water environment patrol team, which invites junior high school and senior high school students to take part in river cleaning activities, and holds an ecological camp every summer to lead students on a natural journey and combine games with water environment education. (Source: 2021 Taipei City Voluntary Local Review. 2021.09.)*

▲ Youth Volunteer Service for Eco-Friendship promotes the importance of river water quality tests

Chapter 4

Challenges and opportunities of APEC Marine Sustainable Development

The APEC region faces both opportunities and challenges in the efforts to achieve sustainable management and conservation of the ocean and its resources. Multiple pressures exist on ocean health and productivity, with climate change and the COVID-19 pandemic being particularly prominent in the past several years. These two major crises have deep and profound impacts on sustainable marine economy, resilient coastal community as well as healthy marine ecosystems. How to address these influences and challenges in a timely and effective manner is an important issue for APEC economies.

4.1 Multiple Challenges to Marine Sustainable Development

In 2023, the 2030 Agenda for Sustainable Development steps into the eighth year of implementation. At the mid-point of the SDG agenda, we are far off target in global scale. Major challenges remain in the course of achieving SDG 14 – life below water by 2030, as progress in some targets are far from the targeted level [78]. In Asia-Pacific region, notable challenges and gaps in area of marine sustainable development include:

The problem of marine environmental pollution is still serious. The global spread of oxygen-depleted ("dead") zones in coastal waters has increased exponentially to over 400 systems since the 1960s and has reached a cumulative area of about 245,000 km^2 worldwide [79]. There was an increase of over 23% in the peak values of the indicator for the 2020 and 2021 year average, compared with the mean value for previous years [80]. The eutrophication in coastal waters has caused the increase of toxic algal bloom events, and has contributed to the slow recovery of reefs in the Great Reef [81]. It is projected that anthropogenic N production will increase by nearly a factor of two by 2050 and, the risk of coastal eutrophication will increase in 21 per cent of large marine ecosystems, including South America, South

78.UN. Global Sustainable Development Report 2023. Advanced unedited version.

79.BREITBURG D, LEVIN L A, OSCHLIES A, et al. Declining oxygen in the global ocean and coastal waters. Science, 2018, 359:6371.

80.UN. Report of the Secretary-General: Progress towards the Sustainable Development Goals. 29 April 2022.

81.MALONE T C, AMBULKER A, BEBIANNO M J, et al. Chapter 10: Changes in nutrient inputs to the marine environment in United Nations, the Second World Assessment Volume II, 2021.

Asia and Oceania[82]. Recent years, more and more concerns focus on the marine debris, marine plastic pollution, leakage waste, and the discharge of land- and sea- based pollutants, including the nuclear contaminated water into the sea.

Uneven recovery and uncertainties are faced by marine sectors. APEC grew at a slower pace of 2.6 percent in 2022 from 6.2 percent in 2021. Growth is expected to remain uneven, with only nine APEC economies growing above 3 percent in 2023. Many marine sectors tend to rebuild its resilience in post pandemic period, but the recovery is susceptible to disruption by uncertainties caused by unstable supply chain, inflation and high cost, volatility in the labour market and tight financial conditions. Tourism is among the most affected sectors in COVID-19 pandemic period. The international tourist spending in APEC decreases from USD696.1 billion (6.0% of total exports) in 2019 to USD177.9 billion (1.7% of total exports) in 2020[83]. In many APEC economies tourism experienced recovery in 2022, with economies reopened from pandemic restrictions. Foreign tourist arrivals in Indonesia jumped 166.42 percent year-on-year to 945.59 thousand in May 2023[84]. However, lack of skilled labour, high logistic cost and degraded environment set back the future sustainable growth of tourism in the Asia-Pacific region. Aquaculture worldwide fell from its long-term growth rate of 4-5% to 2.9% in 2022, mainly due to stocking rates and input costs. Recovery from the pandemic and additional stressors for the aquaculture sector has remained uneven and the most affected group is Small-Scale Aquaculture (SSA)[85].

Investment in blue economy, and marine science and technology is generally insufficient. There are a range of interconnected and related issues to address marine sustainable development which cannot be reduced to one solution. However, funding availability is a significant constraint in the conservation of ocean. The existing gap in conservation funding is huge, with some researchers estimating the gap to be approximately USD7 trillion. Blue economy projects are funded mostly through a variety of public sources, the most common ones being official development assistance and grants. Leveraging multi-source financing to bridge this gap and to achieve the scale up required to transform marine management is therefore critical. APEC is known as the incubator of economic policy ideas. Science, technology and innovation is not only vital to the APEC region's post-COVID recovery, but also instrumental in preparing economies for future shocks and crises. However, even though the ocean contrib-

82.MALONE T C, AMBULKER A, BEBIANNO M J, et al. Chapter 10: Changes in nutrient inputs to the marine environment in United Nations, the Second World Assessment Volume II, 2021.

83.World Travel and Tourism Council. Travel and Tourism Economic Impact APEC 2021. London: World Travel and Tourism Council, 2021. https://wttc.org/Research/Economic-Impact.

84.Trading Economies. Indonesia Tourist Arrivals. Indonesia Tourist Arrivals - June 2023 Data - 2011-2022 Historical - July Forecast (tradingeconomics.com), 2023.

85.APEC Ocean and Fisheries Working Group. Project report: Report and Workshop on Capacity Building to Improve Economic Reactivation in Sustainable Aquaculture, 2023.

utes to 2.5% of the world gross value added, on world average, from 2013 to 2021, only 1.1% of economy-wide research budgets were allocated to ocean science[86].

Insufficient capacity to implement integrated management of marine resources. In developing economies, the capacity to sustainably manage coastal resources and obtain sustainable benefits is generally constrained by limited access to marine scientific and research data, insufficient financial inputs, and shortage on experienced expertise. Integrated marine environment monitor system is vital for informed decision-making and public participation, and need to be strengthened in many economies. Marine protected areas (MPAs) and other effective, area-based measures to conserve biodiversity – including marine sanctuaries, parks and reserves and marine spatial planning (MSP) – have seen substantial growth over the past years.Wide efforts are made by governments of APEC economies on designating MPAs and scaling up marine spatial planning. However, despite progress has been made on expanding coverage of MPAs, the effective management and evaluation of the MPAs around the world is in large extent insufficient.

4.2 Ocean-based Solutions to Tackle Climate Crisis

Climate change is a major crisis currently faced by the world. The Asia-Pacific region is home to many coastal economies that heavily rely on the sustainable use of the oceans for economic and social development. It is also a region directly and significantly affected by the climate change, with extreme weather events posing severe impacts and risks to its sustainable development. Raising climate resilience in this region is a crucial task of APEC. Innovative efforts in coastal infrastructure, ocean energy, transport at sea offer opportunities for clean low-carbon transformation. Wide efforts to enhance ocean health is also crucial to combat climate disaster and support sustainable livelihoods.

4.2.1 Systemic Impacts and Risks

Climate change has brought intensified impacts and compound risks to coastal and island areas. The main drivers of these impacts and risks include accelerated sea level rise, extreme disasters, ocean acidification and ocean warming. In the context of climate change, the rising trend of land and ocean surface temperatures in Asia is significant. With ongoing climate change, by the end of the 21st century, the average summer temperature in some areas of Asia is expected to rise by over 6°C compared to pre-industrial levels. Due to the unprecedented extreme heat events occurring more frequently, some regions, particularly Southeast Asia, may enter a completely new climate state, are likely to be the most severely

86.United Nations Economic and Social Council. Progress towards the Sustainable Development Goals - Report of the Secretary-General at High-level political forum on sustainable development (Supplementary Information), E/2023/64, 2023.

affected areas by extreme heat[87]. Observations and state-of-the-art climate models indicate a significant increase in the frequency and intensity of heavy rainfall events, particularly in Southeast Asia. Therefore, the region may experience more severe flooding as global temperatures continue to rise.

Given that a large portion of Asia's population and urban centers are located along low-lying coastlines, the vulnerability of Asia to sea-level rise is particularly severe. Many economies are estimated to lose more than 10% of their land area if climate warming continues unabated[88]. As future global warming intensifies, the proportion of extreme heat events, heavy precipitation, and strong typhoons is expected to increase. In the recent years, the Asia-Pacific region experienced the most severe impacts and losses from natural disasters. The APEC region, where almost 3 billion people live in (accounting for 38 percent of the global population) could suffer an additional 350,000 deaths annually by 2100 from changes in the number of extreme hot and cold days compared to the present[89]. The World Bank estimates that, without climate change adaptation measures, APEC could absorb losses amounting to 7.3 percent of GDP[90].

In the survey question regarding major impacts and level of impacts of climate change on APEC economies, marine environmental quality, ecosystem function and biodiversity are considered most affected (-3 to -3.5), food security and health, employment and livelihood, marine infrastructure are medium affected (-2 to -3), and coastal disaster prevention, marine fisheries resource, marine carbon sequestration are also believed to be negative affected (-1 to -2) (Figure 4.1). Among the available options, only the development of mariculture and leisure tourism is more likely to be positively affected. However, it is still difficult for some respondents from member economy to identify the impact and degree of some aspects, such as coastal community employment ,livelihood, food security and health in the coastal community, which need long-term observation and research to promote our knowledge and understanding. As noted by one respondent from Chile, the answers to these aspects require the government to take active actions to adapt to and mitigate the impacts of climate change.

87.Asian Development Bank. A Region at Risk: The Human Dimensions of Climate Change in Asia and the Pacific, 2017. http://dx.doi.org/10.22617/TCS178839-2.

88.MARZEION B, LEVERMANN A. Loss of cultural world heritage and currently inhabited places to sea-level rise. Environmental Research Letters, 2014, 9:034001.

89.World Bank. Climate Change in APEC: Assessing Risks, Preparing Financial Markets, and Mobilizing Institutional Investors. Washington, DC: World Bank, 2020. https://openknowledge.worldbank.org/handle/10986/33423.

90.World Bank. Climate Change in APEC: Assessing Risks, Preparing Financial Markets, and Mobilizing Institutional Investors. Washington, DC: World Bank, 2020. https://openknowledge.worldbank.org/handle/10986/33423.

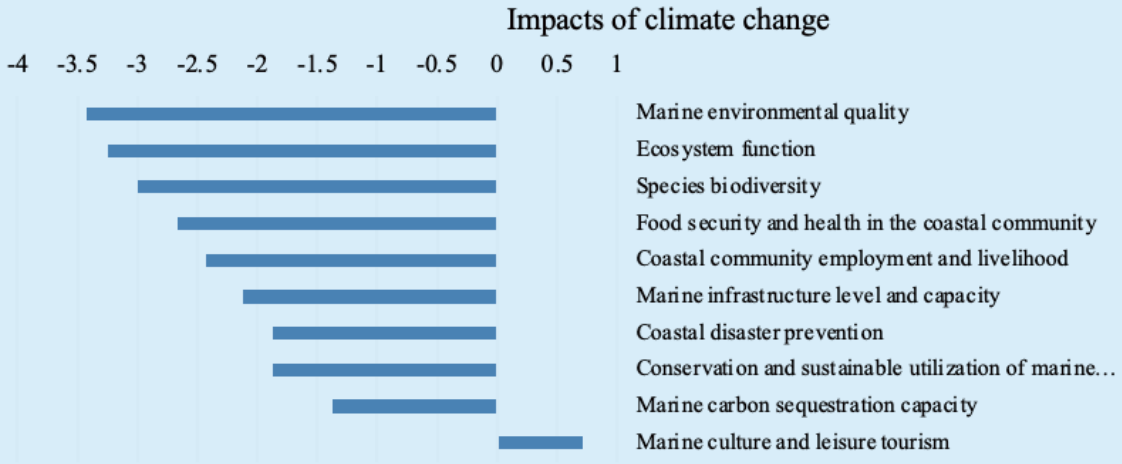


Figure 4.1 Impacts of climate change on marine sustainable development in APEC

In the Asia-Pacific region, the occurrence and intensity of droughts may increase, particularly in Southeast Asia, where change of rainfall and rising temperatures can lead to severe drought conditions. With temperature rising by approximately 4.3°C by 2100 (the RCP8.5 scenario), the number of consecutive drought days in most low-latitude areas of the Asia-Pacific region will increase, with Southeast Asia, and Australia being particularly affected[91].

A significant portion of the population and urban centers in the Asia-Pacific region are located along low-lying coastal areas. One research shows that the highest number of flood victims caused by 100-year storm surge events occurs in Asia, specifically in China and Indonesia[92]. Major cities in low-lying coastal areas such as Bangkok, Jakarta, and Ho Chi Minh City are susceptible to the impacts of sea level rise and other extreme climate events[93]. Delta regions such as the Mekong Delta in Viet Nam are exposed to direct impacts and risks to agriculture and livelihoods from marine flooding due to sea level rise, storm surges, natural subsidence, and saline intrusion[94, 95], Pacific islands are affected by tropical cyclone and face serious issues such as flooding and coastal erosion increasingly.

91.United Nations Economic and Social Commission for Asia and the Pacific. Asia-Pacific Disaster Report 2021. UNESCAP, 2022. https://doi.org/10.18356/9789210057776

92.NEUMANN B, VAFEIDIS A T, ZIMMERMANN J, et al. Future Coastal Population Growth and Exposure to Sea-Level Rise and Coastal Flooding – A Global Assessment. PLOS One, 2015, 10 (6): e0131375.

93.NEUMANN B, VAFEIDIS A T, ZIMMERMANN J, et al. Future Coastal Population Growth and Exposure to Sea-Level Rise and Coastal Flooding – A Global Assessment. PLOS One, 2015, 10 (6): e0131375.

94.GUGLIOTTA M, SAITO Y, LAP V, et al. Process regime, salinity, morphological, and sedimentary trends along the fluvial to marine transition zone of the mixed-energy Mekong River delta, Vietnam. Continental Shelf Research, 2017, 147:7–26.

95.SMAJGL A, TOAN T Q, NHAN D K, et al. Responding to rising sea levels in the Mekong Delta. Nature Climate Change, 2015, 5 (2): 167–174.

The impacts of climate change on social and economic sectors are differentiated and uneven, depending on economies' reliance on marine resources, varying natural environment and differing levels of exposure and vulnerability. For example, Southeast Asia is the world center for extraordinary rich biodiversity of coral reefs. The Coral Triangle Area harboring approximately one-third of the world's coral populations and 76% of known coral species. Over 100 million people in this coastal region depend on its ecosystem services, for livelihoods and food security[96]. However, nearly 70% of the valuable coral reefs in the Coral Triangle are currently facing severe risks from increased human activities and impacts of ocean acidification[97] and warming[98].

Furthermore, changes in fish distribution and abundance due to climate change are expected to affect communities in many ways. By the mid-century, 89% of marine fisheries income is estimated to be weakened by climate related impacts, with island developing economies and Southeast Asia being particularly affected[99]. The long-term loss and degradation of marine ecosystems harm the intrinsic value of the ocean in terms of culture, recreation and human identity and well-being, and undermine the spiritual link between human and ocean.

4.2.2 Ocean-based Solutions

Though facing multiple challenges from climate change, ocean holds immense potential for carbon sequestration, emission reduction and climate adaptation. There have been many initiatives and efforts to promote ocean sectors' contribution to reduce emission, including ocean renewable energy, the shipping industry, low carbon tourism, etc. Preserving coastal blue carbon ecosystems of mangroves, seagrasses, saltmarshes, and large macroalgae can mitigate climate change by carbon absorption and sequestration. Integration of climate measures into ocean policy will enhance the ability of climate change adaptation and resilience[100].

(1) Supporting low-carbon development

APEC economies set the aspirational goals of doubling the share of renewable energy in the region by

96.HOEGH-GULDBERG O, et al. The Coral Triangle and Climate Change: Ecosystems, People and Societies at Risk. Brisbane: WWF Australia, 2009.

97.MEISSNER K J, LIPPMANN T, GUPTA S. Large-Scale Stress Factors Affecting Coral Reefs: Open Ocean Sea Surface Temperature and Surface Seawater Aragonite Saturation over the Next 400 Years. Coral Reefs, 2012, 31(2): 309–319.

98.LOUGH J M. Small Change, Big Difference: Sea Surface Temperature Distributions for Tropical Coral Reef Ecosystems, 1950–2011. Journal of Geophysical Research: Oceans, 2012, 117(C9), p. C09018.

99.LAM V W, CHEUG W W, REYGONDEAU G, et al. Projected change in global fisheries revenues under climate change. Scientific Reports, 2016, 6:32607.

100.HOEGH-GULDBERG O, NORTHROP E, et al. The ocean as a solution to climate change: Updated opportunities for action. Washington, DC: World Resources Institute, 2023. https://oceanpanel.org/publication/ocean-solutions-to-climate-change.

2030 and reducing its energy intensity by 45 per cent by 2035. Ocean renewable energy can contribute to climate change mitigation, including extracting energy from offshore wind, tides, waves, temperature and salinity gradients, and algal biofuels. The growing demand for alternative energy sources presents economic opportunities for the ocean renewable energy sector.

As a major emissions sector on the oceans, the shipping industry has witnessed a new wave of green transformation in recent years. In 2023, APEC launched the Green Maritime Initiative to adopt cleaner technologies, create green shipping corridors and address the sector's emissions. At economy level, initiatives such as Singapore's "Maritime Singapore Decarbonisation Blueprint: Working Towards 2050" prioritized low carbon development and strongly support alternative and clean fuels for maritime transportation.

Box 4.1: Climate Change Adaptation and Resilience

Thailand's case: Low carbon tourism. *Mak Island (Koh Mak) is a small island in Trat province in the eastern coast of the Gulf of Thailand where is beautiful natural and full relaxation. Koh Mak is a supreme model of green tourism and local people created a brand as low carbon destination. The local people decide to form rules to protect their island from the carbon dioxide emission which is also the practice for tourists who visit to Koh Mak, as follows: 1) Do not encourage ferries transporting tourist vehicles, cross to Koh Mak. 2) Limited motorcycles for rental at 70 % of room capacity. 3) Avoid using food containers that are made from foam. 4) Do not dispose of rubbish, sewage, or food waste in the public area. 5) Avoid using chemicals with highly toxic residues. 6) Do not make sound disturbance around 10 p.m. to 7 a.m. 7) Do not support motorized land and sea sports. 8) Do not bring, consume, or sell illegal drugs.*

United States' case: Tools and support for the resilience of coastal communities and marine ecosystems. *NOAA provides scientific research, tools, and information to help coastal communities adapt to changing conditions, manage risks associated with sea-level rise, and protect vulnerable ecosystems. For example, NOAA has a Coastal Resilience Mapping Portal tool with The Nature Conservancy that can be accessed by any practitioners. A climate resilience toolkit has been created to provide steps to resilience in managing climate, case studies of building resilience, and conditions projected for the future. In response to the severe and urgent climate crisis, the President's Emergency Plan*

for Adaptation and Resilience (PREPARE) was also created to support developing economies and communities in vulnerable situations around the world in their efforts to adapt to and manage the impacts of climate change. U. S. also have an "AdSci Coastal Resilience Program" that addresses the needs of decision-makers at various levels dealing with complex climate-related issues in coastal and marine environments. The program element supports partnerships and engagement in the development and transfer of climate-related research and information to advance the resilience of coastal communities and ecosystems. (Source: economy shared)

(2) Enhancing carbon sinks

The ocean is the largest active carbon sink and reservoir in the Earth system. The international community recognizes the value of blue carbon in climate change mitigation and adaptation. The IPCC's Special Report on the Ocean and Cryosphere categorizes mangroves, seagrasses, saltmarshes, and large macroalgae as the four types of coastal blue carbon. These ecosystems cover approximately 0.1% of the Earth's surface and contribute 1% to 10% of global marine primary productivity. Natural mitigation measures in coastal ecosystems involve preserving natural carbon stocks to avoid emissions from compromised integrity, which in certain economies can outweigh emissions from fossil fuels by 1%[101]. Additionally, restoring coastal blue carbon ecosystems like mangroves, tidal marshes, and seagrass meadows can absorb and store approximately 0.5% of the current global emissions, thus helping to alleviate climate change.

Improved protection and management of these ecosystems can lead to enhanced defense against storms, improved water quality and benefits to biodiversity and fisheries productivity. Therefore, some economies, such as China, have included blue carbon ecosystems in their economy-wide determined contributions under the Paris Agreement as one of the approaches to address climate change and achieve carbon neutrality.

(3) Enhancing Ocean governance

In the face of changing climate patterns, the costs of disaster risk management and recovery are escalating. Nature-based solutions offer better resilience against rising sea levels and intensifying coastal storms. Economies like Indonesia; the Philippines and Viet Nam have actively integrated disaster risk

101.IPCC. IPCC special report on the ocean and cryosphere in a changing climate. 2019. https://www.ipcc.ch/srocc/home/

reduction (DRR) frameworks into development planning policies, programs, capacity-building and financial resources[102]. Climate change-related decision-making requires multi-system knowledge and regional information. Climate literacy and traditional knowledge systems can enhance public understanding of climate change risks and unique local adaptation potentials, leading to practical long-term adaptation approaches.

Effective responses to the increasingly daunting challenges posed by climate change require technological considerations, improved adaptation policy arrangements, and governance frameworks. These include coastal protection and management measures to mitigate the impacts of sea level rise and coastal erosion, as practiced in Alaska, the Pacific Islands and Viet Nam.[103,104,105,106] Small island economies and local coastal communities should be prioritized for addressing vulnerability and equity issues, with comprehensive multi-scale institutional arrangements to promote climate resilience and sustainable development. Regional governance frameworks and coordination among cross-regional policies facilitate the integration of dispersed resources and capacities.

Box 4.2 Efforts to address climate change

Mexico's case: Mainstreaming Ecosystem-based Adaptation (EbA) in the tourism sector as a strategy for NDC implementation. *The tourism sector in Mexico is strongly affected by climate change. With sea levels rising, coastal destinations run the risk of losing their beaches and thus one of their main tourism attractions. They also suffer from more severe hurricanes and flooding, which is not only bad for business, but has started to impact local real estate value. Coral reefs are suffering from rising temperature, which poses pressure on their diverse flora and fauna and the local diving industry. Inland destinations on the other hand, are suffering from droughts and a decline in water supply, which impacts local economies and leads to social conflicts. The main components of the project Ecosystem-based Adaption to climate change in the tourism sector (ADAPTUR) are: economic risk*

102.SWILLING M, RUCKELSHAUS M, BRODIE RUDOLPH T, et al. The Ocean Transition: What to Learn from System Transitions. Washington, DC: World Resources Institute, 2020.

103.HINO M, FIELD C B, MACH K J. Managed retreat as a response to natural hazard risk. Nature Climate Change, 2017, 7:364–370.

104.HINO M, FIELD C B, MACH K J. Managed retreat as a response to natural hazard risk. Nature Climate Change, 2017, 7:364–370.

105.COLLINS N, JONES S, NGUYEN T H, et al. Stanton. The contribution of human capital to a holistic response to climate change: learning from and for the Mekong Delta, Vietnam. Asia Pacific Business Review, 2017, 23 (2):230– 242.

106.BOEGE V. Climate Change and Planned Relocation in Oceania. S&F Sicherheit und Frieden, 2016, 34 (1):60–65.

analysis, communication strategy, strengthen public and private sector cooperation, capacity building, planning and implementation of EbA solutions with the participation of all relevant stakeholders (handmade dams and forest restoration to reduce vulnerability to droughts), mobilizing finance from public and private sector, as well as policy development on the regional level.

Riviera Nayarit - Puerto Vallarta © GIZ-ADAPTUR/Mariana Rodriguez
(Source: PANORAMA. https://panorama.solution)

Viet Nam's case: Inclusive Ecosystem-Based Adaptation Study in Thua Thien-Hue. *The central Vietnamese province of Thua Thien Hue is regularly hit by floods, which stand to get worse in the future. Many of Thua Thien-Hue's coastal communities already suffer from unstable livelihoods and insufficient (financial) resources to recover from disasters. Additionally, women do not have a strong decision-making role and as such are often left out of adaptation and management plans. A study was carried out in 2018, focusing on the willingness-to-pay of lower income groups and women, in both urban and coastal areas, for the EbA measures to address these problems. The following EbA actions were set to be implemented: Restoration of urban water bodies, such a pond, for water retention during heavy rainfall events; mangrove restoration to reduce wave and tidal energy and coastal erosion, and improve water quality and provide breeding grounds for fish. A comprehensive household survey demonstrated that EbA is favoured by vulnerable groups: lower income households are willing to pay more for the benefits from EbA. While these households have less money to spend, they stand to gain more due to their current vulnerability. Not only are the interventions able to reduce the risk of climate change impacts, but also present livelihood opportunities and income security. The potential increases in seafood abundance result in more stable livelihoods and food security.*

(Photo credit: Vince Gx, Unsplash)

(Source: CityAdapt. Urban Ecosystem-based Adaptation in Coastal Systems, https://city-adapt.com)

4.3 Ocean's Role in Supporting Recovery and Resilience

COVID-19 was considered to be the most significant pandemic event in the past century, resulting in massive suffering and disruption across all economies. It has exacerbated economic inequality, caused inflation higher than seen in several decades, and led to an economic slowdown beyond almost anything experienced in nearly a century. As for the blue sector, the economies suffered from multiple burdens. While APEC economies are trying to recover from economic shocks emanating from the effects of COVID-19, it is critical to further leverage the potential of the marine sectors.

4.3.1 Impacts of COVID-19 on Social-economic Development

APEC experienced low and uneven growth from pandemic impacts. APEC grew at a slower pace of 2.6 percent in 2022 from 6.2 percent in 2021. Growth is expected to remain uneven, with only nine APEC economies growing above 3 percent in 2023. APEC inflation reached 5.9 percent in 2022 from 2.9 percent in 2021. The inflation outlook has been adjusted slightly upwards to 4.4 percent in 2023, before declining to 2.9 percent in 2024. Income levels have not recovered to pre-pandemic levels in most APEC economies and inequality has widened as the pandemic hit the most vulnerable populations the hardest[107].

107.HERNANDO R C, KURIYAMA C. Uneven Recovery in the APEC Region amid Uncertainty. APEC website, May 30, 2023. https://www.apec.org/press/blogs/2023/uneven-recovery-in-the-apec-region-amid-uncertainty

Trade decelerated in the APEC region. APEC trade activity decelerated in 2022 from double-digit growth in 2021 as the momentum from a pandemic-related recovery dissipated and global demand weakened. Merchandise trade volume in APEC expanded marginally by about 1.1 percent for exports and 1.2 percent for imports in 2022 compared to the level in 2021 (Figure 4.2). Heightened global commodity prices, contractionary monetary policies to combat inflation, and disruptions in global value chains due to COVID-19 outbreaks contributed to the moderation in trade growth.

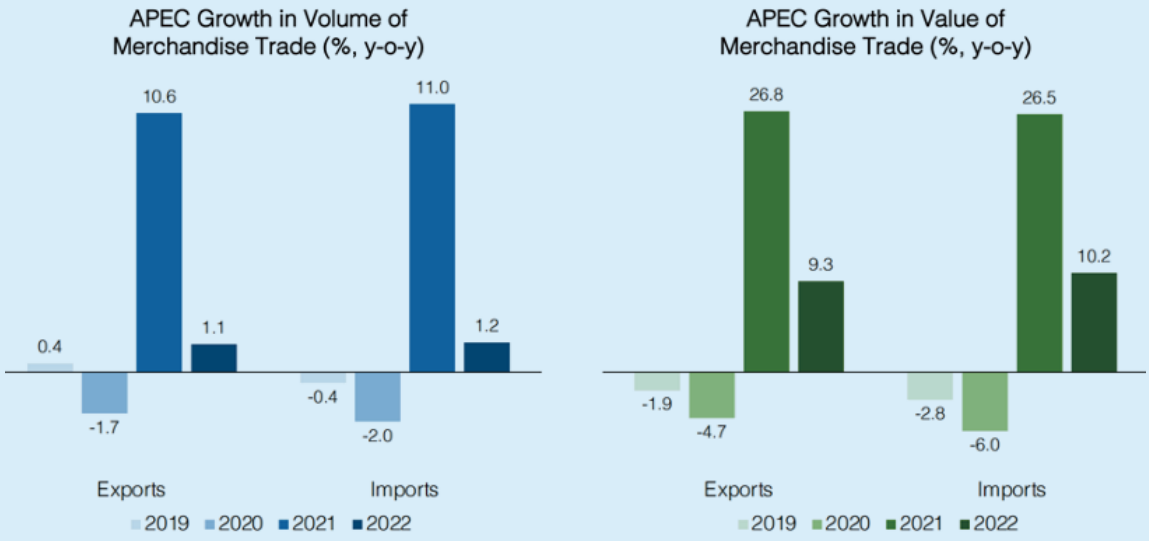


Figure 4.2 APEC growth of merchandise trade

The COVID-19 pandemic disrupted the global supply chains. The outbreak of COVID-19 led to disruptions in logistics networks due to internal travel restrictions and regional lockdowns. Shipping and air transport were suspended due to border closures during the height of the pandemic. Subsequently, with the easing of the COVID-19 pandemic and the improvement of medical supply capabilities, the number of newly implemented non-tariff measures began to decline. However, the global logistics system, on which the global supply chains relied, is not efficient enough to support the increasing flow of trade in post COVID-19 period.

The COVID-19 pandemic caused rising inequality. One of the main consequences of the pandemic is the decline of living standards in many APEC economies. Lockdowns and social distancing measures restricted several economic activities, leading to job and income losses. At the same time, the COVID-19 pandemic has rendered some workers being unable to engage in work, increased family care responsibilities, and caused the closure of certain businesses and sectors. A comparative analysis of

income data before and during the COVID-19 pandemic reveals that average income levels were worse off one year after the pandemic started in more than half of APEC economies. Another negative consequence is rising inequality in all APEC economies. The lower 50 percent of the population experienced a decline in their share of net personal wealth, in contrast to the wealth increase experienced by the top 10 percent and top 1 percent of the population.

The COVID-19 pandemic reduced fishing and post-harvest activities. A number of reasons led to the reduction. The initial lockdown of airports, ports markets and borders, along with the cessation of shipping, halted or severely restricted fishing and post-harvest activities. Sanitary measures, such as physical distancing between crew members at sea, imposed constraints on fishing activities. Limited supplies, labour shortage as well as inadequate medical equipment also affected the level of fishing[108]. According to satellite-generated data indicates a 9 percent decrease in the number of active fishing vessels and a 5 percent reduction in the hours of fishing in 2020 compared to 2019. However, this reduction appears to have significantly underestimated the actual fall in fishing activities [109]. Notably, China saw dramatic decline in fishing activity within its exclusive economic zones, with decreases of about 2 million (down 13.5 percent) and 368,000 fishing hours (down 16.5 percent) [110]. During the pandemic, the fish production dropped 40 to 80 percent in most economies. The export fleets were more severely affected than those catering to domestic markets. Small-scale fishers and workers were hit hardest, and many had been unable to access to social protection or economic support [111].

The COVID-19 disrupted maritime transportation and port operations shrank significantly during the pandemic. For global vessel calls, cargo vessel calls fell by 5.1 percent compared with the previous year, and this reduction nearly doubled when passenger ships were included in the calculation of global port calls[112]. According to Review of Maritime Transport 2021, Transport volume worldwide in 2020 fell to the level of 2017. In 2020, global container transportation decreased by 1.2% compared to the previous year with recurrent COVID-19 outbreaks. The pandemic's negative impact extended to ports, where an unprecedented number of tankers, bulk carriers, and container vessels

108.Food and Agriculture Organization of the United Nations (FAO). How is COVID-19 affecting the fisheries and aquaculture food systems, 2020. https://www.fao.org/documents/card/fr/c/ca8637en/.

109.Global Fishing Watch. Data and technology, Fisheries, News & Views: COVID-19 Brings Unmatched Downturn in Global Fishing Activity, 2021. https://globalfishingwatch.org/data/covid-19-brings-unmatched-downturn-in-global-fishing-activity/.

110.Global Fishing Watch. Data and technology, Fisheries, News & Views: COVID-19 Brings Unmatched Downturn in Global Fishing Activity, 2021. https://globalfishingwatch.org/data/covid-19-brings-unmatched-downturn-in-global-fishing-activity/.

111. Food and Agriculture Organization of the United Nations (FAO). The impact of COVID-19 on fisheries and aquaculture food systems, possible responses, 2020. https://www.fao.org/documents/card/fr/c/cb2537en/.

112.United Nations Conference on Trade and Development. UNCTADstat, Port call and performance statistics: number of port calls, annual, 2021, https://unctadstat.unctad.org/wds/TableViewer/tableView.aspx?ReportId=194889.

were left idle because of the combined effects of increased COVID-19 cases and extreme weather conditions. These disruptions significantly affected global supply chains. When the exports resumed, the shipping companies faced terminal congestion, vessel delays, the prospects of continuing backlogs, and uncertainties. The restriction at ports resulted in the increase of container freight rates in late 2020, and it persisted into early 2022. Moreover,increased vessels' turnaround time added extra demurrage and storage fees to cargo owners, undermining the reliability of maritime services [113].

Marine tourism seriously declined during the COVID-19 outbreak. Before the outbreak of COVID-19, tourism accounted for 10 percent of global GDP and more than 320 million jobs worldwide ,serving around 1.5 billion travelers[114]. Coastal and marine tourism constitutes an important part of global tourism, with more than one billion visitors in 2019, and it is expected to reach 1.5 billion in 2030. In 2020, visitors fell 60 to 80 percent, resulting in an estimated loss between USD910 billion and USD1.2 trillion. As a result of global travel bans and health restrictions, the global tourism industry suffered losses of nearly USD4.5 trillion, with an estimated 62 million jobs lost. The cruise industry lost 99.5 percent of its revenue. Dramatical decrease of international tourists caused a 1.5% to 2.8% fall in GDP globally and posed risks to the livelihoods of billions of people [115].

The conservation and biodiversity efforts were compromised by the virus. Marine tourism is one of the main revenue streams for marine conservation areas (MPAs), as governments and coastal communities use the generated revenues to finance marine research and conservation, monitoring and protection activities in those areas. The loss of that revenue resulted in a reduction in the management presence and an additional burden on fishing pressure in marine protected and conserved areas[116] .

In the APEC survey on marine sustainable development, respondents believe COVID-19 has severe negative impacts on marine culture and leisure, employment and livelihood, marine infrastructure (-3.5 to -2), medium negative impacts on food security and health and coastal disaster prevention (-1 to -2) (Figure 4.3). Because the lessening of economic activities during pandemic out-break period, many believe marine environment and ecosystem has somewhat recovered from human interventions. However, COVID-19 is not a solution to the environmental and climate crisis we face, but a sign that policy measures need to be strengthened in both areas of health and social support and environment conser-

113.United Nations Conference on Trade and Development (UNCTAD). COVID-19 and maritime transport: Navigating the crisis and lessons learned, 2022, https://unctad.org/publication/covid-19-and-maritime-transport-navigating-crisis-and-lessons-learned.

114.UNWTO Tourism Dashboard. See https://www.unwto.org/unwto-tourism-dashboard.

115.United Nations Sustainable Development Group (UNSDG). Policy Brief: COVID-19 and Transforming Tourism, 2020. https://www.un.org/sites/un2.un.org/files/sg_policy_brief_covid-19_tourism_august_2020.pdf.

116.United Nations Conference on Trade and Development (UNCTAD), Impact and implications of COVID-19 for the ocean economy and trade strategy: Case studies from Barbados, Belize and Costa Rica, 2022, https://unctad.org/publication/impact-and-implications-covid-19-ocean-economy-and-trade-strategy.

vation. The international society also calls for environmentally sustainable recovery from the economic crisis caused by COVID-19 with redesign of economic development model to tackle climate change and other environmental crises.

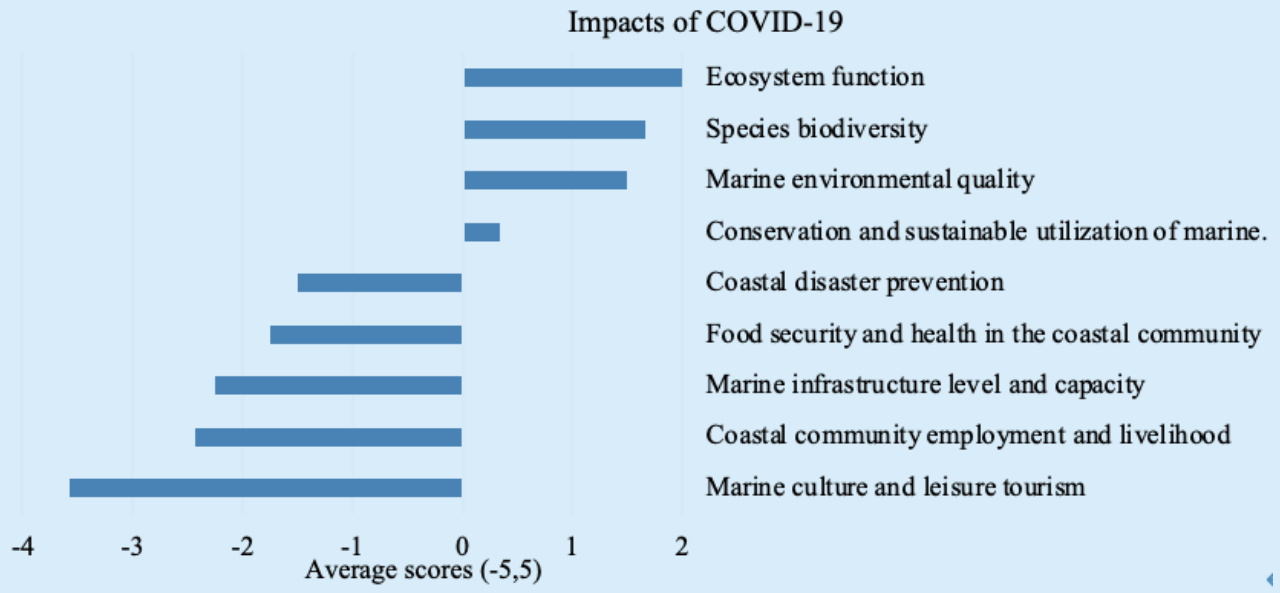


Figure 4.3 Impacts of COVID-19 on marine sustainable development in APEC

4.3.2 Ocean-based Contributions

The international society calls for environmentally sustainable recovery from the economic crisis caused by COVID-19 with redesign of economic development model to tackle environmental crises and social inequity. Although there are downside risks, the ocean economy offers significant development opportunities in sectors such as renewable marine energy, marine and coastal tourism, innovation and digitalization, aquaculture and others.

Develop renewable marine energy. Demand for renewable energy is expected to increase two and a half times by 2035. The generation of renewable energy from tides and waves, wind turbines located in offshore areas, submarine geothermal resources and marine biomass could be viable options to answer the energy needs. Among all marine resources, offshore wind turbines sector has the highest potential of power production. According to GWEC, it is expected that 130GW of offshore wind will be

added between 2023 and 2027[117]. Installed offshore wind power, it reached 57.6GW by the end of 2022, growing at an incredible rate per year[118]. Offshore wind power will play an increasingly big role with projected global additions of more than 60GW between 2023 and 2025, and 68GW in 2026-2027[119]. Additionally, the use of algae as biomass for energy production also offers promising opportunities for future development. Algae biomass can be produced via sustainable aquaculture, creating jobs and new value chains that could be developed to include algae for food consumption[120].

Invest in marine and coastal tourism. According to data from UNWTO, the robust recovery of world tourism has continued into 2023. First, international arrivals reached 80 percent of pre-pandemic levels in the first quarter of 2023. Second, an estimated 235 million tourists traveled internationally in the first three months, more than double the same period of 2022. Third, over 960 million tourists traveled internationally in 2022, indicating a recovery of two-thirds of pre-pandemic numbers[121] . Coast and marine tourism accounts for about 50 percent of all global tourism, equivalent to USD4.6 billion or 5.2 percent of global GDP. As the world begins to recover and reopen, destinations will have the opportunity to use this moment to invest in a more sustainable model of coastal and marine tourism. This approach should prioritize regeneration and resilience to ensure the long-term environmental, economic, and cultural well-being of coastal and island nations.

Invest in broad-based innovation and digitalization. The capacity of ocean-based businesses to participate in domestic and international markets increasingly relies on their access to a reliable communication network, a high level of digital connectivity, and an online platform and services [122].Specific to the ocean economy, the shift toward digital development and a green economy has sped up to support recovery in the post-pandemic period. Digital innovations such as intelligent maritime service present new opportunities for the transition to intelligent transportation in APEC regions. To fully reap the productivity benefits from innovation, bolstering digital infrastructure, alleviating financing constraints for small and medium enterprises, improving the legal framework regarding data and intellectual property rights protection, and enhancing the skills of the workforce should be considered.

117.Global Energy Wind Council (GWEC). Global Wind Report 2023, 2023, https://gwec.net/globalwindreport2023/.

118.World Forum Offshore Wind (WFO). Global Offshore Wind Report 2022, 2023, https://wfo-global.org/wp-content/uploads/2023/03/WFO_Global-Offshore-Wind-Report-2022.pdf.

119.Global Energy Wind Council (GWEC). Global Wind Report 2023, 2023, https://gwec.net/globalwindreport2023/.

120.United Nations Conference on Trade and Development (UNCTAD). The Ocean Economy: Opportunities and Challenges for Small Island Developing States, 2014, https://unctad.org/system/files/official-document/ditcted2014d5_en.pdf.

121. World Tourism Organization (UNWTO). World Tourism Barometer: International Tourism – 2023 starts on a strong note with the Middle East recovering 2019 levels in the first quarter, 2023, https://webunwto.s3.eu-west-1.amazonaws.com/s3fs-public/2023-05/UNWTO_Barom23_02_May_EXCERPT_final.pdf?VersionId=gGmuSXlwfM1yoemsRrBI9ZJf.Vmc9gYD.

122.United Nations Conference on Trade and Development (UNCTAD). COVID-19 and E-commerce: A Global Review, 2021, https://unctad.org/system/files/official-document/dtlstict2020d13_en_0.pdf.

Develop climate-resilient aquaculture. Food insecurity is imperative for sustainable growth in APEC. The prevalence of food insecurity in the region has been rising over the last decade. Food insecurity increased in 2022 as supply chain disruptions compounded by lower production—including for rice, a key staple for the region—because of temporary increases in fuel and fertilizer costs. Reforms are needed in APEC economies to combat food insecurity including developing robust social safety nets, maintaining open trade to allow food to flow to economies in need, and investing in climate-resilient agriculture.

Chapter 5

Our Shared Vision: One Ocean, One Community

Review of progress and practice of APEC's efforts on sustainable management and conservation of ocean resources since 2019 not only enhances our understanding on state of marine sustainable development at regional level, but also provides us an opportunity to learn from experiences and best practices, which is very valuable for future policies and actions on speeding up economic recovery, responding to environmental risks and enhancing resilience of marine ecosystems, to realize our common vision on APEC marine sustainable development.

5.1 Experiences from APEC Marine Sustainable Development

Looking back at the process of APEC marine sustainable development from 2019, there are some experiences that can be shared for reference.

(1) A regional integration approach involved in global sustainable development process

APEC and its economies actively respond to implement the objectives and the targets of UN Sustainable Development Goals, which reflects the regional leadership. For example, the voluntary commitments on marine sustainable development made by member economies and the voluntary review mechanism on the relevant progress provide an effective method for continuous monitoring and stocking, comprehensive understanding and in-depth analyzing on the progress of marine sustainable development in the APEC region. The actions taken and projects implemented by APEC Ocean and Fisheries Working Group (OFWG) related to marine sustainable development have received the sustained attention and constructive discussion within the APEC framework.

Given that the issues on the natural and social-economic development in the global coastal and marine areas are interconnected, the development of APEC marine sustainable solutions is an integral part of the global sustainability scenario and pathways. The world is far off track on achieving the SDGs at the halfway point on the 2030 Agenda, but it is possible to actively improve future prospects for action and progress by 2030 and beyond. Leveraging scientific knowledge, strengthening governance for the SDGs and unleashing the full potential of the SDG framework for promoting sustainable development can make

this happen[123]. An ambitious "SDG-push" scenario, with measures to improve social protection, promote a green economy, address digital disruption, as well as improving education and science, is supported to speed up progress on meeting SDG Goals [124]. Some of these proposed transformative actions also have implications for APEC in pursing regional sustainable development from now on. What we need to do better in the next steps is how to promote effective implementation through resource mobilization, financial support, capacity development and technical cooperation.

(2) A systematic approach taken by APEC in the Actions

After the 5th AELM statement highlighting that "achieving sustainable development remains at the heart of APEC's mandate"[125], the policy-action framework on APEC marine sustainable development has been gradually systematized. Given this, it has offered the top-down supports for APEC economies, and in return, it has received the bottom-up responses from APEC economies. For example, the 27th, 28th and 29th statements of AELM all highlighted the "sustainable growth" and "sustainable recovery" and the instructions has guided the ocean-related actions which called for supporting economic recovery through sustainable management of marine resources. Thus, OFWG has taken measures to facilitate the process of mainstreaming Ocean-Related Issues in order to promote the resilience and sustainable development for fishery and aquaculture sectors among APEC economies. The related actions, which are aligned with the goals of environment protection and economic development, promote the cross-disciplinary synergy of marine blue growth and green recovery. For example, since 2019, Roadmaps on marine debris, IUU, women and inclusive growth, and small-scale fisheries and aquaculture have been endorsed by APEC OFWG. By setting priorities and actions to be completed, these roadmaps help reach common views from economies and stakeholders on key action areas of marine sustainable development. At the level of economies, APEC economies have carried out 46 projects since 2019 in OFWG and other sub-fora, and the topics include marine debris, sustainable fisheries, coastal resilience, blue economy, etc. These projects promote knowledge and information sharing on fisheries, deepen the scientific understandings on marine and coastal ecosystem, and encourage actions to promote the marine conservation and restoration.

(3) A transformation driven by scientific and technological innovation to promote the social and economic development

123.UN. Global sustainable development report 2023. Advance unedited version, 2023. sdgs.un.org/sites/default/-files/2023-06/Advance unedited GSDR 14June2023.pdf.

124.UN. Global sustainable development report 2023. Advance unedited version, 2023. sdgs.un.org/sites/default/-files/2023-06/Advance unedited GSDR 14June2023.pdf.

125.See: Declaration of the 5th APEC Economic Leaders' Declaration in 1997: "Connecting the APEC Community".

Scientific development and technological innovation in recognizing, protecting and utilizing the ocean are the core drivers for APEC to maintain blue growth and green transformation. The practice made by APEC economies shows that new technology has made great contributions to the sustainable use and protection of the ocean. For instance, the application of new green farming technology and equipment, and the development of new low-carbon shipping technology all have better comprehensive natural and socio-economic benefits; The Bio-Circular Green (BCG) Economy concept, where science, innovation and technology are applied to efficiently use resources, maintain and restore our ecosystems, contributing to the global efforts of comprehensively addressing including climate change, extreme weather and natural disasters.

Especially, in the age of multiple compounding global risks leading to escalating social vulnerability and increased inequality, the transformations to sustainable pathways should be rooted in “socially robust” science. The scientists, policy makers and multiple social actors need to work closely together at the science-policy-society interface to build trust, establish the scientific base for progress towards the SDGs[126], and improve the ocean literacy of the whole society at large. For example, the development paths and schemes of coastal resilience in some APEC economies to cope with the risks and impacts of climate change, as well as the digital development progress in promoting post-pandemic recovery, reflect the powerful functions and potential of science and technology in enhancing the resilience of social and economic development and improving the governance capability. In view of the unbalanced development level of science and technology in the Asia-Pacific region, APEC actively supports global science cooperation. And based on the "Ocean Decade", the transformation of scientific and technological research and development capabilities into a driving force for social and economic innovation and development needs the further improvements, because these capabilities are not only to fill the gap between blue infrastructure and capabilities, but also to meet the needs of leading the new trend of global transformation in the digital economy era.

(4) A diversified and comprehensive approach to improve the management capability

There are multiple tools and comprehensive methods to achieve the sustainable ocean governance. APEC economies have made great efforts to develop and apply the appropriate management tools, such as ecosystem-based management methods, coastal and marine spatial planning and marine protected areas, which has played an important role in promoting the improvement of ocean governance capacity in the APEC region.

In the light of the variety and inter-connection among sub-targets of marine sustainable development

126.UN. Global sustainable development report 2023. Advance unedited version, 2023. sdgs.un.org/sites/default/-files/2023-06/Advance unedited GSDR 14June2023.pdf.

goals, which both social and environmental targets have a systematic impact on promoting the overall progress of sustainable development goals, it's recommended to use the inter-connection between the economy and the people to take the strategic interventions and to release positive synergies. For example, the support for small scale fisheries in small islands and coastal areas will contribute to the food security, the women empowerment and other goals.[127]And integrated approaches like ocean-based climate solutions, actions taken to protect and restore nature can also have multiple benefits among many marine sustainable development goals.

(5) An inclusive partnership network with stakeholders' engagement to facilitate the benefit sharing

A series of projects or activities implemented or initiated by APEC have facilitated the active participation of diversified stakeholders in the popularization of marine knowledge, marine debris cleaning and marine ecosystem protection. In particular, the diversified practices such as community-based marine ecosystem protection networking, public participation in collective actions of beach-cleaning, the initiative on blue citizen, and public-private partnership in marine planning have continuously enhanced the role of communities and people in the APEC region in supporting the inclusive and sustainable development of the ocean, and practiced the aim of "no one left behind".

APEC, the OFWG in particular, calls for "enhancing sectoral public and private partnerships, including the participation and communication in OFWG work" and "enhancing cross-fora collaboration to support the mainstreaming of ocean-related issues in APEC" [128] in its strategic plan. These objectives set by OFWG are helpful to mobilize the extensive social resources, capitals and scientific and technological investments we need for the ocean we want, and are available to promote the increase of economic benefits and social well-being of marine resources.

5.2 Collective Actions for APEC Marine Sustainable Development

APEC Putrajaya Vision pursues an open, dynamic, resilient and peaceful Asia-Pacific community by 2040, and proposes the economic driver of strong, balanced, secure, sustainable and inclusive growth in the region. The Putrajaya vision, with its Plan of Action "Aotearoa Plan of Action", is coherent with SDGs in many aspects. Economies' efforts to achieve the Putrajaya Vision 2040 led by APEC will greatly facili-tate the regional progress towards SDG Goals and Targets.

A clean, healthy and resilient ocean is not only source of sustainable livelihoods and economic benefits, but also crucial to address environment crisis, climate change and nature disasters in this region. The

127.SINGH G G, CISNEROS-MONTEMAYOR A M, SWARTZ W, et al. A rapid assessment of co-benefits and trade-offs among Sustainable Development Goals. Marine Policy, 2017, 93:223–231

128.OFWG, Ocean and Fisheries Working Group Strategic Plan 2021- 2023..

APEC Ocean-related Ministerial Meeting (AOMM) in 2002, 2005, 2010 and 2014 recognize ocean's role in deepening regional integration and fostering prosperity. As stated in the Joint Statement of AOMM4, APEC Ocean-related Ministers recognize that ocean connects people, markets and livelihoods, as well as providing ecosystem services and plays an important role towards fulfilling economic recovery and prosperity of the Asia Pacific region. To support the Putrajaya Vision 2040 of strong, balanced, secure, sustainable and inclusive growth in the Asia-Pacific, APEC member economies make endeavors to maintain and restore a healthy ocean and leverage the potential of ocean as driver of economic growth and source of societal inclusiveness.

Shaping the Pacific we want in the future, depends on the common aspirations and collective actions of people in the APEC region. Looking forward into the next 10 to 20 years, it is necessary to formulate comprehensive ocean-based solutions to support the blueprint of APEC Putrajaya Vision 2040, the Aotearoa Plan of Action and the Bangkok Goals on the Bio-Circular-Green (BCG) Economy. Collective actions in five pillars – enhance blue resilience to address environmental challenge as climate change and biodiversity loss; support blue growth to enhance economic benefits from ocean resources; promote blue community building as to contribute to ocean literacy in whole society; develop blue technology to encourage innovative ocean solutions; and build blue partnership to facilitate multi-stakeholder. Suggested actions are identified as the following in our efforts to achieve marine sustainable development.

(1) Blue infrastructure for resilient development

Enhance the resilience of coastal ecosystems and people who depend on them through wide conservation and restoration or restoration actions which help improve the function of coastal ecosystems to withstand pressure and risks, particular from climate change through:

- supporting the UN Decade on Ecosystem Restoration 2021-2030;
- protecting and sustainably utilizing fisheries resources from negative impacts of climate change;
- promoting blue carbon protection and restoration through projects at regional and economy levels;
- enhancing capacity on natural disaster prevention by developing and promoting the nature-based solutions to upgrade and optimize coastal blue infrastructure, such as ecological construction of the coast;
- collecting good practice on building climate-resilient marine economy to facilitate "carbon neutrality" in the APEC region;
- conducting the monitoring, assessment and research cooperation and application demonstration of

the blue carbon.

Apply area-based marine protection and management tools, in order to reverse the further loss and degradation of typical habitats and improve the status of marine biodiversity through:

- improving marine protected areas networks covering hot spots of marine biodiversity and habitats of endangered species;
- sharing and promoting the good practices of ecosystem-based marine spatial planning at the economy and regional level;
- further advancing MSP by facilitating sharing of methodology and empirical experience on MSP and encouraging public participation in MSP processes.

Effectively prevent, reduce and control all kinds of land-based and marine pollution through:

- preventing and controlling of marine environmental pollution based on integrated land and sea planning;
- monitoring, tracing, assessing and controlling the transboundary marine pollution;
- addressing marine pollution issues including nuclear contaminated water and call on members to promote sustainable waste management and reduction and prevention of leakage waste from land-and-sea-based sources;
- promoting the implementation of APEC Roadmap on Marine Debris and enhancing the coordination and cooperation on marine debris prevention;
- exploring and sharing the effective pathway of plastic waste treatment.

Enhance education and capacity building on disaster mitigation to help coastal communities to better respond to marine disasters, and promote a more active role of the private sector in disaster response and relief efforts.

(2) Blue growth for common prosperity

Promote recovery from COVID-19 pandemic and mitigate its potential long-term impact on the social systems through:

- applying bank and fiscal policy to reduce inflation and lessen wage and price pressures;
- supporting reforms to combat food insecurity include developing robust social safety nets, maintain-

ing open trade to allow food supply, and investing in climate resilient fisheries;

- facilitating cross-border travel in the APEC region and welcome the continuation of safe passage work to promote resilience in the face of future disruptions;
- raising investment in broad-based innovation and digitalization by enhancing digital infrastructure, alleviating financing constraints for small and medium-sized firms.

Build sustainable marine economy by stimulating sustainable high-quality growth and releasing potential of digital innovation in marine sectors through:

- promoting sustainable fisheries and aquaculture, by advancing ecosystem-based management in fisheries and promoting eco-friendly modern aquaculture technology;
- promoting multilateral cooperation on the conservation and sustainable utilization of fishery resources;
- promoting green and low-carbon transformation of the port and shipping industry, through economy policies and regional initiatives;
- increasing the investment in marine renewable energy and support realization of APEC energy strategic goals.

Invest in blue economy for strong, balanced, secure, sustainable and inclusive growth of APEC through:

- applying the financial principles of sustainable blue economy, scaling up innovate green financial tools, and leveraging private sectors to expand investment in the blue economy projects;
- developing the blue economy guidelines in APEC and enhancing financial support on APEC priorities on ocean conservation and sustainable ocean-based growth;
- strengthening investment with funds from international or regional financial institutions such as the World Bank, the Asian Development Bank, the Asian Infrastructure Investment Bank and the Global Environment Facility.

Support sustainable consumption and production and encourage environmentally friendly technology and policies through implementation of APEC Roadmap on Marine Debris through:

- addressing the issue of plastic waste and their environment impacts through full-life cycle approach including measures to encourage sustainable design and consumption.

(3) Blue community for inclusive development

Social inclusion and gender equality is essential to enhance the resilience for climate change, disasters and possible future health emergencies. Enhance resilience of coastal community and society as whole through the following multiple measures:

- adopting social protection program to support the resilience of community livelihoods through measures such as unemployment assistance, in-kind support, temporary jobs, and utility subsidies;
- creating alternative livelihood opportunities for the artisanal and small-scale fishermen and enhance their ability to cope with future shocks;
- mainstreaming gender equality and women's empowerment in marine economy by promoting women's participation in marine sectors such as fishery, tourism and maritime transportation;
- promoting digital literacy and skills training to close the digital gaps and facilitate fair participating of and benefiting from digital economy.

Connect and mobilize a wide range of stakeholders and raise awareness on ocean sustainability. Scale up Blue Citizen Initiatives to engage with private sectors, civil society and local communities in ocean conservation and blue economy through:

- developing the Blue Citizen Guidebook and promote Blue Citizen to raise ocean literacy for all, including inland population;
- integrating ocean science and ocean literacy into school curriculum and encourage school programs;
- supporting actions on public education such as beach cleaning, species protection, marine cultural awareness and ocean literacy education.

(4) Blue technology for innovative development

Sustained ocean data, observations and knowledge has invisible role for future sustainable development solutions and climate action. Ocean data can spark connections and collaborations between diverse groups such as industry and science to develop solutions that meet environmental, social and economic imperatives. Improve the capacity to generate ocean data and maximize value of ocean data through:

- strengthening ocean observation, forecasting and early warning and raising knowledge and innovation for multi-hazard early warning systems;
- developing database and information sharing platform for marine sustainable development, enhancing online collaboration and information sharing;

- generating the data, information and knowledge needed for more robust science-informed policies and stronger science-policy interfaces.

Promote innovative solutions to boost marine economic development and respond to post-COVID-19 risks in context of climate change through:

- promoting sufficient and sustainable investment on marine science and technology, building member economies' capacity in scientific research and providing professional training for scientist;
- undertaking interdisciplinary, multi-stakeholder co-design and co-delivery of ocean solutions;
- enhancing inclusive and integrated management frameworks and tools, including nature-based solutions, to provide for adaptive processes under changing ocean conditions.

Strengthen scientific and technological cooperation to encourage innovation sharing among economies through:

- improving the international and regional exchange platform for knowledge, technology and best practices of marine sustainable development;
- supporting early-scientist training and exchange projects within APEC and beyond;
- supporting the multi-level marine scientific research partnership under UN Decade for Ocean Science for Sustainable Development, and carrying out interdisciplinary marine scientific research plans;
- implementing the Kuala Lumpur Declaration by APEC economic leaders in 2020 and make efforts on inclusive economic participation through digital economy and technology;
- raising ocean science capacity through joint research and S&T cooperation to enhance the research capacity of developing economies.

(5) Blue partnership for shared future

Establish an open and inclusive sustainable Asia-Pacific blue partnership cooperation network through:

- engaging with various stakeholders, and providing a flexible cross-disciplinary exchange and cooperation forum to meet the challenges faced by marine sustainable development and create development opportunities;
- encouraging economies to take concrete actions, promoting regional, sub-regional contributions and commitments, to support current global cooperation initiatives and action plans on issues such as oceans, climate and biodiversity;

- promoting APEC's role as the incubator of innovative ideas on regional solution to boost sustainable growth and address multiple challenges;
- jointly formulating frameworks and roadmaps on APEC cooperation in the fields of climate change, blue economy and blue carbon;
- improving collaboration between different APEC sub-fora, and between APEC and other regional and international organizations, including those from the private sector;
- supporting the OFWG playing a leading role in ocean mainstreaming process and collective actions in APEC, including through the APEC international fund.

Strengthen the partnership between developed and developing economies, through:

- jointly implementing the blue partnership actions to support marine environmental protection and ecosystem restoration in developing economies;
- strengthening science and technology and capacity-building support for developing economies and island regions;
- supporting the island regions of developing economies through personnel training, technical assistance and financial support,
- sharing blue growth experiences and technical solutions to help developing economies meet their development demands;
- enhancing capacity development on conservation and sustainable utilization of marine resources, such as ecosystem-based fishery management, marine spatial planning, waste management and coastal restoration.

Encourage APEC economies to implement high-level instructions on mainstreaming ocean-related issues and to take measures to speed up mainstreaming processes within their economies supporting joint programs between the Ocean and Fisheries Working Group (OFWG) and other relevant sub-foras including the APEC Committee on Trade and Investment (CTI) and APEC Business Advisory Council (ABAC).

In conclusion, APEC Putrajaya Vision 2040 calls for "an open, dynamic, resilient and peaceful Asia-Pacific community by 2040, for the prosperity of all our people and future generations" by pursuing "strong,balanced, secure, sustainable and inclusive growth". One Ocean, One Community. APEC economies shall work together and make endeavors to maintain and restore a healthy ocean and leverage the potential of ocean as the important drivers to promote the economic growth and finally facilitate the marine sustainable development.

Annex I

Questionnaire and Analysis Documents

Annex 1.1 Questionnaire

Questionnaire for APEC Marine Sustainable Development Report III

OFWG 01 2023S

Part 1 Background

APEC Marine Sustainable Development Report III (hereinafter referred to as AMSDR III) endorsed by OFWG in March, 2023 (OFWG 01 2023S), is the third report of AMSDR series which focus on the status and progress of marine sustainable development in the Asia-Pacific region and promote best practices sharing on marine sustainable development among APEC economies. Based on the first AMSDR in 2014 and the second AMSDR in 2019, AMSDR III is expected to continue to provide information to update and enhance the understanding of the ocean in recent years, promote the marine cooperation among APEC economies and make contributions to realize "a sustainable planet" to support APEC Putrajaya Vision 2040.

Objective: The questionnaire seeks to collect the information about the status, progress and capacity building of marine sustainable development in your economy. The input will be used for the compiling of the AMSDR III.

Respondent Profile: as the survey covers information related to marine policies and coastal management issues, and requires knowledge on ocean and coastal management, respondents working in government, public sectors, academia and non-governmental organizations with experience on ocean management are welcomed for filling the questionnaire. Personal information contained in the questionnaire will be completely confidential.

Contact Information: Any questions or queries on the questionnaire, please contact:

Ms. LIN Ruijuan

Thank you very much.

Part 2 Respondent Information

Please fill out the relevant details:

a. Economy: _____

b. Name: _____

c. E-mail: _____

d. Organization: _____

e. Please indicate which group you belong to (use √):

Policy maker □

Government official □

Program/Project manager □

Engineer □

Researcher/Academia □

Others: _____

Part 3 Questions

1. Marine Policy

Does your economy have an official strategy or long-term plan/policy to achieve the goals of the Sustainable Development Goal 14 (https://sustainabledevelopment.un.org/sdg14) and related targets since 2015?

Yes □ No □ Not sure □

If yes, please provide details.

Title of the document:	1)	2)
Issued institution:		
Issued time:		
Web links (if available):		

Note: If there is more, you can continue to add the form.

2. Mechanisms

During 2015-2022, does your economy have a comprehensive or specialized progress assessment and reporting mechanism, or coordination mechanism covering or targeting the marine sustainable development?

Yes □ （regular □ irregular □）

No □

Not sure □

If yes, please provide details:

Title :	1)	2)
Institution*:		
Issued time:（M/Y）:		
Web links (if available):		

Note: * An institution can be a government institution, an academic community, or a civil society organization. If there is more, please continue to add the form.

3. Information sharing

Does your economy have a bulletin, big data platform, database or website / web page for information sharing in the areas related to marine sustainable development?

Yes □ No □ Not sure □

If yes, please provide details.

Title of database/website:	1)	2)
Responsible agency:		
Web links (if available):		

Note: If there is more, you can continue to add the form.

4. Marine Issues

What are the major problems or challenges facing the oceans and coastal areas of your economy since 2019? (up to 3 items)

Marine debris □

Eutrophication □

Deterioration of water quality □

Coastal erosion and other disasters □

Sea level rise □

Land-based pollution □

Marine habitat loss or degradation □

Marine biodiversity decline □

Over exploitation of fishery resources □

IUU fishing □

Community livelihood pressure □

Gender problem □

Sustainable economic income problem □

Others: □

5. Climate Change Impact

How does climate change affect the following ocean related aspects in your economy? (Positive-it will be beneficial in this area; Negative- it will slow down or hinder this area. Write down the degree of impact, ranging from 1 to 5, 5 is the strongest and 1 is the slightest.

Affected areas	Impact		How serious (1~5)
	Positive	Negative	
1. Marine environmental quality	☐	☐	
2. Ecosystem function	☐	☐	
3. Species biodiversity	☐	☐	
4. Marine carbon sequestration capacity	☐	☐	
5. Coastal disaster prevention	☐	☐	
6. Conservation and sustainable utilization of marine fishery resources	☐	☐	
7. Marine culture and leisure tourism	☐	☐	
8.Coastal community employment and livelihood	☐	☐	
9.Food security and health in the coastal community	☐	☐	
10.Marine infrastructure level and capacity	☐	☐	
11. Others:	☐	☐	

6. COVID-19 Impact

How does COVID-19 affect the following ocean related aspects in your economy? (Positive-it will be beneficial in this area; Negative- it will slow down or hinder this area; No opinion-unclear or too early to tell. Write down the degree of impact, ranging from 1 to 5, 5 is the strongest and 1 is the slightest.

Affected areas	Impact			How serious (1~5)
	Positive	Negative	No opinion	
1. Marine environmental quality	☐	☐	☐	
2. Marine ecosystem function	☐	☐	☐	
3. Marine species biodiversity	☐	☐	☐	
4. Marine carbon sequestration capacity	☐	☐	☐	
5. Coastal disaster prevention	☐	☐	☐	
6.Conservation and sustainable utilization of marine fishery resources	☐	☐	☐	
7. Marine culture and leisure tourism	☐	☐	☐	
8.Coastal community employment and livelihood	☐	☐	☐	
9.Food security and health in the coastal community	☐	☐	☐	
10. Marine infrastructure level and capacity	☐	☐	☐	
11. Others:	☐	☐	☐	

7. Gaps / Needs

Which of the following capabilities are the major challenges facing your economy to achieve Strong, Balanced, Secure, Sustainable and Inclusive marine development or those that require significant improvement? (up to 3 items)

Political will □
Legal instruments □
Policy coherence and coordination across levels of government □
Effective linkages between policy planning and budgeting □
Public budgeting execution mechanisms □
Adequate dedicated financial resources □
Statistical capacity □
Ocean technology □
Social equity □
Public awareness, participation and support □
Others: □

8. Instruments

Since 2019, whether your economy has implemented ocean related incentives policies or support measures to address climate change and recovery from the pandemic?

Yes □ No □ Not sure □

If yes, please provide details.

	Addressing Climate Change	Recovery from COVID-19
Title of instruments:	1)	2)
Responsible agency:		
Brief introduction:		

Note: If there is more than one more measure, please continue to add the form.

9. Management Approaches

Since 2019, what integrated marine and coastal zone management tools are implemented in your economy and their progress?

Approach/Programm	Scale of covering sea area (or Pilot site)	Policies/Plans/Tools Issued or Implemented (if yes, pls provide details)
Marine spatial planning		No □ Yes □ (Title:)
Integrated coastal management		No □ Yes □ (Title:)
Marine protected areas network		No □ Yes □ (Title:)
Marine ecosystem restoration		No □ Yes □ (Title:)
Fishery conservation and management measures, such as no-take periods or no-take zones		No □ Yes □ (Title:)
Legal or policy measures to combat IUU fishing		No □ Yes □ (Title:)
Ocean solutions for climate change, such as Nature-based Solutions		No □ Yes □ (Title:)
Natural Capital Accounting to assess values relevant to the Marine and Coastal Economy		No □ Yes □ (Title:)
Others:		No □ Yes □ (Title:)

Part 4 Best Practices Sharing

Please share at least one of your economy's best practices or local cases in areas related to marine sustainable development. The cases will be considered as important inputs in AMSDR III or will be a compiled product to share with APEC economies. Up to 600 words for each case with photos, charts or tables will be appropriate.

Title of the case:	
Fields (use √)	Healthy marine ecosystem ☐ Blue Economy ☐ Coastal community livelihood ☐ Marine science and technology innovation ☐ Ocean governance ☐
Contents of the Case *including the background overview, location, main issues, best practices, benefits, and lessons, etc.*	

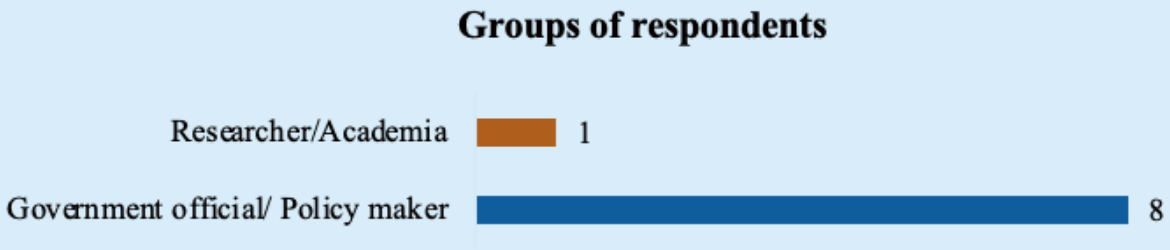
Part 5 Open Comments

What do you think is the urgent need to promote marine sustainable development in APEC region? (e.g. financial support, political will, social engagement, science and technology innovation, policy guidance, international cooperation and coordination, etc.)
Do you have any suggestions for the work of compiling the AMSDR III:
What are the benefits from the APEC Marine Sustainable Development Report:

We highly appreciate your time and efforts in completing this questionnaire.

Annex 1.2 Brief Analysis of the Feedback Information

In order to collect the progress and experience of APEC member economies in marine sustainable development, and draft the AMSDR III, the survey was organized through the APEC secretariat from June to July in 2023. Until July 2023, feedback from nine economies had been received: Australia; Chile; China; Malaysia; Mexico; New Zealand; Papua New Guinea (PNG); Chinese Taipei and the United States. It contains nine questions, including marine policies,mechanisms, information, challenges, impacts of COVID-19 and climate change, gaps,instruments and management approaches , as well as case collection. Also, comments and valuable suggestions were received fromsome respondents, which have been considered in the chapter 5 of this report. Best practices/cases provided by nine economies have been incorporated in the report, some of which are shown in the Boxes.



The analysis of the responses to the nine questions is as follows.

1. Marine policies on implementing the SDG 14 and related targets

The first question mainly focuses on whether economies have official strategies or long-term plans/policies to achieve the goals of the Sustainable Development Goal 14 and related targets since 2015.

Respondents from nine economies indicate the strategies or plans/policies at the economy level for implementing marine sustainable development goals since 2015. PNG has developed a long-term strategic vision. Australia and Chile have comprehensive marine policies and plans, while the other economies have some long-term strategies, policies and action plans related to marine economic development and environmental protection, as well as projects supporting marine-related goals.

2. Assessment and reporting or coordination mechanisms

The second question is to know whether economies have a comprehensive or specialized assessment and reporting mechanism, or coordination mechanism for marine sustainable development.

According to the feedback information from nine economies, during the period of 2015-2022, eight of them have established the assessment and reporting mechanisms or coordination mechanisms related to marine sustainable development. Among them, Malaysia; Mexico; PNG and Chinese Taipei have comprehensive mechanisms for evaluating, reporting and coordinating the sustainable development. Chile and New Zealand have established relevant mechanisms in marine protected areas and fishery theme areas, respectively. Economies such as China and the United States that implement decentralization policies across departments or institutions have relatively decentralized assessment, reporting o r coordination mechanisms.

3. Information sharing platform, database or website

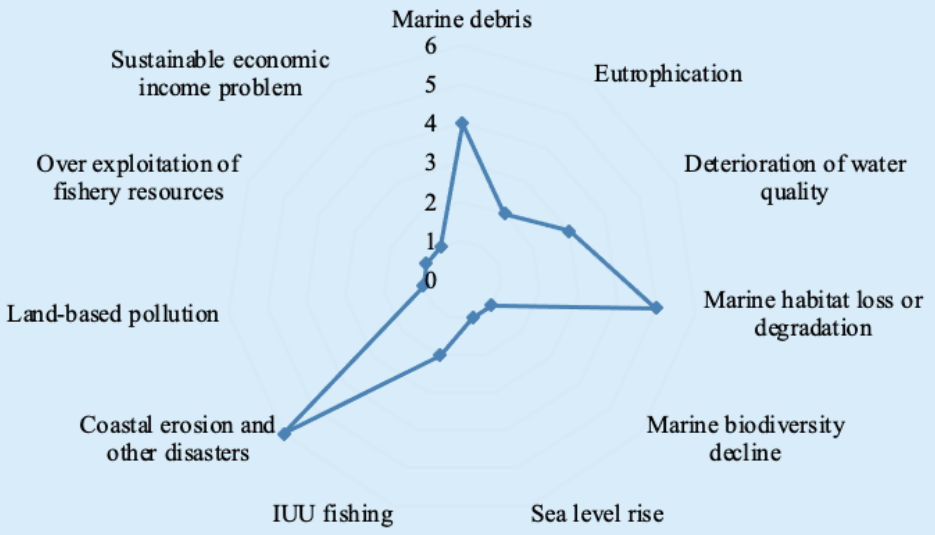
The third question is to know whether economies have a bulletin, big data platform, database or website / web page to share information of marine sustainable development.

According to the feedback information, eight economies have annual reports/bulletins, online databases or portals for information sharing on marine sustainable development. The main channel of information sharing among the seven economies is through government departments. There are some marine scientific data centers or institutions in Australia and some other economies, which can also provide information for marine sustainable development.

4. Major problems or challenges

The fourth question seeks to know the major problems or challenges in the ocean and coastal areas since 2019 for APEC economies.

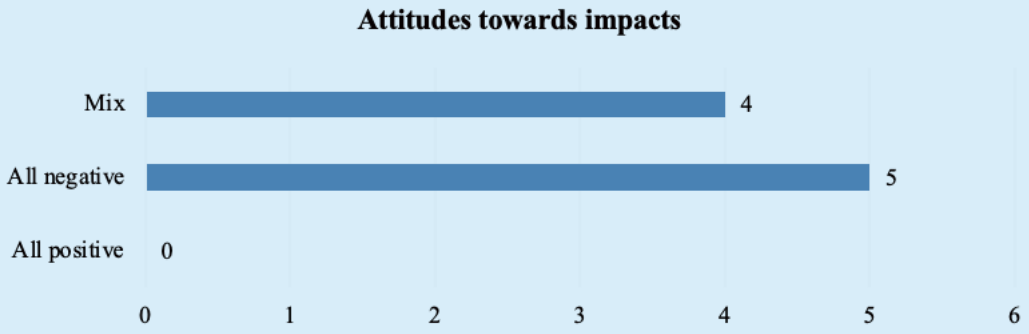
Respondents from nine economies indicate the three major problems or challenges faced in ocean-related areas since 2019. According to the concerns of each issue shown by the feedback information, the main problems faced by each economy have something in common while they did have some difference. Among them, coastal hazard and other disasters, marine habitat loss or degradation and marine debris are the three most common issues (see the figure below). The main problems faced by most economies are different, even between geographically adjacent economies or economies with similar levels of development. According to the classification of environment, ecology, resources, natural disasters and climate change, no economy faces only a single type of problem or challenge, but two or three types of threats, which reflects the complexity of marine problems to some extent. PNG, in particular, is also facing the challenges of climate change and people's livelihood.



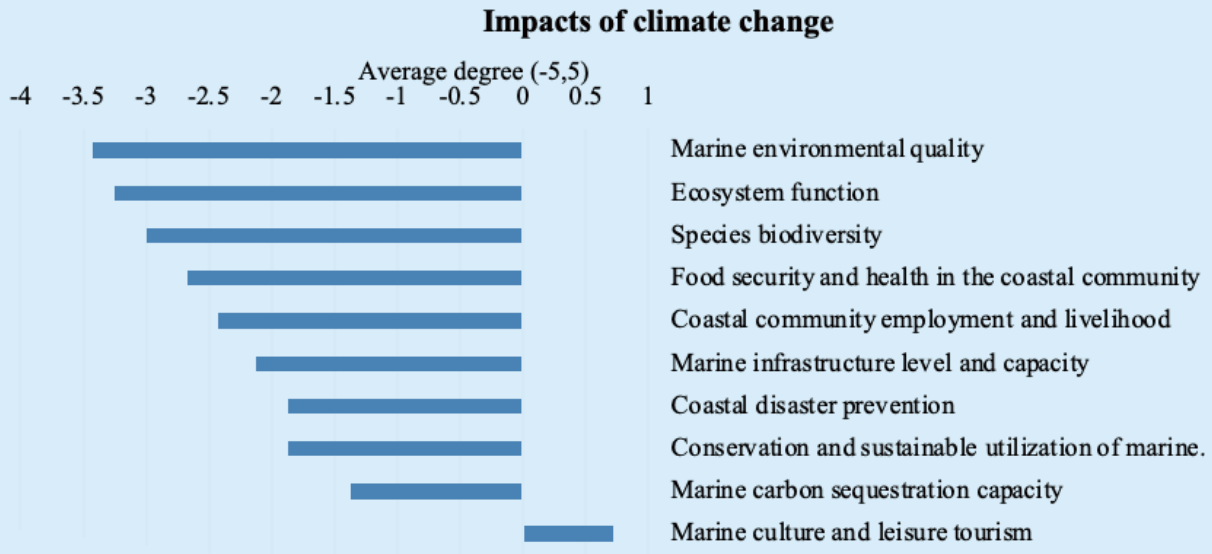
5. Impacts of climate change

The fifth question focuses on knowing the potential impacts of climate change on ocean related aspects in economies and the degree of the positive or negative impacts on each aspect.

Respondents from five economies consider that climate change will have negative impacts on marine ecological environment, coastal protection, resource conservation and utilization, social culture and people's livelihood (see the figure below). Respondents from the other four economies believe that it may have positive impacts on some aspects, such as marine carbon inventory capacity, coastal disaster prevention, marine culture and leisure tourism, food security and health in the coastal community and marine infrastructure level and capacity. In particular, respondent from one economy points out that it may even bring mixed effects on the level and capacity of marine infrastructure.



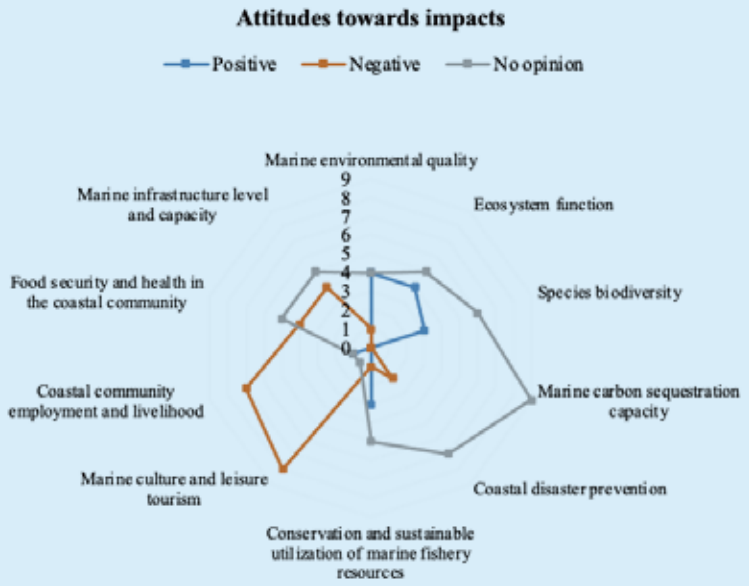
On the average degree of different impact drawn from the feedback information (see the figure below), only the development of Marine culture and leisure tourism is more likely to be positively affected. However, it is still difficult for some respondents from economies to identify the impact and its degree in some aspects, such as coastal community employment and livelihood and food security and health in the coastal community, which need long-term observation and research to promote our knowledge and understanding. As noted by one respondent from Chile, the answers to these aspects require the government to take active actions to adapt to and mitigate the impacts of climate change.



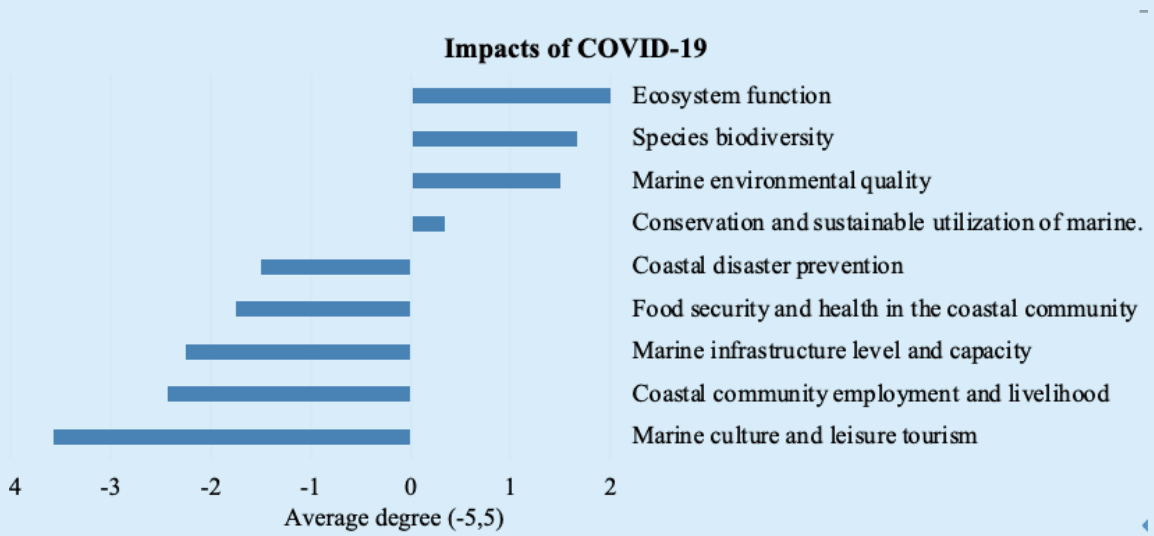
6. Impacts of COVID-19

The sixth question seeks to understand the potential impacts of COVID-19 on ocean related aspects in APEC economies, and the degree of the positive or negative impacts on each aspect.

As far as the attitudes of respondents from economies towards the impacts of COVID-19 in different fields are concerned (see the figure below), more economies indicate that the pandemic will have negative impacts on marine culture, leisure and livelihood of coastal communities. While some other economies indicate that it will have positive impacts on marine ecological environment and resources than those that hold the opposite view. However, more than half of the feedback information from nine economies shows that it is difficult to determine or too early to explain the impacts of the pandemic on marine sustainable development, especially on marine ecological environment, carbon sink capacity and coastal disaster prevention.



On the average degree of different impact drawn from the feedback information (see the figure below), it can be seen that the pandemic is more likely to have a positive impact on ecosystem functions, species diversity, marine environmental governance and marine fishery resources protection, which may be related to the reduction of human activities in the ocean. However, marine leisure tourism, livelihood of coastal community, marine infrastructure capacity, food security and coastal disaster protection may be negatively affected to varying degrees, which also reflects the direct and indirect effects of the pandemic on travel restrictions, people's employment and livelihood, and the reduction of investment in capacity building.



7. Gaps or needs for marine sustainable development

The seventh question is planned to know the major gaps or challenges from economies to achieve the Strong, Balanced, Secure, Sustainable and Inclusive marine development or those that require significant improvement.

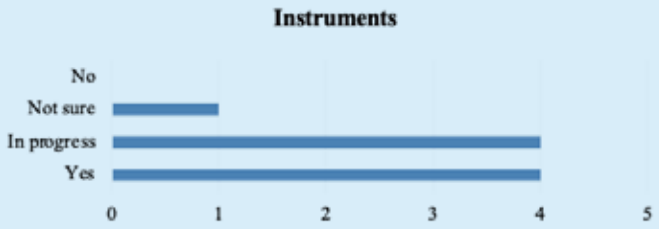
Respondents from nine economies indicate their major challenges or those gaps to achieve marine sustainable development. Although no two economies face the same major gaps or development needs. However, policy coherence and coordination across levels of government, dedicated financial resources and political will are the three main aspects of problems or needs in nine economies (see the figure below), which reflect the core role of government decision-making and resource allocation in promoting the marine sustainable development. The demand for human resources, technology and planning implementation is also relatively crucial. Several economies also face problems in supporting systems such as legislative means, data statistics and management.

8. Instruments to address climate change and support recovery from the pandemic

The eighth question is set to investigate the ocean related incentives policies or support measures from APEC economies to address climate change and recovery from the pandemic since 2019.

According to the feedback information, eight economies have implemented or are promoting ocean related incentives policies or support measures to address climate change and recovery from the Pandemic (see the figure below). More than half of these economies have adopted policies and measures to deal with climate change. The measures taken by different economies have different emphases, including launching a package of funds to support ecosystem protection and restoration (e.g Australia and China), developing a climate policy and legal framework at the economic level (e.g Chile), establishing climate resilience solutions for vulnerable communities (e.g PNG), developing industrial and renewable

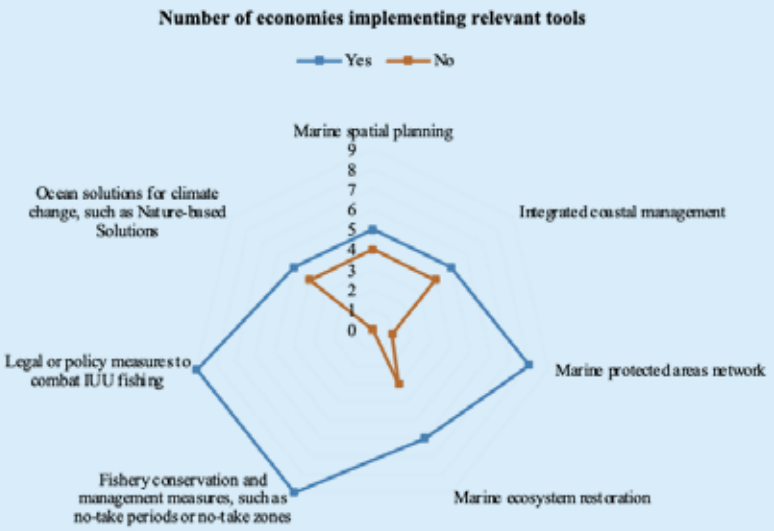
energy policies, standards and plans (e.g the United States). Some economic incentives and public service policy tools were also implemented to support the recovery from the pandemic in economies (e.g China and Malaysia).



9. Integrated marine and coastal zone management tools

The ninth question is to know the integrated ocean and coastal zone management tools implemented in economies since 2019.

According to the feedback information, nine economies have implemented various integrated ocean and coastal zone management tools to promote ocean governance since 2019. Respondents from nine economies provide information on relevant management approaches and list in detail the network links of relevant official websites, policies or regulatory documents. All these economies have implemented fishery conservation and measures to combat IUU. More than half of these economies have implemented the tools, such as marine protected areas, marine ecological restoration, marine spatial planning, integrated coastal zone management and ocean-related climate solutions (see the figure below), etc. For economies that have not implemented relevant management measures in a comprehensive way, such as marine spatial planning, they are willing to promote the adoption of effective management measures in ocean-related plans at economy level in the future (e.g Australia).



Annex II List of APEC Marine Related Projects and Activities Since 2019

No	Project Title	Project Number	Project Year	Proposing Economies
1	Compendium of Preventive Measures and Policies that APEC Economies are taking to Reduce Land-Based Marine Debris	OFWG 01 2019S	2019	Chile
2	Workshop: Understanding and Addressing Marine Debris Impact in the APEC Region	OFWG 02 2019S	2019	Chile
3	Capacity Building on Global Marine Debris Monitoring and Modeling: Supports Protection of the Marine Environment	OFWG 01 2019A	2019	Indonesia
4	The 20th APEC Roundtable Meeting on the Involvement of Business/Private Sector in Sustainability of the Marine	OFWG 03 2019S	2019	Chinese Taipei
5	APEC Workshop on Marine Debris and Microplastics: Blue Citizenship	OFWG 04 2019S	2019	China
6	2019 APEC Coastal and Marine Spatial Planning Training Workshop	OFWG 05 2019S	2019	China
7	Capacity Building for Bird Conservation in Coastal Wetlands in the Asia-Pacific Region	OFWG 06 2019S	2019	China
8	Promoting APEC Innovative Models in Reducing and Managing Land-based Debris into Oceans for Sustainable Development	OFWG 04 2019A	2019	Viet Nam
9	Incentives, Barriers and Policies to Promote Women Inclusion in the Fisheries, Aquaculture and Maritime Sector	OFWG 03 2019	2019	Chile
10	APEC Workshop on Marine Debris and Microplastics: Blue Citizenship	OFWG 01 2020S	2020	Malaysia
11	APEC Seminar on Promoting Circular Economy and Sustainable Materials Management to Effectively Address Marine Plastic Litter in the Asia-Pacific Region	OFWG 04 2020A	2020	Viet Nam

12	Development of a Marine Debris Monitoring Decision Framework for APEC Economies	OFWG 03 2020A	2020	The United States
13	Phase II: Guide on Valuing Fishery By-Products: Promotion of Sustainable Artisan Activities and Women Empowerment	OFWG 02 2020	2020	Indonesia
14	Capacity-Building Workshop on Implementation of Port State Measures under the APEC Roadmap on Combatting IUU Fishing	OFWG 01 2020A	2020	New Zealand
15	2020 APEC Marine Spatial Planning Training Work-shop (Virtual Meeting)	OFWG 02 2020S	2020	China
16	Developing an APEC Best Practices Framework to Address Abandoned, Lost or Discarded Fishing Gear	OFWG 05 2020A	2020	The United States
17	The Role of Extended Producer Responsibility (EPR) Schemes towards Circular Economics in APEC	OFWG 03 2020S	2020	Malaysia
18	APEC Sustainable Coastal Cities Symposium	OFWG 10 2020A	2020	Malaysia
19	Nanoplastics in Marine Debris in the APEC Region - Regional Workshop	OFWG 07 2020A	2020	The United States
20	Capacity Building on Marine Debris Monitoring by Using Innovative Technologies in APEC Region	OFWG 09 2020A	2020	Chinese Taipei
21	Enhancing Collection and Segregation of Waste to Reduce Marine Litter in APEC Economies	OFWG 08 2020A	2020	The United States
22	Transparency as a Tool for A Sustainable Ocean Economy	OFWG 02 2021S	2021	Chile
23	Webinar Series on Driving Seabird Conservation through International Cooperation	OFWG 01 2021S	2021	New Zealand
24	APEC Workshop on Protection, Restoration and Ecological Disaster Reduction of Typical Coastal Ecosystem	OFWG 03 2021S	2021	China

25	2021 APEC Training Workshop on Marine Spatial Planning based on Ecosystem Services	OFWG 04 2021S	2021	China
26	The 6th APEC Blue Economy Forum	OFWG 05 2021S	2021	China
27	Workshop on Technological Innovation for Marine Microorganism Resources	OFWG 06 2021S	2021	China
28	Report and Workshop on Capacity Building for Improvement of Economic Reactivation in Sustainable Aquaculture	OFWG 05 2021	2021	Peru
29	Promoting Women's Role in Ocean Science towards Sustainable and Inclusive Ocean Governance	OFWG 06 2021A	2021	Chinese Taipei
30	Review of Traceability Systems Applied to the Value Chain of Fisheries and Aquaculture in APEC Economies	OFWG 02 2021A	2021	Chile
31	Capacity Building on Marine Debris Management and Monitoring from Source as River is the Major Transport Pathtway	OFWG 04 2021A	2021	Malaysia
32	Capacity Building on Vessel Innovation to Combat Marine Debris	OFWG 08 2021A	2021	Indonesia
33	Determining Microplastics Distribution in Coastal Aquaculture Input Systems and Developing a Mitigation Plan towards Seafood Safety	OFWG 03 2021A	2021	Indonesia
34	Good Practices for Traceability Mechanism of Marine Debris Recycled Products in the APEC Region	OFWG 07 2021A	2021	Chinese Taipei
35	Sharing Knowledge and Experiences on Small-Scale Marine Fisheries Data Collection and Management for Sustainable Development in the APEC Region	OFWG 01 2022	2022	Thailand
36	Knowledge Sharing for Coastal Resilience in the Asia-Pacific Region	OFWG 01 2022S	2022	The United States
37	The 21st APEC Roundtable Meeting on the Involvement of the Business/Private Sector in the Sustainability of the Marine Environment	OFWG 02 2022S	2022	Chinese Taipei

38	Workshop on Blue Carbon Ecosystem Conservation and Management in the APEC Region	OFWG 03 2022S	2022	China
39	Workshop on Promoting Bioplastic Materials to Reduce Marine Plastic Litter in the Asia Pacific Region	OFWG 02 2022A	2022	Indonesia
40	Capacity Building for Blue Citizen in the APEC Region	OFWG 06 2022A	2022	China
41	A Workshop for Fisheries Enforcement Strategies to Prevent, Combat and Deter IUU Fishing Related to COVID-19 Pandemic	OFWG 03 2022A	2022	Indonesia
42	APEC Marine Sustainable Development Report III	OFWG 01 2023S	2023	China
43	The 22nd APEC Roundtable Meeting on the Involvement of the Business/Private Sector in the Sustainability of the Marine Environment	OFWG 02 2023S	2023	Chinese Taipei
44	Workshop on Marine Microplastic Pollution and Control Policy in the APEC Region	OFWG 03 2023S	2023	China
45	APEC Workshop on Regional Marine Debris Management	OFWG 05 2023S	2023	Chinese Taipei
46	Workshop on International Policy Development of Marine Pollution Control, including Marine Plastic Debris and Sustainable Waste Management	OFWG 04 2023S	2023	China