

CHANGING SAILS: ACCELERATING REGIONAL ACTIONS FOR SUSTAINABLE OCEANS IN ASIA AND THE PACIFIC





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The Economic and Social Commission for Asia and the Pacific (ESCAP) serves as the United Nations' regional hub promoting cooperation among countries to achieve inclusive and sustainable development. The largest regional intergovernmental platform with 53 Member States and 9 Associate Members, ESCAP has emerged as a strong regional think-tank offering countries sound analytical products that shed insight into the evolving economic, social and environmental dynamics of the region. The Commission's strategic focus is to deliver on the 2030 Agenda for Sustainable Development, which it does by reinforcing and deepening regional cooperation and integration to advance connectivity, financial cooperation and market integration. ESCAP's research and analysis coupled with its policy advisory services, capacity building and technical assistance to governments aims to support countries' sustainable and inclusive development ambitions.

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FOREWORD



Oceans cover the bulk of the Earth's surface. They provide vital environmental, economic and social benefits to humanity, including food, marine biodiversity, carbon sinks, trade, tourism and cultural identity to coastal communities. Promoting the health and sustainability of oceans is inextricably linked with the implementation of the 2030 Agenda for Sustainable Development in Asia and the Pacific. During these challenging times of the COVID-19 pandemic, it is crucial to take advantage of the window of opportunity offered by reduced emissions and energy demand to protect the marine environment.

Yet, the well-being of oceans is being pushed to a tipping point, as marine pollution, overfishing and climate change increase the fragility of our oceans. The conservation and sustainable use of ocean and marine resources is challenged by the transboundary and highly complex nature of ocean management and the fragmented understanding of the interaction between oceans and human activities.

Changing Sails: Accelerating Regional Actions for Sustainable Oceans in Asia and the Pacific, the theme study for the seventy-sixth session of the Commission, presents four key focus areas for urgent action to halt and reverse the declining health of oceans and marine ecosystems. The lack of data on oceans, growing demand for inclusive and green maritime shipping, deteriorating fish stocks and gaps in fishery management and the mounting pressure of marine plastic pollution are highlighted in the study.

The need to strengthen national statistical systems for collecting ocean data and enforcing the international conventions, norms and standards for maritime shipping, sustainable fisheries and marine pollution is stressed in the study. Regional cooperation through platforms, such as the Asia-Pacific Day for the Ocean, must play a stronger role in mobilizing partnerships, facilitating data-sharing, and implementing and monitoring international norms and standards.

I commend this study to the Commission. Let us seize this moment to steer our region's sails toward a sustainable future. With strong data and a regional commitment as our compass, we will chart the right course.

May 2020

Armida Salsiah Alisjahbana

Under-Secretary-General of the United Nations and
Executive Secretary, United Nations Economic and
Social Commission for Asia and the Pacific

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Jose Antonio Pedrosa Garcia and Shuvojit Banerjee of the Macroeconomic Policy and Financing Development Division were the lead authors of chapter 1. Inputs were also provided by María Mancheño Mena (intern) and Mahesh Uniyal (consultant).

The Statistics Division, in partnership with the Department of Fisheries and Oceans, Government of Canada, the Global Ocean Accounts Partnership, the Intergovernmental Oceanographic Commission of UNESCO (IOC-UNESCO) and the United Nations Environment Programme (UNEP), authored chapter 2. The main contributors were Rikke Munk Hansen and Gemma Van Halderen (lead authors), Michael Bordt (Department of Fisheries and Oceans, Canada), Ben Milligan (Global Ocean Accounts Partnership), Kirsten Isensee (IOC-UNESCO) and Jillian Campbell (UNEP).

Chapter 3 was developed in collaboration with the International Maritime Organization (IMO) and the United Nations Conference on Trade and Development (UNCTAD). Azhar Jaimurzina Ducrest of the Transport Division led the drafting, with inputs from Weimin Ren and Sooyeob Kim of the Transport Division. Valuable contributions were also provided by Jose Matheickal, Edmund Hughes and Bekir Sitki Ustaoglu (IMO); and Frida Youssef, Jan Hoffmann, Hassiba Benamara and Luisa Rodriguez (UNCTAD).

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The ESCAP Strategic Communications and Advocacy Section coordinated the launch and dissemination of the publication.

CONTRIBUTING PARTNERS

Chapter 2

The Department of Fisheries and Oceans Canada is a department within the Government of Canada mandated with safeguarding the country's waters and managing fisheries, oceans and freshwater resources. In its work to ensure healthy and sustainable aquatic ecosystems, the Department promotes sound science and collaborates with Indigenous communities. It also supports economic growth in the marine and fisheries sectors, and innovation in such areas as aquaculture and biotechnology. To ensure a safe relationship between humans and the seas, the Department maintains waterways and responds to maritime incidents, such as search-and-rescue and environmental emergencies.

The **United Nations Environment Programme (UNEP)** is the leading environmental authority. It sets the global environmental agenda, promotes a coherent implementation of the environmental dimension of sustainable development within the United Nations system and serves as an authoritative advocate for the global environment.

The United Nations Environment Programme recognizes the growing need to address global environmental concerns from an urban perspective and to integrate the urban dimension of global environmental issues. More specifically, UNEP aims to promote the link between international cooperation and local action and supports cities in emphasizing interventions that provide local and global benefits. Among of its areas of focus are buildings and infrastructure, transport, air pollution, waste and water management, biodiversity and ecosystems.

The **Intergovernmental Oceanographic Commission of the United Nations Educational, Scientific and Cultural Organization (IOC-UNESCO)** promotes international cooperation and coordinates programmes in marine research, services, observation systems, hazard mitigation, and capacity development in order to understand and effectively manage the resources of the ocean and coastal areas. By applying this knowledge, the Commission aims to improve the governance, management, institutional capacity, and decision-making processes of its Member States with respect to marine resources and climate variability and to foster sustainable development of the marine environment, in particular in developing countries.

Chapter 3

The **United Nations Conference on Trade and Development (UNCTAD)** supports developing countries in accessing the benefits of a globalized economy more fairly and effectively. To smoothen transitions, UNCTAD equips countries with the capacity to manage the potential drawbacks of greater economic integration by providing analysis, facilitating consensus-building and offering technical assistance. These areas support them to use trade, investment, finance and technology as vehicles for inclusive and sustainable development. Together with other United Nations departments and agencies, UNCTAD measures progress made towards achieving the Sustainable Development Goals. UNCTAD also supports financing for development through the implementation of the Addis Ababa Action Agenda.

As a specialized agency of the United Nations, the **International Maritime Organization (IMO)** is the global standard-setting authority for the safety, security and environmental performance of international shipping. Its main role is to create a regulatory framework for the shipping industry that is fair and effective, universally adopted and universally implemented. Through IMO, member States, civil society and the shipping industry work together to ensure a continued and strengthened contribution towards achieving a green economy and sustainable growth. As part of the United Nations family, IMO is actively involved in the implementation of the 2030 Agenda and efforts aimed at achieving the associated Sustainable Development Goals.

Chapter 4

The **Food and Agriculture Organization of the United Nations (FAO)** is a specialized agency mandated with leading international efforts to defeat hunger while improving nutrition and food security.

The goal of FAO is to ensure that all people have regular access to sufficient high-quality food to lead active, healthy lives. With more than 194 member States, FAO works in more than 130 countries. It supports governments and development agencies in their activities to improve and develop agriculture, forestry, fisheries and land and water resources. It also conducts research, provides technical assistance to projects, operates educational and training programmes, and collects data on agricultural output, production and development.

Chapter 5: **UNEP** (See above)

ACRONYMS

APEC	Asia-Pacific Economic Cooperation
CO₂	carbon dioxide
ESCAP	Economic and Social Commission for Asia and the Pacific
FAO	Food and Agriculture Organization of the United Nations
GDP	gross domestic product
IOC-UNESCO	Intergovernmental Oceanographic Commission of the United Nations Educational, Scientific and Cultural Organization
IMO	International Maritime Organization
ICT	information and communications technology
IMF	International Monetary Fund
IPCC	Intergovernmental Panel on Climate Change
IOTC	Indian Ocean Tuna Commission
IUCN	International Union for Conservation of Nature
LNG	liquefied natural gas
Mt	metric ton
NO₂	nitrogen dioxide
NO_x	nitrous oxides
OECD	Organisation for Economic Co-operation and Development
SO_x	sulfur oxide
UNCTAD	United Nation Conference on Trade and Development
UNEP	United Nations Environment Programme
UNESCO	United Nations Educational, Scientific and Cultural Organization
USAID	United States Agency for International Development
WCMC	World Conservation Monitoring Centre

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EXECUTIVE SUMMARY

I. Introduction

The oceans and its resources are the lifelines of Asia and the Pacific. While being the resource for some of the region's key economic sectors, such as seaborne trade, fisheries and tourism, oceans are also the source of well-being, culture and identity for thousands of coastal communities. The conditions of the oceans are inextricably linked to the pathways to sustainable development in Asia and the Pacific.

Various indicators, however, are suggesting that the oceans are becoming more fragile with the pressing impacts of climate change and marine pollution as two of the key factors behind their deterioration. Unsustainable economic practices, such as overfishing, are reducing fish stock to biologically unsustainable levels.

The recent COVID-19 pandemic has led to a temporary shutdown of industrial activities, closing schools and other institutions, significantly reducing transport and human mobility worldwide. This has resulted in a substantial reduction in pollution. The outbreak is providing an opportunity for fish stocks to recover, and more generally to promote more resilient and sustainable practices. For instance, China experienced a reduction of CO₂ emissions by at least 25 per cent during February 2020, potentially saving thousands of lives by curbing air pollution (Burke, 2020). Such indicators show that decisive action taken by governments can have an immediate positive effect on global challenges, such as climate change and the plight of the oceans.

Many of the challenges in the conservation and sustainable use of the oceans and marine resources lie in the transboundary and highly complex nature of ocean management. This is coupled with the fragmented understanding of the interaction between oceans and human activities. In this context, multi-stakeholder dialogues and partnerships are essential to effectively address the current fragmented actions related to oceans.

II. Strengthening data and statistics for Sustainable Development Goal 14

The Asia-Pacific region has yet to meet the data demands of the globally agreed follow-up and review mechanisms for the 2030 Agenda for Sustainable Development, in particular Sustainable Development Goal 14 on the conservation and sustainable use of oceans, seas and marine resources for sustainable development. Among the ten globally agreed indicators for Goal 14, sufficient data are available for only target 14.5 on the conservation of coastal and marine areas and a proxy indicator for target 14.1 on reducing marine pollution. The limited data available suggest that the region is not on track to achieve Goal 14 by 2030. Significant knowledge gaps remain in terms of ocean acidification, fisheries and fishing-related activities, and economic benefits for small island developing States and the least developed countries. Existing analyses in these areas accordingly use non-official data sources.

The dearth of data for Goal 14 can be attributed to insufficient global methodological development, limited country-level experience in collecting ocean data and high cost of collecting data across the exclusive economic zones. Many national statistical systems in the region are not well-equipped to tackle the challenge of coordinating the production and use of ocean data across different national sectors. At the same time, the data gaps are uneven, often being the largest in countries where they are needed the most and where there is limited institutional capacity for data collection and analysis. This calls for regional collaboration to extend support to countries where data and institutional capacity gaps are the largest, and advance efforts to harmonize data across stakeholders.

III. Transitioning towards inclusive and sustainable maritime shipping

The exponential growth of seaborne trade and increased maritime connectivity in Asia and the Pacific has been coupled with a persistent connectivity gap and concerns over the industry's safety and efficiency. Despite the burgeoning growth of shipping services in the region, the Pacific remains isolated from global and regional maritime trade. The maritime shipping industry in Asia and the Pacific must also deal with the growing demand to reduce marine-related casualties and accidents and optimize operations. Regional dialogue is essential to engage the global and regional shipping industry to address the connectivity needs of the Pacific islands countries and territories and develop tangible solutions towards marine connectivity that is more inclusive, safe and efficient.

The sustainability of the maritime transport sector is intrinsically linked to addressing the safety issues and environmental impacts of shipping on the oceans. CO₂ emission from international shipping is projected to grow by between 50 and 250 per cent by 2050, depending on future economic growth and energy development (IMO, 2015). While the impact of recent curbs in maritime transport stemming from the COVID-19 pandemic are still unknown, CO₂ emissions from international shipping may bounce back to pre-pandemic levels and then climb to higher levels if measures to mitigate environmental impacts are not implemented. Many international conventions, norms and standards have been put in place to promote safer and more sustainable shipping. Among them are the International Convention for the Prevention of Pollution from Ships, the International Convention for the Control and Management of Ships' Ballast Water and Sediments and the International Convention for the Safety of Life at Sea through the guidance of the International Maritime Organization (IMO). The enforcement of such international instruments is essential for enabling the sector to attain green and sustainable maritime shipping.

IV. Strengthening sustainable fisheries

Coastal and offshore fisheries play a vital role in the socioeconomic development and cultures of many countries in the region. In 2014, fisheries and aquaculture production in the Pacific was estimated to have been approximately two million metric tons, worth \$3.2 million (Gillett, 2016). Eighty-five per cent of the global population engaged in in the sector in 2016 was in in Asia (FAO, 2018a). The world's fish stock, however, is showing signs of deterioration. Coastal fishery resources are being depleted because of habitat degradation and overexploitation, especially in areas close to population centres, in order to meet the demand of growing Asian economies.

The scientific monitoring and management of capture fisheries is modest and characterized by insufficient knowledge about fish stocks and fishery activities. Transboundary industrial scale fisheries are constrained by restrictions on data sharing, while coastal fisheries suffer from an absence of information. Limited data sharing reduces the opportunity for integrated and nuanced analysis of fisheries. More open systems for sharing and harmonizing data across national statistical systems would serve as a much needed solution to the current data gaps.

The challenges of managing marine capture fisheries also lie in governance and regulatory constraints to enforce fisheries legislation. Many multilateral agreements and voluntary instruments are in place, including, among them, the Convention on Biological Diversity, the Code of Conduct for Responsible Fisheries, which was adopted in 1995 by the members of FAO, and the Agreement on Port State Measures to Prevent, Deter and Eliminate Illegal, Unreported and Unregulated Fishing. The implementation of these agreements in national jurisdictions is critical for the conservation and sustainable use of oceans by closing the potential loopholes for destructive fishing practices, overfishing and illegal, unreported and unregulated fishing. This requires the translation of multilateral agreements into national fisheries laws and policies and regional cooperation to build institutional capacity for enforcement where it is needed the most.

V. Curbing the marine plastic pollution

Marine plastic pollution has become an urgent sustainable challenge for Asia and the Pacific. It is driven by the growing production of plastic, increasing dependence on single-use plastic in daily lives, and weak national systems for waste management. Responding to the growing threat of marine plastic pollution has become imperative.

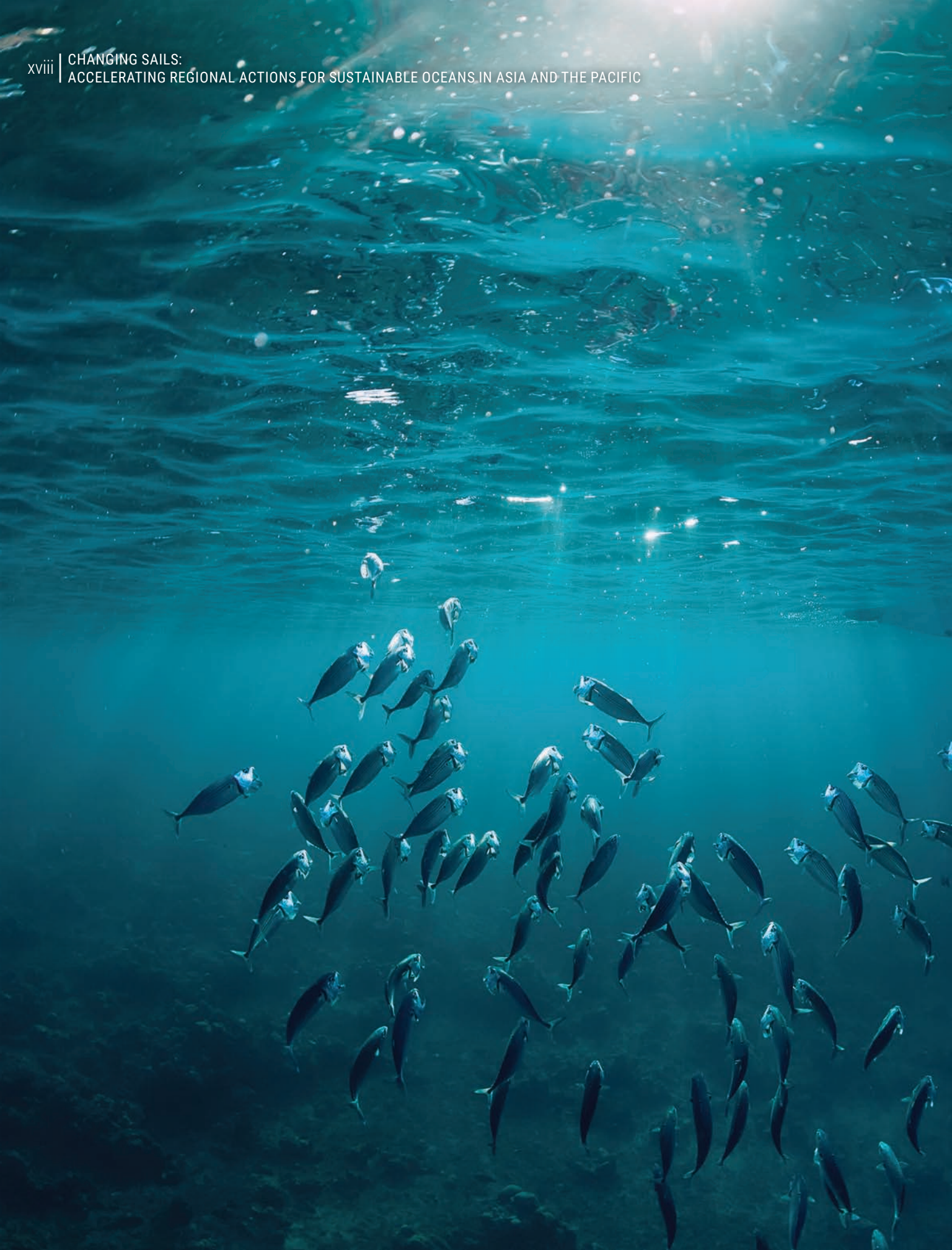
The level of ambition for curbing plastic waste has been raised in international conventions and multilateral agreements on marine pollution, such as the Basel Convention on the Control of Transboundary Movements of Hazardous Wastes and Their Disposal and the ASEAN Framework of Action on Marine Debris. Transformative actions depend on the development and enforcement of effective national policies and frameworks in accordance with such international instruments.

Regional dialogues and partnerships are essential to share and scale up innovative national policies and scientific and technological advancements for curbing the growing pressure of plastic waste. The region is home to pioneer countries in banning single-use plastics. Among them are Bangladesh, Bhutan, India, Mongolia and Papua New Guinea. Regional platforms, such as the Asia Pacific Day for the Ocean, present potential avenues for regional exchange of information, good practices, data and statistics, and technical assistance to accelerate progress toward achieving Sustainable Development Goal 14.

VI. Towards transformative actions for the oceans

To transform actions for the oceans across the areas of examination, two strategic entry points for national-level actions are presented in the report. First, investment in enhancing national statistical systems and more transparent sharing of ocean data is key to resolving the existing blind spots in the understanding of and actions related to the oceans. Second, consistent enforcement of existing international conventions, frameworks, norms and standards is fundamental to the overall protection and sustainable use of the oceans.

To assist efforts aimed at achieving national results, two strategic entry points for regional cooperation are given in the report. First, regional cooperation supports the enforcement and monitoring of international conventions, frameworks, norms and standards by providing the required technical support where needed. Second, strengthening inclusive and action-oriented regional platforms, such as the Asia Pacific Day for the Ocean, offers a pathway for establishing meaningful partnerships, effective follow-up and review, and inclusive sharing of experience across stakeholders and countries.





Chapter 1

Introduction: sustainable management of oceans

1.1. The importance of oceans

The Economic and Social Commission for Asia and the Pacific (ESCAP), at its seventy-fifth session, held in Bangkok from 27 May to 31 May 2019, selected “Promoting economic, social and environmental cooperation on oceans for sustainable development” to be its theme topic for its seventy-sixth session.¹ The decision was aligned with the Sustainable Development Goal 14 – “Conserve and sustainably use the oceans, seas and marine resources for sustainable development”. It was also timely in that the United Nations Ocean Conference was scheduled to be held in Lisbon from 2 to 6 June 2020 under the theme “Conserve and sustainably use the oceans, seas and marine resources for sustainable development”.

Such prominent international support and attention to oceans reflects the invaluable benefits they provide to the planet. First, coastal systems, such as mangroves, salt marshes and seagrass meadows, are at the frontline of climate change and can absorb carbon at rates of up to 50 times those of the same area of tropical forest (UNESCO, n.d.). Oceans are also extremely valuable for biodiversity. An estimated 50 to 80 per cent of all life on Earth is found under the ocean surface. Oceans contain 99 per cent of the living space on the planet, with less than 10 per cent of that space having been explored by humans (MarineBio, 2019). Of

¹ ESCAP/75/32

the entire ocean, 85 per cent of the area and 90 per cent of the volume constitute the dark, cold environment referred to as the deep sea. Sea-fringing areas, where the sun can reach, support most of the biodiversity. For instance, although coral reefs occupy just 0.1 per cent of the bottom of the ocean, they provide support approximately 25 per cent of all marine life and tropical fisheries, sustain coastal economies that depend on reefs-related tourism, and supply food for hundreds of millions of people (World Wildlife Fund, 2020).

Considering economic sectors, shipping is the ocean-based industry most vital for trade, and is closely linked to the rest of the ocean-related economic activities, such as port operations, and shipbuilding or repair. The shipping industry uses the marine ecosystem as an “input” and directly affects its health. This impact has grown over time. For example, in line with the continually rising “use” of oceans, maritime trade increased at an annual average growth rate of 3.4 per cent between 2006 and 2018, with economic growth being a major factor supporting the increase (UNCTAD, 2019b).

The recent COVID-19 pandemic has led to a temporary shutdown in many activities, especially those related to shipping and transport, and tourism. The economic and social impact of the pandemic on the Asian-Pacific region will be hard felt, however a quantifiable amount of the effect is not yet possible to ascertain. Service sectors, such as tourism, rely heavily on oceans. For example, the total contribution of shark-diving to the economy of Fiji was estimated in 2011 at \$42.2 million, composed of the revenue generated by the industry combined with the departure taxes paid by shark divers to the Government (Vianna and others, 2011). This link with tourism is very significant, especially when considering the global trends of the sector. Tourism has been growing steadily, at a rate of 5 per cent, over the past 40 years. This growth is estimated to continue at a similar pace at least until 2030, with most of it being in Asia and the Pacific (World Tourism Organization, 2011).

It is important to note that the influence of fisheries permeates every aspect of life in small island developing States in the Asia-Pacific region, with much of these economies’ nutrition, welfare, culture, employment and recreation dependent on the resources between the shoreline and the outer reef. For instance, average fish consumption in Pacific small island developing States is two to three times higher than the global average of

fish consumption per capita (Gillett, 2016). At the State level, fisheries provide financial resources for national budgets and most of the employment and food security for households in coastal communities.

For these reasons, oceans are a precious asset for sustainable development in general, and especially for small island developing States, which can greatly benefit from them thanks to their exclusive economic zones. Recognized in 1982 in the United Nations Convention on the Law of the Sea, a country’s exclusive economic zone is an area over which a State has exclusive rights with regard to the exploration and use of marine resources, including fisheries and seabed exploration. Beyond countries’ exclusive economic zones, oceans are referred to as “high seas”. The exclusive economic zones typically extend 200 miles from the shore, but they cover up to 350 nautical miles if countries can prove that the claimed area is a natural prolongation of their land territory. While it has taken small island developing States years to efficiently take advantage of their exclusive economic zones, the official recognition of them gives these economies a considerable source of wealth to use for sustainable development.

1.2. The health of oceans in the Asia-Pacific region

A wide variety of indicators show that, despite the vital importance of oceans, their health is very fragile in most countries in the Asia-Pacific region. Figure I shows results of the Ocean Health Index for the exclusive economic zone of each coastal country in Asia and the Pacific, while figure II shows that in the high seas, the situation is even more precarious – mostly because of overfishing.²

² “The Index assesses the health of the high seas across three goals: food provision; sense of place; and biodiversity. Other benefits evaluated by the global Ocean Health Index, such as mariculture, natural (non-food) products, opportunities for artisanal fishing and coastal protection do not occur there and accordingly, cannot be evaluated. Two other goals, tourism and recreation, and livelihoods and economies occur on the high seas when cruise ships or merchant ships transit in those waters. Their benefits, however, accrue where the trips originate and visit, so they are not evaluated for the open ocean itself, but are accounted for in the coastal countries or territories where those activities originate or take place. The high seas provide other important general benefits, such as climate regulation and oxygen production by plant plankton that the Index does not assess”. Source: Ocean Health Index. Available at <http://www.oceanhealthindex.org/>.

Figure I Ocean Health Index: Asia-Pacific exclusive economic zones

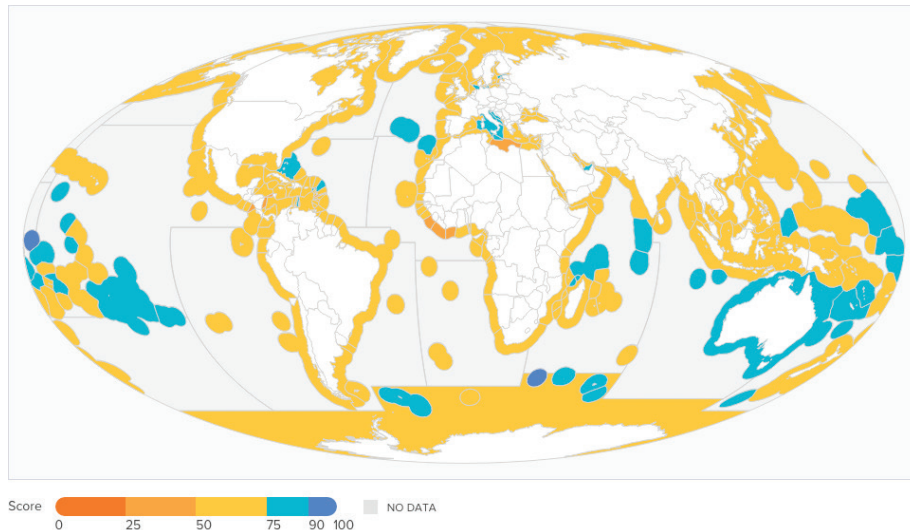
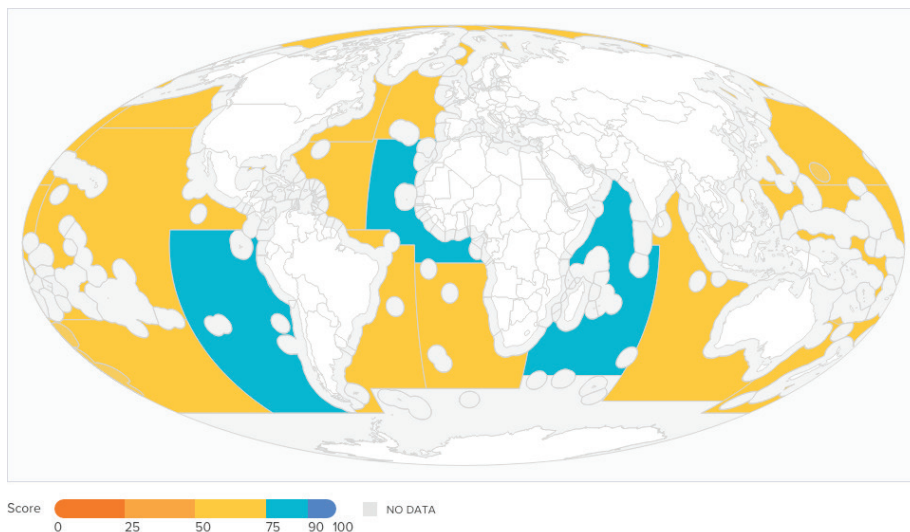


Figure II Ocean Health Index: high seas



Source: National Center for Ecological Analysis and Synthesis and Conservation International (<http://www.oceanhealthindex.org/region-scores/maps>) based on original research of Halpern and others (2012).

Several factors contribute to the fragile situation of oceans in the Asia-Pacific region. One of the most prominent factors is climate change. Table 1 shows the broad range of consequences climate change is having in different parts of the world (IPCC, 2019). Globally, the sea level has risen because of a prominent loss of mass from ice sheets and glaciers (IPCC, 2019). In parallel, the ocean has taken up between 20 and 30 per cent of total anthropogenic CO₂ emissions since the 1980s, causing further acidification (IPCC, 2019). More than 50 per cent of the world's reefs have died in the last

30 years and more than 90 per cent of the remaining reefs are projected to die by 2050 (Secore International, n.d.). Oceans are also warming, which facilitates more frequent and more intense atmospheric extreme events. The impact of these changes can be observed on coastal ecosystems, which are extremely fragile and where the biodiversity is deteriorating (IPCC, 2019). For the countries in Asia and the Pacific, there has been an ongoing decrease in the pH of the water and increased loss of oxygen, which has further detrimental impacts on ecosystems and humans.

Table 1
Observed regional impacts from changes in the oceans and the cryosphere

		Ocean											LEGEND						
		Arctic	EBUS ¹	North Atlantic	North Pacific	South Atlantic	South Pacific	Southern Ocean	Temperate Indian Ocean	Tropical Atlantic	Tropical Indian Ocean	Tropical Pacific							
Greenhouse Gases	Physical changes	Temperature	●●	●	●●	●●	●●	●●	●●	●●	●●	●●	●●	●●	●●	●●	●●	●●	
		Oxygen		●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
		Ocean pH	●●●	●●●	●●●	●●●	●●●	●●●	●●●	●●●	●●●	●●●	●●●	●●●	●●●	●●●	●●●	●●●	●●●
		Sea ice extent	●●●																
Climate Change	Ecosystems	Sea level	●	●●	●●	●●	●●	●●	●●	●●	●●	●●	●●	●●	●●	●●	●●	●●	
		Upper water column	●●	●	●●●	●●	●●	●●	●●	●●	●	●●	●	●●	●	●●	●	●●	●●
		Coral			●			●●●			●●●	●●●	●●●	●●●	●●●	●●●	●●●	●●●	●●●
		Coastal wetlands			●●	●●	●●	●●	●●	●●	●●	●●	●●	●●	●●	●●	●●	●●	●●
		Kelp forest	●●	●●	●●	●●	●●	●	●	●	●	●	●	●	●	●	●	●	●
		Rocky shores	●●		●●●	●●					●●								●
	Human systems and ecosystem services	Deep sea				●													
		Polar benthos	●●						●●	●●									
		Sea ice-associated	●●						●●	●●									
		Fisheries	●●	●	●●●	●	●	●	●	●	●	●●	●	●●	●	●	●	●	●
Human systems and ecosystem services	Tourism	●●	●		●●			●	●	●	●	●	●	●	●	●	●	●	
	Habitat services	●●	●	●●●	●●			●●	●●	●●	●●	●●	●●	●●	●●	●●	●●	●●	
	Transportation/shipping	●●																	
	Cultural services	●●		●	●			●	●	●	●	●	●	●	●	●	●	●	
	Coastal carbon sequestration			●●	●●	●●	●●	●●	●●	●●	●●	●●	●●	●●	●●	●●	●●	●●	

¹ Eastern Boundary Upwelling Systems (Benguela Current, Canary Current, California Current, and Humboldt Current).

Source: IPCC (2019)

The effects of climate change on the ocean, such as those resulting from overfishing and natural disasters, are exacerbating the existing vulnerabilities of communities that depend on coastal fisheries. This is extremely worrying because coastal fisheries are responsible for most of the fishing sector’s contribution to food and employment. Accordingly, steps to assure the continuation of coastal fisheries are of paramount importance.

A second factor is marine pollution. Agricultural practices, coastal tourism, port and harbour developments, damming of rivers, urban development and construction, fishing gear, aquaculture and old, energy-inefficient ships, are sources of marine pollution that threaten coastal and marine habitats. For example, 35,000 square kilometres of mangroves, an area about the size of Belgium, were removed globally between 1980 and 2005 to make way for human development or the creation of shrimp farms (CBC News, 2011).

Economic sectors closely linked to oceans also need to operate in a more sustainable manner. For example, although shipping is considered to be one of the most environmentally friendly modes of transport, it still causes various kinds of damage to the components of marine ecosystems, ranging from several types of

air and water pollution to direct threats to marine flora and fauna.

When it comes to litter, plastic deserves special attention. While it is difficult to assess how much plastic lies in the oceans, estimates indicate that approximately 4,900 metric tons (Mt) (60 per cent of all plastics ever produced) has been discarded, and is accumulating in landfills or in the natural environment (CBC News, 2011). The main mechanism through which plastic affects humans and animals is clear; it is ingested and accumulates in the body, eventually leading to diseases, such as in the case of microplastics, or even suffocation, as has been seen in whales.

The third factor contributing to the deterioration of oceans is overfishing. This is happening mostly in areas close to large population centres, and for fishery products in demand from rapidly growing Asia-Pacific economies, such as sharks fins. Overfishing is threatening ecological integrity and food security, with the percentage of stocks fished at biologically unsustainable levels increasing from 10 per cent in 1974 to 33.1 per cent in 2015 (FAO, 2018a). Commercial overexploitation of the world’s fish stocks is so severe that up to 13 per cent of the global fisheries have collapsed (UNESCO, n.d.). Not only is it the total amount

of fish catch; catching juvenile fish before they can reproduce or targeting key species, such as sharks, alter the overall ecological balance between species, which has very negative consequences for the sustainability of ecosystems. To combat overfishing, it is crucial to involve the private sector. This can be done in a variety of ways, such as involving them in the imposition of fishing moratoria, public private partnerships for conservation or research, or the organization of multi-stakeholder forums.

Illegal, unreported and unregulated fishing is a key factor resulting from overfishing. Decreasing illegal, unreported and unregulated fishing could reduce losses up to \$23.5 billion, or 20 per cent of all wild marine catches (United Nations, 2017b). A cross-cutting factor that has contributed to increasing illegal, unreported and unregulated fishing and the deterioration of oceans more generally is the widespread use of technology. Technological innovations in areas, such as intensive fishing through the use of Global Positioning System (GPS)-controlled fish-aggregating devices, or deeper oil and gas drilling, have reduced the cost of working in areas that historically were not under threat. This has increased illegal, unreported and unregulated fishing and the associated environmental risk. On the other hand, it should be noted that technological innovations are also being applied towards conservation, which is essential to improve the capacity of small island developing States and other States in tackling illegal, unreported and unregulated fishing.

A fundamental tool used to tackle illegal, unreported and unregulated fishing, and more broadly to bring about additional benefits for the effort to achieve sustainable development in small island developing States is regional cooperation. For instance, through the Parties to the Nauru Agreement Concerning Cooperation in the Management of Fisheries of Common Interest, the negotiation process to sell fishing licences to distant-water fishing countries in the tuna fisheries of the Pacific was reshaped to coordinate as one block. This increased the bargaining power of the small island developing States, and as a result, revenue from fishing license fees increased from \$220 million in 2012 to \$470 million in 2016 (Pacific Islands Forum secretariat, 2018), accounting for as much as 75 per cent of Government budgets in countries, such as Kiribati (Gillett, 2016).

1.3. Challenges for the sustainable management of oceans

Given the unique value of oceans and their fragile health, it is important to understand the key challenges involved in their sustainable management:

Although exclusive economic zones are managed by countries, they are common property resources. Two specific characteristics associated with them are worth noting. First, as there are no clear fences or borders, access to them by fishing boats is easy, which makes law enforcement, such as against illegal, unreported and unregulated fishing, critical. Small island developing States, often with exclusive economic zones which can be many thousand times the size of their land territory, lack the capacity and resources to conduct such law enforcement. Second, the resources caught, fish, are a rival good: if a fisherman catches a fish, nobody else can catch it. This results in a situation in which fishermen's incentives are to catch as much fish as possible as quickly as possible. Given that open waters are not managed by individual countries, this phenomenon is even more pronounced in the high seas, which helps explain why their health is worse than in countries' exclusive economic zones. This is a manifestation of the "tragedy of the commons".

Another challenge for other sustainable management of oceans is externalities. This is a type of market failure in which the environmental cost is not internalized in the price and specific agents' actions have an impact on other agents. Negative environmental externalities, notably carbon emissions, are the root cause of climate change, with the small island developing States at the frontline of its impact. Warmer air and sea surface temperatures, ocean acidification, rising sea levels and greater rainfall are expected to reduce significantly the habitats that provide shelter and food for coastal fish and shellfish. In the long run, this is likely to further deteriorate coastal fisheries. Also due to climate change, tuna are likely to move progressively to the east, leading to a slow transfer of resources that will have important implications. A greater number of tuna will be in the high seas, where there are less controls, which, in turn, would likely result in an increase in overfishing, and where distant-water fishing countries, which are generally more responsible

for climate change, need not pay fishing access fees. In parallel, contributions from tuna to the economies of small island developing States in the west Pacific will decline, while those in the central and eastern Pacific will increase.

Institutional or regulatory factors also have a considerable influence. For instance, climate change mitigation requires global collaboration among countries, the level of which may not always be optimal. Similarly, within countries, political interests often make it difficult to achieve the level of action needed to conserve oceans. For example, the resources needed for illegal, unreported and unregulated fishing surveillance may be raised through the elimination of harmful subsidies or hikes in fees, fines and penalties, but these are often politically difficult to set and enforce.

Lack of data and information is also a significant obstacle to gaining an understanding on how to manage oceans more sustainably. This comprises several elements. The cost of inaction may only become visible when it is too late, as shown by the historical collapse of fisheries such as the Atlantic northwestern cod. While varied, the reasons include a piecemeal approach to countries' data gathering on oceans, as well as insufficient data sharing. Limited data sharing results in the amount and quality of data often being weak and not uniform, which complicates efforts to gain a deeper understanding of the state of the oceans. A thorough understanding of the value of ecosystems, such as for jobs and revenue, can help mobilize the public and political elites to follow more sustainable practices. A remarkable effort in this direction is the System of Environmental Economic Accounting and the accompanying Experimental Ecosystem Accounting, a framework that integrates economic and environmental data to provide a comprehensive, multipurpose view of the interrelationships between the economy and the environment, including the changing stocks of environmental assets, such as oceans' biodiversity.³

An additional challenge to sustainably management of oceans is the lack of knowledge that can be translated into action. While this is clearly rooted in the absence of high-quality data, it is also related to the lack of practical research and innovation that can be widely disseminated and translated into environmental conservation initiatives. For instance, in recent years,

it has been proven that innovative techniques, such as microfragmentation, make it possible for coral to grow 25 to 50 times more rapidly than normal, thereby making coral reef regeneration easier (Price-Waldman, 2016).

The final challenge is financial. It has been estimated that the cost to achieve Sustainable Development Goal 14 globally is \$174 billion annually (Johansen and Vestvik, 2020). Of this amount, the greatest resources, \$87 billion, must be devoted to combating marine pollution. This is followed by ecosystems protection, \$40 billion, and fisheries, \$28 billion. While there are no estimates specifically for Asia and the Pacific, the global numbers indicate that the financial challenge at the regional level would be large, but manageable. This is especially the case if the contribution of the private sector is increased and greater use is made of innovative financing tools. There is, however, a clear need for regional financial cooperation to assist vulnerable regional countries with limited resources, such as small island developing States, to meet the financial needs.

Just as the policy response to the current COVID-19 pandemic underscores the importance of coordinated and evidence-based policy measures, grounded in strong political will and commitment to sustainability, the Asia-Pacific response to the plight of the oceans requires the same focus on environmental sustainability of economic and social activities in the long run. These policies need to be directed to multiple fronts and have clear goals and targets. Measures include investing in human and institutional data capacity, leveraging technology and innovation for shipping and marine debris, improving industrial fishing practices, and supporting other mechanisms that contribute to the sustainable management of oceans.

To summarize, oceans are extremely valuable for Asia and the Pacific, a region that uses them intensely. Despite this, the region has taken the benefits of oceans for granted, which has contributed to their current very fragile health. This situation must be reversed. Experience shows that in some areas, recovery is possible and can be quick, but it is not easy. Indeed, managing oceans sustainably is structurally a complex, multisectoral issue that requires a thorough understanding of the incentives at play. It also requires innovative solutions and regional cooperation

³ For more information see <https://seea.un.org/>.

involving all stakeholders, including governments, the private sector and other relevant entities, such as local communities. This report is an effort in this direction and its structure is as follows: chapter 2 contains analyses of the state of data on oceans. In chapter 3, the current state of fisheries is reviewed in detail and chapters 4 and 5 delve into pollution and marine connectivity, respectively. Based on these analyses, chapter 6 concludes with a set of specific recommendations for policymakers to consider.





Fisheries and Oceans
Canada

Pêches et Océans
Canada



UNITED NATIONS
ESCAP
Economic and Social Commission for Asia and the Pacific

UN
environment
programme



United Nations
Educational, Scientific and
Cultural Organization



Intergovernmental
Oceanographic
Commission

Chapter 2

Data on Sustainable Development Goal 14: life below water in Asia and the Pacific

2.1. Introduction

National official data sources and data produced by national statistical systems are at the heart of the follow-up and review of the 2030 Agenda, which is guided by a set of principles, including “that the global review will be primarily based on national official data sources.”⁴ Furthermore, “follow-up and review at the high-level political forum will be informed by an annual progress report on the Sustainable Development Goals (...) based on the global indicator framework and data produced by national statistical systems and information collected at the regional level.”⁵

Asia and the Pacific, similar to most regions in the world, is struggling to meet the data demands of the globally agreed follow-up and review mechanisms for the 2030 Agenda. For Goal 14, the challenge is especially great. Data are sufficient to measure progress related to only one of the ten globally agreed Sustainable Development Goals indicators for Goal 14. While the COVID-19 pandemic has turned the spotlight on the value and need for data-driven decisions, addressing the data challenges for Goal 14 may become even more difficult as the world diverts its attention to data challenges associated with the global outbreak.

⁴ A/RES/70/1, para 74.

⁵ Ibid, para. 83.



The present chapter provides an overview of progress made regarding data availability and reporting for Goal 14 in Asia and the Pacific, the home of the Indian and Pacific Oceans. It includes discussions on the challenges in accelerating action as the world ushers in the Decade of Action to deliver the Sustainable Development Goals and the United Nations Decade of Ocean Science for Sustainable Development (2021–2030).

2.2. Life below water explained

Sustainable Development Goal 14: Life below water, seeks to conserve and sustainably use the world's oceans, seas and marine resources for sustainable development. The Goal includes the following globally agreed targets:

- Prevent and significantly reduce marine pollution (14.1)
- Management, conservation, protection and use of marine and coastal ecosystems (14.2); conserve coastal and marine areas (14.5); enhance the conservation and sustainable use of oceans and their resources (14.c)
- Minimize and address the impacts of ocean acidification (14.3)
- Regulate harvesting and end overfishing illegal unreported and unregulated fishing and destructive fishing practices and implement science-based management plans (14.4); providing fisheries subsidies (14.6); and provide small-scale artisanal fishers to marine resources and markets (14.b)
- Increase economic benefits to small island developing States and least developed countries from the sustainable use of marine resource (14.7) and increase scientific knowledge, develop research capacity and transfer marine technology (14.a).

Six of the ten targets have agreed years by which the ambitions are to be reached. The targets on management, conservation, protection and use of marine and coastal ecosystems (14.2); coastal and marine areas (14.5); fishing and science-based management plans (14.4); and fisheries subsidies

(14.6) are to be achieved by 2020. Target 14.1 on marine pollution is to be reached by 2025; and the target on economic benefits to small island developing States and least developed countries (14.7) is to be reached by 2030. There is no explicit time frame for the remaining four targets.

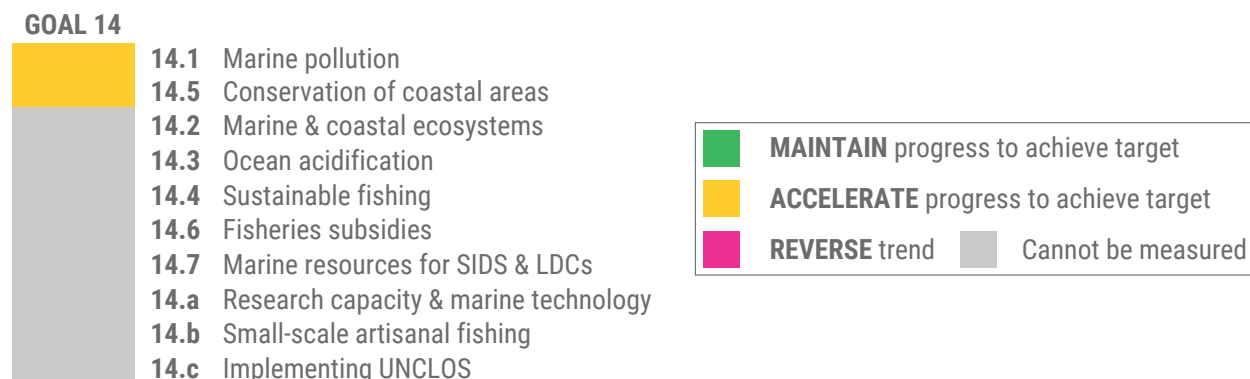
2.3. Progress towards achieving the targets of Sustainable Development Goal 14

Figure III contains an Asia-Pacific Sustainable Development Goals dashboard, which presents estimates of the region's likelihood to achieve Goal 14 targets. The dashboard colour-codes progress: green (maintain progress to achieve the target); yellow (accelerate progress to achieve the target); and red (reverse trend to achieve the target). The high number of targets that are grey indicates data are insufficient to assess progress for most targets. Only for targets 14.1 and 14.5 on marine pollution and conservation of coastal areas are data sufficient to assess progress (and in the case of marine pollution, data are only available for an approved proxy indicator). For both targets, the Asia-Pacific region needs to accelerate progress for them to be realized. Insufficient or missing data have resulted in large information gaps about ocean acidification, fishing and fisheries, economic benefits for small island developing States and least developed countries, and research efforts.

By subregions in Asia and the Pacific, with the exception of North and Central Asia, which is predominantly landlocked and data are not available, the conservation of coastal and marine areas (target 14.5) needs to be increased significantly. Trends related to marine pollution need to reverse in two subregions (East and North-East Asia and South and South-West Asia) and progress needs to accelerate in two others (Pacific and South-East Asia) (figure IV).

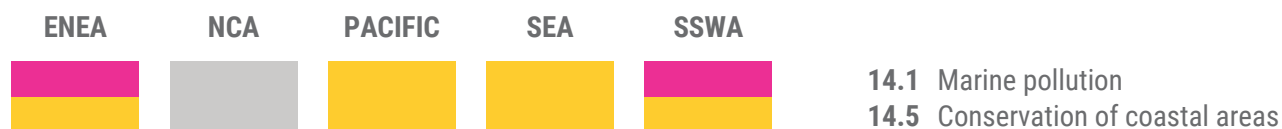
The latest United Nations Environment Programme Global Environment Outlook (GEO 6) paints a dim view of the current state of oceans data and knowledge world-wide (see box 1). In Asia and the Pacific, the current state of oceans data and knowledge is equally dim. The paucity of data can be attributed to a lack of history in terms of global methodological development, lack of country-level experience in collecting ocean data, and the high cost of collecting data across exclusive economic zones.

Figure III Sustainable Development Goal 14 dashboard for Asia and the Pacific, 2019



Note: SIDS, small island developing States; LDCs, least developed countries; UNCLOS, United Nations Convention on the Law of the Sea.

Figure IV Sustainable Development Goal 14 dashboard for subregions in Asia and the Pacific, 2019



Note: ENEA: East and North-East Asia; NCA: North and Central Asia; SEA: South-East Asia; SSWA: South and South-West Asia.

Box 1

The current state of oceans and knowledge

Ocean data have many gaps, which is unsurprising as satellite observations cannot penetrate below surface waters. Most oceanic data are collected by direct measurement or modelling, so it is difficult to obtain good coverage for a vast environment that extends over 70 per cent of the surface of Earth. Some issues can be attributed to lack of global coordination, as there are no global databases for either coral reefs or marine litter. The National Oceanic and Atmospheric Administration maintains the largest coral reef database, but it does not draw upon all sources globally. Similarly, marine litter data are collected by different countries with different protocols and have not been globally consolidated. In addition to litter abundance and distribution, significant knowledge gaps exist regarding the ecological impacts of marine litter, including the toxicity of ingestion, impacts of nanoparticles and microplastics, and how plastics ingested by fish affect human consumption.

Global fish catch data are maintained by FAO to which all countries report annual national landings by species or species group. Commercial fishing catches are better monitored in developed countries, but are almost certainly underestimated, as illegal and unreported fishing could constitute as much as 40 per cent of total catch in some areas (Agnew and others, 2009). In countries with fewer resources devoted to reporting, landings estimates are often based on administrative reporting and are, therefore, less reliable. Obtaining fisheries-independent data through other means, such as research vessels, are expensive, making costs a major impediment in developing countries where even catch monitoring in ports may not be economically viable.

Source: UNEP (2019a).

2.4. Monitoring progress towards achieving Sustainable Development Goal 14⁶

To better understand why data availability is a challenge in Asia and the Pacific, it is necessary to first understand how Goal 14 targets are monitored and which indicators and establish the global data custodians for the indicators. Table 2 provides an overview of Goal 14 indicators, custodian agencies and tier classifications. Goal 14 targets are monitored by 10 global Sustainable Development Goals indicators and three approved proxies.⁷ One of the global Sustainable Development Goals indicators has two parts (14.1.1a – Index of coastal eutrophication and 14.1.1b – plastic debris density), but is counted as one in the global Sustainable Development Goals indicator framework.⁸

In table 2, the 10 indicators are categorized into five themes – marine pollution; protection, conservation, management and use; acidity; fishing, fishers and fisheries; and economic measures (ESCAP classification).

Monitoring of the ten life below water indicators is conducted by six global data custodians: Food and Agriculture Organization of the United Nations (FAO); Intergovernmental Oceanographic Commission of the United Nations Educational, Scientific and

Cultural Organization (IOC-UNESCO); United Nations Environment Programme (UNEP); United Nations Environment World Conservation Monitoring Centre (UNEP-WCMC) with UNEP and the International Union for Conservation of Nature (IUCN); and the Office of Legal Affairs of the United Nations Division of Ocean Affairs and the Law of the Sea. The global data custodians are responsible for, among other things, providing metadata and guidance to countries on how to compile the indicators, developing international standards and strengthening national monitoring and reporting capacity.⁹

Life below water is monitored by five tier I indicators,¹⁰ meaning data are regularly produced by at least 50 per cent of the countries and of the population in every region¹¹ where the indicator is relevant, the indicator is conceptually clear and has an internationally established methodology, and standards are available. Life below water is also monitored by four tier II indicators, meaning data are not regularly produced by countries despite the indicator being conceptually clear, with an internationally established methodology and with standards available. Life below water is monitored by one tier III indicator, meaning no internationally established methodology or standards are currently available for the indicator, but methodology or standards are being (or will be) developed or tested.

⁶ The global SDG indicator framework was reviewed by the Statistical Commission in March 2020 and refinements to two Goal 14 indicators (14.1.1 and 14.2.1) were approved. The present study references the global SDG indicator as of November 2019 and hence does not reflect the refinements approved in March 2020.

⁷ The Statistical Commission agreed, at its fiftieth session, held in New York from 5 March to 8 March 2019, that proxies may be used in global monitoring exercises to allow reporting on targets, while the methodological work on tier III indicators continues until data are available. See Official Records of the Economic and Social Council, 2019, Supplement No. 4 (Decision 50/101). Data custodians are not necessarily in agreement with the approved proxies.

⁸ The Statistical Commission agreed, at its forty-seventh session, held in New York from 8 to 11 March 2016, to a global Sustainable Development Goal indicator framework developed by the Inter-Agency and Expert Group on Sustainable Development Goals Indicators.

⁹ Other responsibilities include the following: compiling and verifying country data and metadata; submitting country data along with regional and global aggregates to the United Nations Department of Economic and Social Affairs Statistics Division; validating and obtaining approval from countries for data submitted to the United Nations Department of Economic and Social Affairs Statistics Division; recommending methodologies for monitoring; strengthening national monitoring and reporting capacity; estimating or adjusting country data, together with the specific country, when country data are missing, collected using a different methodology or inconsistently reported by different sources.

¹⁰ As of November 2019. For tier classifications, see <https://unstats.un.org/sdgs/iaeg-sdgs/tier-classification/>.

¹¹ Assessment of data availability for global tier classification follows the Standard Country or Area Codes for Statistical Use (M49) (see <https://unstats.un.org/unsd/methodology/m49/>), which is different from the standard ESCAP groupings (see <https://data.unescap.org/resource-guides/progress-assessment-methodology>).

Table 2

Global Sustainable Development Goal 14 indicators

Theme	Global Sustainable Development Goals indicator	Global Sustainable Development Goal data custodian	Tier @ Nov 2019
Marine pollution	14.1.1: Index of coastal eutrophication and floating plastic debris density. The indicator includes 14.2.1a: Index of coastal eutrophication and 14.2.1b: Plastic debris density. Proxy: Ocean Health Index (UNEP-WCMC)	UNEP	II
Protection, conservation, management and use	14.2.1: Proportion of national exclusive economic zones managed using ecosystem-based approaches Proxy: Marine Trophic Index (UNEP-WCMC)	UNEP	II
	14.5.1: Coverage of protected areas in relation to marine areas	UNEP-WCMC with UNEP and IUCN	I
	14.c.1: Number of countries making progress in ratifying, accepting and implementing through legal, policy and institutional frameworks, ocean-related instruments that implement international law, as reflected in the United Nations Convention on the Law of the Sea (UNCLOS), for the conservation and sustainable use of the oceans and their resources	Office of Legal Affairs/Division for Ocean Affairs and Law of the Sea	III
Acidity	14.3.1: Average marine acidity (pH) measured at agreed suite of representative sampling stations	IOC-UNESCO	II
Fishing, fisheries and fishers	14.4.1: Proportion of fish stocks within biologically sustainable levels	FAO	I
	14.6.1: Progress by countries in the degree of implementation of international instruments aiming to combat illegal, unreported and unregulated fishing	FAO	I
	14.b.1: Progress by countries in the degree of application of a legal/regulatory/policy/institutional framework that recognizes and protects access rights for small-scale fisheries	FAO	I
Economic measures	14.7.1: Sustainable fisheries as a proportion of GDP in small island developing States, least developed countries and all countries, measured as value add of sustainable marine capture fisheries divided by GDP Proxy Marine Stewardship Council Certified Catch (UNEP-WCMC)	FAO	I
	14.a.1: Proportion of total research budget allocated to research in the field of marine technology National government research expenditure / marine technology / national governmental research and development expenditure	IOC-UNESCO	II

Note: UNEP, United Nations Environment Programme; WCMC, World Conservation Monitoring Centre; IUCN, International Union for Conservation of Nature; IOC-UNESCO, Intergovernmental Oceanographic Commission of United Nations Educational, Scientific and Cultural Organization; FAO, Food and Agriculture Organization of the United Nations; GDP, gross domestic product.

While many of the agreed Sustainable Development Goals indicators for Goal 14 can be measured globally and five have been classified as tier I (meaning data are regularly produced by at least 50 per cent of the countries and of the population in every region), in Asia and the Pacific, there are only sufficient data to measure progress for one of the five tier I indicators (14.5.1 on marine protected areas) and one of three approved proxies: Ocean Health Index (for indicator 14.1.1 on coastal eutrophication and plastic debris). Using the categorization given in table 2, there is sufficient data to measure progress in the Asia-Pacific region for one of three protection, conservation, management and use indicators. There is insufficient data available for monitoring progress in the region for the three fishing, fisheries and fishers indicators even though they are all classified as tier I. There is also insufficient data for monitoring progress for the two economic measures indicators even though one of them is classified as tier I. There is insufficient data for monitoring progress for the indicator on marine pollution, although there are sufficient data for monitoring progress based on its approved proxy (the Ocean Health Index). Finally, there is also insufficient data for monitoring progress for the indicator on ocean acidity, a tier II indicator.

2.5. Measurement considerations relating to Sustainable Development Goal 14

Role of national statistical systems

National official data sources and data produced by national statistical systems are at the heart of follow-up and review of the 2030 Agenda. National statistical systems comprise statistical organizations and units within a country that jointly collect, process and disseminate official statistics on behalf of national Governments. In practice, the national statistical system includes the national statistics office and other units and organizations within the national government, such as the fisheries ministry and the central bank.

Roles and responsibilities within a national statistical system are a major issue faced by many countries in the Asia-Pacific region. In some countries, the National Statistical Office plays a strong coordination and

quality assurance role (for example, in New Zealand), but such a role is the exception rather than the norm. This often leads to a fragmented statistical system in which there is little oversight of the breadth and quality of Sustainable Development Goals data being supplied to global data custodians. Current data sources for Goal 14 indicators illustrate this coordination challenge and some data gaps can be explained by a lack of ocean-relevant agencies embedded in the national statistical systems. There is a need to establish and expand relationships, for example, between statistical institutions and national oceanographic data centres.

Role of international organizations

International organizations are not, by definition, part of a national statistical system. However, for Goal 14, international organizations are expected to collect, compile or produce data for all ten globally agreed indicators. Custodian agencies work with national statistical systems, partners and other stakeholders to ensure that the 2030 Agenda can be monitored globally, and at regional and national levels in a way that informs policy. For Goal 14, this has translated into some indicators being produced by international organizations using global data and modelling (such as the Ocean Health Index, the proxy for indicator 14.1.1, and Marine Stewardship Council (MSC) Certified Catch, the proxy for indicator 14.7.1).

Transboundary nature of the oceans

Addressing areas beyond national jurisdiction is a challenge in the Sustainable Development Goals indicator framework, in particular for Goal 14. As oceans are truly transboundary in that water and pollution in water is constantly flowing from one country to another, the need for international harmonization and standardization is imperative. The global indicator framework for the Sustainable Development Goals uses a mixed approach, which employs globally modelled and national data for many of the Goal 14 indicators. This will hopefully provide a balance between the need to build national statistical capacity to monitor oceans and the need for consistent data across the world's vast oceans.


What is being done to improve data availability in Asia and the Pacific?

While much focus is given to global data availability and efforts to fill data gaps globally, the focus of ESCAP and its partners is to strengthen national capacity and national capabilities. The objective of this is to meet the

2030 Agenda mandate for the global review to primarily be based on national official data sources and the annual progress report of the Secretary-General to be based on data produced by national statistical systems. Example actions are listed in table 3 to illustrate what is being done and give insight into the many opportunities for doing more.

Table 3
Example actions to strengthen data and statistics on the oceans

Focus	Agency	Description
<i>Monitoring Goal 14 indicators</i>	FAO	Open access e-learning course on Sustainable Development Goals indicator 14.b.1 (securing sustainable small-scale fisheries) – supports countries track progress. https://elearning.fao.org/course/view.php?id=348
	UNEP	Global Manual on Ocean Statistics - supports countries in tracking progress against the ambitions of Goal 14 by providing a step-by-step guide to implementing two indicators (14.1.1 and 14.2.1).
	IOC-UNESCO	Platform for Ocean Best Practice – encourages all Goal 14 data custodian agencies to share indicator methodologies. https://www.oceanbestpractices.org/
	IOC-UNESCO	Ocean Acidification Sustainable Development Goals indicator 14.3.1 data portal – tool for the submission of ocean acidification data and metadata for the Sustainable Development Goal indicator 14.3.1. https://oa.iode.org/
	IOC-UNESCO	The Global Ocean Science Report assesses the status and trends in ocean science capacity around the world to support sustainable ocean management (indicator 14.a.1). https://en.unesco.org/gosr
	<i>Statistical systems</i>	ESCAP
IOC-UNESCO		 United Nations Decade of Ocean Science – launched to ensure ocean science can fully support countries in creating improved conditions for sustainable development of oceans.

Focus	Agency	Description
Ocean accounting	ESCAP	 <p>Global Ocean Accounts Partnership – established to develop international standards for the measurement of the economic, social and environmental aspects of the ocean and coasts.</p> <p>https://www.oceanaccounts.org/</p>
	University of New South Wales, Australia	
Citizen science and Goal 14	UNEP	<p>Article on the role of Citizen Science for the Sustainable Development Goals (Fritz and others, 2019).</p> <p>The article explores the use of non-traditional data sources for the Sustainable Development Goals indicator framework and includes a discussion on the use of citizen science for monitoring Sustainable Development Goal target 14.1: substantial reductions in marine pollution, including nutrient pollution and marine debris in coastal waters.</p>
	UNEP	<p>The Regional Seas Programme – a legal framework for protection of oceans and seas through regional seas conventions and actions plans.</p> <p>The Programme launched an initiative to establish a set of core indicators which all regional seas would strive to measure to promote harmonization of data collection at the regional level.</p> <p>https://wedocs.unep.org/bitstream/handle/20.500.11822/27295/ocean_SDG.pdf?sequence=1&isAllowed=y</p>
Gender and the environment	ESCAP	<p>Collaboration to identify Sustainable Development Goals indicators relevant to measuring the environmental-gender nexus in Asia and the Pacific – Goal 14 indicator 14.4.1 is included as a context-specific indicator for use in broader analysis of gender-environment issues.</p>
	UN Women	
	UNEP	
	IUCN	
	IUCN	<p>Resource guide entitled “Advancing gender in the environment: gender in fisheries-a sea of opportunities”.</p>
	USAID	<p>The guide focuses on the nexus of gender and fisheries in alignment with Goals 14 and 5 (gender equality) and the Beijing Declaration and Platform for Action.</p> <p>https://genderandenvironment.org/resource/advancing-gender-in-the-environment-gender-in-fisheries-a-sea-of-opportunities/</p>

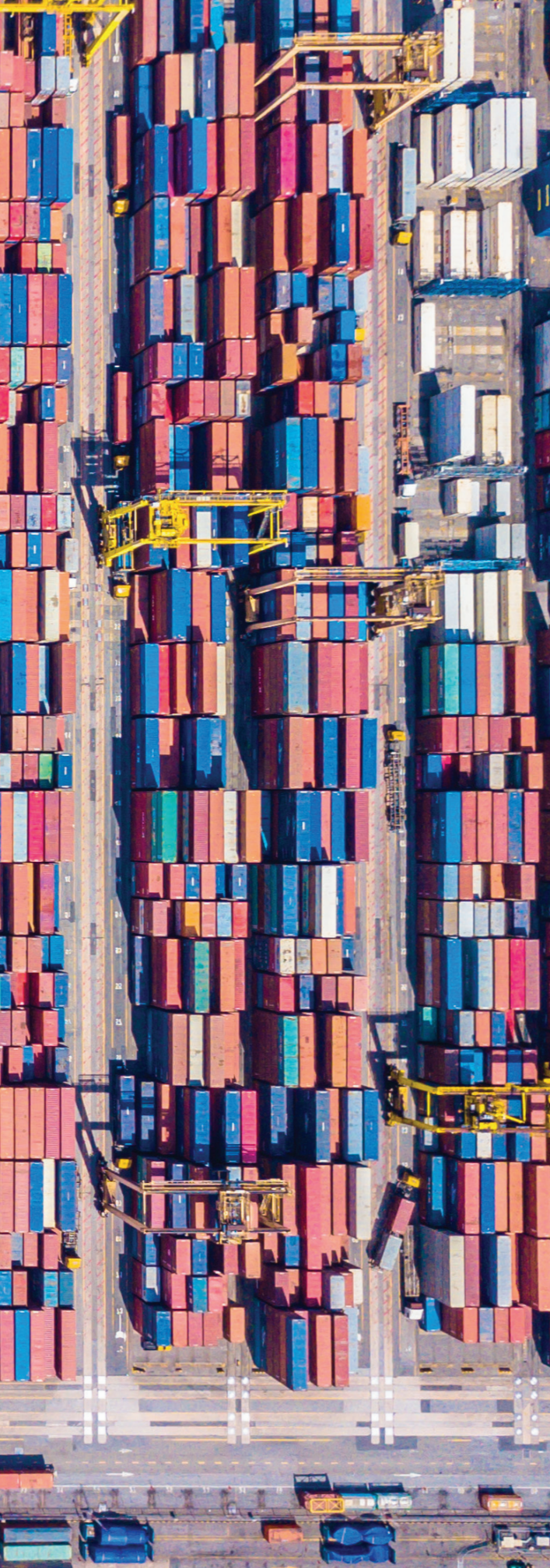
Note: UNEP, United Nations Environment Programme; WCMC, World Conservation Monitoring Centre; IUCN, International Union for Conservation of Nature; IOC-UNESCO, Intergovernmental Oceanographic Commission of the United Nations Educational, Scientific and Cultural Organization; FAO, Food and Agriculture Organization of the United Nations; GDP, gross domestic product; ESCAP, Economic and Social Commission for Asia and the Pacific; USAID, United States Agency for International Development.

2.6. Conclusion and recommendations

The 2030 Agenda for Sustainable Development is a shared blueprint for peace and prosperity for people and the planet, now and into the future. However, measuring the shared blueprint for life below water is a challenge in the Asia-Pacific region. There are only sufficient data to measure progress in Asia and the Pacific for one of the ten globally agreed indicators for Goal 14. Existing data are uneven; countries most in need to better understand their oceans, such as small island developing States, have the least data available and accessible for analysis, and the least capacity to analyse data.

With current priorities directed towards data and statistics to inform strategies to recover from the COVID-19 pandemic, it is important to stay focused on all data challenges, be they immediate or more long term. The dire ocean data situation requires joint efforts to support national statistical systems to regularly produce data and information required to report progress related to attaining Goal 14, as mandated in the 2030 Agenda. Better capacitated governments should consider increasing their assistance in this area to governments in greater need. There is also a need for closer and stronger regional collaboration in providing such support and in advancing standardization efforts and harmonizing existing data holdings.





Chapter 3

Transforming maritime shipping

3.1. Introduction: shipping and oceans

Maritime freight transport, or shipping, has been the backbone of economic development for centuries. Because of its competitive edge in transporting high volume cargo over long distances, shipping comprises a major share in the transport of consumer goods, intermediate products and key commodities, such as oil, iron ore, coal and grain, and accounts for more than 80 per cent of world merchandise trade by volume (UNCTAD, 2019b). The ongoing COVID-19 pandemic is a good reminder of how crucial ports are to the very functioning of modern society. Keeping ports open has been one of the key measures taken by most Governments to ensure that the flow of essential goods and medical supplies still reached their populations, helping them effectively deal with the crisis. While economic activities in many cases are greatly reduced because of COVID-19 pandemic-related measures, a wide range of products are being transported though shipping, as opposed to international inland (road) logistics, which are often limited to the transportation of essential goods.

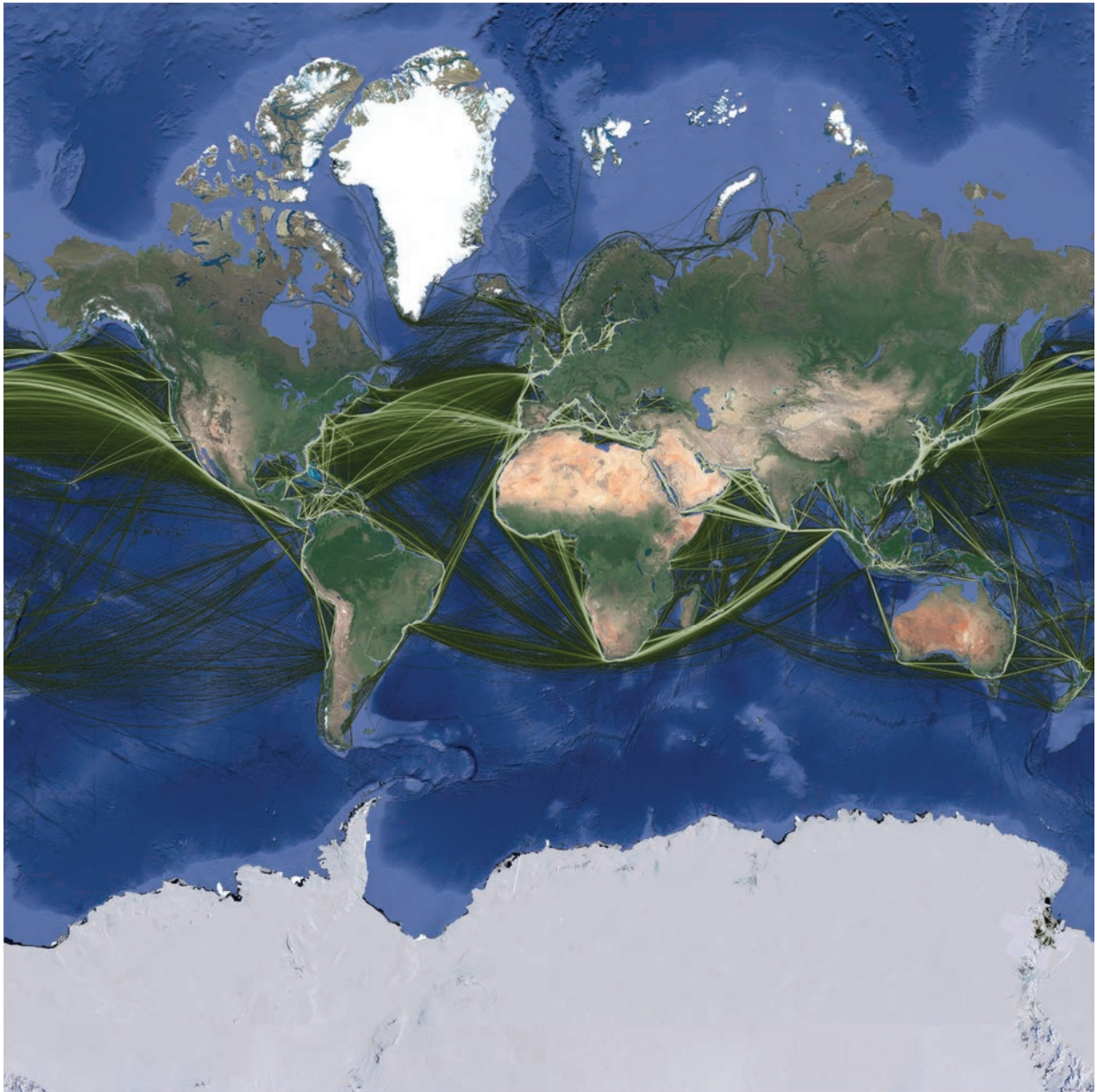
Shipping is also an integral part of the ocean economy. As an ocean-based industry, it directly affects the health of the marine ecosystem and it is closely linked to the port industry, shipbuilding and repair, dredging and maritime safety and surveillance (OECD, 2016). In this context, sustainable shipping is playing a major role in the effort to move towards more sustainable use of the oceans. Progress in this area requires moving away from established shipping practices that have had a detrimental impact on the marine environment, while

allowing for the use of oceans as a natural transport resource to ensure that countries benefit from a sufficient level of maritime connectivity.

Maritime connectivity looks at the availability of shipping services that are reliable, regular and affordable to transport people and goods to their destinations. It is

closely linked to the shipping network configuration and port development (figure V). Countries with low levels of maritime connectivity may face significant development challenges, as they are likely to remain on the margins of the major trading routes and not be able to fully integrate into the global economy.

Figure V Density map of container ship movements in 2018



Source: UNCTAD, shown in ESCAP (2019b).

Development concerns with shipping are also closely linked to the regional and global environmental development goals, as using oceans for transport purposes comes at a cost to the maritime ecosystem. Discussions on climate change have raised awareness about greenhouse gas emissions from shipping, but the environmental impact of those emissions extends well beyond air emissions, causing different types of risks to the components of marine ecosystems. Moving towards more environmentally friendly, **or green shipping**, is necessary, but it is a formidable challenge, especially in Asia and the Pacific, which accounts for the bulk of global shipping and port operations. The ongoing COVID-19 pandemic has contributed to reducing greenhouse gas emissions and other negative externalities of the shipping activities because of the decrease in the production activities and associated freight flows. While the impact of recent curbs in maritime transport from the COVID-19 pandemic is yet unknown, CO₂ emissions from international shipping may bounce back to pre-pandemic levels and then continue to increase if measures to mitigate the environmental impacts are not put in place.

Parallel to the growing sustainability concerns related to shipping is the transformation of the sector through numerous technological developments. The range of newly available technologies is vast, covering such areas as container terminal automation, artificial intelligence, electric stevedoring devices, container and vehicle tracking devices, e-navigation and the “Internet of things”. These developments could contribute towards efforts to achieve greener, more efficient and safer shipping and minimize the impact and footprint of marine traffic and port operations. Some experts believe that maximum deployment of currently known technologies could make it possible to reach almost complete decarbonization of maritime shipping by 2035 (International Trade Forum, 2018). Nevertheless, these opportunities can only be harvested through a systematic and evidence-based approach, which must be coupled with the right policy and regulatory environment in which due attention is given to the risks and costs of deployment and the adequate distribution of benefits. In this context, the COVID-19 pandemic is providing a great momentum to digitalization of port services, prompting ports to pilot innovated protocols and “contactless” solutions to deal with the outbreak. These best practices should be identified, assessed and used as a basis for rapid responses in similar future disruptions or, even, as a new normal in support of a decisive shift towards digitalization and greater use of technologies.

Transition to more sustainable shipping puts the private sector in the policy spotlight, as the strategies of the shipping and port industries shape the landscape of maritime connectivity. The maritime networks are formed by services extended by private carriers and built by connecting ports with each other. This has led to a concentration of shipping and port activities on major trunk routes, regional hub ports and the gateway port of each country. Regions or islands located far from the main routes have relatively unstable and more expensive maritime services. In other words, as private carriers are inevitably sensitive to cost and revenue, maritime connectivity tends to polarize highly connected countries, and countries and regions with continued low levels of maritime connectivity.

Shipping companies and terminal operators seek to scale up their businesses by using larger ships to benefit from lower transport costs per unit or increasing the size of the company through mergers and acquisitions. This has resulted in the constantly increasing share of large companies in the shipping and port sectors. According to the latest data on container shipping, the top ten companies have an overwhelming 83 per cent share of the industry, with 57.7 per cent under the control of the top four shipping companies.¹²

As a global industry, there are various means for shipping companies to deal with national regulatory and enforcement regimes. The most known strategy in this area is the choice of the flag State by shipowners, which allows a ship’s owners to register a merchant ship in a country other than their own, often one that imposes less stringent regulatory requirements.

3.2. Maritime connectivity for inclusive economic development

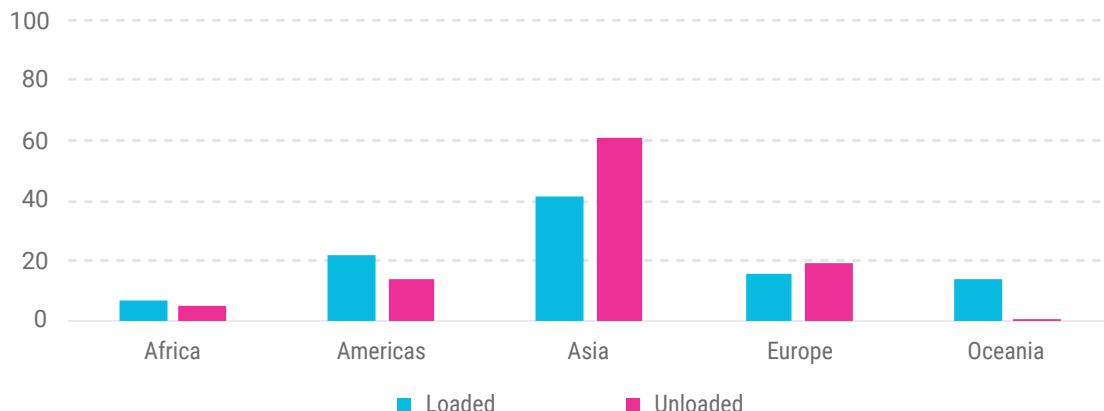
In this section, the role of the shipping and the port sector¹³ in the Asia-Pacific region is examined.

Asia represents by far the largest portion of global seaborne trade. In 2019, the total volume of seaborne trade in Asia was 61 per cent of the unloaded cargo and 41 per cent of the loaded cargo (figure VI). These figures reflect the trade structure of the region in which raw materials are imported from all parts of the world and industrial products and consumer goods are exported.

¹² See <https://alphaliner.axsmarine.com/PublicTop100/>.

¹³ For the rest of the chapter, the term shipping is used in a broader sense to encompass the variety of activities related to transporting goods by sea, including the port activities.

Figure VI International maritime trade by region, 2018 (percentage share in world tonnage)



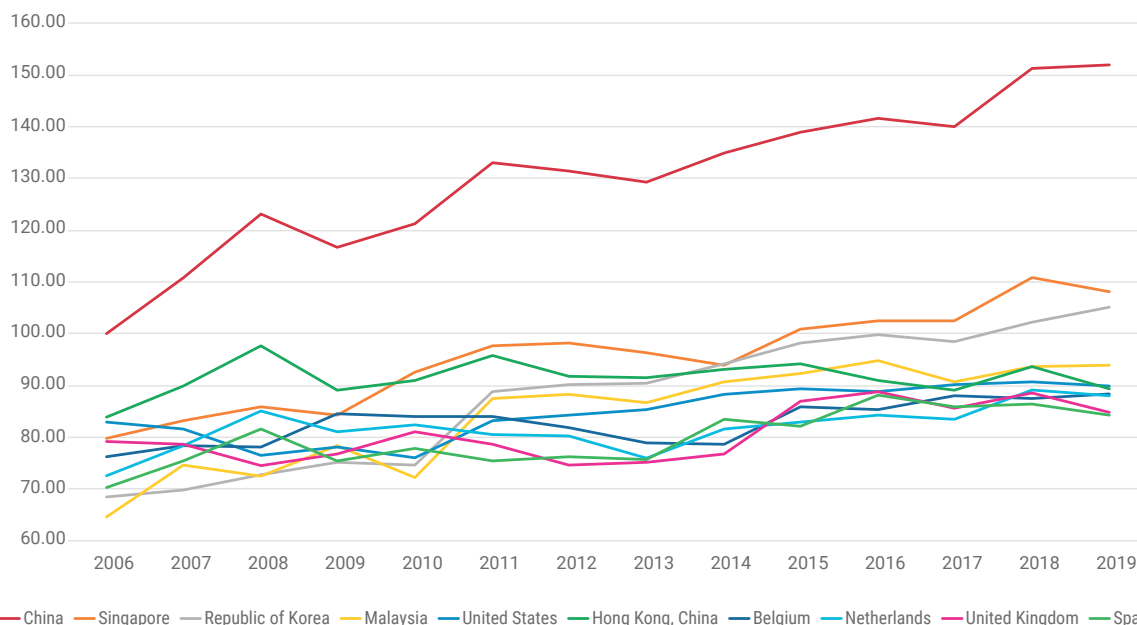
Source: UNCTAD (2019b).

The Asian continent also accounts for two thirds of the world container throughput and is home to nine out of ten of the world’s busiest ports (UNCTAD, 2019b).

In terms of shipping services, the most connected economies in the world are in Asia. The latest UNCTAD Liner Shipping Connectivity Index¹⁴ places five out of

the ten top performers in Asia (China, Singapore, the Republic of Korea, Malaysia and Hong Kong, China), with China leading the global ranking (figure VII). It also highlights that five out of ten highest increases in the level of connectivity in the past decade occurred in Asia, with Viet Nam making the most significant improvement globally (UNCTAD, 2019b).

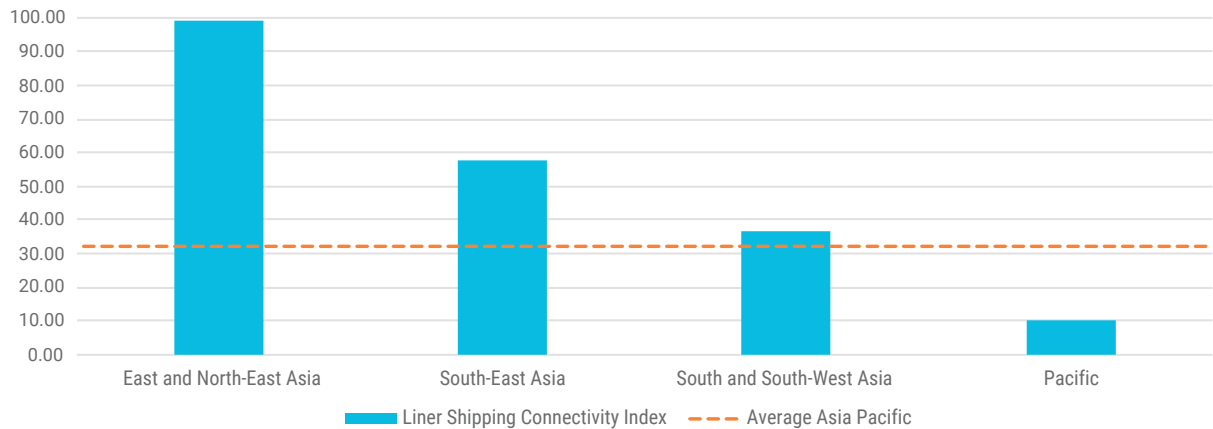
Figure VII Liner Shipping Connectivity Index: top 10, 2006–2019



Source: UNCTAD, based on data provided by MDS Transmodal (<https://unctad.org/en/pages/newsdetails.aspx?OriginalVersionID=2151>).

¹⁴ The Liner Shipping Connectivity Index captures how well countries are connected to global shipping networks. It is computed by UNCTAD based on five components of the maritime transport sector: number of ships; their container-carrying capacity; maximum vessel size; number of services; and number of companies that deploy container ships in a country’s ports.

**Figure VIII The maritime connectivity divide in Asia and the Pacific
(Liner Shipping Connectivity Index, 2019)**



Note: LSCI, Liner Shipping Connectivity Index.
Source: ESCAP based on UNCTAD Liner Shipping Connectivity data, 2019.

This, however, is in contrast to the much lower level of connectivity in some subregions and, in particular, in the small island developing States in the Pacific. Although these countries are highly dependent on seaborne freight and passenger transport for development purpose, the connectivity levels of many of them are well below the regional average (figure VIII). As a result, the small island developing States remain relatively isolated from global and regional maritime trade. Notably, even though their maritime connectivity levels have shown a slight upward trend in recent years, the level of growth tends to be uneven (UNCTAD, 2019b).

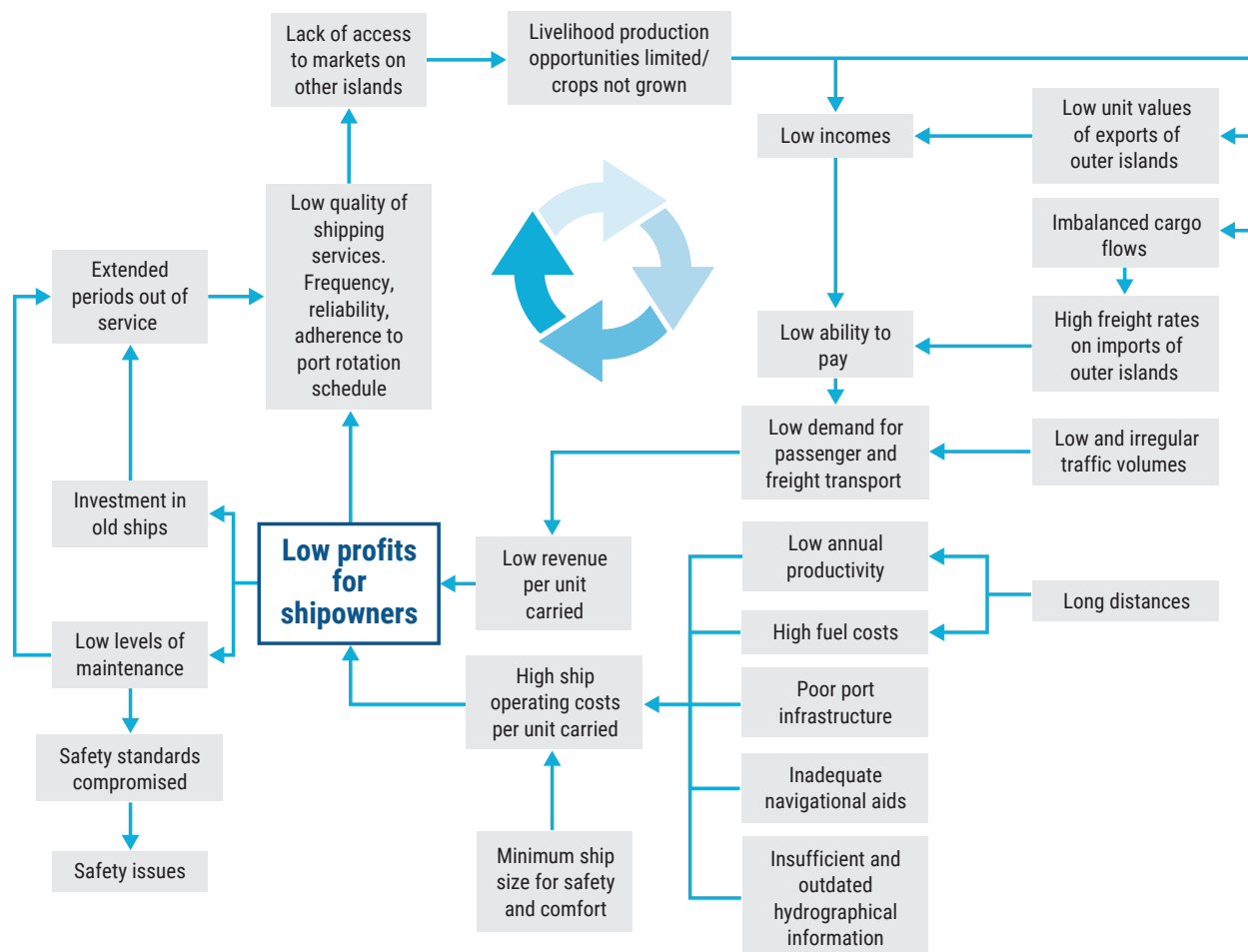
The continued maritime connectivity divide in Asia and Pacific calls into question the inclusiveness of shipping-enabled growth. Located far from trunk routes and feeder networks and requiring very low cargo volume, the Pacific small island developing States are unable to take advantage of the economies of scale of the global shipping network. This forces them to pay high prices for restricted and unreliable shipping services. Some Pacific ports, such as Vila (Vanuatu), receive about one container ship every three days and only four companies provide regular shipping services to the country. In Kiribati, only one operator offers regular liner shipping services, with one ship arriving every ten days. By way of comparison, in top connected ports or countries, dozens of ships call per day and the number of operators is extensive, offering numerous regular services (UNCTAD, 2019b).

The combination of interrelated geographic, economic, demographic and institutional factors come together in a self-reinforcing feedback loop to undermine the ability of small island developing States to close the connectivity gap. The lack of ship services that are safe, affordable and reliable limits access of the population to markets and other social opportunities. This, in turn, results in low incomes for islanders and inability to pay for shipping services, leading to a further deterioration in the quality of shipping (figure IX).

The COVID-19 pandemic has, once again, brought the vulnerabilities of small island developing States into the spotlight. The waves of contraction in the global shipping lines, has added to the concerns of countries in the Pacific over the continued provision of food, vital medicines and health supplies because of the current global crisis coupled with additional climate-related disasters.

Bridging the maritime connectivity gap requires greater and more coordinated efforts of the actors concerned, including small island developing States, the international community and the private sector. There is a significant number of policy measures that small island developing States themselves can pursue to enhance their maritime connectivity. Among them are exploring small-scale efficiency, linking their transport operations to local and regional value chains, and supporting energy-efficient and clean solutions.

Figure IX Shipping in the Pacific: links between constraints and consequences



Source: ESCAP (2013).

They can also further exploit benefits from emerging technologies, especially those linked to cleaner and more efficient energy use.

At the same time, the strategies of the shipping industry remain a major constraint. Shipping, notably container shipping, is an increasingly concentrated sector. This trend is especially visible in the Pacific, where the level of concentration has increased in recent years (UNCTAD, 2019b). The shipping policy for the Pacific should be focused on creating conditions for private carriers to ensure constant commercial

transport services to all communities in line with their interests, needs and public welfare. To incentivize shipping companies, consideration should be given to supplementing and expanding regional shipping commission systems, which have been contributing to the provision of shipping services in the Pacific subregion. In addition, international organizations, Pacific Governments and multilateral development banks may jointly consider financial measures, such as establishing a sustainable maritime connectivity fund, to incentivize fleet renovation and diversification of shipping services in the subregion.

Box 2**Suva Declaration on Improving Maritime Transport and Related Services in the Pacific**

Pursuant to Commission resolution 68/4, the secretariat convened, in 2013, the High-level Meeting on Strengthening Inter-island Shipping and Logistics in the Pacific Island Countries. The Meeting was conducted in collaboration with the International Maritime Organization, the Pacific Islands Forum secretariat and the secretariat of the Pacific Community. It was attended by 33 delegates of 18 Pacific countries and territories, 42 representatives of 19 specialized agencies and related organizations. The Meeting resulted in the Declaration on Improving Maritime Transport and Related Services in the Pacific, which was adopted by acclamation during the Meeting and, subsequently, adopted by the Commission, in its resolution 70/7.

The Suva Declaration is aimed at overcoming sustainable transport challenges in Pacific Island economies and promoting sustainable development, and sets out goals to (a) improve inter-island shipping services and to create an enabling environment for services to shipping, including port infrastructure and border control and maritime-related facilities, ship finance, shipbuilding, slipway and repair facilities, and (b) improve maritime safety and security, prevent and minimize pollution from ships, and develop and implement search and rescue and marine spill response plans.

Source: ESCAP resolution 70/7.

National efforts by small island developing States must be complemented by a strengthened effort to foster regional cooperation. The connectivity divide is a developmental challenge, but it is also an indication that the maritime connectivity of small island developing States clearly lends itself to South-South cooperation. There is a tremendous opportunity for taking advantage of the expertise and experience of several countries from the region that have become established leaders in maritime connectivity, or have managed to achieve a qualitative leap in the level of their maritime connectivity in the course of the past decade, as already referred to above.

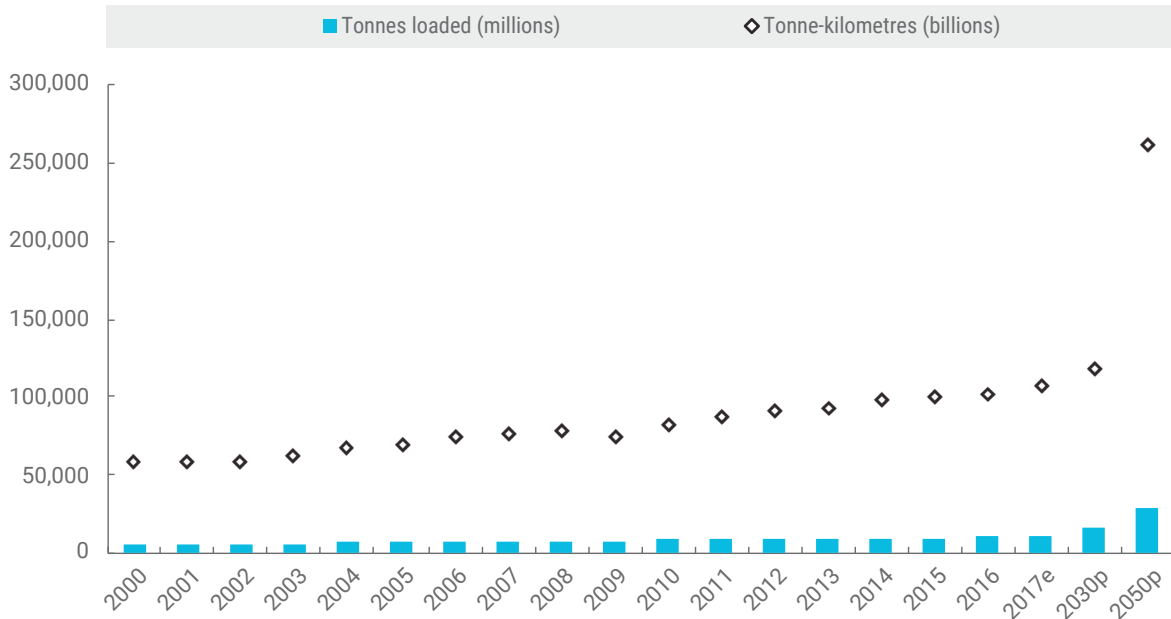
This cooperation should build on the existing recognition of the developmental challenges of the small island developing States in the regional transport cooperation. This includes ESCAP resolution 70/7 in which, the Commission endorsed the Suva Declaration on Improving Maritime Transport and Related Services in the Pacific. Notably, the latter sets out a comprehensive set of goals to overcome sustainable transport challenges in Pacific island countries and promotes sustainable development (box 2).

Efficient and safe shipping in support of sustainable economic growth

Over past decades, the volume of goods shipped by sea has continued to increase; this trend is likely to continue (figure X). Global seaborne trade increased at an annual average rate of 3.4 per cent between 2000 and 2018, with economic growth being one of the major contributors. It is expected that the future of maritime trade will be heavily influenced by structural changes in the Chinese economy, shifts in globalization patterns, intensified and more frequent disruptions, and the environmental sustainability agenda. Most global forecasts anticipate sustained average annual growth of maritime trade. UNCTAD estimates annual growth of 3.4 per cent up to 2024 (UNCTAD, 2019b). Other studies suggest a compound annual growth rate of 3.6 per cent through 2050, which would result in a near tripling of maritime trade volumes over that period (International Trade Forum, 2019).

The current disruption of production and the logistics system in various countries, including China, stemming from the COVID-19 pandemic has a direct impact on

Figure X Projected world seaborne trade (tonnes-miles)



Note: Data for 2017 are estimates; data for 2030 and 2050 are projections

Source: International Transport Forum (2019). Data for 2000 to 2017 are from UNCTAD Review of Maritime Transport (tonnes loaded) and Clarksons Research (tonnes-kilometers). Data for 2030 and 2050 are predictions of International Transport Forum.

the global supply chain. There is a great concern in the shipping industry that shrinking consumption will weaken the economic cycle and that the decrease in production and consumption activities will lead to a decrease in maritime trade. If this scenario materializes, it may result in structural problems, which, in turn, lead to a decrease in shipping demand and in turnover, and have long-lasting consequences on the rate of growth of seaborne trade.

This may further exacerbate the burden on the shipping industry. Prior to the COVID-19 pandemic, as freight rates were expected to remain unchanged in the near term unless demand exceeded supply, shipping companies had already started to cut costs through expanding joint services, rerouting services, providing integrated logistics services and digitalization. Low-profit routes are especially vulnerable to service adjustments, which could further undermine maritime connectivity and trade in the Pacific islands.

At this point, it is not clear how the COVID-19 pandemic will affect concerns over the capacity of the existing

port systems, although there have been some cases in which port congestion and unloading delays have occurred because of the quarantine protocols. To efficiently handle the increasing volume of cargo, most port authorities in the Asia-Pacific region are already working on the expansion of the port system. It should be noted, however, that as the construction of new ports requires significant capital, takes a long time and present environmental concerns, increasing the productivity of existing infrastructure is often the more viable course. This trend may be reinforced in the context of the COVID-19 pandemic, during the global outbreak and when it recedes.

Similarly, the safety of shipping remains at the forefront of the industry's concerns, as currently, Asia is recording the highest number of casualties and accidents worldwide and remains a hotspot for marine-related insurance claims (Allianz, 2019). The poor safety record of the region is the result of many factors, including, among them, busy shipping routes, the high volume of trade in Asia and the tremendous increase in ship sizes. This has raised the likelihood and cost of incidents,

contributed to by the relatively old age of the fleet and a growing lack of qualified seafarers. Increasing the safety and efficiency of shipping has, accordingly, become an essential condition for making the best use of the oceans for further economic growth.

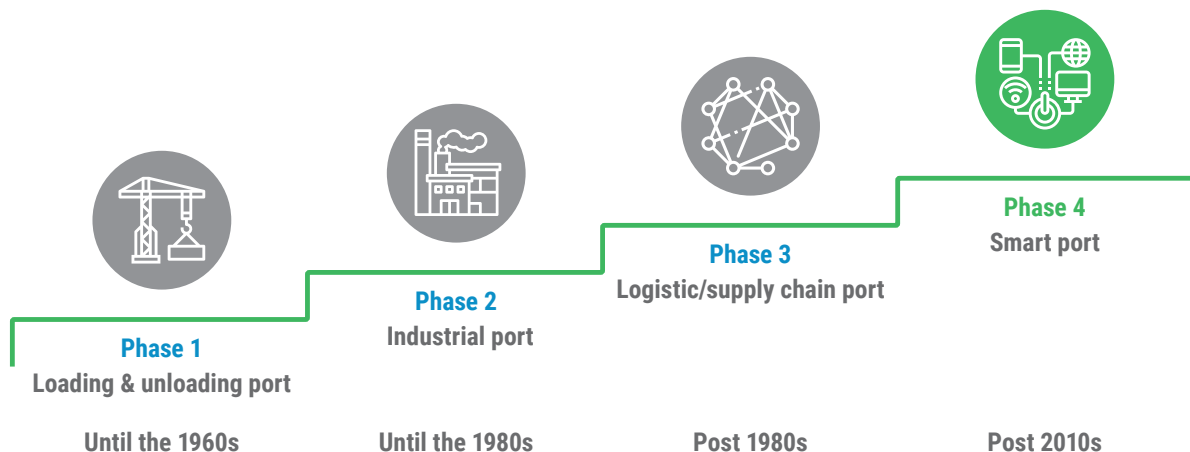
The efficiency of the future performance of the shipping industry is tightly linked to countries' ability to operate an integrated intermodal transport system, namely their capacity, to combine all modes of transport in a more efficient way, and to create favourable conditions for economies of scale and resource optimization along the entire transport system. To some extent, the shipping industry is already moving in this direction. Faced with, in many cases, land transport costs that are higher than maritime transport costs, shippers are increasingly prompted to manage the performance of the total supply chain. Many major shipping lines are offering door-to-door services, as the availability of integrated multimodal transport services affects the choices of shippers' logistics service providers.

Technology and innovation are critical to be competitive in terms of efficiency and safety. For instance, to optimize port performance, a widely adopted strategy in the region is to increase existing capacity through digitalization. The underlying process starts with

optimizing operations and reducing costs before evolving into a stage in which new services and business models are created. This stage entails combining technological advances with improving the port management data and information collection and distribution processes. In many ways, the transition to digital or smart ports and to smart transport and logistics systems have become a necessity rather than an option for the region (figure XI) and, as mentioned before, a greater shift towards digitalization may have been facilitated by the COVID-19 pandemic (PORTSTRATEGY, 2010).

The opportunities emerging from new technologies can only be harvested through a systematic and evidence-based approach coupled with the right policy and regulatory environment. This should be done with due attention to the risks and costs of their deployment and to the adequate distribution of their benefits. It is significant, that in 2019, cyber incidents were rated second among the top five risks for the marine and shipping sector, according to a major industry survey (Allianz, 2019). In addition, increased policy attention is currently being given to the impact of port and ship automation on seafarers and port workers, whose jobs are likely to be automatable in the near future (World Maritime University, 2019).

Figure XI Smart port development in support of more efficient shipping



Source: On the Mos Way Staff (2020).

Harmonized standards and norms are essential for ensuring safe and efficient maritime transport operations. At the global level, the regulations of IMO provide guidance and policy tools to enhance the safety and efficiency of international shipping operations. But, ultimately, the enforcement and implementation of global standards and best practices is contingent on ensuring well-trained human resources on and offshore. To do this, it is necessary to provide training support and awareness-raising in addition to addressing broader social concerns. These concerns are increasingly affecting the performance of the shipping sector, such as the growing shortage of trained crew (especially naval officers), difficult labour conditions for crew and port personnel, gender equality and social costs of safety accidents. For a wide range of ports in the region located in cities or their vicinity, social aspects also entail establishing a successful port-city relationship to help deal with the impact of shipping and port activities on the urban population.

The COVID-19 pandemic has brought these issues to the forefront, as seafarers and port workers have become essential or critical personnel in the effort to keep economies and societies afloat. This crisis should contribute towards achieving greater social protection and awareness of the health hazards and vulnerabilities faced by employees in the transport sector working under such difficult conditions.

Inclusive, safe and efficient shipping: a regional challenge

Making shipping in the Asia-Pacific region more inclusive, safe and efficient is vital for achieving more sustainable use of the oceans and critical for galvanizing collective regional action. Most obstacles to safe and efficient shipping, such as large marine accidents or logistics inefficiencies, generally involve a number of countries, raising the need to deal with them more efficiently through collective action. Regional cooperation and South-South cooperation are key to bridging the connectivity gap in Asia and the Pacific.

The ongoing COVID-19 pandemic is a striking demonstration of the benefits of greater regional cooperation. As a result of the crisis, a coordinated regional response is required to ensure the continued smooth operation of global supply chains and the health and safety of shipping-related personnel and crew through international cooperation and partnerships.

To keep ports open, countries have strengthened the measures of entry and disembarkation of each ship by, for example, forbidding crew shifts in its own ports, prohibiting crews from coming onshore and having contact with unloading personnel, and quarantining crews and ships for 14 days at anchorages. These measures have not only caused congestion at the ports and delays in unloading cargo, they have also adversely affected crew members' health and working conditions. Standardized joint (global or regional) protocols, information exchange and tracing and monitoring mechanisms would help in dealing with the pandemic and stop unnecessary delays for the vessels engaged in international trade and their crews.

Countries in the Asia-Pacific region would draw clear benefits from exchanging information and experience on the challenges and best practices related to safe and efficient shipping and overall transport and logistics efficiencies. They would also benefit from scaling up regional analytical and data collection work, identifying specific regional challenges and addressing issues not covered by global regulations. Finally, they could also enhance the effectiveness and continuity of their efforts to engage the regional and global shipping industry in the transition to safe and efficient shipping.

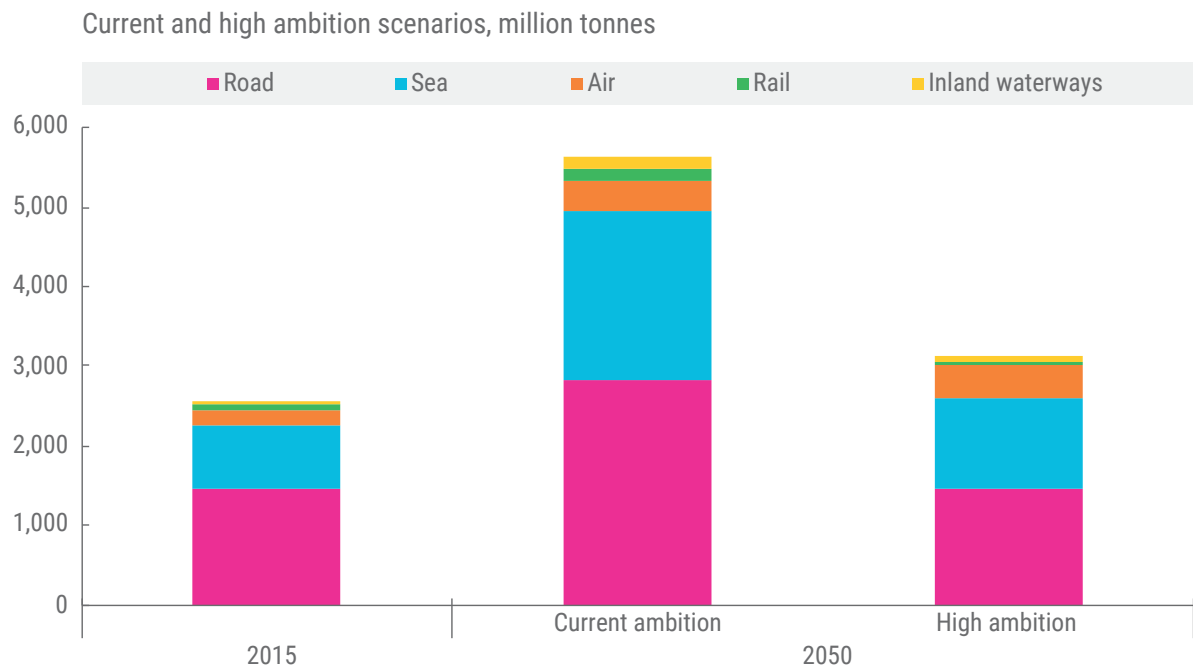
Scaling up regional cooperation on maritime transport connectivity in Asia and the Pacific entails acting on multiple fronts. First, the goal of closing the maritime connectivity gap needs to be placed at the centre of regional transport cooperation efforts and serve as a centrepiece of the regional strategy to deliver on the 2030 Agenda. In this regard, ESCAP member States and development partners should consider increasing their support in order to help small island developing States develop specific action plans in support of their maritime connectivity, mobilize financial and industry support, and implement these activities. Furthermore, regional cooperation should be used to scale up efforts to jointly promote shipping services that are reliable, competitive and well-performing by addressing traditional and emergent maritime safety concerns and the growing challenge of human and institutional development. These efforts should be combined with the search for resource optimization and efficiency gains along the entire transport and logistics chain, making better use of technology and innovation, and building on synergies with the established regional transport network as embodied by the Asian Highway, the Trans-Asian Railway and the network of dry ports.

3.3. Greening shipping in Asia and the Pacific

Efforts directed towards achieving shipping in Asia and the Pacific that is inclusive, safe and efficient must go hand in hand with addressing the environmental impacts of shipping to protect the health of the oceans. From the transport perspective, shipping is considered to be the most environmentally friendly mode of transport. The modal shift from other, more polluting modes to the maritime and coastal shipping is a common policy recommendation when it comes to promoting the sustainability of the freight transport sector. In discussions on climate change the environmental impact of shipping also appears modest, as shipping is estimated to be responsible for approximately 3 per cent of total CO₂ emissions (IMO, 2015).¹⁵

Future scenarios suggest strong growth of shipping’s emissions because of the expected increase in the volume of seaborne trade. An analysis of the CO₂ emissions from international shipping by IMO in 2014 showed that that these emissions could grow by between 50 and 250 per cent by 2050, depending on future economic growth and energy developments (IMO, 2015). This was confirmed by more recent reports in which the magnitude of the CO₂ emissions from international freight transport in the absence of the policy measures and ambitious reduction targets was highlighted (figure XII).

Figure XII Projected carbon dioxide emissions from freight by mode, 2015–2050, current and high ambition scenarios, million tonnes



Source: International Transport Forum (2019).

¹⁵ There are still serious methodological challenges and data shortages, when it comes to estimating the CO₂ emissions from the shipping activities, given the wide variety of ships, sizes, engines, routes, navigation conditions, and other factors, which determine total emissions. Furthermore, many existing studies or estimates of ship emissions are focused on international maritime transport and, accordingly, do not include pollutants emitted by small or domestic vessels, including coastal vessels under flag State control and the inland navigation vessels.

Table 4**Impact of shipping on the marine environment**

1.	Air pollution
2.	Greenhouse gas emissions
3.	Release of ballast water containing aquatic invasive species
4.	Releases of cargo residues
5.	Oil spills from ships
6.	Garbage management and marine-based sources of plastic debris
7.	Underwater noise
8.	Ship-strikes on marine megafauna
9.	Ship groundings or sinking
10.	Sediment contamination due to transshipment or ship breaking activities

Source: ESCAP based on Walker and others (2019).

While discussions on climate change focus on CO₂ emissions, the environmental impacts of shipping goes beyond that, as shipping causes a variety of risks to the components of the marine ecosystem (table 4). Besides CO₂ emissions, shipping is closely associated with other types of air pollution, such as emission of nitrogen oxides (NO_x) and sulfur oxides (SO_x), which play indirect roles in tropospheric ozone formation and aerosol warming. In the third greenhouse study by IMO, carried out in 2014, it was estimated that global NO_x and SO_x emissions from all shipping represented about 15 per cent and 13 per cent of global NO_x and SO_x, respectively from anthropogenic sources, and that international shipping caused approximately 13 per cent and 12 per cent of total global NO_x and SO_x emissions, respectively (IMO, 2015). There is a significant amount of marine plastic litter from ships, which, in turn, prompted the IMO Marine Environment Protection Committee to adopt a dedicated action plan in 2019, followed by a joint IMO/FAO initiative on the prevention of plastic debris from ships.¹⁶

The marine impact of shipping cannot be dissociated from other shipping-related activities, such as shipbuilding and ship demolition. Energy consumption and emissions continue to rise through the entire life cycle of the ship. While emissions can be relatively low during the shipbuilding stage, according to some estimates, emissions from a ship during the ship

scrapping stage can exceed the level of emissions released during the ship's operational phase (figure XIII). This is an area where data and knowledge are still relatively limited and studies on the safety, health and environmental implications, as well as the potential for global standards in this area are being carried out.¹⁷

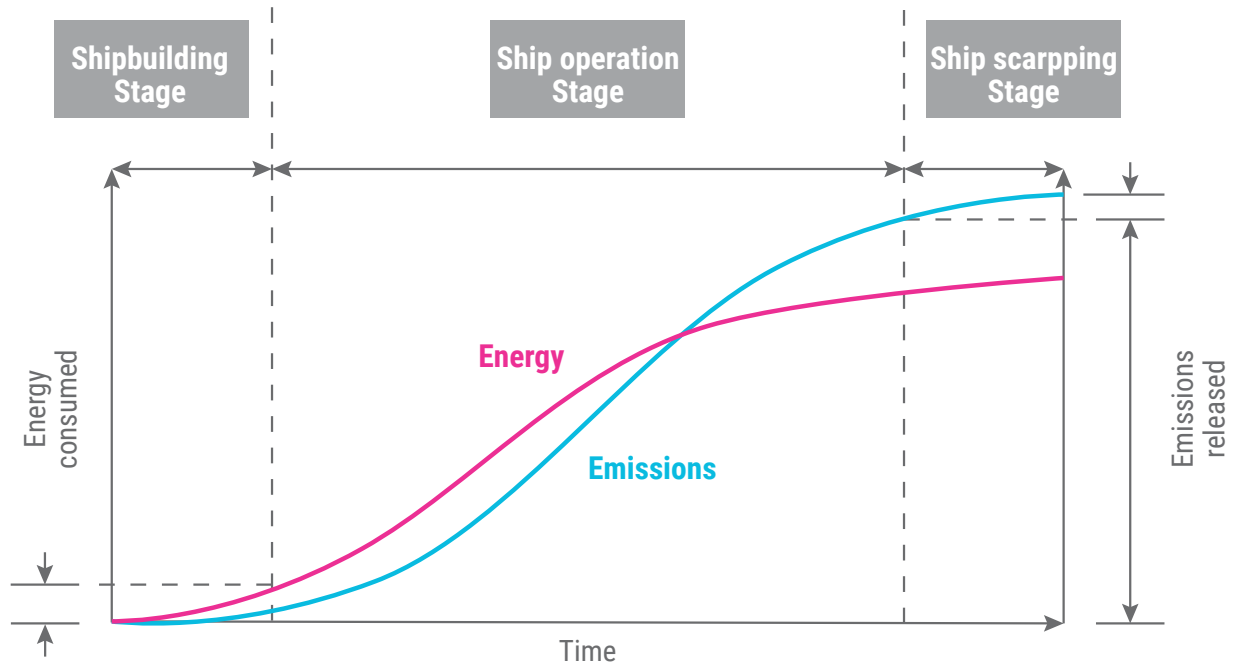
Port operations are directly involved in the transition to more environmentally friendly shipping. Many shipping activities cause air and marine pollution in port areas or their vicinity and areas regulated by the port authorities. Among the activities are wastewater and storm water discharges, leaching of toxic paint additives, spills during loading and unloading of oil tankers and removing sediments to deepen ship channels. Recent ESCAP studies and expert discussions highlight the strong dynamism and significant steps forward in promoting green ports in Asia and the Pacific (box 3).

As noted earlier, it is too early to properly assess the impact of the COVID-19 pandemic on the CO₂ emissions from international shipping, but past experience in similar crises suggests that transport demand and associated emissions tend to rebound and then rise to higher levels if not mitigated by dedicated policy measures.

¹⁶ See <http://www.imo.org/en/MediaCentre/HotTopics/marinelitter/Pages/default.aspx>.

¹⁷ Under its Safe and Environmentally Sound Ship Recycling project in Bangladesh (in short the ENSREC project), IMO is studying the safety, health and environmental implication of ship recycling in Bangladesh in order to consider pertinent global standards in this area for the future.

Figure XIII Estimated energy consumption and emission during a ship's life



Source: Tiwari and Pant (2010). Presentation on Ships Life Cycle

Box 3

Policy options for green ports

Port authorities can carry out a range of measures and policies in support of green shipping, such as the following:

- Establishing national master plan for sustainable transport development with a focus on “high energy efficiency and low carbon” in the shipping and port sectors;
- Upgrading and retrofitting cargo handling equipment;
- Promoting continued partnerships with health and environmental organizations to enhance health and safety for port city residents;
- Providing incentives for ships to use clean energy;
- Fostering research and development, and integration of diversified renewable energy applications;
- Replacing old trailers and cargo trucks with vehicles with high efficiency and low carbon emissions;
- Expanding eco-friendly transportation modes, such as railroads, inland waterways and coastal shipping;
- Introducing emission control areas to actively manage pollutants caused by ships;
- Installing and expanding maritime alternative power facilities to reduce pollutants from berthing vessels;
- Monitoring and certifying through port State controls compliance with ship safety and environmental regulatory standards and rules.

Source: ESCAP (2020), Sustainable port development and improving port productivity (report is being revised).

At the same time, it has also been noted that some changes brought to the forefront by the COVID-19 pandemic, for example, greater rationalization and digitalization of transport services, including the shipping activities, are helping to make them more sustainable in environmental terms, which also means helping to protect the oceans. The close linkage between the COVID-19 pandemic and the challenges associated with climate change have already been conveyed (ESCAP, 2020) and lessons learned from the COVID-19 pandemic policy responses should inform future policies on more sustainable shipping policies. As the pandemic recedes, the numerous “avoid-shift-improve” techniques used during the crisis should be retained as much as possible, avoiding the return to the unsustainable status quo. This transformation of transport connectivity should be continuous but gradual, as many countries and developing

countries, in particular, may be less interested or have reduced capabilities to pursue an ambitious environmental or social agenda in the aftermath of the crisis. Nevertheless, the pandemic presents a good opportunity to incorporate environmental agendas to the new policies that will shape future shipping and maritime connectivity.

Technology and regulations as driving forces supporting green shipping

Technological innovations play a fundamental role in green shipping. The deployment of currently known technological, operational or energy-related innovations (table 5) could make it possible to reach almost complete decarbonization of maritime shipping by 2035 (International Trade Forum, 2018).

Table 5

Technological, operational and alternative energy measures to reach decarbonization

Type of measures	Measures	Possible impact
Technological	Light materials	Potential fuel saving: 0–10%
	Slender design	Potential fuel saving: 10–15%
	Propulsion improvement device	Potential fuel saving: 1–25%
	Bulbous bow	Potential fuel saving: 2–7%
	Air lubrication and hull surface	Potential fuel saving: 2–9%
	Heat recovery	Potential fuel saving: 0–4%
Operational	Speed	CO ₂ reduction potential: 0–60%
	Ship size	CO ₂ reduction potential: 0–30%
	Ship-port interface	CO ₂ reduction potential: 0–60%
	Onshore power	CO ₂ reduction potential: 1%
Fuel/Alternative energy	Advances biofuels	CO ₂ reduction potential: 25–100%
	Liquefied natural gas	CO ₂ reduction potential: 0–20%
	Hydrogen	CO ₂ reduction potential: 0–100%
	Ammonia	CO ₂ reduction potential: 0–100%
	Fuel cells	CO ₂ reduction potential: 2–20%
	Electricity	CO ₂ reduction potential: 0–100%
	Wind	CO ₂ reduction potential: 1–32%
	Solar	CO ₂ reduction potential: 0–12%
Nuclear	CO ₂ reduction potential: 0–100%	

Source: International Transport Forum (2018).

Because of the complexity of shipping operations, one measure alone is very unlikely to be the most cost-effective way to achieve decarbonization of shipping by 2035. Instead, a mixture of technological, operational and fuel-related measures is required. Different combinations of measures would generate different decarbonization pathways, and the implementation of one measure might be incompatible with another (International Trade Forum, 2018). In addition to encouraging the use of new technologies, strong leadership by policymakers, setting clear decarbonization and other targets are essential conditions required for decarbonization (International Trade Forum, 2018). Numerous global regulations have been formulated and measures have been taken to regulate and protect clean air and the marine environment with some major breakthroughs achieved in recent years. IMO is leading the global regulatory work in this field by expanding the range of international legal instruments dealing with the protection of the marine environment from shipping activities (box 4) and promoting different strategies in response to the climate change challenge and the

need to cut greenhouse gas emissions from shipping. These include operational and technical measures, such as the Energy Efficiency Operational Indicator, the Energy Efficiency Design Index and considering potential market-based measures, such as a levy on bunker fuels and carbon pricing.

Faced with the challenges associated with climate change, IMO member countries have also recently agreed on several major initiatives in the environmental protection area. At the seventy-second session of the IMO Marine Environment Protection Committee, held from 9 to 13 April 2018, they agreed to reduce total annual greenhouse gas emissions from international shipping by at least 50 per cent by 2050 based on 2008 emission levels. According to the IMO-phased greenhouse gas reduction strategy, emissions from new ships should be reduced by 20 per cent from 2020, and by 30 per cent from 2023 or 2025, depending on ship type. In addition, the carbon intensity of new and existing ships should be reduced by 40 per cent by 2030 and by 70 per cent by 2050.

Box 4

International Maritime Organization and protection of the marine environment

Of the 51 treaty instruments for the regulation of international shipping member countries of IMO to have adopted to date, 21 are directly related to the environment. The original focus of this work was the prevention of marine pollution by oil, resulting in the adoption of the first-ever comprehensive antipollution convention, the International Convention for the Prevention of Pollution from Ships (MARPOL), in 1973.

This has changed over the past few decades to include a much wider range of measures to prevent marine pollution, and the original MARPOL Convention has been amended many times to also include requirements addressing pollution from chemicals, other harmful substances, garbage, sewage and, under annex VI adopted in 1997, air pollution and emissions from ships.

Other international instruments regulate oil pollution preparedness, response and cooperation (OPRC Convention and its 2000 OPRC-HNS Protocol), control of harmful anti-fouling systems on ships (International Convention on the Control of Harmful Anti-fouling Systems on Ships), prevention of the potentially devastating effects of the spread of invasive harmful aquatic organisms carried by ships' ballast water (Ballast Water Convention), and safe and environmentally sound recycling of ships (Hong Kong Convention).

The International Maritime Organization also carries out secretariat functions in connection with the Convention on the Prevention of Marine Pollution by Dumping of Wastes and Other Matter (the London Convention) and its 1996 Protocol. Its objective is to promote the effective control of all sources of marine pollution and to take all practicable steps to prevent pollution of the sea by dumping of wastes and other matter.

Figure XIV Programme of Follow-up Actions of the Initial IMO Strategy on Reduction of GHG Emission from Ships up to 2023

Streams of activity	2018	2019	2020		2021	2022		2023
	MEPC 73	MEPC 74	MEPC 75	MEPC 76	MEPC 77	MEPC 78	MEPC 79	MEPC 80
Candidate short-term measures (Group A) that can be considered and addressed under existing IMO instruments ¹	Invite concrete proposals	Consideration of proposals	Consideration and decisions on candidate short-term measures that can be considered and addressed under existing IMO instruments e.g. further improvement of the existing energy efficiency framework with a focus on EEDI and SEEMP, ITCP ²					
Candidate short-term measures (Group B) that are not work in progress and are subject to data analysis	Invite concrete proposals	Consideration of proposals	Consideration and decisions on candidate short-term measures that are not work in progress and are subject to data analysis, consistent with the Roadmap ³					
Candidate short-term measures (Group C) that are not work in progress and are not subject to data analysis	Invite concrete proposals	Consideration of proposals	Consideration and decisions on candidate short-term measures that are not work in progress and are not subject to data analysis e.g. National Action Plans guidelines, lifecycle GHG/carbon intensity guidelines for fuels, research and development ³					
Candidate mid- /long-term measures and action to address the identified barriers	Invite concrete proposals	Consideration of proposals including identification of barriers and action to address		Progress made and timelines agreed on the development of mid- and long-term measures				
Impacts on States ³	Invite concrete proposals	Finalization of procedure	Measure-specific impact assessment, as appropriate, consistent with the Initial Strategy, in particular paragraphs 4.10 to 4.13					
Fourth IMO GHG Study	Scope	Initiation of the Study	Progress report	Final report				
Capacity building, technical cooperation, research and development	Development and implementation of actions including support for assessment of impacts and support for implementation of measures							
Follow-up actions towards the development of the revised Strategy		Ship fuel oil consumption data collection pursuant to regulation 22A of MARPOL Annex VI(DCS)			Initiation of revision of the Initial Strategy taking into account IMO DCS data and other relevant information		Adoption of revised Strategy	

1 Includes ongoing work pursuant to regulation 21.6 of MARPOL Annex VI.

2 "In aiming for early action, the timeline for short-term measures should prioritize potential early measures that the Organization could develop, while recognizing those already adopted, including MARPOL Annex VI requirements relevant for climate change, with a view to achieve further reduction of GHG emissions from international shipping before 2023" (paragraph 4.2 of the Initial Strategy).

3 Assessment of impacts on States to be undertaken in accordance with the procedure to be developed by the Organization.

Note: MEPC, Marine Protection Committee; GHG, greenhouse gas; EEDI, Energy Efficiency Design Index; SEEMP, Ship Energy Efficiency Management Plan; ITCP, Integrates Technical Cooperation Programme; DCS, data collection system; MARPOL, International Convention for the Prevention of Pollution from Ships

Source: MEPC 73/19, annex 9.

The International Maritime Organization is also tackling the most harmful pollutants emitted by ships, NO_x, SO_x and particulate matter. According to annex VI of the MARPOL convention, air pollutants, especially SO_x, emitted from ships will have been decreased starting on 1 January 2020 through three different options: reducing the sulfur content of fuel oil used on board commercial ships from 3.5 per cent to 0.5 per cent; installing scrubber; and changing fuel to liquefied natural gas (LNG). These options differ in their installation and operating costs, technical effectiveness, and with regard to long-term investment strategies. The use of low-sulfur fuel is the preferred option in the short term because of the relatively low investment cost. However, the associated cost and availability in the relevant bunkering ports could undermine its attractiveness. The deployment of LNG-fuelled ships involves high investments and time delays, but it has a greater impact on emissions in the long term. Scrubbers or exhaust cleaning systems are a medium-term choice in the light of the remaining life of the vessel and operating

costs, but carriers are reluctant to use them because of the high upfront costs associated with a scrubber unit, estimated at \$5 million, and uncertainty over the acceptance of open loop scrubber systems in some parts of the world. The final decision on the IMO 2020 sulfur regulation, the level of compliance, the degree of enforcement, and the owner's compliance options by shipowners remains unclear.

Finally, to effectively manage ballast water, considered to be a major cause of marine ecosystem destruction, IMO member countries have made it compulsory for maritime vessels to install equipment on all ocean-going vessels from 2022 to 2024 based on the Ballast Water Management Convention. Ballast water is necessary for the safe and efficient operation of the vessel, but it causes ecosystem disturbances and diseases resulting from the release of harmful organisms in the process of replacing ballast water. Accordingly, ships engaged in international voyages are required to install relevant facilities to remove harmful organisms.

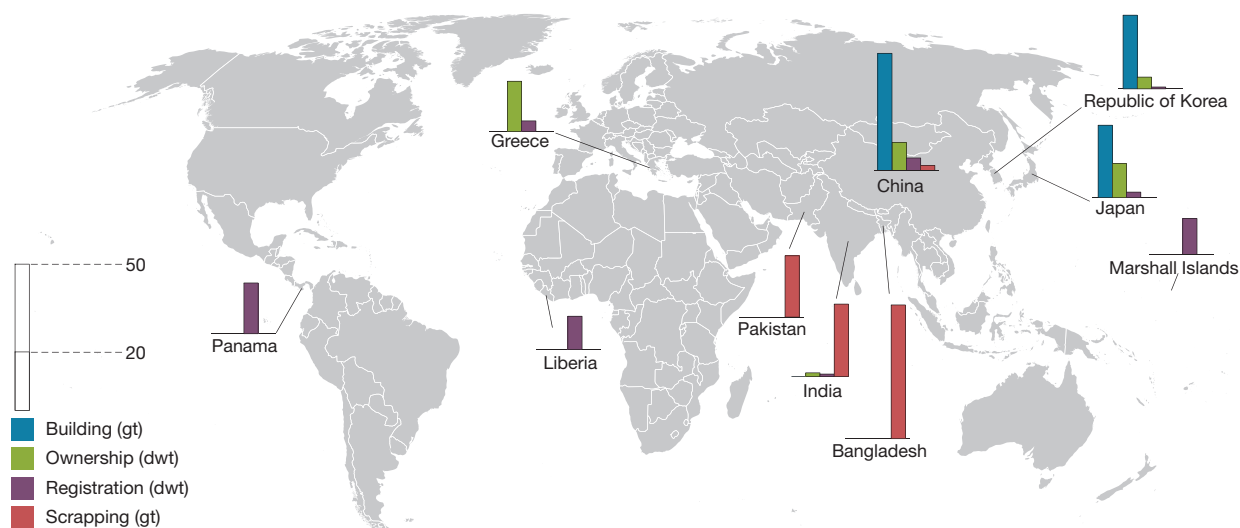
In all, there is strong global leadership and momentum in support of green shipping through the setting of ambitious targets and the identification of mechanisms for reaching them. The rate of acceptance of these targets, however, is not universal and stakeholders' ability to implement the required actions to achieve the targets are far from guaranteed. The key enforcement issue is related to the fact that compliance with the IMO requirements on emissions reduction, ballast water management and monitoring, and inspection and certification of ships' safety compliance lies with the flag States and Port authorities. These authorities are ultimately responsible for investigating, measuring, reporting and verifying compliance with international regulations and domestic laws. Given the dominance of Asia-Pacific countries among the flag and ports States, this region is critical to ensuring progress towards realizing sustainable shipping.

Taking a lead on green shipping – a development strategy for Asia and the Pacific

Asia is home to many major shipbuilding, ship owning, and ship demolition countries. China, Japan and the Republic of Korea are leaders in global ship production,

accounting for 90 per cent of shipbuilding activity. Bangladesh, India, Pakistan and Turkey are prominent in the main part of the ship demolition industry. Bangladesh, in 2018, became the main ship demolition country, accounting for 59 per cent of the total tonnage of demolished ships. In terms of ship owning economies, Greece, Japan, China, Singapore and Hong Kong, China account for more than 50 per cent of the world's tonnage. Moreover, despite the established practice of flagging out resulting in more than 70 per cent of the fleet by tonnage being registered under a foreign flag, most of the Asian economies, belonging to the leading 35 ship-owning economies, have a higher than average number of vessels flying under the national flag. This includes the Islamic Republic of Iran (98 per cent), Indonesia (93 per cent), Viet Nam (81 per cent), Thailand (73 per cent), Hong Kong, China (72 per cent), Malaysia (72 per cent), India (66 per cent), and Singapore (56 per cent). Marshall Islands, Hong Kong, China, Singapore and China are among the top 10 economies with leading flags of registration by dead-weight tonnage, with Marshall Islands in second place worldwide. Looking at the top 10 countries in terms of nationality of ship owner, whether in terms of controlled fleet or direct ownership, a major part of the world fleet of container shipping lines are from Asian countries.

Figure XV Building, ownership, registration and scrapping of ships



Note: Top three countries in each segment are shown; building and scrapping are estimated deliveries and demolitions during 2018; registration and ownership are end-of-year figures.
Source: UNCTAD (2019a).

Greening shipping is an imperative, but it is also an opportunity for the region. Potentially, it could play a leading role in the global transformation of the shipping sector, placing the task of greening shipping at the forefront of its regional development strategy. Transition to eco-friendly shipping offers a tremendous opportunity to address a variety of the problems at the forefront of development challenges. These include industrial development, reduction of transport costs, decreasing energy consumption, mitigating the impact of the climate change, and reducing local air and noise pollution and traffic congestion. Eco-friendly vessels are already being built in the major shipyards in China, Japan and the Republic of Korea. Some experts consider that eco-friendly ship technology could seriously boost the currently stagnant ship-building industry, and even be an important factor in global competition among the shipyards (Lee and Nam, 2017).

Major Asian economies, including China, Japan and

the Republic of Korea, could play a decisive role in the transition to sustainable shipping by imposing significant regulatory and enforcement measures, and engaging the support of the shipping industry. The latter is particularly crucial given the industry's concern with the global regulations because of installation costs, technical difficulties and performance issues, along with other economic considerations (high low-sulfur oil prices and LNG ship prices). At the same time, Governments and other development actors should consider giving the industry the opportunity to guide the environmental sustainability agenda, as the shipping industry and associated stakeholders are currently considering ambitious steps and strategies to contribute towards efforts to deal with climate change. An important part of this work would consist of establishing collaborative networks, such as shipbuilding-shipping networks, which would facilitate the redistribution of the burdens and the benefits of greening the shipping sector.

Box 5

Shipping industry's initiative in support of sustainable shipping

During the Secretary-General's landmark Climate Action Summit, held in September 2019, the global shipping industry launched the Getting to Zero Coalition to cut emissions by at least 50 per cent by 2050 and make the transition to full decarbonization possible.

The Coalition was mandated to deliver a road map with tangible steps to accelerate the production and operation of zero emissions shipping vehicles. The membership group behind the Getting to Zero Coalition consists of more than 80 shipping stakeholders, including shipping industry partners, energy companies, port cities, intergovernmental organizations, civil society and governments.

This coalition joins the list of other IMO-supported projects to cut shipping emissions, such as the following:

- The Global Industry Alliance to Support Low Carbon Shipping, which supports 10 pilot countries in implementing energy-efficiency measures,
- The Global Maritime Technology Network, unites maritime tech centres, which promote ways to improve energy efficiency in the sector,
- GreenVoyage-2050, a collaboration involving IMO and the Government of Norway, which is designed to initiate and promote global efforts to test tech solution for reducing shipping emissions

Source: UN News (2019).

The role of the small island developing States in the Pacific in advancing green shipping reforms is crucial. As with the general case of their maritime connectivity, the needs of these economies are very high. This can not only be attributed to their limited financial and human resources and the small scale of their economies, already referred to above, but also in the light of their dependency on imported (non-renewable) energy sources and their vulnerability to the impact of climate change. The lack of institutional and technical capacity in small island developing States can undermine global regulation efforts because of the insufficient enforcement of IMO regulations by the small island developing States port states controls when inspecting foreign ships calling at their ports. At the same time, as underscored in the recent discussions at the occasion of the Fourth Pacific Regional Energy and Transport Ministers' Meeting, held in Apia from 18 to 20 September 2019, because of its vulnerability to climate change, the Pacific subregion can serve as a hub for international climate change research and a focus for debates around conservation and resource management.

To support the transition to green shipping, developing Asia-Pacific economies need to continue to enhance their human and institutional capacity to meet the

related global and regional targets. The provision of financial and technical assistance remains crucial for most Asia-Pacific countries to be able to meet global decarbonization and other targets related to more environmentally sustainable shipping. As recently shown by the IMO-Norwegian Agency for Development Cooperation Marine Environment Protection for Southeast Asia Seas (MEPSEAS) Project, technical assistance is indispensable. Accordingly, IMO has been scaling up its technical assistance and capacity-building programme. The organization has been expanding its outreach to help countries uptake and implement energy efficiency measures for shipping (GloMEEP project); reduce the transfer of harmful aquatic organisms and pathogens in ships' ballast water and implement the IMO Ballast Water Management Convention (GloBallast project); and prevent the transfer of harmful aquatic species through biofouling (GloFouling project). IMO has also established two Maritime Technology Cooperation Centres in the Asia-Pacific region, as part of its Global Marine Technology Cooperation Centres Network, which unites technology centres in targeted regions to promote technologies and operations to improve energy efficiency in the maritime sector and help navigate shipping into a low-carbon future.

Box 6

The 2050 Strategy for the Blue Pacific Continent and the Pacific Blue Shipping Partnership

At the fiftieth Pacific Island Forum (PIF), held in Funafuti from 13 to 16 August 2019, the PIF leaders endorsed the development of the 2050 Strategy for the Blue Pacific Continent, while acknowledging the need for urgent, immediate actions on the threats and challenges of climate change facing the Blue Pacific and realizing the health and well-being of Pacific people to secure a bright and prosperous future for the Pacific. They agreed that strong political leadership to advance climate change action, protecting the ocean's health and integrity, sustainably managing island and ocean resources, connecting the oceanic continent (air, sea and information communications technology and ensuring healthy people, are cornerstone priorities informed by science.

Likewise, at the Fourth Pacific Regional Energy and Transport Ministers' Meeting (Apia, Samoa, 18–20 September 2019), the ministers applauded the Pacific Blue Shipping Partnership initiative and agreed to work towards the ambitious Partnership's targets for domestic shipping in the Pacific islands countries to reduce greenhouse gas emissions by 40 per cent in 2030 and 100 per cent by 2050.

The Pacific Blue Shipping Partnership, announced by the Governments of Fiji, the Marshall Islands, Samoa, Vanuatu, the Solomon Islands and Tuvalu, has set an emissions reduction target of 40 per cent by 2030, and full decarbonization by 2050.

Source: Forum Communiqué, Fiftieth Pacific Island Forum (August 2019); Apia Outcome Statement, Fourth Pacific Regional Energy and Transport Ministers' Meeting (September 2019); Fiji (n.d.).

In synergy with the technical and regulatory work of IMO, UNCTAD has been developing policy tools and methodologies intended to support sustainable maritime connectivity, such as the UNCTAD Framework for Sustainable Freight Transport and the Sustainable Freight Transport Toolkit. This work features a dedicated training and capacity-building programme covering green shipping and ports, online self-assessment tools, such as a carbon emission calculator, and a methodology for determining the sustainability status of the national freight sector, including its maritime segment.

At the regional level, ESCAP has been providing a comprehensive intergovernmental platform and supporting the development of human and institutional capacities pertaining to sustainable transport connectivity for Asia and the Pacific. This work has resulted in intergovernmental agreements on the Asian Highway Network, the trans-Asian Railway network and dry ports, which provide a comprehensive institutional framework for transport infrastructure development within which related policies and actions can be collectively defined and implemented. The performance of this regional transport network is highly dependent on port development and efficient port logistics, which directly influence the capacity, costs and efficiency of the rest of the transport system, making the issues of sustainable maritime connectivity one of the main priorities in the ESCAP transport work.

3.4. Conclusion and recommendations

A pathway to sustainable use of oceans involves transforming the shipping sector to enhance its performance across multiple criteria in order to offer environmentally sustainable shipping services that are efficient and safe.

While often framed as a challenge, the transition to safer, more efficient and green shipping is a unique development opportunity for the Asia-Pacific region. The region has the potential to realize its other development goals related to industrial development, greater competitiveness, protecting the environment and mitigating the impact of the climate change, and also increase the well-being and quality of life of its population. Seizing this opportunity relies on

strengthening the regional dialogue on sustainable shipping. This dialogue needs to be systematic with the participants meeting on a regular basis, complementing the existing intergovernmental processes on land transport cooperation and raising the profile of sustainable maritime connectivity in the quinquennial Asia-Pacific Ministerial Conference on Transport. Even more importantly, a dialogue on sustainable shipping needs to become an integral part of the cross-sectoral and pluridisciplinary discussions on the health of the oceans. The Asia-Pacific Day of the Ocean, established under the auspices of ESCAP, has already proven to be a powerful platform for multi-stakeholder and multisectoral discussions on shipping in Asia and the Pacific.

The ongoing COVID-19 pandemic is a stark reminder on how crucial such cooperation is for more sustainable use of the oceans and how fragile it may be in time of the great disruptions. Robust mechanisms, rooted in countries-driven and result-oriented regional cooperation, need to be put in place to help countries to act jointly when they need to the most.

The overarching goal of regional dialogue would be to help Asia and the Pacific become a hub for sustainable shipping policies, transform challenges into opportunities to develop tailor-made solutions adapted to regional needs and requirements, promote industrial development, reduce transport costs, enable efficient energy use, curb carbon emissions, ensure resilience to pandemics and natural disasters and adapt to the impacts of climate change. The regional dialogue should also be a venue for keeping the policy spotlight on the connectivity needs of small island developing States by aiming to come up with specific implementation plans and pledges of technical and financial support and helping them design and implement tangible actions in support of their greater maritime connectivity.

Other priorities for individual and collective action are to take full advantage of technological advances and to adhere to global regulations on safe and environmental maritime transport. This entails acceptance and proper enforcement of key IMO conventions, which effectively enhance the safety and environmental performance of shipping, such as the following:

- (a) International Convention for the Safety of Life at Sea (SOLAS), 1974, as amended;
- (b) International Convention for the Prevention of Pollution from Ships, 1973, as modified by the Protocol of 1978 relating thereto and by the Protocol of 1997 (MARPOL);
- (c) International Convention on Standards of Training, Certification and Watchkeeping for Seafarers (STCW) as amended, including the 1995 and Manila Amendments;
- (d) International Convention for the Control and Management of Ships' Ballast Water and Sediments, 2004

Providing a lifeline for the global economy cannot come at the expense of the health of the marine ecosystem. It is the joint and indivisible responsibility of Asia and the Pacific and the shipping community at large to help the region and the planet move towards sustainable use of the oceans.



Chapter 4

Regional cooperation for ocean fisheries

4.1. Introduction

Fisheries in Asia and the Pacific support livelihoods and provide food security, employment and income for millions. Fish is one of the most traded food commodities worldwide; 54 per cent of this trade comes from developing countries where the fish trade generates more income than most other food commodities combined (FAO, 2016). Fish and fish products contribute significantly to the gross domestic product (GDP) of many developing countries. For example, as much as 8.6 per cent in Kiribati, 9.4 per cent in Tuvalu and 4.1 per cent in the Marshall Islands. (Gillett, 2016). In the Asia-Pacific region, fisheries provide food and income to more than 200 million people and 34 million people are engaged in commercial fishing. Eighty-four per cent of the global population engaged in the fisheries and aquaculture sector are from Asia (FAO, 2016).

Human activities affect 97.7 per cent of the world's ocean habitats and have adversely affected more than 90 per cent of many of the world's commercially and ecologically "important" species. In the First World Ocean Assessment, a cycle of decline in ocean health, with changes and losses in the structure, function and benefits obtained from marine systems was identified (United Nations, 2015).

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As explained earlier, in the Asia-Pacific region, the main threats to marine fisheries are overexploitation of fish stocks, the degrading ecosystem and environment health, climate change, increasing operational costs, post-harvest losses, and poor governance and regulation. This is coupled with increasing demand for marine capture fish in the region resulting from population and income growth and associated shifting dietary patterns. While aquaculture will be able to meet some of the increase in regional demand, it is unlikely to replace the current contribution of marine fisheries to the region's food security requirements. Evidence indicates that the growing demand for fish products cannot be met by sustainable capture fisheries in the coming decade. The COVID-19 pandemic is presenting a new array of challenges to the fisheries industry. With a reduction in demand and trade unprecedented since World War II, the livelihoods of fisherman and people participating in the fisheries value chain of the region are under severe threat. Apart from the demand shock, another threat is related to the difficulty in moving supply, as the COVID-19 pandemic risks are particularly acute in enclosed areas, such as boats and especially those away at sea for extended periods. Furthermore, there is the risk of greater illegal fishing because enforcement agencies are occupied with other domestic concerns during the pandemic.

Illegal, unreported and unregulated fishing is a leading culprit in the overexploitation of fisheries resources in Asia and the Pacific; an estimated one in five fish of the landed catch is caught through illegal, unreported and unregulated fishing. The estimate is likely to be higher in some areas, such as in the Eastern Indian Ocean and in the Northern and Western Central Pacific.

Management and conservation measures to promote the sustainability of marine capture fisheries present complex challenges for international law and governance. Many marine living resources, including, among them, high-value fish species, migrate across the jurisdictions of different States and in the high seas where they are considered "shared" or common property. Without strong governance, such stocks are prone to overexploitation in a classic "tragedy of the commons" situation (McWhinnie, 2009). The rate of degradation of the marine environment has been outpacing developments in the region's ocean governance landscape (United Nations, 2017a). Fragmentation of ocean governance at global, regional and national levels present policy and institutional hurdles. Lack of coordination and cooperation within

and among responsible authorities is recognized as a fundamental challenge in prioritizing policies and strategies.

The application of ecosystem and area-based management approaches is also central to the targets of Sustainable Development Goal 14. The urgency for action is demonstrated by the ambition of the targets, with four out of the 10 under an impending 2020 deadline. The focus of this chapter is mainly on two targets that may be advanced through regional cooperation, 14.4 on addressing overfishing, illegal, unreported and unregulated fishing and destructive fishing practices, and 14.5 on the conservation of coastal and marine areas.

In the chapter, marine capture fisheries in coastal (lagoons, reefs, deep-slope or shallow sea areas, often small-scale¹⁸) and offshore (deep sea within countries' exclusive economic zones and in areas beyond national jurisdiction by industrial-scale vessels¹⁹) areas are reviewed to providing an overview of marine capture fisheries in the region. Challenges and opportunities for the management of marine capture fisheries in the Asia-Pacific region are explored. The chapter concludes with suggested areas for strengthened regional cooperation to contribute towards sustainable fisheries and the achievement of Sustainable Development Goal 14 in the region.

4.2. Fisheries and the economy

The Asia-Pacific region is the world's largest producer of fish.²⁰ China, Viet Nam and Thailand are the world's largest exporters of fish and fish products, accounting for 23.3 per cent of total world fisheries (related) exports (FAO, 2018b). The value of fisheries and aquaculture production in the Pacific subregion was estimated at approximately \$3.2 billion in 2014 (Gillett, 2016). In South-East Asia, the export value of the fish caught was \$19.5 billion in 2015 and Asia accounted for 75.4 per cent of total number of fishing vessels

¹⁸ Small-scale fishing is comprised of three components: subsistence (or non-commercial); artisanal (or small-scale commercial); and sport fishing (both recreational and for commercial tourism purposes).

¹⁹ Industrial fishing is equivalent to large-scale commercial fishing and concerns mostly vessels (often more than 15 m in length) that offload at a processing plant or cold storage facility at sea or in port

²⁰ The Asia-Pacific region for ocean capture fisheries in this chapter represents the areas of the Western and Central Pacific Ocean (area of coverage of the Western and Central Pacific Fisheries Commission) and Indian Ocean (covered by the Indian Ocean Tuna Commission).

– motorize and non-motorized (van Wees, 2020). In terms of employment, in 2016, 85 per cent of the people employed in aquaculture and fisheries worldwide were in Asia and there were an increasing number of fishers reported in 2015-2016 for the Pacific (FAO, 2018b).

The trade in capture fisheries products generates significant revenue for developing countries through sales, taxation, license fees and payment for access to fish by distant water fleets. There is concern, however, about the true benefits to these countries from these revenue sources, in particular among small island developing States and least developed countries, as reflected in Sustainable Development Goal target 14.7. For example, the tuna catch in the West and Central Pacific Fisheries Commission area are estimated to account for approximately 55 per cent of the world supply (Williams and Reid, 2019), but most of it is exported outside the region (Gillet, 2014). A similar scenario is occurring in the tuna fisheries of the Indian Ocean where the majority of the catch is exported from the island and coastal States. In both oceans, domestic fleets have typically caught less than 33 per cent of the annual total catch. A slowdown of fisheries as a result of the COVID-19 pandemic will affect more strongly the economies that rely more heavily on ocean resources and the countries that are most affected by the pandemic.²¹

4.3. Fisheries and livelihoods

Coastal fishing is fundamental for livelihood and food security in coastal States and communities. Approximately 90 per cent of fishers and fish farmers in the Asia-Pacific region are small scale, highlighting the impact of the sector at the local level in terms of subsistence fishing and the importance of coastal fisheries to nutrition, culture and employment within coastal communities. In the midst of the COVID-19 pandemic, however, if fisheries activities are stopped for a longer period because of a prolonged crisis, operations could take longer to restart, hampered by the potential deterioration of some equipment, and the consequent decline in households' long-term savings.

Fisheries in South and South-East Asia range from being large-scale industrialized fisheries for pelagic

fishes, such as oil sardine, herring, and tuna, to artisanal fisheries for nearshore and estuarine species. The artisanal and commercial nearshore marine fisheries are a critical component of food security in South and South-East Asian economies. FAO estimates that in 2016, 50.8 million people were employed in fisheries and aquaculture in Asia and the Pacific (FAO, 2018b).

South-East Asian fishery landings (wild capture, not including aquaculture) exceeded 22.4 million tons in 2016, while more than 11.3 million tons were produced in the Indian Ocean that same year (FAO, 2018b).²² This means that 62.6 per cent of the world's marine capture fish production comes from Asia and the Pacific (FAO, 2018b). Almost all of the fish caught in Asia is used for food, although a significant portion of the catch from trawl fisheries is used for animal feed.

In small island developing States, average fish consumption is two to three times higher than the global average of fish per capita (Gillet, 2016). In some developing countries, including small island developing States, small-scale fisheries provide more than 60 per cent of the protein intake. The continuation of current lifestyles, livelihood development, and food security are all highly dependent on coastal fisheries resources. Although dwarfed in volume and value by the offshore tuna fisheries, the region's fisheries based on coastal resources provide most of the non-imported fish supplies to the region and accordingly, play a crucial role in food security.

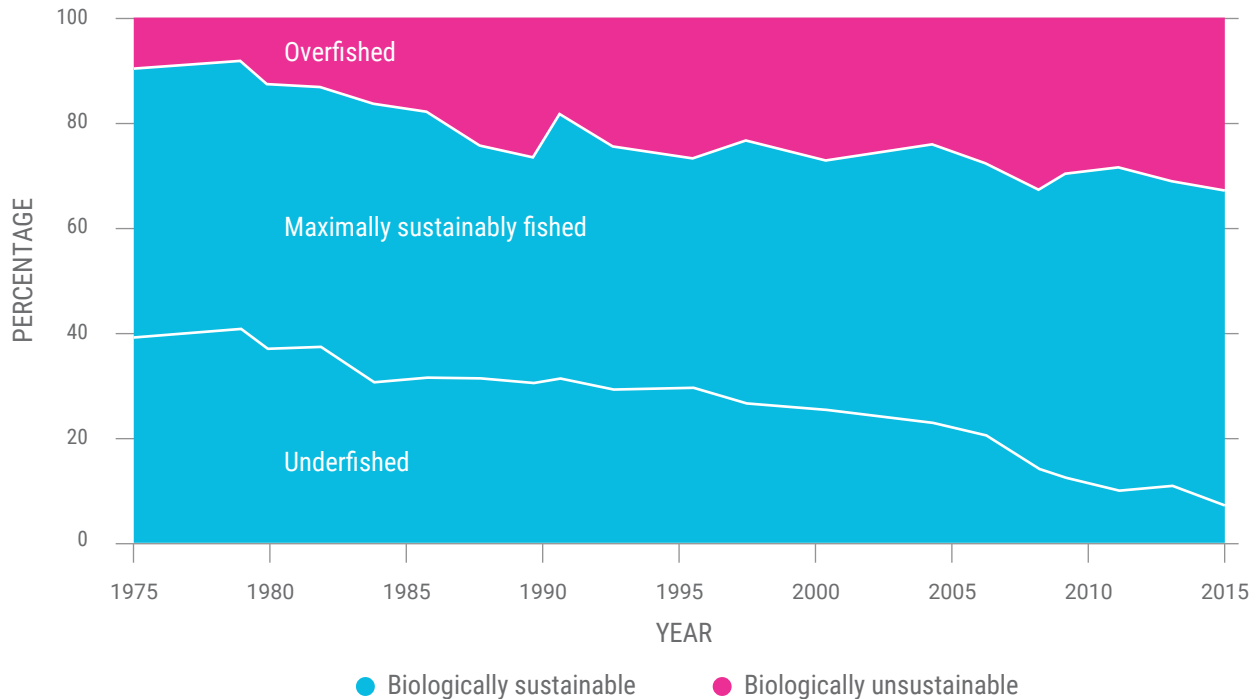
4.4. The health of marine fisheries in Asia and the Pacific

As visible in figure XVI, the state of the world's fish stocks is deteriorating (FAO, 2018b). The concurrent levelling-off of global marine fish catches also raises the question as to whether the current plateau in fishery yields represents the maximum sustainable yield or if greater harvest may be possible. In a world increasingly seeking more fish, it is essential that regions and subregions be able to confidently assess whether there is potential for higher yields through increasing effort, or whether their only option is to rebuild existing overfished stocks.

²¹ As of mid-April 2020, small island developing States appear to be relatively less affected by the pandemic, mainly because of their geographical isolation and sparse populations.

²² The figure for South-East Asia is that of Northwest Pacific in FAO (2018b).

Figure XVI State of the worlds fisheries in 2017



Source: FAO (2018b).

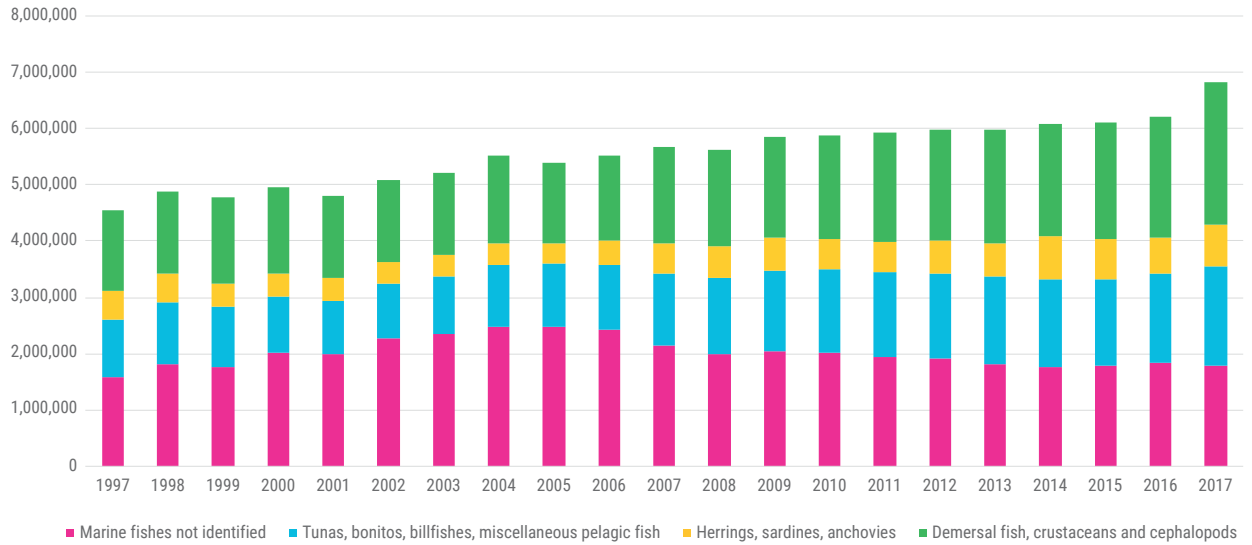
Despite the global picture of stagnating catch and increasing numbers of overfished stocks, the recorded landings from the two main fishing areas (57 and 71 for the Eastern Indian Ocean and Western Central Pacific, respectively) indicate that the trends in marine capture fisheries are growing steadily (figure XVII). Analyses at the national level indicate that fishery yields in most South-East Asian countries have not increased over the past decade. In general, the coastal fishery resources are heavily fished and often show signs of overexploitation, especially in areas close to population centres and for fishery products in demand from the rapidly growing Asian economies. The coastal fisheries are also negatively affected by habitat degradation, which occurs from destructive fishing practices, urbanization, siltation from mining and logging, and competing uses of the coastal zone. The COVID-19 pandemic, however, may create a small window for stocks to recover if it leads to a global slowdown of the commercial fishing industry, as travel constraints, access restrictions and closed ports contribute to a decline in active fishing vessels. Moreover, if demand for fish declines because of activity in restaurants globally and as a result of a global economic recession, resuming fishing operations may take time. This could be beneficial to stocks, as fish would be able to go

through their spawning cycle, allowing some stock of some species to replenish during a sufficiently long slowdown.

Without reliable stock assessments, it is impossible to determine whether fish populations are overexploited or, potentially, underexploited relative to their ability to support sustainable yields. Figure XVIII shows the major fishing countries of the world with a circle representing the total reported landings. The green shading represents the proportion of landings from countries that conduct public assessments of their stock status. Most catch is assessed in Europe, North-West Africa, North America, the largest South American countries, South Africa and Japan. Despite the importance of fisheries to the Asian economies, scientific monitoring and management of capture fisheries are modest, with modern scientific stock assessments not being carried out for most stocks. This is illustrated in figure XVIII by the large circles with a little bit of green in South and South-East Asia, source of 48 per cent of the world's marine capture fisheries. This means that while apparent increases are occurring in the landings from marine capture fisheries, there may be less confidence in the state of the stocks that underpin these fisheries.

Figure XVII Trends in marine capture production in the Indian Ocean Eastern and Western Central Pacific

FAO Fishing Area 57 – Eastern Indian Ocean



FAO Fishing Area 71 – Western Central Pacific

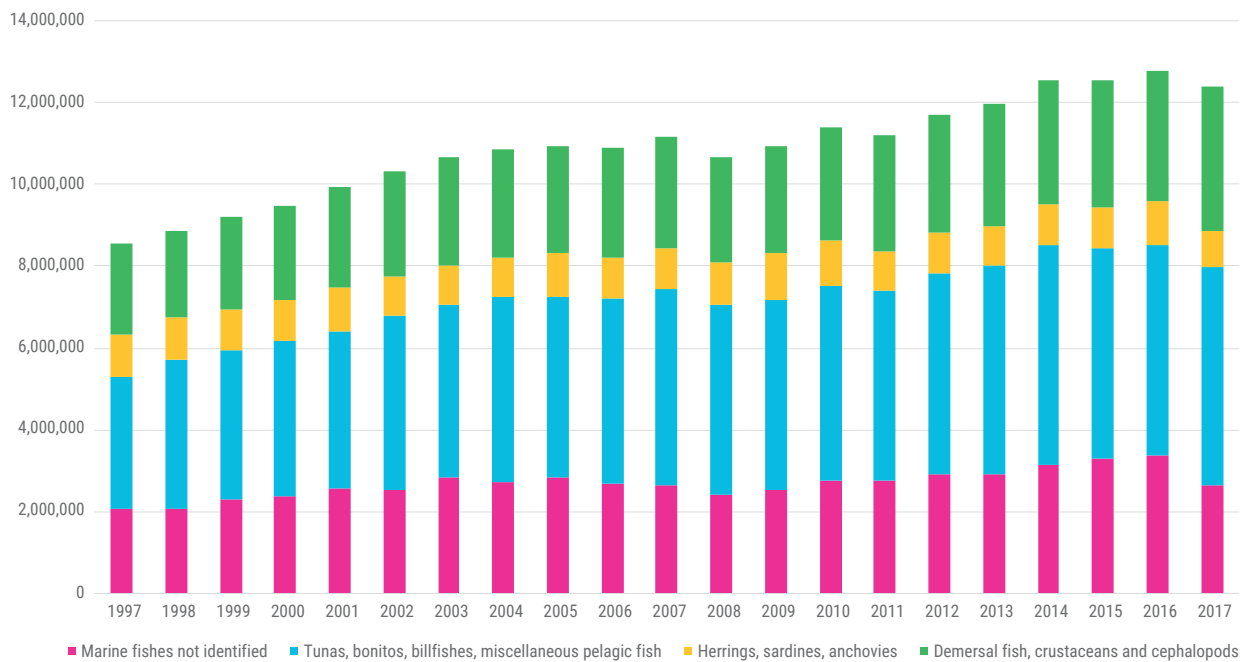
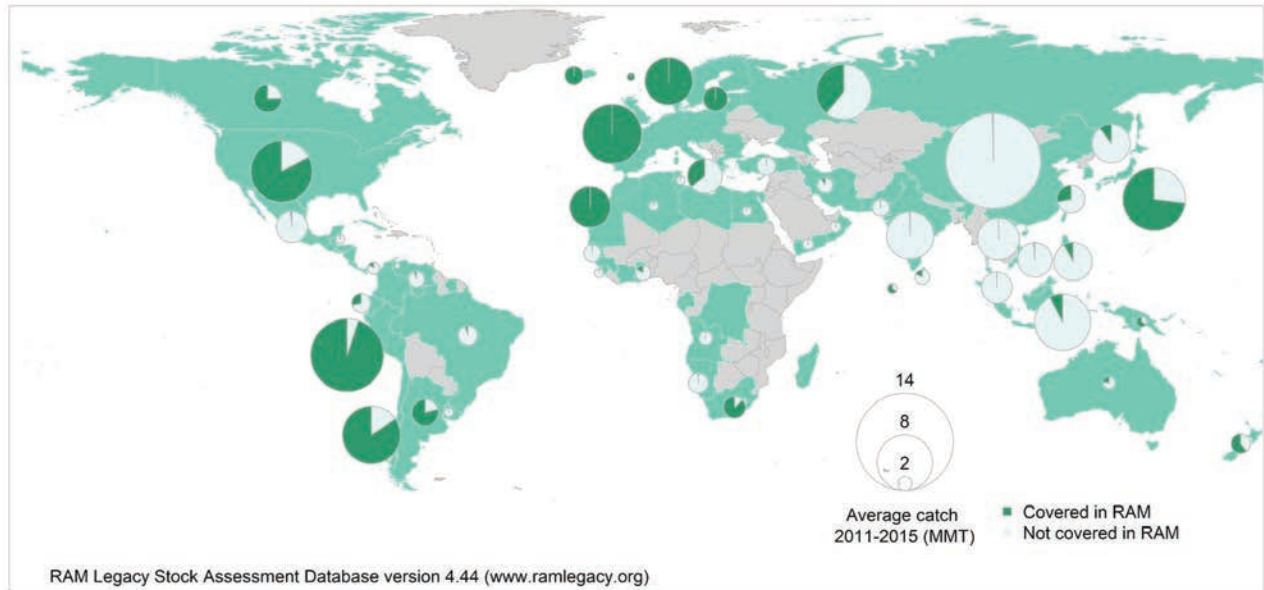


Figure XVIII Source of assessed stocks globally and how they relate to production



Note: In South-East Asia there are a large number of landings but very few stock assessments.
Source: RAM Legacy Database, version 4.4 (<https://www.re3data.org/repository/r3d100012095>)

The analytical approaches for assessing stock status are often difficult and many countries in the region lack the resources and capacity required to carry them out. In this regard, however, there has been some progress. For instance, China, India, Indonesia and Thailand are changing their approaches to improve the assessment of some of their important stocks. FAO is prioritizing building capacity and collaborating with multiple partners and countries to improve the assessment of marine fisheries. Nevertheless, more comprehensive monitoring and assessments of marine fish stocks in the region is needed, in particular in areas not covered by regional fisheries management organizations agreements.

Monitoring of coastal fisheries in most countries of the Asia-Pacific region is nascent, and available statistics are highly uncertain. Because of the wide diversity of species, gears and fleet characteristics, no single management approach is likely to be effective at all scales. Monitoring coastal fisheries is typically expensive. In countries with an extensive coastline, vessels can unload their capacity in a multitude of places. Accordingly, monitoring the coastal fisheries has historically been unaffordable for many countries in the region beyond rudimentary statistics.

The fisheries of South and South-East Asia and the Pacific islands and territories represent an opportunity to learn about the success and failure of different fishery management strategies across multiple scales. The data-poor, multi-species, multi-gear nature of these fisheries makes it difficult to apply existing single stock methods used to analyse data-rich fisheries. Tools for assessing these types of fisheries are still being developed. Fisheries are also spatially complex, covering areas comprised of thousands of square kilometres.

While the industrial sector is starting to get meaningful levels of monitoring coverage, the artisanal sector remains poorly monitored and understood. As a consequence, current coastal fishery management measures, both centrally administered and community driven, tend to be non-quantitative and precautionary, and are intended to protect stocks in a generalized way. For some stocks or areas, however, the absence of information has resulted in no application of management or regulation.

The governance of coastal fisheries is also challenged by the multi-species and multi-gear nature of the fisheries, the complex social dynamics between

fishery participants, conflicts between differing sectors (subsistence and commercial) and inability to monitor and enforce legislation. These challenges are not insurmountable; Indonesia for example, has improved the performance of its coastal fisheries through adoption of the Ecosystem Approach to Fisheries and responding to the information derived from independent resource surveys.

A growing body of research on small-scale and artisanal fisheries also suggests that some fisheries, despite the lack of traditional top-down management by the Government, have managed to avoid the “tragedy of the commons” problem where common-pool resources are inevitably degraded (Feeny, Hanna and McEvoy, 1996; Ostrom and others, 1999). Recent work on community co-management of small-scale fisheries has shown the characteristics of such systems that lead them to be effective (Gutierrez and others, 2011).

4.5. Regulatory and management issues

Many of the management challenges associated with marine capture fisheries are related to governance and regulatory constraints, such as the capacity to enforce fisheries legislation. For offshore fisheries that capture highly migratory fish species, strong cooperation is required to manage stocks that range across multiple exclusive economic zones and international waters. Policy and regulations can be related to a specific species stock or an entire range of stocks, and should be coordinated to ensure that the policy of one jurisdiction does not counter the policy of another. Moreover, such consistency means that the resource is shared equitably among fishery participants. The long history of collaboration and concentration of tuna in Western and Central Pacific within exclusive economic zones may, in part, explain why governance in the Pacific islands has been more effective for their fisheries than elsewhere in the region.

Governments have agreed to many multilateral agreements and voluntary instruments related to fisheries including, among them, the Convention on Biological Diversity, the FAO Code of Conduct for Responsible Fisheries and the FAO Agreement on Port State Measures to Prevent, Deter and Eliminate Illegal, Unreported and Unregulated Fishing. In response to General Assembly resolution 72/249, an international

legally binding instrument under the United Nations Convention on the Law of the Sea is under negotiation on the conservation and sustainable use of marine biological diversity of areas beyond national jurisdiction.

At the regional level, regional fisheries management organizations have adopted conservation and management measures that have the standing of international law. Regional fisheries management organizations are managing highly migratory and straddling fish stocks (the tuna fisheries management organizations, the Indian Ocean Tuna Commission, the Western and Central Pacific Fisheries Commission and the Commission for the Conservation of Southern Bluefin Tuna) and the non-highly migratory high seas fisheries resources in the South Pacific and North Pacific Ocean (the South Pacific Regional Fisheries Management Organisations and the North Pacific Fisheries Commission). Subregional agreements, such as the Parties to the Nauru Agreement, have implemented initiatives, such as the Vessel Day Scheme in the Pacific (box 7), with significant success.

The Western and Central Pacific Fisheries Commission was established under the Convention for the Conservation and Management of Highly Migratory Fish Stocks in the Western and Central Pacific Ocean.²³ The Indian Ocean Tuna Commission is an intergovernmental body²⁴ established to manage tuna and tuna-like species in the Indian Ocean and adjacent seas with the objective to promote the conservation and optimal utilization of tuna and tuna-like stocks covered by the Indian Ocean Tuna Commission Agreement and to encourage sustainable development of fisheries.

²³ Members are the following: Australia; China; Canada; Cook Islands; European Union; Fiji; France; Indonesia; Japan; Kiribati; Marshall Islands; Micronesia (Federated States of); Nauru; New Zealand; Niue; Palau; Papua New Guinea; Philippines; Republic of Korea; Samoa; Solomon Islands; Taiwan Province of China; Tonga; Tuvalu; United States; and Vanuatu.

²⁴ Members are the following: Australia; Bangladesh; Belize; China; Comoros; Eritrea; European Union; France; Guinea; India; Indonesia; Iran (Islamic Rep. of); Japan; Kenya; Madagascar; Malaysia; Maldives; Mauritius; Mozambique; Oman; Pakistan; Philippines; Republic of Korea; Seychelles; Sierra Leone; Somalia; South Africa; Sri Lanka; Sudan; United Republic of Tanzania; Thailand; United Kingdom; and Yemen.

Box 7**Vessel Day Scheme in the Pacific**

Under the Vessel Day Scheme, vessel owners can purchase and trade days fishing at sea in places subject to the Parties to the Nauru Agreement. The purpose of the scheme is to manage and reduce catches of target tuna species and increase the rate of return from fishing activities through access fees paid by distant water fishing nations. The total allocation of fishing days is set and apportioned among Pacific island members for one-year periods up to three years in advance.

Since 1992, the countries of Solomon Islands, Tuvalu, Kiribati, Marshall Islands, Papua New Guinea, Nauru, Federated States of Micronesia and Palau, commonly referred to as the Parties to the Nauru Agreement, have worked collaboratively to manage the tuna stocks within their national waters. The collaborative arrangement under which these countries have worked is the Palau Arrangement for the Management of the Western and Central Pacific Purse Seine Fishery or the Palau Arrangement. The Arrangement is a multilateral treaty governing the operation of purse seine vessels in the national waters of the Parties to the Nauru Agreement. Its primary purpose is to place a limit on the number of vessels operating in the waters of the Parties to the Nauru Agreement.

Under the Vessel Day Scheme, the Parties to the Nauru Agreement set the total number of days that can be fished in their waters combined and the apportionment of the total number of days between each country. These allocations of fishing days are set for 12-month periods and can be set up to three-years in advance. The most recent stock assessment information on the target species of Skipjack (*Katsuwonus pelamis*), Yellowfin (*Thunnus albacares*) and Bigeye (*Thunnus obesus*) tuna and economic information relating to the maximization of economic returns and optimal utilization of the resource is used to assess the allocations of fishing days.

Source: Forum Fisheries Agency (2008).

Some of the management problems related to the implementation of these multilateral agreements in national jurisdictions are the following: inadequacy of national fisheries laws and regulations to fully incorporate the obligations derived from such multilateral agreements (and the harmonization of them with legislation that has competing objectives, such as those governing economic planning or extractive industries); weak enforcement of the existing legal frameworks (many countries have yet to take the necessary steps to become a party and implement international instruments, such as the United Nations Convention on the Law of the Sea, the 1995 United Nations Fish Stocks Agreement or the 2009 FAO Agreement on Port State Measures); and challenges concerning transparency and traceability of fish catch (and zero regulation of bycatch). National fisheries management agencies in some instances can better link scientific advice to fish quotas and catch limits.

4.6. Data collection and reporting in fisheries

Although fisheries are important to the economy and social well-being of Asia-Pacific communities, understanding of fish stocks and fishery activities remains incomplete. There are no data available for fishery-related Sustainable Development Goals, except for target 4 on sustainable fish stocks.

The data supporting the larger transboundary industrial scale fisheries, such as tuna, are often compromised by national confidentiality rules, which restrict making information available to third parties. Aggregation of fisheries information, for example, can lead to erroneous conclusions when estimating the depletion levels that a species can sustainably withstand. This lack of transparency in sharing information can also erode public confidence in government and industry analyses, as third parties are not able to truly

evaluate the conclusions of countries and fisheries commissions.

Many actors in coastal fisheries, on the other hand, suffer from an absence of information. Because of the small-scale nature of their operations, fishers often lack access to infrastructure and may not be able to access the data required to evaluate the sustainability of their operations. Moreover, the vast number of ports that such fisheries can use to unload catch is an indication that governments often lack the resources to fully support data collection by these fisheries.

New sources of data, such as remote sensing, can potentially improve monitoring, especially in areas where there is little or no data or areas requiring real-time data, such as fisheries and maritime conservation. E-reporting and e-monitoring are also promising solutions for improving the capacity to monitor small-scale and industrial-scale fisheries.

Data sharing across data holders, both private and public, remains a challenge, which reduces the opportunity for integrated and nuanced analysis of different fisheries. There is currently no single-entry point for accessing ocean data and information for scientists, governments and experts (UNEP, 2019b). Without significant changes to national laws and incentives, it is unlikely that open access to current “confidential” data will materialize in the immediate future. Harmonized national statistical systems could be beneficial towards ensuring consistent and robust quality control of data associated with fisheries data. This would reduce the data processing costs associated with analyses when public domain is used or confidential data is shared by a particular country for a specific purpose, such as stock assessment. National statistical systems, such as those in the Pacific, face the compounded challenge of increasing the range of the data to be collected and limited capacity in place. Access to infrastructure to assist with cloud-based storage of information would help remote communities and countries store processed information.

4.7. Climate change

The challenge of sustainable management of offshore fisheries is further compounded by the impacts of climate change, such as the shifting pattern of mobility and habitat connection of marine species. Warmer air and sea surface temperatures, ocean acidification,

rising sea levels and greater rainfall are expected to deplete significantly coral reefs, mangrove, seagrass and intertidal habitats, which provide shelter and food for coastal fish and shellfish. This is likely to result in reductions in the productivity of coastal fisheries.

The abundance of tropical tuna in the Pacific Ocean and Indian Ocean is expected to decrease under current climate projections of ocean productivity. The distributions are also expected to change, which are likely to affect significantly coastal States in both oceans. The rationale for measures that allocate catch quotas among fishing entities includes the rights of coastal states to access resources in their exclusive economic zones (whether realized or not; see box 7 on the Vessel Day Scheme, as an example). Changes in the distributions will consequently influence this access. For example, in the Pacific Ocean skipjack and yellowfin tuna are projected to move progressively to the east, under the Representative Concentration Pathway (RCP) 8.5 future climate scenario.²⁵ Contributions from tuna to government revenue and GDP through the application of the Vessel Day Scheme should eventually increase for countries in Central and Eastern Pacific and decline for those in Western Pacific. However, benefits for Central Pacific nations may be offset by a shift in abundances of these tuna into the high seas areas in the Eastern Pacific Ocean which may undermine the effectiveness of the Vessel Day Scheme as a management tool. The effectiveness of the Vessel Day Scheme can largely be attributed to the majority of the best tuna fishing areas being within the exclusive economic zone boundaries of the Pacific island countries and not in the high seas.

While recognizing the need to address the causes of climate change and other existential threats to fisheries, the best adaptation strategy and reduction options over which the Asia-Pacific region has good leverage is to strengthen fisheries to cope with the expected stresses. These effects, as to whether, they will be “mild” or “severe”, may be contingent on the implementation of prudent fisheries management to assist fishers, their communities and stakeholders in adapting to the social and economic consequences of climate change (Gillet, 2014).

²⁵ This is one of the scenarios for climate modeling and research for IPCC, whereby “emissions continue to rise (by how much) throughout the twenty-first century”.

4.8. Preventing overfishing

The basic principle for the recovery of depleted stocks is straightforward – reduce fishing pressure to a level that allows stocks to rebuild. The specific application of plans to aid the recovery of the stock once fishing pressure is reduced requires significant scientific and management capacity, including for monitoring, control and surveillance. The concept of “maximum sustainable yield”, adopted as the goal of many national and international regulatory bodies, is based on an inherent trade-off between increasing harvests and the decreasing ability of a population to compensate for the removal of them.

Many governments use subsidies as a fisheries development tool. Some major fishing economies continue to subsidize their distant-water fleets, making it very difficult for domestic fishing fleets to compete and creating overcapacity in fishing. Addressing overcapacity and overfishing in fishing fleets created by subsidies is recognized in Sustainable Development Goals target 14.6. Subsidies for distant-water fleets may decline in accordance with World Trade Organization measures that are taking effect (Sumaila and others, 2016). Despite some progress, capacity enhancing subsidies, in particular those targeting fossil fuels, estimated at \$22.2 billion globally in 2018, continue to increase as a proportion of total subsidies (Sumaila and others, 2019).

Destructive fishing practices, such as bottom trawling, and the legacy of abandoned fishing gear causing “ghost fishing” result in irreversible damage to ecosystems and marine habitats. Bottom trawling is a highly unselective method in which many non-target species are caught by dragging a large fishing net along the sea floor. This results in unnecessary production of bycatch. Additionally, bottom trawling creates long-lasting and cumulative impacts that change the physical integrity of the ecosystem by producing harmful ocean sediments. Often bottom trawling, among many other activities, leads to ghost fishing, which occurs when fishing gear, such as nets and long lines, are lost, dumped or abandoned, but continue to catch or entangle marine life unattended. FAO estimates that at least 640,000 tons of fishing gear is lost each year (FAO, 2018a) and that fishing gear makes up 10 per cent of all marine debris and 58 per cent of all macroplastics in the oceans. Marine life becomes trapped in a cycle in which the dead catch attracts scavengers, which then get caught in the same net, contributing to already severely depleted fish stocks.

4.9. Illegal, unreported and unregulated fishing

Illegal, unreported and unregulated fishing is a severe threat to marine biodiversity and sustainable fisheries. Approximately one out of five fish caught globally can be attributed to illegal, unreported and unregulated fishing, with higher estimates of up to one in three fish caught in the Eastern Indian, Northern Pacific and Western Central Pacific Oceans (Agnew and others, 2009). World leaders at the 2019 G20 Summit, held in Osaka, Japan, on 28 and 29 June, reiterated that illegal, unreported and unregulated fishing is a serious threat to the sustainability of the ocean and reaffirmed the commitment to end it. However, with a likely impact of the COVID-19 pandemic being weaker offshore law enforcement, illicit fishing may increase in the short term. Under such conditions, the effective management of oceans will decline, making it more difficult for oceans to sustainably provide resources over the long term.

Commercial fisheries are among the most governed areas, a result of the introduction of multilateral agreements and voluntary instruments for sustainable fisheries. The implementation of them at the country level, however, needs to be strengthened. Illegal, unreported and unregulated fishing undermines national, regional and global efforts to manage fisheries sustainably (FAO, 2018b).

The effects of illegal, unreported and unregulated fishing can be severe, especially for coastal and small island developing States heavily dependent on fisheries. Illegal, unreported and unregulated fishing has adverse impacts on national economies, peoples’ livelihoods – especially those of individual small-scale fishers in poor coastal communities in developing countries – food security, and the marine environment. It typically degrades the environment, inhibits stock rebuilding efforts and exacerbates the decline of many fisheries.

Measures on the regulation of transshipment in areas beyond a national jurisdiction

In the absence of effective monitoring, control and surveillance, transshipment poses a serious risk to fisheries by increasing the risk of illegal, unreported and unregulated-caught fish entering the supply chain. Loopholes exist in management approaches to transshipment. For example, tuna long liners may enter into contractual arrangements with processing

plants that include transshipment at sea, making traceability and verification of products very difficult. The Western and Central Pacific Fisheries Commission currently requires 100 per cent observer coverage on carrier vessels partaking in transshipment in the high seas. A recent study indicates the strong probability that substantially more transshipments at sea occurred in the Western and Central Pacific Ocean than were reported by carrier vessels or the relevant flag and coastal States (Pew Charitable Trusts, 2019). Transshipments are likely to increase during the COVID-19 pandemic as a result of port closures and access restrictions in many of the region's member States. This observation indicates the increased risk of illegal, unreported and unregulated-caught fish managed by the Western and Central Pacific Fisheries Commission entering the international market.

The FAO Agreement on Port State Measures provides the minimum standards to be applied by port States for procedures related to preventing vessels engaged in illegal, unreported and unreported fishing from using ports and landing their catches. While an increasing number of Parties to the Port State Measures have been

able to revise their national policy, legal, and institutional framework and increase port inspection capacity in accordance with the Measures, further capacity development is necessary to support developing countries and small island developing States to fully integrate the requirements of the Measures and complementary international instruments to combat illegal, unreported and unregulated fishing in their policy and legal frameworks, institutional arrangements and operational procedures, and to ensure their enforcement. Technology can support these efforts, as shown by the “Bait to Plate” experience (box 8).

The integrated Monitoring, Control and Surveillance (MCS) framework, which was put in place by the Forum Fisheries Agency member countries in the Pacific has been recognized as pioneer in this area (Forum Fisheries Agency, 2019). The focus has now turned to tackling unreporting and misreporting of fishing activity by licensed fishing vessels – in particular, those fishing primarily on the high seas where there are weak management measures and monitoring of activity, including transshipment between fishing vessels and carrier vessels (Forum Fisheries Agency, 2019).

Box 8

Blockchain Tuna Project – “Bait to plate”

Blockchain technology is helping people understand exactly where their food comes from – telling the story about the fish, the fisherman, the families, the crew – the path from the ocean to the plate. Tracking fish from vessels to the supermarket, the Blockchain Supply Chain Traceability Project is using digital technology to strengthen supply chain management in the fresh and frozen tuna sectors of the Western and Central Pacific region. The World Wide Fund for Nature has teamed up with global blockchain venture studio ConsenSys, information and communications technology (ICT) implementer TraSeable, and tuna fishing and processing company Sea Quest Fiji Ltd. to deliver the project in Fiji.

Through blockchain technology, a simple scan of tuna packaging using a smartphone tells the story of a tuna fish – where and when the fish was caught and by which vessel and fishing method. Consumers will have certainty that they're buying legally caught, sustainable tuna with no labour violations.

A combination of radio-frequency identification and QR codes are used to capture information throughout the supply chain. A radio-frequency identification tag is fixed when the fish comes on board the vessel, which then follows the fish and registers automatically at various devices positioned on the vessel, at the dock, and in the processing facility. Once the product enters the processing facility and is partitioned out into various products, it receives a QR code (or potentially in the future, it will receive a near field communication device) that will track the product to its ultimate fate all the way past the retailer.

Source: World Wide Fund for Nature.

4.10. Area-based management

To effectively address the challenges of spatial management of the ocean for fisheries, conservation and other purposes, and the overall competition for ocean space, greater scientific and management capacity at the regional, national and subnational levels are required. An ecosystem approach to fisheries aims to conserve the structure, diversity and functioning of ecosystems, while satisfying societal and human needs for food and nutrition, and the socioeconomic benefits of fishing.

With increased attention to integrated ocean management, fisheries are a central part in relation to the following: wider ecosystem-based management; responding to the threat and impacts of climate change; and the balancing of use rights and trade-offs between fisheries and other non-fisheries objectives and activities. There is a concurrent need for increased attention to fisheries-specific issues and processes to ensure that countries can maximize the social and economic benefits from their fisheries rights and resources essential for the sustainable development of all coastal States. To preserve these and other critical coastal habitats, marine habitats can be managed through ecosystem-based approaches using area-based tools, such as Marine Protected Areas, Integrated Coastal Management, Marine Spatial Planning; and the Large Marine Ecosystem Approach.

Sustainable Development Goal target 14.5 emphasizes the need to protect deteriorating oceans against mismanaged or uncontrolled use of ecosystem services based on the target to conserve at least 10 per cent of coastal and marine areas by 2020. Marine protected areas are a common approach to protect, preserve and rejuvenate ecosystems and marine species. These areas are comprised of marine reserves, no-take zones, locally managed marine areas, fully protected marine areas, marine sanctuaries and ocean sanctuaries. Some examples of use and mixed-use cases for marine protected areas are the following:

- (a) Maintaining biodiversity through providing support for endangered species;
- (b) Protecting habitats from damage occurred by destructive fishing practices and other human-induced damaging activities;
- (c) Eco-tourism;

- (d) Providing areas where fish can safely reproduce and grow to their true size;
- (e) Facilitating scientific research;
- (f) Building resilience to protect repeated damage from climatic events; and
- (g) Helping to preserve local economies, livelihoods and cultures linked to marine environments.

Marine protected areas are an effective management approach to preventing the decline of marine biodiversity. They, however, need to be complemented with other management measures.

A direct benefit of marine protected area is the higher quantities of fish with a greater biomass. This leads to positive spillover effects in neighbouring areas where the fish migrate outside of the boundaries. These benefits are often realized in the future because short-term costs, such as set-up and loss of total catch, are an interim trade-off for long-term favourable effects of food security, positive spillovers, an increase in market value through the change of composition of the catch and a decrease in the costs of locating the fish stocks. The greatest economic returns have been through developing marine protected area networks, whereby multiple marine protected areas are established adjacently with rotating goals and regulations to ensure the sustainability of them and that targeted economic outcomes are achieved.

While marine protected areas are not direct engines for economic growth, economic co-benefits may occur if they are well planned and managed. Optimizing benefits from a marine protected area requires a complex analysis of integrating perspectives of multi-stakeholders to achieve a multi-use management goal. Conducting a thorough economic valuation as part of the planning process can open up new market opportunities related to environmental goods and services, as well as ecosystem service payment schemes, offering the potential to sustainably certify products coming from the marine protected areas. In addition to these benefits, local job creation for the management of the marine protection area is another positive effect on the livelihoods of the surrounding community.

Achieving the balance of meeting conservation priorities at a socioeconomic cost that is acceptable

across a broad range of stakeholder interests is challenging, in particular in cases in which resources are already stretched and livelihoods are marginal, with little room for compromise (Muntoni, Devillers and Koen-Alonso, 2019). The protection of marine areas supports biodiversity and the ecosystem function, and can contribute towards sustainable resource use, which

potentially supports longer-term food and livelihood security. To realize these important contributions and avoid negative outcomes for coastal communities, marine protected areas must be designed inclusively and collaboratively. An example of a collaborative effort is explained in box 9.

Box 9

Coral Triangle Initiative

The Coral Triangle Initiative is a multilateral partnership involving Indonesia, Malaysia, Papua New Guinea, the Philippines, Solomon Islands and Timor-Leste. The objective of the initiative is to protect marine ecosystems to address issues, such as climate change, food security and loss of biodiversity. Together, leaders from the six countries signed the Coral Triangle Initiative on Coral Reefs, Fisheries and Food Security (CTI-CFF) declaration, which is the first of its kind to require multilateral cooperation.

The five core goals of the agreement are the following: strengthening the management of seascapes; promoting an ecosystem approach to fisheries management; establishing and improving effective management of marine protected areas; improving coastal community resilience to climate change; and protecting threatened species. The Initiative is people-centric with expected outcomes of reduced poverty through economic development, food security, sustainable livelihoods and biodiversity.



The coral triangle covers a six million km² area, contains 76 per cent of the world's coral species; six of the world's seven marine turtle species; and sustains 120 million people and a \$12 billion nature-based tourism industry annually.

Source: See <https://www.coraltriangleinitiative.org>

4.11. Conclusion and recommendations

Coastal and offshore fisheries play a critical role in the economic and social development of many countries in the Asia-Pacific region, but they are encountering severe threats from overfishing, climate change and environmental degradation. The impacts of the COVID-19 pandemic are presenting the following challenges: lower demand for fish; restrictions to trade and the offloading of catch in some Pacific ports; threats to fishermen's health and households' livelihoods; and a potential rise in illegal fishing resulting from a reduction in authorities' supervision during the pandemic. On the bright side, less fishing should help to replenish fish stocks and the severe travel restriction affecting tourists reduces pollution.

The 10 targets of Sustainable Development Goal 14 focus on sustainable management and protecting marine and coastal ecosystems. To make progress in this effort, investment, transformative action and innovation are required. It will also benefit greatly from enhanced regional cooperation.

Given the complex nature of fisheries issues, the many interactions with other interests and issues (such as tourism or marine pollution), and in the context of broader processes, such as the World Trade Organization trade negotiations, it is critical that fisheries governance be clear.

It is also important to reaffirm the importance of offshore and coastal fisheries to coastal States in the region and ensure ownership rights and responsibilities of States to the fisheries resources that exist not only in territorial waters and in exclusive economic zones, but also in the adjacent high seas. The responsibilities of different actors at national, subregional and regional levels, as well as in wider international engagements, must be well established with strong processes at all levels to ensure effective communication, collaboration and coordination across sectors, with robust processes to allow stakeholder input. The following specific areas may be considered by policymakers.

(a) Support from ESCAP and related agencies of the United Nations system to promote regional collaboration to strengthen data sharing, and the collection, harmonization and use of fisheries data. Strengthening of capacity for the assessment of marine fishery resources. Promoting the sharing of data across sectors, data holders and governments

to ensure consistency, reduce discrepancy and improve data quality, including disaggregated data for the purpose of achieving sustainable fisheries. Supporting open and easy access to fisheries data through a harmonized data platform.

- (b) Regional collaboration between countries and with support from relevant United Nations entities to increase the number of parties to international multilateral agreements, including the 1982 United Nations Convention on the Law of the Sea, the 1995 United Nations Fish Stocks Agreement, the 1993 Convention on Biological Diversity, the 2003 FAO Agreement to Promote Compliance with International Conservation and Management Measures by Fishing Vessels on the High Seas, and the 2009 FAO Agreement on Port State Measures and strengthen their effective implementation and promote the adoption of voluntary instruments, such as the 1995 FAO Code of Conduct for Responsible Fisheries, in the area of sustainable fishery management and combating illegal, unreported and unregulated fishing. National policy and legal frameworks must be aligned with these multilateral agreements, monitored and enforced.
- (c) Noting the high cost of monitoring, control and surveillance of transshipment activities on the high seas and the current potential lack of compliance with existing conservation and management measures, the Commission is encouraged to advance regional collaboration among countries and encourage measures that facilitate the effective implementation of the Ports State Measures Agreement, which specifically targets illegal, unreported and unregulated fishing. Countries should further cooperate with each other to develop standards for the regulation, monitoring and control of transshipments to mitigate the risk of illegal, unreported and unregulated -caught fish entering the supply chain.
- (d) Regional cooperation among countries on scientifically informed area-based management approaches, with strong processes to protect and promote stakeholder interests, including local communities, should be encouraged. This should recognize the need for greater understanding of the potential impact of fisheries on other legitimate interests and the use of the ocean, such as conservation, eco-tourism, aesthetics, ecological values, and cultural practices.



Chapter 5

Plastic pollution in the marine environment

5.1. Introduction

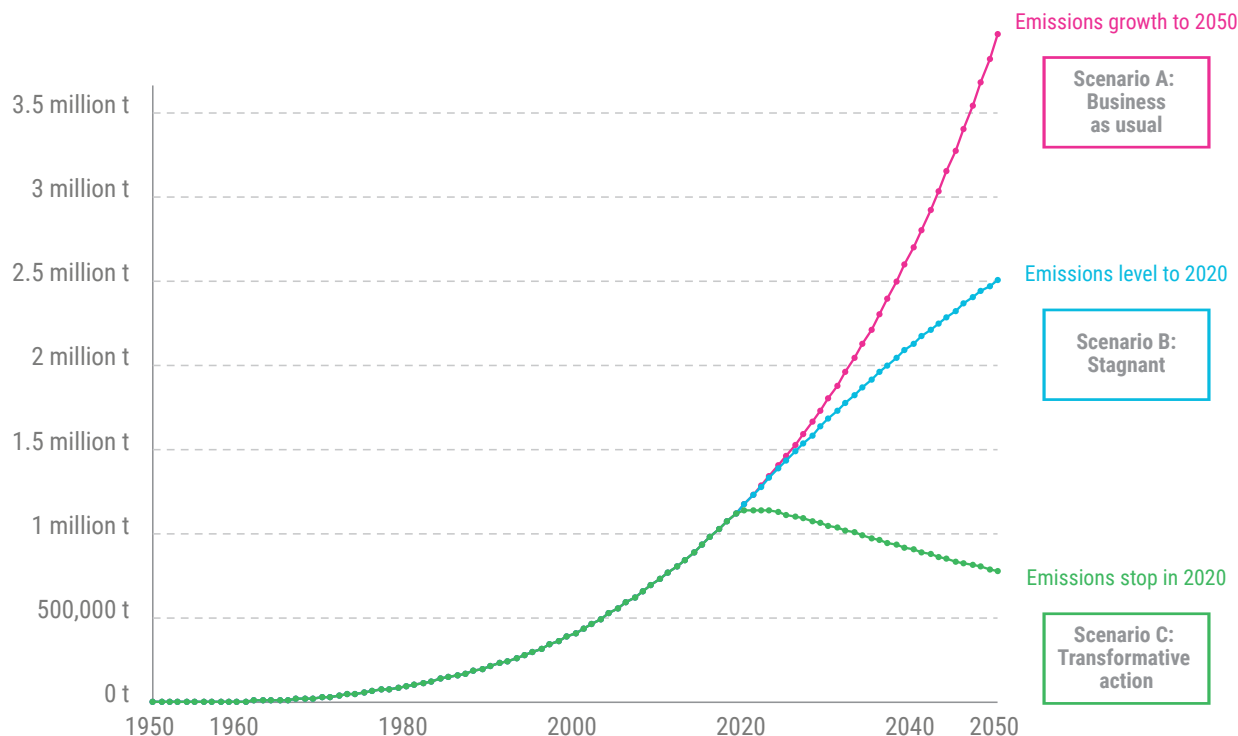
Plastic was rarely used in consumer products prior to 1950. Since then, the production and consumption of it has increased exponentially. The abundance of plastic along with poor waste management has contributed to a growing environmental crisis in the ocean. Between 3.0 million and 5.3 million tons of micro- and macroplastics, respectively, are polluting the environment annually (UNEP, 2018b).

But where is all this plastic coming from? Inadequate and overwhelmed waste management systems, open dumping, storms and rain cause land-based sources of pollution to leak into rivers and the coastal and marine environment. Annually, rivers dump from 470,000 to 2.75 million metric tons of plastic into the seas. Ten rivers in the world are responsible for up to 95 per cent of that debris, and eight of them are in Asia: Yellow, Hai, Pearl, Amur, Mekong, Yangtze, Indus and Ganges Delta (Schmidt and others, 2017). In the Asia-Pacific region, 49.3 per cent of the global plastic volume is produced and 38 per cent of all plastic is consumed (UNEP, 2018b).

These figures expose the magnitude of the plastic crisis and the connection with the Asia-Pacific region, including landlocked countries, that may contribute to river basin pollution that eventually becomes marine debris. The extent of sea-based sources of pollution, including abandoned, lost and discarded fishing gear and waste from ships and ports, and its devastating impacts to ecosystems and marine species remains underexplored.



Figure XIX A century of plastics: historical and projected plastic materials on the surface of the ocean



Note: The figures in the graph do not include micro- or nanoplastics.
 Source: Lebreton, Egger, and Slat (2019).

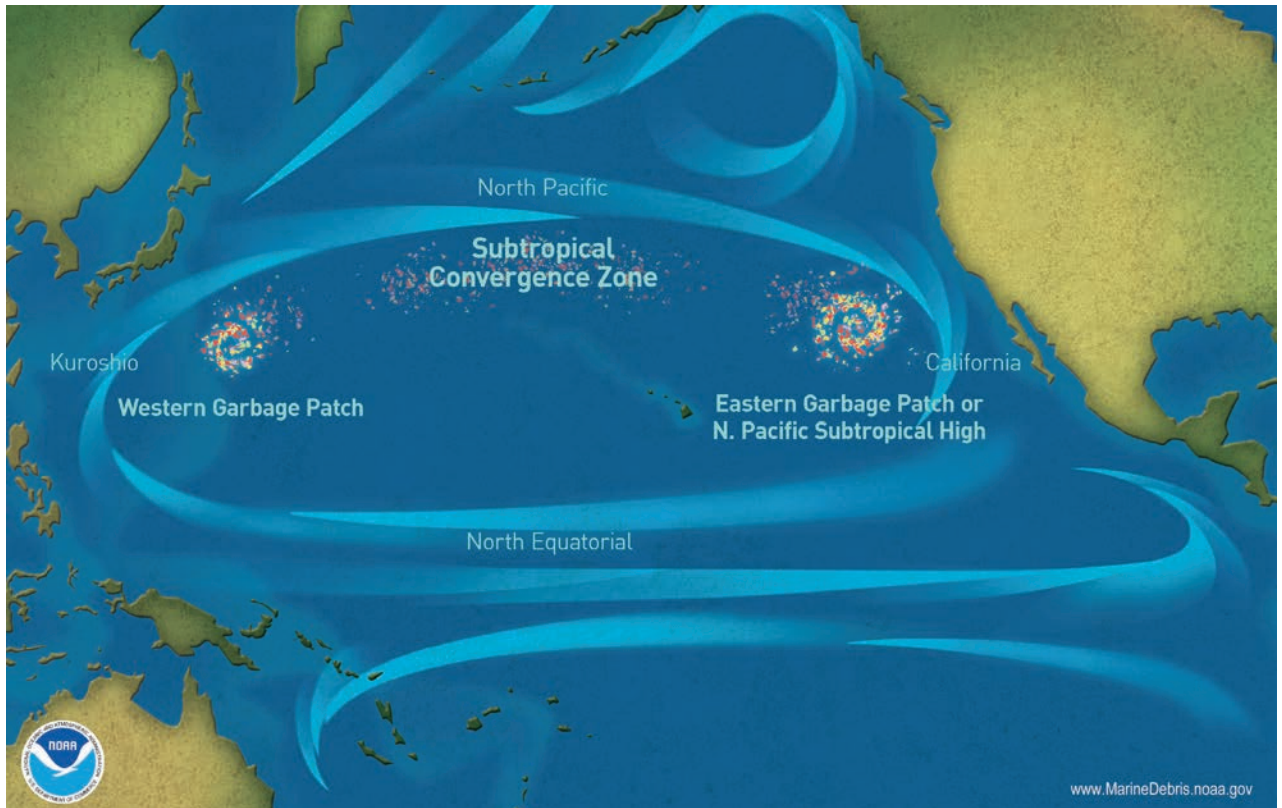
Figure XIX shows the evolution of plastic materials in the ocean since 1950, and projections towards 2050, in what may become a century of plastics. It shows the trajectory of future global accumulation according to three emissions scenarios:

- (a) **Business as usual:** The red line projects continued growth until 2050 aligned with historical plastic production rates.
- (b) **Stagnant:** The blue line assumes emission rates stagnate in 2020.
- (c) **Transformative action:** The grey line plots a scenario in which plastic emissions stop in 2020.

Without transformative actions, the amount of plastic debris could triple in the next three decades, as portrayed in scenario A. Even without an increase in

production rates of plastic, marine debris would double by 2050 (scenario B). The trend could be reversed and the volume of marine debris would decline if emissions were to stop in 2020 (scenario C).

The year 2020 could be a game-changer if strategic policies are put in place to tackle this crisis. Member States may take advantage of the building global momentum to combat marine pollution. In this chapter, the causes and consequences of this phenomenon are discussed to subsequently identify policy responses that policymakers may consider to reach scenario C detailed above, though decisive transformative actions. In the months to come, as the world navigates out of the COVID-19 pandemic, member States must ensure that response policies and stimulus packages contribute towards enabling a more environment-friendly and plastic debris-free recovery.

Figure XX Map of the Great Pacific Garbage Patch


Source: <https://marinedebris.noaa.gov/info/patch.html>.

5.2. The challenge: an ocean of plastic

5.2.1. An urgent sustainable development challenge for the Asia-Pacific region

Plastics have been found in very far-reaching corners of the planet, from 11,000 meters under the water in the Mariana Trench to at the top of Mount Everest. The Deep-Sea Debris Database, which records data from more than 5,000 submersible dives, at more than 4,000 meters deep, showed 3,425 items of man-made debris; 89 per cent of it was single-use plastic products (Chiba and others, 2018).

One of the most visible consequences of this man-made crisis is the so-called “Great Pacific Garbage Patch” or the “Pacific Trash Vortex” (figure XVI), an area blighted with an estimated accumulated debris of 705,000 tons of non-biodegradable plastic mostly from North America and Asia (54 per cent). Although it is not possible to disaggregate the amount of plastic from Asia and the Pacific, table 6 provides information on the most polluting rivers in the world. It indicates that countries sharing these river basins are among the most likely polluters. Regarding the losses of macro-

and microplastic to the environment, the United Nation Environment Programme (UNEP) estimates that the Asia-Pacific region is the source of 31 per cent of the global volume of macroplastics and 44 per cent of microplastics (UNEP, 2018b).

These figures indicate weak waste management across countries. Per capita distribution shows that even among the top 10 polluting rivers, there are considerable comparative differences. Waste mismanagement is most significant in the Yellow, Pearl and Mekong rivers, where plastic pollution is more than six times as much as in the Ganges. As plastic is carried through river basins to the ocean, the impacts of plastic pollution transcends national borders.

This presents an opportunity to use regional cooperation strategies to face common challenges around river basins. Regional cooperation may involve landlocked countries, mainland countries and also archipelagic and island States, as all of them are affected by plastic pollution in different ways. Figure XXI highlights plastic inputs from coastal populations in red; a remarkable predominance of the communities is in the Asia-Pacific region.

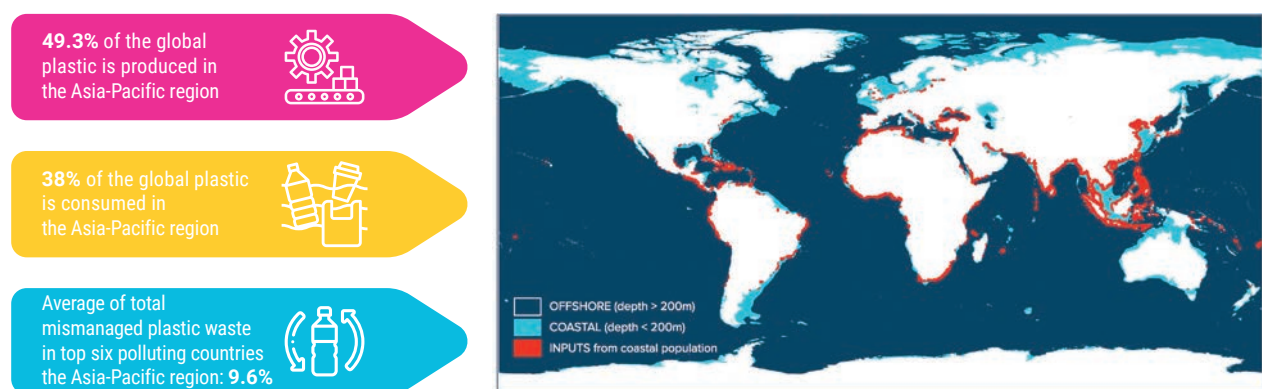
Table 6

Top ten plastic polluting rivers in the world

Continent	River	Receiving Sea	Mismanaged plastic waste (generated in the catchment (tons y-1)	Population	Mismanaged plastic waste generation per capita (kg d-1)
Asia	Chang Jiang (Yangtze River)	East China Sea (Yellow Sea)	16 883 704	503 258 473	0.092
Asia	Indus	Arabian Sea	4 809 288	191 277 131	0.069
Asia	Huang He (Yellow River)	Yellow Sea	122 167 489	124 249	0.092
Asia	Hai He	Yellow Sea	91 858	10 2782 394	0.092
Africa	Nile	Mediterranean	84 792	182 955 620	0.049
Asia	Meghna, Bramaputra, Ganges	Bay of Bengal	72 845	620 596 218	0.013
Asia	Zhujiang (Pearl River)	South China Sea	52 958	74 999 426	0.092
Asia	Amur	Sea of Okhotsk	38 267	64 344 272	0.089
Africa	Niger	Gulf of Guinea	35 196	92 689 954	0.059
Asia	Mekong	South China Sea	33431	61 740 094	0.086

Source: Schmidt and others (2017).

Figure XXI The plastic problem in Asia and the Pacific



Source: Map Lebreton, Egger, and Slat (2019); Waste, Jambeck and others (2015); UNEP (2018b).

5.2.2. The leading factors behind marine pollution

The major factors accelerating marine plastic pollution in the Asia-Pacific region can be grouped into three overarching categories: production structure; lifestyle and consumption patterns; and weak governance and institutional capacities.

Production structure

The current economic model being followed relies on the overexploitation of finite resources. Within this unsustainable economic model, the plastics industry has a vested interest. Globally, it is estimated to be worth \$1.2 trillion, the equivalent of 3.3 times the GDP of the CLMV region, which is comprised of Cambodia, the Lao People's Democratic Republic, Myanmar and Viet Nam (Resource Recycling, 2015). This vested interest perpetuates the production of plastic, which relies on fossil fuels as the main commodity.

Increasing production and availability of fossil fuel-based plastics

Alternatives to plastic products remain limited and less competitive than single-use plastic. While the alternative products, such as bioplastic, are subject to higher cost of research and development, plastic products are more competitive thanks to low oil prices (European Bioplastics, 2016). For example, the price of a white virgin petroleum-based plastic fork is approximately 1.2 cents, compared to 39.3 cents for a fork made from plant starch; and the price of a 5mm plastic straw is 0.9 cents, whereas a 6mm paper straw cost 3.8 cents (Gray, 2018).²⁶ The smaller production volumes of sustainable alternatives has yet to benefit from the same economy of scale as plastics.

Marine-based plastic pollution sources, including abandoned, lost or other discarded fishing gear, aquaculture, shipping and ports

Marine-based plastic pollution is caused by various activities, both inland (such as industrial) and mainly coastal (such as fishing, aquaculture, shipping or ports). Abandoned, lost or otherwise discarded fishing gear is a major environmental concern in the region. A recent report estimates that ghost gear comprises 10 per cent of the plastic waste and that an estimated

640,000 tons of it enter the ocean every year and 6 per cent of all fishing nets used remain as pollution at sea (Greenpeace, 2019). This is consistent with the proportions and types of debris found in the Great Pacific Garbage Patch, with some estimates indicating that fishing nets contribute to almost 50 per cent of that volume. As an example of a potential response to this problem, from Europe, the European Union is updating rules on port reception facilities, and requiring mandatory marking of fishing gear and mandatory retrieval or reporting of lost fishing gear (European Commission, 2020).

Lifestyle and consumption patterns

Contemporary economies, and societies are overexposed to plastics and have developed a co-dependent relationship. Unsustainable production and consumption patterns propelled by the demand for convenience and affordability, such as take-away food packaging and e-commerce, and exacerbated by the low price of plastics are at the heart of the plastic pollution problem.

The consumption of plastic is also linked to the purchasing power of individuals. Economic indicators show an upward trend in purchasing power parity in Asia and the Pacific, as the region becomes the largest consumer market in the world. The regional average income per capita is estimated at \$16,160, in a trajectory expected to reach \$20,660 by 2024 (IMF, 2019). Combining this increase in purchasing power with the estimated population growth, the plastic crisis is expected to worsen in the aforementioned scenario A of "business as usual". Nonetheless, if the COVID-19 pandemic is factored in, the economic impact of this phenomenon may temporarily reduce the overall demand for new products and services. At this point, there is no available data to determine the net effect on plastic consumption in the Asia-Pacific region after the pandemic.

Low prices of plastic encourage consumers to maintain the same consumption patterns. This is exacerbated by the growing culture of disposability and lack of environmental awareness. Out of more than 400 million tons of plastic produced every year, approximately 36 per cent of it is used for single-use packaging. Table 7 provides a list of popular single-use plastics consumed and wasted (UNEP, 2018c). These items are the same types of objects found on beaches during ocean clean-ups and floating on the ocean surface.

²⁶ Exchange rates from pound sterling to United States dollars are estimates.

Table 7**Main polymers used in the production of single-use plastics**

Plastic	Use
Low density polyethylene (LDPE)	➔ Bags, trays, containers, food packaging film
Polystyrene (PS)	➔ Cutlery, plates and cups
High density polyethylene (HDPE)	➔ Milk bottles, freezer bags, shampoo bottles, ice cream containers
Expanded polystyrene (EPS)	➔ Hot drink cups, insulated food packaging, protective packaging for fragile items
Polyethylene terephthalate (PET)	➔ Bottles for water and other drinks, dispensing containers for cleaning fluids, biscuit trays
Polypropylene (PP)	➔ Microwave dishes, ice cream tubs, potato chip bags, bottle caps

Weak governance and institutional capacities

Weak governance and institutional capacities, such as improper waste management and the lack of second-life markets, aggravate efforts to reduce plastic pollution.

Inadequate waste management in Asia and the Pacific contributes significantly to marine pollution through various leakage pathways. Most plastics enter the ocean from coastal communities or from inland water

catchments through major river systems. It has been estimated that coordinated interventions in just five Asian countries (China, Indonesia, the Philippines, Thailand and Viet Nam) could reduce global leakage of plastic waste into the ocean by approximately 45 per cent over the next ten years (Ocean Conservancy and McKinsey Center for Business and Environment, 2015). This coordination is of particular relevance when it involves river basin commissions, such as the Mekong River Commission. An example of a collaborative effort is discussed in box 10.

Box 10**The CounterMEASURE Project**

The Asia and the Pacific region is believed to host numerous hotspots of plastic leakage into the natural environment. Basic understanding of these hotspots in relation to the plastic value chain, as well as pathways of plastic leakage are still lacking. As a result, policies being formulated with the intention of preventing and/or reducing marine litter and plastic pollution may have limited effectiveness in preventing plastic leakage.

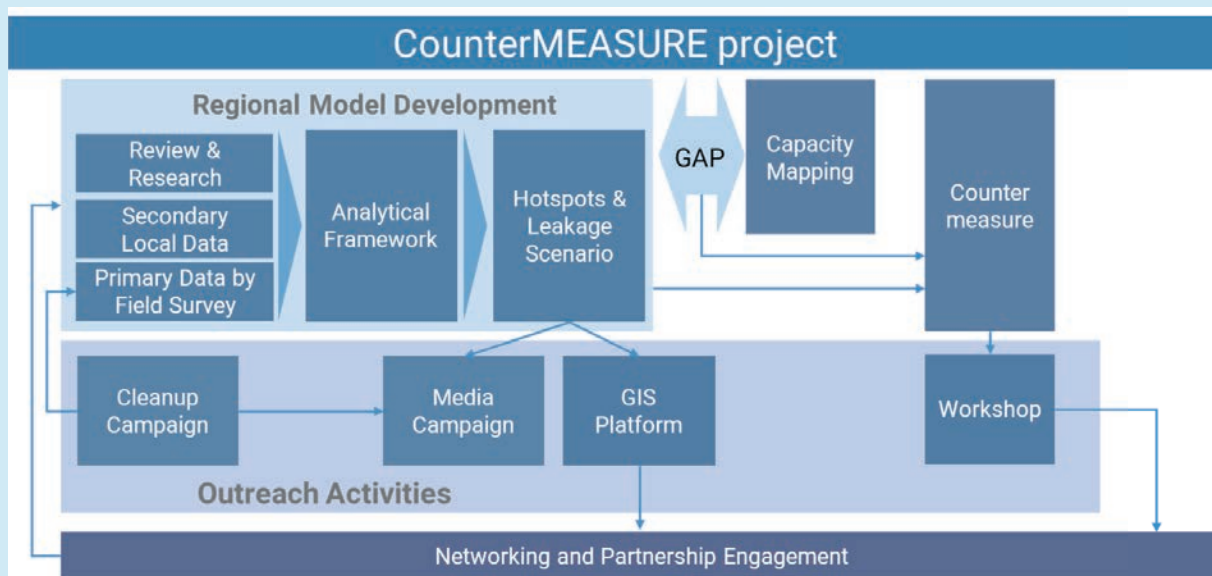
Efforts to understand the plastic leakage pathways, including those from major rivers in Asia, however, have begun. Among those attempts is the work being carried out under the project Promotion of Countermeasures Against Marine Plastic Litter in South-East Asia and India (CounterMEASURE) to develop a region-based model for plastic leakage assessment and monitoring. With support from the Government of Japan and being implemented by the UNEP Asia and the Pacific Office, the project collects, analyses and visualizes information on “hotspots” in the tributaries of the Mekong and the Ganges basins. It integrates, among others, demographic and socioeconomic data, field survey data, geospatial information on land use and location of potential leakage sites, and drone imagery. The project model combines primary data (from field and drone survey) and secondary data (from remote-sensing data, geospatial data and other relevant open data).



Image 1. A port in Chiang Rai, Thailand © UNEP

Preliminary findings have shown that the plastic leakage characteristics along the Mekong and the Ganges may be quite different from those that are regularly highlighted in global analyses. Plastic items of high leakage risk are often site-specific, for example, extensive use of sachets in India. Also, while large cities may generate a significant portion of the national plastic waste volume, the risk of plastic leakage into the rivers in rural areas may not be negligible, a consequence of poorly managed open dumps and the absence of formal waste collection system. As informal recycling is active in Asia, there is a tendency for waste pickers and

recyclers to collect and sort out only high-value plastic waste, such as polyethylene terephthalate, and improperly discard low-value plastic items, such as plastic shopping bags and coloured plastics into waterways and open dump sites, which are prone to flooding in the rainy season.



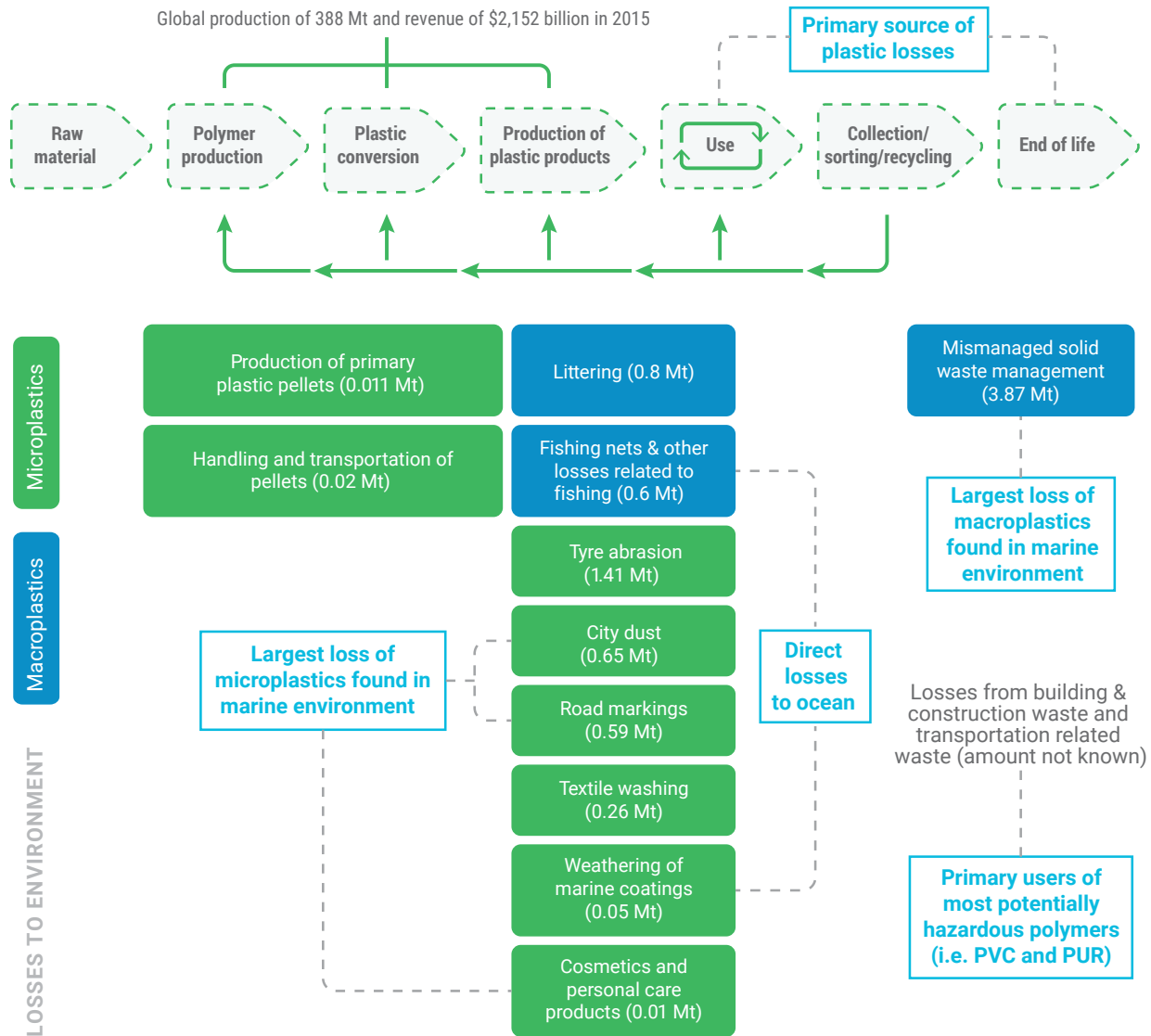
Through the CounterMEASURE project, clean-ups have proven to multiply benefits. In a dense mangrove site at Sagar Vihar in Mumbai, India, for example, a clean-up delivered a triple benefit: cleaning of a targeted area; increased public awareness on the hazards of indiscriminate plastic waste disposal; and generation of site-specific plastic waste data. The exercise also served to verify the effectiveness of the State-wide ban on the use of styrofoam containers and disposable utensils. The volunteer team who organized the clean-up observed the near absence of styrofoam among the collected waste. Increasing availability of data on plastic pollution and understanding of plastic leakage pathways are crucial in promoting evidence-based and effective measures that lead to a reduction in marine litter and plastic pollution.

Source: UNEP Regional Office for Asia and the Pacific.

Plastic losses from land-based sources into oceans occur at every stage of the value chain. For instance, in 2015, approximately 3.9 mt plastic was lost into

the oceans because of mismanaged solid waste management (UNEP, 2018b) (see figure XXII).

Figure XXII Plastic losses in the marine environment across the plastic value chain stage



Note: Mt: metric tons; PVC, polyvinyl chloride; PUR, polyurethane.
Source: UNEP, 2018b.

Global waste projections forecast a 19 per cent increase by 2050 in high-income countries and 40 per cent increase in low- and middle-income countries. Overall, waste is expected to triple by 2050, as there is an upward trend in waste generation in all regions in the world. The overall increase in waste correlates with the projected threefold increase of plastic debris shown in scenario A (figure XIX). The waste composition shows that approximately 12 per cent of all waste is plastic,

which translates into 96.24 million tons per year (Kaza and others, 2018) originating from the region. The lack of strategic policies to reduce the production of plastic and to manage the recycling of it and waste contribute to marine pollution. Asia and the Pacific stands out in this regard. Table 8 provides details on mismanaged plastic waste from the top 10 ranked countries in terms of mismanaging waste. Eight of those countries are in Asia.

Table 8
Mismanaged plastic waste (top 10 countries in the world)

Country	Coastal population [millions]	Waste gen. rate [kg/ppd]	% plastic waste	% mismanaged waste	Mismanaged plastic waste [MMT/year]	% of total mismanaged plastic waste	Plastic marine debris [MMT/year]
China	262.9	1.10	11	76	8.82	27.7	1.32–3.53
Indonesia	187.2	0.52	11	83	3.22	10.1	0.48–1.29
Philippines	83.4	0.5	15	83	1.88	5.9	0.28–0.75
Viet Nam	55.9	0.79	13	88	1.83	5.8	0.28–0.73
Sri Lanka	14.6	5.1	7	84	1.59	5.0	0.24–0.64
Thailand	26.0	1.2	12	75	1.03	3.2	0.15–0.41
Egypt	21.8	1.37	13	69	0.97	3.0	0.15–0.39
Malaysia	22.9	1.52	13	57	0.94	2.9	0.14–0.37
Nigeria	27.5	0.79	13	83	0.85	2.7	0.13–0.34
Bangladesh	70.9	0.43	8	89	0.79	2.5	0.12–0.31

Note: kg/ppd, kilograms/person per day ; MMT, millions of metric tons.
 Source: Jambeck and others (2015).

An estimated two billion tons of municipal solid waste were generated in 2016, with the East Asia and Pacific subregions accounting for 23 per cent of it, Europe and Central Asia, 20 per cent; South Asia, 17 per cent; North America, 14 per cent; Latin America and the Caribbean, 11 per cent; sub-Saharan Africa, 9 per cent; and the Middle East and North Africa producing the least, at 6 per cent. Many countries in Asia and the Pacific suffer from poor waste management. This is the result of a lack of infrastructure and technology, lack of adequate legal and policy frameworks and limited enforcement, and lack of financial resources.

Another factor driving prices and low use of recyclates is that there is no second life marketplace in Asia and the Pacific that supplies high-quality recyclates. This is because the region lacks waste management infrastructure and systems to sort, collect and recover materials for recycling; and market-based incentives and favourable regulations for the use of recycled materials and flaws in production design for recyclability; and there is high demand for single-use or hard-to-recycle products.

Finally, natural disasters and extreme weather events also contribute to the problem of marine debris. For instance, as a result of the Great East Japan Earthquake of March 2011, the debris from the Iwate, Miyagi and Fukushima prefectures may have been as much as

five million tons (Japan, Ministry of the Environment, 2012). Approximately 70 per cent of this volume went to the seabed along Japanese coasts, while the remaining became floating debris (Japan, Ministry of the Environment, 2012).

5.2.3. The impact of plastic pollution

The nominal value of plastic is indirectly proportional to its true final price, as it does not reflect its high environmental, social and economic costs. These costs may sometimes be intangible, but they can also be identified. For example:

Environmental impact

Environmental impacts include threats to marine biodiversity, coastal and marine ecosystems and the services they provide, including the ocean's capacity to regulate climate and the role of coral reefs and coastal vegetation in disaster risk reduction and carbon storage. Plastic pollution has direct physical impacts on marine animals and birds from entanglement and ingestion and potential impacts from bioaccumulation of chemical compounds found in or transported by ingested plastic particles. More than 800 species are known to be affected by ingestion, entanglement, ghost fishing, habitat effects and dispersal by rafting (UNEP, 2018a)

An additional consideration regarding the overproduction and overconsumption of plastics is the CO₂ footprint linked to their lifecycle. Recent studies have shown a calculation of the global lifecycle greenhouse gas emissions of conventional plastics in 2015 amounted to 1.7 Gt of CO₂-equivalent (CO₂e); this is expected to grow to 6.5 Gt CO₂e by 2050 under the current business as usual trajectory (Zheng and Suh, 2019). Accordingly, plastics represent at least a double burden for the ocean: (a) the production process of plastics generates CO₂, which ends up being absorbed by the ocean, and (b) plastics as a final product affects the ocean in the form of pollution, with many consequences to ocean waters and life below water.

Social impact

Social impacts encompass human health impacts from contamination of microplastics in food and agriculture, including through micro and nano particles found in food items for human consumption. Microplastics may be ingested by different marine organisms including invertebrates, fish and birds. More research is needed to confirm the pathway of human exposure to microplastics through the consumption of filter feeding invertebrates, such as mussels or oysters (Joint Group of Experts on the Scientific Aspects of Marine Environmental Protection, 2015). The health effects of chemical additives in plastic products, including Bisphenol A and endocrine disrupters, antioxidants, UV-stabilizers, flame retardants, and plasticizers, remain underexplored, but are causes for health concern. Plastic particles and marine litter may act as carriers and breeding grounds for pathogens, diseases and contaminants.

The incineration and open burning of plastic waste releases toxic chemicals into the atmosphere in the form of gas, contributing to air pollution and cardiorespiratory diseases, affecting children and older adults more severely (Verma and others, 2016). Workers may experience chronic hazards throughout the waste processing cycle, such as respiratory disorders resulting from constant exposure to faecal residues, medical waste and chemicals mixed in the waste, polluted air or other by-products in the process (Azoulay and others, 2019).

Informal waste pickers with little access to occupational health and safety equipment or social and health services are also exposed to and disproportionately affected by plastic pollution. Waste picking in open

dumps poses considerable health threats to the urban poor in many Asian settlements. It can result in lower life expectancy and higher infant mortality rates compared to the general population (UNEP, 2019). This problem is extended to communities near waste collection or waste processing plants and landfills. For example, findings in a recent report in which samples of free-range chicken eggs at two different sites in Indonesia where waste was dumped or burned for fuel or reduction were analysed indicated significant levels of hazardous chemicals, such as dioxins in the eggs (Petrlik and others, 2019).

Populations living in remote and poor areas with limited income opportunities and poor waste management systems are more vulnerable to marine plastic litter carried by ocean currents. In addition to contamination of sources of drinking water and seafood by plastic, float litter may inflict personal injuries to residents in fishing communities and damage their fishing equipment and vessels, which are essential for food security and income generation (UNEP, 2019).

Furthermore, the ocean is integral to the cultural identity and heritage of coastal communities, especially those in the Pacific. The integrity of the heritage is being jeopardized by marine pollution, affecting the socialization of humans around ocean ecosystems.

Economic impact

Recent studies suggest that the annual cost to ecosystem services values, while taking into account the reduction in marine natural capital, per ton of plastic ranges from \$3,300 to \$33,000. Considering an estimated 1 to 5 per cent decline in marine ecosystem service delivery, the annual loss would reach \$500 billion to \$2.0 trillion in lost value from marine ecosystem services (Beaumont and others, 2019). As these are global figures, the proportional costs could be higher for economies that rely more on ocean ecosystems, such as those of the Pacific islands countries and territories and many coastal communities in Asia.

Economic impacts include damages to tourism, fishing and shipping industries. Damage to the Asia-Pacific Economic Cooperation (APEC) economies by marine debris was estimated at \$1.26 billion in 2008 terms (McIlgorm, and others, 2011), while good management and recycling of plastic can save consumer goods companies \$4 billion per year. The recycling of materials, including plastic, results in energy savings

of 20 to 90 per cent, compared to the energy needed to produce virgin materials. It should also be noted that because plastic is made from crude oil, recycling leads to savings of non-renewable fossil fuel resources.

In the case of the tourism industry, the relationship with marine pollution is bidirectional. Tourism generates marine pollution and is affected by it. The economic losses to cities and countries involve cleaning costs and revenue reduction. Some studies have calculated region-wide impacts of \$622 million in the Asia-Pacific region attributable to marine debris. Another study gave an estimate of a 63 per cent reduction in tourists in Geoje Islands in the Republic of Korea because of marine debris, resulting in a loss of \$29 million to \$37 million (Krelling and others, 2017).

5.3. The solution: towards a circular plastic economy

The circular economy provides opportunities for transformative action in the Asia-Pacific region. It focuses on minimizing resource use and keeping the resources that enter the economy in productive use for as long as possible to maximize value. This reduces pressure on finite natural resources and promotes environmentally sound end-of-life solutions, which reduces leakage of waste to the ocean. It has been estimated that between \$80 billion and \$120 billion are lost annually to the economy because of the material value of plastic packaging alone, with economic viability for recycling 50 per cent and reusing 20 per cent of this (Ellen MacArthur Foundation & McKinsey, 2016). Both blue and green economies have the potential to be reshaped within a circular economy approach, aiming at zero waste.

The circular economy offers a holistic, cyclical process from which waste is turned into a resource that can have economic, social, and environmental co-benefits through reduced demand for natural resources, reduced emissions, job creation and fostering innovation. It entails gradually decoupling economic activity from the consumption of finite resources and designing waste out of the system. At a global scale, a transition to circular economy approaches is estimated to potentially provide more than \$1 trillion in material cost savings by 2025 (World Economic Forum, 2014).

Many tools and specific actions have been proposed and used to make management of plastics compatible with a circular economy approach. Among them are the

following: material, design and technical innovations; innovative business models and market-based solutions; improving waste management systems; effective segregation, collection, sorting and recycling of used plastics; and developing and enforcing laws and regulations to enable collaboration across the plastics value chains. The restart of global value chains after the COVID-19 pandemic will provide an opportunity to rethink processes and to make them more environmentally sound. One of the lessons learned in this health crisis should be that member States cannot go back to business as usual; they must seize this turning point to do things differently and better. Another lesson learned is that during a crisis, putting science first is the right thing to do. Early qualitative reviews of how various countries managed the COVID-19 pandemic indicate that the ones that put scientific knowledge and advice at the core of the national response have managed to contain the spread more effectively. While plastic pollution is a slow onset disaster rather than a rapid one, putting integrated scientific analysis and advice first can lead to more sound political decisions.

5.3.1. Design out single-use plastic waste

The move away from single-use plastic to more sustainable alternatives depends on the responsibility of consumers and engagement with the private sector. It is suggested that businesses able to adapt to changing demands, including sustainability, are more likely to succeed in the long term. These socially and environmentally responsible business practices may also contribute towards developing a positive perception of sustainable alternatives among consumers (White, Habib and Hardisty, 2019). A decrease in the supply of plastic from businesses results in a decrease in plastic waste. Innovation through the incorporation of new alternatives to plastic in businesses can also lead to job creation and increased competitiveness.

A withdrawal process from plastic overdependency also relies on consumer awareness of sustainable lifestyles to minimize the demand for plastic, especially among young people. For instance, cigarette warning labels and packaging are an example of effective labelling measures to influence consumer demand (Mallikarjun and others, 2014). In a similar manner, regulations may be implemented for plastic products so that consumers gain a better understanding of the environmental cost of their purchases. Standardization of eco-labels is also critical in the Asia-Pacific region. Such words as

bioplastics, biodegradable, environmentally friendly and green imply that the material would be better, holistically for the environment. This, however, is often not the case, as the materials that are labelled as being biodegradable may or may not fully deteriorate, depending on where the material ends up.

5.3.2. Reuse and recycle plastic

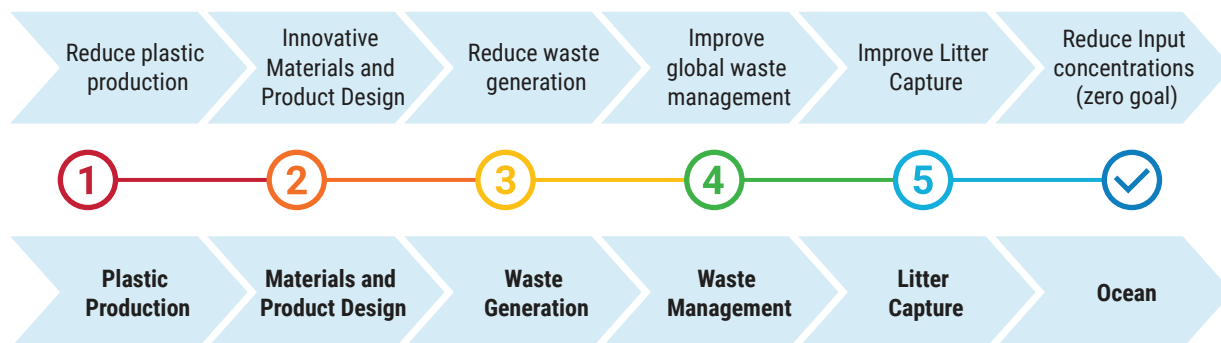
The success of reuse and recycling processes depends on effective waste collection systems. For the consumer goods sectors, the magnitude of the material resource savings generated from a circular economy could exceed \$700 million annually. Further benefits from a circular economy are a stronger focus on innovation, improved product lifecycles and job creation, especially in the informal sector (ESCAP, 2018b). More than 15 million people globally earn their income informally in the waste sector, often collecting 50 to 100 per cent of waste at no cost to a municipality. Informal waste pickers are also frequently from vulnerable groups, such as women or children (ESCAP, 2019a). The effective management of the waste being collected may lead to a reduction in production of new plastic and subsequently plastic pollution.

As mismanaged waste is a major contributor to marine plastic litter, the improvement in waste management

towards a circular economy, therefore, is a priority for reducing plastic pollution on land and in oceans. Solutions are needed across the plastic value chain stages to ensure that less plastic is wasted and enters the ocean (figure XXIII).

Improvement in waste management systems results in more efficient and effective waste collection, source segregation, transportation, treatment, energy recovery and resource recycling, and final disposal. In addition, successful waste management requires context-specific regulatory, economic and social instruments and initiatives, depending on the local conditions. Among them are setting up and implementing appropriate economic and regulatory measures, suitable environmentally sound technologies for waste treatment, recycling and disposal; enabling policy frameworks; creating a market for recycled plastics; increasing financial capacities (through public-private partnership, investment by development finance investors, application of the polluter pays principle and extended producer’s responsibility); increasing technical capacities of the waste management institutions and human resources; synergizing, encouraging and ensuring the co-responsibilities among different stakeholders in waste management, including the informal waste sector; and awareness and behavioural change solutions through positive reinforcements.

Figure XXIII Solutions to plastic pollution



Source: Jambeck, and others (2015).

5.3.3. Restore natural marine systems

The estimated five trillion pieces of plastic debris in the ocean must be cleaned up. This is a formidable task because of its wide distribution and range of sizes and the multiple depths of plastic waste. One clean-up effort is The Oceans Cleanup, a passive system in a trial period in which natural oceanic forces are used to catch and concentrate floating plastic carried by the wind, waves and currents.²⁷ Efforts have been expanded to clean up plastic washed onto beaches. Other such efforts are ongoing. The International Coastal Cleanup in 2018 mobilized more than one million people to collect 10.5 tons of trash over 35,890 kilometres of coast in 122 countries.²⁸ However beneficial the 10.5 tons collected is to the environment, it pales in comparison to the estimated daily flow of plastics into the ocean of more than 21,000 tons (Jambeck and others, 2015).²⁹ The types of items recovered provide helpful information about the products that should be monitored on land. As the responsibility for cleaning up is not always clear, it would benefit from an inclusive multi-stakeholder approach.

While the above-mentioned solutions are necessary to promote a circular economy approach for the

management of plastics, they will need to be part of a much more ambitious and strategic framework of managing plastic, which is presented in the following section.

5.4. Transformative ocean action in Asia and the Pacific

Marine pollution is an example of a global problem whose solution requires regional cooperation and national implementation. Plastic pollution streamed through river basins highlights shared regional accountability for the leakage into the ocean, and a shared responsibility to protect it. As plastic waste markets are local, national, regional and global, the issue must be targeted at multiple levels. National agendas are evolving to tackle the problem of plastic waste by consolidating their will through global resolutions,³⁰ however, much more effort needs to be directed towards regional cooperation and coordination. The Global Sustainable Development Report 2019 (Independent Group of Scientists appointed by the Secretary-General, 2019) suggests four levers in a call to action for transformational change, guiding context-specific implementation strategies. They can also be applied to the protection and sustainable use of the ocean. These include:

Lever	Transformative ocean action
Governance	➔ Strengthening institutions for ocean protection (implementation and enforcement of existing and new policies)
	➔ Waste-Management regulations to tackle marine pollution
	➔ Participation and engagement of all stakeholders for environmental justice
Economy and finance	➔ Development of new plastic-free products, business models and value chains
	➔ Financial incentives to support business innovation for sustainable products
	➔ Counterincentives, such as a plastic tax or other forms of levy
Science and technology	➔ Developing technologies for enhanced waste management and recycling, waste to energy, composting, and others.
	➔ Introducing new sustainable alternatives to plastic
	➔ Recovery of plastic waste already in the ocean
Individual and collective action	➔ Single-use plastic ban
	➔ Reducing waste-oriented demand and promoting responsible consumption
	➔ Changing social norms, promoting changes in lifestyle for sustainability, avoiding pollution (beaches, rivers, lakes, urban) and organizing clean-ups

²⁷ For more details, see <https://theoceancleanup.com/>.

²⁸ The top five categories collected were cigarette butts (5,716,331 items), food wrappers (3,728,712), straws and stirrers (3,668,871), forks, knives and spoons (1,754,908) and plastic beverage bottles (1,754,908).

²⁹ Assuming annual plastic flow into ocean of eight million tons per year.

³⁰ See UNEP/EA.4/Res.6.

5.4.1. Governance

Managing the ocean requires multi-stakeholder engagement and cooperation from all States and jurisdictions. Many international, regional, bilateral and multilateral, sectoral and territorial instruments and mechanisms related to the management of the ocean are in place, such as the United Nations Convention for the Law of the Seas, which is a legal framework for ocean governance. Within national Governments, the public administration of the ocean is shared by different ministries. The approach to ocean governance also depends on national priorities and the relevance of the ocean for local communities and economies. Consequently, there is no homogeneous architecture of ocean governance that can be replicated across the world. This underscores the need for stronger regional cooperation, especially among countries with common challenges and priorities, such as those sharing a river basin.

Many international and regional bodies are working on solutions to deal with marine pollution. Some of them are of great importance for South-East Asia, where most of the pollution is generated. There are also notable experiences from other regions. For example, the European Union has made considerable strides in improving international ocean governance.³¹

The first intergovernmental regional action plans on marine litter in the Asia-Pacific region were driven by regional seas programmes, such as the Coordinating Body on the Seas of East Asia and the Northwest Pacific Action Plan, over a decade ago. In 2019, the Coordinating Body on the Seas of East Asia participating countries, namely Cambodia, China, Indonesia, Malaysia, the Philippines, the Republic of Korea, Singapore, Thailand and Viet Nam, adopted a revised regional action plan on marine litter. The objective of this plan is to consolidate, coordinate and facilitate cooperation, and implement the necessary environmental policies, strategies and measures for sustainable, integrated management of marine litter

³¹ The European Union sees ocean governance as “managing and using the world’s oceans and their resources in ways that keep our oceans healthy, productive, safe, secure and resilient” (European Commission, n.d.). In its recent two years progress report, the European Union showed tangible results in the three pillars that define its framework for ocean governance: improving the international ocean governance framework; reducing human pressures on the oceans and creating the conditions for a sustainable blue economy; strengthening international ocean research and data. More details are available at https://ec.europa.eu/maritimeaffairs/policy/ocean-governance_en.

in the East Asian Seas. It guides national and regional action to (a) prevent and reduce marine litter from land-based sources and sea-based sources, (b) establish regionally coherent monitoring and assessment programmes, and (c) create enabling conditions and build capacity for cross-sector cooperation.

Similarly, the Association of Southeast Asian Nations (ASEAN) has developed the Framework of Action on Marine Debris, which is comprised of four priority areas: (a) policy support and planning; (b) research, innovation and capacity-building; (c) public awareness, education and outreach; and (d) private-sector engagement (ASEAN, 2019). APEC established the APEC Roadmap on Marine Debris, which is voluntary and promotes (a) policy development and coordination; (b) capacity-building; (c) research and innovation; and (d) financing and private sector engagement. In this increasingly crowded policy space, coordination across actors and the existing regional and subregional governance landscape, it is necessary to leverage synergies and further coherent action across the region. Such mechanisms for cooperation and alignment have been put in place, for instance, between ASEAN and Coordinating Body on the Seas of East Asia, to reduce the burdens on member countries of their respective frameworks.

Some regional projects leverage the regional frameworks to create synergies with various regional interventions. SEA circular is an initiative established by UNEP and the Coordinating Body on the Seas of East Asia to reduce marine litter by addressing the management of the plastic value chain in South-East Asia.³² The project works towards the elimination of single-use plastics from selected value chains and

³² SEA circular is working in six countries in South East Asia, Cambodia, Indonesia, Malaysia, the Philippines, Thailand and Viet Nam, from 2019 to 2023 with national and provincial governments, the private sector, civil society groups and non-governmental organizations – and many other stakeholders – to support good governance and policymaking, and promote circular economy principles. SEA circular focuses its interventions on supporting market-based solutions, enhancing the science-basis for decision-making, generating outreach to support awareness and behaviour change, and promoting a regional approach through collaboration and networking – to achieve “less plastic wasted” in the South-East Asia subregion. This project leverages the Coordinating Body on the Seas of East Asia intergovernmental mechanism to achieve the Regional Action Plan on Marine Litter and align with the ASEAN Framework of Action on Marine Debris. These were both adopted in 2019 to guide action to reduce land-based and sea-based sources of marine litter, strengthen science-based monitoring programmes, and improve regional cooperation and outreach for action.

supports strengthening policy and fiscal incentives to reduce virgin plastic use.

Individual countries are also taking stronger actions, such as restricting the use of single-use plastics and developing ambitious national strategies and action plans, such as those developed by Indonesia – National policy and strategy on solid waste management (including plastic waste) regulated by Presidential Decree Regulation No.97/2017, and the National Action Plan on Marine Debris (2017–2025), Malaysia – Roadmap towards Zero Single-Use Plastics (2018–2030), and Thailand – Thailand Roadmap on Plastic Waste Management (2018–2030)) to tackle plastic pollution.

Enhanced ocean governance requires robust institutions; effective implementation and compliance of laws and regulations; constant capacity-building, monitoring and assessment; and the engagement of all stakeholders. This includes coordination at the international, regional, national and local levels, and interministerial cooperation, combining North-North, North-South, South-South and river-basin cooperation approaches.

5.4.2. Economy and finance

The development of new plastic-free products, business models and value chains creates opportunities to apply circular economy innovations for reductions in plastic consumption and improving recycling methods. The economy and finance lever may include regulations in the countries where the goods are produced, sold, and eventually disposed of. Economic incentives and disincentives may catalyse business innovation for sustainable products, including alternatives to traditional fossil-fuel based plastics. For example, in Bangladesh, a plastic bag ban generated positive benefits in employment, as sustainable bags substituted plastic bags, with entrepreneurs providing jobs to hundreds of unemployed workers to produce jute, cotton and paper bags.

Furthermore, financial incentives may foster good practices through tax-exemptions or subsidies; while counterincentives, such as a plastic tax, may discourage demand of the product and contribute towards the discontinuation of the use of plastics. Introducing a plastic tax would provide revenue that could be used to foster public environmental programmes and actions on ocean governance. The percentage and modality of the tax could be assessed by individual member States based on their national situations. This is also an

incentive for national revenue agencies to expand the taxpayer base. As member States resurface out of the COVID-19 pandemic, economic and fiscal interventions, including those related to the environment, will redefine the course of their economies and their sustainable development. To this extent, it is now a good time to rethink how economic recovery packages should factor directly environmental considerations and climate parameters. There is an opportunity for a post-COVID-19 pandemic reform of the entire fiscal and economic framework related, among other things, to the production and consumption of plastics, with a view to create a triple dividend of human health, economic development and ecosystem health.

In the Asia-Pacific region, some forms of plastic tax or levy have been implemented. China has imposed a nation-wide levy for plastic bags thicker than 25 μ (microns) at the local level, Hong Kong, China has implemented a levy on some retailers, and Taiwan Province of China has introduced a levy on disposable plastic bags and tableware. Twenty-three cities in Indonesia have implemented a levy on plastic bags (equivalent to \$0.015 per bag) on customers at selected retailers. Penang state in Malaysia introduced a 0.20 Malaysian ringgit (RM) (\$0.02) charge on plastic bags, as part of its No free plastic bags campaign. Viet Nam applies a levy on retailers for non-biodegradable plastic bags by weight while Fiji imposes a levy on consumers, 0.10 Fiji dollar (F\$) (US\$0.04) per plastic bags (UNEP, 2018a). These strategies could be replicated in other countries, learning from success stories and good practices in the region.

5.4.3. Science and technology

Over the past decades, sustainable solutions have emerged which can offer sustainable alternatives to plastics. The UNESCO Intergovernmental Oceanographic Commission highlights the importance of scientific innovations and new technologies to promote industrial and governmental change for transformative impacts for the ocean. On its website, the Commission stresses that the Blue-Green Economy will be driven by science and technology, and that policy processes and effective institutions will determine its success.³³

One of the main challenges in benefiting from science is time, as the amount of plastics in the ocean may triple within three decades. Accordingly, scientific

³³ See <http://www.unesco.org/new/en/natural-sciences/ioc-oceans/focus-areas/rio-20-ocean/ocean-governance/>.

innovation is needed now. Scientific inventions, such as bioplastics, are already serving as an alternative to traditional fossil-fuel based plastics, however, they are not yet as competitive as traditional plastics in terms of prices. The challenge for member States is to incorporate these available scientific developments into their policymaking.

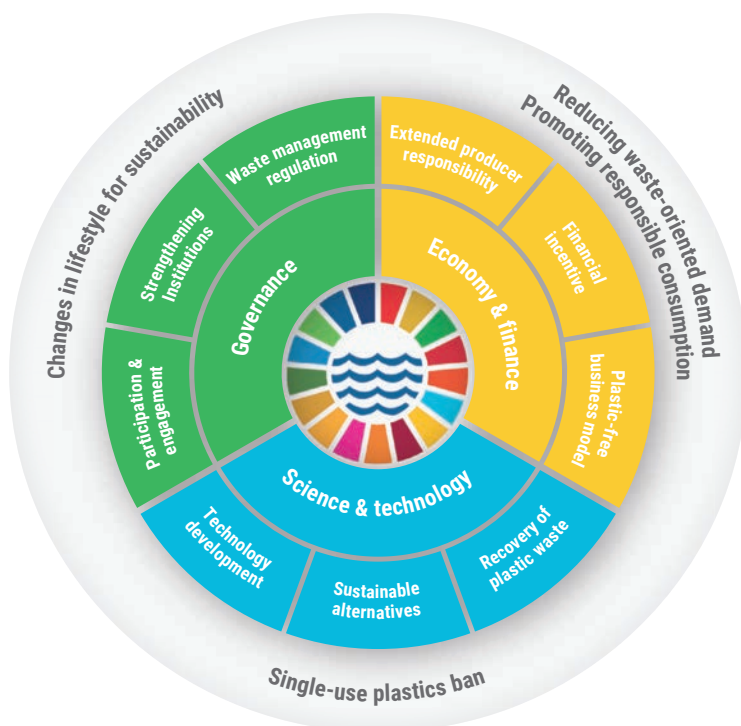
5.4.4. Individual and collective action

Everybody is accountable for the protection of the ocean, including the public and private sector and individuals. Accordingly, it is important to accelerate individual and collective actions through the exchange of information, developments and proposals. This is already being done through such initiatives as the Asia-Pacific Day for the Ocean, which brings together international organizations, governments, academia, the private sector, civil society and individual citizens. Figure XXIV contains a summary of the different levers and the transformative actions required to tackle the marine plastic debris crisis in Asia and the Pacific.

Examples of individual actions by citizens are changing social norms, adjusting lifestyles to plastic-free consumption patterns, reducing waste-oriented demand, avoiding direct pollution and organizing clean-ups. Individual actions by companies may include changes in production practices and supply, with alternatives to plastic promoting responsible consumption. Governments may play a cohesive role in enabling sustainable practices through appropriate regulation and enforcement, which may come in the form of incentives, taxes or fines and enforcement of sustainable consumer behaviour.

A ban on single-use plastics is a successful example of an intervention that requires individual and collective action. Such normative frameworks enable transformative ocean action, triggering dynamic changes in the private sector through production and supply, and modifying consumption patterns of citizens. A ban can be executed gradually and over a course of two to three years, in order to accommodate transitional arrangements, including the modification

Figure XXIV Levers and transformative ocean action



of production lines and the management of current inventories.

In Asia and the Pacific, a few countries have already introduced some forms of nationwide bans of single-use plastic. Bangladesh was a global pioneer of this, by instituting a nationwide ban in 2002, followed by Bhutan and Mongolia in 2009, India and Papua New Guinea in 2016, Marshall Islands, Palau and Sri Lanka in 2017, Vanuatu in 2018, and New Zealand in 2019. This policy measure can be considered by other member States in Asia and the Pacific for the protection of the oceans. Other countries in the region have introduced bans at the local level, namely in Australia, China, India, Indonesia, Malaysia, Myanmar, Pakistan, and the Philippines (UNEP, 2018c). This effort may benefit from scaling up to the national level.

5.5. Conclusion and recommendations

Transformative actions to curb marine plastic pollution require a change of paradigm for consumers and producers supported by adequate regulations, including transitional mechanisms to phase out plastics. The main policy recommendations of this chapter can be summarized as follows.

The first recommendation is to implement national policies for the protection of the ocean, such as a single-use plastic ban and economic incentives or disincentives in order to reduce plastic marine debris. Economic packages and stimuli for reconstruction after the COVID-19 pandemic must embed sustainable practices that enable a future with less plastics, distancing from business as usual. Single-use plastic bans and plastic taxes, and a combination of both, have proved to be effective in tackling marine pollution in many parts of the world, including in countries in Asia. They can translate into additional revenue for governments and a reduction in the demand for conventional plastics, consequently reducing the

related environmental impacts and marine pollution. Other policies should address abandoned, lost and discarded fishing gear, which contributes significantly to the volumes of marine debris in the ocean. Regulations should be made with the objective to improve retrieval mechanisms for the appropriate recycling or management of abandoned, lost and discarded fishing gear, engaging fishermen and manufacturers in the compliance process.

The second recommendation is to promote scientific developments and research through national institutions and private initiatives with the objectives to find new sustainable alternatives to plastic products, clean the pollution in the ocean, and reuse and recycle the existing plastics. Science and technology may provide the solutions to the plastic crisis by improving plastic waste management, and making it possible to promote the recycling and upcycling of already existing inventories of plastic. Technology transfer among neighbouring countries may also help to improve ocean health.

The third recommendation is to promote and participate in the regional exchange of information, data and statistics, technical assistance and good practices to accelerate progress towards achieving Sustainable Development Goal 14. For member States located around river basins, cooperation at the subregional and multi-country level is strongly encouraged, as rivers have been identified as major sources of marine pollution. ESCAP should maintain participatory and multi-stakeholder platforms, such as the Asia-Pacific Day for the Ocean, to foster regional and subregional efforts, facilitate the exchange of scientific and technological development and strengthen regional engagement. Regarding the implementation of existing international agreements and resolutions, member States are strongly encouraged to establish tangible time frames to ensure compliance and accelerate delivery.



Chapter 6

Concluding remarks and call for actions

Our actions for the ocean are constrained by our own limitations, which, in turn, are rooted in lack of data and limited understanding and our ability to devise effective institutional structures and policies for its conservation. We know for certain that the ocean is edging closer to a tipping point, as adverse developments are taking place at an unprecedented pace. For example, overfishing has caused fish stocks to wither and placed the lives of coastal communities at risk, and plastic waste has been found in the deepest ocean seabed and in the guts of the deepest sea creatures. In addition to this, the few exceptions of progress in the preservation of oceans and marine resources are under threat from the effects of climate change. As the COVID-19 pandemic is running its course at a sweeping scale across the region, governments are putting in place large-scale economic responses. These recovery investments have the potential to create a new reality in the post-COVID-19 pandemic embedded in sustainability and resilience for the oceans if they catalyse a shift towards sustainable practices, such as green shipping and decarbonization, and low-impact fisheries, aquaculture, and tourism. Surveying this sobering situation, the present report offers three strategic entry points for urgent actions to halt, and subsequently reverse, the decline of our oceans' and marine ecosystems' health. These three calls for action can be summarized as follows:



6.1. Harnessing data for a healthy ocean

Data have the power to broaden knowledge about the state of oceans and galvanize a strong desire to conserve them. To gain a thorough understanding of the oceans, attaining data that are factual, transparent and harmonized is a precondition. Substantial data gaps remain. Sustainable Development Goal 14, dedicated to monitor the interactions between humans and the oceans, is far from being achieved because only one of the ten globally agreed indicators can be measured. Official, harmonized, and widely shared data are necessary to fully understand the extent of plastic waste entering the oceans, the impact of shipping's carbon emissions on the marine ecosystem, and the status of fish stocks and fisheries practices. A stronger push for investment in producing these data, especially in lower statistical capacity contexts, is required to monitor emerging trends, devise timely response and evaluate their effectiveness.

Sources of data relating to oceans exist, but they are usually fragmented, unharmonized and/or siloed. The lack of cross-sectoral data sharing limits our understanding of the land to ocean impacts and the interconnectedness between country actions and the regional and global outlook. Leveraging and connecting the available data across stakeholders can resolve the existing blind spots impeding our actions. This requires significant changes in national policies and incentives to share and exchange data across countries and among public and private data holders. Stronger national statistical systems and more transparent data sharing policies are needed to produce the high-quality data required for the oceans we want.

6.2. Enforcing international frameworks, norms and standards for the acceleration of actions

Most of the challenges related to the oceans do not rest within countries' borders, nor do they respond to sporadic and isolated solutions. Indeed, the transboundary movement of plastic from rivers to oceanic currents means that impacts of human activities in one country can have implications for many others. Overexploitation of fish stocks and shipping pollution spread ecological harm beyond national borders. Separate standards and uncoordinated actions are insufficient to cope with the transboundary nature and interconnectedness of the oceans. It is

for this reason that international instruments have been put in place and are evolving to raise the level of ambitions and gather the critical mass to protect and achieve sustainable use of ocean resources.

International instruments that set out the common challenges to the oceans and lay the ground for collective action are in place. Among them are the International Convention for the Prevention of Pollution from Ships for regulating the environmental impacts of international shipping; the Code of Conduct for Responsible Fisheries and the subsequent Agreement on Port State Measures with binding principles and standards to tackle illegal, unreported and unregulated fishing; and the Basel Convention for better regulated trade in plastic waste. Decades after the international discussion on oceans and the law of the sea started to take shape, the world has devised a wide range of international commitments, covering such areas as marine biodiversity conservation, plastic waste management, shipping pollution and monitoring of fishing activities in the high sea. Turning these into tangible results depends largely on our ability to translate them into effective actions, enforceable rules, and time-bound targets anchored in national regulatory frameworks.

Some member States have been able to revise national legislations in accordance with international instruments, but institutional gaps remain. Especially important are the gaps in capacities to devise and implement national actions that are aligned with international norms and standards. These gaps in institutional capacities are not evenly distributed, being largest where they are needed the most. For instance, small island developing States and territories, home to some of the world's largest exclusive economic zones, are the most vulnerable to climate change, benefit the least from the burgeoning maritime connectivity in the Asia-Pacific region, and face severe institutional limitations. To address these issues, support across countries is fundamental to make sure that there are no loopholes in the cross-border protection of the oceans and marine resources.

An indispensable approach to tackle weak institutional capacity is to involve all stakeholders, from international organizations to local communities and individuals. This would reflect the growing attention to the oceans and amplify the effects of partnerships protecting them. For instance, when local communities are involved in a partnership approach, individuals are less

likely to engage in illegal, unreported and unregulated activities and will report them to public authorities, thereby increasing the capacity of the State.

6.3. Scaling up actions for the ocean

While the challenges ahead seem daunting, some promising ongoing initiatives are being implemented. For instance, multi-country partnerships, such as the Coral Triangle Initiative, have been put in place to monitor the protection of marine ecosystems, fishery activities and fish stocks. Several countries in Asia and the Pacific, such as Bangladesh, Bhutan, Mongolia, and Papua New Guinea, have introduced successful forms of bans of single-use plastic, triggering a gradual shift in awareness, attitudes and social norms in relation to waste generation.

Building meaningful partnerships starts with engaging in dialogues that are inclusive and action-oriented. Valuable regional platforms already exist, such as

the Asia Pacific Day for the Ocean, which have the potential to raise the bar for regional and collaborative actions. For instance, such platforms can leverage the existing partnerships on oceans data, such as the Global Ocean Accounts Partnership, to jointly support the production of harmonized data used for Sustainable Development Goal 14. They can also serve as an avenue to engage the public and private sector to address the single-use plastic crisis, or to promote more inclusive and sustainable maritime connectivity in Asia and the Pacific. They carve out an invaluable space for exchanging lessons learned and to monitor the enforcement of international conventions and agreements on sustainable fisheries and green shipping, among other activities. Evidence unequivocally shows that as regional dialogues mobilize stakeholders around a stronger and clearer sense of purpose, tangible results follow. Now, the purpose is to manage our oceans sustainably. This is the time to reinvigorate regional platforms to achieve that objective.

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The ocean and its resources are the lifelines of Asia and the Pacific. As a resource for the economy, livelihoods and identity for coastal communities, the condition of the ocean is inextricably linked to the pathways of sustainable development in Asia and the Pacific.

The theme study *Changing Sails: Accelerating Regional Actions for Sustainable Oceans in Asia and the Pacific* explores the key areas around which regional platforms can rally interdisciplinary and cross-sectoral solutions for the ocean. It highlights the lack of data and statistics on the ocean, the growing demand for moving towards inclusive and green maritime shipping, deteriorating fish stocks and gaps in fisheries management and the mounting pressure of marine plastic pollution.

The theme study calls for enhanced sharing of ocean data and stronger investment in national statistical systems for collecting and harmonizing ocean data. It underscores the need for enforcing international conventions, norms and standards in relation to maritime shipping, sustainable fisheries and marine pollution. Finally, it proposes strengthening regional platforms such as the Asia-Pacific Day for the Ocean as avenues for building partnerships, facilitating knowledge and data-sharing and supporting the implementation and monitoring of global agreements.

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