3 Policy instruments and finance for developing countries to promote the conservation and sustainable use of the ocean

This chapter examines the regulatory (command-and-control) and economic policy instruments as well as other finance mechanisms available for countries to create incentives and generate revenue for the conservation and sustainable use of the ocean. It focuses on sustainable fisheries and aquaculture, sustainable tourism, and reducing marine pollution, among others. In addition to its discussion of economic instruments, the chapter highlights three other mechanisms – conservation trust funds, blue carbon payments, and private sector concessions and community management approaches – and the role they can play in supporting the transition to a sustainable ocean.

The need for coherent policy approaches to foster sustainable ocean economies

The ocean economy covers many different sectors and each often has its own governing institutions and policy objectives. Policy making for the ocean economy is therefore frequently fragmented, with responsibility split between multiple sectoral-level ministries. The interconnected nature of ocean, seas and marine resources and the economic sectors they support means that more holistic approaches are needed to ensure policy coherence, identify and manage trade-offs between the sectors, and take advantage of synergies where policies can deliver benefits to multiple sectors. The institutional frameworks in place in this context are also important and can help to foster or hinder such approaches.

Several countries have created dedicated ministries with an overarching responsibility for policy making in the ocean economy. Among these are Barbados, Cabo Verde and Indonesia. Cabo Verde, for instance, created a Ministry for the Maritime Economy in 2018 with a broad portfolio with respect to the ocean that includes traditional maritime sectors such as transport as well as fisheries. Indonesia has taken a different approach, creating the Co-ordinating Ministry of Maritime Affairs and Investments in 2015 to oversee and integrate action across a range of other national ministries including Maritime Affairs and Fisheries, Energy and Mineral Resources, and Tourism and Transport. Given that these co-ordination mechanisms are relatively new, it is not yet possible to evaluate how effective these have been in developing coherent and co-ordinated policies.

A number of least developed countries (LDCs) have also established institutional arrangements and policy frameworks to use their blue natural capital more sustainably and as a driver of sustainable development. In 2017, Bangladesh established the Blue Economy Cell, an inter-ministerial platform tasked to develop a road map and co-ordinate initiatives among ministries on the sustainable ocean economy. Other countries, among them Cambodia and Mozambique, have folded ocean economy responsibilities into an existing ministry. Cambodia has also a specific focus on “the blue economy development with sustainability”, outlined in its 2013-30 National Strategic Plan on Green Growth (National Council on Green Growth, 2013[1]). Overall, implementing the cross-cutting policies needed for the sustainable ocean economy requires dedicated co-ordinating institutions or mechanisms. However, the most effective of these institutional arrangements are likely to be country-specific, dedicated institutions or mechanisms that are able to implement the cross-cutting policy missions needed for the sustainable ocean economy. Box 3.1 highlights some examples of institutional challenges.

Box 3.1. Examples of institutional challenges

- The governance of marine protected areas (MPAs) is a good example of how institutional fragmentation can lead to implementation challenges. In both Indonesia and Antigua and Barbuda, the governance of MPAs is divided among several different ministries. In Indonesia, MPA governance is split between the Ministry of Environment and Forestry and the Ministry of Marine Affairs and Fisheries. In Antigua and Barbuda, MPA governance is split between the Department of Environment, Ministry of Tourism and the Ministry of Agriculture, Fisheries and Barbuda Affairs. In both countries, the ministries have different powers to impose fees and varying capacity to monitor and enforce regulations. For example, in Antigua and Barbuda, the Ministry of Tourism has the power to collect fees from users of national parks while the Ministry of Agriculture, Fisheries and Barbuda Affairs cannot do so on users of the MPA it manages. This division of responsibilities across different ministries can create confusion among stakeholders and impact MPA effectiveness.
- The waste sector in Indonesia is another example of the challenges created by split governance. Indonesia is the world’s second largest producer of marine plastic waste, with adverse implications (Jambeck et al., 2015[2]). In response, the government announced a target to

reduce marine plastic waste 70% by 2025, responsibility for which is shared by the ministries – of Environment and Forestry and Maritime Affairs and Fisheries. However, as most marine plastics come from ineffective solid waste management, with an estimated 83% of solid waste mismanaged (Jambeck et al., 2015[2]), it is challenging for the two ministries to influence this system as it falls under the responsibility of multiple different ministries and local governments.

The policy instruments available to foster a sustainable ocean economy include regulatory (command-and-control) and economic instruments, as well as information and voluntary approaches. Both policy and finance are needed to ensure that ocean sustainability objectives are effectively achieved. Economic instruments, which provide incentives for sustainable production and consumption, are also able to generate government revenue to support the conservation and sustainable use of the ocean. Other available approaches to help mobilise finance for the conservation and sustainable use of the ocean include conservation trust funds, public-private partnerships and co-management. The discussion in this chapter focuses exclusively on policy instruments for managing economic activity within the exclusive economic zone (EEZ) of countries and not on the ocean economy in areas beyond national jurisdiction.

An overview of regulatory, economic and other instruments for the conservation and sustainable use of the ocean

A broad suite of policy instruments is needed to effectively address pressures on the ocean and ensure that the ocean, seas and marine resources are conserved and managed sustainably. Table 3.1 presents some available types of policy instruments.

Given the multiple and diverse pressures on the ocean stemming from different sectors and economic activities (Chapter 2), taking an integrated approach to policy making is essential. Certain policy instruments, such as marine spatial planning (MSP) and MPAs, can serve to help manage and address pressures from several different sectors of the ocean economy (e.g. fisheries, tourism, infrastructure and shipping). Other policy instruments, such as catch limits on fish and gear restrictions, can be used to help address specific pressures stemming from certain sectors. Understanding how to balance sector-specific instruments with broader-scale approaches is important for creating policy mixes that address sustainability in the ocean economy holistically rather than in each sector in isolation.

Regulatory (command-and-control) approaches set out the legal environment in which ocean industries operate inside national EEZs. They impose standards and best practices on access to or use of natural resources. Economic instruments create continuous incentives for actors in the ocean economy to behave in a more sustainable way by putting a price on environmental externalities, and such instruments can also create revenue for governments that can be used to further support conservation and sustainable use. Information and voluntary approaches are intended to influence the behaviour of producers and consumers, for example by providing information to consumers about the underlying production practices of goods and services derived from the ocean. The “multi-aspect” nature of the environmental challenges facing the ocean implies that a mix of different policy instruments will be required (OECD, 2007[3]).

Table 3.1. Policy instruments to promote the conservation and sustainable use of the ocean

Regulatory (command-and-control) instruments	Economic instruments	Information and voluntary approaches
Marine protected areas	Taxes, charges, user fees (e.g. entrance fees to marine parks)	Certification, eco-labelling (e.g. Marine Stewardship Council)
Marine spatial planning and multi-annual management plans	Rights-based management systems (e.g. individually transferable quotas for fisheries)	Voluntary agreements including public-private partnerships (can include, e.g., voluntary biodiversity offset schemes)
Spatial and temporal fishing closures; bans and standards on fishing gear; limits on number and size of vessels; other restrictions or prohibitions on use (e.g. *CITES)	Subsidies to promote biodiversity and reform of environmentally harmful subsidies	Public awareness campaigns (e.g., on plastic waste) and alternatives to single-use plastics
Catch limits or quotas (output controls)	Payments for ecosystem services (PES)	
Standards (e.g. **MARPOL for ships); bans on dynamite fishing	Biodiversity offsets	
Licenses (e.g. aquaculture)	Non-compliance penalties	
Planning requirements (e.g. environmental impact assessments and strategic environmental assessments)	Fines on damages (e.g. oil spills)	
Ban on single-use plastics (e.g. drinking straws and plastic bags)	Levy on single-use plastics (e.g. plastic bags)	
Extended producer responsibility		

Note: *CITES is the Convention on International Trade in Endangered Species of Wild Fauna and Flora; **MARPOL is the International Convention for the Prevention of Pollution from Ships.
Source: Adapted from OECD (2017[4]), *Marine Protected Areas: Economics, Management and Effective Policy Mixes*. https://doi.org/10.1787/9789264276208-en.

Table 3.2 provides an indication of the extent to which selected instruments are able to target or address the different pressures on ocean and marine ecosystems. Further detail is presented in Annex 3.A.

Table 3.2. Pressures on ocean and marine ecosystems and instruments to address these

Pressures on ocean and marine ecosystems	Examples of instruments					
	Marine spatial planning	*EIA and **SEA	Marine protected areas	***ITQ for fisheries	Pollution abatement measure	Sustainable fish certification, eco-labelling
Overfishing	2	1	2	2	0	2
Pollution	2	2	1	0	2	1
Habitat destruction	2	2	2	0	1	1
Climate change	1	1	1	0	2	0
Invasive alien species	1	1	0	0	1	0

Note: *EIA is an environmental impact assessment; SEA is strategic environmental assessment; ***ITQ is an individual transferable quota.
In this table, 0 implies the instrument is unable to address this pressure; 1 implies it has potential to help address this pressure (depending on instrument and context); and 2 implies it has significant potential to address pressure.
Source: Adapted from OECD (2017[4]), *Marine Protected Areas: Economics, Management and Effective Policy Mixes*. https://doi.org/10.1787/9789264276208-en.

Regulatory (command-and-control) instruments

Some of the regulatory instruments available to promote the conservation and sustainable use of the ocean, for instance MSP, are cross-sectoral and can thus have wide-reaching impacts on the ocean economy. MSP is the process by which countries allocate temporal and spatial space to economic activities and environmental protection in their ocean areas. Marine spatial planning can be a resources-intensive as well as time-intensive process as it requires the active involvement of many stakeholders. However, its purpose is to provide a comprehensive planning system that helps to manage competing demands for the ocean and allocate resources in an effective way.

Through the MSP process, countries can ensure that economic, social and environmental objectives are balanced, policy priorities are aligned, and all relevant stakeholders are adequately consulted. As such, MSP can help to underpin the development of a sustainable ocean economy. A best practice guide for MSP, produced by UNESCO and the Intergovernmental Oceanographic Commission (IOC), outlines ten steps for an effective MSP process (Ehler and Douvere, 2009[5]). A key component of MSP is the collection and analysis of data on the current and future condition of ocean areas.

A first step is to build the knowledge base on the marine environment in national waters. Effective MSP requires good knowledge of the geophysical characteristics of the coastlines, solid bathymetric studies (i.e. submarine topography), and the mapping and assessment of marine biodiversity (fauna and flora) and other resources. The larger the area to map, the more complex the exercise. Nevertheless, the benefits are such that some developing countries are more advanced than many developed countries in establishing their MSP, as is the case for Gabon and the Seychelles.

In the Indian Ocean, the Seychelles is in the final phase of developing its MSP, which covers all 1.35 million km², to expand marine protections to 30% of its territory, address climate change adaptation, and support its national ocean economy (Chapter 4). The Seychelles held stakeholder consultations in 2014-15 when it launched a marine spatial plan initiative, in line with the principles set out by the International Oceanographic Commission (Table 3.3). The Seychelles principles were adapted from the 2009 UNESCO-IOC ten-step MSP guide (Ehler and Douvere, 2009[5]). Since then, a number of international research expeditions have contributed to map and assess the marine biodiversity and resources of the Seychelles, among them the National Geographic Pristine Seas mission in 2016 and the Nekton Expedition in 2019.

Its MSP initiative is funded through the Seychelles debt-for-nature swap for the ocean – the world's first – that restructures parts of its national debt into long-term marine conservation funding. Designed by The Nature Conservancy, the Programme Coordination Unit of the United Nations Development Programme (UNDP) and the Global Environmental Facility on behalf of the government of the Seychelles, the agreement is funded by public and private donors (The Nature Conservancy, 2019[6]). A portion of the debt repayments are to be used to fund innovative marine protection and climate adaptation projects through the Seychelles Conservation and Climate Adaptation Trust (SeyCCAT, 2019[7]).

Table 3.3. Marine spatial planning principles used by the Seychelles

Integrated	Address the interrelationship of issues and sectors and of nature and development, as integration can help to create complementary and mutually reinforcing decisions and actions.
Ecosystem-based	Safeguard ecosystem processes, resilience and connectedness, recognising that ecosystems are dynamic, changing and sometimes poorly understood and therefore require precautionary decision making.
Public trust	Marine resources are part of the public domain, not owned exclusively by and not exclusively for the benefit of any one group, so decisions should be made in the interest of the whole community and not any one group or private interest.
Sustainability	Decision making should take into account environmental, economic, social and cultural values in meeting the needs of the present without compromising the ability of future generations to meet their needs.
Transparency	The processes used to make decisions should be easily understood by the public and allow citizens to see how decisions are made, how resources have been allocated and how decisions have been reached that affect their lives.
Participatory	Communities, persons and interests affected by marine resource or activity management should have an opportunity to

	participate in the formulation of ocean management decisions.
Precautionary	Article 15 of the Rio Declaration on Sustainable Development states, "In order to protect the environment, the precautionary approach shall be widely applied by States according to their capabilities. Where there are threats of serious or irreversible damage, lack of full scientific certainty shall not be used as a reason for postponing cost-effective measures to prevent environmental degradation
Adaptive	MSP is a continuing, iterative process that learns and adapts over time.

Source: Ehler and Douvere (2009[5]), *Marine Spatial Planning: A Step-by-Step Approach Toward Ecosystem-based Management*, http://dx.doi.org/10.25607/OBP-43.

One of the challenges of putting effective MSPs in place is the underlying data needs. Greater investment in the collection and analysis of data on the ocean environment (e.g. benthic habitat mapping) is needed for effective MSP and the development of a sustainable ocean economy. (Also pertinent is the role of innovation, discussed elsewhere in this chapter, and the discussion in Chapter 5 of the role of development co-operation.) It is important to note that in addition to MSP, there are various models to achieve integrated ocean management, such as sectoral plans and requirements for impact assessments, and co-existence among different ocean industries.

MPAs are the conservation instrument used most frequently by countries, and they are growing in popularity, expanding to cover 17.3% of national EEZs in 2019 from just 2.1% in 2000 (OECD, 2019[8]). In 2014, for example, the government of Gabon announced the initial creation of the country's MPA network, the largest such network in Africa and home to a wide array of threatened marine life including the largest breeding populations of leatherback and olive ridley sea turtles as well as 20 species of dolphins and whales. As part of its national *Gabon Bleu* (Blue Gabon) initiative, the government is building on the findings of several scientific exploration campaigns, such as the National Geographic Pristine Seas project, which surveyed Gabon's 885-kilometer coastline in 2012 (National Geographic Society, 2020[9]). The network has since been extended several times and should reach 30% of the country's Territorial Sea and Exclusive Economic Zone by 2020. It has been effective in curbing illegal fishing and providing benefits to species and coastal communities in collaboration with the Gabonese national parks agency, the Gabonese Navy, Gabon's national fisheries agency, and coastal communities and companies involved in offshore oil production (U.S. Fish and Wildlife Service, 2017[10]).

The value of ocean ecosystem services is estimated at USD 49.7 trillion per year (Costanza et al., 2014[11]). Yet many MPAs lack sufficient funding to effectively protect the marine ecosystems they contain, for instance by ensuring adequate resources for compliance and enforcement (Gill et al., 2017[12]). Further effort is needed to scale up financing for MPAs and ensure they are effectively managed. As noted in this chapter, economic instruments can help. In addition, the OECD (2017[4]) report, *Marine Protected Areas. Economics, Management and Effective Policy Mixes*, discusses this issue in detail.

Other regulatory instruments include the more traditional standards on fishing gear, quotas on fish catch, commercial fishing permits, emission standards for waterway engines, and fuel sulphur limits for vessels, among many others. Habitat conservation bycatch limits (or individual habitat quotas) also exist, although these are not yet common. Planning tools such as environmental impact assessments (EIAs) and strategic environmental assessments (SEAs) are also used. EIAs can be required to assess the impacts of projects such as offshore windfarms, harbour expansion and dredging, marine aquaculture, and oil platforms and rigs. SEAs tend to be undertaken for larger activities, for example to inform a country's strategy for the development of marine energy (OECD, 2017[4]).

Economic instruments

Economic instruments can play a key role in incentivising sustainability in the ocean economy. Such instruments put a price on an environmentally damaging activity and are able to achieve a given environmental objective at lower cost than more traditional command-and-control approaches. Many

economic instruments such as fees, charges and taxes can also generate revenue for governments. If earmarked, the revenue can also be channelled and used for the conservation and sustainable use of the ocean. The different kinds of economic instruments are briefly described in Box 3.2.

Box 3.2. Economic instruments that incentivise sustainable use of the ocean

- **Taxes** Based on the polluter pays principle, taxes place an additional cost on the use of the natural resource or the emission of a pollutant to reflect the negative environmental externalities these generate. As such, taxes create incentives for both producers and consumers to behave in more environmentally sustainable ways. Examples include taxes on dumping waste and on other pollutants at sea.
- **Fees and charges** A fee or charge is a requited payment to a general government. That is, the payer of the charge receives something in return that is more or less in proportion to that charge. Charges and fees can be used to control access to resources by pricing extraction, for example through a fishing licence fee or entry fee to an MPA.
- **Tradable permits systems** Under tradable permits systems, rights to harvest or access certain resources are allocated through permits that are limited in number and can be traded between permit holders. In some cases, these permits are associated with a specific quota for the level of resource that can be extracted, as in the case of individual tradable quotas for fisheries. These systems can generate revenue for governments if the permits are auctioned.
- **Subsidies** Governments pay subsidies to producers to support the production of certain goods or services. Subsidies can have a negative environmental impact if they increase the level of an environmentally damaging activity, for example sand extraction for construction. Conversely, environmentally motivated subsidies are intended to have a positive impact by lowering the cost of economic activities that have lower environmental impacts.
- **Payments for ecosystem services** Based on the beneficiary pays principle, payments for ecosystems services (PES) are voluntary transactions between service users and service providers that are conditional on agreed rules of natural resource management for generating off-site services (Wunder, 2015[13]). An example of PES for the ocean economy is a scheme that pays for the restoration of mangroves to store carbon (e.g. blue carbon payments) and enhance coastal flood protection.
- **Biodiversity offsets** Based on the mitigation hierarchy, offsetting is a process whereby unavoidable impacts of development are compensated for the creation of new habitat that is equivalent to areas destroyed. At a minimum, biodiversity offsets aim for no net loss of biodiversity and can provide a net gain where more habitat is created than is lost. Biodiversity offsets can be used in the ocean economy to compensate for the development of infrastructure relating to tourism, ports and natural resource extraction. The OECD (2016[14]) report, *Biodiversity Offsets: Effective Design and Implementation*, elaborates such offsets in greater detail.

More than 110 countries are contributing data to the OECD Policy Instruments for the Environment (PINE) database, which includes information on more than 3 500 environment-related policy instruments. These include economic instruments that are relevant to the conservation and sustainable use of the ocean. Analysis of the PINE data finds 57 countries have implemented 209 ocean-relevant economic instruments, of which 188 are currently in force. The most commonly used instrument is taxes, accounting for just over half of the ocean-relevant instruments in the PINE database, followed by fees and charges (Table 3.4.) Taxes relevant to ocean sustainability generated at least USD 4 billion in 2018, with taxes on ocean-related pollution, transport and energy generating the most revenue (OECD, 2020[15]). Figure 3.1 shows the steady

growth in ocean-relevant environmental policy instruments, from 57 in 1990 to 188 in 2020. Examples of a number of these ocean-related economic instruments in developing countries are described below.

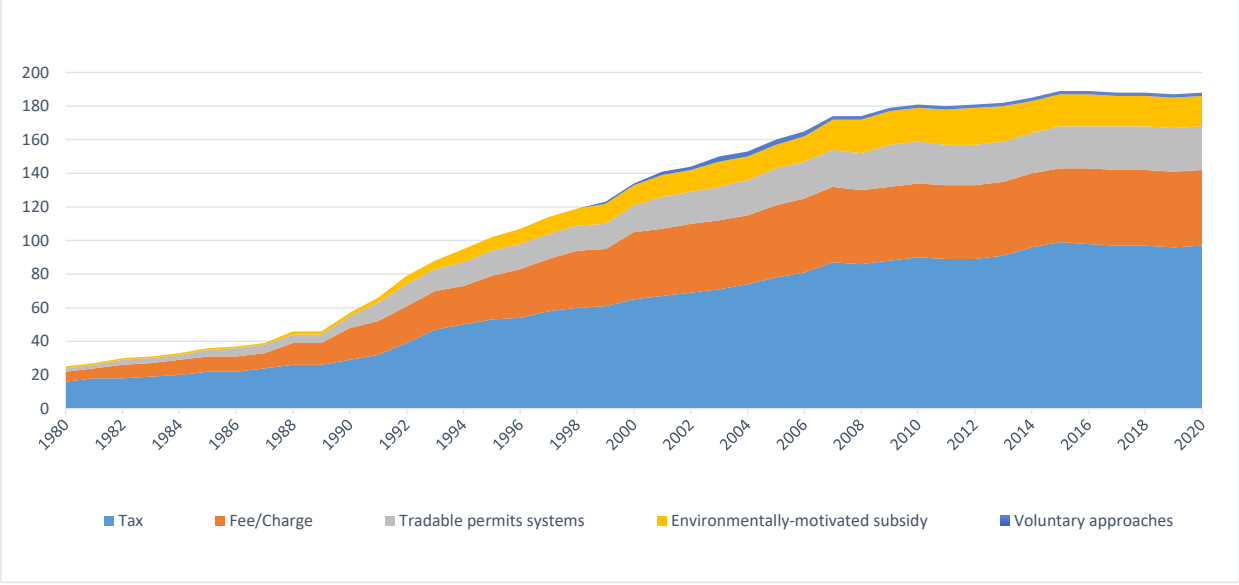
Table 3.4. Active ocean-relevant economic instruments in the OECD PINE database

	Number of instruments	Percentage
Environmentally motivated subsidy	18	9.5%
Fees and charges	45	23.9%
Taxes	94	51.6%
Tradable permits system	26	13.8%

Source: OECD (2020[15]), *Policy Instruments for the Environment database*, oe.cd/pine, accessed June 23, 2020.

StatLink https://doi.org/10.1787/888934159354

Figure 3.1. Growth in ocean-relevant environmental policy instruments



Source: OECD (2020[15]), *Policy Instruments for the Environment database*, oe.cd/pine, accessed June 23, 2020.

StatLink https://doi.org/10.1787/888934159373

Information and voluntary approaches

Information instruments aim to address information asymmetries that often exist among business, government and society. Eco-labels and certification are instruments that have been fairly widely adopted, for example in the case of fisheries. There have been 224 fisheries independently certified as meeting the Marine Stewardship Council standard for sustainable fishing and an additional 94 currently are undergoing assessment (MSC, 2014[16]). Friend of the Sea, among others, is also an important, frequently used certification scheme (OECD, 2011[17]). Examples of other voluntary instruments include negotiated agreements between government and fishers to establish voluntary marine conservation areas.

Policy incentives and finance to conserve the ocean, foster sustainable fisheries, aquaculture and tourism, and manage pollution

Policy incentives and finance to conserve the ocean

Preventing and reversing the loss and degradation of ocean and marine ecosystems are essential to a sustainable ocean economy, as several economic sectors depend on these ecosystems. The fisheries and tourism sectors derive significant value, directly and indirectly, from marine ecosystems. Wildlife tourism, for instance, contributed approximately USD 120 billion to global gross domestic product (GDP) (World Travel & Tourism Council, 2019[18]). Global tourism has increased significantly over the last decade, with an estimated 1.5 billion international arrivals in 2019 (World Tourism Organization, 2019[19]). The continued growth of sectors that derive value from marine ecosystems depends on the ability of governments to manage the ocean and marine resources sustainably. Policy instruments such as marine protected areas can benefit the fisheries and aquaculture sectors, the tourism industry and many other sectors. This section highlights some key economic instruments and finance mechanisms that are available to developing countries to both safeguard the ocean and marine resources and generate revenue for the conservation and sustainable use of the ocean.

Fees and charges for marine protected areas

Many protected areas suffer from chronic underfunding (Watson et al., 2014[20]) (Gill et al., 2017[12]), impacting their ability to protect biodiversity and provide ecosystem services. Marine protected areas tend to have lower establishment costs than do terrestrial areas, but they have higher management costs associated with the logistics of monitoring and enforcing regulations (Bohorquez, Dvarskas and Pikitch, 2019[21]). Given the direct correlation between funding levels and the effectiveness of conservation and sustainable use of biodiversity (Waldron et al., 2017[22]), policies to address MPA funding shortfalls are a priority. User fees have proven to be an effective instrument not only to generate revenue to help cover the cost of managing MPAs but also for controlling access to high-value marine areas (OECD, 2017[4]).

MPA user fees have raised needed revenue in several areas, but they cover the full management costs in only a handful of high-value ecosystems and often must be supplemented by other revenue sources even in popular areas. For example, while the Galapagos National Park in Ecuador generated approximately USD 11.4 million in entrance fees in 2011, the fees did not cover its USD 14.4 million operating cost in that year. Such shortfalls can be covered by other mechanisms such as concessions, as discussed in the subsection on private sector tourism-related concessions and in Thompson et al. (2014[23]). Integrating user fees into a broader financing strategy, for example from government and private-sector concessions, will be important to support many MPAs.

Table 3.5. Marine protected area fees in Kenya

Entry fees for marine protected areas, USD

	Citizen		Residents		Non-residents	
	Adult	Child	Adult	Child	Adult	Child
Entry fee for marine parks						
Kisite Mpunguti	2.10*	1.22*	2.94*	1.66*	17	13
Molindi/Watamu/Mombasa/Kiunga	1.27*	1.22*	2.94*	1.66*	17	13
Boats	All					
Fee per day	2.94					
Annual pass (private)	50.58					
Annual pass (commercial)	147.55					

Note: Prices for citizens and residents are charged in Kenyan shillings (KSH); prices for non-residents are charged in US dollars. For ease of comparison, resident fees shown in this table are converted to USD at the exchange rate in December 2019 of USD 1 = KSH 102.2
Source: Kenya Wildlife Service (2019[24]), *Conservation Fees*, www.kws.go.ke/sites/default/files/parksresorces%3A/KWS%20Conservation%20Fees%20Poster.pdf.

StatLink https://doi.org/10.1787/888934159392

Box 3.3. Protected area fees: The example of Raja Ampat, Indonesia

- The marine protected area in the Raja Ampat archipelago of Indonesia offers an example of good practice in using fees. In this MPA, located in the province of West Papua, a longstanding collaboration between environmental non-governmental organisations (NGOs), the local government and the community created a Regional Public Service Agency (BLUD). The BLUD is authorised to collect an entrance or green fee to pay for management of the marine park. The green fee is IDR 1 million (Indonesian rupiah) for foreigners and IDR 500 000 for Indonesians. In addition to funding management of the park, the green fee revenue has been used to engage with the local community on projects through the community welfare fund. This fund allocates at least IDR 1.5 billion (the equivalent of approximately EUR 100 000) annually to villages in and adjacent to the conservation area for economic, social and environmental development programmes. This has improved, relations between the park authorities and local communities, and local fishers now help to enforce the park regulations.
- However, Raja Ampat remains the first and, as of 2019, only area in Indonesia to use the BLUD instrument, in part due to the significant regulatory hurdles to creating a BLUD. One of these is the need to first establish a technical management authority, a process that involves several separate pieces of legislation at different levels of government and, in Raja Ampat, required the strong leadership of the local authorities in collaboration with NGOs. Scaling up this kind of approach, particularly where an MPA contains ecosystems of high value to tourists, can add to the resources available for the conservation and sustainable use of marine ecosystems. However, local stakeholders from governments, communities and businesses are likely unaware of these approaches or unable to operationalise them successfully. While the Raja Ampat example shows that such approaches can work, fewer regulatory hurdles would no doubt facilitate their uptake.

Source: KKP (2016[25]) Tentang UPTD KKP Raja Ampat (About Raja Ampat's UPTD KKP), http://www.kkpr4.net/index.php?page=page&id=32

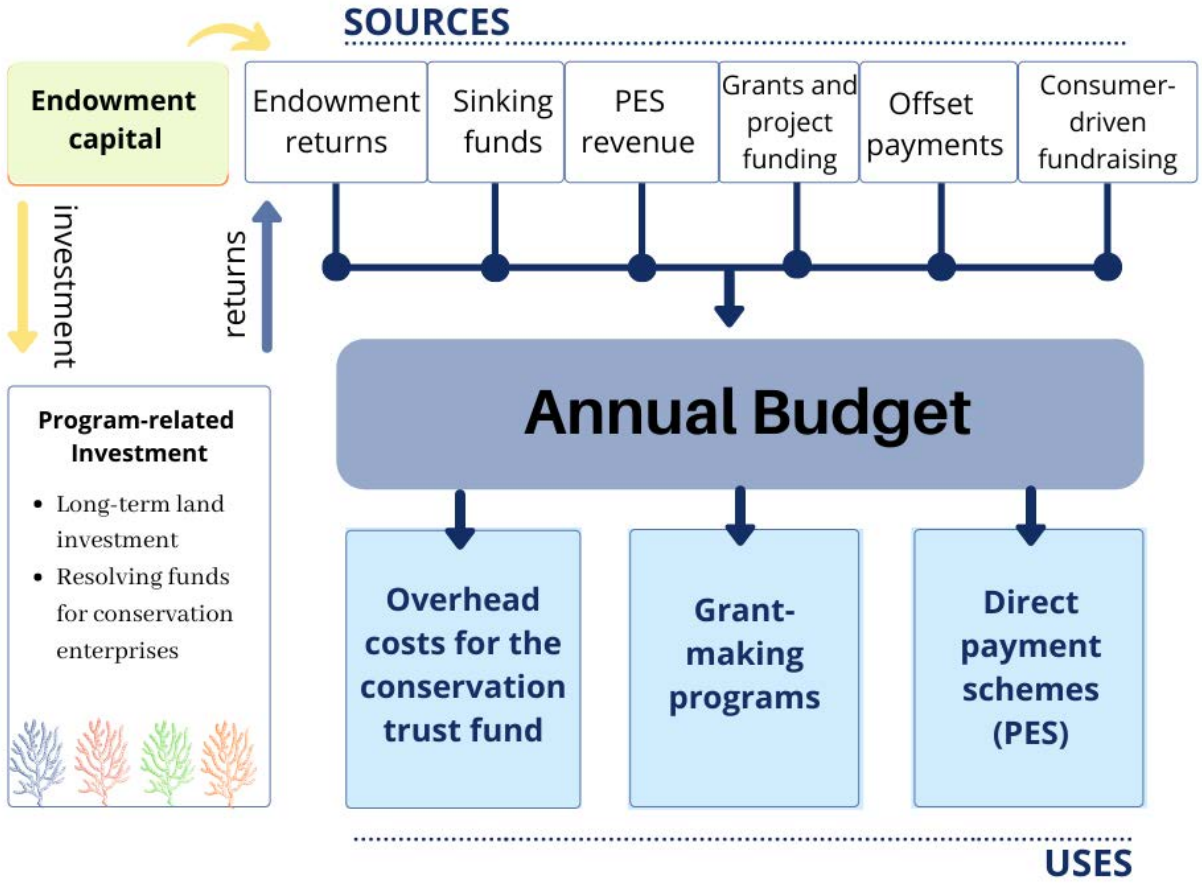
There are challenges and opportunities in the use of fees and charges. Lack of defined access points to marine areas can make it difficult to implement user fees in MPAs. This creates problems of enforcement, as generally MPAs can be accessed on all sides and the cost of patrols can be high (OECD, 2017[4]). Social factors can also reduce the effectiveness of MPA fees, for example if they lead to the exclusion of local populations from traditional use areas. This can lead to conflict between local communities and the MPA, undermining enforcement of the protected area and thus its ecological impact (Pollnac et al., 2010[26]). Many countries use a two-tiered fee system and charge foreign visitors higher fees, as is the case of entrance fees to MPAs in Kenya (Table 3.5). In some areas, tourists pay more than residents. Differentiated fees can enable developing countries to generate revenue from tourists who visit from wealthier, more developed regions while allowing affordable access to local users. Finally, institutional factors can also hamper or even prevent the implementation of user fees. In Antigua and Barbuda, for example, three government agencies share responsibility for managing MPAs. One of these, the Ministry of Agriculture, Lands, Fisheries and Barbuda Affairs, does not have the authority to collect fees in the MPA it manages, while the other two government bodies, the Ministry of Tourism and the Department of Environment, have such authority. In consequence, some MPAs collect access fees and others do not. Further, the fees collected are often returned to the central budget, weakening the incentive for managers to collect them. Indonesia offers an illustration of how these problems can be overcome through a combination of bespoke institutions and benefit sharing with the local community (Box 3.3) (OECD, 2017[4]).

Conservation trust funds

Given the need for broad finance strategies for safeguarding ocean resources, mechanisms that can support a range of interventions are important. Conservation trust funds (CTFs) are independent and private legal entities that can both generate finance and support efforts for the conservation and sustainable use of the ocean. CTFs are used to fund a broad range of projects including the management of protected areas, Payments for Ecosystem Services (PES) programmes and other sustainable development activities. CTFs can therefore play a key role in ensuring sufficient resources are directed towards the conservation and sustainable use of marine natural capital, helping to ensure sustainability in the ocean economy.

Similar to other trust funds, CTFs often rely on long-term funding such as an endowment, at least initially. However, CTFs can also diversify funding mechanisms to include other sources, allowing them to blend finance from public and private sources such as taxes and grants. Not only are CTFs flexible in terms of the revenue they can receive. They can also distribute the money through a variety of mechanisms such as grants, loans and payments for ecosystem services (Figure 3.2). In this way, they act as a financing mechanism and also can catalyse the growth of financing mechanisms such as blue carbon projects.

Figure 3.2. Potential structure of a conservation trust fund



Source: Adapted from Iyer et al. (2018[27]), Finance Tools for Coral Reef Conservation*: A Guide, Conservation Finance Alliance*

CTFs are a popular tool for raising and distributing finance for the conservation and sustainable use of terrestrial and marine biodiversity. More than 80 are either in development or operational globally. At least 6 of the funds in operation focus specifically on marine and coastal conservation. Antigua and Barbuda, Indonesia, and Kenya are using or setting up CTFs to raise and distribute finance for the conservation and sustainable use of marine biodiversity (Table 3.6). The Kenyan trust fund was mandated by the Wildlife Act of 2013 and will primarily focus on the management and restoration of national parks.

Table 3.6. Overview of select conservation trust funds

Country	Name	Operational ?	Year founded	Target size	Funding source	Notes
Antigua and Barbuda	Marine Ecosystems and Protected Area Trust	No	2015	n.a.	Regional Caribbean Biodiversity Fund	Has not yet received an endowment, but has administered funds from the Caribbean Biodiversity Fund
Indonesia	Blue Abadi	Yes	2016	USD 38 million	Endowment	Protected area and community development

Kenya	Kenya conservation trust fund	No	2017	NA	NA	Kenya Wildlife Service and Conservation International are in the process of creating it

Source: Caribbean Biodiversity Fund (n.d.[28]), *Antigua and Barbuda: The Marine and Ecosystem Protected Area, Trust, Inc.* https://www.caribbeanbiodiversityfund.org/antigua-and-barbuda; MPA News (2017[29]), *Financing Spotlight: Blue Abadi, a $38-million Trust Fund to Support MPAs in the Bird's Head Region of Indonesia,* https://mpanews.openchannels.org/news/mpa-news/financing-spotlight-blue-abadi-38-million-trust-fund-support-mpas-bird%E2%80%99s-head-region; Kenya Ministry of Environment and Forestry (n.d.[30]), *Independent Trust Fund is Key to Securing Wildlife Assets, PS,* http://www.environment.go.ke/?p=3393.

The Marine and Ecosystems and Protected Area Trust (MEPA) in Antigua and Barbuda is affiliated to the Caribbean Biodiversity Fund (CBF). The CBF was created to address the second of the two goals of the Caribbean Challenge Initiative:[1] "to have in place fully functioning sustainable finance mechanisms that will provide long-term and reliable funding to conserve and sustainably manage the marine and coastal resources and the environment in each participating country and territory". The CBF manages approximately USD 70 million in funds, and the resources are mobilised through two financial instruments, an endowment fund and a sinking fund.

The CBF endowment fund, approximately USD 43 million, is the permanent funding source to the national conservation trust funds in the Caribbean region (including MEPA). It makes grants to the national trust funds, which administer the resources. To receive funds from the CBF, the national trust funds must have additional sustainable funding sources in place that are at least equal to the level of funding requested from the CBF. Launched in 2018 and with an expected duration of five years, the sinking fund is approximately USD 26.5 million, and focuses exclusively on funding ecosystem-based adaptation activities. A regional approach to CTFs has several advantages. It leverages economies of scale to reduce administration costs, can provide a convenient mechanism for donors looking to have regional impacts, and can catalyse the development of financing mechanisms and capacity at national levels. Regional CTFs can also facilitate co-ordinated action on shared environmental and sustainability issues, which is especially important for the ocean.

Another CTF is the Banc d'Arguin et de la Biodiversité Côtière et Marine (BACoMab) trust fund in Mauritania, which funds multiple activities related to the conservation and sustainable use of ocean resources. Founded in 2009, BACoMaB supports the management activities in the Banc d'Arguin and Diawling national parks as well as marine patrols, environmental education, development of governance systems, and restoration. The fund has a total capitalisation of EUR 26.6 million and in 2018, it spent EUR 460 000 on management activities (BACoMaB Trust Fund, 2019[31]). The ecosystem services provided by Banc d'Arguin National Park are essential to maintaining the fish stocks of the region. Consequently, under the sustainable fisheries partnership agreement between Mauritania and the European Union (EU), the BACoMaB has received approximately EUR 1.9 million for the delivery of these services (OECD, 2017[32]; BACoMaB Trust Fund, 2019[31]). Due to its flexibility, the trust fund has been able to act as both donor co-ordinator for the area and as an intermediary in an international PES scheme while distributing resources across a range of context-specific actions and financial mechanisms.

These two examples highlight the ability of trust funds to generate finance for the conservation and sustainable use of the ocean. The flexibility that CTFs have in leveraging different financial mechanisms allows them to co-ordinate both donors and stakeholders to fund a range of different actions to achieve a unified goal. For this reason, CTFs can play an important role in addressing complex problems in the ocean economy, such as marine plastics, that require a broad range of actions over several sectors. CTFs also can be used to co-ordinate the international community and leverage several different international mechanisms, such as debt for nature swaps, impact investments and more traditional grant funding (Chapter 4).

Payments for Ecosystem Services: Fostering coastal resilience via blue carbon payments

Coastal regions are increasingly affected by climate change. Sea-level rise, for example, is expected to cause USD 1.7-5.5 trillion in damage from coastal flooding over the 21st century (OECD, 2019[33]). Climate change is also expected to increase the severity and frequency of extreme weather events, which will severely impact coastal communities (IPCC, 2019[34]). Developing countries, with their relatively large coastal populations, are therefore particularly at risk from the impacts of climate change. Increasing the resilience of coastal areas, their populations and their industries to the impacts of climate change is a key policy priority to develop the ocean economy sustainably.

Governments play a central role in incentivising the development of coastal areas and, as such, should take the lead in ensuring that these developments are resilient to the impacts of climate change. The first step in this process is to understand how existing and planned coastal infrastructure and development are exposed to the impacts of climate change and environmental degradation. Otherwise, governments risk incentivising projects that will not be viable in the long term. Beyond new developments, ensuring coastal areas and communities are resilient to environmental risk is also essential.

Coastal ecosystems such as mangroves, salt marshes and seagrasses provide a range of highly valuable ecosystem services and can enhance coastal resilience by reducing the impacts of coastal flooding and erosion. Mangroves in particular provide significant benefits to adjacent communities, including reducing the impact of coastal flooding events by dissipating the energy from waves. For example, it is estimated that mangrove areas in the state of Florida in the United States avoided USD 1.5 billion in flooding damage due to Hurricane Irma (Narayan et al., 2019[35]). Relatedly, the loss of mangroves in Philippines has exposed 267 000 people to an increased risk of annual flooding. Restoring mangrove areas lost since 1950 in Philippines would provide an estimated USD 450 million in flood protection benefits annually (Menéndez et al., 2018[36]). These ecosystems can also sequester large amounts of carbon, thereby contributing to mitigating climate change and in some cases, potentially providing a source of revenue.

Mangroves occur predominately in tropical regions, which often have large and vulnerable coastal populations, and provide significant local-scale benefits such as fuel and food. Indonesia, for example, has both the largest coastal population in the world and also the largest extent of mangroves (~3 million hectares). Regions featuring mangroves generally are also characterised by high levels of poverty and consequently local populations can be heavily reliant on the ecosystems services they provide. In the Gazi Bay in Kenya, an estimated 80% of the local residents derive their livelihood directly from fishing-related activities, which are linked to mangroves due to essential role mangroves play in providing a nursey for maturing fish (Wylie, Sutton-Grier and Moore, 2016[37]). The ecosystem services provided by mangroves have been estimated at well over USD 100 000 per hectare, although location and other factors affect their estimated value (Himes-Cornell, Grose and Pendleton, 2018[38]).

The importance of mangrove ecosystems to the global carbon pool and the potential of mangrove restoration to mitigate greenhouse gas (GHG) emissions present a considerable opportunity to generate revenue through blue carbon projects. The loss of mangroves and other coastal ecosystems results in estimated emissions of 0.25-1.05 PgC a year, with mangroves containing approximately half of the global blue carbon pool (Pendleton et al., 2012[39]). Further, mangroves have high productivity, producing 10-15% of coastal sediment carbon storage despite occupying only 0.5% of the global coastal area (Alongi, 2014[40]). Globally, mangroves are being lost at a rapid rate – –around a third of mangroves have been lost to date – with serious consequences for both local communities and global climate change (Alongi et al., 2015[41]). Pendleton et al. (2012[39]) estimated the economic impacts of the emissions from mangrove loss to be USD 6-42 billion a year. The development of aquaculture has driven much of this loss. All four countries selected for Sustainable Ocean Economy Country Diagnostics aim to further expand the aquaculture sector, which potentially may lead to further loss of mangroves.

While opportunities for blue carbon projects vary across the four countries, Indonesia and Kenya feature extensive mangroves. The Indonesian mangroves are being lost at a rate of about 1% year leading to emission of around 26 400 gigagrammes (Gg) of carbon dioxide (CO_2) per year (Alongi et al., 2015[41]). Indonesia recognised the importance of mangrove conservation with the creation of the National Strategy for Mangrove Ecosystem Management in 2012, the Indonesian Blue Carbon Strategy Framework, and the low carbon development strategy that acknowledges the need to conserve mangroves. Several blue carbon projects are underway around the world. Box 3.4 describes one of these, the Mikoko Pamoja blue carbon project, in Gazi Bay, Kenya.

Box 3.4. Mikoko Pamoja blue carbon project in Gazi Bay, Kenya

- The Mikoko Pamoja blue carbon project in Gazi Bay, Kenya is a community-led project that uses mangrove restoration to generate revenue from the voluntary carbon markets. The project area includes 117 hectare (ha) of nationally owned mangroves. The mangroves provide several important ecosystems services to the local community such as food provision (by acting as a nursery for fish), recreation, tourism and fuel. However, the collection of timber, particularly for building, has led to degradation of the mangrove area.
- Mikoko Pamoja has entered into an ecosystem services agreement with Plan Vivo, a certification body and foundation based in the United Kingdom. As part of the project, a non-native timber species was planted away from the mangroves as community forest to replace the supply of fuel wood and construction timber previously obtained from the mangrove area. Between 2013 and 2018, the project has been issued credits for 8 068 tCO_2 of emissions avoided, which has generated USD 61 534. This money has been used to maintain the project activities (including one full-time staff member) and fund two community development projects related to health and sanitation. In 2017, the project received the UNDP Equator Prize, which is awarded biennially "to recognize outstanding community efforts to reduce poverty through the conservation and sustainable use of biodiversity".

Source: Huxham (2013[42]) *Mikoko Pamoja: Mangrove Conservation for Community Benefit*, Plan Vivo Foundation, Edinburgh, https://planvivo.org/docs/Mikoko-Pamoja-PDD_published.pdf and Mwamba et al. (2018[43]), *2017-2018 Plan Vivo Annual Report: Mikoko Pamoja*, Plan Vivo Foundation, Edinburgh, https://www.planvivo.org/docs/2017-2018_Mikoko-Pamoja-Annual-Report-Final-public_.pdf

Blue carbon projects aim to demonstrate emissions removals or avoidance through restoration activities to generate carbon credits; these credits can then be sold on either the compliance or the voluntary markets to generate revenue.[2] These include mechanisms such as the clean development mechanism (CDM) under the Kyoto protocol and the Reducing Emissions from Deforestation and Forest Degradation (REDD+) initiative under the United Framework Convention for Climate Change. There are several different voluntary market standards, among them the Verified Carbon Standard (VCS) and the Plan Vivo standard. Several blue carbon projects have already been certified either under VCS or Plan Vivo standards, but no projects have as yet been certified under the compliance standards (Wylie, Sutton-Grier and Moore, 2016[37]). This is likely related to the greater flexibility and lower transaction costs associated with the certification for the voluntary carbon markets.

The greater flexibility makes voluntary standards more attractive to emerging offsets approaches like blue carbon, and the lower transaction costs mean small-scale projects can be certified. Compliance markets have more rigorous standards of monitoring, reporting and verification that are challenging for smaller projects to meet in a cost-effective way. Under the CDM, for example, a project needs to sell at least 5 000 tCO_2 to justify the transaction costs, which puts this mechanism out of reach for many small-scale coastal projects (Kollmuss et al., 2008[44]). Among the countries for which Sustainable Ocean Economy Country Diagnostics were conducted, projects in Kenya and Indonesia have been certified successful under the

Plan Vivo and VCS standards, respectively. The impacts of these projects have been significant: the Yagasu project in Ache and North Sumatra provinces of Indonesia protects 25 000 ha of forest and restores a further 5 278 ha, resulting in annual emissions reductions of 120 706 tCO_2e (VCS, 2019[45]). Like the Mikoko Pamoja blue carbon project (Box 3.4), Yagasu has had significant positive social impacts by improving the livelihoods of over 9 000 people through employment, increased income and capacity building.

Given how closely linked the development of aquaculture is with mangroves, understanding how to leverage blue carbon projects to improve the sustainability of the aquaculture sector is important. The Markets and Mangroves (MAM) project in the province of Ca Maua on the Mekong delta in Viet Nam offers an interesting approach. The area has a large shrimp farming industry and the project encompasses 3 371 ha, of which 1 715 ha are mangroves (Wylie, Sutton-Grier and Moore, 2016[37]). MAM supported local shrimp farmers to gain organic certification and as part of that process, they must agree not to remove any more mangroves. Further, the project required enrolled farmers to maintain mangrove cover of 50% on their properties and facilitated the restoration of mangroves where required. Certified organic shrimp receive a price premium (of approximately 10%) on European and United States markets, and increased mangrove cover has been shown to improve the productivity of shrimp farms. Consequently, enrolled farmers saw significant profit increases. While carbon finance was intended to play an important role in the MAM project, the benefits of organic certification have so far proved sufficient to engage stakeholders. Developing carbon finance alongside certification, however, could further increase incentives to farmers to take part in this kind of programme.

Smaller-scale projects funded on voluntary carbon markets are a good opportunity for small island developing states (SIDS). Antigua and Barbuda, for example, has less than 1 000 ha of mangroves. Given the transaction costs associated with carbon compliance markets, it is both unattractive and potentially unprofitable to pursue carbon credits through these mechanisms. The experience of the Mikoko Pamoja in Kenya, however, suggests that voluntary markets can be used successfully for projects of smaller scale that could subsequently be enhanced through mechanisms such as organic certification, if aquaculture already exists in these areas.

To date, it has proved challenging to operationalise blue carbon projects at sufficient scales to generate significant revenue in countries with extensive mangroves, such as Indonesia. Under these circumstances, a more viable option could be to pursue certification and carbon finance through the compliance markets. Many developing countries, among them Indonesia, have well-developed programmes as part of the United Nations REDD initiative. Mangroves are a good candidate for inclusion in these programmes due to their rate of conversion and associated emissions. Understanding either how to adapt the systems developed for REDD+ to include blue carbon from mangroves or utilise existing capacity to create new systems may be a good way to significantly lower the establishment and transactions costs of these projects.

Technical challenges remain, including accurately measuring below-ground carbon sequestrations (where the majority of carbon is stored in mangrove ecosystems), accurately mapping mangrove extents and best practice for mangrove restoration (Macreadie et al., 2019[46]). In recognition of these challenges, several regional and international platforms have emerged. These include the Blue Forests initiative, co-funded by the Global Environment Facility; the Mangroves For the Future, a platform of the International Union for Conservation of Nature (IUCN) and UNDP; and the Blue Carbon Initiative of Conservation International, the International Oceanographic Institute and IUCN; all aim to foster research, information exchange and the development of best practice for mangrove restoration (and other ecosystems). It is essential to support and strengthen these efforts if developing nations are to successfully mobilise international carbon finance for the conservation and sustainable development of marine ecosystem services stemming from the ocean.

Finally, beyond carbon payments, there is an increasing role for innovative insurance mechanisms to protect and restore high-value coastal ecosystems. These include parametric insurance for coral reefs and

beaches, in which a payout is triggered by an agreed parametric trigger (e.g. a storm reaches a certain windspeed) rather than by specific valuation of damages (Chapter 4). However, local-scale models of risk and benefit flows specific to individual ecosystems are essential for insurance instruments, and the data are lacking for many areas. This data paucity is a barrier to their broad use, and uptake of these instruments has been limited thus far. To increase the role of financial markets in financing coastal conservation and restoration, improved human and technological capacity for data collection and analysis is needed to build the kinds of risk models that the finance industry requires.

Policy incentives and finance mechanisms for sustainable fisheries and aquaculture

Sustainable fisheries

The fisheries sector is important to the economies of many developing countries and to the livelihoods of their populations (Chapter 2). The vast majority of the estimated 40.3 million fishers in the world work in small-scale and artisanal fisheries in developing countries (FAO, 2018[47]). The fisheries sector relies squarely on healthy, well-functioning marine ecosystems for its long-term sustainability. Yet unsustainable fishing has depleted fish stocks globally, resulting in an estimated USD 83 billion in forgone benefits annually (World Bank, 2017[48]).

Illegal, unreported and unregulated (IUU) fishing remains a serious problem, accounting for as much as 26 million tonnes of fish and costing the global economy up to USD 23.5 billion annually (Agnew et al., 2009[49]). IUU fishing has several important impacts: it can harm law-abiding fishers by creating unfair competition and cutting profitability weaken food security in countries that rely on local seafood; undermine fisheries management efforts by adding pressure that is difficult to quantify.

Developing countries often lack the legal frameworks and resources to monitor and police their water and hence are particularly vulnerable to IUU fishing (Hutniczak, Delpeuch and Leroy, 2019[50]). IUU fishing, therefore, not only degrades the integrity of marine ecosystems. It also puts strains the resources available to countries to combat it. In their recent study of the regulatory gaps in OECD and key partner countries, Hutniczak, Delpeuch and Leroy (2019[50]) find that countries with higher GDP per capita tend to have more developed legal frameworks for addressing IUU fishing . Therefore, an exchange of knowledge and experience among OECD and non-OECD countries could help developing nations to address IUU fishing.

Increasing the resources available to developing countries for fisheries monitoring and management is also key to making fisheries sustainable and growing the ocean economy. The experience of South Africa is an example. An integral part of its ocean economy strategy is to develop a National Ocean and Coastal Information System and extend its earth observation capacity (South Africa Department of Environmental Affairs, 2019[51]). In December 2018, South Africa launched its ZA-cube2 satellite, which revealed the presence of vessels and their exact locations in coastal waters. The data immediately contributed to enhance the South African Integrated Vessel Tracking System), allowing, in its first month in operation, the tracking of drug-carrying vessels in Port Elizabeth and the seizure of drugs worth ZAR 720 million (South Africa rand), equivalent to about USD 46 million (South Africa Department of Environmental Affairs, 2019[51]).

Developing the institutions and systems required to sustainably manage and monitor fisheries requires significant resources. Economic instruments and other fiscal policies can play a key role in enhancing the sustainability of the fisheries sector and in generating revenue. For instance, fees and charges are used extensively in the fisheries sector to raise revenue and control access to resources. In most cases, countries issue a licence to operate in particular fisheries in exchange for a fee. (The OECD PINE database includes information on fisheries-related fees in 43 countries.) The fee is usually based on the size of boat and type of gear being used, the species targeted, and, in some cases, whether the boat is foreign or domestically owned. These fees can generate quite substantial revenue. For instance, fees for fishing

licences in Indonesia generated IDR 448 billion (approximately USD 31.7 million) in 2018 for example. For SIDS, which often have small populations and very large EEZs, fees relating to fisheries produce a substantial revenue stream and make up a significant proportion of total government revenues (Table 3.7). This is particularly true for Pacific Island countries and territories; Kiribati, for example, raised approximately USD 117 million in 2015 through fisheries access fees, an amount equivalent to USD 1 044 for every person in the country (Gillett, 2016[52]).

Providing access to foreign vessels in exchange for monetary compensation is another mechanism for raising revenue for the sustainable management of fisheries. Cabo Verde, for example, received access fees averaging EUR 839 361 a year from 2014-17 from vessels and from the EU Sustainable Fisheries Partnership agreement. However, only EUR 500 000 is ring-fenced for the fisheries sector, with the majority going directly to the central budget (European Commission, 2018[53]). Given the particular abundance of high-value marine species such as tunas in the Pacific Island countries and territories, it is unlikely other nations can replicate the level of fees generated. Further, if fees are contingent on catching migratory species, as is the case in Cabo Verde, revenue streams can be unreliable from year to year, making it difficult to plan budgets effectively.

Table 3.7. Revenue from access fees for foreign fishing vessels in Pacific Island countries and territories in USD, 2014

Country or /territory	Access fee revenue	Access fee revenue per capita	Access fee revenue per km² EEZ	Total access fee revenue as % of government revenue
Cook Islands	8 473 500	554	4.61	11.40%
Micronesia	47 518 000	462	5.96	20.90%
Fiji*	555 815	1	0.43	0.04%
Kiribati	116 040 984	1 044	32.69	75.00%
Marshall Islands	16 920 802	310	7.94	16.40%
Nauru	15 852 459	1 487	49.54	13.70%
Niue	635 815	424	1.63	3.30%
Palau	3 620 586	203	5.76	3.30%
Papua New Guinea	85 019 455	11	27.25	1.70%
Samoa**	555 814	3	4.63	0.30%
Solomon Islands	27 963 558	45	20.87	7.20%
Tokelau	9 050 000	7 762	31.21	52.50%
Tonga	627 858	6	0.9	0.40%
Tuvalu	14 777 814	1 321	16.42	58.30%
Vanuatu	1 759 112	6	2.59	1.00%

Note: *No foreign fishing allowed in its EEZ, but payments under the terms of the South Pacific Tuna treaty with the United States. ** No foreign fishing allowed in its EEZ.Source: Adapted from Gillett (2016[52]), *Fisheries in the Economies of Pacific Island Countries and Territories*, https://www.spc.int/sites/default/files/wordpresscontent/wp-content/uploads/2016/11/Gillett_16_Benefish-fisheries-in-economies-of-pacific-countries.pdf.

StatLink https://doi.org/10.1787/888934159411

Where pelagic fisheries are relatively underexploited, as in Kenya, and where domestic capacity to exploit the stocks is low, allowing paid access to foreign vessels can help raise funds that could then be used to further develop domestic fishing capacity. Many countries also directly support fisheries through support for fuel and the manufacture and distribution of fishing gear and fishing vessels. However, support that lowers the cost of inputs in general, and of fuel support in particular, is considered the most likely to lead to overfishing and IUU fishing and the least likely to deliver income benefits to fishers (OECD, 2017[54]).

While there is understandable pressure to improve global food security and provide livelihoods for fishing communities, governments and investors should focus on smart approaches that benefit fishers more (and in the longer term) and are not likely to encourage unsustainable fishing. It is essential to ensure that domestic management and monitoring are improved concurrently with improved capacity. Otherwise, any growth in the industry could be short-lived, as stocks could decline with increased fishing effort. Developing countries, therefore, must strike a delicate balance in their investments in the domestic fishing industry and in the tools and institutions to effectively manage their fisheries resources sustainably.

Growing the value of the fisheries sector

Seafood processing is also an important industry. Millions of people, particularly women, are involved in artisanal fish processing (OECD/FAO, 2019[55]). Assessing the seafood production value chain in developing countries is challenging as they often lack post-harvest facilities such as drying equipment as well as ice plants and cold storage facilities. Such installations can add value to the seafood product, increase the selling price and reduce the post-harvest losses that occur in these fisheries (Rosales et al., 2017[56]). When no storage facilities with ice are available in ports, for instance, fishers may have to either sell their catch too cheaply or lose it to spoilage. Developing more value added for the entire fish production will therefore highly dependent on enhancing the post-harvest processing chains.

Measures that add value, such as certifications, are seen to offer the greatest potential for increasing the socio-economic benefits from fishing, together with interventions to reduce post-harvest losses and to reduce by-catch (Carneiro et al., 2019[57]). Certification and eco-labelling can lead to price premiums for more sustainable fishing practices and to the prioritisation of value over quantity in seafood production (FAO, 2017[58]). Certification also makes an important contribution to greater traceability of fish products, ensuring that specific legal requirements are met along the value chain and reducing trading of illegally fished fish.

Sustainable aquaculture

Growing the aquaculture sector in coastal areas is an opportunity for developing countries to also grow the ocean economy and increase food security, as Chapter 2 notes. However, this needs to be managed effectively to ensure that growth in this sector is not at the expense of coastal ecosystems. For example, coastal production systems such as shrimp that rely on the creation of salt ponds can have negative impacts if they drive the conversion of high-value coastal ecosystems, such as mangroves. In addition, high-intensity, closed circulation systems require high levels of capital and require significant energy inputs, and thus may not be the best option for developing countries given their potential community-level impacts. Economic incentives to grow aquaculture should consider the environmental effects of expanded production and encourage production systems that best fit the country's environmental and socio-economic context.

Historically, the expansion of aquaculture has been associated with some negative environmental consequences such as land use change, pollution from excess feed and waste products, and the introduction of invasive species (Diana, 2009[59]). However, conclusions regarding its impacts vary widely. For example, some research has attributed only an estimated 10% of mangrove loss to aquaculture expansion globally (Diana, 2009[59]), while other evidence indicates that expansion of shrimp ponds has been the primary cause of mangrove loss in Thailand (Sampantamit et al., 2020[60]). At the same time, most aquaculture (69.5%) is of fed species, and the most nutritious sources of feed for aquaculture are fish oil and fishmeal. The use of fish oil and fishmeal in fish feed is declining in favour of alternate sources, predominately oil seed and other crops (FAO, 2018[47]). Understanding and accounting for the environmental impacts of feed production are essential to ensure aquaculture growth is sustainable.

Many developing countries are targeting growth in the aquaculture sector and using subsidies and other forms of support to encourage its development. In South Africa, some aquaculture businesses are eligible

for government grants of up to ZAR 20 million (USD 1.1 million) under the aquaculture development and enhancement programme of the Department of Trade and Industry. The development of environmentally sustainable shrimp and prawn aquaculture is also a component of Thailand's *Twelfth National Economic and Social Development Plan (2017-2021)* (Office of Prime Minister of Thailand, 2017[61]). The aquaculture sector is eligible for a range of tax incentives and non-tax incentives under the country's Investment Promotion Act. The sector is also linked to a special economic zone (SEZ), a term often used for tax breaks for new investments in certain industries in a particular region. To ensure that this development is sustainable, countries must understand the environmental impacts of this increased production, which calls for a strong environmental impact assessment process. A comprehensive spatial planning process also can help to avoid ecologically sensitive areas and minimise additional impacts (Henriksson et al., 2019[62]).

Data on the impacts of potential aquaculture development are essential for selecting the aquaculture production system best suited to local environmental and socio-economic conditions. Low input systems, such as the production of molluscs and seaweed, for example, require smaller capital inputs and generally produce lower value products (in the case of seaweed). But such systems can be implemented at community or individual level. Whereas more intensive systems, produce more, but require higher capital and energy inputs, reducing their suitability for many developing country contexts. At the extreme end, large recirculating saltwater aquaculture systems can produce fish using 1-3% of the water used in traditional aquaculture, but these systems require sophisticated technology and high capital inputs with payback periods of about eight years (Bregnballe, 2015[63]). Choosing the most appropriate system for a given context is therefore essential to ensure future aquaculture production is socially and economically sustainable.

Policy incentives and finance mechanisms for sustainable tourism

Another important sector to promote the conservation and sustainable use of the ocean is tourism, a key pillar of the economy in many developing countries (Chapter 2). The rapid growth of the tourism sector over the last 20 years is predicted to continue, with sustainability issues becoming increasingly important (OECD, 2020[64]). Relying as they do on the recreational value of beaches and clean waters, marine and coastal tourism are highly dependent on the quality of natural ecosystems to attract visitors. Yet unmanaged tourism is contributing to ecosystem depletion and fragility, jeopardising the sector's own economic sustainability. Key challenges include the beach degradation resulting from sand harvesting, mangroves deforestation and an ever-growing coastal population that is putting pressure on coastal ecosystems. Climate change vulnerability is also a risk for countries that rely on tourism, particularly so for small island states where tourism is also the largest sector of the national economy and the largest employer (Scott, Hall and Gössling, 2019[65]). In Antigua and Barbuda, for example, tourism represents nearly 60% of the GDP. The tension between the promotion of commercial activities to foster economic growth and the need to address environmental concerns is a key issue for most developing countries.

Globally, tourism also has significant adverse environmental impacts: it directly contributes 5% of global GHG emissions and increasing the pressures on domestic freshwater supplies, food systems and waste disposal systems (OECD, 2018[66]). The economic and environmental ramifications of overuse by tourism of high-value marine ecosystems can be significant. An example is Maya Bay in Thailand, which closed in 2018 after a rapid increase in visitor numbers caused the severe degradation of both marine and terrestrial ecosystems. The bay will remain closed until at least June 2021. Boracay island, a popular tourist destination in Philippines, was closed for six months in 2018 after it emerged that the vast majority of businesses and residents lacked wastewater permits and in many cases were discharging sewage directly into the sea (Reyes et al., 2018[67]). The island closure affected the employment of 35 000 people and cost an estimated 20 billion pesos (approximately USD 395 million). Reducing the negative impact of tourism on coastal zones, therefore, is a priority area for the sustainable ocean economy and one that will bring long-term economic and environmental benefits.

The OECD (2018[66]) identified the shift to sustainable tourism as a tourism sector megatrend to 2040. Megatrends are large-scale social, economic, environmental and technological changes that are likely to have profound long-term consequences for a sector. Sustainable tourism is an opportunity for developing countries to grow a key sector of the ocean economy while maintaining and enhancing natural capital to deliver multiple benefits to society and nature. This section highlights policy instruments and mechanisms available to developing countries and examples of how they are being applied and can be used to generate revenue and finance the transition to sustainable tourism.

Tourism-related taxes for sustainable development

Tourism-related taxes can create incentives for sustainable tourism. Revenue generated by these policy instruments, if earmarked, can also be used to finance activities related to the conservation and sustainable use of the ocean and to support local and vulnerable communities dependent on the ocean. Taxes can also help to counter financial leakages in the tourism industry[3] that reduce the economic benefits derived from tourism in developing countries; and have reduced the effectiveness of tourism on poverty alleviation in developing countries (World Tourism Organization, 2002[68]). Tourism-related taxes may include a specific mechanism to direct revenue towards relevant activities through as earmarking or credits for investments in marine conservation and sustainable use activities. Revenue from well-designed taxes on the tourism industry and the goods and services consumed also can help developing countries manage the impacts of development, with most of the tax burden falling on generally wealthy foreign nationals. However, such taxes also can reduce the competitiveness and attractiveness of destinations to both investors and tourists (OECD, 2014[69]).

A good practice example is the corporate social responsibility tax introduced in 2014 in the Seychelles. It was introduced in 2014. The tax, a 0.5% levy on the business turnover, includes a credit of up to 0.25% of turnover for investments in community projects, including biodiversity conservation, and has been taken up by several local hotels (UNDP, 2019[70]).

As highlighted in Chapter 2, the cruise industry is an important sector for small island developing states, and raising levies on passengers is a useful mean to generate revenues to address sustainability challenges. Antigua and Barbuda imposes a USD 1.50-per person levy on cruise ship passengers that generated approximately USD 1.2 million in 2018. This revenue is transferred directly to the national solid waste management agency to recover the costs of dealing with the waste generated by cruise ships and their passengers. Raising the levy to include a component related to the management of marine biodiversity could be a good way to generate additional resources. The equivalent fee levied by the Seychelles is just over USD 7; the UNDP Biodiversity Finance Initiative has recommended it be raised to USD 20. This recommended fee is also significantly higher than the current Antigua and Barbuda levy, suggesting there are untapped opportunities to raise more revenue from this tourism-related taxes.

Levying fees and taxes on cruise ships (and their passengers) has been challenging in the Caribbean, as the islands, individually, are in a weak negotiating position with the cruise companies and are in fierce competition with other islands for passengers. As a result, there has been a race to the bottom, with taxes on cruise passengers in the Caribbean ranging from USD 1.50 to USD 18. Greater co-ordination among the Caribbean nations could strengthen their collective negotiating position and lead to increased government revenues to support environmentally sustainable growth in cruise tourism (MacClellan, 2019[71]). However, given the extent of environmental impacts from cruising, both in and out of port, taxes alone may not generate sufficient revenue to ensure sustainability. Other regulatory measures are likely required.

An example of tourism-related taxes as an instrument to support environmental protection is the Iceland accommodation tax, highlighted in *Tourism Trends and Policies 2014*, an OECD review of taxation of the tourism industry in 30 OECD countries and partner economies (OECD, 2014[69]). The tax partially finances the Icelandic Tourist Site Protection Fund, which was established in 2011 and allocates 40% of its funds

to the Environment Agency of Iceland for national parks. Since its inception, the Fund has supported more than 750 projects and in 2017, allocated ISK 700 million (Icelandic króna). (OECD, 2018[66]). Before the establishment of the fund only ISK 50 million was available for the parks.

Tourism-related subsidies

Government subsidies can also be used to promote more sustainable tourism. Kenya, for example, offers a customs duty exemption for equipment relating to the creation of wastewater treatment plants for hotels.[4] Thus, hotels in Kenya are incentivised to invest in wastewater treatment plants, which potentially reduces both the environmental impact of the hotels and the pressure new hotel developments place on local infrastructure.

In many cases, government support to the ocean economy takes the form of an SEZ. Their use has grown rapidly in the last six years: in 2019, 4 772 SEZs were operating in developing economies (UNCTAD, 2019[72]). SEZs can be used to promote investment in large-scale infrastructure projects for the ocean economy such as ports or fish processing facilities. SEZs have been criticised for negative environmental impacts that stem from relaxed regulations and from countries' prioritisation of development in the short term over the long-term sustainability of the projects (UNCTAD, 2019[72]).

For developing countries, better integration of environmental sustainability objectives into the conditions for receiving subsidies in SEZs, combined with a strong process of assessing the impacts of development, is key if they are to make the most of subsidies to grow the sustainable ocean economy. Indonesia provides an example. It uses SEZs and a range of subsidies to encourage new investments in less-developed areas. Four tourism SEZs with a legal basis (i.e. specific regulation and institutional structures) were operating in Indonesia 2019: Mandalika (Lombok), Mortoai (Maluku), Tanjung Kelayan (Belitung) and Tanjung Lesung (Banten). The subsidies take the form of tax holidays, excise and import duty exemptions. and other tax allowances designed to reduce the cost of the project. However, the pace and extent of the tourism expansion anticipated in these areas raise some concerns regarding the sustainability of the growth (Ollivaud and Haxton, 2019[73]). For example, in Bali, tourists use significantly more water (up to 200 L per day) than do residents (up to 60 L per day for rural and 120 L per day for urban residents), putting a strain on local infrastructure (Ollivaud and Haxton, 2019[73]). Further, Indonesia is the world's second largest contributor to ocean plastic waste, which increasing numbers of tourists could exacerbate (Jambeck et al., 2015[2]).

Private sector tourism-related concessions and community co-management of MPAs

Ensuring a sustainable source of financing for MPAs is essential for the conservation and sustainable use of marine resources in the ocean economy. In some – but not all – cases, the cost of management is covered by a combination of government allocations and user fees (OECD, 2017[4]) (see above). Partnering with the private sector to offer concessions for exclusive access to resources can provide MPAs a sustainable source of financing in the form of fees paid by the private sector. Providing exclusive access rights creates a sense of ownership in the individual companies that can inspire good behaviour and environmental stewardship. However, private concessions also can cause conflict with local communities if they lead to the perceived or actual loss of rights to certain resources. Comprehensive stakeholder consultation and measures to address distributional impacts of the concession are key to the success of concessions, particularly in areas with vulnerable and indigenous communities.

The tourism sector is potentially well suited to MPA concessions since the desirability of a destination is often directly linked to environmental quality. Relatedly, issues relating to excess tourism, such as overcrowding and environmental degradation, can negatively impact the competitiveness of a destination. The tourism and travel sector is expanding and international arrival grew by 3.8% in 2019 (World Tourism Organization, 2019[74]). Wildlife tourism alone, defined as viewing or experiencing animals in their natural habitat, directly contributed USD 120.1 billion to global GDP in 2018, representing 4.4% of tourism and

travel sector GDP. Its share of the market is much higher in some areas than in others, for example representing 36.3% of the tourism and travel sector in Africa (World Travel & Tourism Council, 2019[18]). A key challenge is to convert this growth in the tourism sector overall and the value of wildlife tourism into sustainable financing for marine ecosystems.

The size of conservation concessions can vary considerably, ranging from individual tour or dive operators to large resorts. Concession fees must be structured to ensure that the concession is an attractive investment and that the revenue generated is sufficient to cover the costs of the management. This can be a problem if the management authority has no experience of awarding concessions and may not be aware of their value or if the authority awards contracts for less than their market value because of pressure to act quickly. Unscrupulous private sector actors may also underreport revenues from their activities, reducing the resources generated by the concession. Concession fees based on visitor numbers can avoid this latter problem, but it may not be an effective approach in a marine area with no clear entry point (Iyer et al., 2018[27]). Beyond the fees they generate, concessions can also aid the conservation and sustainable use of marine resources through improving the management of an area (e.g. through increased resources such as staff), the development of infrastructure for visitors, development of the local communities, and the restriction of access (Iyer et al., 2018[27]).

In many regions, the local community has access to and utilises areas in an MPA. Granting exclusive access to a private entity and restricting local community access can create resentment. A transparent and open concession process that is based on clear legal frameworks is, therefore, key to ensuring that local communities are not unfairly excluded. Further engaging the local community and all other relevant stakeholders in the process of creating the concession is also important to ensure transparency and equity. The essential components of a successful concessions system, identified in UNDP guidelines for enacting concessions in protected areas, are illustrated in Figure 3.3 (Thompson et al., 2014[23]). Each of these components is present to some extent in all concession programmes, although this will vary considerably based on the size and complexity of the concession itself. Concession projects should be adaptable and improved as needed over time. Given how complex many projects can be, it is essential to incorporate and use the latest available technology and techniques to manage human, financial and natural capital efficiently. Adaptability will help concessions to generate revenue while maximising the environmental and social outcomes.

Figure 3.3. Components of a successful concession system

Note: This figure highlights the main components of a concession system. All of these components will need to be present to some degree for the concession system to be a success.
Source: Adapted from Thompson et. al. (2014[23]), *Tourism Concessions in Protected Areas: Guidelines for Managers*, https://www.undp.org/content/undp/en/home/librarypage/environment-energy/ecosystems_and_biodiversity/tourism-concessions-in-protected-natural-areas.html.

Engaging the local community in the process of developing the concession can create a sense of shared ownership between the concession-holder and other stakeholders. Moreover, strong community support and engagement are essential for effecting management of protected areas (Watson et al., 2014[20]). A good illustration is the Misool Eco Resort (MER) in Indonesia, where private sector concessions and the local community have worked well together. In 2005, the MER signed a 25-year access agreement with the local communities in Batbitim, West Papua. It was signed by the heads of two families who hold customary ownership rights to the area and local officials from various government and community institutions. The tourism office issued a business permit and the municipal governor (*upati*) gave verbal support. The agreement grants exclusive access to the tourism operator to develop infrastructure and run dive operations and prohibited the removal of marine resources from a 40 000-ha area; it also includes cash payments, education and employment for the local community. A specific exemption from the prohibition on removing marine resources, valid for a two-week period once every two years, is included in the agreement to ensure the survival of the traditional fishing practices of the local people (The Nature Conservancy, 2010[75]). Since the founding of the MER, there has been a 250% increase in fish biomass in the area protected by community and MER-funded patrols, indicating concessional approaches can be effective for protected marine resources and creating sustainable growth in the tourism sector.

The Galapagos National Park (GNP) in Ecuador is another good example of how concessions can work to control access and generate revenue for the conservation and sustainable use of biodiversity. As noted in the subsection on fees and charges in MPAs in this chapter, the number of visitors to the GNP has grown from about 17 000 in 1980 to 241 800 in 2017, an increase of 1 422% (La Dirección del Parque Nacional Galápagos [Galapagos National Park Directorate], 2018[76]). Tourism accounted for approximately half the Galapagos GDP in 2013, and the increasing visitor numbers generate significant value for the economy of the island. But they could place increasing strain on habitat in the national park. To control the visitors, the GNP restricts the number of concessions licenses it grants based on

assessment of the carrying capacity, environmental impacts and the GNP management plan. The Ministry of Tourism then must approve the plan for the number of licenses and once it does, the GNP accepts applications for concessions and after considering them, publicly announces the winning bids. All concessions expire annually and are not renewed if more than one breach of the concession conditions has been reported. In 2011, the GNP generated USD 15.5 million, of which concessions represented the third largest contributions of around 7%.[5] As the total revenues of the GNP exceed its operating budget of USD 14.4 million, concessions form a valuable part of the sustainable financing model for the protected area (Thompson et al., 2014[23]).

Policy instruments to curb marine pollution, including plastic

Managing the interface between the land and ocean is crucial for the sustainable ocean economy. Pollution from land-based production and consumption has significant adverse impacts on the ocean, for example. Insert text here on marine pollution (80% from land-based sources). Marine pollution includes chemical, light, noise and plastic pollution. Examples of chemical pollution are pesticides, fertilisers, oil, industrial chemicals and sewage. Light and noise also have adverse impacts on the ocean and marine species. Noise from ships, sonar devices and oil rigs, for example, cause disruption to marine mammals by affecting their communication, migration, hunting and reproduction patterns. Overall, it is estimated that approximately 80% of marine pollution originates from land-based sources.

As highlighted in Chapter 1, about 8 million tonnes of plastic enter the ocean every year; are estimated to cost society from USD 500 billion to USD 2 500 billion a year in lost ecosystem services; and result in losses of USD 13 billion a year to tourism and fisheries (OECD, 2018[77]; Beaumont et al., 2019[78]). Addressing marine plastics, therefore, is a policy priority for both developed and developing countries.

Marine plastic pollution affects both the marine environment and human health. For example, plastics discarded at sea (often fishing gear) can cause the deaths of large marine animals that become entangled, and gear can continue to ghost fish for several years, thus reducing fisheries production. Single-use plastics, such as drinking straws and carrier bags, also are consumed by marine animals, leading to their deaths in extreme cases. Further, global plastic production is expected to triple by 2050, with the increased consumption projected to be in countries that currently lack capacity to effectively manage their waste (World Economic Forum, 2016[79]). As microplastics accumulate in the marine food chain, the consumption of plastics by people, through seafood, is also becoming a public health concern. However, empirical evidence for health risks of microplastics consumption is currently limited (Koelmans et al., 2017[80]).

Jambeck et al. (2015[2]) identify coastal population and efficacy of solid waste management systems as key determinants of marine plastic pollution. The authors also cite some studies that point to China as the biggest contributor to marine plastic pollution globally followed by Indonesia, Philippines, Viet Nam and Sri Lanka. However, these estimates do not account for illegal dumping or the import and export of waste internationally, which are relevant for establishing a better understanding of the problem of plastic pollution (Miedzinski, Mazzucato and Ekins, 2019[81]).

The OECD (2018[77]) Environment Policy Paper on improving plastics management discusses the environmental implications of marine plastic waste and sets out several options to address it:

- Changes in product design: These can include the use of alternative materials in place of plastics or changes that reduce the need for plastics in the first place. Shifting to biodegradable or bio-based plastics could also reduce the environmental impacts of marine plastic pollution. However, such a shift could increase environmental burdens elsewhere, and biodegradable plastics may still persist in the environment as microplastics or nanoplastics if they do not fully break down.
- Improve waste management: Improving the collection and recycling of plastics can reduce the rate of at which plastic enters the ocean.

- Plastic clean up: Manually removing plastic waste from problem areas such as beaches and directly from the ocean itself will ameliorate the impacts of plastics in certain areas. However, manually removing plastic waste is likely to be expensive.

Interventions to address plastic waste should occur as early in the waste management cycle as possible. In many cases, reducing the creation of plastic waste to begin with is the most desirable option. Countries have used economic instruments (taxes and fees) to reduce demand for single-use plastics. There has been a sharp rise since 2015 in the number of policies to address single-use plastic, in particular policies to reduce the use of plastic bags (UN Environment, 2018[82]). In most cases, these policies include partial or total bans on the use of certain types of bags or impose levies on the consumption of plastic bags. Levies on plastics can be imposed on suppliers, retailers or consumers, and often take the form of a flat rate charge on plastic bags. Several developing countries, including Antigua and Barbuda, Cabo Verde, and Kenya, have put in place complete bans on the use of certain types of single-use plastic bags. However it difficult to assess the environmental effectiveness of these bans due to a lack of monitoring (UN Environment, 2018[82]).

Indonesia has imposed a levy of USD 0.015 on plastic bags in 23 cities. While it resulted in a large drop in plastic bag usage initially, the levy has but has encountered significant retailer and consumer resistance that has delayed implementation of the policy nationwide (Langenheim, 2017[83]). Levies and bans have had significant success in reducing usage of plastic bags in some other countries such as Belgium, Denmark and the United Kingdom, although no data exist on the impact of approximately 50% of the policies implemented globally (UN Environment, 2018[82]). Where bans and levies have been successful, they are often associated with strong awareness and education campaigns that target increased awareness of the impacts of plastic pollution and with alternatives to single-use plastics. This underscores the importance of public education around plastics and how they can be avoided in policy mixes designed to reduce plastic waste. In addition to awareness, ensuring affordable alternatives to single-use plastic and enforcement of bans or levies are essential conditions for success. Extended producer responsibility, whereby producers are given responsibility for the disposal of post-consumer products, could also incentivise the uptake of single-use plastic alternatives among manufacturers. Finally, a ban on single-use plastic can create opportunities for new business that can provide sustainable alternatives. Hence, reducing single-use plastic can be good for both the environment and the economy if policy instruments are managed carefully.

Addressing other types of marine pollution is equally critical. Various policy instruments are available, depending on the source of pollution. Taxes on the use of pesticides and fertilisers can help to prevent their excessive use (Sud, 2020[84]). Such a policy instrument relies on the polluter pays principle and can generate finance for marine pollution prevention and control, for instance to help fund infrastructure investments in the treatment, recycling and reuse of wastewater. Other ways to incentivise positive behaviour include an initiative by the South African Port of Durban that offers a 10% reduction on port fees to ships that use specific types of fuels and have therefore received of a Green Award. The Panama Canal Authority, in another example, has changed berth allocation policies to incorporate environmental considerations. Through its Environmental Premium Ranking, the Canal Authority recognises shipping companies that meet environmental criteria entitling them to obtain certain priority rights in canal transit. Commonly used criteria include a ship's nitrogen oxide emissions, the type of fuel used and other indices of energy efficiency (ITF, 2018[85]). More general approaches are also important, such as raising public awareness by educating people about preventing marine pollution through radio, television and social media and in classrooms.

Science, technology and innovation for sustainable ocean economies

Scientific and technological advances are expected to play a crucial role in improving both an integrated and evidence-based management of the ocean and the sustainability of ocean-based economic activities themselves (OECD, 2019[86]). For developing countries, such advances can contribute greatly to building national ocean strategies by enhancing understanding of national marine resources and enabling more effective monitoring of the activities taking place in national waters and beyond.

Understanding national marine resources

Each country needs information about its national, ocean-based resources to develop the ocean economy and enhance sustainability. Ocean scientific programmes often are the starting point for the development of national marine spatial planning (MSP). Sustainable and synergic uses of marine and coastal areas and resources benefit from the adoption of an ecosystem-based approach to MSP and integrated coastal zone management practices (UN Environment, 2019[87]).

Expanding scientific knowledge on the ocean opens up economic development opportunities. Recent advancements in ocean observation capacity and vessel tracking capabilities, for example, led to the development of new systems for mapping and monitoring coastal and marine environments. Such systems have proven to be useful, particularly when applied in sustainable fisheries management (e.g. the South Africa National Ocean and Coastal Information System). While these systems are becoming more affordable, in many cases, links with policy-makers, regulatory bodies, and police and naval forces need to be reinforced to ensure the enforcement of compliance.

As developing countries further develop their ocean strategies, it is worth highlighting two areas that can assist in making the most of ocean science, technologies and innovation: ocean economy knowledge and innovation networks and international co-operation initiatives.

Participating in ocean economy knowledge and innovation networks

Many countries are engaging in emerging ocean economy knowledge and innovation networks (OECD, 2019[86]). These initiatives, some building on decades of co-operation, strive to bring together a diversity of players – public research institutes, small and medium-sized enterprises, large enterprises, universities and other public agencies – to work on scientific and technological innovations in many different sectors of the ocean economy such as marine robots and autonomous vehicles, renewable energy systems, and biotechnologies. The actors then apply their innovations, often smart combinations of existing and/or new technologies, to tackle complex problems in ocean applications that range from ocean monitoring and marine ecosystems regeneration to aquaculture and marine renewable energies.

This is an opportune time for developing countries to benefit from projects led by these knowledge and innovation networks mainly based in OECD countries. The UN has declared 2021-30 the Decade of Ocean Science for Sustainable Development. Developing a sustainable ocean economy is the focus as well of Sustainable Development Goal 14 (conserve and sustainably use the oceans, seas and marine resources for sustainable development). Target 14.A encapsulates one of the main rationales for stronger co-operation between the ocean science and research and development communities on one hand and the developing countries on the other:

> *"Target 14.A Increase scientific knowledge, develop research capacity and transfer marine technology, taking into account the Intergovernmental Oceanographic Commission Criteria and Guidelines on the Transfer of Marine Technology, in order to improve ocean health and to enhance the contribution of marine biodiversity to the development of developing countries, in particular small island developing states and least developed countries" (UN, 2019[88]).*

In this context, several programmes are encouraging knowledge transfer and capacity building. Some examples are shown in Box 3.5.

Box 3.5. Networks that facilitate the sharing of scientific know-how and transfer of marine technology

The Commonwealth Blue Charter is an agreement by all 53 Commonwealth countries "to actively co-operate to solve ocean-related problems and meet commitments for sustainable ocean development" (Commonwealth Secretariat, 2020[89]). With support from the Commonwealth Secretariat, many countries are currently assessing the potential economic value of their oceanic waters, with small states often focusing on key sectors such as artisanal fishing, maritime transport and tourism (Roberts and Ali, 2018[90]). Ocean exploration and marine mapping projects, conducted in partnerships with United Kingdom oceanographic institutions, provide important contributions to the assessments.

Building on a decade of different research projects in the Macaronesian region and working with Portuguese stakeholders and developing country partners, the Oceanic Platform of the Canary Islands established a real-time observational network for water and air quality monitoring. Monitoring is conducted in eight different ports (including Madeira, Azores, Canary Islands and Cabo Verde) to promote marine research and sustainable development. As part of this "ECOMARPORT project", technology transfer and specialised training are provided from the Canary Islands and through Cabo Verde to the rest of the Macaronesian archipelagos and Western Africa (PLOCAN, 2020[91]).

The Atlantic International Research Centre (AIR Centre), supported by the Portuguese Science and Technology Foundation, is another distributed network for international co-operation. It fosters scientific and technology projects focused on ecosystems and sustainable ocean activities locally and globally and between developed and developing countries on both sides of the Atlantic. Major research themes bring together international teams, for example on the comparative analysis of bays and estuaries. Branch offices of the AIR Centre and affiliated institutions are based in Angola, Brazil, Cabo Verde, Nigeria, Portugal, South Africa, Spain and the United States. Additional collaborative and joint ventures in development have been initiated in Ghana, Namibia, Norway, Senegal and the United Kingdom (AIR Centre, 2020[92]).

The Indian Ocean Rim Association (IORA) is the lead body for promoting regional collaboration across the Indian Ocean. The IORA Blue Economy Core Group aims to encourage South-South collaboration on the ocean economy of the IORA member states (Bohler-Muller, 2014[93]). The IORA provides a framework for academic co-operation and researcher exchanges in the area of blue growth, focusing on analysis of risks and threats to peaceful trade in the region such as territorial maritime disputes; maritime piracy; terrorism against ships, ports and other critical infrastructure; organised sea-borne crime and trafficking; and the potential impacts of natural or man-made disasters and extreme events. Other areas of focus include aquaculture and food security and may be expanded to include shipping and oil and gas exploration.

Joining forces regionally for joint ocean exploration and conservation and sustainable use of marine ecosystems

The development of more sustainable ocean economies can both contribute to and benefit from enhanced regional collaboration. As demonstrated by ongoing MSP efforts, cross-border co-operation can be crucial to make the most of scarce financial resources for cost-effective ocean mapping, joint marine exploitation and conservation efforts.

The co-operation between the Seychelles and Mauritius in the scientific mapping and delimitation of their continental shelf is a good case in point. In 2008, the countries made a joint submission to the Commission on the Limits of the Continental Shelf concerning the Mascarene Plateau, an extended continental shelf of approximately 396 000 km².kilometres. In 2012, they signed a treaty whereby they agree to jointly exercise their sovereign rights to manage and exploit the resources in the "joint zone" of the Plateau. Along with exploration, the agreement concerns environmental protection, marine resources management including fisheries and hydrocarbons, and, importantly, the equal sharing of all resources in the zone. Through a jointly managed authority that oversees the activities in the area, the Seychelles and Mauritius plan to issue licenses for oil exploration and exploitation (UNECA, 2016[94]).

Regional bodies also are actively working on ocean strategies, including in the Caribbean region where countries are very diverse and have different levels of institutional and financial capacity to harness opportunities linked to the ocean economy (UN, 2018[95]). Most of the ocean economy in the region is based on tourism, shipping, mining and, for a limited number of countries, artisanal fisheries. In 2019, the Organisation of Eastern Caribbean States (OECS) launched a Green-Blue Economy Strategy and Action Plan, the region's first, to combine green and blue economy strategies for sustainable development (Organisation of Eastern Caribbean States, 2019[96]). The OECS comprises 11 countries and territories in the Eastern Caribbean: Anguilla, Antigua and Barbuda, British Virgin Islands, Dominica, Grenada, Guadeloupe, Martinique, Montserrat, Saint Kitts and Nevis, Saint Lucia, and Saint Vincent and the Grenadines.

In another illustration of co-operation, ten governments signed the 2014 Hamilton Declaration on Collaboration for the Conservation of the Sargasso Sea to tackle the Sargassum challenges. The ten are Azores, Bahamas, Bermuda, British Virgin Islands, Canada, Cayman Islands, Dominican Republic, Monaco, United Kingdom and the United States. The Hamilton Declaration is the first instrument to establish an international body to conserve an ecosystem that lies primarily in an area beyond national jurisdiction (Sargasso Sea Commission, 2019[97]).

The ocean economy is also drawing interest at continental level. In 2016, the UN Economic Commission for Africa published a policy handbook to provide initial advice to African member states on mainstreaming the blue economy into their national development plans, strategies, policies and laws (UNECA, 2016[94]). The African Union also launched several initiatives, including its 2050 Integrated Maritime Strategy to provide a broad framework for the protection and sustainable exploitation of Africa's marine resources. A centrepiece of the strategy is creation of a Combined Exclusive Maritime Zone of Africa, a common maritime space intended to boost trade, protect the environment and fisheries, enable the sharing of information, and strengthen border protection and defence activities.

References

Agnew, D. et al. (2009), "Estimating the Worldwide Extent of Illegal Fishing", *PLoS ONE*, Vol. 4/2, p. e4570, http://dx.doi.org/10.1371/journal.pone.0004570. [49]

AIR Centre (2020), *AIR Centre - About Us (webpage)*, https://www.aircentre.org/ (accessed on 10 April 2020). [92]

Alongi, D. (2014), "Carbon cycling and storage in mangrove forests", *Annual Review of Marine Science*, Vol. 6/1, pp. 195-219, http://dx.doi.org/10.1146/annurev-marine-010213-135020. [40]

Alongi, D. et al. (2015), "Indonesia's blue carbon: A globally significant and vulnerable sink for seagrass and mangrove carbon", *Wetlands Ecology and Management*, Vol. 24/1, pp. 3-13, http://dx.doi.org/10.1007/s11273-015-9446-y. [41]

BACoMaB Trust Fund (2019), *Rapport Annuel 2018 [Annual Report 2018]*, https://bacomab.org/wp-content/uploads/2019/04/Rapport-annuel-BACoMAB-2018-2.pdf. [31]

Beaumont, N. et al. (2019), "Global ecological, social and economic impacts of marine plastic", *Marine Pollution Bulletin*, Vol. 142, pp. 189-195, http://dx.doi.org/10.1016/j.marpolbul.2019.03.022. [78]

Bohler-Muller, N. (2014), "The Big Blue: Regional networks across the Indian Ocean", *Human Sciences Research Council*, http://www.hsrc.ac.za/en/review/hsrc-review-november-2014/the-big-blue-networks-across-indian-ocean. [93]

Bohorquez, J., A. Dvarskas and E. Pikitch (2019), "Filling the data gap: A pressing need for advancing MPA sustainable finance", *Frontiers in Marine Science*, Vol. 6, http://dx.doi.org/10.3389/fmars.2019.00045. [21]

Bregnballe, J. (2015), *A Guide to Recirculation Aqauaculture*, Food and Agriculture Organization/EUROFISH International Organisation, http://www.fao.org/3/a-i4626e.pdf. [63]

Cabral, R. et al. (2018), "Rapid and lasting gains from solving illegal fishing", *Nature Ecology & Evolution*, Vol. 2/4, pp. 650-658, http://dx.doi.org/10.1038/s41559-018-0499-1. [99]

Caribbean Biodiversity Fund (n.d.), *Antigua and Barbuda: Marine Ecosystem Protected Area Trust*, https://www.caribbeanbiodiversityfund.org/antigua-and-barbuda (accessed on 2020). [28]

Commonwealth Secretariat (2020), *The Commonwealth Blue Charter (webpage)*, https://bluecharter.thecommonwealth.org/. [89]

Costanza, R. et al. (2014), "Changes in the global value of ecosystem services", *Global Environmental Change*, Vol. 26, pp. 152-158, http://dx.doi.org/10.1016/j.gloenvcha.2014.04.002. [11]

Diana, J. (2009), "Aquaculture production and biodiversity conservation", *BioScience*, Vol. 59/1, pp. 27-38, http://dx.doi.org/10.1525/bio.2009.59.1.7. [59]

Ehler, C. and F. Douvere (2009), "Marine spatial planning: A step-by-step approach toward ecosystem-based management", *IOC Manuals and Guides*, No. 53, UNESCO, Paris, http://dx.doi.org/10.25607/OBP-43. [5]

European Commission (2018), *Ex-post and Ex-ante Evaluations Study of the Sustainable Fisheries Partnership Agreement between the European Union and the Republic of Cabo Verde*. [53]

Expert Group for Aid Studies, S. (ed.) (2019), *Fishing Aid: Mapping and Synthesising Evidence in Support of SDG 14 Fisheries Targets*, https://eba.se/en/rapporter/fishing-aid-mapping-and-synthesising-evidence-in-support-of-sdg-14-fisheries-targets/11447/. [57]

FAO (2018), *The State of World Fisheries and Aquaculture 2018*, Food and Agriculture Organization (FAO), Rome, http://www.fao.org/3/I9540EN/i9540en.pdf. [47]

FAO (2017), "Seafood traceability for fisheries compliance: Country-level support for catch documentation schemes", *FAO Fisheries and Aquaculture Technical Paper*, No. 619, Food and Agriculture Organization, Rome, http://www.fao.org/3/a-i8183e.pdf. [58]

Gill, D. et al. (2017), "Capacity shortfalls hinder the performance of marine protected areas globally", *Nature*, Vol. 543/7647, pp. 665-669, http://dx.doi.org/10.1038/nature21708. [12]

Gillett, R. (2016), *Fisheries in the Economies of Pacific Island Countries and Territories*, Pacific Community, Noumea, New Caledonia, https://www.spc.int/sites/default/files/wordpresscontent/wp-content/uploads/2016/11/Gillett_16_Benefish-fisheries-in-economies-of-pacific-countries.pdf. [52]

Henriksson, P. et al. (2019), "Indonesian aquaculture futures - Identifying interventions for reducing environmental impacts", *Environmental Research Letters*, Vol. 14/12, p. 124062, http://dx.doi.org/10.1088/1748-9326/ab4b79. [62]

Himes-Cornell, A., S. Grose and L. Pendleton (2018), "Mangrove ecosystem service values and methodological approaches to valuation: Where do we stand?", *Frontiers in Marine Science*, Vol. 5, p. 376, http://dx.doi.org/10.3389/fmars.2018.00376. [38]

Hutniczak, B., C. Delpeuch and A. Leroy (2019), "Closing Gaps in National Regulations Against IUU Fishing", *OECD Food, Agriculture and Fisheries Papers*, No. 120, OECD Publishing, Paris, https://dx.doi.org/10.1787/9b86ba08-en. [50]

Huxham, M. (2013), *Mikoko Pamoja: Mangrove Conservation for Community Benefit*, Plan Vivo Foundation, Edinburgh, https://planvivo.org/docs/Mikoko-Pamoja-PDD_published.pdf. [42]

ITF (2018), "Reducing shipping greenhouse gas emissions: Lessons from port-based incentives", *International Transport Forum Policy Papers*, No. 48, OECD Publishing, Paris, https://dx.doi.org/10.1787/d3cecae7-en. [85]

Iyer, V. et al. (2018), *Finance Tools for Coral Reef Conservation: A Guide*, Conservation Finance Alliance, https://static1.squarespace.com/static/57e1f17b37c58156a98f1ee4/t/5c7d85219b747a7942c16e01/1551730017189/50+Reefs+Finance+Guide+FINAL-sm.pdf. [27]

Jambeck, J. et al. (2015), "Plastic waste inputs from land into the ocean", *Science*, Vol. 347/6223, pp. 768-771, http://dx.doi.org/10.1126/SCIENCE.1260352. [2]

Kenya Ministry of Environment and Forestry (n.d.), *Independent Trust Fund is Key to Securing Wildlife Assets, PS*, http://www.environment.go.ke/?p=3393 (accessed on July 2020). [30]

Kenya Wildlife Service (2019), *Conservation Fees*, http://www.kws.go.ke/sites/default/files/parksresorces%3A/KWS%20Conservation%20Fees%20Poster.pdf. [24]

KKP (2016), *Tentang UPTD KKP Raja Ampat (About Raja Ampat's UPTD KKP)*, http://kkpr4.net/en/index.php. [25]

Koelmans, A. et al. (2017), "Risks of plastic debris: Unravelling fact, opinion, perception, and belief", *Environmental Science & Technology*, Vol. 51/20, pp. 11513-11519, http://dx.doi.org/10.1021/acs.est.7b02219. [80]

Kollmuss, A. et al. (2008), *Making Sense of the Voluntary Carbon Market: A Comparison of Carbon Offset Standards*, World Wildlife Fund Germany, Frankfurt, https://mediamanager.sei.org/documents/Publications/SEI-Report-WWF-ComparisonCarbonOffset-08.pdf. [44]

La Dirección del Parque Nacional Galápagos [Galapagos National Park Directorate] (2018), *Informe Anuale 2017 [Annual Report 2017]*, `Ministerio del Ambiente, Ecuador, http://www.galapagos.gob.ec/wp-content/uploads/downloads/2018/02/informe_visitantes_anual_2017.pdf. [76]

Langenheim, J. (2017), *Indonesia pledges $1bn a year to curb ocean waste*, https://www.theguardian.com/environment/the-coral-triangle/2017/mar/02/indonesia-pledges-us1-billion-a-year-to-curb-ocean-waste. [83]

MacClellan, R. (2019), *Commentary: A call for Caribbean governments to tax cruise sector more and tax air passengers less*, https://www.caribbeanlifenews.com/stories/2019/7/2019-07-12-oped-caribbean-tourism-taxes-dilemma-cl.html. [71]

Macreadie, P. et al. (2019), "The future of Blue Carbon science", *Nature Communications*, Vol. 10/1, http://dx.doi.org/10.1038/s41467-019-11693-w. [46]

Menéndez, P. et al. (2018), "Valuing the protection services of mangroves at national scale: The Philippines", *Ecosystem Services*, Vol. 34, pp. 24-36, http://dx.doi.org/10.1016/j.ecoser.2018.09.005. [36]

Miedzinski, M., M. Mazzucato and P. Ekins (2019), "A framework for mission-oriented innovation policy roadmapping for the SDGs: The case of plastic-free oceans", *Working Paper Series*, No. 2019-03, UCL Institute for Innovation and Public Purpose, London, https://www.ucl.ac.uk/bartlett/public-purpose/wp2019-03. [81]

MSC (2014), *Marine Stewardship Council Global Impacts Report 2014: Monitoring and Evaluation (1999-2013)*, https://www.msc.org/docs/default-source/default-document-library/what-we-are-doing/global-impact-reports/msc_global-impacts-report-2014-web.pdf?sfvrsn=5f4e0f20_8. [16]

Mwamba, M. et al. (2018), *2017-2018 Plan Vivo Annual Report: Mikoko Pamoja*, Plan Vivo Foundation, Edinburgh, https://www.planvivo.org/docs/2017-2018_Mikoko-Pamoja-Annual-Report-Final-public_.pdf. [43]

Narayan, S. et al. (2019), *Valuing the Flood Risk Reduction Benefits of Florida's Mangroves*, The Nature Conservancy, Arlington, VA, http://www.conservationgateway.org/SiteAssets/Pages/floridamangroves/Mangrove_Report_digital_FINAL.pdf. [35]

National Council on Green Growth (2013), *National Strategic Plan on Green Growth (2013-2020)*, Royal Government of Cambogia, https://www.greengrowthknowledge.org/sites/default/files/downloads/policy-database/CAMBODIA%29%20National%20Strategic%20Plan%20on%20Green%20Growth%202013-2030.pdf. [1]

National Geographic Society (2020), *Prisine Seas: Expeditions (webpage)*, https://www.nationalgeographic.org/projects/pristine-seas/expeditions/ (accessed on 6 September 2019). [9]

Oceans, O. (ed.) (2017), *Financing spotlight: Blue Abadi, a $38-million trust fund to support MPAs in the Bird's Head region of Indonesia*, Open Communication for the Oceans, https://mpanews.openchannels.org/news/mpa-news/financing-spotlight-blue-abadi-38-million-trust-fund-support-mpas-birds-head-region (accessed on July 2020). [29]

OECD (2020), *Policy Instruments for the Environment (database)*, http://oe.cd/pine. [15]

OECD (2020), "Rethinking tourism success for sustainable growth", in *OECD Tourism Trends and Policies 2020*, OECD Publishing, Paris, https://dx.doi.org/10.1787/82b46508-en. [64]

OECD (2019), *Fisheries Support Estimate Database*, http://oe.cd/FSE (accessed on 2019). [98]

OECD (2019), *OECD Environment Statistics - Biodiversity: Protected Areas (database)*, http://dx.doi.org/10.1787/5fa661ce-en (accessed on 15 May 2019). [8]

OECD (2019), *Responding to Rising Seas: OECD Country Approaches to Tackling Coastal Risks*, OECD Publishing, Paris, https://dx.doi.org/10.1787/9789264312487-en. [33]

OECD (2019), *Rethinking Innovation for a Sustainable Ocean Economy*, OECD Publishing, Paris, https://dx.doi.org/10.1787/9789264311053-en. [86]

OECD (2018), "Improving plastics management: Trends, policy responses, and the role of international co-operation and trade", *OECD Environment Policy Papers*, No. 12, OECD Publishing, Paris, https://dx.doi.org/10.1787/c5f7c448-en. [77]

OECD (2018), *OECD Tourism Trends and Policies 2018*, OECD Publishing, Paris, https://dx.doi.org/10.1787/tour-2018-en. [66]

OECD (2017), *Marine Protected Areas: Economics, Management and Effective Policy Mixes*, OECD Publishing, Paris, https://doi.org/10.1787/9789264276208-en (accessed on 1 May 2018). [4]

OECD (2017), "Support to fisheries: Levels and impacts", *OECD Food, Agriculture and Fisheries Papers*, No. 103, OECD Publishing, Paris, https://dx.doi.org/10.1787/00287855-en. [54]

OECD (2017), *The Political Economy of Biodiversity Policy Reform*, OECD Publishing, Paris, http://dx.doi.org/10.1787/9789264269545-en. [32]

OECD (2016), *Biodiversity Offsets: Effective Design and Implementation*, OECD Publishing, Paris, https://dx.doi.org/10.1787/9789264222519-en. [14]

OECD (2014), *OECD Tourism Trends and Policies 2014*, OECD Publishing, Paris, https://dx.doi.org/10.1787/tour-2014-en. [69]

OECD (2011), *Fisheries and Aquaculture Certification*, OECD Publishing, Paris, https://dx.doi.org/10.1787/9789264119680-en. [17]

OECD (2007), *Instrument Mixes for Environmental Policy*, OECD Publishing, Paris, https://dx.doi.org/10.1787/9789264018419-en. [3]

OECD/FAO (2019), *OECD-FAO Agricultural Outlook 2019-2028*, OECD Publishing, Paris/Food and Agriculture Organization of the United Nations, Rome, https://dx.doi.org/10.1787/agr_outlook-2019-en. [55]

Office of Prime Minister of Thailand (2017), *Twelfth National Economic and Social Development Plans (2017-2021)*, https://www.greengrowthknowledge.org/sites/default/files/downloads/policy-database/THAILAND%29%20The%20Twelfth%20National%20Economic%20and%20Social%20Development%20Plan%20%282017-2021%29.pdf. [61]

Ollivaud, P. and P. Haxton (2019), "Making the most of tourism in Indonesia to promote sustainable regional development", *OECD Economics Department Working Papers*, No. 1535, OECD Publishing, Paris, https://dx.doi.org/10.1787/c73325d9-en. [73]

Organisation of Eastern Caribbean States (2019), *OECS to establish Green-Blue Economy Strategy and Action Plan with CANARI*, https://pressroom.oecs.org/oecs-to-establish-green-blue-economy-strategy-and-action-plan-with-canari. [96]

PLOCAN (2020), *EcoMarPort, Transferencia tecnológica y Eco-innovación para la gestión ambiental y Marina en zonas Portuarias de la Macaronesia*, https://www.ecomarport.eu/. [91]

Pollnac, R. et al. (2010), "Marine reserves as linked social-ecological systems", *Proceedings of the National Academy of Sciences*, Vol. 107/43, pp. 18262-18265, http://dx.doi.org/10.1073/pnas.0908266107. [26]

Pörtner, H. et al. (eds.) (2019), *Summary for policymakers*, Intergovernmental Panel on Climate Change (IPCC), Geneva. [34]

Reyes, C. et al. (2018), *The Boracay Closure: Socioeconomic Consequences and Resilience Management*, Philippine Institute for Development Studies, Quezon City, Philippines, https://pidswebs.pids.gov.ph/CDN/PUBLICATIONS/pidsdps1837.pdf (accessed on 14 September 2019). [67]

Roberts, J. and A. Ali (2018), *The Blue Economy and Small States*, Commonwealth Secretariat, London, http://dx.doi.org/978-1-84859-950-5. [90]

Rosales, R. et al. (2017), "Value chain analysis and small-scale fisheries management", *Marine Policy*, Vol. 83, pp. 11-21, http://dx.doi.org/10.1016/j.marpol.2017.05.023. [56]

Sampantamit, T. et al. (2020), "Aquaculture production and its environmental sustainability in Thailand: Challenges and potential solutions", *Sustainability*, Vol. 12/5, p. 2010, http://dx.doi.org/10.3390/su12052010. [60]

Sargasso Sea Commission (2019), *Sargasso Sea Commission (webpage)*, http://www.sargassoseacommission.org/index.php (accessed on 22 July 2019). [97]

Scott, D., C. Hall and S. Gössling (2019), "Global tourism vulnerability to climate change", *Annals of Tourism Research*, Vol. 77, pp. 49-61, http://dx.doi.org/10.1016/j.annals.2019.05.007. [65]

SeyCCAT (2019), *SeyCCAT - About Us (web page)*, https://seyccat.org/about-us/. [7]

South Africa Department of Environmental Affairs (2019), *Oceans Economy Summary Progress Report February 2019*, South Africa Department of Environmental Affairs, Pretoria, https://www.environment.gov.za/sites/default/files/reports/oceanseconomy_summaryprogressreport2019.pdf (accessed on 23 July 2019). [51]

Sud, M. (2020), "Managing the biodiversity impacts of fertiliser and pesticide use: Overview and insights from trends and policies across selected OECD countries", *OECD Environment Working Papers*, No. 155, OECD Publishing, Paris, https://dx.doi.org/10.1787/63942249-en. [84]

The Nature Conservancy (2019), *Seychelles expands marine protections to 26% - Achieves milestone 2 of the award-winning debt conversion*, https://www.nature.org/en-us/explore/newsroom/seychelles-expands-marine-protections/. [6]

The Nature Conservancy (2010), *Coral Triangle MCA Feasibility Analysis – Final Interim Findings Public Version, V.2*, https://www.mpaaction.org/sites/default/files/MCA_Feasibility_Analysis_Coral_Triangle_Indonesia_Public_Version_Final_2010_Oct_V2_ENGLISH.pdf. [75]

Thompson, A. et al. (2014), *Tourism Concessions in Protected Areas: Guidlines for Managers*, United Nations Development Programme, New York, https://www.undp.org/content/undp/en/home/librarypage/environment-energy/ecosystems_and_biodiversity/tourism-concessions-in-protected-natural-areas.html. [23]

Thrush, S. (ed.) (2012), "Estimating global 'blue carbon' emissions from conversion and degradation of vegetated coastal ecosystems", *PLoS ONE*, Vol. 7/9, p. e43542, http://dx.doi.org/10.1371/journal.pone.0043542. [39]

U.S. Fish and Wildlife Service (2017), "U.S. Fish and Wildlife Service statement from Bryan Arroyo, Assistant Director for International Affairs, on the expansion of Gabon's Marine Protected Area Network", https://www.fws.gov/international/wildlife-without-borders/africa/statement-gabon-mpa-expansion.html (accessed on 22 July 2019). [10]

UN (2019), *Sustainable Development Goals Knowledge Platform (webpage)*, https://sustainabledevelopment.un.org/sdg14. [88]

UN (2018), *Report of the Secretary-General: Sustainable Development of the Caribbean Sea for Present and Future Generations*, United Nations General Assembly, New York, https://www.un.org/ga/search/view_doc.asp?symbol=A/73/225&Lang=E. [95]

UN Environment (2019), *Naples Ministerial Declaration: Mediterranean Action Plan*, United Nations Environment Programme (UNEP), Nairobi, https://www.msp-platform.eu/sites/default/files/naples_declaration_0.pdf. [87]

UN Environment (2018), *Single-use Plastics: A Roadmap for Sustainability*, United Nations Environment Programme, Nairobi, https://wedocs.unep.org/bitstream/handle/20.500.11822/25496/singleUsePlastic_sustainability.pdf. [82]

UNCTAD (2019), *World Investment Report 2019: Special Economic Zones*, United Nations Conference on Trade and Development (UNCTAD), Geneva, https://unctad.org/en/PublicationsLibrary/wir2019_en.pdf. [72]

UNDP (2019), *The Biodiversity Finance Initiative - Seychelles: Finance Plan for Biodiversity Conservation 2019-2023*, United Nations Development Programme (UNDP), New York, https://www.biodiversityfinance.net/sites/default/files/content/knowledge_products/BIOFIN%20Finance%20Plan%20-%20%2015th%20February%202019.pdf. [70]

UNECA (2016), *Africa's Blue Economy: A Policy Handbook*, United Nations Economic Commission for Africa (UNECA), Addis Ababa, https://www.uneca.org/publications/africas-blue-economy-policy-handbook. [94]

VCS (2019), *Coastal Carbon Corridor: Mangrove Restoration and Coastal Greenbelt Protection in the East Coast of Aceh and North Sumatra Province, Indonesia*, Verified Carbon Standard. [45]

Waldron, A. et al. (2017), "Reductions in global biodiversity loss predicted from conservation spending", *Nature*, Vol. 55, pp. 364-367, http://dx.doi.org/10.1038/nature24295. [22]

Watson, J. et al. (2014), "The performance and potential of protected areas", *Nature*, Vol. 515/7525, pp. 67-73, http://dx.doi.org/10.1038/nature13947. [20]

World Bank (2017), *The Sunken Billions Revisited: Progress and Challenges in Global Marine Fisheries*, World Bank, Washington, DC, http://dx.doi.org/10.1596/978-1-4648-0919-4. [48]

World Economic Forum (2016), *The New Plastics Economy: Rethinking the Future of Plastics*, http://www3.weforum.org/docs/WEF_The_New_Plastics_Economy.pdf. [79]

World Tourism Organization (2019), *International Tourism Highlights: 2019 Edition*, http://dx.doi.org/10.18111/9789284421152. [74]

World Tourism Organization (2019), *World Tourism Barometer*. [19]

World Tourism Organization (2002), *Tourism and Poverty Alleviation*. [68]

World Travel & Tourism Council (2019), *Economic Impact of Global Wildlife Tourism*, https://travesiasdigital.com/wp-content/uploads/2019/08/The-Economic-Impact-of-Global-Wildlife-Tourism-Final-19.pdf. [18]

Wunder, S. (2015), "Revisiting the concept of payments for environmental services", *Ecological Economics*, Vol. 117, pp. 234-243, http://dx.doi.org/10.1016/j.ecolecon.2014.08.016. [13]

Wylie, L., A. Sutton-Grier and A. Moore (2016), "Keys to successful blue carbon projects: Lessons learned from global case studies", *Marine Policy*, Vol. 65, pp. 76-84, http://dx.doi.org/10.1016/j.marpol.2015.12.020. [37]

Annex 3.A. Examples of policy instruments to address different pressures on the ocean

Annex Table 3.A.1. Examples of regulatory policy instruments to address different pressures on the ocean

Regulatory instruments	Pressure				
	Overfishing	Pollution	Habitat destruction	Invasive alien species	Climate change
Marine spatial planning (spatial restrictions for specific activities)	X	X	X	X	X
Marine protected areas	X	x	X		
Temporal restrictions (seasonal, temporary closures)	X	X	X	X	X
Total allowable catch	X				
Individual catch quotas	X				
Territorial use rights	X				
Property rights	X				
Effort quotas (limits on the number of days at sea)	X				
Fishing standards	X				
Fishing licenses	X				
Gear restrictions	X		X		
By-catch restrictions	X				
Discard restrictions/bans	X				
Landing limits (restrictions on fish quantities and size)	X				
Vessel restrictions (number, size, horsepower)	X	X			
Ship construction standards	X				
Specification of “best available technology” or “best environmental practice” for fishing	X	X	X	X	X
Planning requirements (i.e. environmental impact assessments and emergency response plans)		X	X	X	X
Standards (e.g. pollution, emissions, construction)		X	X	X	X
Emission permits		X			X
Restrictions on mineral extraction		X			
Restrictions on ballast water discharges		X		X	
Restrictions on volume and concentration of discharged pollutants from onshore and offshore		X			
Limitation on oil, gas and other mining operations		X	X		X
Limitation on number of freight and cruise ships operating		X		X	
Restrictions on tourism operations		X	X		

Annex Table 3.A.2. Examples of economic and information and voluntary policy instruments to address different pressures on the ocean

Economic instruments and information and voluntary approaches	Pressure				
	Overfishing	Pollution	Habitat destruction	Invasive alien species	Climate change
Economic instruments					
Individually transferable quotas	X				
Resource tax	X				
User fees	X	X	X	X	
R&D subsidies	X	X	X	X	X
Non-compliance fees/penalties	X	X	X	X	X
Insurance measures	X				
Removal or reform of harmful subsidies	X	X	X	X	X
Buy-back and decommissioning schemes	X	X	X	X	X
Taxes on fertilisers and pesticides (inputs)		X			
Pollution taxes or emissions trading schemes		X	X		X
Payments for ecosystem services	X	X	X		
Information and voluntary approaches					
Certification and eco-labelling	X	X	X		X
Industry codes of practice	X	X	X	X	X
Marine charts, navigation aids, other marine services	X	X	X	X	X
Awareness campaigns and education	X	X	X	X	X

Source: OECD (2017[4]), *Marine Protected Areas: Economics, Management and Effective Policy Mixes*, https://doi.org/10.1787/9789264276208-en.

Notes

[1] The Caribbean Challenge Initiative was launched at the ninth meeting of the Conference of the Parties to the Convention on Biological Diversity. In addition to the second goal shown here, it set out the goal to effectively conserve and manage at least 20% of the marine and coastal environment by 2020..

[2] On the compliance markets, a buyer is obliged to purchase carbon offsets to meet emissions reduction targets under a particular treaty or mechanism, internationally or domestically (such as the Kyoto protocol or the EU Emissions Trading System). Voluntary markets serve entities that purchase carbon offsets voluntarily to be more sustainable.

[3] Where financial revenues from tourism activities are remitted abroad.

[4] For more information, see https://www.tourismauthority.go.ke/index.php/tourism-support-services/custom-duty-exemption.

[5] Entrance fees contributed the largest amount to the operating budget, at USD 11.4 million.