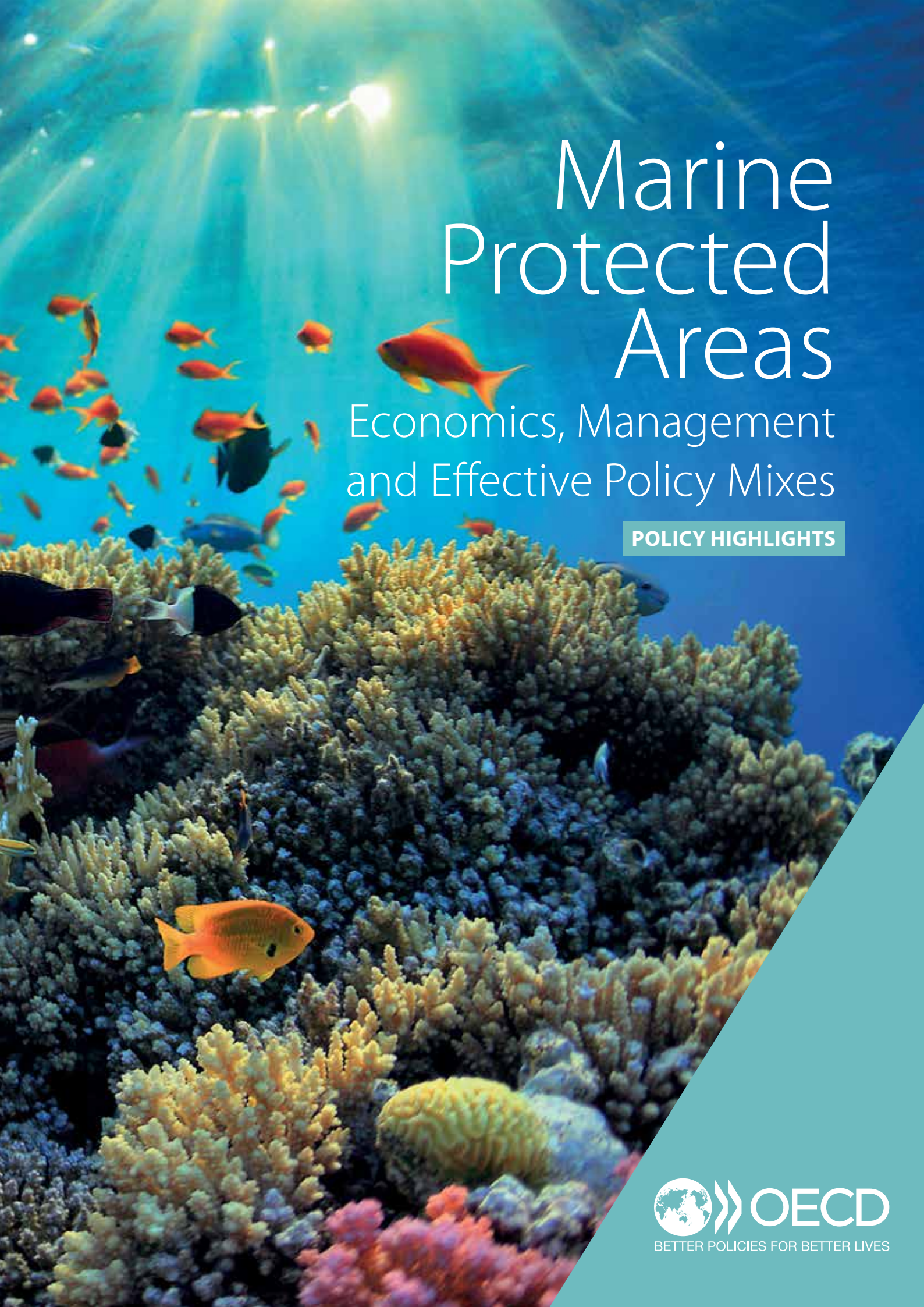

Marine Protected Areas

Economics, Management and Effective Policy Mixes

POLICY HIGHLIGHTS

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BETTER POLICIES FOR BETTER LIVES

Marine Protected Areas

Economics, Management and Effective Policy Mixes

Progress in expanding the coverage of marine protected areas is underway. With a push from the Sustainable Development Goals their global coverage is expected to increase even further. But their effectiveness is uneven. It is one thing to draw a line on a map – it is another to effectively design, site, monitor and enforce them. We are starting to understand what works and what doesn't. Adaptive management and improvements over time will be essential if marine conservation and sustainable use objectives are to be met.

Simon Upton – OECD Environment Director

OECD
BETTER POLICIES FOR BETTER LIVES

Pressures on marine ecosystems from human activities are already severe and the often competing demands for marine space and resources are projected to rise. Costs of poor ocean management practices include environmental and social costs that are often not factored into decision-making processes. This undermines the resilience of the ecosystems upon which we depend, for food, for income, but also other less visible life-support functions such as coastal protection, habitat provisioning and carbon sequestration. Marine protected areas are one of the policy instruments available to help ensure the conservation and sustainable use of our vast yet vulnerable ecosystems. While progress is being made towards increasing the global coverage of marine protected areas, significantly greater efforts are needed to ensure these are also being located in areas that are under threat and can therefore yield greatest environmental benefits, and that they are effectively managed.

The OECD report ***Marine Protected Areas: Economics, Management and Effective Policy Mixes*** (OECD, 2017) examines recent developments and experiences with marine protected areas (MPAs) around the world and provides good practice insights to enhance their effectiveness.

The publication addresses the following questions:

- **What is the role and current state-of-play of marine protected areas in the conservation and sustainable use of marine biodiversity and ecosystems?**
- **What are the benefits and costs associated with MPAs?**
- **What are the key design and implementation features that need to be considered to ensure the effective management of MPAs?**
- **How are MPAs financed and what options are there to scale this up?**
- **How have MPAs been implemented alongside other policy instruments, to more comprehensively and effectively address the multiple pressures on marine ecosystems?**

1 Key pressures on marine ecosystems

3.1 BILLION

An estimated 3.1 billion people rely on oceans for almost 20% of their animal protein intake (through seafood) (FAO, 2016) and more than 500 million people are engaged in ocean-related livelihoods (UNDP, 2012).

60% DEGRADED

60% of the world's major marine ecosystems have been degraded or are being used unsustainably (UNEP, 2011). Since the 1980's an estimated 20% of global mangroves have been lost and 19% of coral reefs have disappeared (UNDP, 2012).

Marine ecosystems are immensely varied both in type and geographical extent. They encompass oceans, seas, salt marshes, intertidal zones, estuaries, lagoons, mangroves, coral reefs, the deep sea and the sea floor (Kaiser and Roumasset, 2002). Covering about 70% of the earth's surface, these ecosystems play a crucial role in human welfare, by providing social, economic and environmental benefits to the world's growing population.

In addition to being an important source of food, income and employment, marine ecosystems provide a variety of other services that are critical for human wellbeing. These include coastal protection, marine biodiversity, and carbon sequestration. Mangroves and coral reefs for example provide valuable protection against extreme weather events such as storms and floods, and the oceans have absorbed one third of the carbon dioxide resulting from human activities (Bijma et al, 2013).

The pressures on marine ecosystems from human activities however are multiple (Table 1), and expected to rise. These pressures can also re-enforce each other, exerting cumulative impacts on marine ecosystems and biodiversity.

Ocean-based industries are projected to double their contribution to global value-added by 2030. The value-added growth projections over the period 2010-2030 include:

- **Marine aquaculture to triple**
- **Industrial-scale capture fisheries to more than double**
- **Maritime and coastal tourism to double**
- **Port activities to more than double**
- **Offshore wind to grow by a factor of 80** (albeit from a small base) (OECD, 2016).

Pressures on marine ecosystems are therefore also likely to be exacerbated as these ocean-industries grow.

Table 1. **Key pressures on marine ecosystems**

Overfishing and exploitation	In 2013, 31% of fish stocks were estimated as fished at biologically unsustainable levels (i.e., over-fished), compared to 10% in 1974. Of the total number of stocks assessed in 2013, fully fished stocks accounted for 58% and under-fished stocks 11% (FAO, 2016). Illegal, unreported and unregulated (IUU) fishing also continues to present challenges. About 11-26 million tonnes of fish is lost to IUU annually representing a mean loss of 18% across all fisheries (Agnew et al., 2009).
Pollution	Marine pollution occurs when harmful, or potentially harmful, effects result from the entry into the ocean of chemicals, particles, industrial, agricultural and residential waste, noise, or the spread of invasive organisms. Most sources of marine pollution (80%) are land based often from nonpoint sources such as agricultural runoff (GOC, 2014).
Habitat destruction	Habitat destruction along the coast and in the ocean results from harmful fishing practices such as trawling or dynamite fishing; poor land use practices in agriculture, coastal development and forestry sectors; and other human activities such as mining, dredging and anchoring, as well as tourism and coastal encroachment.
Climate change	Climate change is rapidly impacting species and ecosystems that are already under stress from other pressures. Climate change impacts to marine ecosystems have already resulted in either loss or degradation of 50% of salt marshes, 35% of mangroves, 30% of coral reefs and 20% of seagrass worldwide (Doney et al., 2012).
Invasive alien species	These foreign organisms are responsible for severe environmental impacts such as altering native ecosystems by disrupting native habitats, extinction of some marine flora and fauna, decreased water quality, increasing competition and predation among species, and spread of disease.

200

BILLION USD

The cumulative economic impact of poor ocean management practices is estimated to be in the order of USD 200 billion per year (UNDP, 2012).

2 The role of marine protected areas in marine biodiversity conservation and sustainable use

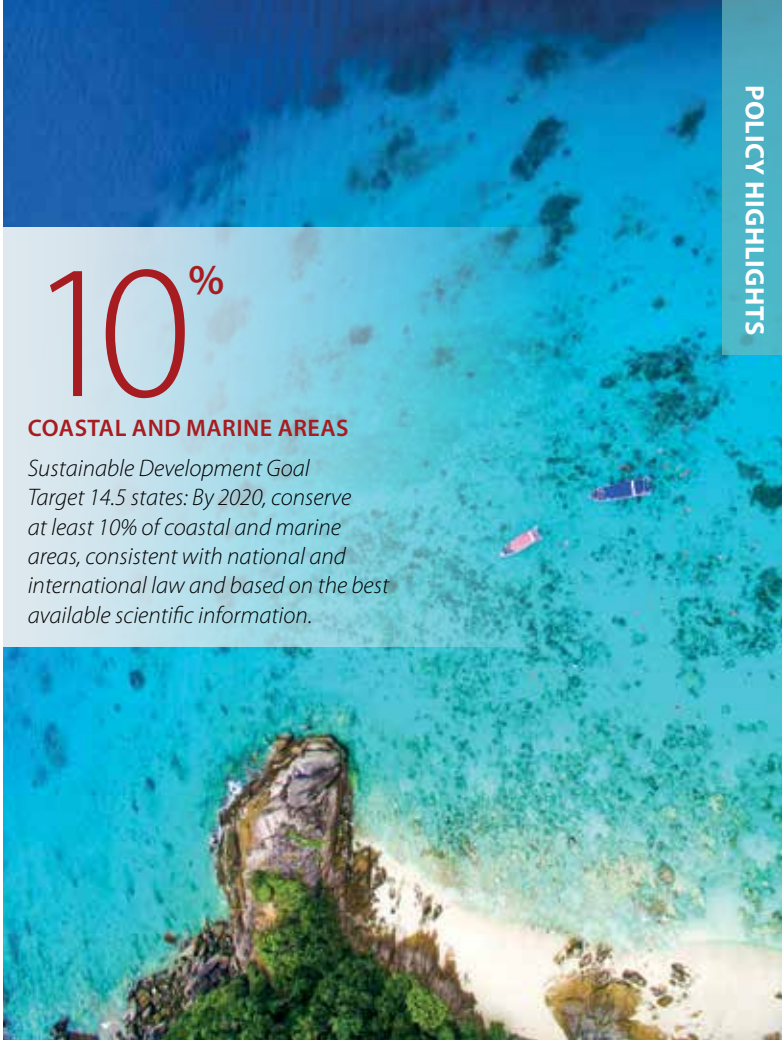
Marine protected areas (MPAs) are one policy instrument available that have the potential to address several of the pressures on marine biodiversity (Table 2), in particular over-fishing and exploitation and habitat destruction. In addition to protecting rare and threatened species and their habitats and other areas of ecological importance, MPAs can help ensure the sustainable provision of multiple other ecosystem services that are fundamental for human well-being, including for fisheries, coastal protection (buffering against storms and erosion), tourism and recreation.

Table 2. **Examples of policy instruments for marine biodiversity conservation and sustainable use**

Regulatory (i.e. 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. MSC)
Marine spatial planning	Individually transferable quotas	Voluntary agreements, including public private partnerships (which can include e.g., voluntary biodiversity offset schemes)
Spatial and temporal fishing closures; limits on number and size of vessels (input controls); other re-strictions or prohibitions on use (e.g. CITES)	Reform of subsidies harmful to marine ecosystems and use of subsidies that promote conservation and sustainable use	
Standards (e.g. MARPOL for ships); bans on dynamite fishing or fishing gear	Payments for ecosystem services	
Catch limits or quotas (output controls)	Biodiversity offsets	
Licenses e.g. aquaculture and offshore windfarms	Non-compliance penalties	
Planning requirements (e.g. Environmental Impact Assessments and Strategic Environmental Assessments)	Fines on damages	

MPAs have been receiving increasing attention from policy makers as an instrument for marine biodiversity conservation and sustainable use. While there is no single universally agreed definition, the IUCN defines MPAs as "a clearly defined geographical space, recognised, dedicated and managed, through legal or other effective means, to achieve the long-term conservation of nature with associated ecosystem services and cultural values".[1] According to this definition, MPAs cover about 4.12% of the total marine environment (Figure 1). Under both the Convention on Biological Diversity (CBD) and the Sustainable Development Goals, Parties have agreed to conserve 10% of marine and coastal areas by 2020.

CBD Aichi Biodiversity Target 11 states: By 2020, at least 17% of terrestrial and inland water, and 10% of coastal and marine areas, especially areas of particular importance for biodiversity and ecosystem services, are conserved through effectively and equitably managed, ecologically representative and well-connected systems of protected areas and other effective area-based conservation measures, and integrated into the wider landscape and seascapes.

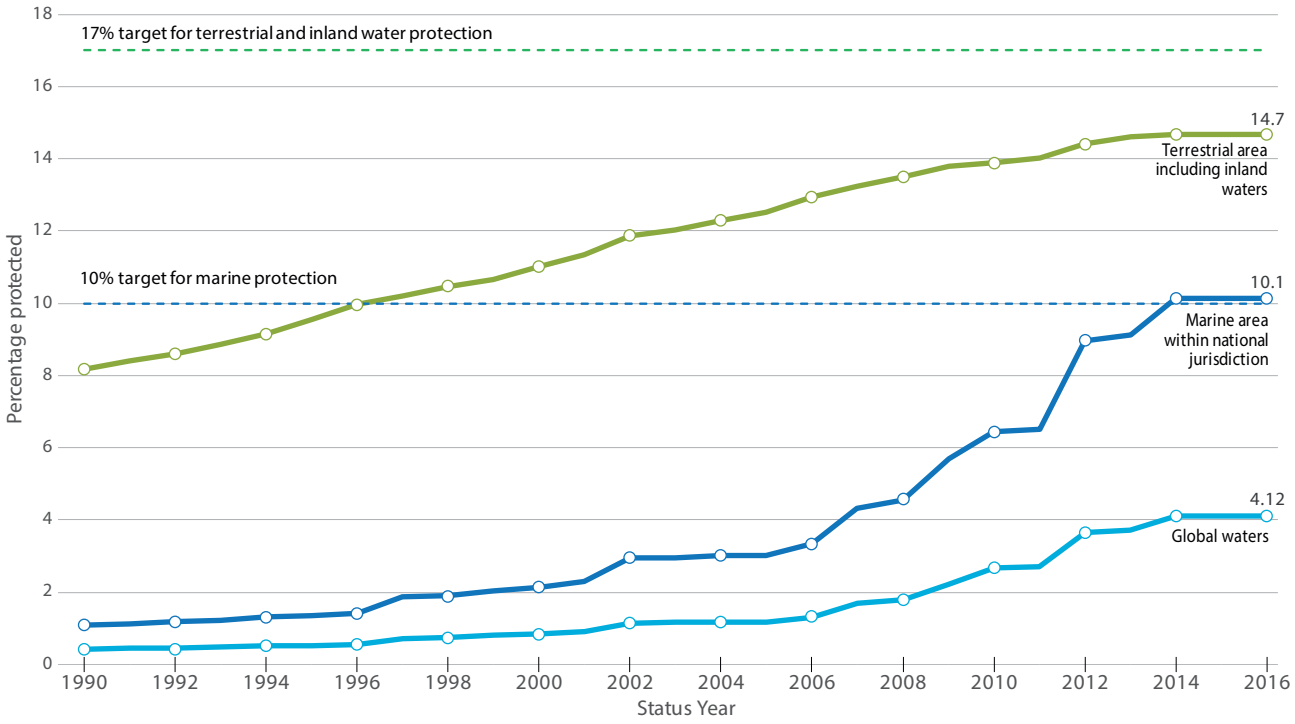


10%

COASTAL AND MARINE AREAS

Sustainable Development Goal Target 14.5 states: By 2020, conserve at least 10% of coastal and marine areas, consistent with national and international law and based on the best available scientific information.

Figure 1. **Trends in global marine and terrestrial protected area coverage over time**



Source: Adapted from UNEP-WCMC and IUCN (2016), *Protected Planet Report 2016*, UNEP-WCMC and IUCN, Cambridge United Kingdom and Gland, Switzerland.

1. The definition adopted by the Ad Hoc Technical Expert Group on Marine and Coastal Protected Areas for a marine and coastal protected area is: (a) "Marine and coastal protected area' means any defined area within or adjacent to the marine environment, together with its overlying waters and associated flora, fauna and historical and cultural features, which has been reserved by legislation or other effective means, including custom, with the effect that its marine and/or coastal biodiversity enjoys a higher level of protection than its surroundings. (b) "Areas within the marine environment include permanent shallow marine waters; sea bays; straits; lagoons; estuaries; subtidal aquatic beds (kelp beds, seagrass beds; tropical marine meadows); coral reefs; intertidal muds; sand or salt flats and marshes; deep-water coral reefs; deep-water vents; and open ocean habitats.".

The recent increase in global MPA coverage has also been achieved, in large part, via the recent trend in the establishment of large scale MPAs (LSMPAs), often described as MPAs larger than 100 000 km^2. Devillers et al (2014) found that 10 of the existing MPAs or those under creation accounted for more than 53% of the world's total MPA coverage.

While some progress has been made in expanding MPA coverage, further efforts are required to meet the internationally agreed targets. In addition, substantial further efforts are needed to enhance the design and implementation of MPAs, as evidence suggests that in many cases, they are not meeting their intended objectives.

Key challenges include:

- **strategically siting MPAs so as to maximise environmental and socio-economic benefits in a cost-effective way**
- **agreeing on and implementing adequate MPA management plans**
- **putting in place robust monitoring and reporting frameworks**
- **ensuring solid compliance and enforcement mechanisms**
- **mobilising sufficient finance to enable sustainable management**
- **embedding MPAs in an effective policy mix so as to address the multiple pressures.**

0.59%

NO-TAKE MPAs

Of the 3.41% global MPA coverage in 2014, only 0.59% was established as no-take MPAs (Thomas et al, 2014) i.e., areas that prohibit extractive practices such as fishing and mining

3 The benefits and costs of MPAs

MPAs can provide a wide variety of benefits ranging from the conservation of whole areas that are home to important biodiversity, serving as nursery grounds for fisheries and enhancing fish stocks, protecting habitats that buffer the impacts of storms and waves, and removing excess nutrients and pollutants from the water. They can also provide more sustainable tourism and recreational benefits, as well as enhance other non-use values such as cultural and heritage values. The total ecosystem service benefits of achieving 10% coverage of MPAs have been estimated at USD 622-923 billion over the period 2015-2050 (Brander et al., 2015).

Looking across the establishment costs of thirteen MPAs which varied in size, location, objectives and degree of protection, McCrea-Strub et al. (2011) find that variation in MPA start-up costs are most significantly related to MPA size and the duration of the establishment phase. The operating costs of MPAs (including employment, administration, and monitoring and enforcement costs) depend on several variables, particularly design, location, configuration, socio-economic context, and zoning (Ban et al., 2011).

Other costs can include possible congestion costs to fishers if they are displaced to other areas (at least in the short run), and opportunity costs.

In one of the very few global studies available to date, Brander et al. (2015) examine the net benefits of protecting marine habitats through expanding the coverage of no-take MPAs to 10% and 30% and find that the benefits exceed the costs, with ratios in the range of 3.17 – 19.77.

4 Key design and implementation features for more effective MPAs

When considering the introduction of an MPA, it is important to have a clear understanding of the state of and pressures on a particular marine or coastal ecosystem, and the likelihood that an MPA – or a network of MPAs – can address these, as well as the range of stakeholders involved.

Clearly define the **goals and objectives** of the MPA, and the required level of protection to achieve them. These should be stated at an operational level, so as to be specific, measurable, achievable, realistic and time-bound (SMART), and accompanying indicators should be identified that will enable the eventual assessment of whether the objectives are being met. An understanding of the expected **costs and benefits** of the particular MPA is important for a number of reasons. It enables decision makers to better evaluate the net benefits to society from investing in an MPA and to prioritise efforts amongst various possible MPAs if resources are limited. It can also provide insights on how these net benefits are distributed (i.e. over time, different geographic scales and between different user groups) and thus how they can best be managed. Understanding the costs associated with MPAs also enables planners to budget and to help secure sufficient finance for the effective long-term management of the MPA.

While studies evaluating the benefits and costs of individual MPAs do exist, in general economic valuation methods to help inform the design and implementation of MPAs are not yet widespread. Software tools such as Marxan and MarZone - which aid systematic reserve design by analysing how given conservation objectives can be attained at least cost - have been used in several cases but could be adopted more widely.

Overall, more **strategic siting of MPAs** is needed, to enhance the environmental as well as cost-effectiveness of MPAs. While ecological criteria is the norm for determining where to locate an MPA (i.e., by identifying ecologically significant and representative areas), studies suggest that often MPAs are situated in locations that are not under direct threat of loss (Burke et al, 2011; Edgar, 2011; Devillers et al., 2014). As noted by Watson et al. (2014), large and remote MPAs may not necessarily avert imminent and direct threats in populated coastal waters where pressures on biodiversity often remain intense. This implies that resources may not be allocated to areas where they will have greatest environmental impact.

Monitoring of MPAs, important both initially in order to establish ecological and socioeconomic baseline data, as well as regularly thereafter, to assess trends in performance over time, has often not been undertaken as rigorously as needed. Challenges encountered include lack of sufficient human resources (staff, capacity), financial resources, equipment and infrastructure, and knowledge. Indicators selected should be able to determine whether the objective(s) of the MPA are being achieved. Monitoring protocols can help to provide guidance to MPA managers, as well as to streamline monitoring methods across MPAs so as to facilitate comparison. **Reporting** including via on-line databases with publicly available information can help to increase transparency and enable the sharing of information and lessons learned across different MPAs, their respective management approaches, and their effectiveness in achieving intended objectives.

Compliance and enforcement methods also vary substantially across MPAs. Approaches for assessing compliance include direct surveillance (e.g. air surveillance, vessel patrols), indirect observation (e.g., discarded gear on reefs) and law enforcement records.

Methods that are able to attribute non-compliance to those directly responsible are best suited to applying sanctions. With regard to enforcement, either the probability of detection or the sanctions must be high so as to offset the potential economic gains from MPA violations. However, existing studies suggest that few MPAs have a robust compliance and enforcement regime in place, which has been cited as an important reason for lack of MPA effectiveness. While the costs of enforcement have traditionally been high, recent technological innovations such as vessel monitoring systems and remote sensing can help to drive the costs down.

5 How are MPAs financed and what options are there to scale this up?

Adequately financing the management of MPAs is often a major challenge and is likely to be exacerbated as countries strive to meet the 10% target under the Convention on Biological Diversity and the Sustainable Development Goals. Although not comprehensive, available information suggests that the main source of MPA financing in developed countries is government budget, whereas in developing countries, international donors as well as user fees can constitute an important source of MPA finance (Table 3).

Overall, more comprehensive and diverse MPA financing portfolios are needed, via the introduction of instruments such as taxes, fines and other revenue-generating mechanisms, which are also in line with the polluter pays principle. Such instruments can therefore provide incentives to mitigate other pressures on marine biodiversity such as pollution or can serve as deterrents to non-compliance. MPA financing strategies, which include identifying the financing needs, and the possible instruments through which additional finance can be mobilised, should form an integral component of a MPA management plan.

Table 3. **Examples of MPA financing mechanisms**

Financing instrument	Examples of use
Domestic government budget	Often the main source of MPA finance in many developed countries.
External development finance (e.g. ODA) and NGOs	Often a substantial source of MPA finance in many developing countries.
Trust funds	Several trust funds have been established which also help to ensure more sustainable finance for MPAs, such as in Belize, Mexico and Mauritania.
User fees	Often a substantial source of finance in a number of MPAs. Entrance fees to marine national parks are being used in Australia, Belize, Mexico, Thailand and the Galapagos Islands in Ecuador for example.
Taxes and fines	Examples include France, where the 1995 Barnier Act set up a tax on maritime passenger ships that are destined to natural protected areas, and where revenue is earmarked for these.
Subsidies	MPAs can enhance fisheries by explicitly protecting nursing grounds and fish stocks or the biodiversity that stocks depend on, resulting in increased fish yields. Existing subsidies to fisheries, notably those that are potentially environmentally harmful, could be reformed, including to support MPA management when they also benefit fishers.
Payments for ecosystem services – including blue carbon	PES programmes in the context of marine and coastal ecosystems are beginning to be introduced. Examples include sea turtle conservation efforts in Tanzania, and grey whale habitat protection in Mexico, as well as payments for mangrove conservation in Kenya via the voluntary carbon market.
Marine biodiversity offsets	Rarely used to date – one example is the fish habitat offset policy in Queensland, Australia introduced in 2002 (now absorbed into the Queensland Environmental Offsets Policy of 2014). Another is a voluntary blue carbon offset programme, SeaGrass Grow, to restore seagrass meadows.

6 Embedding MPAs into effective policy mixes

While MPAs are a crucial component to help ensure marine conservation and sustainable use, they are not sufficient to ensure that the broader environmental goal is met. Efforts to address multiple pressures simultaneously, through a policy mix, need to be intensified in order to improve the effectiveness and resiliency of MPAs in achieving their intended objectives. Complementary instruments are required to manage over-fishing (including outside MPA boundaries), marine pollution (including water pollution from land-based sources), the introduction of invasive alien species, and ocean warming and acidification from climate change.

A full package of policy measures is needed to ensure the sustainable use of marine resources, including policies that lie beyond the mandates of environment ministries. The **political economy of MPAs** is also important in this regard and another area where a clearer understanding of the costs and benefits of MPAs, including inter-temporally, can help to alleviate potential conflicts. Opponents to MPAs, for example, tend to focus on the short run opportunity costs, primarily the loss of fishing opportunities. The establishment of inter-Ministerial Committees to develop national marine and coastal development strategies, which bring together multiple stakeholders, can help to ensure a better understanding of the costs and benefits of decisions to different users, and the possible measures needed to address vulnerable groups most affected. Such measures can help to address political economy issues that arise e.g. between conservation and fishing communities and can also help to foster **policy coherence**.

Marine spatial planning and other ecosystem-based management regimes are increasingly being used in a number of countries, and can help to obtain a broader understanding of the often competing demands on the ocean space and the diverse stakeholders involved. Combining MPAs with properly designed rights-based fisheries management strategies outside MPA boundaries has the potential to optimise both conservation and fishing goals. The Great Barrier Reef Water Quality Protection Plan is an example where combined marine and terrestrial spatial conservation planning is being utilised to better manage the agricultural impacts of pollution entering the Great Barrier Reef from adjacent catchments.

Box 1. EU MARINE LEGISLATION: A POLICY MIX TO MANAGE MULTIPLE ENVIRONMENTAL PRESSURES

The 2008 Marine Strategy Framework Directive 2008/56/EC, the 2014 Directive on establishing a framework for maritime planning 2014/89/EU, and the 2002 EU Recommendation on Integrated Coastal Zone Management 2002/413/EC offer a comprehensive and integrated approach to the protection of all European coasts and marine waters. In addition, there are a number of complementary policies: the EU Habitats Directive, the EU Directive on the conservation of wild birds, regulation of fisheries through the Common Fisheries Policy, EU biodiversity strategy to 2020, EU Regulation 1143/2014 on Invasive Alien Species, and the control of input of nutrients and chemicals into waters through the Water Framework Directive, Nitrates Directive and EU Common Agricultural Policy.

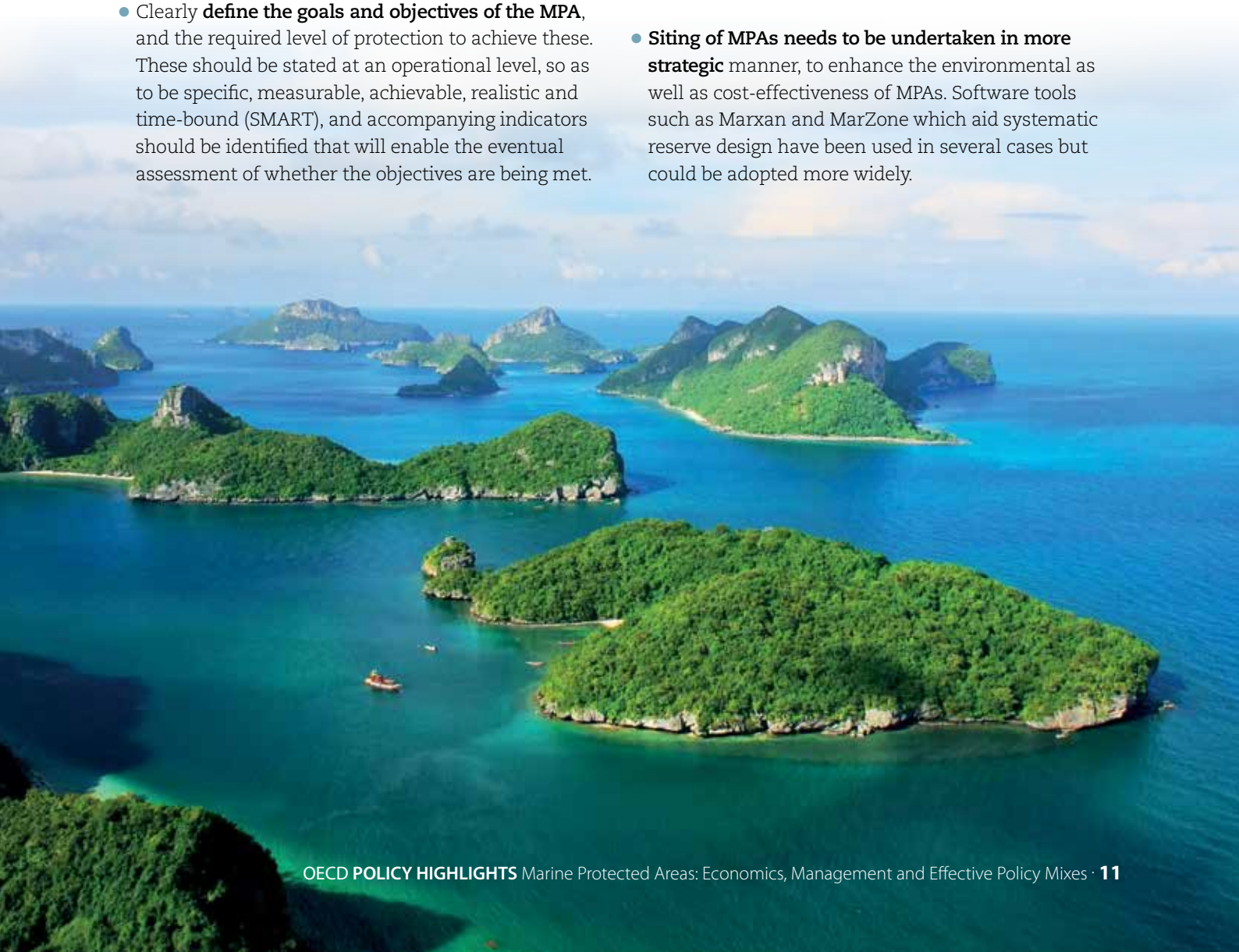
The EU sees marine spatial planning as a fundamental requirement for the integrated management of a growing and increasingly competitive maritime economy, while at the same time safeguarding marine biodiversity. The EU Marine Strategy Framework Directive , the environmental pillar of the EU Maritime Policy, introduced the principle of ecosystem-based marine spatial planning and provides a supportive framework for national initiatives toward spatial planning, designed for achieving a good status for the environment.

EU members have their own policy instruments to implement and comply with those at the EU level. For example, in the United Kingdom, marine plans (inshore and offshore) are required for all English seas by 2021 to plan for sustainable use of marine resources. This includes designating areas as European Marine Sites (Special Areas of Conservation and Special Protection Areas), Sites of Special Scientific Interest with marine components, and Marine Conservation Zones. There is also a marine licensing system to prevent pollution in UK seas, and a number of land-based policies that affect sea water quality, including the UK Farm Waste Grant Scheme, the Nitrate Sensitive Areas Scheme, the Organic Farming Scheme, and the Voluntary Initiative on pesticides use.

7 Good practice insights for effective MPAs

Given the vastness, the multidimensionality and the ecological complexity of the oceans; the lack of internationally comparable and systematic indicators and databases that assess and report on MPA effectiveness; as well as the mounting pressures on marine ecosystems, it is not possible to say that all MPAs have been effective in achieving their objectives. Many have been effective or partially so, though weaknesses still remain. There is increasing evidence to suggest that the benefits of MPAs are considerable and that the costs of inaction will continue to rise if further corrective measures are not taken. Adopting a precautionary approach in this context is therefore also relevant. Good practice insights for more effective MPAs include:

- Develop a **clear understanding of the state of and pressures on particular marine and coastal ecosystems**, the likelihood that MPAs can address these, and the range of stakeholders involved.
- Clearly **define the goals and objectives of the MPA**, and the required level of protection to achieve these. These should be stated at an operational level, so as to be specific, measurable, achievable, realistic and time-bound (SMART), and accompanying indicators should be identified that will enable the eventual assessment of whether the objectives are being met.
- **Estimate the expected costs and benefits of MPAs**. While studies evaluating the costs and benefits of MPAs do exist, in general economic valuation is not yet widespread and is not being used to help inform the design and implementation of MPAs.
- **Siting of MPAs needs to be undertaken in more strategic** manner, to enhance the environmental as well as cost-effectiveness of MPAs. Software tools such as Marxan and MarZone which aid systematic reserve design have been used in several cases but could be adopted more widely.



- Develop an **MPA management plan**, establish a baseline and monitor ecological and socio-economic data to assess trends in performance over time. This has often not been undertaken as rigorously as needed. Challenges encountered include lack of sufficient human and financial resources, equipment and infrastructure.

- **Monitoring** protocols can help to provide guidance to MPA managers, as well as to streamline monitoring methods across MPAs so as to facilitate comparison.

- **Reporting** via the creation of national or regional on-line databases with publicly available information increases transparency and enables the sharing of information and lessons learned across different MPAs, their respective management approaches, and their effectiveness in achieving intended goals.

- **Compliance and enforcement** methods also vary substantially across MPAs, with existing studies suggesting that few MPAs have a robust compliance and enforcement regime in place. Understanding the motivations behind non-compliance can help to determine the most appropriate measures to address these.

- **MPA financing strategies**, which include identifying the financing needs and the possible instruments through which additional finance can be mobilised, should form an integral component of an MPA management plan. In cases where government budget is unlikely to be sufficient to ensure the effective management of an MPA, other instruments such as user fees, trust funds, taxes on activities that are harmful to marine biodiversity, and payments for ecosystem services, amongst others, can be explored.

- **Put in place effective policy mixes** that can meaningfully address the full range of pressures on marine biodiversity and ecosystems. While MPAs are an important component of this, they are not sufficient to ensure that the broader environmental goal is met. Complementary instruments need to be in place to manage pressures such as over-fishing, marine pollution (including from land-based sources), climate change, and invasive alien species. A comprehensive package of policy measures is needed to ensure the sustainable use of marine resources, including policies that lie beyond the mandates of environment ministries (Box 2).

Box 2. THE NEED FOR POLICY COHERENCE AND THE SUSTAINABLE DEVELOPMENT GOALS

Embedding MPA design issues into other policy approaches, such as Marine Spatial Planning and ecosystem-based management approaches, and establishing inter-Ministerial Committees to develop national marine and coastal development strategies, bring together multiple stakeholders. This can help to ensure a better understanding of the costs and benefits of decisions to different users (i.e. the winners and losers), and the possible transitional measures needed to address any vulnerable groups most adversely affected. Such measures can help to address political economy issues that arise e.g. between conservation and fishing communities, and can also help to foster policy coherence. This is a fundamental component of any strategy that can meaningfully contribute to the achievement of the Sustainable Development Goals, including those for oceans and marine biodiversity, for food security, and for poverty alleviation.

References

Agnew, D.J. et al. (2009), "Estimating the worldwide extent of illegal fishing", *PLoS ONE* 4(2), Cambridge.

Ban, N.C. et al. (2011), "Designing, implementing and managing marine protected areas: Emerging trends and opportunities for coral reef nations", *Journal of Experimental Marine Biology and Ecology*, 408:21-31, Elsevier, Amsterdam.

Bijma, J. et al. (2013), "Climate change and the oceans - What does the future hold?", *Marine Pollution Bulletin*, Elsevier, Amsterdam.

Brander, L. et al. (2015), *The Benefits to People of Expanding of Marine Protected Areas*, IVM Institute for Environmental Studies, Amsterdam.

Devillers, R. et al. (2014), "Reinventing residual reserves in the sea: Are we favouring ease of establishment over need for protection?", *Aquatic Conservation: Marine and Freshwater Ecosystems*, 25 (4): 480-504, John Wiley & Sons Ltd, New Jersey.

Doney, S.C. et al. (2012), "Climate Change Impacts on Marine Ecosystems", *Annual Review of Marine Science*, 4:11-37, Annual Reviews, Palo Alto.

Edgar, G.J. (2011), "Does the global network of marine protected areas provide an adequate safety net for marine biodiversity?", *Aquatic Conservation: Marine Freshwater Ecosystems*, 21: 313-316, John Wiley & Sons Ltd, New Jersey.

FAO (2016), *The State of World Fisheries and Aquaculture*, Food and Agriculture Organization, Rome.

Kaiser, B. and J. Roumasset (2002), "Valuing indirect ecosystem services: The case of tropical watersheds", *Environment and Development Economics*, 4: 701-714, Cambridge University Press, Cambridge.

McCrea-Strub, A. et al. (2011), "Understanding the cost of establishing marine protected areas", *Marine Policy*, 35: 1-9, Elsevier, Amsterdam.

OECD (2016), *The Ocean Economy to 2030*, OECD Publishing, Paris, http://dx.doi.org/10.1787/9789264251724-en.

Thomas, H.L. et al. (2014), "Evaluating official marine protected area coverage for Aichi Target 11: Appraising the data and methods that define our progress", *Aquatic Conservation: Marine and Freshwater Ecosystems*, 24 (Suppl. 2), John Wiley & Sons Ltd, New Jersey.

UNDP (2012), *Catalysing Ocean Finance Volume I Transforming Markets to Restore and Protect the Global Ocean*, United Nations Development Programme, New York.

UNEP (2011), *Towards a Green Economy: pathways to sustainable development and poverty eradication* (a synthesis for policy makers), United Nations Environment Programme, Nairobi.

Watson, J.E.M. et al. (2014), "The performance and potential of protected areas", *Nature*, 515: 67-73, Nature Publishing Group, London.

Intense exploitation of the oceans has degraded marine biodiversity and ecosystems to a severe extent, despite the suite of policy instruments available to address pressures on the marine environment. The OECD publication *Marine Protected Areas: Economics, Management and Effective Policy Mixes* presents insights for effectively managing marine protected areas (MPAs), one of the policy instruments available for the conservation and sustainable use of marine biodiversity and ecosystems. While global coverage of MPAs has been increasing over the past two decades, the collective response must be significantly scaled up and improved.

Drawing on available literature and numerous examples from developed and developing countries, the book highlights effective design and implementation of MPAs, so as to enhance their environmental and cost effectiveness. It covers a broad range of issues including more strategic siting of MPAs, monitoring and compliance, sustainable finance for MPAs, and the need to embed these in a wider policy mix so as to address the multiple pressures on marine ecosystems.

For further reading see the following publication on which these Policy Highlights are based:
OECD (2017), *Marine Protected Areas: Economics, Management and Effective Policy Mixes*, OECD Publishing, Paris.
http://dx.doi.org/10.1787/9789264276208-en

Other reading:
OECD (forthcoming, 2018), *Biodiversity and Development: Mainstreaming and Managing for Results*, OECD Publishing, Paris.

OECD (2016), *The Ocean Economy in 2030*, OECD Publishing, Paris.
http://dx.doi.org/10.1787/9789264251724-en

OECD (2015), *Green Growth in Fisheries and Aquaculture*, OECD Publishing, Paris. http://dx.doi.org/10.1787/9789264232143-en

OECD (2013), *Scaling Up Finance Mechanisms for Biodiversity*, OECD Publishing, Paris.
http://dx.doi.org/10.1787/9789264193833-en

OECD (2010), *Paying for Biodiversity: Enhancing the Cost-Effectiveness of Payments for Ecosystem Services*, OECD Publishing, Paris.
http://dx.doi.org/10.1787/9789264090279-en

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OECD Environment Directorate,
December 2016