

8 Marine management – aspiration and reality

> Humankind has divided the ocean into artificial zones in order to lay sole claim to specific areas and their resources. Species and water masses, however, migrate undisturbed across the borders of these zones, as do heat, pollutants and litter. Successful marine management therefore requires collective solutions, which must be based on transnational, cross-sectoral thinking and aim for the protection and sustainable use of the seas.



A constitution for the seas

> Who owns the sea? Humans have been asking this question ever since they began to compete with one another over fishing rights or shipping routes. For almost four decades, a legally binding answer has been enshrined in the United Nations Convention on the Law of the Sea. It regulates who has jurisdiction over specific activities in the various maritime zones and obliges all actors to protect the marine environment – with little success so far, in the latter case, due to the failure to fully implement the Convention's provisions.

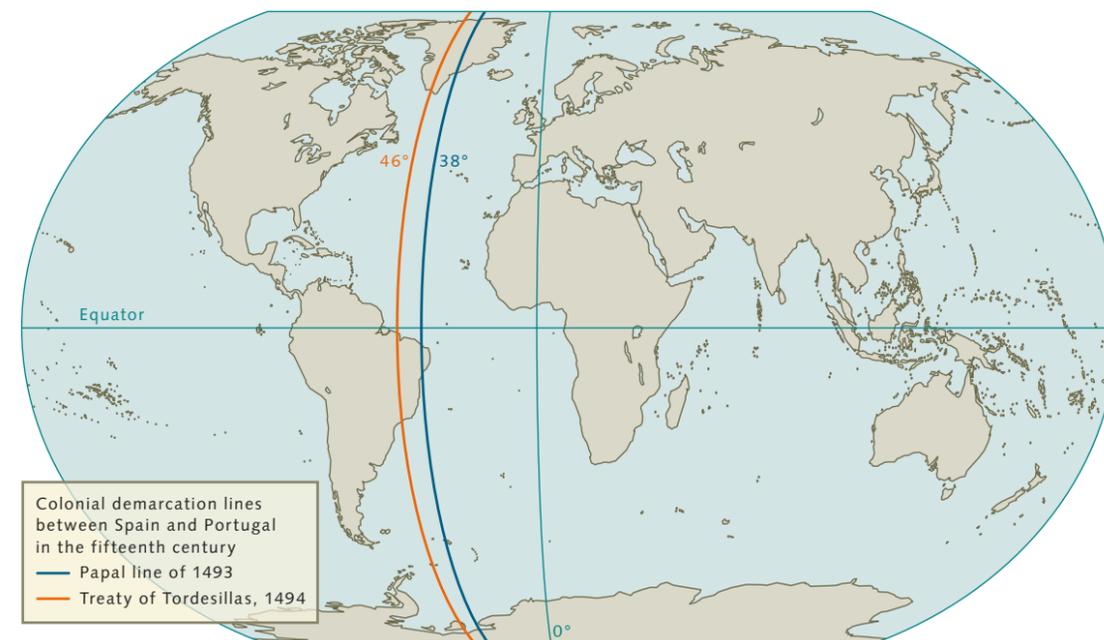
The origins of the law of the sea

December 2022 will mark 40 years since the international community agreed the United Nations Convention on the Law of the Sea (UNCLOS). The adoption of this major convention governing the use of the oceans is regarded as a historic milestone, for it answers the question of who may lay claim to the sea and its resources and thus establishes the basis for its collective and sustainable management under international law.

Progress towards the Convention was slow and fraught with difficulty, however. The origins of the international law of the sea date back to the time of the Roman Empire. In 529 AD, the Roman Emperor Justinian I decreed that the sea, like the air, was common to all and that no one may lay

claim to it; it may thus be used by everyone. This quickly became the universal view; however, attitudes changed in the Middle Ages, when coastal states began to exercise sovereignty over the coastal waters adjacent to their kingdoms or territories. This development culminated in the signing of the Treaty of Tordesillas – a city in northern Spain – by seafaring nations Portugal and Spain on 7 June 1494. With the blessing of Pope Alexander VI, these two countries divided up the world and its oceans between them along a north-to-south meridian, with Spain receiving all the sea areas in the western Atlantic, the Pacific and the Gulf of Mexico and Portugal being granted the eastern and southern Atlantic and the Indian Ocean.

Just 100 years later, the treaty was largely obsolete: the Reformation, initiated by Martin Luther, had split



8.1 > At the end of the fifteenth century, two maritime powers, Portugal and Spain, wielded such huge influence that Pope Alexander VI shared out the world between them. Territories to the west of the blue line in the Atlantic were awarded to Spain, and those to the east, to Portugal. The demarcation line was adjusted in the Treaty of Tordesillas.

the Church, and Protestant England and the Netherlands were now vying to establish themselves as seafaring nations and colonial powers alongside Catholic Spain and Portugal and were seeking to trade with territories overseas. The Treaty of Tordesillas was an obstacle to their endeavours. It prevented the Netherlands, for example, from sending ships across the Indian Ocean to its colony in the East Indies (now Indonesia). The dispute escalated when the Netherlands captured a vessel from the Portuguese in 1603. In order to provide a measure of post hoc justification for the attack, for which it was responsible, the United East India Company (Vereenigde Oost-Indische Compagnie – VOC) commissioned one of the country's best lawyers to produce a legal appraisal of the incident. The lawyer's name was Hugo Grotius (1583-1645).

Born in Delft in the Netherlands on 10 April 1583, Hugo Grotius was soon acclaimed as a child prodigy. At the age of 11, he was permitted to enrol at university; upon completing his studies just four years later at the age of 15, he went on to become a lawyer and diplomat. Grotius was happy to accede to the East India Company's request and composed a legal treatise, only one chapter of which would be published during his lifetime. In this treatise, entitled *Mare liberum* ("the free sea"), Grotius expounded his theory that unlike the land, the sea could be neither occupied nor defended by anyone; every nation should therefore have unrestricted access to the ocean and be free to use it.

A counter-opinion was presented by the English scholar John Selden (1584-1654) in 1635. In two volumes entitled *Mare clausum* ("the closed sea"), Selden defended the legal right of the English monarchy to dominion over all waters around the British Isles, concluding from this that among other things, this gave England exclusive fishing rights in these waters. On this basis, according to Selden's argument, the English monarchy also had the right to require foreign fishermen to acquire licences and pay taxes in order to fish in English waters. John Selden thus placed the interests of the coastal state above the principle of the "free sea" which everyone could use.



The concepts of *Mare liberum* and *Mare clausum* propounded by Grotius and Selden, respectively, are still in use among experts in the law of the sea to this day: the former when the principle of the "free sea" is at stake, and the latter when national claims to jurisdiction over areas of the sea are at issue. In practice, however, the principle of the "free sea" has applied since the 17th century, albeit limited by the three-mile zone. This concept was developed by the Dutch jurist Cornelis van Bynkershoek (1673-1743), who posited that a state should be able to exercise sovereign jurisdiction over the area of their coastal waters which they could defend with a cannon shot from the land. At that time, the range of a cannon was approxima-

8.2 > The Dutch jurist and diplomat Hugo Grotius argued that the sea was no one's property; all nations should therefore have free access to the ocean.

JOHN

SELDEN.



8.3 > The English scholar John Selden took a dispute over fishing rights as an opportunity to proclaim the British monarchy's dominion over all waters around the British Isles. He thus placed the interests of the coastal state above the principle that the seas were free for every nation to use.

tely three nautical miles (equivalent to 5.6 kilometres). Although this three-mile rule was never enshrined in writing, it was accepted by so many states that it soon came to be recognized as customary law.

As the coastal states steadily gained the ability to exercise effective control of the sea far outside the range of a cannon shot, the three-mile breadth of the territorial sea was increasingly called into question. In the first half of the 20th century, ever more states began to extend their claims to jurisdiction. These numerous “go-it-alone” approaches sparked tensions between coastal states and seafaring nations. If the breadth of waters under national jurisdiction were extended, this would create the risk that more than 100 straits and shipping routes of major significance worldwide would fall under exclusively national control – including hotspots of commercial shipping such as the Strait of Gibraltar. Alarmed that a multitude of diverse national rules for the territorial sea would make international shipping, fishing and resource extraction infinitely more complicated, the seafaring nations became fervent champions of freedom of the seas. Other voices entered the debate, calling for nation-states’ rights to regulate in the territorial sea to be limited to specific topics: rules to protect the marine environment from pollution caused by shipping accidents, discharges from ships or fuel leaks, for example. Other experts, in turn, argued that coastal states should be permitted to regulate all human activities within their territorial waters.

In order to introduce a measure of agreement and order into this confusion of interests, the United Nations convened three successive international conferences on the law of the sea. The first of these conferences, held in Geneva, Switzerland, in 1958, was attended by 86 states. Together, they adopted four Geneva Conventions, thereby establishing a set of general rules governing the delimitation and exploitation of maritime areas and laying the key foundations for a collectively binding legal regime for the maritime space. The four agreements, known as the Geneva Conventions on the Law of the Sea, covered: (1) the territorial sea and the contiguous zone; (2) the high seas; (3) fishing and conservation of the living resources of the high seas; and (4) the continental shelf.

The second conference took place in 1960, again in Geneva. This time, the objective was to reach agreement on the territorial sea and fishery limits. The negotiations proved inconclusive, however. Among other things, the participating states proved unable, at that time, to reach agreement on the breadth of the territorial sea and thus failed to clarify one of the most pressing issues of the day. In 1973, the United Nations convened a further conference on the law of the sea, this time in New York, in order to consider aspects of marine mining. However, the 160 participating nations seized the opportunity afforded by the meeting to rewrite the rules on the use of the ocean. The process took a full nine years. After 11 sessions and a total of 585 days of deliberations, the international community signed the new constitution for the seas – the United Nations Convention on the Law of the Sea (UNCLOS) – in Montego Bay, Jamaica, on 10 December 1982. The Convention entered into force on 16 November 1994.

A convention like no other

The United Nations Convention on the Law of the Sea (UNCLOS) is perhaps the most complex and comprehensive international treaty ever concluded. It comprises 17 parts with a total of 320 articles, as well as an additional nine annexes containing supplementary provisions. It not only draws together the Geneva Conventions – the “old” law of the sea, which continues to apply – in a single unified treaty. It also divides the sea into various legal zones, regulates the use of these areas, e.g. for shipping, fishing and marine scientific research, includes provisions on seabed mining and the protection of the marine environment, and stipulates how disputes between two or more Parties are to be settled.

Four new institutions were established under the Convention for these and other purposes:

1. the International Tribunal for the Law of the Sea (ITLOS) in Hamburg, Germany; the Tribunal’s jurisdiction is limited to legal disputes concerning the interpretation and application of the Convention;



8.4 > The judges at the International Tribunal for the Law of the Sea (ITLOS) in Hamburg rule solely on legal disputes concerning the interpretation and application of the United Nations Convention on the Law of the Sea.

2. the Commission on the Limits of the Continental Shelf (CLCS), which convenes in New York;
3. the International Seabed Authority (ISA) in Kingston, Jamaica;
4. the regular Meetings of State Parties to the Convention.

In addition, two supplementary agreements which deal with implementation currently exist:

- the Agreement relating to the Implementation of Part XI of the United Nations Convention on the Law of the Sea (abbreviated to “Deep Seabed Agreement”). This Agreement was adopted on 28 July 1994 and contains detailed provisions on mining in areas beyond national jurisdiction;
- the Agreement for the Implementation of the Provisions of the United Nations Convention on the Law of the Sea of 10 December 1982 relating to the Conservation and Management of Straddling Fish Stocks and Highly Migratory Fish Stocks (Fish Stocks Agreement). This Agreement was adopted on 4 December 1995 and limits all Parties’ freedom of fishing in respect of highly migratory fish stocks and stocks in areas under and beyond national jurisdiction.

A third implementing agreement on the conservation and sustainable use of marine biological diversity in international waters, i.e. marine biodiversity in areas beyond national jurisdiction (BBNJ) is currently being negotiated by the international community. The aim is to establish a binding legal framework which draws together the many existing individual measures on the conservation of biodiversity and ensures the protection and sustainable use of ecosystems in the high seas on a cross-sectoral basis. Responsibility for this topic is currently divided among multiple agencies, including the International Maritime Organization (IMO) and the regional fisheries management organizations (RFMOs). In all cases, however, their jurisdiction is limited. There is also a lack of common guidelines and progress based on effective interinstitutional cooperation at all levels and across sectors. The new implementing agreement is intended to rectify this situation.

The rules and obligations set forth in the United Nations Convention on the Law of the Sea apply first and foremost to the 168 Parties, which include the EU (as at May 2021). However, most of the provisions are also binding on states which have not acceded to the Convention, including the US, as they constitute a body of established customary law which has been recognized and applied by these countries over a period of almost 40 years.

Dividing up the ocean

The United Nations Convention on the Law of the Sea attempts to achieve a balance between the interests of the nation-states and the freedom of the seas and defines various maritime zones and the corresponding extent of certain sovereign rights of the coastal states. These zones are:

- internal waters and the territorial sea,
- the contiguous zone,
- the exclusive economic zone,
- the continental shelf,
- the high seas and the Area.

Internal waters and the territorial sea

Saline waters landward of the baseline or low-water mark are defined as internal waters. The territorial sea, by contrast, is on the seaward side of the baseline and extends for up to 12 nautical miles (one nautical mile is 1852 metres). States have complete sovereignty over their internal waters because – like the territorial sea – they form part of its territory. Nations also have wide-ranging sovereignty over their territorial sea; this includes rights

to the airspace, the water column, the seabed and the ground below the seabed. However, a coastal state may not prohibit the innocent passage of foreign ships through its territorial sea.

Passage is considered innocent if, while passing through the territorial sea, the ship in question does not use or threaten violence, does not spy on the coastal state and does not at any time pose a threat to the security of the coastal state in any other way. The United Nations Convention on the Law of the Sea defines potential threats in detail: for example, submarines must surface for the passage and hoist their flag. The Convention also prohibits unlawful discharges and other forms of marine pollution. The coastal state may designate shipping channels that must be used for passage and can levy charges if it provides services that enhance the safety of shipping. However, when designating shipping channels and traffic separation schemes, it must heed the recommendations of the International Maritime Organization (IMO).

Article 37 of the Convention on the Law of the Sea stipulates that the coastal state must grant foreign ships right of transit passage if the territorial sea is part of a strait or waterway that links parts of the high seas or different



8.5 > On 24 October 2014, German Foreign Minister Frank-Walter Steinmeier (right) and his Dutch counterpart Bert Koenders signed the German-Netherlands Treaty on the Use and Management of the Territorial Sea between Three and Twelve Nautical Miles from the Coast (known as the Ems-Dollart Treaty).

exclusive economic zones with each other and is used by international shipping. Coastal states have less scope for restricting the right of transit passage than for curbing innocent passage: in principle, transiting ships have the same freedom as on the high seas. Transit passage can be suspended or restricted only in the event of the threat or exercise of military force by the ship. Submarines can be submerged while passing through straits.

Defining boundaries in the territorial sea can become a contentious political issue. Germany and the Netherlands, for example, have been wrangling for decades over the precise delineation of the national border in the territorial sea. The two countries did not reach agreement until 2014, when they signed the German-Netherlands Treaty on the Use and Management of the Territorial Sea between Three and Twelve Nautical Miles from the Coast (known as the Ems-Dollart Treaty). Under its provisions, the two states maintain their divergent legal standpoints regarding the delineation of the national border in the

territorial sea, but agreed a joint system for the management of maritime traffic in the navigation channel to and from their ports along the Ems.

Furthermore, under the terms of the Treaty, the Westerems Commission was established as a permanent commission to deal with shipping matters in the navigation channel, including decision-making on the precise route of the channel. With regard to non-living natural resources and the construction of installations, e.g. for renewable energy generation, the two parties reached agreement on a demarcation line to assist in determining which system of national law is applicable. The Netherlands has jurisdiction on the western side, while Germany has jurisdiction on the eastern side of the line.

The contiguous zone and exclusive economic zone

The contiguous zone adjoins the territorial sea, extending a maximum of 24 nautical miles beyond the low-water line. In this zone, coastal states may exercise certain

powers of inspection and, for example, enforce customs regulations vis-à-vis third countries. Beyond the contiguous zone is the exclusive economic zone (EEZ), which can extend up to 200 nautical miles from the low-water line. This zone does not form part of the coastal state's sovereign territory. However, the coastal state has exclusive rights to fish in this area, to extract resources, to engage in marine mining and to approve, erect and operate artificial islands and installations such as oil drilling platforms and offshore wind farms. In this zone, the coastal state also has jurisdiction over marine conservation and marine research. This means that foreign states must obtain the consent of the coastal state if they wish to conduct scientific studies in the exclusive economic zone. However, the Convention makes it clear that a coastal state may not assert any territorial claims to any part of the exclusive economic zone; in other words, it may not seek to incorporate the EEZ into its national territory. Third countries have freedom of navigation in this area and may also lay submarine cables and pipelines here. When doing so, however, they must take account of existing structures.

The continental shelf

The United Nations Convention on the Law of the Sea sets out special rules on the continental shelf, which in large part lies below the exclusive economic zone, but is regarded as a separate marine zone. A coastal state has exclusive rights within the entire continental shelf area provided that it lies within the 200-nautical-mile limit. Under the law of the sea, every coastal state is entitled to a continental shelf of up to 200 nautical miles, even if in geological terms the shelf is narrower than this. If the geological continental shelf extends beyond this 200-nautical-mile limit – which is the case with an estimated 85 coastal states – the coastal state may, under Article 76 of the Convention on the Law of the Sea, extend the outer limit of the shelf.

To do so it must make a submission to the Commission on the Limits of the Continental Shelf (CLCS), setting out the scientific data that show that the relevant part of the seabed and subsoil thereof constitute a natural prolonga-

tion of its continental margin. As a result of this requirement, the continental margins are now some of the most comprehensively surveyed areas of the sea, with detailed data available on the topography and geology of the sea floor here. Elsewhere, particularly in the deep sea zones, there are still many large areas of white on the maps of the seafloor. By June 2021, just 20.6 per cent of the global seafloor had been mapped.

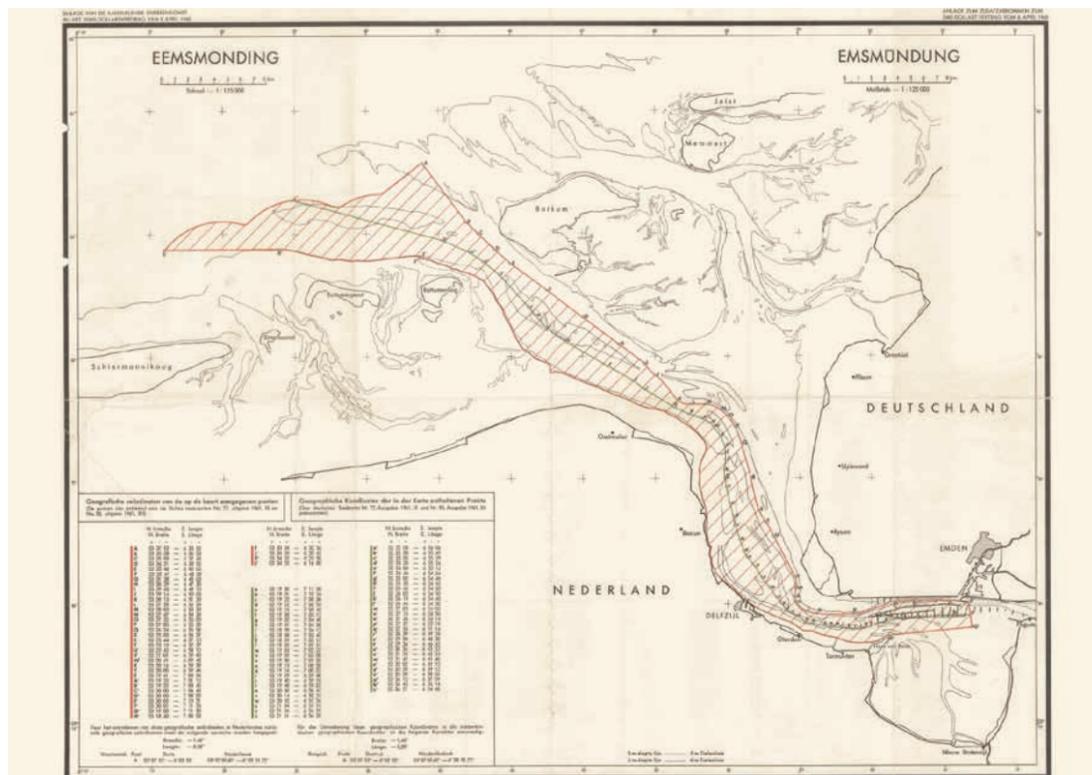
The extended continental shelf is an area of jurisdiction in which only the coastal state has the right to explore and exploit the natural resources of the seabed. The coastal state is, however, required to pay royalties from the profits generated by marine mining in these areas to the International Seabed Authority. Freedom of fishing and freedom of maritime navigation apply in the waters above the extended continental shelf.

However, there are legal limits to the extension of the continental shelf: the new outer limit of the continental shelf must not be more than 350 nautical miles from the coastal state's baseline or more than 100 nautical miles from the 2500-metre isobath. A combination of the two methods is permitted.

In the Arctic, where the coastal states have been making overlapping territorial claims for decades, the delimitation of boundaries is complicated by the fact that three underwater ridges – the Lomonosov Ridge, the Gakkel Ridge and the Alpha-Mendelev Ridge – run along the floor of the Arctic Ocean. A special provision in the Convention on the Law of the Sea therefore applies: Article 76 of the Convention distinguishes between submarine ridges and submarine elevations.

Depending on whether a ridge or an elevation is joined to a coastal state's continental shelf, different rules apply. If parts of the continental shelf run over a submarine ridge, only the 350-nautical-mile rule can be applied; the rule on the 2500-metre isobath cannot be invoked. However, if the continental shelf extends over a submarine elevation, both rules apply, since it is assumed that the submarine elevation will generally consist of the same material as the continental shelf. Submarine ridges, by contrast, usually consist of volcanic rock and are therefore of a different material from the continental shelf.

8.6 > The dispute between Germany and the Netherlands in the territorial sea stems from their divergent views regarding the delineation of the national border in the Ems estuary. While the Netherlands draws the border along the deepest points in the river, Germany refers to a letter of feoffment dating back to 1464, which places the border along the western low-water line of the Ems. As a pragmatic solution, in operation since 1960, the two countries have agreed an area of shared use in the territorial sea up to three nautical miles (and up to 12 nautical miles since 2014) with a clear midline (since 1962); the treaty between the two countries defines their respective responsibilities in relation to various management issues.



Baseline

The baseline is normally the low-water mark – in other words, the lowest point reached by the sea at low tide – as marked on officially recognized nautical charts. However, as a standard nautical chart zero does not exist at the international level and the position and course of all low-water marks have never been formally established, the data used by coastal states to plot the baseline vary considerably. In the case of estuaries, islands along the coast or deeply indented or highly unstable coastlines, baselines may be plotted using natural points along the furthest seaward extent of the low-water line (promontories, fringes of islands, etc.).

8.7 > A Somali pirate by the wreck of a Taiwanese fishing boat which he and several other men have hijacked. Suspected piracy and human trafficking are two of the few circumstances in which the United Nations Convention on the Law of the Sea (UNCLOS) permits the use of force on the high seas.



These complex rules in the Convention on the Law of the Sea hamper the work of the Commission on the Limits of the Continental Shelf. The Commission considers all submitted applications and makes a recommendation. If the coastal state adjusts the outer limit of its extended economic zone in accordance with the recommendation, this outer limit is final and binding. What is not clear is what happens if a coastal state opposes the Commission's recommendation and sets an outer limit that is not in accordance with the recommendation. The Commission is not a body with judicial powers: its purpose is only to ensure that the delimitation of boundaries complies with scientific standards.

As the Commission is chronically underfunded, it generally takes several years, and in some cases several decades, to consider an application and reach a decision. Moreover, the Commission is not responsible for situations in which two coastal states with opposing or adjacent coastlines argue over the precise boundary of their

continental shelves or over overlapping areas to which they lay claim. In such cases, the Convention on the Law of the Sea requires the countries involved to conclude one or more boundary agreements. In other words, the states concerned have to sort out these disputes among themselves. If this were to fail, the dispute could be settled by an international court such as the International Court of Justice or the International Tribunal for the Law of the Sea – provided that the countries involved recognize its jurisdiction.

In the Arctic, the willingness of the coastal states to negotiate and compromise has in the past enabled many disputes over boundaries and territories to be resolved. In September 2010, for example, Norway and Russia signed a cooperation agreement that put an end to four decades of argument over the boundary of their adjacent economic zones and continental shelves in the mineral- and resource-rich Barents Sea. The boundary that has been agreed gives equal weight to the claims of both countries.

The two parties also agreed that any new, as yet undiscovered resource deposits that straddle the boundary would be exploited jointly.

The delimitation of the continental shelf in the North Sea was also a subject of dispute for many years. Here, the European continental shelf is almost entirely covered by the sea. The International Court of Justice therefore instructed the parties to the dispute to agree a workable solution which ensured that each party would be granted all parts of the continental shelf that constituted a natural prolongation of its land territory in or under the sea, insofar as this was possible without detriment to the natural continuation of the land territory of another party. In 1972, the Federal Republic of Germany concluded an agreement with Denmark, the United Kingdom and the Netherlands on the delimitation on the continental shelf.

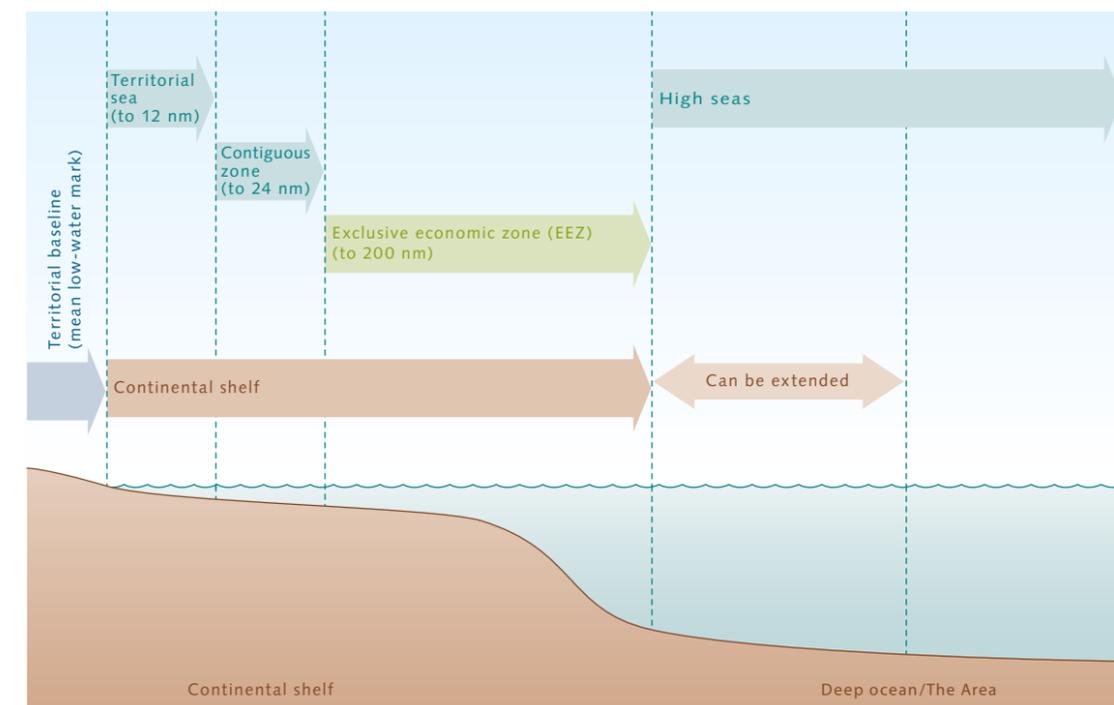
The high seas

The high seas commence at the outer limit of the exclusive economic zone. The term “high seas” applies to the entire

water column but does not include the seabed. Experts in international law describe the high seas as “global commons”, for they are open for use by all states on an equal basis. No state may claim sovereign rights over, or appropriate, any part of the high seas.

Within the limits of the high seas, all states have the freedom of the high seas: among other things, this means that ships have free passage and aircraft have the right to overfly. In addition, anyone can fish or conduct research in these areas, although certain aspects of freedom of fishing are now regulated in more detail by numerous international treaties and also by the Fish Stocks Agreement.

In accordance with the Convention, all human activities on the high seas must be peaceful in nature. However, all states have a duty to repress piracy and human trafficking. Furthermore, with the exception of marine distress signals, all ships are prohibited from engaging in unauthorized broadcasting, defined as the transmission of sound radio or television broadcasts, on the high seas intended for reception by the general public. Warships may not seize any other vessel unless there are grounds to



8.8 > The United Nations Convention on the Law of the Sea (UNCLOS) divides the sea into various legal zones, with the state's sovereignty decreasing with increasing distance from the baseline. See table overleaf.

	Maritime zone	Extent of coastal state's jurisdiction	Rights of third countries / Freedom of the seas
Part of the national territory	Internal waters Waters between dry land and the baseline of a coastal state.	<ul style="list-style-type: none"> Subject to the coastal state's complete territorial jurisdiction; No right of innocent passage; A ship entering another state's internal waters falls within the territorial jurisdiction of the coastal or port state; A state may reserve rights of fishing and cabotage (the operation of passenger and goods transport services between inland ports) for its own nationals. 	
	The territorial sea Breadth up to 12 nautical miles on the seaward side of the baseline or low-water mark.	<ul style="list-style-type: none"> The coastal state has sovereign rights to the airspace, the water column, the seabed and the ground below the seabed; The coastal state defines environmental provisions, may provide for the safety of shipping and may designate shipping channels; The coastal state has certain limited rights of intervention in respect of shipping and may levy charges for providing certain services (e.g. towage). 	Right of innocent passage, including for warships on peaceful missions; submarines must surface for the passage and hoist their flag.
Zones that are not part of the national territory (i.e. zones of coastal state functional jurisdiction)	The contiguous zone Breadth may not exceed 12 nautical miles; outer limit may not extend more than 24 nautical miles from the baseline; zone does not include the airspace.	<ul style="list-style-type: none"> The coastal state is granted rights of inspection, precedence or monopoly status vis-à-vis other states and their nationals, but only for a specific segment of jurisdiction; The coastal state has rights of inspection necessary to prevent and prosecute violations of the financial, immigration or health regulations applicable on its national territory. 	
	Exclusive economic zone (EEZ) Breadth up to 200 nautical miles from the baseline; zone does not include the airspace.	<ul style="list-style-type: none"> The coastal state has certain exclusive rights and sovereign powers; The coastal state has sovereign rights for the purpose of exploring and exploiting, conserving and managing the natural resources, whether living or non-living; almost all economically relevant activities are reserved for the coastal state, including fishing, wind power generation, resource extraction, mining; Right to conduct maritime spatial planning; Duty to conserve fish stocks living in the EEZ and to take measures against illegal fishing. 	Rights of third countries: <ul style="list-style-type: none"> freedom of navigation, freedom of overflight, freedom to lay submarine cables and pipelines, and other internationally lawful uses of the sea related to these freedoms.

	Continental shelf comprises the seabed that extends throughout the natural prolongation of the land territory to the outer edge of the continental margin; the extended continental shelf must not be more than 350 nautical miles from the baseline or more than 100 nautical miles from the 2500-metre isobath.	<ul style="list-style-type: none"> The coastal state exercises sovereign rights over the continental shelf for the purpose of exploring it and exploiting its natural resources (monopoly of exploration and exploitation); however, the right to prohibit marine scientific research on the extended continental shelf (beyond 200 nautical miles) is limited; A coastal state is required to make payments in respect of the exploitation of the resources of the extended continental shelf beyond the 200-mile limit; a developing state which is a net importer of a mineral resource produced from its continental shelf is exempt from making such payments; The coastal state has the exclusive right to authorize and regulate drilling on the continental shelf for all purposes and to establish artificial islands, installations and structures (e.g. wind farms). 	Waters above the extended continental shelf form part of the high seas. Rights of third countries: <ul style="list-style-type: none"> Freedom of fishing, Scientific research in the water column, Navigation, Overflight, Laying of submarine cables and pipelines, and other internationally lawful uses of the sea related to these freedoms.
Zones that are not part of the national territory (i.e. zones of coastal state functional jurisdiction)	High seas Directly adjacent to the EEZ; comprises the water column but not the seabed.	<ul style="list-style-type: none"> No exclusive rights of use; No state may claim sovereignty over the high seas or parts thereof; Consideration is imperative: all states must contribute to the conservation of the living resources of the high seas; The threat and use of force are prohibited on the high seas, which are reserved for peaceful purposes; Ships on the high seas are subject to the jurisdiction of their flag state; On the high seas, any state may take measures against ships that are engaged in piracy or slavery or misuse their flag. 	<ul style="list-style-type: none"> Prohibition of appropriation: no one may lay claim to the high seas; Freedom of use for all interested parties on an equal basis, with due regard for the interests of other states and the activities conducted within the framework of seabed mining far from the coasts; Freedom of navigation (may be restricted by rules adopted by regional fisheries management organizations); in situations of competition, the first comer has right of access; Freedom of overflight, freedom to lay cables and pipelines; Freedom to construct artificial islands.
	The Area The seabed and ocean floor and subsoil thereof, beyond the limits of national jurisdiction, which have been declared part of the common heritage of mankind.	<ul style="list-style-type: none"> Prohibition of appropriation: No state may claim or exercise sovereignty or sovereign rights over the Area or parts thereof. 	<ul style="list-style-type: none"> No unauthorized use of the Area and its mineral resources; permission is required for all activities (except for prospecting for mineral resources); Exploration, use and exploitation of, and revenue from, this Area beyond national jurisdiction and its resources should benefit everyone, including non-industrialized countries and future generations; activities in the Area should therefore be conducted in a manner which protects the environment, resources and markets; ISA to safeguard compliance with all legal requirements.

suspect piracy, human trafficking (slavery) or other offences subject to penalties under the Convention.

The Convention also establishes a duty of states to cooperate on the conservation and management of the living resources of the high seas, including, in particular, fish, marine mammals and seabirds. Decisions on species conservation and the management of resources should be taken on the basis of the best scientific evidence, the prerequisite being that this evidence is available to all states concerned.

The Parties' compliance with these and other marine conservation provisions set forth in the Convention is inadequate, however. It was therefore recognized some time ago that the principle of freedom of the high seas was not sufficient to hold Parties to account and ensure that they made adequate provision to protect the marine environment in international waters. In 2015, the United Nations General Assembly therefore voted to commence negotiations on a third implementing agreement, mentioned above, on the conservation and sustainable use of marine biological diversity in areas beyond national jurisdiction (BBNJ agreement), thus restricting the scope and freedom of the nation-states. This presupposes, of course, that the agreement is ultimately adopted and ratified by the member states.

The Area

The United Nations Convention on the Law of the Sea (UNCLOS) defines the "Area" as the seabed and ocean floor and subsoil thereof, beyond the limits of the continental shelf, as well as all the non-living resources contained therein. It is made clear that this definition does not include the water column or the air space above these waters. The Area and its mineral resources have been declared part of the common heritage of mankind and may be used solely for peaceful and beneficial purposes. Unlike the situation with the high seas, however, such use requires authorization, for which an application must be submitted to the International Seabed Authority, which oversees all human activity within the Area. All states have equal rights of access and benefit-sharing in respect of the Area and its resources. It is also important to note

that states are liable for all activities undertaken by their nationals within the Area.

Balancing interests – an ongoing process

On the face of it, the division of the ocean into the zones defined in the United Nations Convention on the Law of the Sea provides the clarity sought by all stakeholders. A closer look, however, reveals that as a result of the human demarcation of these artificial zones, a specific area of the sea may be subject to several different legal regimes, depending on the type of use. In the waters of the exclusive economic zone, for example, the coastal state has exclusive usage rights where fishing and the construction of wind energy installations are concerned. However, in this same maritime zone, the freedom of the high seas applies when topics such as sea rescues or anti-piracy measures are the main focus of interest.

The situation is complicated by the fact that nature itself pays no heed to these artificial boundaries: shoals of fish, for example, migrate freely between the zones. In some cases, this may mean that a multitude of agencies is responsible for the sustainable management of one and the same stock, whose survival can only be guaranteed if all these agencies work together. On the other hand this example shows that when it comes to the sustainable use of marine resources, the interests of the coastal states must constantly be weighed in the balance against the freedom of the seas. And decision-making is rarely straightforward, least of all when stress factors such as climate change impacts, pollution, noise, coastal development and resource extraction likewise make themselves felt across every inter-zonal boundary.

Regional seas conventions

The United Nations Convention on the Law of the Sea includes special provisions on inland seas (enclosed seas) and semi-enclosed seas. A number of highly significant stretches of water, including the Black Sea, the North Sea, the Baltic Sea, the Mediterranean, the Persian Gulf and the Gulf of Mexico, fall into this category. The Convention



8.9 > The United Nations Convention on the Law of the Sea (UNCLOS) includes special provisions on inland seas such as the Mediterranean: it obliges all the coastal states to cooperate on issues such as the protection of the marine environment, fishing, scientific research and relations with other states and international organizations.

requires the coastal states to cooperate in a number of thematic areas, with shared responsibility for fisheries management, the protection of the marine environment and scientific research in their respective waters; it also calls for their collaboration with other states and international organizations.

One example of this type of regional cooperation in the European context is the Helsinki Commission (HELCOM), a framework in which all nine Baltic Sea states and the European Union work together to develop strategies to protect the Baltic Sea. Core topics include the conservation of biodiversity, fisheries and shipping, pollutant discharges and eutrophication of the sea by riverine inputs or airborne deposition. The representatives of all the Baltic Sea states collaborate in five permanent working groups and in a multitude of expert groups and projects, and develop recommendations and strategies with the aim of restoring the ecological balance in the Baltic Sea. These recommendations and strategies are not legally binding, however: implementation is a matter for the Contracting Parties.

Regional seas conventions and action plans now exist in at least 18 sea areas worldwide. They are regarded as one of the key instruments in international marine management, often also known as “ocean governance”. The major advantage of regional conventions is that nations are often more willing to agree joint objectives and activities, and hence to cede some of their rights, at the regional level than in the much larger international arena. Furthermore, regional conventions allow the parties to make area-specific arrangements, which often offer far greater prospects of success than would be the case with more general international rules.

Rethinking coastal zone management

Regional seas conventions and action plans provide participating coastal states with a common framework and make it easier for them to develop and implement their own integrated management programmes for coastal areas and the territorial sea. The term “integrated coastal zone management” denotes a regulatory and governance approach in which coastal areas are recognized as a com-

plex, dynamic system involving multiple interactions between human communities and marine and coastal ecosystems across zonal and sectoral boundaries. This means – according to one of the key principles of the integrated approach – that coastal issues can no longer be addressed solely within the parameters of the traditional sectors: their spheres of competence overlap far too often for that. Furthermore, stakeholders in the fisheries, tourism, energy, shipping, resource extraction and environmental sectors may well pursue competing or even conflicting interests; the resulting measures are almost always detrimental to the marine environment.

For that reason, integrated marine management aims to develop inter-zonal, cross-sectoral guidelines for sustainable use of the ocean and its resources. At present, this approach is mainly applied in regional action plans, e.g. in the European Union, where the European Commission has developed an Integrated Maritime Policy covering five major and converging policy fields: the blue economy, marine data and knowledge, maritime spatial planning, integrated maritime surveillance, and sea basin strategies. However, regional seas conventions are by no means a prerequisite for successful integrated coastal zone management. With good planning and implementation, coastal states can improve their coastal zone management and ocean governance with integrated approaches even if they act on their own.

Due to the division of the sea into separate zones under the United Nations Convention on the Law of the Sea and the multiple spheres of competence, however, even integrated marine management quickly reaches its limits. Experts note that one reason is the ever-increasing number of stakeholders and agencies involved. This system may still be relatively straightforward at the local level, but decision-making becomes ever more complex, cumbersome and ineffective with each successive tier (regional, national, transregional, international). A further obstacle, the experts say, is the lack of information-sharing between the numerous participating sectors and institutions, as well as a general lack of awareness of how measures or changes in one sector impact on all the others.

	Convention	Year adopted	Year entered into force	No. of States
UNEP Administered				
1. Mediterranean	Barcelona	1976/1995	1978/2004	22
2. Western and Central Africa	Abidjan	1981	1984	22
3. Wider Caribbean	Cartagena	1983	1986	28
4. Eastern Africa	Nairobi	1985	1996	10
5. East Asian Seas	None	1984 (Revised in 1993)	Action plan in force	9
6. North-West Pacific	None	1994	Action plan in force	4
7. Caspian Sea	Tehran	2003	2006	5
Non-UNEP Administered				
8. Regional Organisation for the Protection of the Marine Environment (ROPME)	Kuwait	1978	1979	8
9. South-East Pacific	Lima	1981	1986	4
10. Red Sea and Gulf of Aden	Jeddah	1982	1985	8
11. Pacific	Noumea	1986	1990	19
12. Black Sea	Bucharest	1992	1994	6
13. South Asian Seas	None	1995	Action plan in force	5
14. North-East Pacific	Antigua	2002	2010	8
Independent Regional Seas Programmes				
15. Baltic Sea	Helsinki	1974/1992	1980/2000	10
16. North East Atlantic	Oslo-Paris (OSPAR)	1974/78/92	1998	16
17. Antarctic	Antarctic Treaty/Commission for the Conservation of Antarctic Living Resources	1959/1980	1961/1982	32
18. Arctic	Arctic Council Protection of the Arctic Marine Environment Working Group			8

8.10 > Regional seas conventions are regarded as the jewel in the crown of environmental diplomacy as they facilitate regional cooperation and actions which would be almost impossible to implement at the international level. They are therefore one of the most important tools in the United Nations Environment Programme (UNEP) toolkit. The table above lists 18 regional seas conventions and action plans currently involving more than 146 nations.

New approaches to marine management

> Despite clear stipulations laid down in the international law of the sea, there is a gap between the aspirations and realities of marine management. There are many reasons for this. They include a lack of money, knowledge and political will to implement applicable law; rigid structures and overlapping responsibilities hinder effective action. We must break out of these limitations – with the help of new actors and networks and by means of goal-oriented cooperation across levels, sectors and national borders.

An obvious contradiction

In essence, the United Nations Convention on the Law of the Sea (UNCLOS) places an obligation on the parties to cooperate at the regional, national, supra-regional and global levels and to effectively protect the marine environment in this way. As stated in the provisions, all measures and concepts applied to this end must be integrative in their substance and preventive and precautionary in their effects. But why then, one might ask, are the world's oceans in such a bad state? Why is there such a wide gulf between the ambition and reality of the international law of the sea and marine management?

The answers given to this question vary greatly. They range from pointing out the lack of implementation of many existing agreements to calling for a radical transformation of marine management. For example, the authors of the United Nations *Second World Ocean Assessment* argue that the ocean and its resources can only be protected and used sustainably if UNCLOS and its many complementary legal instruments are actually implemented worldwide. Among these complementary legal instruments, the authors include:

- *International treaties:* These include international agreements on sustainable fisheries management, on protection against pollution from ships, on the protection of certain marine habitats, and on the protection of crews, fishers and other workers in the marine sector;
- *Regional treaties:* This category includes the regional fisheries agreements as well as the regional marine conventions and programmes of action;

- *Soft law instruments:* The term “soft law” covers agreements, guidelines, resolutions or declarations of intent which, unlike “hard law”, are not legally binding and compliance with which cannot be enforced in the courts. Nevertheless, they are frequently used at the international level and nations pay great attention to them, primarily because soft law regulations often serve as precursors for later hard law regulations in the form of treaties or agreements. In the area of marine management they include, for example, the various fisheries guidelines of the Food and Agriculture Organization (FAO) and the guidelines for marine spatial planning issued by the UNESCO Intergovernmental Oceanographic Commission (IOC). Also relevant are the Rio Declaration on Environment and Development as well as the 2030 Agenda and its 17 Sustainable Development Goals (SDGs) – in particular SDG 14, with which the community of nations commits to the conservation and sustainable use of the oceans, seas and marine resources.

The UN experts state that the implementation of this multitude of laws, guidelines and requirements constitutes a great challenge for all nations. The number of international conventions of significance for the sea now amounts to more than 100.

Especially the small island states and the world's economically weakest countries lack the expertise, financial resources and qualified personnel and the necessary institutions or authorities to implement effective marine management measures, the scientists say. The authors also emphasize that successful marine management begins on land. All terrestrial activities must be managed in such a way that the sea and its biotic communities ulti-



8.11 > Baye Cheikh Mbaye from Senegal labels sample bottles in the wet lab during an expedition on the German research vessel *Heincke*. At just under 55 metres, it is the second largest ship in the fleet of the Alfred Wegener Institute, Helmholtz Centre for Polar and Marine Research (AWI).

mately bene-fit instead of being primarily harmed, as has been the case so far.

According to the UN experts, there are also numerous issues that are only partially covered by existing legal instruments – regulations on dealing with marine litter or fisheries management for example. Many areas need to be reworked. Another complicating factor is that even in relatively well-regulated and controlled areas, private-sector actors often find loopholes that give them financial advantages, but ultimately come at the expense of people and the marine environment.

A recent example of such a loophole can be found in shipping. New research shows that ship-owners in industrialized countries such as Japan, South Korea, the USA and European Union member states are increasingly choosing “flags of convenience”, i.e. they are registering the ships in a foreign country in order to be able to scrap them cheaply at the end of their service life in countries with weak occupational health and safety standards and

environmental regulations. Data from 2014 to 2018 show that 80 per cent of all retired ships were dismantled in ship graveyards or demolition yards in Bangladesh, India and Pakistan. All three countries are known for frequently scrapping ships right on the beaches, releasing large amounts of asbestos, oil and toxic chemicals into the environment in the process. Moreover, local employers and authorities pay scant attention to occupational health and safety conditions or compliance with environmental regulations during the dismantling of ships.

The option of registering ships in foreign countries was mainly used by ship-owners in EU countries: between 2002 and 2019 the proportion of ships that sailed under the flag of a developing country, even though their owners were EU citizens, increased from 46 to 96 per cent. This increase is also due to stricter rules on ship disposal that have been in force in the European Union since 31 December 2018. According to these rules, ships flying the flag of an EU member state must

Ocean Panel

The Ocean Panel is a joint initiative of 14 coastal nations that was launched in September 2018 with the aim of developing pragmatic solutions for a sustainable marine economy. To this end, the initiative works with representatives from politics, science, business and civil society. Members are Australia, Canada, Chile, Fiji, Ghana, Indonesia, Jamaica, Japan, Kenya, Mexico, Namibia, Norway, Palau and Portugal.



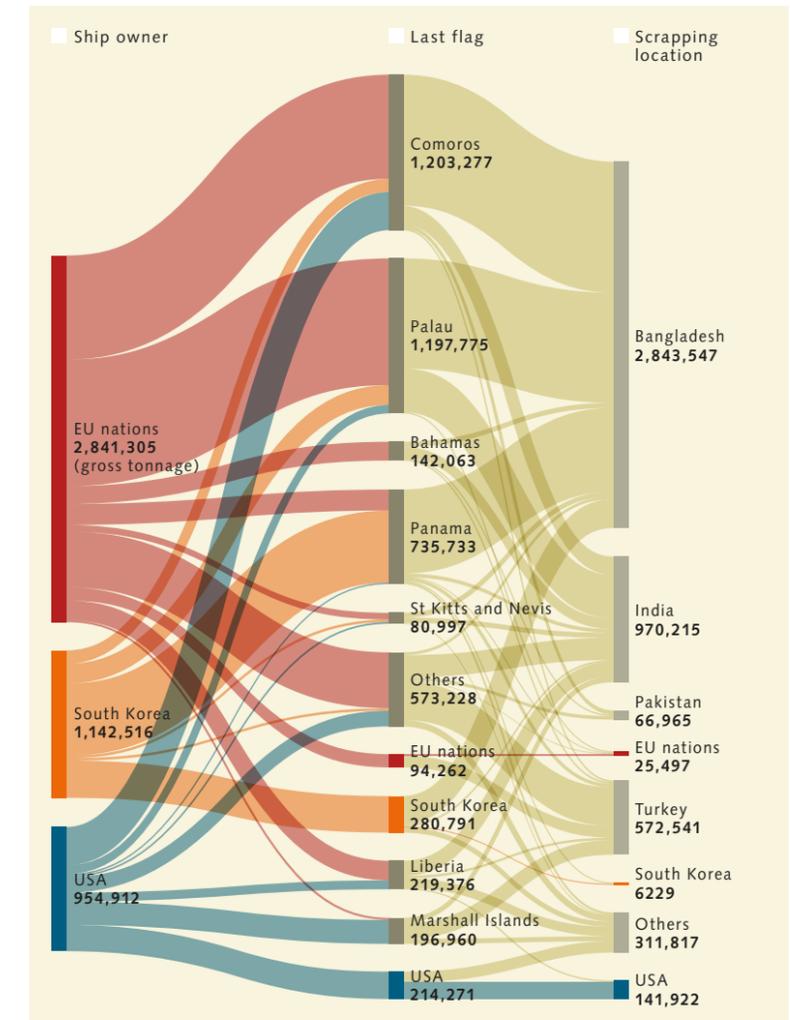
8.12 > The Chittagong ship graveyard in Bangladesh is one of the many places where disused cargo ships, tankers and container ships are scrapped directly on the beach. Asbestos, oil, toxic chemicals and other substances are released into the environment in the process. The pollutants also affect the health of the approximately 20,000 workers at the ship-breaking yard.

ultimately be dismantled and recycled at a dismantling facility that is on a list of approved facilities and thus demonstrably meets a number of safety and environmental standards. The standards required in the EU go beyond those set by the International Maritime Organization in its controversial Hong Kong International Convention for the Safe and Environmentally Sound Recycling of Ships. Before this convention was signed in 2009, more than 100 environmental and human rights organizations as well as trade unions and representatives of numerous other institutions had jointly protested against the inadequate IMO minimum standards and called for improvements.

A fundamental transformation is needed

In view of these and many other discrepancies between the aspirations and realities of ocean governance, the approaches put forward by a growing number of experts go far beyond the United Nations' stance. They are calling not only for clear implementation of existing agreements, laws and guidelines, but also for a fundamental reform of marine management. These experts include, for example, members of the Intergovernmental Panel on Climate Change and the Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services as well as a group of researchers who, on behalf of the Ocean Panel, developed strategies for a radical reorganization of marine management.

They state unanimously that the oceans' current situation demands a fundamental rethink, or in other words: a new relationship between humanity and nature and especially the ocean, guided by the awareness that the ocean is the common heritage of all, that it should not serve individual gain and only be utilized within its ecosystems' capacity to perform without coming to harm. All human activities should therefore primarily aim at the recovery and revitalization of marine ecosystems and not at their exploitation. At the same time, flexible and effective marine management processes must be identified that guarantee the protection and sustainable use of the oceans. This is the only way to prevent the imminent collapse of the



ocean's biotic communities and thus its key functions for economies and societies.

To describe the scope of transformation that is called for, the Ocean Panel experts draw on examples from human history. In their opinion, the necessary societal change is roughly comparable to the fundamental changes that led to hunter-gatherers becoming sedentary farmers about 12,000 years ago, or to the upheaval in which Europe's peasant-based Renaissance and Reformation period (1450 to 1750) societies mastered the leap into the industrial age. In other words, to meet the objective of sustainable use of the sea, all aspects of our modern lives

8.13 > A study shows that the majority of ships scrapped in 2019 belonged to owners from the European Union, South Korea and the USA. However, the owners ultimately had the ageing ships registered under "flags of convenience", allowing them to be disposed of in countries with lax environmental regulations.

8.14 > The Great Blue Hole forms the entrance to an undersea cave system and is a major tourist attraction in the part of the Mesoamerican Reef administered by Belize. The country's integrated coastal management plan is considered exemplary. It banks on healthy, robust coastal ecosystems being of much greater benefit to humans than exploited and degraded ones.



must change fundamentally. There must be a rethink on almost everything, and almost everything must be re-designed with a view to sustainability. Humankind should regard nature's carrying capacities as a red line that is not to be crossed.

According to the scientists, the failure of the current marine management system is due to the fact that, firstly, the tasks are distributed among too many independently acting sectors and institutions. Secondly, there are no instruments or incentives for a jointly coordinated approach, although the Convention on the Law of the Sea does in fact provide the requisite framework. A content analysis of more than 500 international conventions on environmental protection and human activities in the world's oceans proved revealing in this regard. The findings showed that global agreements largely make reference only to individual marine sectors, such as fisheries, pollution, resource extraction or shipping. Only rarely do they cover two or more sectors. In contrast, regional agreements usually cover several such sectors. However,

they too tend to mention only in passing cross-cutting issues such as the strengthening of marine biocoenoses.

A similar picture emerges when looking at the most important institutions in global and national marine management. These are also predominantly assigned to individual sectors and rarely have cross-border jurisdiction. They include institutions that:

- govern land use in coastal, rural or urban areas,
- manage inland waters and monitor their use,
- manage the use of natural resources (such as agriculture, forestry, mining, fisheries),
- are responsible for environmental protection,
- are tasked with promoting development (economy, energy sector, transport), or
- oversee and regulate human activities at sea.

The scientists find that there is an insufficient degree of cooperation between all these institutions. Moreover, climate change, technological change and the demands

of a growing global population are exacerbating man-made pressure on the oceans. This makes the failure of current marine management all the more obvious, they note.

Ideas for new marine management

According to the experts, the search for ways out of this crisis should be learning-driven and knowledge-based. Research has shown that ecosystems on land, in rivers, and in freshwater or marine estuaries are closely interconnected and that none of the three global crises (climate change, species loss, pollution) can be solved on its own. Sustainable marine use therefore calls for a holistic approach to marine management. However, this requires a much greater willingness to cooperate on the part of all actors – from local through to international levels. It also requires a greater sense of responsibility, clear liability rules in the event of violations, transparent decision-making processes and new participatory procedures to ensure that conflicts over use are resolved and that all stakeholders benefit fairly from the resources and services provided by the sea, especially those outside of national territorial waters.

The experts have particular hopes for “niche solutions” that are devised and tested at a small or local scale, prove their worth and are then moved out into the world as best-practice examples and widely applied. For example, a cross-sectoral integrated coastal management plan adopted in Belize in 2016 has global appeal and serves as a role model. Its development was initiated by a newly created ministry that places under one roof the areas of agriculture, fisheries, forestry, environmental protection and sustainable development.

In the process of developing the new plan, the government sought advice from experts in integrated coastal planning. It also organized a co-creation process in which all stakeholders affected by coastal planning were able to participate. Ministries as well as non-governmental organizations, businesses and representatives of local communities participated in the process. The new management plan aims at more effectively protecting the coasts from storm damage and rising sea levels, increasing profits from fishing

and tourism, and at strengthening protection for mangroves, coral reefs and *Zostera* beds, thus safeguarding the livelihoods of a large part of the coastal population.

The plan also highlights the need to coordinate and fund a wide range of different actors and measures for successful implementation – from coastal pollution, bottom-net fisheries, pelagic fisheries and aquaculture to tourism development, education, climate change adaptation and the preservation of cultural heritage. Moreover, the new management plan led to the Belize government banning oil exploration at the world's second largest coral reef, the Mesoamerican Barrier Reef. UNESCO praised the coastal management plan as one of the most progressive in the world and considered the country's great coral reef to be so well protected now that it removed the reef from the List of World Heritage in Danger.

Great progress in marine protection can also be achieved by eliminating subsidies. Without them, many deep-sea fisheries would be loss-making enterprises. Moreover, fertilizer-intensive forms of agricultural cropping are also subsidized, resulting in the eutrophication of rivers and coastal waters. And looking further, subsidized coastal reconfiguration, forest clearing and the sealing of soil surfaces ultimately harm the sea. They limit the ability of natural landscapes to remove carbon dioxide from the atmosphere, and thus drive climate change. They also destroy habitats important for species diversity and minimize their functional diversity, on which the oceans in turn depend in direct and indirect ways.

The first signs of an awareness shift in politics and business can be found in the increasing willingness of nations and companies to work towards self-imposed environmental and climate targets. The most prominent example of such voluntary commitments are the Nationally Determined Contributions (NDCs) to which the signatories to the Paris Climate Agreement have pledged.

Voluntary commitments with direct relevance to the ocean are made by governmental and non-governmental actors at the regular Our Ocean Conference or at the UN Ocean Conference. A remarkably large number of actors subsequently implement the projects they announced. In the 2014 to 2017 period, for example, one third of all com-

Our Ocean Conference
Our Ocean Conference (OOC) is an annual event that brings together government and business representatives as well as scientific and civil society leaders to exchange information on progress in ocean conservation and announce new projects. These always fall under one of the following six headings: (1) marine protected areas, (2) climate change, (3) marine pollution, (4) sustainable fisheries, (5) sustainable blue economy and (6) marine security.

mitments announced at the Our Ocean Conferences concerned marine protected areas. Of these 143 announcements, half were implemented by 2019, meaning that more than five million square kilometres of marine areas were newly protected worldwide, for example in Palau, Argentina, Chile, Canada, the USA, Norway, Ireland and Micronesia.

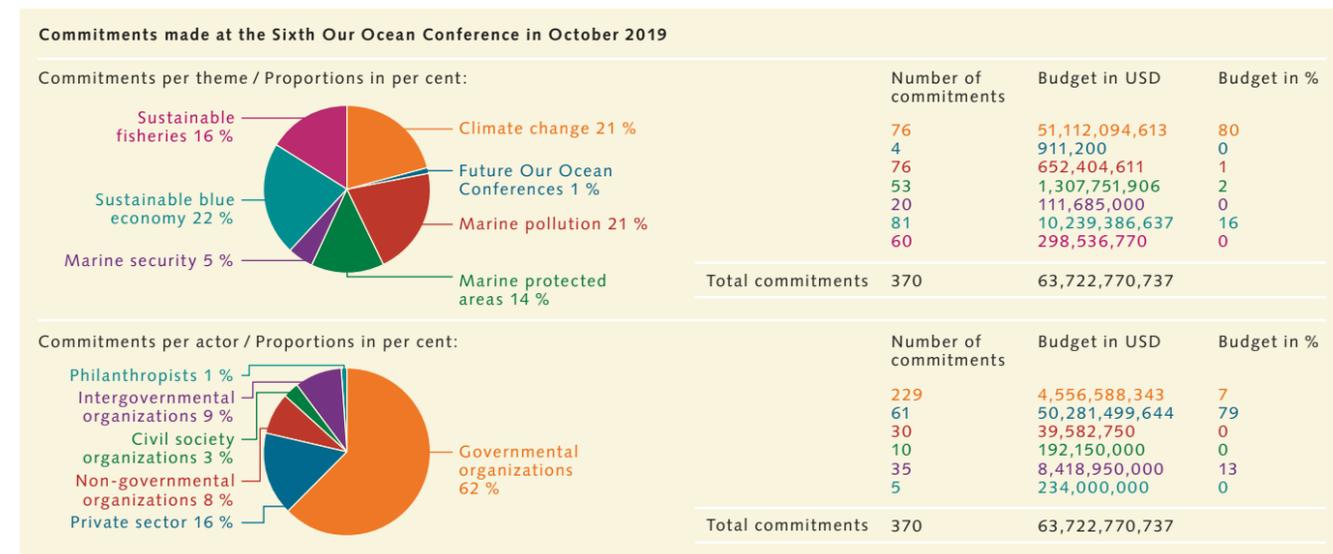
At the Sixth Our Ocean Conference in October 2019, governments, businesses and other stakeholders pledged a total of 370 actions at a combined cost of USD 64 billion. Among others, the actions covered:

- Commitments to let independent scientists conduct on-board monitoring of krill hauls (fisheries companies);
- Investment in Ocean Risk Initiatives (insurance);
- Funding commitments for projects on environmental transformation in maritime shipping (banks);
- A variety of research as well as knowledge and data transfer projects (research institutions and governments);
- Projects to prevent or reduce marine litter (NGOs and governments);
- Increased efforts to effectively implement conservation measures in designated marine protected areas (governments) and much more.

Overall, 23 per cent of the measures announced fell into the category of “sustainable blue economy” and 21 per cent dealt with marine pollution. Another 16 per cent targeted sustainable fisheries, while five and four per cent covered marine security and the hosting of future conferences respectively. In terms of pledged funds, 80 per cent of the funds were to be used for measures to combat climate change, followed by financial commitments for measures for a sustainable marine economy.

However, voluntary commitments alone are not enough to drive the necessary change. Experts say that ocean governance structures also need to change. While decisions have so far often been made at the highest national level and their implementation then pushed through to the lowest level (top-down approach), sustainable development requires network-like decision-making structures in which representatives from the political arena, the private sector, research and civil society participate and cooperate in a variety of ways across thematic boundaries and levels of responsibility. The strands of such a polycentric management network would therefore extend in all directions – with many linkages across sectoral, thematic and district, regional and national boundaries.

8.15 > At the Sixth Our Ocean Conference in 2019, participants made ocean protection pledges worth a total of USD 64 billion. The majority of project ideas were submitted by governments, while the most financially costly pledges came from the private sector.



8.16 > For some years now, abalone sea snails in Chile may only be caught by fishers who hold a fishing licence for the respective coastal area where the snails occur. Since the introduction of these exclusive fishing rights for artisanal fisheries, the once heavily overfished stocks have recovered in many places.

The scientists are convinced that such a complex management network with many cooperating decision-making centres has three major advantages:

- It is more open to innovative approaches and promotes shared learning.
- It involves all societal groups in decision-making, especially the local public affected by the decisions.
- It can therefore respond more effectively to the challenges of our time than an administrative system in which there is little diversity of interests and only one way of decision-making.

In practice, such network-like approaches already exist where, for example, the decision-making authority for local marine management has been placed in the hands of the local coastal population, meaning that the residents, supported by experts, jointly consult and decide on the use and protection of their waters. Another crucial factor for success is that the opinions and approaches of local

actors are incorporated into regional and national decision-making processes and that the stakeholders at the various levels coordinate with each other.

In Chile, for example, after the collapse of the abalone stocks in 1991, the government introduced Territorial Use Rights in Fisheries (TURFs) for artisanal fisheries. This means that in more than 550 designated coastal areas, only certain groups of artisanal fishers have been allowed to catch Chilean abalone (*Concholepas concholepas*) and other species for several years – each in the section the group was allocated. The fisher cooperatives themselves decide on the quantities caught. They autonomously monitor compliance with the legal regulations in their area and are obliged to report regular stock assessments to the supervisory authorities. As a result of this local fisheries management, the artisanal fishers’ catches have increased continuously in most regions, and as much as fivefold in some areas. The sector is once again reliably providing food for the coastal population and work for more than 17,000 fishers. In particularly well-managed

The WBGU criteria for a future system of ocean governance

As early as 2013, an expert panel of the German Federal Government (the German Advisory Council on Global Change, WBGU) developed ten criteria that can be used to analyse and realign existing marine management structures. The criteria have lost none of their value or relevance to this day. Ambitious marine management under this approach is based on the following principles:

1. *Adaptive management* aims to continuously improve the knowledge base for governance and to promptly use it in the conservation and sustainable use of the oceans. Adaptive management aims to broaden our knowledge of the structure and dynamics of ecosystems via a learning process and thus iteratively improves the protection and management of the seas.
2. *Incentives for innovation* encouraging a sustainable, low risk use of the oceans reward players who develop long-term, sustainable business models on the use and conservation of the seas instead of seeking short-term profit maximization.
3. *A clear assignment of rights of use* is necessary to prevent the overexploitation of the sea, which is a common good. This makes it possible to exclude certain users and thus to coordinate use – either via markets or by negotiation. Furthermore, the societal costs of use can be charged to the users according to the polluter pays principle, so that the external costs are internalized.
4. Neither the conservation nor the sustainable use of the oceans as a global public good is possible without an unprecedented

level of *global cooperation* and global cooperation mechanisms. Global cooperation forms the foundation for the development of international treaties on marine conservation and use, and for the joint implementation of these treaties.

5. *Subsidiary decision-making structures* – i.e. assigning decision-making powers primarily to decentralized decision-makers at the regional or local level, and secondarily to central international agencies – are crucial for the acceptance of global and national regulations. Moreover, such an interpretation of subsidiarity makes regulations easier to enforce efficiently.
6. *Transparent information* ensures that all players have access to the relevant data.
7. *Participatory decision-making structures* make it possible to reveal interests; they lead to decisions that all stakeholders can understand.
8. *Fair distribution mechanisms* aim to ensure an equitable distribution both of the benefits of marine resource use and of the costs – e.g. of conservation, monitoring, surveillance and sanctions. This applies to the sharing of costs and benefits between countries and between different levels of a country's government.
9. *Conflict-resolution mechanisms* are necessary in order to coordinate the many and complex use interests of different stakeholders (e.g. governments and individuals).
10. *Sanction mechanisms* at the different governance levels are key instruments for enforcing compliance with regulations on use.

TURFs, stock densities and fish size have also increased, indicating that this approach is a valuable tool for sustainable coastal and fisheries management.

Furthermore, according to the Ocean Panel authors, an international ocean agency is needed as the highest level institution. This agency should define the norms and principles and thus the overarching rules for sustainable network-like marine management. It would also be tasked with offering rules and mechanisms for dispute resolution and enforcing compliance with important principles such as transparency, accountability and diversity of participation. A United Nations resolution would be needed to

establish such an institution, as well as a group of nations that would put up the necessary funding, but without claiming special privileges in return.

Experts from the German Advisory Council on Global Change (WBGU) had already put forward a similar institutional proposal in 2013. They proposed the establishment of a World Ocean Organization as the global steward of the ocean as human heritage, and defined ten criteria against which ambitious ocean governance would have to be measured.

However, not all experts approve of the idea of a UN ocean agency. In view of the experiences with the nego-

tiations on the Mining Code for the deep sea and the agreement on Biodiversity Beyond National Jurisdiction (BBNJ), critics point out that once again this body would probably be composed of representatives of the nation states. There would thus be a danger that their differences in interests would again delay elementary decision-making processes and severely hamper the work of the Ocean Agency. Moreover, it is questionable whether the industrialized nations would even agree to such an ocean agency. They would after all only have one vote each and would have to decide on fundamental questions of ocean use together with many developing countries and landlocked states, and may have to submit to majority decisions.

Nevertheless, the international community should certainly take note of the Ocean Panel authors' recommendations. The principles of a network-like sustainable marine management they developed could prove to be extremely useful – regardless of whether or not there will ultimately be an ocean agency. With these principles as guardrails, it may be possible to actually bring to life the framework provided by the United Nations Convention on the Law of the Sea and guarantee the sea the protection it needs to serve humanity in the best possible way. Once again and in brief, the most important recommended actions put forward for future marine management are as follows:

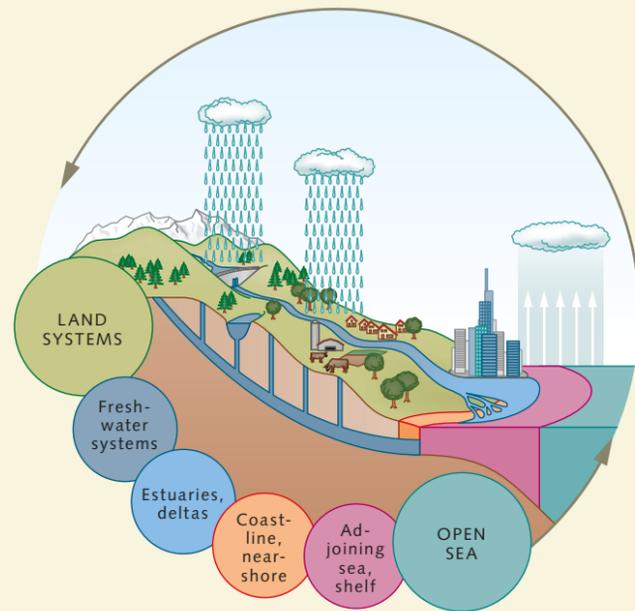
- All decisions should aim at sustainable use of the oceans and be based on the guidelines agreed upon by the international community in the UN Climate Convention, the Paris Climate Agreement and the Convention on Biological Diversity. In addition, the polluter-pays principle applies (polluter pays to remedy damage caused), as already laid down in the Rio Declaration on Environment and Development. The United Nations Convention on the Law of the Sea forms the legal basis for all action.
- Programmes and measures should go beyond sectoral and zonal boundaries and take into account information from all affected areas. This requires close cooperation between the many actors and institutions.

- Decisions should be science-based and always take into account the precautionary principle. To ensure that expert knowledge is reliably incorporated into decision-making processes, fixed procedures should be introduced that allow scientists to be heard or to participate. Moreover, the effectiveness and efficiency of all measures should be checked by means of large-scale monitoring and evaluation programmes.
- Sustainable marine management necessitates a flexible organizational framework within which it is also possible to react promptly and efficiently to unforeseen changes.
- Sustainable marine management should rely on a closely meshed network composed of many actors to ensure that all can participate in decision-making. Moreover, it is important to make all decision-making processes transparent.
- All knowledge about the state of the ocean, legal frameworks, use plans, research results, technology developments and best-practice examples should be freely shared among all stakeholders via knowledge and data portals.
- The process of marine management should be characterized by fairness and equality. It is crucial to this end that human rights are protected and enforced, and that actors take responsibility for their actions and are liable for adverse repercussions. Furthermore, a balance must be obtained between individual short-term goals and the common long-term goal of sustainable ocean use.

The authors also call on all governments, businesses and civil society representatives to strengthen the transformational ocean programmes established by the United Nations and its institutions. As a result of human activity, the ocean, a source of life, is in an extremely precarious situation. This is further exacerbated by climate change. To release it from this predicament and to guarantee a sustainable future for both the ocean's biocoenoses and the billions of people who benefit from the sea requires the support and cooperation of all – a plea that is quite in the spirit of the Convention on the Law of the Sea.

Source-to-sea approach – marine protection starts far inland

An example of new forms of environmental and marine management is the “source-to-sea approach” which was developed by an international organizational network of the same name. Its basic idea is to think of marine protection in such a way that all physiographic regions from which substances enter the sea are included in the management, i.e. from the source of the (material) flows to the ocean. Geographically, this approach starts at the headwaters of streams and rivers, extends through forests, fields, wetlands, lakes and settlements along their course, and extends beyond the delta or estuary to the coastal sea and finally to the open sea.



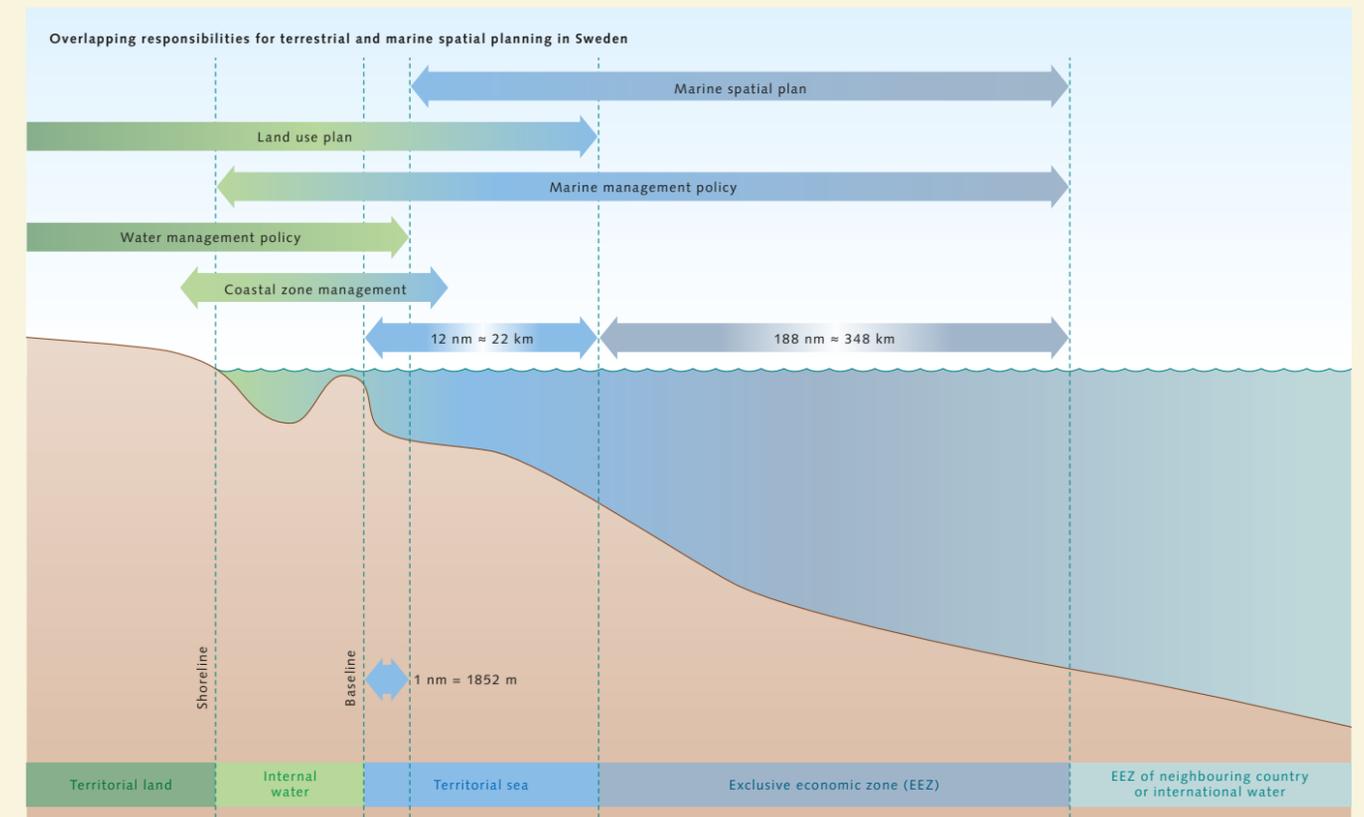
8.17 > The source-to-sea approach takes into account the many material flows from land to sea and vice versa. It therefore involves all inland physiographic regions and inland actors in coastal and marine protection.

All these spaces are interlinked through movements of water, sediments, organisms, pollutants and materials and through various ecosystem services. Additionally, humans are active in all physiographic regions, utilizing their resources with a primary focus on self-interest. This means that they are less interested in what happens further downstream. For this reason, the initiators of the source-to-sea concept developed a structured process that can be used to analyse this system consisting of different spaces, actors, interests, forms of use and regulations, thus broadening the individual actors' perspectives and generating opportunities for supra-regional cooperation. Joint projects share the following characteristics: they (1) are holistically conceived, (2) initiate new partnerships, (3) set thematic priorities, (4) respond to the conditions on site, (5) act in a goal-oriented manner and (6) are adaptable. This means that measures are scientifically guided, results are documented, and methods and processes are evaluated so that appropriate adjustments can be made in the event of failure or regression.

This process tends to result in closer cooperation between actors across sectoral boundaries. Sweden even went so far as to merge its fisheries agency with parts of its environment agency. Together they have formed the new Swedish Agency for Marine and Water Management since 2011. It is tasked with implementing national and European guidelines for inland waters and for marine and fisheries management. By uniting these three subsectors under one roof, the staff are empowered to take a holistic view of streams, lakes, rivers and marine areas and the environmental problems that arise. This perspective is becoming increasingly important as the pressure to address problems holistically increases as a result of climate change and new national and international targets. Two examples: Sweden's energy sector is to be fully converted to electricity from renewable energy sources by 2040; a large proportion of the electricity supply is to be provided by hydropower plants, but these must first be modernized to meet important environmental standards. At the same time, the water quality in Sweden's inland and coastal waters is to be improved. Their status is still far from what would be considered a “good” status by the European Union or Sweden itself.

According to the source-to-sea initiators, eight years after the new authority started its work, not everything was going according to plan quite yet. The internal coordination of measures in particular as well as the cooperation with other national authorities still needed to be improved. Both were still hampered by different, partly overlapping areas of

responsibility, programmes of measures and regulations, the initiators reported in 2019. But a start had been made and the structured process is now being applied in several coastal regions – for example in the Bay of Bengal, in 14 Pacific island nations and in the global quest for ways to solve the marine litter crisis.



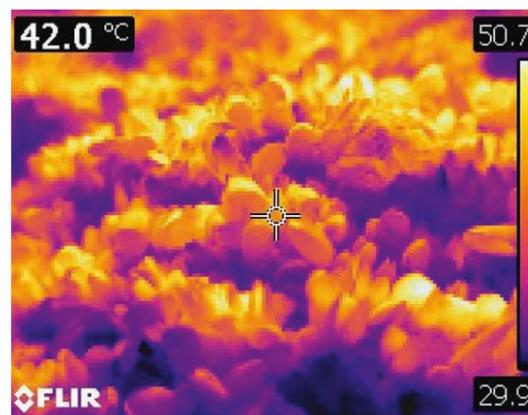
8.18 > This presentation by the Swedish Agency for Marine and Water Management shows how, in Sweden's coastal regions, programmes of measures and responsibilities for specific zones overlap and continue to hamper integrative and cross-sectoral management.

The ocean – flashpoint yet part of the solution

> As a consequence of climate change, overfishing, habitat destruction, species extinction, overfertilization, pollution, shipping and many other stress factors, the state of the ocean is steadily worsening today. And yet the world needs an intact and productive ocean now more than ever. The immediate and highest priority must be to drastically reduce these stresses. There is disagreement, however, on how this objective can be realized, and it is not clear whether humanity currently has the will to initiate the necessary changes.

In sharper fokus

First the good news: Since the turn of the millennium the ocean has been moving up the political agenda, and the world's leaders are now acknowledging that the state of the world's oceans is much worse than had long been assumed, with higher temperatures, sea-level rise, and more intense storms, as well as declining biodiversity. Acidity levels are rising, while oxygen concentrations continue to drop. The oceans are being severely overfished in many regions and are being polluted with tonnes of contaminants and garbage every day. In 2020, more than 80 per cent of the ocean's surface area experienced at least one heat wave. At the beginning of the United Nations Decade of Ocean Science for Sustainable Development, it is clear that the oceans are the setting for not just one, but three global environmental crises, all of which are entirely man-made – the climate crisis, the biodiversity crisis and the global pollution crisis.

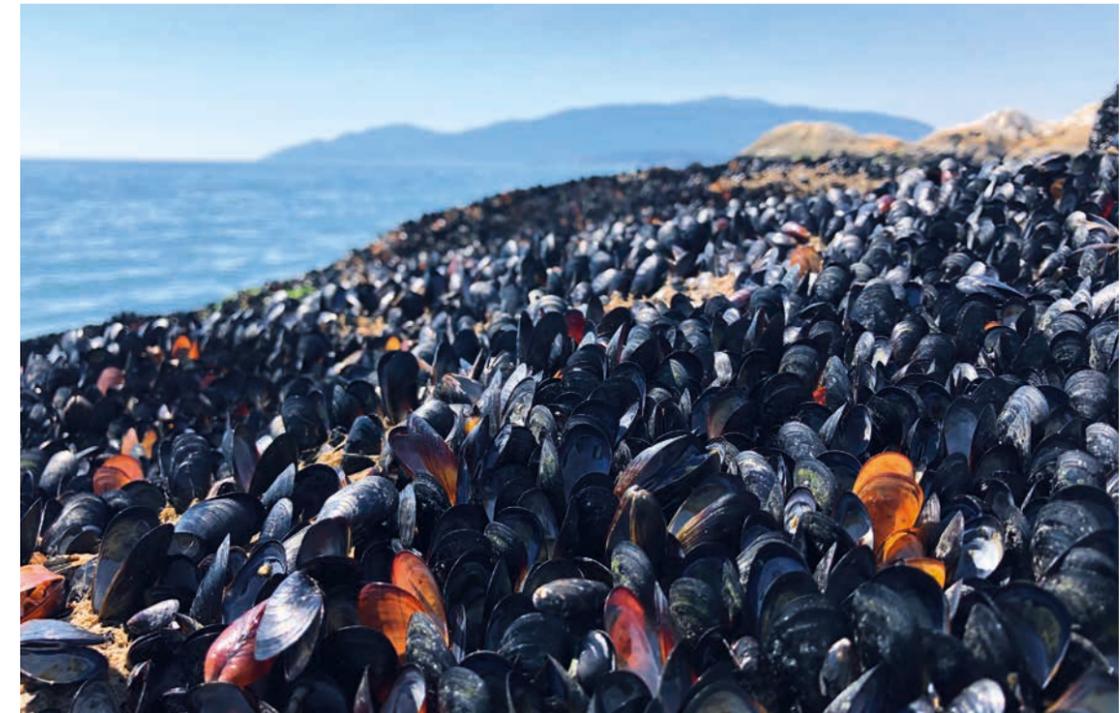


8.19 > This thermal image of a mussel bed in Vancouver, Canada, indicates that the mussels heated up to 50 degrees Celsius during an extreme heat wave in summer 2021.

The impacts of these environmental crises are not equally distributed around the globe. Throughout the world, the disruptions, particularly those associated with climate change, are hitting poor people hardest, because they have little or no adaptive capacity. The hardships are exemplified by small-scale fishers who are not able to follow the migrating schools of fish with their small boats, or farming families in coastal regions, who are increasingly losing their lands and livelihoods to the rising seas.

There is also no question that social problems such as poverty, hunger and social injustice are fuelling the crisis. People who depend solely on the sea have no choice but to keep on fishing until the very last fish is caught. The extent to which marine conservation measures and programmes for sustainable use of the seas can be effective therefore always depends on the extent to which they take into account the needs of people impacted locally.

At the same time, however, the ocean itself offers a number of solutions, ranging from its great potential for wind energy and sustainable fishing and aquaculture to the immense amounts of carbon dioxide that could be fixed and sequestered by the restoration of mangrove forests and seagrass meadows, or through systematic large-scale kelp farming. Yet achieving these goals will require a fundamental paradigm shift in the way we interact with the sea. Instead of focusing exclusively on the objectives of extracting the maximum amounts of fish, shellfish, oil, gas, sand, ores and other resources, humankind will have to consider how the goals of marine conservation, sustainable use and a fair and equitable sharing of the ocean's bounty can be reconciled and implemented simultaneously.



8.20 > Dead mussels cover a stretch of beach in Vancouver, Canada. Under normal conditions, these rocky coast dwellers can survive temperatures of 35 degrees Celsius for short periods. However, these marine organisms were unable to cope with the record temperatures of 45 to 50 degrees reached in summer 2021; as a result, large numbers of them died.

The experts assembled in the Ocean Panel recommend five basic building blocks:

1. **Whenever decisions about the ocean are made in future, they must be based on data and scientific knowledge.** This requires open, accessible databases and technologies that facilitate the measurement of environmental parameters, simulation of processes, tracking of stakeholders, prediction of developments, monitoring of management measures and, finally, the sharing of data. Some of these technologies are already being applied on a small scale. A computer model, known as POSEIDON, allows scientists to simulate the interactions among various fishery management measures, fishing fleets and marine ecosystems, thus enabling them to compare alternative options. There is also a new Marine Manager portal developed by the marine conservation organization Global Fishing Watch. Almost in real time, the portal makes data available on key marine parameters, zone boundaries and human activities (e.g. fishing, mining, tourism) in

marine protected areas, thereby facilitating the monitoring and protection of the various regions by area administrators and interested users. At present, this portal only covers five selected marine protected areas, but should be functioning globally by 2024 at the latest.

2. **Marine spatial planning should be guided by concrete goals and transcend sector boundaries.** Considering the many interactions among the individual sectors of the marine economy, new and coordinated policies for use are needed that include integrated, ecosystem-based management and science-based spatial planning for all marine regions. However, success can only be achieved when a balance is established between the interests of the various user groups. All of these groups must therefore be involved in the planning. Other requirements are that the ocean may only be exploited to an extent which does not harm its biotic communities, and that the local populations have fair access and usage rights. This includes exclusive fishing rights for local fishing communities.

- 3. More money needs to be invested in methods for sustainable use of the oceans.** To date, only one quarter of the funds needed to restore critical degraded ocean habitats is available. Governments are also being called upon to foster new kinds of sustainable marine use through subsidies. These could easily be financed through elimination or redirection of the existing harmful subsidies for industrial fishing and for subsea extraction of oil and gas. Correctly applied, investments in the health of the ocean offer the prospect of substantial financial returns in the long term.
- 4. Land-based inputs of garbage and pollutants must be stopped,** especially by reducing the huge amounts of waste through smart recycling practices and the use of alternative packaging materials, and by introducing a circular economy in all sectors of business. Effective environmental protection measures also need to be introduced and implemented in agriculture.
- 5. The many services provided by the oceans must be reflected in all economic accounting and product prices, in order to more clearly reflect the true value and importance of the ocean.** Conventional methods of calculating a country's economic performance (gross domestic product, for example) fail to consider the damage done by some industries, or the extent to which their activities accelerate climate

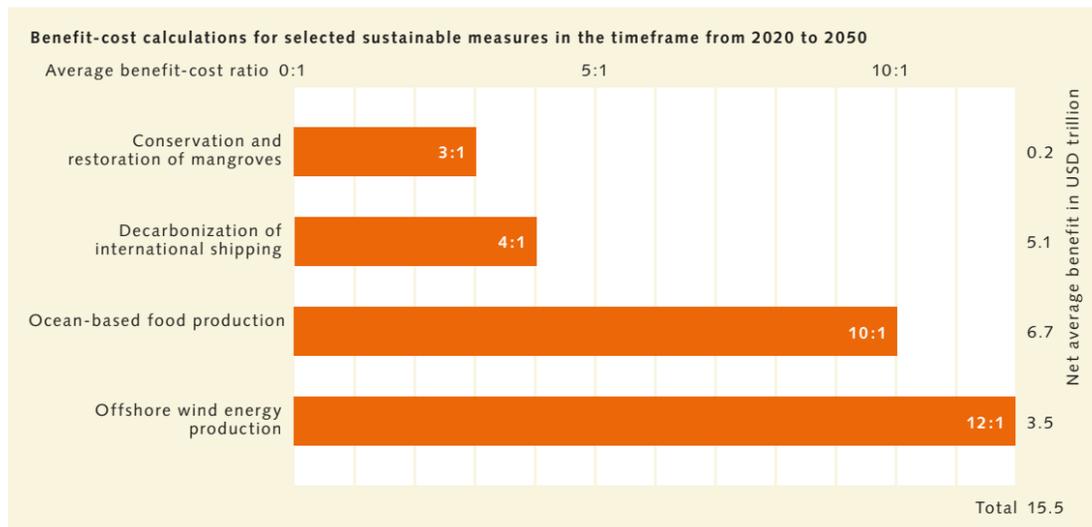
change. This also still applies to calculations of the strength of the marine economy, perpetuating the perception that non-sustainable activities like industrial fishing are profitable, and leading to their being subsidized in many places. To realistically balance the damage caused by marine industries with the potential benefits provided by the ocean, new calculation criteria and procedures are needed. Their development is a task that needs to be addressed jointly by governments and their statistics authorities.

The Ocean Panel experts no longer automatically interpret the term “marine conservation” to mean that humans should completely refrain from using the sea in certain regions. What is proposed instead is a more responsible approach that preserves the biodiversity and important habitats in the oceans, strengthens the resilience of marine biotic communities, and allows their decimated stocks to recover – an approach which is now being advocated by many proponents of an expanding marine economy.

The threefold benefits of genuine marine protected areas

A new study, published in March 2021, shows that radical marine conservation, meaning the expansion of highly

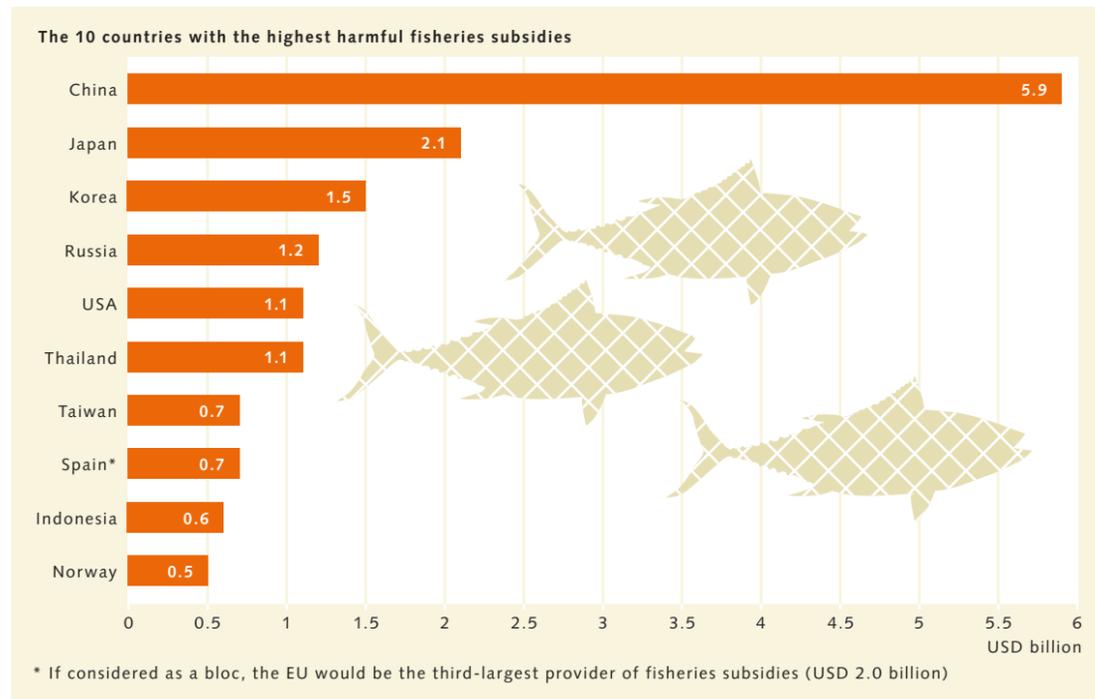
8.21 > Investments in sustainable forms of marine use pay off in the long term. Experts predict profitable benefit-cost ratios and high returns within three decades.



8.22 > Healthy seagrass meadows and mangrove forests, such as those that still exist in Cuba and elsewhere, are hotspots of marine biodiversity. Here, an American crocodile (*Crocodylus acutus*) rests on a seagrass bed near a red mangrove (*Rhizophora mangle*).



8.23 > Large fishing countries now pay high subsidies to allow their fleets to fish far from home, thus minimizing the risk of overfishing in their own waters. According to the most recent calculations, the 10 largest providers of subsidies spent around USD 15.4 billion on this item in 2018.



protected marine regions, can also help in tackling the climate and biodiversity crises. However, those involved with this issue must understand that widely different protection standards can be implied by the term Marine Protected Area (MPA). The International Union for Conservation of Nature (IUCN) defines six different types of marine protected area. They range from the most strictly regulated MPAs, where all activities are prohibited that destroy habitats or involve the removal of organisms or material from the sea (including fishing and mining, as well as oil and gas extraction), to areas in which sustainable use of natural resources is permitted.

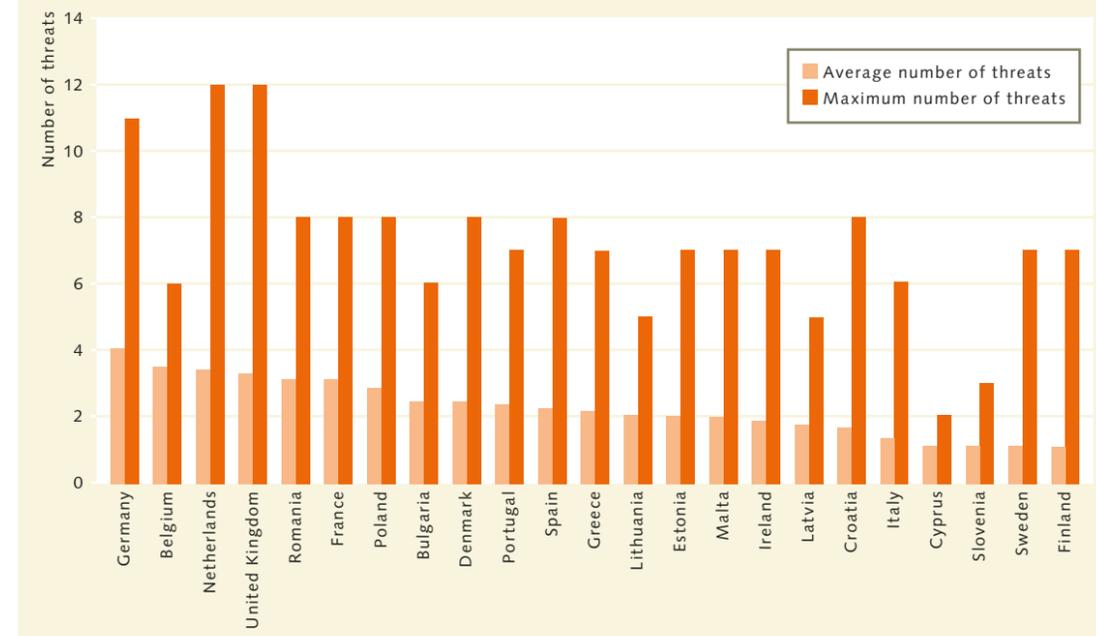
As of June 2021, a total area of 7.7 per cent of the global seas had been officially granted marine protected status – an area equivalent to the size of North America. However, high fishery protection standards have actually been implemented in only 2.7 per cent of the global marine area. According to Oceana, an ocean conservation organization, activities harmful to the sea and its biotic communities are permitted in up to 96 per cent of the designated Natura 2000 marine protected areas in Europe. Areas such as these

are therefore referred to in environmental conservation circles as “paper parks”. They are protected areas on paper only, providing little or no protection in reality. To take just one example from the Oceana report: in more than 500 European Natura 2000 areas that were explicitly designated for protection of the seabed fauna, fishing methods that destroy these very communities are still permitted.

But even disregarding the lack of effective protection in many marine protected areas, the number, size and connectivity of the areas, in the view of experts, are far from what is necessary to offer the many sea-floor dwellers sufficient habitats over the long term, or to enable them to adapt to climate change. Adaptation would generally require migration to areas closer to the poles, where the organisms would encounter conditions similar to those in their former habitats. Protected corridors between the old and new habitats are necessary to facilitate the colonization of new areas by these flora and fauna.

In the new March 2021 study mentioned above, an international team of scientists therefore investigated

Average and maximum number of threats in Natura 2000 marine protected areas (out of a total of 13 threats assessed)



8.24 > When the marine conservation organization Oceana reviewed some 3450 European marine protected areas with regard to their protection standards in 2018, they found that in more than 70 per cent of the areas at least one of 13 environmentally harmful activities was permitted, including disruptive interventions such as aquaculture, fishing, oil and gas extraction, shipping, laying of subsea cables and pipelines, and the construction of wind farms.

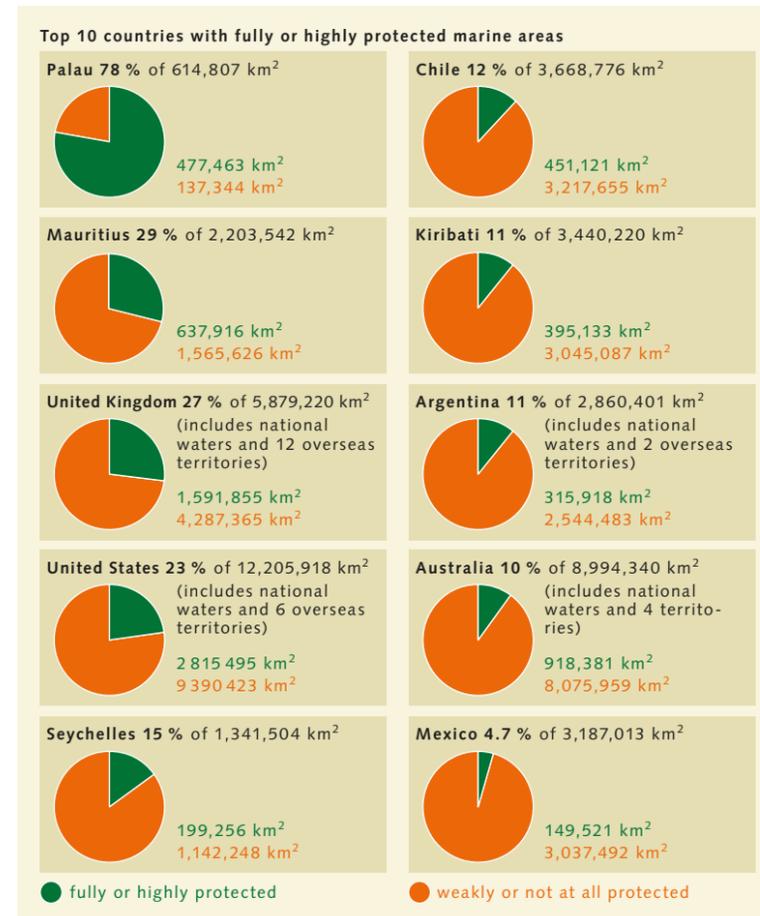
which marine regions need to be urgently placed under protection in order to achieve the best possible outcomes in terms of species conservation, fishing and climate protection. For the latter, the most important question was in which regions bottom trawling should be prohibited, because this activity disturbs carbon reserves on the sea floor and encourages their breakdown by microorganisms. Over the long term, this process leads to the release of 15 to 20 per cent of the carbon dioxide that the ocean had previously removed from the atmosphere and trapped in sediments on the sea floor. Bottom trawling worldwide causes elevated emissions of greenhouse gases on a scale similar to the amounts released by soil changes in agriculture.

As a first step, the researchers calculated what proportion of the oceans would have to be strictly protected if only one of the three objectives at a time were prioritized (species conservation, secure fishing yields, maintenance of carbon stores on the seabed):

1. Species diversity would receive 90 per cent of the maximum possible benefit if around 21 per cent of the

ocean's area were protected from human intervention. This would require the granting of strict protected status for 43 per cent of national waters (exclusive economic zones – EEZs) and six per cent of the high seas. The result would be a much greater degree of habitat protection, particularly for endangered species and those threatened with extinction. While 1.5 per cent of the necessary area currently has protected status, after the expansion the proportion would increase to as much as 87 per cent.

2. Fishing yields would increase by up to 5.9 million tonnes if 28 per cent of the marine area were protected. For this objective, as for species conservation, the protection mandate would have to apply primarily to the EEZs, where 96 per cent of all wild catches are now made.
3. To effectively protect around 90 per cent of the carbon stores on the sea floor that are being subjected to bottom trawling, this activity would have to be prohibited in 3.6 per cent of the ocean area, again mainly inside the EEZs because most trawl fishers work in this



8.25 > Since January 2020, Palau has topped the list of countries with the greatest proportion of marine protected areas. It has placed 78 per cent of its exclusive economic zone under strict protection, an area larger than the US state of California. This means that fishing and all forms of resource extraction are prohibited there.

area. The researchers were not able to include the possible impacts of deep-sea mining on greenhouse gas emissions from the ocean in their calculations, because it is still largely unknown how this industrial sector will develop over time.

The selection of protected areas is considerably more complex when all three goals are addressed simultaneously, because in some places the goals may be incompatible. Measures to conserve biodiversity, for example, could entirely preclude fishing in certain areas.

Nevertheless, the results of the calculations illustrate the role that the ocean could play in tackling the current crises. Placing 45 per cent of the total marine area under strict protection could achieve 71 per cent of the possible

benefit for biodiversity, 92 per cent of the possible benefit for fisheries, and 29 per cent of the possible benefit for maintenance of carbon stores. However, this would require intensive international cooperation, targeted selection of the marine regions to be protected, and financial compensation for countries that would have to close large areas of their species-rich coastal waters to fishing and resource extraction and thus lose these potential earnings. The scientists note that a coordinated network of marine protected areas could serve as an effective mechanism for more climate and species protection, and would also contribute to the recovery of fish stocks so that the sea would again produce more food for humans.

Both the World Biodiversity Council (IPBES) and the Intergovernmental Panel on Climate Change (IPCC) support this approach. In their new Workshop Report on the interactions between biodiversity and climate change, they set the required proportion of natural areas at 30 to 50 per cent.

If exploitation were the exception

Environmentalists take these scientific recommendations much further. During the 2021 Monaco Ocean Week, a policy discussion forum on marine issues that is now held on a regular basis, one group presented novel and alternative ideas.

If the designation, implementation and management of marine protected areas are so complex and difficult, the group suggested, it might make more sense to place the entire area of the oceans under protection, and then just designate those areas where exploitation of the sea or its use for shipping lanes would still be permitted. The extraction of organisms and material from the sea would then no longer be the rule but the exception, and fishing, mining and shipping companies would have to apply for the necessary licences.

The consequence of such a step would be that anyone who wants to fish, extract resources or engage in long-distance shipping would have to provide evidence, in their application, that their activities would cause no harm to marine biodiversity or the marine habitat, or at least that

the environmental footprint of these activities would be kept within acceptable limits. The approach would thus completely reverse the status quo, shifting the perspective and focus of the problem from exploitation of the oceans to their protection. The immediate consequence would be that the companies, rather than marine conservation organizations, would have to compete to be recognized and heard in the debate on sustainable marine management. It would also be easier to discuss which forms of fishing and other marine uses are acceptable, and which are not. Furthermore, it would be possible to ensure that an environmental impact assessment were carried out prior to any industrial use of the sea, and that the results of the assessment would genuinely count.

According to environmentalists, the current UN negotiations on the third implementing agreement on the conservation and sustainable use of marine biological diversity in areas beyond national jurisdiction (BBNJ agreement) offer a realistic opportunity to explore how such an approach could be put into practice – even though it would initially be limited to the high seas. Representatives of

industry and governments will presumably reject the idea out of hand because such an approach would severely restrict the use of the seas. Given the current crises facing the Earth, however, humankind has no option but to search for new ideas. Or, to paraphrase a joint analysis by the Intergovernmental Panel on Climate Change and the World Biodiversity Council: Sustainable development for people and nature will only be achievable if humanity fundamentally reforms and reorients its economic, social and governmental systems. This will necessitate measures on a scale never previously undertaken in human history. The idea of giving conservation the highest priority in global marine management would fit nicely within the framework of a reformed and realigned system of ocean governance.

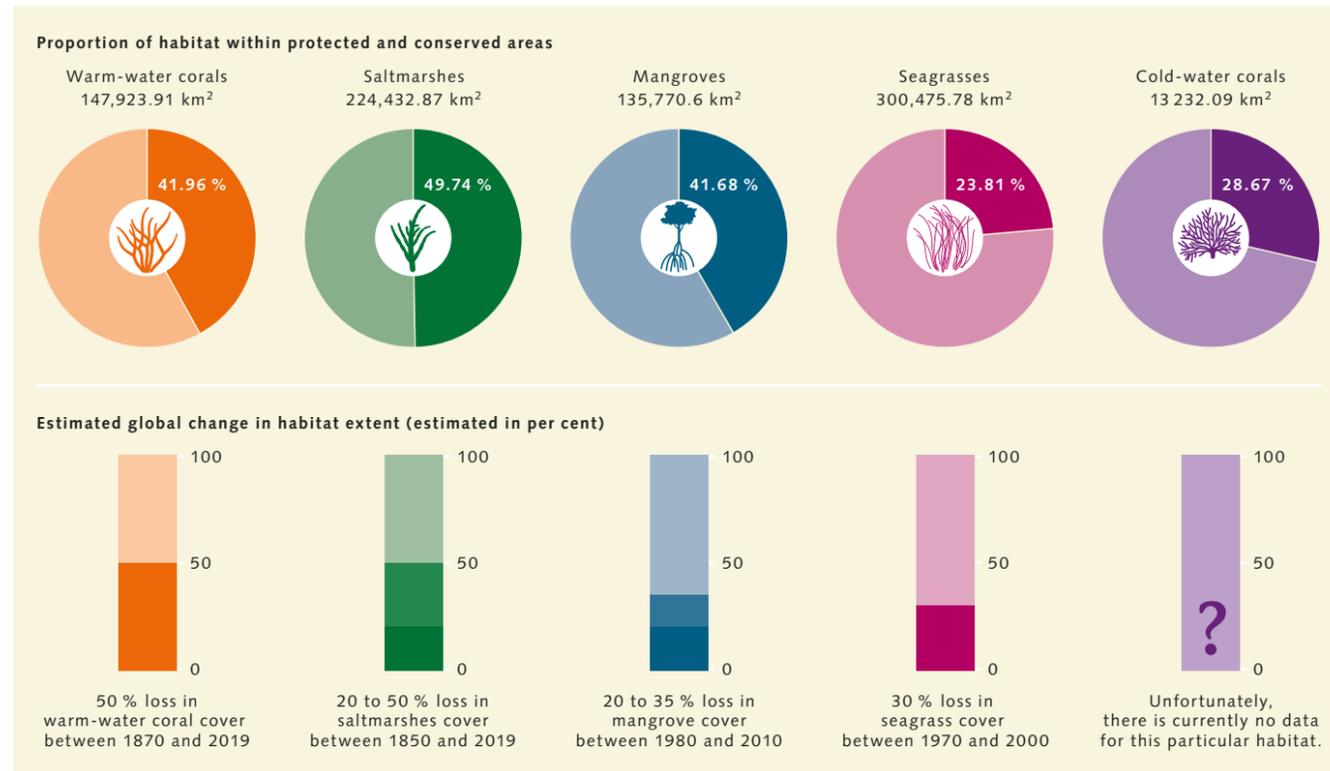
The overriding goal – to restore the ocean

Today, more than ever, humanity is dependent on a healthy and productive world ocean. However, we are currently at a crossroads: while the pressure of human use



Nauru Agreement
The eight member states of the Nauru Agreement are Kiribati, Nauru, the Marshall Islands, the Solomon Islands, Palau, Papua New Guinea, Tuvalu and Tokelau, as well as the Federated States of Micronesia. Among other species, half of the world's skipjack tuna, the most commonly fished tuna species in the world, is caught in the territorial waters of these nations.

8.26 > A desperate search for food: A Florida manatee (*Trichechus manatus latirostris*) searches for edible seagrass beneath a thick carpet of algae in the waters of Florida. The algae are spreading because Florida's rivers are carrying more and more fertilizer and untreated wastewater into the sea. In the first five months of 2021 alone, 761 manatees starved to death in Florida. This was 10 per cent of the total population.



8.27 and 8.28 > The coastal zones of the oceans are among the Earth's habitats that have been most extensively altered by humankind. In the *Ocean+Habitats* project, experts at the United Nations Environment Programme keep records of the extent to which coral reefs, mangroves, salt marshes and other vital coastal ecosystems are under threat.

is steadily increasing, the diversity of life in the ocean is rapidly decreasing, and with it the range of ocean services. Scientists report that one third to one half of the sensitive marine habitats, including coral reefs, salt marshes and mangroves, have already been destroyed. Large stretches of coastline are suffering from rising levels of pollution, eutrophication (overfertilization), oxygen deficiency and heat stress. The number of marine species threatened with extinction is growing. IUCN experts have so far assessed the population figures for more than 14,000 marine species. There is a high risk of extinction for around 11 per cent, i.e. more than 1500, of these species. They are therefore classified as endangered, critically endangered or threatened with extinction.

In order to reverse this trend, first, the restoration of habitats with key functions for the ocean is vital. Foremost among them are the mangroves, seagrass meadows, salt marshes, coral reefs, kelp forests and mussel beds. The number of restoration projects around the world is

growing, but they are still far too small to have a global impact. Second, the anthropogenic pressure on the oceans must be minimized. The highest priorities are a drastic reduction in greenhouse gas emissions and a shift from the conventional system of global fishing to truly sustainable fishing and management methods. If both these aims can be achieved, experts say, the prerequisites for the recovery of marine life within the next three decades would be met.

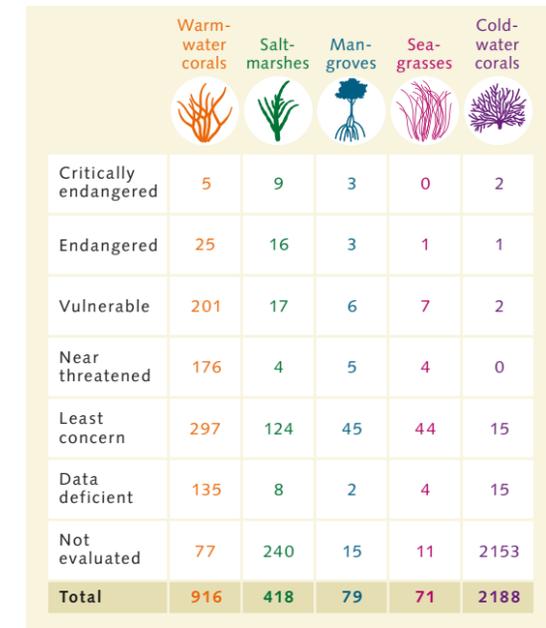
But scientists also agree that there is no single solution that will enable the ocean to recover its former health. On the contrary, success can only be achieved if a number of coordinated measures are taken that are tailored to local conditions:

1. preserving and restoring habitats,
2. protecting endangered species and ensuring the sustainable use of healthy stocks,
3. effectively combating the causes of pollution, and

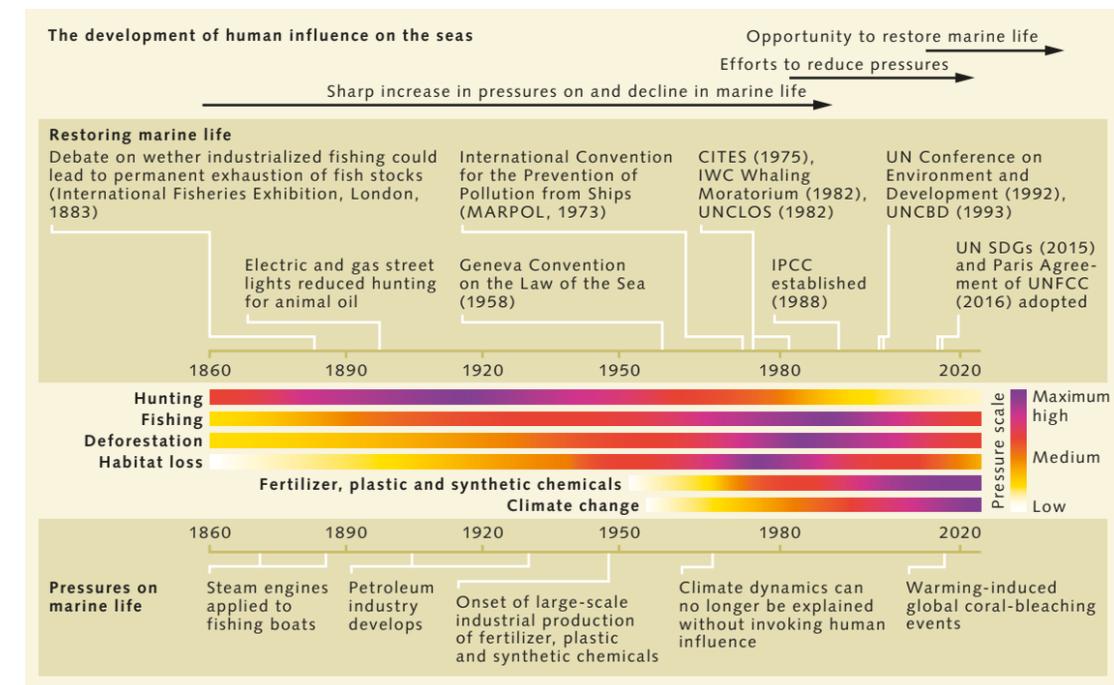
4. curbing climate change through drastic reduction of anthropogenic greenhouse gas emissions.

Many examples from a variety of regions show that protection, cooperation and the restoration of marine habitats pay off. Since commercial hunting of baleen whales was prohibited globally, the populations of humpback and blue whales have been recovering. In Vietnam, the area of mangrove forests is expanding in coastal regions where local communities have a voice in decisions on their use. In Bangladesh, scientists have been able to show that newly established mussel beds fully protect the salt marshes behind them from the destructive power of the waves, and this effectively stabilizes the coasts.

On the Kachelotplate sandbank, in the part of the Wadden Sea National Park in the territory of the German state of Lower Saxony, more grey seal pups are born every year. This is because the seals are able to find sufficient food and quiet in the park. While the staff counted only 40 young animals in 2010, the birth rate reached a new record high in 2020, with 372 newborns.



8.29 > Hundreds of coastal organisms are now on the Red List of Threatened Species. These scientific assessments help local decision-makers decide which species are in most urgent need of habitat improvement.



8.30 > Fishing and the hunting of whales and other marine mammals were the first human activities to put heavy pressure on the seas. Since then, conservation agreements and technological advances have at least reduced this hunting pressure. However, economic development has resulted in the emergence of two new and deadly trends, climate change and marine pollution.

Affordable and effective – coastal and climate protection using nature’s tools

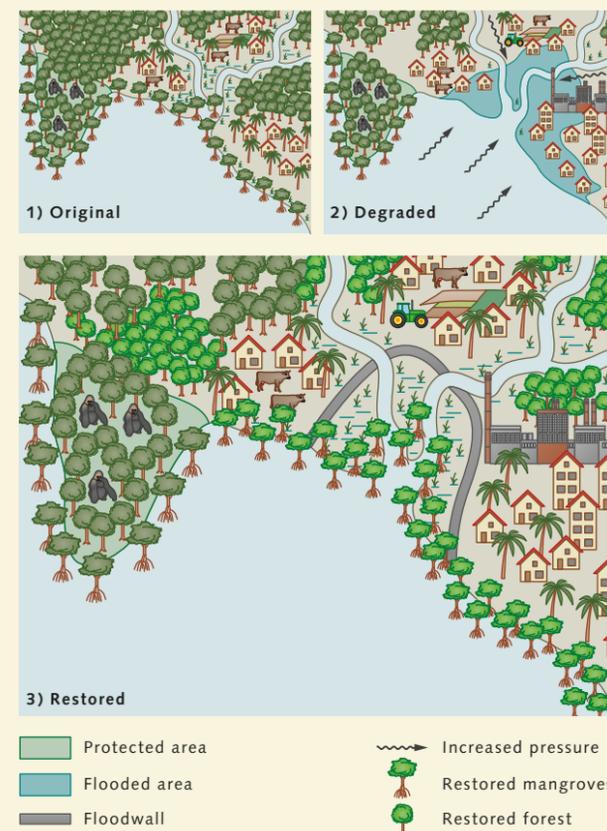
Nature-based solutions (NbSs) are among the most promising and cost-effective approaches in the fight to tackle the planet’s triple crisis. These are measures for the protection, restoration or expansion of healthy natural areas with the objective of enhancing their many benefits and managing them sustainably.

In coastal zones this primarily involves the restoration, renaturalization or comprehensive replanting of mangroves, seagrass meadows, coral reefs, mussel beds, salt marshes, dunes and natural floodplains. These measures are effective in facilitating:

- **the removal of carbon dioxide from the atmosphere, thus limiting global warming** (Mangroves, for example, can store up to four times more carbon per square metre than tropical rainforests. Natural ocean-based measures to increase natural carbon storage are known as blue carbon.);
- **the creation of habitats for rich and resilient biodiversity** (Intact coastal ecosystems filter pollutants and suspended material from the water and provide organisms with protection, food and corridors for potential migration of species. The benefits: less stressed species have a better chance of adapting to climate change. For example, 4000 square metres of seagrass meadow provide a habitat and food for around 40,000 fish and 50 million invertebrates such as lobsters and shrimp.);
- **the reinforcement of natural coastal protection** (Coral reefs, mussel beds, seagrass meadows, kelp forests and mangrove forests help to absorb the force of waves, thus mitigating flooding and minimizing the destruction and degradation of inland coastal areas. An additional advantage: After a storm, the mangroves, mussel beds, etc. repair the damage themselves and, unlike dikes and protective walls, they grow naturally with rising sea level.);
- **mitigation of the severity of local ocean acidification** (By absorbing carbon dioxide from the water, seagrass meadows reduce local acidification in the ocean, for example by up to 30 per cent off the coast of the US state of California.);
- **food security for coastal communities** (Healthy coastal ecosystems provide a habitat and nursery for many marine organisms and sea-birds. If their offspring can develop successfully as a result of favourable habitat conditions and sustainable management, the yields achieved by fishers, hunters and gatherers will increase.);

- **provision of new livelihoods for people** (The beauty and biodiversity of healthy coastal ecosystems attract tourists and may enable local communities to generate new sources of income and escape poverty.).

Nature-based solution for the coastal zones



8.31 > The restoration of wetlands, along with coastal and mangrove forests, can be effective in protecting populated coastal areas from storm surges, rising sea levels and erosion.

The prerequisite for all of these functions, however, is that human societies drastically reduce their greenhouse gas emissions. For mangroves, seagrasses, kelp forests and mussels react sensitively to heat stress, extreme storms and rapidly rising sea levels. In light of the current global warming, it is also vital to allow species and biotic communities viable routes for migrating polewards. Dikes, protective walls and

coastal cities paved in concrete often present insurmountable obstacles. And finally, the restoration and preservation of these natural coastal bulwarks require a considerable amount of specialized interdisciplinary knowledge, adequate funding and local communities’ participation and support. If only one of these aspects is missing, projects will fail.



8.32 > A bright idea: Women from a village on the southeast coast of India are planting mangrove seedlings along the bank of a river. Each family that takes part in this restoration project receives a goat and some chickens as payment. This incentive improves the villagers’ food supply and motivates them to participate.

Critical delay – marine conservation as a development goal

Everything that is currently happening in marine research and policy-making is based on the 2030 Agenda for Sustainable Development. This was signed by the leaders of the UN member states in September 2015 and includes 17 development goals. Marine protection is dealt with in Goal 14, which reads: Conserve and sustainably use the oceans, seas and marine resources for sustainable development.

The priorities are reflected in ten targets, which set the following objectives:

1. By 2025, significantly reduce marine pollution;
2. By 2020, sustainably manage and protect marine ecosystems;
3. Minimize the impacts of ocean acidification;
4. By 2020, end overfishing, illegal fishing and destructive fishing practices and implement science-based fishing management plans;
5. By 2020, conserve at least ten per cent of coastal and marine areas, consistent with national and international law and based on the best available scientific information;
6. By 2020, prohibit harmful fisheries subsidies;
7. By 2030, increase the economic benefits to island states and least developed countries from the sustainable use of marine resources;
8. Increase the transfer of scientific knowledge and technology and enhance the research capacity of small island states and developing countries;
9. Provide access for small-scale artisanal fishers to marine resources and markets;
10. Implement the UN Convention on the Law of the Sea and its associated agreements in order to propagate conservation of the seas and sustainable use of its resources.

For four of the targets, the deadline – the end of 2020 – has already passed, with no significant progress being reported. According to a recent UN interim report, the current efforts to protect the marine environment, and the small-scale fishers in particular, are by no means sufficient to conserve the fragile resource that is the ocean. A first interim assessment was to be made at the second UN Ocean Conference, but this was postponed from June 2020 to the summer of 2022 due to the coronavirus pandemic.

United Nations analysts say that the pandemic has demonstrated what it means to live on a planet where nature and the climate are out of balance. It can only be hoped that this experience will further motivate the international community to work together and with resolve towards the realization of the 2030 Agenda. Less than ten years remain.

Eight small island states in the West Pacific provide an example of what sustainable fishing can look like. Within a period of 40 years, the member nations of the Nauru Agreement developed a common set of rules by which they now successfully and profitably control tuna fishing in their national waters. The core of the Agreement is a process of auctioning off a fixed number of fishing days to foreign fishing vessels. Beforehand, however, the island states carry out a precise assessment of the tuna stocks to determine how many tonnes can be caught without endangering the populations. From this amount, the number of fishing days is calculated and taken into account in the bidding process. In addition, strict conditions are imposed by the member states. Fishing vessels that use purse-seine nets are required to have observers on board who, among other things, ensure that neither dolphins nor whale sharks are caught. The use of anchored or free-floating platforms that attract tuna, marlin and other highly desirable edible fish, and make their capture easier, is also prohibited.

For the past 10 years, these measures have allowed the association of island states to protect its tuna stocks from overfishing by the large fishing fleets from Europe, China, the USA, Japan and Thailand, and to generate an income of up to USD 500 million annually from fishing licences. Prior to the agreement, when each member state was still issuing its own fishing licences, less than five per cent of the sale value of the tuna flowed into the national coffers of the country of origin. Since the bidding procedure has been in operation, this share has risen to 25 per cent for the skipjack tuna (*Katsuwonus pelamis*), for example.

The many successes at the local level illustrate that sufficient tools and knowledge for sustainable marine management are available. The task now is to make use of them, to involve all stakeholders in the process, make the required funds available, and to always consider the ocean in relation to the climate and humanity. Protecting the ocean, enhancing its biodiversity and using its services sustainably is also climate action. Performing such marine protection activities at one location, however, should never be used as an excuse to allow emission-intensive activities to be carried out elsewhere.

CONCLUSION

Sustainable marine management – a Herculean task

For nearly four decades, the United Nations Convention on the Law of the Sea has provided a clear framework in international law for all human activities on the seas and oceans, thus establishing a strong foundation for communal governance of the ocean. The convention classifies the marine areas into zones, regulates who can lay claim to the ocean and its resources in the various regions, and includes provisions on shipping, seabed mining and conservation of the marine environment. Furthermore, it calls upon all nations to work together regionally and globally to address issues relating to the ocean, and provides guidance to the international community on how disputes between parties should be resolved.

To date, 168 countries, the vast majority of states, have ratified the Convention and undertaken to comply with its provisions. However, the present state of the oceans provides ample evidence that so far, the international community has in fact largely missed its goal of sustainable use. There are many reasons for this failure. Developing countries, for their part, often lack the necessary structures, funding, know-how, personnel and technology to implement international regulations and agreements at the national level. In industrialised countries and at the international level, cross-sectoral cooperation is often lacking, resulting in conflicting goals and measures that have less impact than was originally planned. Industry and business, in turn, are still seeking to exploit legal loopholes in order to maximize their own profits at the expense of the marine environment.

In view of the global impacts of climate change and the ongoing biodiversity and pollution crises, it is now widely accepted that recovery of the oceans cannot be achieved simply by applying stand-alone

solutions. Instead, integrated approaches are necessary at all levels of marine management. This means that programmes for marine use must be planned and agreed using transparent procedures that involve all stakeholders and transcend sectors, zones and often borders as well. Marine conservation, in other words, does not begin at the coastline, but much further inland.

Decisions on marine use should always be made on a scientific basis, and local community interests must be considered in all cases. In this way, it can be ensured that innovative local solutions receive recognition at higher levels, and can then be implemented on a broader basis.

Subsidies for activities that are harmful to the environment should be abolished. The public funds previously used to finance those subsidies should be employed instead to promote projects that restore marine and coastal ecosystems. Such approaches will have the added benefit of enabling communities to nurture and use ecosystems sustainably. In that vein, the measures that promise the greatest success are those which revitalize biotic communities while simultaneously contributing to climate protection and improving local living conditions.

Opinions naturally differ on the scope of the changes required. While some experts believe that restructuring the economic and value systems is absolutely necessary in order to significantly reduce anthropogenic pressure on the oceans, others point out that a great deal would have been achieved already had the existing rules and regulations been implemented consistently. In any event, it will not be a straightforward process. Progressing ocean recovery is a great challenge to humankind. Indeed, it is a task on a scale similar to that of mitigating climate change. The two must go hand in hand for humanity and the oceans to have a future.