4 Hope for the oceans

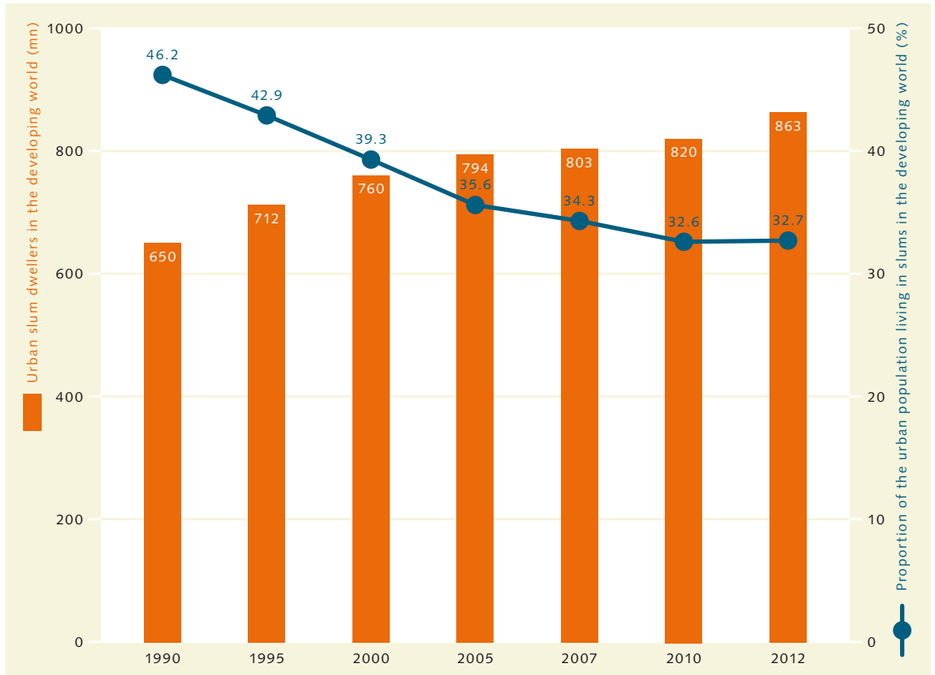
> The extent of the pollution and destruction of marine habitats is daunting. However, there are already numerous examples showing how marine conservation and the sustainable use of marine resources can be achieved – not only through international agreements but also through measures adopted at the local level. It is also encouraging that the United Nations has declared marine conservation to be one of the major development goals for the future.

Roadmap towards a sustainable future?

> Comprehensive and sustainable use of our natural resources is one of the major challenges for the future. The United Nations is therefore currently developing an agenda with 17 Sustainable Development Goals (SDGs) as a roadmap to 2030. One of these goals is sustainable use of marine resources. However, it is individual countries' commitment that will determine whether the world comes close to achieving this ideal.

Social justice – a key goal

Living conditions around the world still vary considerably. Many people live in extreme poverty, suffer hunger and have no access to education or social progress. Recognizing the major problems affecting social development in many parts of the world, the United Nations adopted the Millennium Declaration in September 2000 as the basis for the establishment of eight major development goals. Known as the Millennium Development Goals (MDGs), their purpose was to help achieve significant improvements in social conditions in the developing countries by 2015. Several of the MDGs have been reached; many have been partially met. MDG 4, for example, aims to reduce child mortality by two-thirds by 2015 compared with 1990, when annual mortality among the under-fives stood at 12.7 million. Since then, the figure has fallen to six million despite a growing world population. The United Nations sees this as a landmark victory in its campaign to further reduce child mortality.

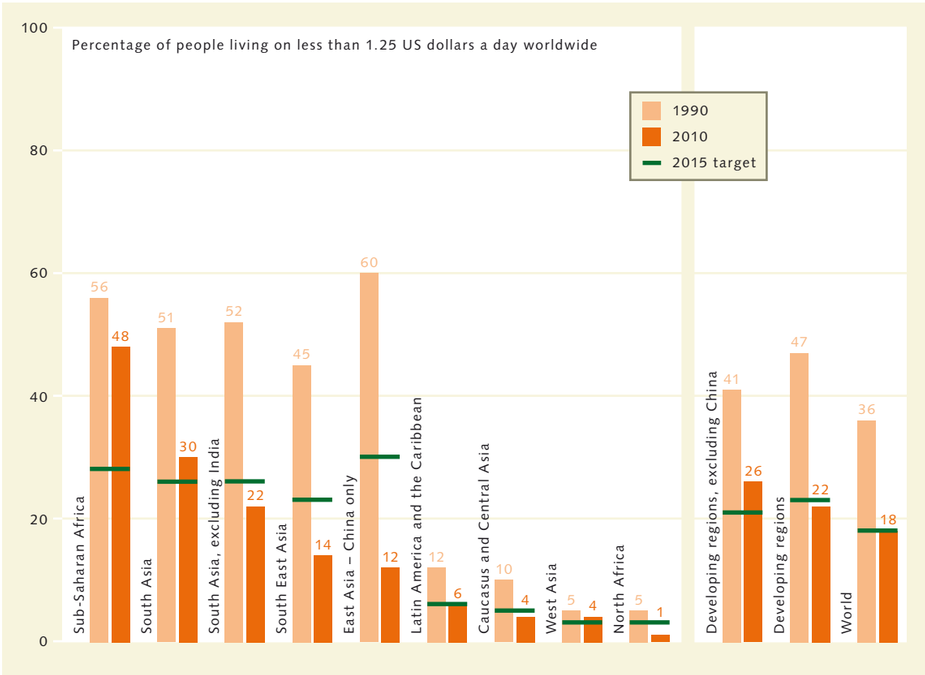


4.1 > Modest progress has been achieved on reducing the number of slum dwellers worldwide. Although the proportion of the urban population living in slums declined from 46.2 per cent in 1990 to 32.7 per cent in 2012, the absolute number of slum dwellers increased over the same period, from 650 million to 863 million, as a result of population growth.

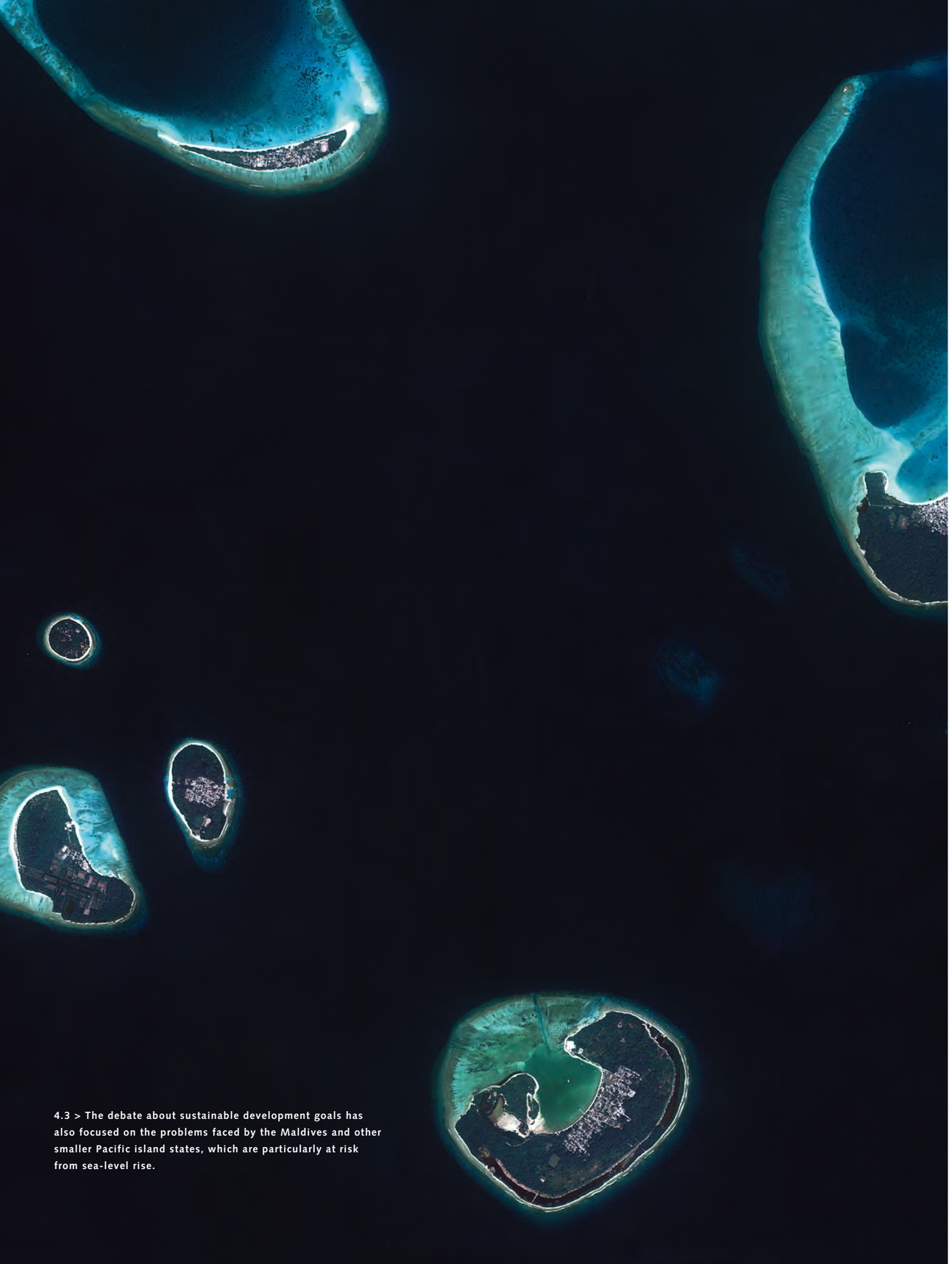
Despite these glimmers of hope, there has been frequent criticism of the MDGs in recent years. Viewed in terms of the classic three-pillar model of sustainability, the MDGs' unilateral focus on social aspects is identified as an obvious shortcoming. The environmental dimension features only once, namely in MDG 7, and there is no mention of marine resources at all. The critics also point out that the MDGs fail, by and large, to address governance aspects and that they apply only to the developing countries.

A universal global sustainable development agenda?

At an MDG summit in 2010, it was therefore agreed that a new agenda should be defined for the period beyond 2015 to 2030. The future goals should be universal: in other words, they should apply to developing, emerging and developed countries alike and should take account of all the dimensions of sustainability. Crucially, it was recognized in this context that living conditions cannot be improved if the environmental dimension is neglected and humankind's natural life support systems continue to be destroyed. The new post-2015 agenda should therefore also take account of the outcomes of the United Nations Conference on Sustainable Development (**Rio+20**) held in Rio de Janeiro in 2012, exactly 20 years after the UN Conference on Environment and Development (Earth Summit) took place in the same city. The Rio+20 outcome document deals with the social dimension, such as poverty eradication, but also calls for a green economy, as well as measures to combat environmental problems, e.g. land degradation, desertification and climate change. In order to elaborate the new post-2015 sustainable development agenda, an Open Working Group (OWG) was established in 2012 under the auspices of the United Nations; this format was chosen in order to involve a range of stakeholders in the deliberations.



4.2 > Several MDGs were reached by 2015. They include the goal of halving the number of people living on less than 1.25 US dollars a day worldwide. However, in sub-Saharan Africa, almost half the population still lives in extreme poverty, with only a very small decrease since 1990. China, by contrast, has achieved an 80 per cent reduction in the number of people living in poverty.



4.3 > The debate about sustainable development goals has also focused on the problems faced by the Maldives and other smaller Pacific island states, which are particularly at risk from sea-level rise.

Open to suggestions

In contrast to many other processes conducted under the auspices of the United Nations, the Open Working Group – as the name suggests – was intended to be inclusive and accessible to a broad public. An Internet portal was established, enabling interest groups, businesses and individuals to submit position papers and well-reasoned proposals on new goals. The scientific community and other experts were invited to share their experience on various aspects of sustainability and feed it into the process.

As a rule, every UN member state has the right to send a representative to the various United Nations committees and bodies. To ensure that every representative from almost 200 countries has a chance to have a say, the time available for individual statements is reduced to a minimum. In order to ensure that the work on the SDGs progressed in a constructive, efficient and focused manner, it was therefore agreed that in the OWG, the inputs would be streamlined, with one representative speaking on behalf of a constituency of three countries, such as the Germany/France/Switzerland trio. The constituencies' spokespersons – generally diplomats or senior officials from the member states' Foreign or Environment Ministries – rotated on a regular basis. The duration of the Open Working Group's sessions was also reduced substantially, as the aim was to submit a comprehensive proposal on the new sustainable development agenda in the shortest possible time. In order to access the knowledge of the scientific community and other civil society groups, the OWG invited experts to New York to provide brief inputs and statements on various aspects of sustainability. The aim was to consult independent scientists who were able to provide an overview of current research in their particular discipline. Directly involving external experts from civil society was an unusual move for the United Nations: generally, it is only the member countries' own designated representatives who appear before UN bodies, doing so once they have been duly briefed by policy advisors or external experts.

This consultation process involving experts and national representatives lasted eight months and also focused on the marine environment.

In spring 2014, the OWG finally published its report. In it, the OWG proposes 17 Sustainable Development Goals (SDGs) and 169 targets to be reached by 2030. This makes the list of SDGs far more detailed than the old MDG agenda with its eight Millennium Development Goals and 21 targets. As the first step, the United Nations General Assembly approved the Open Working Group's proposal in autumn 2014. In the following months, a United Nations committee held further negotiations in order to develop the SDGs in more detail and resolve the issue of financing.

Accolades from on high

In July 2015, the list of SDGs was presented at the Third International Conference on Financing for Development (FfD) in Addis Ababa. The Conference brought together high-level political representatives, including Heads of State and Government and Ministers of Finance, Foreign Affairs and Development Cooperation, to discuss how much money the international community will provide for sustainable development in the developing countries.

In the run-up to the conference, the developed countries had pledged to promote actions in support of sustainable production and consumption patterns and activities to counter the threats of climate change with contributions amounting to 100 billion US dollars from 2020 onwards. At the meeting, however, none of the countries was willing to commit definitely to payments. It thus remains unclear at present where the funds are to come from in future. At least the delegates were able to agree that projects to combat poverty or hunger must not be seen in isolation from climate action. Future development initiatives must pursue both objectives simultaneously.

A further outcome of the conference is that Germany, the United Kingdom, the Netherlands and the USA will launch an initiative by which the developing countries will be assisted in reforming their tax systems such that resources are released to fund the SDGs. Critics have noted that this approach reduces the struggle for greater sustainability to the nation-state level instead of tackling the challenges through international commitments.

The SDGs – a new 2030 global sustainable development agenda

The United Nations Open Working Group has defined 17 goals to guide the international community towards sustainable living conditions and a green economy over the next 15 years. For each of these goals, various targets have been defined, with 169 targets in total. Only the targets relating to Goal 14 are set out below. SDGs 14a, 14b and 14c are not goals per se, but describe the means and measures by which sustainable development is to be achieved in various areas.

Goal 1: End poverty in all its forms everywhere

Goal 2: End hunger, achieve food security and improved nutrition and promote sustainable agriculture

Goal 3: Ensure healthy lives and promote well-being for all at all ages

Goal 4: Ensure inclusive and equitable quality education and promote lifelong learning opportunities for all

Goal 5: Achieve gender equality and empower all women and girls

Goal 6: Ensure availability and sustainable management of water and sanitation for all

Goal 7: Ensure access to affordable, reliable, sustainable and modern energy for all

Goal 8: Promote sustained, inclusive and sustainable economic growth, full and productive employment and decent work for all

Goal 9: Build resilient infrastructure, promote inclusive and sustainable industrialization and foster innovation

Goal 10: Reduce inequality within and among countries

Goal 11: Make cities and human settlements inclusive, safe, resilient and sustainable

Goal 12: Ensure sustainable consumption and production patterns

Goal 13: Take urgent action to combat climate change and its impacts

Goal 14: Conserve and sustainably use the oceans, seas and marine resources for sustainable development

14.1: **By 2025, prevent and significantly reduce marine pollution of all kinds, in particular from land-based activities, including marine debris and nutrient pollution**

14.2: **By 2020, sustainably manage and protect marine and coastal ecosystems to avoid significant adverse impacts, including by strengthening their resilience, and take action for their restoration in order to achieve healthy and productive oceans**

14.3: **Minimize and address the impacts of ocean acidification, including through enhanced scientific cooperation at all levels**

14.4: **By 2020, effectively regulate harvesting and end overfishing, illegal, unreported and unregulated fishing and destructive fishing practices and implement science-based management plans, in order to restore fish stocks in the shortest time feasible, at least to levels that can produce maximum sustainable yield as determined by their biological characteristics**

14.5: **By 2020, conserve at least 10 per cent of coastal and marine areas, consistent with national and international law and based on the best available scientific information**

14.6: **By 2020, prohibit certain forms of fisheries subsidies which contribute to overcapacity and overfishing, eliminate subsidies that contribute to illegal, unreported and unregulated fishing and refrain from introducing new such subsidies, recognizing that appropriate and effective special and differential treatment for developing and least developed countries should be an integral part of the World Trade Organization fisheries subsidies negotiation**

14.7: **By 2030, increase the economic benefits to small island developing States and least developed countries from the sustainable use of marine resources, including through sustainable management of fisheries, aquaculture and tourism**

14a: **Increase scientific knowledge, develop research capacity and transfer marine technology, taking into account the Intergovernmental Oceanographic Commission Criteria and Guidelines on the Transfer of Marine Technology, in order to improve ocean health and to enhance the contribution of marine biodiversity to the development of developing countries, in particular small island developing States and least developed countries**

14b: **Provide access for small-scale artisanal fishers to marine resources and markets**

14c: **Ensure the full implementation of international law, as reflected in the United Nations Convention on the Law of the Sea for States parties thereto, including, where applicable, existing regional and international regimes for the conservation and sustainable use of oceans and their resources by their parties**

Goal 15: Protect, restore and promote sustainable use of terrestrial ecosystems, sustainably manage forests, combat desertification, and halt and reverse land degradation and halt biodiversity loss

Goal 16: Promote peaceful and inclusive societies for sustainable development, provide access to justice for all and build effective, accountable and inclusive institutions at all levels

Goal 17: Strengthen the means of implementation and revitalize the global partnership for sustainable development

4.4 > Communities in the Democratic Republic of the Congo learn how to protect themselves using mosquito nets. Malaria is a frequent cause of poverty because persons with the disease are no longer able to work.

Meeting in New York in September 2015, the United Nations General Assembly – the UN's chief deliberative, policymaking and representative organ – formally approved the draft SDGs. This means that there now is, for the first time, a framework for action towards comprehensive, sustainable global development. A noteworthy positive aspect is that following adoption of the SDGs some 2000 initiatives have started their work around the world to carry out diverse projects in support of the SDGs at regional level. It remains to be hoped that this impetus can be maintained in future. For it is still unclear after the General Assembly how the SDGs are to be financed in the period to 2030.

The SDGs: the critics' view

In spring 2015, the International Council for Science (ICSU) already published a paper on the Open Working Group's set of SDGs, in which it reviews the 169 targets for the Sustainable Development Goals from a science perspective and considers how well developed each target is. It concludes that out of 169 targets, 29 per cent are well developed, 54 per cent could be strengthened by being more specific, and 17 per cent require significant work.

Among other criticisms, the ICSU argues that as they stand, the SDGs fall short of the high standards initially set by the OWG itself. It notes that all the targets should meet the SMART criteria – a concept borrowed from business and project management, which states that goals can only be achieved if they fulfil the following five criteria: they must be specific, measurable, attainable (and ambitious), relevant, and time-bound. The ICSU therefore made the following criticisms:

- Some goals are insufficiently specific. For example, Target 14.7 calls for the sustainable use of marine resources by small island developing States. However, it is not specified what the term "marine resources" encompasses. In this case, it should be made clear that marine mining or, indeed, energy generation should be developed in a sustainable manner.
- Some Sustainable Development Goals are not quantified, i.e. they lack measurable indicators, meaning that some countries may fail to pursue the goals with sufficient commitment. Target 14.1, for example, merely calls for "marine pollution of all kinds" to be significantly reduced. However, this is an ideal rather than a specific goal. It would be more useful to specify target figures, e.g. reduce existing marine pollution of all kinds by 30 per cent, as this is a clear and achievable goal.
- There are major differences in the urgency with which the various goals must be addressed. For example, developing countries which at present have to make considerable efforts to combat hunger and malnutrition (SDG 2) will have less capacity to invest in promoting sustainable tourism (one of the targets for SDG 8) than a developed country. Prioritization of certain goals from the outset would therefore have been useful.
- The number of SDGs (17) and targets (169) is unrealistically high, and it is already foreseeable that only a proportion of the SDGs will be reached with the funding available. The number of MDGs was smaller and clear priorities were set, which was essential to making progress in the first place, the ICSU notes.
- No deadlines have been set for reaching some of the SDGs; one example is Target 14.3, which merely states that the impacts of ocean acidification are to be minimized and addressed.
- Possible conflicts between some of the goals have not been adequately considered. For example, Goal 2 calls for an end to hunger in the world; in line with Target 2.3, agricultural productivity will have to double by 2030 in order to achieve this goal. However, as this will require the use of large quantities of artificial fertilizer, there is a risk that this will cause even more nutrient pollution of rivers and coastal waters, creating a possible conflict with Target 14.1, which calls among other things for pollution, including nutrient pollution, of coastal waters to be significantly reduced.

So why are there so many points of criticism, and why are the SMART criteria not always met? Experts say that this is because the United Nations negotiations are first and foremost a political process: the aim is to find a formula that is acceptable to all countries. Even with criteria such as SMART, the wording is often vague. The reality is that consensus is essential in the United Nations, for resolutions such as the SDG agenda can only be implemented if they are adopted unanimously by the General Assembly. Very few UN bodies operate a system of majority voting.

Since the SDG process commenced, the representatives of the Open Working Group have responded publicly to criticism. They point out that the purpose of their work was to overcome the limitations of the Millennium Development Goals and to devise a sustainable development agenda that is as comprehensive as possible and covers the environment, economic and social dimensions in equal measure. And, they say, a political process always involves weighing up which goals should ultimately be pursued, and with which degree of intensity. The OWG accepts the criticism that not all the Goals will be reached by 2030. However, it is keen to ensure, in every case, the continuation of projects that have progressed successfully thanks to the MDGs.

Looking for the right benchmark

Notwithstanding all the criticism, it must be kept in mind that the SDG process is far from complete. Quite the contrary: the detailed work is only just beginning. Defining goals and targets was merely the first step. The second consists of defining indicators – benchmarks – to measure, in future, whether and to what extent progress towards the goals is being made. The list of indicators should be ready by spring 2016.

Fifteen years ago, the **United Nations Statistics Division** developed 60 indicators to measure progress towards the Millennium Development Goals. As not all the MDGs can be measured equally, the indicators were assessed according to their feasibility, suitability and relevance. Very much like the ratings used to rank countries'

4.5 > Critics are calling for the threat to the deep sea from marine mining and oil production to be defined more precisely in the SDGs. At Miami Beach (above) and elsewhere, there have already been numerous protests against the sell-off of the seabed.

creditworthiness, the system – which is likely to be adopted for the SDGs – awarded a score from AAA to CCC for these three criteria. This can be illustrated with reference to Goal 1: Eradicate extreme poverty and hunger. One of the indicators for MDG 1 was "proportion of population below the national poverty line, disaggregated by sex and age group". This parameter can be measured very accurately because most countries maintain detailed statistical data. This indicator was therefore awarded an AAA ranking.

Furthermore, all those MDG indicators which have proved their worth will be retained for the SDGs. In addition, the UN Statistics Division is currently developing new or better indicators, again drawing on external expertise. The Division published a list of 338 proposed indicators in early 2015.

4.6 > Melting of continental glaciers, seen here in Greenland, is one of the greatest threats posed by global warming. Combating climate change is one of the most ambitious and challenging goals on the SDG agenda.

The complexities of data collection

Experience with the MDGs has shown that data collection and statistical analysis of indicators cost a great deal of time and money. The success of the SDG agenda therefore depends, not least, on adequate funding being available for this purpose. Given that there are 17 SDGs and 169 targets, the effort involved is several orders of magnitude greater than for the MDGs. In mid 2015, the Open Working Group signalled that collecting the requisite data for 169 targets and the same number of indicators and reporting the figures to the United Nations was likely to be unmanageable for many countries, especially those whose monitoring systems and/or statistical offices are underresourced or (almost) non-existent. According to the experts, the upper limit is 100 harmonized global SDG indicators in order to be sure that all countries submit their data to the UN Statistics Division within a reasonable timeframe. Timely submission of national data is essential to allow conclusions to be drawn as to whether countries are on track to achieve their goals.

During the MDG era, analysing the data was often difficult as the figures were submitted with several years' delay. As the MDG process continued, however, many developing countries built up their statistical capacities and the situation improved. The OWG assumes that 100 indicators are manageable. However, it remains to be seen whether 169 targets can be captured adequately with just 100 indicators.

In practice, it will also become apparent that not all targets are equally relevant to all countries. For example, not every landlocked country needs to take measures to combat eutrophication of coastal waters if it has no rivers that wash nutrients into the sea. Malaria is another example: this particular problem does not affect the Northern European countries, so for them, providing data on this particular indicator is unlikely to be onerous. This reduces the amount of data that countries need to provide, as some targets may not be relevant.

A small set of indicators for everything?

One topic of discussion at present is whether a small set of comprehensive indicators can be used to measure progress towards several targets. This is quite conceivable, as many of the goals are linked. One example is the sustainable use of marine resources – a major goal which comprises many targets, such as conservation of fish stocks, reduction of nutrient loads, etc. Theoretically, all these aspects could be captured by a single indicator such as the Ocean Health Index (OHI), which assigns a single score to describe the condition of ocean regions or, indeed, the global ocean. The technical term for an indicator which covers a range of aspects is a "composite indicator". A country's gross national income can also be considered a composite indicator.

Although the OHI was discussed as a possible SDG indicator, it has now been rejected: the OHI is an extremely complex indicator, consisting of 10 categories which are used to evaluate the condition of marine ecosystems. There were also concerns about the weighting of the categories, because the OHI simply adds them together and calculates simple mean scores on that basis. Critics argue that as a result, poor results in one category can simply be cancelled out by good results in another; the OHI implicitly adheres to a weak concept of sustainability, in that natural capital that has been destroyed can simply be substituted to an almost unlimited extent by other forms of natural capital. Nonetheless, efforts are currently under way to de-termine to what extent the SDG indicators can be merged in order to reduce the total number. Identifying thematic overlaps can certainly help. Combating poverty (SDG 1), for example, is impossible without food security (SDG 2).

The limits to the SDG agenda

Notwithstanding all the justified criticism, many scientists consider that the Sustainable Development Goals (SDGs) build successfully on the Millennium Development Goals (MDGs). Whereas the MDGs were defined by United Nations experts and adopted by the UN General Assembly fairly quickly, the SDGs have been developed in an inclusive process lasting several years. This was essential to produce a comprehensive agenda which also places emphasis on good governance at the national level, which has an essential role to play. For example, SDG 16 calls for promotion of peaceful and inclusive societies and the provision of access to justice for all. Goals such as these touch on politically sensitive areas. They are entirely new: they were not included in the MDGs and have therefore not been captured in statistics. Developing appropriate indicators is therefore proving extremely difficult. For example, what kind of indicator can be used to measure "the percentage of population who believe decision-making at all levels is inclusive and responsive"?

Whether the SDGs genuinely contribute to a sustainable future will undoubtedly depend on the policies adopted at the national level. The SDG agenda is not legally binding. If countries fall short of their goals, there is no way of sanctioning them. Scientists emphasize, however, that the mere existence of the MDGs exerted a measure of pressure. Failure to achieve key goals thus harmed a country's international reputation. The SDGs are likely to have a similar effect, encouraging the adoption of national or regional measures to combat localized environmental problems such as nutrient pollution of water resources.

As a rule, countries give top priority to their own national problems. The question, then, is to what extent countries will in future be willing to work together to tackle global challenges such as climate change or ocean warming and acidification. In many cases, the international community has failed to get a grip on global environmental threats despite the existence of binding multilateral agreements such as the Kyoto Protocol. So it is almost impossible to predict to what extent the SDG agenda will motivate countries to take concerted action. The MDGs' strength lay primarily in their clarity: they were easy for everyone to understand. This led to a high level of public interest and awareness, with non-governmental organizations, citizens' action groups and the press in many countries casting a critical eye over whether and to what extent the MDGs were being achieved. In view of the high level of attention already focused on the SDGs, it is likely that a similar process of critical monitoring will accompany progress towards the SDGs, prompting intense public debate over the next few years. This may well exert additional public pressure on governments to show more commitment to working together on tackling global problems in the next decade and a half.

Kyoto Protocol
In order to reduce emissions of greenhouse gases such as carbon dioxide, the international community adopted the United Nations Framework Convention on Climate Change in New York in May 1992. The Convention was further elaborated in a Protocol adopted in Kyoto, Japan, in 1997, which sets internationally binding emission reduction targets for the first time. Despite these agreements, greenhouse gas emissions have increased in some developed countries and especially in the emerging economies.

Protecting the seas is possible

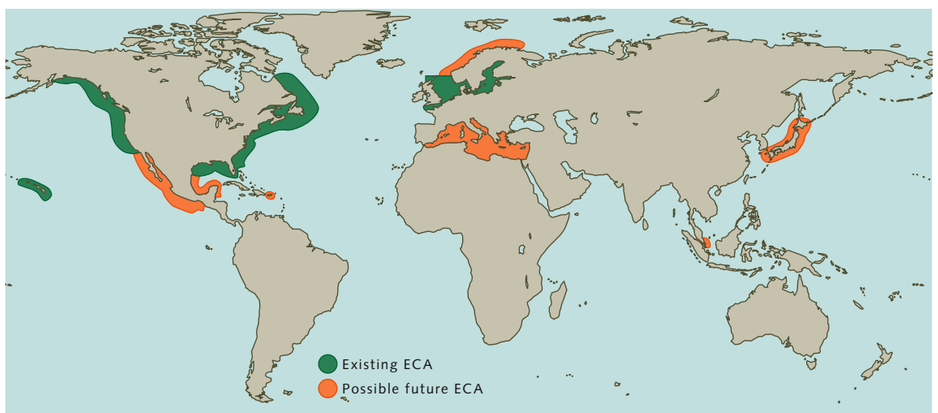
> Various agreements on the conservation of the marine environment and the sustainable use of marine resources have been implemented successfully around the world. In the process, however, it has become apparent that there is a strong preference for conservation measures that can be adopted at least cost. If more progress is to be achieved, all groups within society must play their part in demanding and taking action to save our seas.

Successes at the local level and in the international arena

Comprehensive and sustainable use of the marine environment is still a long way off: that is evident from the continuing overexploitation of fish stocks in European waters, the oil pollution in the Niger Delta and the eutrophication of the Yellow Sea off mainland China. On the other hand, there are many positive examples which prove that protecting the seas is possible – both at global and at regional or local level. The motivations for protecting the marine environment and moving towards sustainability vary considerably, as do the methods by which this is achieved. In some cases, massive public pressure has resulted in higher standards of protection or the use of improved technologies. In others, there were sound economic arguments for implementing appropriate measures. Often, a detailed cost-benefit analysis revealed that investing in sustainability was the more cost-effective option.

Cleaner shipping

In some instances, it takes time for states to reach agreement on marine protection regimes. Indeed, this is often only possible if the rules are not too stringent or the negotiating partners set long deadlines for achieving specific goals. This search for the lowest common denominator does not necessarily mean a poor compromise; it is often a crucial step in the right direction. A topical example is the reduction of harmful emissions from the burning of cheap, low-grade heavy fuel oil (HFO) in shipping. Ships running on HFO emit large quantities of sulphur oxides (SO_X), nitrogen oxides (NO_X) and particulate matter (soot) in their exhaust gases, which can cause respiratory diseases. While catalytic converters in vehicles and cleaner heating and industrial systems have done much to reduce air pollution in many ports, ships continue to emit their unfiltered exhaust gas into the atmosphere. In some dockland areas, the concentration of air pollutants reached such high levels in recent years that new waterside housing projects were put at risk. There was also pressure from the tourism industry: the growing number of cruise ships led to a deterioration in air quality in the very coastal resorts that are popular with passengers and advertise the fact that they offer clean and fresh seaside air.



4.7 > Emission Control Areas (ECAs) are sea areas in which shipping is subject to stricter emissions limits. Environmental organizations are calling for ECAs to be established in other coastal regions with a high volume of shipping traffic.

In order to improve the situation, the member states of the International Maritime Organization (IMO) agreed that the emission limit values (caps) had to be reduced. Limit values are set under an IMO agreement, the International Convention for the Prevention of Pollution from Ships (MARPOL 73/78). MARPOL contains several annexes specifying in detail which particular types of pollution are prohibited. The new caps on exhaust gas are set out in Annex VI to the Convention. Among other things, the sulphur content in heavy fuel oil is to be reduced worldwide. Until 2012, a maximum sulphur content of 4.5 per cent was permitted. This was lowered to 3.5 per cent in 2012, and will be reduced to a mandatory 0.5 per cent globally, although this will not happen until 2020.

In addition, Annex VI to the Convention defines various sea areas – known as Emission Control Areas (ECAs) – in which more stringent regulations apply.

Emission Control Areas have been established for some of the busiest shipping routes where the adoption of special mandatory measures for emissions from ships is required to prevent, reduce and control coastal air pollution. These special areas currently include the English Channel, the North Sea and the Baltic Sea, where there is a high volume of shipping traffic, and the waters off the coast of the US and Canada. A 1.5 per cent maximum sulphur content in fuel applied in the Baltic from 2006 and in the North Sea from 2007, and this was lowered to 1.0 per cent in 2010 and then to 0.1 per cent from January 2015.

Noxious emissions from shipping can be abated if vessels switch to much more expensive diesel, or are fitted with marine exhaust gas cleaning systems. Both options increase the costs to the shipping companies, which vigorously opposed tighter emission limit values for many years. Environmental organizations therefore view the decision to allow vessels to continue to burn heavy fuel oil with a very high sulphur content (3.5 per cent) in international waters until 2020 as a concession to the shipping companies. The fact that these limit values were adopted at all, despite opposition from the shipping industry, is due to the cost-benefit ratio. Ports and coastal towns benefit from a thriving shipping industry, transshipment and cruise tourism as these sectors generate income. However, the tourism industry and local communities are vocal in their opposition to air pollution, with mounting public pressure against emissions from shipping in recent years, especially in the ECAs. Cruise ships and larger commercial vessels are therefore required to switch to diesel when lying at anchor in the ECAs. The more stringent IMO rules are intended to reduce air pollution from passing ships in future as well. The benefits, then, are better air quality in the ECAs and less conflict between the shipping industry, on the one hand, and tourism and ports/coastal communities, on the other. Environmental organizations are now calling for other sea areas, such as the Mediterranean, to be designated as ECAs.

The MARPOL Convention is an international treaty, and compliance is therefore mandatory under international law. States which have acceded to the Convention

4.8 > Exhaust gases from shipping are a problem in many ports, such as Hamburg (above). Under IMO rules, these exhaust gases will contain lower levels of pollutants in future. Black smoke cannot be avoided altogether, however: it is emitted in short bursts from ships' revving engines during docking.

are thus permitted to verify a vessel's compliance with these more stringent emissions limits and, indeed, with MARPOL's other provisions while the vessel is in port. Under this system of Port State Control (PSC), authorities may also levy fines for non-compliance, which must be paid immediately in cash. Vessels or their flag state may also incur penalty points under an international points system. The penalty point system enables persistently non-compliant vessels to be flagged up in the international databases, with the result that their masters must expect the checks to be repeated in other ports en route.

The end of commercial whaling

The commercial whaling moratorium is another example of a successful international agreement. Adopted by the members of the International Whaling Commission (IWC) in 1982 following the dramatic decline of many whale populations, the moratorium entered into force in 1986, spelling the end for the commercial hunting of the great whales. Progress towards this goal was fraught with difficulty, however.

The IWC was established in 1948 by 14 member countries, all of which were engaged in commercial whaling on a relatively large scale. At that time, the IWC's main purpose was to set whaling quotas, which were then allocated to the individual member countries. As the quotas were not based on whale numbers but were simply intended to ensure that the profits from whaling were shared as fairly as possible, whales were hunted relentlessly. In 1961/1962 alone – a record season – some 66 000 whales were killed worldwide. Studies undertaken in the Southern Ocean in the early 1960s revealed the severely depleted status of the whale populations for the first time.

Catch limits, e.g. for blue whales and humpback whales, were agreed within the IWC framework on various occasions, but several of the whaling nations opposed the restrictions and whaling continued. As whale populations steadily declined, the first of the major UN environmental conferences – the United Nations Conference on the Human Environment (UNCHE) in 1972 – called for a moratorium on commercial whaling, initially for 10 years. Nevertheless, whaling continued, whereupon various environmental organizations began to protest more vigorously against whaling – in some cases with headline-grabbing campaigns in which activists on inflatable boats attempted to disrupt whaling operations at sea. In many countries, there was a shift in public mood, with growing opposition to whaling. In 1982, Seychelles abandoned commercial whaling and proposed a moratorium for the first time.

Until that point, the IWC had mainly consisted of countries which were engaged in or supported whaling. However, the IWC is an international organization and is open to any country in the world, and now it began to attract more countries which were opposed to whaling. In 1986, anti-whaling nations formed the majority in the IWC for the first time, enabling the moratorium to be adopted. Iceland, Japan, Norway and the Soviet Union lodged objections to the moratorium and continued their whaling operations. Russia ceased whaling at the end of the Cold War, although it formally maintains its objection to the present day. Iceland and Norway have also maintained their objections but unlike Russia, they have continued their commercial whaling operations, setting their own catch quotas each year. Japan finally withdrew its objection but its whaling programme also continues, based on Japan's invoking of a clause in the International Convention for the Regulation of Whaling – the IWC's key document – which permits whaling for purposes of scientific research. The IWC also allows some indigenous communities which have traditionally engaged in subsistence whaling to continue this practice for livelihood purposes.

Despite all these limitations, the moratorium is widely regarded as a success. In 1982, prior to the moratorium, more than 13 000 whales were killed. Now the figure is around 2000 whales killed each year. Iceland and Norway mainly hunt northern minke whales *(Balaenoptera acutorostrata)*. Iceland also catches fin whales *(Balaenoptera physalus)*, which are still relatively abundant. Blue whales and other species described by the IWC as rare species requiring special protection are not hunted. Another success is that the moratorium has made it possible to establish the Southern Ocean Whale Sanctuary in the area surrounding Antarctica, which is an important region for whales. Even today, there is an ongoing dispute within the IWC as to whether the ban on whaling should be eased. Japan in particular is attempting to win other member states' support for its interests. However, there is no need for concern about a possible softening of the moratorium at present.

Moratorium
A moratorium is an agreement on the suspension of an activity, by which states undertake not to exercise their use rights or enforce claims to payments. A moratorium generally remains in force for a limited period. Various states or communities such as the Greenlandic Inuit, which depend on subsistence whaling, are exempt from the whaling moratorium. The International Whaling Commission (IWC) discusses such exemptions at its regular meetings.

4.9 > For the men of the Chukchi people in northeast Russia, hunting gray whales is an age-old tradition. They use the meat to feed themselves and, above all, their sled dogs.

Why does conservation fail?

These and other examples show that with clear rules, rigorous implementation and stringent controls, it is possible to protect the marine environment. But this raises the question why relatively few of the agreements have been successful so far. The Kyoto Protocol, for example, shows how difficult it is to make climate protection a global obligation. The Kyoto Protocol was the first international agreement to establish an absolute and legally binding limitation on greenhouse gas emissions. Under the Protocol, the developed countries pledged to achieve specific greenhouse gas emissions reductions. The Protocol contains detailed regu-lations on emissions of carbon dioxide (CO_2), methane (CH_4), nitrous oxide (N_2O) and several other greenhouse gases. Although carbon dioxide is not the most potent greenhouse gas, it is released in very large quantities through the burning of natural gas, oil and coal, and is therefore of particular significance. For the first Kyoto commitment period (2008 to 2012), the European Union, for example, pledged to cut its greenhouse gas emissions by 8 per cent compared with baseline year 1990. This target was met.

The problem is that not all developed countries acceded to the Kyoto Protocol. The US, for example – the world's second largest emitter of carbon dioxide – did not sign the Protocol. Making matters worse, no limits were agreed for the developing countries and transition economies because their per capita greenhouse gas emissions are much lower than those of the developed countries. However, with their populations each exceeding one bil-

4.10 > China is one of the world's largest producers and consumers of coal. Coking plants are particularly densely concentrated in Linfen in the southwest of Shanxi Province. The US Blacksmith Institute rated the city among the world's most polluted places in both 2006 and 2007.

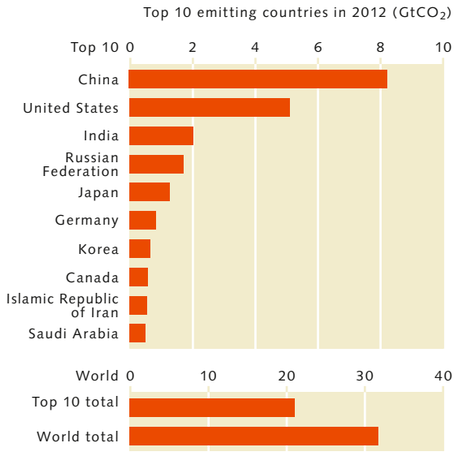
lion, both China and India emit vast quantities of greenhouse gases. Today, China is the world's largest carbon dioxide emitter and is thus a major contributor to the greenhouse effect. For the sake of the climate, it therefore needs to cut its emissions as a matter of urgency. However, it is also important to consider that a large percentage of China's carbon dioxide emissions come from heavy industry, which manufactures products for the European and US markets. In that sense, China's carbon dioxide emissions cannot be viewed in isolation from the importing countries. This shows that effective climate action is, without doubt, a global responsibility.

Climate protection – a lonely pursuit

At the end of the first commitment period, the parties to the Kyoto Protocol met again in order to agree new climate targets for the second commitment period (2013 to 2020). Although the international community agreed fresh targets, this time, it was not only the US but other countries too that rejected the new commitments. Japan, Canada, New Zealand and Russia are no longer participating in the second commitment period. Reduction commitments were adopted by the European Union and its member states, Australia, Belarus, Iceland, Kazakhstan, Liechtenstein, Monaco, Norway, Switzerland and Ukraine. Together, however, these countries account for just 15 per cent of global emissions. As a result, greenhouse gas emissions have continued to rise. The Kyoto Protocol is therefore not generally regarded as a success. The future allocation of greenhouse gas reductions remains a contentious issue, as is the question of how the developing countries and transition economies, especially China and India, can be persuaded to cut their carbon dioxide emissions.

Short-term thinking vs. climate action

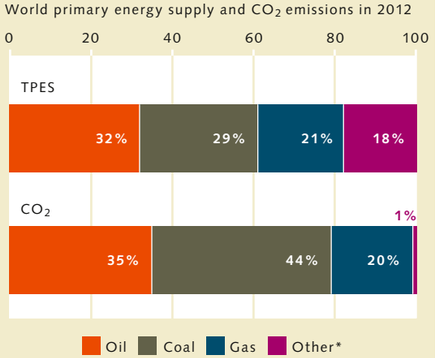
So what are the reasons for the Kyoto Protocol's and other environmental agreements' lack of success? From the economists' perspective, the answer is clear: national implementation of agreements or regulations ultimately depends



4.11 > Two-thirds of the world's carbon dioxide emissions are produced by just 10 countries. China and the US are by far the largest emitters.

on the extent to which the benefits outweigh the costs for the country concerned. If a target can be reached at minimal cost, national measures are more likely to be adopted. One example is the new waste ordinance in Oahu, one of the islands in the Hawaiian Archipelago. Since 1 July 2015, the ordinance has banned businesses from handing out plastic bags to their customers. The authorities' aim is to reduce the amount of plastic waste, much of which ends up as marine litter. The plastic bag ban does not cost Hawaii very much at all, as alternatives such as paper bags and biodegradable plastics have existed for some time. The benefits, however, are substantial, as the ban is helping to keep Hawaii's beaches litter-free and promotes its image as an unspoilt, near-natural tourist destination.

Dispensing with fossil fuels is difficult, however, as almost all the national economies are dependent on them. Crude oil is used to produce fuels to power vehicles; natural gas and coal are needed for electricity generation and heating. The transition to alternative technologies such as photovoltaics and wind power is complex and requires major upfront investment, the costs of which seem extremely high compared with other energy sources. However, conventional cost-benefit calculations often



4.12 > Compared with other fossil fuels, the burning of coal releases particularly large amounts of carbon dioxide. Although more oil than coal is burned worldwide, it emits less carbon dioxide. Renewable energy technologies such as photovoltaics, hydro and wind power, but also nuclear power plants produce next to no carbon dioxide emissions during their operation. The above figures do not take into account energy consumption and carbon dioxide emissions from uranium mining, the manufacture of wind turbines and photovoltaic systems and the construction of hydropower plants.

Fish stock
A stock is defined as a self-sustaining population of a fish species within a specific sea area. As a rule, the various stocks of a species are so geographically separate that one stock's individuals do not mix with another's, even though they belong to the same species. In a fisheries context, this means that a species is very rarely totally depleted; generally, this applies only to a specific stock.

ignore the external costs. Energy generation is a case in point: at present, only the costs of the feedstocks used to produce electricity or heating tend to be considered. Coal, a fossil energy source, thus appears to be a cheap fuel. For that reason, many countries use vast amounts of it. However, this cost-benefit analysis does not factor in the external costs associated with the greenhouse gas emissions produced in the burning of coal. No price is put on the droughts, storms, ocean acidification and sea-level rise caused or exacerbated by climate change.

As the gains from the avoidance of external costs are not considered, many countries continue to rely on fossil fuels. In the transition economies and developing countries, such as China and India, where industrial production is booming, soaring energy demand is therefore met primarily by cheap coal. Many other countries also shy away from the costly transition to low-carbon technology, with the result that global carbon dioxide emissions are still rising. Instead of investing in alternative technologies, private-sector energy suppliers and industry keep costs down for the present by utilizing cheap fossil fuels. Society will have to pay the price in future, in the form of high consequential costs.

Free riders obstruct environmental protection

In a situation like this, the free rider problem occurs. Free-riding countries are those which make little or no contribution to climate protection. They leave it to other states to invest in climate change mitigation and to switch to renewable energies. Without making any contribution themselves, they profit from others' efforts and investment. This in turn deters those countries which would otherwise be willing to invest in protecting the climate and the environment. Due to the free riders, however, they have little incentive to intensify their commitment.

As a consequence, some countries are demanding that the top 10 carbon dioxide emitters – including China, the US, India, Russia, Japan and Germany, which together produce two-thirds of global carbon dioxide emissions – massively reduce their CO_2 emissions before they themselves take action. China and India counter with the argument that the leading industrialized countries should take action on the climate first of all. The result is that very little progress is made. On the other hand, China – unlike the US – is now attempting to make more intensive use of renewable energy sources, primarily hydro, wind and solar.

China has therefore greatly expanded its wind energy sector in recent years. By the end of 2014, China's installed wind power capacity was almost equivalent to that of all the European wind farms combined. The total capacity of US wind farms, by contrast, is only half this amount. However, in some cases, this massive expansion of renewable energies in China is causing major problems. China's hydropower projects, such as the Three Gorges Dam, are an example. The damming of the Yangtze River has destroyed numerous towns, villages and natural habitats, and this damage is irreversible.

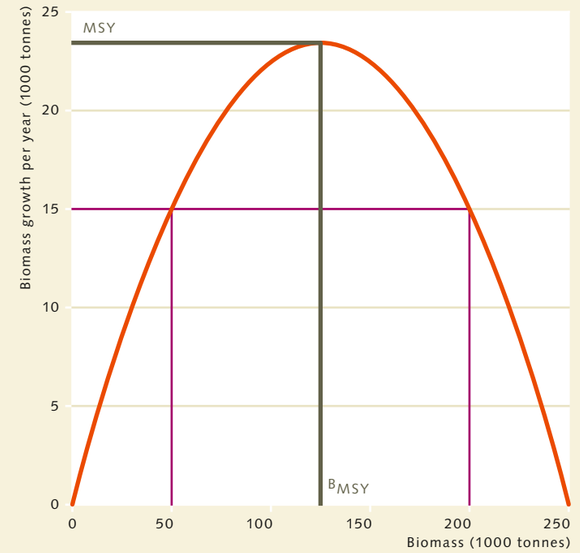
Some progress nonetheless

Despite national self-interests, environmental protection and a sustainable economy are within reach at the international level, as a multitude of examples show. For the marine environment, the European Union's new Common Fisheries Policy (CFP) is particularly noteworthy; it aims to end the overexploitation of European fish stocks. For many years, the EU's fishing fleet was far too large, but there was vehement opposition to any restriction on fishing from politicians keen not to lose votes, especially in structurally weak regions. Accordingly, the annual Total Allowable Catches (TACs) set by EU fisheries ministers for the various species were often far higher than recommended by scientists, resulting in the progressive overexploitation of many stocks. Today, stocks are mostly made up of smaller and juvenile fish, which are often thrown back into the sea because they are below the prescribed minimum size. This practice of discarding fish has steadily worsened the problem of overfishing in recent years.

In view of the permanent massive overexploitation of many of the EU's fish stocks, a change of policy was finally agreed. The new CFP entered into force in 2014. Its aim is to regulate fishing in a way which allows fish stocks to recover, enabling them to be fished at an optimal level in future. Fishery scientists see this as a milestone in the move towards the sustainable exploitation of Europe's fish stocks. Although discussions on how the new fisheries policy should be implemented day-to-day are still ongoing, a start has been made. From now on, fishing in the EU will be based on maximum sustainable yield (MSY). The MSY is the maximum catch that can be taken from a species' stock over an indefinite period without jeopardizing that stock's productivity.

Fishing based on MSY not only gives fish stocks a chance to recover. It also offers a range of economic benefits. If stocks are allowed to grow, this increases fisheries' catch potential. Future catches will consist of larger fish, which fetch higher market prices per kilo, and discards will decrease. If stocks consist of larger fish, it takes far less time to catch a tonne of fish, reducing fishing

Why fishing at MSY levels delivers more



4.13

The maximum sustainable yield (MSY) is the maximum catch that can be taken from a species' stock over an indefinite period without jeopardizing that stock's productivity. The maximum sustainable yield (MSY) is achieved at a certain level of biomass (B_{MSY}). This differs in size from fish stock to fish stock. At B_{MSY} the annual production of new biomass is at its maximum – firstly because the fish grow particularly well and increase their weight, and secondly because more eggs and larvae survive to develop into fish.

Above or below B_{MSY}, the stock is less productive. At about 200 000 tonnes biomass, for example, the stock provides only 15 000 tonnes of new biomass per year. This is because there are more fish in the stock to compete for food, and they each put on less weight. Also, more eggs and juvenile fish are cannibalized. A stock of only 50 000 tonnes biomass experiences a similar level of biomass growth. Although this smaller stock contains fewer spawners, the total achieved from the increase in weight of the individual fish (as a result of reduced competition for food) and the biomass of the offspring (which have a greater chance of survival within a smaller stock) is the same as for a large stock.

It is interesting that sustainable fishing is also possible with larger or smaller sized stocks than the B_{MSY}, but the annual fish yield is lower.

effort and cutting fuel and wage costs. Ultimately, higher profit margins and rates of return can be achieved – and that means additional revenue for the fishing industry.

Accurately estimating fish stocks

For fishing to be based on MSY, however, it is essential to know how many fish there are in the sea. The challenge is that the size of a stock naturally fluctuates from year to year. Key environmental parameters determining the number of juveniles produced include water temperature, salinity and oxygen concentration. The food supply also determines how well the fish grow. Today, it is recognized that even regular climatic fluctuations influence the development of fish stocks. So it is not enough to set a specific allowable catch once and for all. On the contrary, fishery scientists must reassess the stock every year to enable them to make catch recommendations for the coming fishing season; in other words, they must determine the total allowable catch, in tonnes, at a level that does not exceed the MSY.

4.14 > Pilot projects are now under way to test the installation of on-board cameras as a means of monitoring catches.

In order to estimate stock size, scientists utilize catch data from fishermen, as well as the findings from catch samples collected during research expeditions. Using mathematical models, they then calculate the recommended maximum annual catch.

This process is made more difficult, however, by the fact that a variety of methods exist for calculating the MSY, sometimes resulting in discrepancies in the figures. Fishing in Australia and the US is now based on MSY, but their management regimes differ nonetheless. The International Council for the Exploration of the Sea (ICES) is currently advising the EU bodies on the introduction of appropriate calculation methods.

Doing battle against discards

In order to protect and ensure the optimal use of fish stocks in future, the new CFP also envisages various measures to reduce discards. They include the introduction of selective fishing gear specifically designed to catch only the target species. However, even the use of improved fishing gear does not always avoid fish of different species ending up in the same net. Specialists call this a mixed fishery. In cod fisheries, for example, haddock and whiting are often caught as bycatch. This has caused problems because fishermen were only permitted to land the species for which they had been allocated a quota – generally cod. All the other fish and marine fauna caught as bycatch were dumped overboard. Most of the discards were already dead when they went back into the water. In future, fishermen engaged in mixed fishing should acquire quotas for all species likely to end up in their nets. As soon as a quota is exhausted, fishing must cease in order to avoid overexploitation of the species – even if the quotas for the other species have not yet been exhausted. Discussions are currently under way to determine how the EU can best monitor the discard ban. One option is to install sealed CCTV cameras to monitor activity on deck. According to experts, the widespread use of this or other solutions in routine fishing operations is simply a matter of time. From their perspective, EU fisheries policy reform was the most important factor, and this has been achieved with the new CFP.

Centralism gives way to regional responsibility

The new CFP has introduced another change as well: the individual fishing regions will now have a greater say. Previously, all the rules were agreed centrally in Brussels and applied equally to all the EU waters. However, fisheries can vary considerably according to species and region, making it almost impossible to apply all the rules to all the various regions. Some rules were found to be unworkable, so new rules were adopted without amending or repealing the first. The outcome, over time, was an overly complex and sometimes contradictory EU fishing regime. Many of the EU rules were therefore viewed by fishermen themselves as excessive or impractical. Indeed, some of them were ignored altogether.

The new CFP now provides for greater involvement of fishermen in fisheries management and decision-making. For example, Member States can delegate decision-making power to the regional level and give responsibility to the regional bodies where the fisheries directors of the seaboard states are based, such as the Baltic Sea Fisheries Forum (BALTFISH) – the regional body providing a platform for discussion of fisheries issues in the Baltic Sea. These bodies can then draft management plans that are appropriate for their specific region, which will then be approved by the EU's Agriculture and Fisheries Council. The regional bodies will hold regular consultations with a second tier, namely the Regional Advisory Councils. Up to two-thirds of the members of the RACs are experts from the fisheries sector, with experts from other interest groups, such as nature conservation organizations and trade unions, comprising the remaining one-third.

With its regionalization of fisheries policy, the EU is to some extent following the example of the US, where fishing has been based on MSY for some years and regional fisheries management regimes are in place in various coastal regions and are the responsibility of five regional fishery bodies. In 2013, for the first time, all five regional fishery bodies in the US set their total allowable catches precisely according to the recommendations made by fishery scientists, based on MSY – a move which fishery scientists hail as a success. In addition to the US and the EU, Australia has based its fishing activity on MSY for some time. Here too, fishermen are involved in fishery management at the local level.

Fishing vs. marine conservation?

A further challenge for the EU at present is to bring fisheries management into line with the Marine Strategy Framework Directive (MSFD) adopted in 2008. The general aim of the MSFD is to achieve or maintain good environmental status in the marine environment. There is thus an obligation not only to ensure that fisheries are exploited at sustainable levels, but also to minimize impacts on seabed habitats. Bottom trawling can degrade these habitats even if the fishery in question is sustainable in terms of its impact on fish stocks. According to the MSFD, fishing should in future be managed in such a way that EU sea areas which merit a specific protection regime are no longer fished at all, or are fished less intensively. In the EU, some scientists are currently mapping the seabed and gathering information on which types of organism occur in various seabed habitats, such as mussel beds, seagrass beds and diverse types of sediment. Maps are also being produced to show the level of intensity of fishing in the various areas, so that in future, it will be possible to assess more accurately which specific areas are particularly sensitive and should perhaps be excluded from fishing activities that impact on the seabed.

Various uses in a limited space

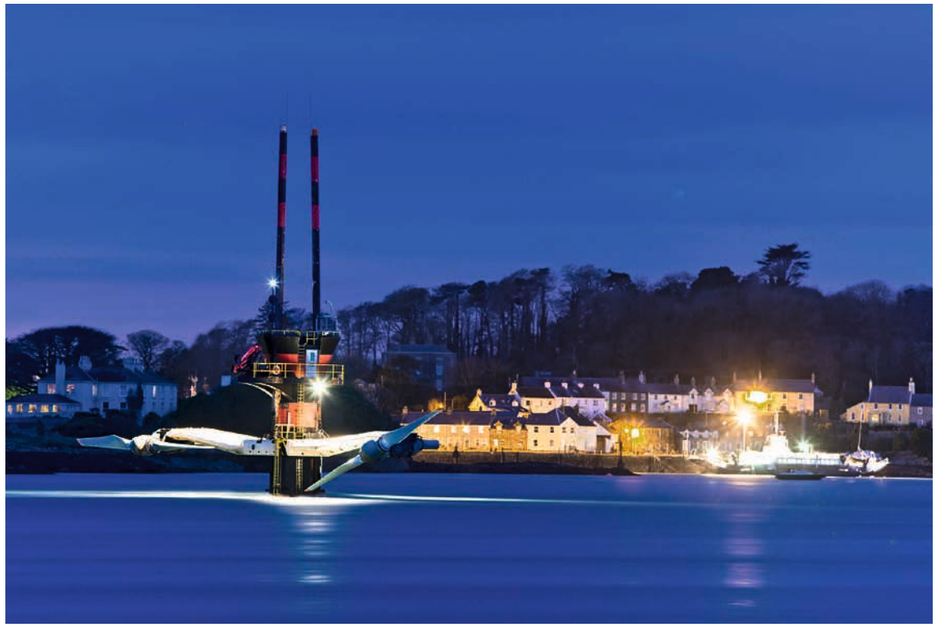
If the marine environment is to be protected more effectively, based on the sustainable management of its resources, there must, in future, be better coordination between its conservation and use. Marine spatial planning (MSP) is an important tool in achieving this goal. MSP is a means of coordinating the various coastal and marine interests. Economic activities in the marine environment, e.g. fishing, offshore wind farm construction, dredging for marine aggregates (i.e. gravel and sand), shipping and oil production, must be balanced against other uses, such as leisure and recreation and, not least, conservation.

MSP was first developed in the 1980s as a means of resolving conflicts of interest over the conservation and use of the Great Barrier Reef along the east coast of Australia. Experts now take the view that a marine spatial plan should always be based on an ecosystem approach; in other words, a sea area should be managed in a way which avoids negative impacts on marine habitats and the provision of ecosystem services. Ultimately, marine spatial planning should prevent the proliferation of uses which has caused major pollution of coastal waters and environmental problems in many regions of the world in the past. The prerequisite for a successful MSP is that all stakeholder groups and the local community are involved in the planning process.

Offshore wind powers spatial planning

Since the start of the new millennium, interest in marine spatial planning has noticeably increased. Contributory factors are the increase in shipping and the trend towards more offshore extraction of mineral resources such as natural gas and oil in many sea areas. In Europe, particularly in the United Kingdom and later also in Germany, the strong expansion of offshore wind power was also a driving force behind the introduction of MSP. The question of how to reconcile wind power expansion with shipping and safety along maritime transport routes was the main focus of attention here. The authorities therefore demanded detailed analyses of the potential risks posed by wind turbines, for example in the event of a damaged vessel drifting at sea. Attention also focused intensively on the extent to which large-scale wind farms affect the flyways of migratory birds, and biological assessments were conducted to answer this question. Denmark and the Netherlands, for their part, were keen to assess to what extent offshore construction would jeopardize the status of the Wadden Sea as a UNESCO Natural World Heritage site.

The expansion of offshore energy worldwide seems set to continue, and from a climate perspective, this is a welcome trend. However, this form of energy generation will inevitably clash with aspects of marine conservation and use, not only in Europe. Even during construction, there is potential for conflict. The use of heavy piledriving machinery to ram the foundations of wind turbines into the seabed triggers powerful sound waves which are now known to cause hearing impairment in marine mammals. Although the use of mitigation devices, such as air bubble curtains, to reduce underwater noise is now being trialled, it seems likely that in future, wind farm construction will in some cases have to take the behaviour of marine mammals into account, for example by halting construction to allow whale mothers and calves to pass. And once a wind farm is established, fishing – a key sector of the economy in many coastal states – becomes impossible in that area, so alternatives must be identified. All these aspects must be considered in marine spatial planning in future.



4.15 > The SeaGen tidal energy convertor in Strangford Lough in Northern Ireland is a 1.2 megawatts device whose output is comparable to that of a wind turbine. SeaGen is unusual in that it uses rotors to produce power, whereas the common method of extracting tidal energy utilizes turbines installed in a barrage wall.

The perfect MSP

At first, each country implemented MSPs as it saw fit, with little sign of any harmonized spatial planning. MSP experts from UNESCO's Intergovernmental Oceanographic Commission (IOC) therefore published guidelines on marine spatial planning in 2009. They set out a step-by-step approach for ideal marine spatial planning in line with ecosystem-based management. As the authors themselves emphasize, these guidelines are a general tool which can be applied at international, regional and local level. According to the guidelines, marine spatial planning should consist of the following 10 steps:

- Identifying need and establishing authority;
- Obtaining financial support;
- Organizing the process through pre-planning;
- Organizing stakeholder participation;
- Defining and analysing existing conditions;
- Defining and analysing future conditions;
- Preparing and approving the spatial management plan;
- Implementing and enforcing the spatial management plan;
- Monitoring and evaluating performance;
- Adapting the marine spatial management process.

The authors point out that MSP is a long-term process which must be continuously tailored to changing conditions; this involves further consultation between planning authorities and the various stakeholder groups. Identifying possible alternative sea use scenarios is also important, as is setting specific planning objectives at the outset, which should be measurable. Comprehensive marine spatial planning has many advantages, according to the authors. One is that it allows stakeholders' common interests to be identified. For example, an offshore wind farm can provide a refuge for certain species of fish, particularly juveniles, as no fishing takes place in this area. Tourist excursions to wind farm sites are another possible option. In sea areas where natural reefs have been destroyed by fishing, the bases of wind turbines can act as artificial reefs for

4.16 > Marine spatial planning can also help to mitigate conflicts between wind turbines and the flyways of migratory birds.

The ecosystem approach
The ecosystem approach is a strategy for the integrated management of land, water and living resources that promotes conservation and sustainable use in an equitable way. Instead of applying a species-by-species approach, it focuses on the dynamic relationships within and among species and between species and their natural environment.

Offshore energy – creating space for green power plants at sea

Climate change will radically alter conditions in the marine environment in future. Atmospheric warming will be accompanied by a rise in the temperature of seawater. Scientists attribute the mass die-off of tropical coral reefs to rising water temperatures. Furthermore, a large amount of the carbon dioxide emitted into the atmosphere from the burning of coal, oil and natural gas dissolves in seawater and, put simply, forms carbonic acid. The likely impacts of this ocean acidification are still impossible to predict. The melting of the continental glaciers in Greenland and the Antarctic has the potential to cause sea levels to rise by several metres over the coming centuries. This would spell disaster for people living in low-lying coastal regions. These impacts of climate change can only be avoided if humankind switches from fossil fuels to renewable energies as soon as possible.

The marine environment can facilitate this process. The wind across the sea, the waves and the currents contain vast amounts of kinetic energy, i.e. the energy of motion, which can be converted into electricity. The key renewable marine energies are:

- wind energy;
- wave energy;
- tidal energy;
- ocean current energy;
- energy derived from temperature differences at various ocean depths (ocean thermal energy conversion – OTEC);
- energy derived from the different salt content of freshwater and saltwater (osmotic power).

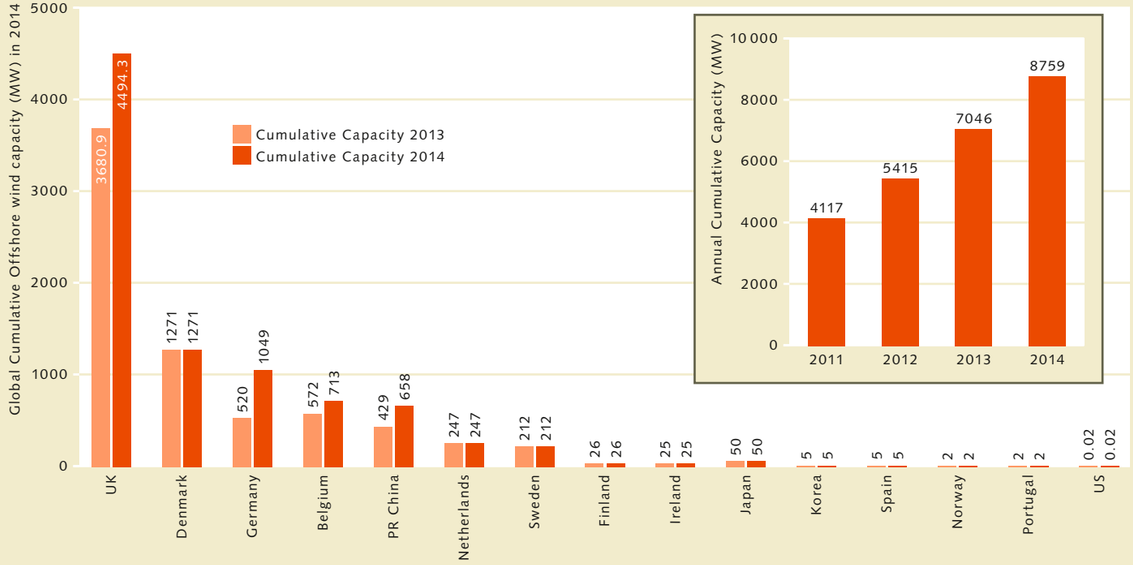
Electricity currently accounts for around 18 per cent of the world's total energy consumption. Renewable marine energies have the potential to meet a substantial share of the world's electricity needs. Wind energy appears to be the most promising: experts estimate that offshore wind power alone could in future supply around 5000 terawatt-hours (TWh) of electricity a year worldwide – approximately a quarter of the world's current annual electricity consumption of about 20 000 terawatt-hours (1 terawatt-hour = 1 trillion watts). However, it is essential to differentiate between the technical potential of an energy technology and its sustainable potential. The technical potential includes all the plant locations which are theoretically feasible. The sustainable potential looks at environmental factors, such as the damage that the construction of foundations for offshore wind turbines causes to seabed habitats. The sustainable potential is accordingly lower than the technical potential.

Offshore wind power is the marine energy currently at the most advanced stage of development. In 2014, the many thousands of wind turbines installed worldwide had a total **nominal capacity** of 8795 megawatts. An average offshore wind turbine produces 2 to 4 megawatts – enough to supply around 5000 households with electricity. Nominal capacity is the maximum output generated by a wind turbine in optimum wind conditions. At present, the total capacity of offshore installations is low compared with onshore wind farms. For example, the wind turbines installed onshore in the German state of Lower Saxony alone have a total capacity of around 8300 megawatts. Nonetheless, the expansion of offshore wind energy has gained considerable momentum in recent years. In 2011, annual global cumulative offshore wind capacity was just 4117 megawatts. Installed capacity has thus more than doubled between 2011 and 2014.

Europe in particular has greatly expanded its offshore wind power sector in recent years. At the end of 2014, 2488 offshore wind turbines were installed in European waters, making a cumulative total of 8045 megawatts. Europe thus produces some 90 per cent of the world's offshore wind-generated electricity. The United Kingdom leads the field, with around 4500 megawatts of installed capacity in its coastal waters. There are several reasons why the UK has surged ahead: the expansion of offshore wind began early on; as an island, the UK has a large EEZ; and, thirdly, turbines were erected in shallow waters fairly near to the coast. In Germany, by contrast, there were massive protests against offshore wind expansion near the coast. The tourism industry was concerned that holiday-makers would be disturbed by the sight of large wind farms on the horizon. Conservationists cautioned against siting wind turbines close to the Wadden Sea, a UNESCO World Heritage site and an important resting area for millions of migratory birds. Most of Germany's wind farms are therefore located in deeper waters some distance offshore, creating greater technical complexity. Delays also occurred in Germany because the routes selected for the power lines connecting the wind farms to the onshore grid ran through sea areas contaminated with unexploded ordnance from the Second World War, which first had to be cleared.

China has emerged as the global leader in the expansion of onshore wind energy, taking only a few years to achieve this status. Experts are therefore predicting that China will also invest heavily in the expansion of offshore wind. In the US, by contrast, only a small number of offshore pilot projects have been launched to date.

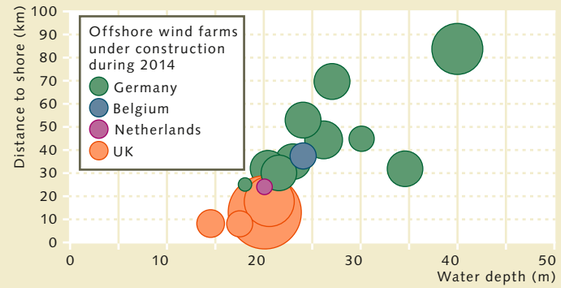
There is growing interest in offshore wind energy in Japan as well. Here, however, there is a very steep descent to the deep ocean floor, with very little shallow water around the Japanese islands compared with Europe. Japan therefore favours floating wind farms which stand upright in the water and are anchored to the seabed with steel cables. A number of these installations already exist around the world. This is viewed as a mature technology, although the great depths involved make it more expensive than conventional wind farms.



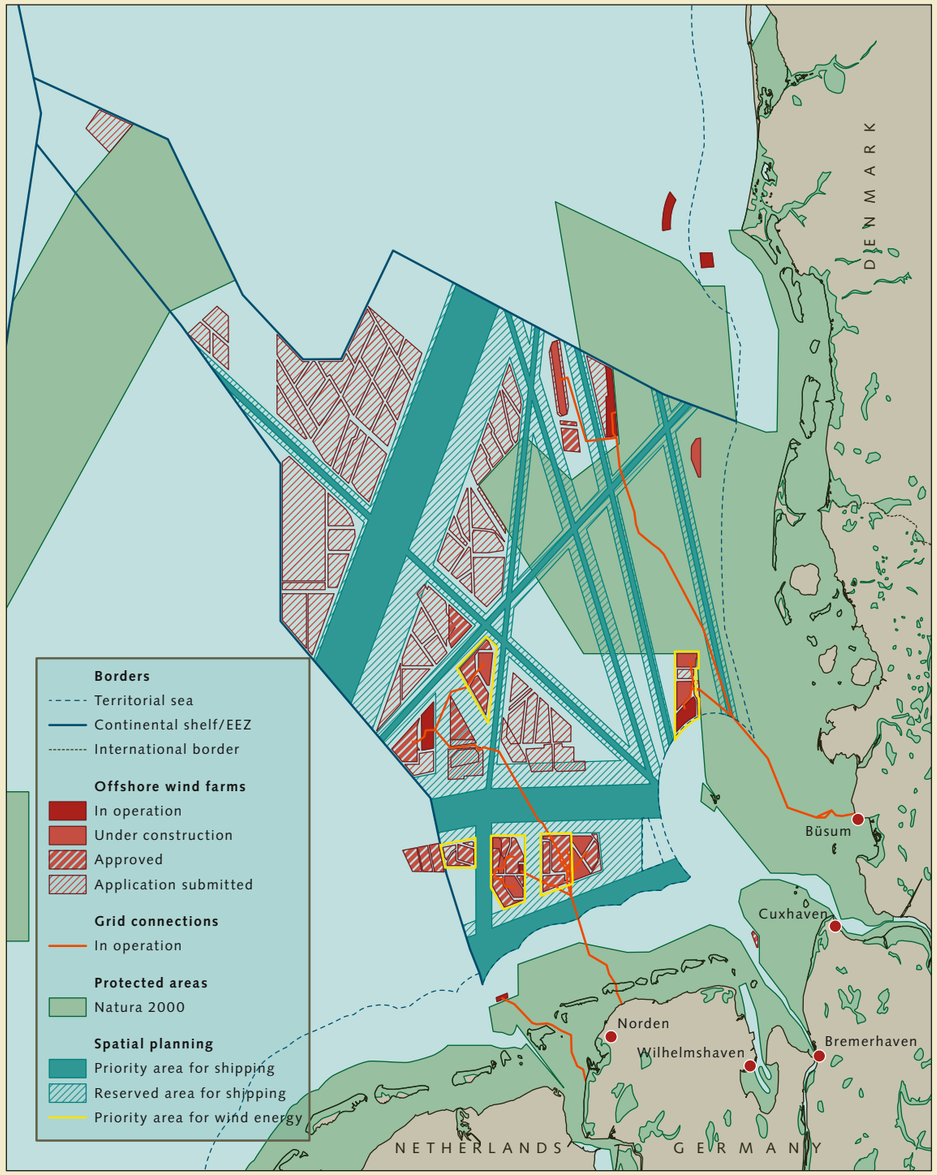
4.17 > The United Kingdom currently leads the field in the expansion of offshore wind power. In Germany, many offshore projects are now nearing completion, so it is likely to move up to second place over the next few years. The current dynamic momentum in this market is evident from the fact that global cumulative offshore wind capacity has doubled in just a few years.

Compared with wind, the other offshore marine energy technologies are still in their infancy. Although a number of wave, ocean current and osmotic power plants already exist around the world, many of them are prototypes. Industrial production on a large scale, comparable with wind energy, is still a long way off. Ocean thermal energy conversion (OTEC) is the least advanced of these technologies. In the 1990s, several small-scale prototypes were built in Hawaii, but a larger fully operational system has yet to be constructed.

Tidal power plants have been an established technology for decades, but rely on dams and barrages for the installation of large turbines, making their construction extremely complex. For that reason, very few of these plants exist worldwide. A notable example of a tidal power plant is the La Rance Barrage near the town of Saint-Malo in France, which has been in operation since 1966.



4.18 > Other countries, different building regulations: in Germany, the construction of wind farms near the coast is banned, whereas the United Kingdom has built many wind farms in much shallower waters directly off the coast. This is possible, not least, due to the lack of extensive tidal sand and mud flats in the UK.



4.19 > Spatial plans for the German EEZ, which have existed since 2009, specify which uses are permitted, and in which areas. As shown above, wind farms may only be constructed outside Natura 2000 sites some distance away from shipping lanes.

colonization by marine organisms that require a hard substrate. And lastly, various types of offshore energy can be combined; for example, ocean current energy installations can be mounted on the bases of wind turbines, thus making better use of the available space in the sea area concerned.

Mandatory marine spatial planning

In a number of countries, MSP is now regulatory and enforceable under national law; examples are Belgium, China, Germany, the United Kingdom and the US. In the European Union, a directive requiring Member States to harmonize their maritime spatial planning entered into force in 2014. The aim, among other things, is to avoid conflicts at the borders between EEZs. For example, it should be possible, in future, to avoid a situation in which a marine protected area on one side of the border lies directly adjacent to an area where a neighbouring state plans to dredge for sand and gravel.

With its Federal Spatial Planning Act (Raumordnungsgesetz), Germany is a good example of how multiple interests can be reconciled through regulation. Under the longstanding procedure stipulated by this Act, areas are designated for specific types of land use, such as economic development, nature conservation, and recreation. The areas are then marked on a detailed land use map. This spatial planning model has now been extended to the EEZ and marine spatial plans have been produced.

Initially, the driving force was offshore wind energy as part of the German government's massive expansion of renewable energies at the start of the new millennium. Unlike shipping and fishing, wind turbines are a static, not a mobile form of use, occupying space in the sea area concerned for at least 25 years. They can thus be regarded as permanent structures. As a wind farm with 100 turbines easily covers an area of 30 to 40 square kilometres, their space requirement is considerable. Risk analyses were therefore conducted to assess to what extent wind farms posed a shipping hazard. As a result, wind farm exclusion zones were identified to prevent collisions from occurring, as were priority areas for wind energy.

Protected areas in the EEZ

The spatial plans for Germany's exclusive economic zone (EEZ) entered into force in 2009. Among other things, they show power line routes and marine dredging areas (aggregates), as well as marine protected areas, i.e. Natura 2000 sites. Under various EU directives, each Member State is required to designate Natura 2000 sites, which together form an EU-wide network of nature protection areas, the aim being to combat the fragmentation of Europe's protected habitats so that rare fauna and flora can regain access to their original areas of distribution. The Natura 2000 sites include some coastal and offshore areas in the Member States. According to experts, Germany has set an example in its spatial planning by designating all the Natura 2000 sites in its EEZ as zero-use zones, whereas it is customary to allow economic uses to continue in Natura 2000 sites provided that assessments are conducted to show that this does not adversely affect their conservation function. Around 30 per cent of Germany's EEZ in the North Sea and 50 per cent of the EEZ in the Baltic are thus protected.

There are some criticisms, however. Before the spatial plans entered into force in 2009, various companies had submitted applications to construct wind farms. For one project, operators were granted a licence prior to 2009. However, this would now be located in a Natura 2000 site. But because approval had already been granted, the project can still go ahead. Spatial plans in Germany are usually revised every seven years or so, but critics are keen to amend the spatial plan now, so that the longstanding permission for the construction of the wind farm in the protected area is withdrawn.

British pragmatism

As Germany has a federal structure and thus consists of a number of constituent states, harmonizing marine conservation requires considerable administrative effort. The spatial plans adopted at federal, i.e. national, level only apply to the EEZ. The states of Lower Saxony (North Sea), Schleswig-Holstein (North Sea/Baltic Sea) and Mecklen-

4.20 > Laying of undersea cables, which is carried out by large specialist vessels such as *Team Oman*, must also be considered in marine spatial planning.

burg-Western Pomerania (Baltic Sea) are responsible for protecting the territorial sea. This increases the need for coordination, as the national authorities must first reach agreement with their counterparts in the individual states. Negotiations were required, for example, to identify where the power lines for the wind farms should cross the border between the EEZ and the territorial sea.

A more pragmatic approach to marine spatial planning is adopted in the United Kingdom, which does not have a federal structure and where responsibility for marine spatial planning is not divided among a number of public authorities. In the UK, the Marine and Coastal Access Act 2009 created the Marine Management Organisation (MMO), which has been responsible for marine spatial planning in England and Wales since it was set up. The MMO is an executive non-departmental public body, sponsored by the Department for Environment, Food and Rural Affairs (Defra). The MMO is responsible for various marine activities, including monitoring of fisheries management plans, dealing with marine pollution emergencies such as oil spills or other environmental disasters, and, of course, developing the MSP. The granting of licences or leases for the economic exploitation of marine assets, on the other hand, is a matter for the Crown Estate, the public body which manages the Crown's property portfolio.

The MMO has split England's inshore and offshore waters into 11 marine plan areas, for which planning processes are currently being conducted. For the East marine plan areas, for example, consultations lasting until early 2015 were held with a large number of stakeholder groups and interested parties, including representatives of:

- aquaculture;
- defence and national security;
- energy production and infrastructure development;
- fisheries;
- local communities and elected members;
- local authorities;
- marine conservation;
- marine aggregates;
- ports and shipping;
- telecommunications and cabling;
- tourism and recreation;
- wastewater treatment and disposal.

In order to involve the various stakeholder groups, the MMO offered the following opportunities for dialogue until early 2015 for the East marine plan areas alone:

- five series of stakeholder workshops attended by over 300 people;
- 400 one-to-one meetings between the MMO and representatives of various stakeholder groups and Members of Parliament;
- local liaison officers based in Lowestoft and Grimsby met with many local stakeholders and attended their meetings and events;
- 23 public **drop-in sessions** across the East attended by over 700 people;
- specific groups or fora, e.g. Local Authority elected members, Local Government Associations, conservation authorities, etc.;
- international workshops with experts from Belgium, Denmark, Germany, Netherlands, Germany, Norway and the European Commission;
- two decision-makers' workshops.

In addition, around 2000 comments and proposals from 70 different organizations were dealt with.

Based on the MSP guidance provided by UNESCO's Intergovernmental Oceanographic Commission (IOC), this aspect of the MMO's work is regarded as exemplary. The marine spatial planning process in England is still ongoing. Thus it is likely to take several years, until the implementation of the first action programmes based on MSP, before it becomes apparent whether this planning process and the intensive involvement of stakeholder groups are capable of producing successful marine spatial plans.

Help towards self-help

As is evident from the example of marine spatial planning in Belize (see Box overleaf), which involved numerous experts from various non-governmental and environmental organizations, external assistance is often required. The nature of this external support may vary, but the diverse approaches have, for some years, been subsumed under the heading "capacity building". Academic institutions take this as meaning the promotion of scientific expertise through joint projects, exchanges or training programmes involving researchers or technical staff. For development agencies, it tends to refer to the granting of microloans, enabling the unemployed in developing countries to purchase a plot of land or open a small artisanal business with a view to generating their own income.

In other cases, capacity building is the term applied to projects involving direct contact between development workers and local communities. The ultimate goal is implementation of these projects by stakeholders and local project managers, with external support being reduced to a necessary minimum. This approach does not necessarily require millions of euros in development assistance. Often, what is needed, first and foremost, are well-qualified facilitators who are able to identify solutions for the community concerned and motivate and provide training for local people.

Nowadays, many organizations are engaged in projects which focus on the sustainable management of coastal and marine habitats. In most of these regions, poverty and population growth have forced local communities to destroy their natural resource base. One example is the island of Gau, which belongs to Fiji's archipelago in the southeast Pacific. Agriculture has caused problems on Gau and neighbouring islands. Firstly, areas of rainforest were cleared some years ago to create arable land, which was used to grow food for local communities. Secondly,

MSP in Belize – not just good on paper?

In the IOC experts' view, Belize in Central America is an international model of best practice in successful marine spatial planning. Here, the marine spatial planning process, in which marine conservation was a priority, has now concluded, although the plan has yet to be approved by Parliament.

The coast of Belize is home to the world's second longest unbroken reef system, the Belize Barrier Reef, which contains a rich diversity of species, including three atolls and extensive mangrove forests. Around 40 per cent of the Belizean population of approximately 300 000 live and work in the coastal zone, many in tourism, which generates more than 10 per cent of GDP. Other revenue sources are aquaculture and fishing. Belize also has an oil and petrochemicals industry.

As in other maritime states, the Belizean coastline was under severe threat from population growth, construction and overfishing. However, the government was relatively quick to respond. It adopted the Coastal Zone Management Act in 1998 – long before MSP became a topic of discussion. A Coastal Zone Management Authority and Institute (CZMAI) was set up at the same time, although it took more than 12 years to produce the Belize Integrated Coastal Zone Management Plan, whose aim is to balance economic development and marine conservation. Various non-governmental organizations assisted the Coastal Zone Management Authority and Institute with the preparation of the management plan.

As the first step, a review of the current human uses of the marine and coastal zones was conducted, with gathering of all the available data and information on aspects such as coral reefs, manatee and turtle populations, lobster fisheries, commercial shipping and cruise tourism, popular sites for recreational activities and diving, areas of oil/petroleum leases, and much more.

Nine use zones, i.e. coastal agriculture, aquaculture, coastal development, dredging, fishing, oil exploration, marine recreation, marine transportation and conservation, were identified along the coast and offshore, and nine planning regions were established. Stakeholder consultations were then held in all the regions and included community-level group meetings. Representatives from all sectors and interests – from business to fishing and conservation – were encouraged to share their ideas and suggestions.

Based on this overview of local opinion, which was continuously updated, it was possible to develop ideas on future development, usage and conservation in the various coastal and marine regions. Using the latest modelling and planning software, three scenarios were developed in this way:

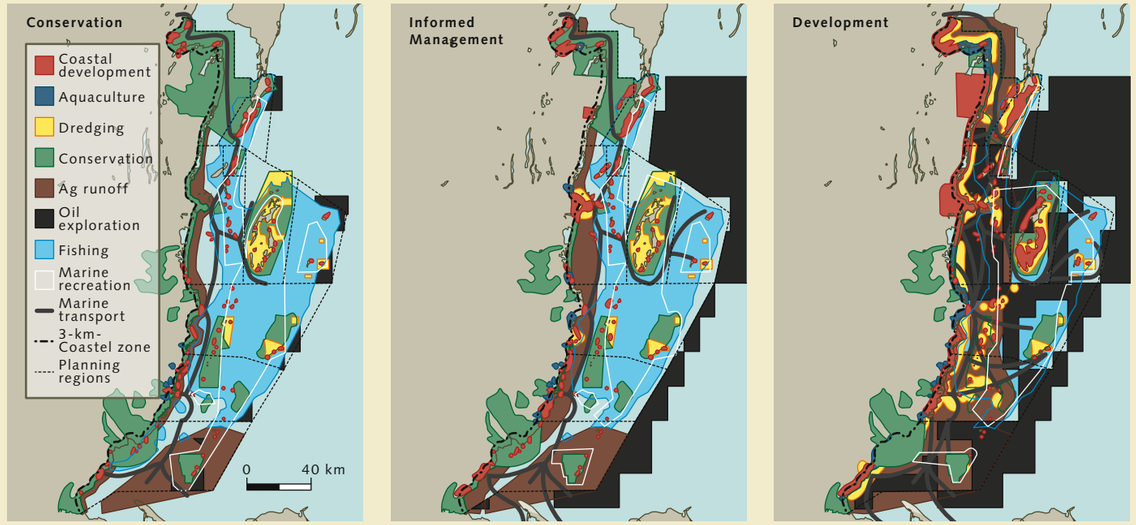
- **Conservation:** In this scenario, preservation of ecosystems and biodiversity are heavily favoured over economic development. This largely reflects the position of environmental activists.

- **Development:** This scenario generally prioritizes the interests of the extractive industry and developers, and visualizes rapid economic growth and urbanization.

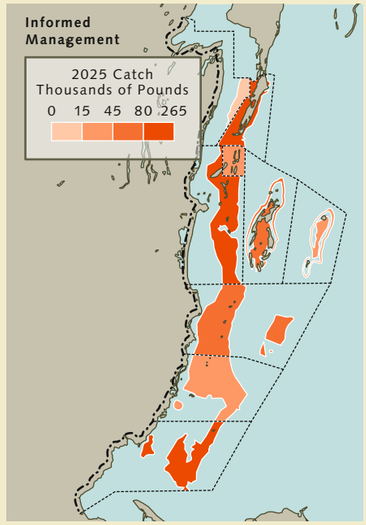
- **Informed management:** This scenario, initially regarded as a compromise or moderate scenario, envisages a cautious and sustainable approach based on planning for economic development and conservation of critical resources, minimizing impacts on coastal and marine ecosystems and maximizing benefits.

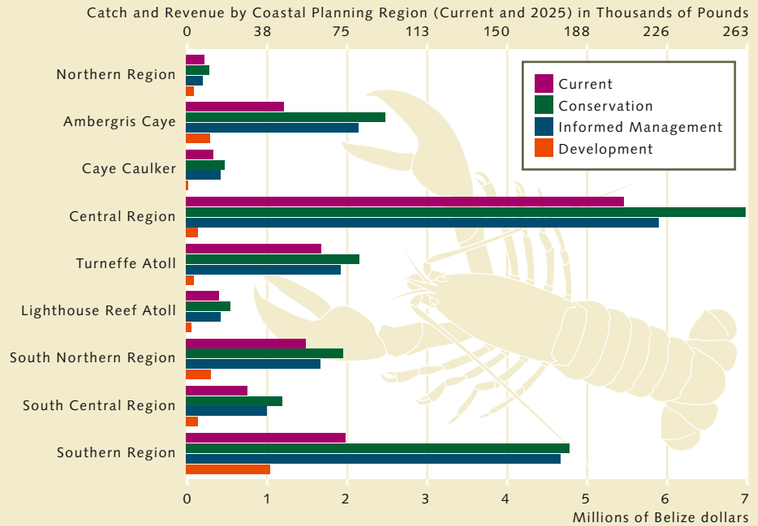
The informed management scenario was ultimately endorsed as the best option for Belize, as it represents the most sustainable future for Belize's coastal zone while ensuring more prosperity for Belizeans. All development projects and approval procedures must comply with this management plan in future. An evaluation of the plan will take place every four years. Despite this comprehensive approach to marine spatial planning, which has received international accolades, criticism has also been expressed in various quarters. Scientists point out that the impacts of climate change have not been factored into the calculations, and that technological advances and changing market prices have not been considered.

A far more serious issue is that the plan has still not entered into force. At present, Belize lacks the governmental and political structures required for its successful implementation. Otherwise, it is impossible to explain why, in 2015, the Energy Ministry announced plans to expand oil production in the immediate vicinity of the Belize Barrier Reef, a UNESCO Natural World Heritage site. This unleashed a storm of protest around the world. A final decision on the expansion of oil production has yet to be taken.



4.21 > In order to visualize possible future development, three alternative scenarios were produced as part of the marine spatial planning process in Belize. The country, which lies along Central America's Atlantic coast, opted for the informed management scenario, a strategy which allows cautious development with no adverse impacts on coastal habitats. It is clear from the above that oil production should only be permitted on the periphery of the planning regions.





4.22 > Using professional planning and modelling software, it is possible to forecast the catch and revenue for local lobster fishing in Belize in the nine planning regions in 2025. This shows that the highest values are achieved with the conservation scenario, while the development scenario produces the lowest figures.

cattle and pigs were left to roam around, damaging the best farming areas and contaminating vital water resources. The adoption of westernized lifestyles resulted in growing levels of pollution on the island. Settlements lacked a drainage system for the disposal of waste- and rainwater. And last but not least, the clearing of mangroves led to a decline of fishing and caused coastal degradation. With support from the University of the South Pacific, various solutions were developed for the districts of Gau in partnership with local communities. They include the following:

- the establishment of no-take marine areas to support the recovery of fish stocks;
- construction of a stone breakwater to protect coastlines as a partial replacement for the destroyed mangroves;
- replanting of mangroves to provide natural flood protection and act as a nursery for fish;
- planting of native hardwood to protect the villages from storms and provide a timber supply in the future;
- controls on the cutting of trees in forests;
- monitoring and prevention of wildfires;
- promotion of a smokeless stove to reduce the firewood requirement;
- improved animal husbandry, including pens for cattle and pigs;
- construction of small drainage pits;
- sorting and composting of waste;
- planting of pandanus (voivoi), which is used for making mats for sale as an income generation measure;
- planting of village taro gardens and sale of taro fruit (for flour and animal feed) as an additional income generation measure.

As the project managers emphasize, this example reaffirms the importance of building trust, involving local communities in the projects and working in partnership with them. This is the only way to identify needs and impart an understanding of sustainable resource management.

A global voice for small-scale fishing

Partnership with people is also a priority for the global research network "Too Big To Ignore" (TBTI). TBTI aims to improve economic conditions for the many millions of people around the world whose livelihoods depend on small-scale fisheries (SSF), as the debate about overexploitation of marine resources has long been dominated by industrial fishing. TBTI therefore aims to promote sustainable fishing so that over the long term, adequate incomes and livelihoods are safeguarded for fishermen.

The network currently comprises more than 60 researchers from 27 developing and developed countries and transition economies, who are initially engaged in collecting detailed data on local fishermen's living conditions. The researchers and their project partners input the data into an open-access Internet platform, known as the Information System on Small-scale Fisheries (ISSF), which also contains specialist literature on the various fishing regions in all the coastal nations. The information can be accessed by clicking on a map on the relevant webpage.

TBTI thus aims to elevate the profile of small-scale fisheries, as artisanal fishermen are still marginalized in many countries. The network will also explore how fishermen's living conditions can be improved, especially in the West African region, whose coastal waters are already overexploited to some extent as a result of industrial fishing.

The network further looks at economic relationships, such as fishermen's pay, commercial channels for the distribution of fish, and the proportion of the final price that is received by the fishermen. Possible impacts of climate change and potential strategies for adapting to future sea-level rise are also analysed.

Laying the foundations

An interesting example of capacity building at academic level is a programme run by the International Ocean Institute, which has offered an annual Ocean Governance workshop in Canada for young professionals from various disciplines from all over the world for more than 30

4.23 > Small-scale fisheries are still very important in many countries. Fishing techniques vary considerably from country to country. The photo shows traditional stilt fishermen near the town of Galle on the Sri Lankan coast.

years. The aim is to deepen young people's understanding of the ever-increasing importance of the oceans as they embark on their careers, thereby laying the foundations for participants to act as advocates for marine conservation throughout their professional lives. To date, around 600 people have participated in the workshops in Canada and many of them now hold positions in which they maintain close contacts to policy- and decision-makers. Many of the workshop participants have stayed in contact with each other and continue to advocate for ocean governance. They include a public prosecutor in Sri Lanka's Ministry of Justice and the Principal Research Officer at the Institute of Marine Affairs of Trinidad and Tobago. All in all, there is considerable commitment worldwide to marine conservation, and it seems that nowadays, many more people are aware of the importance of the oceans and the sustainable management of marine resources than was the case only a few years ago.

Pressure from the grassroots

Marine conservation can be achieved in various ways: first and foremost, of course, through appropriate policy decisions, legislation, monitoring and sanctions However, policy-makers only tend to take action under pressure from civil society – and civil society can only exert pressure if the public is well-informed and has an understanding of the sustainable management of the marine and coastal environment.

The pressure that the public can exert should not be underestimated. For example, the IMO requirement for tankers to be fitted with double hulls was introduced, not least, as a result of massive public protests and media coverage, which became increasingly vehement over the years with each major tanker disaster. The fact that such disasters had to happen before action was taken should give us pause for thought. Farsighted planning for future sustainable development is therefore imperative.

4.24 > After the *Amoco Cadiz* oil tanker disaster off the coast of Brittany in March 1978, there were massive protests against oil pollution, as seen here in the French port of Brest. As a result of these protests, much more stringent tanker safety standards were introduced over the years.

Conclusion

How marine conservation can work

Despite the plethora of bad news about the state of the oceans, there are many positive examples which prove that it is possible to protect the seas and utilize marine resources sustainably. They include the decision by the International Maritime Organization (IMO) to introduce stricter emission limit values for shipping. Among other things, the maximum sulphur content of heavy fuel oil will be reduced from 2020, and in some sea areas, even more stringent regulations apply. These areas, known as ECAs, have been established for some of the busiest shipping routes where emissions from ships contribute significantly to coastal air pollution. They currently include the English Channel, the North Sea and the Baltic Sea, and the waters off the coast of the US and Canada.

Another success is the commercial whaling moratorium, which entered into force in 1986, spelling the end for the commercial hunting of the great whales. Although Iceland, Japan and Norway continue to hunt whales, the number of whales killed has decreased dramatically.

The fact that countries are able to reach agreement despite national self-interests is evidenced by the European Union's new Common Fisheries Policy (CFP). For many years, the EU's fishing fleet was far too large, but there was vehement opposition to any restriction on fishing from politicians keen not to lose votes, especially in structurally weak regions. Accordingly, the annual Total Allowable Catches (TACs) set by fisheries ministers for the various species were far higher than recommended by fishery scientists, resulting in the progressive overexploitation of many stocks in EU waters. With the new CFP, fishing in the EU will henceforth be based on maximum sustainable yield (MSY). The MSY is the maximum catch that can be taken from a species' stock over an indefinite period without jeopardizing that stock's productivity. The aim is to regulate fishing in a way which allows fish stocks to recover, enabling them to be fished at an optimal level in future. Although discussions on how the new fisheries policy should be implemented day-to-day are still ongoing, a start has been made.

If the marine environment is to be protected more effectively, based on the sustainable management of its resources, there must, in future, be better coordination between its conservation and diverse uses. Marine spatial planning (MSP) is an important tool in achieving this goal. MSP is a means of coordinating the various coastal and marine interests. Economic activities in the marine environment, e.g. fishing, offshore wind farm construction, dredging for marine aggregates (i.e. gravel and sand), shipping and oil production, must be balanced against other uses such as leisure and recreation and, not least, conservation. With its Federal Spatial Planning Act (Raumordnungsgesetz), Germany is a good example of how multiple interests can be reconciled through regulation.

As ever, marine conservation is most effective when the public itself takes action. A well-informed public with a good understanding of the marine environment can exert the necessary pressure to effect policy changes. To that end, however, it is often necessary to provide support, in the form of aid projects, so that people are able to take responsibility for the sustainable management of their environment. This capacity building is now a policy demand at the highest level and is enshrined in the United Nations' new Sustainable Development Goals (SDGs), a new sustainability agenda for the years to 2030. It is encouraging that with this agenda, marine conservation is, for the first time, a key global goal.