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## Sustainable Use of Our Oceans – Making Ideas Work

“Sustainability” has become one of today’s inflationary terms and is therefore somewhat imprecise. Its meaning varies according to definition or context. Sustainability can only be achieved, however, if there is agreement on the concept and its meaning. Only then can a clear set of demands and appropriate policy measures be developed. This applies equally to sustainable management of onshore and offshore resources. This fourth edition of the *World Ocean Review* therefore attempts to build a bridge between the theory of sustainability and its practical application in science and policy-making. It shows how attempts are now being made in various scientific disciplines to develop viable hypotheses and models through which the findings of sustainability theoreticians can be translated into social, political and economic strategies with practical relevance. The implementation of these strategies is ultimately a matter for policy-makers, but private individuals, businesses and public institutions can make substantial contributions to sustainable development as well.

In the early days, the word “sustainability” was clearly defined. It originated in 18th century German silviculture: in 1713, chief mining administrator Hans Carl von Carlowitz published a treatise on forest management, entitled *Sylvicultura oeconomica* – the first publication ever to talk about “continual, consistent and sustainable use”. At the time von Carlowitz coined the phrase, great quantities of wood were required for mining and the smelting of ores in many regions of Europe, resulting in progressive deforestation around many mining towns. An acute scarcity of this natural resource threatened to occur. By the early

18th century, wood had to be brought in by river from distant forests. Hans Carl von Carlowitz warned that people would suffer “great need” without wood and called for the forests to be preserved. The sustainable use of the forests was therefore promoted for purely economic reasons. This approach yet had little in common with the concept of nature conservation that has gained currency today.

With the Industrial Revolution, the concept of sustainability steadily receded into the background. Furthermore, as a consequence of the extreme privations suffered in two world wars, the Western industrialized nations, from the mid 20th century onwards, pursued one overriding political goal: to generate continuous economic growth and thus achieve prosperity for all. It was only in the early 1960s that there was growing criticism of this creed of growth and progress, for the damage increasingly inflicted on the environment as a result of the continual pursuit of economic growth was becoming impossible to ignore.

In the early 1980s, the United Nations (UN) established the World Commission on Environment and Development (WCED), whose purpose was to identify pathways towards several major objectives, among them alleviating poverty in the developing countries and halting environmental degradation. In 1987, the Commission published its report, entitled *Our Common Future*, also known as the Brundtland Report after Gro Harlem Brundtland, the then Prime Minister of Norway, who chaired the Commission. The Report initiated an important new debate about the role of sustainability but provided no practical guidance for policy-makers.

In the years that followed, sustainability researchers – basing their work on the Brundtland Report – developed the three-pillar model, which defines the three equally important dimensions – environmental, economic and social – of sustainability. However, it is clear that in many of the world’s countries, economics continues to take precedence over the environmental and social dimensions. This has prompted experts in the ethics of sustainability to map out more specific pathways towards sustainable development. As one solution for the future, they propose the concept of “strong sustainability”, whose aim is to preserve natural assets – known as natural capital – and protect them from ruthless exploitation. Strong sustainability does not view nature as a museum piece that must be preserved in a static state. Instead, it promotes the idea that renewable natural assets, such as fish stocks, can be exploited – but only to an extent that allows them to fully regenerate. Non-regenerative resources such as oil, with all their negative impacts, should therefore be replaced with renewables. Strong sustainability also calls for the restoration of depleted natural assets. It thus aims to reconcile the conservation of natural capital with its economic utilization. The constant natural capital rule (CNCR) is one attempt to put this concept in practice; according to the CNCR, natural capital should not decline over time but should be used responsibly and, above all, depleted natural resources should be replaced in full with natural capital of equal value.

Strong sustainability is intended to provide guidance for future policy decisions. However, sustainable use is

only possible if people properly appreciate the significance and value of nature. In recent years, the notion of “natural capital” has often been replaced by the concept of “ecosystem services” in this context. With this approach, the services that nature can provide, now and in future – including marine ecosystem services – are categorized and evaluated individually. Four categories have now been defined: provisioning, supporting, regulating and cultural services. In relation to the marine environment, provisioning services include the production of fish stocks and the shipping lanes which nature provides free of charge. Cultural services include tourism but also traditions associated with the sea. The most important supporting service is primary production, notably the accumulation of marine biomass from phytoplankton through photosynthesis. “Regulating services” is scientists’ blanket term for the basic biological, chemical and physical processes which take place in the oceans and benefit human well-being, such as the absorption of carbon dioxide.

Today, many of these services are at risk from over-exploitation, pollution and climate change. Examples are the depletion of fish stocks through overfishing, and sea-level rise. Carbon dioxide emissions also pose a threat to the sea. A large amount of the carbon dioxide emitted into the atmosphere dissolves in seawater, causing gradual ocean acidification, with potentially devastating impacts on marine habitats such as coral reefs.

Coastal regions, many of which are densely populated, suffer disproportionately from these human-induced impacts. According to the United Nations, about 2.8 bil-

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lion people – more than 40 per cent of the global population – now live in coastal cities. What's more, 13 of the world's 20 megacities with a population above 10 million are located on the coast, resulting in a high level of use and severe pollution of coastal waters in many cases. Eutrophication of coastal waters – caused by leaching of nutrients from agriculture – causes algal blooms and oxygen depletion in seawater and is a serious problem. The physical destruction of coastal habitats as a consequence of development, construction of embankments and discharge of pollutants continues, with wetlands, salt meadows, sand and mudflats, coral reefs and mangrove forests particularly at risk.

In order to achieve sustainable use of marine habitats, researchers are now attempting, as a first step, to ascertain the current status of these habitats, for before targeted measures to improve them can be implemented, it is essential to have detailed knowledge of the extent to which a habitat is degraded and how close it is to its original healthy state. Various global programmes have therefore been established to collect comparative datasets. Researchers in the US, for example, have developed the global Ocean Health Index (OHI), which allows the status of diverse marine habitats to be compared. The OHI's scores are based on environmental factors such as biodiversity, but it also rates regions according to socioeconomic criteria, such as coastal livelihoods. However, general indices of this kind are not an adequate basis for more focused environmental policy-making: this requires specific target values or caps. In Europe, these targets are currently defined in the Marine Strategy Framework Directive (MSFD), which aims to achieve or maintain good marine environmental status by 2020. The Directive requires all of Europe's coastal states to develop and implement national marine strategies in order to achieve this goal.

It is thus apparent that the demand for comprehensive and sustainable use of the marine environment and therefore for good ocean governance must be directed at all stakeholders, including policy-makers. And indeed, a multitude of relevant institutions exists at the international level. However, in most cases, their policy-making remit

only covers individual issues or sectors of relevance to the marine environment. Even in the United Nations, responsibility for marine matters is divided among several organizations and agencies. The International Maritime Organization (IMO), for example, is the United Nations' specialized agency responsible for regulating international shipping, while the International Seabed Authority (ISA) deals solely with the exploitation of marine minerals in international waters. There are also various major UN organizations whose agendas, although focusing mainly on other areas, have a tangential connection to the marine environment.

At regional level, too, a sectoral perspective on the marine environment currently prevails. Around 600 bilateral and multilateral treaties are now in force, each governing specific types of use within a given region. Due, perhaps, to the sheer number of agreements, there are few examples of genuinely well-functioning regional ocean governance. Problems are caused by vested interests, corruption and, not least, the lack of cooperation among the countries concerned. Efforts to protect the marine environment along Africa's Atlantic coast between Mauritania and South Africa, for example, as agreed in the Abidjan Convention, which entered into force in 1984, were quickly abandoned. A coordinated approach was impeded by civil wars in Côte d'Ivoire, Liberia and Sierra Leone and by a lack of technical equipment and funding. A concerted marine conservation effort by the signatory states has only recently resumed.

The division of the seas into separate zones makes it more difficult to develop and implement programmes for the sustainable management and conservation of the marine environment as a whole. For example, a distinction is currently made between the territorial sea, which forms part of the coastal state's sovereign territory, the exclusive economic zone, in which a coastal state has exclusive rights to exploit the natural resources and fish stocks, and the high seas (international waters). The high seas offer a multitude of freedoms with few restrictions, with every state having a right of access. However, many experts now recommend that the freedom of the seas be restricted in the interests of sustainable use.

The establishment of protected areas in international waters (the high seas), for example, is poorly regulated in the law of the sea. There is currently no institution in existence with powers to protect an international sea area from top to bottom; in other words, from the water surface to the seabed. Nor is there any legal framework in which states might reach a binding agreement to protect and refrain from using a specific area of the sea. Some coastal states have established protected areas in their national waters, but no such arrangements currently exist in the high seas.

Despite the many obstacles, there are various examples of well-functioning ocean governance: one is the system of Port State Control (PSC), which monitors compliance with specific UN conventions. It permits national port authorities to detain a ship if it fails to comply with the provisions of the relevant international conventions. The IMO's decision to impose more stringent limits on exhaust gas from ships is a positive example. Among other things, the sulphur content in heavy fuel oil is to be reduced worldwide by 2020. In addition, various sea areas – known as Emission Control Areas (ECAs) – have been defined in which more stringent regulations apply.

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. Consequently, 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. Economic activities in the marine environment, e.g. fishing, offshore wind farm construction 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 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 global 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.

In many cases, scientists can already make recommendations on how the marine environment can be better protected and used more sustainably. In other words, pathways towards more sustainable management have already been identified. Nonetheless, there are still too many vested interests, especially in the economic sphere. Short-sighted and short-term profit maximization often takes priority. Overexploitation of marine resources is viewed as the price to be paid for profits. Furthermore, the political structures in many coastal states are still too inefficient to protect these states' own marine resources and thus safeguard a sustainable future for our oceans.