



world ocean review

Living with the oceans.

2015

4

Sustainable Use of Our Oceans – Making Ideas Work

Published by
maribus in cooperation with



future ocean
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Preface

Time brings change. In our fast-moving age, the Earth, and therefore also Nature and our society, are changing ever more rapidly. With high population growth and the progressive diversification of labour, we humans are changing the face of our planet to an unprecedented extent.

Some of the greatest challenges result from growing complexity, interconnectedness and linkages across the globe: examples are the increasing integration of international financial markets and the economic interdependence of consumer and producer societies. In a globalized world, comprehending all that happens in politics, the economy and the cultural sphere has become an ever more difficult task.

Our scientific knowledge, too, has grown apace. It has become more diverse and multifaceted, creating something of a barrier to understanding and making the lessons to be learned from science less accessible. This applies especially to our oceans. Over recent decades, we have learned, for example, that chemical, biological and physical processes in the marine environment influence each other and cannot be viewed in isolation, requiring a more integrated approach to our interpretation of scientific data and showing that there are no simple answers to the multitude of questions arising in modern marine research. Indeed, as we increasingly recognize that marine ecosystems are worth protecting, many questions and expectations arise. We must begin, therefore, by being mindful of the essentials: by establishing clarity on the concepts and terminology and how to communicate them to a wider public, and being clear about the fundamental principles guiding our actions.

One of the most important and most frequently asked questions – and also one of the most difficult to answer – is this: what does “sustainability” mean? Sustainability embodies the approach that we must take to our future management of our oceans. But it is not only used by environmentalists and peace researchers. It is increasingly claimed by business as well. The concept of sustainability not only informs the debate about making sparing use of the seas’ resources for their own sake; it is also part of the numerous polemics from businesses in their roles as energy suppliers and food producers.

This fourth *World Ocean Review* shows how the concept of sustainability came into being, how and why it is so often used, and how it should guide our actions in future. In this ever more complex and globalized world, it shows that ultimately, policy-makers, acting on behalf of the public as the source of their legitimation, but also citizens themselves must take responsibility. I hope that this review will bring this assumption of responsibility and hence the protection of our seas a little closer for everyone.



Nikolaus Gelpke

maribus gGmbH Managing Director, mareverlag publisher and IOI President

We humans have utilized the services provided by the seas since time immemorial while attempting, at the same time, to avoid the dangers that they pose. We seek proximity to the sea, for our coastlines offer many benefits to those who live there. With a rapid growing population, however, many of us are concerned about the future of our oceans and coasts. How can conservation and use be reconciled? Which criteria should be applied to assess potential development pathways towards sustainable use of the marine environment?

These questions arise with particular urgency in relation to fishing and the many other claims on the diverse resources found in the oceans, marginal seas and coastal regions. How much ocean pollution is acceptable? What form of compensation arrangements should be established between winners and losers? Philosophy and environmental ethics help us to structure these questions and address them in light of fundamental issues of sustainability. It is this discourse which provides guidance as we develop solutions to distribution issues, taking account of intergenerational justice and global responsibility.

This fourth *World Ocean Review* focuses on sustainability. It offers insights into the economic value of the environment and explains sustainable development concepts that can be applied to the oceans. It also offers an overview of the ecosystem services that our seas provide. In recent years, we have come to recognize that the resources of our Earth and its oceans are finite. This means that we must identify and accept planetary and oceanic boundaries and factor them into human development.

How are our seas faring today? The first *World Ocean Review* provided a full and detailed answer to this question, and the key aspects are reprised in this latest edition. Poverty reduction, education and a well-functioning social system are essential prerequisites for sustainable development. Given that our world consists mainly of ocean, global governance regimes – not only the law of the sea – have an important role to play. The United Nations has numerous organizations and agencies whose mandate extends to the marine environment. Are there too many of them? Would more inter-agency cooperation be beneficial?

In autumn 2015, the United Nations adopted the new Sustainable Development Goals (SDGs). For the first time, marine conservation is now a global goal in its own right. This creates visibility and political capital for the oceans. Movement towards the sustainable use of the oceans is possible, and good progress is already being made in some areas.

A global sustainable development agenda must take account of five dimensions: human dignity, the environment, prosperity, peace and cooperation. The world’s oceans have a key role to play in all of them. In that spirit, I wish you an inspiring and thought-provoking read.



Prof. Dr. Martin Visbeck

Spokesperson of the Cluster of Excellence “The Future Ocean”



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1 Concepts for a better world

> Prudent and sustainable use of nature's resources has yet to become a reality. Past approaches have failed because the concept of "sustainability" is so ill-defined. Moreover, sustainability can only be accomplished if the complex linkages within the natural world are valued more accurately. For the future it is therefore vital to improve our understanding of the diverse services of ecosystems and to put a comprehensive conception of sustainability into practice.



What is sustainability?

> The concept of “sustainability” comes from forestry and originally meant something like: using natural resources mindfully so that the supply never runs out. Today, however, the concept is ill-defined; firstly because there are various theories of sustainability and secondly because the word has passed into inflationary use. For that reason scientists now debate what is actually meant by “sustainability” and seek to formulate concrete guidelines for sustainable living and economic activity.

A tricky concept

Nowadays the concept of “sustainability” is a staple of any public debate and is used in an inflationary way. Playing on the positive connotations of the word “sustainability” – much like “peace”, “justice” and “conservation” – people tend to use it in every possible context. Industry talks about “sustainable production” and financial services providers offer “sustainable performance”. Consumers are urged to “eat and drink sustainably”; music classes support “sustainable child development” and even a warm-water bathing day for senior citizens at a public pool is advertised as “sustainable”. Everybody understands “sustainability” to mean something slightly different. The concept tends to be more confusing than clarifying. Depending on the given definition, project or context it takes on a

different meaning. But the current inflationary use of the term is not solely to blame for this baffling ambiguity; the fact is, the concept is indeed a blend of different factors. Sustainability is a complex matter. Economic development models, the world food supply, nature conservation, poverty reduction or distributive justice – all these aspects play a part in the sustainability debate. Looking back into the past, however, it is evident that the individual themes were often considered in isolation from one another and studied separately. Depending on the historical situation, certain questions took precedence, and others were put on hold until they in turn had become urgent.

Experts today endeavour to frame plausible theories and models in order to enhance the understanding of all the elements that comprise sustainability. The main challenge for the future is to put the broadly accepted insights of sustainability theorists into practice in concrete societal, political or economic models.

Fear of timber scarcity

The expression “sustainable” or “sustainability” came into use in German silvicultural theory in the 18th century. Back in 1713 the chief mining official Hans Carl von Carlowitz, from Freiberg in what was then the Principality of Saxony, published the forestry treatise *Sylvicultura oeconomica*, in which the principle of “continuously enduring and sustainable use” was discussed for the first time. Von Carlowitz coined the term at a time when many parts of Europe were in need of vast quantities of wood for mining and ore-smelting. Gradually the environs of many mining towns were becoming deforested. Wood shortages were an imminent threat. Even at the start of the 18th century, wood was having to be shipped from far away by river.

Von Carlowitz warned that, without wood, people would “suffer great hardship”. In his *Sylvicultura oeconomica* he called for the forests to be conserved. People, he wrote, should save wood, conserve forests by sowing and planting trees, and seek “surrogata” or alternatives to wood. All in all, people should only harvest as much wood as could regrow.

The aim of forest management was to achieve the greatest possible wood harvest sustainably – in other words, consistently over time – without overexploiting the forest. Thus, 300 years ago, von Carlowitz was voicing demands which are still crucial to the current sustainability debate. Then, however, the focus was on economic considerations rather than nature and forest conservation per se. That was equally apparent from the composition of the forests, and what was considered sustainable at the time: they tended to be monocultures of tree species of interest to the wood industry rather than near-natural forests. Since the concept of sustainability was originally clearly and narrowly defined, it provided a basis for deriving binding rules. For every tree species, prescribed felling rates were defined, i.e. annual maximum quantities of wood that were permissible to cut in a section of forest.

Too many people – too little food

Not just in Germany but throughout Europe, scholars in the eighteenth century were getting to grips with the finite nature of natural resources, although in this context – unlike in the work of von Carlowitz – there was no discussion of sustainability. An important aspect was how to supply foodstuffs to the growing population. Today it is estimated that the population of Europe as a whole grew from 140 million to 266 million between 1750 and 1850. In England alone, the number of inhabitants swelled from around 7 to 20 million people during the same period.

The British economist Thomas Robert Malthus warned that food production would not be able to keep pace with population growth in future. And if the plight of the poor improved, he wrote, this would lead to further population growth – and hence to a food crisis. Ultimately, the result would be a worsening of overall poverty. One



1.2 > Silviculturists in the state of Minnesota, USA at the end of the 19th century. Wood was in particular demand as a raw material at the time, and vast quantities of it were required for housebuilding in the growing towns.

solution, Malthus and others seemed to think, would be to maintain the population figure at a constant level. A few years earlier, scholars like the North German lawyer, Justus Möser, had already argued against smallpox vaccination on population policy grounds. The vaccination, Möser warned, would reduce child mortality so greatly that “the world would become too small for all the progeny of mankind”.

The doom-laden fears of scholars like Malthus and Möser did not come to pass. Before population growth in Europe could lead to a large-scale food shortage, the problem was solved by a natural scientist: in the mid-19th century, the German chemist Justus Liebig developed artificial fertilizer, paving the way for a huge increase in the productivity of arable farmland. Just as his precursor von Carlowitz did for forestry, Liebig strove to achieve persistently high yields in agriculture whilst endeavouring not to deplete soil fertility.

Environmental degradation caused by the Industrial Revolution

Thanks to Liebig’s invention, the kind of food shortage that Malthus had prophesied for the future never came to pass. On the contrary, the topic that captured the atten-

1.1 > The concept of “sustainable” silviculture was introduced in 1713 by the Saxonian chief mining official Hans Carl von Carlowitz in his treatise *Sylvicultura oeconomica*, in which he advocated prudent management of forest resources.



1.3 > Back in 1892 the richly forested Adirondack Park in New York State was designated a National Park by the US authorities. With an area of 24 000 km² it is almost as large as the island of Sicily.



tion of thinkers and scientists was degradation of the natural environment because, in the late eighteenth and the first half of the nineteenth centuries, Europe was overtaken by the Industrial Revolution: the slow and deep-seated transformation of an agricultural into an industrial society. The world was radically transformed by coal mining, metal smelting, the growth of towns and the construction of barrage dams, highways and railways. One who criticized the devastating impacts of this industrial growth was the US statesman and scholar George Perkins Marsh, who toured Europe in the 1850s and was ambassador at the Italian court in Rome between 1861 and 1882. In many of the locations he visited, he observed how humans were changing and to some extent destroying nature. In 1874 he published his most important work, *Man and Nature: The Earth as Modified by Human Action*, in which he described his observations. Marsh's ideal was the village community which conserves nature in the long term and uses its resources mindfully. He warned that humans were in the process of rendering the Earth, the home of humankind, unfit for habitation. People needed to protect nature out of "enlightened self-interest", he argued. But Marsh also emphasized that it was possible to use natural resources rationally. People have a right to use nature's assets, he stated, but not to abuse them.

Marsh's theories and his drastic descriptions of environmental degradation in Europe had the most momentous impact in his country of birth, the USA. In order to



1.4 > The US scholar George Perkins Marsh is acknowledged as one of the forefathers of the environmental movement. In the mid-19th century on a tour of Europe he experienced how nature was being destroyed. His drastic descriptions of this overexploitation contributed to the introduction of sustainable forest management in the USA.

Marsh's teachings. He established sustainable forest use in the USA, just as had been advocated by von Carlowitz almost 200 years previously.

Prosperity rather than sustainability?

Apart from a few positive examples, however, the idea of making prudent use of nature stubbornly failed to take off.

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