

Managing marine ecosystems: the crucial contribution of research

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Background

Over the past thirty years or so, the ecosystem approach to fishing has sought to reconcile marine resource exploitation with the need to protect biodiversity, supporting sustainable fishing grounds. Nevertheless, the industry continues to intensively fish certain species of pelagic fish (sardines, anchovies, mackerel etc.), which now account for more than a third of global catches. New approaches and indicators are now being developed to further advance the ecosystem approach to fisheries management, taking into consideration the interactions with other marine species (e.g. predators) as well as different societal stakeholders. However, more needs to be done to recognise the increasingly global dimension of this issue.

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Further reading

GRORUD-COLVERT K. et al., 2021 – The MPA Guide : A framework to achieve global goals for the ocean. *Science*. Review 10 September 2021: 373. <https://www.science.org/doi/10.1126/science.abfo861>

MOATTI J.-P., CURY P., 2017 – « L'océan et les objectifs de développement durable ». In : Euzen A. (dir.) et al., *L'océan à découvert*, Paris, CNRS : 46-47.

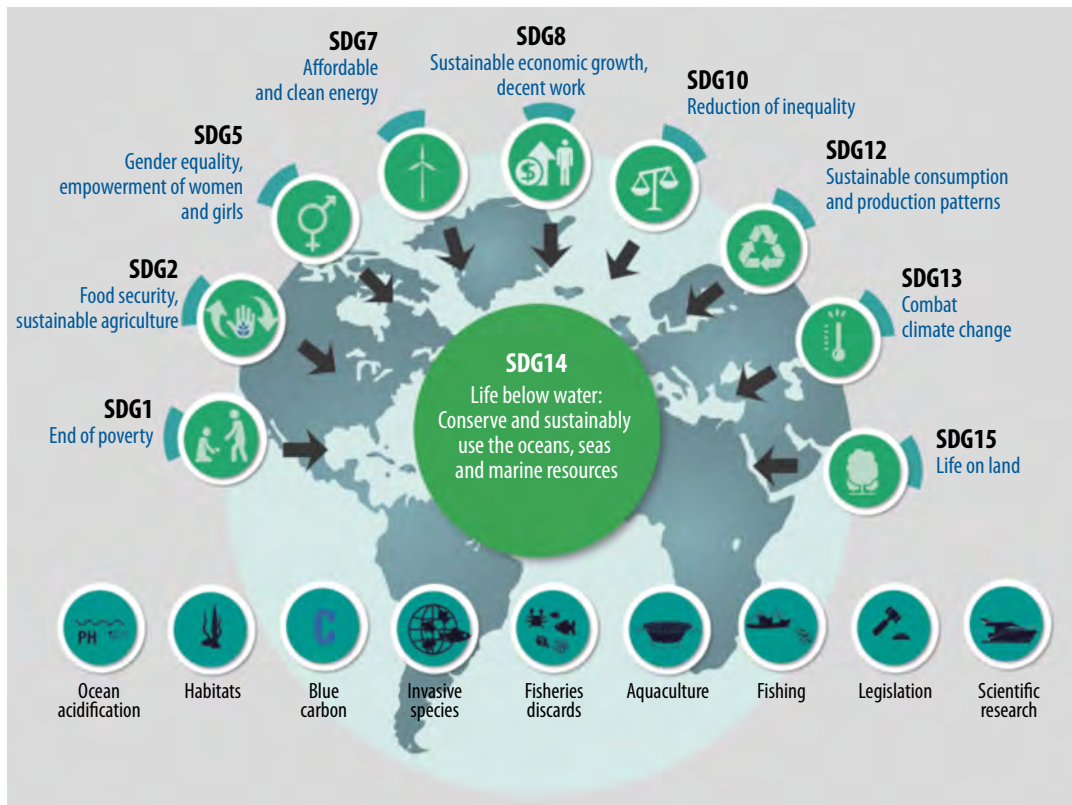
The exploitation of marine resources must be sensitive to ecosystem dynamics

A global response to this problem has recently emerged in the form of the Ecosystem Approach to Fisheries Management (EAFM), a model of sustainable resource usage which is respectful of marine ecosystems. The EAFM approach proposes to reconcile exploitation and conservation at the ecosystem level, now acknowledged as the appropriate scale at which to manage fisheries and integrate scientific knowledge. EAFM first appeared in the Rio Declaration of 1992 (Agenda 21) and the Food and Agriculture Organization (FAO) fisheries code of conduct published in 1995. The role and importance of EAFM were recognised by 47 countries at the conference on sustainable fishing and marine ecosystems held in Reykjavik in October 2001. EAFM now has a direct impact on fisheries management in many countries, including South Africa, Australia and the USA. In Europe, it is written into the Common Fisheries Policy (CFP), but its actual implementation has proven to be slow and halting, with researchers still struggling to develop the tools and methods required to manage it effectively. One major priority is to better understand the impact of fishing not only on the species it targets, but on the marine ecosystem as a whole. Currently, more than 37% of the world's fishing catches are made up of small fish destined to be transformed into flour and oil for animal consumption in aquaculture systems. And yet, these fish are the fuel that powers marine ecosystems, providing sustenance for all marine

predators (sharks, marlin, swordfish, marine mammals, turtles etc.), whose numbers are now dwindling (by as much as 80% or more).

The Namibian example

In Namibia, home to one of the world's most fertile oceanic ecosystems, the sardine population was around 10 million tonnes in the 1960s, but by the 1980s it had collapsed as a result of over-fishing. Previously abundant stocks dwindled to next to nothing, and marine predators including various bird species (penguins and gannets) died of starvation. Bird populations thus plummeted by more than 90%, and some species are now on the brink of extinction. The ecosystem reached a tipping point and began to behave in an entirely new manner (what we call an ecological shift). Jellyfish began to proliferate, to such an extent (their collective mass is now estimated to be somewhere between 12 and 20 million tonnes) that jellyfish now outweigh fish by 2.5 to 1. Namibian fishermen with no interest in jellyfish must now wait for brighter days to come, when fish will once again outnumber jellyfish. The problem is that nobody knows how long it will take for this ocean ecosystem to begin producing fish in such quantities again. There are example of similar ecosystem shifts all over the world: the Black Sea, the Mediterranean, the Bohai Sea and others have witnessed a proliferation of short-lived species such as jellyfish and octopuses. Scientific studies have recommended cutting catches in half in many ecosystems, while doubling the minimum biomass of prey fish which must be left in the water (in relation



Research on SDG 14 (Oceans) must focus on interactions, synergies and compromises with other SDGs featuring in Agenda 2030, in order to grasp the complexity of the global challenges transforming our oceans, and their exploitation
 (source: Moatti & Cury, 2017).

to the current conventional targets). These new indicators have already been incorporated into national fishery management plans in some countries, including South Africa.

More research is needed on the relationships between SDG 14 and the other SDGs

For scientists responsible for drafting fishing policy recommendations, EAFM has ushered in some profound transformations. They can no longer be content with analysing and

modelling fish stocks, but must instead strive to comprehend the multiple interactions which define the workings of marine ecosystems and their systems of exploitation. Major scientific breakthroughs have been made in this field in recent years, including the contributions made by protected marine areas and certain plants, particularly *Posidonia*, to the fight against climate change, as well as the importance of small-scale fishing in the fight to end poverty and inequality, particularly that suffered by women. Recent scientific results have provided powerful, albeit still underused, tools for improving

the operational management of marine resources. Now, in application of Agenda 2030 and its 17 SDGs, we need to take an even broader view of the problems created by fisheries exploitation. Building scenarios to plot the evolution of socio-ecosystems in the context of climate change and declining biodiversity will be indispensable in order to better understand the constraints associated with the Sustainable Development Goals (SDGs) pertaining to food security (SDG 2), poverty (SDG 1), employment (SDG 8), climate change (SDG 13), the fight to end inequality (SDG 10) etc. (see illustration).

KEY POINTS

EAFM is, or should be, a process of continuous improvement reshaping our relationship with nature and the governance of the oceans. Research has an essential role to play in the implementation of EAFM, helping us to understand the workings of marine ecosystems and calculate new ecosystem indicators for fisheries management. Scientific research should allow us to implement the ecosystem approach within an increasingly integrative framework, facilitating the sustainable management of marine ecosystems in the face of increasingly urgent and complex, global problems. Only a proactive approach which is open to all scientific disciplines will be capable of identifying cogent solutions to these planetary challenges.

SUSTAINABILITY SCIENCE

UNDERSTAND, CO-CONSTRUCT, TRANSFORM

Volume 2

Collective thinking coordinated
by Olivier Dangles and Marie-Lise Sabrié

IRD Éditions

French National Research Institute for Sustainable Development
Marseille, 2023

D2S follow-up of the articles: Claire Fréour and Magali Laigne
Editorial coordination: Marie-Laure Portal-Cabanel
Cover: Charlotte Devanz
Design and layout: Aline Lugand

Cover photo: Rock painting, Cueva de las Manos, Argentina.
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PDF version ISBN: 978-2-7099-3003-1