MARINE PROTECTED AREAS FOR OCEANIC ECOSYSTEMS

TECHNICAL SUMMARY

MACBIO

Marine and Coastal Biodiversity Management
in Pacific Island Countries

MARINE SPATIAL PLANNING

Marine Spatial Planning is an integrated and participatory planning process and tool that seeks to balance ecological, economic, and social objectives, aiming for sustainable marine resource use and prosperous blue economies.

The MACBIO project supports partner countries in collecting and analyzing spatial data on different forms of current and future marine resource use, establishing a baseline for national sustainable development planning.

Aiming for integrated ocean management, marine spatial planning facilitates the sustainable use and conservation of marine and coastal ecosystems and habitats.

This review is part of MACBIO's support to its partner countries' marine spatial planning processes. These processes aim to balance uses with the need to effectively manage and protect the rich natural capital upon which those uses rely.

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MARINE ECOSYSTEM SERVICE VALUATION   **MARINE SPATIAL PLANNING**   **EFFECTIVE MANAGEMENT**

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SPREP
Secretariat of the Pacific Regional
Environment Programme

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On behalf of:

Federal Ministry
for the Environment, Nature Conservation,
Building and Nuclear Safety

of the Federal Republic of Germany

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Open ocean (or deep ocean or offshore) ecosystems, habitats and species, beyond the 80 metre depth contour, are under increasing pressure from overfishing, bycatch, destructive fishing practices, heavy shipping traffic, oil, gas and mineral exploration and extraction, land and sea-based sources of pollution and climate change.

Until recently, no-take and other types of marine protected area (MPAs) were underused tools in the ocean management toolbox, but knowledge has shifted and a number of large-scale MPAs exist that include deep oceanic waters[1,2].

MPAs are defined here as "*a clearly defined geographical space, recognised, dedicated and managed, through legal or other effective means, to achieve the long-term conservation of nature with associated ecosystem services and cultural values*"[3].

No-take MPAs are areas in which all extraction of natural resources is prohibited, for the protection of populations and ecosystems[4]. No-take MPAs have clear benefits for exploited populations, food webs, and habitat condition[5,6,7].

In this paper, we explore the question of how MPAs benefit open ocean ecosystems including deep-sea benthic and pelagic habitats and for pelagic, mobile and/or migratory species.

OPEN OCEAN HABITATS ARE COMPLEX AND DIVERSE

Open ocean habitats can be characterized in various ways. Firstly, there are topographic features on the sea floor such as seamounts, rises, shelf breaks, canyons, ridges and trenches, as well as oceanographic features such as currents, fronts, eddies and upwellings, which can be mapped[8].

Secondly, the deep open ocean varies dramatically with depth, in physical (especially light, temperature and pressure), biological and ecological characteristics, across at least five major layers or vertical zones, known as the epipelagic or photic, mesopelagic or mesophotic, bathypelagic, abyssopelagic and hadal zones[9]. Thirdly, within each zone there are horizontal patterns that differ in physical and biological characteristics with latitude and longitude, at various spatial scales, which may or may not overlap vertically[10,11].

Species do not move randomly through open ocean habitats, but tend to follow certain pathways and aggregate at certain sites. Even for species that can theoretically travel long distances, it may be only a few individuals who undertake extensive migrations, while the majority remains within a smaller home range and most aggregate at certain times in predictable locations[12].

DISPELLING ASSUMPTIONS ABOUT OFFSHORE MPAS

There has been some argument against the use of MPAs to protect open ocean habitats and species, but new science suggests they are effective. Here we present each assumption and the facts which dispel them.

ASSUMPTION 1: Marine Protected Areas are not useful offshore because pelagic species are too mobile

This claim stems, in part, from the flawed assumption that the sole purpose of offshore MPAs is to benefit pelagic fish species targeted by the fishing sector. Most offshore MPAs however have broader goals[1].

Most of the open ocean's inhabitants are not very mobile and comprise small planktonic and nektonic fishes and invertebrates with more sedentary lifestyles[13]. These species therefore, stand to benefit from protection granted by Marine Protected areas.

For those species that are mobile, the idea that they travel very large distances comes from data collected about the maximum distance travelled by one or a few individuals of a species, however this does not necessarily reflect all or even the average mobility of the whole population[14,15,16]. Further, many species, whether migratory or just generally

wide-ranging, use predictable movement pathways and breeding, feeding and resting areas in the ocean that can be tracked, mapped and protected[17,18]. Many threats to open ocean organisms are either site specific or cumulative, and can be reduced through spatial protection at particular sites[19].

Nations are showing that they recognise the benefits of large-scale offshore, carefully located MPAs, or networks of offshore MPAs, by their willingness and capacity to establish large-scale MPAs; globally, there are now 10 MPAs >200,000 km[2] in size[20].

ASSUMPTION 2: Regulations or moratoria on gears or catch are more appropriate for limiting incidental capture of threatened pelagic fauna.

Catch and gear regulations are an important management response to reducing the capture of threatened pelagic fauna, however, as a single measure, they have so far proved inadequate in protecting many target and bycatch species. Offshore MPAs complement traditional fisheries management tools to help provide comprehensive protection for species[21].

ASSUMPTION 3: Because the open ocean is characterized by physical processes that are often dynamic in space and time, it is not possible to represent these processes in static MPAs.

Many important pelagic features are more spatially or temporally predictable than previously understood[22], so that static or potentially dynamic MPAs can be designed accordingly[23]. Larger-scale MPAs, even when static, would have a high likelihood of including dynamic features[20]. For features with less predictability, mobile fisheries closures have already been effectively implemented in some locations[24].

ASSUMPTION 4: The pelagic ocean is data-poor compared with terrestrial or coastal systems, making effective offshore MPA design impossible.

Broadscale data sets, especially time-series data on remotely sensed physical and biological features, are more abundant than commonly perceived and are useful for MPA design. In the Pacific Island region, there are at least 70 datasets applicable to MPA planning. In addition, it is possible to factor any knowledge deficiencies into offshore MPA design principles[25].

ASSUMPTION 5: Illegal use of the open ocean is difficult and expensive to observe, making it challenging to enforce MPA regulations, especially in developing nations.

Offshore surveillance and compliance monitoring for fisheries is already being used and is becoming more effective and can benefit open ocean MPAs significantly. The widespread adoption of vessel monitoring systems (VMSs) and use of satellite imagery, both within and beyond fisheries, and financial support for use of these data in developing nations, is already improving remote surveillance to identify if vessels are illegally entering MPAs with electronic "fences"[12]. Multi-jurisdictional surveillance and monitoring efforts within and between countries are also increasing the efficiency and effectiveness of compliance efforts.

CONCLUSIONS

MPAs have a practical and increasingly important role to play in the management and protection of open ocean ecosystems. Most populations of wide-ranging species have narrower ranges than the extreme records of their movements imply is the norm, and their movement often includes repeated use of predictable site. So it is possible to include 30–50% of these populations' ranges within no-take MPAs.

Of course, "wide-ranging" species comprise the minority of the animals in the ocean – most biomass is made up of a highly diverse community of smaller, much less mobile species. There is greater understanding of the ocean's three-dimensional complexity and an ever-increasing willingness of nations to establish large-scale MPAs.

Ultimately, no-take MPAs are the best tool to support holistic maintenance of open ocean species and ecosystems, because MPAs reduce human pressure thereby sustaining biodiversity, habitats and food webs. MPAs also give species and habitats a buffer to withstand and recover from the large-scale, pervasive and unpredictable impacts, including climate change impacts.

SOURCE: *Ceccarelli DM and L Fernandes, 2017, The value of offshore marine protected areas for open ocean habitats and species. Report to the MACBIO project. Suva: GIZ, IUCN, SPREP.*

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