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‘Seascape’: a key influence on marine protected areas

New research has shed light on how fish respond to marine protected areas (MPAs). It suggests that seascape structure – the range of sea depths and habitat types included inside and outside the MPA – has a larger influence on changes in the abundance of fish than protection itself.

MPAs are one means of protecting species affected by human activities. Many MPAs in the Mediterranean are situated in areas that combine a wide range of features, such as rock, boulders, sand and sea grass. However, this is not necessarily for scientific reasons - these areas may be less accessible to fishing, which makes them socially and economically more acceptable sites for conservation efforts. New research from the EU EMPAFISH project[1] suggests that these complex and varied habitats may also be the most effective at protecting fish stocks.

The researchers focused on the Cerbère-Banyuls Natural Marine Reserve in the French Mediterranean which is used for both professional (artisanal) and recreational fishing. They analysed the fish communities and habitats in the marine reserve itself, the buffer zone and in neighbouring unprotected areas. They also examined the relations among fish species' responses to protection and environmental variables.

Environmental characteristics, such as natural shelter, had a stronger influence on fish abundance than protection. Protection had the greatest influence on fish abundance in shallower waters (less than 10 m deep) and areas with less rocky covering. This may be partly because artisanal, recreational and spear fishing decrease with increasing depth; deeper, more complex or rocky habitats may be less suited to large-scale commercial fishing which may explain why fish stocks in these areas were less affected by protection.

The impacts of habitat and protection were more apparent at the large, seascape (30,000 m^2) level than at the smaller ‘transect’ (250 m^2) level, according to the research team. Considering habitat characteristics at this larger scale could help guide the choice of location for MPAs and may prove useful in assessing the effectiveness of MPAs.

Establishing MPAs where fish are most likely to respond to protection will provide the most cost-effective returns. This research suggests that factors, such as habitat, should be considered carefully to ensure that MPAs offer cost-effective protection; there is little point in designating areas for protection if fish stocks are likely to be unresponsive to that protection (i.e. where fishing mortality is low due to natural shelters). The researchers caution that the specific environmental conditions and human factors that influence species’ response to protection are complex and are likely to vary from region to region and with the specific dynamics of human use (e.g. types of fishing or recreational use).

1. EMPAFISH: European Marine Protected Areas as Tools for FISHeries Management, was supported by the European Commission under the Sixth Framework Programme. See: http://www.um.es/empafish/index.php?option=com_content&task=view&id=19&Itemid=49

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