# Marine Protected Areas overlook a large fraction of biodiversity hotspots

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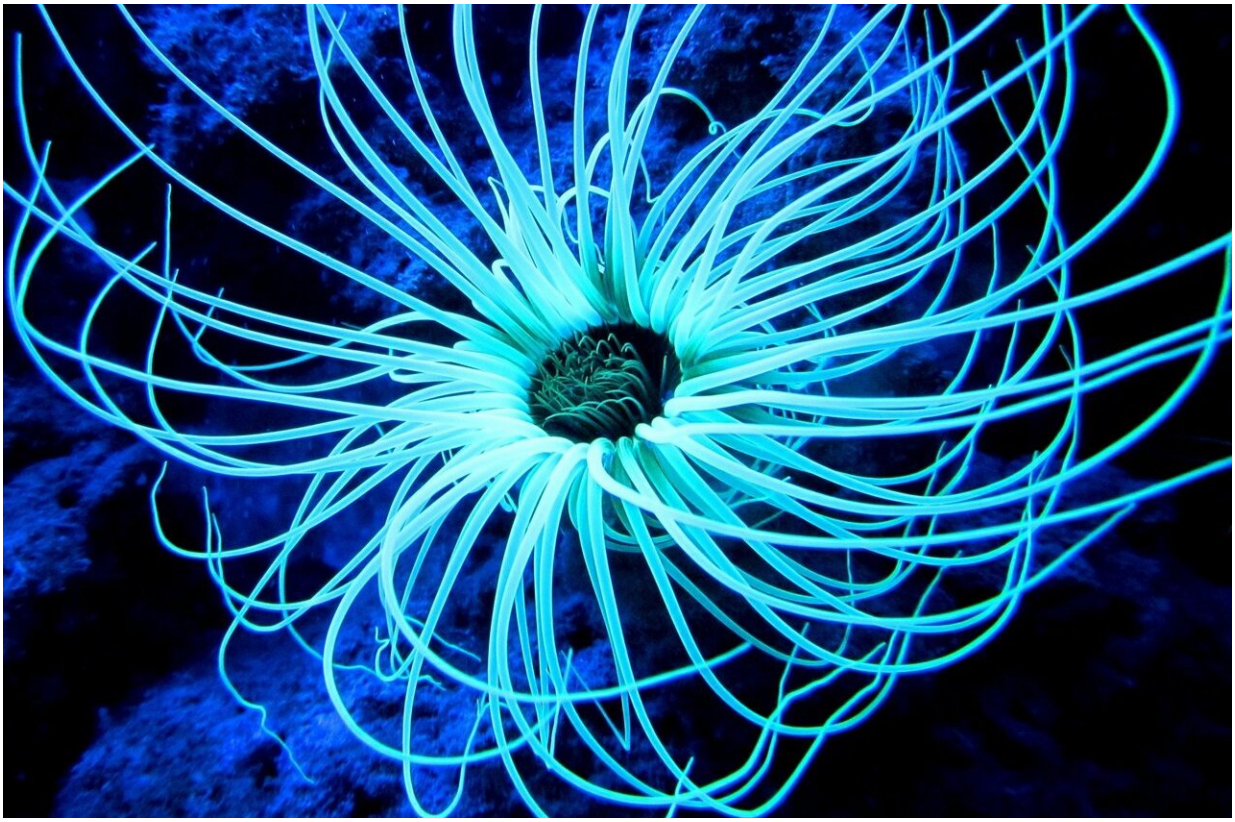

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Current marine protected areas (MPAs) leave almost three-quarters of ecologically and functionally important species unprotected, concludes a new performance assessment of the Finnish MPA network. Published in

*Frontiers in Marine Science*, the study finds the MPAs were designated with little knowledge of local marine biodiversity—and that increasing existing networks by just 1% in ecologically most relevant areas could double conservation of the most important species. In addition to identifying areas of high conservation value, the methodology—which uses a unique new dataset of 140,000 samples—can also be used in ecosystem-based marine spatial planning and impact avoidance, including siting of wind energy infrastructure, aquaculture and other human activities.

Marine ecosystems are facing an unprecedented loss of biodiversity from habitat destruction, changing marine environments and increasing extraction of marine resources.

"This means now, more than ever, protected areas are crucial for sustaining marine ecosystems", says Elina Virtanen, lead author of the study from the Finnish Environment Institute (SYKE), Finland.

Marine Protected Areas—which can encompass estuaries, seas and oceans—safeguard these natural resources from human activities. In Europe, EU member states use the EU Habitats Directive to designate protected areas based on a list of habitats and species deemed important for conservation.

In Finland, which has one of the most complex marine environments worldwide, around 10% of seas are currently protected. But the assessment of Finnish MPA efficiency reveals this has still left important parts of the ecosystem completely unprotected—with an average of only 27% of marine biodiversity currently protected.

## So how has this happened?

"Establishment of these protected sites has relied on certain important

habitats, such as lagoons, shallow bays and reefs, or the presence of seals or important bird areas, rather than knowledge of underwater species present or the ecological value of those areas," explains Virtanen.

While the current Marine Protected Areas serve to protect many important habitats, they give too little consideration to underwater nature, especially functionally important species. But because extensive protective coverage has already been implemented in Finnish seas, clear evidence is required for any changes to be made to existing MPAs.

"It was therefore important to indicate the areas that are the most important hotspots for marine biodiversity," says Virtanen.

The researchers had access to almost 140,000 recently collected samples of data on species and habitat distribution, as well as data on human pressures and the marine environment. These data were input into ecological distribution models to get a comprehensive view of the current marine environment.

These distribution models were then applied to a spatial prioritization technique called Zonation, which grades areas based on their ecological importance. This can be used to identify areas of high conservation value.

"We found that increasing the protected area from just 10% to 11% in the most biodiverse areas would double conservation of the most ecologically important species," says Virtanen. "This means increased protection of rare and threatened species, functionally important species and fish reproduction areas."

However, the researchers emphasize that increasing protected areas is not the only means for safeguarding the integrity of the marine ecosystem. Human activities threatening biodiversity can also be

reallocated to areas of low biodiversity and conservation value using ecosystem-based marine spatial planning.

"We felt it is also important to highlight where sea usage can be allowed, such as the extraction of seabed materials, aquaculture, or wind energy," says Virtanen.

This means a big win for marine protection, as well as a cost-effective MPA designation method that can keep policy-makers happy.

Provided sufficient data exist, the approach can be used globally to show that small but targeted changes can have massive effects on the efficiency of protected areas—and a major boost for sustainable use of the sea.

"There is a need to reassess current MPA boundaries to ensure they focus conservation efforts to the most valuable areas, and an increased emphasis on ecological efficiency is essential when designating or expanding MPAs," says Virtanen. "This way we can ensure that Marine Protected Areas achieve global conservation objectives meaningfully and efficiently."

**More information:** *Frontiers in Marine Science*, DOI: 10.3389/fmars.2018.00402 , www.frontiersin.org/articles/1 … mars.2018.00402/full

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