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Media Release

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Biodiversity as important as climate for marine fish production, new study shows

Diverse fish communities are more productive and resistant to changing temperatures, a new study by IMAS marine biologists, along with US and Chilean colleagues, has found.

As fish provide protein to billions of people and are an especially critical food source in the developing world, the research offers the most thorough proof yet that preserving marine biodiversity can benefit people as much as the oceans.

Published today in the United States in Proceedings of the National Academy of Sciences, the findings are based on the latest global analysis based on the Reef Life Survey dataset, involving IMAS staff and led by the US Smithsonian Institution.

The study confirmed that biodiversity is a key factor needed for fish resources to thrive over coming decades, as communities with more fish species are more productive and more resilient to both rising temperatures and temperature swings.

The accelerating loss and rearrangement of species all over the globe have troubled both scientists and the public for decades but the question of whether biodiversity offered practical value - for humans and ecosystems – had previously remained controversial.

“Preserving biodiversity is not just an aesthetic or spiritual issue - it’s critical to the healthy functioning of ecosystems, and the important services they provide to humans, like seafood,” said lead author Emmett Duffy, director of the Tennenbaum Marine Observatories Network at the Smithsonian Institution.

The discovery is a result of the Reef Life Survey (RLS), which includes underwater censuses of over 3,000 fish species in 44 countries around the world, and is managed and coordinated at IMAS.

Many of the surveyors were volunteer citizen scientists, about a third of whom had no scientific background.

Volunteer divers from over 10 countries received training from the program’s lead scientists, Prof Graham Edgar and Dr Rick Stuart-Smith.

“This study is based on more than 4500 underwater surveys,” co-author Rick Stuart-Smith said.

“It was only possible with the enthusiastic contributions of highly trained RLS volunteer divers, which allowed us to achieve this comprehensive coverage of the world’s reefs, from tropical to polar waters.”

“Coordination of surveys additionally involved researchers in 18 countries, plus input from scientists across Australia through the National Environmental Science Program, an Australian Government funded initiative”, Professor Edgar said.

“Such a broad-based study was unthinkable even a decade ago.

“Now, with rapid advances in communication and data processing, and with the support of volunteers, biologists are able to tackle the biggest environmental issues facing humanity.

“Most importantly, this can be done at the national and global scales needed for improved and cost-effective management.”

Armed with the most comprehensive global dataset on marine biodiversity involving standardized counts, the researchers tracked how 25 different environmental factors influenced total fish biomass on coral and rocky reefs around the world.

Surprisingly, one of the strongest influences was biodiversity: both the number of species (*species richness*) and the variety of ways they use their environment (*functional diversity*) enhanced fish biomass.

The boost in fish resources provided by biodiversity was second only to that of warm temperatures.

A complex relationship was found between temperature and fish biomass: temperature increased fish biomass on average, but not for communities with few species living at higher temperatures.

“This work is a critical step forward in linking insights from experiments in buckets and garden plots to the larger world,” co-author Jonathan Lefcheck of the Virginia Institute of Marine Science said, referring to earlier biodiversity experiments done with plants and small animals in gardens or greenhouses.

“It shows that experimental ecologists have in fact been on the right track for 20 years, and that biodiversity is paramount to how natural systems work.”

The study is available at: <http://www.pnas.org/content/early/2016/05/10/1524465113>

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