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Researchers develop model to predict success of Marine Protected Areas

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By Responsible Seafood Advocate

Griffith University researchers: Some fish levels recovering but variation exists

A new study led by Griffith University has developed a model to predict the success of Marine Protected Areas (MPAs) based on historical fishing pressure and environmental conditions like wave exposure and distance to coastal habitats.

The study, published in *Marine Policy* (<https://www.sciencedirect.com/science/article/pii/S0308597X22000719>), modelled the biomass of fish at 57 sites inside MPAs in Raja Ampat, Indonesia, and used the model to predict the recovery of marine protection zones. Part of one of the largest MPA networks in the tropics, it's located at the epicentre of the coral triangle: An area in the western Pacific Ocean that includes Indonesia, Malaysia, the Philippines, Papua New Guinea, Timor Leste and Solomon Islands.

“Named for its staggering number of corals (nearly 600 different species of reef-building corals alone), the Coral Triangle supports over 120 million people who rely on its coral reefs for food, income and protection from storms,” said Dr. Laura Griffiths, the study’s co-author and a Ph.D. graduate from the Australian Rivers Institute.



A new study suggests that overall fish levels in southern Raja Ampat are recovering well and meeting the MPAs goals, but there are key areas where fish are not recovering, contrary to expectations. Photo courtesy of Griffith University.

With the biodiversity of the reef under pressure from various types of fishing, MPAs can be an important management tool to protect biodiversity and ensure the sustainability of fisheries, especially in Indonesia with limited fisheries management. However, the study suggests that not all protection areas are created equal: Its location, environmental conditions and how degraded the area was prior to the creation of the MPA all influence its potential success.

The banner features the ADM logo on the left, which consists of a green leaf-like shape next to the letters 'ADM' in blue. To the right of the logo, the text 'Early life nutrition for future growth success.' is written in white on a dark blue background. On the far right, there is a small image of a shrimp and a green button with the text 'LEARN MORE' in white.

(<https://www.global.admanimalnutrition.com/activities/aquaculture/>).

“At the creation of marine protection areas, the level of fishing within an area before it became an MPA is often not considered when setting objectives for the protection zone,” said Griffith. “The method we developed using spatial modelling of fish biomass takes into account the level of fishing pressure prior to MPA establishment, to get a clearer understanding of exactly how MPAs are reaching conservation goals.

According to the research team, fish were improving inside some MPAs, but “a lot of variation” existed. The study showed that more fish were found inside no-take zones in areas closer to coastal habitats and patrol posts, in areas with greater waves and in areas further from populated villages.

However, some MPAs in remote with very little fishing pressure already had large numbers of fish before they were established, so goals of increased fish biomass for such areas are “unrealistic.” Overall, findings suggest that, in southern Raja Ampat, fish levels are recovering well and meeting the MPAs goals, but there are key areas where fish are not recovering, contrary to expectations.

“These areas should be the focus of more research and warrant further investigation of management; for example, assessing poaching as a potential cause of poor recovery trends,” said Dr. Griffiths. “Crucially, our research highlights the importance of linking historical and current fishing pressure with environmental conditions to understand how fish recover inside MPAs over time.”

[Read the full study \(https://www.sciencedirect.com/science/article/pii/S0308597X22000719\)](https://www.sciencedirect.com/science/article/pii/S0308597X22000719).

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