

Scientists in Fiji examine how forest conservation helps coral reefs

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Researchers from the University of Hawai'i at Mānoa (UH Mānoa), WCS (Wildlife Conservation Society), and other groups are discovering how forest conservation in Fiji can minimize the impact of human activities on coral reefs and their fish populations. Credit: Stacy Jupiter/WCS

Researchers from the University of Hawai'i at Mānoa (UH Mānoa), WCS (Wildlife Conservation Society), and other groups are discovering how forest conservation in Fiji can minimize the impact of human activities on coral reefs and their fish populations. Specifically, authors of a newly published study in the journal *Scientific Reports* have used innovative modeling tools to identify specific locations on the land where conservation actions would yield the highest benefits for downstream reefs in terms of mitigating harm to coral communities and associated reef fish populations. The study is titled "Scenario Planning with Linked Land-Sea Models Inform Where Forest Conservation Actions Will Promote Coral Reef Resilience."

The researchers focused on Fiji's Kubulau District, where indigenous landowners are already taking action to manage their resources through a ridge-to-reef management plan.

Human activities on land often have cascading effects for marine ecosystems, and human-related impacts on Fiji are threatening more than 25 percent of the total global reef area. Expansion of commercial agriculture, logging, mining, and coastal development can harm coral reefs and their associated fisheries through increases in sediment and nutrient runoff. Consequent reef degradation directly affects food security, human wellbeing, and cultural practices in tropical island communities around the world.

To determine where management and [conservation](#) efforts would be most impactful, the researchers built a fine-scale, linked land and sea model that integrates existing land-use with coral reef condition and fish biomass. The team then simulated various future land-use and climate change scenarios to pinpoint areas in key watersheds where conservation would provide the most benefit to downstream coral reef systems. In every simulated scenario, coral reef impacts were minimized when native forest was protected or restored.

"The results of this study can be used by the village chiefs and the resource management committee in Kubulau to provide a geographic focus to their management actions," said Dr. Sangeeta Mangubhai, director of the WCS Fiji Country Program.

The methods also have applications far beyond Kubulau, particularly as many indigenous island communities are mobilizing to revitalize customary ridge to reef management systems and governments are becoming more interested in applying an integrated land-sea planning approach.

Dr. Jade Delevaux of the University of Hawai'i and lead author of the study said, "This novel tool relies on two freely available software packages and can be used in open access geographic information systems (GIS). As more and more remote sensing and bathymetry data become freely available to serve as data inputs, the model can serve even very data-poor regions around the world to allow for better management of linked land and sea areas."

The model thus provides a platform for evidence-based decision making for ridge to reef management and lends confidence that directed terrestrial conservation actions can bolster reef resilience by minimizing damage from land-based runoff.

Dr. Stacy Jupiter, WCS Melanesia regional program director, added: "The results provide hope because they demonstrate that resilience of [coral reefs](#) to global change can be promoted through local actions, thereby empowering local people to become better stewards over their resources."

More information: J. M. S. Delevaux et al, Scenario planning with linked land-sea models inform where forest conservation actions will promote coral reef resilience, *Scientific Reports* (2018). [DOI:](#)

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