

Coral scientists use new model to find where corals are most likely to survive climate change

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This image shows a WCS conservationist conducting research on coral reef systems in Indonesia's Karimunjawa Marine Park. Using a new coral assessment method for measuring resilience, a team of researchers have found that heat-tolerant coral species living in locations with wide temperature variations are most likely to survive in regions impacted by climate change. Credit: Fakhrizal Setiawan

Marine conservationists from the Wildlife Conservation Society working with other coral reef experts have identified heat-tolerant coral species living in locations with continuous background temperature variability as

those having the best chance of surviving climate change, according to a new simplified method for measuring coral reef resilience.

Therefore, coral reefs with these characteristics should receive immediate attention for conserving this highly threatened ecosystem, according to the authors of a study appearing today in the online journal [PLOS ONE](#).

The bewildering diversity of coral reef environments has made assessing and prioritizing them costly, and yet they require immediate action to respond to the threats of [climate change](#). Combining expert opinion and scientific evidence, the scientists developed a simplified assessment that reduces this complexity to 11 key and easily measured factors. This finding greatly simplifies and reduces the time needed for assessments and, therefore, gives coral reef managers a cost-effective, evidence-based tool for gauging a reef's chances of survival.

"Coral reefs are astoundingly [complex systems](#)," said Dr. Tim McClanahan, lead author of the study and head of WCS's coral reef research and conservation program. "This reality sometimes leads to the assumption that evaluations and management strategies must also be complex. Our study reveals, however, that effective [conservation decisions](#) may hinge on a few easily measurable factors, and this can promote faster management actions."

The study streamlines a previous approach to measuring the resilience of coral reefs by squaring a currently used assessment models with expert opinions and existing data sets. Focusing on a comprehensive field study undertaken by WCS in Karimunjawa Marine Park, located on the coast of Java in Indonesia, McClanahan and his co-authors examined a previously employed complex and expensive assessment protocol that included over 60 factors—herbivorous fish diversity, bio-erosion rates, hard coral cover, and many others—in order to determine which factors

were most important.

Using a filtering methodology using surveys and scientific literature, the research team winnowed the list to 11 easily measured factors. Among these, the most important factors favoring resilience are heat-resistant [coral species](#) and background temperature variability.

The researchers then used the data collected in the previous comprehensive survey of Karimunjawa [Marine Park](#) and reassessed it with the new model. The priorities reached were not the same as the first assessment, which suggested that largely unimportant factors biased the selection of sites in the first assessment while increasing the costs of the investigation.

While the new model offers a potentially valuable, cost-effective tool in ranking the resilience of coral reef systems, McClanahan said that further research is needed to evaluate the priority and types of heat-resistant corals and temperature variability needed for conservation planning. He added that one of the more exciting outputs was that the study prioritized future investigations by identifying factors that are least agreed on among scientists and that have the highest potential to promote the resilience of [coral reefs](#).

"This method gives us a foundation for what could become an indispensable assessment tool for identifying conservation priorities," added McClanahan. "We suspect this protocol will drive investigations for the next decade."

Provided by Wildlife Conservation Society

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