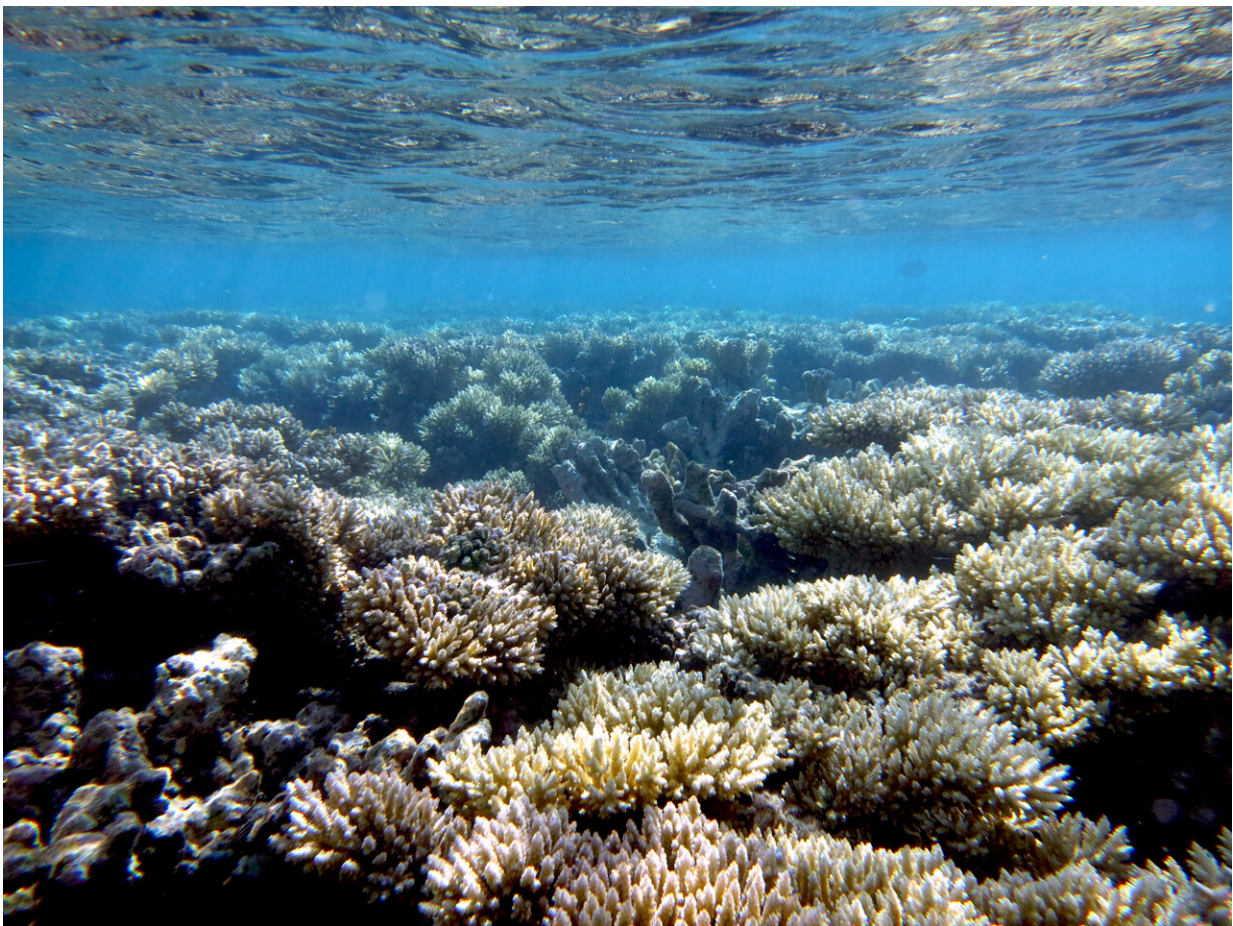


# Feathered friends can become unlikely helpers for tropical coral reefs facing climate change threat

December 6 2023

---



Acropora coral at study site. Credit: Dr Cassandra Benkwitt

Tropical coral reefs are among our most spectacular ecosystems, yet a rapidly warming planet threatens the future survival of many reefs. However, there may be hope for some tropical reefs in the form of feathered friends.

A new study led by researchers at Lancaster University has found that the presence of seabirds on [islands](#) adjacent to tropical [coral reefs](#) can boost coral growth rates on those reefs by more than double.

And as a result of this faster growth, coral reefs near [seabird](#) colonies can bounce back much quicker from bleaching events—which often cause mass die-off of corals when seas become too hot—the international team of researchers also discovered.

The study focused on Acropora, an important type of coral that provides complex structures supporting [fish populations](#) and reef growth, and which is also important for protecting coastal areas from waves and storms. The results of the study are outlined in the paper "Seabirds boost coral reef resilience" [published](#) in *Science Advances*.

The researchers found that Acropora around islands with seabirds recovered from bleaching events by around 10 months faster (approx. three years eight months) compared to reefs located away from seabird colonies (four years six months).

Researchers say these shorter recovery times could prove the difference between continuing to bounce back for some reefs in the face of a warming planet where damaging bleaching events now occur much more frequently than in earlier decades.

The key to how seabirds can help [tropical coral reefs](#) to grow and recover more quickly is through their droppings. Seabirds feed on fish in the open ocean far from islands, and then return to islands to

roost—depositing nitrogen- and phosphorus-rich nutrients on the island in the form of guano. Some of the guano is washed off the islands by rain and into the surrounding seas where the nutrients fertilize corals, and other [marine species](#).

"Our results clearly show that seabird-derived nutrients are directly driving faster coral growth rates and faster recovery rates in *Acropora* coral," said Dr. Casey Benkwitt, research fellow in coral reef ecology at Lancaster University and lead author of the study.

"This faster recovery may be critical as the average time between successive bleaching events was 5.9 years in 2016—a reduction from 27 years in the 1980s. Even small reductions in recovery times during this window may be key to maintaining coral cover over the short-term," she added.

The researchers' study focused on a remote archipelago in the Indian Ocean. They compared reefs next to islands with thriving populations of seabirds, such as red-footed boobies, sooty terns and lesser noddies, against reefs next to islands with few seabirds. The islands with few birds have populations of rats, a very damaging invasive species that is devastating to birdlife as they eat eggs and chicks. It is no coincidence that the islands with thriving bird populations are rat-free.

The reefs in the study area suffered extensive coral bleaching and mortality following marine heat waves in 2015–16, providing an opportunity to observe, and compare, how coral on different reefs recovered. The researchers surveyed the sites from one year before the bleaching event to six years after the bleaching, and modeled the *Acropora* recovery for the years between surveys.

The research team sampled nitrogen stable isotope values, a reliable tracer of seabird-derived nutrients, and measured growth rates of the

Acropora corals for three years.





Red-footed booby. Credit: Dr Cassandra Benkwitt

The results showed that seabird-derived nutrients taken up by corals next to bird islands boosted coral growth rates—with the rate doubling for each unit of seabird nutrient increase.

In contrast, coral near rat-infested islands had similar nutrient values to coral found distant from islands—showing the supply of these nutrients had been virtually cut off by the lack of birds.

The scientists also undertook an experimental approach to find out if the faster growth was directly due to the nutrients, as opposed to other factors such as genetic differences in corals between different islands. They transplanted some *Acropora* corals between islands with and without rats.

This experiment confirmed that it was the presence of seabirds that caused the nutrient enrichment.

At an island level, coral colonies transplanted to seabird islands grew twice as fast as those transplanted to rat-infested islands. Natural coral colonies were also found to grow faster near to rat-free islands with an estimated 2.4 times faster growth rate compared to coral around rat-infested islands.

Dr. Benkwitt said, "We've been able to show a clear link between the presence of seabirds and faster coral growth. This is really exciting and encouraging that a natural solution is available to help boost the resilience of coral reefs in the face of a warming planet.





Seabirds flying above rat-free island. Credit: Dr Cassandra Benkwitt

"By restoring seabird populations, corals can quickly take up and benefit from the supply of new nutrients, and our three-year experiment shows that these benefits are not just a short boost—they can be sustained over the long-term."

The researchers say their findings add further weight to the growing body of evidence that shows the ecological damage across ecosystems on land and sea from invasive rats on tropical islands.

Professor Nick Graham of Lancaster University and Principal Investigator of the study said, "Combined, these results suggest that eradicating rats and restoring seabird populations could play an important role in re-establishing the natural flows of seabird nutrients to the nearshore marine environment, bolstering rapid coral reef recovery which will be critical as we expect to see more frequent climate disturbances."

Environmental benefits of seabird nutrients go beyond increased rates of coral recovery. "Growth rates of fish on reefs adjacent to islands with large seabird colonies is also faster and overall biomass of fish is [50% greater than on reefs](#) next to islands with rats," said Dr. Shaun Wilson, a co-author of the study from the Australian Institute of Marine Science.

"Consequently, rates of grazing and bioerosion by fishes is three times faster on islands with seabirds, which are key processes helping to maintain a healthy [reef](#)."

**More information:** Cassandra Benkwitt et al, Seabirds boost coral reef resilience, *Science Advances* (2023). [DOI: 10.1126/sciadv.adj0390](https://doi.org/10.1126/sciadv.adj0390).  
[www.science.org/doi/10.1126/sciadv.adj0390](https://www.science.org/doi/10.1126/sciadv.adj0390)

Provided by Lancaster University

Citation: Feathered friends can become unlikely helpers for tropical coral reefs facing climate change threat (2023, December 6) retrieved 27 April 2024 from <https://phys.org/news/2023-12-feathered-friends-helpers-tropical-coral.html>

|  |
|--|
| <p>This document is subject to copyright. Apart from any fair dealing for the purpose of private study or research, no part may be reproduced without the written permission. The content is provided for information purposes only.</p> |
|--|