

Sponge competition may damage corals

May 3 2011, by Sara Coelho, PlanetEarth Online



Red finger sponge and brown tube sponges.

Sponges are a group of common and diverse aquatic creatures, very abundant in coral reefs where they are an important part of the ecosystem. But new research has found that if the balance is disturbed, sponges can outcompete the corals and damage the reef in the long term.

Coral reefs are home to many species and are probably the most diverse habitats on Earth. 'Corals are the bioengineers of these systems, providing the habitat for many species of algae, [fish](#), crustaceans or sponges,' says Manuel González-Rivero, a marine biologist from the University of Exeter.

Reefs are also an extremely competitive environment: 'Space is a critical resource in the marine world, and all organisms compete for space to some extent,' González-Rivero explains. In recent years scientists have found that some reefs alternate between coral or seaweed dominated

environments, depending on local conditions.

'Climate change affects the balance between these alternate states with modern regimes of disturbance selecting for quicker growing, weedy species,' says González-Rivero. But the equilibrium might be affected by a third party: sponges.

Sponges are one of the oldest groups of animals existing on Earth. They evolved about 650 million years ago, well before the invention of paws, antennae or wings. Nowadays, they are extremely common and diverse, especially in coral reefs where sponge diversity can be anywhere between 200 to 600 species.

Sponges are generally benign; they provide homes for small animals and plants, and help to support the reef by cementing corals and rubble. But some species, dubbed the excavating sponges, erode the matrix of the coral for a living and may cause actual damage to the reef structure.

González-Rivero, with Laith Yakob and Peter Mumby, wanted to understand how sponges affect the seaweed-coral balance. To do that, they developed a mathematical model to describe the competition between these three groups. The model considers rates of growth, coral erosion and grazing of sponges and seaweed by fish.

'The interaction represented by our model refers to physical contact, where [algae](#) typically overgrow their competitor, coral resist the advance of their competitor by means of defending tentacles, and sponges successfully avoid their defences and overgrow coral,' says González-Rivero.

The results, reported in the journal *Ecological Modelling* show that sponges can indeed become dominant and out-compete the corals at a moderate to high rate of overgrowth, especially if grazing by fish and

competition with seaweeds is low.

This scenario becomes likely if the [coral reefs](#) are disturbed by constant and high loads of nutrients, which upset the balance in favour of the sponges. If sponges take over and end up dominating the corals at the ecosystem level, recovery is unlikely.

'Suppressing the growth of [coral](#) bioengineers will compromise essential ecosystem services such as habitat provision for other species,' says González-Rivero, adding that 'our study points out the need to include important space-occupying species, such as [sponges](#), in ecological models of reef systems.'

More information: González-Rivero, M, et al, The role of sponge competition on coral reef alternative steady states. *Ecological Modelling* (2011): 222:1847-1853. [doi:10.1016/j.ecolmodel.2011.03.020](https://doi.org/10.1016/j.ecolmodel.2011.03.020)

Provided by PlanetEarth Online

Citation: Sponge competition may damage corals (2011, May 3) retrieved 23 April 2024 from <https://phys.org/news/2011-05-sponge-competition-corals.html>

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.