

Shipwrecks on coral reefs harbor unwanted species

August 20 2008

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The findings of the study, published in the open-access journal PLoS ONE, suggest that removal of these structures sooner rather than later is key to keeping reefs healthy.

In many areas of the world, coral reef health is declining, but identifying the exact cause of the problem is difficult. Overgrowth of coral reefs by other species, such as algae, are usually attributed to environmental degradation, but bleaching, disease, damage by typhoons, overfishing, coastal development, pollution, and tourism can cause problems as well.

The study was conducted at Palmyra Atoll National Wildlife Refuge in the central Pacific, a relatively remote, comparatively pristine area where little human activity has occurred since WWII. In 1991, a 100-foot vessel shipwrecked on the atoll. Scientists first surveyed the area in 2004 and found a species called *Rhodactis howesii* —an organism related to sea anemones and corals—in low abundance around the wreck.

In subsequent years, however, populations of this organism increased exponentially. Scientists documented extremely high densities of *R. howesii* that progressively decreased with distance from the ship, whereas *R. howesii* were rare to absent in other parts of the atoll. They also confirmed high densities of *R. howesii* around several buoys.

Whether this phenomenon occurs on other coral atolls is unknown; however, in the case of Palmyra, the *R. howesii* infestation is beginning to reach catastrophic proportions, according to Dr. Thierry Work, the lead author of the study and a scientist at the USGS National Wildlife Health Center, Honolulu Field Station. Within a few years, *R. howesii* spread to where it now occupies nearly 1 square mile.

"Why this phenomenon is occurring remains a mystery," said Work. One possibility, he said, is that iron leaching from the ship and mooring buoy chains, accompanied with other environmental factors particular to Palmyra atoll, are somehow promoting the growth of *Rhodactis*.

"Given the ability of *Rhodactis* sp. to rapidly reproduce and completely smother reefs, managers are now facing the possibility that even with removal of the ship, sheer reproductive capacity of *R. howesii* may continue to fuel its spread along the western reef shelf of Palmyra," Work said.

Understanding what constitutes a healthy underwater ecosystem, as well

as what does not, is crucial to preventing further losses in species and habitat. This research illustrates a little-known problem that, unlike global warming and pollution, could be prevented by removing man-made debris such as shipwrecks from coral reefs before organisms like *Rhodactis howesii* can overtake healthy coral reefs.

Citation: Work TM, Aeby GS, Maragos JE (2008) Phase Shift from a Coral to a Corallimorph-Dominated Reef Associated with a Shipwreck on Palmyra Atoll. PLoS ONE 3(8): e2989.

doi:10.1371/journal.pone.0002989

[dx.plos.org/10.1371/journal.pone.0002989](https://doi.org/10.1371/journal.pone.0002989)

Source: Public Library of Science

Citation: Shipwrecks on coral reefs harbor unwanted species (2008, August 20) retrieved 23 April 2024 from <https://phys.org/news/2008-08-shipwrecks-coral-reefs-harbor-unwanted.html>

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