

The constant gardeners of the world's reefs

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(PhysOrg.com) -- Australian scientists have urged greater consideration for the brilliantly-hued parrot fishes that tend and renew the world's imperilled coral reefs.

“Parrotfishes are the constant gardeners of the reef. They play a crucial role in keeping it healthy, suppressing weed, removing sediment and helping the corals to regrow after a setback,” explains Professor David Bellwood of the ARC Centre of Excellence for Coral Reef Studies and James Cook University.

In a major new study published in the *Proceedings of the Royal Society*, Prof. Bellwood, Dr Andrew Hoey and Prof. Terry Hughes have investigated parrot [fish](#) populations on 18 coral island reefs extending from Mauritius in the west Indian Ocean to Tahiti in the central Pacific.

“Parrot fish fulfil a number of key roles on the reef. They remove sick and dead corals and clean areas for new corals to settle, they remove weedy growth, and they cart away literally tonnes of sand and sediment that would otherwise smother the corals,” Prof Bellwood explains.

“But there are two sorts of parrot fish - the large ones which perform the main garbage removal task for the reef, and the much smaller ones which scrape away at the reef and keep it clean, healthy and free of weed. Both are being targeted by fishers, but the smaller parrotfish appear better able to withstand the pressure.”

Prof. Bellwood says the activity of these small parrotfishes (and other

reef cleaners) are the possibly the main explanation why many coral reefs around the world subject to heavy human pressures have not yet collapsed.

“These smaller fish are incredibly tough and this is good news, because it means they are in a sense buying us time to get the management of coral reefs right, as the world sorts out how it is going to cut its carbon emissions and reduce other pressures on reefs.”

While the smaller parrotfish are indeed resilient, it is nevertheless vital not to overfish them because of the role they perform in helping reefs regenerate, he cautions. Larger parrotfish have already suffered extensively from heavy targetting by spear fishers

“Our analyses found that the most heavily-fished reefs have lost virtually all of their large parrotfishes, with individuals larger than 25 cm accounting for just 3–6% of the remaining stocks on the five most heavily fished reefs,” the team say in their report.

In marked contrast reefs which were protected, as in Australia, had healthy population of large and small parrotfish, which in turn kept the corals in peak condition.

The team found a strong connection between human population densities, exposure to fishing and the depletion of parrotfishes. In many areas of the world important groups of fishes were effectively missing. It was particularly striking how few people it required to fundamentally change the ecology of a coral reef.

Their survey included Mauritius and Rodrigues in the western Indian Ocean, Cocos-Keeling and Rowley Shoals off Western Australia, the Togeian Islands off Sulawesi, five reefs on Australia’s Great Barrier Reef

(GBR), Binnegem and Kavieng in Papua New Guinea, Pohnpei and Kosrae in Micronesia, Apia and Nu'utele in Western Samoa, and Tahiti and Moorea in French Polynesia.

Interviews with old fishers dated the decline of parrotfish in many cases to the 1960s and 70s, as more desirable table fish became scarce and new technologies such as SCUBA and the speargun accelerated the trend.

In many areas studied large parrot fish had been virtually eliminated, and with the loss of the fishes their ecological roles are no longer delivered, only the smaller species remained to keep the reef healthy. “However on Hilder and Carter Reefs in the GBR - which are fully protected - parrot fish populations are completely intact and performing their essential roles in looking after the reef,” Prof. Bellwood says.

The team adds “The most positive aspect of our findings is that even in the face of moderately high human population densities and intensive fishing, the Indo- Pacific reefs we examined still retain enough grazing activity to prevent the phase shifts to macroalgae (seaweed) that are occurring elsewhere, particularly in the Caribbean.”

The researchers say that parrot fish are just one group of fishes that perform services essential to keep coral reefs in good condition and help ensure their rapid recovery from storms, coral bleaching or more direct human impacts..

“The significance of this work lies in the greater understanding it gives us about how [coral reefs](#) work as a system,” says Prof. Bellwood. “The tough little parrotfishes are keeping the system running – but we cannot be complacent. We have yet to see the consequences of killing their vulnerable larger relatives.”

More information: Their paper [Human activity selectively impacts the ecosystem roles of parrotfishes on coral reefs](#) by David R. Bellwood, Andrew S. Hoey and Terence P. Hughes, appears in the *Proceedings of the Royal Society* (Biological Sciences) [doi:10.1098/rspb.2011.1906](https://doi.org/10.1098/rspb.2011.1906)

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