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Plundering coral reefs to fill fish tanks

By TAN CHENG LI

The world's richest reefs are being plundered to furnish aquariums with exotic fish and corals.

AQUARIUM hobbyists were once happy having a few fish swimming in a glass tank decorated with artificial plants and rocks. Not anymore. Today, home aquariums house "mini reefs", which are almost perfect replicas of real marine ecosystems. Eager to recreate lively and colourful coral reefs in glass tanks, hobbyists are seeking not only the most unique reef fish, but also marine invertebrates such as sponges, anemones and starfish, and of course, live corals.

This enthusiasm is fuelling growths in the marine aquarium trade, now a multi-million-dollar industry of enormous diversity – over 2,000 species of fish, 500 of invertebrates and 200 of corals are being traded. At the International Coral Reef Symposium last month in Cairns, Australia, marine scientists voiced concerns over the burgeoning business.

Indonesia and the Philippines account for well over 60% of the trade in ornamental fish and marine invertebrates, according to marine biologist Dr Elizabeth Wood of Britain's Marine Conservation Society.

"Reliable data is scarce but estimates from a number of studies suggest a global catch of 20 to 30 million fish annually. Recent analysis of the packing lists of US imports for one year (2004/05) showed a total of 11 million fish being imported," she says.



Great appeal: While home aquariums are filled with colourful reef fish, public aquariums stock up on exotic and charismatic species such as sharks, to draw visitors.

Much sought-after are damselfish, anemone fish, gobies, wrasses, anthias and butterfly fish. The more expensive fish are the rarities such as clown trigger fish, various angelfish and tang fish.

And with the growing preference for miniature coral reefs, demand for live corals has surged while that of coral rocks has taken a dip. Wood reveals that one million to 1.4 million pieces of live corals are traded annually, with Indonesia providing about 70% of stocks. Other major suppliers are the Philippines, Brazil, Maldives, Vietnam, Sri Lanka and Hawaii.

Driving the trade are not just hobbyists, but also public aquaria which, having large tanks, seek charismatic big fish such as sharks, rays, groupers and moray eels. Most of the coral reef animals end up in the United States, Europe, and increasingly, the Far East.

Unfortunately, much of the trade involves “illegal, unreported and unregulated fishing”, according Dr Barbara Best, coastal resources and policy adviser at the US Agency for International Development (USAID). “Many countries with coral reefs lack the policy and regulatory tools necessary to prevent large-scale trafficking and to effectively manage the trade in a way that promotes sustainable use,” she writes in her paper *Coral Reef Wildlife Trade: Global Goods And Shared Management Responsibility*.



Colourful reef fish and live corals are a hit with aquarium hobbyists. With commercial breeding of these marine creatures having little success, stocks are still being taken from the wild.

The unsustainable practices and lax regulation worry scientists as they threaten the health of vulnerable coral reef species and ecosystems. Fishermen often over-exploit fish populations and use fishing methods, such as cyanide fishing, that harm marine organisms and habitats. “The unsustainable trade adds to the cumulative stresses that coral reefs are facing from climate change, ocean acidification, over-fishing, destructive fishing and land-based pollution,” writes Best.

Wood says harvesting of corals and coral rocks is potentially damaging for not only does it remove and damage habitat, it reduces coral density and diversity, and can eventually undermine the reef structure. Also, targeted collection of desired fish and popular colour morphs puts some species at risk of depletion.

Much depends on the intensity of collection, the population size and the biological characteristics of the species concerned, she adds. “Currently, there is no evidence of any species collected for the marine ornamental trade being at risk of global extinction but there is evidence of local depletions.”

The Banggai cardinalfish (*Pterapogon kauderni*), found only in the Banggai Islands of Sulawesi, Indonesia, is a case in point. In the mid-2000s, as many as a million specimens were captured annually from a population believed to be only around two million. Today, surveys show drastic declines in the wild, and local extinction at some sites.

Over-harvesting of targeted species can also have an ecosystem-wide impact – for instance, the removal of herbivores and grazers will mean that algae will proliferate in reefs.

Then there is the problem of invasive, alien species. The gorgeous lionfish, native to the Indian and Pacific Oceans, were exported in large numbers for home aquariums the world over and soon found their way into Atlantic and Caribbean waters. In the US state of Florida, they are devouring smaller fish such as juvenile groupers and snappers, thus destroying local fisheries.

Controlling trade

Considering the pressures currently faced by reefs, it is important that aquarium fisheries are monitored and managed to ensure they are sustainable. A number of countries have prohibited harvesting and commercial trade in wild-harvested corals and coral rocks – among them are Mozambique, Vietnam, Vanuatu, Marshall Islands and Tonga. The inclusion of corals in Appendix II of the Convention on International Trade in Endangered Species (CITES) has driven management action as permits are required for their trade.

But management challenges and uncertainties remain. For instance, countries set their own export quotas, and these might not be based on scientific assessments. Also, the seahorse is the only marine aquarium fish species that is listed in CITES. Among the non-fish species, only giant clams, queen conch, and marine mussels are controlled under CITES.

Laura Dee, a PhD student at the University of California, Santa Barbara, the United States, found that “laws, management strategies, and trade reforms have been implemented worldwide, but with varying efficacy”. In her survey on the management efforts of 24 countries, she found that only a third have fisheries management plans and less than 5% have assessed stocks of traded species or restrict collection volumes. There are laws protecting endangered species in only 38% of the countries and 46% do not have protected marine areas.

She found that Indonesia and the Philippines, the two largest suppliers of ornamental coral reef wildlife, do not survey wild stocks to determine the amount of corals and fish that could be harvested, and do not designate collection areas.

Farmed corals can relieve pressure on wild stocks but they now make up only a fifth of the trade and there is no immediate prospect of the volume growing significantly, chiefly because propagation has been successful so far only for the fast-growing, small-polyp varieties such as staghorn corals (*Acropora*), plate or table corals (*Montipora*) and cauliflower or brush corals (*Pocillopora*). Fragments of these can be grown out to produce colonies of marketable size.

There has been little or no commercial success with large-polyp varieties such as elegance corals (*Catalaphyllia*), bubble corals (*Plerogyra*) and brain corals (*Trachyphyllia*), which are hugely popular among aquarium hobbyists.

Wood says coral and fish harvesting can be sustainable provided they are managed on-site and are based on sound information about species abundance, vulnerability and resilience.

Reef-rich countries, she says, need to set total allowable catch (TAC) and export quotas, to ensure that vulnerable species are not over-exploited. Harvesting can be controlled through licensing and restricting the number of collectors. Designating collection and “no-take” areas will also help conserve stocks. Species known to have poor chances of survival should not be traded. Certification can also help promote sustainable fisheries and good practice.

She says that in Papua New Guinea, the aquarium fishery was started only after the Department of Natural Resources had carried out surveys of collecting areas and established TACs. The main challenge is that the implementation of TACs and quotas requires considerable resources on the ground, such as recording of daily catch and capacity to quickly analyse the data and provide feedback.

Wood also urges for mandatory minimum standards of handling and welfare to reduce the current high mortality (30% to 40%) of aquarium fish during transportation.

USAID's Best says that since demand is driven by importing countries, they must be part of the solution. She says both exporting and importing countries should have complementary regulating and policy frameworks. “Appropriate policies by importing countries can support efforts by the exporters to regulate the trade, promote best practices, support local management efforts and create incentives for sustainable use and conservation of coral reef ecosystems.”

For instance, the European Union, wanting to prevent wild-collected corals, has suspended imports from Indonesia. Governments can also disallow import of cyanide-caught fish. Sounding promising is a new test to detect cyanide traces in fish.

Governments should also emulate the action of Maldives, which has prohibited export of several species known to have poor chances of survival in captivity.

“Some species just should not be kept and consumers must be made aware of this,” says Dr Andrew Rhyne of Roger Williams University in Rhode Island, the United States.

Ultimately, it is the consumer who calls the shots. “It is important for consumers to know how the fish have been collected, to ask questions about stocks and conservation, and to understand that their buying them will have an impact. That will put pressure on collectors,” says Wood.

That awareness has to spread fast. Demand for clownfish rose 30% after the release of the animated feature *Finding Nemo* and with a 3D version of the film coming out soon, we can expect fishers to again plunder reefs to satiate the public’s taste for the cute creatures.