

with the WWF and IUCN at the Zoological Society of London, April 29 – May 1, 1996.

JOHANNES, R.E. & M. RIEPEN. (1995). Environmental, economic and social implications of the live reef fish trade in Asia and the western Pacific. Report to The Nature Conservancy and the South Pacific Commission. 82 p.

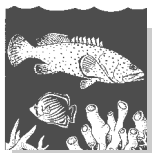
LEE, C. & Y. SADOVY. (In press). A taste for live fish: Hong Kong's role in the live reef fish trade. NAGA The ICLARM Quarterly.

LEWIS, N.D. (1986). Epidemiology and impact of ciguatera in the Pacific: a review. *Marine Fisheries Review* 48(4): 6–13.

SADOVY, Y. (1996). Reproduction in reef fishery species. In: Reef fisheries (eds. N.V.C. Polunin and C.M. Roberts). Chapman & Hall, U.K. 15–59.

SADOVY, Y. (In press). The live reef fish trade: a role for importers in combating destructive fishing practices – the Hong Kong example. Proceedings of the Workshop on the Impacts of Destructive Fishing Practices on the Marine Environment. 16–18 December 1997, Hong Kong, China.

SHAM, J.C.H. (1997). Destructive fishing – an action plan to tackle the issue. Proc. First Int. Symp. Mar. Cons. Hong Kong. Hong Kong Marine Conservation Society. 98–104.



## Ciguatera hits Hong Kong live food-fish trade

by Yvonne Sadovy<sup>1</sup>

The demand for live fish for the South East (SE) Asian food market has grown rapidly in the last 10–15 years (Johannes & Riepen, 1995), especially in Hong Kong, Taiwan and China where retail prices for the most favoured species can exceed US\$ 100 per kilogram. Originally, most of the fish included in this trade came from the South China Sea but, as demand increased and stocks close to the major importing nations became depleted and could no longer supply the market, fish were increasingly sought from further afield. By the 1990s, live food fish entering Hong Kong, the major importer and accounting for 60 per cent of the trade, came from as far west in the Indian Ocean as the Maldives and as far south and east as the Marshall Islands, Solomon Islands, the Great Barrier Reef of Australia, and adjacent areas (Johannes & Riepen, 1995). So valuable is this trade that market prices can accommodate the long and expensive transportation costs from these more distant locations to Hong Kong where the total annual wholesale value of the live reef fish trade exceeds that of the entire traditional (i.e. chilled fish) capture fishery (Lee & Sadovy, unpubl. ms.)!

The growing trade in live reef fish for food has spawned a number of concerns which relate to both resource use and to issues of human health. Over-harvesting of resources is obvious in some areas, for example, from the fishing of spawning

aggregations, the taking of large numbers of juveniles and worrying declines of certain particularly vulnerable species such as the humphead (Maori or Napoleon) wrasse. The use of sodium cyanide to catch fish for this market is also of concern since sodium cyanide is toxic to reefs (Jones, 1997) and reef communities, and may be used to take a significant proportion of fish marketed (e.g. Barber & Pratt, 1997). The consequences for humans of consuming fish caught with sodium cyanide are not known.

What is evident, however, is that there is a growing risk to consuming nations in SE Asia of ciguatera fish poisoning because of the species being marketed, i.e. a number of top reef predators species often implicated as ciguatoxic (e.g., *Cheilinus undulatus*, *Lutjanus argentimaculatus*, *L. bohar*, *Symphorus nematophorus*, *Cephalopholis argus*, *Epinephelus fuscoguttatus*, *E. lanceolatus*, *E. merra*, *E. polyphedion*, *E. tauvina*, *Plectropomus laevis*, *P. leopardus*, *P. oligacanthus*, *P. pessuliferus*, and *Variola louti*), and the expansion of the trade into areas known for producing ciguatoxic fish of some of these key desired species. As a consequence, there is a growing likelihood of ciguatoxic fishes being imported into major consuming nations.

Ciguatera fish poisoning is recognised as a serious health problem in the tropics and subtropics (Chan et al., 1992) and is likely to grow with increasing

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international trade in reef fishes. Ciguatera poisoning has not historically been a problem in SE Asia (ciguatoxins have rarely been reported in fish from the northern South China Sea) and so the general public is largely unaware of ciguatera. However, with many potentially poisonous species of live fish brought in Hong Kong from known hotspots of ciguatoxic fish in the Indo-Pacific (e.g. Lewis, 1986; Glaziou & Legrand, 1994), ciguatera is expected to represent an increasing problem for Hong Kong, and for other importing nations, as demand for live fish grows.

Indeed, available figures indicate a marked increase in confirmed ciguatera poisonings in Hong Kong from the 1980s into the 1990s. Although evidently little known prior to 1984, between 1984 and 1988, inclusive, there were 23 cases of ciguatera poisoning reported affecting 182 people (Hong Kong Standard, 27/5/88). In the last decade, the number of reported cases has increased from 7 cases, between 1988 and 1990, inclusive, to 31 cases and 245 victims in 1991–92, and 39 cases with 182 victims, in 1993–94; in 1995 13 cases and 53 victims were recorded (Hong Kong Department of Health). Doctors, however, believe that the actual number of cases is much higher and that most are either unreported, or misdiagnosed as food poisoning (Chan et al., 1992).

The Hong Kong Department of Health is aware of ciguatera as a health issue and has periodically issued warnings of the risk. It also carries out a number of tests on imported fish, including one for ciguatera. However, these tests are only carried out on dead, chilled, fish since live fish are not, surprisingly, classified as food in Hong Kong under current legislation. This means that the species most likely to carry ciguatoxins, the larger reef fishes imported live, are not currently screened for ciguatera on import into Hong Kong. Moreover, since monitoring of the live food fish trade in general is incomplete, it would not, at present, be possible to determine the sources of most live reef fish coming into Hong Kong, and thereby to identify fish most likely to be of risk in harbouring ciguatoxins. Representations have been made to the government to address this human health issue by improving monitoring and by testing of live fish on import, especially those fish coming in from high risk areas.

Ciguatera is a significant health and resource problem in tropical areas because of its erratic and often unpredictable spatial and temporal distribution (Lewis, 1986). This is a problem for those nations where ciguatoxic fishes occur that wish to develop their demersal marine resources (Dalzell, 1992). It is also a problem for places, like Hong Kong that are largely naïve to the risk of ciguatera poisoning,

which do not have a monitoring or testing programme with which to tackle the issue and which have overfished their own resources and hence rely on those from elsewhere.

Moreover, importers themselves appear to be largely unaware of, or simply unconcerned about, the potential risks of importing ciguatoxic fishes.

There is also a broader issue that should be considered. Sodium cyanide is used to catch a significant proportion of live reef fish for food (it is also used to catch fish for the aquarium trade and to take juveniles for mariculture). Cyanide has been shown to be damaging to the reefs themselves (Jones, 1997). Bearing in mind that there are already links between cyanide and habitat damage and that habitat damage has been associated with providing surfaces for the settlement of dinoflagellates implicated in ciguatera fish poisonings in French Polynesia, Pacific, and in the Caribbean's Virgin Islands, (Bagnis et al., 1988; Kohler & Kohler, 1992), it would be prudent to address the various problems of the live reef fish trade as a whole, rather than piecemeal. Such an approach is necessary to ensure a sustainable and healthy fishery of live fish that continues to be lucrative well into the future and for as many countries as possible.

## Addendum

Since this article was written, in the first few weeks of 1998 one or more shipments of fish came into Hong Kong from the western Pacific containing ciguatoxic fish. So far this year, 113 people have suffered from ciguatera. There have been no mortalities to date but there is a lot of public concern. The suspected species of fish is the tiger grouper although the source of the fish has not been officially confirmed. At the date of writing, the Hong Kong Government has not decided what measures to use to reduce the probability that ciguatoxic fishes will enter the local markets. Until now, public health warnings have simply suggested that the public avoid eating reef fish larger than 1.8 kg and to reduce fish intake in general.

A recommendation was also made to select cultured fish where possible. Demand for live fish has fallen along with prices. Problems have been encountered with an estimated hundreds of tonnes of imported fish piling up due to poor sales. Moreover, large shipments will have arrived in Hong Kong prior to the Chinese New Year period, starting on 28 January, when fish consumption usually increases. The government and industry are looking for ways of dealing with this problem which has been a major blow to the live reef fish trade.

## References

- BAGNIS, R., J. BENNETT, M. BARSINAS, J.H. DROLLET, G. JACQUET, P.H. CRUCHET & H. PASCAL. (1988). Correlation between ciguateric fish and damage to reefs in the Gambier Islands (French Polynesia). Proc. 6th Int. Coral Reef Symp. Australia (Choat, J. H. et al., Eds.). Townsville, Australia. 195–200.
- BARBER, C.V. & V.R. PRATT. (1997). Sullied Seas: strategies for combating cyanide fishing in Southeast Asia and beyond. World Resources Institute, Washington D.C. U. S. A.
- CHAN, T.Y.K., A.Y.W. CHAN & J. SHAM. (1992). The clinical features and management of ciguatera fish poisoning. J. Hong Kong Med. Assoc. 44(2): 119–121.
- DALZELL, P. (1992). Ciguatera fish poisoning and fisheries development in the South Pacific region. Bull. Soc. Path. Ex., 85: 435–444.
- GLAZIOU, P. & A.-M. LEGRAND. (1994). The epidemiology of ciguatera fish poisoning. Toxicon. 32: 863–873.
- JOHANNES, R.E. & M. RIEPEN. (1995). Environmental, economic and social implications of the live reef fish trade in Asia and the western Pacific. Report to TNC and SPC. 82 p.
- JONES, R.J. (1997). Effects of cyanide on coral. SPC Live Reef Fish Information Bulletin, No. 3: 3–8.
- KOHLER, S.T. AND C.C. KOHLER. (1992). Dead bleached coral provides new surfaces for dinoflagellates implicated in ciguatera fish poisonings. Env. Biol. Fish. 35: 413–416.
- LEE, C. & Y. SADOVY. Submitted. A taste for live fish: Hong Kong's role in the live reef fish trade.
- LEWIS, N.D. (1986). Epidemiology and impact of ciguatera in the Pacific: a review. Marine Fisheries Review 48(4): 6–13.



## Live fish exporter concerned about fish stocks

by Dos O'Sullivan

**Source:** *Austasia Aquaculture*: 11(4), October/November 1997, 15–16.

*After five years of producing fibreglass tanks for aquaculture, Tony Walton moved to seafood processing and marketing. Tony is manager of Aqua Cairns, which sells both live and fresh-chilled product. Aqua Cairns manages two fishing boats, as well as buying fish from other boats along the north Queensland coast. This enables the company to export almost 100 t of live fish a year. Tony is concerned that fish stocks do not become overexploited.*

Located in Cairns, north Queensland, Aqua Cairns is the largest and one of the longest-running live-fish exporting companies in the country. Manager Tony Walton runs a very tight operation; however, he is always concerned about the sustainability of reef-fish stocks.

'There's a large number of new players in the industry, and this effects quality and market prices,' he told *Austasia Aquaculture*. 'More fisheries regulations are required to prevent continuing oversupply and overexploitation of the stocks. There are too many boats, and a buyout of some licences is needed.'

Data published by CRC Reef Research show that live reef fish exports from Cairns exceed A\$ 2 mil-

lion per year. The CRC research team is maintaining detailed catch records with cross-referencing of boats, volume, species weight, and ratio of large fish to small fish. 'This is showing that some areas are fished year round,' Tony said. 'Such areas need to be closed to both recreational and professional fishermen during spawning periods. I believe that a closure starting around October or early November and extending till mid-December will provide more protection for the stocks.'

### Large boats required

Tony believes that the fishing boats' small size (less than 14 m) means that there is only a limited area of coverage, usually a 3–4 hour voyage from port. 'This in turn means that there is only a small number of reefs that can be fished,' he said. 'Larger boats (20 m, say) would allow more than 24 hours' steaming to fish in new areas and so spread out the fishing pressure. The special design of our onboard recirculation systems means that we can hold fish at sea for up to six days.'

He is also very concerned about the taking of small fish. 'We've installed plastic measures on all our