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A Taste for Live Fish: Hong Kong's Live Reef Fish Market

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Abstract

This paper provides an overview of the live reef fish market in Hong Kong, which accounted for about 15 000 t/yr (US$345 million) of live fish imports in the mid-1990s. The live fish trade has spawned a number of management concerns, including overfishing of highly-valued species, use of destructive fishing techniques and human health risks. Recent actions by the Hong Kong government in response to these concerns are reported and possible region-wide initiatives are briefly discussed in this paper.

Introduction

Hong Kong has a big appetite for seafood. It has one of the highest per capita consumptions (46 kg/person/yr) of seafood in the world. While frozen fish is consumed, it has long been a popular custom among the Cantonese Chinese to keep the fish alive until moments before cooking. This is said to be the best way to preserve the taste and texture of a fish and consumers are prepared to pay well for this.

Until the 1980s, live reef fish consumed in Hong Kong came largely from local waters and the northern sector of the South China Sea (Johannes and Reipen 1995). As desired species became overfished locally and as demand for volume and novelty grew, live fish were shipped or flown in from more distant areas such as Indonesia, the Maldives, Australia and the western Pacific. As one area became depleted of desired species, businesses simply moved on to new locations to keep pace with the burgeoning market. Imports of live fish increased from 2 000 t in the late 1980s to about 15 000 t by the mid-1990s. The great majority of fish are caught in the wild.

The key role of Hong Kong in this trade was first recognized by Johannes and Reipen (1995). Hong Kong is the major importer of live reef fish for food in Southeast Asia, accounting for as much as 60% of the total annual regional trade of 25 000 t (Johannes and Reipen 1995). The total value of imported live fish of about US$345 million (using an average wholesale price of US$23/kg, from Sham 1997) is well in excess of Hong Kong's total annual seafood production from capture fisheries (US$278 million—1995 figures), making live fish the major seafood commodity in Hong Kong.

This rapidly growing high value trade, made possible by great improvements in transportation, holding facilities and the rapidly growing regional wealth, has spawned a number of resource and health concerns. We provide a profile of the trade in Hong Kong, discuss some of these management concerns and report on recent actions by the Hong Kong government to address these problems. We also explore possible initiatives available to responsible importing economies.

Live Fish Trade in Hong Kong

Live fishes for food are sold at thousands of markets and restaurants throughout Hong Kong. The two largest markets are at Sai Kung and Lei Yue Mun, with many small shops, each with numerous small tanks on display to the public. They sell fish and a wide variety of crustaceans and molluscs, almost all of which are wild-caught. Seafood is purchased live by the public and then usually sent to one of the many restaurants nearby for preparation. About 80% of the live marine fish consumed in Hong Kong is im-

ported by sea or air, the balance being supplied by the local mariculture industry (Wilson 1997). Upon arrival in Hong Kong, fish are either transferred by small boats to coastal towns for distribution to fish traders or restaurants, stored in mariculture zones prior to distribution, or re-exported to China (Johannes and Reipen 1995; Li 1996).

For a better understanding of the live reef fish trade, we present results of a preliminary survey of the species and sizes commonly marketed in Hong Kong. The survey was conducted between December 1995 and February 1996 at Lei Yue Mun where about 40 shops operate. During each survey month, three randomly selected shops were sampled every morning and afternoon for one week. For each shop visit, counts were made of the total number and species composition of fishes present in all of the shop's aquaria. Data obtained are approximate on a shopfront basis since many shops had additional holding facilities that could not be surveyed.

At least 54 species were observed on at least 10 occasions each during the survey (Table 1). In a decreasing order of abundance, the top 11 species and their length distribution are presented in Fig. 1 (a-k). The size distribution of the highly valued giant grouper, *Epinephelus lanceolatus* is also shown in the figure. Species were dominated by the snappers (Lutjanidae) and groupers (Serranidae). Groupers were the most abundant, both in terms of number of species and number of individuals, making up 64% of all fishes counted. A follow-up visit in April 1997 produced a very similar species list. Moreover, recent interviews with about 50% of major traders indicated that, by weight, 60% of imports were coral trout, 20% *Epinephelus* species, 4% giant grouper, 2% Maori wrasse, 2% highfin grouper, and the remainder classed as miscellaneous (Sham

Table 1. Species observed (on at least 10 occasions) in the Lei Yue Mun live fish market in Hong Kong from December 1995 to February 1996.

Family/Genera/Species Name	English Common Name
Carangidae	
1. *Trachinotus* spp.[a]	Pampano
Centropomidae	
2. *Lates calcarifer*[a]	Giant perch
3. *Psammoperca waigiensis*	Pink-eyed bass
Haemulidae	
4. *Plectorhinchus cinctus*	Sweetlips
Labridae	
5. *Cheilinus undulatus*[b]	Humphead, Maori, Napoleon wrasse
6. *Choerodon anchorago*	Blunt-headed parrotfish
7. *Choerodon azurio*	
8. *Choerodon schoenleinii*	Green wrasse
Lethrinidae	
9. *Gymnocranius griseus*	White seabream
Lutjanidae	
10. *Lutjanus argentimaculatus*[a,b]	Mangrove red snapper
11. *Lutjanus bohar*[b]	Two-spot red snapper
12. *Lutjanus johnii*	John's snapper
13. *Lutjanus rivulatus*	Bubble lip snapper
14. *Lutjanus russellii*[a]	Russell's snapper
15. *Lutjanus sebae*	Emperor red snapper
16. *Lutjanus stellatus*	Star snapper
17. *Symphorus nematophorus*[b]	
Scatophagidae	
18. *Scatophagus argus*	Scat
Scaridae	
19. *Scarus forsteni*	Toothed wrasse
20. *Scarus ghobban*	
Scorpaenidae	
21. *Synanceia verrucosa*	Stonefish
Serranidae	
22. *Aethaloperca rogaa*	Redmouth grouper
23. *Anyperodon leucogrammicus*	Slender grouper
24. *Cephalopholis argus*[b]	Peacock hind
25. *Cephalopholis sonnerati*	Tomato hind
26. *Cromileptes altivelis*	Humpback, rat, mouse, highfin grouper
27. *Epinephelus akaara*[a]	Hong Kong, red grouper
28. *Epinephelus areolatus*[a]	Areolate, dotted grouper
29. *Epinephelus awoara*[a]	Yellow grouper
30. *Epinephelus bleekeri*[a]	Duskytail grouper

continued next page...

Table 1. (Continuation)

Family/Genera/Species Name	English Common Name
Serranidae (continuation)	
31. *Epinephelus caeruleopunctatus*	Whitespotted grouper
32. *Epinephelus coioides*	Orange-spotted, green grouper
33. *Epinephelus cyanopodus*	Speckled blue grouper
34. *Epinephelus fuscoguttatus*[b]	Brown-marbled, tiger grouper
35. *Epinephelus howlandi*	Blacksaddle grouper
36. *Epinephelus lanceolatus*[b]	Giant grouper
37. *Epinephelus maculatus*	Highfin grouper
38. *Epinephelus malabaricus*[a]	Malabar grouper
39. *Epinephelus merra*[b]	Honeycomb grouper
40. *Epinephelus polylepis*	Smallscaled grouper
41. *Epinephelus polyphekadion*[b]	Camouflage flowery grouper, cod
42. *Epinephelus tauvina*[b]	Greasy grouper, estuary cod
43. *Epinephelus tukula*	Potato grouper
44. *Plectropomus areolatus*	Squaretail, spotted coralgrouper, trout
45. *Plectropomus laevis*[b]	Blacksaddled coralgrouper, trout (Dark form)
46. *Plectropomus laevis*[b]	Blacksaddled coralgrouper, trout (pale black saddle form)
47. *Plectropomus leopardus*[b]	Leopard coralgrouper, trout
48. *Plectropomus maculatus*	Spotted coralgrouper, trout
49. *Plectropomus oligacanthus*[b]	Highfin coralgrouper, trout
50. *Plectropomus pessuliferus*[b]	Roving coralgrouper, trout
51. *Variola louti*[b]	Yellow-edged lyretail
Sparidae	
52. *Acanthopagrus latus*[a]	Yellowfin seabream
53. *Acanthopagrus schlegeli*[a]	Blackfin seabream
54. *Rhabdosargus sarba*[a]	Gold-lined seabream

[a] fishes also reared in Hong Kong via mariculture.
[b] indicates potentially ciguatoxic fish.

1997; Louise Li, pers. comm.). Groupers clearly represent the major component of the trade, by both weight and number.

Not surprisingly, groupers figure among the most valuable species, although the Maori wrasse fetches some of the highest prices per kg. In 1997, mean retail prices per kg ranged from over US$100 for highfin grouper, Maori wrasse and coral trout, to about $30 for *Epinephelus* groupers (see also Johannes and Reipen 1995). In 1996, several large giant groupers were sold for about US$10 000 each (South China Morning Post 14/4/1996), making them comparable in price to silver, ounce for ounce!

Mean total lengths for the species in Fig. 1 ranged from 35 to 50 cm. Because of the preferred market size range, the larger species are mainly sold as juveniles, particularly *Cheilinus undulatus*, *Epinephelus lanceolatus* and *E. fuscoguttatus*. Turnover rates were high. Over the three month survey period, an average of 22% of the fish brought into a shop on any one day was sold on the same day, with 85% sold within 6 days.

The fishes in Fig. 1 largely fall within the weight range of 0.5-2.0, kg, spanning the sizes preferred by consumers (i.e., 0.6-1.5 kg). The giant grouper, long considered a special fish, was an exception. They spanned 45 to 90 cm and, although not abundant (only 222 were seen during the survey), we noted that they were present in almost every shop in small numbers, often for extended periods. This is partly because they are perceived to confer good luck, possess medicinal value, and be an indicator of tank water quality. They are also highly valued. 1997 retail prices are about US$100/kg. They are occasionally sold live to religious groups who return them to the wild for spiritual reasons.

Management Concerns

The high demand for certain species and size ranges of live fish has created a potential for overexploitation. Many, like the slow-growing groupers, are known to be particularly vulnerable to fishing pressure. For larger species, almost all individuals marketed are juvenile because of the sizes preferred by consumers. Moreover, several high-value species, like the giant grouper and the Maori wrasse, occur only at low densities and are particularly susceptible to the intense pressure which their high value entails. Both species have recently been included on the IUCN Red List, largely due to concerns over the actual or potential impact of the live food fish trade (Hudson and Mace 1996). The few well-documented examples of established live reef fish fisheries, such as those in Palau and Papua New Guinea, clearly illustrate that stocks can rapidly become depleted (Richards 1993; Johannes and Reipen 1995). In some cases, spawning aggregations (where large numbers of individuals assemble briefly each year to spawn), are specifically targeted often resulting in rapid and devastating losses of reproductively mature individuals.

A second major concern is the use of damaging collection techniques (notably sodium cyanide),

especially for the Maori wrasse and several species of grouper (Johannes and Reipen 1995; Vaughan Pratt, pers. comm.). This is potentially damaging to reef communities and reef structures. It may also pose a threat to the health of fishers and consumers (Sham 1997). Its widespread and growing use is an issue throughout the region. Although toxic substances are prohibited as a means of fishing almost everywhere, there is virtually no control on their use. Many of the fish sold in Hong Kong have almost certainly been caught using cyanide, according to testing of shipments bound for Hong Kong from the Philippines (Vaughan Pratt, pers. comm.). Although alternative fishing methods are available, such as hook and line, cyanide may be easier to use for many fishers. Alarmingly, it is increasingly becoming a 'tradition' passed down from father to son, making its use harder to eliminate.

A health issue arising from the rapid expansion of the trade in the western Pacific is the increased possibility that ciguatoxic fish will be traded around Southeast Asia. Ciguatera is a term for a group of toxins (ciguatoxins) which occur naturally in certain species of reef fish and are concentrated up the food chain from smaller to larger individuals. In humans, the clinical picture is one of a combination of gastrointestinal and neurological symptoms which can, in some cases, lead to death (Chan et al. 1992).

Ciguatera fish poisoning is now increasingly recognized as a serious health problem in the tropics and subtropics (Chan et al. 1992). Until recently, ciguatera has not been a problem in Southeast Asia. However, as increasing numbers of live fish are brought into the region from known 'hotspots' of ciguatoxic fishes in the Pacific, ciguatera is expected to represent an increasing problem in Hong Kong.

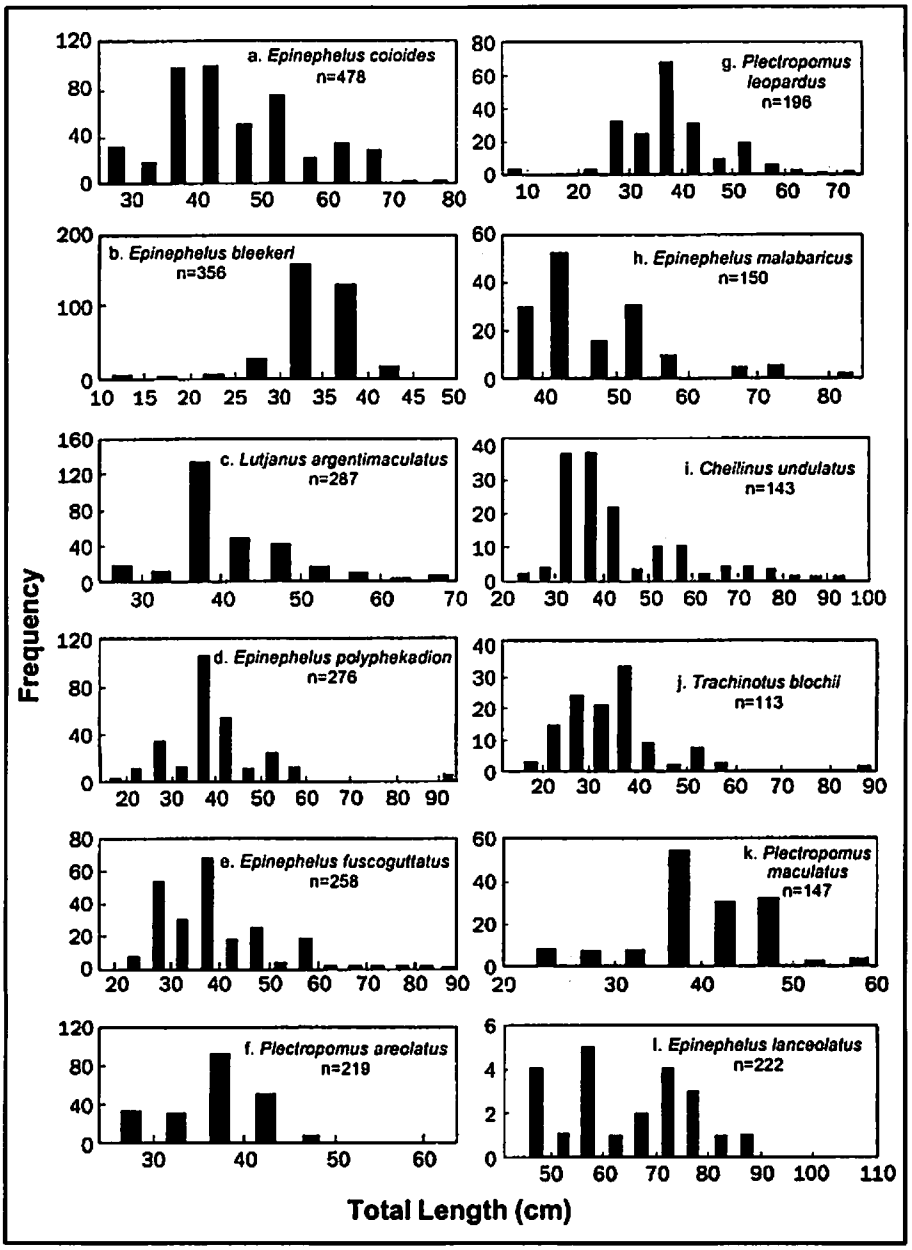

Fig. 1. Size distribution of selected fishes observed in the Lei Yue Mun market in Hong Kong (Dec. 1995 - Feb. 1996).

Indeed, available figures indicate a marked increase in reported poisonings from the 1980s to the 1990s. Although little known prior to 1984, there were 23 cases of ciguatera poisoning reported affecting 182 people between 1984 and 1988 (Hong Kong Standard 27/5/88). In the last decade the number of reported cases has apparently grown with the growing imports of live fish into Hong Kong. The number of cases have increased from 7 between 1988 and 1990, to 31 in 1991-92, and 244 victims in 1993-94 (Department of Health). Doctors, however, believe that the actual number of cases is much higher and that most were either unreported or misdiagnosed as food poisoning (Chan et al. 1992). While the Hong Kong Department of Health does test for ciguatera, they do not monitor the source of these animals nor do they focus on the most implicated species (Table 1).

Management Directions

With demand expected to grow rapidly for live reef fish, it is critical to consider how this can be satisfied without seriously damaging reef and fish resources. Virtually all of the fish in the trade are captured from the wild. While mariculture can satisfy some of the demand, its potential to supply the highly valued species, such as Maori wrasse, giant grouper and coral trout, is not promising for the near future. In Hong Kong, while local mariculture produces small volumes of several low-valued *Epinephelus* species, (Table 1), annual production appears to have stabilized at about 3 000 t and is unlikely to rise above this level (Wilson 1997). Moreover, local mariculture operations rely on wild-caught juveniles for broodstock, representing yet another pressure on fished stocks. Only in Taiwan does there seem to be an excellent potential for increased production of groupers, mainly *E. malabaricus*, which are hatchery-reared. Improvement in mariculture technology is in urgent need of national and international funding and promotion.

To tackle the serious issues of cyanide use and health concerns, importing economies need to commit resources to monitoring and assisting regional-level initiatives for cyanide control and testing. One possible approach is the development of regional cooperation to ensure that fish are 'cyanide-free' or 'hook-caught', akin to the 'dolphin-free' label now applied to some tuna products or the 'net-caught' guarantee associated with certain marine aquarium fishes to indicate non-use of cyanide in their capture. Cyanide-testing by exporting countries, as currently practiced in the Philippines, produces cyanide-free certificates that would carry much greater weight if required to accompany imported fish. Comprehensive monitoring programs would ensure that all sea and air imports are monitored and would be crucial for following trends in volume and species composition, locating problem areas and in identifying countries which may be the source of possible ciguatera risk. Cyanide-testing may be feasible by importing economies in the future when more sensitive tests have been developed. At present, tests on importation will very likely be counterproductive and only create the illusion that all is well. This is because fish can break down toxic cyanide overtime and testing is often possible only a long time after capture. Efforts need to be directed towards the elimination of cyanide in the electro-plating industry, as has been done in many other countries (Johannes and Reipen 1995), and to regulate access to it.

As the major importer and beneficiary of the live reef fish trade, Hong Kong has a special responsibility in working towards solutions and for ensuring a more responsible industry. The Hong Kong government is now clearly concerned about the issues. Locally it has proposed greater penalties for destructive fishing practices and education to increase public awareness of such practices. Internationally, under the Asia-Pacific Economic Cooperation (APEC) Marine Resources Conservation Working Group, Hong Kong (together with Taiwan and the People's Republic of China) is organizing a workshop in December 1997 on destructive fishing practices in the region. Along with greater regional cooperation, improvements can be made in import monitoring, with tighter control on Hong Kong registered vessels. Efforts are also needed to promote sustainable mariculture. Through these kinds of actions, the live fish food industry must recognize that while there is nothing wrong with trading live fish, it is not acceptable to use destructive fishing techniques, to market contaminated fish or to contribute to regional resource degradation.

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