A History of Fishing with Explosives and Poisons in Hong Kong Waters

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Abstract

Fishing with explosives is still being practiced around Hong Kong. The first legislation against blast fishing was passed in Hong Kong in 1903. Since then, successive legislation has increased the penalties and fines on blast fishing and fishing with poisons. However, the problem has not been eliminated as enforcement puts pressure on the resources of the Marine Police. It would be more effective to educate the local communities on the destructive effects of these practices and make them more vigilant and responsible for controlling them.

Introduction

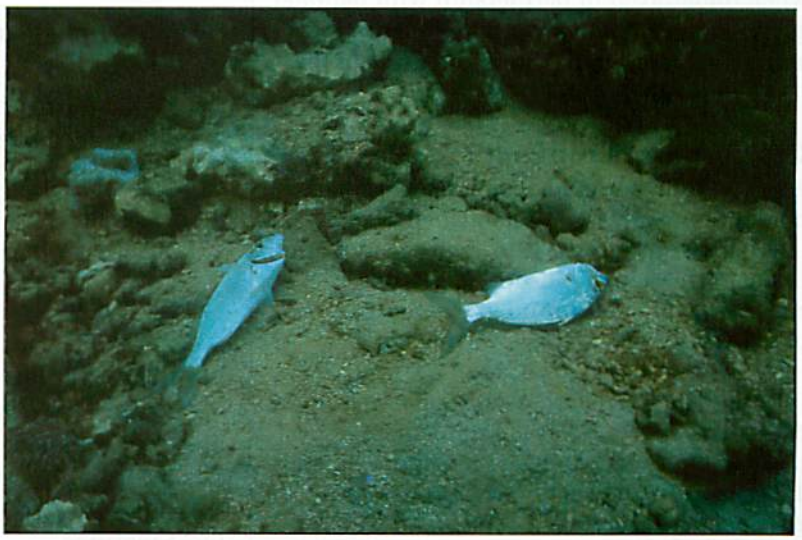
Fishing with explosives and poisons such as cyanide has become a major problem in Southeast Asian countries such as the Philippines, Indonesia, Malaysia and Thailand (McManus 1988; UNEP 1994; Pratt 1996). In 1996, conservation groups in Hong Kong drew attention to the blast fishing occurring in Hong Kong waters and to Hong Kong's key role as the largest consumer of live food fish. Many of these live food fish are caught using sodium cyanide (Pratt 1996). Because of the publicity, the Legislative Council of the Hong Kong Government has taken an interest in the issue.

This paper gives a history of fishing with explosives and poisons in Hong Kong waters. Information has been collected from the Agriculture and Fisheries Department (AFD) of the Hong Kong Government, The Royal Hong Kong Marine Police and other sources. The laws pertaining to fishing with explosives and poisons and the effects of these destructive fishing techniques are discussed. Assessment of the cumulative effects of such practices on fish stocks and the marine environment is difficult and beyond the scope of this paper.

Fishing with Explosives

Explosives have been used for fishing in Hong Kong waters for at least a century. Norton-Kyshe (1898) noted that dynamite fishing was very common in the region and that the acting Governor of Hong Kong had requested the inhabitants of Hong Kong to refrain from explosive fishing as "the practice of fishing by means of dynamite is unnecessarily destructive and is contrary to the spirit of true sport." At the time there were no laws regulating fishing in Hong Kong. Legislation concerning fishing (and later the same year, fishing with explosives) was introduced in 1903.

Legislation against blast fishing did not halt the practice. Explosives were still being used extensively for fishing in 1940. Lin (1940) described their use: three-inch long sticks of a nitroglycerin based explosive were cut into two or three pieces and each one fitted with a detonator and waterproof fuse. The



Mojarra (Gerres macrosoma) *killed by blast fishing.*

Table 1. A summary of the legislation regulating the use of explosives and poisons for fishing in Hong Kong.

Years in effect	Ordinance	Maximum penalties and details
1903-1953	Merchant Shipping Consolidation Ordinance (MSCO) 1899	First fishing regulations but no mention of fishing with explosives
1903-1953	Addition to section 29 of MSCO 1899	$50 or imprisonment for 3 months, with or without hard labor First ban on fishing with explosives
1911-1951	Fisheries (Dynamite) Ordinance 1911	$200 or imprisonment for 2 months, with or without hard labour.
1953-1978	Merchant Shipping Ordinance (Merchant Shipping (Minor Fisheries) Regulations 1953)	$1 000 and imprisonment for 6 months. The *possession* of explosives for fishing made illegal
1962-1987	Fisheries Protection Ordinance (FPO) 1962	$2 000 and imprisonment for 3 months. The following toxic substances were also banned for fishing: 1) The residue left after oil has been expressed from tea seeds, commonly known as *Chai Tsai Peng*; 2) The root, or any derivative of the root, of the shrub *Derris elliptica* and *Derris malaccensis*, commonly known as *Yue Tang*. Also gave new powers of boarding, entry, search and seizure without warrant
1987-present	Amendment to FPO (Cap. 171) (Fisheries Protection Regulations ammended 1988)	$10 000 and imprisonment for 6 months. Item 2 of banned toxic substances also amended to: 2) "Any substance containing any proportion of (a) rotenone, (b) cyanide, (c) phenthoate, (d) permethrin."

explosives were used by purse-seine boats which would simply throw a lighted stick where schools of fishes were sighted. Although this was believed to be a very effective method of fishing, Lin noted that the blasts also killed fish larvae and, in shallow waters, plants and animals that might provide food and shelter for fish. *Pa Teng* (seine) boats using explosives were estimated to use around 1 600 sticks annually at a cost of 30-50 cents per stick.

A British Naval Intelligence report on the Hong Kong fishing fleet at the time of the Japanese occupation (Anon. 1944) noted the use of explosive charges in conjunction with purse-seine nets and speculated that "The use of small explosive charges to kill or stun fish is also a method common to Hong Kong and the Iberian peninsula and may have been introduced by the Portuguese at Macao."

The increased penalties introduced under the Merchant Shipping Ordinance 1953 appear to have had little effect. In the 1950s the Agriculture, Fisheries and Forestry Department (AFFD) made several attempts to dissuade fishers from using dynamite. Dynamite was used to stun or kill fish attracted to bright lights at night as the purse seine nets of the time (21-27 fathoms) were not long enough to encircle the area of light into which fish had been attracted (AFFD 1955). The Department demonstrated that a larger 50 fathom net would eliminate the need for explosives but this approach was not adopted by fishers as the larger net required more deck space to work than was available on most vessels (AFFD 1955).

Dynamite fishing was still being practised in the late 1950s in Hong Kong and Chinese territorial waters by purse-seine boats fishing for pelagic species such as Mackerel scad (*Decapterus* species) and green pilchard (*Sardinella jussieu*) (AFFD 1958, 1959). As a result, the AFFD conducted an education campaign. Lectures and educational films focused on the wasteful nature of explosive fishing (e.g., many fish were not collected which attracted scavengers such as sharks to the fishing grounds), its effects on fish

Signs like this have been erected in fishing communities by the government.

Table 2. Confirmed cases of explosive fishing detected by the Agriculture and Fisheries Department and cases resulting in prosecution (AFD, unpublished data).

	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987
No. of cases	1	0	2	2	1	4	7	5	0	5
No. of prosecutions	N/A	N/A	N/A	N/A	1	4	7	5	0	5
	1988	1989	1990	1991	1992	1993	1994	1995	1996	Total
No. of cases	3	6	0	0	0	1	0	1	2	40
No. of prosecutions	3	1	0	0	0	1	0	1	2	30

stocks and the danger posed by explosives. At that time, nearly all the main fishing centers had at least one fisher who had lost an arm or a hand in accidents with explosives (AFFD 1958).

Unfortunately, the campaign seems to have been largely unsuccessful. Explosive fishing was still "widespread" (Anon. 1962). In 1962, the Attorney General proposed a Fisheries Protection Bill to the Legislative Council for its approval. The overall aim of the bill was to "promote the conservation of fish and other forms of aquatic life within the waters of the Colony and to regulate fishing practices and to prevent activities detrimental to the fishing industry." Legislation was passed the same year.

It seems likely that blast fishing continued to occur locally although the Chinese Government banned fishing with explosives in Chinese waters on 1st January 1965 (AFD 1965). Fishers blamed poor catches of mackerel scad the following year on bad weather and enforcement of the ban (AFD 1966).

Table 2 shows the number of confirmed cases of explosives fishing in Hong Kong dealt with by the AFD and the number of prosecutions that resulted between 1978 and 1996. All but two of the cases were from eastern waters. From 1962 to 1983, there were "very few" prosecutions (Anon. 1988) but the worrying increase in cases during 1983-1987 led to the increase in maximum penalties in 1987. These regulations remain unchanged at present although the AFD has recently called for an increase in the maximum fine to $200 000 (SCMP 1996).

Table 2 would seem to indicate a decrease in annual cases of explosive fishing from the 1980s to 1990s. This may not, however, reflect an actual decrease in the use of explosives for fishing. Table 3 shows a rather different picture for the past four years during which there has been a huge increase in the amount of Amatol (Sodium nitrate and trinitrotoluene) intended for fishing purposes seized by the Marine Police. Comparable data are not available prior to 1993.

Most of the explosives seized were found hidden near the seashore on islands in northeastern waters. Amounts ranged between 0.4 and 224.75 kg of explosives. Prosecutions in 1996 resulted in repatriation for two mainland Chinese found in possession of explosives for the purposes of fishing and a one month suspended sentence with a fine of $8 000 each for two local fishers caught using bombs. The larger amounts of explosives seized are believed to reflect an increase in the amounts of explosive used for fishing purposes (O'Brien 1997).

Effects of Explosive Fishing

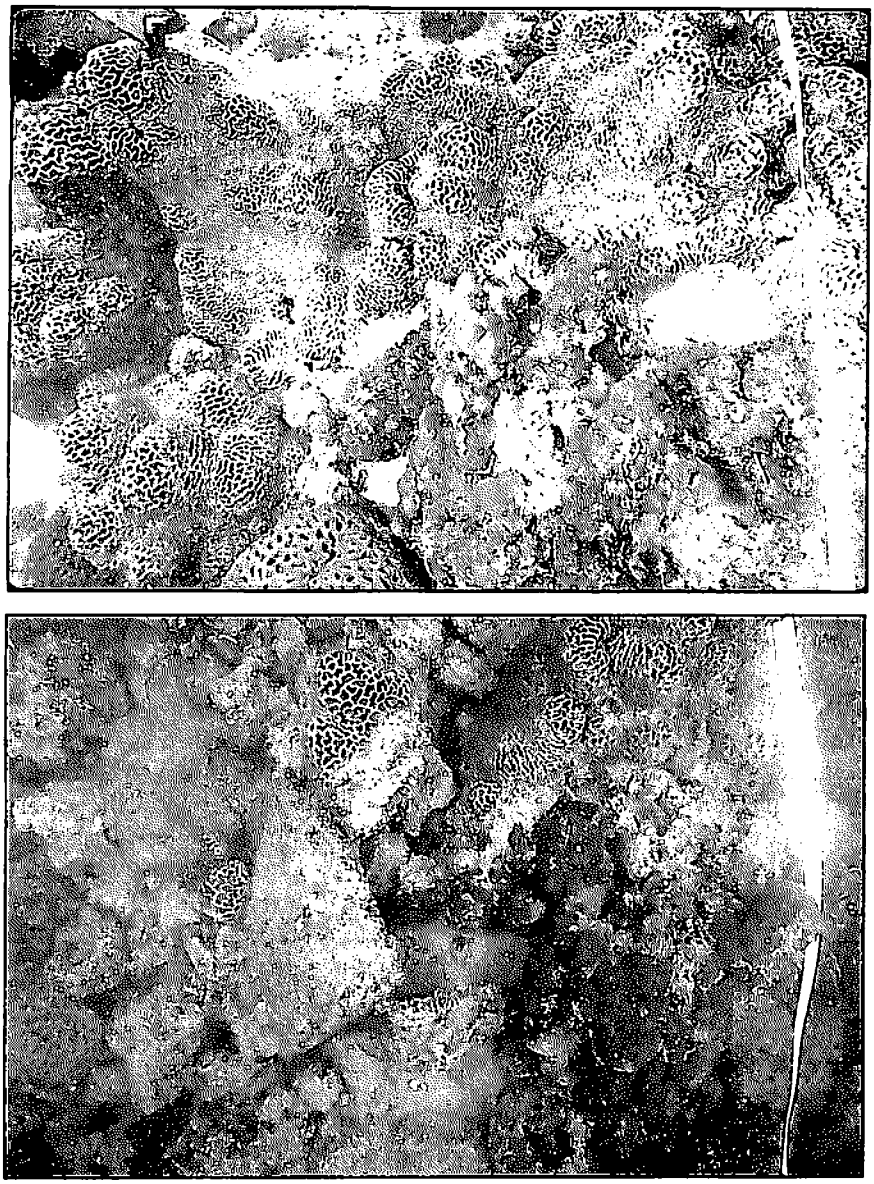
Explosives detonated underwater rupture the swimbladders of teleost fish, stunning or killing them so that they are easy to collect. Saila et al. (1993) modeled the effects of

Table 3. Fish-bombs and associated materials seized by the Hong Kong Marine Police, 1993-1996 (O'Brien 1997; O'Brien, pers. comm.; Marine Police North Division, unpublished data).

	Year			
Components	1993	1994	1995	1996
Fish-bombs	26	31	28	22
Amatol (kg)	15.38	194.28	258.7	387.6
Other explosives (kg)	N/A	N/A	15.7	4
Detonators	115	742	1945	290
Potential no. of fish bombs*	75-115	970-1490	1290-1990	1930-2980
Number of arrests**	2	5	3	4

* Potential numbers of fish-bombs are estimated based on "Amatol" seizures and the maximum and minimum quantities of "Amatol" (0.13-0.2 kg) in assembled fish-bombs seized during 1995 and 1996.

**Information on the number of arrests in Table 3 differs slightly from Table 2 as not all cases involve the AFD.



Photos by D. McCorry

The same coral colonies before (a) and after (b) explosives were used for fishing nearby.

explosives on fishes in combination with field observations from an area in the Philippines where benthic and pelagic species are targeted. Their results showed that when an explosive is detonated underwater, a spherical, positive, shock wave is produced that is symmetric in all directions. Almost everything in the immediate vicinity of the explosion (1-2 m) is destroyed, including corals. Outside this area, most non-swimbladder fish and other organisms will survive. However, when detonated near the surface a cavitation zone is produced and the negative pressure associated with this appears to cause the death of swimbladder fish further from the explosion (10-20 m).

Bombs usually consist of a detonator, match head and safety fuse inserted into an explosive (usually Amatol) and tied up in a polythene bag with a rock to make the package sink (O'Brien 1997). There are two main methods of deployment. Pelagic fish in deeper waters may be targeted from the surface, stunned or killed with explosives and then collected using seine nets. Long-term effects on pelagic communities are unclear but this is certainly a wasteful method of fishing as all fishes with swimbladders will be killed in the particular vicinity. Some will sink and many will not be collected as the fishers inevitably hurry to leave the area to avoid detection. In addition, the territorial waters of Hong Kong are rarely deeper than 25 m and blast fishing on the surface will kill demersal species that will not be collected with a seine net.

Explosives may also be used when schools of target fish, or areas thought to contain target fish, have been located above shallow substrates such as rocky or coral reefs. Explosives are detonated above the substrate and the fish may be collected using a long-handled net. This method is particularly destructive when the shock wave from the blast comes into contact with scleractinian coral communities, shattering them and killing other nontarget organisms. Loss of habitat reduces the recolonization of coral-associated fish and it has been estimated that blasted reefs can take 40 years to regenerate to a point of 50% cover (UNEP 1994). It is not clear how these "typical" explosions compare to those in Hong Kong but patches of coral rubble found at two sites that fit descriptions of explosive damage show similar blast radii, i.e., 1.5 m (pers. obs.).

Poison Fishing

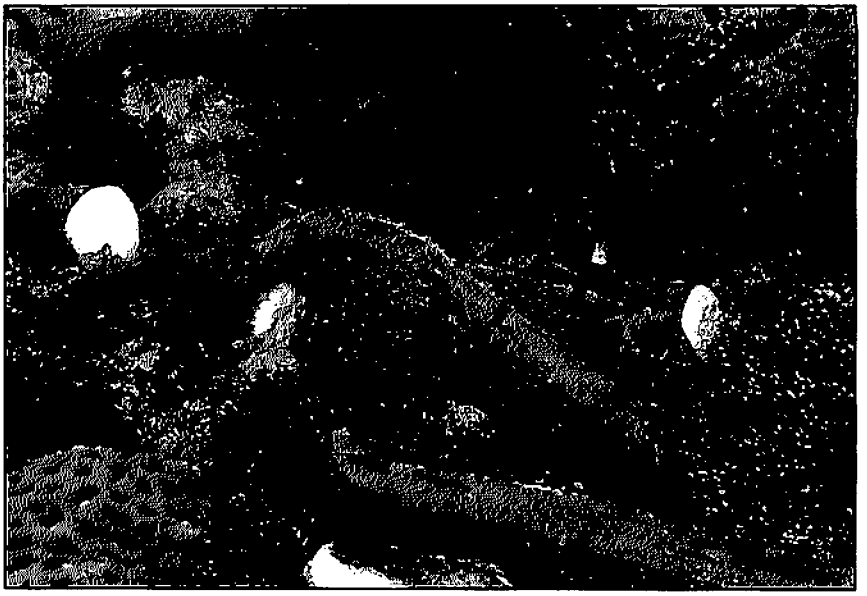
Fishing with poisons was first banned under the Fisheries Protection Ordinance 1962 (Table 1). The move to ban poison fishing was a precautionary one. In an address to the Legislative Council the Attorney General stated, "Poison is not used at present for fishing in Colony waters but its use is current in neighbouring countries and could easily be extended to Hong Kong should effective control of the use of explosives be enforced" (Anon. 1962). Maximum penalties were increased and the list of banned substances expanded in 1987.

Only two cases of cyanide use are known. In 1995, a fishing vessel owner was prosecuted for the

possession of a toxic substance (sodium cyanide) for the purposes of fishing. He received a two-month suspended sentence and a $5 000 fine despite claiming he was returning from fishing outside Hong Kong waters. The second case (also in 1995) involved five people who were caught fishing with sodium cyanide and were subsequently fined $2 000.

In other Southeast Asian countries, cyanide is usually squirted by divers from plastic bottles onto reefs for the purposes of stunning and catching live food fish, such as the Napoleon wrasse (*Cheilinus undulatus*), or for the collection of exotic reef fish for the aquarium trade (Rubec 1986). The low density of large demersal fish in local waters and the wide availability and diversity of aquarium fish from other countries in the region are probably the main reasons behind the low incidence of cyanide use in Hong Kong. Cyanide has variable effects on marine invertebrates and the effects on corals are not well understood. UNEP (1994) describes the effects on corals as "slight" but Rubec (1986) reports that two applications of cyanide to coral heads, four months apart, resulted in high polyp mortality.

Other ichthyocides may also be in use here. Ho (1981) listed five local plants which are used as fish poisons in China and Taiwan but the main problem is likely to come from rotenone. Rotenone is a traditional fish poison derived from the derris root that affects the ability of fish to take up oxygen, causing them to become narcotized and easy to collect (UNEP 1994). As such, it has been used by ichthyologists for the collection of fishes, particularly when small and cryptic species are sought (Brock 1982). A recreational diver found three plastic bottles containing traces of rotenone on the seabed in northeastern waters in 1995. No other cases of rotenone use are known at this time. Rotenone is available legally as it has other uses, e.g., as an agricultural pesticide (Li, pers. comm.). Overall, the use of poisons for fishing would appear to be minimal.



These sticks of Amatol found on the seabed were probably thrown overboard to avoid detection.

Discussion

Little is known of the long-term effects of these destructive fishing techniques in Hong Kong. The apparent low incidence of poison use, however, means that the impact will be localized and unlikely to affect the marine ecosystems on a larger scale. Blast fishing impacts marine life directly as a result of the blast, and indirectly through modification of the substrate and reduction of available food. The relative importance of direct and indirect impacts will be determined largely by the method of deployment.

Explosives directed against pelagic species will have a direct impact on the fish themselves (and possibly also an impact on pelagic food chains) but explosions in very shallow waters will probably have a greater long-term impact by killing benthic organisms and shattering hard corals. Areas of high coral cover are found patchily distributed along Hong Kong's rocky shorelines, particularly in eastern waters, and are best described as "non-reef coral communities" (McManus 1988) as they rarely show limestone reef development. These areas currently support few large, commercially desired fish (Cornish, unpubl. data), which may explain why they are only occasionally targeted by blast fishers. However, as these areas of high coral cover are small and almost all are less than 10 m deep from Chart Datum, the potential for destruction when systematically targeted is very high.

All seizures of explosives from 1993 to 1996 (Table 3) occurred in the northeastern waters of Hong Kong, primarily in Double Haven (Yan Chau Tong). Most of the explosives were hidden on the shore from where they could be quickly retrieved and used. Results of a questionnaire distributed to longtime SCUBA divers in Hong Kong (Cornish and McCorry, unpubl. data) revealed that most of the divers had heard or seen blast fishing in Hong Kong. Most of the reports were again from northeastern and eastern waters. In recent years there have also been isolated reports from southern waters.

Unfortunately, explosives are readily and cheaply available from

China which is less than 5 km across Mirs Bay in Hong Kong's northeastern waters. These explosives are diverted from quarries and construction sites and smuggled back into Hong Kong, often by Hong Kong and Chinese fishing vessels (O'Brien 1997). The hiding of large amounts of explosives in one place raises suspicions that the benefits of buying and using large amounts of explosives outweigh the risks of financial loss through seizure.

During 1996, Marine Police used high-tech surveillance on fishing vessels suspected of using fish-bombs and caught two dozen people from three fishing communities in northeastern waters who were involved in these activities (O'Brien 1997).

Conclusion

In summary, Hong Kong has a long history of blast fishing. The destructive effects of blast fishing have long been recognized, leading to legislation outlawing the practice nearly one hundred years ago. However, while maximum penalties for the offence have been increased periodically and other efforts have been made to dissuade fishers from using explosives, the problem has never been eliminated. Legislation has undoubtedly acted as a deterrent for some but enforcement is not easy as the Marine Police have limited resources that can be diverted from their main duties such as border patrol and crime prevention. As experience suggests that only a few fishing communities are responsible for the majority of explosive use, increased vigilance and education efforts directed towards these communities may be effective where legislation has failed before. In addition, Hong Kong's first marine parks were designated at Double Haven and Hoi Ha Wan in 1996. These protected areas are managed by the AFD providing additional patrols in these remote areas. It is hoped that such efforts will reduce the use of "the most destructive fishing practice of all" (UNEP 1994).

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