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### BLAST FISHING IN THE PACIFIC

by

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#### Introduction

The use of dynamite and other explosives for fishing is commonplace throughout the tropical Pacific, although usually illegal. There is much anecdotal information on the impact of underwater explosions on fishery resources and their habitat, but little real data can be found in the existing literature. The most complete account was found in Wood and Johannes' book entitled Tropical Marine Pollution, published in 1975.

It is clear that dynamite or blast fishing in a habitat such as a live coral reef can be devastating, although destruction of the habitat by explosives in coral reef communities and rates of recovery have never been adequately evaluated. The depth at which a charge is exploded and the size of the charge have an important influence on the extent of damage to the benthic habitat in an area.

#### History of the Problem

Blast fishing in the Pacific Islands began in earnest during and immediately after World War II, particularly in those islands touched by the war. In Palau during the war, fishermen were provided with hand grenades and other explosives to fish for the occupying Japanese troops. After the war many islanders became munitions experts and were able to defuse mines, bombs and other ordnance. In the 1960s one could still see huts in the jungles of Palau built over a single large piece of ordnance to keep the powder dry for use in constructing fish bombs.

When World War II vintage powder became rare, fishermen began to use commercially available explosive compounds. A common form of powder used in the Philippines consisted of 75 per cent potassium chlorate, 15 per cent charcoal, and 10 per cent sulphur or cornstarch (Ramas, 1969).

The most recent type of explosives used are those stolen or taken from construction companies. Dynamite and blasting caps are commonly utilized by both civilian and military construction teams in the many projects underway throughout the Pacific Islands and can be readily utilized as fish bombs.

Another interesting development has been the recent use of seal bombs in blast fishing, particularly in Guam and the Northern Mariana Islands. These explosives originate from the California-based purse seine tuna fleet and are used to herd tuna and dolphins in the large purse seine nets. They have become readily available in Guam and are reportedly in common use for blast fishing on the reefs.

#### Direct Impacts of Blast Fishing

The most obvious detrimental impact of blast fishing is the devastation that can occur to living coral reef communities. Maragos (personal communication) reported the complete destruction of living reefs in Indonesia where blast fishing has been extensively employed. Ramas reports that on some nearshore reefs in the Philippines formerly teeming with life, blast fishing has reduced the habitat to dead coral debris occupied by only a few small fish. Personal observations have confirmed the loss of coral reef habitat from blast fishing in Guam, Truk and Palau.

The most pronounced damage is seen in areas of calm water with many delicate, branching corals. Examples can be seen in Truk lagoon where reefs formerly rich in Acropora coral thickets have been reduced to rubble. Lesser damage can be seen at blast fishing sites such as Double Reef, Guam, where the reef is composed of robust coral forms associated with the conditions of a high-energy environment and large ocean swells.

Another substantial impact from blast fishing is the large quantities of fish that can be killed during a single blasting operation. This is particularly true when an area is chummed with bait until a high biomass of fish has accumulated. Charges are then thrown or pre-set, and a tremendous fish kill can result. In these cases often the fishermen only harvest the larger or more desirable species and leave the rest. The great reduction of several species of fish in Palau has been attributed to blast fishing, particularly during seasonal spawning migrations when the fish are densely aggregated (Johannes, 1981).

Blast fishing on surface schooling fish or fish attracted away from the bottom by chum, although resulting in high mortality of fish, is much less destructive to the habitat than detonation of charges directly on the reefs. Personal observations have confirmed this in Palau.

#### Indirect Impacts of Blast Fishing

Other more subtle impacts can result from blast fishing. In Indonesia, Maragos reports a complete community change on those reefs heavily blasted by fishermen. Fish communities changed from typically reef-associated species to herbivorous species, which graze on filamentous algae growing on dead coral rubble.

In Fiji, Owens (1971) attributes blasting, along with other human activities, as combining to eliminate most of the predators at all stages in the life cycle of the crown-of-thorns starfish, Acanthaster planci. This could lead to the current Acanthaster coral predation problem affecting reefs in urban areas throughout the Pacific.

Blasting may also contribute to another serious problem associated with coral reefs, that of outbreaks of ciguatera fish poisoning. The relationship between disruption of reefs by man, such as during blast fishing, and the subsequent development of ciguatera in the immediate area seems too frequent to be coincidental.

A problem that has never been dealt with seriously (except by blast fishermen) is the actual physical damage and death of fishermen that can result from use of explosives in fishing. In Palau, the Philippines and other Pacific islands, it is not uncommon today to see older men with missing fingers, hands or even arms from making and using explosives for fishing. Blast fishing was particularly dangerous in the post-World War II era when live ordnance had to be defused and unstable, homemade explosives were made. Today the use of commercial dynamite and other explosive products renders blast fishing much safer.

### Management and Enforcement

It is clear that blast fishing is extremely destructive in most cases and should be illegal, as it is in the vast majority of the Pacific Islands and coastal countries. The big problem appears to be enforcement of the laws. Blast fishing can be so lucrative, and the probability of being caught so low, that it is rampant in many areas.

In some areas local enforcement by village chiefs keeps the problem in check, at least near the villages. Wass (personal communication) reports this as being the case in areas of American Samoa. Most of the blast fishing occurs in the remote areas away from villages.

For enforcement purposes it is important to be able to recognize fish killed by explosives. Recent inspection of fish shipped from Truk to Guam for sale clearly indicated they were taken by blast fishing (Hamm, personal communication). Ronquillo (1950) summarized anatomical damage observable in fish by explosives as follows:

1. The air bladder, if present, is almost always ruptured and blood clots are found in the lumen.
2. The vertebral column may be fractured in any part along its length.
3. Localized haemorrhages are present around the area of fractured parts due to the destruction of the blood vessels and tearing of the adjacent tissues.
4. Parts or all of the contents of the body cavity may be damaged or crushed with haemorrhages, depending upon the size, shape, position and distance of the fish from the explosion.
5. Fracture and/or dislocation of the abdominal ribs from the vertebral column may be found especially in spiny fishes, with accompanying haemorrhages present in the area of the fracture.

6. The blood vessels below the vertebral column may break and cause haemorrhages of varying degrees along that region.
7. Rupture of the parietal peritoneum, especially that attached to the abdominal ribs may occur.

Dislocation and/or fracture of the vertebral column and ribs, if present, are clearly shown in an x-ray. The air bladder, if ruptured, will be filled with blood and will be obliterated in the negative. If not ruptured and, therefore, filled with air as in normal fish, it occupies a definite shape and position in the abdominal cavity.

Many Pacific Island governments are recognizing the serious nature of blast fishing and are increasing the penalties for those caught conducting this illegal activity. In Guam there was a change in the law in 1981 making the use of fishing with explosives (as well as chemicals and electricity) a felony. Two men were recently convicted of this felony. The Palau House of Delegates is currently reviewing a bill that, if passed, will increase the penalties for fishing with environment-damaging materials such as explosives.

Resource managers are recognizing the importance of coral reefs, not only as fishery resource habitats, but for their recreational and aesthetic value. Managers are beginning to take into account the uniqueness of a particular reef and its proximity to, and use by, various interest groups. This approach is especially important in those Pacific islands where tourism is becoming, or has the potential to become, an important industry. The problem is recognized in Truk where local scuba diving operators watch closely for anyone blast fishing. They recognize the damage that can be done, not only to fish populations, but to the beautiful reefs and historic shipwrecks in the lagoon, which are the base for tourist industry development in Truk.

### Education

Education is undoubtedly the key to the problem. The coastal populations of Pacific Island countries have to be made aware of what they have to lose. They must recognize that corals are the foundation species on which tremendous numbers of other organisms depend. So central are corals to the integrity of the reef community that when they are selectively killed, migration or death of much of the other reef fauna results. The tragedy of destroying a section of living coral reef by blast fishing, merely to harvest a few pounds of fish, must be understood. Fisheries Officers can and should play a key role in educating the public, particularly the fishing public with which they have daily contact.

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