BLAST FISHING IN THE PHILIPPINES, WITH NOTES ON TWO DESTRUCTIVE FISHING ACTIVITIES

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ABSTRACT

Blast fishing has been considered a destructive method of fishing because it destroys coral reef habitats and fishery stocks as well as other marine organisms. Although a number of studies have documented the extent of its occurrence in some parts of the Philippines where it is causing considerable damage to places such as the Palawan group of islands, the Sulu archipelago, and the western Mindanao, there is also evidence that the incidence of blast fishing has declined or ceased in some areas of the country. This generally decreasing trend in the incidence of blast fishing is attributed mainly to the increased environmental awareness of people as a result of educational campaigns against destructive fishing activities, the vigorous implementation of fishery laws by some local government units and, more importantly, the depletion in coastal areas of schooling fish, which are the primary targets of blast fishermen.

An economic analysis of blast fishing provides evidence that while individual fishers derive substantial financial benefits from blast fishing, the net loss to society after years is substantial, a good reason to eliminate blast fishing on coral reefs.

Two other fishing activities—spear fishing with scuba or "hookah" compressor and drift gill net fishing—also deplete marine resources. Spear fishing with scuba should be banned. Drift gill net fishing should be regulated to minimize its potential negative impact on fish, marine mammals, and other marine species.

The development of alternative fishing activities or sources of income to which spear fishers, drift gill net operators, and blast fishers can shift their fishing operations is highly desirable.

Introduction

Fishing is an important activity in developing countries, being a source of income and livelihood for a large number of the human population. Destructive fishing activities involving the use of explosives and poisons are common in tropical countries where poverty is prevalent (Pauly and Chua 1988, Pauly et al. 1989). Other activities, such as coral mining, dredging, and boat anchoring on coral reefs, whether associated with fishing or not, destroy fish habitats and are also considered destructive to fisheries. Blast fishing, which is considered a destructive method of fishing because it destroys coral reef habitats and fishery stocks as well as other marine organisms, has been practiced in the Philippines since the 1930's but became rampant during the decades following World War II. Even trawlers used dynamite-blasting in the 1950s (Thomas 1999).

Blast fishing and sedimentation are the two main causes of physical and biological destruction of coral reefs in Southeast Asia (Yap and Gomez 1985). This is true with reference to the early decades, based on our observations in the Philippines. However, fishing with the use of poisons may have equaled or even surpassed blast fishing in some areas as one of the leading causes of reef destruction in the 1990s. According to Barber and Pratt (1997), more than one million kilograms of cyanide have been squirted onto Philippine coral reefs since the 1960s. In addition, our observations in southern Philippines indicate a wide use of locally grown fish poison, *Derris*, in shallow coastal areas. However, the extent of the use of this natural poison needs to be determined. Saila et al. (1993) tend to minimize the effect of blast fishing on hard corals, stating that the primary targets of blast fishers are schooling and pelagic fish and that most explosives are detonated near the surface and probably inflict minimum damage at the bottom. However, our earlier observations indicated that some fishers throw dynamite bombs that sink to the sea bottom before explosion, killing demersal fish and creating craters on coral beds. The present review will deal with blast fishing and two fishing practices that may also be destructive to fishery species and marine biodiversity.

Sources of Data and Information

The information from published papers, unpublished survey reports and records of local government units was supplemented by our own observations during the past 25 years and by interviews of several fishermen and local government officials. In most cases, information from the interviewees was obtained indirectly by asking general questions on fisheries rather than on blast fishing and other kinds of destructive fishing methods. Indirect questioning was resorted to because of the unwillingness of fishermen to talk about destructive fishing methods used by their friends. Interviewees were assured that their names will not be included in this report.

Blast Fishing

Fishing with explosives as a method and its general and immediate effects on fish and the coral environment have been adequately described in several papers. Blast fishing has been the subject of our earlier reports (Alcala and Gomez 1979, 1987). Recently several reviews and reports with particular reference to the Philippines have appeared. Abregana (1988) discussed the psychological and social determinants influencing the behavior of blast fishermen in Central Visayas and driving them to engage in blast fishing. Galvez et al. (1989) described the social and cultural dynamics of blast fishing and sodium cyanide fishing in two villages in Lingayen Gulf area, Pangasinan. McAllister (1988, 1991) and Ansula and McAllister (1992) discussed the environmental, economic, and social costs of coral reef destruction in the Philippines. Rubec (1988) reiterated the need for conservation and management of Philippine coral reefs. Pauly et al. (1989) included dynamite blasting in their review of tropical fisheries management. McManus et al. (1997) discussed potential rates of recovery of coral reefs destroyed by bad fishing practices, including dynamite blasting. Saila et al. (1993) modeled the effects of destructive fishing practices on coral reefs. Although Pet-Soede et al. (1999) studied the economics of blast fishing on Indonesian reefs, this paper is relevant to the Philippines. In addition, a number of unpublished reports on incidence of blast fishing in various areas of the country and records of apprehensions of illegal fishers and of legal cases on blast fishers have been made available.

Present Status

It is common knowledge that blast fishing occurs in all parts of the Philippines. About 70,000 fishers, 12% of capture fishers in the country, are engaged in blast fishing according to Sievert (1999). The more important question is whether the use of explosives for fishing has increased, or decreased, or has remained the same in these areas in the 1990s, the time frame for this review.

To date only one study (McManus, Reyes and Nañola 1997) has reported actual counts of reef bombing for fish. They observed an average of 10 blasts per hour in Bolinao, Pangasinan from 1987 to mid-1989. This number was reduced by 90% beginning mid-1989 as a result of strict enforcement of laws (McManus et al. 1992). It is hoped that the situation has further improved since 1992, especially as a result of the efforts of the Lingayen Gulf Commission.

The situation on Luzon (except Bolinao), southern Mindanao and most of Eastern Visayas is not well known. Information indicates that the seas in the Babuyan group of islands off northern Luzon are subjected to blast fishing. Reports on blast fishing in the vicinity of Dinagat and Siargao Islands have been received. It may be assumed that the area around Guiuan, Samar has been relatively free of this destructive method because of the presence in the area of non-government organizations concerned with marine conservation.

The Palawan area contains the largest concentration of coral reefs in the country, and is a favorite area for blast fishers. As expected, information available from the area indicates that blast fishing and other forms of destructive fishing occur throughout the area, with the notable exception of Puerto Princesa City, where the mayor has been successful in stopping these destructive activities (pers. observ.). HARIBON Palawan and the Environmental Legal Assistance Center (ELAC) reported that blast fishing occurs in the towns of Coron, Cuyo, Dumaran, Taytay, and Roxas (all in northern Palawan) and in Balabac, Bataraza, Quezon and Rizal (all in southern Palawan). BANTAY PALAWAN listed 20 localities and towns on the main island and on the many small islands comprising the province of Palawan, giving the impression that blast fishing is rampant in the province. Cases were filed against six persons in the municipalities of Taytay, Agutaya, Linapacan, Magsaysay, Balabac, and San Vicente for blast fishing in violation of the Philippine Fisheries Code of 1998 from January to November, 1998; two persons were convicted and sentenced to five and six years of imprisonment, two cases have been archived, and two cases are active (Sammy Umandap, International Marine Alliance, pers. comm.). It is not known whether cases have been filed in the courts in 1999. However, the January-March 1999 issue of *Likas Palawan* carried a news item about three blast fishermen who were arrested and meted the punishment of hard labor for three days a week for five years by their Tagbanua Barangay Captain of Tara, Coron, in northern Palawan.

The status of blast fishing in the Tubbataha Reefs National Marine Park can be inferred from data on both coral cover and fish abundance. The live coral cover of selected areas in the North and South Islets were assessed by Estacion et al.(1993) in 1991. Four years later, Divinagracia and Reboton (1995, unpubl. Rept.), repeated the measurements using the same transect-quadrat method. They found that the average of live hard coral cover in the shallow reef (less than 30 ft) had slightly improved from 27% to 32% in the North Reef, but that in South Reef had decreased from 44% to 27%. Luchavez and Luchavez (1995 unpubl. rept.) compared the results of target fish species census in 9-10 transect lines laid on the two reefs at two sampling periods (1991 and 1995) and found that the mean densities (+/SE of Mean) were 56.2 +/- 22.1 (1991) and 44.0+/-11.6 (1995), while the biomasses were 34.7+/-23.6 (1991) and 7.9+/-2.0 (1992). In both sampling the mean numbers of species were 6.4+/-.09 (1991) and 6.8+/-1.1 (1995). Both density and biomass were higher in 1991. The coral and fish data suggest that blast fishing could have occurred in Tubbataha during the period 1991-1995. Information furnished me, however, indicates that blast fishing incidence decreased two years ago. The park is now actively protected by the World Wildlife Philippines and fishing with explosives is expected to have been controlled.

My personal assessment is that the coastline of Negros Oriental has been rid of blast fishing as early as the late 1970s in localities near Dumaguete City. Other towns have been free from blast fishing since the 1980s. It is safe to state that blast fishing is now a rare occurrence in Negros Oriental and the adjoining towns of Negros Occidental and probably also in Siquijor. The absence of blast fishing in Negros Oriental is due mainly to the relentless campaign against destructive fishing by various sectors of society, including the academe (Silliman University), local government units, non-government organizations, and the police and other enforcement agencies. One major factor is the governor's program on coastal resource management which promotes the establishment of no-take marine reserves and enforcement of fishery laws. However, as will be discussed below, unsustainable, if not destructive, fishing method (drift gillnet) is still being used by fishers in the Sulu Sea.

Although no longer rampant as in earlier decades, incidence of blast fishing has been reported in certain areas of Central Visayas. Danajon Reef in northeastern Bohol and even Mactan Island were subjected to blast fishing in 1997. The blast occurred near a police patrol boat (D. Catada, pers. comm.).

In Western Visayas, Macahulum and Carbin coral reefs off Sagay City and a reef off Cadiz City in the Visayan Sea used to be targets of intense blast fishing in the past until the local government of Sagay began protecting them beginning in the mid-1980s. This greatly reduced the incidence of blast fishing. Carbin reef has been integrated into the national protected area system and is now largely free from blast fishing (author's pers. obs.; Mayor Joseph Maranon, pers. comm.). Some mayors of certain towns in northern Negros have just formed a council for marine conservation and management which could eliminate the practice.

On the island of Mindanao, some areas, including Basilan and Zamboanga Peninsula and the eastern part (islands near Surigao), are still subjected to blast fishing according to reports, but it has been difficult to get quantitative data. At one time in 1997, an explosive blast at the large Sta Cruz Island almost killed one member of a group of graduate students diving off the small Sta Cruz Island some 200 meters away (L. Alfeche, pers. comm.). In this area, blast fishing apparently still occurs.

One good news from Mindanao concerns the great reduction of blast fishing along the coastline of Zamboanga del Norte Province from Dipolog City eastward to Misamis Occidental and Misamis Oriental Provinces. Blast fishing still occurs in and near Ozamis City, Misamis Occidental. On Camiguin Island, blast fishing has been stopped since the mid-1990s, according to my informants. The city of Dapitan, in particular, is almost free of blast fishing. The city filed 43 cases in court (17 of them against blast fishers) from 1989 to 1999 (data provided by Cyril Patangan, Agricultural Technologist, Dapitan City). Only one case (against a purse seiner) was filed in 1999. Out of the 17 cases of blast fishing, 10 were decided on after the accused were found guilty or pleaded guilty; the rest of the cases were either archived, dismissed, or still on trial. Blast fishing on some offshore reefs of Dapitan occurs occasionally, but is in general effectively controlled. Credit is due to the local government units for their effective information campaign against all forms of destructive fishing and for their vigorous implementation of fishery laws. The presence of alternative fishing opportunities (aquaculture) in Dapitan City must have helped in the control of blast fishing. This is confirmed by interviews.

In the Sulu Archipelago, available information (S. Rasul, pers. comm.) indicates that blast fishing is still occurring there. Cabanban (1997 and pers. comm.) reported that blast fishing occurs on Semporna reefs, Sabah, and it is probable that this activity extends to the Sulu Archipelago because of proximity. Information reaching me states that blast fishing occurs in the vicinity of the Turtle Islands and near the small islands close to Sabah.

From the foregoing reports, it appears that blast fishing still occurs in the country although its incidence has decreased. In some areas it has ceased. The reasons for this are, first, the general awareness of our people of the widespread destruction of marine ecosystems and their disapproval of destructive fishing methods; second, the continuing educational campaign directed at all forms of destructive fishing by conservation groups, such as Haribon, Tambuyog, ELAC, Bantay Dagat, NGO's and some educational institutions; third, the establishment of marine reserves and strict implementation of fishery laws by local government units (e.g., Negros Oriental province, city of Sagay, city of Dapitan, town of Lopez Jaena in Misamis Occidental, town of Masinloc in Zambales, city of Puerto Princesa in Palawan); and fourth, the development of aquaculture opportunities and tourism as alternatives to blast fishing. This seems to be the case for some blast fishers of Dapitan who are now engaged in fish-pen culture in protected waters of the city. The fifth reason (and probably the basic reason) could be that in many coastal areas of the country the target schooling fish species have been depleted, making such areas no longer profitable for blast fishers. This has forced blast fishers to fish in more pristine coral reefs previously considered too remote, but now accessible with the use of motorized boats, as Pet-Soede (1999) has pointed out in Indonesia. In the Philippines, more pristine coral reefs in Tubbataha and in the China Sea are attractive to blast fishers.

Long-Term Effects of Blast Fishing

Recovery of Corals.

Coral reefs and their biodiversity are damaged by a number of causes, which often exert their effects simultaneously, and it is difficult to separate the effects of each of these factors. Nevertheless, McManus and Nañola (1997) attempted to assess the relative importance of blasting, poisoning with sodium cyanide, and anchoring on a reef slope of a heavily exploited fringing reef in Bolinao, Pangasinan using a balance sheet model in which rates of potential coral destruction from blasting, poisoning and anchoring were each assessed against rates of potential regrowth. They concluded that for the period 1987-1990, approximately 1.4% per year of the hermatypic (reef forming) corals may have been lost to blasting, 0.4% per year to cyanide, and 0.03 per year to anchors. The potential coral recovery rate of 3.8% per year in the absence of disturbance was reduced by about one-third to 2.4% per year. For the study reef, corals recovered slowly, and blasting had more effect than either cyanide or boat anchoring. The authors, however, warn that their findings are subject to uncertainties due to compounded errors in computation. Considering the rampant use of cyanide in the Bolinao area, the small amount of damage inflicted by this poison is surprisingly low relative to that caused by blasting, but this is explained by the authors in terms of need for accurate data on coral mortality due to cyanide fishing.

Saila, Kocic and McManus (1993) modeled the effects of destructive fishing practices (blasting, cyanide and other poisons, and anchoring) on coral reefs based on observed physical and biological data from Santiago Island, Bolinao, Pangasinan. Some relevant data used in this modeling are; area of reef flat (24 km^2); area of reef slope (60km^2); current extent of damaged coral (50%); estimated loss of coral in % per year (moderate case): to blast fishing (0.44), to cyanide and other poisons (2), to anchors (0.4), total (2.84), coral regrowth in % per year (1.0). Note that the coral regrowth figure is lower than the potential recovery rate of McManus and Nañola (1997), which is 2.4% per year. Simulations carried out for a period of 100 years under the assumption that 50% of the coral cover has already been destroyed "... indicated that the sum of all current destructive practices was sufficient to continue loss of diversity and loss of live coral cover for about 25 years before any recovery was expected. On the other hand, a reduction in the rate of destructive fishing to about 30% of the current level would permit continuing slow recovery of both diversity and live coral cover." The authors then suggest that to accomplish this reduction of the rate of destructive fishing, attempts should be made to eliminate the use of poisons in coral reefs and to reduce anchor damage, in addition to reducing blast fishing. There is a need to reconcile the findings of these two studies referred to in this section.

Empirical data on recovery of corals in blasted reefs are not easy to obtain. In general, sections of reef dominated by slower growing massive and encrusting corals will take a longer time to recover, perhaps 25 to 50 years, than areas with fast-growing branching and foliose corals (Wilkinson, et al. 1999). Alcala and Gomez (1979) reported on the slow rate of recovery of corals in a known blasted reef at Bantayan and Escaño, off Dumaguete. Michael Alcala (unpubl. data), surveying the same reef in 1995, 23 years after the cessation of blasting using quadrat and video-quadrat methods and taking large samples (25-250), found that the live hard coral cover ranged from 16 to 25%. It is to be noted that this reef is a fished area for traditional fishers and has not been protected from fishing. Contrast this with the recovery of Pescador Reef, off western Cebu, which developed a live hard coral cover (mostly branching corals) of 45% four years after it was almost completely destroyed by a typhoon (L. Alcala and Gomez 1990). This reef was partially protected for tourism. Recovery of blasted coral reefs is variable, subject to a number of factors, and requires careful studies.

Fish yield in blasted coral reefs.

Little data are available on fish yields from predominantly blasted reefs. McManus et al. (1992) gave 2.7 tons/km^2/yr for a heavily dynamited reef slope in Bolinao. A shallow reef flat in southwestern Negros, which was heavily dynamited from the late 1930s to the 1970s, produced no more than about 5.0 tons/km^2/yr (Alcala and Gomez 1985). In 1996, the same reef including the nearby non-reef area yielded only 2.8 tons/km^2/yr (Luchavez 1996). These yields contrast sharply with those of Sumilon and Apo Islands which ranged from 15 to excess of 30 tons (Alcala and Russ 1990).

Recovery of fish populations in blasted reefs.

McManus et al. (1992) studied the fish communities on the reef slope and reef flat in Bolinao from 1986 to 1992. These reefs were subjected to destructive forms of fishing. Although some pattern in abundance and diversity in the reef slope has been observed, none was evident in the reef flat. The pattern of abundance on the reef flat resembles the finding of Russ and Alcala (1996) at the Apo non-reserve where abundance did not increase significantly in several years (see below).

The recovery of fish communities in reefs which had been blasted and where fishing with non-destructive gear was allowed has not been studied. It is not possible to find a reef that has been fished by explosives only; practically all coral reefs in the Philippines have been subjected to various destructive methods of fishing at one time or another. The coral reefs in two marine reserves (Sumilon and Apo) in the Central Visayas studied for 25 years by Alcala and Russ (e.g., Alcala and Russ 1990, Russ and Alcala 1996) come close as examples as they were fished with explosives and muro-ami before their protection and now incorporate no-take reserves and adjacent non-reserves (fished areas) serving as controls (Russ and Alcala 1996). Taking only the large predators or target fishes (Serranidae, Lutjanidae, Lethrinidae and Carangidae), there was a significant positive correlation of mean density with years of protection at both Apo and Sumilon reserves; mean density remained low and did not change significantly at the Apo non-reserve (where fishing occurred as in the Bolinao reef slope referred to above). At the Sumilon reserve, density decreased significantly twice when the reserve was open to fishing and increased significantly three times following reserve protection. The pattern of increase of biomass at both islands was more curvilinear, beginning with slow increase followed by an increasing rate of increase. Increase of density and biomass is due to protection (Russ and Alcala 1996). At Sumilon reserve, 2 and 1.5 years of efficient fishing eliminated gains in density and biomass accumulated over 5 and 9 years, respectively, of reserve protection, showing that it is far easier to destroy fisheries than to conserve them.

Fish recruitment on blasted reefs.

This subject has not been studied thus far. The general observation that heavily dynamited reefs are characterized by low fish density leads us to ask why this is so. For one thing, such dynamited reefs lost their structure, becoming monotonous flat areas of coral rubble. Of course reefs lose their structure as a result of several factors, such as sedimentation, poisoning, etc. Does this change in structure affect patterns of recruitment? I believe this is one area for investigation.

Economics of Blast Fishing

A few studies have dealt with economics of degraded reefs. McAllister (1988, 1991) and Ansula and McAllister (1992) discussed the environmental, economic, and social costs of destruction of Philippine coral reefs. The drop in the productivity of Philippine coral reefs due to degradation was estimated at 37%. But the authors think that with just 1% loss of productivity, the value of Philippine coral reefs shall have decreased by more than US$ 27 billion! I am not in a position to critically evaluate this claim, but I agree that the loss could be substantial. The authors also point out the various non-monetary values of coral reefs, such as protection of land from erosion.

Studies on the contribution of good coral reefs to tourism in the Philippines are few. Vogt (1997) estimated the yearly economic benefits of tourism after an initial investment of US$ 32,692 in the marine reserve of Apo Island, off Dauin, Negros Oriental, at US$ 22,910 to the fisher community, US$ 61,770 to resort and dive shop owners, and US$ 42,115 to dive tour operators. The records (DENR, PAMB for Apo) show that about US$ 35,000 in entrance fees were collected in one year. The fish yield from this reef in 1990 was 20 metric tons (unpublished data), representing a sizeable income for the Apo fishers. These financial benefits indicate that a coral reef area of about 106 ha., if protected, can bring in a substantial income to communities.

A recent study in Indonesia may well apply to the Philippines because of the similarity of social and environmental conditions. Pet-Soede, Cesar and Pet (1999) studied the characteristics, impacts, and economic costs and benefits of blast fishing in the Spermonde Archipelago in southwest Sulawesi, Indonesia for a period of almost two years. They reported that the economic benefits from blast fishing address the need for good sources of income for fishers claiming to have no other alternatives. The crew members in small-, medium-, and large-scale blast fishing operations earned US$ 55, 146, and 197, respectively, per month, while boat owners earned US$ 55, 393, and 1100, respectively, in the same operations. These incomes were comparable to the highest incomes in conventional coastal fisheries. The cost-benefit balance at the society level, calculated with an economic model, showed a net loss after 20 years of blast fishing of US$ 306,800 per km^2 of coral reef where there is a high potential value of tourism and coastal protection, US $33,900 per km^2 where there is a low potential value. The authors point out that the economic costs to society are four times the total net private benefits from blast fishing in areas with high potential value for tourism and coastal protection. They hope that the results of their studies will raise the level of political will to ban blast fishing in Indonesian waters.

Indeed, the political will to eliminate blast fishing and other destructive fishing methods and to enforce fishery laws is urgently needed. Abregana (1988) advocated a community-based fishery development scheme to stop the use of this method. Galvez et al. (1989) made a point in stating that the local communities in the Lingayen Gulf have accepted blast fishing and that corruption is a major factor that hinders or prevents the control of blast fishing.

Other Objectionable Fishing Practices

There are other fishing practices that may have negative impacts on either the marine environment or the marine biodiversity, or both. One such method, spear fishing, appears to cause depletion of fishery species in shallow marine areas. The other, drift gillnets, may have serious impact on marine mammals and other marine species (e.g., turtles and non-target fish species).

Spear fishing

Traditionally, spear fishing was a non-destructive method used by fishermen to catch large, highly valued fish species in coral reefs during the day. The equipment consisted of goggles and spear guns, all home-made. Catching fish with this method was highly dependent on the skills and swimming endurance of fishers. However, when scuba equipment, "hookah" compressors, underwater flashlights, and poisons were available and were used in various combinations with powerful spears, spear fishing became a very efficient fishing method. Without using scuba, a spear fisher can easily catch 20-50 kg of fish from good coral reefs in two hours. In a small island like Selinog (60+ ha), there may be 10-12 spear fishers who fish almost every night. A spear fisher group using compressor was observed to catch 90-135 kg in one night (unpublished data, Silliman Marine Laboratory, 1991). Although data are needed, this level of fishing in coastal areas appears to be not sustainable.

Spear fishing is probably one major cause of depletion of fisheries along the coast of many islands of the country, as indicated by the absence of medium and large fish and of invertebrates like sea cucumbers. At night, many fish species (e.g. parrot fishes, siganids, caesionids) "sleep" on the sea bottom or are inactive, rendering them highly vulnerable to spear guns. Even marine turtles "sleep" on coral reefs and are often victims of spear fishers. The use of poisons by spear fishers probably also contribute to the death of corals. In the Palaus, spear fishing of the bumphead parrot fish in the mid-1980s has resulted in the depletion of this fish (G. Russ and N. Idechong, pers. comm.). McManus et al. (1992) state that banning this device would arrest the rapid decline in number and diversity of fish in the reef slope of Bolinao, Pangasinan.

The use of "hookah" compressors is hazardous to human health, as pointed out earlier (Alcala and Gomez 1987, McManus et al. 1992). Because air is not filtered, fishers breathe air mixed with oil, slowly impairing their health. Furthermore, they often exceed the limits of no-decompression diving and often suffer (sometimes dying from) the bends. In 1993, according to one report, 30 of the 200 divers in a Philippine community suffered from the bends and 10 died from the disease. One informal survey indicated that in seven out of eight communities, one or more divers had died from the bends within three years (Anon. 1997). The victims generally are not aware that diving using "hookah" compressors without following diving rules is injurious to health. Because of ignorance, one survivor (now a cripple), for example, insists he had a heart attack while diving!

The use of "hookah" compressors in fishing is now recognized as a destructive practice and should be banned (McManus et al. 1992, Pet and Djohane, 1998 as cited in Pet-Soede et al. 1999). Some municipal governments have enacted ordinances banning spear fishing with compressors or with scuba, but they have difficulty enforcing them. In one case, the police did not enforce the regulations because they themselves were involved in this illegal fishing.

Drift Gillnets

Drift gillnets vary from one to three kilometers in length and are 18 meters deep. They drift with the boats they are attached to and are maintained in position by floats above and sinkers below. At present, there are probably more than 200 drift nets operating in the Bohol Sea and East Sulu Sea, the body of sea water enclosed by the islands of Negros, Siquijor, Bohol, and the provinces of Zamboaga Sur, Zamboanga del Norte, Misamis Occidental, Lanao del Norte, Misamis Oriental, Camiguin, Agusan del Norte, and Surigao del Norte in northern Mindanao. In the Dapitan area alone there are 29 (Cyril Patanga, pers. comm.). Drift gillnets have also been reported in the San Vicente (Palawan) area, operating in the South China Sea. They may also be found in other large bodies of sea water in the country. Dolar (1994) reported 50 drift gillnets based in Malabuhan, southern Negros Oriental, 30 at Pamilacan Island, Bohol, and 40 at Aliguay and Selinog Islands, Dapitan City, a total of 120 units operating in the Bohol Sea and East Sulu Sea. The usual fish catch of drift gillnets in the Dapitan, Zamboanga del Norte area is 150-400 kg/trip in good weather conditions. Drift gillnets operate at least 20 days a month.

Pelagic fish species are caught, mostly tunas and blue marlins, but marine mammals (dolphins) and occasionally turtles are caught as well. According to information some dolphins and turtles if still alive may be released by some fishers but are slaughtered for food or bait if dead. Dolar (1994) reported that the average dolphin bycatch per day was 3.1 based on 16 days of observation in the East Sulu Sea and estimated that 428 dolphins were caught and butchered during the six-month operation (November to May). Dolar (1999, pp. 64-66) reported that 2,259 dolphins (1,556 spinners, 519 Frasers, and 184 spotteds) were killed through directed and incidental fishing in her study area in East Sulu Sea in 1994-1995. The estimated sustainable take would be 171 spinners, 48 Frasers, and 55 spotteds. The kills in 1994-1995 were therefore not sustainable. Drift gillnets appear to have a negative impact on marine biodiversity. Some form of control in the number of areas of operation for this gear may be needed to prevent depletion of some marine species that are useful to humans in ways other than food (e.g., tourism). One way to effect this control is through establishment of "no-take" marine reserves.

Summary

Although some areas, notably the Palawan group of islands, the Sulu Archipelago and western Mindanao seem to be still subject to considerable blast fishing, there is evidence that the incidence of blast fishing has declined or ceased in some areas of the country. The reasons for the generally decreasing trend in the incidence of blast fishing are the increased environmental awareness of people as a result of educational campaigns against destructive fishing activities, the vigorous implementation of fishery laws by some local government units and, more importantly, the depletion in coastal areas of schooling fish, which are the primary targets of blast fishermen. In some cases, this has resulted in the movement of blast fishers to fish-rich reefs in the Palawan and the South China Sea areas.

Empirical and simulation studies on long term recovery of hard corals indicate slow recovery on blasted reefs that are continually fished. One such simulation study indicated that reduction by 30% of the current level of destructive fishing activities would allow slow recovery of both corals and biodiversity. The density of large predatory fish did not change in one fished reef even in the absence of blast fishing and other destructive fishing practices, but density and biomass in two protected reefs showed increase with years of protection over the period of study (9-11 yrs). The patterns of coral and fish recovery on blasted reefs which are later fished with traditional non-destructive gear or which are converted to marine reserves need more studies. Fish larval recruitment in such blasted reefs should be part of these studies.

An economic analysis of blast fishing indicates that while individual fishers derive substantial financial benefits from blast fishing, the net loss to society after 20 years was substantial, a good reason to eliminate blast fishing on coral reefs.

Two other fishing activities—spear fishing with scuba or "hookah" compressor and drift gill net fishing—also deplete marine resources. Spear fishing with scuba should be banned. Drift gill net fishing should be regulated to minimize its potential negative impact on fish, marine mammals and other marine species. The development of alternative fishing activities or sources of income (e.g. mariculture, tourism) to which spear fishers, drift gillnet operators and blast fishers can shift their fishing operations is highly desirable.

Acknowledgments

I wish to thank the University of the Philippines Marine Science Institute through its Director, Dr. E.D. Gomez, for the financial support in the preparation of this paper. Thanks are also due those who provided me with current information on the incidence of blast fishing.

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WHAT WOMEN ARE COMPLAINING ABOUT: SEXISM ON CAMPUS

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ABSTRACT

This article presents the various forms of sexism on campus based on a qualitative research done in four universities in central Philippines. As the research revealed, sexism is apparent in the teaching-learning activities in the classroom, behavioral interaction on campus, school policies and programs, co-curricular activities, and student services. The challenges for women's studies are outlined and some initiatives to curb campus sexism are identified.

Introduction

Consider these forms of behavior on campus: taunting or whistling at women, following women around, ogling at women's body parts, using instructional materials depicting women in a degrading manner, using male pronoun to refer to both women and men, or cracking jokes at the expense of women.

Sexism on campus has various shades. From the subtle to explicit forms, sexism in an academic environment erodes the capacity of learners to appreciate human beings based on individual qualifications rather than on sex. As a form of discrimination, sexism is the treatment or consideration of, or making a distinction in favor of or against, a person based on sex rather than on merit. Sexism entails unwelcome conduct that unreasonably interferes with work or learning performance, or creates an intimidating, hostile, or offensive academic setting.

An academic environment has to promote standards of equality and improve chances of inspiring the full and equitable participation of women in our classes. Studies on campus sexism not only expose old prejudices but also substantiate