

sources. Local government officials believe that Hong Kong-based middlemen and traders supply cyanide to fishermen to guarantee the supply of certain volumes and species. The fishing grounds where cyanide fishing is most common are around Hon Cha La, Hon Gom, Hon Lon, Hon Do, Hon Dung, Hon Mieu, Hon Tre, Hon Mun, Hon Tam, Hon Noi, Hon Ngoai, Bai Tien up to Ninh-Binh Thuan. Khanh Hoa live reef fishermen and traders also travel to Phu Yen, and Ninh-Binh Thuan to fish and trade with live reef fishermen and traders from those provinces.

Vinh Tho is a typical fishing village near Nha Trang city, with 40 ships and 20 boats specialised in hookah diving to capture live food fish, lobsters, and ornamental fish. Live food fish are sold to floating-cage middlemen who mainly grow out and trade in *Plectropomus leopardus* and lobsters. The price of live *P. leopardus* paid by these middlemen is US\$ 10-17/kg, depending on size and grade. (Middlemen, in turn, sell the fish to exporters for around US\$ 22/kg, who ship them on to Hong Kong and Taiwan.) By contrast, fresh fish of the same species only fetch US\$ 5.50/kg for the fishermen. As small percentage of the live catch is sold to local tourist restaurants.

Fishermen sell live lobsters to middlemen for as much as US\$ 24-27/kg, who sell them to restaurant traders in Ho Chi Minh City. Most aquarium fish are sold by fishermen to middlemen for only US\$ 0.35 apiece for various species of butterflyfish and triggerfish. Middlemen are able to resell them in Nha Trang, however, for considerably more.

Conclusion

These four "snapshots" of the live reef fish trade in Vietnam are initial and incomplete pictures of the situation. IMA is currently working with national and local officials to address the many problems associated with the live reef fish trade, especially the apparently widespread and indiscriminate use of cyanide. One of the first steps will be to continue to collect better information on the status of the trade with respect to collection areas, methods used, and volumes and species collected and exported. Nevertheless, it is clear from this initial survey that the live reef fish trade in Vietnam is of significant size, and is plagued with the widespread use of cyanide that has caused so much damage in other countries in Southeast Asia.



Destructive fishing practices mini symposium

by Lida Pet-Soede¹

The mini symposium, Destructive Fishing Practices - Towards a Global Understanding of Causes, Effects and Management Solutions, took place in October 2000 at the 9th International Coral Reef Symposium, Bali, Indonesia. Seventeen papers were presented, covering the wide range of impacts from different destructive fishing practices (DFP) on corals and reefs, experiences with enforcement, and suggestions for creating incentives to stop using destructive methods. The discussions, triggered by the presentations, continued in an evening session with the aim of summarising the current state of knowledge of all aspects of DFP and to point to a clear direction towards both proven and innovative new management solutions. A panel discussion was held in which both a selected panellist and the general audience discussed four provocative questions at length. The issues presented and discussed at the mini symposium and evening session are summarised here.

A number of other participants illustrated the destructive impacts of fish traps, derelict fishing gear and pa-aling (a modification of the well-known muro-ami method) to reef ecosystems. In Puerto Rico, 44% of a sample of 100 fish traps were found to cause damage to the reef — 23% to hard coral colonies and 34% to gorgonian colonies. In Hawai'i, derelict fishing gear originating from trawl, seine and other gill nets destroys coral habitat, entangles reef fauna and may accelerate introduction of alien species. In the Philippines, pa-aling may indeed be less destructive than the muro-ami from which it evolved, but appears to be a highly efficient and non-selective gear that easily clears reefs of fish.

Various papers focused on blast fishing and cyanide fishing. Evidence shows that blast fishing in Malaysia not only results in rubble fields but also in seriously reduced fish species diversity — fewer

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individuals per species — and an overall smaller average fish size. Overfishing issues in Indonesia were discussed in relation to the live food fish trade. A model compared habitat impacts of cyanide fishing and blast fishing assuming different levels of fishing effort. Reactions of corals to cyanide exposure were illustrated by a series of highly detailed results from gel electrophoresis analyses at different NaCN exposure levels of corals in laboratories. Implications were drawn for field situations. Rates of natural recovery of coral rubble fields generated by blast fishing at a number of sites in Indonesia were shown to be extremely low or non-existent especially in areas with high currents. Long-term implications were discussed.

Motivations for destructive fishing practices were illustrated by case studies from the Philippines and Indonesia. Economic need, financial greed, and regional differences in social structures and attitudes towards resource exploitation were discussed.

The suggestion was made to focus on monitoring live food fish transport vessels more closely based upon some evidence that these are sometimes involved in cyanide smuggling. Common conclusions were that management is needed now. A series of papers discussed different approaches and successes or failures, while some new ideas regarding the effective banning of DFP were proposed.

Preliminary results of the Indo-Pacific destructive fishing reform initiative are promising. Large numbers of fishers have been trained in using different capture methods. Current changes in the composition of live food fish in the Hong Kong markets were presented and suggest that fish from farther afield are taking over the market. Fish from these other sources appear to come from mariculture mostly.

Although the forces behind these changes are more related to health (rumours of ciguatera poisoning) and socio-economic issues (Asian economic crisis and political unrest) than to environmental awareness, they indicate that the live food fish trade will be going through major changes in the near future. The importance of supporting alternative livelihood strategies was discussed with examples from Malaysia, and a number of creative market and policy initiatives to transform the current live food fish trade were listed.

On the aquarium trade side, a very comprehensive list was presented of large numbers of fish and invertebrates that are unsuitable for the aquarium trade due to special requirements for food, handling or holding. The fact that the United States is one of the largest importing countries of coral reef resources provides a good opportunity to imple-

ment innovative trade measures where the burden of proof that the products are harvested sustainably or derived from mariculture would be shifted to the producing countries.

Discussions continued into an evening session and centred around four questions:

- How do DFP differ from other anthropogenic impacts on coral reefs in terms of both effects on the reef and rates and manner of reef recovery?
- On either a regional or worldwide basis, how do the various forms of DFP compare in terms of their contribution to reef destruction?
- Are fishers “forced” into DFP as a last resort under Malthusian overfishing conditions, or is the adoption of DFP more often a case of greed rather than need?
- What is the role of corruption in finding a solution for the DFP problems and what types of enforcement and management solutions have proven effective in combating DFP in local situations, and are these applicable on a global basis?

Helen Fox (University of California) was the panelist for the first question and discussed how blast and cyanide fishing in combination with other anthropogenic impacts can become disastrous. Rates of recovery and the scale of different anthropogenic influences are important factors that determine which impact is greater. Discussions among the group revolved around examples of reefs that have adapted in response to regular storm events such as in Belize or to regular sediment influxes. The point was made that the relative importance of impacts will differ in different circumstances, such as those of small island reefs compared with reefs around large land masses.

It was also pointed out that whereas the issue of global climate change seems to revolve around using less fossil fuel, using fish bombs concerns the need for people to catch fish to sell. One response was to suggest that a regional prioritisation of anthropological threats is needed along with a lobby to direct effort and funding to the most serious threats. It was agreed that the quantification of the different anthropological threats in different regions is needed so that decisions can be made to make the most of the limited funding and logistic capacity available to conserve and protect coral reefs locally.

Herman Cesar from the Institute for Environmental Studies at the Free University of Amsterdam was the panellist for the second question. He pointed out that blast fishing appears to be a global problem, whereas cyanide fishing seems to be largely limited to the central Indo-Pacific but is

not an issue on east African or Caribbean reefs. (In the Caribbean, tourist SCUBA operations have proliferated and damage done by divers walking on the reefs has become a major problem.) From the group it was added that the base of the cyanide problem is the live fish trade, more so because fishers wipe out spawning aggregations of groupers and other target species.

A clear definition of DFP was sought. It was agreed that although overfishing need not be covered by such a definition, it is strongly related to DFP and that it would be better to talk about destruction to the 'life support system' rather than to 'habitat'. A discussion started around the point that the Hong Kong market claims to aim at being part of a sustainable industry so as to allow fish trading and consumption to continue. This was debated and it was suggested that there is little evidence of this.

The possible banning of hookah compressors in the live food fish industry² was put forward and supported by the entire group as a means to reduce both the use of cyanide and the risk of over-fishing. However, the use of hookah in the net-capturing of aquarium fish would then also be at stake, so a suggestion would be to ban hookah and only allow certified groups to use it, which will make enforcement and control more complex.

Allowing the use of clove oil in the live reef fish trade was briefly discussed as it is apparently used in Australia and was a common anaesthetic in Indonesia; however, it was also maintained that this would not resolve overfishing issues at spawning sites or, in general. Blast fishing is in some ways unique. For example, bombs are often used in open water to catch pelagic fish very effectively without harming reef substrate. Patrol and enforcement were considered potentially valuable solutions but would require major inputs in most countries to be effective.

Sofia Bettencourt of The World Bank, Washington, the panellist for the third question, discussed issues of poverty and population growth as factors driving the use of DFP. The abuse of common property by a few people has different management implications than a situation where most of the resource users engage in abusing, destroying or wasting a common property resource. In Bettencourt's experience, detailed studies fail to find a link between alternative income strategies (AIGs) and conservation success. From the group the question arose as to the reasons for examining economic issues and determining whether need or

greed fuels DFP. The answer given was that once one knows the economic or social reasons for fishers using DFP, it becomes clearer whether a certain AIG or combination of AIGs would be a suitable management strategy or not.

The discussion then moved to a number of possible negative side effects of AIGs, where newcomers could move into the space left by people who enter the AIG programme. Also, the comparison was made with bank robbers or contract killers that are criminal offenders for whom no AIGs are sought. This issue remains open.

Robert Johannes a private consultant and editor of the *SPC Live Reef Fish Information Bulletin* was the panellist for the last question. He stated that judging from the literature on DFP, corruption is not a serious problem because it is almost never mentioned. Once this issue — which is related to enforcement — comes out, it can be dealt with, otherwise efforts directed at management might be fruitless.

The group discussed the fact that it is sometimes difficult to write about this issue safely. Examples from the field indicate that situations can become very intimidating when stakes are high especially in the stage before a case is led before court. Other experience relates of situations where corruption issues were reported repeatedly without anything happening and the option of large-scale sanctions was discussed. To this it was debated that a positive approach would work better than a negative approach with sanctions. Recent examples from Indonesia show how positive local media coverage of a recent arrest of fishers using DFP increased the feeling of peer pressure amongst law enforcers and led to a serious follow up in court³. Possibilities of giving enforcement authority to local communities were discussed but it was agreed that this creates risks and that trained authorities could better maintain legal rights. The session ended with the positive remark that it should be acknowledged that over the past 2–3 years local groups exert new and stronger voices that address corruption issues.

DFP have been recognised as important regional threats to coral reefs for at least two decades, yet the global significance of this problem is perhaps underestimated and continues to take a back seat to such commonly-cited reef threats as sedimentation, eutrophication, overfishing in general, and global climate change. In a number of developing countries, however, DFP is the most immediate and significant threat to the continued existence of

2. The use of hookah compressors has recently been banned at one location in Indonesia — see Editor's Mutterings, this issue.

3. See Erdmann, this issue, p. 19.

coral reefs and steps need to be taken to both eliminate these practices and promote recovery of DFP-damaged reefs.

Convenors of the symposium were Dr Annadel Cabanban, Dr Mark V. Erdmann and Dr Lida Pet-Soede.

Abstracts are available from the author and full papers are under review for publication. For further information contact Lida Pet-Soede at: <lidapet@attglobal.net>.



Who's minding the reef? Corruption and enforcement in Indonesia

M.V. Erdmann¹

The recent mini symposium on destructive fishing practices (DFP) at the 9th International Coral Reef Symposium in Bali (October 2000) confirmed that now more than ever, blast and cyanide fishing are decimating reefs throughout the Indian and Pacific Oceans. Participants at that symposium suggested that in Southeast Asia, these DFP are the most significant threat facing coral reefs today — even more so than coral bleaching. Unlike coral bleaching, however, DFP damage has a clear and directly preventable human cause. So why does it still continue? Why have we failed to stop blast and cyanide fishing?

Certainly this failure is not due to a lack of legislation. Blast and cyanide fishing are strictly illegal in most countries with coral reefs (though significant legal loopholes may be present). Rather, the problem is often one of lack of enforcement and prosecution of the fishers and companies using these destructive techniques. A recent email survey requesting information of previous DFP court cases in Indonesia suggested that there is an appalling lack of such cases on the public record. Why has this situation arisen, despite the fact that significant legislation exists to prevent and punish DFP?

In Indonesia, the reasons for such a poor enforcement record are manifold. Police and park rangers often lack incentive and the facilities to investigate DFP incidents, and are frequently woefully ignorant of the pertinent laws and the reasons for them. More often than not, however, the real reason for a lack of enforcement against DFP is more sinister — corruption. Blast and cyanide fishing are very lucrative businesses in Indonesia, and for the average coastal policeman, a cyanide boat is viewed more as a source of “extracurricular funding” than as an enforcement problem. Individual blast fishermen are happy to pay significant “protection money” to ensure that police never happen to be on the scene when blasting is happening.

Often the police and military are involved directly, either in supplying explosives or cyanide, or as the owners of the fishing company. Even in the rare cases where some external force (such as an NGO or a minister's visit) has increased the resolve of police and rangers, the arrested fishers hardly ever make it to court — their boss will usually pay off the police or the court to make sure the case is never brought to trial. Finally, in the exceedingly rare instances where a blast or cyanide case is brought to trial, the company for which the fishers work will undoubtedly take advantage of the most corrupt arena in Indonesian society — the legal system — and pay the judges directly for a ruling in favour of the fishers.

Under this system, it is perhaps not surprising that blast and cyanide fishing continue unabated throughout much of Indonesia. With few exceptions, the only reason for lessening bomb and cyanide use is financial unviability (when the reefs are too degraded to bomb and target species too rare to catch with cyanide).

Models for effective enforcement from the field are few. The Nature Conservancy's Indonesia program, working in conjunction with the Komodo National Park rangers (see Pet, this issue) looks promising, however. Here, an international conservation NGO supports local conservation enforcement agencies with funding, equipment and expertise.

Here I describe a different model for enforcement that is proving successful in North Sulawesi — the involvement of the private sector in protection of the reefs from which they make their livelihoods. The North Sulawesi Watersports Association (NSWA) is a group of 13 environmentally-concerned marine tourism businesses operating in the Bunaken National Marine Park and beyond. In the late 1990s, as declining reefs and grouper and humphead wrasse populations around Indonesia

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