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Management of Indian Fisheries – Regulation and Compliance

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Introduction

Many management measures are already in place for the protection and conservation of the Indian fisheres resources. The Wildlife (Protection) Act, 1972 provides legal protection to many endangered and threatened organisms. Marine mammals, turtles, some of the sharks, fishes like the giant grouper and sea horse, corals, sea cucumbers, gorgonids, some of the molluscs etc. come under the Wildlife Protection Act and therefore there exists strict enforcement of rules against capture and possession of the protected animals.

It is widely quoted that the depletion is due to the introduction of trawler fishing techniques, which are scrape, the bottom of the sea and end up catching juvenile fish. A lot of research conducted by many fisheries research firms does not deny the fact that there is a definite threat to the fishing resources. In viewing this problem of over fishing (by the trawlers) as a negative externality to the traditional fishing community, the best way to internalize the social cost inflicted by the people who over fish is the question that this study attempts to seek the answer for. One of the most commonly practiced techniques to sustain the fisheries resource is the blanket ban on fishing during specific months of the year, like the one practiced in the coastal regions in India.

It will be appropriate to look in to the history of introduction of mechanised trawling before examining the reasons for depletion of fisheries wealth. Around 1890, trawler fishing developed in Europe and over the years this technology was transferred to India. The first two Five Year plans emphasised the need for an expanding fishery to provide an inexpensive protein source to improve the health of the Indian poor. (Salagrama, 2002). This was carried out by projects like the Indo– Norwegian programme in order to provide food for the masses and to boost the national economy, by stimulating the mechanisation of the fisheries sector. Initially, the mechanisation was in the form of motors, for the traditional crafts. However the government initiated development programs switched to European type boats small boats with in board motors, the so-called mechanised boats.

At the outset of mechanisation, the gear was still the same old gill nets but they were now nylon nets as opposed to the conventional cotton, hemp, and linen yarn. Later, the introduction of trawlers became prominent. This improvement in the gear and the vessels saw an increasing U.S and Japanese demand for the Indian prawn. The returns were impressive and this led to the introduction of mechanised vessels on a larger scale and

modernization of the indigenous crafts for the development of marine fisheries. These proved to be an important source of foreign exchange. The third Five-Year plan and the ones that followed shifted the focus from the development of fisheries to help the poor to increasing production for export (Salagrama, 2002).

It is well understood that any management measure should be directed towards sustainability of concerned resources. There is no doubt that a resource which is alarmingly declining has to be restored by adopting all the management measures including total ban. The vital issue is that realistic database should be available to consider a species or group to be included in the Schedule. The database on the different resources should be updated annually. Such a database will help in a long-term to evolve appropriate management measures. It is felt that the current management measures are adopted without a realistic and strong database regarding the status of the resources. Such types of management measures create lot of livelihood issues and hence will become redundant.

Code of Conduct for Responsible Fisheries

With this situation in mind, more than 170 Members of the Food and Agriculture Organization of the United Nations (FAO) adopted the Code of Conduct for Responsible Fisheries in 1995. The Code is voluntary rather than mandatory, and aimed at everyone working in, and involved with, fisheries and aquaculture, irrespective of whether they are located in inland areas or in the oceans. Because the Code is voluntary, it is necessary to ensure that all people working in fisheries and aquaculture commit themselves to its principles and goals and take practical measures to implement them. The Code of Conduct, which consists of a collection of principles, goals and elements for action, took more than two years to elaborate. Representatives from members of FAO, inter-governmental organizations, the fishing industry and nongovernmental organizations worked long and hard to reach agreement on the Code. It is therefore a result of effort by many different groups involved in fisheries and aquaculture. In this respect the Code represents a global consensus or agreement on a wide range of fisheries and aquaculture issues. Governments, in cooperation with their industries and fishing communities, have the responsibility to implement the Code. FAO's role is to technically support their activities but it does not have a direct responsibility for implementation because FAO does not have a responsibility for the development and implementation of national fishery policies. This is the sole responsibility of governments. Implementation of the Code will be most effectively achieved when governments are able to incorporate its principles and goals into national fishery policies and legislation. To ensure that there is support for these policies and legislative changes, governments should take steps to consult with industry and other groups to promote their support and voluntary compliance. In addition, governments should encourage fishing communities and industry to develop codes of good practice that are consistent with, and support, the goals and purpose of the Code of Conduct. These codes of good practice are another important way of promoting the implementation of the Code.

The Code advocates that countries should have clear and well-organized fishing policies in order to manage their fisheries. These policies should be developed with the cooperation of all groups that have an interest in fisheries, including the fishing industry, fish workers, environmental groups and other interested organizations. When cooperation among countries in fishery conservation and management is necessary due to fishery resources are shared among countries, the Code calls for new regional fishery organizations to be established or for existing organizations to be strengthened. Cooperation in this way is the only realistic approach to achieving the long-term goals that were discussed in the preceding section of this booklet. The role of regional fishery organizations is considered further in the section relating to Regional and International Cooperation. It is important that fishing industries at all levels operate within a clear fisheries management and legal

framework so that everyone involved in fisheries has a clear understanding of the rules to be followed.

Fisheries should be managed to ensure that fishing and fish processing are conducted in ways that minimize negativeimpacts on the environment, reduce waste, and preserve the quality of fish caught. Fishers should keep records of their fishing operations. Governments should have enforceable laws with procedures for determining and punishing violators. Punishment for violations could include fines or even the removal of fishing licences if violations are severe. When developing fisheries policies, it is important to consider a number of issues. These include, among other things, the costs and benefits of fishing and the environmental and social impacts of fishing.

In preparing these policies, countries should use the best scientific information available while taking into account traditional fishing practices and knowledge where it is appropriate to do so. In the absence of adequate scientific information, countries should act more cautiously in setting fishing limits. All people and organizations concerned with fishing should be encouraged to share their views and opinions on fishing issues. Particular attention should be given to the needs of local people who depend upon fisheries for their livelihoods.

Countries should strive to educate and train fishers and fish farmers, so that they can be involved in developing and implementing policies to ensure sustainable fisheries now and in the future. To protect fish resources, dynamiting, poisoning and other destructive fishing practices should be prohibited in all countries. Countries should ensure that only fishing vessels permitted fish in their waters. Such fishing should be done in a responsible manner and in accordance with any rules, regulations or laws that may be applied by a country. To avoid overfishing (taking so much fish that the fish stocks will decline in the future), the size of the fishing fleet should not be too large for the natural supply of fish. In addition, the effects of fishing gear on the environment (impacts on coral reefs, for example) should be understood before using a new fishing gear. Fishing methods and gear should be selective, and designed to minimize waste and promote high survival rates for escaping fish. Gear should also minimize the catching of fish species that are not wanted (non-target or by-catch fish) or that are endangered. Fishing gear and fishing methods that are not selective or which cause high levels of waste should be phased out.

Vessel supplies should be purchased with a view to minimizing waste and garbage. The owners and crew of fishing vessels should ensure that discharges of waste do not cause major pollution. To protect air quality, countries should adopt guidelines that aim at reducing the release of dangerous exhaust gas and the release of ozone-depleting substances found in the refrigeration systems of some fishing vessels. These substances should be phased out. Important fish habitats such as wetlands, mangroves, reefs and lagoons, should be protected from destruction and pollution. Where natural disasters harm fisheries resources, countries should be prepared to take emergency conservation and management measures when necessary.

As a renewable natural resource, fish can be harvested year after year if countries have wise policies in place and if responsible fishing and utilization practices are followed. Similarly, with aquaculture, fish farming that does not harm the environment should be promoted because this type of culture will make important social and economic contributions to farming communities and the economies of their countries. If the Code of Conduct for Responsible Fisheries is implemented successfully by all people who are involved in fisheries and aquaculture it can be expected that fish and fisheries products will be available for consumption by present and future generations. In fact, current generations

have a moral obligation to ensure that they do not reduce the supplies of fish available for future generations by careless and excessive use today.

The Code of Conduct for Responsible Fisheries urges countries and their citizens to implement comprehensive and integrated policies in the fisheries sector so that a healthier, more robust sector will result. In the longer-run such responsible behaviour will give good results in terms of the improved status of fish stocks, a more reliable contribution to food security and sustained income-earning opportunities. If all the world's nations unite in pursuing responsible fishing practices, there will be ample fish supplies for many generations to come. The Fisheries Department of FAO hopes that you have found this booklet informative and that you will contribute to ensuring that the world's fisheries and aquaculture are developed and managed in a responsible way.

In the year 2006, an estimation of compliance of the fisheries of India with Article 7 (Fisheries Management) of the FAO (UN) Code of Conduct for Responsible Fishing was done.

Marine ornamental fish trade

Global marine ornamental fish trade is expanding rapidly in recent years. The global annual marine ornamental fish trade is estimated at US$ 200-330 millions (Chapman and Fitz-coy, 1997; Larkin and Degener, 2001). Annual global trade is about 20-22 million number of marine ornamental fish. Nearly 1.5-2.0 million people world wide (half in United States and one-fourth in Europe) keep marine aquaria (Green, 2003). According to the data provided by the exporters, the Philippines, Indonesia, the Solomon Islands, Sri Lanka, Australia, Fiji, the Maldives and Palau together supplied 98 per cent of total number of fish exported. According to Global Marine Aquarium Data base (GMAD) trade records from importers for the year 1997-2002, the United States, the United Kingdom, the Netherlands, France and Germany were the most important countries of destinations comprising 99 per cent of all import of ornamental fish (Wabnitz *et al*., 2003). In India, till date no organized trade of marine ornamental has been initiated. India has a wealth of marine ornamental fish. It has the potential to develop a lucrative marine ornamental fish trade.

Nearly 98 per cent of the marine ornamental species are wild collected mainly from coral reefs of tropical developing countries, which raises doubts regarding its sustainability (Inskipp, 2003). In recent years aquarium industries has attracted much controversy. Opponents to the trade draw attention to the damaging techniques. High level of mortality is associated with insensitive shipping and poor husbandry along the supply chain (Oliver, 2003; Balboa, 2003). Aquarium species are typically gathered by local fishers using live capture technique (such as slurp guns or barriers and hand nets) or chemicals such as Sodium cyanide. This adversely affects the overall health of specimens, as well as killing non-targeted organisms(Erdmann, *et al*.,2000) Consequently the marine aquarium trade is frequently referred to a major contributing cause to the global decline of coral reef. The over harvesting of targeted organisms is another aspect of concern (Moore and Best, 2001).

Supporters of aquarium industry maintain that it is potentially highly sustainable, that proper collection techniques have minimal impact on the coral reefs and it is relatively low volume but very high value. This arise a need to evolve biologically sustainable management measures for marine ornamentals. Some management strategies are: establishing marine reserves where illegal collections is taking place, restricting access to marine ornamental fishing, setting up of quotas, size limits, temporary closures, and species which are unsuitable for aquaria should not be harvested (Wabnitz *et al*., 2003). The permanent solution to a long term sustainable trade of marine ornamental can be achieved only through the development of culture technology. According to data held in GMAD a total of 1,471 species of fish are traded globally. Out of these more than 84 species are reared in

captivity, majority of species reared are from the family Pomacentridae (Wabnitz *et al*., 2003).

The ideal way of managing Indian fisheries to follow the code of conduct for responsible fisheries and to adopt the culture technologies for the available marine species and to strictly follow the certification procedures in wild collection

Mariculture on marine food, shell and ornamental fish

Mariculture can be an environmentally sound way to increase the supply of food, shell and ornamental fish, by helping reduced pressure on wild fish population and producing juvenile and market size fish of a wide variety of species year round. It is hoped that much of the market demand for the more popular fishes may eventually be satisfied by cultured fish, once culture technologies have been established successfully. However, in reality most marine ornamental aquaculture remains comparatively problematic, both from a technical and socio-economic point of view. Attempts at closing life cycle, i.e. spawning, rearing and mating, repeatedly in closed system have proved technically challenging for most species and existing mariculture project have been developed on a relatively small scale (Wabnitz *et al*., 2003). Some mariculture interventions are:

i) Broodstock bank for tank reared food, shell and ornamental fish

It is practically difficult and costly affair for a fish farmer/entrepreneur to maintain the broodstock. The broodstock is essential for hatchery technology; hence there is a need to establish a broodstock bank for the proved fish species on culture technologies. Central Marine Fisheries Research Institute (CMFRI) can take up a lead role in establishing and maintaining fish broodstock bank.

ii) Small-scale marine food, shell and ornamental hatchery technology

Small-scale hatchery technology is highly recommended because the capital costs and technologies are accessible at relatively low cost, which can be affordable for fisherfolk/entrepreneur. It focuses on the larval rearing and nursery aspects of fingerling production. Small scale hatcheries do not hold broodstock, instead they purchase fertilized eggs or newly hatched larvae from larger hatcheries (Sim *et al.,* 2005).

A typical small-hatchery unit consists of the following feature:

- Two indoor larval rearing with 10 m^3 capacity
- One sand filter (8-10 m^3)
- Outdoor live food production tanks (2-3 units each of micro-algae and zooplankton tanks, with 10 m^3 and 5 m^3capacity, respectively)
- Flow-through water supply system with regular water exchange
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Advantage of Small-scale hatcheries

Low capital inputs, simple construction, ease of operation and management, flexibility and quick economic returns.

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Need for Certification for wild collection

Commercial level breeding technologies of all the species will take a very long time. If we wait till then, we may fail to enter into this lucrative global trade in the near future, because fish trade is based on varieties. It is suggested that a few number of entrepreneurs can be licensed to collect suitable ornamental fish species from selected area using eco-friendly collection methods. Availability of necessary infrastructure and technical know how

for conditioning and maintaining of harvested species should be one of the prerequisites for issuing license to an entrepreneur (Gopakumar and Ignatius, 2006).

Certification and standards in similar lines with Marine Aquarium Council (MAC) on Ecosystem and Fishery Management (EFM), Collection, Fishing and Holding (CFH), Handling, Husbandry and Transport (HHT), Mariculture and Aquaculture Management (MAM) can be developed and implemented jointly by Central Marine Fisheries Research Institute (CMFRI) and National Bureau of Fish Genetic Resources (NBFGR) (Gopakumar and Ignatius, 2006). The use of approved training course in the above said areas should be a mandatory requirement for certification. The impact of exploitation has to be closely monitored by scientific agencies at periodic intervals and required management measures have to be implemented as and when required (Gopakumar and Ignatius, 2006).

On 25th January, 2010 Marine Products Export Development Authority (MPEDA) has finalized and submitted the guidelines for green certification or eco-labelling of ornamental fish to ensure its environmental and socio-economic sustainability. It is worth knowing the principles, standards and procedure followed by Marine Aquarium Council. The below mentioned information was downloaded from www.aquariumcouncil.org.

The Marine Aquarium Council (MAC)

Principles and criteria that have been developed by the Marine Aquarium Council follow four Standards:

The **Ecosystem and Fishery Management (EFM) Standard** addresses in-situ habitat, stock and species management and conservation by verifying that the fishery and its marine aquarium organisms are managed according to the principles of ecosystem health, biological diversity, and sustainable use.

The **Collection, Fishing and Holding (CFH) Standard** addresses harvesting of fish, coral, live rock and other coral reef organisms, handling prior to export, holding, plus packaging and transport to ensure ecosystem health, biological diversity, sustainable use, and proper animal husbandry.

The **Handling, Husbandry and Transport (HHT) Standard** addresses the handling of marine aquarium organisms during export, import, and wholesale operations to ensure optimal health and traceability through the chain of custody.

The **Mariculture and Aquaculture Management (MAM) Standard** addresses the propagation, collection, and culturing of marine aquarium organisms to ensure ecosystem health, traceability, and proper mitigation of environmental and social impacts.

Detailed information about MAC certification and standards can be downloaded from the website www.aquariumcouncil.org.

Extension Programme

I. Creating Awareness:

Public and private extension services should give wide and well planned publicity about eco-friendly method of wild collection, conservation and culture technologies through mass media and information technology. They should motivate the fisherfolk/entrepreneur to go for licensed eco-friendly collection method and wherever possible to establish small-scale fish hatcheries. Information technology is a powerful tool. In India, majority of population own mobile phones. Hence creating awareness on above issues through message service will be a right strategy. Creation of website on these issues will also give timely and updated information. Production of Video films/CDs and publishing in dailies and

magazines on success stories of eco-friendly method of wild collection, conservation and culture technologies will create awareness among the public.

Special programmes in Doordarshan and private channels on eco-friendly method of wild collection, conservation and culture technologies may be telecasted to create awareness among the public.

II. Education:

Education is a powerful tool, which can bring desirable change in the behavior of an individual. Public and private extension services should conduct frequent campaign covering all coastal districts focusing on eco-friendly method of wild collection, conservation and culture technologies. Regular follow-up should be undertaken periodically.

III. Training:

Creating awareness and educating fisher folk will induce interest among them. Once interest aroused, they will be eager to know more about that. Hands on training on eco-friendly method of wild collection, conservation and culture technologies will help them to learn and practice in day to day life. Information on certification, marketing and financial assistance may also be provided during training. Regular follow-up should be undertaken periodically.

IV. Agricultural Technology Management Agency (ATMA) – (Proposed for small-scale marine fish hatcheries)

After training and visit system, a key concept to decentralize decision making at the district level is through the creation of ATMA. It is a registered society responsible for technology dissemination at district level. It links with all line departments, research organizations, non-governmental organizations and agencies associated with farming development in districts. In ATMA, villages play crucial role in program planning and resource allocation.

Fishermen/women who can establish small-scale marine fish hatchery at village level can organize into a group called Fish Farmer Interest Groups (FFIG). Each ornamental fish farmer interest group comprise of 10-15 fish farmers interested in ornamental fish culture. FFIGs are grouped in the line of fish culture as Fish Farmer Association (FFA) at block/*mandal* level. FFAs are grouped as Fish Farmer Federation (OFFF).

Structure of ATMA: It is well structured with various committees' viz., Governing Board (GB), and ATMA Management Committee (AMC) at the district level. Fish Farmer Advisory Committee (FFAC-It comprises the heads of FFIGs from different village in that block) and Block Technology Team (BTT- It comprises few Subject Matter Specialists) at block level and Fish Farmer Interest Groups (FFIG).

ATMA functions by preparing and implementing the Strategic Research and Extension Plan (SREP). AMC constitutes a team of heads of all line departments for the purpose of preparation of SREP. SREP is a comprehensive document identifying research/ extension priorities for district, keeping in mind agro-ecological conditions and existing gaps in technology generation and dissemination in marine ornamental fish culture. SREPs will be prepared for new districts in coordination with the line departments, Krishi Vigyan Kendras (KVKs), Panchayati Raj Institutions (PRIs), Private Sector, farmers and other stake-holders at the district level.

Steps may be followed in implementing ATMA- Small-scale marine fish hatchery

1. ATMA organizes Participatory Rural Appraisal (PRA) a data collection tool and then AMC develops SREP on marine ornamental fish culture for the district.
2. Identify market for ornamental fish species.
3. BTTs organize FFIGs and assess interest in marine ornamental fish culture.
4. Consult with research institutes and KVK to test new technologies.
5. FFIG leaders oriented through exposure visits on successful enterprises.
6. ATMA facilitates contracts between FFIGs and buyers.
7. Train FFIGs members on marine ornamental fish culture.
8. Arrange for broodstocks, seeds and inputs needed to establish small-scale marine ornamental fish hatchery.
9. FFIG members produce fish; BTT and/ or buyers staff members supervise production and provide technical support as needed. FFIG members harvest, handle and market the product to the buyer's specification.

V. Entrepreneurship Development

Ornamental fish culture is an entrepreneurial activity which can be viewed as a process consisting of three broad phase;

1. Stimulatory Phase: Identifying and selecting potential entrepreneur is an important exercise which can be carried out through TAT (Thematic Apperception Test). The identified potential entrepreneur should be trained well to develop his technical competence.

2. Support Phase: Support activities provide infrastructure facilities, resources, abilities and skills to entrepreneur for enterprise launching and management.

3. Sustaining Phase: It refers to all such efforts that facilitate growth and continuity through expansion, diversification and technology up gradation of on going enterprises.

VI. Roles of extension personnel in light of market led extension

• SWOT analysis of the market: Strengths (demand, high marketability, good price etc.), Weaknesses (the reverse of the above), Opportunities (export to other places, appropriate time of selling etc.) and Threats (imports) need to be analyzed about the markets. Accordingly, the fish farmers need to be made aware of this analysis for planning production and marketing.
• Organization of Fish Farmers' Interest Groups (FFIGs) building their capabilities with regard to ornamental fish culture.
• Supporting and enhancing the capacities of locally established groups under various schemes / programmes. These groups need to be educated on the importance, utility and benefit of self-help action.
• Enhancing the interactive and communication skills of the fish farmers to exchange their views with customers and other market forces (middlemen) for getting feedback.
• Advice on product planning: selection of fish species and marketability will be the starting point of the enterprise.
• Direct marketing: fish farmers need to be informed abut the benefits of direct marketing.
• Capacity building of FFIGs in terms of improved production, handling, husbandry and transport.

• Acquiring complete market intelligence which includes likely price trends, demand position, current prices, market practices, communication network, etc besides production technologies regularly on various aspects of markets.
• Regular usage of internet facility through computers to get updated on market intelligence.
• Publication of market information in news papers, radio and Television besides internet.
• Organization of study tours of FFIGS: to the successful enterprises for various operations with similar socio-economic and farming systems as the fish farmers learn more from each other.
• Creation of websites of successful FFIGs in the field of agribusiness management with all the information to help other FFIGs to achieve success.

Conclusion

In India, fisheries management is often intertwined between formal and informal or traditional management systems (Pido *et al.* 1996). The formal management system declared by the government centralizes the administration of the resource exploitation under the department of fisheries. While on the other hand the traditional fishing communities have a strong adherence to existing traditions and customs of the fishing community. Given the heterogeneity of the fishing customs amongst the villages, there is an inevitable clash of interests. This discrepancy between numerous local agreements impeded the uniform regulation of fisheries, sought by the government. Further, the increasing divide between the traditional and mechanized fishermen lead to a lot of conflicts during the late 1970's.

Another vital aspect is to review the quality and availability of resources and ecosystem services after the implementation of the management measures in order to compare it with the pre-management scenario. This should be given topmost priority and suitable agencies should be identified and the data should be collected to get a real picture. It is well understood that the marine resource assessment is a process where lot of assumptions are made to estimate the stock. However, the methodology adopted and the samplings made should be scientifically well accepted.

There is also a lack of coordination in the implementation by different managers. The contradiction is mainly due to the fact that certain resources of conservation importance are coming under the Forest Department whereas the fishery resources of the area come under the Fisheries Department. Here a proper co-ordination and interaction between the agencies are almost lacking. Consequently, the different type of fishing methods which are being practiced in the region destroys a lot of biodiversity, which is a matter of concern. At the same time, small-scale exploitation of a resource for livelihood (eg. sea weed collection) is given alarming significance.

It is well known that for any management measure which is affecting the livelihood of a sector, it is better to have a participatory conservation approach. The current management scenario has not made enough scope for this vital aspect.

It is evident from the above that certain improvements are essential for the development of effective management measures and its implementation in the region. The hard core conservation measures have to be reconsidered. The sustainable exploitation of resources from the area can be practiced whereas destructive practices have to be effectively curbed. On a global basis also, the coral reef ecosystem are permitted for sustainable exploitation, which can substantially contribute to the economy. The policy of total ban should be resorted only when it is absolutely warranted based on the database created through careful scientific studies. Otherwise a lot of illegal exploitation of the resources is bound to happen, which is more disastrous and harmful to the ecosystem.

We have reached a necessity in evolving marine fisheries policy in our country for developing an organized trade of marine ornamentals. Though it is suitable to develop a sustainable trade of marine fishes through reared species, but commercial level breeding technologies of all the species of demand will take a very long time. If we wait till then, we may fail to enter into this lucrative global trade in the near future. A small scale marine fish hatchery technology for proved successful fish species can be established in large numbers wherever possible. Though it takes long time for establishment of large scale units, as we progress one day we can substantially reduce the load of wild collection and replace with hatchery produced species in marine fish trade. Extension programmes will play a crucial role in implementing licensed eco-friendly method of wild collection, conservation and culture technologies among marine fisherfolk/entrepreneur.

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