



Enhancing the Fisheries Resources in Southeast Asia: Recommended Approaches

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With the progress now at hand in rearing marine animals, the potential is growing but the experience, protocols, and guidelines on how to combine fisheries enhancement and management are still missing. This paper therefore presents some recommended approaches in enhancing the fisheries resources of the Southeast Asian region.

In the Southeast Asian Region, the declining fisheries resources in terms of both demersal and pelagic fishes in the coastal and offshore areas, has directly affected the fishing industries which saw a quick growth during the past two decades. This situation pushes a large numbers of fishing vessels to perform illegal fishing outside their national jurisdiction or in the exclusive economic zones (EEZs) of other countries and even in the high seas.

Several approaches for enhancing the marine and inland fisheries resources have been promoted at national levels in an effort to conserve and manage the coastal resources since the late 1970s. However, due to the perceived impacts to the fisheries resources that emanate from changes of the climate and human activities, understanding and managing the enhancement of fisheries systems could be considered. On the other hand, the tendency of many countries to favor the politically “easy” enhancement measures while refraining from taking the course of the much needed but politically more difficult management actions (*e.g.* reducing fishing

capacity or allocating rights), has helped in discrediting the approaches developed and recommended by fishery scientists.

Nevertheless, varied interests must have already been renewed since many countries are now more decisively addressing the core issue of overcapacity considering that most high value resources are now declining. The recent proliferation of modern tagging technologies and the progress in visual assessments of reef stocks have paved the way to the more convincing assessment of the impacts of stock enhancements or installation of artificial reefs.

Available Approaches

Conventional fisheries management measures such as regulation of minimum mesh sizes, closed areas and closed seasons have been used to counteract the situations of high fishing pressure or degraded environments. However, such measures can be difficult to enforce and do not always offer the possibility of increasing or maintaining production levels. Improvements in the productivity of habitats are also important that may come, *inter alia*, from sustainable enhancements of the habitat (*e.g.* through artificial reefs), primary productivity (protecting fishery *refugia*) and recruitment (*e.g.* through artificial propagation and restocking/ranching). In order to enhance the fisheries resources and achieve fisheries sustainability, the following

available approaches could be considered and adapted by the countries in the region.

Protecting the fisheries *refugia*

Fisheries *refugia* could be a solution to consider, where fisheries *refugia* as defined by the UNEP/GEF/SCS RWG-F are the “spatially and geographically defined, marine or coastal areas in which specific management measures are applied to sustain important species [fisheries resources] during the critical stages of their life cycle, for their sustainable use.” The regional guidelines on the use of fisheries *refugia* for capture fisheries management in Southeast Asia, that constitute part of the Regional Guidelines for Responsible Fisheries in Southeast Asia, was published by SEAFDEC in 2006 while taking advantage of the available key results from the South China Sea project which addressed key barriers to effective fisheries habitat management in the South China Sea and Gulf of Thailand (SEAFDEC, 2006).

These key barriers include: limited information regarding fish life-cycle and critical habitat linkages and the role that marine habitats play in sustaining fisheries; low level understanding among stakeholders, including fisherfolk, scientists, policy makers, and fisheries and habitat managers of the linkages between fish stocks and habitats; limited community acceptance of “protected” area-based approaches to marine management in Southeast Asia; and limited experience in national fisheries and environment departments and ministries with respect to the implementation of integrated fisheries and habitat management approaches. Nevertheless, 52 known fisheries *refugia* have been identified and characterized so far.

Artificial propagation and use of aquaculture technologies

As additional tools for stock enhancement, the adoption of certain aquaculture technologies would be necessary specifically: (i) for areas in which certain species cannot reproduce naturally due to irremediable loss of critical habitats; (ii) to maintain fisheries despite recruitment overfishing in places and situations where conventional management does not work; or (iii) to boost stock rebuilding.

Physical modifications of natural conditions

Certain modifications of the natural conditions of marine waters are likely to become acceptable if these are mainly aimed at re-establishing the natural conditions (e.g. reopening coastal lagoons and wetlands, replanting mangroves or sea grass beds). Artificial reefs using old vessels and vehicles, old tires, quarry rocks and concrete structures might be adequate to create additional habitats (e.g. in soft bottom ecosystems) in order to increase biodiversity, attract predators, provide reproductive as well

as feeding or nursery space. Establishment of bio-filters (e.g. with oysters and mussels) could improve the water quality when nutrient loads are too high. As reported by many countries in the region, artificial reefs also serve as “anti-trawl” devices.

SEAFDEC Approaches on Enhancement of Fisheries Resources

The 1st phase of the resources enhancement project implemented by the SEAFDEC Training Department in Thailand and the SEAFDEC Aquaculture Department in the Philippines from 2001 to 2006 was mostly focused on the review of enhancement efforts made by the SEAFDEC Member Countries. Moreover, in spite of many attempts made by the countries in promoting responsible fishing and practices to reduce the impacts of fishing to the critical life cycle of some commercial species and support the enhancement of the fish stocks, little achievements have been made so far.

The Workshop on Enhancing Coastal Resources through Artificial Reefs, Stationary Fishing Gear Design and Construction, and Marine Protected Areas organized by the SEAFDEC Training Department in October 2003 in Thailand, noted that all participating countries have in place their respective national legislations, policies and plans including resource enhancement activities to promote conservation and management of the marine resources. In this connection, future approaches on enhancing the fisheries resources should be advanced and existing policy frameworks should be strengthened and supported by the respective national policies/implementation programs for example, the establishment of fisheries *refugia* and improvement of the productivity of tidal flats (Sato and Tamura, 2009). Monitoring and assessment of the impacts from such enhancements should be considered by the countries and should be made part of the respective countries’ enhancement programs implemented at the national level.

In terms of using aquaculture technologies as tools to enhance the stocks, most of the research works conducted by the SEAFDEC Aquaculture Department since 2005 to the present (SEAFDEC, 2006a), have been focused on the species under international concern such as the seahorses (*Hippocampus barbouri*, *H. comes*, and *H. kuda*), humphead wrasse (*Cheilinus undulatus*), abalone (*Haliotis asinina*), angelwing clam (*Pholas orientalis*) and sea cucumber (*Holothuria scabra*). In order to disseminate the outcomes from the research works to the SEAFDEC Member Countries and exchange experiences, regional training/workshops have been organized by SEAFDEC. In addition, manuals on the seed production of some enhanced species

covering management of broodstock, induced spawning, larval rearing, settlement preparation, and management of nursery systems, have been produced and disseminated.

Learning from the aforementioned experiences and considering the present scenario reflecting the status of the region's marine resources, enhancements of the fisheries resources and fish stocks in the Southeast Asia are the main focus of the 2nd phase of the project to be implemented by SEAFDEC from 2010 to 2015. These include:

- 1) Enhancing the productivity of tidal flats in collaboration with Member Countries and as part of community-based fisheries resources management;
- 2) Establishing fisheries *refugia* in both inland and marine waters including commercial species and trans-boundary pelagic species and shared stock species;
- 3) Conducting research for the development of aquaculture technologies as additional tools for stock enhancement;
- 4) Promoting appropriate aquaculture-based fisheries enhancements;
- 5) Developing the offshore fishery enhancement systems and promoting precautionary approach to capture fisheries (only specific sea areas where natural seasons for fisheries are limited); and
- 6) Providing technical support to the national policies on enhancement of fisheries resources and fish stocks to achieve the sustainable enhancements in the Southeast Asian region.

References

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Strategies to Combat Illegal Fishing and Manage Fishing Capacity:

Southeast Asian Perspective

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This paper provides some information on the framework for marine fisheries management in Southeast Asia, including the relative classification of small- and commercial-scale fisheries by countries in the region, references to fishery laws and regulations, levels of fishing capacity and information on the institutional responsibilities for registration and licenses of fishing vessels and fishing gear in selected countries. Suggested directions for national management to combat illegal fishing are indicated based on the lessons learned from some countries in the region. Recommendations are also provided on the future challenges and regional strategies to facilitate actions to combat illegal fishing. However, certain focus will be on the illegal fishing practices by foreign vessels (from neighboring states and others) and their continued fishing in the EEZ's of the region.

It is widely recognized that the severe problems confronting the future global food security are driven by substantial world population growth, continued increase in demand for fish protein while large numbers of the world's fish stocks are currently being depleted. The situation is similar in every region of the world including the Southeast Asian region, which is currently providing one-fourth of the global marine fish production or about 14 million tons of fish products. The increasing demand for fish products together with the rapid growth of fishing capacity and the development of modern fishing techniques resulted in the over-exploitation of the fisheries resources in the Southeast Asian region. Nonetheless, the demand for fish by the fishing industries of the countries in the region is still increasing, which in a way leads to further increase in the numbers of fishers and vessels, and a growing intensity of fishing activities aiming to meet the soaring demand. This, in turn, has been driving and contributing to the continued practice of illegal fishing both inside and outside the Southeast Asian waters. Illegal fishing as defined by FAO means "fishing in contravention of the laws and regulations of a country or an international agreement", and includes destructive fishing and other illegal fishing practices within the Exclusive Economic Zones (EEZs) of countries.