

conflicts among fishers on the use of the resources while encouraging the fishers to protect the resources. Although most AMSs do not have legal frameworks on fisheries co-management, efforts have been made by SEAFDEC to promote co-management in their respective national jurisdictions through the establishment of pilot sites.

Viet Nam started promoting the concept of Co-management/CBFM in 2003, and has developed national guidelines on small-scale fisheries co-management for approval by the Government. A provision which states that “co-management is a management approach, in which the State shares its authority, responsibility, and management functions with the resource users,” was included in the guidelines.

Thailand started implementing Co-management/CBFM models in 1997 through some activities that aimed to enhance the well-being of fishers’ groups around the coast of Gulf of Thailand and Andaman Sea. These included providing improved infrastructures in local fishing piers and fish processing plants, enhancing extension works on coastal aquaculture, and promoting fish releasing activities and installation of Artificial Reefs (ARs). The latter activity was however faced with the difficulties in finding appropriate locations for installing ARs as the ARs were large and seemed to sink in the bottom of the sea, and there was no space to serve as a public place for fishers to use during the installation. In addition, monitoring of the ARs was not carried out after the termination of the project. Under the new Fisheries Law which was adopted in 2015 (some parts of which deal with the fishing communities), promotion of the co-management concept could be intensified as the Law stipulated the need to “promote the participation and support local fishing communities in the management, maintenance, conservation, restoration, and sustainable use of aquatic resources within the fishery in coastal fisheries or inland fisheries.”

In the State of Sabah in Malaysia, Co-management/CBRM of the river fish population locally called “Tagal System” was initiated in 2000. A smart-partnership approach between the local communities and the State Government, the System aims to protect and restore the fishery resources in the river for sustainable benefit of the local communities. In 2004, the Department of Fisheries of Sabah zoned the Tagal sites to make the Tagal System more successful and sustainable. Since then, the CBRM/Tagal System was also applied to other areas such as rice-field water canals, brackishwater rivers, and coastal waters. Local business development like eco/agro-tourism was also promoted in some successful Tagal sites to generate additional incomes for the local communities which include sports fishing, fish feeding, fish body massage, and swimming with the fish. The CBRM/Tagal System then expand to the marine

waters through the launching of Artificial Reefs in 2009 as well as CBRM/Tagal for sea cucumber in 2011 that aimed to protect and restore the population of sea cucumber in Sabah since sea cucumber is considered a potential agro-tourism product of the State of Sabah. The success of Tagal System could be seen in all rivers with Tagal sites that are clean with plenty of fish, and in the enhanced awareness, harmony, and cooperation that has been created among local communities and other stakeholders on fishery resources conservation. The successful results also created an opportunity for the adoption of the CBRM/Tagal System in other States of Malaysia for sustainable fisheries development of the country. CBRM is considered a mechanism for sustainable utilization of fishery resources in coastal and inland areas through appropriate resource management. Therefore, promotion of this mechanism in the AMSs should be intensified.

## 5.5 Ecosystem Approach to Fisheries Management

Fisheries has been playing an essential role in the development of national and local economies of developing countries. However, compared with the other sectors of the national food economy, development of the fisheries sector is not only poorly planned and regulated but is also inadequately funded and often neglected by all levels of the government. The little attention given to the fisheries sector caused considerable impacts on productivity, livelihood sustainability and vulnerability of the fishing communities, and the resilience of the overall fisheries systems.

Building on the FAO initiatives, the Ecosystem Approach to Fisheries Management (EAFM) was advocated in the Southeast Asian region to strike a balance among the diverse societal objectives by taking into account the knowledge and uncertainties of biotic, abiotic, and human components of ecosystems and their interactions and applying an integrated approach to fisheries within ecologically meaningful boundaries (FAO, 2003). EAFM is essentially an integrated management strategy within ecologically defined boundaries, and the integrated systems approach promoted through the EAFM tie together integrated coastal management and ecosystem-level perspectives. The principles that underlie the EAFM (FAO, 2005) emphasize on the importance of collaborative and adaptive approaches, in simple terms, EAFM is an attempt to do fisheries management in an ecosystem context (Link, 2010).

EAFM is an adaptive management process in which stakeholders’ participation and co-management approach play a central role. The process begins with a scoping phase, during which concerns over both fishing and non-

fishing activities and social well-being are identified, along with the broad geographic area to be managed. Issues relevant to the EAFM plan are ecological in nature (e.g. effects of fishing on habitats and ecosystem resilience, and target and by-catch species); societal (e.g. related to livelihood options, health and safety, post-harvest and processing, and interactions with other sectors); and related to governance (e.g. institutional, consultation, and external drivers). Stakeholders, as well as management institutions across all sectors are engaged in all phases of the management cycle, including deciding on priority issues to be addressed and the goals and objectives of the EAFM plan.

Management institutions identify the management strategies and actions to be implemented, and recommend actions on how to enforce them, to meet the goals and objectives of the plan. An essential component of an EAFM is the identification of indicators to be used during the scientific assessment of the outcomes to make sure that the goals and objectives of the EAFM management plan are achieved, as well as in reviewing the effectiveness of the management actions. The results are then used to adapt and revise the EAFM management plan as necessary. The five steps (plus a pre-step for start-up tasks) that make up the EAFM planning process are shown in **Figure 76**. Step 1: Definition and scoping of the Fisheries Management Unit (FMU); Step 2: Identification and prioritization of the issues and goals; Step 3: Development of the EAFM plan; Step 4: Implementation of the EAFM plan; Step 5: Monitoring, Evaluation and Adaption. It should be noted that the EAFM planning process is dynamic rather than linear, often cyclic as it evolves, and is adaptive.



**Figure 76.** Five steps of EAFM

Source: Pomeroy et al., 2013; Staples et al., 2014

Many AMSs are now considering the adoption of EAFM which puts more emphasis on balancing the ecological and human well-being based on good governance. Training courses on the Essential Ecosystem Approach

to Fisheries Management (E-EAFM) had been organized by SEAFDEC Training Department through the REBYC-II CTI Project since 2014 to promote the concept and principles of EAFM in the AMSs. Adoption of the EAFM concept has various benefits to the AMSs as fisheries officers would be capable of applying the approach for developing appropriate national fisheries management plans for their respective countries. The AMSs are now conducting many activities based on the EAFM concept.

In some AMSs, fisheries management plans were developed taking into consideration the concept and principles of EAFM. In the Philippines for example, the Samar Sea Fisheries Management Plan (SSFMP) was based on the EAFM concept, *i.e.* starting with the formation of a Technical Working Group (TWG), the key stakeholders were identified and then followed by collection of the data on human, ecological, and governance aspects. SSFMP cooperates with various sectors, including the NGOs, local government units (LGUs), universities, especially in collecting the necessary data to be used in strengthening the functions of the SSFMP. Moreover, EAFM training and workshops were also organized to improve the knowledge and skills of relevant stakeholders of the SSFMP on the EAFM and co-management, especially its socio-economic aspects. As a result, a socio-economic survey form and guide for trawl fishery and other fishing gears was developed and the survey was conducted in early 2015 covering 11 municipalities and cities along Samar Sea. The data was analyzed by the enumerators, officers, and fishers and the results were presented at the Writeshop on Data Analysis organized by BFAR and the necessary management actions were clarified. One of the current activities of the SSFMP is aimed at providing alternative livelihoods to relevant stakeholders on the use of gillnets, traps, and hook and line in three sites, namely: Calbayog, Catbalogan, and Daram, and six municipalities on trawls.

In Malaysia, an EAFM Steering Committee was established in 2013 and during its National EAFM Workshop, where the vision of the EAFM Steering Committee was developed and the roadmap for the implementation of EAFM in Malaysia was determined. This was followed by the conduct of EAFM training courses involving relevant stakeholders of the country's fisheries management program on the implementation of fisheries conservation zones. In November 2015, the Fisheries Resource Management Plan for Lawas in Sarawak was developed using the EAFM approach.

In Indonesia, the workshop to develop EAFM indicators was organized in 2010. Using the EAFM indicators, assessment of the performance of its Fisheries Management Plan was carried out. Moreover, Indonesia also developed an EAFM assessment plan for shark fisheries which was

adopted in 2010-2011. Furthermore, capacity development on the EAFM has been promoted in many areas of the country.

The Governments of Cambodia, Lao PDR, and Myanmar have also been paying attention on the importance of EAFM by sending their respective fisheries officers to take part in the Regional EAFM Training Course and Training of Trainers on Essential Ecosystem Approach to Fisheries Management (TOT-E-EAFM) organized by SEAFDEC in 2015. SEAFDEC also supported the EAFM and TOT-EAFM on-site training in Lao PDR, Myanmar, and Cambodia starting August 2016. The Department of Fisheries of Viet Nam also started to enhance the capacity of its local fisheries officers by organizing EAFM training courses with the trainers who had been trained by SEAFDEC.

While many countries have already developed their respective fisheries management plans based on the EAFM concept, capacity building on EAFM had been provided to local people in respective countries using the EAFM materials. However, capacity building activities need to be intensified and continued for the effective implementation of EAFM in the Southeast Asian region. Meanwhile, Thailand already translated the EAFM materials into the Thai language for dissemination throughout the country while Myanmar is in the process of translating the materials into the Burmese language. These efforts should be supported and enhanced considering that the EAFM materials would be more useful if these are in the local languages of the countries.

## 5.6 Habitat Protection and Coastal Fishery Resource Enhancement

The coastal waters of Southeast Asia are blessed with fishery resources with high level of productivity because of rich ecosystems such as dense mangrove forests and sea grass beds sustained by rich effluence of nutrients from land, as well as extensive coral reefs with clean tropical sea environment. These areas are significant to a broad range of aquatic organisms, *e.g.* refuge during their life cycle from breeding, spawning, nursing, and growing; feeding zones of aquatic species that are economically important; and serve as important source of recruitment of a wide diversity of aquatic resources.

It is widely recognized that healthy aquatic environment is a prerequisite for sustainable fisheries production. Therefore, fisheries management in the Southeast Asian region should be directed towards realizing a good balance and relationship between human activities and coastal environment so that aquatic resources could be utilized in

a sustainable manner. Specifically, fisheries management should aim to safeguard the health and reproductive capacity of fish stocks through sustainable protection and conservation of the aquatic resources that provide the foundations for profitable fishing industry and promote equitable sharing of benefits for the resource users. However, most of the important fishery resources in the region are believed to have declined due to many factors that include overfishing, illegal fishing, use of destructive fishing practices, and environmental degradation. Inshore, the massive clearance of mangrove forests for aquaculture, urbanization, industrialization, wood fuel, timber, and the like, has brought about large destruction of the breeding, nursery, and feeding areas of many aquatic species that might have been already destroyed and lost.

Accordingly, the June 2011 ASEAN-SEAFDEC Conference on Sustainable Fisheries for Food Security Towards 2020 “Fish for the People 2020: Adaptation to a Changing Environment” adopted the ASEAN Resolution and Plan of Action on Sustainable Fisheries for Food Security for the ASEAN Region Towards 2020 that include provisions encouraging the AMSs to “*Optimize the use of inshore waters through resources enhancement programs such as promoting the installation of artificial reefs and structures, encouraging coordinated and effective planning for coastal fisheries management programs, undertaking environmental impact assessment studies, restocking of commercially-important fish species, as appropriate, and give priority to human resources development for the implementation of such programs*” (Plan of Operation No. 27); and “*Recognizing the different management approaches that are required, sustainably manage major critical coastal habitats, such as mangroves, coral reefs, and sea grasses; and develop and disseminate information and guidance on appropriate tools and interventions*” (Plan of Operation No. 29).

### 5.6.1 Coastal Fishery Resource Enhancement Programs of the Southeast Asian Countries

Many Southeast Asian countries have been concerned with declining resources, and thus had mainstreamed coastal fishery resource enhancement programs in their respective national plans, policies, and legislations, with the purpose of addressing the degradation of fishery resources. As a result, various tools have been used to alleviate the declining resources, while means of enhancing the habitats and controlling the utilization of resources have been undertaken, *e.g.* deployment of artificial reefs (ARs), promotion of fishery *refugia* and marine protected areas (MPAs), use of fish aggregating devices (FADs), and installation of stationary fishing gears (SFGs). These are summarized in **Box 16**.