

effective implementation of international instruments and agreements. To boost the regional approach and to facilitate cooperation, options should be explored in finding common ground for the management of fishing capacity and in enhancing efforts to combat IUU fishing in the region. Moreover, cooperation among such organizations as the Association of Southeast Asian Nations (ASEAN), the Asia-Pacific Fisheries Commission (APFIC), Southeast Asian Fisheries Development Center (SEAFDEC), and the Secretariat of the RPOA to Promote Responsible Fishing Practices (including Combating IUU Fishing), should be enhanced in order to improve the working relationship with the countries based on the respective on-going and planned initiatives that would secure benefits for the countries and ensure the sustainable utilization of the fishery resources in the Southeast Asian region.

4.2 By-catch Reduction and Management

At the international level, the term “discards” is frequently synonymous with “by-catch”, even considering that “by-catch” is usually the main source of discarded catch in many fishery activities, especially from industrial fisheries in the temperate countries. Since “discards” are generally regarded as an important result of the negative impact of fisheries, various attempts have been made around the world to minimize “by-catch”. Unfortunately, the term “by-catch” as used in tropical areas including the Southeast Asian region, could result in misunderstandings about fisheries of the region. The major part of fisheries in the Southeast Asian region can be categorized as small-scale coastal operations exploiting a large number of tropical species. Therefore, three factors could differentiate the fisheries in the region from those of the temperate zones. These are: (a) most fishery operations in tropical waters are small-scale and conducted from one to few days, taking into account the economic value of the catch; (b) by the characteristics of tropical ecosystem, individual species in tropical waters have relatively small stock size compared with those in temperate areas; and (c) the inherent flexibility of markets in tropical areas traditionally handle a wide range of catch species each of which is relatively in small volumes.

Therefore, the international definition of “by-catch” could be modified for it to be applicable to fisheries in Southeast Asia, but should not be understood as source of discards. Thus, for the Southeast Asian region, “by-catch” could be associated with the target catch although such term is not used in all fisheries in the region and “by-catch” could be used for industrial fisheries. However, a more appropriate working term for by-catch in the region could be “unwanted catch” or “trash fish” which comprised the low- and no-value species, and under-sized commercially valuable species. Another major issue that should be addressed is the estimation of the scale of discards by fisheries in the

region. For in general, the amount of discards in Southeast Asia could be relatively small, considering the nature of small-scale fishery operations, but the increasing demand for aquaculture feeds encourages fisheries to land non-edible small-sized catch.

The collection of data to estimate the scale of discards might not be a priority issue for the Southeast Asian region. However, since collection of accurate data on discards requires enormous efforts and still might give unreliable results due to the small volume, more practical and useful approach should be developed through the conduct of appropriate research directed towards the development of management actions to reduce discards. The first important step that could be immediately undertaken by the countries is to identify the fisheries with discards problems through research that focuses on the reduction of “by-catch” or “unwanted catch”.

Under the present fishery regime, it may be difficult to convince fishers to be responsible in their operations through the use of selective fishing devices or by-catch reduction devices such as the Turtle Excluder Devices (TEDs), and the Juvenile and Trash Excluder Devices (JTEDs) which have been specifically designed to reduce by-catch. Fishers should also be made aware that such devices are important for the development of practical selective fishing methods which, in conjunction with the implementation of right-based fisheries, will eventually minimize the “unwanted catch”.

Considering that reduction of by-catch is a new initiative in the Southeast Asian region, demonstrations on the use of JTEDs have been conducted in the region through the SEAFDEC and FAO collaborative programs on Responsible Fishing Technologies and Practices, and By-catch Reduction Technologies and Change of Management (REBYC) which exhibit the rationale for the adoption of JTEDs as technical tool and as platform to initiate other management measures. In order that the adoption of JTEDs in the region would be sustainable, the Southeast Asian countries are encouraged to develop their respective national policies on the use of JTEDs and other selective fishing devices or by-catch reduction devices.

4.3 Community-based Fishery Management Approach in the Southeast Asian Region

Fisheries in Southeast Asia are complex and any one single community-based fisheries approach may not be applicable, although it has been recorded that co-management approach has been progressing well in Malaysia, Thailand and Cambodia. The experiences of these countries indicate that effective and well-defined partnerships of NGOs and government take some time to establish, while the fisher groups or community

organizations need encouragement from the government and NGOs to adapt sustainable fisheries management.

The region's fisheries could be considered as among the most productive and biologically diverse resources in the world, where more than 300 million people depend significantly on fish as source of protein (SEAFDEC, 2001) although approximately 35% of the people live below the poverty line (Pomeroy and Viswanathan, 2008). The region's fishery resources had been known to be depleted due to increased fishing pressure, unregulated fishing efforts, continued use of destructive fishing methods such as mechanized push-net, trawlers, cyanide and dynamite seriously destroying the fish habitats and reducing the fish stocks. It has been reported that over the past 40 years, the standing fish stocks in the Southeast Asian region have been reduced to less than one-fourth of their former levels (Pauly *et al.*, 2002; Pauly *et al.*, 2005). The current fishery crises therefore pose critical threat to sustainable fisheries and the livelihoods of millions of people who depend on these resources especially those living in the coastal areas.

The fishery management system that has been practiced in this region through the years had been unsuccessful in managing the fishery resources. It has been recognized that fishers must take active part in the fishery management system and the current top-down and centralized system must be reviewed and subsequently changed to better management systems. Co-management has been considered an alternative approach for the management and exploitation of the fishery resources. Specifically, Community-based Co-management (CBCM) is a people centered, community oriented, and resources-based partnership approach in which government agencies, the community of local resource users, NGOs, and other stakeholders share the responsibility and participate in the decision making for the management of the fisheries (Kuperan *et al.*, 2003; Berkes *et al.*, 2001; Pomeroy, 2001; Pomeroy and Williams, 1994; Sen and Nielsen, 1996; Nik Mustapha *et al.*, 1998).

The ultimate goal for co-management is to empower fishers in the expectation of better management (Kuperan *et al.*, 2003). Meanwhile, Community-based Fisheries Management (CBFM) is a process by which the substantial role for fishers in management of the resources they depend on is enhanced within a framework of government support. Co-management is not an end point because it is a process by which the relationship among the parties concerned is constantly changing. However, there is a hierarchy of co-management arrangements where the fishers are initially consulted by the government, but later on, when regulations are introduced fishers are involved in designing, implementing, and enforcing laws and

regulations with minimum advice and assistance from the government.

Organized fishers groups are the central elements in co-management intervention with local institutions as important prerequisites for effective co-management, because these institutions are to make decisions and undertake collective actions (Kalikoski *et al.*, 2002; Noble, 2000). The participation of fishers and other stakeholders reduces the negative economic, social and cultural impacts that are traditionally borne by the fishing communities (Lane, 2001). Pomeroy and Ahmed (2006) cited that the potential benefits of co-management could include a more open, accountable, transparent, and autonomous management process which is more economical as it requires less cost for administration and enforcement. In the process of co-management, community awareness should be enhanced through information, training and education, allowing local communities to share power with political and economic elites and government agencies. The social unity among fishers groups in local communities should be improved in order to minimize social conflicts. Effective co-management framework is usually envisioned to generate benefits for the resource users and local communities' conservation efforts, and subsequently under the co-management arrangement, poverty and resource degradation could be reduced (Brown *et al.*, 2005).

Generally, community organizations in the Southeast Asian region are rather weak especially in the aspect of co-management, which could be because co-management started to develop in Southeast Asia only in the early 1990s. Pomeroy (1998) found out that few groups of fishers in the Philippines had opted to either formally organize or seek to implement institutional arrangements on their own. In the village organizations in Lao PDR, there are no specific local organizations that focused on resource management.

4.3.1 Issues and Concerns

Various initiatives on co-management have been undertaken by the Southeast Asian countries, but the scale for co-management arrangements varies a great deal in terms of people, ecology and level of management. Fisheries are considered common pool resources and characterized as open access. Traditional top-down management approach could not provide incentives to the fishers to reduce fishing effort. Therefore, there is a need to address the important issues in co-management which include: unclear property rights, undefined role of NGOs, homogeneity characteristics of communities, poverty in fishing communities, and sustainability of co-management.

The main problem in fisheries management generally lies among the fishers themselves because of unclear property rights over the fishery. Although property rights arrangements exist, these are complex where fishers and community members have generally low motivation to contribute to community fishery. Without seeing any tangible benefits, community members are unwilling to invest time and effort in the management. Even if fishers recognize that community management can reduce illegal fishing which is attributed to the establishment of the community fisheries, but it is still unclear to them whether community-based fisheries could really provide them benefits in terms of increased income from fishing. Although local and municipal level governments could play active role in fisheries management, each country has their own different ways of handling problems related to legal authority of co-management institutions. The government's role in granting legal authority is the basis for the 'constitutional rules' that determine who can exercise legitimate local management functions which include determining access rights to the resources.

The community fishery potentially offers the government a low-cost and effective means of improving compliance with rules and regulations, for example in banning of illegal fishing gears. Considering that individual and community empowerment is a central element of co-management, empowering the communities would free them from many bureaucratic requirements of government agencies. Based on some countries' experience in co-management, NGOs have played very important role in facilitating the establishment local co-management, by focusing on building fisher community organizations that can manage their fisheries through active interaction with the government. Although the involvement of NGOs in establishing an appropriate co-management approach may not always be equal, it is expected that individual NGOs should not also be rigid to adopt their own approach but should make limited modifications to fit with local circumstances. However, several NGOs have different approaches and in some cases, do not want to change their strategies and adjust to the local or project needs.

Based on the experience of the Philippines and other Southeast Asian countries, enhanced capacity building strengthened the confidence and sense of empowerment of the resource users and partners, and NGOs have been the appropriate groups for organizing local communities. In Thailand, some NGOs network emerged and succeeded in organizing the local resource users. However, it has come to a point that co-management in Thailand is heavily dependent on NGOs in terms of organizing local communities and raising the awareness of community members on the aspect of resource management. A similar situation emerged in Bangladesh where the NGOs were

most successful in organizing the poor. In the Philippines, a CBFM program started with a small aquaculture project, which had expanded through the help of local NGOs and local government. Similar lessons learned about the importance of NGOs in fisheries co-management have also been documented in Thailand.

It has been observed that communities that are homogeneous are more likely to establish effective community-based fisheries management. There are many communities in Thailand, Indonesia and the Philippines, where successful co-management was dependent on the high level of socio-economic and cultural homogeneity of the communities. However, co-management project could also be successful even in socio-economically and culturally heterogeneous communities, such as in the village of San Salvador in the Philippines where co-management in fisheries has been successful despite marked differences in ethnicity and fishing gears. Fishing is an activity of last resort or as a safety valve for the poor, *i.e.* people who fish for subsistence are already poor. However, at this point in time, it might still be early to determine whether CBFM could really have a strong role in rural poverty reduction, even if food security and poverty reduction had always been the key agenda of the Southeast Asian countries. The easy entry into artisanal fishing by the poor results in the vulnerability of the aquatic resources to biological and economic over-exploitation, making it impossible to use the exploitation of resources as routes for people to get out of poverty.

The sustainability of institutional arrangements under co-management arrangement is still to be determined. Although it has become clear that establishing sustainable co-management in any one fishery requires some time, meanwhile, the locally organized communities should be developed as sustainable organizations with legitimate decision making body to decide on the access and use of the fishery. Eventually, the fishers' feeling of ownership would automatically come through their active participation in the communities' fishery activities. The most important factors that hamper the establishment of CBFM are external forces such as threats and conflicts. Improving the political will and commitment of the fishers groups would be needed to counter the pressure from elite groups, because when local but influential people and politicians are involved with personal gains in mind and control the fishing rights, it would be difficult to solve the problem. In the communities where political elites are not included in the process or are opposed to the project for some reasons or another, all interventions could not be sustained after the completion of any project. Since adequate financial resources is required in order to support the co-management processes, oftentimes co-management projects which are initiated and funded by external

financial sources fail when the project is completed due to the inability of the local partners to continue funding the activities.

Co-management in the Southeast Asian Region

In Southeast Asia, co-management and community-based natural resources management has started to develop through the initiatives of people, NGOs, government and international agencies, as ways of involving the resource users in fisheries management. The history of co-management in this region shows a shift from CBFM to co-management (CM). In the Philippines, natural resource management had been top-down and non-participatory for centuries, and with its long history of traditional fisheries rights and allocation, community-based coastal resource management (CBCRM) was initiated in early 1980s. The country is now the only country in the region that has a wide range of experiences in terms of CBCRM and co-management (Pomeroy and Carlos, 1997). Since the late 1970s, the country's fisheries was defacto open access and subjected to overexploitation but in 1975-1998, fisheries management had been implemented in accordance with the Philippine Presidential Decree 704 series of 1975, and in order to reduce fishing effort, licensing system was introduced. Nonetheless, in spite of the number of laws and regulatory frameworks for integrated coastal management that were introduced in the Philippines, none of these were enforced properly (Eisma, Christie and Hershman, 2005).

In 1991, the Philippine Government recognized the need to enhance the stakeholders' participation in management and to devolve control over resource access to local levels through policy and institutional reforms. Such policy reforms included decentralization of authority, strengthening of the enforcement of fisheries laws, and promoting community-based initiatives. Thus, the government transferred the management of natural resources to local fishing communities and municipalities under its Local Government Code (LGC). Thus, good prospects for co-management in the Philippines started largely due to the changes in the political climate of the country, specifically the move to delegate more responsibilities to local governments and NGOs involved actively in community development (Nik Mustapha, 2002). Since then, over 180 CBCRM projects have been implemented by the government, NGOs, fishing communities, as well as by the academic and research institutions.

Evidences of the implementation of co-management have been increasing in Thailand, Malaysia, Cambodia, Lao PDR, and Vietnam. The governments of these countries are exerting efforts in order to sustainably utilize the fisheries and improve the socio-economic conditions of small-scale fishing communities through the CM approach. SEAFDEC

for its part has developed regional guidelines for all Member Countries to formulate fisheries policy supportive to co-management or community-based management approach. From 2001 to 2009, co-management pilot projects have been implemented in Thailand, Malaysia and Cambodia under the ASEAN-SEAFDEC collaborative mechanism with support from the Trust Fund of the Government of Japan (JTF). During the implementation of the pilot projects, the participating countries made certain adjustments in the CM approach to ensure its applicability in the concerned countries and sustain its implementation after the completion of the relevant funded projects.

The first pilot community-based fisheries management project was started in Thailand by its Department of Fisheries (DOF) with the involvement of local fishers and other stakeholders. In Thailand, it has become necessary to adopt the CBFM approach because commercial fishing vessels had been encroaching in the prohibited areas 3 km from the shoreline and using destructive fishing gears. The main objective of the pilot project was to improve the livelihoods of coastal fishing communities by reducing the fishing pressure. Many important activities were conducted under the project which centered on enhancing local employment and income through capacity building and improved participation of local fishers in the management of the coastal resources through sustainable utilization and at the same time generate alternative income for sustainable livelihoods. As part of the project activities, fishers groups were organized and had been involved in fisheries conservation such as releasing juveniles, establishing crab banks, installation of artificial reefs, among others. This pilot project has been successful in managing fishing activities, monitoring, and enforcement of regulations to combat illegal fishing.

The centralized fisheries management system provides limited scope for co-management of the fisheries in Malaysia. Thus, the Locally Based Coastal Resource Management (LBCRM) project was implemented in Langkawi Island from 2001 to 2007, where a model Fishermen Economic Group was formed, and later this model group had been adapted in several fishing communities in Peninsular Malaysia. Considering the nature of the functions of the group, it was later renamed in July 2007 as the Fishery Resource Management Community. Therefore, the fisheries management approach has moved towards a more holistic and ecosystem based approach (SEAFDEC, 2009).

During the implementation of the LBCRM in Malaysia, all administrative and technical support was provided by the Department of Fisheries Malaysia (DoFM). Co-management approach was initiated in Kuala Teriang, Langkawi with the active participation of the staff of DoFM and members of the local fishing community.

The local people were actively involved in fisheries conservation activities in the project area such as re-plantation of mangroves, installation of artificial reefs and selling fish-based food products. The institutional arrangement for the project implementation was done with the strong role of SEAFDEC and DoFM, while a fisheries resources management committee was formed under the supervision of the DoFM and Fisheries Development Board. The organized fishers group was able to prepare their own fisheries resource management plan (FRMP). However, there was a problem in the implementation of the planned activities due to inadequate number of DoFM staff in the project site (SEAFDEC, 2009).

A traditional community-based approach had been implemented in Sabah, East Malaysia over the past 20 years. Locally called tagal, the system prohibits fishing by concerned communities in a river for a certain period. Since 2001, the Department of Fisheries Sabah (DoFS) has extended support to promote this approach in order to conserve and protect freshwater riverine fisheries. As a result, more than 240 tagal fisheries groups have been established in various locations in Sabah. The DoFS and local community had worked jointly in this co-management project. Only local people with traditional use rights are included in the tagal fisheries groups, which have established fish sanctuaries and introduced restrictions on using fishing gears such as gill net in particular fishing area in the river. Eco-tourism activities have also been promoted very successfully in many tagal projects. Although in general, the tagal co-management approach is promising, but in some areas this system has not been successful due to weak institutional arrangements and lack of enforcement.

In Cambodia, riverine fisheries are open access especially in the upstream provinces near the Mekong River Basin. In 2000, the Royal Government of Cambodia, through the Fisheries Administration (FiA) reformed the fisheries policy of the whole country by empowering the local communities to manage the resources by themselves, known as the “community fisheries” or CF. However, the process of CF establishment and implementation varies and relies on the supporting organizations and government agencies. A co-management pilot project implemented in 2005-2009 by the FiA with funding support from the Japanese Grassroots Level Aid, focused on community organization, capacity building and empowerment of local fishers in order to ensure their participation in the management of the resources and improve livelihoods through alternative income earning opportunities. In the process, the organized local community groups were able to prepare their own Community Fisheries Area Management Plan (CFAMP) which together with other related documents such as Internal Law, By-Laws, and the community fisheries zoning map were endorsed by the

local administration to the Governor with the Community Fishing Area Agreement for approval. Under the co-management project, the Community Fishers (CF) and Local Enforcement Unit (LEU) were established in 2002. Although community management is a very new concept in Cambodia compared with that the other countries in the Southeast Asian region, the country has an excellent opportunity to practice sound community management because the Cambodian Government encourages the fishers to be actively involved in community resource management.

In Vietnam, communities are not yet regulated by the rule of law, which is very important for sustainable resource use. The legal framework is not yet clear on how much the local government can be creative and proactive in the decision-making and planning of the local community. Based on traditional methods and practices along with the lessons learned and experience gained, Vietnam could have the real chance to implement successful community-based management if the government would only remain highly supportive and would continue to encourage the stakeholders to implement such scheme.

4.3.2 Future Direction

Thus in the Southeast Asian region, community-based management and co-management arrangements in fisheries are considered as feasible options for bringing together the relevant levels of the government and users in pursuing a common set of goals to improve the resource and socio-economic conditions of the communities. More than two decades of research have provided sufficient conclusive support for co-management and community-based management as approaches for effective enforcement and equitable access for the poor and often voiceless fishers (Dey and Kanagaratnam, 2008). Nevertheless, in the context of small-scale fisheries in Southeast Asia which is complex, one single community-based fisheries approach may not be applicable everywhere, considering that community-based co-management approach involves continuous consultation, negotiations, information sharing, and conflict management among stakeholders for the improvement of the existing management systems.

4.4 Habitats Protection and Coastal Fishery Resources Enhancement

4.4.1 Issues and Concerns

The coastal waters of Southeast Asia comprise a rich ecosystem characterized by the existence of areas with extensive coral reefs and seasonal up-welling, as well as the presence of dense mangrove forests enriched with nutrients from land. These areas are critical to a broad range of aquatic organisms during their life