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Alleviating Poverty
in Rural Communities
through
Fisheries
Interventions



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Editorial

Poverty has always been one of the chronic problems in small-scale fisheries communities in developing countries. Many researchers believe that this reality could be attributed to the government structural systems since most fisheries administrations in developing countries are normally small-sized with their main roles focusing more on technical improvements rather than on socio-economics. For being very technically-oriented, most fisheries administrations implement programs that do not generally give importance to poverty alleviation.

The severe economic problem in the rural fisheries communities is aggravated by the declining trend of the fish catch due to the general deterioration of the fisheries resources in marine and inland waters. Although some countries in the region after years of modern fisheries development have already started to address fisheries management issues, many government fisheries administrations still identify such issues as low priority and in a rather slow pacing because no major structure changes have been made within their governments. Thus, mainstreaming of new issues targeted to address poverty concerns in the government policies has not yet been effected.

Meanwhile, in recognizing the need to address poverty alleviation issues in rural fisheries communities, SEAFDEC has partnered with regional and international organizations, e.g. the ASEAN, the ASEAN Foundation, and the Japanese Trust Fund Program, for the conduct of projects and activities that aim to alleviate the socio-economic conditions in the rural communities through fisheries interventions. Such efforts are focused not only in the marine fisheries sector but also in the inland fisheries sector by fostering among others sustainable community-based freshwater aquaculture. It is the desire of SEAFDEC to bring the needed technology to the rural communities through capacity building and human resource development considering that the rural poor people, who have been isolated from the most basic infrastructures, do not have the access to technology and other related inputs to improve their livelihoods. SEAFDEC therefore looks at the collective needs of the poor fisherfolk by turning to a number of multi-faceted strategies as means to alleviate their socio-economic conditions.



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C O N T E N T S

One of the interventions being adopted by SEAFDEC is through human resource development allowing the fishery communities to take part in sustainable resources utilization and management for improved livelihood and local food security. At the same time, the capacity of fisheries administrations is also being enhanced to enable them to provide the long-term support to the target communities. At the onset, the fisheries interventions being advanced by SEAFDEC are in the areas of local/indigenous institution and co-management, responsible fishing technologies, backyard fishery post-harvest technology, rural aquaculture, and inland fisheries development.

In a parallel development, recognizing that the deteriorating economic conditions of the fishing communities is brought about by lack of alternative livelihood in the fishing communities that leads to rural poverty, SEAFDEC is implementing a project on the Promotion of “One Village, One Fisheries Products (FOVOP)” System to Improve the Livelihood of the Fisheries Communities in the ASEAN Region. FOVOP is also considered as a means to hopefully enhance the effectiveness of the respective government’s programs and activities in reaching out to the grassroots level in order to boost their efforts and capabilities in addressing poverty alleviation in the rural fisheries communities.

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FISH for the PEOPLE is a special publication produced by the Southeast Asian Fisheries Development Center (SEAFDEC) to promote sustainable fisheries for food security in the ASEAN region.

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Strengthening the capability of SEAFDEC in planning and coordinating regional activities: Role of the SEAFDEC Special Advisor

V.T. Sulit



During the 29th Meeting of the SEAFDEC Council in 1997, the Government of Japan while reiterating its continued support to SEAFDEC, indicated the possibility of dispatching an expert to be based at the SEAFDEC Secretariat in Bangkok, Thailand who could assist in strengthening the capability of SEAFDEC in planning and coordinating regional activities aimed at promoting sustainable development of the region's fisheries. Thus, the assignment of a Special Advisor for SEAFDEC in the person of Dr. Yasuhisa Kato was realized later that same year. The first bold task of Dr. Kato as the SEAFDEC Special Advisor was to develop the draft SEAFDEC Strategic Plan which included new directions for SEAFDEC with special emphasis on regional issues and anticipated external threats as well as in promoting efficient and sustainable use of fisheries resources, strengthening mechanisms for regional collaboration especially with the ASEAN through the ASEAN-SEAFDEC Fisheries Consultative Group mechanism, and increasing the visibility of SEAFDEC. The draft SEAFDEC Strategic Plan was discussed during the SEAFDEC Special Consultative Meeting in December 1997 while commemorating the 30th anniversary of the establishment of SEAFDEC, and adopted during the 30th Meeting of the SEAFDEC Council in 1998.

While boosting the regional efforts of SEAFDEC, Dr. Kato's next initiative was to prepare the necessary working mechanisms for policy formulation which he envisaged could be achieved by establishing the Working Group on Regional Fisheries Policy (WGRFP) at the SEAFDEC Secretariat. Formally organized in 1999 with members seconded by most Member Countries, the WGRFP succeeded in promoting a more effective regional coordination system and a clearer regional orientation of SEAFDEC activities. As its Head, Dr. Kato also transformed the WGRFP into

a human resource development forum that enabled the members to enhance their capabilities in planning and coordinating fisheries-related activities. After their return to their respective countries, the members of the WGRFP have occupied higher positions in their government fisheries agencies. Supported by the Government of Japan for six years through its Trust Fund program (JTF), the WGRFP was phased out in mid-2006.

The FAO Code of Conduct for Responsible Fisheries (CCRF) which was adopted in 1995 has been used for the formulation of regional strategies on responsible fisheries. However, since the CCRF failed to address the small scale fisheries in the tropical areas which are operated under multi-species and multi-gear conditions, Dr. Kato initiated the Regionalization of the CCRF (RCCRF) in 1998 with funding support from the JTF. The RCCRF came out with regional guidelines on responsible fishing operations, fisheries management, aquaculture development, and fisheries post-harvest and trade. In addition, supplementary guidelines to substantiate the regional guidelines on responsible fisheries management were also published. The consistent effort of SEAFDEC in promoting the regional guidelines in Southeast Asia and the commitment of the ASEAN countries to continue embracing the regional guidelines have earned for SEAFDEC the Margarita Lizárraga Medal Award given by FAO for the Biennium 2006-2007. The SEAFDEC Secretary-General and Dr. Kato as the brain behind the RCCRF received the Award on behalf of the ASEAN Member Countries at the FAO Headquarters in Rome in November 2007.

The tasks assigned him as SEAFDEC Special Advisor was not new to him at all. Dr. Kato who has a Ph.D. in Population Dynamics and Marine Ecology, served as Director of FAO's Operation Services and later on as Director of FAO's Policy and Planning Division before he joined SEAFDEC. While still quite new with SEAFDEC, Dr. Kato was also instrumental in the organization of the ASEAN-SEAFDEC Conference on Sustainable Fisheries in the New Millennium "Fish for the People" (Millennium Conference), 19-24 November 2001 in Bangkok, Thailand where the Ministers of the ASEAN-SEAFDEC Member Countries gathered together and adopted the Resolution and Plan of Action on Sustainable Fisheries for Food Security for the ASEAN Region (Resolution and Plan of Action), which has since then served as a common fisheries policy framework for the regional programs and activities of SEAFDEC.

After the Millennium Conference, SEAFDEC viewed it important to appropriately publicize its regional activities in promoting sustainable fisheries to improve local peoples' understanding on the need to properly manage fisheries for their benefit. Thus, the Special Publication "Fish for the People" was conceived with Dr. Kato as the Editor-in-Chief and its maiden issue printed in March 2003. Since then, through the continued financial support from the JTF, the Special Publication has come out with 16 issues in six (6) volumes as of December 2008 with Dr. Kato at the helm. Moreover, the Special Publication has also been promoting the initiatives of the SEAFDEC Member Countries in addressing issues and concerns related to sustainable development of fisheries as provided for in the Resolution and Plan of Action.

In the midst of all his activities and his attendance in many fisheries-related meetings as well as conferences in and outside Thailand, Dr. Kato never rested. He continued to scan the CCRF and since issues on poverty alleviation have not been directly dealt with in the CCRF, he initiated a program on poverty alleviation in the Southeast Asian region through fisheries interventions by introducing the concept of "One Village One Fisheries Product" (FOVOP) and developing an HRD program on poverty alleviation for the ASEAN region. Such HRD project and the FOVOP received generous funding from the ASEAN Foundation through the Japan-ASEAN Solidarity Fund, and are currently being implemented in the ASEAN region with the SEAFDEC Secretariat coordinating.

Very recently, Dr. Kato promoted the development of Alternate Fisheries Management as a possible way for the fisheries sector to address poverty issues in fisheries communities, considering that such Alternate Fisheries Management system is very applicable to the region considering its unique ecosystem, resource structure, fisheries structure, and other socio-economic conditions. Appropriate management approaches such as rights-based fisheries (co-management using group user rights for small-scale fisheries and fisheries licensing for large-scale fisheries, delegation of management responsibility to resource users, institutional capacity building for fisheries

management) are being considered under the said Alternate Fisheries Management System.

It has been 11 years since Dr. Kato joined SEAFDEC and he has decided to move on and leave SEAFDEC in December 2008 to take a professorial position at Kagoshima University in the southern part of Japan. As the location of the University has similar climate with that of the Southeast Asian countries, Dr. Kato would still continue to work with the region although from a different angle.

The foregoing are just but a few of his major achievements. SEAFDEC has been very fortunate and is therefore very grateful to Dr. Kato for his continuous efforts in promoting sustainable fisheries development in the region. In recognizing the initiatives and efforts of Dr. Kato, the SEAFDEC Secretary-General in his Message during the 30th Meeting of the SEAFDEC Program Committee in Singapore in November 2008 thanked Dr. Kato on behalf of the SEAFDEC Member Countries for his excellent services in promoting sustainable fisheries in the region and enhancing the visibility of SEAFDEC, while serving as SEAFDEC Special Advisor.

The Special Publication "Fish for the People", which has been successful in enhancing the visibility of SEAFDEC, has also been very fortunate to have Dr. Kato as its Editor-in-Chief. The legacy that Dr. Kato left behind specifically to the Special Publication Team would remain imprinted in our hearts and in our minds. To Dr. Kato, the Editorial Team of Fish for the People in expressing our accolade wishes you the best of luck in your future endeavors. Good bye!



Considerations for Mitigating Poverty in Rural Communities of Southeast Asia through Fisheries Interventions

Yasuhisa Kato

How can fisheries perform the role of improving the people's livelihoods when the fisheries resources in the Southeast Asian region have been reported to be depleted due to over-exploitation?

In the Southeast Asian region, fisheries which are characterized as small-scale have played important roles in terms of generating income and livelihood, accelerating economic development, and ensuring food security. However, the irony is that fisheries through its development have no longer provided stable livelihood due to its over-capacity situation and the importance of low value species, once considered as valuable protein food for rural communities, has now become very much in demand as feeds for aquaculture which has been drastically expanded aiming for the foreign market. The provision of livelihood and rural food security by fisheries is no longer a major objective of the sector as the promotion of foreign exchange earning through aquaculture products is becoming a single objective of the fisheries in most of Southeast Asian countries. Behind such situation, the fisheries communities that contribute significantly to realizing such task have remained impoverished and continued to be exposed to the multiple dimensions of poverty such as inadequate support and services, low level of education, generally politically motivated governance, and vulnerability to natural hazards and occupational risks. Moreover, the region's huge numbers of fishers are also confronted daily with the need to chase after the declining fisheries resources.

Looking at the overall progress in the region's social and economic development during the past few decades, the disparity in the social and economic conditions among and within the countries is still very apparent. The concept of "open access" and the guaranteed daily incomes with no heavy investments, and the long preparatory and waiting period in aquaculture, have made small-scale fisheries very attractive to large numbers of immigrants who must have been financially constrained in the other sectors. It is the continued flow of immigrants from other sectors and the lack of means of regulating the numbers of fishers that makes it difficult for the fisheries sector to develop a system for alleviating its over-capacity status.

This is where the possible development of an appropriate management for the fisheries should be carefully examined.

Compared with the management of agriculture, which has been already developed for several thousands of years, fisheries management is a recent development only during the last 30 years after the introduction and expansion of modern fisheries. Such short history is not sufficient enough for many people to successfully understand the interaction between fisheries and the resources as well as the impact of fisheries on the environment. Considering that fisheries resources are renewable and common resources, the resource users go through two special conditions when exploiting such unique resources. These conditions are the unclear ownership of the resources, and the need for government intervention in fisheries management (Kato, 2008).

The fisheries industry is involved in racing for the resources that do not belong to anybody until these are caught. This condition is coupled by the migration nature of the resources that move in a wide range of sea areas and the difficulty in locating the resources through the open waters. This further inhibits the development of a clear sense of ownership of the fisheries resources by the users. It is also due to the unclear or no ownership of the fisheries resources that nobody seems to accept the stewardship over the fisheries resources. This is in spite of Article 56.1 (a) of the UNCLOS specifying the sovereign right for managing the natural resources, whether living or non-living in the exclusive economic zone. In reality, since the fisheries resources are common resources, then government agencies should accept the custodianship authority over such resources including the management responsibilities. However, due to insufficient technical capabilities, most government agencies especially in developing countries do not normally play the role as custodians over the fisheries resources except perhaps in certain trans-boundary fisheries conflicts.

Given therefore these two special conditions, it would be difficult to achieve sustainability in fisheries. The issue of "no or unclear ownership of the resources" makes the users irresponsible in their manner of exploiting the resources. The government's interventions in fisheries management, if such services are not effectively provided, may also provide a negative impact for the resource users. The accountability of the resource users, who are not in the position to be involved in the activities such as fisheries management-related activities, could not also be encouraged nor developed under the current system.

Thus, “chasing after the few fishes by the fishers” continue to accelerate further in an unregulated manner. Such situation also leads to the evolution of two vicious cycles (**Box 1**) characterizing the fisheries conditions in the Southeast Asian region, the vicious cycles of resource utilization and overcapacity in fisheries. The situation is even further aggravated when government agencies increasingly lose their trust on the resource users while the resource users for their part, tend to ignore the rules and regulations to the extent of finding ways to bypass such rules.

Although it is necessary to find ways to improve the current human relationship between government agencies and the resource users, many government agencies instead tend to strengthen the enforcement of management requirements when low level of compliance of management rules are observed. Unless the relationship between government agencies and resource users is improved, intensifying any fisheries management system in such top down manner could only lead to escalating costs and increased burden on the part of the governments in securing the required annual budgets which could be difficult task for many developing countries to undertake.

Despite the importance of regular communication and cooperation work by the government fisheries related agencies with fishing communities through their fisheries management intervention, as such basic contact with sector can be the basis for any national safety net system such as poverty alleviation programs, it has been observed that most of the relevant agencies have already given up such important work due to overwhelming difficulties to accomplish the required tasks based on past experiences. Frequent communication between the government agencies and rural fishing communities could help identify the real rural problems. The general absence of mutual trust between government agencies and resource users would make the rural fishers feel that they have been systematically left out in terms of government support and services in fisheries and could result in irresponsible and unregulated fisheries operations adding to the problems of over-capacity and over-exploitation.

Modification of the Two Unique Conditions for Fisheries

In a situation where the daily incomes of small-scale fisheries are not enough for their daily needs, the fishers could resort to destructive fishing gears such as using fine mesh nets and illegal fishing practices such as using dynamite. Furthermore, as the fishing grounds normally operated by the fishers include the inshore waters known to be spawning and nursery grounds for commercially important species, unregulated fisheries could provide

destructive effects not only on the coastal resources but also on the entire fisheries ecosystem. In evaluating the current social, economic and sustainable use of fisheries resources in especially coastal/inshore waters where small-scale fisheries are operating in the region, it is urgently needed to develop an alternate fisheries management system that is aimed not only at improving the fisheries system but also in improving the social and economic conditions including alleviating rural poverty.

The MSY (Maximum Sustainable Yield) based “resource management” system (stock assessment driven system) has been promoted but not successful. Although most of the analysis of such failure tended to focus on the different ecosystem (single and multi-species ecosystem) between temperate and tropical ecosystems, such failure can also be attributed to the different fisheries or social structure of fisheries. Compared with temperate fisheries where the fishing units (number of fishing boats) are in the order of 1,000~10,000, tropical fisheries such as in the Southeast Asian region can be measured in the order of 100,000~few millions in most of the countries. In addition, the sizes of fishing boats used are quite different (in temperate areas >100 G/T while in tropical areas <100 G/T, 90% of which can be categorized as small-scale fisheries using less than 5 G/T boats). The current international thrust including globalization opts to apply a standardized system such as the MSY-based “resource management” in the case of fisheries management, ignoring the wide diversification of social, economic and ecosystems in the world. Considering such diversified situation of fisheries, it is more appropriate to develop the most applicable fisheries management system (Alternate Fisheries Management System) analyzing the situation of the fisheries in the respective regions. In the case of tropical fisheries, especially in the Southeast Asia region, the social factor of its fisheries is critically important compared with those in the temperate areas where relatively small numbers of people are involved and operated in offshore areas. In this connection, regional policy discussions are now being directed towards the modification of the two unique conditions for fisheries as basis for the development of such Alternate Fisheries Management System.

As major fisheries management activities conducted by most Southeast Asian countries are more focused toward solving local conflicts over the use of fisheries resources, when such conflicts occur, interventions are conducted in an *ad hoc* manner similar to fire extinguishing exercises when fire had already broken out. In general, the effective preventive management system to avoid resource conflicts among the users or over-exploitation of the fisheries resources has not yet been developed. Since the solution of such fisheries management problems is very much

socially and economically rooted and normally considered as local problems, it should also be understood that any government intervention can be more effective if actions are initiated at the local level.

The Southeast Asian countries developed its regional fisheries policy in 2001 through the adoption of the “Resolution and Plan of Action on Sustainable Fisheries for Food Security for the ASEAN Region” (Resolution and Plan of Action). Paragraph 5 and 6 of the Resolution indicated respectively, the need to “*Encourage effective management of fisheries through delegation of selected management functions to the local level*”, and “*Recognize the need to progressively replace open access to fisheries resources with limited access regimes through the introduction of rights-based fisheries which may also facilitate the management of fishing capacity and promote the use of responsible fishing gears and practices*”.

Moreover, starting in 1998, SEAFDEC has implemented the Regionalization of the Code of Conduct for Responsible Fisheries (CCRF). From 1998 to 2006, SEAFDEC came up with Regional Guidelines embodying four themes, namely: responsible fishing operations, aquaculture development, fisheries management, and post-harvest and trade, that clarified the corresponding issues specified in the global CCRF. The Regional Guidelines for Responsible Fisheries Management in Southeast Asia address the importance of decentralization, rights-based fisheries, etc. (SEAFDEC, 2003). To elaborate on particular issues in the said Regional Guidelines, the Supplementary Guidelines on Co-Management Using Group User Rights was later on published (SEAFDEC, 2006). The Supplementary Guidelines also aim to further assist the SEAFDEC Member Countries in developing the most practical national system that could address the various aspects of improving their fisheries management in a responsible manner.

Open Access to Regulated Entry

Although the concept of “open access” for the aquatic resources has been modified to suit the different levels of ocean governance, exploitation of the aquatic resources still considered as common resources through the “open access regime,” is still a major problem in fisheries. While it is not feasible to drastically modify such regime to “limited access regime” as stipulated in the Resolution and Plan of Action (SEAFDEC, 2001) because “open access regime” was developed through various awareness and consensus building, it is equally more difficult to simply modify such regime as a matter of convenience for the fisheries sector. Considering the widely prevailing perceptions of “open access” regime on aquatic resources, the use of “regulated entry system” could therefore be considered as a possible option to be used as basis to introduce the appropriate right-based fisheries.

Delegation of Management Authority and Co-management

The promotion of “delegation of management authority to local level through the decentralized process” could mean “transferring the authority within the government structure.” In order to avoid any misinterpretation, co-management has been introduced. *Co-management is an approach to management in which the government shares certain authority, responsibilities and functions of managing the fisheries with the resource users as partners* (SEAFDEC, 2006). Thus, co-management has been considered convenient for government officers who may fear of “losing their administrative power” due to the decentralization and delegation process of fisheries management. Such officers would have better feeling even after certain authority has been delegated to the local level as far as co-management system is used.

Rights-based Fisheries

Since any fisheries management system could not be effectively implemented under the “open access regime”, the introduction of rights-based fisheries has been considered for the effective implementation of a sustainable fisheries management. In rights-based fisheries, the right to fish or utilize the fisheries resources is licensed or permitted by competent government authority, giving the licensed fishers access and use rights to a particular fishing ground, where such rights are being accompanied by obligations to comply with the rules and regulations of the rights-based regime (SEAFDEC, 2006). Moreover, in order to develop and improve fisheries management, SEAFDEC has promoted the “group user rights” as appropriate “rights-based fisheries” in the designated area under the co-management system together with institution building exercise which promote to establish appropriate resource users group to whom the “group user rights” are given. It is expected that the use of “group user rights” over the designated area allocated to the respective fishing communities could strengthen the ownership of the resources and enhance partnerships in resource utilization. Eventually, when the responsibility in management is shared among the resource users, compliance level of the rules and regulations could be improved, thus achieving sustainable fisheries.

Thus, the aforementioned unique conditions of the fisheries in the region could be modified where “unclear ownership” could be addressed by the introduction of rights-based fisheries: group user rights for small-scale fisheries (in the case of commercial fisheries using larger fishing boats in offshore areas, fisheries licensing system can be improved and promoted.), while “government intervention” could be promoted through the delegation of management responsibility or rights to the resource users. By modifying such unique conditions, fishers would

consequently be freed from being perpetually entangled in the two vicious cycles.

Poverty Alleviation in Rural Communities through Fisheries Interventions

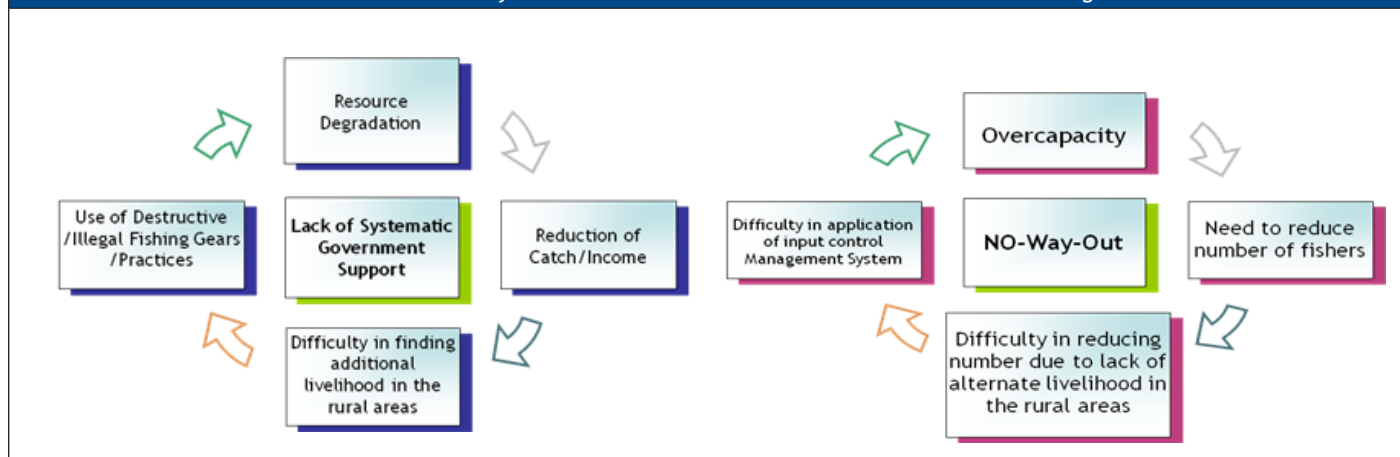
The fisheries communities are increasingly vulnerable to many factors such as natural hazards (e.g., drastic changes in climatic conditions, unfavorable weather conditions such as typhoons, cyclones, seasonal fluctuation of fish stocks, etc.), economic disasters (e.g., increasing cost of fuel, fluctuating fish prices, poor market accessibility, intervention of middlemen in marketing, etc.), occupational risks (e.g., poor living conditions, low educational level, absence of medical care, unsafe fishing vessels and equipment, etc.), and political instability (e.g., weak and not fair law enforcement, top-down system of governance, etc.). The presence of any of these factors could lead to the chronic deterioration of the living conditions of the fishers.

In Southeast Asia, the number of rural poor could be increasing. The World Bank (2008) for example cited that in South Asia including many Southeast Asian countries, the number of rural poor has continued to increase from about 380 million people (below \$1 a-day poverty line) to almost 400 million in 2002. Compared with the urban poor in South Asia, the number was a little over 100 million (below \$1 a-day poverty line) in 1993 to about 120 million in 2002. In the South Asian region, high priority has been placed in mobilizing agriculture for poverty reduction and this includes the fisheries sector. However, while agriculture and fisheries could play the role as main provider of environmental services that could be tapped to alleviate poverty, the unwise use and inappropriate management of the natural resources could also lead to environmental disaster and eventually further aggravating poverty in the rural areas.

Many technical interventions within and outside the fisheries sector have been advanced by the national and local governments, donor agencies, and the NGOs, however, these were predominantly aimed at accelerating foreign exchange earnings through the introduction of modern fishing technologies and infrastructure development. Little focus has been given to improving the living conditions of the poor fishers because their problems are considered less technical and such social and economic issues are difficult for external parties to handle.

Considering that the fisheries resources in the region although renewable, have already been depleted, such resources or whatever is left of it should be properly managed to avoid further degradation. Harkes (1999) reported that there used to be some so-called traditional management systems adopted in Asia and the Pacific. Although such management systems may not have been scientifically developed as with the modern resource management system, these were aimed at the equitable distribution of natural resources or social functions mitigating the conflicts among the resource users. Since such systems have been replaced by the so-called “modern system”, more focus has since then been given to the centrally controlled governance disregarding the capability of the people at the local level. Thus, the traditional management systems subsequently disappeared due to various external factors including colonization, development assistance and globalization. Nonetheless, the prevalence of the vicious cycles (**Box 1**) in tropical fisheries has deterred all efforts to achieve sustainability and alleviate poverty in the fisheries communities. In the vicious cycle of resource utilization, fishers are always encountering difficulties in finding additional sources of income in the rural communities in spite of governments’ attempts to overcome their deteriorating financial status. This further aggravates the resource situation when fishers are involved in unsustainable fishing operations to be able to desperately cope with their families’ daily needs. With the absence of

Box 1. Two vicious cycles that characterize fisheries in the Southeast Asian region



government support, the fishers have no other way out and continue to get entangled in the vicious cycle. In order to achieve sustainable fisheries, it is therefore necessary to consider the various possibilities of improving the poverty situation in the fisheries communities by fisheries interventions. SEAFDEC believes that any potential effort in alleviating poverty in fishery communities should give extra attention on human resource development by allowing the fishery communities to take part in sustainable resources utilization and management. There is also a need to enhance the capacity of government staff to enable them to appropriately provide the long-term support to the target communities.

Many factors should be considered in order to achieve sustainable fisheries in the Southeast Asian region. Firstly, overcapacity should be addressed considering that there are too many fishers competing with each other and chasing after the dwindling fisheries resources. Secondly, since fisheries are being conducted under the open-access regime, it is very difficult to regulate fisheries, and much more the establishment of an appropriate fisheries management system could not be easily put in place. Lastly, the continuing reduction of the fishers' daily catch exacerbates their socio-economic conditions leading to the further worsening of the poverty status in the fisheries households.

Given such scenario, there is not much option at hand to alleviate the fishers' socio-economic status mainly because of the absence of alternative income-earning opportunities in the rural fisheries communities where the people have always depended on fishing activities for their livelihoods. Fishers turn to using illegal and destructive fishing gears and practices in order to desperately cope with their families' daily needs. Thus, the further aggravation of the fishers' social, economic and financial status leads to further deterioration of the ecological conditions of the fisheries resources.

The vicious cycle on resource utilization could even be magnified further by the least benefits that the fishers normally obtain from the fish they caught, a commodity that could have improved their livelihoods. The presence of a traditional marketing system in small-scale fisheries communities orchestrated by the middlemen does not give the fishers much chance to dictate the price of their catch. Moreover, the fishers are also not in a position to initiate small business using their catch through value-adding due to limited technical and financial capabilities. Then there is the general competitive marketing situation for fish and fishery products in the markets, which worsens the situation in the rural fisheries communities.

“One Village, One Fisheries Product (FOVOP)” System

In an effort to address the persistent poverty situation in the fisheries communities, SEAFDEC is implementing the project on the Promotion of “One Village, One Fisheries Product (FOVOP)” System to Improve the Livelihood for the Fisheries Communities in ASEAN Region with financial support from the ASEAN Foundation through the Japan-ASEAN Solidarity Fund. The project aims to improve fisheries livelihoods by motivating the potential people in the fisheries communities through the introduction and promotion of the concept of “One Village, One Fisheries Product (FOVOP)”.

The Japanese OVOP (One Village One Product) initiative and its bottom-up approach have been replicated and developed in many countries in the Southeast Asian region as means of activating the rural communities and improving their economic status, motivating the people and mobilizing the unique but locally available technical skills and materials (Kato, 2006). Through FOVOP, the principle of the OVOP movement is now being gradually applied for the social and economic improvement of the regions' fisheries communities. Thus, FOVOP has been promoted by SEAFDEC in the region focusing on the strategy of seeking “Only One Product” instead of “Number One Product” in order to reduce competition from the industry. This requires local producers to identify and promote a unique and differentiated traditional fishery products and related services from each particular fisheries community (Kato, 2006).

The FOVOP project also recognizes that women, having been actively involved in the fisheries activities although their level of involvement has been kept informal, should be considered as potential stakeholders in rural economic activities. Moreover, guided by the principle that the identification of FOVOP project ideas should be promoted based on bottom-up approach, three major priority areas have been considered in the introduction of the FOVOP concept, namely: Human Resource Development to build up the community leaders; development of special marketing strategy of FOVOP products; and production of FOVOP products. Furthermore, it is also the principle of FOVOP that community products and services should initially focus on the domestic market or at the maximum the intra-regional trade level, with some potential products and services to be developed further and gradually promoted to cater the international markets.

Alternate Fisheries Management System

A probable way out for the fisheries sector to address poverty issues in fisheries communities is the promotion of an Alternate Management System, which can be a package of systems being fully applicable for the tropical multi-species nature and large number of people involved fisheries in the Southeast Asian countries. If the fisheries management system is only focused on the sustainable use of fisheries resources, such system will not convince poor fishers who normally have short-term perspectives (food for tomorrow rather than long term sustainability) in terms of resource use. Alternate Fisheries Management System should include long term sustainability by modifying the two unique conditions of fisheries and scenario that provide economic improvement of the fisher's livelihood. In this connection, as an important prerequisite under the system, modernization and improvement of domestic marketing system should be considered in order to: (1) retain the maximum benefits of fishery products in the fisheries communities; and (2) ensure that the production and marketing of community products including value-added products would activate the rural economic activities thus creating additional livelihoods in the fisheries communities.

In connection with the proposed Alternate Fisheries Management System, the Regional Advisory Committee on Fisheries Management in Southeast Asia (RAC) at its first meeting in September 2008, agreed to recommend to the Council of SEAFDEC during its meeting in early 2009 that: In the promotion of innovative fisheries management in the Southeast Asian region to address poverty alleviation in the region's fisheries communities, the adoption of an Alternate Fisheries Management System should be considered (SEAFDEC, 2008).

As proposed, the Alternate Fisheries Management System should be developed taking into full account the regional specificities and requirements. The system is not based on fisheries stock size, it should not be promoted only by scientists but by mobilizing the "local knowledge", and it can be promoted by "input control" system, not by "output control system" as in the resource management system. In the promotion of an Alternate Fisheries Management System, some major considerations should be taken into account (**Box 2**). In this regard, the Alternate Fisheries Management System for Southeast Asia (Kato, 2008a) can be further recognized in the region and its necessity can be clarified in the promotional work of Ecosystem-based Fisheries Management System as an opportunity, as the development of Ecosystem-based Fisheries Management System has been internationally initiated based on various

Box 2. Major Considerations on Alternate Fisheries Management System

- Change from "open access" to right-based fisheries enhances the sense of ownership by fishers
- Delegation of management responsibility/right to resource users enhances the extent of fishers' involvement into the activities promoting sustainable fisheries
- Institution building for fishers at community level is the key to promote above co-management
- The fisheries management will be promoted by two alternate fisheries management system "input control/ right-based fisheries" system in Southeast Asia by the different scales of fisheries
- Regionally promoting an alternate fisheries management system to majority of the small-scale fisheries by "group users right system" (SEAFDEC, 2006) and to commercial fisheries by "licensing"

criticism and constraints for The MSY based "resource management" system.

Conclusion and Way Forward

Fisheries in the region which have been characterized as small-scale have traditionally absorbed the economic needs of the rural population by providing them livelihood opportunities. With the current large number of small-scale fishers constantly increasing because fisheries have been considered as the last resort of life for the rural people in many developing countries, it has been generally understood that the absorbing capacity of the sub-sector has already been saturated and reached the overcapacity status based on various scientific evidences and trends. Considering the ever increasing population in most of the rural areas, it has become necessary to develop a fisheries management system for "regulating small-scale fisheries through the introduction of regulated fisheries entry system". Although such introduction might mean some sacrifices on the part of the rural people, it should be recognized that a delayed action would accompany much greater social and economic pains later. In addition, people and the aquatic environment would continue to suffer from the impact caused by such "no-action".

As stock assessment driven resource management system is not applicable to the multi-species tropical fisheries, especially to coastal fisheries, a package of alternate fisheries management system for the coastal fisheries has already been discussed among the Southeast Asian countries (SEAFDEC, 2008). However, there is still a need to discuss further several issues in order to set up national policies for establishing and promoting such alternate fisheries management system. During such discussions, policy makers should be specifically made aware that the system is not fully dependent on stock assessment and

that there is a need to delegate the management right to the resource users who do not have any scientific and high educational background to cope with the resource management system if this is to be applied to the target sub-sector.

The most important aspect in the management package is institutional building of the fishers' organizations where eligible fishers can be members, having some public functions in each community as far as practical for such group of resource users. This is a critical element in promoting rights-based fisheries through "co-management" arrangement. A set of privileges and obligations, both fishing rights in the designated areas to be allocated for each community and part of the management right, especially on the day to day management actions can be delegated to the community institutions, while government agencies either central or local governments would focus on the development of the enabling environment (legal framework and technical assistance) to support the fisheries communities' initiatives.

Empowerment of the resource users through institutional building should be further strengthened to provide additional privilege, such as the right to organize public auction of the resource users' harvest. Involvement of fishers in marketing at community level will provide with financial incentive to manage the fisheries as well as a stable financial income for the community institutions. This would ensure the sustainable institutions on such factors as being financially independent from government support, and reducing financial burden of government agencies. The formalization and some modernization of the local market system is also justified from the aspects of national food security and the preparatory work for increasing the involvement of community products in regional and international trade.

Although the proposed alternate fisheries management system primarily aims to regulate small-scale fisheries through the introduction of regulated fisheries entry system, it could have positive effects on the various issues that have been identified as difficult for improvement under the conventional system. Such issues include: the promotion of responsible fisheries including the reduction of governments' involvement in the MCS (monitoring, control and surveillance) activities, mitigation of overcapacity, improvement of the collection of fisheries information, promotion of resource enhancement programs, and improved support for the national safety net program on poverty alleviation.

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Strengthening Sustainable Development of Aquaculture

in Southeast Asia: Interventions and Strategies to Enhance the Multiple Roles of Aquaculture in Rural Development

Pedro B. Bueno

The social context of aquaculture in most of Southeast Asian countries is rural poverty and therefore its purpose is to improve incomes and distribute wealth. This does not preclude support for large commercial and industrial-scale operations as there are mechanisms and models by which these types help in rural economic development. A review of selected aquaculture and community aquaculture-based fisheries projects and programs in several countries in the region show three recurring themes common to the progress of aquaculture, namely: policies and institutional changes in support of poverty-focused aquaculture, the driving force of markets, and technology development and adoption by small and poor farmers.

Policy and Institutional Change

Most countries in Southeast Asia have recognized aquaculture as a distinct and separate sector or industry and therefore a major part of the national strategy for reducing rural poverty. For example, the Vietnamese government's aquaculture development program 1999–2010 sets out the country's vision to prioritize aquaculture development for reducing hunger and poverty. In the Philippines the latest medium term development plan (MTDP) and the Fisheries Code of 1998 target modernization of aquaculture technology for the poor.

The institutional arrangements for aquaculture in Southeast Asia vary widely. There are many institutions involved in land and water lease, environmental control, sanitary measures, pro-poor programs, and trade. Responsibility and jurisdiction is split between federal/central and state/local authorities in different manners. Nevertheless, coordination between agencies is improving, for example, specific spatial regimes have been created for aquaculture in Cambodia (Poverty Reduction Strategy Plan) and Malaysia (food security in 5-year plan) that make reference to aquaculture in national policy or planning documents. Malaysia has set up aquaculture investment zones while the Philippines has been establishing mariculture parks, and Indonesia has developed aquaculture zones for nucleus-estate type export aquaculture.

Most countries in the region continue to allocate public resources for aquaculture by: i) establishing hatcheries and ensuring seed stock availability; ii) establishing

demonstration and training farms; iii) training of farmers; iv) selecting and providing full assistance to key farmers to apply and showcase a specific culture system; v) fielding extension workers; vi) providing special loan programs and in rare instances, marketing assistance; and vii) extending financial incentives for large-scale development.

Aquaculture can therefore be worked into policy and planning through its contribution to rural development generally and to income generation and food production. For example, Vietnam's Sustainable Aquaculture for Poverty Alleviation 2000 (SAPA) strategy recognizes the need for raising awareness on aquaculture opportunities, improving participatory approaches and institutional capacity (**Box 1**). It also recognizes the gap between the needs of farmers and the services offered by extension institutions and issues of access to markets and financial services by the rural poor.

Structural Changes in Southeast Asian Aquaculture

Technology has transformed the region's aquaculture from a subsistence food production system to a major agribusiness industry. Hatchery technology, pelleted feeds production and disease control have revolutionized the structure of farming systems, expanding and intensifying production. Modern fish farming technology has expanded beyond the traditional ponds, to rice fields, floodplains, rivers and coastal waters supplying vast quantities of food fish to growing domestic and international markets.

Box 1. Objectives of Vietnam's Sustainable Aquaculture for Poverty Alleviation 2000

- To enhance the capacities of poor people in rural areas to improve livelihoods through awareness raising and improved aquatic resources management and aquaculture;
- To strengthen the capabilities of institutions particularly local institutions, to understand and support the objectives of poor people in inland and coastal communities who benefit from aquaculture;
- To share environmentally sound, low-risk, low-cost aquaculture technologies and aquatic resources management practices; and
- To develop national policy based on lessons and experience from local pilots and inter-sectoral collaboration on strategies for addressing poverty.

On-farm fish production is only one link in the aquaculture value chain, accounting for perhaps much less than half of the total value addition of the industry. Progressive commercialization has led to a strong agribusiness-focus in the operation and management of rural aquaculture. It has prompted fish farmers to become selective in the choice of farmed species, adopt new and better fish cultivation technologies, and establish links with a whole chain of activities from production and marketing of fish seed and fish feed to icing or refrigeration, transport, storage, processing and retailing or export.

Many formerly subsistence, household- and family-based aquaculture systems like Vietnam's VAC (Garden-Livestock-Fish) system gradually evolved to more commercialized agribusiness aquaculture enterprises, such as the cage and pond culture of *Pangasius* spp. (basa and tra catfish) in the Mekong Delta. The new trends brought in more intensive production practices forcing changes in the industrial organization of aquaculture. As individual farms became linked to more organized input and output markets, consolidation occurred along the entire commodity supply chain. This consolidation in turn delivered economies of scale, greater efficiency and huge increase in basa and tra production as well as in the number of households involved.

Markets for high value fish as drivers of change

The rise of export trade has produced significant structural changes in the development of aquaculture in Southeast Asia. Rapid changes in the culture systems, species choices, and propagation and processing techniques have been taking place in response to increasing and changing consumer preferences and demands. As a result, not only the traditionally fish eating Asian countries (such as China, Bangladesh, Vietnam and Thailand) have increased and diversified aquaculture production but, in less than two decades, countries with relatively low level of fish consumption (for instance India, Iran and Pakistan) have also joined the ranks of aquaculture exporters. Thus, the trend of export trade for fish from the region which focused on three major markets, the US, Japan and EU, is expected to shift to increasing intra-regional and south-south trade. A response to market requirements is the growing coordination of private sector input and output chains. Formal and informal links between smallholder producers and large processing companies are leading the industry toward more efficient and competitive business environment: better quality assurance for consumers; secured margins for producers; and competitive prices for products. Export certification schemes have further streamlined production, processing, distribution and retail chains. The product chains for one species after another - shrimps, catfish, tilapia – follow this integrating structure.

In Vietnam and Thailand the aquaculture product chains are increasingly molded by urban consumption behavior, as supermarket chains force product quality control in both domestic and export markets.

However, the complexities of food safety and public health concerns and other technical barriers have had dramatic effects on market access for the Southeast Asian countries. The impacts have had a disproportionate effect on small-scale producers and smaller economies due to economies of scale in the cost structure of HACCP (Hazard Analysis and Critical Control Point) and SPS (Sanitary and Phytosanitary Standards) compliance regimes as well as to non-technical barriers of trade. Elimination of harmful tariffs such as tariff escalation and tariff peaks can result in huge gains for poor people involved in the input supply and value-added activities.

Species diversification

In Southeast Asia, 70 species are being cultured (at any one time in the world there are 150 and since records became available, there have been more than 400 species cultured). There has always been an appetite for new species for aquaculture. Tilapia and catfish have both made a huge inroad as cultured species in the last decade. Grouper and other reef fishes, sea bass, shrimps and prawns as well as eels are already established as favored fish in the Asian upscale market.

Seaweed is a highly consolidated industry although a few global corporations dominate the processing and distribution of non-food products. However, the farming and primary processing can be widely dispersed in rural and poorer communities. Recreational aquaculture such as the raising of ornamental fish and fish for angling has been promoted in peri-urban areas.

Impacts of Aquaculture on Poverty and Livelihood

In Southeast Asian countries, aquaculture systems have been developed to enhance the livelihood in rural communities (**Box 2**).

In most countries in the region, fish farmers generally earn higher household incomes than other farmers. In Vietnam for example, 50% of the farmers involved in aquaculture derive on the average 75% of their household income. In addition, 80–100% of aquaculture products from Vietnam's rural farm households are marketed confirming that aquaculture is primarily a cash-generating activity. Small-scale tilapia farmers in Central Luzon, Philippines showed average net annual earnings 48–49% higher compared to rice farming. In many countries in the region,

the average market price of fish is lower than those of other animal products, such as chicken, pork, and red meat. Low aquaculture commodity prices in the region for such products as carps and tilapias, make fish highly accessible to even the poorest segments of the population.

Moreover, many aquaculture activities such as shrimp seed collection and artisanal production of fish trapping and packing materials are important sources of employment for rural women. Projects that targeted women and poor households provide access to land, water, credit and extension which they could not afford otherwise. The same is true in fish processing factories in Vietnam, which employs primarily young females between 18 and 25 years old. Although salaries of these workers are still quite low at US \$1–3, they are higher than wages earned from

agricultural activities in their home villages. Aquaculture in Mekong Delta (catfish farming, rice-fish and rice-prawn farming) contributes to a decrease in migration by young women from rural areas to urban centers by offering local opportunities to earn a living. Most of the laborers in catfish farming households also enjoy better and more stable income, have fewer concerns about their daily food source, and are able to send small amounts of money to their families.

Small-holder Aquaculture

There are a number of examples from Southeast Asia of small-holder aquaculture systems that have improved incomes of resource-poor rural households. The aquaculture component of the popular integrated fruit trees/vegetables

Box 2. Examples of aquaculture systems and strategies to develop rural communities in Southeast Asia

Indonesia

Segmentation of the production processes: creating more employment and raising technical efficiency. Segmenting the production process attains for the sector higher technical efficiency, increases the opportunity for achieving better economic efficiency, and creates more jobs and values along the chain. The satellite seed production and distribution system pioneered by Indonesia is a good model, where the government hatchery maintains breeder stocks because the private sector usually finds this part of the chain unattractive for investment, distributes (sells) the breeders to private hatcheries, supplies fertilized eggs or nauplii to backyard hatchery operators for rearing until nursing size and sold to nursery operators to further grow to fingerling size, which are then sold to farmers. This has been adopted recently by the Philippines for its milkfish industry.

Integrated livestock-fish farming in rice-based system: environmentally friendly, waste conversion, energy saving, risk-spreading strategy, self reliance. Integrated livestock-fish farming provides a viable option to poor rice farmers in Indonesia, earning them a higher net income than an average government officer. Combining chicken raising with fish culture in earthen ponds on rice farms allow farmers to optimize the utilization of on-farm wastes, and supplement feed and fertilizer inputs to increase farm production and net household income. Although, a relatively low cost agri-business, majority of poor farmers find it difficult to adopt the technology or practice due to lack of credit, and burden of high initial cost of digging ponds on the farm.

Large-scale shrimp farming in “tambaks” transforms Indonesia’s coastal villages. Traditional coastal rice areas “tambaks” are being consolidated for shrimp production. Often the investors/leaseholders of “tambaks” are urban people attracted by profitability in shrimp farming. The operations and management of shrimp farms are usually done through locals, and financed by informal lending or investment. Large-scale operation of “tambaks” for shrimp farming has attracted other forms of investment in rural areas, such as electricity, roads and water, connecting remote rural hinterlands with urban commercial areas. The transformation has provided an avenue for people, formerly farmers but now caretakers, managers or workers to earn income. But financial institutions have not shown interest in providing capital to local people who want to invest in shrimp farming on lands they possess or hold under lease rights. Absence of land titles is a big hindrance in obtaining institutional financing.

Philippines

Tilapia farming as a small business. Freshwater tilapia (cage and nursery) farming generates employment opportunities for small-scale operators, caretakers, laborers, and their households, particularly in the rural areas where employment opportunities are limited and labor supply is abundant. Backyard/small-scale pond and cage farms rely mainly on family labor. Roughly 24,000 people in Pampanga and Nueva Ecija (Central Luzon), inclusive of tilapia workers and their household members, are likely to depend directly on tilapia pond farming for employment. Caretakers and salaried workers on small tilapia farms earn P2,000-3,000 per month. In addition, they sometimes receive free food and 10% of net profits. Some large-scale tilapia farmers hire caretakers at P3,000 per month and give them 15-20% of net profits. Thus, tilapia pond farming provides both employment and income benefits to poorer workers who would not be able to establish their own ponds. Fish consumption increased significantly in farming households, and the supply of tilapia from cage farming has helped keep tilapia prices stable, making it more affordable to lower income consumers.

Thailand

Finding ways to benefit fully from market chains. With increasing attention to food safety such as labeling and traceability, market chains are becoming more vertically integrated. According to the “farm to plate” philosophy, Thailand declared 2004 as “Food Safety Year” to increase awareness and improve systems for safe aquaculture production, and link “safe” food producers to processors and market access. Capacity building and technical assistance have ensured that small-scale producers can participate and benefit from such trends. The implications of trace-ability for the small-scale services and input suppliers surrounding some aquaculture systems with very fragmented input supply and trading systems remains to be seen. Vertically integrated market chains may provide producers with more stable markets, and perhaps opportunities for funding from “higher” in the chain (i.e. consumers pay a premium price) to support costs of transition to better practices. The experiences of Thailand generally reflect the struggles of the export oriented sector of Asia. Market access and trade issues have made public-private sector alliances compelling. The market, but particularly trade, is driving the sector to be more competitive and environmentally friendly. This has led to the development and implementation of a mix of regulatory and voluntary management mechanisms jointly developed by the government, industry and farmer groups. The voluntary mechanisms have resulted in increasingly widespread adoption of better management practices.

Box 2. Examples of aquaculture systems and strategies to develop rural communities in Southeast Asia (Cont'd)

Vietnam

Traditional practices such as rice-fish and rice-shrimp culture, and integrated fish, livestock and crop cultivation, including the widely known VAC system, have provided an entry point for Vietnam's rural people (majority of whom are still engaged in farming) to improve income and livelihoods within the limits of available land resources prior to moving toward intensive commercial aquaculture supported by more liberal land use policy and opening up of export markets. But even in some of the more advanced aquaculture practices such as basa (catfish) aquaculture, shrimp farming or intensive tilapia farming in freshwater ponds, there are significant income and employment opportunities for the poor people including those in upstream (seed production and supply provisions) and downstream (processing and marketing) activities.

Improving income and livelihoods in the early days of economic liberalization. The VAC, which is totally family-managed, can be found in irrigated lowlands, rain-fed uplands, and peri-urban areas of Vietnam. The system is a mix of annual and perennial crops including fruits and vegetables, cattle, pigs and poultry, with several species of Chinese and Indian carps grown in ponds. Annual yields of 2-3 tons/ha are commonly achieved while semi-intensive systems, especially with tilapia, may reach 4.5-5 tons/ha. Since 1989, the Vietnamese government has distributed land for farmers and encouraged the development of the family economy through diversified agriculture, not only by growing rice. In many Red River Delta communities, VAC farming constitutes 50-70% of farmers' income, with annual income three to five times higher than that from growing two rice crops per year. The system is labor intensive, but does not require hard manual labor, and affords productive employment for people of all ages. The system also helps protect the production environment, and improve family health and nutrition. Today in Vietnam, the VAC system is considered to be an effective solution for poverty alleviation, dietary improvement, and prevention of malnutrition.

Aquaculture in the Mekong Delta: Revolutionizing rural farms with employment and wage benefits. The Mekong Delta is now home for Vietnam's intensive aquaculture, accounting for 85% of national aquaculture production. Intensive catfish (*Pangasius* spp.) culture in the Mekong Delta started in cages in the 1960's and in ponds since 1999. The produce is mostly exported. Cage and pond culture of catfish provide employment for 11,058 households through own-farm employment. Considering that each household hires two laborers for fish feeding, about 30,000 poor landless people are estimated to be working in catfish farming. On average, each hired laborer working on fish cages and ponds gets about VND550,000-600,000 (US\$36-40) per month or less than US\$2 per day. In 2003, there were also 5,300 workers with a salary income of less than US\$2 per day in five catfish export processing factories in An Giang Province. The number of workers in fish processing in Dong Thap, Vinh Long and other parts of the Mekong Delta is about 3,000. Poor women make up a particularly high proportion of workers (>70%) in the processing factories. Several thousand people are also employed in related services sectors (finance and credit organizations, fish feed and seed producers and traders, veterinary services, storing and transportation, etc.). Basa catfish is mostly reared in cages on the Mekong River, and its production in ponds together with tra catfish has been growing. There are 83 fish and 32 giant freshwater prawn hatcheries in the Mekong Delta area, and five processing and export factories operate in An Giang, the main catfish-producing province. Indeed, all these provide significant rural employment.

– fish/shrimp pond – livestock pen system (VAC) in Viet Nam contributed 30-70% of the income from the total farming system. The success factors of Vietnam's systems are shown in **Box 3**. Fish is produced mainly for family consumption and the surplus for sale. Integrated small-scale aquaculture is becoming a more popular farming practice in the rural areas. Both inputs and outputs of this small-scale integrated system are increasing, indicating the growing interest of farmers to intensify production. This has resulted in better economic returns.

In Indonesia, the main small-scale aquaculture systems are freshwater pond culture, rice-fish culture and fish rearing

in small net cages in inland and coastal areas. About 78% of the households cultivate fishes in a freshwater farm of less than 0.05 ha. The aquaculture component increased net revenue from rice-fish culture and net cage culture increased overall household revenue. Aquaculture is the main income source of 6.6% of the freshwater pond and paddy-field culture households and 23.6% of the net cage culture households. In comparison, aquaculture is the main income source of the brackishwater pond culture households and 57% of the marine net pen culture households, with agriculture providing a secondary income. Intensive carp polyculture, which is also popular in Vietnam, provided a bigger share of household income than traditional fish operation using simpler methods.

Box 3. Success factors for selected pro-poor aquaculture technologies and systems (Vietnam)

Pangasius "Basa" catfish

- policy shifts - withdrawal of restrictions on land conversion
- technological advancement and their successful application - extension and training services along with credit support

VAC System

- opening up of market economy
- growing demand for fish in urban markets
- available labor and external inputs
- opportunity to integrate and diversify farming systems, with improved cash flow and net household income through modest and gradual investment

Strategies for Interventions

The above examples suggest a range of policy and technological support, interventions and strategies for small fish farmers. Specifically, a number of suggestions (**Box 4**) could be considered to enhance the multiple roles of aquaculture in rural development particularly in addressing poverty issues in the fisheries communities.

Box 4. Strategies to enhance the multiple roles of aquaculture in rural development

- a. Low-input technologies can be adopted, promoted and supported through facilitating credit, infrastructure development and creation of public and private institutional support mechanisms
- b. Wider adoption of integrated agriculture-aquaculture systems permits the sustainable expansion of aquaculture where it is most needed, improve the productivity and sustainability of farms and reduce impact on the environment (by recycling farm wastes)
- c. The adoption of small-scale environmentally friendly mollusc and seaweed culture by coastal artisanal fishermen, as an alternate rural livelihood, has the added benefit of reducing pressure on wild fish stocks and cleaning the coastal waters
- d. Common property water resources such as flood plains, swamps, reservoirs and irrigation structures could be developed or leased to poor households that otherwise lack productive assets while areas that are not suitable for agriculture, which are not critical habitats, could be used for aquaculture (e.g. saline soils)
- e. A farming systems research and extension approach could be established to identify the poor and assess their needs and resources, to adapt technologies to their local contexts, and to widely disseminate them to potential beneficiaries
- f. Pro-poor technologies are under-utilized, even in countries where aquaculture is a tradition, due to a number of constraints which should be addressed, such as absence of political will, limited institutional, human and financial capacity, institutional barriers, government restructuring, and reduction of government services for development
- g. Barriers to adoption of aquaculture or improved technologies by the poor that need to be cleared includes lack of security of tenure or a well-defined system of land and water use rights, difficulty in accessing inputs, credit and markets, and inappropriate technologies and lack of technical assistance
- h. Enabling policies and appropriate institutional arrangements to channel services to the poor should be instituted to address the various constraints (e.g. public linkages -- cooperation among several concerned ministries under one roof at provincial level and public-private partnerships -- combined government-NGO extension services; extension services through input providers, contract farming, etc.)
- i. Although favorable government policy and public sector investment are initially required, small-scale and even subsistence aquaculture could function largely as a private sector activity in order to sustain its contribution to rural livelihoods
- j. The less advantaged producers should be ensured of access to export markets, and fair share of benefits from the production chain
- k. Participatory processes for small-scale producers and organization of producers into groups and associations are important factors that could extend trade and market links



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Initiatives in Enhancing the Role of Fisheries in Poverty Alleviation: Southeast Asian Regional Synthesis

Virgilia T. Sulit



In the Southeast Asian region, the fisheries sector plays a vital role in ensuring food security of its peoples. In 2006, the total fish production in Southeast Asia was 23,948,854 mt accounting for about 15% of the world's total fisheries production of the same year (**Table 1**). The number of fishers comprising more than 2% of the region's total population does not include those engaged in fish culture as well as in ancillary fisheries activities such as selling, marketing, processing, etc. Of the total number of fishers, more than 80% are engaged in small-scale fisheries. Considering that the peoples in the Southeast Asian region are fish eaters with an average annual per capita consumption of about 26.8 kg compared to the world's average of only 16.4 kg (**Table 1**), the small-scale fishers have been the main suppliers of fish for the people.

Sustainable development of small-scale fisheries could therefore lead to poverty alleviation and economic development. However, there are many concerns that impede the sustainability of the region's small-scale fisheries which include the large number of fishers, poverty in the fishing communities, and the weak law enforcement system common in many countries in this region. The many fishers competing with each other, and racing over the decreasing fisheries resources has led to the problem of overcapacity. Being conducted under the open-access regime, the small-scale fisheries sub-sector is difficult to regulate while the establishment of an appropriate fisheries management system could not also be easily put in place.

Poverty Alleviation Programs of SEAFDEC

The diminishing daily catch of the fishers exacerbates their socio-economic conditions leading to the further worsening of their severe poverty status. In most cases, the fishers turn to illegal and destructive fishing gears and practices in order to desperately cope with their families' daily needs. This further aggravates the already deteriorating ecological conditions of the fisheries resources. As Kato (2008) very aptly put it, the fishers are perpetually entangled in vicious cycles which are the classic characteristics of small-scale fisheries in the Southeast Asian region.

Such vicious cycles are even magnified by the least benefits that the fishers normally obtain from the fish they caught, a commodity that could have improved their livelihoods. Due to limited technical and financial capabilities, the fishers are also not able to initiate small business using their catch through value-adding.

As a regional fisheries organization, SEAFDEC has been continuously balancing its programs and activities between the sustainable development of the region's small-scale fisheries and the enhancement of the socio-economic conditions of the small-scale fishers. Specifically, two projects are being implemented by SEAFDEC with the main objective of addressing poverty issues in the fisheries communities (**Box 1**).

National Initiatives in Alleviating Poverty in Fisheries Communities

In the past, strategies adopted by many countries in the region to alleviate poverty in their respective fisheries communities were geared towards accelerating foreign exchange earnings through the introduction of modern fishing technologies and intensification of infrastructure development (Kato, 2008). Most of the initiatives however, are not coordinated and to some extent very fragmented in terms of achieving sustainable fisheries. In addition, improvement of the living conditions of the poor fisherfolk had been given very little focus, thus, such strategies generally failed to improve the social and economic conditions in the fisheries communities.

The declining trend of fish catch due to the general deterioration of the fisheries resources in marine and inland waters has led many countries in the region after years of modern fisheries development, to focus their attention in addressing fisheries management issues recognizing that the current resource use patterns are no longer sustainable.

Restructuring and Enhancing Programs and Policies

It has been recognized that the main factor contributing to the depletion of the fishery resources is excess fishing

efforts not only due to the unlimited number of fishing gears but also because of the large numbers of fishers. In addition, in their attempts to catch more, the fishers use fishing gears are non-selective sometimes having fine mesh size that could trap the juveniles and undersized fishes inhibiting their growth to marketable sizes. Considering that the fisheries sector plays an important role in the region's economies, many countries have adopted ways and means of addressing overcapacity in their fisheries and alleviating poverty through fisheries interventions by restructuring and enhancing their programs and policies (**Box 2**).

Issues and Concerns in Promoting Sustainable Fisheries and Poverty Alleviation

Since the region's fisheries have started to show certain declining trend brought about by the so-called globalization through the introduction of modern fisheries during the 1950~60s, fisheries management issues have just gradually been recognized as urgently needed to address such concern. However, further recognition of the importance of fisheries management has oftentimes been masked by the rapid development of the fisheries and the economic benefits that are derived from the fisheries industry. Furthermore, gradual process of recognition by the national governments has also been noted which could also be due to the absence of clear policies on the development of a management system through government intervention in fisheries.

Table 1. Population, Fish Consumption, Fish Production and Number of Fishers in Southeast Asia

Countries	2006 Population (millions)	Per Capita Fish Consumption (kg/person/year)	2006 Fish Production (mt)	Estimated Number of Fishers
Brunei Darussalam	0.4	36.1	3,100	5,541
Cambodia	14.1	23.4	532,700	2,000,000
Indonesia	225.5	20.9	6,989,033	2,600,000
Lao PDR	6.1	28.6	107,800	na
Malaysia	26.9	55.4	1,498,732	90,700
Myanmar	51.0	24.2	2,581,780	2,000,000
Philippines	86.3	31.7	4,414,310	1,914,400
Singapore	4.5	37.9	11,676	na
Thailand	65.2	32.6	4,162,096	191,700
Vietnam	84.2	25.4	3,647,627	1,022,300
Southeast Asia's Total	564.2	26.8	23,948,854	9,824,641
World Total	6,555.0	16.4	159,897,138	-

Sources: World Population Data Sheet, Population Reference Bureau, Washington DC, USA; Annual Average of Annual Per Capita Consumption of Fish and Shellfish for Human Food: 2003-2005 Average (estimated live weight equivalent), NOAA, USA (Sourced from Food and Agriculture Organization of the United Nations); FAO FishStat Plus 2008 ; SEAFDEC (2008)

Nonetheless, with the adoption of the "Code of Conduct for Responsible Fisheries" and related Regional Guidelines, many countries in the region have now recognized the need to adopt certain management system for the sustainable development of their fisheries. But considering that fisheries management is a recent development, the short history of its development is not sufficient enough for many people to understand the fisheries resources. In addition, since the fisheries industry relies solely on the renewable natural common resources, there are two unique and special conditions in fisheries that should be addressed in order to develop an appropriate management system. These special conditions are: (1) unclear ownership of the resources, which

Box 1. SEAFDEC Programs on Poverty Alleviation in Fisheries Communities

Promotion of “One Village, One Fisheries Products (FOVOP)” System to Improve the Livelihood for the Fisheries Communities in the ASEAN Region

Funded by the ASEAN Foundation, the project aims to improve fisheries livelihood by motivating the potential people in fishing communities in the ASEAN countries through human resource development (HRD). The project activities include: Regional Technical Consultations, development of the materials for training and awareness building, case studies on the Promotion of FOVOP in ASEAN Region, awareness building on (FOVOP) to address gender and development in the fishing community, promotion of the participation of women’s groups on the community based business activities, and establishment of Regional Network on the Promotion of FOVOP in ASEAN region to maintain and enhance the momentum initiated by the project.

Guided by the principle that the identification of FOVOP project ideas should be promoted based on bottom-up approach, three major priority areas have been identified in the introduction of the FOVOP concept at the national level, namely: Human Resource Development to build the community leaders; development of special marketing strategy of FOVOP products; and production of FOVOP products. In addition, it is also the principle of FOVOP that community products and services should focus at the domestic market or at the maximum the intra-regional trade level. Considering that drastic improvement of domestic market system could be difficult, the potential products and services could be developed further and gradually promoted to cater the international markets.

FOVOP is also envisaged to activate the economic activities by selecting “One Unique Product” in the ASEAN countries in a systematic way as provided for in the Regional Strategy for the Promotion of FOVOP in the ASEAN Region adopted by the ASEAN countries. Lessons learned from successful country FOVOP activities could be duplicated to other areas where applicable, as has been done in the OVOP movement in Japan.

Human Resource Development (HRD) on Poverty Alleviation and Food Security by Fisheries Intervention in the ASEAN Region

Also funded by the ASEAN Foundation, the project is envisaged to enhance human capacity of fishers of selected rural fishery communities as well as relevant fisheries government officials and those working at the local level in order to alleviate poverty through fisheries intervention.

The HRD areas cover five thematic areas mobilizing the technical expertise and facilities of the SEAFDEC Department.

- HRD on local/indigenous institutions and co-management aims to achieve the long-term objective of poverty alleviation through the development of well-being of the individuals as well as the local communities as a whole. This would involve strengthening the local/indigenous institutions and promoting co-management in fisheries resources.
- HRD on responsible fishing technologies addresses the issue on declining trend of fishery resources from the use of destructive fishing gears and practices to compensate the fishers’ reduced daily income. Fishers in the Tsunami affected communities are the target beneficiaries of the HRD to enable them to re-build their livelihood.
- The recent expansion of aquaculture businesses and consequently, the increase in demand for fish feed has led to the diversion of low-value species from the communities to markets outside for conversion into fish feed. Appropriate technology should be promoted through this HRD to transform these low-value edible fish into value-added products for human consumption.
- People would be empowered with the capacity to become aquaculture producers by introducing appropriate aquaculture technologies through this HRD, e.g. small-scale pond and cage culture with simple technology appropriate for rural areas will mean a diversification of livelihood away from fishing.
- People living in the terrestrial areas are involved in inland fisheries as supplemental source of incomes. Due to the reduction of the inland fisheries resources and the seasonal fluctuation of stocks in terms of abundance, sustainable improvement of livelihood of these people should be promoted. The rural areas of the Cambodia, Lao PDR, Myanmar and Vietnam (CLMV countries) could be considered as priority beneficiaries of this HRD activity.

makes the resource users not responsible enough in using the resources, and (2) government intervention in management, which at present is laid down in a top-down approach (Kato, 2008). Guided by some regional instruments such as the regional guidelines, (e.g. Supplementary Guidelines on Co-management using Group User Rights (SEAFDEC, 2006)), efforts have also been made by the countries to minimize the occurrence of the two unique conditions in fisheries. For example, in order to mitigate the undefined ownership of the resources, rights-based fisheries have been introduced through group user right for the coastal fisheries. Co-management has also been popularly promoted in many countries in the region in order to delegate management responsibility and right to the resource users.

In the Southeast Asian region, small-scale fisheries play very important role in developing national economies as well as in ensuring local food security, sustainable livelihoods

and poverty alleviation. Despite the importance of the sub-sector and the large number of fishers involved, small-scale fisheries remain one of the most disadvantaged sectors, thus, support and intervention from the government is necessary in ensuring the well-being and sustainability of the sub-sector. Considering that the Southeast Asian region accounts for more than 15% of the world’s total fisheries production (Table 1), and since the region’s fisheries resources have already been depleted there is a need to develop appropriate alternate fisheries management system that is applicable for the region (Kato, 2008a). In addition, Kato (2008a) also advanced that the efforts of the countries to establish such management system should be recognized during the development of any resource management system initiatives and instruments.

Specifically, the issues identified by most countries in the region (SEAFDEC, 2008a) are grouped into (1) social,

Box 2. Initiatives of the ASEAN countries in addressing overcapacity in fisheries and alleviating poverty

Brunei Darussalam enforces a moratorium in fishing operation in its Zone 1 (from shoreline to 3 nautical miles (nmi)) starting in January 2008 until full recovery of the marine resources is achieved. Notwithstanding its possible impact on the country's small-scale fishers, the moratorium includes: (1) transferring commercial small-scale fishermen who own companies and hire foreign fishermen from Zone 1 to Zone 2 (from 3 nmi to 20 nmi); (2) freezing the issuances of fishing gear permits that exceed the allowable number of fishing gears in Zone 1; and (3) placing new applications of part-time fishermen and those operating fishing companies in Zone 2.

Cambodia has taken giant leaps to create rights for fishing communities through co-management. Starting in October 2000, large areas of the inland fishing grounds have been taken out of the control of the influential and rich individuals, and given to the communities to manage. Such fisheries reform promoted the transfer of role and responsibilities from the central government to local communities. Through the country's Sub-Decree on Community Fisheries, community fisheries (CF) organizations have been established in inland and coastal areas to ensure greater participation of local communities in fisheries conservation and management and allow the local communities to manage their respective fishery areas. From the beginning of the reform in 2000, the number of CFs increased from 165 to 509 in December 2007. In the Rectangular Strategy of Cambodia, fisheries reforms have been placed in one strategic side where management of the community fisheries and family fisheries is one of the priorities to address the poverty issues in fisheries. Under the fisheries reform, local communities are empowered to enable them to attain sustainable livelihoods in terms of both socioeconomic and nutritional aspects.

The National Policy of **Indonesia** includes Pro-growth Strategy (for economic growth), Pro-job Strategy (to increase/create major job opportunities), and Pro-Poor Strategy (for poverty alleviation). Although the country's general poverty alleviation program is not directly under its responsibility, the Ministry of Marine Affairs and Fisheries promote poverty alleviation in the fisheries sector by empowering the coastal communities (helping the poor to help themselves) through the Directorate General (DG) of Coastal and Small Islands; funding small scale aquaculture/fishermen through the DG of Aquaculture, DG Fish Capture and DG Fisheries Product Processing and Marketing; and intensifying education, training and extension for fisheries communities and young generation as well as capacity building for the fisheries in technology, management and information; and strengthening community fisheries organizations.

The National Goal of **Lao PDR** is to liberate the country from the group of Least Developed Countries by the year 2020 through sustainable and equitable development. Under the Ministry of Agriculture and Forestry's strategies to achieve food security, the Department of Livestock and Fisheries promote the Poverty Reduction and Agricultural Management (PRAM) by strengthening collaboration to promote education services with the objective of alleviating poverty in the fisheries and livestock sectors. National collaboration involves the National University of Laos and other departments within and outside the Ministry of Agriculture and Forestry while transboundary and regional collaboration has been initiated with regional partners of the Wetlands Alliance Program (WAP), the Udon Thani International Cooperation and Development Office (Thailand), and Thai Vocational colleges.

Malaysia implements a number of precautionary approaches to protect its fishery resources from over-exploitation and ensure sustainable fishing activities. These include: (1) moratorium on new fishing licenses issuance; (2) Exit Plan concept through Buy-Back Scheme and Matching Grant; (3) infrastructure development by increasing landing sites equipped with associated facilities; (4) installation of more artificial reefs and fish aggregating devices; (5) repair of fishermen's houses. In addition, other schemes are also being promoted to alleviate poverty in fisheries communities such as the Special Fishermen Fund (a soft loan credit scheme without interest for traditional fishermen to increase productivity and income); Fishermen Housing Scheme (loan assistance for construction of fishermen houses); People's Well-being Development Scheme (SPKR) through allocation of grants for repair and construction of fishing vessels and procurement of fishing equipment and gears; and Fuel Incentives Scheme (allocation of RM1.00/liter fuel incentives to fishing communities through cooperatives and organizations such as NEKMAT/PENESA/ Ko-Nelayan to reduce cost of fishing operations. Diversification Program for Generating Fishermen Income is also advanced through the conduct of non-formal training courses, workshops and seminars on various fisheries topics, and the Skippers Development Program is conducted for the vessels crew and fishermen.

Myanmar has created appropriate legal frameworks and formulated various strategies for the sustainable development and management of marine fisheries. Fisheries management is carried out through licensing. In accordance with the Myanmar Fisheries Laws and Regulations, some of the fisheries management authorities have been distributed to the State/Division, District and Township levels. In some cases, the DOF and fishermen work together in co-management in fisheries, especially in "leasable fisheries" (fisheries permits granted to fish in demarcated areas of fishing grounds using permitted fishing gears). Without the auction system, the DOF may grant fishing permit directly to fishermen on mutual agreement on revenue and maintenance of the fishing grounds. This fishing permit is valid for 3 or 6 years instead of the yearly permit by auction. Strengthening of the Fisheries Community for Fisheries Management and Alleviation of Poverty is being pursued in the aquaculture sector where fish farmers can get loans from the "Livestock and Fisheries Development Bank" with their documents of possessing the culture ponds as collateral. The loan granted is 1.25 million Kyats per hectare with a low interest to be paid back within 5 or 10 years. The DOF is also giving loans in inland and marine fisheries sectors to support the activities of the rural community fishers with limited financial investments.

Myanmar's Ayeyarwady Division was playing the most important role in terms of fishing, aquaculture, agriculture, and traditional processing of fishery products. Unfortunately, cyclone Nargis hit the lower part of Myanmar on 2 May 2008, causing ultimate destruction in the Ayeyarwady Division, where most of the fishing communities are located and include significant numbers of poor and vulnerable people depending on fisheries and aquatic products for income and food security. As a result, the area is left helpless and 80% of the people became jobless, homeless, and landless. As an aftermath of the Nargis disaster, all types of fishing whether artisanal or commercial have ceased to operate for the time being. Meanwhile the Government is carrying out the task of resettlement and rehabilitation of the affected coastal communities. The Ministry of Livestock and Fisheries through the Department of Fisheries have made a strategic plan to rehabilitate the fisheries communities. As a first step, the DOF is taking the responsibility of constructing small boats (8000 small boats) for use in artisanal fishing, which are mechanized with petrol engines. Fishing equipments have also been procured directly from manufacturers in the country and abroad. In the interim period, immediate replacement of fishing boats, and distribution of gears and nets to the affected in-shore and offshore fishers, was carried out. Assistance was also extended to fishers, fish farmers and buyers to resume their related fishery activities in the affected areas. Since fishery industry can avail quick income and recover the livelihoods of fishermen, the Government has allowed fishermen to go fishing in open fishery areas for three months from May 2008. Fishermen are also granted exemption from gear license fees. For the immediate rehabilitation and resumption of fishery operations, fish farmers and fishing boat owners are being provided with loans by the Livestock and Fisheries Development Bank.

Box 2. Initiatives of the ASEAN countries in addressing overcapacity in fisheries and alleviating poverty (Cont'd)

In the **Philippines**, co-management in fisheries has been implemented through the Fisheries and Aquatic Resources Management Councils (FARMCs) under the Fisheries Code of 1998 where both governments and the communities/resource users share certain responsibilities in decision-making and other functions of management. Philippines succeeded in having a legal framework where, with political will, government can support and facilitate fisheries co-management. The FARMC is a tool that enables the active participation among stakeholders, particularly the small-scale fisherfolk in fisheries management. It recognizes their competence and assigns responsibility to them for fisheries management at the local levels. However, there is a need to strengthen the fisherfolk organizations and the FARMCs to be able to competently perform their mandates in co-management. Moreover, a representation mechanism for the small-scale fisherfolk has been established through the Social Reform and Poverty Alleviation Act (Republic Act 8425) which created the National Anti-Poverty Commission (NAPC), designed to attend to poverty concerns of the basic sectors. The small-scale fisherfolk sector is represented by a Sectoral Representative as a member of the NAPC through which the 25-member Fisherfolk Council, has a 10-point Agenda to the government that consists of policy and program recommendations regarding issues in fisheries and poverty alleviation.

Thailand has implemented a number of projects in attempts to evolve a new and promising natural resource management models under the three pillars of democracy: political will, legislation, and bureaucracy as guide for the communities through series of experiential learning. The projects include: small-scale fisheries development project in Makham Pom Bay, Rayong Province from 1982 to June 1983 with the objectives of generating incomes and elevating the fishermen's quality of life; small-scale fisheries regional development project in Phang Nga Bay on the Andaman Coast of Southern Thailand (1979-1986), where many activities were implemented to address poverty issue of coastal villages; small-scale marine fisheries development project (a rural development project under the Poverty Alleviation Program) from 1985-1986 with short-term objectives of elevating the socio-economic status of marine small-scale fishermen, restoring the fishery resources in the local fishing grounds, and promoting fishing occupation; artificial reefs project under the Fisheries Resources Conservation Plan of the 6th National Economic and Social Development Plan (1988-1991), which aims to install artificial reefs in the Gulf of Thailand and the Andaman Sea in two locations a year; Children of the Sea which aimed at development a system of multi-faceted mariculture in collaboration with small-scale fishermen in Phang Nga Bay; and Coastal Habitats and Resources Management (CHARM) Project in Ban Don Bay in Surat Thani, and Phang Nga Bay in Phang Nga, Phuket, Krabi and Trang provinces, with the main objectives of evolving and testing a pragmatic co-management system as an alternative approach to the failing centrally management system. Under the 10th National Socio and Economic Plan, the Department of Fisheries has set up the Thai Marine Fishery Management Master Plan (2007-2016), structured under the vision of 'sustainable marine fisheries development attainable with the people at the center of sufficiency economy' to develop the quality of life of the fishermen.

Under the Comprehensive Poverty Reduction and Growth Strategy (CPRGS) of **Vietnam**, fisheries and aquaculture have been identified to play major roles in national poverty reduction and accelerating national economic growth. The country's strategies include investing support fishery infrastructure, power transmission lines, roads in aquaculture areas that are either newly established or converted from rice or salt production; building six national breeding centers, and environment alert centers in specialized aquaculture areas in the North, Center and Mekong River Delta; ensuring the sustainability of the growth of aquaculture production; improving the access of poor fisheries households to production inputs, information, extension services, credits and markets. The Sustainable Aquaculture for Poverty Alleviation (SAPA) program of the Ministry of Fisheries provides the basic concept for implementing more targeted interventions for poverty reduction in the fishery and aquaculture sector, ensuring more effective participation of and consultation with poor in planing for aquaculture development at all levels, capacity building among provincial and local staff to implement more effective poverty focused approaches to aquaculture, and promoting widespread communication for sharing of experiences in poverty reduction in the aquatic resources sector to promote more widespread adoption of better practices. The Government also develops the sustainable fisheries and livelihood National Action Plan and Working Group as a means of implementing capacity reduction goals and shared areas of cooperation across relevant state agencies - including standardized strategy for livelihood improvement while reducing near-shore pressures, and ensure clear linking of job conversion to poverty alleviation at national and international levels. Initial pilots for large-scale re-occupation and de-commission programs would be developed first in hardest hit (most vulnerable) communities as well as across a fisheries unit (e.g. Gulf of Tonkin trawl) to test approaches to job diversification, fleet rationalization and capacity reduction.

economic and human rights aspects; (2) sustainable resource use and access rights aspects; and (3) post-harvest benefits aspects (**Box 3** and **Box 4**).

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Box 3. Issues and concerns in promoting sustainable fisheries and poverty alleviation

Social, economic and human rights aspects

- Fishermen suffering from:
 - Poverty due to low and uncertain incomes, no savings, being always in debt, and lack of alternative livelihood
 - High operation costs due to the increasing prices of fishing gears, engines including spare parts and maintenance, fuel, etc. while gaining low revenues
 - Difficulty in obtaining financial assistance from formal financial system
 - Poor social conditions, e.g. housing and living conditions, education, health, etc.
 - Difficulty in accessing information
 - Unsafe working conditions during fishing activities at sea and natural disasters
- Gender inequity in fishing activities and fisheries management
- Lack of interest of next generation to engage in fishing occupation

Sustainable resource use and access rights aspects

- Unclear ownership of fishery resources under the “open access” regimes
- Multiple use of water resources results in conflicts among small-scale fishers, between small-scale and large-scale fishers, and between fisheries and other economic sectors
- Insufficient government intervention and legal framework to support fishery resources management
- •Marginalization of local participation in fisheries management and policy making
- Difficulty in the application of “output control”, e.g. Maximum Sustainable Yield (MSY), Total Allowable Catch (TAC), etc., and the enforcement of management rules, e.g. Monitoring Control and Surveillance (MCS) system, for the management of small-scale fisheries
- Increased fishing efforts in terms of fishers, fishing vessels and gears
- Use of irresponsible fishing gears and methods, e.g. gears with small mesh size, electric fishing gear, and chemicals
- Exploitation of fishery resources beyond its sustainable level, resulting in the decline of resources
- Degradation of fishery habitats due to fisheries and other factors, such as conversion of fishing grounds for other development purposes, upstream dam construction, tourism activities, pollution, deforestation, coastal erosion, climate change, etc.

Post-harvest benefits aspects

- Post-harvest losses due to inappropriate fish handling technologies
- Insufficient and inappropriate infrastructures, e.g. fishing ports, roads, cold-storage facilities, market facilities
- Unavailability or inaccessibility of an effective marketing system

Box 4. Initiatives of the Southeast Asian countries in addressing the issues and concerns in fisheries sustainability

Social, economic and human rights aspects

- Supporting alternative livelihood to generate additional incomes to fishermen based on the need of local communities
- Enhancing fishermen’s access to financial sources
- Improving the living environment, e.g. development of facilities and infrastructure systems in fishing villages, house repair, etc.
- Addressing the need to mitigate the impacts from natural hazards and disasters through the adoption of for example, the “Recommendations on Safety at Sea for Small Fishing Boats in Southeast Asia (2003)” and the “Plan of Action on Regional Cooperation for the Rehabilitation and Restoration of Fisheries in the ASEAN Tsunami Affected Areas (2005)”, etc.
- Promoting gender equity in fisheries

Sustainable resource use and access rights aspects

- Implementation of the Code of Conduct for Responsible Fisheries (CCRF) at the regional and national levels, and incorporating the CCRF framework into the national fisheries policy
- Promotion of innovative fisheries management, i.e. decentralization of management authorities, co-management, rights-based fisheries, community-based fisheries, etc.
- Establishment and enforcement of legal framework relevant to capture fisheries, e.g. zoning, fisheries licensing, gear restriction, and establishment of closed areas and closed seasons, including fishing moratorium in areas where resources are over-exploited, etc.
- Strengthening of local institutions and networks in various forms, e.g. fisher cooperatives, fisher groups, fisher professional organizations, partnership between fishers and business enterprises, etc. ; and improving coordination between the fisheries and other sectors to minimize conflicts within and among the sectors
- Controlling and reducing fishing capacity, e.g. through vessel registration, vessel buy-back program, etc.
- Promoting the use of responsible fishing gears and practices, e.g. the Juvenile and Trash Excluder Devices (JTEDs), etc., to minimize the catch of trash and juvenile fishes
- Habitat conservation and rehabilitation of fishery resources, e.g. through the deployment of Artificial Reefs (ARs) and Fish Aggregating Devices (FADs), mangrove reforestation, establishment of Marine Protected Areas (MPAs) and fisheries refugia, aquatic animals restocking program, etc.
- Utilizing available statistics, information and indicators to support fisheries policy planning and management to ensure sustainable utilization of fishery resources

Post-harvest benefits aspects

- Development and application of appropriate fish preservation and post-harvest technologies, and improvement of post-harvest facilities
- Support the development of value-added products by local communities, e.g. One Village One Fisheries Product (FOVOP) of SEAFDEC to strengthen fish marketing system and generate additional incomes
- Active participation in the on-going discussion on establishment of traceability, certification and labeling schemes for fisheries products

Community-based Freshwater Aquaculture for Poverty Alleviation

Bunchong Chumnongsittathum and Pouchamarn Wongsanga

Freshwater aquaculture has been practiced in Southeast Asia for centuries providing livelihood to rural people and ensuring sustainable supply of fishery products to the local populace and food security. Considering that the rural poor generally lacks access to technology, information, capital and inputs for livelihoods, community-based aquaculture has been identified as an approach to look into their collective needs and aspirations. Recognizing also that technologies for freshwater aquaculture are already available in the region, SEAFDEC has initiated projects in order that such technologies could be adapted in the local context of each country. The project on the “Promotion of Sustainable Freshwater Aquaculture for Rural Communities” with funding support from the Japanese Trust Fund was therefore conducted in order to assist the countries in Southeast Asia in developing rural freshwater aquaculture. As an important component of the project, capacity building was focused where existing regional competence and experiences were compiled and thereafter shared among the countries in the region for adoption based on their respective conditions. Thus, appropriate aquaculture systems have been promoted for adoption in the remote rural areas in Southeast Asia where most people have long been ignored due to their isolation from the most basic infrastructures.

Strategies in Promoting Community-based Freshwater Aquaculture in Southeast Asia

A Regional Training on “Community-based Aquaculture for Remote Rural Areas of Southeast Asia” was identified as a major activity under the aforementioned project. The concept and direction for the training were based on a review of the regional needs, development context and requirements, taking into consideration the identified common constraints and needs for rural aquaculture development. Intended for relevant government officers (e.g., extension officers) from the region, the training was conducted in 2007 and 2008. In addition as output of the project, a training package was developed, tested and reviewed for dissemination in the region (SEAFDEC, 2007).

On the technical side, as aquaculture continues to domesticate new aquatic organisms, the role of national research institutes should be enhanced while the promotion of aquaculture of indigenous species should be supported. Moreover, research areas in broodstock management, seed propagation, feeds and feeding, diseases, farm management, etc. should be strengthened through enhanced cooperation

between the aquaculture industry and national research institutes. This would facilitate the effectiveness of all efforts for the safety of the consumers and the harmony of all socio-economic activities dependent on the common natural resource base.

Community-based Freshwater Aquaculture: Experience of Thailand

Under the concept of “Sufficiency Economy” (**Box 1**) being promoted by His Majesty the King of Thailand, the Department of Fisheries (DOF) of Thailand has been responsible in promoting a number of community-based aquaculture to improve the livelihoods of the fisheries communities. In addition, following the “New Theory” (**Box 2**) also introduced by His Majesty the King of Thailand in 1992 several projects have also been implemented in the rural areas of the country under His Royal initiatives. The “New Theory” was initiated at the Royally-initiated Wat Mongkol Chaipattana Area Development Project to serve as a model of land and water management for the farmers. Under the New Theory, the land is divided into four parts (30:30:30:10), where 30% is set aside for pond and fish culture, 30% for rice cultivation, 30% for growing fruits and perennial trees, and 10% for housing, raising animals and other activities (Bunchong, 2007).

When the Government decentralized the authority for management of natural resources including fisheries in all community waters to the sub-district governments, locally known as Tambon Administrative Organizations (TAOs) in 2001, the TAOs have become the local institutions responsible for rural development. However, the DOF continues to provide the necessary technical assistance

Box 1. Sufficiency Economy Promoted by His Majesty King Bhumibol Adulyadej of Thailand

- Develop attitude on the sustainable livelihoods, targeting the farmers, merchants, businessmen, government officials, etc.
- Means having enough to live on and to live for, and to refrain from leading a luxurious and extravagant life, just having enough
- Means that whatever is produced is enough for own use, no need to borrow from other people
- People can rely on themselves, can stand on their own legs
- Means having enough and being satisfied with the situation
- If people are satisfied with their needs, they will be less greedy
- With less greed, they will cause less trouble to other people
- Everything must be within its limits, saying what is necessary, acting. just to have enough which means being satisfied at a moderate level

Box 2. New Theory by His Majesty King Bhumibol Adulyadej of Thailand

Phase 1: To live at a self-sufficient level which allows farmers to become self-reliant and maintain their living on a frugal basis

Phase 2: To cooperate as a group in order to handle the production, marketing, management, and educational welfare, as well as social development

Phase 3: To build up connections within various occupation groups and to expand businesses through cooperation with the private sector, NGOs and the government, in order to assist the farmers in the areas of investment, marketing, production, management and information management

supporting the activities conducted by the TAOs. The DOF has played an important role in rural aquaculture development, planning, and implementation. Its services include aquaculture extension and transfer of fish farming technologies to farmers. While fisheries organizations or cooperatives may be found in areas where there are considerable aquaculture activities, the roles of these farmers' organizations are primarily related to marketing. Unfortunately, the DOF has not been able to mobilize the support of these organizations to deliver its extension programs because of various shortcomings affecting the farmers' organizations and the aquaculture extension services. However, community participation in aquaculture development through village committees, district councils, and the TAOs has been evident. In this context, fish farmers and villagers participate in the planning and making decisions on their community resource use and conservation.

Nevertheless, the DOF continues to provide assistance in the preparation of extension materials to the newly established Bureau of Fishery Technology Transfer and Extension. Under the new arrangement, all training activities are decentralized and conducted through the Tambon Technological Transfer Center, which is meant to be a one-stop service center where farmers and local residents can get advice and information, and contact experts in various disciplines.

Village Fish Pond Development Project

The Village Fish Pond Development Project (VFPDP) is a state-sponsored initiative in support of community fishpond development projects. VFPDP aims to increase fish production for local consumption, generate local employment, and reduce malnutrition and poverty. The rationale of VFPDP stems from the need to strengthen social cohesiveness and develop community awareness with the fishponds serving as core facilities that could provide self-help opportunities. Aside from generating direct benefits in terms of fish production and improved water supply, the VFPDP trains villagers to be self-reliant.

This has resulted in the establishment of many fishponds by private individuals and communal fishponds in the villages.

The DOF has promoted the VFPDP for some years already however its efforts have been constrained by water shortages, unfavorable biophysical conditions, low natural productivity, and farm management issues such as stocking density, pond management, access to feeds, and harvesting methods. The VFPDP activities have also been affected by environmental degradation, limited financial and human resources, inappropriate links between extension and research, and external shocks such as financial crisis.

School Fishpond Program (the Lunch Program)

One of the most promising Thai government support programs for poor communities to increase rural fish production is the School Fishpond Program (the Lunch Program) under Her Royal Highness Princess Maha Chakri Sirindhorn. The target areas are village schools, mainly primary and to a lesser extent, secondary schools in remote areas. The main objective of this program is to improve the nutritional status of school children by providing them with fish for consumption through self-help initiatives in fish farming. The program, which began in 1992, includes construction of fishponds, aquaculture training, and provision of fish seeds and technical advice to schools. The Lunch Program has also piloted an integrated fish-poultry farming project to increase fish production at low cost. Despite encouraging outcomes (**Table 1**), some constraints have affected the program which include limited water supply, inadequate feeds and other inputs, and limited knowledge in fish farming. However, through a series of simple activities involving village fishponds in small water bodies, students and the communities are able to participate in the experiential learning process that actively demonstrates the potential benefits of improved fishpond management to livelihoods and human nutrition.

Integrated Agriculture-Aquaculture

Integrated agriculture-aquaculture has been practiced in Thailand for almost a century, initially in Bangkok and at present throughout the country. The most popular systems are fish/poultry culture, fish/livestock culture, and mixed culture (fish, livestock, and poultry). While the DOF promotes several activities to increase fish production through integrated farming, the Bank for Agriculture and Agricultural Cooperatives (BAAC) with support from the Belgian Administration for Development Cooperation (BADC), has also developed the guidelines for integrated fish farming in northeastern Thailand. Integrated livestock/fish farming systems provide the livestock manure used as organic fertilizer for the fish ponds, which also function as waste stabilization ponds.

Table 1. Production from Pilot Integrated Fish and Poultry Farming Project under the School Lunch Program (2000)

Region	Number of Schools Involved	Chicken Layers	Eggs Produced (pcs)	Fish Production (kg)	Total Income ('000 Baht)
Northeastern	4	1,250	351,852	405	598
Northern	4	900	246,145	421	459
Central	3	550	147,119	308	231
Southern	1	504	129,936	365	235
Total	12	3,204	875,052	1,499	1,523

Thailand’s Development Policy and Framework for Small-Scale Freshwater Aquaculture

The national development policy of the Thai Government is guided by its National Economic and Social Development Plan (NESDP). The main objective of the NESDP is to promote economic development by utilizing natural and human resources to increase production, generate employment, and increase national incomes. Specifically, the National Fisheries Policy included in the NESDP hinges on the assumption that future rural aquaculture development will remain at a small-scale and subsistence level, mainly for domestic consumption and local household food security, especially for the rural poor, thus limiting the scope for intensifying the systems. Researchers should therefore find innovative and viable low-cost and low input technology options for such conditions, just like some appropriate technology options for small-scale freshwater aquaculture that have been developed in northeastern Thailand.

Role of the TAOs

In the past, the communities did not have the opportunity and experience to make appropriate and enforceable resource management decisions. With the establishment of the TAOs, the communities now play the major role in arbitrating and facilitating the management of their natural resources. Opportunities for capacity building as well as forging close partnerships between the stakeholders in the communities and government services, including fisheries officers and TAO officials have been provided through the participatory learning processes and iterative improvements.

Fisheries Act (1947)

The Fisheries Act (1947) prohibits private pond construction in the public domain but fish farmers can construct fishponds on their own land and can also operate cage culture in public waters. However, such cage culture activities are allowed only upon fulfilling certain requirements such as non-obstruction of waterways or transportation, non-disturbance to the public, a suitable location, and approval by district and provincial authorities. Licenses for fish cage farming are normally granted for a period of five years. The Fisheries Act also does not require freshwater aquaculture activities operating on private property to register and



obtain permission. Nevertheless, the Government requires all aquaculture operators to register with the competent authority and get permission before their actual operations. Fish farmers also have the traditional rights to access to water supply from rivers and reservoirs but the proposed changes to the Water Law being considered include the possible introduction of charges for water use especially for recreational purpose such as watering golf courses. The Government has no policy to regulate fish farm production as long as endangered species listed by laws are not farmed. The Government would continue to apply concepts and practices guided by the FAO Code of Conduct for Responsible Fisheries and the associated regional and national guidelines.

Interventions to Safeguard Thailand's Freshwater Aquaculture Development

Aquaculture Zoning

Aquaculture zoning can serve as a tool for planning and implementing aquaculture activities to mitigate adverse environmental impacts. As an example, due to the absence of zoning, the rapid expansion of marine shrimp farms into freshwater areas of several provinces in central Thailand has generated conflicts in the use of land and water resources. Salinity intrusion attributed to shrimp farming also affected the freshwater ecosystems, ricefields, and orchards. This situation led to the enforcement in December 1997, of Article 9 of the Environmental Act of 1996 to ban low salinity shrimp farming in freshwater areas throughout the country.

Biosafety and Disease Prevention

Introduction and transfer of alien aquatic species could be deliberately and accidentally done. Alien species are introduced mainly for aquaculture and the aquarium trade, and in many instances are imported illegally without adequate quarantine procedures. Freshwater aquaculture is constantly exposed to the risk of the possible adverse impacts from the introduction of alien species and farmed organisms, which usually come with the introduction also of diseases and parasites. Enforceable and effective safeguards have been developed towards practical biosafety measures. However, awareness should be raised on aquaculture health management guidelines for transboundary movements of live aquatic animals (such as health certification, quarantine, and diagnostic procedures) in order that farmers, researchers, and the general public would be well informed. This would minimize the potentially damaging risks from irresponsible introduction and dissemination of alien aquatic species and farmed organisms.

Lessons Learned from Thailand's Experiences

Fish farming has developed rapidly over the last few decades, partly in response to a decline in capture fisheries and to a rising demand for fish. Small-scale farmers have benefited from the development of aquaculture, although existing data do not allow assessing the socioeconomic benefits to these farmers. Fish marketing in Thailand is competitive but with good road networks, transportation systems, supporting infrastructure, and telecommunications, fish and fish products flow freely in the whole country. This enables central Thailand to supply fish to deficit areas such as northeastern Thailand where retail prices of fish are generally higher than in other parts of Thailand. Northeastern Thailand is also home to majority of the small-scale farmers in the country, who are faced with the increasing pressure to improve farm productivity and reduce production costs to remain competitive in a free market system.

Furthermore, the DOF has placed great emphasis on the development of fisheries stations, which have catalyzed the development of the private sector's dominant role in seed production and seed supply to support the increasing importance of fish farming. While the Government has played an instrumental role in providing the necessary facilities to ensure steady seed supply for fish farming, its role has not hindered the private sector from developing and taking over the seed supply business. The private sector has been providing reliable supply of seeds for the whole country, with complementary development initiatives also of the feeds industry. Without a reliable seed supply, fish farming would not have developed into a major industry. The Government has also sustained its research and development initiatives in fish breeding to maintain good quality broodstock and ensure open public access to farmed species and strains of good performance. The private and public sectors have successfully partnered in seed production and quality assurance of the seed stock.

The DOF of Thailand has been promoting the "Farm to Plate" program that includes food safety as well as the responsible production of aquatic food products. The program encompasses good aquaculture practices (GAP) focusing on food safety, Code of Conduct (CoC), and Best Management Practices (BMP) that boosts among others traceability schemes, detection of chemical residues in aquatic food products, etc., and is an environmentally oriented scheme for reducing the risks of diseases and environmental pollution. The DOF and Ministry of Agriculture and Cooperatives make sure that the fish

farmers embrace such systems in order to comply with the minimum requirements for safe fish and fishery products for local consumption as well as for export.

Benefits of Community-based Freshwater Aquaculture to the Poor Fisheries Communities

The DOF of Thailand has been assisting the rural poor fisheries communities in terms of aquaculture extension services based on the approach of using technologies appropriate for household-level and pond-based aquaculture. Since most local communities and individual farming households have limited resources at their disposal, less technical but demand-led approaches have been promoted in order to reach the target groups. Nevertheless, challenges in developing viable technology options for aquaculture continue to emerge in the rapidly changing rural economy. Responding to such challenges requires capacity building of local government agencies and local service providers. Adaptable approaches are needed without relying on rigidly predetermined packages of technology. Analyzing the characteristics of households or small-scale farmers and assessing the specific features of their operating environment are important elements in appraising ways to make aquaculture work for small-scale farmers.

The innovative approaches promoted by DOF (e.g. VFPDP) enhance learning and community participation in the planning and use of water resources for integrated aquaculture-agriculture, improve livelihood options, and increase benefits for the target groups.

The other countries in the Southeast Asian region could also initiate similar approaches by targeting mainly the agents of learning and information dissemination such as the teachers, students, community-based organizations, village leaders, and extension officers. Understanding the relevant features of water resources management and their competing and complementary uses could prevent conflicts and mitigate adverse environmental impacts. Furthermore, addressing issues related to common property rights as well as access to land and water resources could ease the access gaps to critical livelihood assets for the poor to engage in small-scale aquaculture.

Moreover, Thailand's School Fishpond Program is also a promising way to alleviate malnutrition among poor children in remote rural areas. While the program provides

immediate direct nutritional benefits among students of targeted schools, the benefits could go beyond the school boundaries as the program serves as a catalyst in the communities to promote the use of water resources for integrated aquaculture-agriculture. The schools act as a focal point, providing outreach to students, parents, and other members of the communities, and a hub for information exchange and dissemination.

The Southeast Asian countries involved in the Regional Training conducted by SEAFDEC have already been provided with options in promoting aquaculture in remote rural areas to help alleviate poverty in the rural communities.

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Maximizing the Utilization of Fish Catch for Human Consumption

Goh Kian Heng and Tan-Low Lai Kim

This article highlights the R&D activities of SEAFDEC Marine Fisheries Research Department based in Singapore, on the utilization of low-value marine and freshwater fish catch for the production of surimi and fish jelly products, a breakthrough that could enhance the growth of the surimi industry in the Southeast Asian region.

Small-scale fish trawlers operating in the Southeast Asian region normally catch substantial amounts of fishes that are sorted onboard the vessels into high economic-value species and other species. The latter comprise a significant portion of small demersal fishes also known as “trash fish” that are generally discarded as they are not mostly used for human consumption or are turned into feeds for livestock and cultured fishes. Even while the region’s fish stocks are reported to be over-exploited, the region’s trash fish production or discards in 2005 was estimated to be about 1.056 million mt or about 10% of the region’s total marine fish catch (10.785 million mt) during that year (SEAFDEC, 2008). On the other hand, according to APFIC (2005) the world’s production in 2003 has been reduced by 24% (or about 32 million mt) to fish meal and other non-food uses, although not much information is available on how much

trash fish is presently used in the Asia-Pacific region. Among the reasons for the low discards in the Southeast Asian region include the fact that in many countries trash fish is still used for direct human consumption such as in Indonesia and the Philippines, and that some discards are no longer thrown away as these are sold at good prices to fish meal processing plants as in the case of Thailand. In Vietnam, it has been reported that fishers prefer to catch low-value fish for commercial purposes rather than target the high economic-value fish with large portion of low-value fish as by-catch.

While the region’s fish catch has been reported to be dwindling, the demand for fish is expected to increase. In 2006 for example, fish production from the Southeast Asian countries from capture and aquaculture was about 24,000,000 mt of which about 15,000,000 mt or about 63% was consumed (**Table 1**), while 18% was exported and the remaining 19% for other uses including the manufacture of non-food products.

As the region’s population is expected to grow and the demand for fish would continue to increase, there is a need to prevent potential future shortage in fish supply considering that the peoples in the region are fish-loving, thus, the maximum utilization of the fish catch should be assured. This effort is also expected to help improve

Table 1. Total fish production and consumption in Southeast Asia (2006)

Countries	2006 Population (millions) ¹	Per Capita Fish Consumption ² (kg/person/year)	2006 Fish Consumption (mt)	2006 Fish Production ³ (mt)	2006 Fish Export ³ (mt)
Brunei Darussalam	0.4	36.1	14,440	3,100	736
Cambodia	14.1	23.4	329,940	532,700	48,868
Indonesia	225.5	20.9	4,712,950	6,989,033	884,954
Lao PDR	6.1	28.6	174,460	107,800	-
Malaysia	26.9	55.4	1,490,260	1,498,732	253,154
Myanmar	51.0	24.2	1,234,200	2,581,780	271,071
Philippines	86.3	31.7	2,735,710	4,414,310	171,071
Singapore	4.5	37.9	170,550	11,676	97,009
Thailand	65.2	32.6	2,125,520	4,162,096	1,700,160
Vietnam	84.2	25.4	2,138,680	3,647,627	830,826
Southeast Asia’s Total	564.2	26.8	15,126,670	23,948,854	4,257,849
World Total	6,555.0	16.4	107,502,000	159,897,138	

Sources

1 World Population Data Sheet, Population Reference Bureau, Washington DC, USA

2 Annual Average of Annual Per Capita Consumption of Fish and Shellfish for Human Food: 2003-2005 Average (estimated live weight equivalent), NOAA, USA (Sourced from Food and Agriculture Organization of the United Nations)

3 Source: FAO FishStat Plus 2008

the socio-economic conditions of the small-scale fishers through increased incomes, and at the same time ensure their food security.

In the Southeast Asian region, the volume of low-value fish catch depends on the fishing season, the fishing grounds and the fishers' efforts in sorting the catch. Low-value fishes are grouped into deteriorating quality unsuitable for human consumption which are used to produce feeds and low-value small-sized fish which are acceptable for human food. The quality of the fish usually deteriorates because of poor methods and unavailability of facilities for preserving fish while onboard the vessels and the long period spent at sea. On the other hand, trash fish that could be used for human consumption are produced by fishermen on short fishing trips (e.g., 1-2 days).

In order to address the concerns of maximizing the utilization of fish catch, the SEAFDEC Marine Fisheries Research Department (MFRD) conducted a project from 2002 to 2005, on maximizing the utilization of fish catch from both marine and freshwater environments under the ASEAN-SEAFDEC Special Five-Year Program. This was an offshoot of the 2001 ASEAN-SEAFDEC Conference on Sustainable Fisheries for Food Security in the New Millennium which put much emphasis on the maximum fish utilization and reduction of wastage from fisheries post-harvest. Thus, MFRD has since then conducted post-harvest projects on small pelagic marine and freshwater fish species in the region to maximize their utilization. In carrying out the project activities, MFRD collaborated with the National Center for Quality Control and Product Development (NCQC) of Indonesia to examine the utilization of small pelagic fish species, and with the Fisheries Administration (FiA) of Cambodia for the utilization of freshwater fish catch from the Tonle Sap Great Lake.

Maximum Utilization of Small Pelagic Marine Species

The maximum utilization of small demersal fishes for human consumption has been promoted through the production of



fish jelly products such as fish balls and cakes are highly popular traditional products in the Southeast Asian region. This was through the R&D activities of MFRD on the development of frozen surimi (raw materials for making of fish jelly products) and fish jelly products from small demersal fish species or trawl by-catch which include the big eye snapper (*Priacanthus* spp.), threadfin bream (*Nemipterus* spp.), lizardfish (*Saurida* spp.), etc. (Siriporn, 2007 and 2007a).

Besides utilizing small demersal fish species for value-addition, MFRD also conducted R&D activities on utilization of small pelagic fish species, which are often regarded as low economic value fish due to its poor consumer preference and often for its poor quality due to improper handling by fishers onboard the vessels and on-shore processing. As such, small pelagic fish species are under-utilized and most of the time the fish species end up as post-harvest losses.

Table 2. Capture production of major small pelagic species in Southeast Asia by ISSCAAP groups (2005)

Small pelagic fishes for production of surimi-based products	ISSCAAP Groups	Family	Scientific Name	2005 Production (mt)
Round scads	Jacks, mullets, sauries, etc.	Carangidae	<i>Decapterus</i> spp.	743,327
Selar scads	Jacks, mullets, sauries, etc.	Carangidae	<i>Alepes</i> spp.	348,525
Indian mackerels	Mackerels	Scombridae	<i>Rastrelliger kanagurta</i>	483,306
Indo-Pacific mackerel	Mackerels	Scombridae	<i>Rastrelliger brachysoma</i>	236,479

Remarks

1 ISSCAAP - International Standard Statistical Classification of Aquatic Animals and Plants

Table 2 shows the 2005 landing data of small pelagic fish species in the region (SEAFDEC, 2008), indicating that the round scads (*Decapterus* spp.) formed the largest catch from the jacks, mullets and sauries group at 743,327 mt, forming the largest catch from the jacks group. Another major group of species landed was the mackerels group, with the Indian mackerels (*Rastrelliger kanagurta*) at 483,306 mt and the Indo Pacific mackerels (*Rastrelliger brachysoma*) at 236,479 mt, contributing 61% and 30% of the total catch of the mackerel group, respectively. The project therefore targeted on scads and the mackerels for the production of surimi-based products (Goh and Yeap, 2005). The result was an array of value-added products ranging from snack food to surimi-based products which have been promoted in many countries in the region (MFRD, 2006).

MFRD has successfully processed the round scad into pelagic fish surimi for further processing into surimi-based products. The value-added products made from the pelagic surimi included the comminuted products such as chikuwa, fish sausage, fish nuggets, and fish cookies (using vacuum drying techniques for the processing of fish cookies). The products made from the mackerel groups include the fish floss and dried sweet meat. The latter is a form of Chinese New Year snacks popularly known in Singapore and Malaysia as “bah kwa” and in Indonesia as “dendeng”, which were conventionally made from meat of land animals such as beef, chicken or pork.

The trials conducted to produce surimi from pelagic fish species made use of the alkaline leaching method. Although the surimi produced may not possess superior gel strength, it provides the fish jelly products processors an alternative to incorporate different grades of surimi to their products to serve as cost reduction factor and at the same time be able to stabilize the availability of raw materials to the fish jelly products industry.

Maximum Utilization of Low-value Freshwater Fish Species

The project activity was conducted in Cambodia with the collaboration of its FiA. Although Cambodia ranked fifth in production from inland capture fisheries after China, Bangladesh, India, and Myanmar, with its catch of 422,000 mt in 2006 (FAO, 2008), the Tonle Sap Great Lake in Cambodia has the world’s largest floodplain which increases and decreases in size from 3,000 km² at the peak of the dry season in May to 12000 km² in the wet season in October. Moreover, it has also been reported that there are more than 3.5 million people or more than 25% of the country’s total population living around the Tonle Sap

Great Lake and depending on freshwater fisheries for their livelihoods.

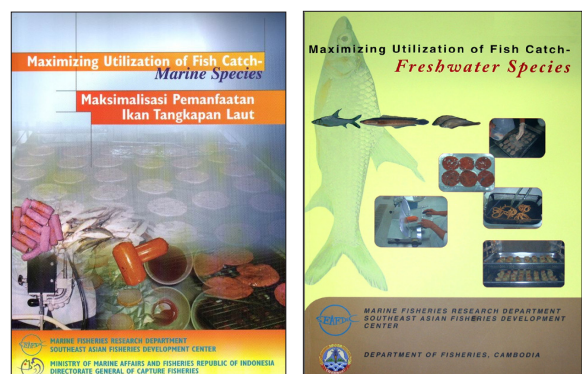
Considering that three species which are abundant in the Great Lake, are considered as low-value and under-utilized, namely: the featherback fish (*Notopterus* spp.), snakehead fish (*Channa* spp.) and soldier river barbs (*Cyclocheilichthys enplos*), these were used as the target species of the project activity. Thus, MFRD conducted experimental studies to develop a new range of value-added fish products from under-utilized freshwater fish resources, which are acceptable to the palate of the Southeast Asian people. This activity was also envisaged to promote the conversion of under-utilized freshwater fish species for human consumption as well as to develop value-added products that could be exploited to improve the socio-economic conditions of the people who are dependent on freshwater fisheries.

During the product development, the featherback fish and snakehead were used to produce fish bah kwa, fish cracker, fish siew mai, and fish tofu. For the soldier river barbs, these were used to produce snacks products such as fish “murukku” and fish satay. “Murukku” is originally a South Indian vegetarian snack product made from dhal flour and spices, formed into noodle-like strands and deep fried to form a crispy product (MFRD, 2005). In fish “murukku” the minced fish meat of soldier barb was used as a substitute for the dhal flour in the mixture that included the other spices.

Moreover, fish satay was also produced from the soldier barbs. Fish satay is a popular dried seasoned fish snack commonly made from small demersal marine fishes. For the freshwater fish species, the soldier river barbs served as good substitutes for the marine fishes.

Way Forward

MFRD continues to conduct regional training courses in fish processing for government officials, fish technologists



The publications produced by MFRD on Maximizing Utilization of Fish Catch for marine and freshwater species

and commercial processors from Southeast Asia, on the technologies in utilizing the abundance of low market value fish resources for the production of frozen surimi, fish jelly products and other value-added products. With technological approach, MFRD is able to develop fishery products from low-value small demersal and pelagic fish species as well as under-utilized freshwater fishes, and transfer the technology to the ASEAN countries. The approach towards value addition is an effort to create awareness in maximizing the utilization of fish catch to address the issue on sustainable fisheries. Thus, the utilization of such species would not only contribute towards food security for the peoples of the region but also to the national economies of the ASEAN countries.

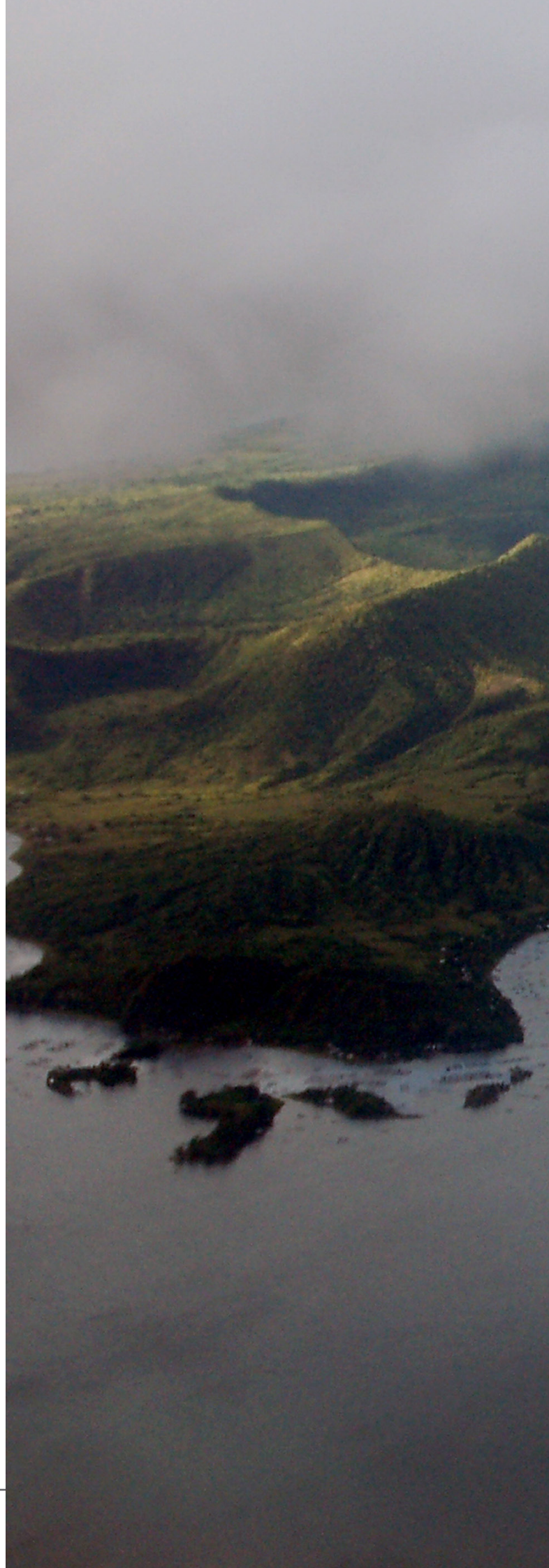
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Co-Management in Philippine Fisheries: The Fisheries and Aquatic Resources Management Council (FARMC)

Gloria C. Diaz and Arsenio S. Bañares

A famous folk song in the Philippines, “Si Filemon”, reflects the impoverished livelihood of a poor fisherman named Filemon. The song conveys the plight of Filemon who goes to fish everyday using hook and line, who gets only small trash fish which he sells in a dilapidated market, and the sale from his catch is just enough to buy a glass of tuba (coconut wine) with nothing left for his family’s needs. The song may have some exaggerations but tries to impart the message on the need to help the fishers improve their economic status in order to get out from chronic poverty. The Philippines for its part, tries to address the needs of the country’s more than one million Filemons. Considering also that there are other millions of poor fishers like Filemon in the Southeast Asian region, they should be the target of any national safety net program on poverty alleviation. It is envisaged that this article could serve as a model for other countries in the region in their efforts to promote co-management in fisheries to help their own Filemons.

The Philippines is an archipelagic country consisting of more than 7100 islands lying north of the equator and on the western rim of the Pacific Ocean with a total land area of about 298,170 km². The country extends about 2000 km in a south-north direction from the northeast coast of Borneo to 150 km off Taiwan. Its total territorial water area including the exclusive economic zone (EEZ) is about 2.2 million km² with about 266,000 km² of coastal waters. The country’s aquatic resources profile is summarized in **Box 1**. In 2007, the Philippines ranked 8th among the top fish producing countries in the world with a total production of 4.7 million mt, a significant increase from about 2.8 million mt in 1997. Tuna is the country’s top export commodity followed by shrimps and seaweeds.

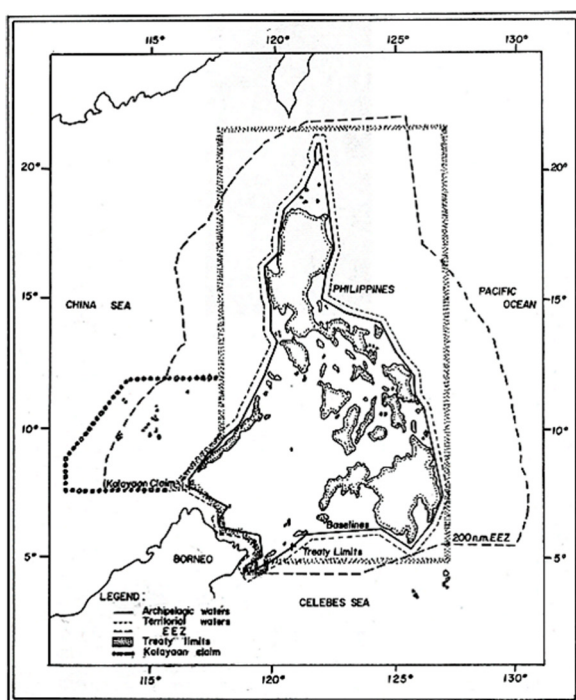
The small-scale fisheries in the country are also interchangeably known as artisanal, municipal, coastal or subsistence fisheries. More specifically, “subsistence fishing” refers to operations wherein fishing units catch marine products mainly for household consumption, while

“coastal fisheries” are defined as fisheries by fishing ground or area. Thus, fishing operations from the shoreline to 15 km is described as coastal fisheries. Municipal fisheries include capture operations using motorized and non-motorized boats that weigh 3 GT or less, as well as fishing and gathering less mobile aquatic animals without using boats. The persons involved are referred to as municipal fisherfolk who are directly or indirectly engaged in municipal fishing and other related fishing activities. The fisherfolk use bancas (a type of boat) with a capacity of 2-5 persons, usually without engine, and fishing gear such as hook and line, gillnet and others.

By area of operation, municipal fisheries can be classified into marine municipal fisheries in coastal waters and inland municipal fisheries in freshwater areas such as lakes, rivers, streams, dams, swamps, etc. In the Philippine context, boats that exceed 3 GT are considered commercial, and the sizes of commercial fishing boats are further categorized into: small-scale (3.1 to 20 GT), medium-scale (20.1 to

Box 1: Profile of the Philippines' aquatic resources

Marine Resources	Inland Resources
Total Territorial Waters (including EEZ): 2,200,000 km ²	Swamplands: 246,063 ha
Coastal: 266,000 km ²	Freshwater: 106,328 ha
Oceanic: 1,934,000 km ²	Brackishwater: 139,735 ha
Shelf area (depth: 200 m): 184,000 km ²	Other Inland Resources: 250,000 ha
Coral reef area: 27,000 km ²	Lakes: 200,000 ha
Length of coastline: 17,460 km	Rivers, reservoirs, etc.: 50,000 ha



Map of the Philippines showing the extent of its waters including its EEZ



Municipal fishing boats in the Philippines
(Photo by G.C. Diaz 2008)

Philippines representing about 85% of the country's total fishing force.

Implementation of Relevant Instruments for the Promotion of Sustainable Fisheries

Code of Conduct for Responsible Fisheries (CCRF)

The thematic issues in the CCRF have been used as the guiding principle during the development of the new Philippine Fisheries Code (Republic Act 8550) or the Fisheries Code of 1998. Consequently, the global CCRF and the Regional Guidelines for Responsible Fisheries have been used as framework in the formulation of programs such as the Philippine Comprehensive National Fisheries Industry Development Plan (CNFIDP). More specifically, the CCRF was also used as basis in the formulation of the National Plan of Action for sharks as well as for combating IUU fishing. The Philippine Bureau of Fisheries and Aquatic Resources (BFAR) provides training to the country's fisheries managers as well as to other stakeholders, and has conducted a series of seminars on the CCRF and the Regional Guidelines. In addition, the Philippine Council for Aquatic Marine Research and Development (PCAMRD) also offers a training program on sustainable fisheries management in the context of the CCRF.

150 GT), and large-scale (more than 150 GT). In 2007, the aquaculture sector posted the highest fish production of about 47% (2.2 million mt) while the commercial fisheries sector contributed 25% (1.2 million mt). The small-scale or municipal fisheries sector accounted for about 28% of the country's total fisheries production (1.3 million mt). There are about two million small-scale fishers (1,914,400) in the



Typical Philippine banca (Photo by BFAR)



A typical Filemon with his meager fish catch and his family, the main target of the Philippines' efforts in promoting sustainable fisheries management (Photo by AQD's Sid Tendencia)

Rights-based Fisheries and Co-management Using Group User Rights

The Philippines continued to promote the sustainable development of the country's tuna fisheries in consonance with the provisions stipulated in the Resolution and Plan of Action on Sustainable Fisheries and Food Security for the ASEAN Region. Considering that tuna is the number one export commodity of the Philippines, BFAR promulgated Fisheries Administrative Order (FAO) No. 224 for the establishment of the Tuna Productivity Project (TPP) in Davao Gulf (southeastern Mindanao). FAO 224 gives exclusive fishing rights within the project area of 256 km² to the members of a cooperative in the Davao Gulf comprising small- and medium-scale commercial fishing boat operators in accordance with the TPP management regulations. In the Philippines, the TPP is now being referred to as a model in co-management and rights-based fisheries.

Development, Management and Conservation of the Fisheries and Aquatic Resources

Republic Act No. 8550 (RA 8550) also known as the Fisheries Code of 1998 is "An Act providing for the Development, Management and Conservation of the Fisheries and Aquatic Resources, integrating all Laws pertinent thereto, and for other purposes." Serving as guidelines, the Act has mandated the Department of Agriculture (DA) through BFAR to carry-out the major tasks of fisheries resource management in the whole country. The Fisheries Code of 1998 was developed with the global CCRF as the framework and guiding principle. Under this Act, the structure of BFAR was reconstituted from its staff status to line agency under the DA with its new prime mandate of promoting management, development, conservation, protection and utilization of

fisheries and aquatic resources of the country, except the municipal waters which were placed under the municipal or city government as stipulated in the Philippine Local Government Code of 1991 or RA 7160. As one of the policies in RA 8550, the fisheries and aquatic resources should be managed in a manner consistent with the concept of an integrated coastal area management in specific natural fisheries management areas, appropriately supported by research, technical services and guidance. In this regard, BFAR has issued various Fisheries Administrative Orders (FAOs) to address the issues on fisheries management.

Co-management in Fisheries

Under the framework of RA 8550, the Philippines had shifted to the system of co-management, where both governments and the communities/resource users share certain responsibilities in the decision-making and other functions of management. This was based on Sec. 68 of RA 8550 which provides that the development of fisheries and aquatic resources in municipal waters and bays shall be by the fisherfolk and their organizations residing within the geographical jurisdiction of the barangays, municipalities or cities together with the concerned local government units. Moreover, Sec. 69 of RA 8550 also provides for the establishment of Fisheries and Aquatic Resource Management Councils (FARMCs) at the national level and in all municipalities/cities abutting municipal waters.

The councils are to be formed by fisherfolk organizations/cooperatives and NGOs in the locality and should be assisted by the local government units and other government entities. Consultation and orientation on the formation of



MFARMC members of Looc, Romblon prepares management plan for their Fish Sanctuary and mangrove resources

the councils is also required before they are organized. The FARMC is consulted by the Local Government Unit in matters concerning the formulation of fisheries policies, preparation of fisheries development plans and various concerns in the management of fisheries and aquatic resources. The FARMCs also assist in the enforcement of rules and regulations in fisheries and perform other functions as mandated by the Fisheries Code. Thus, the Philippines succeeded in having a legal framework where government can support and facilitate fisheries co-management and this is through the FARMCs.

The FARMC serves as a tool that enables the active participation of the stakeholders, particularly the small-scale fisherfolk in fisheries management by recognizing their competence and assigning them certain responsibilities of fisheries management at the local level. RA 8550 also provides the legal framework for the role of National Fisheries and Aquatic Resource Management Councils (NFARMC), Municipal/City (M/C) FARMC and Integrated (I) FARMC.

Specifically, Fisheries Administrative Order No. 196 was issued to provide the guidelines in creating and implementing the FARMCs. Initial experiences in the establishment of the FARMCs have demonstrated considerable success, but there is a need to sustain the initiatives by providing adequate support to empower the communities, build effective linkages and institutions, and provide adequate financial and technical resources to implement the FARMC program. Strengthening the fisherfolk organizations and the FARMCs to enable them to competently perform their mandates in co-management is a necessary element for success.

With the government agenda of creating 2.0 million jobs until 2010 as well as the need to make fisheries sustainable to support the livelihoods of the fisherfolk and contribute significantly to food security, program interventions to alleviate poverty among the small-scale fisherfolk have been implemented. These include fisheries resource management, establishment of mariculture zones/parks, and stock and resource enhancement anchored on the concept of community-based and integrated coastal resource management. In addition, assistance in technology demonstrations through capacity building has been initiated in order to promote livelihood improvement, and marketing and loan access. Development of fisheries infrastructure, distribution of post-harvest equipment and fishing gear paraphernalia, input assistance (fingerlings, seaweeds and others), establishment of seaweed nurseries, etc. have also been initiated.

National Policies and Governance

The Philippine Constitution

Article XIII Section 7 of the 1987 Philippine Constitution states that the government “shall protect the rights of subsistence fishermen, especially of local communities, to the preferential use of the communal marine and fishing resources, both inland and offshore. It shall provide support to such fishermen through appropriate technology and research... and other services.” This policy is therefore embodied in the Local Government Code of 1991 (RA 7160) and the 1998 Fisheries Code (RA 8550).

Local Government Code of 1991

Article 149 of RA 7160 grants “duly registered organizations and cooperatives of marginal fishermen preferential right to fishery privileges.” It also sets the municipal waters at 15 km from the shoreline. The enactment or promulgation of municipal or city ordinances and related resolutions affecting fishing and fisheries have already been transferred/vested to the Local Government Units pursuant to RA 7160. Some structural changes in terms of the devolution of functions related to the transfer of basic services and technology to the fishing communities have been made by virtue of RA 7160, by giving greater autonomy to local government units in the management of their aquatic resources. In this regard, a memorandum of agreement between DA and the Department of Interior and Local Government (DILG) authorizes the devolution of fisheries regulatory functions within municipal waters, thus, the jurisdiction over the municipal waters has been transferred to the local government units concerned.

Issues and Concerns in Fisheries Management

The Philippine fisheries sector is faced with interlinked issues and problems, which include among others: the depleted fishery resources largely brought about by excessive fishing effort and open access regimes; degraded fishery habitats due to destructive fishing methods, conversion of fishery habitats into economic uses and negative impacts from land-based activities; intensified resource use competition and conflict, among fisher groups and other economic sectors; poverty among small-scale fisherfolk; post-harvest losses due to lack of infrastructure facilities (e.g., fish ports, market roads and dry/cold-storage facilities) and limited technological know-how; limited institutional capabilities from the local up to the national levels of governance; inadequate/inconsistent fisheries policies; and weak institutional partnership among government agencies, civil society organizations and private sector (BFAR, 2005).

Moreover, the implementation of fisheries co-management through the FARMCs is also faced with the problem of insufficient support for its implementation, i.e. inadequacy in the number of technical personnel and funds for full program implementation. At the local level, the recommendatory and advisory function of the FARMC somehow limits its capability to translate management initiatives from the community level into local regulations and programs if the initiatives are not supported by the Local Government Unit. This is a big challenge as well as an opportunity for the community for a more active engagement with the Local Government.

Future Directions

In order that the abovementioned concerns would be addressed, BFAR has launched programs that include provision of support services to increase fisheries production and alleviate the living conditions of the small-scale fisherfolk like Filemon. Specifically in 2008 and onwards, BFAR has committed to accelerate its efforts on aquaculture for rural development, expand seaweeds production to non-traditional areas, promote aquaculture and mariculture technologies, and implement Monitoring Control and Surveillance System and Coastal Resources Management Programs.

BFAR will also embark on new initiatives that will promote organic aquaculture, culture of high value species, deep sea mariculture parks for seaweeds, and culture of ornamental fishes. More post-harvest facilities would be established while assistance on HACCP compliance will be improved. BFAR will start capacitating the most vulnerable sector, the small-scale fisherfolk, to adapt to the changing situations caused by climate change by teaching them new skills and become more flexible. Fisheries cooperatives will be strengthened and linked with financial institutions and access markets for their products.

The 2005 Comprehensive National Fisheries Industry Development Plan of the Philippines (CNFIDP 2005) provides a comprehensive framework for promoting the optimal development and long-term sustainability of benefits derived from fisheries over the next 20 years (2006-2025), where priority projects for the small-scale fisheries sector have been identified. This includes the comprehensive education program for the FARMCs and fisherfolk organizations to enhance the capabilities of both the Local Government Units and the local communities in various facets of fisheries management. The priority projects under the CNFIDP include: (1) validation of priority use rights through municipal registration and licensing to minimize

resource use conflicts; (2) enhancement of locally managed marine areas and rehabilitation and regeneration of coastal and inland ecosystems to address the issues of habitat degradation; (3) sustainable fisheries livelihood to resolve livelihood-related concerns; (4) infrastructure and post-harvest facilities development for municipal fisheries to address the need for cold storage facilities and fish landing centers; (5) enhancement of fishery law enforcement to address concerns about weak law enforcement; and (6) rationalization of municipal fishing effort to address concerns regarding overfishing. Collectively, these priority projects are envisioned to result in the alleviation of poverty among the small-scale fisherfolk in the Philippines including the country's millions of Filemons and make the Philippine fishing industry more responsive to present and future challenges.

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Assessing the Socio-Economic Conditions of Small-Scale Fisheries: Experience of Thailand in Implementing Development Projects

Sanchai Tandavanitj

Small-scale fisheries play an important role in providing income and employment to a large number of fishers and their families, who form part of the poorest and most disadvantaged communities in society. Small-scale fishers constitute the majority in the fisheries sector but their earnings are limited. The income of small-scale fisheries is in general rather low compared with other sectors such as commercial fisheries or agriculture.

The activities of small-scale fisheries sector both inland and coastal fisheries conducted full- or part-time or just seasonally, are often aimed at supplying fish and fishery products to local and domestic markets, and for household consumption. Small-scale fisheries play a significant role in securing food at the micro-levels especially for the poorest households. Moreover, small-scale fisheries have been the source of protein in local areas that are far from the urban centers (FAO, 2003).

Frequently, small-scale fishers are unable to initiate and carry out the changes that could have brought them the benefits because they are economically, socially and politically marginalized. Given the appropriate conditions however, small-scale fisheries could still contribute significantly to socio-economic development by enhancing

their capacity. This could be a powerful way to reduce rural inequity and poverty in small-scale fishing communities (FAO, 2005).

Problems and Constraints in Achieving Sustainability in Small-scale Fisheries

The main problems and constraints of small-scale fisheries are threefold and are mostly related to social, economic and human rights aspects that lead them to poverty and vulnerability (**Box 1**). In order to address such problems it is necessary that an enabling environment should be created for the small-scale fisheries.

Support for Small-scale Fisheries through an Enabling Environment

Small-scale fishery is one occupation characterized by the uncertainties of change. The resource itself has dynamic characteristics with production of fish being unstable because of the declining resources and unstable market demand. The income from fishing operations fluctuates based on the changing marketing price of fish. Moreover, coastal communities are always confronted with the risk of absorbing the effects from natural disasters. The small-scale fishers therefore require special protection and assistance which could be made possible by creating for them an enabling environment.

Box 1. Major problems and constraints in small-scale fisheries

Social issues

- **Poor living and housing conditions**

Small-scale fishing communities are isolated not only geographically but also socio-economically from the land-based society. Most marine small-scale fishing communities are located along the coastal areas which are far from the government's basic infrastructures and public utilities. The fishers prefer to settle their houses near the sea for convenience in operating their fishing activities. Consequently, the fishing communities are often crowded and are lacking of essential infrastructures such as roads, electricity, water supply facilities, hospitals and schools. Such situation makes the fishers' living standards poor as well as their health in deteriorating conditions.

- **Low education**

As a consequence of low earnings and incomes, the fishers have the least opportunity to get a formal education. Much more, the fishers are mostly not concerned about their children's education, for the reason that the fishers need household labor force to support fishing as well as ancillary activities such as landing, selling, and net repairing.

Economic issues

- **Uncertain income and no savings**

The income of fishing households, especially the small-scale fishing households, comes mainly from fisheries. Fishers are an occupational group closely associated with poverty. Their income is uncertain and lower than the average level which is normally not enough for their daily subsistence or even if their income may be enough for their families' daily needs, there is nothing left for savings to spend for their future needs.

- **Being in debt and no market power**

Most of small-scale fishers have to sell their catch to local middlemen. The price is often dictated by the middlemen and thus, could be lower than the market price because there is no more chance for any negotiation due to the fishers' financial indebtedness to the middleman. Since fishers lack the necessary funds to invest in fishing equipments, their only recourse is to obtain loans from middlemen, which could take various forms such as cash, fuel for boats, boat engines, fishing gear, fishing boats, etc. Fishers pay their loans by deducting certain amount of money from the sale of their catch to the middlemen. Such arrangement results in the fishers' less power in negotiating for the price of their catch.

- **Lack of alternative source of income**

Job opportunities for small-scale fishers are rather limited, and most of them do not have tenure to any piece of land. Consequently, they could not generate alternative income from agriculture. In view of their limited education and lack of other skills, it is oftentimes difficult for fishers to be engaged in other jobs and services.

Human right issues

- **Right to participate in managing local resources**

Being already affected by the socio-economical constraints, small-scale fishers are largely neglected by decision-makers and planners. Thus, they are oftentimes overlooked during the discussions relating to national poverty reduction strategies. By law, they should have the right to get support from public services (e.g. schools, hospitals) but it has remained very difficult for them to access such services. This is caused by the lack of standard services in the rural areas. It should have been ideal if the fishers could also participate in the decision-making process on community development and welfare in the fishing communities. Fishers should also be involved in making decisions on management measures that will affect them. As the main stakeholders, fishers should be prompted to take part in community management more interactively.

- **Gender inequity in fisheries management**

Women have been earning incomes and contributing to the family's well-being, where their involvement in fisheries is not only limited to their family responsibilities such as child caring, doing household chores, etc. In the fishing communities, women work with men in various activities concerning harvesting, processing and marketing. They also take part in household financial control. Such active involvement certainly allows them to take part in decision-making at the household level. Traditionally, men have been considered as heads of households and as decision-makers, while women played the subordinate roles and have not been involved in decision-making at the community level and at higher levels of management planning. Many human capacity developments have been designed for men only, while women could also be capable of effectively dealing with occupational issues. Due to their limited education, women usually lack self-confidence for participating in community meetings. Thus, the status of women in fishing communities should be assessed. The existing roles of women in household responsibilities, income generating, and involvement in community organization in various aspects should be recognized in order to design an appropriate plan for the promotion of gender equity in fisheries management.

Involvement of small-scale fisheries in national policy and legislation

Fisheries policy must provide a long-term vision for the small-scale fisheries through the clear specification of objectives and tools. Legislation should therefore provide the mechanisms for the implementation and enforcement of such objectives (FAO, 2005). National policies should secure the right of the poor small-scale fishers to the resources, considering that such rights are often eroded because of the absence of appropriate legislation. The policy-making process should be formalized to assure the involvement of the small-scale fishers. Such form of practical process should be formally promoted and should

not exclude the fishers' participation considering their involvement through the decentralization process, would bring the decision making process closer to the people.

Participation in fisheries co-management processes

Any management processes can be improved if these are made adaptable and flexible using multiple perspectives and a broad range of ecological knowledge and understanding, including those of the resource users and the fisheries communities. Indeed, it is in combining local and scientific knowledge that makes management even stronger than any community-based management or government management. Such management systems would have the

capacity to adapt to changes and are better able to deal with uncertainties and surprises (Berkes and Folke, 1998; Folke et al, 2002). The management process could then be considered as a co-management strategy.

Co-management could be understood as “the sharing of responsibilities, rights and duties between the primary stakeholders, in particular, local communities and the nation state...” (World Bank, 1999). Wilson et al (2006) defines co-management as an arrangement where the responsibility for resource management is shared between the government and users groups. Such definitions imply that participation of all stakeholders is the key mechanism in co-management system. Thus, co-management is the collaborative and participatory process of regulatory decision-making among the representatives of users groups, government agencies and research institutions (Jentoft et al., 1998). Moreover, co-management is considered to be a more democratic governance system, because it implies increased involvement of users and delegation of decisions to be taken as close as possible to the users.

Decentralization of fisheries management

The management approach currently prevailing is based on a centralized government intervention or top-down approach, and evidences are prevalent to prove that the current management approach is insufficient in dealing with the aforementioned issues (Nielsen et al., 2004). The trend of a greater participation of the resource users in management however, has recently been increasing. In this aspect, community-based management could become a contrary approach to activate the social processes and involve the resource users in resource management (Pomeroy and Berkes, 1997).

Decentralization of governance over fisheries and coastal resources is interestingly getting worldwide attention (Christie and White, 1997) since this approach could overcome the obstacle of a centralized management. Although the definition of decentralization differs from country to country but normally, decentralization could mean an act in which a central government formally transfers powers to actors and institutions at the lower levels in a political-administrative and territorial hierarchy. Decentralization is also justified as a means for increasing the efficiency and equity of development activities and delivery of services, and also for promoting local participation and democracy (Ribot, 2002). In both decentralization and co-management, the central government acts to transfer power and authority to local-level institutions. The objectives of both co-management and decentralization are the mobilization and strengthening of people’s participation in the decision-making processes and procedures that concern their well-being. Various types

of decentralization can be used by national governments to establish conditions that are conducive to co-management. In this article, the experience of Thailand is being advanced as possible model in decentralization and co-management processes.

Small-scale fisheries in Thailand

The Department of Fisheries (DOF) of Thailand defines “small-scale fisheries” to mean a typically traditional, artisanal and subsistence fishery. Fishing is carried out for livelihood and operated with non-destructive fishing gear in areas not further than 3 km from the shoreline, and in a mainly labor intensive way. The small-scale fisheries could also include small areas devoted to aquaculture.

Based on the Thailand’s National Statistics Record in 2000, small-scale fishers live along the coastal areas in 23 provinces comprising 93,418 fishery households and 29,122 employed households. The fishery households comprised 429,894 individuals (218,171 male and 211,723 female) while the employed households about 128,520 individuals (68,268 male and 60,252 female). For the inland capture fisheries, rivers, lakes, swamps and reservoirs constitute the important fishing grounds. Fisheries in these areas have long been part of the Thai culture and serve as an important source of animal protein for the rural people. Most of the people in this sub-sector are also considered small-scale fishers, with the fishing households estimated to have over 2 million individuals.

Small-scale fisheries play an important role for providing the sources of protein in the local areas that are far from civilization. This group is mainly immersed in poverty, poor health, uncertain occupational safety, and short life expectancy. The fishers usually spend a lot of time fishing in some seasons but making only low production. The lack of technology in fish post-harvest and processing also results in the low selling price of their catch. Meanwhile, the problem of declining marine resources happens fully and with the fishers having insufficient knowledge in marine resource conservation, the resources continue to be degraded.

Past experiences in small-scale fisheries development projects

During the past two decades, a number of projects in small-scale fisheries or coastal resource management have been implemented in Thailand with various objectives and approaches. The most important projects implemented by the DOF in collaboration with other organizations are shown in **Box 2**. It should be noted that such small-scale fisheries management projects were designed towards decentralization where the participation of the local people

Box 2. Small-scale fisheries and coastal resource management collaborative projects in Thailand

The Small-scale Fisheries Development Project (SSFD) was implemented under the 6th and 7th National Social and Economic Development Plans (1987-1991 and 1992-1996). In order to improve the living standard of fishers and their communities, fisheries-related infrastructures such as small fishing piers, facilities for keeping and repairing fishing gear, and water supply tanks, were built. The project activities were aimed at promoting alternative sources of income for the fishers' families, which included fish cage culture, shell culture and fishery product processing. Moreover, artificial reefs (ARs) installation was done to provide fish shelters as well as spawning and nursing grounds for fish stocks (Saraya, 1997). The activities were implemented in communities along the coastlines of the Gulf of Thailand and the Andaman Sea, and designed to address the general problems of the coastal communities. The package of activities was designed for implementation in suitable areas however in practice some activities were in fact not suitable in certain situations. The officers and project staff obtained the information to plan the activities through survey and interview with the people in the community, while the people did not have much opportunity to participate in the decision making process or in the development of activities that would suit their communities and needs. Thus, the people paid less attention to the project, because they did not understand the overall goals and purposes of such government-sponsored projects. As a result, the project activities ceased immediately after the project staff were transferred since no other official and local people took over.

The Bay of Bengal Program (BOBP) in Phang Nga Bay was a collaborative project between the DOF and the BOBP under FAO. It was initiated in 1995 with the aim of building sufficient resource management skills within the bay communities where majority of the fisheries management responsibilities would be eventually transferred to the villages (Nickerson-Tietze, 2000). The activities were designed to address the identified problems like mangrove reforestation to solve the degradation of the coastal habitats. The fishers had additional sources of income by introducing eco-tourism in the mangrove areas and operating passenger boats. Besides tourism business activities, the fishers started to manage the central markets in their communities, where they could sell their catch comprising mainly shrimps, at much higher prices than before.

The Fishing Right Pilot Project (FRPP) in Bang Sa Phan Bay, Prachuap Kiri Khan Province was developed from the SSFD in order to establish a fishers group in each village. At the beginning of the FRPP, the fishers groups were engaged in the implementation of a revolving fund for the members' fishing or aquaculture activities. In 1999, FRPP was given a demarcated coastal area of about 150,000 rai² or 240 km² (one rai = 1600 m²) of Bang Sa Phan Bay in the Gulf of Thailand (Anuchiracheeva et al., 2003). Nine fishers groups in the project site had the role and function as management body for the demarcated area. A regulation of the FRPP provided that inside the demarcated area the operation of trawls and luring light purse seines using less than 2.5 cm mesh size are prohibited. Monitoring of the prohibited fisheries inside the demarcated area was conducted using a patrol boat and fisher volunteers. Great effort in terms of manpower and budget was put in place for monitoring. The local fishers and stakeholders were encouraged to be involved in the management of the project area through the public hearings conducted and continuous exchanging of necessary information on the management procedures. Day after day the fishers and local people gained understanding about the need to protect their coastal resources and area.

The Locally Based Coastal Resource Management Project (LBCRM-PD) in Pathew District, Chumphorn Province was a collaborative pilot project on coastal resource management between the DOF and the Training Department of the Southeast Asian Fisheries Development Center (SEAFDEC/TD). The project aimed to establish a practical framework for sustainable coastal resource management at local level through the fishers' participation. This prompted the people to join in the decision making process on coastal fisheries management at the community level by providing the opportunity for training and education programs (Yamao, 2003). The project activities included a baseline survey to obtain the necessary information and data for the establishment of sustainable coastal resource management, extend and encourage locally based coastal resource management with the participation of stakeholders to achieve a consensus for the demarcated zone for fishing and aquaculture, and encourage local businesses by improving the techniques and marketing of processed fishery products of the women's group. From these activities, the local people have learned how to achieve a consensus for their management measures. The role of the local organization in supporting the peoples' consensus was also enhanced. However, since LBCRM-PD was still a new concept, the local people still needed guidance from the project officers or researchers in the discussion of their problems and in finding possible solutions.

The Coastal Habitat and Resources Management Project (CHARM) was a 5-year project (2003-2007) of the Royal Thai Government co-funded by the European Union and implemented by the DOF of Thailand. The CHARM project was aimed at promoting a co-management approach at the national, provincial and local levels between government, private sector and local communities. Institutional arrangements and technical operations for co-management have been tested and progressively developed in two project areas, namely: in Phang-nga Bay in the Andaman Sea (Phuket, Phang-nga, Krabi, and Trang Provinces) and in Ban Don Bay (Surat Thani Province) in the Gulf of Thailand. Some achievements presented interesting points where the local people participated in the co-management through the institutional process by linking the occupational groups with the local government in the organization of planning activities. Meanwhile, a partner's network was set up to exchange experiences and to coordinate their activities in the same sub-district. Human capacity building was conducted through the many training programs which dealt with a number of issues such as community organization and strengthening, monitoring, control and surveillance, and community-based tourism.

has been increased and where their interactive involvement has been in the project management process not only in the implementation stage. Local knowledge had been considered a key input to the management measures that have been promoted.

In order to prevent the fisherfolk from going against the regulations in the implementation of the activities, they should believe in the essential data used in making decisions by encouraging them to participate in the data collection and analysis. Consequently, this would make the fisherfolk understand the causes and the reasons for

developing such regulating measures. Moreover, since the trend of the activities in coastal resource management projects is towards reduction of subsidy such as infrastructure construction, promotion of alternative jobs to fishers should be done in order to increase their incomes. Training and capacity building could be provided based on the needs of the communities.

In the decentralization policy, the people's capacity is raised by devolving the authority for management to local organizations or village committees. This could lead to the promotion of activities that encourage fishers to make self-

rule management and help solve the problem of inadequate enforcement. The projects implemented by DOF have successfully enhanced the fishers' awareness of the need for the sustainable use of the coastal resources. One example of this attempt was to ban trawlers and push nets, which often caused conflict with the other types of small-scale fishing operations. These gears are very destructive in terms of over-harvesting the marine resources and degrading the sea-grass beds. The ban was agreed upon by the government and the communities. A combination of activities supported this attempt which includes public education by convincing the push net fishers to change their fishing practices, increasing enforcement and economic incentives (Nickerson-Tietze, 2000). The people supported such measure in order to increase their incomes and since illegal fishing operations using push nets have caused serious conflicts among the fishers, their indication of support was meant to address such conflict.

National Policies to Secure Social, Economic and Human Rights Aspects

Socio-economic assistance in small-scale fisheries

Socio-economic assistance for the fisheries sector was facilitated by DOF through the promotion of community-based fisheries management (or co-management) activities for small-scale fisheries targeting the fishers groups. The

activities included: (1) promotion of small business for local fishery products as well as ready to eat products, and promotion of One Tambon, One Product (OTOP); (2) conduct of training on alternative jobs and site visits; (3) promotion of the fishers group' revolving funds for loan purposes to secure their livelihoods; (4) promotion of fishers group co-op shop for cheaper essential daily needs; and (5) organization of the fisher wives as women's groups to do small business on fishery or agriculture products.

Provisions in the Thai Constitution related to natural resource management

In the Constitution of the Kingdom of Thailand, many sections deal with the management of natural resources and the environment. Some sections in the Constitution also provide the empowerment of people and communities to participate in the management as well as maintenance, conservation and exploitation of the natural resources. Thus, the government has been encouraging public participation in the conservation and exploitation of natural resources. The Constitution also stipulates the duties and authorities of local government organizations to maintain the quality of the environment and natural resources.

Specifically, the law contains the following substance (Chenkitkosol et al., 2003): (1) management, preservation and exploitation of the natural resources and environment



in the area of the locality; (2) participation in the preservation of natural resources and environment outside the area of the locality specifically in cases where the living conditions of the inhabitants in the area may be affected; and (3) participation in consideration with the initiation of any project or activity outside the area of the locality which may affect the quality of the environment, health or sanitary conditions of the inhabitants in the area.

Way Forward

Under the 10th National Socio and Economic Plan, the DOF developed the 10-year Thai Marine Fishery Management Master Plan (2007-2016) with the vision of “sustainable marine fisheries development attainable with the people at the center of the sufficiency economy”. The Plan proposed to enhance the quality of life of the fishermen, develop sustainable marine fishery corresponding to the code of conduct for responsible fisheries, increase the efficiency of co-management and collaboration of networking, and capacity building for fishery enterprises corresponding to the situation and changes in the fisheries conditions. The target of sustaining and securing the marine fishery, collaborating and networking, and human capacity building should support the changes in the conditions of marine fisheries.

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The Filter Net (Tangab) Fishery in Iloilo Strait, Philippines: Food and Livelihood for Coastal Communities in the Midst of Waste of Non-target Fishery Resources

T.U. Bagarinao

The Philippines is home to a mixed of blessings: an enormous marine biodiversity, a tremendous variety of fishery enterprises, and about 50 million coastal residents who mostly fish and eat fish. So many animals and so many nets in the water result in huge total catches of target fishery species, but also unfortunately of ‘trash fish’ — huge numbers of diverse marine larvae, juveniles, small adults, and unwanted species.

‘Trash fish’ is a category of fisheries by-catch, which as a whole has been estimated to average about 20% worldwide, but difficult to quantify in Philippine fisheries given the large number and variety of fishers, fishing grounds, gears, species, and markets. Moreover, it is difficult to quantify the costs and benefits of a given fishery, and in particular to balance the economic benefits to the coastal communities in terms of food and livelihood versus the ecological costs of catching (killing!) untold numbers of larvae, juveniles, and small adults of innumerable species. Qualitative information is readily available, however, and this article takes as example the case of the filter net or tangab fishery in Iloilo Strait in central Philippines. A typical *tangab* catch from Iloilo strait is a large mixture of small sizes of low-value and non-marketable species loaded from bagnets into many wooden boxes.

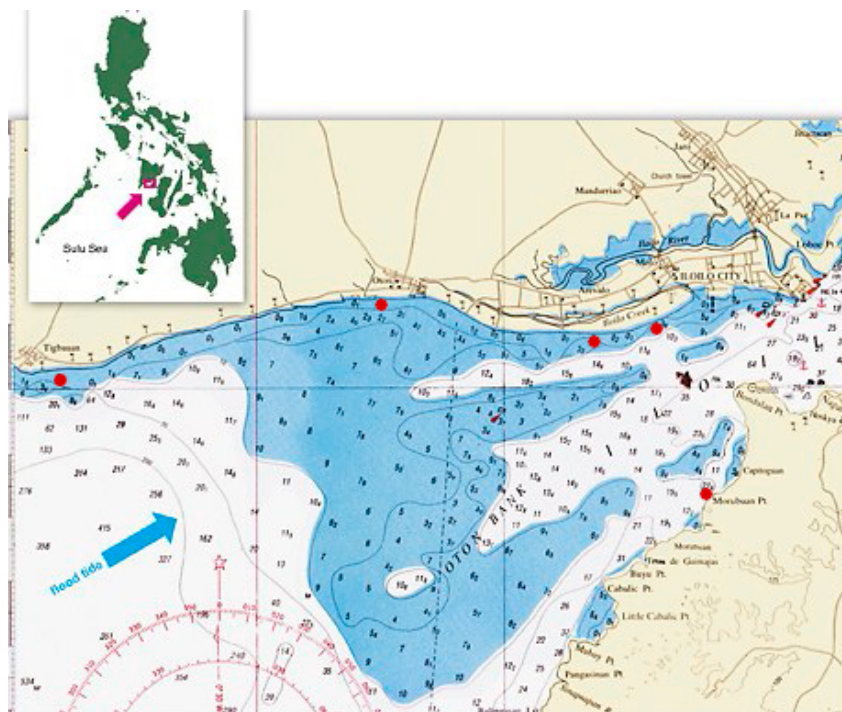


Fig. 1. Iloilo Strait between Panay Island and Guimaras Island in central Philippines, showing the tangab fishery sites (● in Morobuan in Guimaras, Arevalo and Calumpang in Iloilo City, Oton Bank, and Atabayán in Tigbauan

Tangab fishery sites

Between the southeastern coast of Panay Island and the northeastern coast of Guimaras Island in central Philippines is Iloilo Strait (Fig. 1), a very narrow channel mostly less than 20 m deep. Iloilo Strait is a unique location for a filter net fishery because the water from the Panay Gulf and the Sulu Sea floods in and out of the channel twice a

Table 1. *Tangab* fishery sites in Iloilo Strait, some aspects of operation, and estimates of volume of good-value fish versus low-value ‘trash fish’ in 2007

<i>Tangab</i> fishery sites	Number <i>tangab</i> nets	Number owners/operators	Distance offshore (km)	Water depth (m)	Season of operation	‘Good fish’ (% vol.)	‘Trash fish’ (% vol.)
Morobuan, Guimaras	88	30	<1	15-18	Jan -Dec	50	50
Calumpang, Iloilo City	15	4	<1	10-18	Jan - Dec	5	95
Arevalo, Iloilo City	19	8	1	12-17	Sep - Jun	5	95
Oton Bank and Atabayán*, Tigbauan	280	28	3-4	12-20	Nov - May	3	97*

* For Atabayán, the small sergestid and euphausiid shrimps are not ‘trash fish’ but are actually the target species, intended for the ginamos and tinabal factories right at the beach



Fig. 2. Tangab location, structure, and operation

day and generates strong currents that bring all kinds and sizes of marine animals into the tangab nets that are set in the shallow parts of the strait. *Tangab* operations are concentrated at four fishing villages fronting Iloilo Strait: Barangay Morobuan in Jordan, Guimaras; Barangay Calumpang and Barangay Santo Nino Sur, Arevalo, in Iloilo City; and Barangay Atabayan in Tigbauan, Iloilo, the landing site for *tangab* operations in the Oton Bank, offshore from adjacent Oton town (Fig. 1, Table 1). Rather belatedly it was learned that another fishing village east of Iloilo River and further inside Iloilo Strait, also has some *tangab* in operation.

Tangab structure and operation

Tangab are large fixed filter nets set in waters 10-20 m deep and 1-4 km offshore (Fig. 2). The nets are held open by coconut trunks driven into the sea bed. The opening is usually 10 m wide and 10 m deep. The net is 20-30 m long to the cod end, with large mesh at the mouth (10 cm), smaller meshes at the middle (5 cm), and fine mesh at the cod end (3 mm, then 1 mm). *Tangab* nets are set up in groups of 2-12 per owner depending on capital (Table 1). Fishing with *tangab* is done only during calm seas, weak winds, and no storms. *Tangab* are passive gear which filters nearly everything from the water surface to the sea bed. The nets are dropped only during periods of strong water currents, that is, 7-9 days around the full moon and 7-9 days around the new moon. During an operation, the fishermen work from dusk till dawn, dropping the *tangab* net in time for the flood tide into Iloilo Strait, a few hours before the night high tide. At high tide, the fishermen haul the nets up to harvest the catch. Before the tidal current reverses direction, fishermen may reverse the nets to catch fish during the ebb tide. The catch is sorted, brought to shore, washed, picked, and sold.

Tangab as source of livelihood and food

In 2007, there were about 70 *tangab* owners operating about 400 *tangab* nets at the four sites in Iloilo Strait (Table 1). A *tangab* owner employs a boat crew of 3-5

men depending on the boat size and the number of nets operated. In addition to the boat crew, large numbers of men 15-40 years old clean and transport the catch, and large numbers of women (mostly mothers) help in the post-harvest processing and fish vending (Fig. 3). The wages of the fishers and the income from the catch are not much, but there is always free fish for the day and the goodwill of the *tangab* owner and the fishing team.

Even more than the coastal villagers employed in the *tangab* fishery are the people (both near and far) who find “sud-an” or “dapli” (protein dish) in the *tangab* catch. On nights and early mornings when the *tangab* are harvested, the locals gather at the beach to buy some of the good fish or pick the fresh ‘trash fish’ for edible species and sizes, often enough free fish for the day’s breakfast and lunch (Fig. 3). Many villagers also dry (under the sun) some of the ‘trash fishes’ for later consumption.

Tangab catch: more ‘trash fish’ than good fish

Tangab nets filter huge volumes of water and catch everything carried by the currents— marine animals (no plants) from the sea surface to the sea bed. Numerous species of fishes, crustaceans, mollusks, and other invertebrates



Fig. 3. The tangab fishery provides livelihood and food to many coastal residents



Fig. 4. Good fish and ‘trash fish’ from the tangab in Morobuan, Guimaras

are caught in the *tangab* at the four sites (Figures 4, 5, 6, 7) and at times even large endangered marine animals such as whale sharks and dugongs. A relatively small amount of the tangab catch is good fish—relatively high-value fishes, shrimps, mantis shrimps, crabs, squids, and cuttlefishes sold at Philippine Pesos 50-300/kg according to species. Some days the tangab would catch large schools of the larval anchovy, *Stolephorus* spp. (locally known as “lolo-lobo”) or the sergestid shrimp, *Acetes* spp. (locally called “hipon”) that have high market value (Philippine Pesos (P) 80/kg or P1,000-1,200 per box). A much larger proportion of the catch is ‘trash fish’ of very low market value (usually P1-5/kg). Because of the small mesh (1-3 mm) at the cod end, tangab nets catch enormous numbers of small individuals that make up most of the ‘trash fish’—larvae, juveniles or small adults of various fishes and invertebrates. After being picked while fresh for edible species and sizes, the remaining ‘trash fish’ are sun-dried and sorted for human consumption, for fish meal, and livestock feed. Catches from the four tangab fishery sites vary in the proportion of good fish to ‘trash fish’ (Table 1). The *tangab* in Morobuan catch large amounts of good fish that are marketed in Guimaras and Iloilo City, but about an equal amount is ‘trash fish’ (Fig. 4).

The *tangab* in Arevalo and Calumpang catch some good fish (about 5%) that are sold in the neighborhood, but much greater amounts of ‘trash fish’ (95%) (Figs. 5, 6). In Arevalo, much of the low-grade ‘trash fish’ is sold to a

pond operator who raises sea bass and groupers for local restaurants. It is quite distressing to be present when the tangab catch is landed. Dead animals are left on the beach and in the water—enormous numbers of pufferfishes, eel leptocephali, lobster phyllosomas, megalopas, small crabs, polychaetes, and the juveniles of many fish species that are commercially exploited at older stages and larger sizes.

Many people think that the small animals caught by *tangab* are worthless and that it is no big deal to waste them. But in fact, these small animals, if not caught, will grow big to be harvested later by the fishery or become the breeders to perpetuate the species or serve as prey for fishery species, and otherwise sustain the food webs that underpin coastal ecosystems. Thus the wanton waste of small animals is not acceptable and must be prevented or markedly reduced.

The numerous tangab nets set in the Oton Bank target the small but abundant sergestid and euphasiid shrimps (*Acetes* spp. and other species) but also catch large amounts of larval and juvenile fishes. About 250 boxes of these small shrimps and fishes are landed after a night’s operation (Fig. 7). Although small and otherwise of low per unit value, these targeted species are not ‘trash fish’,



Fig. 5. Good fish and ‘trash fish’ from the tangab in Arevalo, Iloilo City



Fig. 6. Good fish and ‘trash fish’ from the tangab in Calumpang, Iloilo City

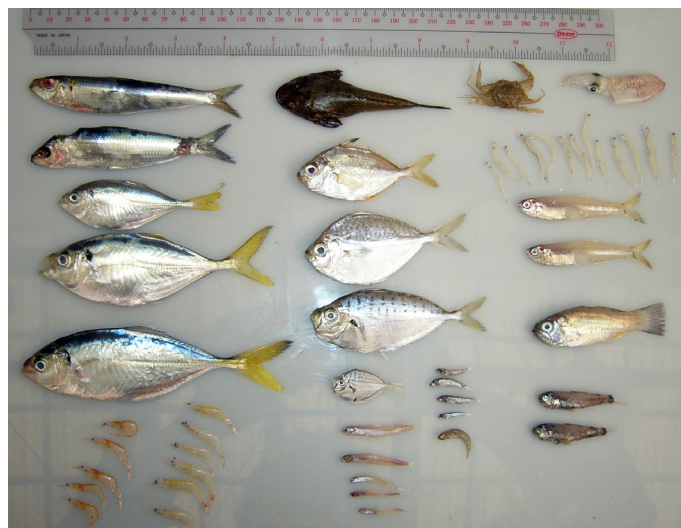


Fig. 7. The tiny shrimps (left) and small fishes (right) targeted by the tangab in Oton Bank and landed in Atabayan, Tigbauan are processed into either dried shrimps kalkag, shrimp paste ginamos or salted fermented fish tinabal in cans

but they make up about 97% of the catch volume. Only small amounts of good fish (3%) are caught and sold to vendors at the beach. Most of the catch is landed at three brokers in Atabayan, Tigbauan. Pure fresh *Acetes* spp. is sun-dried into “kalkag” for both local and export markets. The small shrimps are made into a salted and fermented shrimp paste locally called “ginamos” which is used as condiment in Filipino cooking. Equally large volumes of mixed shrimps and larval fishes are salted in large brining tanks into “tinabal,” a drippy fermented fish product that is later marketed all over Mindanao and other islands.

How bad is the tangab?

It is often said that there is no ‘trash fish’ in the Philippines, presumably because fishing villages use ‘trash fish’ very well—cook them fresh, dry them, salt them, use them as bait for larger fish, feed them to livestock, feed them to farmed fish. But in fact, there is plenty of ‘trash fish’ in the Philippines, and their post-harvest use does not justify the harvest and waste of small animals with very low market value but very high biodiversity and ecological value. Unnecessary harvest of ‘trash fish’ by any fishing gear leads to: loss of a large variety of species and enormous numbers of individuals, disruption of food webs and community structures of marine organisms, and eventual decline of marine fisheries. The *tangab* fishery has operated for decades, at least since after World War II. Although *tangab* operators complain that the catch has decreased but they continue to operate. The decrease in catch may be due to increase in capacity, but it could also be due to an actual decline in fishery resources but no such data is available. The species caught by the *tangab* in Iloilo Strait, including the larvae, presumably come mostly from the Panay Gulf, an extension of the Sulu Sea—a huge pool and source of fish. A decline in *tangab* catch in Iloilo Strait will not become obvious so readily.



Box 1. Recommendations advanced by Dr. Pagarinao to reduce amount of small animals caught by *tangab*

1. Use larger mesh for the cod end of the *tangab* net, for example 10-20 mm rather than the present 1-3 mm
2. Keep the mouth of the *tangab* net above the sea bed (about 1 meter) to reduce the entry of small benthic animals, and under the water surface (about 1 meter) to reduce the entry of planktonic larvae
3. In collaboration with the *tangab* operators, test the above gear modifications for efficacy in reducing the catch of small animals and 'trash fish'

The saving grace of the *tangab* fishery is that it has naturally imposed breaks in fishing activity. The *tangab* fishery in the Oton Bank and in Arevalo has a natural closed season for 4-6 months during the "habagat" period (June-September) depending on how soon the monsoon winds start and end and how soon the *tangab* can be brought to working order again. The *tangab* fishery in Morobuan and Calumpang, further inside the strait and somewhat more sheltered from the monsoon, operates more or less year-round except during storms. During the months of operation, the *tangab*

nets fish for only 7-9 days every other week during the full moon and new moon periods. During these fishing days, the *tangab* nets are in the water for only 6-12 hours, usually between dusk and dawn. Thus, the *tangab* nets are not in the water all the time, which is good, but when they are, they fish indiscriminately, which is bad. The amount of small animals caught by the *tangab* must be reduced markedly.

How can the harvest and waste of 'trash fish' by *tangab* be prevented?

Regulation of the *tangab* fishery should be made in the ecological and socioeconomic context, and with the participation and acceptance of the direct stakeholders, especially the poor fishers and fish consumers. A workshop was held on 18-19 August 2008 at the SEAFDEC Aquaculture Department in Tigbauan, Iloilo, Philippines to discuss the *tangab* fishery and what might be done to prevent waste of resources and to ensure the sustainability of the fishery and its benefits to the village people. In

Box 2. Unified positions regarding *tangab* fishery

Iloilo City Group

- Iloilo has not licensed the operation of *tangab*, and thus they are illegal

Barangay Calumpang, Molo, Iloilo City

- Only 3-5 operators are now engaged in *tangab* fishery in Calumpang, and if *tangab* is banned, Iloilo City should provide alternative livelihood to the 3-5 operators

Barangay Sto Nino Sur, Arevalo, Iloilo City

- If *tangab* is banned, Iloilo City should provide alternative fishing gear like gill nets to Sto Nino Sur
- *Tangab* operation will be adjusted (longer ropes will be used) so that the opening of the *tangab* net stays below the water surface and above the sea bed and only the animals in the middle of the water column are caught

Barangay Morobuan, Jordan, Guimaras Group

- Limit the issuance of *tangab* permits, and promote the use of large mesh net at the cod end
- Declare a closed season or 'sem break' in March-April, when less cash is needed for school while head of the family should be given 'cash for work' during off season
- Conduct 'pulong-pulong sa barangay' with Local Government Executives and BFAR Region 6

Municipality of Tigbauan and Barangay Atabayan, Tigbauan Group

- Fishing by *tangab* or 'saludan' in Tigbauan is acceptable due to the following reasons:
 - The catch of saludan in Tigbauan is mostly hipon, with 10% incidental fish for family consumption.
 - The major livelihood of about 500 families in Barangay Atabayan and adjacent coastal barangays is the catching, processing, and vending of the small shrimps hipon.
 - *Tangab* operation is seasonal, from November to May, and only during the full moon and new moon periods when the tides are high and the currents strong.
 - The fishing permits and concession fees are major sources of tax revenue for the municipality and barangays.

Municipality of Oton Group

- Since the data on *tangab* catch in Oton-Tigbauan boundary show high volumes of the target catch (hipon), we believe that the *tangab* operation in Oton-Tigbauan is not as destructive as the Morobuan and Calumpang *tangab*.
- Oton LGU supports the total ban of *tangab*, but with adjustment period and alternative livelihood programs for affected fisherfolk.
- Years ago, Oton LGU sought to protect and conserve fish resources by banning *tangab* operation in the municipal waters of Oton. However, neighboring towns did not support the ban
- In 2003, Oton lifted the ban on the *tangab*. The LGU now has ongoing study on appropriate number of *tangab* units to be given permits.
- There should be a defined closed and open season for *tangab* in Morobuan-Calumpang areas, as there is for Arevalo and Atabayan.
- During the closed season, operators will look for alternative livelihood and the fishery species gain time to reproduce and grow.

attendance were 20 *tangab* operators and fish vendors, three barangay captains, representatives of the city and town mayors, fisheries managers of the local government units (LGU), and officers of the Bureau of Fisheries and Aquatic Resources (BFAR). Results of this study were presented during the workshop, where three recommendations (**Box 1**) to reduce the amount of small animals caught by the *tangab* were also advanced.

The participants then met by LGU groups and discussed and unified their positions regarding the *tangab* fishery

(**Box 2**). The plenary discussions identified three management issues related to the *tangab* fishery, namely: too much wasted by-catch or ‘trash fish’; too many *tangab* nets in operation; and encroachment of motorized filter nets (*sungkit*) into areas with *tangab* and other gears (gill nets, etc.) in operation. Several interventions were then recommended (**Box 3**) and the fisheries regulators of the local government units were urged to turn them into policy statements, ordinances, and specific regulations as soon as possible.

Box 3. Interventions recommended during the workshop where fisheries regulators of the local government units were asked to turn them into policy statements, ordinances, and specific regulations

1. Use larger mesh (10-20 mm instead of 1-3 mm) at the cod end (*puyuhan*) of the *tangab* net
2. Adjust the length of the ropes around the *tangab* opening such that the net mouth stays at least 1 meter off the sea bed and at least 1 meter below the water surface (instead of spanning the entire water column)
3. If the *tangab* fishery targets the *hipon* or *Acetes* shrimps and other small adult shrimps, then allow operation of the *tangab* only when the *hipon* is in season (November to April); no *hipon*, no *tangab*
4. Define the coastal zone for *tangab* operation and allow *tangab* only in designated area
5. Limit issuance of *tangab* permits
6. Increase the mesh size of the non-return valve
7. Implement a unified *tangab* management scheme in adjacent municipalities
8. Conduct study on the appropriate mesh sizes for *tangab* nets
9. Identify alternative and better gear for use by *tangab* operators
10. If *tangab* is banned, provide alternative livelihood to displaced fishers
11. Conduct information education and communication campaign in *tangab* fishery sites (*pulong-pulong*)

About the Author

Dr. Teodora U. Bagarinao is a Scientist of SEAFDEC Aquaculture Department (AQD) based in Tigbauan, Iloilo, Philippines. Her interest in the *tangab* fishery began one day in 2003 while she was looking for shells along Villa Beach just a few kilometers from her house in Iloilo City. On that day she saw people congregating on the beach and learned that a whale shark *Rhincodon typus* had been caught in a *tangab* net. The whale shark was towed to shore but could not be landed because the tide had gone out, and also because it was illegal to do so (the shark was reportedly taken offshore and killed there). Then came several outrigger boats unloading bagnets of small fish into many wooden boxes, which was the typical *tangab* catch, a large mixture of small sizes of low-value and non-marketable species. Thus began her conversations with fishers about the *tangab* and sampling of the species thereby caught. Every summer, she brings students to see the *tangab* catch and to learn to identify them. In 2007, at the behest of the AQD Chief, she conducted a formal study of the *tangab* fishery and after one season had gathered plenty of information about one of the critical issues in marine capture fisheries: food and livelihood for coastal residents in the midst of overharvest and waste of young and small fishes and crustaceans.

CALENDAR OF EVENTS

Date	Venue	Title	Organizer
2008			
3 Oct-02 Nov	Philippines	Training on Fish Health Management	SEAFDEC/AQD
3 Oct-02 Nov	Philippines	Training on the Culture of Natural Food Organisms	SEAFDEC/AQD
6-10 October	Puerto Varas, Chile	4 th Session of FAO Sub-Committee on Aquaculture	FAO
6 Oct 08 - 27 Feb 09	Thailand	Training Course on Fishing Vessel Operation for Tinsulanonda Fisheries College	SEAFDEC/TD
13-17 October	Bangkok, Thailand	International Conference on Securing Sustainable Small-scale Fisheries: Bring together responsible fisheries and social development	FAO
19-22 October	Qingdao, China	Coastal Zone Asia Pacific Conference (CZAP2008)	CZAP
20-24 October	Yokohama, Japan	5 th World Fisheries Congress	World Fisheries Congress
20-24 October	Hanoi, Vietnam	Senior Officials Meeting of the Meeting of the ASEAN Ministers on Agriculture and Forestry (SOM-AMAF)	ASEAN
20-29 October	Thailand	Short-term Training Course on Fishing Technology for University Student #46	SEAFDEC/TD
21-23 October	Malaysia	Regional Seminar on Integrated Coastal Resource Management Approach in Southeast Asia: Review Project ICRM-PL	SEAFDEC/TD
22-24 October	Singapore	End-of-Activity Seminar for the Program on Chemical and Drug Residues in Fish and Fish Products in Southeast Asia	SEAFDEC/MFRD
27 Oct-7 Nov	Thailand	Regional Training Course on Co-management Using Group User Rights for Enhancing Small-scale Fisheries	SEAFDEC/TD
28 October	Thailand	Technical Workshop on Fishing Boats Registration and Safety at Sea in Thailand	SEAFDEC/TD
29 Oct-3 Nov	Thailand	Training Course on Fishing Technology for Ubonrathchathani University	SEAFDEC/TD
30 Oct-1 Nov	Singapore	9 th Meeting of SEAFDEC Information Staff Exchange Program	Secretariat&MFRD
3-5 November	Singapore	31 st Meeting of SEAFDEC Program Committee	SEAFDEC
6-7 November	Singapore	11 th Meeting of Fisheries Consultative Group (FCG) for the ASEAN-SEAFDEC Strategic Partnership (ASSP) Program	SEAFDEC
10-19 November	Philippines	Training of Trainers on Rural Aquaculture (under HRD project supported by the ASEAN Foundation)	SEAFDEC/AQD
18-27 November	Thailand	Regional Training Course on Responsible Fishing Technology (under HRD project supported by the ASEAN Foundation)	SEAFDEC/TD
20-23 November	Phuket, Thailand	IMT-GT Fisheries Seminar and Expo 2008 "Sustainable Fisheries and Aquaculture Prosperity in the IMT-GT Sub-region"	DOF Thailand
25-27 November	Rome, Italy	Informal open-ended Technical Meeting to Review the Annexes of the Draft Legally-Binding Instrument on Port State Measures to Prevent, Deter and Eliminate IUU Fishing	FAO
1-3 December	Thailand	1 st Expert Meeting and Regional Workshop on the Reduction of the Impacts of Fishing Gear in Coastal and Marine Environment in the Southeast Asian Water	SEAFDEC/TD
2009			
26-30 January	Rome, Italy	Technical Consultation to draft a legally-binding instrument on port State measures to prevent, deter and eliminate illegal, unreported and unregulated fishing	FAO
2-6 March	Rome, Italy	28 th Session of the FAO Committee on Fisheries	FAO

Southeast Asian Fisheries Development Center (SEAFDEC)

What is SEAFDEC?

SEAFDEC is an autonomous intergovernmental body established as a regional treaty organization in 1967 to promote sustainable fisheries development in Southeast Asia.

Objectives

SEAFDEC aims specifically to develop fishery potentials in the region through training, research and information services in order to improve food supply through rational utilization of fisheries resources in the region.

Functions

To achieve its objectives the Center has the following functions:

1. To offer training courses, and to organize workshops and seminars, in fishing technology, marine engineering, extension methodology, post-harvest technology, and aquaculture;
2. To conduct research and development in fishing gear technology, fishing ground surveys, post-harvest technology and aquaculture, to examine problems related to the handling of fish at sea and quality control, and to undertake studies on the fisheries resources in the region; and
3. To arrange for the transfer of technology to the countries in the region and to make available the printed and non-printed media, which include the publication of statistical bulletins for the exchange and dissemination related to fisheries and aquaculture development.

Membership

SEAFDEC members are the ASEAN Member Countries (Brunei Darussalam, Cambodia, Indonesia, Lao PDR, Malaysia, Myanmar, the Philippines, Singapore, Thailand and Vietnam) and Japan.



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In the occasion of the Millennium Conference, a drawing contest was organized for the children among ASEAN-SEAFDEC Member Countries, on the theme of "Fish and the Culture". This is the second best drawing from Myanmar.