Community-based Freshwater Aquaculture for Poverty Alleviation

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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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