

Value-adding of Freshwater Fishes for Poverty Alleviation and Food Security in Southeast Asian Countries

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Freshwater aquatic species are important fishery resources for many countries in Southeast Asia, providing the most needed animal protein for people in marginalized and poor fishing communities thus, contributing to food security especially in rural areas. Southeast Asia is known for its traditional fish products generated by household producers as well as small and medium-sized establishments which are usually family-owned business ventures and operated as backyard industry. Value-adding has been introduced in the fish processing industry to transform low-value fishes into various fish products with enhanced economic value in order to increase incomes and subsequently, enhance the socio-economic conditions in rural fishing communities. Thus, value-adding could contribute to poverty alleviation and food security for these communities. Some of the freshwater fish species produced in the region could be under-utilized and of low-value in view of the preference of consumers for the high-value marine aquatic species. Considering the continuous decline of the marine resources, it has become necessary to maximize the utilization of freshwater fish resources by converting certain quantities of freshwater fishes into value-added products that are acceptable in domestic as well as in international markets, thus, enhancing the contribution of freshwater fisheries to food security and poverty alleviation in the Southeast Asian region.

Many countries in Southeast Asia produce considerable quantities of traditional fish products such as fish sauce and other forms of cured and fermented fish products, which represent a significant component of fish utilization in the region. Yeap and Tan (2002) cited that processing of traditional fish products which accounts for 30-45% of the region's total fisheries production, is the most important means of preserving fish in many developing countries where post-harvest facilities including those for maintaining the freshness of fish are inadequate (Yeap *et al.*, 2007). Fish sauce is the most important traditional fish product produced by most countries in the region. It is widely used as a condiment or as an ingredient in cooking to add flavor to a number of dishes (MFRD, 2003). In addition, other fish products which serve as major traditional source of animal protein, have been developed in Southeast Asia using marine and freshwater fishes as raw materials (MFRD, 2002).

In general, traditional fish products such as fish sauce and other cured fish products are mostly consumed domestically in most countries of Southeast Asia. However, some countries in the region have been exporting traditional fish products to countries with considerable number of inhabitants originating from Southeast Asia, but trading of such products has been constrained by requirements for improved processing and compliance with the safety and quality requirements of export products. In order to assist the countries in the region in improving their traditional fish products, SEAFDEC through its Marine Fisheries Research Department (MFRD) has promoted the development of sustainable fishery post-harvest technology in Southeast Asia aimed at enhancing the production of safe and quality fish and fishery products. This is also meant to make the region's fish and fishery products more competitive in the world market and generate increased incomes to improve the economies of the countries in the region. Nevertheless, Goh and Yeap (2007) emphasized that the development of fishery post-harvest technology could be made sustainable by maximizing the utilization of fish catch while minimizing post-harvest losses and at the same time ensuring the safety and quality of the fish and fishery products.

SEAFDEC's program on sustainable fishery post-harvest technology paved the way for the development of the surimi industry in Southeast Asia in the 2000s, considering that in the 70s little was known about the surimi technology in the region (Yeap and Chow, 2011). The surimi industry in the region which makes use of low-value marine fishes, has come up with a wide range of value-added products for human



consumption such as fish sausage, fish loaf, fish burger, fish tofu, fish bah kwa, fish floss, fish cracker, fish siew mai, fish muffin, and so on. Moreover, by-products from tuna and swordfish processing have also been turned into fish products for human consumption such as breaded and buttered products, and fish sausage. Furthermore, efforts have also been made to improve the quality of traditional fish products by going into simple mechanization to increase productivity and introducing the concept of Hazard Analysis and Critical Control Point (HACCP) to ensure the quality and safety of the products. As a result, about 200,000 tons of surimi was produced in the region in 2009 accounting for about 30% of the world's total surimi production (Yeap and Chow, 2011) while value-added products continued to be generated by the fish processing industry in the region contributing substantially to the world's total production of value-added fish products.

Status of Freshwater Fish Production in the Southeast Asian Region

The current status of marine fishery resources in the region has been reported to be dwindling. As such, the resources may not be able to sustain its role in supplying the raw materials needed to generate a considerable amount of value-added fish products. This is therefore the opportune time to turn the focus on the development of fish products using low-value freshwater fishes through value-adding. Since freshwater fishery resources in Southeast Asia are being harvested from rural fishing areas where storage facilities are inadequate, it has become considerably important to maximize the economic value of the fishery resources through value-adding to ensure that the contribution of freshwater fisheries to food security and poverty alleviation in the rural areas of the region is enhanced.



Southeast Asia produces considerable quantities of freshwater fishes that could be utilized extensively as raw materials in the fish processing industry. In 2010 for example, the total fisheries production of the Southeast Asian countries was reported to be about 31.5 million metric tons (mt) and valued at about US\$38.8 billion (SEAFDEC, 2012). Of this total, 14.9 million mt was contributed by marine capture fisheries, 2.4 million by inland capture fisheries while 14.2 million mt came from aquaculture. With the contribution of freshwater aquaculture of about 3.1 million mt to the total production from aquaculture, this implies that a total of about 5.5 million mt of freshwater aquatic species had been produced in Southeast Asia in 2010 (Table 1). This production accounts for about 18% of the region's total fisheries production in terms of volume and about 17% in value, offering the possibility of increasing the economic value of freshwater fishes by turning them into processed products through value-adding. Consequently, the contribution of freshwater resources to food security and poverty alleviation especially in the remote rural areas is enhanced through the generation of value-added fish products.

Table 1. Production from inland capture fisheries and freshwater aquaculture of the Southeast Asian Countries (2010)

Countries	2010 Production from Inland Capture Fisheries		2010 Production from Freshwater Aquaculture		Total Fisheries Production in 2010	
	Volume (mt)	Value ('000 US\$)	Volume (mt)	Value ('000 US\$)	Volume (mt)	Value ('000 US\$)
Brunei Darussalam	-	-	19	150	2,772	11,626
Cambodia	405,000	-	-	-	550,000	533,528
Indonesia	344,972	-	1,347,183	2,134,415	11,662,311	14,085,949
Lao PDR	30,000	93,168	82,100	-	113,000	204,969
Malaysia	4,545	13,138	155,398	252,161	1,806,577	2,821,786
Myanmar	1,002,430	1,503,645	772,396	724,138	3,901,979	5,821,638
Philippines	185,406	174,479	308,093	419,786	5,155,647	4,534,628
Singapore	-	-	403	1,660	5,233	25,423
Thailand	209,800	288,277	432,378	654,223	3,113,316	4,501,934
Vietnam	194,200	-	-	-	5,127,600	6,941,179
TOTAL	2,377,253	2,526,476	3,097,970	4,186,533	31,438,435	31,802,983

Source: Fishery Statistical Bulletin of Southeast Asia 2010, Southeast Asian Fisheries Development Center, Bangkok, Thailand, June 2012

The four CLMV countries, namely: Cambodia, Lao PDR, Myanmar and Vietnam, together accounts for more than 50% of the region's total production from inland capture fisheries and freshwater aquaculture notwithstanding the insufficiency of relevant data provided by some countries. Therefore, sustainable utilization of the freshwater fish resources is necessary to ensure that the countries could make full use of their resources and alleviate poverty especially in rural fishing communities.

Utilization of Freshwater Fishes for Value-added Products

MFRD has been conducting projects on the maximum utilization of fish catch which included components on the use of under-utilized marine fish species as well as under-utilized freshwater fish species for the development of value-added products since 2002. For the utilization of freshwater fish species, the activity was launched in Cambodia in 2004 and later in 2011 in Lao PDR, Myanmar and Vietnam, while Indonesia is also participating in the activity considering its substantial production volume of freshwater fishes from inland capture fisheries as well as from freshwater aquaculture as shown in **Table 1**.

With the main objective of developing a new range of value-added products from underutilized freshwater fishes, the activity enabled the conversion of freshwater fishes into value-added products for human consumption as well as for trading in international market. The main objective of the activity is to increase the contribution of freshwater fisheries through value-adding to food security and poverty alleviation especially in the aforementioned four countries. Moreover,

the transformation of under-utilized freshwater fishes into value-added products, which are acceptable to the palate of the peoples in the Southeast Asian region as well as in other regions of the world, has been envisioned to provide alternative sources of fish protein for human nutrition in view of the imminent shortage of traditional marine fish resources in Southeast Asia that could supply the demand of its ever growing population.

During the first stage of the activity which was conducted with the collaboration of the Fisheries Administration (FiA) of Cambodia in 2004, common freshwater fish species which are abundant in the Tonle Sap Great Lake of Cambodia, were identified for value-adding, namely: the featherback (*Notopterus* spp.), snakehead (*Channa micropeltes*), moonlight gourami (*Trichogaster microlepis*), and soldier river barb (*Cyclocheilichthys enoplos*). Thus, surimi was developed from fresh featherbacks and snakehead fillets while fish siew mai, fish tofu, fish crackers and fish bah kwa were produced from featherbacks, snakeheads, and gouramis. Fish *satay* and fish *marukku* were also developed from the soldier river barbs.

The activity was however, discontinued after the completion of the SEAFDEC Special Five-Year Program in 2005. With the intention of reviving the activity for the benefit of the rural fishing communities in the region, the Government of Singapore initiated a three-year project on the utilization of freshwater fish for value-added products in 2011 for Lao PDR, Myanmar and Vietnam with Indonesia also indicating interest to take part in the implementation of the activity, which also envisions to upgrade the processing and packaging technology of value-added products from freshwater fishes and to extend assistance to the participating countries in this endeavor.

As envisioned, the new products to be developed should aim for the small and medium enterprises in which case, the utilization of simple and easy-to-use equipment and technology were emphasized. Processing trials and product development were conducted in the participating countries involving commercial cooperants. In order that these countries could take off with their project plans, a regional training course on processing value-added products using freshwater fish was organized in October 2011, to equip the participants with the basic techniques and equipment necessary for the development of value-added fish products. The training included lectures on processing value-added products, Good Manufacturing Practices (GMP), Hazard Analysis and Critical Control Point (HACCP), and product shelf-life testing. In addition, practical sessions were conducted that enabled the participants to process six types of value-added products, namely: fish sausage, fish patty, spicy fish paste, fish *murukku*, fish *siew mai*, and fish crackers.



Way Forward

MFRD will compile the results of the processing trials and product development conducted by the participating countries, to be included in a handbook on processing of value-added freshwater fish products. MFRD will also organize an End-of-Project Seminar in 2013 to provide the participating countries an opportunity to discuss and share the results of their respective project activities. Moreover, the results could also be used as a reference in mobilizing One Village, One Fisheries Product (FOVOP) by the Southeast Asian countries. FOVOP is aimed at promoting the creation of economic activities in the rural communities to enable them to carry out alternative and supplemental livelihoods that could alleviate poverty and attain sustainable fisheries development and management as well as food security. One of the major components of FOVOP includes the development and improvement of products and services as well as human resources and entrepreneurial capacity (SEAFDEC, 2010). This activity implemented by MFRD therefore fits well into the promotion of FOVOP in the Southeast Asian region.

This is also intended to address specific provisions in the 2011 Plan of Action adopted during the ASEAN-SEAFDEC Conference in June 2011, on the need to “*introduce and provide support for the development and application of technologies that optimize the utilization of catches, reduce post-harvest losses, wastes and discards in commercial and small-scale fisheries and processing operations, through improved processing, facilities and infrastructure development, on-board and on-shore handling, storage, distribution and marketing of fish and fishery products,*” and on the need to “*promote the production of and preserve the diversity of traditional fish products by assisting producers to secure stable supplies of quality raw materials, meet food safety requirements and to improve product identity, nutritive value and marketing. In the process promote One Village, One Fisheries Product (FOVOP) and other initiatives to promote local fishery products*”.



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