Quality management in the Pangasius export supply chain in Vietnam

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2 Description of the Pangasius Production in the Mekong River Delta, Vietnam

2.1 Introduction

The objective of this chapter is to provide an overview of the Vietnamese aquaculture development. It presents the role of Vietnam in the world fresh aquaculture market. Subsequently, the chapter provides an overview of the Pangasius industry and the role of smallholders. The final pages of the chapter illustrate the regulatory framework.

2.2 Aquacultural production in Vietnam

The world aquaculture production can be divided into two sources: China and other countries. Vietnam ranks third after China and India and its aquaculture industry, especially Pangasius, has been growing strongly since 2003 (Table 2.1).

Table 2.1 World fresh aquaculture 1996-2006

Unit: Million tonnes

Year / Country	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006
China	11.08	12.47	13.36	14.39	15.39	16.25	17.32	18.17	19.35	20.59	22.11
India	1.76	1.86	1.91	2.13	1.94	2.12	2.19	2.31	2.80	2.97	3.13
Vietnam	0.29	0.30	0.32	0.37	0.46	0.54	0.63	0.84	1.04	1.29	1.51
Indonesia	0.73	0.66	0.63	0.75	0.79	0.86	0.90	0.98	1.05	1.23	1.33
Thailand	0.48	0.47	0.49	0.54	0.59	0.57	0.57	0.71	0.90	0.96	1.03
Others	2.56	2.79	2.96	3.20	3.41	3.72	3.98	4.28	4.60	4.74	5.00

Source: FAO, 2009.

Today, aquaculture (or fish-farming) accounts for more than 40% in volume of seafood produced in Vietnam and almost 60% in value (FAO, 2007). Vietnam ranks first in the list of the top 10 aquaculture producers in 2006 in terms of annual growth rate (Table 2.2).

Table 2.2 Top ten aquaculture producers in terms of quantity, 2004-2006

Producer	2004 (Tonnes)	2006 (Tonnes)	APR (%)
China	30,614, 968	34,429,122	6.05
India	2, 794, 636	3,123,135	5.71
Vietnam	1,198,617	1,657,727	17.60
Thailand	1, 259,983	1,385,801	4.87
Indonesia	1,045,051	1,292,899	11.23
Bangladesh	914,752	892,049	-1.25
Chile	665,421	802,410	9,81
Japan	776,421	733,891	-2.78
Norway	636,802	708,780	5.50
Philippines	512,220	623,369	10.32

Note: Data exclude aquatic plants; average annual percentage growth rate (APR) for 2004–2006.
Source: FAO, 2009.

Remarkably, while world growth of aquaculture has averaged 6.1% in volume terms between 2004 and 2006, Vietnamese production has grown by 17.6% in this period (FAO, 2009). The main driver of this growth is Pangasius production in the Mekong River Delta (MOFI, 2008).

Vietnam (figure 2.1) has a coastline of more than 3,200 km long with over 3,000 islands, a wealth of natural inland water bodies (lakes and rivers) and seasonal flooded grounds. Since 2000, the fisheries sector is an important contributor to the economy of Vietnam and fisheries are identified as a key economic growth sector by the Vietnamese Government (MOFI, 2006).
The total area of water-surface is approximately 1.7 million hectares (MOFI, 2006). The Vietnamese government expects a further increase of the aquaculture sector of more than 25% in 2010 (Table 2.3).

Figure 2.1 Vietnam with its extensive coastline.

Table 2.3 Vietnam aquaculture production in 2005 and development targets for 2010

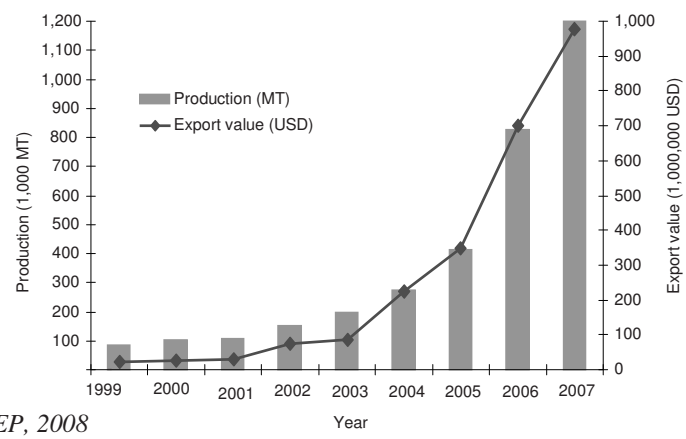
	Observed in 2005	Estimated for 2010
Production (tonnes)	1,507,160	2,100,000
Fresh water farming	958,870	1,000,000
Shrimp	324,680	400,000
Marine fish farming	3,510	200,000
Mollusks	114,570	380,000
Seaweed	20,260	50,000
Others	85,270	72,000
Export Value (mil. USD)	1,627	2,500
Labor (person)	2,550,000	2,800,000
Areas (ha)	960,000	1,100,000

Source: MOFI, 2006.

According to MOFI (2006), Pangasius production will reach up to about 1 million tons and 1.5 million tonnes by the year 2010 and 2015, respectively. Remarkably, production has increased already to 1.2 million tonnes in the 2007 (MOFI, 2008) (figure 2.2). This production accounts for more than 50% of the total aquaculture production of Vietnam (VASEP, 2008). Within 10 years (1997–2007), farming areas increased about eight-fold from 1,250 ha to 9,000 ha, while the production increased 45-fold from around 22,500 tones to 1,200,000 tonnes.

At the moment, black tiger shrimp and Pangasius are the main aquaculture products in Vietnam due to their high export value in various foreign markets.

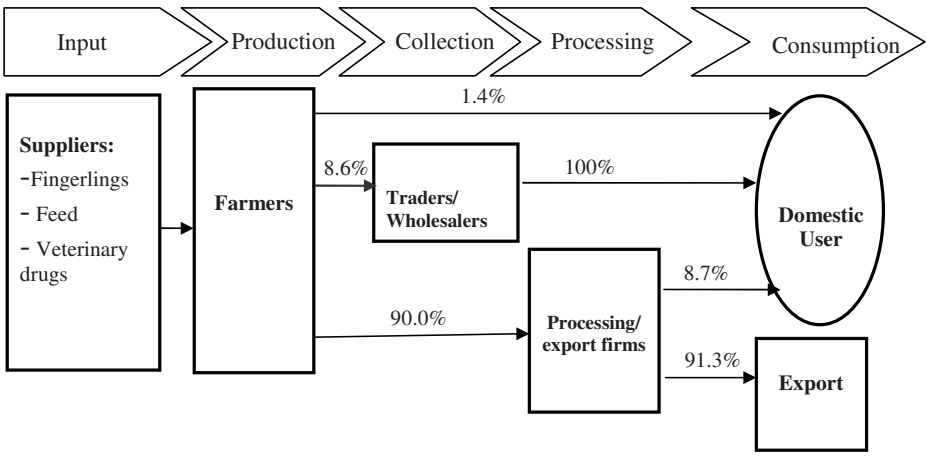
Figure 2.2 The development of Pangasius culture 1999-2007



Source: VASEP, 2008

Figure 2.3 shows the supply chain of Pangasius products. The main activities of supply chain actors are analyzed in chapter 5. Primary actors in the value chain include hatcheries, fish farmers, traders, and processing/export firms. Supporting actors include suppliers of inputs, service providers, and institutions.

Figure 2.3 Supply chains of Pangasius products

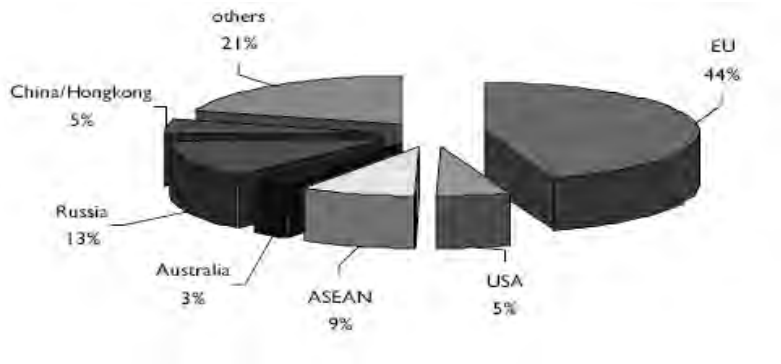


Source: Adapted from Loc et al., 2009.

The Pangasius supply chain in Vietnam is predominantly export oriented. As a result, trade makes up approximately 91.3% of total production and targets well established markets such as the Eureopean Union and the United States, as well as emerging markets such as Russia and ASEAN member countries (figure 2.4).

At the moment, Pangasius is exported to over 80 countries world wide (VASEP, 2008). The total value exported in 2007 was almost 1 billion USD, an increase of 34% in value compared to 2006. In 2009, the Pangasius exported value was almost 1.34 billion USD, and the European Union has remained the largest importer of Pangasius (see figure 2.4). In terms of expected market demand in the near future, a prosperous time lies ahead for the Pangasius sector. Consumption of white fish fillets is increasing, and wild stocks, especially in Europe, continue to decline (Globefish, 2008).

Figure 2.4 Market share of Vietnam's Pangasius exports in 2007



Source: Globefish, 2009

The Pangasius processing firms developed rapidly. Within a 10-year period (1997–2007), 40 processing plants with a combined capacity of up to 3,500 tonnes of raw fish daily were established, mostly in the MRD. This growth resulted in an increase of over 55-fold, from 7,000 to 386,870 tons of exported fillets (VASEP, 2008). In terms of value, the Netherlands and the United States paid the highest average price per imported kilo, while Russia and the Ukraine paid the lowest (Table 2.4).

Table 2.4 Volume, value, and average price of top ten Pangasius importers in 2008

Market	Volume (Tonnes)	Value US$ (1000)	% Change by volume 2007-2008	Average price (US$/kg)
Russia	118,155	198,500.40	43	1.68
Spain	46,237	119,753.83	29	2.59
Netherlands	33,278	89,850.60	24	2.70
Germany	41,959	108,673.81	23	2.59
Ukraine	74,359	131,615.43	221	1.77
USA	24,179	76,647.43	33	3.17
Poland	37,056	81,893.76	-46	2.21
Italy	16,137	41,149.35	33	2.55
Mexico	23,154	59,737.32	164	2.58
Egypt	26,630	57,787.10	350	2.17
Sub-totals	441,144	965,609.03	87	2.18

Source: VASEP, 2008.

Pangasius farming in Vietnam predominantly concerns smallholders. On average each farm has 2.3 employees and the farm size is 0.66 ha (GSO, 2007). Pangasius production supports the livelihoods (directly and indirectly) of 105,535 individuals and provides an additional 116,000 jobs in the processing sector (VASEP, 2008). Around 90 percent of the farms in the Mekong Delta are privately owned by farmers who have developed their skills through experience rather than any formal education (World Bank, 2006). Involvement of small-scale farmers is a prerequisite for sustainable management of the sector (World Bank, 2008). Mantingh and Dung (2008) revealed that the small-scale farm of 1,000 m^2 and a harvest of 20 MT/cycle makes a profit of VND 40 million per year. This number is 15 times the poverty line according to Vietnamese standards and 3.5 times the international poverty line.[3] Therefore, it is necessary to ensure their continued participation in the increasingly stringent international trading environment for aquaculture production.

2.3 Pangasius production systems

Pangasius culture

Pangasius hypophthalmus (Tra fish) Pangasius bocourti (Basa fish)

Two Pangasius species are used in commercial aquaculture in the MRD: *Pangasius hypophthalmus* (in Vietnamese: Tra) and *Pangasius bocourti* (in Viertnam: Basa). Currenly, Tra is the most popular species due to a high yield and a shorter production cycle (Basa has to grow for eight months compared to six months for Tra). Basa also requires a higher water quality than Tra, and has a lower dress-out weight, which is the amount of fish required to produce one kilo of fillet. For Tra, 3.1 kg of fish are necessary to produce 1 kg of filet whereas up to 3.8 kg of Basa are needed for the same amount of filet (MOFI, 2006). According to VASEP (2007), more than 95 percent of total Pangasius production belongs to the Tra species. From here on, the name "Pangasius" refers to Pangasius hypophthalmus.

[3] According to the UN (2005), the poverty line is at 2 USD/day (32,000 VND/day).

Pangasius hypophthalmus is an omnivorous species, native to the Mekong River. It feeds on fish, crustaceans, and vegetable matter. Pangasius is an easy fish to culture as relatively little farming technology is needed. The Pangasius is cultured at high stocking densities as they survive in poor water quality and at low oxygen levels (Hill and Hill 1994; MRC 2001).

Pangasius aquaculture has existed in the Mekong Delta since the 1950s. The farmers collected the fish larvae from the Mekong River during the early flood season. The larvae were then nursed in small ponds and provided to local farmers, who produced the fish for local consumption. However, since the 1990s the Pangasius culture has developed rapidly because of rising demand in foreign markets and improved production and management techniques like induced reproduction, feed quality, water management, and pond design.

The MRD is the main area of national freshwater fish production. The highest fish production is in An Giang, followed by Can Tho and Dong Thap. In 2005, the An Giang, Dong Thap and Cantho provinces produced 145,500 tonnes, 93,000 tonnes, and 81,500 tonnes of Pangasius, respectively (VASEP, 2006). Pond culture of Pangasius is expected to expand rapidly in order to meet the national target.

There are three production systems in Pangasius farming: ponds, cages and net-pen enclosures (World Bank, 2006). The design and construction of the different systems is highly dependent on the location and farm configuration.

- Ponds

The use of ponds for Pangasius culture is the dominating system and is increasing rapidly. Ponds range between 350 and 16,000 m^2, and farmers have several ponds in their farms (Survey 1, 2008). However, the majority of the Pangasius are produced in small-scale ponds. The ponds are designed rather simply without water storage or a reservoir. Water is refreshed continuously by pumping from the canal/river. However, the same canal/river is often used for water discharge and supply. There is no water discharge treatment, which increases river pollution and disease transmission. After every harvest, the accumulated waste at the bottom of the pond is often removed and either released into the river or treated and used for agriculture fertilization or for reinforcement at the pond banks. In most places pond culture has not yet been planned. Ponds are located near river banks and islands (on average 30-50 m); however, in some cases, the pond is far away from the nearest water source, causing difficulties in water exchange.

Pangasius culture in pond

- Cages

Open systems, like floating cages are designed to keep a continuous water exchange environment by utilizing the current river water as much as possible. In comparison with ponds, cages allow higher fish densities and have a higher productivity. Cages vary from 100–1500 m^3 and are normally submerged in the river close to the riverbank. The distance between cages is 2-3 m (if the cages belong to one household) and 5-10 m (if the cages belong to different households). The density of cages is high in areas where the water current is strong. A disadvantage of cage culture is that it produces more waste than the pond system, as uneaten feed and feces drift away with the water's current. Cage culture requires a relatively high initial capital investment; hence, this type of culture system is mainly applied by the rich households.

Pangasius culture in cage

- Net-fence enclosures

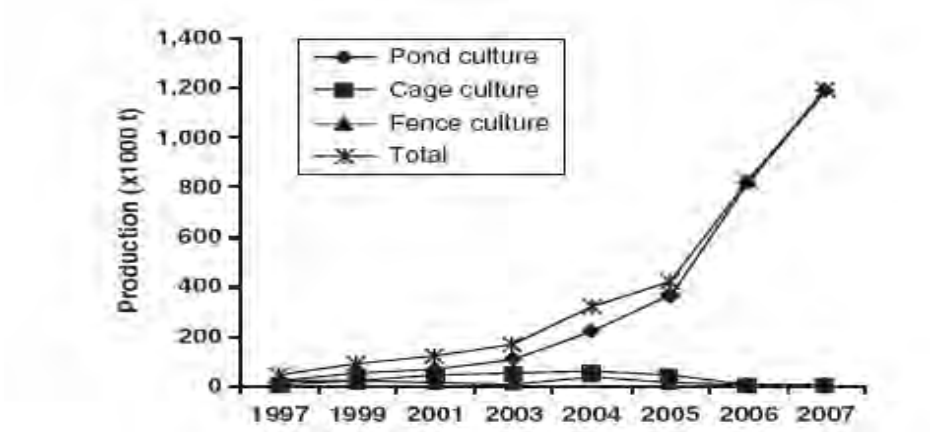
To culture in enclosures, nets or fences are used to isolate a section of the river. The ground of the enclosure is the river floor, which contributes to a reduced need for construction material. Another advantage of this type of enclosure is

that the amount of wasted feed is lower compared to cages because the feed falls to the riverbed where it can still be eaten by the Pangasius, which is a bottom feeder. These factors explain the growing popularity of production in enclosures.

Pangasius culture in net-fence enclosure

The pond aquaculture system is the most widely used and generates the best results in terms of productivity and environmental concerns. Figure 2.4 shows the development of the Pangasius aquaculture production system from 1997-2007. This figure reveals that Pangasius production was almost 1,200,000 tonnes, at which pond culture reached the highest production share (95 percent of Pangasius production in ponds). Therefore, in this research we restrict attention to the Pangasius pond culture.

Figure 2.5 Development of Pangasius culture production systems 1997-2007 in Vietnam.



Source: Phuong et al., 2009.

2.4 Development of the regulatory framework

Economic renovation, or "Doi moi," policies implemented at the end of the 1980s, and in particular at the beginning of the 1990s have been important to the development of all sectors of Vietnam's economy, including fisheries and aquaculture. This implementation has led to a gradual shift away from state control to market-based mechanisms. Despite this shift, the government of Vietnam maintains an extensive legal and regulatory framework for the development of the fishery sector, governed primarily by the Ministry of Agriculture and Rural Development (MARD) and the Prime Ministers Office. Aside from the policies and regulations issued by the central government, some local policies are implemented at the provincial level. This framework is in principle geared to reorienting the nation's economy to higher performance in international markets.

Since 1999, the Vietnamese government has promoted the diversification policy with the goal to increase the contribution of aquaculture to economic growth. As a result, the total aquaculture production of the MRD in 2006 was 1.17 million tons, from a culture area of 691,200 hectares (GSO, 2008). This growth resulted in an increase in demand for fingerlings production.

Food safety and quality is one of the major issues in the regulatory framework. As noted earlier, the Ministry of Fisheries is the highest authority for the issuance of all decrees and regulations in the fields of food safety and quality, environmental protection, fisheries resource development and protection, veterinary drug use and production, and training on food safety and quality. At the local government level, the Department of Fisheries is responsible for implementing and expanding the decrees and regulations to other relevant departments, lower management authority, processing/export firms, and farmers, as well as for receiving their feedback (Loc, 2006; Khoi, 2007).

The regulations have put in place a stringent system of advanced production techniques, pond design and construction, and appropriate planning for aquaculture. However, the implementation of the policies is hampered by poor institutional enforcement (see 6.2.1 and 8.2.1).

Technical standards[4] for private sector investment and management in the fishery sector were approved in 1999, standards for brood-stock and fingerlings in 2001, and grow-out farm standards in 2002. The use of fingerlings, feed and chemicals/drugs has increased due to the expansion of aquaculture. The MOFI issued lists of permitted and prohibited chemicals/drugs for aquaculture in May 2002. All were updated in 2004 outlining lists of prohibited and permitted

[4] Standards are rules, regulations, or procedure that specify characteristics that must be met by a product. In addition, standards are used to assess the level of performance to measure whether a product can be certified.

chemicals and drugs for aquaculture. Despite the development of these standards, widespread use of banned substances in aquaculture still exists (see more details in chapters 5 and 6).

Credit for commercial fish is one of the most important constraints for aquaculture development, both for the poor and rich households. Greater support of aquaculture through loans has been given, first to successful farmers, next to farmers with a land certificate, and then to groups of farmers. The financial institutions, which have provided the bulk of this form of credit, include the Vietnam Bank for Agriculture and Rural Development (VBARD), the Development Assistance Fund (DAF), the Bank for Investment and Development of Vietnam (BIDV), INCOMBANK, Marine Bank and other financial institutions. In addition, provincial governments and other government bodies invest directly in government-owned fishery and fish processing enterprises. However, the amount of loans is commonly insufficient. Pangasius farmers with a land certificate can borrow up to 100 million VND, and those without a land certificate up to 10 million VND (MOFI, 2006). For a Pangasius farm, a total loan of VND 100 million covers only a small portion of the total financial needs. For example, small-scale farmers managing a 5,000 m^2 pond require a budget of 3 billion VND (see appendix 5.1).

Extension centers play an important role for the dissemination of regulations, technology transfer and training of the farmers. The Central Aquaculture Extension was established in 2000 and renamed the National Fishery Extension Center (NAFEC) in 2003. The NAFEC under MOFI is responsible for fishery extension services at the national level. In the provinces where fisheries and aquaculture contribute significantly to the local economy, a Department of Fisheries on the provincial level is established together with an extension center. All extension activities are combined under the management of the division of agriculture/forestry, and fisheries at district and commune levels. These extension services are pivotal for the dissemination of market information to farmers.

2.5 Organization and certification

Organization of fish farmers for quality compliance

As food quality and safety measures become more stringent in export markets Pangasius small-scale farmers will be forced to adapt their practices to maintain market access. The An Giang Fishery Association (AFA), a provincial branch of the Vietnam Association of Seafood Exporters and Producers (VASEP), has emerged as a key stakeholder in the industry. AFA was established in 2003 and has more than 850 members, including farmers, hatchery operators, processors and fish feed producers. The organization was established after the US anti-dumping case to better liaise between processing companies and farmers in an

effort to establish standards for quality and to negotiate prices. This organization plays a key role in bridging the gap between the processing/export companies and the farmers, satisfying each other's needs for a good price and good quality and also in balancing supply and demand. In 2007, An Giang province produced 250,000 MT of Pangasius for export, 60% of which was produced by AFA members (Source: AFA, 2008). The need for more stringent quality assurance has forced a trend towards company-owned farms or affiliated companies' farms rather than processors dependent on the supply of individual farmers (section 8.3).

Since 2005, AGIFISH Company has pioneered the development and implementation of the Pangasius production chain. As a result, AGIFISH Pure Pangasius Union (APPU) has been established. The objective of APPU is to produce Pangasius products free of banned antibiotic and chemical residues, reduce negative impacts caused by price fluctuation and ensure constant supply of raw fish for AGIFISH Company. Moreover, APPU provides high quality and guarantees traceability of products. Currently, APPU is a new model that coordinates the activities of five stakeholders in the value chain: hatcheries, farmers, feed suppliers, veterinary drugs suppliers, and processors. In particularly, APPU has provided technical and financial support to its members in the form of high quality fingerlings, trade credit on feeds, free fish-disease testing, and disease prevention/treatment's advices. Additionally, APPU members also receive information on export markets as well as hygiene and food safety of each market. APPU has 32 members (all SQF certified). The APPU members apply SQF standards and use industrial feed so as not to pollute the water. Moreover, members receive SQF training that teaches them how to use chemicals and antibiotics in Pangasius production to meet the customer's safety requirements. In 2007, APPU was granted SQF 1000^{CM} for farmers and SQF 2000^{CM} for processing plants. This means that the APPU brand has been accepted in foreign markets for product traceability.

Certification processes of public governance initiatives

In Vietnam, the state authority NAVIQAVED, situated in the Ministry of Agriculture and Rural Development (MARD), took the lead in developing a Pangasius brand in 2006 to better capture the market niche that the fish holds in world markets. As part of this brand, the Swiss multinational Société Générale de Surveillance (SGS), a third party auditor specializing in food quality and safety systems such as Safe Quality Food (SQF) standards based on the HACCP system, has provided support to improve the quality, safety and traceability of the product in the supply chain. However, because contaminations typically occur through the application of chemicals and anti-biotics during production the industry is also moving to certify farmers through the SQF 1000 standards.

These standards assure traceability through each stage of production from hatcheries to growth in ponds.

In general, certification schemes are used by large-scale rather than small-scale producers because of the high cost involved in certification. Farmers often complain the unequal balance between the costs and benefits among the different stakeholders[5] because the standards require investments from the farmer, but benefits often do not increase (FAO, 2007). Currently, three standards are used in Pangasius farming: SQF 1000^{CM}, Naturland organic and Bio Suisse. In addition several new standards are in progress: Global-GAP (testing phase), BAP, Vietnam-GAP, and a standard through WWF's aquaculture dialogue, BMPs for Pangasius aquaculture that are currently being developed and refined for Pangasius in the Mekong Delta. These standards are discussed in appendix 2.1.

In short, the main obstacles for small-scale farmers to comply with any of the schemes are 1) lack of knowledge about the available schemes, 2) difficulties in complying with the schemes technically, 3) lack of training possibilities, and 4) the high cost of certification (Flavio et al., 2007). The growing number of certification programs results in confusion among buyers and consumers (PAD, 2008). FAO is presently working on an analysis of different certification systems. The FAO is also working with certification bodies, producer groups, processors, and consumer organizations to draft guidelines on how aquaculture certifications should be established and applied. To comply with quality standards, the small-scale farmers should conduct better management practices (BMPs) as a prerequisite for the development of HACCP–based standards. Consequently, BMPs are targeting small-scale farmers to improve their management practices (see appendix 2.1 for more details).

Donors and investments

Donors have contributed substantially to the development of the fisheries sector. Denmark (DANIDA) has been a key donor since the beginning of the 1990s and is still considered the major foreign partner for the Ministry of Fisheries in the years to come. The first Fisheries Sector Programme Support (FSPS I) 2000-2005 supported reforms in the fisheries administration, including in the Vietnamese Ministry of Fisheries. The second phase (FSPS II), from 2006-2010, builds on the experiences and activities from the first phase of the program. It includes the following four components: strengthening of the fisheries administration, strengthening the management of fisheries caught, sustainable development of aquaculture, and strengthening the capacities of post-harvest and

[5] Farmers have the longest time for Pangasius production (average is six months) and take more risks in term of investment costs and market access (Khoi et al., 2008).

marketing. The total budget frame of ongoing development projects and programs within the fisheries sector is around US$ 60-65 million, of which DANIDA accounts for approximately US$ 45 million. The second most active donor in the Pangasius sector is the German. Gesellschaft fur Technische Zusammenarbeit (GTZ), which has funded a small and a medium enterprise development program. In the Pangasius sector, several components comprise the GTZ program, including public private partnership (PPP) on organic Pangasius farming in An Giang in 2004, development of the Pangasius Global-GAP; and value chain analysis of the Pangasius sector. The projects are all focusing on the An Giang province.

AusAid funds the development of Better Management Practices (BMPs) for Pangasius aquaculture in the Mekong Delta. The project aims to develop and facilitate adoption of BMPs for Pangasius farming that will increase the profitability and environmental performance of farmers through more efficient use of resources. Implementation of these practices will reduce farmers' risk profile and environmental impact and contribute to the wider sustainability of the industry as a whole. The Australian Center for International Agricultural Research (ACIAR)'s program in Vietnam commenced in 1993. Since that time, a significant program in forestry, land and water resources, animal sciences, crop sciences, fisheries and post-harvest technology has emerged. While training remains very important, an evolution has occurred from a predominant emphasis on capacity building to one on practical farmer and policy impact.

(See appendix 2.2 for an overview of on-going donor projects and programs).

2.6 Conclusions

Vietnam is now the third largest producer of world fresh aquaculture and Pangasius has been a keystone of this growth. The Pangasius industry is comprised of many smallholders facing major challenges regarding food safety requirements in major export markets, and in particular, the European Union.

After two decades of steady production growth serious concerns exist regarding the environmental sustainability of the system and in particular the exploitation of wild fish stocks for feed, veterinary drugs on the farms, and water pollution. In response to these concerns, several international NGOs and processing companies have begun to develop and implement social and environmental certification programs of Pangasius aquaculture in Vietnam. Some examples are Naturland Organic Standards, Global-GAP (formerly EUREP-GAP), Safe Quality Food (SQF) 1000 and 2000, and BMPs, which are more focused on food safety issues, but include elements of environmental and social sustainability. To date, the number of smallholders involved in these programs is quite small. This

fact underlines the relevance of the major problem under study: the design of an export-oriented supply chain based on small-scale farming systems.