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**A comparative analysis of Bangladesh, India, Thailand, and Vietnam
With particular reference to institutional and socio-economic aspects**

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Vietnam Shrimp Farming Review

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ACRONYMS

ADB	Asian Development Bank
AIT	Asian Institute of Technology
MoFi	Ministry of Fisheries of Vietnam
DoFi	Provincial Department of Fisheries
DOSTE	Provincial Department of Science, Technology and Environment
IDRC	International Development Research Centre
IFEP	Institute for Fisheries and Economic Planning
IUCN	World Conservation Union
MOSTE	Ministry of Science, Technology and Environment
NACA	Network of Aquaculture Centres in Asia-Pacific
NGO	Non-Government Organisation
GO	Government Organisation
OXFAM	Oxford Famine Relief
RIA-1	Research Institute for Aquaculture (No. 1)
RIA-2	Research Institute for Aquaculture (No. 2)
UNDP	United Nations Development Programme
UNOPS	United Nations Office of Project Services
VASEP	Vietnam Association of Seafood Exporters and Producers

Vietnam Shrimp Farming Review

1. INTRODUCTION

Driven by high demand from affluent consumers in the north and the urge for foreign currency earning to support socio-economic development as well as attacking poverty in coastal areas, shrimp farming has been promoted by the Government of the south-east developing countries during the last two decades.

In Vietnam, under current situation, shrimp farming is explicitly encouraged by the Government and local authorities especially after the country carried out the economic reform (1986) and recently with the promulgation of the resolution No.09 of the Government allowing transformation of low productivity rice/salt fields into shrimp aquaculture. The boom of the shrimp farming has given opportunities for coastal communities to improve livelihoods, increase income and create employment as well as earned foreign revenue for the country. In 2001 export values of the fisheries sector rank the third after crude oil and garment exports. In many cases the development of the sector has contributed to poverty alleviation in coastal communities (Nhuong 2000; MoFi 2002).

However concerns regarding sustainability, environmental and social impacts of shrimp farming have been raised in Vietnam by international and national public and research communities. Within this development context, Vietnam joined in the PORESSFA project which aimed at addressing the following question: "Can shrimp farming be a reliable factor for rural development and national economic growth for third world countries in Asia and if so, under which social, institutional and environmental conditions?"

This literature report of Vietnam's shrimp farming is prepared in fulfilment of the PORESSFA's first workphase.

The aims of the report are:

- Review the current status and trends of shrimp farming development in Vietnam
- Synthesize environmental impacts and economic performances of the different types of shrimp farming activities taking account the specific economic and resource endowments of the country
- Synthesize institutional arrangements and social impacts of shrimp farming activities.
- Introduce and discuss some key-concepts relevant such as globalisation, sustainable development, and economic growth in the specific context of Vietnam.

2. OVERVIEW OF VIETNAM'S SHRIMP FARMING

Shrimp farming began in Vietnam about 100 years ago (Nguyen Trong Nho 1985), however modern shrimp farming was started after 1980s since the country launched the economic reform (Doi Moi) and the Government explicitly encouraging the development of shrimp farming. The sector has been expanding very fast since 2000 when the government issued the resolution 09/NQ-CP allowing farmers to transform coastal saline rice fields into shrimp farms. Report from the MoFi (2002) showed that in 2001 Vietnam used 478,800 ha for farming shrimp, increased by 42,6 per cent compared to 2000.

Up to date, Vietnamese shrimp farming is unevenly distributed along 3,200 km of coastline from the northern tip of Quang Ninh to the southern tip of Ca Mau province. Most of the farms (nearly 90 %) were located in the southern part of the country from Vung Tau to Ca Mau peninsula (Table 1). In terms of area used for shrimp farming the current figure put Vietnam at the top of shrimp producing countries (Vietnam passed Indonesia that used 350,000 ha for shrimp farming according to FAO statistics in 2000). However Vietnam's shrimp farming continues to show trends of area expanding and increasing intensification as indicated in the National master plan for aquaculture as well as coastal provincial aquaculture plans for a period of 2000 - 2010.

Table 1: Shrimp farming area in Vietnam in 2001 by regions

Northern		Central		Southern	
Province	Area (ha)	Province	Area (ha)	Province	Area (ha)
Quang Ninh	7.100	Da Nang	255	Ba Ria-Vung Tau	3.438
Hai Phong	6.929	Quang Nam	1.480	Dong Nai	
Thai Binh	2.064	Quang Ngai	1.920	HCM City	2.935
Nam Dinh	3.484	Binh Dinh	2.457	Long An	3.236
Ninh Binh	1.912	Phu Yen	2.593	Tien Giang	2.385
Thanh Hoa	3.569	Khanh Hoa	5.033	Ben Tre	49.877
Nghe An	1.887	Ninh Thuan	1.150	Tra Vinh	12.950
Ha Tinh	1.400	Binh Thuan	1.500	Soc Trang	42.500
Quang Binh	948			Bac Lieu	88.231
Quang Tri	680			Ca Mau	202.000
Thua Thien Hue	3.787			Kien Giang	21.100
Total	33.760		16.388		428.652

Source: Ministry of fisheries, 2002

There is a very large diversification of shrimp farming systems in Vietnam. Regarding cultured species, traditionally there were four species of shrimp farmed in Vietnam namely *Machrobranchium rosenbergii* (freshwater prawn), *Metapenaeus ensis*, *Penaeus merguensis* and *Penaeus monodon*. *Penaeus monodon* is now the most popular cultured species of Vietnamese shrimp farmers. However, *Penaeus monodon* requires quite high salinity and temperature conditions means that the Mekong Delta are not suitable for this species during the rainy season and neither the Northern provinces in the late autumn and winter time. Recently *Penaeus vannamei* was introduced in Vietnam and it is in trial process. *Penaeus Vannamei* was considered as a good potential for culture in the Mekong delta in rainy seasons and in the Northern provinces in the autumn and winter time (MoFi 2002). *Penaeus Vannamei* culture is expanding given the successes of Chinese introduction of the white shrimp in recent years. Introduction of the white shrimp has environmental risks which will be discussed in the environmental impacts session.

Regarding hatcheries operation, at the end of year 2001 Vietnam has 4,077 shrimp hatcheries nationwide, producing 16 billion larvae (PL15) and meeting the demands of the farmers (MoFi 2002). Distribution of hatcheries in Vietnam is presented in Table 2. Most of hatcheries are located in the South Central of Vietnam where there are favourable conditions for hatching and abundance of shrimp broodstock. In the northern region, hatchery is the most important issue because farmers in the northern region still depend heavily on shrimp seed from the central region. The dependence of the North on the Central on shrimp seed exposed the north to a high risk of disease and crop failure due to low quality and insufficient seed supply. It is probably a key constraint explaining less development of shrimp farming in the

North in comparison with the Central and the South. The North has been trying to produce seed and has got success recently.

Table 2: Distribution of hatcheries and larvae production in 2001 by regions

Region	Number of hatcheries	Seed production (million PL15)
North	41	504
Central	2,922	11,751
South	1,114	3,745
Total	4,077	16,000

Regarding growth-out shrimp farming systems, worldwide shrimp aquaculture is often classified as extensive, semi-intensive, intensive and super-intensive mostly according to stocking density (NACA 2002). In Vietnam shrimp farming methods are also categorized as extensive, “improved” extensive, semi-intensive and intensive. However ranking criteria are sometimes different from province to province therefore the described categorisation of shrimp farms below has a relative meaning.

2.1. Extensive farming

This farming method is very popular in Vietnam, especially in the Mekong River Delta (ADB 1996; RIA2 2003). In the extensive system, pond size often varies largely from 1 to 3 ha for household farms and from 5 to 50 ha for state farms (Vu Do Quynh 1992; RIA2 2003). Shrimp seed are trapped from wild stock which based on tidal water regimes and sometimes farmers supplement hatcheries seed with a density of 1 individual/m². There is no additional feed required in this system as shrimp use natural feed in pond (Can Tho University 1994). The average shrimp productivity of the system was 100 - 150 kg/ ha/ year (MoFi 2002).

2.2. Improved extensive farming

This method is similar to the extensive system but the difference is apart from shrimp seed traps from the wild, farmers additionally stocks with artificial hatcheries seed and takes care of feeding management. Additional shrimp stocking density in the system is often from 2-4 postlarva/m² (MoFi 2002). The improved extensive as well as the extensive farming system are actually polyculture as stated by ADB (1996) “It is particularly common in improved extensive systems to find farmers harvesting seaweed, fish, and crabs from their ponds”. The productivity of shrimp in improved extensive ponds is about 250- 500 kg/ha/year (MoFi 2002).

2.3. Rice-shrimp farming

This system has been practised for decades in coastal provinces of the Mekong delta (Vuong 2002). In the rice-shrimp system, traditional rice fields were modified with a trench and dike around the periphery of the field. Farmers often stock *Penaeus Monodon* with a rate of 1-2 individuals per m² (Brennan et al. 2002). Average shrimp productivity of this system was reported as high as 200-300 kg/ha/crop (MoFi 2002). The rice-shrimp farming model has been actively promoted by the MoFi since 1998 and during the last 5 years it has been expanding fast, especially after the promulgation of the Governmental Resolution of 09/NQ-CP regarding transformation of saline rice fields into rice – shrimp integration.

2.4. Mangrove- shrimp farming

This system is widely practiced in the Mekong delta. In terms of physical allocation of “pond” and mangrove areas Clough et al. 2002 stated that there are two types of farming systems called mixed and separate mangrove-shrimp farming. Most farmers use the extensive

culture system which relies on wild seed and natural food derived from mangrove material (Binh and Lin, 1995), however, recently farmers have made efforts shifting to improved extensive systems (Minh 2001; Clough et al. 2002).

In this system, farm size ranges from 2-17 ha sometime to 20 ha (Clough 2002; Minh 2001). The area devoted to shrimp ponds appeared in forms of canals and ditches which accounts for 15 to 50% of total area (Minh 2001; Binh 1994; Jonshon et al. 1999). According to Binh (1994), the farming system with a mangrove cover of 31 - 50% of the pond area gave the highest net profit and return to annual investment. It is difficult to estimate productivity of the mangrove-shrimp farming systems because beside shrimp farmers also harvest other products such as wild shrimp species, fish and crab. However in case studies in the Mekong delta, a natural shrimp productivity was estimated as 290 kg/ha/year (Minh 2001), 265 kg/ha (Binh 1994) and 286 kg/ha (Johnston et al. 1999).

Minh (2001) categorized four existing models of mangrove - shrimp aquaculture integration namely extensive (traditional), improved extensive shrimp, improved extensive shrimp cum crab and improved extensive shrimp cum crab and cockle. The productivity of these four models was documented as follows:

Table 3: Productivity of different mangrove- shrimp farming systems in Mekong delta

Items	Extensive	Improved extensive shrimp	Improved extensive shrimp cum crab	Improved extensive shrimp cum crab and cockle
Productivity (kg/ha/year)	290	333 ± 111.4 72 ± 85.5 24 ± 13.3 (crab)	425 ± 102.1 107 ± 89.9 65 ± 49.6	400 (natural) 313 (<i>monodon</i>) 60 (crab) 1,323 (cockle)

Source: Minh 2001

2.5. Eco-shrimp farming

This is basically a method of extensive farming system characterized by a low stocking density and relied on natural feeding.

2.6. Semi-intensive farming

Up to date semi-intensive shrimp farming accounted for 5 % of the total shrimp farm areas in Vietnam (IFEP 2002). However the number of farms practising the system is increasing because it is viewed as the most successful method and therefore is being promoted and adopted by the Government, local authorities and farmers. Pond size in this system is small, ranges from to 2 ha. The stocking density is from 5-15 post larvae per m². Average productivity varies from 1,000 – 1,500 kg/ha/year (MoFi 2002).

2.7. Intensive farming

Intensive shrimp farming introduced to Vietnam since 1989 and started in the central (Khanh Hoa DoFi 2002). With pond size varies from 0.2 to 1 ha and stocking density from 15 - 30 post larvae per m², the average productivity of the system is reported as a range from 2,500 – 4,000 kg /crop/ ha/year (MoFi 2002).

2.8. Shrimp farming in sandy land

Recently (1999) shrimp farming in sandy land is initiated by farmers in Ninh Thuan province then it was quickly developed in other central provinces such as Phu Yen, Binh Dinh, Quang Ngai, Thua Thien Hue, Quang Tri and Quang Binh. At present, there were an estimation of 540 ha of sand land used for shrimp aquaculture with an average yield varies from 3 to 6 tones per ha per crop (Nguyen Hai Duong 2002). MoFi (2002) estimated that in the coastal central provinces with a coastline of 930 km, there are 15,000 ha of sandy land cultivable for shrimp aquaculture. Due to its special concerns in 2002 the MoFi in collaboration with IUCN organised a workshop entitled “expanding shrimp aquaculture on sandy land in Vietnam challenges and opportunities”. As argued in the workshop the sandy land shrimp aquaculture is an option for maintaining efficiency of Vietnam’s shrimp farming in the world market.

Down to country level, there is much different from region to region in terms of shrimp farming development. The southern coastal provinces in 2001 used 422,279 ha accounting for 88 per cent of the total shrimp farming area. The average productivity of the South was only 323 kg/ha, decreased 12 percent compared to the productivity of the region in 2000. The central coastal provinces had 16,388 ha for shrimp aquaculture, producing 23,727 tonnes of shrimp and accounted for 14% of total farmed shrimp production. This region were the most successful shrimp producers with an average of 1,607 tonnes per ha and 4.4 times higher than average productivity of the country (MoFi 2002). The north coastal provinces from Quang Ninh to Thua Thien Hue used 33,760 ha for shrimp culture and accounted for 7% of Vietnam’s shrimp farming areas. The production of this region was 7,934 tonnes, approximately 5% of the total production. The productivity of the North is still very low (272 kg/ha), however, some provinces in the region have higher high productivity such as Quang Tri (803 kg/ha) and Thua Thien Hue provinces (609 kg/ha). As stated by the Ministry of fisheries (2002), compared to other regions shrimp farming in the North is very basic and is at “the beginning to prepare knowledge, experiences and infrastructures to be ready for future shrimp aquaculture operation”. The government and provincial authorities in the North have made various plans to exploit coastal areas for ponds for shrimp aquaculture.

Compared to other regional countries, Vietnam’s shrimp farming is technically lagged behind. Most of shrimp farms in Vietnam are now in extensive and “improved extensive” systems. According to the Ministry of fisheries (2002), in total of 478,800 ha used for shrimp farming in 2001, proportion of intensive and semi-intensive farming was 1 % and 5 % respectively. The ratio of intensive and semi-intensive farming has reduced in comparison with the figure estimated by the NACA/ADB survey in 1996 (extensive, semi-intensive and intensive ratio by that time was 5 and 15 respectively) due to the absolute increase of extensive farming systems in recent years was higher than that of intensive and semi-intensive ones. Shrimp productivity in Vietnam is very low compared to other South-East Asian countries. The average productivity in 2001 was 340 kg/ha whereas other regional countries such as Thai Land reached 3 metrics tones per ha. This lagged shrimp farming development in Vietnam compared to other shrimp producing countries has socio-economic and environmental implications which will be discussed in later sessions.

Shrimp farming development is receiving strong supports from the Government, private investors and international donors. Most of shrimp farms in Vietnam are operated by local small scale farmers. However the Government provides incentives promoting shrimp aquaculture through a number of supportive policies and instruments such as preferential taxation and credit programs as well as technical extension services. The Government support could be appeared in forms of aquaculture development projects. MoFish in 2002 estimated

there are 211 shrimp farming projects being implemented in coastal provinces. VASEP (2003) indicated that there are 343 aquaculture projects being invested in Vietnam.

Box 1: Shrimp farming in Ca Mau

By the year 2001, Ca Mau has a total area of 202,000 ha for aquaculture, of which 18,000 hectares are for shrimp-mangrove culture, 10,000 hectares for shrimp culture in ditches among household vegetable gardens, 147,000 hectares for improved extensive shrimp farming, 26,500 hectares for rice - shrimp farming and 100 hectares of semi-intensive and intensive shrimp farming systems.

The average yield for shrimp culture in Ca Mau province in 2001 was 500 kg/ha for the improved-extensive shrimp farming system, 150-200 kg/ha for the recently changed improved-extensive shrimp farming system in rotation with rice crops, 1-1.5 tons/ha for semi-intensive shrimp farming system and 3-4 tons/ha for intensive shrimp farming system.

(Source: RIA-2 2003)

In line with Government credit policies, commercial bank in Vietnam also stepped in providing loans for farmers for aquaculture development. Recently loans of Vietnam Agriculture and Rural Development Bank invested for aquaculture has showed an increase trend. In 1998 the Bank loaned 262.55 billion VND, in 1999 loaned 443.56 billion VND and the amount of loans in year 2000 was 772.10 billion VND. In year 2001 there were 260,000 households and companies obtained loans from Vietnam Agriculture and Rural Development Bank, of which 259,504 households accounted for 99.8 % obtained loans for aquaculture development.

Recently the Government and local authorities also encourage private sectors to invest in shrimp aquaculture. A number of foreign and domestic private enterprises are now investing in shrimp farming projects such as the Vietnamese – American company (American); the Au Lac company in Quang Ninh; the Huong Giang stock company (Vietnamese); the Long Thang limited company (Taiwan) in Hoi An – Quang Nam; the Duyen Hai – Bac Lieu company; the ASA (American). Most of projects of private enterprises are interested in intensifying shrimp farming. Some tends to develop as a complicated complex including growth-out aquaculture, hatcheries operation as well as mangrove environmental rehabilitation. There are a lot of promises from these investment projects in terms of creating employment opportunities, raising income and living standards for local communities. However there are risks in such enterprise based shrimp projects as experienced from other countries such as India (1996), Bangladesh (1997).

At present, DANIDA, NORAD, ADB, WB, UNDP, FAO, NACA and ACIAR are supporting in the fisheries sector in Viet Nam. Most of projects initiated by international donors are dealing with sustainability of shrimp farming, improvement of coastal zone management and coastal environmental rehabilitation.

Today shrimp aquaculture is very important to Vietnamese economy. The shrimp farming has contributed to improvements of livelihoods for coastal communities (Nhuong 2000). By 2001 there were 580,000 labours employed in growth-out aquaculture (MoFi 2002). Boom of shrimp aquaculture has promoted other backward and forward sectors such as hatcheries, processing, labourers and aquatic product trading. For example in 2001 there were about 4,000 hatcheries (MoFi 2002). Taking the IFEP's estimation into account that on average there were 2.3 persons per hatchery, the hatcheries operation has employed about 9,000-10,000 labours. Shrimp farming has created jobs for coastal poor people. The development of shrimp aquaculture also benefited the country with substantial foreign currency earnings. In

2001 Vietnam exported 87,000 tonnes of frozen shrimp and earned \$780 million (MoFi 2002). The shrimp export values has increased to \$950 million in 2002. Shrimp products were the top among exported aquatic commodities.

3. ECONOMIC OF SHRIMP PRODUCTION

3.1. Hatcheries

Report by IFEP showed that on average, the initial investment cost of hatcheries installation was estimated at 123 VND million per hatchery. The cost includes land lease, house building, tank construction and purchase of equipment and machines (IFEP 2002).

Operation cost of seed production household was 95.12 VND million of which physical cost accounted for 71.88 VND million (75.6%), labour cost accounted for 8.4% and depreciation cost for 11.3% (IFEP 2002). Production cost was 17.82 VND per one P15. Average production of a hatchery was 5.34 million post larva /year. With average selling price of 26.34 VND per post larva 15, the return would be 140.6 VND million per hatchery per year. Return to investment cost was 1.48, which means that each VND production cost would produce revenue of 1.48 VND. Shrimp hatchery could be assessed as a high benefit activity.

3.2. Growth-out production

There are differences in estimation of production costs for different shrimp farming methods in Vietnam. According to an IFEP survey (2002), production cost for intensive and semi-intensive shrimp production was 107.08 VND million /ha, for extensive and improved extensive system was 16.71 VND million /ha. The production costs consist of seed, feed, pond preparation, chemicals and bio-products, labour cost, depreciation of ponds and facilities. Results of a socio-economic carried out by RIA 2 (2002) under the GAMBAS project showed that the cash production costs for the semi intensive, improved extensive method and for extensive rice/shrimp – shrimp methods were 30 million VND, 18 million VND per ha and 8-10 million VND per ha respectively. Cost structure per kg of shrimp produced in the Mekong Delta estimated by NACA/WB survey is presented in the Table 4.

Table 4: Cost structure per kilogram of shrimp in Vietnam by farming system

Items	Semi-intensive (US\$)	%	Extensive (US\$)	%
Fixed cost	1.11	33.2	2.01	66.0
Overhead	0.32	9.5	1.07	35.1
Depreciation	0.79	23.7	0.93	30.6
Interest	0.00	0.0	0.01	0.2
Variable cost	2.23	66.8	1.04	34.0
Feed	0.77	23.1	0.17	5.6
Seed	1.06	31.7	0.42	13.9
Power	0.02	0.5	0.04	1.3
Labour	0.15	4.6	0.24	8.0
Other	0.23	6.8	0.16	5.2
Total cost	3.34		3.04	
Farm-gate price	5.63		2.73	
Profit	2.29		-0.31	

Source: ADB/NACA survey, 1996.

It is interesting to notice that the farm gate price of shrimp produced in extensive farming system is lower than that of semi-intensive system. Farm gate price of extensive farming system is normally expected to be higher as the harvested size of shrimp is higher in this farming method. Estimation of cost to produce shrimp is different could be also due to different estimation methods used by a particular research group. Shrimp culture in Viet Nam is operated by small scale farmers and normally they do not implement record keeping of data relevant to their shrimp production. This could result in differences for cost and return estimations.

Investment cost for extensive (improved) system was 28 VND million /ha, for intensive and semi-intensive was 137.94 VND million /ha. The fixed cost includes pond construction, inlet and outlet system installation, purchase of equipment/facility, installation of electricity and pond lease. Unfortunately no detailed breakdown of cost items is given by the IFEP survey (2002). Average farm gate price was estimated by IFEP (2002) at 109,000 VND, the cost to produce a kilogram of shrimp was 78,000 VND, then the return to investment cost was 1.4, each VND production cost would generate 1.4 VND gross returns. With this estimation shrimp aquaculture in Viet Nam was inefficient.

The production cost of intensive and semi-intensive system was higher than extensive one and in contrary the farm gate price of extensive culture was normally higher. It is therefore the profit return to investment in extensive system is higher than semi and intensive system however the semi and intensive systems produce more products per unit area thus the total profit of the semi-extensive and intensive would be higher given that the market price is stable. Cost components and price per unit changed according to year, seasons and regions. For example in year 2002 the seed cost was lower due to cheap price of seed.

Semi and intensive shrimp production often requires high investment cost which beyond current financial capability of most of Vietnamese farmers. The IFEP survey (2002) showed that total return of shrimp farmer household was only from 50 to 100 VND million per year. This means that for shrimp farmers to move to higher intensification level it is not an easy task and therefore happens only when farmers receive loans from outside stakeholders such as the Bank, relatives or other farmers, etc. Apart from high investment requirement farmers have to gain good knowledge and experience to be ready for semi and intensive farming. The implication is that without Government and private sector interventions extensive shrimp aquaculture will continue to dominate in Vietnam in near future.

4. ENVIRONMENTAL ISSUES

Shrimp culture, while increasing the quantity of exported goods and improving the living standards of local populations in the short term, has caused some negative impacts to the coastal environment. As worldwide, environmental concerns are mangrove deforestation, land conversion into shrimp aquaculture, disease outbreaks, and introduction of new species, salt water intrusion and soil erosion.

Mangrove forest deforestation: The rapid development of shrimp aquaculture has had an impact on Vietnam's mangrove forests. According to Hong (1999) for the last two decades, the greatest threat to mangroves in Vietnam has been shrimp aquaculture. Before the Vietnamese war there were 400,000 ha of mangroves in Vietnam and today it is estimated that about 200,000 ha of mangroves remaining (Hong and San 1993; Hong 1996; EJF 2002).

Causes of mangrove deforestation include the American war, logging, and expansion of rice farming, influx of people and shrimp aquaculture. For example in Ca Mau province mangrove cover has dropped from over 200,000 ha prior to 1975 to 60,000 – 70,000 ha and most of this destruction has been from shrimp aquaculture (EJF 2002).

Today mangrove conversion into shrimp farming is not allowed and the government has made efforts in mangrove protection and mangrove replanting schemes. In mangrove based shrimp farms, models of integrated mangrove-shrimp farming systems are promoted by the Government and local authorities. Still there are concerns over exact models of integrated farming should be used (EJF 2002). Most of farmers now recognise mangrove is not suitable for shrimp aquaculture, especially semi-intensive and intensive farming; however in some places illegal conversion of mangrove into shrimp farms still occurs. Mangrove forest management is facing difficulties since farmers do not have incentives to protect mangroves because there are not much direct benefits for them from mangrove (EJF 2002). Even with state mangrove forest enterprises they have to allocate mangrove patches to farmers because they do not have enough resources to finance mangrove management.

Land conversion into shrimp aquaculture: In 2002 the Government promulgated the resolution No.09/NQ-CP which allows conversion of low and saline productivity rice/salt fields into aquaculture ponds. In 2001 there were about 210,000 ha of saline rice fields and salt pans in coastal provinces, mostly in the Mekong Delta were converted into shrimp ponds (Tran Van Quynh 2002).

Monoculture rice farmers remain among the poorest because rice cultivation produces low benefit (Nhuong 2000; Vuong 2002). In many coastal rice fields where seawater intrusion makes the land unsuitable for rice cultivation, shrimp culture becomes an effective way to utilize available resources (Brennan et al. 2002; Vuong 2002). Integration of shrimp farming in one rice crop areas, affected by seawater intrusion can improve farmers' economic status and made the farming system became more diversified. Shrimp farming is reported 4 times higher than traditional rice farming (Be et al. 1993; MoFi 2002) and there is high market demand for shrimp.

However, there are environmental and social impacts in the conversion of rice paddies into shrimp farms. Lin (1999) stated that conversion of low productivity rice fields into shrimp farms has environmental and social impacts. Shrimp farming earns much higher profit than rice farming that provides strong incentives to farmer's conversion of rice fields into shrimp ponds. Shrimp farming raises land price, farmers who are not able to participate into shrimp culture could rent their paddies to other people. This causes social impacts in terms of livelihood security for coastal people. Without good planning and infrastructure development saline water will intrude further inland making it useless for agriculture and other purposes. Up to date no abandoned land due to shrimp farming is reported in Vietnam because the sector is newly developed in 1990s (EJF 2002). However there is potential risk for Vietnam to repeat Thai's experiences if the Government and local authorities do not take immediate measures to regulate the sector's development (EJF 2002).

Shrimp disease outbreak. Diseases often hit shrimp aquaculture annually resulting in total or partial loss of the sector. In 1994 Vietnam's shrimp farms in the Mekong delta faced great disease. In 2001 statistics of 18 coastal provinces revealed that, 22,694 ha of shrimp farms were affected by disease and some places experienced heavy loss, for example 305 ha in Phu Yen had totally lost (MoFi 2002). In beginning of year 2002 some provinces, especially Me

Kong river delta experienced shrimp farms affected by diseases, mainly on cultured shrimp. These disease consequences have resulted in mass media raising concerns over sustainable shrimp farming. For example Cohen (2002) posted a sensational paper entitled “Sweat and Sour Shrimp” in the Far Eastern Economic Review (FEER). The paper then was translated and posted in some domestic mass media such as Lao Dong newspaper (2002) and Public Science newspaper (2002). These extreme cases revealed that to some extent negative social and environmental impacts do occur in Vietnam however it is not an overall picture of shrimp farming sector in Vietnam.

Introduction of new species: *Penaeus Vannamei* has introduced to Vietnam. In 2002 some pilot sites got success as announced by MoFi (2002). Introduction of new species like *P. Vannamei* has a risk of importing TAURA syndrome. This serious disease had wiped out shrimp industries in Latin American Countries such as Ecuador, Peru.

Environmental pollution: Currently most shrimp farming in Viet Nam are extensive, there is low nutrient, chemicals and antibiotics load of shrimp farming into environment. However shrimp farming is a downstream activity that could receive impacts from others. The government is now supporting an ongoing national environmental monitoring and early warning system in aquaculture.

Chemical and antibiotics use: There is on-going national program to evaluate and control of chemical and antibiotics use in fisheries. Extensive aquaculture use less inputs however more inputs are applied for higher intensive systems. In addition, chemicals and antibiotics could be overused due to lack of know-how of producers as well as suppliers. The Government now traces the chemicals and antibiotic control to its root, from producers as well as suppliers. This is expected to ensure that no trace of chemicals is found in Vietnam exported shrimp.

5. LEGAL ISSUES

Legal documents governing water use and environment protection are found in The Land Law (1993) and the Environment Protection Law (1994). Shrimp farming activity used land/water bodies which currently is viewed as one type of agricultural land. Therefore shrimp farming is subject to the land law (1993, revised 1999) and the environmental protection and management law (1993). Under the two laws, there are a number of decrees, circulars and regulations for shrimp farming regulation (IFEP 2002). For example, the decree on protection and development of aquatic resources was issued by the Government in 1989. Further efforts were made in 1991 (establishment of division of aquatic resource protection) and 1994 (establishment of aquatic resource inspection). This legal framework was mainly focused on fisheries resource protection and was not much relevant to aquaculture as well as shrimp farming.

Currently the fisheries law is under construction with assistance from NORAD. Some articles will be given in the fisheries law for farm establishment, water and land use regulation in aquaculture.

Within management jurisdiction, The Government, the Ministry and Provincial Committee of coastal provinces have issued a number of resolutions, decrees, decisions and regulations to regulate shrimp farming activities.

- Resolution No.09/NQ-CP issued on 15/6/2000 regarding some guidelines and policies for transforming economic structure and consuming agricultural products. One session of the resolution has specified that within 10 years: "focused investment for sustainable aquaculture development: shrimp farming is a major export product in aquaculture. Promote brackish water shrimp farming (tiger shrimp, other shrimp) and freshwater shrimp farming (*Macrobranchium rogeberrii*), combine intensive farming with semi-intensive and eco-farming, of which limit intensive and semi-intensive farming at 100,000 ha, raise shrimp production to above 300,000 tonnes/year". The resolution allowed farmers to convert saline low productivity rice paddies into shrimp ponds. A number of incentives are given such as seed production, soft loan, etc.
- Decree No.64/ND- CP regarding guidelines for allocation of agriculture land to farmers. According to the 64 decree, the state also leases land to individual households, enterprises, and foreigners under special rules.
- Decree No.86/ND-CP issued regarding conditions for involving in fisheries business. The article 9 "conditions for fisheries seed production" and the article 10 "conditions for growth-out aquaculture" are relevant to shrimp farming. Organisations and individuals involving in growth-out aquaculture must fulfil required conditions such as farm establishment in compliance with (aquaculture) master plans, farm systems should fulfil standards for hygiene, environmental protection, feed, chemicals, drugs use must follow regulations, semi-intensive and intensive farming must follow fisheries ministry regulations on control and recognition of safe and hygienic standards.
- Decision No. 103/QD-TTg issued on 25/8/2000 regarding some policies to promote hatcheries development. This resolution has contributed to promote shrimp seed production in such a way that it attracted and created conditions for organisations, individuals, economic sectors to invest and protect seed production. Collateral is not required for loans for less than 50 VND million for fisheries seed production.
- Decision No.03/QD-BTS issued on 23/1/2002 by Ministry of fisheries regarding regulations on management of drugs in livestock and fisheries.
- Decision No.17/QD-BTS issued on 24/5/2002 by Ministry of fisheries regarding list of drugs allow use and limit use in aquaculture.
- Decision No.18/QD-BTS issued on 3/6/2002 by Ministry of fisheries regarding regulations for experiments of fisheries seed, feed, drugs, chemicals and bio-products use in aquaculture.
- Decision No.04/QD-BTS issued on 24/1/2002 regarding regulations for environment management in semi and intensive farming areas. This decision applies for area above 30 ha operating semi and intensive shrimp farming. According to the decision producers have to apply measures to produce shrimp productively, efficiently and protect environment. Attachment to the decision is criteria for farm construction, seed quarantine and minimisation of drug, chemicals and antibiotic use in farming process.

6. SOCIAL ISSUES

In general, shrimp farming is one of very few options for economic development in coastal areas. The activity has the potential to enhance smallholder income, or to provide relatively well-paid employment at larger operations. It appears that shrimp farming can create relatively high levels of employment per unit area of land when compared with most feasible alternatives.

The government of Viet Nam is interested in promoting coastal aquaculture, amongst shrimp farming for national economic growth and poverty alleviation. Soft loans programs are already launched by the Government to support the poor involving in (shrimp) aquaculture. International donors such as DANIDA, WB, ADB, and UNDP have projects to explore poverty alleviation via coastal aquaculture. The conclusion came out from projects was that shrimp farming could be integrated for poverty alleviation in coastal communities. Case studies carried out by Nhuong (2000) in the north of Viet Nam suggest that there is scope for coastal aquaculture now mainly shrimp farming to play a role in poverty alleviation. However the poor rarely involve directly in shrimp farming.

Modern shrimp farming is high risk. Some environmental organizations have the impression that shrimp farming represents a danger to the socio-economic development of the country. Shrimp farming has sometimes been associated with increased inequity, resource appropriation, and resource use conflict. These problems are related to the social, economic, and political contexts in which the shrimp farming has developed. Unfortunately, very few studies exist to dig further these phenomena thoroughly and objectively. Further studies are required to gain a better and more understanding of these issues.

7. POLICY, INSTITUTIONAL AND POLITICAL ECONOMY

This section identifies and summarises studies and documents which attempt to analyse the development of shrimp farming industry from a policy, institutional and/or political economy perspective. So far there are few studies on these issues.

Vietnam entered 21st centuries with about one third of population living under poverty (UNDP, 2002). In the national poverty alleviation strategy for the period 2001 – 2010, the Government has set a target to reduce the poverty rate from 32% in 2001 to 19% in 2010. In accordance with the government commitment, fisheries sector have also prepared a poverty alleviation strategy called SAPA – “Sustainable Development of Aquaculture for Poverty Alleviation”. There is a potential for shrimp aquaculture to contribute to poverty alleviation as the poor account for high rate in the coastal area. The recent Government strategies to promote coastal shrimp aquaculture in one way for foreign exchange earnings to accelerate macro economic growth and in the other contribute to poverty reduction.

To pay back the debt and to promote economic growth the nation needs foreign currency earnings. Within a development context that major agricultural products faced market difficulties and coastal people have few livelihood options, the economic structural change and development of coastal aquaculture, including shrimp culture is a right approach that will contribute “to make the poor obtain food security, to make the food secured people become

richer and to make the rich become richer” (the national poverty alleviation strategy for the period 2001 – 2010). Aquaculture development will create jobs, reduce poverty and transform the economy, increase efficiency of using potential resources.

Contribution of shrimp farming to poverty reduction is often understood from a conventional approach that the sector will support poverty alleviation via promoting macro economic growth and transforming coastal rural economy. In coastal areas there are few economic options and education level is very low. Shrimp farming has brought changes to coastal socio-economic conditions. The winners improve their wealth at the same time, tax from shrimp farming goes to local budget and it is reinvested in infrastructure development such as electricity, road, school and hospital. This effect will reduce fees that the poor have to pay for improving their common infrastructure. Shrimp farming also created jobs for coastal citizens including the poor. Many coastal communities have improved their conditions due to aquaculture development.

Some development projects have tried to involve the poor in shrimp farming. The government also has policies to offer soft loans, collateral exemption for loan less than 50 VND million to support the poor. However encouraging the poor to participate directly in shrimp farming could be risky as shrimp farming is complicated technology and required high investment that are beyond the poor’s resources.

However coastal shrimp aquaculture is a risky business. In Mekong delta, even in the year of bumper crops, surveys of the Institute for Fisheries Economic and Planning (2001) showed that the number of households who lost crops was about 20%. Recently public media, national and international organisations have raised concerns on interactions between shrimp culture and environment and poverty alleviation in Vietnam. For instance, the Far Eastern Economic Review (2002) published an article called “Sweet and sour shrimp” (2002), England Justice Foundation (EJF) with “risky business” (2002). Research surveys and experiences also indicated that shrimp culture in one hand could improve poor farmers’ economic conditions (Nhuong, 2000) and in the other it also can turn the medium and rich people practicing shrimp culture into the poor if there are no suitable management mechanisms.

Traditionally shrimp farming in Vietnam is operated by local small scale farmers. This type of operation has an advantage for poverty reduction and diversification of livelihoods options for local people. Recently the Government has policies to promote intensive shrimp farming such as encouraging foreign and domestic investors to participate in shrimp aquaculture. This intensification process could bring social conflicts and displace local people from their traditional resources as concerned by some public media. In order for shrimp farming to play active roles in poverty alleviation the central and local governments have to take full responsibilities to regulate shrimp aquaculture, ensuring that this activity benefit the poor. Specific regulations should be developed to ensure that this type of farms benefit the local citizens and cause no harm to them.

Though individual small scale households are independent to each other in terms of farming, producers in a particular area depend on each other for the final success of farming because they share some common resources such as water, inlet, out let systems and supporting services. While the government management system has limited staff, the risk such as diseases could be shared by promoting community based management systems. The individual producers should come together to form groups voluntarily for managing their

common resources that are used shrimp farming. The cost of operating this management system if occur should be paid by individual producers themselves. The state management also benefit from this community based management system in such a way that they will reduce the management cost while expanding the benefit to large areas. So far there are no specific guidelines issued by the Government to support individual producers to form community based management systems.

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