

KẾ HOẠCH QUẢN LÝ ĐỂ PHÁT TRIỂN BỀN VỮNG NGHỀ NUÔI TÔM VÀ BẢO VỆ RỪNG NGẬP MẶN Ở ĐỒNG BẰNG SÔNG CỬU LONG

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TÓM TẮT Trong những năm gần đây, sự phát triển nhanh chóng của nghề nuôi tôm ở đồng bằng sông Cửu Long là nguyên nhân chính gây sự mất cân bằng của các hệ sinh thái tự nhiên và tàn phá rừng ngập mặn. Điều này là do người dân địa phương thiếu kinh nghiệm nuôi tôm, kiến thức về lợi ích hữu hình và vô hình của rừng ngập mặn và cả kiến thức về luật pháp. Do đó, trong chiến lược phát triển bền vững nghề nuôi tôm và bảo vệ rừng ngập mặn, các chủ thể cần kiểm soát được những diễn biến phức tạp trong mối quan hệ hỗn hợp giữa kinh tế, xã hội và môi trường đối với những hoạt động nuôi tôm ở đồng bằng sông Cửu Long. Bài báo này đề xuất một số giải pháp nhằm đạt được mục đích trên.

SOME SUGGESTIONS FOR SUSTAINABLE DEVELOPMENT OF SHRIMP CULTURE AND PROTECTION OF MANGROVE FOREST IN THE MEKONG DELTA

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ABSTRACT In recent years, the quick development of shrimp culture in Mekong is the main reason causing the unstable status of natural ecosystems and destruction of mangrove forests because local residents lack knowledge of shrimp culture, advantages of mangrove forest and laws/regulations. So, in the strategies for sustainable development of shrimp culture and protection of mangrove forest, governmental and local stakeholders should control developing economy, environment and society in a multifaceted relationship with shrimp culture activities in Mekong Delta. This paper suggests some solutions for sustainable development of shrimp culture and mangrove protection.

1. Introduction

Sustainable aquaculture is defined as the balanced use of resources and the ecosystem to satisfy human needs, conserve rural resources, maintain and enhance the quality of the environment (Folke and Kautsky, 1992). With the situation of environment, natural resources, society and economy,

however, the potential of shrimp culture in Mekong Delta has met the challenges in development and expansion/improving of productivity as well as protection of natural resources and environment. Quality environment and mangrove forest have been reduced. Productivity of shrimp farming was low with traditional

culture methods. Land-use has been degraded. Farmers lack information and knowledge of shrimp farming technique and natural resources protection. These factors of environment, mangrove forest and shrimp farming have complex relationship. In addition, shrimp farm activities also reasoned conflicts among natural resources users and environmental protection. Therefore, in order to develop shrimp culture and to protect mangrove forest in Mekong Delta, managers and policy planners should make a master plan, which focus on institutions, policies, technologies, economy, and education to enhance awareness among farmers.

2. Problem of shrimp culture in Mekong Delta

Shrimp culture in the Mekong Delta has expanded rapid and unplanning, in specific after the decision No. 09/NQ-CT issued on June 15, 2000 of Vietnam (Figs. 1, 2 and 3). These figures show that environmental pollution and diseases cause mainly reducing of productivity of shrimp culture in the Mekong Delta during from 1991 to 1995 (Hao, 1999). This experiment is founded in 1994 in the losses sustained (Anon, 1994). The shrimp culture development impacts negative on mangrove forest and other coastal habitat (Hong, 1995). The relationship between shrimp culture areas and mangrove forest areas shows in fig. 4. The increasing of shrimp culture areas means the reducing of mangrove forest areas. Although the

shrimp culture areas and production in increasing, productivity of shrimp farming has still not increased or has increased but it was little.

In the other ways, there are problems of shrimp culture development. Shrimp culture reasons the overlap in the developing plans of using of land and natural resources of local offices/authorities, and conflicts between shrimp farmers and other local people with the big ranking of poor and rich people. Shrimp culture limited the development of other economic sectors and sourced unsuitable economy and affected directly on living standard of local people. The culture methods are mainly extensive models. Semi-intensive and intensive shrimp cultures have been applied in some places in Tra Vinh, Soc Trang and Bac Lieu provinces. Infrastructure and equipment for shrimp farming are poor and backward. Education level and awareness of local people are low. Farmers are poor or lacking practices and stakeholders also are poor management methods and practices. These affect efficiency of shrimp farming and mangrove areas. Productivity of shrimp farming is low and areas and coverage of mangrove forest has been reducing while shrimp culture areas increase. So, to gain benefit from long-term plans, it is indicated that a strategy of sustainable development for shrimp culture in Mekong Delta should be set up as soon as possible. This strategy should link factors of economy, environment and society in a multifaceted relationship.

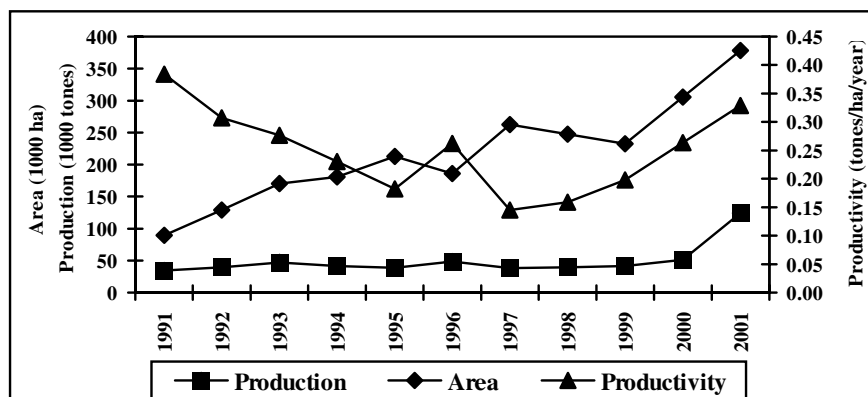


Figure 1: Culture area, production and productivity of shrimp farm in the Mekong Delta (Sources: GSO, 2001; Phuong and Hai, 1998; Pham Nam Duong, 2002)

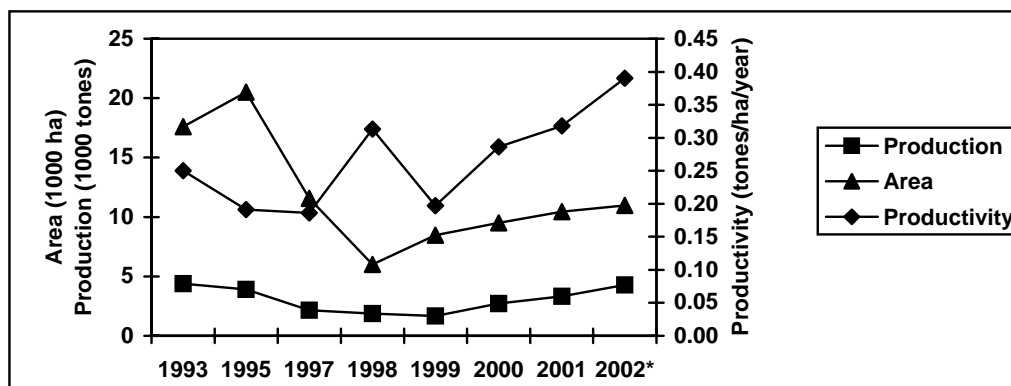


Figure 2: Shrimp culture progress in Tra Vinh Provinces
 (*: The planning of shrimp culture in 2002)
 (Source: GSO, 2001; Phuong and Hai, 1998, Tra Vinh DoF, 1999, 2000, 2001; Pham Nam Duong, 2002)

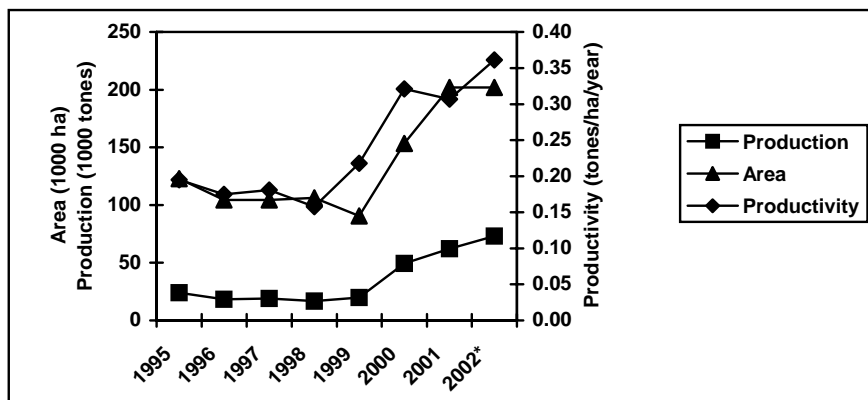


Figure 3: Shrimp culture progress in Ca Mau Provinces
(*: The planning of shrimp culture in 2002)

(Source: GSO, 2001; Phuong and Hai, 1998; Pham Nam Duong, 2002; CSO, 2001)

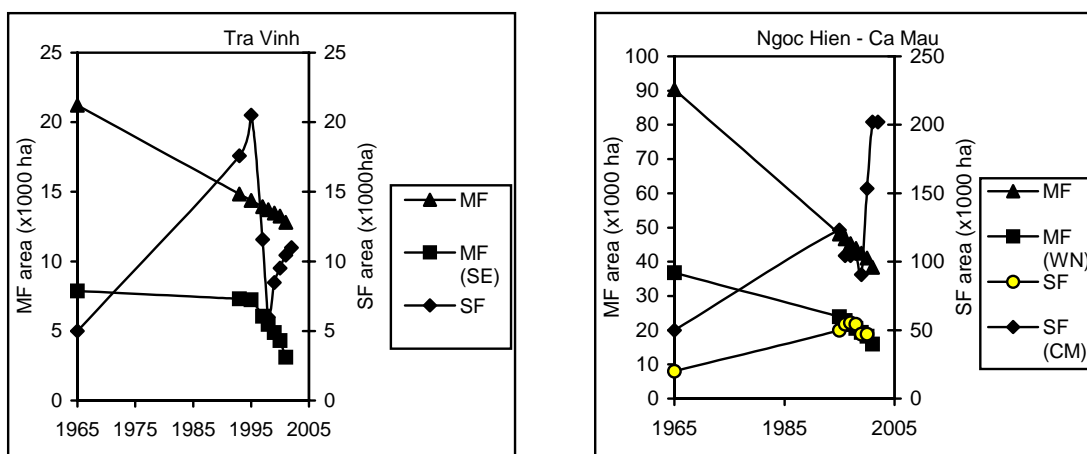


Figure 4: Relationship between mangrove forest areas and shrimp farm areas in Tra Vinh (left) and Ngoc Hien - Ca mau (right)
MF: Mangrove Forest, SF: Shrimp farm, CM: Ca Mau
(Source: Thu, 2002)

3. Institutions: Strengthen their capacity and develop their linkages together

The shrimp farming development in the Mekong Delta indicated some weak capacity in the involvement of extension officers, technologists and foresters in the local institutions and

there are also conflicts in their developing plans. Thus, strengthening their capacity, solving the existing conflicts among natural resources users and improving equipment being used are necessary in developing shrimp culture and protecting mangrove forest. Further, many national institutions/universities have involved

in improving capacity for local extension officers and farmers participating in their programs.

The local institutions include DOSTE (Department of Science, Technology and Environment), DoF (Department of Fisheries), Department of Agro-Forestry/Aquaculture Extension Center, Aquatic Natural Resources Protection Center, Community Authority, Groups (Women society, Young Party and etc.), MAN Biospheres and Natural Parks and the national institutions, Institute of Oceanography (VNIO), RIA 2 (Research Institution of Aquaculture No 2), Can Tho University, An Giang University, University of Agro-Forestry, Fisheries University, Monitoring Stations (of VNIO), Branch of Research Institution of Aquaculture Minh Hai (of RIA 2), National Bank for Agriculture and Rural Development, National Bank as well as NGOs. The above organizations should work harmoniously and consistently in related concerns. Their intertwined relationship is illustrated in Fig. 5. The linkage helps in creating awareness among the officers and farmers, setting up the shrimp feed production unit, providing loans and subsidies to farmers, and securing cooperation and political support. Moreover, these relationships also help in farmers' increasing awareness and knowledge of mangrove forest, roles of ecosystems and shrimp farming practices. Then, the farmers will participate in the protection, re-plantation and development of mangrove forest. Further, Community Authorities and Government need to

built and set up the mangrove buffer zones, protection areas and natural parks, which can protect natural resources and inland coastal zone.

4. Policies

To manage and develop shrimp culture and to protect mangrove forest, the long-term plans of local economy should be built for development processing. These strategies are based on the reasonable law/regular and detail plans in local region. They relate with law/regulation, administration and others.

5. Law and regulation

The 73 items of laws, regulations, decisions and circular letter in forest and 76 ones in fisheries have been issued, in which the important ones are Law for the Protection and Development of Forest (August 19, 1991) and Land Law (1993) which relationship with mangrove forest, State Law for the Protection and Development of Aquatic Resources (May 5, 1989) and Decree No. 14/CP (March 19, 1996) of the Prime Minister on Management of Seed Quality - which relate with shrimp culture - and Law on Environmental Protection (1993). However, only one in them is used for mangrove forest. Decision No. 432/TTg (August 7, 1995) by the Prime Minister on the Protection, Development of Mangrove Forest and Warp Areas in Ngoc Hien District, Minh Hai Province (currently Ca Mau province). These show that the law system for protection mangrove forest and development of shrimp culture is incomplete. Therefore, it is necessary

that the specific law in mangrove protection and its relation should be issued as soon as possible. These are basic legal frameworks, which help

planners and managers to build the plans for development of mangrove area easily.

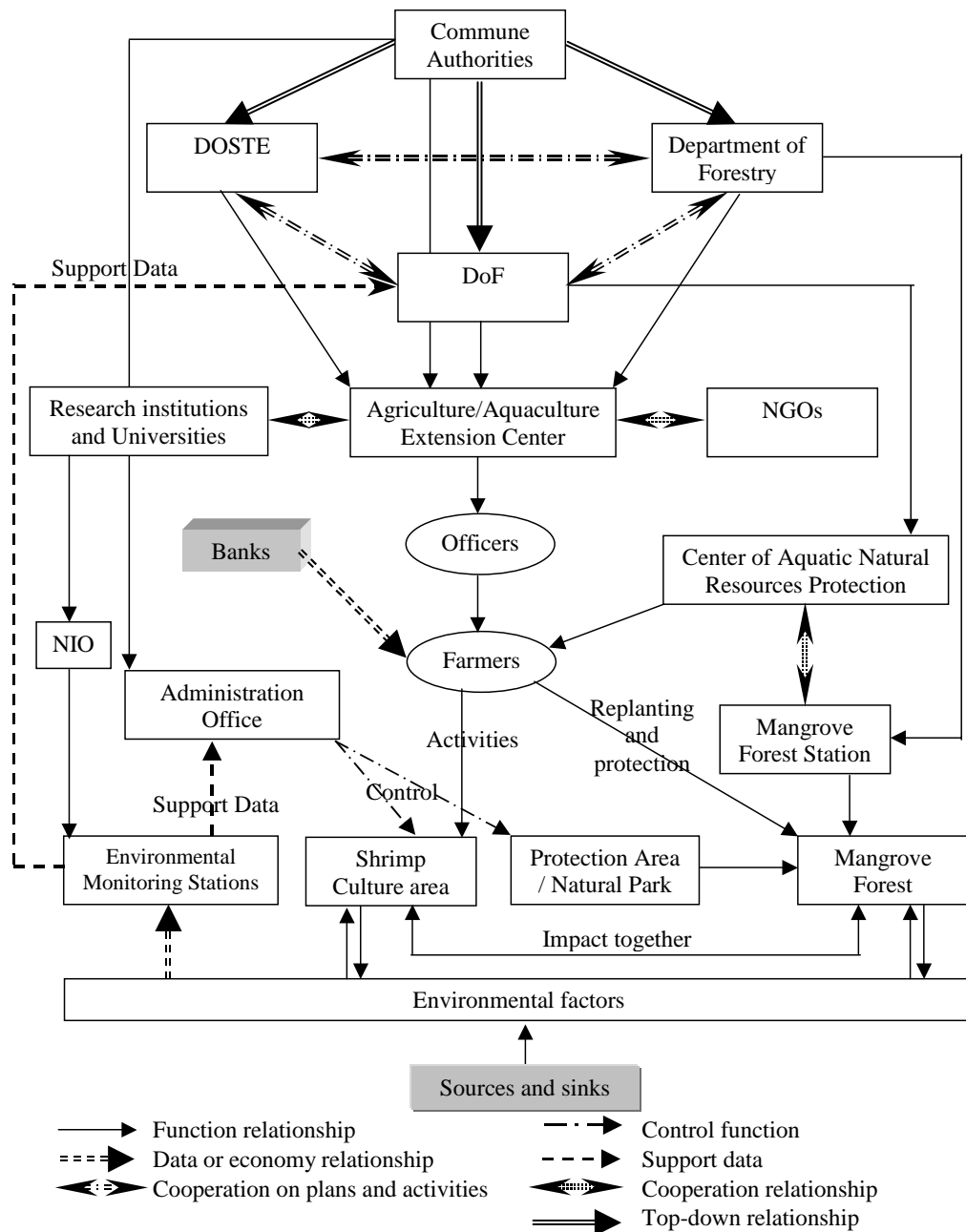


Figure 5: Framework for shrimp culture development and mangrove protection in Mekong Delta

6. Tax systems and administrative improvement

Tax system and administrative management solution including rewarding and penalty system are able to attract participation of local residents into mangrove protection and shrimp development in the Mekong Delta. Further, reasonable tax system and encouraging policies and stability of laws/ regulations will enhance the degree in investment of capital as well as technical issues from farmers. A set of reasonable tax will not only limit the continuously widening gap between the rich and the poor, but also lessen the conflicts among other natural resource users. In other the way, encouraging policies from government help to create conditions for local residents participate in replanting and protecting mangrove forests. Consequently, with suitable and valid administration solutions, deforestation will be reduced and eliminated soon.

7. Zoning

In Mekong Delta, highlighted facing issues are conversing of agricultural land to shrimp culture freely and cutting down of mangrove trees for shrimp farm. Consequence, living standard of local residents and environment are much influenced; agricultural land is degraded, conflicts among land users increase. While zoning is often to regulate activity in a particular area to meet management objectives, usually related to conservation (Jain, 1997), and zoning can also ensure that the activities of one community do not negatively affect

the welfare of other user communities and sustainable development (Lynch and Maggio, 2000), zoning of mangrove forest, shrimp farming and other activities might help to develop the economy, control and protect environment and coastal zone. However, how do mangrove and shrimp farm distribute and how much is the ratio of mangrove and shrimp farm? They can be mixed mangrove forest and shrimp farm with ratio of 7:3 (Johnston *et al.*, 1998a), 6:4, 5:5 or 4:6 (Benthem, 1998). Or they can be cultured separately. Although mixed shrimp - mangrove forest farming systems have potential to provide both poverty alleviation and mangrove restoration / protection and have so far slowed loss of forest (Menasveta, 1997; Johnston *et al.*, 1998a; Johnston *et al.*, 1998b), mangrove habitat/ecosystem will be lost (Primavera 1998). Therefore, the separate mangrove – farming system are applied. Three areas will be established, Full Protection Zones, Buffer Zones and Transition Zones. The Full Protection Zones range from 100 to 1000 m where no tree felling, settlement or farming will be allowed, only reforestation activities, research and monitoring or other low-impact uses will be taken place, and collection of small marine products in foreshore areas is permitted but no fish and shrimp or larvae (Benthem, 1998). The Buffer Zones located on the inland side of the Full Protection Zones and about 1 km wide: 60% of the land is mangrove forest cover (20 year rotation) and 40% remainder can be used for aquaculture

and settlement (Bentham, 1998). The Transition Zones are areas inland side of Buffer Zones where agriculture, shrimp farming, urban development and others will be allowed, and they will be managed to reduce their impact on other zones.

8. Mangrove rehabilitation and protection

Mangrove rehabilitation and protection should be set up in the Full Protection Zones and Buffer Zones. The species applied for mangrove replanting are *Rhizophora apiculata* and *Sonneratia caseolaris* because of their high economic value, capability to withstand wide fluctuations in salinity and strong wave action and adapting in Mekong Delta. Households will be actively involved in the planting activities because they provide the labor, and they are the main responsible for maintenance and protection of the plantation.

In addition, mangrove reforestation should be expanded and covered into the western foreshore of Mekong Delta where land areas have been deposited each year.

9. Shrimp culture requirements

Most shrimp farms in Mekong Delta are small-scale models. Only few of them are large area with more than 5 ha. However, there are not any treated ponds. Their results are reducing of environmental quality and increasing of disease. Therefore, it is required that all shrimp farming households be registered including the equipments used. If the area of the

registered farms over 5 hectares they must have waste water treatment and sedimentation ponds which is not less than 10 percent of the total pond area. When the registered farms are small, they should be grouped together. Then, the requirements for each group are to apply as the same as the large farms. The level of the BOD₅ in the effluent of the shrimp pond that is discharged into water sources cannot exceed 10 ppm (Standard of Vietnam: 20ppm of BOD₅ (MOSTE, 1995)). There is also a ban on the flushing of the sedimentation of the shrimp pond directly into the public water.

The coastal fisheries stations should be set up in every coastal province. Each unit is equipped with water analysis facilities for water quality, bacteria count, heavy metal analysis and other environmental conditions monitoring. Each unit provides regular visits to all shrimp farms. In during their visits they will check water quality for shrimp farms, record all necessary information and talk with the farmers about the problems they are facing. Then any assistant or technical service will be provided at once; some complicated problems will be solved the following trip after those problems are discussed thoroughly at the stations. Diagnostic services for the shrimp farmers, including checking disease, advising farmers and supporting farm management methods are also offered.

10. Technologies

Beside suitable policies, technologies play important roles in

mangrove rehabilitation and protection as well as development of shrimp farm and protection of environment. The technologies include EIA technique (Environmental Impact Assessment), application geographical information systems and remote sensing techniques for identification and protection of mangrove forest, shrimp culture methods.

11. Environmental impact assessment for shrimp culture

Rivers system in Mekong Delta is complex and interlacing network so it is difficult to set up and apply ecological models. Thus, identification residual time of water, water exchange, EIA and ecological capacity for shrimp culture have not carried out yet. However, a recent research of Institute of Oceanography Nha Trang showed that methods of radioactivity technology might be applied to identify residual time of water and ecological carrying capacity (Nguyen Tac An et al., 2002). Therefore, the studies of identification of these factors by methods of radioactivity technology need to be carried out as soon as possible. Then, the ecological models are used to analyze carrying capacity of ecosystem.

12. Application geographical information systems and remote sensing techniques for protection of mangrove forest

Because of topographical complication, identification of status of mangrove forests and their complex processes are difficult. Remote Sensing

Technique helps to categorize situation of mangrove forest and to analyze phenomena that are changed in mangrove forest on time and in time. Then, GIS technique needs to be applied in order to find out the best method and the shortest way to solve the problems and to protect mangrove forest.

13. Culture methods

Culture methods also play important roles for shrimp development and mangrove protection. In Mekong Delta, the shrimp farming methods are mainly extensive and extensive plus which resulted in low productivity and depended on natural conditions while semi-intensive resulting in high productivity has been applied in a scattered way. And mangrove forest was also cut down and conversed to shrimp farm. Therefore, looking for the best culture methods can urge the development of shrimp farm and protection of mangrove forest. The semi-intensive should be applied in Mekong Delta. It is recommended that semi-intensive be carried out in the Transition Zones. In the Buffer Zones, shrimp and mangrove systems are applied but shrimp and mangrove should be cultured separately and shrimp farming areas should be lower than mangrove forest, ratio between mangrove forest area and shrimp farming area is 6:4.

14. Aquaculture extension

Most shrimp farmers in Mekong Delta have originated from rice paddy farmers, so they lack knowledge of biological characteristics of shrimp,

shrimp culture methods as well as the relationships of shrimp culture with neighbor ecosystems such as mangrove forest and wetland ecosystem. Certainly, they are easily failed. Therefore, in the plans of sustainable development of shrimp culture and protection of mangrove forest and environment in Mekong Delta, aquaculture extension courses should be conducted for shrimp farmers. In these courses, beside knowledge and information of shrimp and shrimp culture, farmers should be learned the complicated linkages of shrimp culture with surrounding ecosystems and between shrimp culture with other economic sectors. Then, they will have better culture shrimp methods and willingly participate in replanting and protection of mangrove forest.

15. Economy

Most farmers in Mekong Delta were poor so they have not had enough money for shrimp culture or doing anything. Few farmers can borrow money from bank with low interest. The others borrow money from moneylenders with interest from 5 – 8% a month. It seems that farmers have been failed because of high interest. Therefore, finding the suitable capital generating solution is the foremost decisive factor to the success of shrimp culture in Mekong Delta. The found basic solution is attracting supporting sources both from governmental, NGOs and international organizations and from local residents. On the other hand, it is needed to pay attention to middle term and long-term

financial sources and other commercial credit financial sources. However, in reality, there are money at the banks, farmers need more financial loan but farmers cannot borrow money from the banks because the banks' regulations and farmers' current situation do not match. So, when this is solved, the farmers will have more opportunities to invest in their shrimp farming development. A part from this, capital for farmers can be attracted from development projects, collaboration programs with international organizations.

Further, government should create good conditions in term of policies and capital for farmer households participating in planting and protecting mangrove forest.

16. Community education

Difficulties and failures that farmers in Mekong Delta have faced shrimp farming in previous years seem to be rooted from low level of education of local farmers. It is essential to provide training/educational courses aiming at improving awareness among the people here. The training/educational programs do not only include some literature skills but knowledge on household economy management, legal literacy, technical shrimp farming, and environmental protection as well. The training courses can be organized in daytime at suitable schedule or in the evening when most farmers are free from their daily work. The training courses can also be conducted at the community centers and should be organized regularly and

the knowledge should be updated. While being equipped with those skills and knowledge, farmers can follow the latest technical information and improve their farming skills and more than that contribute to sustainable development of the area.

17. Conclusions

From above analysis, shrimp culture in Mekong expanded quite rapidly mainly because mangrove forests destroyed because local residents lack knowledge of shrimp culture, advantages of mangrove forest and laws/regulations. Therefore, in the strategies for sustainable development of shrimp culture and protection of mangrove forest, government and local authorities should pay serious attention on these issues. They should set up a linkage of institutions, local organizations and NGOs. Suitable and stable laws system and consistent policies should be built and rebuilt. A master plan and zoning for shrimp farms and related sectors should be made. Farmers' capacity and awareness should also be taken into account in these strategies.

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