CHAPTER VII

SOCIO-ECONOMIC FACTORS AFFECTING OF WETLAND RESOURCES MANAGEMENT IN STUDY AREA

In this chapter, we describe wetland agro-biodiversity resources management activities in the study area. Consequently, a Poisson regression model was designed using method of maximum likelihood to identify different socio-economic factors that affect to human resources management.

7.1 Wetland agro-biodiversity resource management activities in study area.

Over the last decades the use of wetlands for agriculture has increased because of increasing population and the resultant need to produce more food. However, there are environmental concerns associated with increasing use of wetlands for agriculture and other livelihood activities. As livelihood of the people in Dong San village depends much upon wetland agro-biodiversity resources in addition to farming as seasonally flooded forest plays a critical role in the well being of the farming households where access to alternative sources, such as energy for cooking, nutrition for animals, materials for fertilizer and constructing materials for shelter, are limited for some of the reasons as mentioned above. Thus, the well being of the people in the village is directly affected by the management of these agro-biodiversity resources. This issue was addressed in this study by examining the wetland agro-biodiversity

resource management practices and its effect on well being of Dong San villagers as mentioned in chapters before. According to these importances of seasonally flooded forest as wetland and amidst the environment crisis in the Songkhram basin, the villagers have tried to solve the various problems that have arisen. Included, they have been setup local initiative on agro-biodiversity and aquatic resources conservation and utilization with various activities. Presently, Dong San villagers have participate in wetland agro-biodiversity resources management under present investigation included four activities. These were;

7.1.1 Fish sanctuary project

The Fish Sanctuary Project (FSP) focuses on how communities can conserve and utilize their natural resources in a sustainable manner over a fixed time period. Once approved by the Commune Council, the plan may then be implemented. The Fish Sanctuary Project (FSP) took several times to draft with villagers in Dong San Village. The villagers worked together to learn how to prepare management plans. The goal of the planning process is to enable communities to prepare their plan in such a way that they have a clear understanding and strong consensus regarding its contents, allowing the plan to be fully implemented by the community. The objectives of the Fish Sanctuary Project (FSP) in Dong San Village include the following;

– To protect and manage flood forest for a regular supply of daily needed forest products and provide habitat to fish for spawning and nourishing

− To conserve flooded forests to provide shelter for aquatic life (conserve aquatic biodiversity).

− To conserve forests to protect villagers from storms.

− To develop sustainable fishing practices for livelihood improvement of fishers in Dong San village.

Figure7-1: Villagers worked together to learn how to prepare management plans.

This management plan is extensive. It defines the area and the resources to which these regulations apply, the permitted and banned uses of the resource, the organizational structure of the committee and their roles, the community's roles and responsibilities, allowable harvest amounts of forestry products, fishing gears, size and season, illegal gear used in the community fishing area, specifications on budgetary uses, and fines for prohibited activities including clearing of the flood forest, catching of wild animals and use of illegal fishing gear. The plan also includes guidelines for income generation from the community fisheries, including

membership fees, fishing permits, fish harvesting for community fishery management support, income from eco-tourism, service charges and fines from offenders. Within this management plan, therefore, there is an emphasis on both areas where the forest or fishery is strictly protected and flood forest and fishery utilization areas where extractive activities are permitted. For example, conservation strategies include protection of the flood forests near the village and protection of the fish sanctuary. For the flooded forest areas near the village, only dead wood can be collected, banning the cutting of green shoots for firewood.

Figure7-2: Fish conservation zones; the signs give notification of regulations.
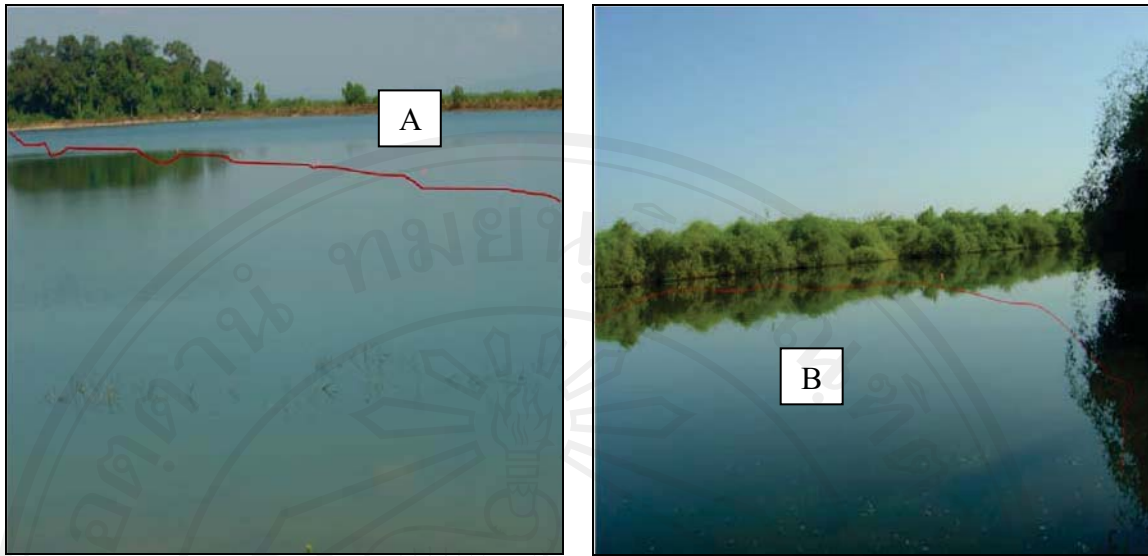
<div align="center">Nhong Mak Saeo Yai: site A   Kud Seaw: site B</div>

Figure7-3: Fish conservation zones; the red line give notification of fish sanctuary area.

7.1.2   Wildlife conservation

The result of focused group discussions revealed that Dong San villagers generally held positive attitudes towards wildlife and nearby protected areas. Reasons given for the importance of wildlife across the village's protected areas included its attraction to tourists, enjoyment derived from viewing wildlife, and its value for future generations. Others valued wildlife for aesthetic reasons, and because of historic links between wildlife and traditional tribal culture. Dong San village had announced area in the south of the Nhong Mak Saeo Yai reservoir which was an area of higher, old growth lowland forest, associated with the temple at Don Lao Kaw to be "protected landscapes" as important area for species of amphibians and reptiles. Also, the school at Dong San village was interesting as the school principle had established a small "conservation area" for the eastern butterfly lizard (Leiolepis reevesii) on the school playing field. The colony of burrowing lizards was very healthy and could form a focus for further conservation awareness and education in the area.

Figure7-4: conservation area; eastern butterfly lizard at Dong San School.

7.1.3 Spiritual forest protection

Regarding ecological aspects, a forest is a natural resource which is important for maintaining a sustainable environment due to its protective functions such as water regulation and protecting biodiversity. Besides these values, the forest also plays a spiritual function. This value is reflected in their traditions and folklore. The term spiritual forest is used to describe any kind of forest which, one way or another, has a spiritual or/and religious function in the community. They include ceremonial forests (which local people call "gosh" forests), and spiritual forests (or worship forests). There are 80 ha of spiritual forest and 8 ha of ceremonial forest in the Dong San village. However, as mentioned earlier, both these forest areas have deteriorated remarkably and were under threat of being cleared in the near future. A large part of these forests has been converted into agricultural land already. Under this threat, the village elders and leaders wanted to revive their communal forest for cultural

practices and to effectively protect the forest. Firstly, the village elders and leaders met up with different family clans to discuss their ideas. After getting agreement with family clans, the village leaders organized meeting with the villagers to discuss communal forest management, instead of dividing the forest for individual households. Under a participatory process and given the strong power of family clans and village leaders, a plan was drawn up for managing the forest through planning forest areas for use for different purposes (e.g., for spiritual activities, ceremony, and community utility) based on their culture and customs, and how to use and protect forest in effective and sustainable ways.

The forest management rules were set up accordingly with different forest uses together with a monetary penalty system to enforce the rules. A forest protection group was appointed by villagers to enforce community forest management rules, and is operated based on regular contributions by all village households. The village forest management rules work well as they are designed, planned, and managed based on villagers' indigenous knowledge, their ethnic culture and beliefs, and the needs of the whole community. In the forest areas used for spiritual activities and cemetery, only dried branches are collected at a certain time of the year. Cutting any trees in these areas is prohibited. Firewood for household use and timber for public utility can be extracted from the forest area. Timber for individual housing construction needs to be approved of in advance and paid for at a special low price. The community council processes applications for this product and makes decisions in consultation with villagers based on their knowledge of available resources in the forest. Since the rules were implemented, nearly 10 years ago, only a few cases of violations of the rules have been recorded.

7.1.4   Annual tree planting on special occasions

Large-scale vegetation clearing accompanying agricultural development has been a major driver of biodiversity loss. Dong San community have established rural tree planting on farm and community lands initiatives on important religious holidays and appropriate occasions such as father's day and mother's day. It is a way of getting schools and their villagers involved in all the processes of planning and implementing a community wetland agro-biodiversity resources management plan. Concerned with forest degradation, government emphasized on raising tree plantations in and around village. Tree saplings were provided free of cost to villagers and school. The planted area focuses on village area, riparian land, river catchment and spiritual forest which shared financial supported from local government.

7.2 Socio-economic factors and agro-biodiversity in study area.

As discussed in chapter I., we hypothesize that the environment and livelihood coping strategies of household and socio-economic characteristics (such as sex, age, educational status, household member, period of residency, income from wetland products) of the household have influences to small farmer's management of wetland agro-biodiversity in the study area. Primary interest centers on the number of participated in wetland agro-biodiversity management and conservation in each household. The majority of the household surveyed participated in wetland agro-biodiversity resources management for main four activities over the 2007/08 period, but several of these households participated more frequently between 0–4 times.

Based on the assumption, we assume that, across households, $h = 1,2,...,H (= 60)$ and time periods, $t = 1,2,...,T (= 1)$, which 60 observations generate count frequencies of 300 corresponding to $y_i = 0,1,2,3$ and 4 respectively. Major socio-economic that influences on frequency of participated in wetland resources management activities and estimated equation are as given in Table 7-1. The goodness of fit tests have given insignificant χ2-tests indicating that the Poisson is an appropriate model to explain count diversity. The Likelihood Ratio (LR) test has been used to check significance of the inclusion of a set of variables with a score of 16.11, suggesting that there was a relationship between the probability of a farmer choosing to participate and the suggested variables and the model correctly predicted 66 percent. The results of the survey reveal that socio-economic factors have a variety of implications on agro-biodiversity and farmers' livelihoods. Factors such as land (farm size per household), rice yield (kg/ha), cash income from agro-biodiversity products, non-cash income from agro-biodiversity products, household members affiliated with local institutions and attitude towards conservation are major influences on agro-biodiversity through creating opportunities to manage and forcing farmers into strategies that minimize household risk. In turn, these changes affect livelihoods. The parameters of these variables are all found statistically significant at varying significance levels as reported in Table 7-1.

This is the poisson regression estimate when all variables in the model are evaluated at zero (intercept), the log of the expected count for participate is 2.48 units. In the case of total cultivated land ownership (Land), a unit increase of land (ha/hh) for villager, the difference in the logs of expected counts (participate) would be expected to decrease by 0.018 units while holding the other variables constant in the

model at statistically significant at the 0.05 level *(P=0.013)*. Whereas rice yield (SRP) variable had positive sign, low yields clearly impact on the food security situation of the area and adversely affect livelihoods. To meet family needs, farmers make choices as to which crops to grow or livestock (number and species) to keep and which enterprises to undertake (on-farm or off-farm). If a villager were to increase their SRP by one unit (kg/ha), the difference in the logs of expected counts (participate) would be expected to increase by 5.17 units at statistically significant at the 0.05 level *(P=0.029)*. Similarly to the variables: cash income from from agro-biodiversity products (CashAgbio) and non-cash income from surrogated price (SurAgbio) of agro-biodiversity products were positive significant at the 0.05 level. If a villager were to increase their CashAgbio and SurAgbio by one unit, the difference in the logs of expected counts (participate) would be expected to increase by 4.5 and 5.9 units respectively.

As ability to cultivate wet season rice (Wrice), given the other variables are held constant in the model. If a villager were to increase their Wrice by one time, the difference in the logs of expected counts (participate) would be expected to decrease by 0.280 units at statistically significant at the 0.01 level *(P=0.001)*. Unlike, attitude towards conservation (Contude), a unit increase of Contude for villager, the difference in the logs of expected counts (participate) would be expected to increase by 0.261 units while holding the other variables constant in the model at statistically significant at the 0.05 level *(P=0.028)*. The same as household that had at least one member affiliated with local institutions (Mlocal), were more favorable toward the social, environmental, and economic participation in village was also positively significant with participation in wetland agro-biodiversity resources management activities,

although at statistically significant at the 0.001 level *(P=0.031).* Compared to nonmembers, membership in any organization would increase the difference in the logs of expected counts is expected to 0.269 unit higher for membership while holding the other variables constant in the model.

Table 7-1: Poisson Regression Results of the number of wetland resources management activities participated by Dong San villagers During 1 year Period, 2007

Independent Variables	Estimate	P-value
intercept	2.48	0.00
Farm and Farm Operator Characteristics:		
Land	0.018	*0.013
Fincome	-4.94	0.849
Debt	5.96	0.220
SRP	5.17	*0.029
CashAgbio	4.5	*0.015
SurAgbio	5.9	*0.011
Liv	0.002	0.868
Farmer Preferences and Characteristics:		
HAge	0.006	0.305
HEdu	0.260	0.210
HGen	-0.266	0.149
Hsize	0.002	0.964
HRes	0.318	0.104
Mlabour	-0.098	0.247
Ofincome	-4.115	0.768
Farming system:		
Wrice	-0.280	**0.001
Drice	-0.005	0.963
Social Participation:		
Mlocal	0.269	*0.031
Contude	0.261	*0.028
Bentude	-0.163	0.121
Summary statistics:		
Dependent variable is count		
Observations	60	
Log-Likelihood	-101.024	
Likelihood Ratio	16.112	
Wald $\chi 2$	66.161	

Source: calculated by SPSS

Note: * Statistically significant at the 0.05 level

    ** Statistically significant at the 0.01 level

7.3 Farmer's opinion on perception and expectation toward agro-biodiversity management

Investigation of the perception and expectation focused on current wetland agro-biodiversity resources management (ABDM) practices, development of rules and regulation, rights and ownership and benefit distribution. Dong San villagers were asked to select a response, ranging from strongly disagree to strongly agree for statements on perception and from highly expected to no expectation, which best matched their opinion. Table 7-2 presents villager's responses. It is evident that overall the participants strongly agreed with current management practice and had high expectation of benefits returned from involving in wetland agro-biodiversity resources management. To enhance effective resources management, villager expectation of benefits accrued from participating in collective activities needs to be persisted. Community investment to the floodplain is necessary. In addition to labor and time, monetary forms of investment such as on value-added agro-biodiversity products (Mats), resource conservation activities such as forest restoration needs to be introduced. When ABDM is considered at high stake and villagers perceive a sense of actual stakeholders, it is likely that they will commit themselves to ensure benefits returned. Subsequently, community wetland agro-biodiversity where the community gain benefits from will be protected.

Table 7-2: Participant responses on community perception and expectation toward ABDM.

No.	Items	Mean value	S.D.	description
Community Perception				
1.	ABDM should focus on providing community with basic needs e.g., food, fuel, fiber, and timber	4.53	0.734	Strongly agree
2.	All villagers must involve in development of rules and regulations	4.42	0.645	Strongly agree
3.	Community well-being is the main purpose of ABDM.	3.42	1.101	Agree
4.	ABDM involves only people who gain direct benefits out from the forest.	4.30	0.730	Strongly agree
5.	Community has a full responsibility on ABDM	4.32	0.913	Strongly agree
6.	Ecosystem balance is the main goal of ABDM.	4.31	0.618	Strongly agree
7.	Only community members have rights to access and benefit from the community forest.	4.01	1.146	Agree
8.	Villagers have equitable rights to gain benefits from the community forest.	4.42	0.564	Strongly agree
9.	Management activities are usually directed by governmental agencies	4.05	1.446	Agree
Community expectation from participating in ABDM				
10.	External assistance on community development	3.44	0.707	Highly expected
11.	Access to the forest for agro-biodiversity collection	3.52	0.600	Highly expected
12.	Source of timber and fuel wood	3.47	0.754	Highly expected
13.	Community forest helps connecting villagers together	3.75	0.518	Highly expected
14.	Being recognized by outsiders	3.50	0.839	Highly expected

Note: Calculated from excel.

Ranks of average values and meanings on community perception are as follows.

| 4.21-5.00 | represents | strongly agree |

| 3.41-4.20 | represents | agree |

| 2.61-3.40 | represents | disagree |

| 1.81-2.60 | represents | strongly disagree |

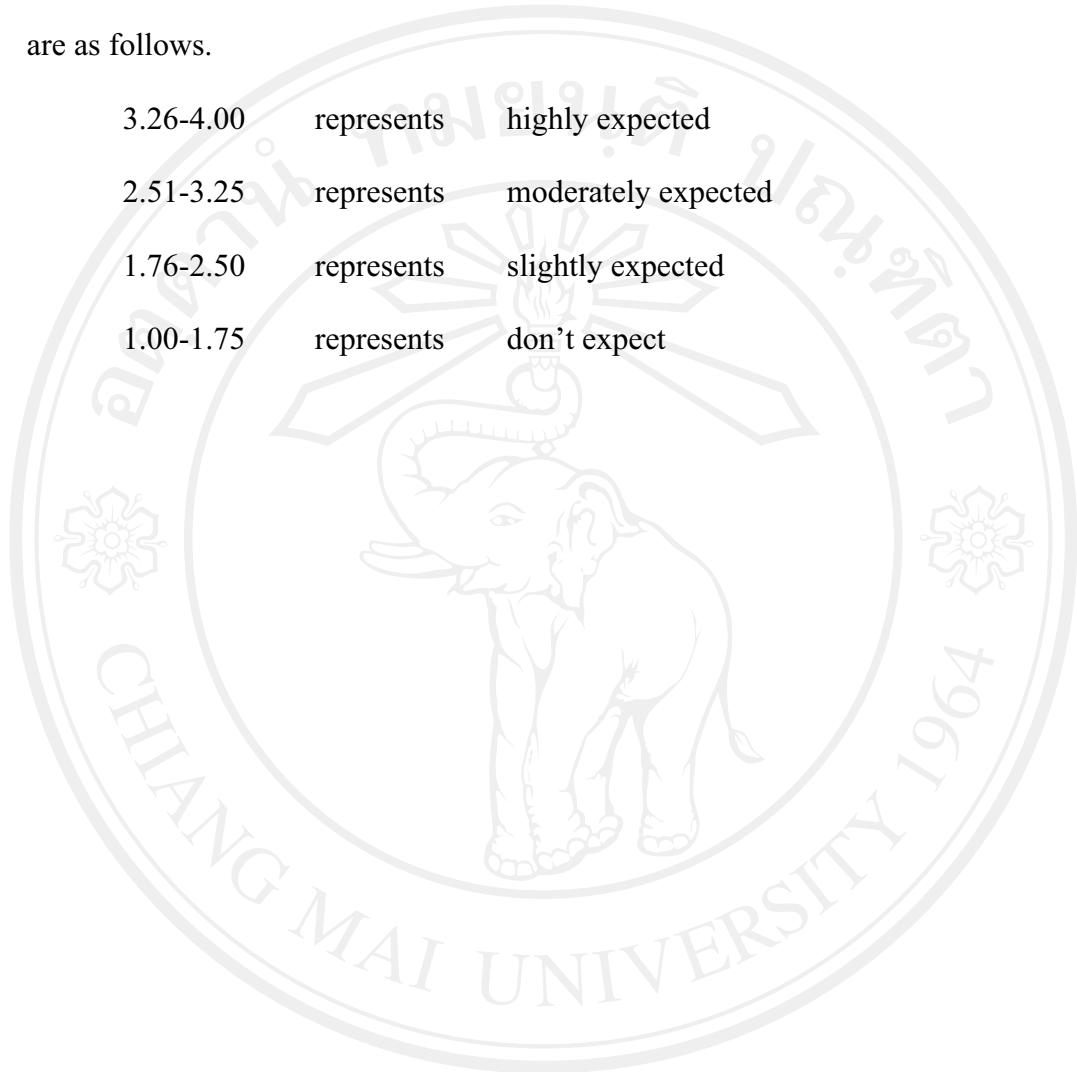   1.00-1.80   represents   don't know

Ranks of average values and meanings of expectation from participating in ABDM

are as follows.

    3.26-4.00   represents   highly expected

    2.51-3.25   represents   moderately expected

    1.76-2.50   represents   slightly expected

    1.00-1.75   represents   don't expect