CHAPTER III

RESEARCH MEDTHODS

This chapter outlines the way in which the study collected, analyzed and integrated different types of data. In developing a methodology, the project has two underlying premises.

3.1 Methods of the study

3.1.1 Selection of study site

The study site, Dong San village is located in Phone Ngam sub-district, Arkat Amnuai district, Sakon Nakhon province and it has approximately 250 families (preliminary survey, 2007) who are mostly farmer and engaged in fishing. More than 90% of farmers in village practice subsistence agriculture and their livelihoods depend on wetlands agro-biodiversity resources.

3.1.2 Data collection

Primary data collection

The field survey was used to understand the context of study site and also the survey was carried out to gain understanding about resources management and patterns, current farmers' practice in cropping systems, crop productivity and yield,

socio-economic constraints for production. Participatory Rural Appraisal (PRA) and key informant interview were employed. Socio-economic data consisted of the information on household, land holdings and tenure, land use and cropping pattern, production cost, and food situation. Data was collected by administering the structure questionnaire to the randomly sampled households. The primary data were collected through interviews with two dimensions;

1) Household survey covered the following issues:

a. Background information on income, livelihood activities, etc.

b. Household coping strategies, etc.

2) Focus group discussions, important and effective qualitative elements of the field research were the focus-group discussions that helped in the understanding of the range of perspectives that exist within the communities regarding their coping and adaptation strategies with respect to climatic shocks, such as flooded. Focus-groups are assembled by researchers to discuss and comment on, from personal experience, the topic that is subject of the research. The focus-group discussions comprised 7 to 10 participants were fisherman, rice farmers, women, elders, and leader of the village. These discussions complemented the open-end questions of the household survey regarding local climate indicators and specific coping and adaptation strategies. It was possible to go deeper and more precisely into these topics by drawing tables with the participants that represented the different local climate indicators. The coping and adaptation strategies were mentioned with respect to the specific crop.

Secondary data collection

The above mentioned research methods combined with secondary data such as local historical literature, physical data and demographic data that have shed light on

the impact of natural flooded on local farmers. Data were mainly gathered from published documents of the Mekong Wetlands Biodiversity Conservation and Sustainable Use Programme (MWBP), Thai Bann research and others related sources.

Population and sampling

The population in this study is total households of Dong San village which are located on Sonkharm River banks of Arkat Amnuai district, Sakon Nakhon province. The sample size is 60 households which directly use and involved in agro-biodiversity's conservation activities of in study area by simple random sampling method.

3.2 Data analysis

Microsoft Excel program and SPSS version 12 were used to enter the individual household data.

1. To fulfill first objective of the study, the data from the formal survey and interview was analyzed by using descriptive statistics, to address management and utilization practices of wetland resources management in study area.

2. For of the stated second and third objective, the socio-economic analyses will be emphasized on agro-biodiversity used values, and social participation in resources management. The detailed data analyses are given below.

3.2.1 Economic valuation of Agro-biodiversity in Wetlands

In order to understand the values and benefits of agro-biodiversity according to FAO (2004) and Barbier *et al.* (1997), there are two main categories of values have been identified as below.

1. Use-values can be divided into:

1.1. Direct use-values refer to the benefits resulting from actual use, such as for food, fodder, shelter, ritual, medicinal and commercialization. These values can be further divided into *income values* and *non-income values*. In many cases, the non-income values are of greater importance.

1.2. Indirect use-values are the benefits derived from ecosystem functions; including adaptability to marginal environments and contribution to nutrient cycling. Also, the cultural and social values obtained from agro-biodiversity (e.g. social status).

1.3. Option values are derived from the value given to safeguarding an asset for the option of using it at a future date. These may be seen as a type of insurance value, against the occurrence of new diseases or climate change.

2. Non-use values can be divided into:

2.1. The existence value is relevant to a much wider stakeholder group as it is not linked to any direct uses. For example, people may pay to see plant or animal life in another country or region that they cannot see in their own

2.2. Bequest value refers to benefits from ensuring that certain goods will be preserved for future generations. For example, many of us are concerned with future damages from global warming and would be willing to pay to reduce them, despite the fact that the vast majority of the damages are expected to affect the Earth long after our generation is gone.

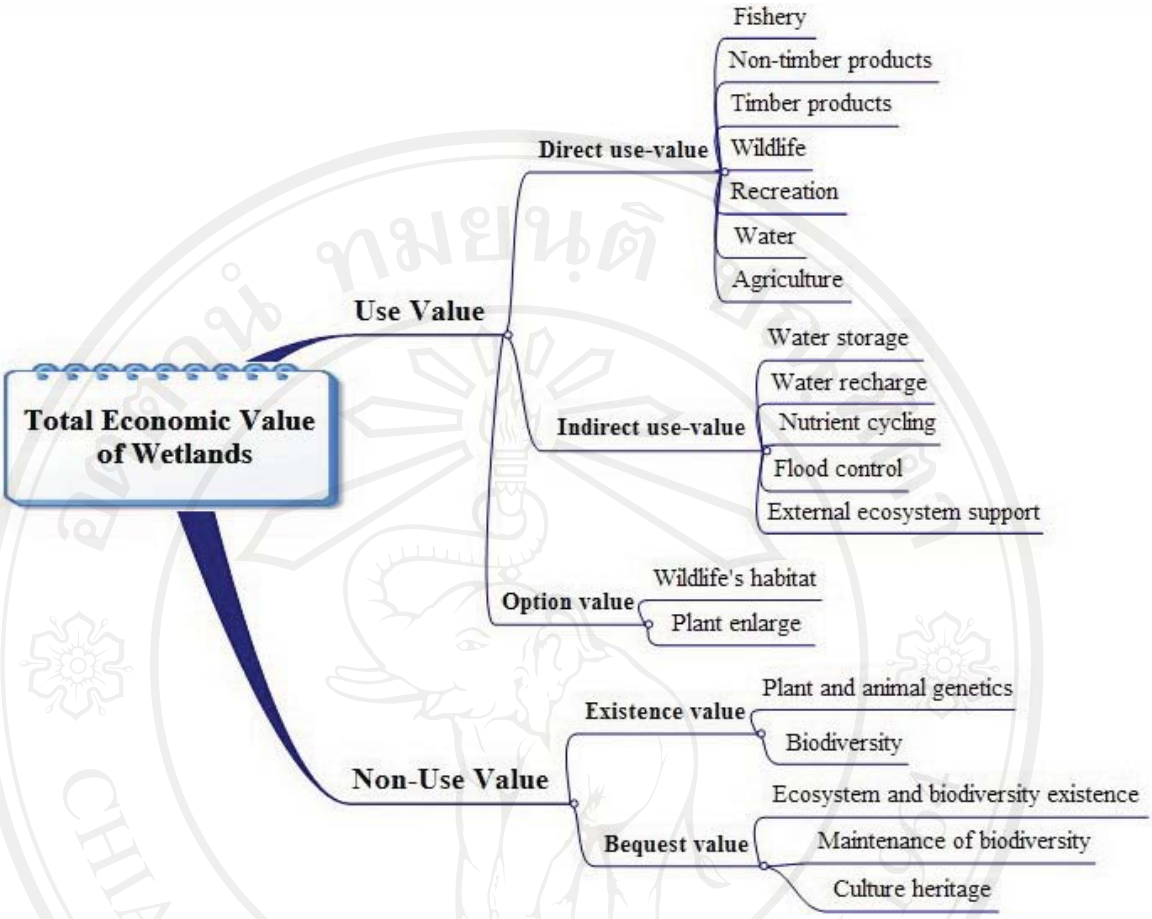

Figure 3-1: Classification of total economic value for wetlands.
Source: adapted from FAO (2004) and Barbier *et al.,* (1997)

Estimation of Agro-biodiversity direct use value in study area

In this study, we apply a market price method to estimate direct use values from the wetland area. The direct use values derived from local uses that can be assessed from resource-based economic activities taking place in the floodplain such as aquaculture, capture fisheries, agricultural production, and wetland products collection.

Market price method is used to evaluate the agro-biodiversity use values. The study taken account only direct use value to answer the question that how many percentage of wetland resources that contribute to household. The direct use value of

agro-biodiversity resources in term of the rural people direct use is equal to the net income generated from products of wetland to rural people. In study site, agro-biodiversity products that people collected can be classified into 5 categories as follows; fishery, earthworms, edible mushrooms, bamboo shoots, wild vegetable plants. If the agro-biodiversity products are sold, local market price will be used to calculate the net value (as gross income generated). However, when products are used for only subsistence purpose, the net value is estimated base on surrogate prices by use market price of the close substitute for such product. So, the study aimed to estimated net value of agro-biodiversity products from direct use. It should be point out that the net value and value are fairly close due to negligible cost of gathering.

Equation (1) shows the calculation of total value of agro-biodiversity products (Viboonpun, 2000).

$$ABDV = \sum_{i=1}^{n} \left(Q_i P_i - C_i \right) \qquad \textit{eq. (1)}$$

Where; $ABDV$ = total value of agro-biodiversity products (Baht)

Q_i = Amount of agro-biodiversity product i being collected

P_i = Local market price of agro-biodiversity product i (Baht/ unit)

C_i = Cost for collected agro-biodiversity product i (Baht)

i = Type of agro-biodiversity products

n = Total number of agro-biodiversity products

3.2.2 Family income

Family income including farm and off-farm income is the main economic parameter (Doppler *et al.,* 2007). It gives the economic power of a family and income generated in one year. Family income is defined as the economic benefit a family receives for the use of family owned resources (e.g. labour, land) and managerial skill of the family. So, equation (2) shows the calculation of family income.

$$HIC = FIC + FIA + FWP + OFW + OFR \qquad eq.\ (2)$$

Where; HIC = total family income (Baht/year)

FIC = Net income from crop (Baht/year)

FIA = Net income from raised animal (Baht/year)

FWP = Net income from gathered wetland products (Baht/year)

OFW = Wage/ salary (Baht/year)

OFR = Remittance (Baht/year)

3.2.3 Social participation and resources management

Participation in utilizing and conservation of agro-biodiversity were chosen for presentation of resources management in the community. Poisson regression analysis was employed to assess the socio-economic factors that affecting to frequency of participation in wetland resources management activities by using SPSS program, poisson regression model can be used to predict a response variable that is affected by one or more explanatory variables. A Poisson regression model is sometimes known as a log-linear model, the regression parameters are estimated by

the method of maximum likelihood. The data are a random of observations on a sample of 60 households visited 4 times in the 2007/08 production year.

Poisson regression model;

Poisson regression model is non-linear and estimates the effect of independent variables x_i on a scalar dependent variable y_i. The density function for the Poisson regression is:

$$f\left(y_i / x_i\right) = \frac{e^{-\mu_i} \mu_i^{y_i}}{y_i!}, \qquad \textit{eq. (3)}$$

Where Poisson regression model specifies that each y_i is drawn from a Poisson distribution with parameter μ_i the mean parameter is a function of the regressors x_i, and a parameter vector, β. The Poisson distribution is discrete, like the binomial distribution. It has only a single parameter μ which μ is both the mean and the variance. The basic model formulation is that the mean of the poisson random variable is a function of predictor information.

The probability of observing Y_i=k, is:

$$E\left(y_i | x_i\right) = \mu_i = \exp\left(x'_i \beta\right), \; y_i = 0,1,2...,k \qquad \textit{eq. (4)}$$

The Poisson regression model for counts (with a log link which is often referred to as "Poisson log linear model") is:

$$\log\left(\mu\right) = \alpha + \beta X \qquad \textit{eq. (5)}$$

Since the log of the expected value of Y is a linear function of explanatory variables and the expected value of Y is a multiplicative function of x. So, we model the data in order to describe and predict the counts as given below.

$$E(Y) = \mu \qquad \textit{eq. (6)}$$

$$\log(\mu) = \alpha + \beta X$$

$$\mu = \exp(\alpha + \beta X)$$

$$\log(Y) = \alpha + \beta_i X_i \qquad \textit{eq. (7)}$$

$$Y = (e^{\alpha})(e^{\beta_i X_i}) \qquad \textit{eq. (8)} \text{ (Long, 1997)}$$

The result of Poisson regression analysis from SPSS program by GENLOG procedure is described below:

[In Analyze $\rightarrow$ Loglinear $\rightarrow$ General $\rightarrow$ Distribution $\rightarrow$ Poisson]

That estimate function as its mean could be linked to a set of explanatory variables using a linear function like:

$$Y = \exp(\alpha + \beta_i X_i + ... + \beta_n X_n + \varepsilon) \qquad \textit{eq. (9)}$$

Where Y = observation value in T_i (time period)

y_i = frequency of observation

x_i = independent variables

α = constant

β = coefficient

ε = error term

The model attempts to explain, how are socio-economic factors relevant to the topic of farmers' management of wetland agro-biodiversity? Is it that socio-economic condition or characteristics of small farmers have affect on how they respond to participation in wetland resources management and conservation activities? If so, what is the role of socio-economic condition in the design of utility wetland agro-

biodiversity management and conservation activities? Is it that wetland agro-biodiversity management and conservation activities have socio-economic affected on farmers? If so, what is the role of that wetland agro-biodiversity management and conservation activities design in understanding these effect? Of course, all of these relationships are relevant.

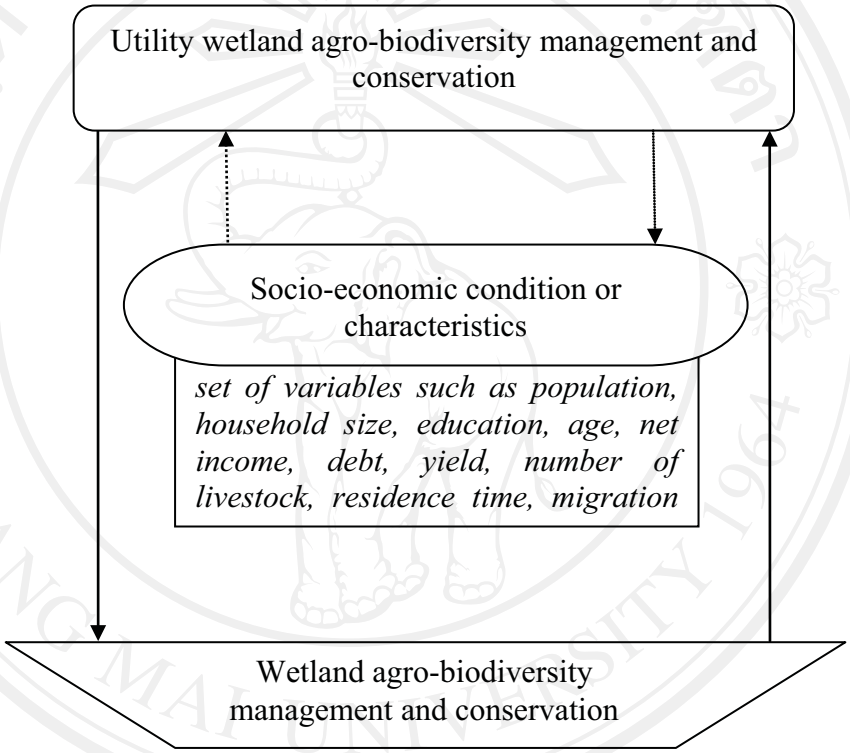

Figure3-2: Conceptual model relating socio-economic conditions and characteristics to small farmers' management of wetland agro-biodiversity

This part provides a conceptual framework for understanding the several ways in which socio-economic factors relate to wetland agro-biodiversity management and conservation. A simplified conceptual model (Figure3-2, Table3-1) is used here to illustrate how socio-economic conditions and socio-economic affect variables are related to small farmers' management of wetland agro-biodiversity.

In general, conceptual models such as the one presented here are used to organize concept and formulate hypotheses. Models can help identify potential independent and dependent variables, as well as the relationship among them that form hypotheses about cause and effect. To achieve this end, a regression model was developed in which the dependent variable was FRPAR reflecting different levels of participated in conservation activities.

Table3-1: Socio-economic factors specified as variables in the equations

Independent Variables	*Specification*	*Expected Sign*
***Farm and Farm Operator Characteristics**:*		
Land	Total cultivated land ownership (ha/hh)	(-)
Fincome	Cash income from farm sources (baht/year/hh)	(-)
Debt	Indebtedness of household (baht)	
SRP	Rice yield (kg/ha/year)	(-)
CashAgbio	Cash income from agro-biodiversity products (baht/year/hh)	(+)
SurAgbio	Non-cash income from Surrogated price (baht/year/hh) from agro-biodiversity products	(+)
Liv	Livestock owned (head/hh)	(+)
Farmer Preferences and Characteristics:		
HAge	Age of head of household (year)	(+)
HEdu	Years of school (year)	(+)
HGen	Sex of head of household; 1 if male, otherwise 0	(+)
Hsize	Household members (person)	(+)
HRes	Residence time (dummy)	(+)
Mlabour	Migration of active labour force(no/hh)	(-)
Ofincome	Cash income from off-farm sources (baht/year/household)	(-)
Farming system:		
Wrice	Ability to cultivate wet season rice; 1 if yes, otherwise 0	(-)
Drice	Ability to cultivate dry season rice; 1 if yes, otherwise 0	(+)
Social Participation:		
Mlocal	Household members affiliated with local institutions; 1 if "yes", 0 otherwise	(+)
Contude	Attitude towards conservation; 1 if "positive", 0 otherwise	(+)
Bentude	Attitude towards future benefit; 1 if "positive", 0 otherwise	(+)