

CHAPTER III

METHODOLOGY

This chapter will provide the methodology used in this research. The areas of Bang Khun Sai sub-district can be divided into the upland area and the lowland area which influence the locals' occupations. As a result, this research chose the choice experiment method to value the willingness to pay for decreasing the impacts of a sea level rise in Bang Khun Sai. This method can describe about the willingness to pay (WTP) for decreasing the impact of many aspects for example the loss of income from various jobs, the loss due to flooding, and the loss of the mangrove forests and the mudflat areas. The related secondary data was collected, the consultation with experts, and collecting data from pre-test survey, in order to construct the research tool. i.e., the design of attributes and their levels, the create choice set. Then the field data collection by one-on-one interviews for valuation of the WTP and respondents' attitudes.

The in-depth interviews were carried out to gather possible guidelines for dealing with the impacts of a sea level rise in Bang Khun Sai. After that, the thematic analysis was used to analyze and summary the research result. The content of this chapter consists of the sample size and sampling method, the construction of the research tools and the data analysis. The steps of conducting this research were shown in Figure 3.1.

3.1 Sample size and sampling method

There are two sample groups in this research: the sample group for the valuation of the willingness to pay and the sample group for gathering the possible guidelines to deal with the impacts of a sea level rise for the areas of Bang Khun Sai. The details were described as follows:

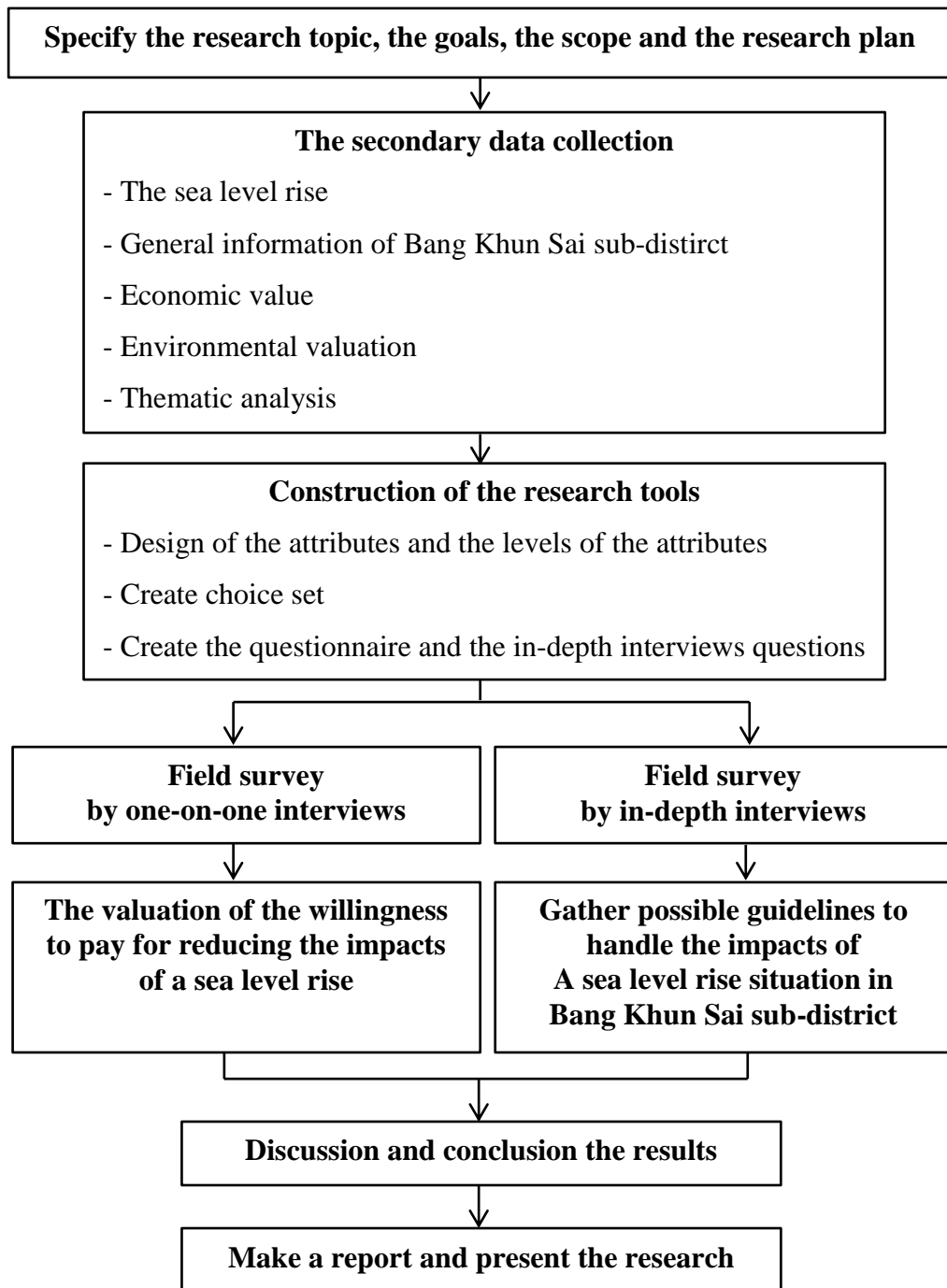


Figure 3.1 The diagram of research procedures

(1) the sample group for the valuation of the willingness to pay: The specification of this sample group was done based on the equation of Krejcie and Morgan. The scope of population was the locals of Bang Khun Sai whose ages between 18-75 years old. Based on the information from Ban Laem District Office (2013), total population of Bang Khun Sai is 6,977 people, so the minimum sample group is at least 364 people at the 95% confidence level (Krejcie and Morgan, 1970). However, the actual data collection were collected from 380 people, after that stratified random sampling method was done based on physical features of the areas as follows: the upland area consist of Moo 5, 6, 7, 9 and 11 with 2,923 people and the lowland area consists of Moo 1, 2, 3, 4, 8 and 10 with 4,054 people. The details were shown in Table 3.1. The convenience sampling method was used in each area. This sample group was given the questionnaire for the interview.

Table 3.1 Sample group in each area of Bang Khun Sai sub-district *(Ban Laem District Office, 2013)

Areas	Population (people)	Samples (people)
The upland area	2,923*	159
The lowland area	4,054*	221
Total	6,977*	380

(2) the sample group for gathering the guidelines to deal with the impacts of a sea level rise for the Bang Khun Sai sub-district: The purposive sampling of the sample group was used by considering the interviewees i.e., the key informants who were able to provide the information about the guidelines for dealing with a sea level rise in Bang Khun Sai and should be the head department or the deputy head department of the organizations. There were 4 main sample groups in this research: 1) the official authorities for natural resources and environmental management consisted of one officer from the Provincial Offices for Natural Resources and Environment Phetchaburi and two officers from the Mangrove Resource Development Station Number 6 (Phetchaburi), 2) the official authorities for monitoring and planning the vocational plan consisted of one officer from the Ban Laem District Office of Fishery,

and one officer from the Ban Laem District Office of Agriculture, 3) the local authority who directly oversee the areas i.e., one officer from the Bang Khun Sai Subdistrict Administrative Organization, and 4) the local experts consisted of two members of the Bang Khun Sai Subdistrict Marine Resource Conservation Group and a member of user group of Maung Tar Lhor irrigation water. The relevant stakeholders of the in-depth interviews consisted of the 9 interviewees described previously were shown in Figure 3.2.

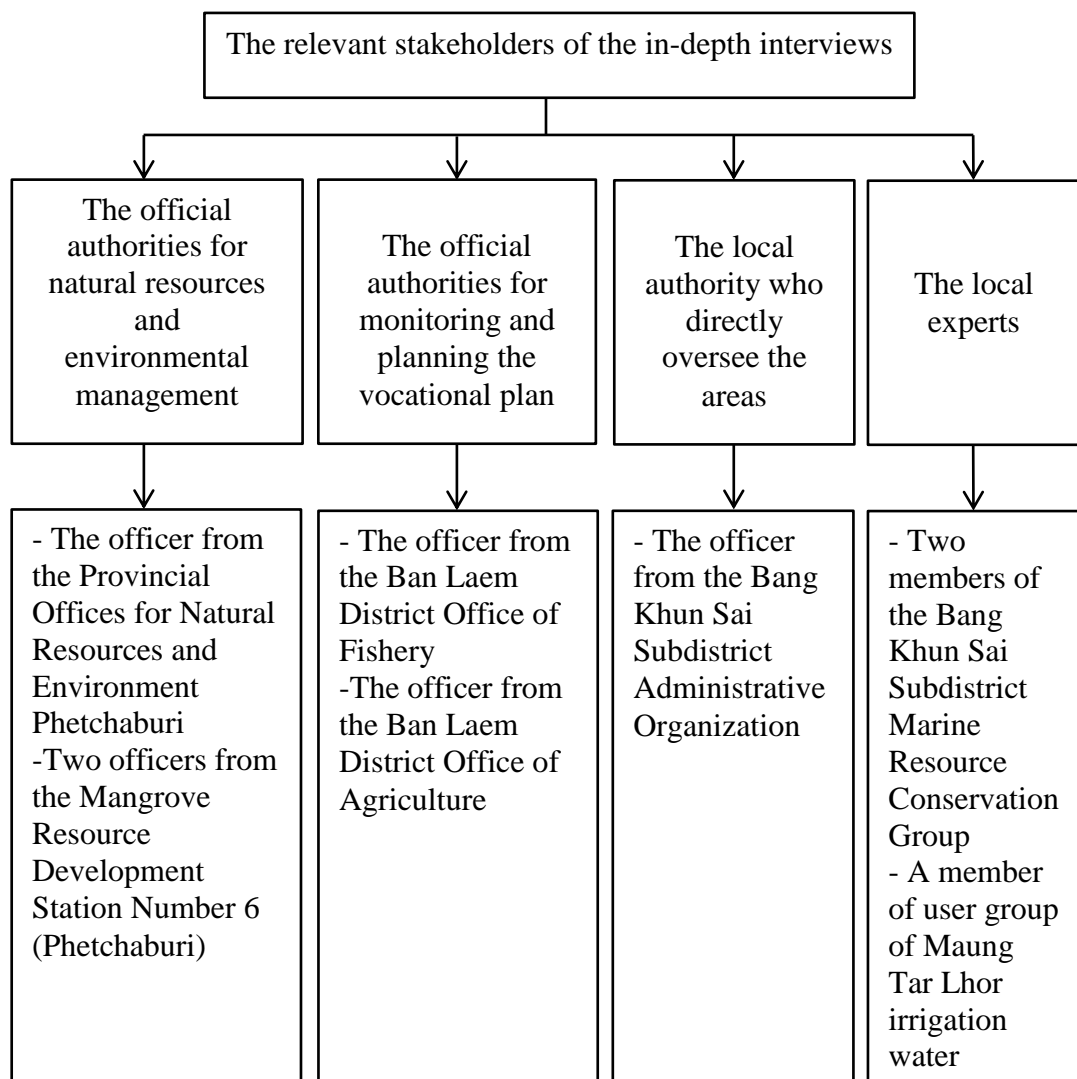


Figure 3.2 The diagram of sample group for in-depth interviews

3.2 Construction of the research tool

This research used the questionnaires consisting of the choice sets for asking the sample groups. The steps of constructing the research tools composed of the design of the attributes, specifying the levels of the attributes, creating the choice sets, creating questionnaires, and creating the in-depth interviews questions. These steps were described as follows:

3.2.1 The design of the attributes

According to the discussion with the expert about coastal ecology and economic, the pre-test survey, including the study of secondary general data of the Bang Khun Sai sub-district, the information of the impacts of sea level rise on the coastal resources, the ways of livings, and the occupations of the locals in Bang Khun Sai, thus this research specified the research attributes for 7 attributes which could be divided into 6 attributes of reducing the impacts of sea level rise and 1 money attribute as follows:

(1) the reduction of the loss of income from pedal board clams;

This attribute reflected the direct use value of the natural resources of Bang Khun Sai by expecting the sea level rise may affect the loss of income from pedal board clams due to the mudflat areas were decreased causing the reduction of the cockles.

(2) the reduction of the loss of income from aquaculture;

This attribute reflected the direct use value of the natural resources of Bang Khun Sai by expecting the sea level rise may impact on the loss of income from aquaculture because the flooding of the shrimp ponds and the fish ponds in the lowland area or the seawater intrusion which affected the freshwater aquaculture in the upland area.

(3) the reduction of the loss of income from salt farming;

This attribute reflected the direct use value of the natural resources of Bang Khun Sai by expecting the sea level increase may affect the loss of income from salt farming due to the loss of some areas for salt farming and the increase of cost in reinforcing the levees.

(4) the reduction of the loss of income from agriculture;

This attribute reflected the direct use value of the natural resources of Bang Khun Sai by expecting the sea level increase may affect the reduction of the loss of income from agriculture, which means the loss of income from rice paddy field, planting vegetation, raise animals due to the damaged products because of the saltwater intrusion causing the problem of saline soil that is not suitable for agriculture.

(5) the reduction of the frequency and the duration of flooding;

This attribute reflected the indirect use value of the natural resources of Bang Khun Sai in the aspect of the services of marine and coastal ecosystems for flooding protection by expecting the sea level increase may impact on the frequency and the duration of flooding which affected the public utility and the dwelling areas.

(6) the reduction of the loss of the mangrove forests and the mudflat areas;

This attribute also reflected the use value and non-use value of the natural resources of Bang Khun Sai by expecting the sea level increase may affect the reduction of the mangrove forests and the mudflat areas due to when the sea level increase, usually the mangrove forests will adapt themselves by retreating into the mainland; however, nowadays there are many barriers such as roads, the dwelling areas causing the reduction of the mangrove forest area. Also, the sea level rise may cause the loss of the mudflat area that further away from the coast due to permanent seawater flooding.

(7) the amount of money contributing to the fund;

The amount of money contribution to the operational fund for dealing the impacts of sea level rise in Bang Khun Sai for handling this impacts of sea level rise by being used to support the projects of decreasing this impacts in Bang Khun Sai sub-district.

3.2.2 Specify the levels of the attributes

Based on the interviews of the local authorities and the study of general information of Bang Khun Sai sub-district including the impacts of sea level rise, it was expected that in the next 20-50 years, the sea level will accumulatively increase about 38-53 cm (Department of Marine and Coastal Resources, 2012). As a result, in

this research the levels of the attributes were assigned for 3 levels: the level of the result due to no actions were taken in reducing the impacts of sea level rise, and the levels of the intensity of the operations or the activities in decreasing the impacts of sea level rise as at the good level and at the excellent level. In addition, the pre-test survey was done in this research for specifying the levels of the money attribute to support the fund; there were 5 levels of the money attribute as follows:

(1) the reduction of the loss of income from pedal board clams;

If there were no actions taken, the reduction of the loss of income from pedal board clams was assigned to be 70%. If there were the operations done at the good level and at the excellent level, the decreased income from pedal board clams were assigned to be 35% and 15%, respectively.

(2) the reduction of the loss of income from aquaculture;

If there were no actions taken, the reduction of the loss of income from aquaculture was assigned to be 70%. If there were the operations done at the good level and at the excellent level, the decreased income from aquaculture were assigned to be 35% and 15%, respectively.

(3) the reduction of the loss of income from salt farming;

If there were no actions taken, the reduction of the loss of income from salt farming was assigned to be 50%. If there were the operations done at the good level and at the excellent level, the decreased income from salt farming were assigned to be 25% and 10%, respectively.

(4) the reduction of the loss of income from agriculture;

If there were no actions taken, the reduction of the loss of income from agriculture was assigned to be 70%. If there were the operations done at the good level and at the excellent level, the decreased income from agriculture were assigned to be 35% and 15%, respectively.

(5) the reduction of the frequency and the duration of flooding;

If there were no actions taken, the frequency and the duration of flooding was assigned to be 3 times/year for the total flooding period of 4 weeks. If there were the operations done at the good level and at the excellent level, the frequency and the duration of flooding were assigned to be 2 times/year with flooding period for 3 weeks and 1 time/year with flooding period for 2 weeks, respectively.

(6) the reduction of the loss of the mangrove forests and the mudflat areas;

If there were no actions taken, the loss of the mangrove forests and the mudflat areas was assigned to 360 Rai. If there were the operations done at the good level and the excellent level, the loss of such areas were assigned to be 180 and 90 Rai, respectively.

(7) the amount of money contributing to the fund;

According to the pre-test survey of 60 locals in Ban Laem sub-district whose ages were 18-75 years old (Ban Laem consists of the natural areas and the occupations of the locals similar to those of Bang Khun Sai), and gave the details that the operation following the plan for decreasing the impact of sea level rise needed the budget. Thus, it is necessary to ask some cooperation from general public. The willingness to pay was assigned in a form of money contribution to the fund for dealing the impacts of sea level rise.

The test used the payment ladder technique which listed the interval of money from the minimum to the maximum which could be possible for each plan in decreasing the impact of sea level rise. The interviewer would ask about the amount of money as in the order from the minimum to the maximum; if the respondents were certain that they could pay for such amount, then they need to fill the (✓) sign; if the respondents were certain that they could not pay by asking from the maximum to the minimum, then they need to fill the (✗) sign.

The result analysis of the mean, median, and mode of the amount of money, which that the respondents answered by using the data from the payment ladder, could be divided into 5 levels i.e., 0, 50, 100, 300 and 1,000 Baht. These levels will be used to specify the amount of money contribution to the fund in the actual data collection. The details of the pre-test questionnaire and the results of the pre-test questionnaire were described in the Appendix A. The attributes and the levels of the attributes in reducing the impacts of sea level rise were shown in Table 3.2.

Table 3.2 Attributes and its levels

Attributes	Level
the reduction of the loss of income from pedal board clams (INPC)	no action: INPCn (decreased by 70%) good: INPCg (decreased by 35%) excellent: INPCe (decreased by 15%)
the reduction of the loss of income from aquaculture (INAQ)	no action: INAQn (decreased by 70%) good: INAQg (decreased by 35%) excellent: INAQe (decreased by 15%)
the reduction of the loss of income from salt farming (INSF)	no action: INSFn (decreased by 50%) good: INSFg (decreased by 25%) excellent: INSFe (decreased by 10%)
the reduction of the loss of income from agriculture (INAG)	no action: INAGn (decreased by 70%) good: INAGg (decreased by 35%) excellent: INAGe (decreased by 15%)
the reduction of the frequency and the duration of flooding (FLOOD)	no action: FLOODn (3 times/year for 4 weeks) good: FLOODg (2 times/year for 3 weeks) excellent: FLOODe (1 time/year for 2 weeks)
the reduction of the loss of the mangrove forests and the mudflat areas (MAMU)	no action: MAMUn (loss of the mangrove forests and the mudflat areas 360 Rai) good: MAMUg (loss of the mangrove forests and the mudflat areas 180 Rai) excellent: MAMUe (loss of the mangrove forests and the mudflat areas 90 Rai)
the amount of money contributing to the fund (Baht/year) (COST)	0 (no actions) ,50, 100, 300 and 1,000

3.2.3 Creating the choice sets

Based on the number of the attributes in decreasing the impacts of sea level rise, there were 6 attributes; each attribute had 3 levels and the money attribute had 5 levels. The choice set had 3 choices as the status quo for 1 choice and the non-

status quo for 2 choices. Thus, the combination of the choices as in the form of full factorial design were $3^{(2 \times 6)}$ and the number of possible choices were $3^{(2 \times 6)} \times 5 = 2,657,205$ choices (Seenprachawong, 2013).

In this research, the fractional choices were constructed using the orthogonal design for 45 possible choices without any bias on any attributes; they consisted of equally attributes and levels (Kuhfeld, 2010). The details of the 45 choices were shown in the Appendix B. In addition, the cyclical design was used in creating the choice sets, then pairing up with the status quo. Thus there were 45 choice sets. After that the choice sets were blocking in 15 groups; each group composed of 3 choice sets containing in the questionnaire. Therefore, there were 15 versions of the questionnaires in this research. Each respondent would choose the choice for 3 times from 1 version. These versions would be randomized to be used in the interview equally (Seenprachawong, 2013).

Each choice set consisted of 3 choices: the status quo or the choice of no action for 1 choice which would appear in every choice set, and the choice of following the operation plans for coping with the impacts of a sea level rise for 2 choices i.e., Plan A and Plan B. The example of the choice set was shown in Table 3.3.



















3.2.4 Creating the questionnaire

In this research, there were 380 respondents who answered the questionnaire (Appendix C). The structure of the questionnaire was divided into 3 parts: part 1 was the economic-social characteristics of respondents, part 2 was the respondents' attitudes toward the situation and problem, and part 3 was the willingness to pay. The details of the questionnaires' structure were explained as follows:

(1) part 1: the economic-social characteristics of respondents;

This part consisted of the questions regarding genders, ages, marital statuses, the level of education, the period of living in Bang Khun Sai sub-district, the number of members in the household, the occupation, the average income, and being the member of the environmental organization.

Table 3.3 The example of choice set

Attributes	No action	Plan A	Plan B
the reduction of the loss of income from pedal board clams	decreased by 70% 	decreased by 70% 	decreased by 35% 
the reduction of the loss of income from aquaculture	decreased by 70% 	decreased by 70% 	decreased by 35% 
the reduction of the loss of income from salt farming	decreased by 50% 	decreased by 10% 	decreased by 50% 
the reduction of the loss of income from agriculture	decreased by 70% 	decreased by 70% 	decreased by 35% 
the reduction of the frequency and the duration of flooding	3 times/year for 4 weeks 	3 times/year for 4 weeks 	2 times/year for 3 weeks 
the reduction of the loss of the mangrove forests and the mudflat areas	loss of the mangrove forests and the mudflat areas 360 Rai 	loss of the mangrove forests and the mudflat areas 180 Rai 	loss of the mangrove forests and the mudflat areas 90 Rai 
the amount of money contributing to the fund (Baht/year)	0	100	300
Your choice selection			

(2) part 2: the attitudes of the respondents toward the situation;

This part consisted of the questions to evaluate attitudes of the respondents toward the important situation and problem of Thailand that the government should solve them, the anxiety about the impacts of climate change, the responsibility of solving the natural resources and the environment problems, and the comprehension of sea level rise problem and the future impacts after the researcher explained the information in the cards along with the interview.

(3) part 3: The willingness to pay;

This part was the questions using in the choice experiment method (CEM) which composed of 3 choice sets with the details of Plan A and Plan B as well as the difference of money contribution to the fund. In the end of this part, if the respondent chose the option of no action taken for all 3 times, then the researcher would pursue with the question about their reason for only choosing the no action choice. If the respondents chose the Plan A or Plan B for at least 1 time, then the researcher would ask about which organization should be the main organization for being responsible of fundraising for the fund.

3.2.5 Creating the in-depth interviews questions

This research used the in-depth interviews questions with 9 interviewees (Appendix D) consisting of the questions about the impacts of a sea level rise, the current plan to deal with the impact, and the future guidelines to cope with a sea level rise in Bang Khun Sai.

3.3 Data analysis

The data analysis from the questionnaire was done by using the statistical program for 3 main analyses: the economic-social characteristics analysis of respondents, the attitudes analysis of the respondents, and the valuation of the willingness to pay and the factors which influence the willingness to pay. In addition, the data analysis of the information obtained from the in-depth interviews was done by using the thematic analysis. The details of data analysis were explained as follows:

3.3.1 The analysis of the respondents' economic-social characteristics

The data analysis in this part used the percentage and the average values which some economic-social characteristics data such as ages, the number of years of education, the number of years living in Bang Khun Sai, the number of the household members, and the average income, will be grouped so these data agree with the data analysis of the willingness to pay and the factors influenced the willingness to pay.

3.3.2 The analysis of the respondents' attitudes

The data analysis in this part mostly used the percentage value except the attitude analysis toward the responsibility of solving the natural resources and environment problems would use both the percentage and the average values. The valuation of such attitudes was turned into the scores by using the rating scale method following the likert scale. The measurement level was divided into 5 levels i.e., absolutely disagree (substituted by 0), disagree (substituted by 1), no comment (substituted by 2), agree (substitute by 3), and absolutely agree (substituted by 4). After that the range of the average score was done for measuring the levels of the attitudes by using the class interval size equation (Rungruang Sri, 2007) as follows:

$$\text{Class interval size} = \frac{\text{Range}}{\text{Number of interval}}$$

The range is $4-0 = 4$ and the number of intervals was 5. Thus, the class interval size was 0.8 which can be used to display the average scores and the interpretation of the attitudes which were described in Table 3.4.

Table 3.4 Interpretation of the attitudes

Average scores	Attitude
3.21-4.00	at the maximum level
2.41-3.20	at the high level
1.61-2.40	at the medium level
0.81-1.60	at the low level
0.00-0.80	at the lowest level

3.3.3 The valuation of the willingness to pay and the factors that influenced WTP

In the valuation of the willingness to pay by using the choice experiment method (CEM), the choices were composed of: one choice of the status quo or no action, and two choices for following the operation plans to manage the impacts of sea level rise. The choices for following the operation plans were assigned the levels of the attributes for both the attributes of decreasing the impacts of sea level rise and the money attributes; a combination of these choices made one choice set. The respondents were assumed to be the trade-off situation between better result and higher value to be spent. There was only one choice that can make the respondent most satisfied from all three choices in each choice set. As a result, the conditional logit model was appropriate for the analysis in this research. In addition, the researcher specified the model of making a choice decision based on the choice experiment general model (Equation 3.1). For this research, there were 4 groups of the independent variables shown in Equation 3.2 as follows: (Pramoon, 2008; Nabangchang-Srisawalak *et al.*, 2011; Seenprachawong, 2013).

$$U_{ij} = f(X_i, P_i, Z_{mj}) \tag{3.1}$$

$$U_{ij} = f(INPCe_i, INPCg_i, INAQe_i, INAQg_i, INSFe_i, INSFg_i, INAGE_i, INAGg_i, FLOODE_i, FLOODg_i, MAMUe_i, MAMUg_i, COST_i, COST_{ij}, Z_{mj}, S_{mj}) \tag{3.2}$$

The dependent variable was: U_{ij} is the indirect utility level by choosing the choice i of the respondent j . If the respondent j chooses the choice i , then U_{ij} equals 1. If the respondent j chooses the other choices, then U_{ij} equals 0.

The independent variables were divided into 4 groups i.e., the money attributes, the attributes at different levels for reducing the impacts of sea level rise, the economic-social characteristics of respondents, and the comprehension of the problems. With the attributes at different levels for reducing the impacts of a sea level rise were encoded using the effect code method; the choice of the status quo or no action taken would be effect coded as -1 in order to estimate the coefficients of such omitted variable easily. (Seenprachawong, 2013). The details of the independent variables and the effect coding were described in Table 3.5.

Table 3.5 The independent variables and the effect coding

Variables	Definition	Data encoding
Money attributes		
$COST_i$	The amount of money contributing to the fund for the choice i	0, 50, 100, 300 and 1,000 Baht/person/year
$COST_{ij}$	The amount of money contributing to the fund for the respondent j at the choice i	0, 50, 100, 300 and 1,000 Baht/person/year divided by the respondents' income
Attributes at different levels for reducing the impacts of sea level rise		
$INPCe_i$	the reduction of the loss of income from pedal board clams at the	-1 if choice i is no action 1 if choice i give the reduction of the loss of income from pedal board clams at the excellent level

Table 3.5 The independent variables and the effect coding (cont.)

Variables	Definition	Data encoding
$INPCg_i$	the reduction of the loss of income from pedal board clams at the good level	-1 if choice i is no action 1 if choice i give the reduction of the loss of income from pedal board clams at the good level 0 if choice i give the reduction of the loss of income from pedal board clams at the excellent level
$INAQe_i$	the reduction of the loss of income from aquaculture at the excellent level	-1 if choice i is no action 1 if choice i give the reduction of the loss of income from aquaculture at the excellent level 0 if choice i give the reduction of the loss of income from aquaculture at the good level
$INAQg_i$	the reduction of the loss of income from aquaculture at the good level	-1 if choice i is no action 1 if choice i give the reduction of the loss of income from aquaculture at the good level 0 if choice i give the reduction of the loss of income from aquaculture at the excellent level
$INSFe_i$	the reduction of the loss of income from salt farming at the excellent level	-1 if choice i is no action 1 if choice i give the reduction of the loss of income from salt farming at the excellent level 0 if choice i give the reduction of the loss of income from salt farming at the good level
$INSFg_i$	the reduction of the loss of income from salt farming at the good level	-1 if choice i is no action 1 if choice i give the reduction of the loss of income from salt farming at the good level 0 if choice i give the reduction of the loss of income from salt farming at the excellent level
$INAGe_i$	the reduction of the loss of income from agriculture at	-1 if choice i is no action 1 if choice i give the reduction of the loss of income from agriculture at the excellent level

Table 3.5 The independent variables and the effect coding (cont.)

Variables	Definition	Data encoding
	the excellent level	0 if choice i give the reduction of the loss of income from agriculture at the excellent level
$INAGg_i$	the reduction of the loss of income from agriculture at the good level	-1 if choice i is no action 1 if choice i give the reduction of the loss of income from agriculture at the good level
	the excellent level	0 if choice i give the reduction of the loss of income from agriculture at the excellent level
$FLOODe_i$	the reduction of the frequency and the duration of flooding at the excellent level	-1 if choice i is no action 1 if choice i give the reduction of the frequency and the duration of flooding at the excellent level
	the good level	0 if choice i give the reduction of the frequency and the duration of flooding at the good level
$FLOODg_i$	the reduction of the frequency and the duration of flooding at the good level	-1 if choice i is no action 1 if choice i give the reduction of the frequency and the duration of flooding at the good level
	the excellent level	0 if choice i give the reduction of the frequency and the duration of flooding at the excellent level
$MAMUe_i$	the reduction of the loss of the mangrove forests and the mudflat areas at the excellent level	-1 if choice i is no action 1 if choice i give the reduction of the loss of the mangrove forests and the mudflat areas at the excellent level
	the good level	0 if choice i give the reduction of the loss of the mangrove forests and the mudflat areas at the good level
$MAMUg_i$	the reduction of the loss of the mangrove forests areas and the mudflat areas at the	-1 if choice i is no action 1 if choice i give and the reduction of the loss of the mangrove forests and the mudflat areas at the good level
	the excellent level	0 if choice i give and the reduction of the loss of

Table 3.5 The independent variables and the effect coding (cont.)

Variables	Definition	Data encoding
	good level	the mangrove forests and the mudflat areas at the excellent level
Economic-social characteristics of respondents		
Z_{mj}	The economic-social characteristics m of the respondent j	The dummy variables such as dwelling areas, the number of years of education, the number of years living in Bang Khun Sai, the number of members in the household, the income, being a member in the environmental organization, etc.
Comprehension of the problems		
S_{mj}	Acknowledge and understand the problem m of the respondent j	The dummy variables such as comprehension of the sea level rise situation and potential impacts

After that the coefficients were estimated from the choice experiment models using the statistical program. Once the optimal choice experiment model was obtained, the coefficients of the attribute variables of each level for decreasing the impacts of sea level rise could be calculated. After that, those calculated coefficients which were statistically significant would be used in the calculation of the willingness to pay for decreasing the impacts of sea level rise from the level of no action taken to the levels of following the operation plans by using Equation 3.3. Equation 3.3 was also adapted to be used in this research as expressed in Equation 3.4 (Israngkura, 1998; Pramoon, 2008; Seenprachawong, 2013):

$$WTP = CS = -\frac{1}{\mu} (V_{i1} - V_{i0}) \tag{3.3}$$

$$WTP = CS = -\frac{1}{\beta_c + \frac{\beta_{cl}}{I}} (V_{i1} - V_{i0}) \tag{3.4}$$

where WTP is the willingness to pay,

CS is the compensating surplus,

V_{i0} is the utility of the attribute for reducing the impacts of sea level rise at the level of no action taken, meaning the coefficient of such attribute needs to be multiplied by -1 according to the effect coding of the attribute,

V_{i1} is the utility of the attribute for reducing the impacts of sea level rise at either the good level or the excellent level, meaning the coefficient of such attribute needs to be multiplied by 1 according to the effect coding of the attribute,

$V_{i1} - V_{i0}$ is the indirect utility that is increased from the level of no action taken to either the good level or the excellent level,

β_C is the coefficient of the money attribute contributing to the fund,

β_{CI} is the coefficient of the money attribute contributing to the fund divided by the average income,

I is the average income.

In addition, the optimal choice experiment model could be used in the analysis of the factors that influenced the willingness to pay for reducing the impacts of a sea level rise by considering the signs of the statistically significant coefficients of variables of the money attributes, variables of the economic-social characteristics of respondents, and variables of the acknowledgement and comprehension of the problems. The signs of any statistically significant variables indicate the directions of the relationship: if the sign is plus (+), then the relationship will be in the same direction; if the sign is minus (-), then the relationship will be in the opposite direction.

The variables that were assigned to be the dummy variables could be used in the calculation of the marginal willingness to pay by using Equation 3.5 (Israngkura, 1998; Pramoon, 2008; Seenprachawong, 2013):

$$MWTP = IP = \frac{-\beta_d}{\beta_C + \frac{\beta_{CI}}{I}} \quad (3.5)$$

where $MWTP$ is the marginal willingness to pay,

β_d is the coefficient of the dummy variable.

3.3.4 Gathering the guidelines for coping with a sea level rise situation

The data analysis of the information obtained from participants, which could provide the guideline information for managing the impacts of a sea level rise, was done by using the thematic analysis. The thematic analysis is the technique for analyzing the qualitative data by classifying and blocking the data. The first step of the thematic analysis is transcribing the in-depth interviews records and then coding material based on only the useful information for the research and the analysis. The next step is constructing the thematic networks for a combination of data which consists of the data comparison and the data analysis i.e., passages, sentences, or ideas. If there are any repetitive data, then they will be grouped as the subthemes. After that, the subthemes will be regrouped based on their distinct point or based on the principles or the question guidelines.

In this research, the grouping of subthemes was done based on the guidelines for dealing with the impacts of a sea level rise from the IPCC (1990), which consisted of 3 guideline methods i.e., the retreat method, the accommodation method, and the protection method. These 3 guideline methods were used as the themes. The last step of the thematic analysis is the interpretation and the conclusion of the classified data (Attride-Stirling, 2001; Braun and Clarke, 2006; Potisita, 2011).