CHAPTER V
DISCUSSIONS

From the results of this research in the willingness to pay for decreasing impacts from a sea level rise and guidelines for coping with a sea level rise situation from relevant stakeholders who are responsible for a sea level rise management at Bang Khun Sai sub-district, it showed several issues that can be discussed. The issues as follows: (1) the economic-social characteristics and attitude of respondents, (2) the willingness to pay and factors that influenced WTP, and (3) the guidelines for coping with a sea level rise situation with the following detail.

5.1 The economic-social characteristics and attitude of respondents

In overall of the Bang Khun Sai sub-district, it was found that a ratio between male and female respondents were similar with an average age at 48.7 years old. A number of years educated were 6.61 years. A number of years living in the Bang Khun Sai sub-district were 41.86 years. A number of family members in household were 4.72 persons with an average income of 9,763.2 Baht/person/month. The occupations were varied such as general employees, trading, coastal fishery, pedal board clams, salt farm owners, aquaculture, agriculture etc. The results showed that most local people at Bang Khun Sai sub-district were at working age with primary education level (grade 6). Also, their income was quite low. Although most of them did not participate in any environmental groups, but some respondents (18.9%) participated in the environmental organization which is the Bang Khun Sai Subdistrict Marine Resource Conservation Group. Because this conservation group was established by a local leader.

From the economic-social characteristics of the respondents, it correlates with the attitude of the respondents about national crisis that needed to be coped and solved. Most respondents stated that the Thai government should allocate financial

budget to assist in poverty alleviation as the first priority, followed by natural resource conservation and improving quality of education, respectively.

Moreover, it was found that the local people at Bang Khun Sai sub-district had attitude toward the responsibility in solving problem of natural resource and environment in direct use value as the first priority. In contrast, the study of Sribencharak (2005) on willingness to pay for conservation and restoration at Don Hoi Lot Wetland, showed that the respondents had attitude in responsibility in solving problem of natural resource and environment for bequest value as the first priority. This could be because Don Hoi Lot is a ramsar site. Then, it led to preservation and conservation for the future generation rather than utilizing.

When considering the economic-social characteristics of the respondents with their area based; which were the upland and lowland area, it showed that most respondents who lived in the upland area were male while most respondents who lived in the lowland area were female. Furthermore, the respondents from the upland area had higher average age, a number of years educated, a number of years living in Bang Khun Sai sub-district, and average income than the respondents who lived in the lowland area. In contrast, the respondents who lived in the lowland area had an average number of household members higher than the respondents who lived in the upland area. Regarding occupations of the respondents, it showed that the respondents who lived in the upland area had the highest ratio on others occupations such as general employees and trading, followed by salt farm owners and salt carrying, pedal board clams, agriculture, and aquaculture, respectively. Similarly, the respondents who lived in the lowland area had the highest ratio on others occupations such as general employees and trading but followed by pedal board clams, salt farm owners and salt carrying, aquaculture, and agriculture, respectively.

After the researcher used information cards; which showed an information on sea level rise situation and its impacts, explaining to the respondents (Appendix C). It showed that the level of understanding of the respondents who lived in the upland area had a level of understanding higher than the respondents who lived in lowland area.

5.2 The willingness to pay and factors that influenced WTP

Local people at Bang Khun Sai sub-district are willing to pay for reducing impacts from a sea level rise at 830 Baht/person/year. The people emphasized on reducing the loss of mangrove forests and mudflat areas, followed by loss of income from pedal board clams, loss of income from aquaculture, and reducing the frequency and the duration of flooding. Therefore, the value of willingness to pay for reducing each impact was 408, 179, 132, and 111 Baht/person/year, respectively. However, the sample did not emphasize on reducing impacts on the loss of income from salt farming and agriculture (rice paddy field, raise animals, planting vegetation). A reason was because an area of salt farming at Bang Khun Sai sub-district did not receive impacts from coastal erosion and sea level rise due to the coast of Bang Khun Sai is considered as the stable coast (Sinsakul *et al*, 2002; Department of Marine and Coastal Resources, 2012). Also, a main problem of local agriculture was water shortage during dry season (Bang Khun Sai Subdistrict Administrative Organization, 2011 a). Thus, it is considered that the local people would prefer to cope with this problem.

From the research, it was found that the sample were willing to pay for reducing impacts of a sea level rise at 830 Baht/ person/ year. This value showed that the local people emphasized on natural resource and housing protection. It also showed the potential to establish an operational fund in the future to deal with the impacts of sea level rise in Bang Khun Sai sub-district. In the past, at Bang Khun Sai sub-district, there was fund raising from the local people for 120 Baht/household/year for preservation and protection coastal resource and conservation area, preserving mangrove forest ecosystem and breeding site for coastal aquatic animals as well as looking after the site from any illegal activities. Since then, local governments found benefits from the working of the conservation group. Therefore, there has been supported fund for conservation group annually (Tosakul and Boonmathya, 2008; Bang Khun Sai Subdistrict Administrative Organization, 2011 a).

In accordance with a model applied for analysis, it showed correlation between each factor of the respondents and value of willingness to pay. It included educational level, number of years living in Bang Khun Sai sub-district, level of understanding in problems of sea level rise and potential impacts, occupation, income,

participation in environmental organization, and physical characteristics of dwelling areas.

It was found that factors effecting value of the willingness to pay with statistical significance including educational level, level of understanding in problems of sea level rise and potential impacts, occupation, and physical characteristics of dwelling areas.

In overall of this research findings, it showed that the respondents, who were educated more than 8 years, were willing to pay more than the respondents, who were educated between 0-4 years with statistical significance [P = 0.0005]. In addition, the respondents, who were educated from 5-7 years, were willing to pay more than the respondents, who were educated between 0-4 years with statistical significance [P = 0.0024]. This result correlates with a report of Department of Marine and Coastal Resources (2013) and a research of Seenprachawong (2014) which found that educational background effected to value of willingness to pay with the same correlation.

The respondents, who had level of understanding in problems of sea level rise and potential impacts at thoroughly understand/understand level, were willing to pay more than the respondents, who are absolutely not understand/ not understand level in the problems with statistical significance [P = 0.0000]. Also, the respondents, who somewhat understand level, were willing to pay more than the respondents who are absolutely not understand/not understand level with statistical significance [P = 0.0001]. This result correlates with a report of Department of Marine and Coastal Resources (2013) which found that visitors, who had knowledge about coral, were willing to pay for supported fund for coral restoration as well as a research finding of Nakaworapan (2013) found that people at working age in Bangkok, who knew about biodiversity, were willing to pay for coral restoration at Samed Island, Rayong Province.

The respondents, who occupied in others occupations (i.e. general employees and trading), were willing to pay not different with the respondents who occupied in pedal board clams, aquaculture, and agriculture (rice paddy field, raise animals, planting vegetation) with statistical significance [P = 0.1386, 0.8193 and 0.3459, respectively]. On the other hand, the respondents, who owned salt farms and

employees in salt carrying, were willing to pay less than the respondents who occupied in others occupations with statistical significance [P = 0.0536]. This was because salt farm areas at Bang Khun Sai sub-district did not receive impacts from coastal erosion and impacts of a sea level rise. Moreover, even though an average level of education of salt farm owners were higher than average level of education of other respondents in Bang Khun Sai sub-district. But, the respondents, who occupied in salt carrying, had an average in educational level lower than others occupations.

Regarding physical characteristics of dwelling areas, it showed that the respondents, who lived in the upland area, were willing to pay more than the respondents who lived in the lowland area with statistical significance [P = 0.0097]. This was because the respondents, who lived in the upland area, had an average educational level and understanding level of problems of sea level rise and its impacts more than the respondents who lived in the lowland area. This is different from coastal households in Samut Sakhon and Samut Prakan province that gave value for adaptation with a sea level rise not depend on distance to the coast (Kulpraneet, 2013).

However, factors not effecting the willingness to pay with statistical significance comprised number of years living in Bang Khun Sai sub-district, income, and participating as members in environmental organization.

Regarding number of years living in Bang Khun Sai sub-district in overall, it was found that people, who lived in this area less than 30 years, were willing to pay not much different with the people who lived in this area from 31 years and above with statistical significance [P = 0.3033]. This result correlates with the research findings of Saengsupavanich (2012) which found that number of years living in risky areas; coastal erosion, in Nakhon Si Thammarat province not effecting on willingness to pay for constructing detected breakwaters with statistical significance.

Regarding the respondents, who had average income lower than 10,000 Baht/person/month, were willing to pay not much different with the respondents who had average income from 10,001-50,000 Baht/person/month with statistical significance [P = 0.2851]. This result contrasts with attitude in responsibility in solving problems in natural resource and environment which found that the majority of the respondents (51.5%) agreed with increasing tax for high income people as to bring money to manage with impacts from climate change.

Moreover, it found that the respondents, who were members in environmental organization, were willing to pay not different with the respondents who were not members in environmental organization with statistical significance [P = 0.7730]. This result correlates with Nakaworapan (2013) who found that members of environmental groups did not effect on willingness to pay of people at working age group in Bangkok for coral restoration at Samed Island.

However, some respondents (15.8%) were not willing to pay for reducing impacts of a sea level rise because of low income, followed by governmental responsibility, not ensuring that the fund will be allocated for managing problems of sea level rise, and not ensuring the plan can be achieved in accordingly. This correlates with Nakaworapan (2013) who found that low income was a major cause that made respondents were not willing to pay while Saengsupavanich (2012), Sribencharak (2005), and Department of Marine and Coastal Resources (2013) found that a major cause that made some respondents were not willing to pay because they thought that it was governmental responsibility.

5.3 The guidelines for coping with a sea level rise situation

From the in-depth interviews, it was found that the relevant stakeholders shared the same opinion that it is necessary to cope with a sea level rise in order to minimize the impacts in the future. The samples mentioned guidelines that covered the guidelines for coping with a sea level rise situation of IPCC (1990) which included (1) retreat method which is a community migrates to a higher area or moves further into the land (2) accommodation method which includes permanently raising buildings, temporary raising buildings during the highest tide, space reclamation, changing occupations, and financial funding for using in impact prevention, and (3) protection method which includes building, reinforcing or developing road, saltwater levee, saltwater barrier gate, drainage system, boosting the sandbags, dredging ditches around the area, water resources management, and mangrove forest protection. In addition, others guidelines that did not include in IPCC, the researcher identifies in others guidelines including the study and collection related document, construction a model and risk map, creating network for working, and disseminating information.

These guidelines are only opinion from the relevant stakeholders in sea level rise management at Bang Khun Sai sub-district. Its have not been studied on the suitability for implementation.

Regarding guidelines that were most repeated by the relevant stakeholders were protection method which included reinforcing saltwater levee in accordance with sea level rise and protection mangrove forest for preserving benefit from ecosystem service. This result is different from the research findings of Kulpraneet (2013) which found that households living at coastal around the Gulf of Thailand in Samut Sakhon and Samut Prakan province emphasized on accommodation method (changing or improving housing) as the first priority.

At the meantime, others researches mention guidelines for minimizing impacts from a sea level rise by decreasing greenhouse gas emission which is a major cause in climate change and sea level rise. It is in accordance with the research findings of Stocker *et al*. (2013) and Graham *et al*. (2014). It was observed that none of the relevant stakeholders in this research mentioned about this guideline. However, from the literature review on the Provincial Offices for Natural Resources and Environment Phetchaburi (2014), there is a work plan or measure in decreasing greenhouse gas emissions; for example, waste minimization and reducing air pollution from burning rise straw, developing a city model to become green city by applying green belt concept, and applying a concept of sufficient economy leading to low carbon society etc.

Although IPCC (2013) stated that causes of a sea level rising are the extension of volume of seawater in combination with the melting of snow and ice at the earth pole. However, the raising of seawater level in each region is different depending on factors in each area. For the Upper Gulf of Thailand, the lifting of sea level is mainly caused by land subsidence because of pumping ground water, building heavy construction on the land, and natural subsidence (Department of Marine and Coastal Resources, 2012). Therefore, it is necessary to consider about land subsidence in order to cope with a sea level rise situation at Bang Khun Sai sub-district.