CHAPTER 5 RESEARCH FINDINGS

5.1 General Background

Table 5.1 shows the ethnicity of the respondents in the three study areas namely Sg. Batang, Sg. Belukang and Sg. Tiang. Sg. Belukang and Sg. Tiang are futher divided into *Bagan* and *Kampung*.

Table 5.1. Ethnicity of respondents in Rungkup

Ethnicity	Sites											
	Sg. Batang		Bagan Sg. Belukang		Kg Sg. Belukang		Bagan Sg. Tiang		Kg Sg. Tiang		Total	
	N	%	N	%	N	%	N	%	N	%	N	%
Chinese	1	1.4	18	100	-	-	107	98.2	-	-	126	42.6
Malays	67	97.2	-	-	38	100	-	-	62	100	167	56.4
Indians	1	1.4	-	-	-	-	2	0.9	-	-	3	1.0
Total	69	100	18	100	38	100	109	100	62	100	296	100

Overall Malays accounted for 56.4 per cent of the sample household followed by Chinese, 42.6 per cent and Indians, 1 per cent. There are predominantly Chinese residing in the *Bagans* as in Bagan Sg. Belukang (100%) and Bagan Sg. Tiang (98.2%) while Malays and Indians are residing slightly further inland from the coast.

A survey on the household size in Sg. Batang indicates an average of 5 occupants, Kampung Sg. Belukang with an average of 6 occupants, Bagan Sg. Belukang with an average of 5 occupants, Kampung Sg. Tiang with an average of 6 occupants and an average of 4 occupants in Bagan Sg. Tiang.

The survey also indicates that most of the respondents interviewed have been living in the area for some time with an average of 15 years in Sg. Batang, 28 years in Bagan Sg. Belukang, 24 years in Kampung Sg. Belukang, 20 years in Bagan Sg. Tiang and 23 years in Kampung Sg. Tiang.

On the educational level, the study shows that 41.6 per cent of the respondents received primary level education, 35.5 per cent up to secondary lower, 11.8 per cent secondary upper, 0.3 per cent university level and 10.8 per cent without formal education.

Figure 5.1 shows that 50.7 per cent of the respondents were farmers in Sg. Batang, 39.5 per cent in Kampung Sg. Belukang and 85.5 per cent in Kampung Sg. Tiang. However 66.7 per cent of the respondents were fishermen in Bagan Sg. Belukang and 74.3 per cent in Bagan Sg. Tiang. The remaining percentage is of other occupations such as odd job workers, shopkeepers, pensioner etc. Farming and fishing, two of the major economics activities, to which most of the respondents were attached, do not serve the households well in terms of income. 46.1 per cent of sample respondents earned less than RM500. Another 24.2 per cent earned between RM500 to RM1000 while only a small number (15.3%) earned a monthly income of more than RM1000. 14.4 per cent were without monthly income (Figure 5.2).

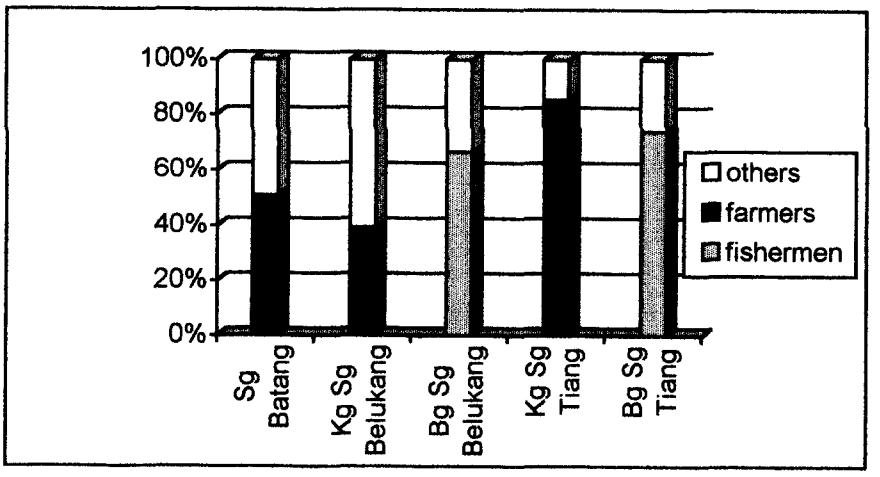

Figure 5.1. Occupations of respondents

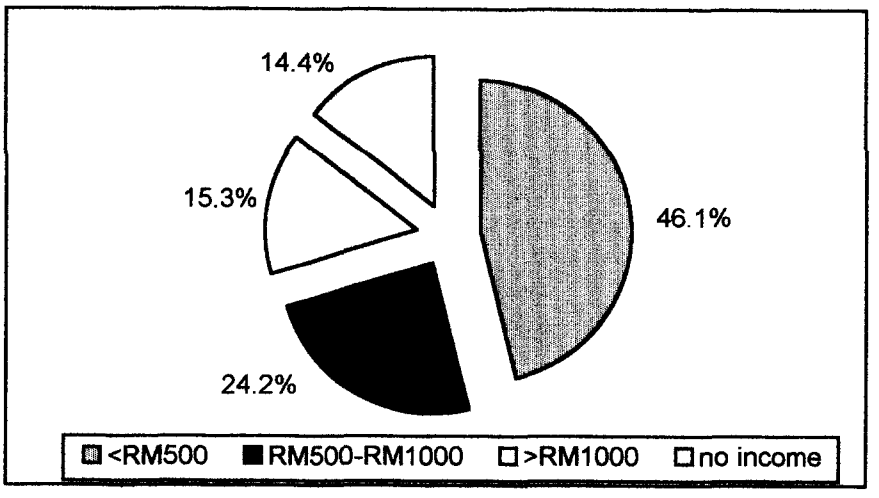

Figure 5.2. Monthly income among the respondents

5.2 Landholdings

Figure 5.3 shows types of landholdings in Rungkup. More than 80.0 per cent of the farmers in the study area, were land owner in Sg. Batang, Kampung Sg. Belukang and Kampung Sg. Tiang while respondents living in Bagan Sg. Belukang and Bagan Sg. Tiang, were all under Temporary Occupation of Land (TOL) status and only a small percentage rented land or staying with their relatives.

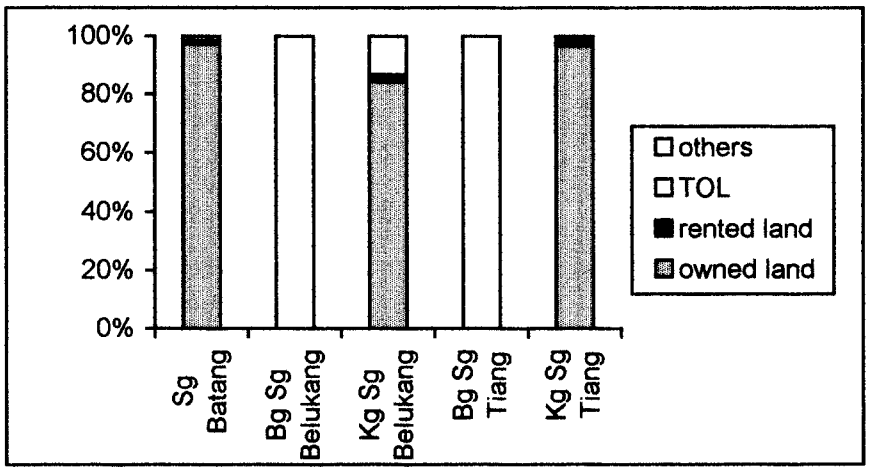

Figure 5.3. Landholdings in Rungkup

5.3 Economics Sectors

5.3.1 Farming

Data collected reveals that coconut was the main crop planted by most of the smallholders in Rungkup with a total percentage of 65.8 per cent followed by oil palm, 4.2 per cent, cocoa, 3.3 per cent and others 26.7 per cent. Cocoa was planted mainly as intercrop. Banana, tapioca etc were planted by 26.7 per cent farmers in the form of seeking extra income (Figure 5.4).

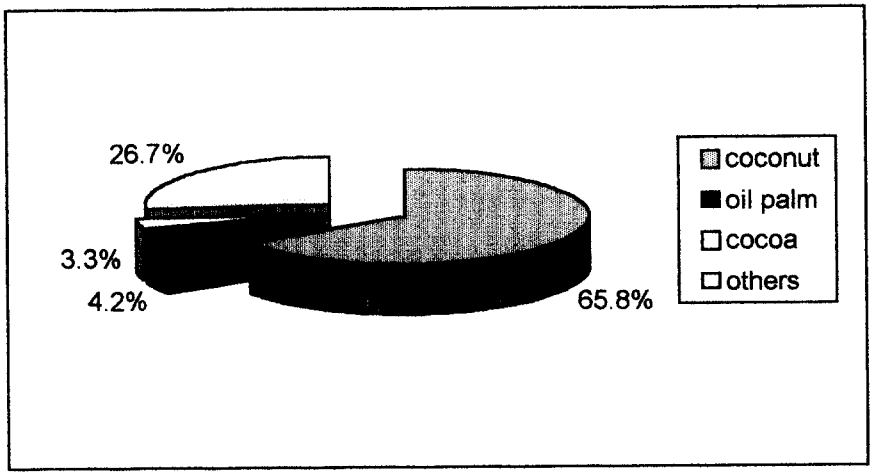

Figure 5.4. Main crops grown in Rungkup

Major problems faced by the farmers in these areas were poor quality soil due to land salinity, low price of commodity and pest.

5.3.2 Fishing

As we all thought there is a decline fish catches in Rungkup. However only 36.5 per cent of the respondents complained of depleting catch in Bagan Sg. Tiang and 22.2 per cent in Bagan Sg. Belukang (Figure 5.5). Survey in Bagan Sg. Belukang (39%) and Bagan Sg. Tiang (40%) reveal that fishermen in these areas were in fact catching more fish compared to 5 years ago.

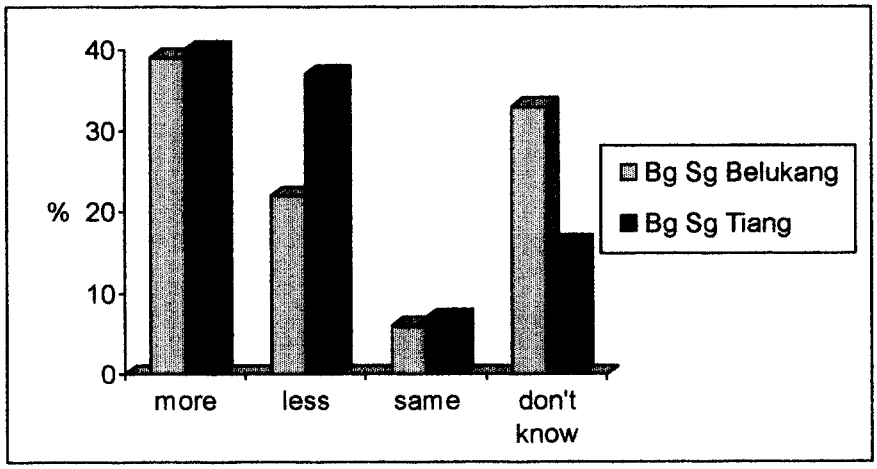

Figure 5.5. Fish catches in Rungkup

Only a small number of respondents in both *Bagans* admitted that their catch has been the same as before. According to the respondents, increased catch was due to the development in scientific equipments while depleting catch was due to an increase in the number of fishermen and fishing boats in Rungkup.

5.4 Coastal Problems

5.4.1 Coastal Flooding

Respondents who encountered coastal flooding were those living near the sea especially those living in *Bagans*. None of the respondents in Kampung experienced coastal flooding. According to 83.3 per cent of the respondents in Bagan Sg. Belukang and 76.1 per cent in Bagan Sg. Tiang, coastal flooding isn't a problem at the moment compared to 11.1 per cent of the respondents in Bagan Sg. Belukang and 24.8 per cent of respondents in Bagan Sg. Tiang who experienced coastal flooding in the past . Table 5.2 shows the flooding problem in Rungkup and Figure 5.6, 5.7 and 5.8 show the extent of flooding in the study areas.

From the survey point of view, it is expected that the nearby population i.e. residents living within 1.4km from the coast will be vulnerable to coastal flooding in Bagan Sg. Belukang (Figure 5.7) and 1.2km in Bagan Sg. Tiang (Figure 5.8). The vulnerable areas were circled in the maps shown.

Residents in Sg. Batang were less vulnerable as they live further inland. Only a respondent in Sg. Batang experienced coastal flooding in the past and present where he has to relocate his house further in land due to this problem (Figure 5.6).

Table 5.2. Coastal flooding in Rungkup

Responses	Sites											
	Sg. Batang		Bg Sg. Belukang		Kg Sg. Belukang		Bg Sg. Tiang		Kg Sg. Tiang		Total	
	N	%	N	%	N	%	N	%	N	%	N	%
Present												
Yes	1	1.7	3	16.7	-	-	24	22.0	-	-	28	9.5
No	68	98.3	15	83.3	38	100	83	76.1	62	100	266	89.9
Don't know	-	-	-	-	-	-	2	1.9	-	-	2	0.6
Total	69	100	18	100	38	100	109	100	62	100	296	100
Past												
Yes	1	1.7	14	77.8	-	-	81	74.3	-	-	96	32.4
No	68	98.3	2	11.1	38	100	27	24.8	62	100	197	66.6
Don't know	-	-	2	11.1	-	-	1	0.9	-	-	3	1.0
Total	69	100	18	100	38	100	109	100	62	100	296	100

Based on the questionnaire survey it has also been observed that respondents who live further inland before the coastal road were less vulnerable to coastal flooding and those who live beyond the coastal road are not vulnerable to coastal flooding at all. Since the respondents who live futher inland as in Kampung Sg. Belukang and Kampung Sg. Tiang were not vulnerable to coastal flooding at all, their point of view regarding coastal flooding were not taken into consideration.

Table 5.3 shows the severity of coastal flooding in Sg. Batang, Bagan Sg. Belukang and Bagan Sg. Tiang. Each site revealed distinctive perception patterns. Only a little significant percentage of respondents in Sg. Batang and Bagan Sg. Tiang perceived that coastal flooding was a very serious matter both in the past and present.

All the respondents in Bagan Sg. Belukang perceived coastal flooding as a very serious matter in the past. The number of respondents in Bagan Sg. Tiang who perceived coastal flooding as a serious matter in the past (13.8%) has also been reduced to a smaller number at present (6.4%). Impromptu reason to the decrease in severity of coastal flooding both in Bagan Sg. Belukang and Bagan Sg. Tiang at present was the construction of new coastal bund. Those who perceived coastal flooding as a serious matter were those who live near the sea and felt the impact of coastal flooding.

According to the respondents in Bagan Sg. Belukang, flooding normally take place at the end of the year especially in the month of October and November. In Bagan Sg. Tiang, flooding normally take place in the month of March, June and Sept in the past but the frequency of flooding has been reduced due to the construction and maintenance of coastal bund.

Table 5.3. Perceived severity of coastal flooding in Rungkup

Responses	Sites							
	Sg. Batang		Bg Sg. Belukang		Bg Sg. Tiang		Total	
	N	%	N	%	N	%	N	%
Present								
Very serious	1	1.7	-	-	7	6.4	8	4.1
Serious	-	-	-	-	7	6.4	7	3.6
Not serious	68	98.3	18	100	95	87.2	18	92.3
Total	69	100	18	100	109	100	196	100
Past								
Very serious	1	1.7	18	100	4	3.7	23	11.7
Serious	-	-	-	-	15	13.8	15	7.7
Not serious	68	98.3	-	-	90	82.5	158	80.6
Total	69	100	18	100	109	100	196	100

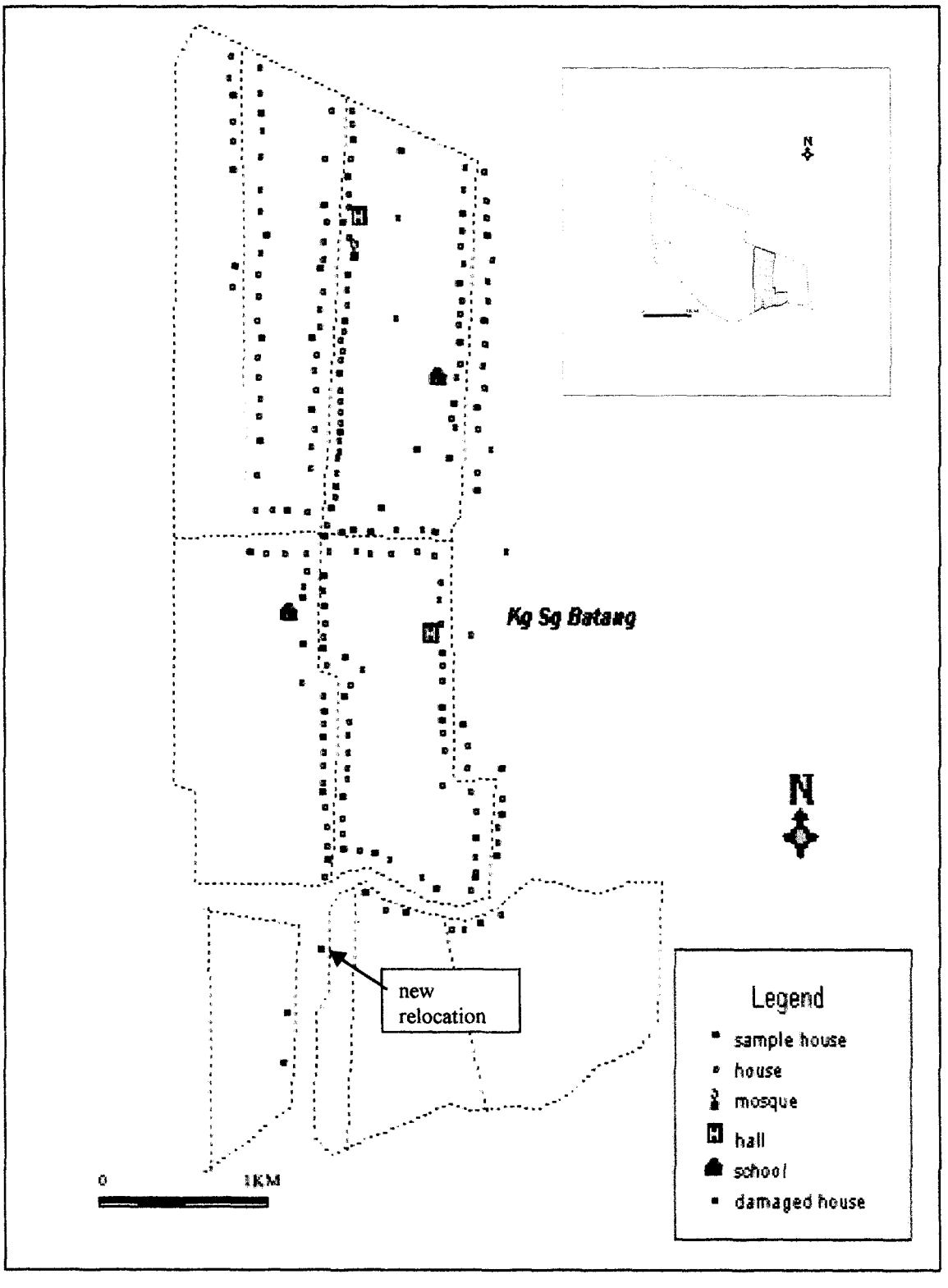

Figure 5.6. Sample houses and extent of coastal flooding in Sg. Batang

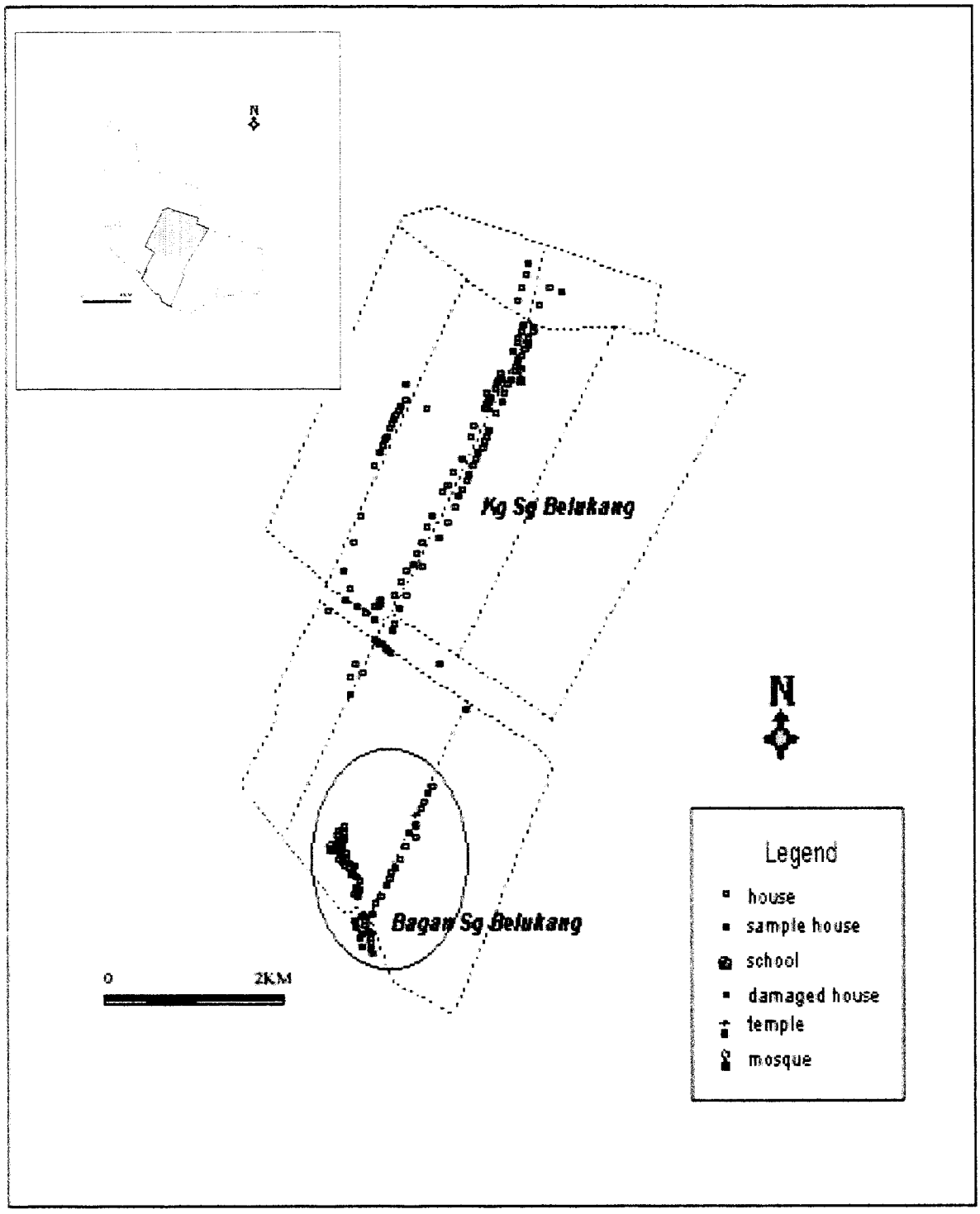

Figure 5.7. Sample houses and extent of coastal flooding in Sg. Belukang

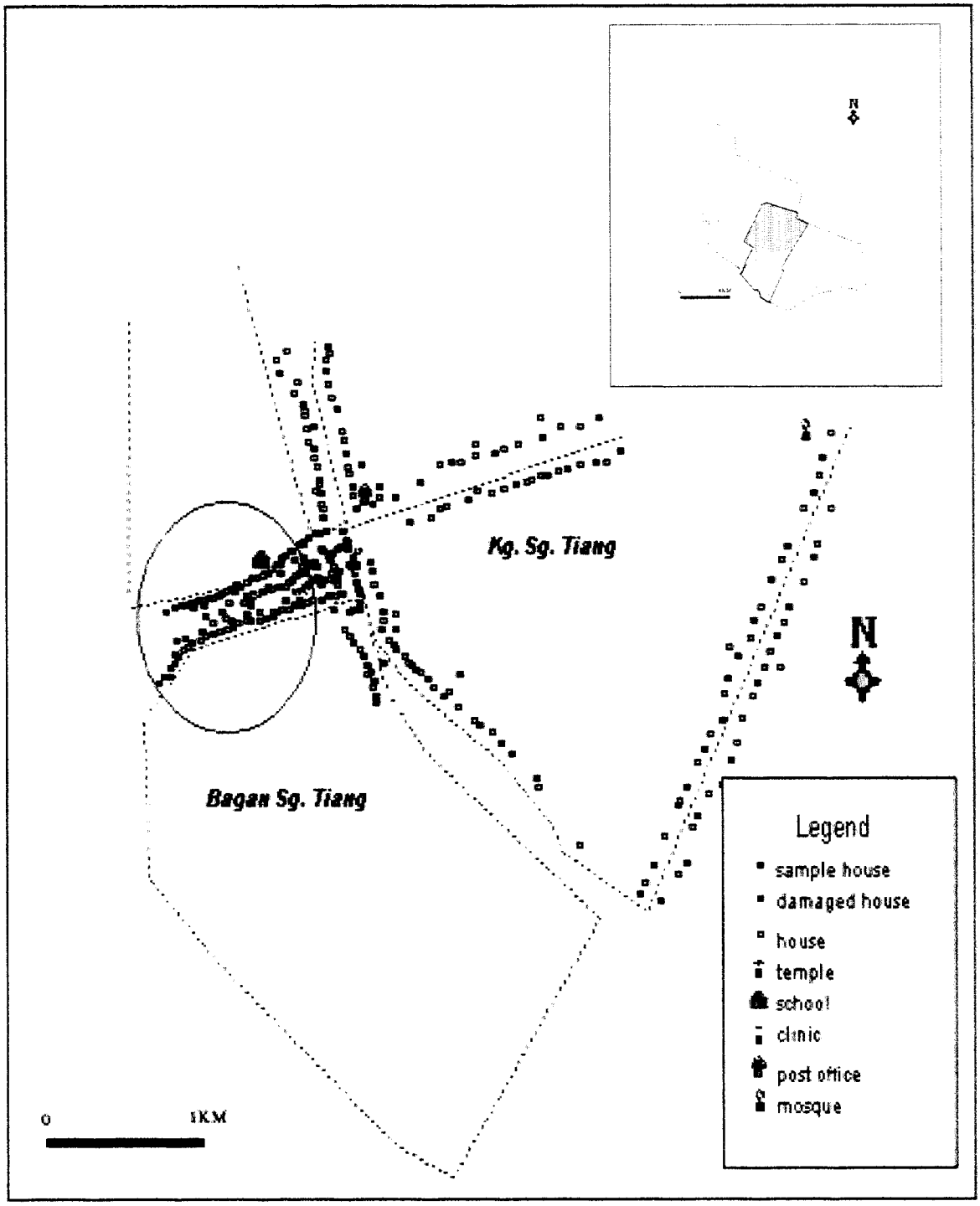

Figure 5.8. Sample houses and extent of coastal flooding in Sg. Tiang

5.4.2 Coastal Erosion

Table 5.4. Responses to coastal erosion awareness in Rungkup

Respomses	Sites											
	Sg. Batang		Bg Sg. Belukang		Kg Sg. Belukang		Bg Sg. Tiang		Kg Sg. Tiang		Total	
	N	%	N	%	N	%	N	%	N	%	N	%
Yes	1	1.7	15	83.3	-	-	85	77.9	-	-	101	34.1
No	68	98.3	-	-	38	100	20	18.3	62	100	188	63.5
Don't know	-	-	3	16.7	-	-	4	3.8	-	-	7	2.4
Total	69	100	18	100	38	100	109	100	62	100	296	100

Based on the table above, none of the respondent in Kampung Sg. Belukang and Kampung Sg. Tiang has any trouble with coastal erosion in Rungkup. However majority of the respondents (83.3% in Bagan Sg. Belukang and 77.9% in Bagan Sg. Tiang) perceived it as a threat in their communities. It is significantly greater than the proportion of respondents (2.4%) in these two areas who were unaware of coastal erosion at all. Perhaps erosion is simply less noticeable than coastal flooding because it is a slower process.

Table 5.5. Property losses due to coastal erosion

Responses	Sites							
	Sg. Batang		Bg Sg. Belukang		Bg Sg. Tiang		Total	
	N	%	N	%	N	%	N	%
Yes	1	1.4	16	88.9	34	31.2	51	26.0
No	68	98.6	2	11.1	75	68.8	145	74.0
Total	69	100	18	100	109	100	196	100

Table above shows the percentage of responses to property losses due to coastal erosion. Respondents in Bagan Sg. Belukang suffered the most of coastal erosion whereby 88.9 per cent responses to property loss as compared to 31.2 per cent of the respondents in Bagan Sg. Tiang. Plate 5.1 and 5.2 show the damaged or abandoned house in Sg. Batang and Bagan Sg. Tiang.

The approximately cost of loss was about RM25000 among the respondent in Sg. Batang, RM50000 in Bagan Sg. Belukang and more than RM100000 in Bagan Sg. Tiang. The damages were in the form of loss of land, house, electrical items, vehicles, fowls etc.

Magnitude of receding coast was obtained from respondents. The perceived magnitude of receding coast is shown in Table 5.6. 3.1 per cent of the respondents perceived the coast has receded less than 0.5km, 25.5 per cent perceived between 0.5km to 1km and 14.8 percent perceived more than 1km. However 56.6 per cent were uncertain of the coastline condition. These respondents were mainly stayed further inland.

Table 5.6. Perceived magnitude of receding coastline

Magnitude	Sites							
	Sg. Batang		Bg Sg. Belukang		Bg Sg. Tiang		Total	
	N	%	N	%	N	%	N	%
< 0.5km	1	1.7	2	11.1	3	2.8	6	3.1
0.5 – 1km	-	-	15	83.3	35	32.1	50	25.5
> 1km	-	-	-	-	29	26.6	29	14.8
Uncertain	68	98.3	1	5.6	42	38.5	111	56.6
Total	69	100	18	100	109	100	196	100

When the respondents' perception was compared with the actual length of retreat in the topographical maps, it was found that the coastline in Sg. Batang has retreated 0.29km, Sg. Belukang retreated about 0.70km while Sg. Tiang experienced a retreat of 0.63km. From the comparison we can conclude that majority of the respondents in Sg. Belukang and Sg. Tiang display no predisposition towards over or underestimating erosion magnitude.

Historically, erosion damages have been a function of coastline changes during the early years of coastal settlement. Where the coast was receding, houses were located safely inland. Where it was stable, incoming residents selected sites progressively closer to the high water mark. Sample survey maps show that land lots in Sg. Batang, Bagan Sg. Belukang and Bagan Sg. Tiang which formerly contained houses and now under water and it is widely believed that additional unrecorded structures have also been lost. Abandoned or damaged houses lie 0.11km offshore in Bagan Sg. Belukang and 0.15-0.33km offshore in Bagan Sg. Tiang as shown in the sample maps (Figure 5.7 and Figure 5.8).

5.4.3 Perceptions

Respondents were asked to specify the causes of coastal erosion whether it be man induced, natural or a combination of both. A number of the respondents (37.2%) were unaware of the causes of coastal erosion and were unable to supply an answer to the question. 44.4 per cent perceived it as primarily nature while 14.8 perceived it as a combination of both man and nature. Only a small percentage (3.6%) perceived it as man induced (Table 5.7). Natural processes were perceived to be of great importance in Bagan Sg. Belukang and Bagan Sg. Tiang. Respondent in Sg. Batang unanimously cited a combination of human activities and nature as causes of erosion. Among the natural cause perceived by the respondents were coastal storms while human induced activities were an increased in the number of fishing boats, indiscriminate cutting of mangrove and poor maintenance of coastal bund. Whether the causes of erosion are perceived as supernatural forces, human activities or physical processes is likely to affect the natural of subsequent adjustment strategies and the degree of confidence invested in them by respondents.

Table 5.7. Responses to perceive causes of erosion in Rungkup

Causes	Sites							
	Sg. Batang		Bg Sg. Belukang		Bg Sg. Tiang		Total	
	N	%	N	%	N	%	N	%
Primarily man	-	-	1	5.6	6	5.5	7	3.6
Primarily nature	-	-	16	88.8	71	65.1	87	44.4
Combination of man and nature	1	1.7	1	5.6	27	24.8	29	14.8
Don't know	68	98.3	-	-	5	4.6	73	37.2
Total	69	100	18	100	109	100	196	100

A majority of respondents (58.9%) didn't perceive any future risk of erosion as shown in Figure 5.9. A substantial minority (6.7%) perceived a risk in future and the remainder (34.4%) was unsure.

29.7 per cent of the respondents perceived their property will be threatened or damaged should sea level rise. A substantial minority (8.9%) was equally convinced that property loss will likely to happen. The remainder was uncertain about the future (Figure 5.10).

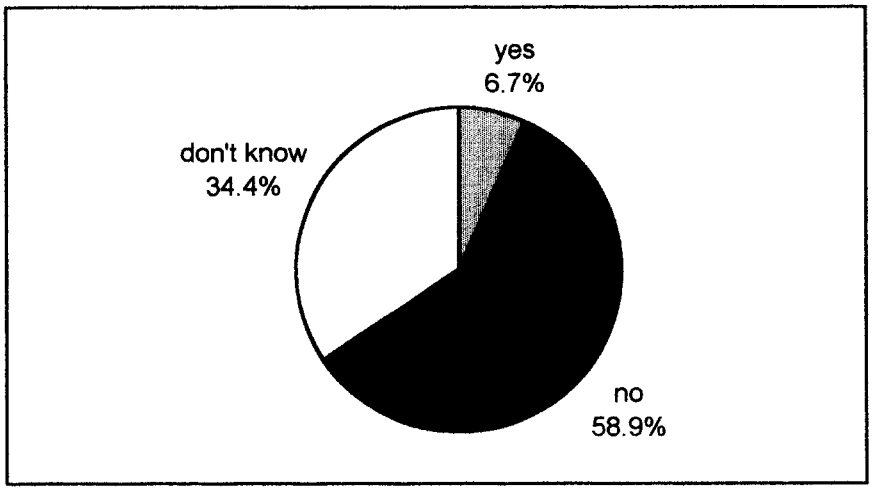

Figure 5.9. Perceived future risk of erosion

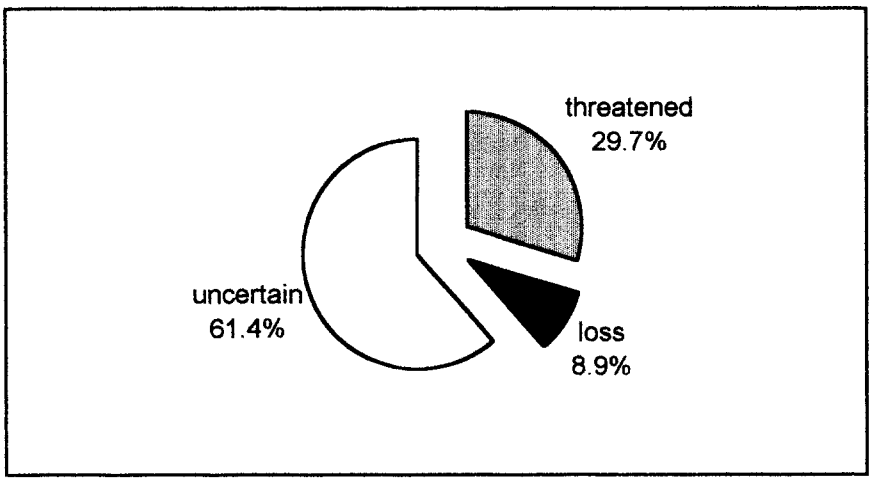

Figure 5.10. Perceived property risk to sea level rise

5.4.4 Mitigation Measures

The respondents used different types of mitigation measures to overcome erosion problem in Rungkup (Table 5.8). Coastal dwellers were both highly aware of adjustments to erosion and a minority was active in putting them into effect. 5.7 per cent of the respondents used old tyres (Plate 5.3), timber piles (Figure 5.4), culvert (Plate 5.5) as a form of mitigation measures to protect their homes. Houses sited near the coast are raised on stilts 1.5-2.0m from the ground from time to time as a form of engineering measures by 11.1 per cent respondents in Bagan Sg. Belukang. Many homeowners (15.8%) abandoned or relocate their storm-damaged homes. Relocating structures from erosion hazard areas has been sporadic. Malay houses tend to be easily relocated where their house can be dismantled and fix again in another area as shown in Plate 5.6.

All these mitigation measures were done on individually basis. The respondents were satisfied with the responses to erosion at the different levels of organisations. However majority of the respondents (50.5%) were uncertain of any mitigation measures that could be employed to alleviate coastal erosion while 27.0 per cent of the respondents appealed to public to protect their property.

Table 5.8. Mitigation measures to prevent coastal erosion

Measures	Sites							
	Sg. Batang		BgSg. Belukang		Bg Sg. Tiang		Total	
	N	%	N	%	N	%	N	%
No action	68	98.6	9	50.0	22	20.2	99	50.5
Move house	1	1.4	1	5.6	29	26.6	31	15.8
Appeal to public	-	-	6	33.3	47	43.1	53	27.0
Engineering	-	-	2	11.1	-	-	2	1.0
Others	-	-	-	-	11	10.1	11	5.7
Total	69	100	18	100	109	100	196	100

Estimated amount spent on mitigation measures was about RM25000 by the respondent in Sg. Batang, RM50000 in Sg. Belukang and more than RM100000 in Sg. Tiang. When asked about additional action to offset future erosion, it was found that only a small number of respondents (20%) were willing to take additional action while a large number were unwilling to take any action (77%). 3 per cent of the respondents were uncertain of any actions (Figure 5.11).

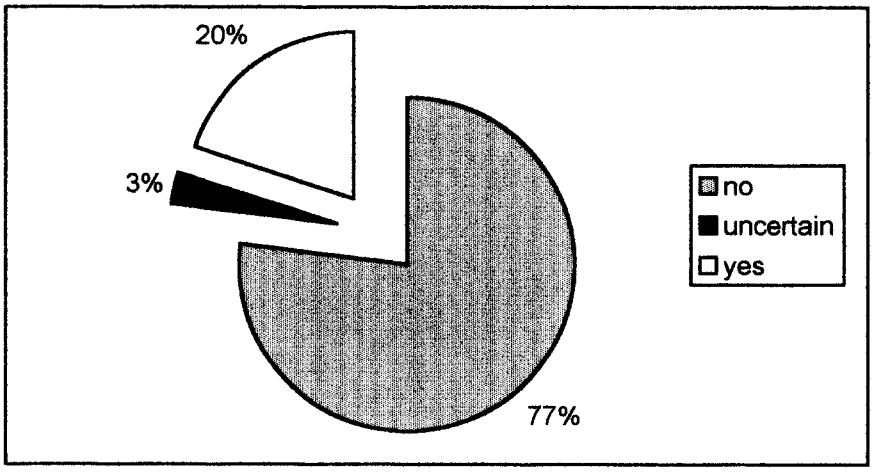

Figure 5.11. Responses to additional action

5.4.5 Resettlement

According to the respondents in Sg. Batang 2 to 3 families have moved to another place due to coastal erosion while in Bagan Sg. Belukang more than 20 families and more than 40 families have moved away in Bagan Sg. Tiang.

Although coastal erosion is a threat to the coastal communities however majority of the respondents (89%) were unwilling to relocate in a new place. Only 8 per cent are willing to relocate and the remainder was uncertain of their decision (Figure 5.12). However for those respondents who were willing to relocate, majority of them were uncertain of their new location. 21 per cent preferred to be located near the sea and another 12 per cent preferred further inland (Figure 5.13).

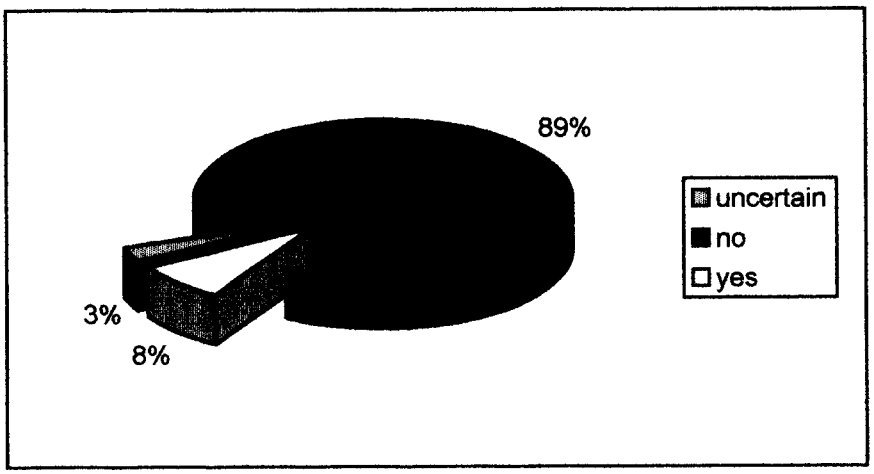

Figure 5.12. Resettlement in new place

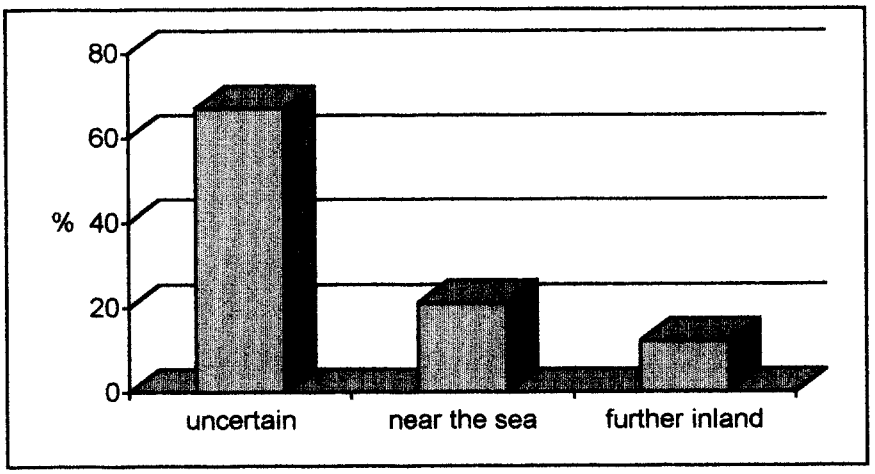

Figure 5.13. New location

Plate 5.1. Abandoned house in Sg. Batang due to land inundation

Plate 5.2. Abandoned house in Sg. Tiang due to coastal erosion

Plate 5.3. Old tyres used as erosion protection measures

Plate 5.4. Timber piles used as erosion protection measures

Plate 5.5. Concrete culvert used as erosion protection measures

Plate 5.6. Relocation of new house in Sg Batang