

Assessing Different Types of Flood Losses in Kelantan State in Malaysia during the December 2014 Flood

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Abstract

Malaysia is a flood-prone country, especially in the east coast state of Kelantan which is exposed to seasonal monsoon floods. Floods are a major seasonal environmental disaster affecting Kelantan state, bringing significant flood losses, viz. direct or indirect losses and tangible or intangible losses. The December 2014 flood that hit Kelantan state was a very severe flood that brought flood losses in terms of loss of lives, injury, infrastructure destruction, property damage, crop loss, loss of livelihoods, disruption to normal services and losses due to expenses in healthcare. The methodology uses a questionnaire-based cross sectional convenience sampling method in three pre-selected flood hit sites of Gua Musang, Kota Bharu and Kuala Krai. The total number of respondents interviewed was 477. The results indicate that both direct and indirect, as well as tangible and intangible flood losses were exceptionally large. Of the 477 flood victims, 407 (85.3 %) suffered losses. A total of 346 suffered direct losses in house damage averaging RM3,945.00 per family. A total of 376 victims also suffered losses to house contents, averaging RM5,250.66 per family. Another 179 victims suffered damages to vehicles (including boats) averaging losses of RM23,427.09 per family. In terms of crop losses, 14 victims reported losses averaging RM11,255.36 per family. Another 49 victims reported business losses. The reported overall direct and tangible total losses averaged RM26,622.27 per family. Yet, only a small number of victims received flood relief from government. Results also showed that during huge floods, victims cannot rely on relatives to help them as almost everyone was a victim. However, strong social capital in the form of help from family members, friends, NGOs and the Malaysian public was significant in helping victims cope and recover.

Keywords: Direct Flood Damage; Indirect Flood Damage; Tangible Flood Damage; Intangible Flood Damage.

1. Introduction

Malaysia is a routinely affected by floods as the country is exposed to monsoon winds and experiences heavy rains in deforested urban areas. Historically, Winstedt (1927) as documented "The Great Flood of 1926" during the colonial period. More recently, however, deforestation and rapid development have led to greater frequencies of flooding in many parts of the country (Chan, 2016a). Floods inundate a significant proportion of lowlands near rivers and floodplains and affect a significant percentage of the country's population (Ahmad Hussaini, 2014). Flood losses come in many forms: direct or indirect losses and tangible or intangible losses (Chan et al., 2002). Often, as tangible and direct losses are relatively easier to quantify, they are included in most flood loss assessments but intangible and indirect losses which are much more difficult to quantify are seldom included (Mohammad Ghazi Hj Ismail et al., 2015). Consequently, there is a misconception that direct and tangible losses are far greater than indirect and intangible losses. In developed countries, indirect and intangible

losses have been shown to be very severe (Green et al., 1983a; Green et al., 1983b; Green and Penning-Rowsell, 1988; Green et al., 1983c). In Malaysia, Chan (2016b) has also shown that such losses during the 2014 floods in the east coast states of Peninsular Malaysia are significant. Intangible flood damages include loss of life and limb, cost of preparedness which include flood warning, planning and public awareness and education, inconvenience caused by floods, loss of school hours, loss of sleep and mental torture, stress and anxiety, health effects and other non-quantifiable losses. In most developing countries where the flood loss evaluation is not well developed, intangible flood losses are under-estimated and very often left unevaluated altogether. This gives a false picture of actual overall flood loss. Studies in Thailand floods show that both tangible and intangible flood damages affect the Thai economy significantly. Lekuthai and Vongvisessomja (2001) showed that tangible damage assessment, i.e. the monetary value of all direct and indirect physical damages, is documented in great detail in Thailand. However, because of many difficulties, intangible damages are seldom assessed or taken into account. They developed the 'Anxiety-Productivity and Income Interrelationship Approach (API)' to quantify the intangible damage in monetary terms. Their results indicated that intangible flood damage in the Bangkok area can be significant. In Germany, Dassanayake et al. (2015), studied methods for the evaluation of intangible flood losses and their integration in flood risk analysis. They again found that there are relatively few studies evaluating intangible flood losses as compared to tangible flood losses. They used cost-benefit and multi-criteria analyses to assess the intangible losses and found that such losses can be significant.

In Malaysia, Chan (1995) had earlier studied and documented both direct-indirect and tangible-intangible flood damages, and found that despite being much smaller in monetary terms, intangible flood loss can be mentally devastating (Chan and Parker, 1997). The disastrous major flood in December 2014 in Kelantan State was a tragedy that devastated the state in terms of flood losses in infrastructure destruction, property damage, crop loss, loss of livelihoods, disruption to normal services and heavy expenses in healthcare. The floods were reported as one of the most significant and severe floods in Kelantan's history (Bah Kuning). It brought severe damage to the victims' property, crops and livestock, business as well as to their mental and physical health which affected their daily life. This study aimed to assess the actual reported damage as well as the victims' response to flood impacts among residents at several locations in the Kelantan River Basin. More recently, as a result of climate change and rapid opening of forested areas, floods have occurred with increasing frequencies and severities (Chan, 2015). Teoh and Boo (2011) reported that the Johor floods of 2006/2007 inflicted more than RM1 billion in economic losses. Flood impacts are varied and not easy to estimate. Property and structural damages are only a small part of the total impacts of floods. Physical (tangible) and direct losses can be quantified. Indirect and intangible losses, however, can be very serious and long lasting (Penning-Rowsell and Parker, 2002). Human lives are also lost almost every year and hundreds of thousands of flood victims suffer illnesses either directly or indirectly due to floods (Nasir et al., 2012). Flooding is a routinely seasonal hazard that occurs almost on an annual basis in varying degrees of magnitude (Hj Keizrul Abdullah, 2002). However, of late, floods have occurred with increasing frequency and severity in many parts of the country (Chan, 2013). In terms of damage, the country's estimated annual flood damage is about RM915 million (Ahmad Hussaini, 2014). The damage includes crop losses, property damage, infrastructural damage, loss in business and industries, etc. Human lives are also lost almost every year. In some severe cases of flooding (for example in 1967, 1971, 1988, 1996, 2006 and 2010), significant loss of life have occurred. Yet, most estimates of flood damage are concentrated on physical damage. For example, Teoh and Boo, (2011) reported that the Johor floods of 2006/2007 inflicted more

than RM1 billion in economic losses, but down-played the fact that six lives were lost. They also reported that in 2011, the floods in January saw the evacuation of over 40,000 people in Johor, Melaka, Negri Sembilan and Pahang. Again, the loss of three lives was not highlighted. In the December 2014 massive floods that devastated the states of Kelantan, Terengganu, Pahang and Perak, again damage to infrastructure estimated at RM2.9bil was emphasised although nearly 400,000 people were victims and suffered various types of losses/damages (The Star, 21 Jan 2015). The focus on physical and direct damages was highlighted when the Malaysian Government announced that RM800 million had also been allotted for repairs and reconstruction of basic infrastructure such as schools, hospitals, roads and bridges. For Budget 2015, RM893 million would be set aside for flood mitigation projects (The Star, 21 Jan 2015). However, flood impacts are varied and not easy to estimate. Property and structural damages are only a small part of the total impacts of floods. Routinely, government and the private sector only estimate the physical (tangible) and direct losses that can be quantified as they are easier to quantify. Indirect and intangible losses, however, can be very serious and long lasting (Penning-Rowsell and Parker, 2002). Human lives are also lost almost every year and hundreds of thousands of flood victims suffer illnesses either directly or indirectly due to floods. Nasir et al. (2012) have documented that the psychological impacts of floods on victims can be much more severe and long-lasting than physical damage. Their study showed that flood victims suffered cognitive, emotional and behavioural shortfalls such as fear, anxiety, hopelessness, helplessness and depression. The researchers recommend that strong social support from people who are well equipped with knowledge and skills in the management of stress, anxiety and other psychological problems.

2. Methodology

This study adopts a multi-methods approach whereby a combination of complementary research methods which includes historical analysis, use of the 'cultural insider' observer approach (i.e. by the author), quantitative questionnaire survey and qualitative interviews highlighting selected exceptional cases. Historical analysis is used for documentation of past floods in terms of frequency, magnitude and severity. Historical flood analysis is used to study how broader physical-socio-political forces have created and perpetuated the flood hazard in Kelantan. As the 'cultural insider', the author himself is well positioned to as a researcher with rich experience, having worked in the flood management area for more than 30 years. This approach involves asking research questions as an 'observer-participant' and is used in the analysis of key stakeholders (government officials, NGO workers, flood managers and flood victims, and the general public) on their flood losses and their response to the flood hazard. The quantitative questionnaire is employed to study individual/household perception, response and flood loss incurred. The quantitative survey is used within each of four selected sample sites. Finally, qualitative indepth interviews are recorded with selected flood victims to highlight the severity of various flood losses incurred. The merits and demerits of each of the above methods are outlined by Chan (1995). The employment of more than one research method to approach a research question, often called 'triangulation', strengthens a study and has become common practice (Fordham, 1992). In terms of research methodology, the triangulation strategy has greater advantage over a single research strategy and is recommended in the literature because of its advantage of possessing the merits of all methods adopted while simultaneously reducing the demerits inherent in them (Frankfort-Nachmias and Nachmias, 1992). According to Chan (1995), triangulation contributes to the overall effectiveness of the study as the many research methods adopted complement each other as different areas/objectives in a study are better tackled by different research methods.

In this study, a questionnaire-based cross sectional study was conducted by convenience sampling at locations in Gua Musang, Kota Bharu and Kuala Krai. The questionnaire was divided into four parts: Part A collected the respondents' demographic details; Part B was the perception and characteristics of flood; Part C was on total flood losses; and Part D was on flood relief. The total number of respondents interviewed was 477 (Table 1). The data was analysed by using SPSS software.

Table 1: Sample Areas by Ethnic Groups in Kelantan

Sample Sites	Ethnicity				Total
	Malay	Chinese	Indian	Others	
Gua Musang	242	2	2	1	247
Kota Bharu	102	18	10	0	130
Kuala Krai	99	1	0	0	100
Total	443	21	12	1	477

3. Analysis and Discussion of Results

Results indicate that both direct and indirect, as well as tangible and intangible flood losses were exceptionally large during the December 2014 flood. Of the 477 flood victims, 407 (85.3 %) suffered losses. A total of 346 suffered direct losses in house damage averaging RM3,945.00 per family (Table 2). A total of 376 victims also suffered losses to house contents, averaging RM5,250.66 per family. Another 179 victims suffered damages to vehicles (including boats) averaging losses of RM23,427.09 per family (Table 3). This is a huge amount of losses even by the standards of the richer states like Selangor or Penang. In the context of Kelantan, one of the poorest states in the country, such a big loss is devastating. In terms of crop losses, 14 victims reported losses averaging RM11,255.36 per family. Of the 49 victims who reported business losses, the average loss was not given but 4 reported 100 % losses, 9 reported 50 % losses and 36 reported losses below 30 %. A total of 330 victims reported overall direct and tangible total losses averaging RM26,622.27 per family. This is a huge amount considering the low incomes of the victims in Kelantan, one of the poorest states in Malaysia (Che Hashim Bin Hassan, 2011). Table 4 and Table 5 look at indirect and intangible losses. Results show that only illness and healthcare costs were reported. A total of 27 victims reported suffering various forms of illness with the average healthcare cost of RM67 to themselves and RM55 to their family members. Although this survey did not find any deaths, it was reported in the newspapers that there were 25 flood-related deaths in the country with 11 in Kelantan.

Overall, flood victims in the Kelantan river basin generally suffered severely in both direct and indirect as well as tangible and intangible losses. Many living beside the Kelantan River had their houses, vehicles, crops and livestock completely destroyed and washed away. Many became totally bankrupt as their entire savings and houses vanished in the event. Hence, both direct and indirect flood damages were large as were tangible and intangible flood damage. Hence, it is not enough for the authorities and NGOs to merely provide food and shelter and other tangible aids. Flood victims must be provided with non-material help in terms of counselling, healthcare, education and awareness training and other intangible help. However, despite all the reports about flood aid being given, the results of this study showed that only a small number of victims actually received flood relief from government. The results also showed that during huge floods, victims also cannot rely on relatives to help them as almost everyone was a victim. However, strong social capital in the form of help from friends, NGOs and the Malaysian public was imperative in helping victims cope and recover (Aldrich, 2012).

Intangible losses are seen in the different types of diseases suffered by flood victims in Kelantan. Fever and stress appeared to be the most serious. Overall, however, types of sicknesses were not significant as the number of cases was small.

Table 2: Sample Areas by Flood Damage Suffered in Kelantan

	Question: Did you suffer a Flood Loss during the December 2014 flood?			Total
	Yes	No	NA	
Gua Musang	226	16	5	247
Kota Bharu	119	11	0	130
Kuala Krai	62	38	0	100
Total	407	65	5	477

Table 3: Total Damage to House

1-10	101-100	1001-2000	2001-3000	3001-4000	4001-5000	5001-10000	10001-40000	No Damage	No Comments	Not Applicable	Total
3	44	46	27	22	18	22	10	33	7	15	247
3	10	3	18	11	22	37	4	15	0	7	130
1	31	8	1	3	0	1	1	27	2	25	100
7	85	57	46	36	40	60	10	75	9	47	477

Table 4: Sample Areas by Types of Diseases Suffered by Victims in Kelantan

Site	Fever	Running Nose	Vomitting	Skin Disease	Others	No Sickness	Cough	Dengue	Stress	Total
Gua Musang	1	1	6	2	6	218	1	0	12	247
Kota Bharu	3	0	1	0	1	120	0	0	5	130
Kuala Krai	13	3	6	1	4	50	6	2	15	100
Total	17	4	13	3	11	388	7	2	32	477

Table 5: Sample Areas by Costs of Treatment Suffered by Victims in Kelantan

	Cost (MYR) of Treatment for Various Diseases									Total
	11-20	21-50	51-100	101-150	151-200	200 & Above	No Cost of Treatment	No Comments	NA	
Kelantan	1	6	0	0	0	2	217	5	16	247
Pahang	0	3	1	0	0	0	121	0	5	130
Terengganu	0	2	5	3	5	6	57	7	15	100
Total	1	11	6	3	5	8	395	12	36	477

In Malaysia, floods can cause a range of damages to residential and commercial properties located on rural and urban floodplains. While the damages in rural areas are usually confined to residential properties (with farm properties usually doubling up as residential premises) resulting in the loss of livestock and crops, and damage to building structure and contents, urban flood damage involves both damage to residential and commercial properties. And

because of the high density of residential and commercial properties, infrastructure and public utilities in urban areas, urban flood damage is expected to be much higher than in the rural areas. Flood damage records have been and are still being collected by government departments and agencies on an ad hoc basis, i.e. whenever a flood occurs. As such, damage statistics are incomplete, irregular, and only covers government owned properties and utilities, the only exception being crop damage. Based on these records the estimated flood damage in Malaysia is of moderate extent compared with other neighbouring countries but this could largely be due to the underestimation of damages

4. Conclusion

Malaysia is considered a flood-prone country, especially in the east coast state of Kelantan which is exposed to seasonal monsoon floods. Floods are a major seasonal environmental disaster affecting Kelantan state, bringing significant flood losses, viz. direct or indirect losses and tangible or intangible losses. The December 2014 flood that hit Kelantan state was a very severe flood that brought flood losses in terms of loss of lives, injury, infrastructure destruction, property damage, crop loss, loss of livelihoods, disruption to normal services and losses due to expenses in healthcare. The methodology uses a questionnaire-based cross sectional convenience sampling method in three pre-selected flood hit sites of Gua Musang, Kota Bharu and Kuala Krai. The results indicate that both direct and indirect, as well as tangible and intangible flood losses were exceptionally large. Almost all affected flood victims suffered losses of some sorts. Most suffered direct losses in terms of damage to house structures, damage to house contents, damage to vehicles (including boats), crop losses, livestock losses and other damages. Victims in the business sector also reported significant business losses. Overall, both direct and indirect losses were high. However, only a small number of victims received flood relief from government. Results also showed that during huge floods, victims cannot rely on relatives to help them as almost everyone was a victim. The results, however, showed that strong social capital in the form of help from family members, friends, NGOs and the Malaysian public was significant in helping victims cope and recover.

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