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Disaster Risks Management through Adaptive Actions from Human-Based Perspective: Case Study of 2014 Flood Disaster

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Abstract: In Malaysia, floods are often considered a normal phenomenon in the lives of some communities, which can sometimes cause disasters to occur beyond expectations, as shown during the flood of 2014. The issue of flood disasters, which particularly impacts SDG 13 of the integrated Sustainable Development Goals (SDGs), still lacks widespread attention from sociology researchers in Malaysia. Similarly, questions related to the welfare of victims, especially in regards to aspects of disaster management from a humanitarian perspective, are still neglected. This study aims to identify the adaptive actions through a solution from a humanitarian perspective in managing flood disaster risks. For the purpose of obtaining data, this study used a qualitative approach with a case study design. Data were collected using in-depth interviews and non-participant observation methods. A total of ten experts, consisting of the flood management teams involved in managing the 2014 flood disaster in Hulu Dungun, Terengganu, Malaysia, were selected through a purposive random sampling method. The results showed that adaptive actions in managing flood disaster risks from a humanitarian point of view include the provision of social support, collective cooperation from the flood management teams, and adaptation efforts after the floods.

Keywords: adaptive action; climate change; collective cooperation; environmental sociology; flood disaster; management; risks; social support

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1. Introduction

Climate change causing floods can require ongoing attention. Over time, weather and human-related factors not only play a role in causing floods to worsen, but limited data on past flood events can also make it difficult for authorities to measure comparatively climate-change-driven flood trends to reduce their risk [1–3]. It is increasingly clear that the effects of climate change are a contributing factor to floods, which cause economic damage and major casualties [4]. Although the warming global climate may not cause floods directly, climate change influenced by other factors can exacerbate the flooding process, such as patterns of temperature, rainfall, and humidity. Climate change and the weak level of public awareness of the importance of the environment have seen a tremendous increase, notably in the aspect of natural disaster events in the future. The phenomenon of seasonal floods every year in Malaysia has become common among members of the communities, especially on the East Coast, such as in Kelantan, Terengganu, and Pahang. In fact, flash floods usually also occur on the West Coast, such as in Johor, Kuala Lumpur, Melaka, and Selangor. Flood disasters are unpredictable events and occur due to climate variation in certain areas [5]. The increasingly alarming phenomenon of floods in Malaysia needs to be balanced with increased awareness, response, and preparedness for disasters from all elements of society, especially in at-risk communities [6]. A natural hazard is a physical event or condition that has the potential to cause death, injury, property damage, agricultural loss, loss of livestock, environmental damage [7], business disruption loss [8–10], and interrupt the normal functioning of society [2].

The phenomenon of floods is not a new thing to at-risk communities on the East Coast of Malaysia. The floods that often hit the East Coast areas usually occur during the monsoon season, which begins in October and ends in March [11]. However, the seasonal floods that are considered a natural phenomenon can turn into disasters without warning, which threaten public safety depending on the magnitude, altitude, and duration of the landing, and the frequency of floods. Over time, the imbalances resulting from disruptions triggered by disasters have not received widespread attention, especially from the humanitarian perspective [12]. Reducing disaster risk is essential to achieving the Sustainable Development Goals (SDGs), as natural disasters cause economic and human losses, as well as hinder sustainable development [13,14]. A previous study by Ishiwatri and Sasuki [13] shows that disasters are unfortunate events that can trigger increases in the investments to prepare for flooding by raising public awareness of flood risks and proving the effectiveness of flood protection infrastructure. Moreover, a previous study in Thailand examining the 2011 floods found that the country's flood management relies mainly on structural measures and emergency responses, which was not an exception during the floods [15]. As for previous studies in Malaysia, it is recommended that the drainage systems should be upgraded, proper flood management schemes should be planned, and flood forecasting should be strengthened [11]. They also suggested designing an effective early flood warning system to activate the plans and initiating a proper public awareness campaign to educate and train the local community to deal with disasters.

The need and response concerning dealing with flood disasters should also be seen from a combination of various different aspects in the context of implementing adaptive actions to manage flood risks. Previous studies have focused more on the management and mitigation of flood risks by engineering solutions in general, for example, setting up permanent flood control commissions, establishing flood disaster relief mechanisms, conducting river basin studies, preparing drainage master plans for major cities, implementing structural or engineering control methods, establishing flood forecasting and warning systems, as well as establishing a network of hydrological and flood data collection stations throughout the country [16]. However, the solutions using this method are seen to be less effective for mitigating the disaster risks and maximizing public safety. Therefore, the aim of this paper is to address this important gap by identifying adaptive actions from a humanitarian perspective to manage the flood risks by taking into account the case study of the 2014 flood disasters in Hulu Dungun, Terengganu, Malaysia. The rationale for the selection of the 2014 flood disaster case study is that the number of victims involved in this series is higher compared to a series of other flood disasters that have occurred in Malaysia.

1.1. Background of Study

Floods have negative impacts, which cause death, damage, and severe social and economic effects, as well as structural damage and erosion, property loss, food and water pollution, disruption of socio-economic activities such as transportation and communication, as well as damage to agricultural land [17]. The impact experienced by the victims was so profound that they faced social disruptions such as the destruction of property damage, poor housing, vehicles that were no longer functioning, and many roads that were closed due to the flooding. Victims also had to bear the burden when they suffered the loss of homes and properties, destruction of agricultural areas, and the deaths of livestock [1,3]. This not only caused losses to the victims but also burdened the government in the process of channeling disaster relief and large-scale post-disaster recovery [18] because of climate change and limited adaptation capacities [12,19]. In the case of the 2014 flood disaster that occurred in the states of Kelantan, Terengganu, Pahang, Perak, and Johor, this resulted in losses of RM2.85 million (US$681 million), involving approximately 500,000 victims, and claimed a total of 25 lives [20] (see Table 1).

Table 1. The series of flood disasters in Malaysia, 1965–2014.

Year	States and Regions	Number of Deaths	An Estimate of the Number of Victims
1965	Kelantan and Terengganu	6	300,000
1967	Kelantan, Terengganu and Perak	50	125,000
1971	Kelantan, Terengganu, Perak and Selangor (Klang)	61	243,000
1993	Kelantan, Terengganu, Perak, Selangor (Klang), Johor (Muar) and Sabah	30	20,000
2006	Kelantan, Terengganu, Perak, Selangor (Klang) and Johor (Muar & Batu Pahat)	52	244,051
2013	Kelantan, Terengganu and Pahang	17	220,000
2014	Kelantan, Terengganu, Pahang, Perak and Johor	25	500,000

This table is a non-actual estimate of the number of flood victims [20].

Even before the events of the past have subsided, another flood case is expected to occur by the end of 2021 when it hits the Klang Valley, especially in Selangor, which is densely populated. The incident is also said to have been one of the worst in the history of flood disasters in Malaysia since 1971. As of 4 January 2022, nearly 50 people died, and more than 200,000 victims nationwide had been evacuated to relief centers. Two months later, society was shocked by the off-season. Usually, the monsoon weather improves around February, and there is no heavier rain, which indicates that the monsoon season is coming to an end in the near future, around March [21]. However, considering that the flooding is occurring when cases of COVID-19 are still active across Malaysia, and with the concern of the new variant Omicron in the country, there are concerns that large numbers of people in relief centers would increase the risk of transmission [22] and impact human health [23]. In the context of the recurrent flooding, the community engagement processes, social support, and a 'robust gratitude for life' among local residents all significantly strengthened coping skills [24]. Aid agencies need to have a skilled workforce and expertise in helping to reassure and give hope to victims. Policies that can really help the victims when they need should be practiced to alleviate the physical and mental burden on the victims [22]. This is because disability can interfere with involvement in preparedness activities, relief, and impacts in the aftermath, notably in terms of physical as well as emotional elements [25–27]. If we fail to take heed of every catastrophic event that befalls, human civilization will continue to revolve around the same life process, facing the same problems as well as practicing the same solutions [28].

1.2. Literature Review

1.2.1. Flood Disaster

Flood disasters are defined as the overflow or failure of a river to hold water in it, especially when it rains heavily and discharges into flood plains [29,30]. Floods are very serious natural disasters and are common in most countries in the world [30]. Flood disasters are the most devastating natural disasters in Malaysia, where 90% of the damage from natural disasters is related to flood disasters [31]. Flood disasters impact communities living in areas prone to disaster risks and result in the loss of human life, economic loss, destruction of crops, as well as the destruction of infrastructure [29,32–34]. Flood disasters can be classified as a type of disaster that occurs in a quick and sudden period, but it is also one of the disasters that can sometimes be predicted, anticipated, reduced, and well-controlled [35]. It is likely the widest spread among the various disaster events that occur in most countries and causes the most deaths [7].

1.2.2. Disaster Risk Management (DRM)

DRM should be implemented appropriately to prevent threats and catastrophic events, reduce the likelihood of disaster events, ensure effective response and preparation for the effects of possible disasters, and also ensure the system realizes post-disaster recovery [36,37]. DRM refers to the process of developing, implementing, and evaluating strategies, poli-

cies, and measures to increase public understanding of disaster risk, promote disaster risk reduction, and transfer and promote continuous improvement in disaster mitigation, preparedness, response, and recovery [38,39]. DRM activities are focused on hazard identification and management, arranging the absence of buildings in danger-prone regions, disaster-free areas, and proper development strategies if individuals choose to live in high-probability zones of disaster [40,41]. Previous studies have tended to suggest that community involvement (community and public) in the implementation of DRM is a pillar of support for such an approach on which sustainable DRM can be built [42–44].

1.2.3. Social Support

Social support in the form of spirit, motivation, and encouragement is important to help boost the morale of flood victims [45]. Social support is a source of coping—a social "fund" that contains more emotional and material resources that people might draw upon when dealing with challenging and stressful situations [46]. Social support refers to the function and quality of social relationships and can affect the way a person copes with stress and acts as a buffer that reduces or even prevents stress from occurring [47,48]. Harris [49] suggested that the appropriate focus needs social support, such as counselors for those seeking personal growth using the spiritual, religious, and resilience functions of praying in the context of traumatic experiences.

1.2.4. Adaptation

The concept of adaptation should include human and ecology systems, which usually refers to the results, processes, and actions of society by making changes and reforms to build and reorganize systems to achieve a working relationship with its environment [32,50]. Adaptation is an important component in policies, practices, or projects to reduce the impact on communities vulnerable to these disasters [29,50]. Likewise, adaptation is the process of overcoming risk by reducing the threat to something of value through the result of adaptation, process, or action while recovering from disaster quickly both culturally and economically by using its resources and social connectivity [29,31,50,51].

1.3. Research Contribution

Conceptually, the empirical value of the research is the significant contribution in two main aspects, namely social support and adaptation. Flood disasters are considered unforeseen events that cause disruption in the normal functioning of the community and affect the psychosocial well-being of the community. In terms of practice, this research contributes to the aspect of disaster risk management. This research is important to improve the performance and efficiency of disaster management among flood management teams at the central, state, and district levels. This research is embodied in the discipline of disaster sociology, which is a relatively new field. As a new field, there has not been much research conducted in Malaysia. This study is expected to contribute to the proliferation of new information and knowledge in the corpus of sociology.

1.4. Study Objective

(a) To examine the forms of social support and collective cooperation shown by experts in flood disaster management.
(b) To identify the adaptation efforts undertaken by the authorities after the 2014 flood disaster.

1.5. Manuscript Organization

The remainder of this paper is structured as follows: Section 1 introduces the case study, including the study background (Section 1.1), literature review (Section 1.2), research contribution (Section 1.3), study objective (Section 1.4), and manuscript organization (Section 1.5); next, Section 2 describes, at a glance, the scenario of flood disaster; Section 3 outlines materials and methods, which covers data collection (Section 3.1), sampling procedure (Section 3.2), data analysis (Section 3.3), and study area (Section 3.4); Section 4 presents

the results and discussion in terms of the importance of social support (Section 4.1), collective cooperation from flood management teams (Section 4.2), and post-disaster adaptation efforts (Section 4.3); and lastly, Section 5 concludes the main findings of the study and provides recommendations for future study.

2. Scenario of 2014 Flood Disaster

At the end of 2014, a flood disaster occurred in the states of Kelantan, Terengganu, Pahang, Perak, and Perlis. The flood was the worst event that has hit Malaysia in history, especially in the East Coast states of the Peninsular area. Since December 18, the Malaysian Meteorological Department has issued a total of 38 severe weather warnings for precautionary measures, of which 15 warnings were at the red level, 15 warnings were at the orange level, and 8 warnings were at the yellow level. The number of victims recorded in the states involved was as follows: Kelantan (32,343 victims), Terengganu (28,991 victims), Pahang (24,316 victims), Perak (4335 victims), and Perlis (265 victims). The floods in Kelantan have had a profound impact on the entire population, as the state was the most affected compared to other states. The continuous rain for seven days, starting on 25 December 2014 and ending on 2 January 2015, paralyzed almost the entire state of Kelantan. The colonies of Gua Musang and Kuala Krai were likened to islands and lost land contact with nearby areas [52]. Such a flood is an unexpected event for the whole society. The effects of this disaster have left many victims homeless, and they have had to take refuge in relief centers and in tents. Flood disasters in Malaysia usually occur suddenly or unexpectedly and in stages. The floods took some time to stop and fully recover. The process has become more serious and beyond the expectations of the community lately, as floods have become one of the increasingly dominant disasters in Malaysia [53]. Table 2 shows the width of flood-prone areas in Peninsular Malaysia, which covers an area of 29,800 km^2 or 9% of the land area and involves a total of 22% or 4.82 million people [54].

Table 2. Width of flood-prone areas in Peninsular Malaysia.

States	Width of the Area (km^2)	Total of Population (Year of 2000)	Flood-Prone Area (km^2)	Population Affected by Flood (Year of 2002)
Perlis	795	198,335	26.74	12,736
Kedah	9425	1,572,107	209.44	117,368
Pulau Pinang	1030	1,225,501	206.83	342,524
Perak	21,005	2,030,382	662.84	275,374
Selangor	7955	3,947,527	1788.70	669,217
Kuala Lumpur	243	1,297,526	13.18	157,302
Negeri Sembilan	6643	830,080	129.48	40,887
Melaka	1651	602,867	80.85	27,811
Johor	18,986	2,565,701	2366.71	290,570
Pahang	35,965	1,231,176	6271.62	615,128
Terengganu	12,955	879,691	2222.87	425,396
Kelantan	14,920	1,289,199	1640.38	714,287

Source: The table is taken from Ujang [54].

Based on the width of flood-prone areas in Peninsular Malaysia, it can be said that no state is free from facing risks, hazards, and disasters. In fact, the risks and hazards of floods that occurred in Malaysia every year for five consecutive years, from 2010 to 2014, have been identified as a threat that can disrupt the country's development and industry status as well as the achievement of developed country status by 2020. The hazard of flood disasters will send the level of national development a few years backward while also threatening the country's food security [55].

Table 3 shows the trend of flood phenomena in five consecutive years where the flood disaster that occurred in 2014 involved more flood-prone areas. Meanwhile, Table 4 shows the number of flood events that occurred in Malaysia during 2014 was a total of 381 incidents involving the entire state [56]. In fact, almost half a million victims were

evacuated during the year, not including unregistered victims, while the estimated loss was more than RM200 million (US$46 million). The increased vulnerability of at-risk communities in developing countries to natural disasters is due to living in flood-prone areas with poor housing, ineffective disaster warning systems, and poor infrastructure [57].

Table 3. Flood phenomena in five years, 2010–2014.

Year	Date	States (Regions) *	Level (m) **
2010	10 May 2010	Sabah (Kota Kinabalu)	Up to 3.0
	14 August 2010	Kedah (Sik)	Up to 2.2
	19 August 2010	Negeri Sembilan (Jelebu)	Up to 1.5
	27 September 2010	Perak (Hulu Perak)	Up to 1.5
	2 November 2010–8 November 2010	Kelantan (Pasir Mas)	Up to 1.5
	14 November 2010	Perak (Kinta)	Up to 1.2
	9 December 2010	Sabah (Tawau)	Up to 1.5
2011	28 March 2011–30 March 2011	Kedah (Baling)	0.5–1.0
	21 November 2011	Negeri Sembilan (Jelebu)	0.5–1.0
	21 November 2011–22 November 2011	Terengganu (Setiu)	0.3–1.2
	22 November 2011–24 November 2011	Kelantan (Machang)	0.5–1.5
	2 December 2011	Selangor (Hulu Langat)	0.5–1.5
	13 December 2011	WP (Kuala Lumpur)	0.5–3.0
2012	7 March 2012	Selangor (Hulu Langat)	0.3–1.5
	7 May 2012	Selangor (Hulu Selangor)	0.5–2.0
	31 October 2012	Selangor (Klang)	0.5–1.0
	24 November 2012	Kedah (Baling)	0.5–1.0
	2 December 2012	Negeri Sembilan (Tampin)	0.5–1.0
	24 December 2012	Pahang (Kuantan)	Up to 1.2
2013	23 October 2013	Pahang (Cameron Highland)	1.5–2.5
	4 December 2013–5 December 2013	Terengganu (Marang)	0.3–1.2
	4 December 2013–6 December 2013	Terengganu (Kemaman)	0.3–1.5
	24 December 2013	Selangor (Petaling & Gombak)	0.5–1.0
2014	12 February 2014–15 February 2014	Sabah (Tenom)	0.2–2.5
	2 November 2014	Kedah (Baling)	0.5–1.0
	23 November 2014	Perlis (Arau)	0.3–0.5
	23 November 2014–24 November 2014	Kedah (Kubang Pasu)	0.5–1.0
	15 December 2014–19 December 2014	Terengganu (Besut)	0.3–1.8
	16 December 2014	Terengganu (Kemaman)	0.3–1.8
	17 December 2014–19 December 2014	Kelantan (Gua Musang)	Up to 3.5
	22 December 2014–24 December 2014	Kelantan (Galas & Machang)	Up to 4.0
	22 December 2014–26 December 2014	Pahang	0.3–1.1
	22 December 2014–28 December 2014	Pahang (Bera)	0.6–1.5
	23 December 2014–31 December 2014	Perak (Kuala Kangsar/Hulu Perak)	0.3–1.8
	25 December 2014	Kelantan (Kota Bharu)	Up to 3.5
	25 December 2014–28 December 2014	Kelantan (Tanah Merah)	1.0–8.0
	26 December 2014	Johor (Kluang)	0.3–0.6

* Areas showing the highest flood levels were recorded. ** Lowest and highest flood levels. Source: Department of Irrigation and Drainage Malaysia [56].

This situation means that the flood phenomenon in Malaysia is no longer a natural process of flooding, but it is a serious threat and a risky situation that can cause destruction and physical damage, claim lives, and disrupt economic, social, and cultural systems. Since the 2014 flood disaster experience, a great deal of focus has shifted to providing effective solutions, but there have yet to be many significant improvements in flood disaster management. In total, the world has suffered an estimated loss of US$150 billion and 9000 deaths in 2019 as a result of 820 natural disasters [58]. According to data, the first half of the 2020 disaster year showed a total loss of US$68 billion and 2900 deaths due to natural disasters [59]. Floods have been a major obstacle to sustainable development in the country, as governments and individuals bear so many losses as a result of natural disasters [60].

While these natural disasters, such as floods, are unavoidable, at-risk communities need to be more sensitive to climate change and the physical environment [61]. This is so that the loss of money, property, and lives can be avoided. Meanwhile, flood forecasting methods and collective action from flood management teams should be easier to perform if it is based on local experience and existing past information. Global warming and climate change have negative influences on natural systems, with immediate consequences and some potentially catastrophic events [62,63]. Although the occurrence of certain disasters cannot be directly linked to climate change [64], it does facilitate an increase in the frequency and intensity of natural disasters.

Table 4. Flood events in Malaysia, 2014.

States	Number of Flood Incidents	Average Daily Rainfall (mm)	Total of Victims (Person)	Maximum Flood Depth (m)	Estimated Loses (RM)
Perlis	19	156	458	0.5	-
Kedah	33	201	1706	1.5	12,685,000
Pulau Pinang	20	158	-	1.5	-
Perak	52	159	4421	1.8	6,946,500
Kelantan	49	514	319,156	7.0	36,394,000
Terengganu	19	413	62,281	1.8	18,600,000
Pahang	27	537	69,728	2.5	13,570,000
Selangor	92	144	308	1.0	-
Melaka	11	148	96	0.6	-
N. Sembilan	14	101	-	1.2	7,650,000
Johor	8	267	1677	0.6	-
Sabah	13	159	8059	4.0	122,450,000
Sarawak	14	193	388	1.5	-
WP KL	7	87	-	0.6	-
WP Labuan	3	-	-	1.0	-
Total	381	-	468,278	-	218,295,500

Source: Department of Irrigation and Drainage Malaysia [56].

3. Materials and Methods

3.1. Data Collection

This research is a qualitative study that used a case study design through two methods of data collection, namely in-depth interviews and non-participant observation, to obtain the primary data. A qualitative study using a case design is an in-depth exploratory study conducted on a limited system such as activities, events, processes, or individuals based on extensive data collection [65]. In addition, study data and information were obtained or collected from existing secondary sources or researchers as second-hand data. The secondary data to this study can be obtained from many resources such as flood-related books, journals, reports, newspapers, and magazines.

3.2. Sampling Procedure

A field study was conducted in 2016, which is two years after the flood disaster occurred in 2014. To gather more in-depth information, interviews were conducted with 10 experts who have more than 10 years of experience in managing flood disasters. A total of 10 experts from the various parties involved in managing the flood disaster in 2014 were selected through the purposive sampling method. Of the 10 informants, six were men, and four were women. Informants were aged in the range of 20 to 60 years. Each informant has a different field of assignment in managing and controlling flood disaster events. The justification for the selection of informants among the flood management experts was because they were agents or intermediaries at the state, district, and village levels during the 2014 flood disaster. They were responsible for managing the 2014 flood disaster in the

local area. The selection of informants also considers their experience, knowledge, and expertise in managing floods.

3.3. Data Analysis

The data and information obtained were analyzed simultaneously while the data collection was being carried out, which is a continuous and non-linear process. Data and information were then analyzed using thematic analysis methods to identify patterns or themes within the qualitative data [66]. The next process involved the qualitative data and information being then studied descriptively and then presented in the form of descriptions, charts, diagrams, tables, and other methods to facilitate the reporting activities of research findings.

3.4. Study Area

This study was conducted in three villages located in Hulu Dungun, namely Kampung Pasir Raja (4°33′57.2″ N, 102°58′34.7″ E), Kampung Kuala Jengai (4°43′24.6″ N, 103°5′2″ E), and Kampung Minda (4°46′58.4″ N, 103°6′32.8″ E) [67]. The three villages were selected because they were the villages that were badly affected when the flood disaster occurred in 2014. The rationale for the selection of the villages is because they are most vulnerable to hazards, risks, and disasters. It can be said that almost every year, the villages will be hit by floods every time the monsoon season arrives. During the 2014 flood disaster, almost 80% of the settlements were inundated by floods caused by the overflow of water in Sungai Dungun. Hulu Dungun is an area located in the interior of the Dungun district. Hulu Dungun is also a flood-prone area every time the flood season arrives. This is because the topographic conditions and the sloping terrain are contributing factors to the flooding process every time the monsoon season arrives.

In total, Malaysia is a country with 16 states, including Terengganu. Dungun is the second-largest district in the state of Terengganu, Malaysia. The area of Terengganu is approximately 1,295,638.3 hectares, which houses eight districts, namely Kuala Terengganu, Kuala Nerus, Setiu, Besut, Kemaman, Marang, Hulu Terengganu, and Dungun. Dungun district has an area of approximately 274,503 hectares or 35 square kilometers, with a population of 168,300 people [68]. The morphology of the Dungun district is characterized by a combination of low-lying areas on the coast, swamps in the east, and undulating in the middle. Most of the settlements in the Dungun district, especially in the upstream part, are located near the South China Sea, which is on the edge of areas close to water resources such as Tenggol Island, Tanjung Jara Beach, Rantau Abang Beach, Teluk Lipat Beach, Mak Nik Beach, Chemerong Waterfall, and many more. Apart from around the coast, the residential areas are also mostly surrounded by rivers and ditches. These rivers and ditches are usually built as a boundary between villages and are often used as an irrigation system for socio-economic activities. The rivers and ditches are built in various sizes and widths according to the suitability of a village. The main socio-economic activities of the people in Hulu Dungun consist of agriculture, fisheries, livestock, small enterprises, and tourism.

4. Results and Discussion

The results found that adaptive actions to manage flood disaster risks from a humanitarian perspective include the importance of social support, collective action from the flood management teams, and post-disaster adaptation efforts.

4.1. The Importance of Social Support

4.1.1. Emotional Support

The adverse effects of a disaster require resilience, and the victim's ability to adapt and subsequently restore their lives after a disaster is dependent on the emotional support they receive. Emotional support works to alleviate the anxiety and distress experienced by encouraging the acceptance of support [39]. This is because the form and violence of natural

disasters have an impact on the emotional health as well as the victim's quality of life. The results found that the emotional support received by the victims was manifested through pilgrimage activities during or after the flood. Through pilgrimage activity, management can identify the problems faced by the victims, especially related to their emotions, even though physically, the flood disaster has fully recovered [69]. For example, there were problems related to their emotional health stability after the flood. Most victims were found to be dealing with trauma, disruption, fear, and depression after the flood. One of the informants, a 38-year-old woman, reported that although the flood had physically fully recovered, some of the victims were still affected emotionally, as the victims faced trauma and fear. Sometimes, the victims are unaware that they are dealing with an emotional problem.

" . . . when we come to visit, they will feel a little strong when there are people who always pay attention, help and care about them. We also let's always monitor the village after the flood and fix everything . . . there are victims only the exterior looks strong... but their insides all sorts of other things they think... what will happen to them if they are not helped... some are still traumatized... scared... sometimes they just give up . . . "

The 2014 flood disaster destroyed homes and property, risked lives, and left the victims in a very 'fragile' state in terms of emotional and social readiness. The emotional support provided by the management can reassure those facing psychosocial disturbances because of the flood. In addition, victims who received ongoing emotional support from family members, friends, neighbors, and community members were also found to be able to recover in a short time. A sense of brotherhood or belonging among community members is highly encouraged to reduce the negative effects of natural disasters [70]. The emotional support received by the victims from various parties was found to be able to increase their resilience to recover and return to a normal and stable situation. It is very important when they are less able to fight the less stable situation.

4.1.2. Instrumental Support

Instrumental support or tangible support is a relief given by an individual to another individual in need in the form of money, material, or time allocated to that individual [71]. In this study, the instrumental support received by the victims was in the form of goods or materials, financial aid, energy, time, as well as any form of direct relief during and after the flood disaster. The victims need enough money for them to repair, clean, and replace household items that have been destroyed by the floods. A 60-year-old male informant said that zakat was distributed to the victims as emergency relief during and after the flood. The support from the Malaysian community is said to be very encouraging when some of them need help. The informant added that the Malaysian community is known as a generous group with donations and help. Plus, the presence of social media such as Facebook, Twitter, Instagram, and other platforms is very effective in channeling various forms of assistance and support to victims. However, the provision of relief in the form of money was found to usually be temporary in nature and not the main source of dependence or the next source of survival for victims after a flood.

"...a lot of assistance is given by the management... one of them is zakat... indeed every time there is a flood, the victims will get zakat... in terms of financial aid, it is not difficult, Malaysian are all generous . . . there are all kinds of social media right now... many people come to send their help... usually, if you give money for a while, it's all gone... but, this financial aid is very important..."

The results found that the management also plays a role in providing instrumental support in terms of their time and energy to clean the victims' housing areas that have been affected by the flood. After the flood, the victims faced a dirty house because it was contaminated with mud, garbage, and other items that have been damaged. In the process of rehabilitation, most of the victims were found to be in dire need of help and support from flood management teams to clean up their living areas. The thick mud allegedly made it difficult for the victims to clean up their homes due to a lack of equipment and manpower.

According to one of the female informants, aged 40, the Malaysia Armed Forces, Malaysia Civil Defense Forces, Fire and Rescue Department of Malaysia, as well as The People's Volunteer Crops together with the National Disaster Management Agency, were involved in the process of cleaning the homes and other affected areas after the flood to ease the burden of the victims.

"…. usually the rescue teams, volunteers and the public do the cleaning work... they help the victims to clean their houses and the affected areas... well, after the flood, many were destroyed and broken … let's work together to repair the victims' houses... and anything that should be helped... "

In this regard, various forms of relief and social support provided by individuals or parties who manage disasters were found to have formed a positive perception of the management who work hard to help the victims [72]. However, the researchers were told that there were victims who have a poor perception of the management, especially in the distribution of aids. Even so, after the victims received good help and treatment, as well as solid support in terms of energy and time spent by the management, these positive impressions are said to have finally succeeded in eliminating the bad impression. The victim's frustration with the management issue was found to have led to the formation of a bad impression on the management.

4.1.3. Information Support

Information support is the advisory help given by a person to the victim in the event of a problem [73]. In this context, information support in the form of activities provides advice, suggestions, and information on how to deal with disruptions, problems, or stress due to floods. Furthermore, with adequate sources of information support, victims were found to not feel left out, and they felt there was still a place to lean despite being saddened by the traumatic events that had befallen them as well as threatened their lives and safety. The study found that community-based programs are implemented by the management so that information in the form of advice and guidance can be channeled to the victims.

In addition, information support was found to be important as it was implemented before, during, and after floods in preparation for disaster response to reduce flood risk or hazard. Pre-disaster information support is related to disaster preparedness and disaster response. The role of information support during floods is related to personal safety at relief centers, social rehabilitation activities, and advice on the possibility of flood disasters recurring soon. After the flood disaster, information support helped to convey information to the victims, especially on aspects of physical and emotional health, as well as preventive measures in the event of another flood disaster in the future, as told by one of the male informants aged 57.

"...before the flood, we give a reminder to the villagers... let them be more prepared... during the flood... we always remind them to keep them safe... we advice them to recover quicky … we also advise to be vigilant, maybe the next wave of floods will happen... maybe worse than this... after the floods, there are flood management teams who give information about health... a little bit info about to prevent future floods..."

In this regard, it can be said that the effective delivery of information support to victims and locals is only successful when there is a social relationship and collective awareness among them. The victims are found to be able to bounce back when they receive adequate social help and support from various sources, through the social relationships built, before they can restore normal and stable situations after the flood. Similarly, the collective awareness among the victims can succeed in the recovery process after the flood, which can eventually help the victims face the physical effects and social disruptions caused by the flood for the purpose of restoring their life. The effectiveness of information delivery involves the support of good social relationships around them, especially among family and community members.

4.2. Collective Cooperation from Flood Management Teams

From the humanitarian perspective, the study found that the collective cooperation from various management teams is shown through the responsibility of handling and managing flood disasters. Disaster management is the task of managing resources to plan and implement activities performed before, during, and after a disaster aimed at preventing and reducing the effects of disasters [74]. During the floods, management teams at the village and district levels were found to first act to provide disaster relief to victims and residents. Disaster relief relates to activities that involve rescue, finding missing victims, evacuating the dead, and disaster recovery [75]. Another informant, a 40-year-old woman, stated that the committee that manages flood disasters at the local level plays an important role because they are closer to the victims and the locals, notably in providing various forms of relief to them.

"...the local level must go down to the field first... before the help from the top (centre) arrives... we as the local level management agency must be responsible for the safety of every local who is affected... we have to give various forms of support to them... that is the important role we play during the severe floods that day..."

The study found that the National Disaster Management Agency and members of the Special Malaysia Disaster Assistance and Rescue Team, which consists of officers and members from various other agencies such as The Fire and Rescue Department, Malaysian Armed Forces, Royal Malaysia Police, as well as volunteers, acted to aid the victims. With the existing preparations, they worked together to deal with the floods as soon as they received the information, especially in providing emergency and rescue assistance, relief, and support. Disaster preparedness is usually able to formulate realistic and effective planning, reduce the duplication of aid, and maximize the effectiveness of community efforts in responding to disasters [76]. An informant, a 55-year-old man, revealed that all teams work together to help local agencies in managing disasters that occur in some areas. Local agencies are the most important component because they understand the intricacies of the field of work involving local flood disasters better.

"...we are not alone... we are helped by National Disaster Management Agency and Special Malaysia Disaster Assistance and Rescue Team... it has become our responsibility to provide assistance to the people affected by the floods . . . I think the local authorities and their members know the situation and the needs of the people during the big floods... so, to make situation easier at that time, we have worked with the central people... "

The study found that short-term and long-term rehabilitation efforts have been continued by the Social Welfare Department Malaysia after floods to help victims recover and rebuild their lives. The Social Welfare Department Malaysia has provided short-term material assistance such as food, beverages, and necessities in the early stages after the floods. Meanwhile, long-term assistance is in the form of money, also called '*wang ehsan*', and rehabilitation assistance are also given to the victims. Researchers were also told that post-disaster recovery assistance such as free housing was provided with the consent and permission of the Central Disaster Management Committee as well as the State Disaster Management Committee. Housing rehabilitation assistance is only given to victims who have not received '*wang ehsan*' and depends on the level of damage and destruction that occurred, as explained by one of the informants, a 38-year-old man.

"...for material support, everything has been provided by the Social Welfare Department... usually, assistance is given in the form of '*wang ehsan*' or rehabilitation assistance... any victims who do not receive '*wang ehsan*', we have given them other rehabilitation assistance... but houses are not in our provision... because we have to see first how severe the floods are and then we have to consult with more experts..."

Meanwhile, amid the less stable situation due to floods, it can be said that the entire Malaysian community from various states, races, religions, and political parties work together to save, reduce, and alleviate the suffering faced by the victims. The cooperation among members of the mosque community, the media, government and private associations, entrepreneurs, and various other parties was shown through their social support

by launching a disaster relief fund. Collective cooperation from all parties increased the ability and capacity for the delivery of social support. The results of the study found that various parties such as flood disaster management committees, local agencies, NGOs, and individuals have taken a collaborative approach and acted collectively.

4.3. Post-Disaster Adaptation Efforts

4.3.1. Construction of Concrete Embankments

The study found that the adaptation efforts after floods are primarily to build concrete embankments to control floods. The construction of control structures on the riverbanks is an action that is able to reduce riverbank erosion, especially during floods or after high-tide phenomena [77]. The construction of concrete embankments was found to be performed through cooperation from the authorities to maximize the safety of the community, property, and other infrastructure facilities [78]. An informant, who is a 60-year-old man, said that the floods were found to have caused more unfenced cliffs to be eroded, especially along the coastal areas close to residential areas. However, social consensus through cooperation by building concrete embankments after floods were found to be successful in reducing seawater from overflowing into the surrounding areas, especially in residential areas during the rainy season. The effort to build this concrete embankment is also claimed to be able to reduce erosion.

" . . . we are worried that the lives of the locals are in danger... many houses are at-risk of collapsing... the locals here are also worried that the cliffs near their houses have been badly damaged after the floods . . . they are also afraid because when it rains heavily, the river water will enter their house area... although not everything we do can stop the big flood that day... but, at least concrete embankments can reduce erosion which was previously worse...."

4.3.2. Construction of Stone Block Fortress

In addition, adaptation efforts after the floods were also carried out by the authorities, namely by building fortifications from blocks of stone. The study found that the government's action to build fortifications from these blocks of rock was performed along the coast, which is often eroded when the rainy season arrives every year, let alone after the 2014 floods. The researchers were told that this effort was enacted according to certain phases, i.e., the authorities prioritize areas that are experiencing severe erosion and need immediate action. However, the stone fortifications were found to be destroyed little by little with the arrival of the flood season each year. This is because floodwater flowing into the surrounding area destroyed building infrastructure and facilities [79], including flood defenses. The government has no choice but to act to make improvements when the structure was almost destroyed. According to an informant, a 45-year-old man, the destruction of the cobblestone fortifications with every flood season has caused the authorities to be more concerned with efforts to implement other subsequent methods.

" . . . there are all kinds of efforts we have made . . . but all of them are temporary . . . one of them is a stone fort... high cost but cannot completely prevent floods . . . the government has to think two or three times if they want to do something (other efforts) . . . let the result worth it and no loss . . . "

Therefore, it is understood that the authorities have made a decision to ensure that the stone fortifications in some of the affected areas are constantly being added, notably in the coastal areas. When depletion occurs, the replenishment process will be implemented immediately. For example, the stone block fortifications at Teluk Lipat Beach and Teluk Gadong Beach are constantly being added to in stages. Even today, the structure still survives and is constantly monitored so that the process of replenishment can be performed if it is found destroyed, especially during the flood season each year. This effort is performed because most of the locals carry out socio-economic activities along the coast. Due to that, monitoring is conducted continuously, so that they can continue to live there, and the continuity of their socio-economic activities is not disrupted.

According to the United States Environmental Protection Agency (US EPA), examples of adaptation efforts include the construction of a flood barrier wall in Manhattan, Long Island, New York, to prevent erosion, the construction of coastal protection layers in Warden Bay, United Kingdom, and the construction of breakwaters in Herne Bay. The adaptation efforts conducted by the authorities in those countries were found to have a positive impact on the communities living in the area [80].

4.3.3. Restoring and Improving a Drainage Ditch Systems

The study found that the adaptation efforts made after the floods focused on restoring and improving drainage ditch systems in the villages through gotong-royong activities. The drainage ditch systems built in villages are intended to facilitate the flow of water and prevent flash floods and rising sea levels. The existing drainage ditch systems were found to be repaired and replaced. In fact, authorities have managed and cleaned clogged or dysfunctional drains on a regular basis after floods. As such, according to another informant, a 38-year-old woman, the authorities always carry out cleaning work on the drainage ditch and river every six months with the cooperation of locals. Through these efforts, well-managed drainage ditches and rivers can accommodate large quantities of flooding. This situation was also found to reduce the risks and hazards that occur in the residential and surrounding flood-prone areas.

" . . . sometimes prevent, no matter how good, disasters (floods) still happen... so, we try to reduce (impact) in terms of hazard mitigation and disaster response... although there is mitigation but floods also happen... there are many ways we have done . . . everything fails when incidents become more difficult to control can happen at any time without a clue... so, we chosen to have an adaptation efforts... every six months we will act... we agree to have gotong-royong to clean the ditches, rivers and any drainage . . . "

According to the Intergovernmental Panel on Climate Change (IPCC), there are more and more options for adaptation today, including integrated management, collaborative measures from the community, ecosystem-based approaches, disaster risk reduction, as well as relevant management plans and strategies [81]. In addition, integrated river basin management is an approach that encourages stakeholders to consider environmental and social relationships broadly [82]. In this study, stakeholders such as government, community organizations, businesses, industry, other organizations, and individuals with particular interests were found to have acted after the 2014 flood disaster through collective cooperation and social integration to repair ditches and clean drain systems, especially in flood-prone areas. As previous studies have found, water-related problems can only be addressed effectively through collaborative efforts by many stakeholders, along with input from many technical disciplines [83].

5. Conclusions

Overall, this research was conducted to maximize social awareness among academics and students on the issue of natural disasters in Malaysia, which are becoming more serious. The proliferation of ideas from more sociologists is able to address the unnoticed shortcomings in this research. This research is also an effort to further enrich the knowledge of communities about the impact of flood disasters from a humanitarian aspect. The community better understands the difficulties faced by the victims as a result of flood disasters, and this is what leads to the social support needed by the victims, especially from individuals, communities, society, and authorities. This research found that various forms of social support received by the victims were found to be able to reduce the flood disruptions and help calm the victims. The social support needed by the victims from the management teams during and after the flood includes emotional, instrumental, and even informational support.

Emotional support is shown through a program of interviews and talks related to flood disasters aimed at imparting knowledge, education, and useful information to victims on flood risk mitigation. Meanwhile, instrumental support exists in the form of social

assistance schemes to reduce the burden and help the victims continue to survive, especially after the flood disaster. Social assistance in the form of money such as vouchers is paid directly, while insurance is paid indirectly. Non-financial assistance exists in the form of food items and equipment according to their needs. Information support exists in the form of activities that provide advice, suggestions, and information on how to deal with disaster disruptions, problems, or stress due to floods. With adequate sources of informational support, victims feel less isolated, and they feel there is still a place to lean despite being saddened by the traumatic events that befell them and threaten their lives and safety.

Additionally, the collective cooperation shown by various parties involved in flood management, especially from the management committees, local agencies, NGOs, and individuals, greatly helped the victims become more resilient when faced with disasters. This is because, when a flood occurs, the rescue agencies and the authorities who first arrive in the flooded area are alleged to have acted to help and support the victims. Victims are housed in relief centers that have been set up to ensure their social well-being and reduce disaster risks. Social support is needed by the victims so that their social well-being can be improved again. The disruptions caused by the floods were found to have minimized the social well-being of the victims who needed social support from various sources. Therefore, through the awareness and recognition that a disaster occurred, there are efforts from various parties to adapt and rehabilitate the situation to normalize the disruptions. Because of that, it is very important to enhance disaster responses, either by the authorities or the victims themselves, through various post-disaster adaptation efforts. Adaptation efforts as disaster response are expected to be able to change the flood disaster risks of victims because of climate-related extreme events.

In conclusion, adaptive actions in managing flood disaster risks from a humanitarian point of view include the provision of social support, collective cooperation from the flood management team, and adaptation efforts after the floods. There is a need to integrate disaster risks into national policies, strategies, and plans toward achieving the SDGs, especially in action against climate change. In terms of future study, we recommend other researchers use methods other than qualitative methods, such as quantitative or mixed methods, to obtain more in-depth information. However, the main challenge of this study is that the case study selection of flood disaster events that occurred in 2014 is no longer suitable as many more other flood events will occur in the future.

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