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Resilience Adaptability Community towards Flood Disaster: Case Study Temerloh, Pahang

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Abstract

The concept of sustainable development which combines ideas aimed to meet the needs of the present without compromising the ability of future generations. United Nations approved "Sustainable Development Goals 2030" (SDG) and sustainable development has been accepted as the primary objective of public policy and decision makers for the well-being and quality of life. Sustainable development in the SDG-15 is intended to "protect, restore and promote the sustainable use of terrestrial ecosystems, sustainable management of forests and halt the manage and restore land degradation and halt the loss of biodiversity". To achieve the sustainable development of this aspect of the resilience in the community need to see the impact of their acceptance of the changes experienced as a result of natural disasters. The study area is more concentrated in Temerloh, Pahang. Natural disasters cannot be stopped as it relates to the natural cycle of nature, but the impact of disasters can be minimized with emphasis on the ecological balance in an ecosystem. Planning and development strategies need to be more sustainable to reduce negative impacts occur. Accordingly, the study objectives were to evaluate the resilience of victims is intended to determine the extent to which they can adapt and create solutions (mitigation) the impact of flooding faced. With the existence of the resilience within the flood victims, he was influential to the victims recover from trauma and restores the spirit of survival though not as original condition. In addition, the government should also play a major role in reducing the negative impact on the victim. Thus, by evaluating aspects of the viscosity can show public acceptance of disaster and can strategize and plan future more systematically in line with the objectives of SDG 15.

Keyword: Flood, SDG 15, Resilience, Sustainable, Development

Introduction

Flooding is a natural disaster that caused by climatological factors or climatic factors such as temperature, rainfall, evaporation, wind movement and the natural conditions of the earth (Balek 1983). In Malaysia floods and flash floods happen in tradition, especially on the east coast during the monsoon season. Increased frequency of flooding in the country occurs either

naturally or due to changes in monsoon due to the increase in urban slums (Chan 1996; Jamaluddin & Sham 1987; Rose & Peter 2001). Flooding is usually caused either by continuous rain causes greater quantity than usual or river water spilling into the river or from both (Balkema et al. 1993; Schulz et al. 1972). The river becomes shallower in the downstream area as a result of repeated floods occurred (Bradley & Potter 1992; Whiting 1998).

Natural disasters such as floods in recent years have occurred as severely as in 2014 where Malaysia is experiencing heavy flooding, bringing much harm to the victims and the government. Increased frequency and intensity of floods that occur every year due to the development of viable land use in the river basin. Improvement of land-use changes could be the starting point to enhance the level of vulnerability to various natural disasters risk that ultimately affects the man himself. (Tuan Pah Rokiah Syed Hussain et al., 2015). There are various forms of natural disasters which exist between them, flooding, mudslides, landslides, droughts and flash floods. According to Md. Anowar Hossain Bhuiyan et al. (2004), stating changes in land use can cause environmental degradation and ultimately disrupt the lives of people who inhabit the area including River Basin. Apart from the drastic changes in land use in the river basin, there are also other factors that contributed to the severity of natural disasters, especially floods, namely the increase in population in the Basin. This is because the increase in population also affects the diversity of land use patterns in the Basin, including for commercial development activities such as agriculture, logging, industrial, infrastructure, settlements, recreation and tourism. Deterioration of natural vegetation area could give a negative impression to the people as a natural green areas play an important role as an insulator flood.

Therefore, especially people living in coastal areas are at higher risk of river floods affected compared with other people who are remote from the river. Accordingly, the power density of the disaster is necessary to reduce losses in the future and to guarantee the quality of their lives. To increase the viscosity of the flooding, it needs to identify indicators in terms of population density. Identify social indicators in the phase of disaster aid in a more accurate assessment of social security. This assessment can also help track the development of resistance in the appropriate direction to the community resilient to develop a strategy or plan for increased durability in every phase of the disaster.

Flood Disaster: Flood is a Part of Vulnerability

According to Adger et. al. (2000) original meaning of the Latin word meaning vulnerable, namely "vulnerare" or "*capacity to do*". They also stated that the word vulnerability itself is taken from the Latin word "vulnerabilis" used by the Romans to describe the soldiers who lay wounded on the battlefield and is exposed to the risk of further attacks. Vulnerability viewed from a capacity group of people, places and systems will be threatened by pressures such as climate change, land degradation, demographic changes and changes in technology. Aspects of vulnerability in the context of society and the environment cannot be excluded because it is seen as a potential for some earnings perspective disasters such as floods that occurred as a result of environment-community interaction. Vulnerability has many dimensions and meanings depending on the orientation and perspective studies. In simple meaning, vulnerability can be defined as a form of disaster that struck the community in a variety of shapes, sizes, and in such magnitude. Affinity

concept vulnerability to floods is very accurate because it involves an ecological approach that requires a direct relationship between humans and the environment.

The dynamics of the concept of fair vulnerability associated with floods because it leads to the reason and the cause and effect can be triggered by this vulnerability. According to White (1938), in the event of flooding, the ecological approach is targeted because he realized that not only the effects of disasters undergoing renovation but human exposure to disasters should also be customized. The results will form a linear model that describes how the influence of natural events and human impact (Figure 1).

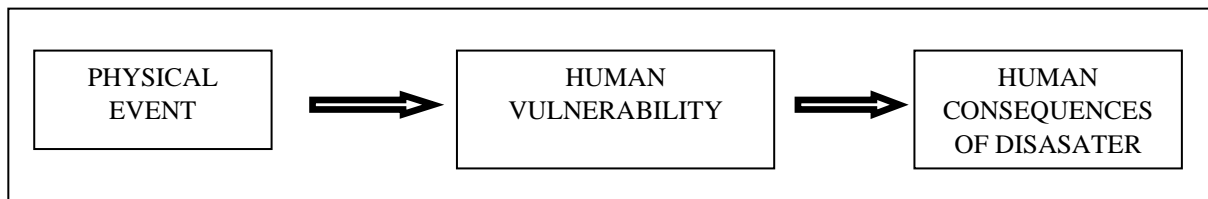


Figure 1: Model Genesis Vulnerability on Flood from Linear Model

Source: Modified from Alexander (2012)

Understanding the Resilience

Resilience is a concept that connects with the community environment, especially for the ecological system - social reacts to stress and shock to retain its function (Folken, 2006). Moreover, according to Shahrudin (2015), the resilience easily is the ability of the system to return to a state of drone congregation after a disruption to the system. Walker et al. al. (2004) & Folken (2006), the resilience of three important concepts in understanding the social ecological system of persistence, adaptability and transformability.

In this study we focus on the social dimensions of power density of population to experience the effectiveness of disaster information, actions during the flood and after the flood of actions linked to the definition of community resilience which involves the ability to withstand the shocks of social change during a disaster. It is a way to minimize social disruption and mitigate the effects of flooding in the future.

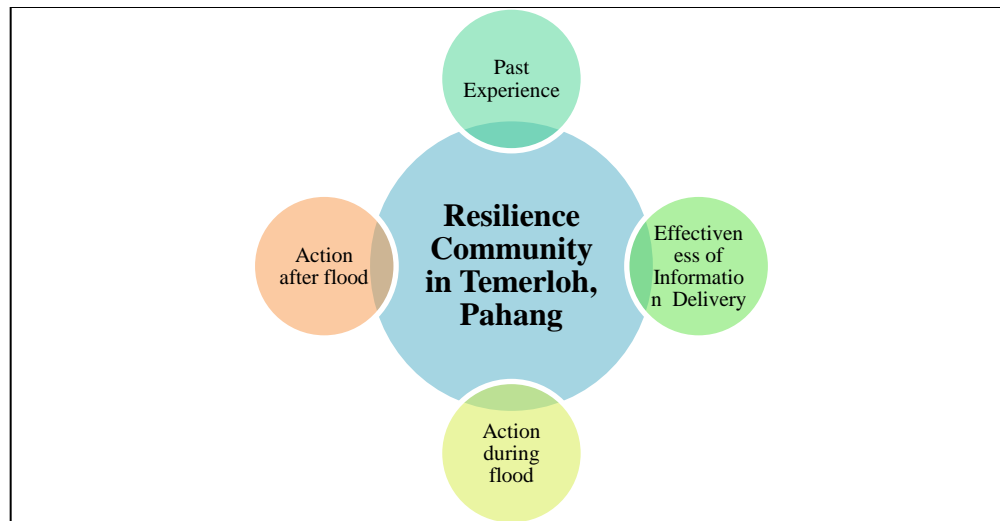


Figure 2: Resilience Community Framework in Temerloh, Pahang

This figure illustrates the actions of ordinary people do during a disaster. Pre-disaster phase indicates the social conditions existing before a disaster. After a disaster occurs, the response phase commenced and social functioning and quality of life decreases sharply for a period of time in the recovery phase as a function of the community improves as different aspects of resilience such as technical factors, economic and social factors are restored. In some cases by different factors such as innovation and improvement, various aspects of society than it was before the existing (Forgette & Boening, 2009).

Social resilience in the context of disaster depending on the social situation of victim in disaster and post disaster (Tobin & M., 2002). It also involves how people react to the current crisis and the process of building the new quality of life. Therefore, in determining and measuring the social resilience indicator needed to represent each phase of disasters (Manyena, 2006).

A review of relevant literature was conducted to identify and define a reliable indicator of resilience. These include education, community reaction, trust the leadership and delivery of information. All indicators of potential social and related power density of past studies have been put into the table together with writers who suggested (Table 1). Then determining all the indicators associated with the bookmark that was obtained from a survey conducted to examine the relationship between literature review and findings.

Table 1: List of potential indicators of social resilience in communities

Indicators	Resilience	Researcher
Sense of Community	(Feeling of belonging to a community or place)	Paten et al. (2001)
Trust	(Trust to neighbourhood)	Enemark (2006)
Community Participation	Involvements in a community	Paton et al. (2001)
Leadership	Leadership within a community	Harland (2005), Hegney (2008)
Collective efficacy	A Group shared belief in their collective power to produce specific changes	Moore (2004)
Community efficacy	Community belief in their own capabilities of performing and completing jobs	Paton et al. (2001)
Social Capital	Community's invest, access ,and use resources surrounded in social networks to gain returns	Maguire (2007), Hagan (2001)
Social Cohesion	Community willingness to cooperate with each other	Paton (2001)
Community involvement	Involvements in community	Clauss-Ehlers & Levi (2002)
Communication and information	Interchange and share information within community	Ink (2006), Rohrmann (2000)
Resource dependency	The reliance on a narrow range of resources leading to social stresses	Adger (2007)
Improvisation refers to creativity and ingenuity	Community creativity and innovative to devise a solution for enhancing resilience	Lalonde & Forgette (2011) dan Boening (2001)
Innovation	Innovative to devise a solution for building and enhancing resilience	Demchak (2006)
Social Support	Support from neighbourhood	Kaniasty & Norris (1999), Norris (2008)
Learning	Learning from previous disasters	Zhou (2010)
Education	Level of Knowledge about flood	Paton (2001)

Demographic Information	such as age, gender, socioeconomic status(income), health, historical, education, cultural (religious belief) or populations with special needs	Tobin (2010), Cutter (2012)
Coping Style	Adaptive capacity and developing strategy	Miller (1999)

Source: Modified from Sanaz Khalili et al. (2015)

Material and Method: Case Study at Temerloh, Pahang

This study focus at Temerloh, Pahang, Temerloh is a city that developed and organized. It is a city in the middle of the state of Pahang, Malaysia located at the junction between Semantan River and Pahang River. Temerloh located at an altitude of 163 feet above sea level and its geographical position is 3 ° 26'55 "N 102 ° 24'58" E. The city is starting from trading activities that existed before because of its strategic location. The city has been dubbed "Bandar Ikan Patin". Waterville is also the name of an area located in Pahang. An area of 225.086 hectares (2,251 square miles) with a population for year 2009 (164.900 people).

Temerloh district consists of ten sub-districts, which is *Mukim Sanggang, Mukim Jenderak, Mukim Songgang, Mukim Perak, Mukim Lebak, Mukim Songsang II, Mukim Lipat Kajang, Mukim Mentakab, Mukim Perak II and Mukim Kerbau*. Temerloh district was created on July 1, 1889 with the FY Wise was appointed as Collector and Referees' first. Then the position was changed to 'District Officer' and W.L. JI. be the first to Temerloh District Officer District Officer from 1898 to date, the 67th is Dato' Hj. Rates Bin Abdul Rahman. Given its position in the middle of the peninsula, they called "Middle Point Peninsula" for nickname this area (Temerloh District and Land Office, 2015).

This objective of study identifies the level of viscosity of the people were facing a huge flood in 2014/2015 which have an impact on their quality of life. Using qualitative methods, things in the study are (i) identify the social resilience of the most important in the community of the questionnaire (ii) make an assessment of indicators through interviews with the leaders of the village that their villages affected by the floods and the relevance of the indicator from researchers before the (iii) classify this indicator for each phase of the disaster cycle. Results of the study give the see social security in order to enhance consistency in the community gradually during the floods.

In 2014, Malaysia has faced severe flooding and one of the states involved is Pahang. The study focuses in Temerloh, Pahang. According to the Department of Irrigation and Drainage (DID) infrastructure in estimated losses experienced in Temerloh on the flood in 2014 was RM 144,531,940.00. It involves schools, mosques, roads, electricity poles and so on. Temerloh district was the worst affected by the floods in 2014. Some of the worst affected districts in the Temerloh district is Mukim Perak I, Mukim Stork, Mukim Sanggang II, Mukim Reverse, Mukim Mentakab I,

Mukim Lebak, Kerdau Reuters, Reuters Lipat Kajang Mukim Sanggang I, Mukim Jenderak I, II and Reuters Jenderak Mentakab II. Flood in Temerloh District takes eight to ten days to subside. In addition, there is the case of two houses were washed away by floods in Kampung aftermath, Temerloh. Non-Governmental Organisations (NGO) has donated two tent while, the government has built two new houses for them (DID Report, 2015).

Pahang River is the main river that drained from Kuala Tahan to Kuala Pahang as far as 320 km, creeks flowing into a Pahang river in northern Kuala Tahan while Semantan river adjoining the Pahang river in Temerloh, Pahang. Figure 3 shows the Pahang river long profile. Kuala Tahan area which is part of the Forest Reserve National Park provides a large catchment area for the Pahang state with a height of 2000 meters.

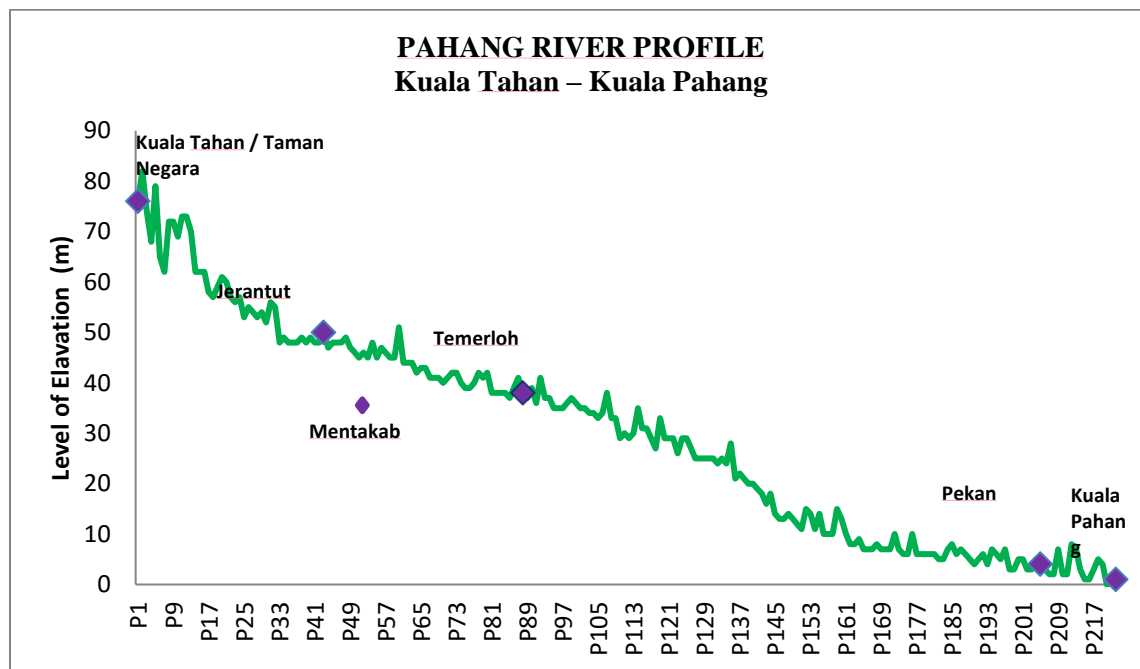


Figure 3: Pahang River Profile from Kuala Tahan to Kuala Pahang

Source: Shahrudin Idrus et al. (2015)

Figure 4 shows the flooding that has occurred in the state of Pahang, starting from 1954 until 2015 for 61 years. According to Figure 4, there are four levels of flooding acquired the level of the (risk), level two (danger), level three (disaster) and level four (catastrophe). The scale of the state by Idrus et al. (20015), according to him this scale is set according to the level and scale of the magnitude of the empirical data. Through the record floods in Pahang has worsened since the beginning of the 1980s. Whenever flooding flood level in stage 3 of the disaster category. If seen in the 1980s, the floods are the effects of opening up new areas for rubber and oil palm by FELDA and FELCRA to help people -people Malay especially for a piece of land to work. In 2014 and 2015, after more than 40 years of rubber and oil palm cultivation was redone by the FELDA, FELCRA and individuals for nearly simultaneously led to the open ground and exposed to water runoff. Furthermore the number of exceptional monsoon rains have caused the fall in the rate of runoff water and cannot be accommodated by the rivers in the vicinity. As such, the shallow river

conditions and the existence of small islands in the middle of the river to prevent the flow of water to the sea (Idrus et al., (2015).

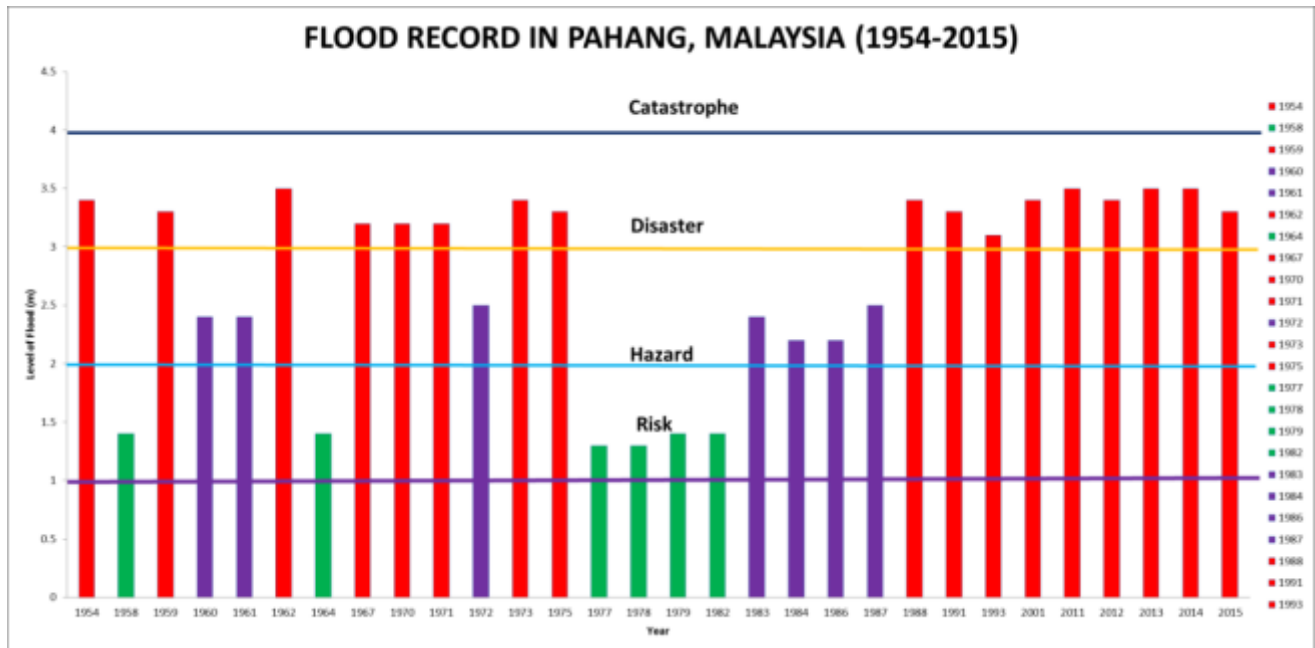


Figure 4: Flood Record in Pahang, Malaysia from 1964 until 2015
 Source: Idrus, (2015)

Data Collection

The methodology used to obtain data is through using a questionnaire survey conducted for the flood victims in Temerloh. Information obtained from the questionnaires were analysed for indicator to the indicator associated with that obtained in the study of literature. The information in the previous studies used to see the strengths and weaknesses of the resilience of the population in the Temreloh area for the flood. Questionnaire in circulation using simple random technique. Identifying the villages worst affected by flooding in the sub district. Questionnaire in circulation formal, house to house. The literature review was used to check out what previous studies have determined the guidance of social resilience in communities. The content of this review are then used to create a relationship with questionnaires done in the field.

Table 2: Indicator dan Resilience are related with the indicator from survey

Indicators	Resilience	Researcher
Sense of Community	(Feeling of belonging to a community or place)	Paten et al. (2001)
Trust	(Trust to neighbourhood)	Enemark (2006)
Community Participation	Involvements in a community	Paton et al. (2001)
Leadership	Leadership within a community	Harland (2005), Hegney (2008)
Community efficacy	Community belief in their own capabilities of performing and completing jobs	Paton et al. (2001)
Social Cohesion	Community willingness to cooperate with each other	Paton (2001)
Community involvement Improvisation refers to creativity and ingenuity	Involvements in community Community creativity and innovative to devise a solution for enhancing resilience	Clauss-Ehlers & Levi (2002) Lalonde & Forgette (2011) dan Boening (2001)
Innovation	Innovative to devise a solution for building and enhancing resilience	Demchak (2006)

Source: Modified from Sanaz Khalili et al. (2015)

Result and Discussion

The data analysis was made using Statistic Package of Social Science (SPSS) to generate frequency each indicator selected through a survey that was carried out. This approach aims to see the percentage obtained by reference to four key indicators. Among these indicators is the Past Experience, Effectiveness of Information, Actions Taken During the Flooding and The Action Taken After the Flood.

Indicator I: Past Experience

Through this one indicator, it includes experience flooding population within 1 year and experience a flood of people before the year 2014 (Fig. 5). The results obtained showed that the majority of the population in Temerloh have as much experience as one of the worst floods like in 2014. As much as 90 per cent (%) of the population tops times faced severe flooding.

Moreover, the experience in dealing with the flood before 2014, 71% had a flood (Fig. 6). For them in 2014 was the most severe floods. If viewed as an indicator of past experience this,

even though they never received floods before, but they still live in the area. This shows the population density is high because they are able to survive to receive disaster. As stated by the Patent et al. (2001), which is classed indicator involves the action of the community because they have power density affect feelings and piercings in places. Involve love in their area cause they feel pity to leave the place even had braved floods every year. Indicator of trust by Enemark (2006), is related with the research because trust is importance thing in community to get the information. With trust, we can do anything together and can help each other.

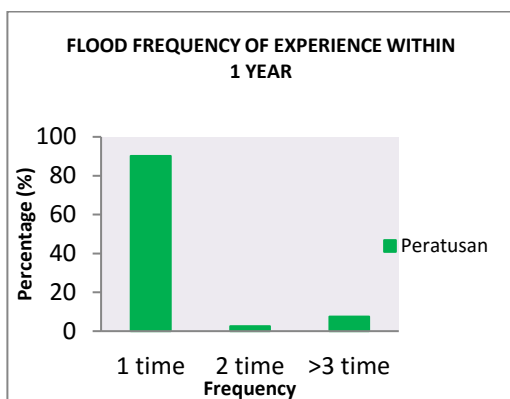


Figure 5: Flood Frequency of Experience within 1 Year Before 2014

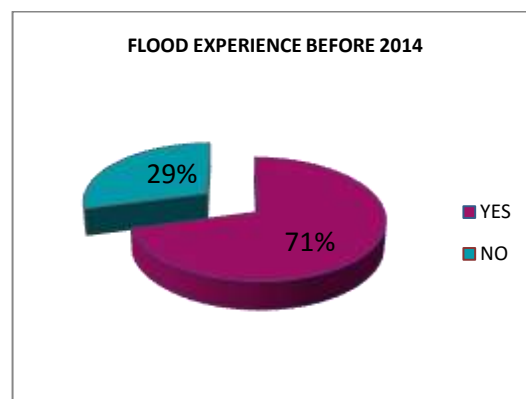


Figure 6: Flood Experience

Indicator II: Effectiveness of Information

For an indicator to two of delivery the information it includes questions of early warning, alert types received, action taken during the left and total time taken before taking action. Through this issue, the results obtained can show the effectiveness of the delivery of information to the public to control the safety of the victim. The resilience of the view refers to the acceptance of the delivery of information whether they receive and take action or they did not manage to receive information led them to continue living in the house without making any action. Through this, we can detect the factors that cause the victim may face flooding or otherwise.

Through the figure 7, it shows the percentage of victims receive early warnings about the flood. Results showed that 69% of victims receive early warning of disasters. If you look at the scores obtained indicate the population is sensitive to the environment, aspects of high resilience because they are always ready to receive information. The type of information that they obtain the majority of the television or radio. It shows social media is the primary target population for early warning information (fig.8). A total of 50% of the population get early warning from television, 25.2% of the authorities, 24.8% of benchmark flood, 19.8% of insights and 1.5% of the siren. Actions taken by the people were when they receive an early warning is immediately moved (fig. 9). This is what most abounded do that is by 81.2% while the rest of them prefer action items on high (15.3%), contact family members in advance (2.5%). Waiting for the rescue team arrived to move (0.5%) and other forms (0.5%). The time taken to move their most urgent category is immediately by less than one hour (Fig.10). A total of 75.5% of victims continues to move when getting an early warning and for a period of seven to 24 hours was 2.0%. From the results obtained, the action moved to immediately show the resilience in them is high as willing

to leave for safety. They are concerned with accumulating life of wealth even though they know it will suffer huge losses.

According to Paton et al. (2001), Harland (2005) and Hegney (2008), they said the involvement of communities and leadership to be an indicator of resilience. This is because if the relationship in a community and work together it will affect future events. The flood disaster is a disaster who need the help and support of local communities. Therefore, a good relationship between the community and local leaders can give strength and spirit to the victim to take appropriate action when faced with disaster.

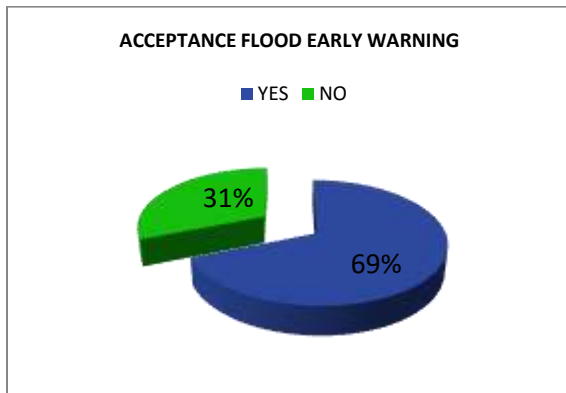


Figure 7: Acceptance Flood Early Warning

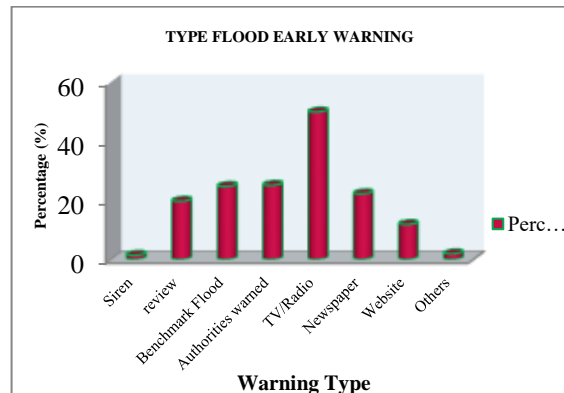


Figure 8: Type Flood Early Warning

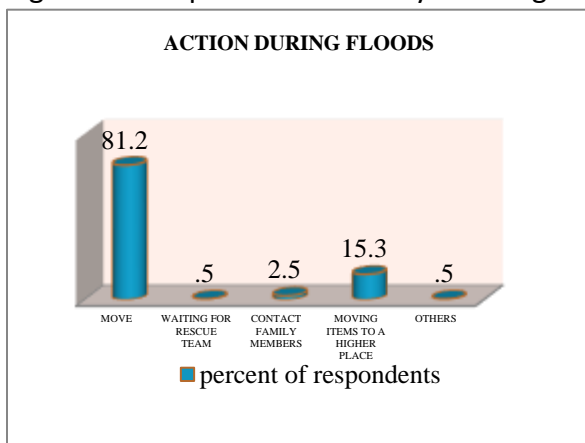


Figure 9: Action During Floods

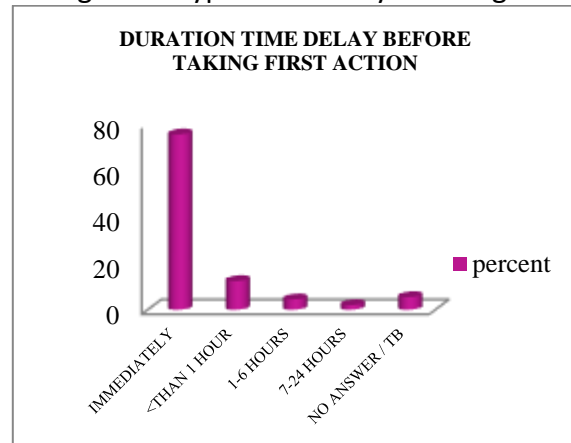


Figure 10: Duration Time Delay Before Taking First Action

Indicator III: Actions Taken During the Flooding

Through the questionnaire, the actions taken residents during flooding involves the transfer of knowledge about the place and type of transfer. Figure 11 show that 95% of people know where to move when floods. A total of 77.7% of victims in Temerloh moved in the transfer while a total of 13.4% moved to their relatives and 8.9% in other places.

In this indicator, it can relate to the indicator by Paton et al. (2001), Paton (2006) and Clauss-Ehlers. They stated that there should be an indicator to improve the effectiveness of

community resilience, social cohesion and community involvement. The aim, when a community is confident with the organization that manages it facilitates working party responsible for helping the flood victims. Unity and good relations can give positive assurance to cooperate in implementing the tasks in the time of emergency. Its impact can facilitate both sides to resolve the issue when the time is difficult.

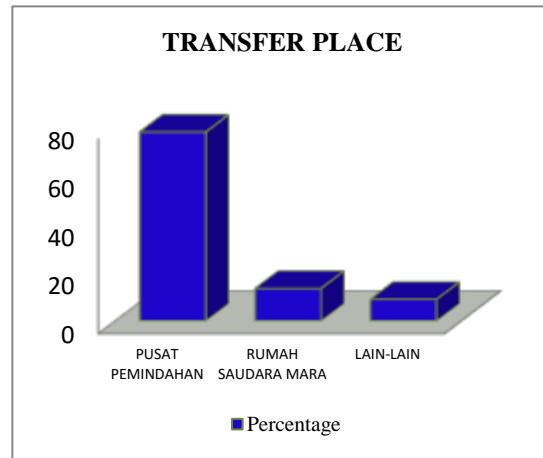
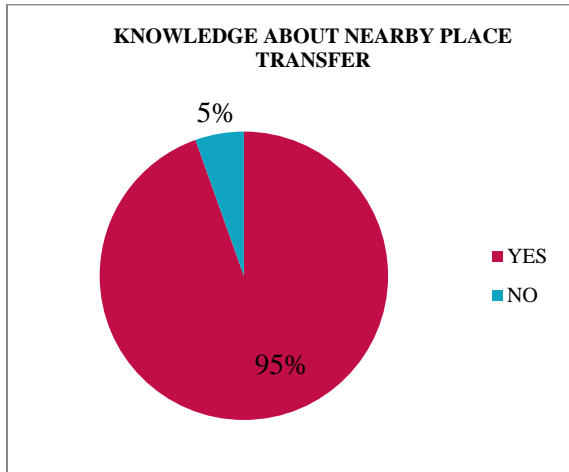


Figure 11: Knowledge About Nearby Transfer Place Figure 12: Transfer Place

Indicator IV: The Action Taken After the Flood

For the people were affected by the floods majority of them are still high in the old house. Their resilience very high power because they are willing to start a new life in the same place despite the need to rebuild a new life for any losses they have suffered. According to the figure 13, a total of 87.6% of victims in Temerloh choose to continue to live in their old homes while the rest chose to move (2%) and is moving (2%). However, some are still not sure to stay or move, namely by 8.4%.

Through the results of this survey, it can be associated with indicators by Lalonde & Forgette (2001), the enhancements that referring creativity and the innovation as well as by Demchak (2006) . They state that the creative and innovative community can make decisions wisely and resilience. Intelligent and innovative to devise a solution for building and enhancing resilience.

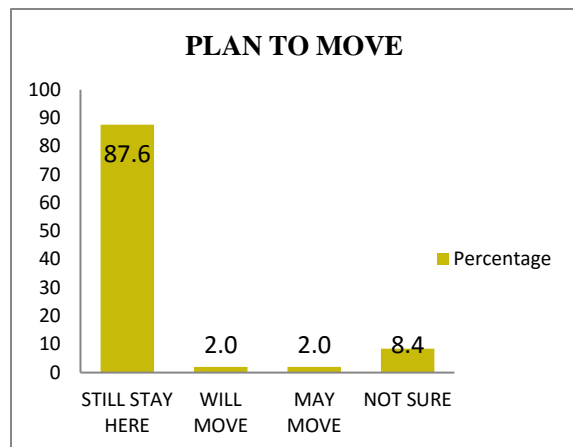


Figure 13: Plan to Move

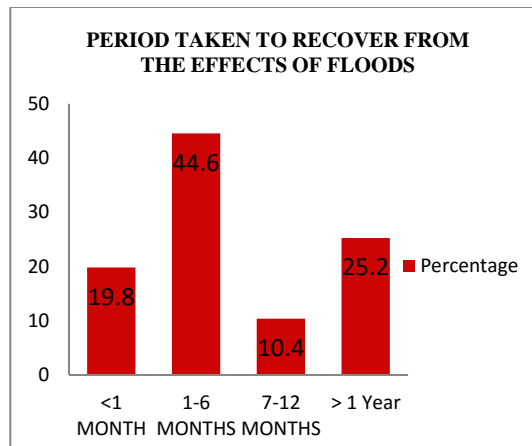


Figure 14: Period Taken to recover from the effects of Floods

Conclusion

The resilience construct has been studied in numerous contexts and from various disciplinary perspectives. Based on result made, that resilience pertains to the ability of a system to sustain itself through adaptation and occasional transformation. It means, the resilient communities learn to cope with adapt to and shape change. Through this concept, it demonstrates the resilience of the community and can be a guide for those who want to apply it in life when receiving all the influential changes equally and indirectly. The results can be taken action, observed and measured the strengths and weaknesses of each community endeavouring to find solutions.

The study emphasizes the relationship between various sources and ecological resilience and the community should be explored to see the system's dependence on earth ecosystems. The survival in the community is to track and strengthen their position when there is a change in our lives. On behalf of the government, its resilience is important for them to implement policies to preserve life in society. For example, it can be used by the Forest Service in the use of information to differentiate the best way to implement changes in forest policies that will affect the community. By the resilience of the community influences the ability to successfully resist the reaction and make them more confident in social skills, so people can develop strategies to recover from changes.

Through the results of the study showed, the resilience of the community residents in Temerloh, Pahang is high. This is because, even though in 2014 they received a great flood of the year before, but the victims still want to stay in their original homes. This community still dare to rise again to resume their lives even though not in its original condition. They have to incur a loss, but they still did not give up. Their spirit has been revealed, a community in Temerloh, Pahang has the resilience to high power. Factors that encourage them to remain in situ influenced by their past experience and attitude consistency there. They are willing to face disaster in the face. There is a plan to remove terms such losses would reduce the impact of raising the house, build a wall and so on. It shows they are trying to improve the quality of their powered on.

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