European Proceedings of
Social and Behavioural Sciences
EpSBS

www.europeanproceedings.com
e-ISSN: 2357-1330

DOI: 10.15405/epsbs.2020.10.02.45

ICH 2019
International Conference on Humanities

COMMUNITY RESILIENCE BUILDING IN THE AFTERMATH OF FLOOD DISASTER

Norsyuhada Anua (a)*, Chan Ngai Weng (b)
*Corresponding author

(a) School of Humanities, Geography Department, University Science of Malaysia, Penang 11800, Malaysia, norsyuhadaanua@yahoo.com
(b) School of Humanities, Geography Department, University Science of Malaysia, Penang 11800, Malaysia, nwchan1@gmail.com

Abstract

In the world, natural disasters are unpredictable, but communities can reduce the threat if they are prepared in advance. Increasing community resilience has been identified as a key component of disaster management, risk reduction and vulnerability reduction efforts. Flooding in Malaysia is a serious threat to communities and livelihoods. Enhancing community resilience is the key to reducing exposure to flood hazards. The main objectives of this study are (1) to identify the vulnerability of communities to floods, and (2) to study how communities can build resilience against floods. The methodology involves a quantitative questionnaire survey of a sample of 100 households, selected through random sampling technique. Qualitative in-depth interviews were also used for selected households. The findings revealed that victims who are experienced are better prepared as they use a complete preparation procedure, evacuate earlier before the flood water level rises, have adequate emergency money-savings, build or modify their house into a floating house (raft house) and other flood-proofing methods, and store adequate emergency supplies. These experienced victims have built up their resilience to floods. In contrast, victims who are inexperienced do not practice these strategies and are therefore highly vulnerable. In conclusion, this study recommends building flood victims' individual resilience as well as improvement in social, economic, institutional and physical resilience of communities through preparedness, awareness, and adaptation to face floods.

2357-1330 © 2020 Published by European Publisher.

Keywords: Resilience, vulnerability, preparedness, disaster management.

This is an Open Access article distributed under the terms of the Creative Commons Attribution-Noncommercial 4.0 Unported License, permitting all non-commercial use, distribution, and reproduction in any medium, provided the original work is properly cited.

https://doi.org/10.15405/epsbs.2020.10.02.45
Corresponding Author: Norsyuhada Anua
Selection and peer-review under responsibility of the Organizing Committee of the conference
eISSN: 2357-1330

1. Introduction

Flood disaster is among the world's most frequent, damaging types of disasters and uncontrollable natural events, causing a threat to human lives and property and indirectly to the country's economy. Frequent floods can cause damage to property, agriculture, infrastructure and even livelihood. The annual floods in Malaysia have caused the loss of nearly billion dollars.

Floods are anticipated to happen more severely and regularly in the future because of climate change, changes in land use pattern, unplanned and rapid urbanizations, poor watershed management and reduced drainage capacities of rivers due to sedimentation and expansion of impermeable surfaces in urban areas (Chan & Narimah Samat, 2017). The recent frequent occurrence of catastrophic flood shows that Malaysia is not a country as it is supposed to be despite being located outside the 'Pacific Ring of Fire', free of earthquakes, volcanic eruptions, and typhoons, as it still experiences extreme flood disasters. Moreover, Malaysia also experiences other disasters such as droughts, landslides, haze, typhoon and man-made catastrophes (Chan, 2015). Almost every year losses from flood are rising as well as damage to crops and livestock, public structures and properties and interrupting activities (Chan et al., 2002).

1.1. The flood of 2014

Kelantan is one of the flood-prone areas. The floods in Kelantan are mostly caused by substantial precipitation brought by the Northeast Monsoon from November to March of each year. It is sorted as a yearly flood, as happens each year during the Rainstorm season. However, monsoon flood from December 2014 to January 2015 with the heavy rainfall occurred for many days which led to disastrous flooding in every part of the Kelantan state. Floods were preceded by more than a week of continuous rainfall, with intense rainfall from 14 to 19 December 2014; by 17 December, rivers exceeded the danger level. The major flood known as the Yellow Deluge (Bah Kuning) triggered by the muddy flood of water that caused the suspended sediment from the catchment areas to be eroded by rainfall (Wan Ruslan & Tahereh, 2017). The flood had also caused houses to be washed away by unusually strong currents. The floods were considered to be the greatest extreme floods in the history of Malaysia. The table 01 and 02 below shows the great flood at Kelantan and also definition of resilience.

Table 01. The great flood at Kelantan

Great Flood (Year)	The Average Annual Rainfall (Mm/Year)
1926	NA
1967	NA
1971	NA
1983	2,86050
1988	3,163.85
2004	2,492.75

*NA = Not Available
(Source: Department of Drainage and Irrigation Kelantan, 2014)

https://doi.org/10.15405/epsbs.2020.10.02.45
Corresponding Author: Norsyuhada Anua
Selection and peer-review under responsibility of the Organizing Committee of the conference
eISSN: 2357-1330

1.2. Definition of resilience

Table 02. Resilience definition

Definition of resilience	Author
Resilience is the capacity of individuals or populations to cope with external stress and disruption as a result of social, political and environmental change.	Adger (2000)
Resilience is the capacity of rural households to cope, with, adapt to and benefit from floods	Bruijn (2005)
Resilience to natural hazards is a person's ability to cope with or adapt to hazard stress. It includes the planned preparation and spontaneous or premeditated adaptations undertaken in the face of natural hazards, including relief and rescue.	Pelling (2007)
Resilience is the ability to withstand any discomfort while preserving the level of efficiency of its social, cultural, physical and environmental components.	Balica & Wright (2010)

2. Problem Statement

The main issues in this study are that flood victims are often vulnerable in the face of floods. Despite the annual floods that hit the state of Kelantan, most of the victims do not learn any lesson from past events. Vulnerable flood victims are often too attached to the ancestral culture; they know they are threatened but do not want to act (Chan, 1997). This led them to experience severe flooding. Residents also took a long time to recover from the flood.

3. Research Questions

These case studies seek to answer the following research question;

1) Are the victims vulnerable to the floods?

2) How can the communities build up their resilience against the floods?

4. Purpose of the Study

The fieldwork on which this paper is based on was carried in Kuala Krai which is in small village called Kampung Manek Urai Lama. Using the case study approach, this study explores the concept of resilience with participants by talking to them about their understanding and experiences of how to overcome the problems in the aftermath of flood disasters. Hence, this paper will focus to examine the vulnerability of communities to floods and study how the communities can build up their resilience against the flood.

5. Research Methods

5.1. Study Area

This study was conducted in Kampung Manek Urai Lama, Kuala Krai, Kelantan, located in the Olak Jeram district between 5 ° 22 ' 47.9"N and 102 ° 14 ' 38.6"E. Manek urai is a small town in Kelantan, about 25 kilometers away from Kuala Krai. Kampung Manek Urai Lama was the area with the highest total losses during the floods in in December 2014 where the flood reaches up to 6-10 meters. The floods in 2014 were the most severe as the continuous 6-day rainfall period led to clashes between the Lebir River and Galas River. This situation made water to overflow in the Kuala Krai, Gua Musang, and Dabong. As a result, the

https://doi.org/10.15405/epsbs.2020.10.02.45
Corresponding Author: Norsyuhada Anua
Selection and peer-review under responsibility of the Organizing Committee of the conference
eISSN: 2357-1330

economic situation in Manek Urai completely affected and most of the main roads were all closed to all light vehicles. The flood had also washed away houses due to the unusually strong current. Figure 01 below shows the maps of Manek Urai, Kuala Krai.

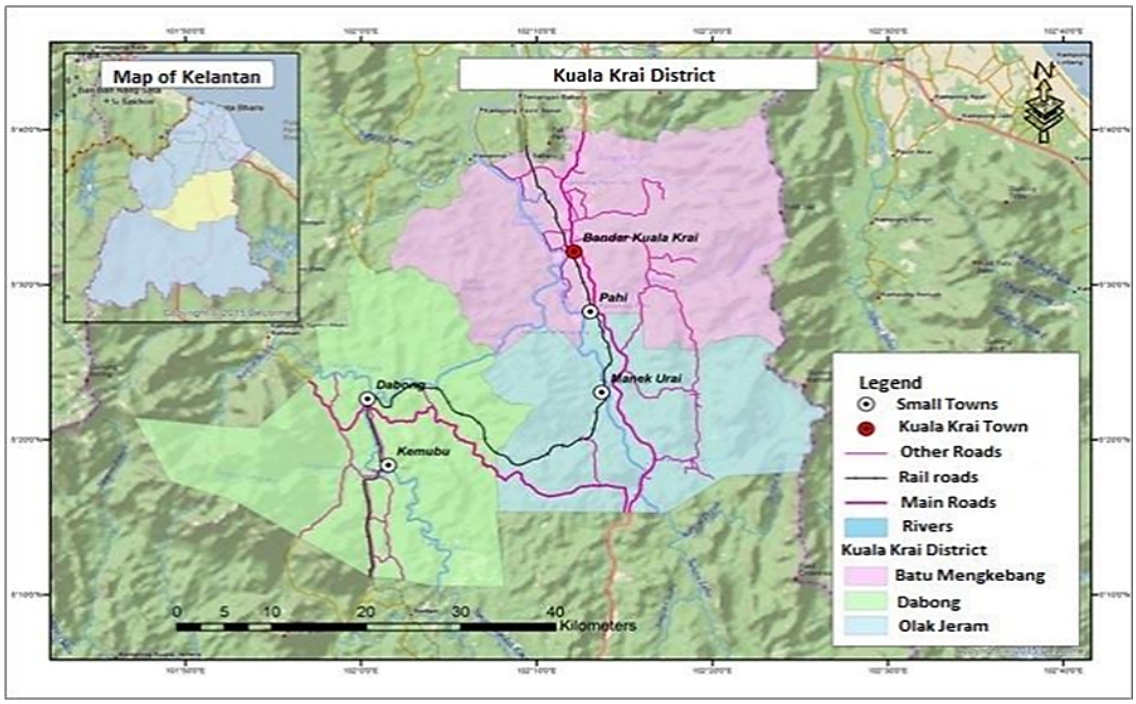

Figure 01. Maps of Manek Urai, Kuala Krai

5.2. Sampling

The participant target population is made up of victims hit by floods in Kelantan. A total of 100 households from Kampung Manek Urai Lama who were interviewed via a designed questionnaire. The selected sample was prepared according to the procedure used by (Krejcie & Morgan, 1970). The sample size was chosen because at Manek Urai Kuala Krai population are 11,697 peoples (Department of Statistics, 2010). The table 03 was proposed to select respondents who were high population areas. In addition, the table suggested 96 sample but researchers added 100 samples for these study areas and also the acceptable margin error was ± 10%. In addition, researchers provided detailed information regarding the purpose and the procedures of this study and only willing respondents were taken. Researchers excluded respondents who refused to take part in the study for various reasons. The simple random sampling was used in this study for the selection of the respondents. The selected sample tables of size population as below;

Table 03. Selected sample tables

Acceptable Margin of Error	Size of population					
	Large	5000	2500	1000	500	200
± 20%	24	24	24	23	23	22
± 15%	43	42	42	41	39	22
± 10%	96	94	93	88	81	65
± 7.5%	171	165	160	146	127	92
± 5%	384	357	333	278	217	132

https://doi.org/10.15405/epsbs.2020.10.02.45
Corresponding Author: Norsyuhada Anua
Selection and peer-review under responsibility of the Organizing Committee of the conference
eISSN: 2357-1330

5.3. Data collection

Data collection was directed for a time of a quarter of a year from January to March 2018.The study adopted a mixed-method methodology for the methodology. Mixed methods look into speaks to examine including the assortment, examination and understanding of quantitative and subjective information in a solitary report or in a progression of studies which explore the equivalent hidden wonder (Leech, 2008).

Both primary and secondary was gathered for study purposes. The secondary data used in this study are books, report and research articles. Primary data were obtained through a questionnaire. A detailed questionnaire was set up for the study area households, which included inquiries concerning the financial and demographic characteristics of the respondents. Qualitative in-depth interviews have also been used for chosen households. A self-reported questionnaire was administered, and the researcher read all the things to the respondents. Respondents were then allowed the chance to peruse the things all alone before rounding out their reactions under the direction of the researcher. Participants were informed that the questionnaire was not an appraisal and that there were no right or inaccurate answers and that they ought to react honestly. On average, the completion of a single questionnaire took at least 10-20 minutes.

Essential information were entered in the Statistical Package for Social Sciences (SPSS) Version 22 for handling and investigation of information, including data input, screening, demographic profiling and generative descriptive statistics. Descriptive statistics were used to calculate the percentage of socio-economic profiles for households.

6. Findings

The result of this study show that a gender balance was achieved as an almost equally balanced number of male and female respondents were surveyed (Table 04). The table also showed the socio-demographic characteristics of the respondents (n=100). The sample also showed a good balance of age groups, although slightly more respondents were in their 60s and above. The distribution of educational levels of the respondents was also quite well balanced. Socio-demographic characteristics of 100 respondents who were participated in the study with eligibility criteria are presented in Table 04. Most of them (49.0 %) were female and 51.0% are male. Participants are victims of the great flood in 2014 and most of them experienced it. Majority of the participants were aged 60 and above (41.0%) and had different levels of education. The highest educational qualifications were MCE/SPM/STPM 34.0% and a few of them had a university education and others.

Table 04. Socio-demographic of the respondents (n=100)

Variables	Sample n (%)
Gender	
Female	49 (49.0)
Male	51 (51.0)
Age (years):	
20-29	4 (4.0)
30-39	16 (16.0)
40-49	17 (17.0)
50-59	22 (22.0)
60 and above	41 (41.0)

https://doi.org/10.15405/epsbs.2020.10.02.45
Corresponding Author: Norsyuhada Anua
Selection and peer-review under responsibility of the Organizing Committee of the conference
eISSN: 2357-1330

Level of education:	
Primary School	18 (18.0)
LCE/SRP/PMR	30 (30.0)
MCE/SPM/STPM	34 (34.0)
Diploma/Degree	6 (6.0)
None	12 (12.0

Table 05 represented the time taken to evacuate the victims of the flood. The table showed the vulnerability of the flood victims to the flood disasters. Most people in Kelantan have already adapted to the flood and often they do not move early because they do not anticipate the level of floodwater to rise. But in 2014 the flood levels were so high and unpredictable. At that time, the residents of Kelantan were much panicked and evacuate after very high water levels. The victims could not save their belongings. In addition, the rescue, and aid missions of the department and agencies could not enter their settlements due to the deep and intense water levels. People evacuated within 24 hours (n=24) 24.0% and others within 6 hours 3.0% and 8 hours 3.0%. The results show that the majority of people waited for the water level to rise before evacuating 70.0 %. Despite the dangers of floods that occur annually in Kelantan, the residents know that their homes will be flooded, but they do not easily move to other areas even when the water level has reached their stairs. This situation becomes more difficult and tiring when the flood victims are only willing to move when the floods become worse (Mohd Zulhafiz Said et al, 2013). Figure 02 shows a victim on the rooftop waving at a rescue boat. In addition, most householders declined to evacuate to other locations earlier because of fear of losing their belongings. Respondents described:

> *"We didn't want to move earlier because before this the water level was just near the stairs and every year when flood coming to our sons will stay in the house to guard off the belongings". After the water level rises to the ceiling they will go up to the roof to ask for help from the rescue boat.*

Table 05. Time taken to evacuate

Time to evacuate	**Number of respondents (%)**
6 hours	3 (3.0)
8 hours	3 (3.0)
Within 24hours	24 (24.0)
Wait for the water level to rise	70 (70.0)

Figure 02. A picture shows a victim (blue circled) on the rooftop waving at a rescue boat

https://doi.org/10.15405/epsbs.2020.10.02.45
Corresponding Author: Norsyuhada Anua
Selection and peer-review under responsibility of the Organizing Committee of the conference
eISSN: 2357-1330

Results of the field survey revealed that the victims took a long period to recover from the flood. Table 06 shows the duration of the victims to recover from the flood disaster in December 2014. The percentage of duration: 5 months, 10 months and 1 year were 2.0% and 4.0% was also low than the years above. Majority of the households from the research study were too close to the flood-prone river. The result shows that a large majority of 92.0% of victims took more than 1 year to recover from the flood. This happens because of vulnerable residents that cannot recover fast. Most of the victims came from a poor family, and this made them too fragile for rehabilitation from the flood. Poverty in the study area makes them vulnerable to flooding. Low-income residents living in the city may be disqualified because their placement is in a threatened area which tends to be destroyed when disasters such as floods, storms and wavy sea occur (The World Bank, 2010). Communities in rural areas do not have access to the information they need to deal with flood hazards. In an interview one of the respondents lamented her experiences during the recovery period as follows;

> *"I lived in a tent for almost a year waiting for a government house. I felt sorry for the kids because they are so young and it is cold when it rains. I think this is a test from God to us. I keep up praying to God for the strengthening of life".*

Table 06. Duration of recovery from flood

Months/Year	Number of respondents (%)
5 Months	2 (2.0%)
10 Months	2 (2.0%)
1 year	4 (4.0)

Table 07. Domain indicator of community resilience buildings

Indicator	Agreement scale percentage (%)					
	Strongly agree	Agree	Neutral	Disagree	Strongly agree	TOTAL
Economic resilience						
Had multiple livelihood source	80.0	18.0	1.0	1.0	1.0	100.0
Have savings in case of emergency	73.0	23.0	0.0	2.0	1.0	100.0
Physical resilience						
Build a raft house	76.0	18.0	6.0	0.0	0.0	100.0
Place of relocation in a higher area	65.0	30.0	0.0	0.0	0.0	100.0
Community competence						
Social networking's	90.0	8.0	1.0	1.0	0.0	100.0
Boat handling skills	70.0	25.0	4.0	1.0	0.0	100.0
Institutional resilience						
Flood warning	76.0	23.0	0.0	0.0	1.0	100.0
Resilient knowledge in school	91.0	7.0	1.0	1.0	0.0	100.0
Emergency skill	89.0	6.0	5.0	0.0	0.0	100.0

https://doi.org/10.15405/epsbs.2020.10.02.45
Corresponding Author: Norsyuhada Anua
Selection and peer-review under responsibility of the Organizing Committee of the conference
eISSN: 2357-1330

Table 07 reveals the resilience's four sub-components contribute to community resilience. Researchers who use the dominant likert scale for assessing resilience with the domain indicators. We've taken four community resilience indicators including economic, physical, community and physical competency. The economic resilience is significant as it improves family financial limit. The likert scale showed that, in order to increase resilience, people should have several sources of income and savings in emergency situations.

The second one is physical resilience which has two variables. The results show households want to build a safe house for an emergency, especially in monsoon season. They strongly agree to build raft houses to stay when the floodwater rises. Majority of the victims built their houses in the flood-prone areas and could be easily destroyed during flooding.

Community competence has been established to be linked to the strength of networking, the building of relations with neighbours and the strengthening of community ties. In this matter, people should work together to address the many problems caused by the floods, rather than waiting for the authorities to attend to them. According to Mohanty (2006), helping each other during the floods act as a' safety net' and' shock absorbs. Integrating local knowledge of the experience of floods and flood memories with that of' expert knowledge' could help to deepen understanding of the problems faced by local people and to strengthen community resilience (McEwen & Jones, 2012; Mercer et al., 2009). The result shows that social networking and boating skills are critical for saving lives.

Institutional resilience concerns the endeavours of organizations to battle calamities through arranging, mindfulness raising projects and alleviation measures. The entirety factors received a high percentage of strongly agrees. It shows the community wants to learn something. However, in the study sites, most communities in the study area did not receive detailed flood warnings. Often the flood warning to the people of Kelantan is spread only by the head of the village. However, although they received flood warnings, the community culture ignored the warning because it was adapted to the flood. Residents in the flood-prone area will only move if they feel they are in danger and when the water level starts entering their home. Hence, the organizations should therefore play a strong role in effective flood protection initiatives at this study site.

7. Conclusion

Disaster is a collective and intersecting process and event when all the important things like economic, environmental, social, technology, political and technological transpiring over a varying length of time (Oliver-Smith, 1998). This concept can be applied to flood resilience. With examples like those discussed in this paper, there are many indicators that can strengthen community resilience and sustainability. Along these lines, the consequences of this study show that the network flexibility has been affected by versatility pointers, for example, social, financial, infrastructural/ natural institutional, and psychological and network capability between connections. These indicators have been found to be useful in assessing community resilience in an integrated manner and in the formulation of a framework of the concept of community resilience.

This study has found that the study sites are vulnerable to flood disasters but they are strongly making effort to combat the flood in the future. Communities need to learn from past floods in order to

increase resilience in these areas and therefore diminish the effect of future flood disasters. For additional exploration, this study recommends building the individual resilience of flood victims as well as improving the social, financial, institutional and physical flexibility of networks through readiness, mindfulness and adaptation to confront floods.

Acknowledgments

We thank all 100 respondents who participated in this research project and to School of Humanities for funding authors for present this paper at conference. Researcher also would like to thank for research grant under "Modelling the Fundamental Aspects of Community Flood Vulnerability, Adaptation and Resilience towards Climate Change in Kelantan, Malaysia", 203. PHUMANITI.6711693.

References

Adger, W. N. (2000). Social and Ecological Resilience: Are They Related? *Progress in Human Geography, 24*(3), 347-364. https://doi.org/10.1191/030913200701540465

Balica, S., & Wright, N. (2010). Reducing the Complexity of the Flood Vulnerability Index. *Environment Hazards, 9*(4), 321-339.

Bruijn, D. K. (2005). Resilience and Flood Risk Management. A Systems Approach Applied to Lowland Rivers: Delft University of Technology.

Chan, N. W. (1997). "Warnings in the Context of Flood Hazard in Malaysia". In Handmer, J. (1997). Flood Warning Issues and Practice in Total System Design. Flood Hazard Research Centre: Middlesex University.

Chan, N. W., Ibrahim, A. L., Yusoff, R., & Ismail, N. A. (2002). The significance of stress and other intangible losses during major flood disasters in Malaysia. Disaster management: Strengthening the national security capabilities, 160-173.

Chan, N. W. (2015). Impacts of Disasters and Disaster Risk Management in Malaysia: The Case of Floods. In D. P. Aldrige, S. Oum, & Y. Sawada (Eds.), Resilience and Recovery in Asian Disasters, Risks, Governance, and Society (pp. 239-265). Springer (e-Book). https://doi.org/10.1007/978-4-431-55022-8_12

Chan, N. W., & Narimah, S. (2017). Reducing Flood Hazards for Overall Flood Loss Reduction towards Alleviating Poverty of Flood Victims in Kelantan State, Malaysia. Proceedings in 3rd Ruhuna University International Conference on Humanities and Social Sciences di University of Ruhuna, Sri Lanka.

Department of Statistics. (2010). Population and Demography. Retrieved on 2019, November 11, from https://www.dosm.gov.my/v1/index.php?r=column/ctwoByCat&parent_id=115&menu_id=L0pheU43NWJwRWVSZklWdzQ4TlhUUT09

Department of Drainage and Irrigation. (2014). Laporan Banjir Tahun 2014/2015 [Annual Flood Report 2014/2015]. Water Resources and Hydrology Section, Kelantan.

Krejcie, R. V., & Morgan, D. W. (1970). Determining Sample Size for Research Activities. *Educational and Psychological Measurement, 30*, 607-610. https://doi.org/10.1177/001316447003000308

Leech, N. O. A. (2008). A Typology of Mixed Methods Research Designs, Quality, and Quantity, 43(2), 265-27.

Mohd, Z. S, Salfarina, A. G., & Abd, M. A. A. (2013). Menangani Masalah Banjir di Daerah Padang Terap, Kedah: Analisis Persepsi dan Tindakan Pemimpin Masyarakat Tempatan [Addressing Flood Problems in Padang Terap District, Kedah: Perception Analysis and Action by Local Society Leaders]. *Malaysia Journal of Society and Space, 9*(4), 142-149.

Mohanty, M. (2006). Urban Squatters, the Informal Sector and Livelihood Strategies of the Poor in Fiji Islands. *Development Bulletin* 70, 65-80. http://repository.usp.ac.fj/id/eprint/3952

https://doi.org/10.15405/epsbs.2020.10.02.45
Corresponding Author: Norsyuhada Anua
Selection and peer-review under responsibility of the Organizing Committee of the conference
eISSN: 2357-1330

Mercer, J., Kelman, I., Taranis, L., & Suchet-Pearson, S. (2009) Framework for Integrating Indigenous and Scientific Knowledge for Disaster Risk Reduction. *Disasters, 34*(1), 214-239.

McEwen, L., & Jones, O. (2012). Building local/lay flood knowledges into community flood resilience planning after the July 2007 floods, Gloucestershire, UK. *Hydrology Research, 45*(5), 675-688.

Oliver-Smith, A. (1998). Global changes and the definition of disaster. In Quarantelli, E. L. (Ed.), *What is a Disaster? Perspectives on the Question*. Routledge.

Pelling, M. (2007). Learning from others: the scope and challenges for participatory disaster risk assessment. *Disasters, 31*(4), 373-385. https://doi.org/10.1111/j.1467-7717.2007.01014.x

The World Bank. (2010). The World Bank Annual Report 2010, Year in Review. Professional Graphics Co: United States.