



**DISASTER RISK MANAGEMENT FOR COMMUNITY
RESILIENCE IN LEMBAH BERTAM, CAMERON
HIGHLAND**

BY

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**A thesis submitted in fulfilment of the requirement for the
degree of Master of Science (Built Environment)**

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MAY 2019

ABSTRACT

Recent attentions of disaster-response professionals, government officials and academics are turning from disaster vulnerability towards disaster resilience. The current approach measures are focusing on the preferred way to help communities to help themselves as part of community engagement with natural hazard reduction. The increasing rate of natural disasters in Lembah Bertam have pointed out the vulnerability of community and the lack of proactive measures to eliminate or mitigate the impact of disasters. The area was heavily affected during the flood in 2013 and 2014 when water was released from nearby hydroelectric dam due to rapid water increase in reservoir during heavy downpour. Henceforth, the operation of Disaster Risk Management (DRM) measures in Lembah Bertam are expected to contribute towards cultivating the social resilience so that the adverse impact of natural disasters can be eliminated or mitigated, hence allowing the vulnerable communities to prepare, adapt and responds better towards the disaster impact and pressure. Therefore, the aim of this research is to study the DRM practices in Lembah Bertam for the enhancement of community resilience towards natural disasters. The objectives of this study are (i) to identify the Disaster Risk Management practices in Lembah Bertam based on key measures of DRM, and (ii) to assess the social resilience of community towards disaster using coping and adaptive capacity resilience assessment. The DRM measures of Lembah Bertam were compared with other vulnerable countries while the method used to study community resilience is face-to-face intercept survey questionnaire. The data retrieved determines the characteristics of community resilience for further corrective measures in the future. Descriptive analysis was used to determine the community resilient based on data from the survey. The study claims that under-developed disaster risk management measures lead to weak social coping and adaptive capacity in which have resulted in poor social resilience. The comparison of DRM measures proved that Lembah Bertam is in need of recent and more focused DRM policy and physical implementations. As a result, the findings show that an effective strategy of resilience involves not only the government effort and social infrastructure alone, but also the reliability of physical infrastructure. In developing a better social resilience of community, it is necessary to recognize that people have different vulnerabilities due to their cultural background, ethnicity and other factors that influences their capacity to expect, prepare, response and recover from disasters.

خلاصة البحث

تتحول الانتباه الأخير لمهنيي الاستجابة للكوارث والمسؤولين الحكوميين والأكاديميين من التعرض للكوارث إلى القدرة على مواجهة الكوارث. وتركز مقاربات النهج الحالية على الطريقة المفضلة لمساعدة المجتمعات على مساعدة أنفسهم كجزء من مشاركة المجتمع في الحد من المخاطر الطبيعية. لقد أشار ارتفاع معدل الكوارث الطبيعية في ليمبه بيرتام إلى ضعف المجتمع وعدم وجود تدابير استباقية للقضاء على آثار الكوارث أو تخفيفها. وتأثرت المنطقة بشدة خلال الفيضان في عامي 2013 و 2014 عندما تم إطلاق المياه من السد الكهربائي القريب بسبب الزيادة السريعة في المياه في الخزان أثناء هطول الأمطار الغزيرة. من الآن فصاعداً، من المتوقع أن تساهم إجراءات إدارة مخاطر الكوارث في ليمبا بيرتام في تعزيز المرونة الاجتماعية بحيث يمكن القضاء على الآثار الضارة للكوارث الطبيعية أو تخفيفها، مما يتيح للمجتمعات الضعيفة الاستعداد والتكيف والاستجابة بشكل أفضل نحو تأثير الكارثة والضغط. لذلك، فإن الهدف من هذا البحث هو دراسة ممارسات إدارة الحقوق الرقمية في ليمبه بيرتام لتعزيز مرونة المجتمع تجاه الكوارث الطبيعية. كانت أهداف هذه الدراسة هي: (1) تحديد ممارسات إدارة مخاطر الكوارث في ليمبه بيرتام بناءً على التدابير الرئيسية لإدارة الكوارث، و (2) تقييم المرونة الاجتماعية للمجتمع تجاه الكوارث باستخدام تقييم القدرة على التكيف والتكيف. وتمت مقارنة تدابير إدارة الحقوق الرقمية في ليمبه بيرتام مع البلدان الضعيفة الأخرى في حين أن الطريقة المستخدمة لدراسة مرونة المجتمع هي استبيان مسح اعتراض وجهها لوجه. تحدد البيانات التي يتم استردادها خصائص مرونة المجتمع لاتخاذ المزيد من التدابير التصحيحية في المستقبل. وتم استخدام التحليل الوصفي لتحديد مرونة المجتمع بناءً على بيانات من الاستطلاع. تدعي الدراسة أن تدابير إدارة مخاطر الكوارث غير المتطورة تؤدي إلى ضعف القدرة على التكيف الاجتماعي والقدرة على التكيف والتي أدت إلى ضعف المرونة الاجتماعية. أثبتت مقارنة تدابير إدارة الحقوق الرقمية أن ليمبا بيرتام في حاجة إلى سياسات تدابير إدارة مخاطر الكوارث (د.ر.م.) الحديثة والتطبيقات المادية. ونتيجة لذلك، تبين النتائج أن الاستراتيجية الفعالة للمرونة لا تتضمن فقط الجهود الحكومية والبنية التحتية الاجتماعية وحدها، ولكنها تتعدى إلى موثوقية البنية التحتية المادية. عند تطوير قدرة اجتماعية أفضل على الصمود، من الضروري إدراك أن الناس لديهم نقاط ضعف مختلفة بسبب خلفيتهم الثقافية والعرق والعوامل الأخرى التي تؤثر على قدرتهم على التنبؤ بالكوارث والاستعداد لها والاستجابة لها والتعافي منها.

APPROVAL PAGE

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DECLARATION

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ACKNOWLEDGEMENTS

In the name of Allah, the most gracious and the most merciful. Indeed, there is no action that can be done without the Mercy of Allah s.w.t.

Firstly, I am most thankful and grateful to my main supervisor, Dr. Izawati for providing me full support and encouragement throughout my journey in completing this research. She has been with me through ups and downs while continuously guiding me to explore my study and not to give up.

My sincere thankfulness also goes to my co-supervisor, Dr. Mohd Ramzi Mohd Hussain, for always been a great support system. I am thankful for his willingness in sharing knowledge, opinions, indirectly and directly on uncertainty matters in completing this thesis.

Most importantly, I am grateful to have a very understanding family members who are always there for me to back me up and are always patience with me. My colleagues, who were there along the way, and making sure I successfully complete this journey.

Finally, I wish to express my appreciation and thanks to those who provided their time, effort and support for this project although their names are not mentioned. May the blessings of Allah s.w.t reach to all of these kind helping hands. Once again, we glorify Allah for His endless mercy on us one of which is enabling us to successfully round off the efforts of writing this thesis.

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CHAPTER ONE

INTRODUCTION

1.1 BACKGROUND OF THE STUDY

More than half of global flood are happening in Asia and the source of the disaster are often natural phenomena – heavy rainfalls, high tides, landslides, and also human factors (Tingsanchali, 2012). The fact is that human activities are contributing towards the aggressive occurrences of natural disasters nowadays and among that, flooding disasters have been one of the major known natural disasters in the world. Exploitation of natural resources for economic growth often accompanied by environmental degradation. Since floodplain areas are very fertile and flat enough for agriculture development, an increased number of the population also calls for more land clearing and deforestation for urbanization, hence becoming the reason for less water infiltration and greater flood peak and large runoff. Development of cities in floodplains cuts down the catchment area and blocks floodways, causing the damage to be worse. Problems are becoming more severe when unusual flood event such as 100-year flood and flash flooding are becoming more frequent and severe and is more difficult to predict (Shafie 2007, BadrulHisham et al., 2010).

Flooding disasters is the most devastating natural event with highest economic loss in Malaysia (Diya et al., 2014). With more than 189 river basins covering both Peninsula Malaysia and Sabah Sarawak, 85 of them are prone to flooding. D/iya et al. (2014) also mentions the estimated flood prone area in Malaysia is up to 9% which is approximately 29,800 km² and is affecting at least 4.82 million people, an estimated of 22% of the country's population. Historically, the most significant floods in Malaysia that causes major life and economic loss starts in 1926 known as the “storm forest flood’

followed by several flooding incidences in 1996, 2000, 2004, 2006, 2007, 2008, 2010, 2011, 2012, 2014, 2016 and 2016 throughout the state (Musa Garba Abdullahi, 2014). The 2012 flood incidence in Kelantan which is the La Nina phenomenon was the next major flooding since 1926 flood. This unfortunate event is followed by the 2014 flood in Kelantan, have caused huge impact on both economically and socially (Taib, 2016). Other than that, flooding events are only those of the common flash floods and monsoon floods which is the two main flood categories in Malaysia (DID, 2000a). From the hydrological perspective, the time taken for the river flow to recede to normal level is what differentiate between the two in which monsoon flood can take up to months to recede while flash floods only need a few hours to recover (Taib, 2016; Noorazuan, 2006).

In Malaysia, Lembah Bertam, Cameron Highland is one of the main attractions known for its cool weather and abundant agriculture products which become an attraction for tourists from local and foreign countries. An increased demand for agricultural development led to aggressive land openings for farming and development eventually adds up the total impervious surfaces that contribute toward flood during extensive storm events. Locating within monsoon-climate region, Lembah Bertam area are always expecting the abundant monsoon rain especially in the month of October until February on average. The community are always expecting the monsoon rain that sometimes come with natural disasters within the monsoon season. However, within the last few years, flash (mud) floods and landslides are no longer threatening the community during monsoon season only but also during post-monsoon season when it rains. Although this phenomenon is not a new occurrence, News Straits Time has reported that more than 60 percent of forest reserve have been cleared illegally for more than 14 years. The agriculture exploitation does not seem to be slowing down any

moment soon but becoming more aggressive and gradually filling up even in the steepest slope areas. The natural condition of the forest that helps to take in the monsoon rain is now depleted hence the increase of natural disasters.

Furthermore, ongoing construction development of condos and high rise buildings on the slopes is another contributing factor for this concern. The area also houses Sultan Abu Bakar (SAB) Dam for hydroelectric generation in the upstream of Lembah Bertam. The building of the dam in Lembah Bertam has very much benefit the community for supplying water and electricity, but the construction of mega structure comes with a price. The downstream community are susceptible to dam break or sudden water surge from water being released from the dam, which can easily cause major flooding in a short amount of time.

Thereupon, it became a crucial reason for the stressing of public safety around dams which includes public safety plans and public safety measures for the livelihood of the downstream community. The community are greatly exposed for sudden disaster occurrences whenever abundant rain falls in the area. To make matter worse, the 2013 flood is the first major flood event since 1985 flood which is a 28 years' gap. The younger generations have no flooding experience while the older generations might be too old and have less energy to react immediately towards the disaster.

Presently, the local community are having more exposure towards disasters and indirectly their vulnerability towards disaster also increases. Since Lembah Bertam is one of a popular tourist spots, the danger of local and foreign tourists to get caught up in disasters is most likely to happen. With any disaster occurrences, the mechanism of Disaster Management was placed under National Security Council (MKN) issued by the Prime Ministers Department (JPM). MKN is the National Key Crisis Management Agency and is responsible for coordinating National Disaster Management and for

inaugurating as well as to safeguard all policies of the National Disaster Management Mechanism adhered to and implemented in each disaster management level (Disaster Management Handbook Malaysia). In addition, flood events are specifically monitored and managed under national framework for flood management (Komoo, Aziz, & Lim, 2011).

Since the community are the first responders, they serve as the best liability in disaster risk management effort. Disaster studies and hazard management disciplines has long since, stresses the importance of community's ability and places to cope with both the expected and unexpected, and prepare for disaster events (Cretney, 2016; Buckle, 2006; Manyena; 2006). Ahamed (2013) mentions while it is not possible to prevent natural disasters, protective measures to reduce disaster impacts can be disclosed. Furthermore, Cretney (2016) added that activities led by the pre-existing communities plays a crucial role in aiding integrated response and building of community resilience to disaster events.

1.2 STATEMENT OF THE PROBLEM

With the never ending climate change impacts and increasing rate of natural disasters in the area, there is no "one size fits all" way to do it for disaster risk management. All the effort must be tailored according to the community and context specific (Woolf et al., 2016). In light of this event, disaster resilience has become the "watch-word" in disaster management as promoted by Sendai Framework for Disaster Risk Reduction 2015-2030 (Manyena, 2016). The global disaster management blueprint shifts from hazard awareness in Hyogo Framework of Action (HFA) to resilience enhancement in Sendai Framework. Malaysia is one of the developing country that has adopted HFA in reducing the substantial loss due to disasters through applying the recommendations in

the framework (Komoo et al., 2011). Community-based Disaster Risk Management (CBDRM) is one of the example for DRR effort adopted from the framework that responds to local problems and needs.

UNISDR (2009) depicts CBDRM as the” process of disaster risk management in which at risk communities are actively engaged in the identification, analysis, treatment, monitoring and evaluation of disaster risks in order to reduce their vulnerabilities and enhance their capacities”. (p.35). This effort makes use of local knowledge and expertise, and strengthen both the technical and organizational capacity of community.

Nonetheless, the concept of disaster resilience is still indeterminate since different research groups applied differently according to their understanding. There has been extensive debate to determine the actual conceptual framework for disaster resilience and on how to apply the concept in the planning measures (Woolf et al., 2016; de Bruijne et al., 2010). However, by looking through the perspective of community resilience, Manyena (2016) claims that a consensus for the resilience has been made to focus on the capacity of individual, community, state, or system in order to confront positively with the significant effect of disaster. Community resilience is “*the ability of localized (usually geographically defined areas) to respond, cope and adapt to change through communal actions*” – (Cretney, 2016; Berkes and Ross, 2013; Magis, 2010). Hence, community resilience is built upon the ability of the members of society that shares the same or similar circumstances and was able to work together to overcome challenges thus improving their ability to face challenges. For that reason, enhancing the capacity of community plays a huge role in supporting the mitigation efforts of reducing the impacts of disasters. Furthermore, (coping and adaptive) capacity is one of

the four main measures under disaster management effort (Palliyaguru & Amaratunga, 2008).

Despite that, there has been no critical assessment of community resilience in Lembah Bertam to justify the coping and adaptive capacity measures under the disaster risk management effort. A framework made by Parsons et al (2016) lists the assessment themes to cover on the social and infrastructure part of community resilience in his work of assessing the community resilience in Australia using the ANDRI method. Nonetheless, the assessment of infrastructure resilience would require a new study that focuses the man-made part of the resilience. In response to this matter, there is a need to have a clear identification of disaster management effort in Lembah Bertam in order to have better understanding of the community's social resilience. The study also proposes to assess the social resilience considering the framework of coping and adaptive capacity as one of the measures under disaster risk management.

1.3 RESEARCH AIM

This research aims to study the Disaster Risk Management practices in Lembah Bertam for the enhancement of community resilience towards natural disasters.

1.4 RESEARCH QUESTIONS

1. What are the Disaster Risk Management practices in Lembah Bertam based on Disaster Resilience Framework?
2. What is the social resilience of community towards disaster based on coping and adaptive capacity resilience assessment?

1.5 RESEARCH OBJECTIVES

The objectives in this study are:

1. To identify the Disaster Risk Management practices in Lembah Bertam based on key measures of DRM.
2. To assess the social resilience of community towards disaster in Lembah Bertam using coping and adaptive capacity resilience assessment.

1.6 SCOPES AND LIMITATIONS OF THE STUDY

In this study, the focus is on studying the capacity of the group of people living in disaster-prone highland area. Since highland areas are more vulnerable towards development and interventions, the connectivity from one place to another is limited and they have singular paved road as main path to travel. The facilities are minimal and it consumes longer time to reach.

Based on the problem statement previously, the assessment used in this study is based on the resilience framework created by Parsons that have several themes considering both the tangible and intangible qualities of coping and adaptive capacity. From the six themes listed, the researcher is focusing only on the social qualities that involves human interaction which are the social character resilience, economic capital resilience, information and engagement resilience, and social and community engagement resilience. The remaining themes which are the emergency and planning resilience, and emergency services resilience are not covered in this study but is open for future research. In response towards Hyogo Framework of Action, the research studies the planning and policy of disaster risk management in Malaysia to understand the management for disaster risk reduction. In addition, the assessment of community

resilience is the effort of reflecting the priorities proposed in the Sendai Framework for Disaster Risk Reduction.

There are some limitations or error in the research that could happen in the process of data collection. According to Neuman (2014), error is “*the difference between obtained values and true values*”. The error is somewhat that become one of the limitation in this research. For this study, there are two types of limitations identified which are the definition of resilient community and the limitation of survey questionnaire.

During the process of data collection, the researcher intends to use survey questionnaire and observation method. Nevertheless, it is expected the researcher to face the respective errors in the process of data collection:

1. Nonresponse error specific to a survey item. This type of error happens when certain questions are skipped or ignored by respondents when answering the survey.
2. Measurement errors caused by respondents. The type of error happens when respondents do not listen carefully to the questions and just answer resultantly.
3. Measurement errors caused by interviewer. The interviewer or enumerator could be sloppy in reading questions or recording answers.

1.7 SIGNIFICANCE OF THE STUDY

This study is investigating the disaster risk management practices in Lembah Bertam, Cameron Highland which is a disaster-prone tourist attraction in Malaysia. Since the assessment framework for disaster resilience cover both the tangible and intangible qualities of resilience, this study is focusing on the intangible quality only which is

social resilience. Future studies can be established that further focuses on the tangible qualities of resilience within the Lembah Bertam community.

Another intention in this study is advocating the importance of coping and adaptive capacity from the social resilience perspective. Coping and adaptive capacity is one of the main measures under disaster risk management effort. The remaining measures under disaster risk management are still open for further studies to investigate the practices in the area. Through this study, the possibility of improving the community resilience can be developed in future studies through the gap holes found in the assessment from the resilience framework.

1.8 THESIS STRUCTURE

Every chapter in this thesis is interrelated to one another. The whole research is divided into seven main chapters that describes the details of research starting from the background overview of research until the discussion and conclusion of research.

Chapter 1 is the overview for the whole research purposes in this study. The chapter is to formulate the structure of the study by describing the intention of the research including research background and statement of the problem. The chapter also have the research aim and objectives, as well as the research structure to guide the researcher in conducting the research.

In Chapter 2, it describes the topical background of this study. The chapter provides understanding on related issues and subjects in relevant with the scope of the study. Literature review is the review from other authors that talks about the topic related in this study. It also shows on the magnitude of understanding of researcher in this topic based on readings from different sources such as articles, reports, handbooks and other secondary source of data. The chapter discusses on the two main topic in this

research which are Disaster Risk Management (DRM) and Community Resilient in relation to disaster risk reduction of natural hazards. In addition, this chapter also reviews the framework of disaster resilience that was used to guide resilience assessment in this study.

Chapter 3 elaborates on the methodology undertaken in this study to achieve the objectives. The chapter consist of research design, questionnaire design, procedures for collecting survey, and lastly method for data analysis. This chapter elaborates on exploratory research method approaches in order to achieve the objectives in this study.

Chapter 4 elaborate the findings of DRM in Lembah Bertam as well as the comparison of DRM practices with other disaster prone countries.

Chapter 5 is the result and analysis of survey questionnaire; the quantitative part of the study. The survey was used to assess the remaining four themes under resilience assessment framework which are social character, economic capital, information and engagement, and lastly the social and community engagement.

Lastly, Chapter 6 is the discussion of findings from the data collection whether the study is able to achieve the objectives. This chapter presents the synthesis and the overall summary from the findings. This chapter also presents the conclusion and recommendation in this study.

1.9 CHAPTER SUMMARY

To sum up, this chapter provided the foundation throughout the entire chapter in this study. This chapter summarizes the motive, aim and objective as well as the topical background in this study to guide the researcher in conducting the research. The main key points have been highlighted and details will be further detailed in each chapters accordingly.