



THE IMPACTS OF TSUNAMI ON THE AFFECTED
COMMUNITY: KOTA KUALA MUDA, KEDAH

BY

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ABSTRACT

The tsunami of December 2004 was one of the most devastating tragedies ever occurred. Approximately 250,000 lives perished, millions injured and suffered. The destructions to property could not be accurately estimated. The impact of the tsunami on the environment shows that damage was inflicted on natural resources such as coral reefs, mangroves and other coastal ecosystems that acted as wave defence barriers. Moreover, inlands, wetlands and agricultural land were salinated and natural resources for livelihood were badly affected especially for coastal communities. This situation worsened as basic facilities were also destroyed. Thus, this research focuses on the impacts of the tsunami on the affected community. The objectives of the research are to identify the impacts of the tsunami on the community in terms of the physical infrastructure, environment and livelihood; examine the changes on the existing coastal site due to the tsunami; investigate the extent of the awareness level of the disaster and management among the community; recommend suitable measures in order to minimize the devastation on the community. Survey was conducted on 211 coastal residents as well as site observation in the coastal area. The result indicates that the tsunami disrupted energy during its drawdown period. Floating debris, carried back and forth by the extreme drawdown of the water level when the waves receded, forcefully carrying people and destroying structures in its path. Damage included lives that were lost or severely injured, structural damage, severe coastal erosion, destructions of the coastal ecosystem and immediate coastline changes. Indirect impacts or secondary damage followed the primary damage. The secondary damage was caused by floating debris, sewage, and chemical pollution that followed the destruction. The impacts also included human dimensions in the coastal areas which had psychological and emotional impacts on the people from sudden losses, disease and sanitation problems from the destroyed sewage systems and potable water. The damage towards the basic utilities and amenities such as the road networks and electrical supply also had serious impacts on the business community. Findings also indicates that the tool that can minimize the impact of tsunami on the community is by increasing the hazard and disaster awareness alarm among the community. The information gained from this study can be used to help the community as well as the agencies involved in order to minimize the impacts of the tsunami on the community and to develop a more effective mitigation measures for disasters such as the tsunami.

ملخص البحث

كان تسونا مي ديسمبر 2004، واحدة من المأساة الأكثر تدميرا من أي وقت مضى أن يحدث للبشرية في تاينخ الحضارة الإنسانية. هلك ما يقرب من 250,000 شخص، وعانى الملايين بجروح، في حين أن تدمير الممتلكات وفقدان فرص لا يمكن تقديرها بدقة. ويظهر تأثير هذه الموجات على الدمار البيئي الذي يلحق الضرر كان على الموارد الطبيعية مثل الشعاب المرجانية، وأشجار المعروف، والكتبان الرملية والنظم الإيكولوجية الساحلية الأخرى التي كانت بمثابة حواجز الدفاع الموجة. وعلاوة على ذلك، تم إينلندس المألحة والأراضي الرطبة والأراضي الزراعية وتأثرت الموارد الطبيعية لكسب الرزق ومصدر دخل بشدة، خاصة بالنسبة للمجتمعات الساحلية الذين تنطوي في مصايد الأسماك. تفاقم الوضع كما دمرت أيضا مرافق أساسية. على هذا النحو، وتركز هذه الدراسة على تأثيرات تسونا مي على مجتمع الرفاهة في المنطقة الساحلية على أساس من المصادر الأولية والثانوية المتاحة. وتشمل المصادر الأولية الاستبيانات والمقابلات والملاحظات بينما تشمل الموارد الثانوية الكتب والحكومة والتقارير الدولية، والمجلات العلمية والخرائط والمقالات التي أبرزت القضايا ذات الصلة تسونامي. واعتبرت بعض الدراسات في نفس المجال في أجزاء أخرى من العالم أيضا للقيام بهذه المهمة. وفقا للمستطلعين، هو تأثير تسونامي على رفاه المجتمع من حيث فقدان الدخل بسبب الأضرار التي لحقت معدات الصيد مثل قوارب الصيد والشباك التي تسبب اضطراب في أنشطة الصيد ذات الصلة وكذلك من حيث الأضرار التي لحقت خصائص معظمها نحو المنازل وبليبه تلف معدات الصيد مثل قوارب الصيد وشباك الصيد. وبالإضافة الى ذلك، فإنه يؤثر أيضا روتين حياتهم اليومية مثل اضطراب في الدورة المدرسية بسبب الأضرار التي لحقت ممتلكات المدرسة. وفقا للمستطلعين، والأدوات التي كانوا يعتقدون يمكن أن تقلل من تأثير تسونامي تجاه المجتمع هي عن طريق زيادة الوعي بالأخطار والكوارث بين المكسب المعلومات الجالية. من هذه الدراسة يمكن استخدامها لمساعدة المجتمع وكذلك إشراك الوكالات من أجل تقليل آثار تسونامي على المجتمع وتطوير تدابير التخفيف أكثر فعالية للكوارث مثل تسونامي. الى جانب ذلك، الأبحاث قد تساعد على خلق الوعي على المجتمع أن يكون مستعدا لمواجهة الوضع الكارثي مثل التسونامي. من خلال الاستعداد للمجتمع، يمكن أن يكون تأثير تقليل الحد. أما بالنسبة للسلطة، هذا البحث قد يساعد من خلال السماح لهم اتخاذ القرار الأفضل.

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DECLARATION

I hereby declare that this thesis is the result of my own investigation, except where otherwise stated. I also declare that it has not been previously or concurrently submitted as a whole for any other degrees at IIUM or other institutions.

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CHAPTER ONE

INTRODUCTION

1.1 INTRODUCTION

Tsunami are waves caused by sudden movement of the ocean due to earthquakes, landslides on the sea floor, land slumping into the ocean, large volcanic eruptions or meteorite impact in the ocean.

The occurrence of a tsunami involves the movement of water from the surface to the seafloor, which means its speed is controlled by water depth. As a result, as the wave approaches land and reaches increasingly shallow water it slows. This statement was also supported by Kerr (2005) which in depth explains that the water column still in deeper water is moving slightly faster and catches up, resulting in the wave bunching up and becoming much higher. A tsunami is often a series of waves and the first may not necessarily be the largest.

Tsunami phenomenon is usually associated with earthquakes, landslides or volcanic eruptions in, or adjacent to oceans, and results in sudden movement of the water column (Abbot, 2009). Until recently tsunami were called tidal waves, even though the event has nothing to do with tides.

The tsunami generated by the December earthquake first struck Sumatra in Indonesia and then spread across the Indian Ocean to reach the Andaman Islands, Sri Lanka, India and Thailand (Park et al., 2005). According to Tajul (2005),

"Although Malaysia lies in the "shadow" of Sumatra, tsunami waves were distributed around the north end of Sumatra and then travelled south easterly across the Strait of Malacca to reach the Malaysian coast and offshore islands."

This include Kota Kuala Muda, Kedah which was selected as the study area. These have caused extreme inundation and extensive damage, loss of property and life along the coasts of 12 surrounding counties in the Indian Ocean. According to International Federation of Red Cross and Red Crescents Societies (IFRC) (2005), the loss of lives has also been extended to the people from totally 27 countries from other parts of the world.

Therefore, this research focuses on analysing the impact of the tsunami on the community. The study area which has been chosen is Kuala Muda, Kedah.

1.2 RESEARCH BACKGROUND

On 26th December 2004, several countries on the Indian Ocean were hit by tsunami. This phenomenon was triggered by a massive earthquake with the recorded magnitude of 9.0 on the Richter scale, with the epicentre just off the west coast of North Sumatera, Indonesia. Malaysia was affected by tsunami besides Indonesia (Acheh), Sri Lanka, Thailand, India, Maldives, Myanmar, Bangladesh, Somalia, Seychelles, Tanzania, Kenya and Yemen. According to the International Federation of Red Cross and Red Crescents Societies(IFRC) (2005), approximately 224, 685 deaths were reported, 174, 729 confirmed dead and 49, 956 still missing. This tsunami had claimed 68 lives in Malaysia, mostly in Penang, besides Langkawi Islands, Kota Kuala Muda, Perak and Selangor.

The impact of the tsunami on environmental destruction shows towards natural resources such as coral reefs, mangroves, sand dunes and other coastal ecosystem that acted as wave defence barriers. Moreover Colbourne (2005) also added that inlands, wetlands and agricultural land were salinated and natural resources for livelihood and for source of income were badly affected, especially for coastal communities who were

involve in fisheries. The situation worsened as basic facilities, amenities and facilities such as the roads, road lamppost and the drainage system were also destroyed (Danielson et al, 2007). Furthermore, this situation indirectly affect the communities in terms of socio – economics and psychological well-being (Hollifield, 2008 and Free, 2010). This research focuses on assessing and identifying the impact of the tsunami on the community.

1.3 PROBLEM STATEMENT

The devastating tragedy of tsunami does not only give impact on the physical infrastructures but also severely affected the environmental resources and the community well-being of the affected area. Whereas the damage to the environment on land can be seen, the devastation imposed on the marine environment is hidden (Ibrahim Komoo and Mazlan Othman, 2006).

Closer to the shore, many natural ecosystems, most notably coral reefs and mangroves, act as natural shock absorbers and wave breakers. During the past several decades, these ecosystems have been damaged and reduced in most countries along the Indian Ocean. Indeed, the damage from the tsunami waves was far more devastating than it would have been had they still been intact.

The impact on coastal fishing communities and the people living there, some of the poorest in the region, has been devastating with high losses of income earners as well as boats and fishing gear. The disaster devastated communities with its high toll of human lives, injuries, family networks, homes and livelihoods. The majority of those and livelihoods with loss of dwelling units, household assets, and productive assets like boats and nets. (Sorenson and Olwig et al, 2007).

In Malaysian context, Ghazali and Ong (2005) explained that the coastal bunds and revetments that protected the mostly agricultural hinterland of Perlis, Kedah, Perak were severely tested but not seriously damaged. Overtopping of revetment and bund crests were noted in Langkawi and north Perak. Some river banks collapsed due to the sudden drawdown of water during the return-flow. On the other hand, tsunami waves created deposition at the river mouths in the north and northwest of Penang.

According to the post- tsunami report from the Department of Drainage and Irrigation Malaysia (DID) (2004), most of the damaged houses in the impact areas were old wooden or part-brick buildings. In Kuala Muda, it was observed that single-brick walls could not withstand the onslaught of the tsunami waves. However, reinforced concrete walls of houses along the first row of buildings from the sea managed to stay intact.

Immediately after the wave passed it was common to find the remains of marine animals on what had been grazing land. These remains created stench, which contribute towards air pollution to the area. Moreover, the remains also may cause bacteria to spread and can lead to health problems to the surrounding communities.

Moreover, a study by Miller in 2007 which was on the tsunami's psychological aftermath reported that 20–25% of children affected by the Tsunami in Aceh required professional treatment for psychosocial problems. Additionally, a dramatic increase in the demand for counselling and psychological cares, including tertiary-referral specialized care, was registered in the entire country. Not all these were people who had been directly affected; some were people in nearby areas who vicariously shared the trauma of the Tsunami and worried about the possibility of new waves. Besides that, Neuner, Shauner and Catani et al. (2006) have also identified how the psychological impact spreads far beyond those who have suffered directly.

In Malaysia, although the tsunami had occurred in 2004 and taken place in Kuala Muda itself, and only once hit Malaysia but this study still valid because the evidence of the tsunami occurrence is still clear. Besides that, there are not many studies and research on tsunami and the community well being done in Malaysia context. Moreover, this study can contribute towards the planning system in managing tsunami disaster in the future.

1.4 GOAL AND OBJECTIVES

The goal for this study to identify the impacts of tsunami on the affected community.

There are four objectives, which have been formulated in order to achieve the goal:

- i. To identify the impacts of the tsunami on the community in terms of physical infrastructure, environment and livelihood.
- ii. To examine the changes on the existing coastal site due to the tsunami.
- iii. To investigate the extent of the awareness level on disaster awareness and management of the community.
- iv. To recommend suitable measures in order to minimize the devastation on the community.

1.5 RESEARCH HYPOTHESIS

This research intends to highlight and provide answers and justifications to these questions:

- i. How did the tsunami occurrence affect the community in Kota Kuala Muda, Kedah?
- ii. How does tsunami event change the condition of the tsunami affected coastal area?

- iii. What is the current awareness level of the community on disaster awareness and management?
- iv. What are the tools and methods, which can be, use in order to minimize the destructions caused by the tsunami?

1.6 RESEARCH AIM

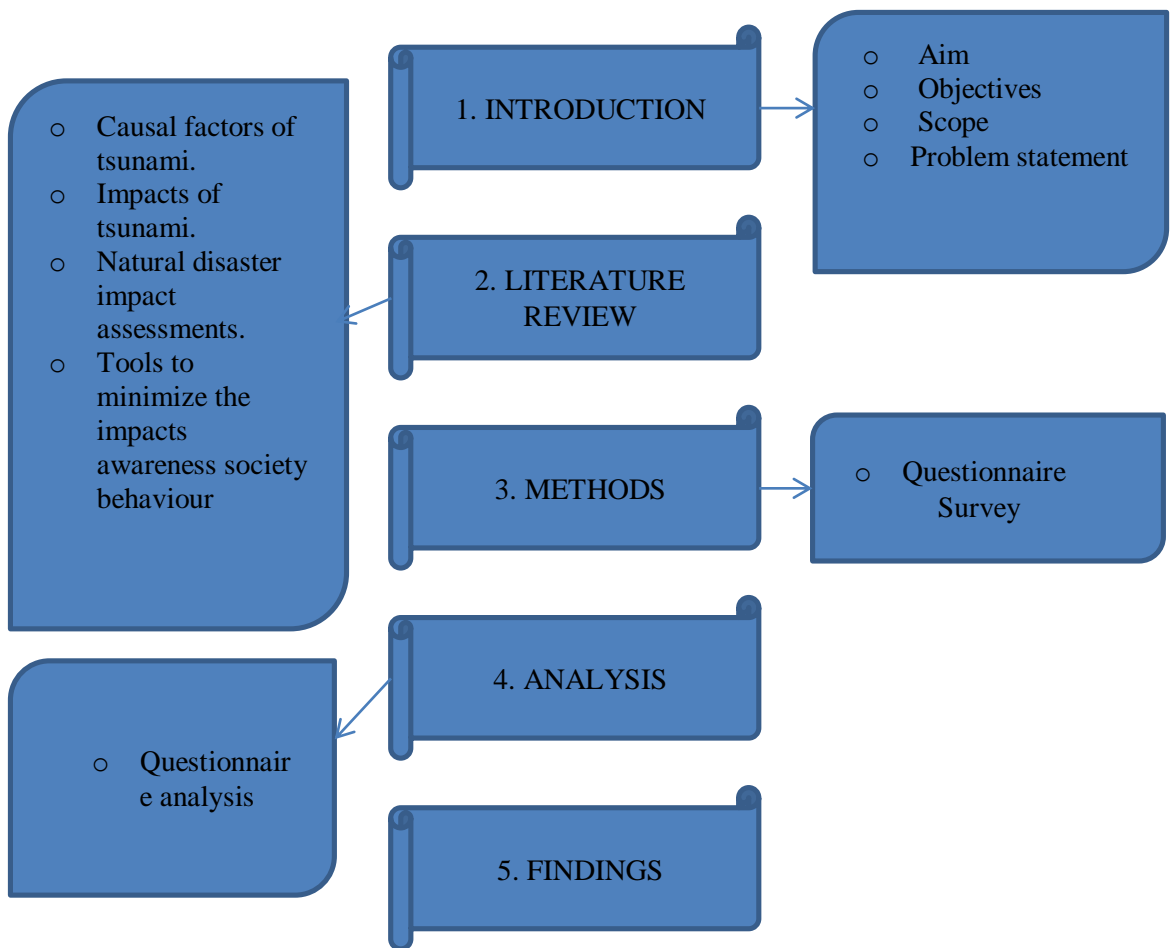


Figure 1.1: Research framework

In this research, the process started from the introduction which contains statement of problems, goal, objectives and scope. Besides that, literature review on this topic will

also be included in this research. The process for this research is divided then into four stages, which are:

- i. Introduction
- ii. Literature review
- iii. Research Method
- iv. Analysis
- v. Findings

1.7 OBJECTIVES

The scope for this study can be divided into two sections. The first part covers on the impact of the tsunami on the affected community. This research focuses on the impact of tsunami from the community planning and also the physical planning perspectives. From community planning, such as the change of lifestyle for example change of jobs, the effect on the income level, the effects on their daily routines. For physical planning, such as affect the school properties which hinder their child from going to school, destruction to their boats and houses which caused them to move out of their homes and also destruction on the infrastructures such as school which affected their daily routines. This research did not cover the psychological and emotional effect of the tsunami on the affected community in details for example trauma and also depression and etc. The second part will be covering on the community perception on disaster awareness and management. Table 1.1 was present parallel with the research objectives. This is to ensure that all the scopes achieved all the objectives that were formulated.

Table 1.1
Scope of study

RESEARCH SCOPE	RESEARCH OBJECTIVES
<p>Observation on the existing condition and changes of the coastal site</p> <p>How does the tsunami affect the community, in terms of:</p> <ol style="list-style-type: none"> 1. Loss of income 2. Damages to property 3. Affect daily routine 4. Emotional effect 	<p>Objective #2: To examine the changes on the existing coastal site.</p> <p>Objective #1: To identify the impacts of the tsunami on the affected community in terms of physical infrastructure, environment and livelihood.</p>
<p>Awareness on disaster awareness and management</p> <ol style="list-style-type: none"> 1. Tools to minimize the tsunami impacts on the community well-being. 2. Opinion of the community on the level of awareness on safety level from the local government and the community. 3. Opinion of the community of the medium of communication that can be used to inform the public on natural disaster related issues. 4. Responsible bodies for providing information and warnings related to natural hazards. 5. What to improve within the alarmed system operation and the community response in order to increase the efficiency. 	<p>Objective #3: To know the extent of the awareness level on disaster awareness and management of the community.</p> <p>Objective #4: To recommend suitable measures in order to minimize the devastation on the community.</p>

1.8 SCOPE

There are a few limitations in this study. The first one is that it requires opinion and perspectives from the public that is directly or indirectly affected by the tsunami. The answer might not be accurate and honest hence might affect the result during the data analysis.

The second constraint is that the data collections were mostly done through questionnaires and interviews and the respondents might refuse to answer the questionnaires or refuse to be interviewed in which it affects the time used for surveying. This also may affect the accuracy of the data, reliability of the method, transferability of the findings and the validity of the recommendation.

Besides that, another constraint is manpower. Lack of manpower also leads to the increase in time consumption in conducting the questionnaire survey.

Furthermore, this study heavily relies on the primary data, which are the questionnaires survey, observations, and also interviews. Moreover, cost plays an important role in any form of project.

1.9 SIGNIFICANCE OF STUDY

Through this study, by stressing on the impact on the affected community, hopefully the information can be used for future studies in related field that may help the community as well as the agencies involve in order to minimize the impacts of the tsunami on the community as well as the physical infrastructure and the environmental resources.

In terms of community, the research may help to create awareness on the community to be prepared in facing disastrous situation such as the tsunami. Through community preparedness, the impact can be minimized and reduced. Moreover, by increasing the information on disaster education, more accurate measures can be taken in order to minimize the impact or the destruction on the communities.

In urban and regional planning perspectives, proper installation of hard approach such as the installation of breakwaters, seawalls, rock revetment or trees plantation which can act as a wave breaker can reduce the impact of the tsunami towards the community. This also apply to the soft approach such as increasing the education on disaster management and mitigation which will also contribute towards mitigation measures.

As for the authority, this research may help them to make better decision. For example the risk assessment and also develop more effective mitigation measures for