

AN EVALUATION OF THE IMPACT OF COASTAL EROSION TO THE ENVIRONMENT AND ECONOMIC ACTIVITIES AT MENGABANG TELIPOT, TERENGGANU

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Abstract

Coastal erosion is the natural process that occurs whenever the transport of material away from the shoreline and it is not balanced by new material being deposited onto the shoreline. There are several factors that involve environmental factors and human factors. This factor gives the effect to the coastal areas. The coastal erosion can affect the environment and economic activities at the Mengabang Telipot, Terengganu. The villagers and tourists are in danger because of the bad environment that involves coastal erosion. The major incident of coastal erosion happened when some houses collapse because of the erosion. Coastal erosion also disturbs the economic activities that involve fishermen and businessmen around that area. Generally, this research focuses on two main objectives which are to analyse the impact of the current state of coastal erosion to the environment and economic activities at Mengabang Telipot, Terengganu, and to suggest proper solutions to prevent coastal erosion towards the environment and economic activities at Mengabang Telipot, Terengganu. This study has adopted an observation and questionnaire. The findings of the study are that coastal erosion gives more bad impact to the environment and economic activities that involve the villagers and people that stay at Mengabang Telipot area. This erosion needs to be prevented before it becomes more serious which can give bad effect to the environment and economic activities.

Keywords-- Coastal Erosion, Environment, Economic Activities

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INTRODUCTION

Coastal areas are very important to human beings for culture activities and economic exchanges between different nations like trade and fishing. Nowadays, Terengganu is facing coastal erosion that happens since 2015 but it is more serious in 2017 when the villagers lost their property because of the incident. In 2017, the villagers lost their house because of the critical coastal erosion (citation). Coastal erosion is a natural process that occurs whenever the transport of material away from the shoreline is not balanced by new material being deposited onto the shoreline. It happens during strong winds, high waves and high tides and strong storm conditions, and results in coastline retreat and loss of land. The coastal erosion happens because of natural process like tsunami, strong winds and high waves but human factors also contribute to the coastal erosion like sand mining, deforestation and ecologically unsustainable. Coastal erosion gives the bad impact to environment and economic activities.

LITERATURE REVIEW

Definition of Coastal Erosion

Coastal erosion has become an important environmental concern. In the past decades, it has caused significant economic losses, ecological damage, and social problems (Jime'nez et al., 2012). However, beach erosion not only poses a risk to existing assets, but also causes a significant setback to recreation and tourism and, consequently, threatens one of the most important sources of the economy in coastal regions (Houston, 2008). Coastal erosion and environmental degradation are accelerating along many coastal areas of the country due to the natural and

anthropogenic activities. According to Cambers (2009), coastal erosion happens because of natural and anthropogenic factors. Erosion and accretion of sediments affect shorelines along oceans. According to Davidson (2010), the coast is an area that separates land and oceans where the solid rock material covered by layered rock layers. Coastal erosion also means the marine system that controls the land system and forms a new landscape such as a bay, high cliff and the existence of stacked rocks (Jaafar et al., 2017).

The Cases of Coastal Erosion in Global and Malaysia

According to Kaneko et al. (2014), the factors of coastal erosion in Fort Dauphin are from natural and human-induced. The coastal erosion also happens because soil erosion increases in developing countries such as the forest industry and unregulated pasture (Syvitski et al., 2005). According to Sutherland et al. (2005), the erosion can be a threat to their safety and properties of local residents if the sea level rises. According to Appeaning-Addo (2009), in Ghana, the coastal erosion, which has destroyed the coastal environment, affected the socio-economic life of the local population, threatened cultural heritage and hindered coastal tourism development. According to Rosnan and Zaini (2010), the Setiu wetlands, Terengganu changes because the waves, tides, currents, and monsoon season affect the beach profiles and sediment size distribution at beach area. Nowadays, Terengganu, a state that occupied with the longest shoreline in Malaysia is threatened by coastal erosion problem due to wave actions.

Factor of the Coastal Erosion

According to Abd Maulud et al. (2015), coastlines changes can be categorized into two main factors which are natural process and human activities. According to Department of Irrigation and Drainage (2014), this phenomenon occurs due to the natural processes that interact on coastal areas such as waves, sediment, wind, currents and tides. Next, the monsoon also causes beach erosion as the backshore and foreshore are cut back, ridges are flattened, hence the beach profile is smoothed out (Wong, 1981). According to Nor Haslinda et al. (2014), severe erosion for several decades happen because man made sea structures had been constructed. Phenomenon of erosion in one location could also lead in accretion of erosion to nearby coastal areas and cause rapid changes in the position of shoreline (Braatz, et al., 2007).

Impact of the Coastal Erosion to the Environment

According to Niesing (2005), the pressures of climate change and increase in human activity toward the coasts has turned coastal erosion into a more serious problem, not only for coastal municipalities, but for the world as a whole. Coastal erosion involves in shaping the present coastlines (Van Rijn, 2011). The rise of sea level, wave, monsoon, wind and tidal inundation factors are actually the common events. However, those factors occur at out of control as they change the shoreline trend in a bad way due to climate change which resulting from global warming (Islam & Rahman, 2015).

Impact of the Coastal Erosion to the Economic Activities

According to Kadaruddin (1995), the main attraction of tourists in the coastal zone is the presence of beautiful beaches which has clean environment, an attractive landscape, as well as clean and safe coastal waters. The coastal erosion will make the community loss of property, people, financial and facilities. Many families were evacuated from their homes as their shelters were threatened by the shore erosion (David, 2016). Generally socio-economic sectors that are affected and influenced from coastal erosion are: fisheries and aquaculture, recreation and tourism, biodiversity, settlements and infrastructure, financial services and human health. Tourism is also one of the maritime activities at the coastal area. The impacts of tourism in coastal areas arise from the construction of infrastructure and recreation area. According to HALL (2001, p. 602), coastal tourism embraces the full range of tourism, leisure, and recreationally oriented activities that take place in the coastal zone and the offshore coastal waters.

The Solution to Prevent the Coastal Erosion

According to Li (2014), an effective solution of coastal protection is needed to protect homes, natural habitats, and local economic and social activities along the coastlines from being damaged and even destroyed by coastal erosion. According to Smith (1995), to prevent the coastal area from being affected more seriously, the authority needs to stop aggregate dredging along lagoon coast. According to Department of Irrigation and Drainage (2002), methods that are being carried out is by arranging rocks in size ranging from 0.5 ton to 1 ton above eroded cliff areas. Another purpose of the breakwater fortress built is to slow down the speed of the waves when approaching the coast and reduce wave action in the rear area of the structure construction through reflection and absorption energy waves and this can create a state of calm water.

METHODOLOGY

Figure 5 shows the research strategy (research strategy or research flow?). It comprises of 8 steps that begins with finding the information about the study and ends with the analysis and discussions. (The steps need to be explained in more details. Even the steps need to be revisited. Please refer to others research flow. Figure number and title should not be part of the

picture. They are written out of the picture / figure. How many expert did you interview?)

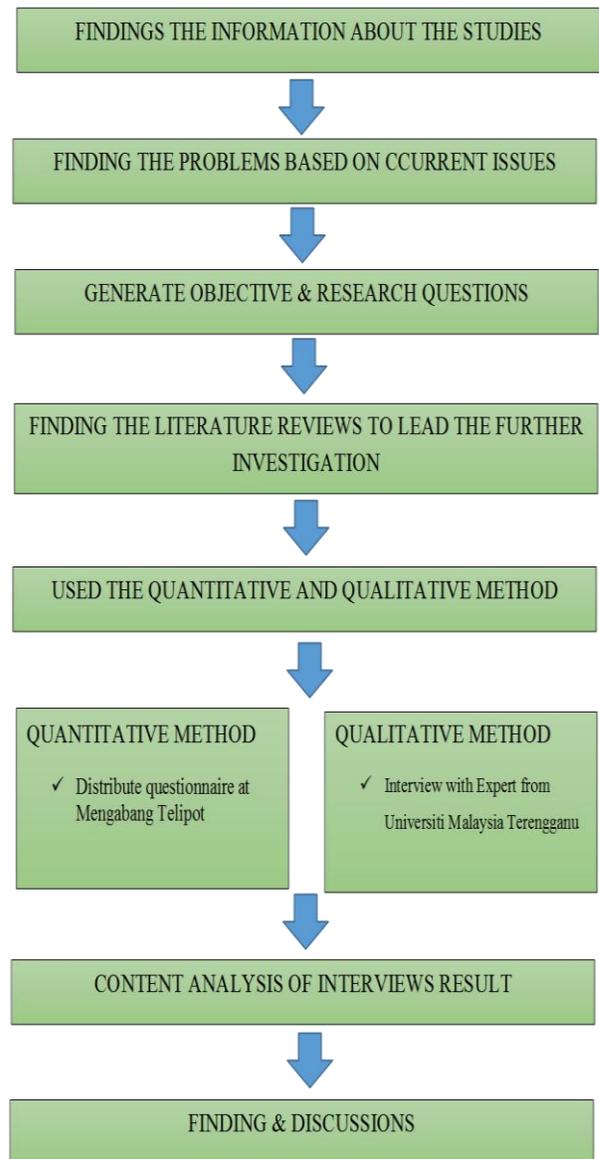


Figure 5. Diagram of Research Strategy

RESULTS & DISCUSSIONS

A survey was conducted with 50 respondents at Mengabang Telipot. 50 questionnaires were distributed to the villagers and the resident around that area. In the questionnaire, the Likert Scale was used to measure the impact of coastal erosion to the environment and the economic activities at Mengabang Telipot. Table 1 shows the Likert Scale

Table 1. Likert Scale

1	2	3	4	5
Strong disagree	Disagree	Neutral	Agree	Strongly agree

Tables 2 and 3 indicate the questions that had been asked in the survey process in order to answer the impacts of coastal erosion to the environment and the economic activities at Mengabang Telipot, based on their own perspectives.

Table 2. Questions used in measuring the impact coastal erosion to the environment (Section B1)

1.	Coastal erosion gives impact on the environment and ecosystem at the area of erosion.
2.	Coastal erosion affects the ecosystem like fish and coral reef at sea.
3.	Coastal areas will change the structure of the area because of the erosion.
4.	Coastal erosion gives impact on housing areas and community life at the area.
5.	Coastal erosion impacts social aspects towards local communities.
6.	Daily activities of the population are disturbed because of coastal erosion.
7.	Beach erosion has an impact on property safety in the erosion area.
8.	The safety of residents and tourists is guaranteed despite beach erosion.
9.	Tourism activity is reduced due to the decrease in security on the beach.
10.	The cliffs will be higher and trouble the fishermen to go to the sea.

Table 3. Questions used in measuring the impact coastal erosion to the economic activities (Section B2)

1.	Fishing activities are disrupted due to coastal erosion.
2.	Fishing activity is disturbed due to the difficulty fishing of the boat.
3.	Coast erosion affects the income and economy of the surrounding population.
4.	The lack of marine resources is due to coastal erosion.
5.	Coastal erosion affects tourism activities in this area.
6.	Tourists are less interested towards this area because of safety.
7.	Business activity is less due to coastal erosion.
8.	Business is decreasing due to coastal erosion.
9.	Recreational activities at the beach will be affected by safety factors.
10.	Businessmen and fishermen will obtain lower income sources due to coastal erosion

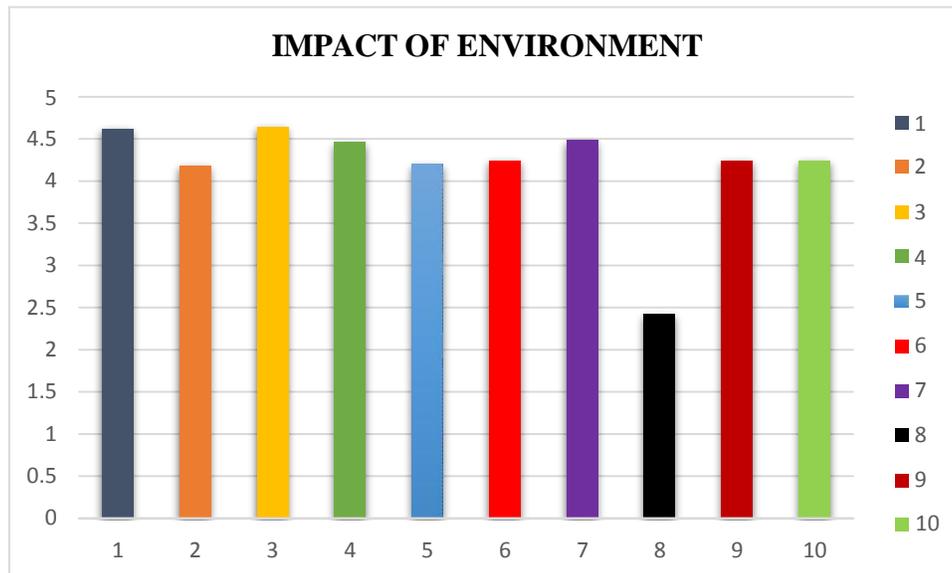


Figure 1. Mean Analysis of the impact of coastal erosion to the environment

Figure 1 illustrates the Mean Analysis of the impact of coastal erosion to the environment given by the respondents to each question. Based on the mean analysis of all the questions, the responses from the respondents show that the structure of that place has changed because of the erosion. The coastal erosion

makes the bad environment when the villagers scared to live at that area because of the erosion. The environment is not safe after the erosion happened.

Figure 2 shows Mean Analysis of the impact of coastal erosion to the economic activities. This study was conducted because

coastal erosion gives bad impact to the economic activities like fishing, business and tourism activities at Mengabang Telipot.

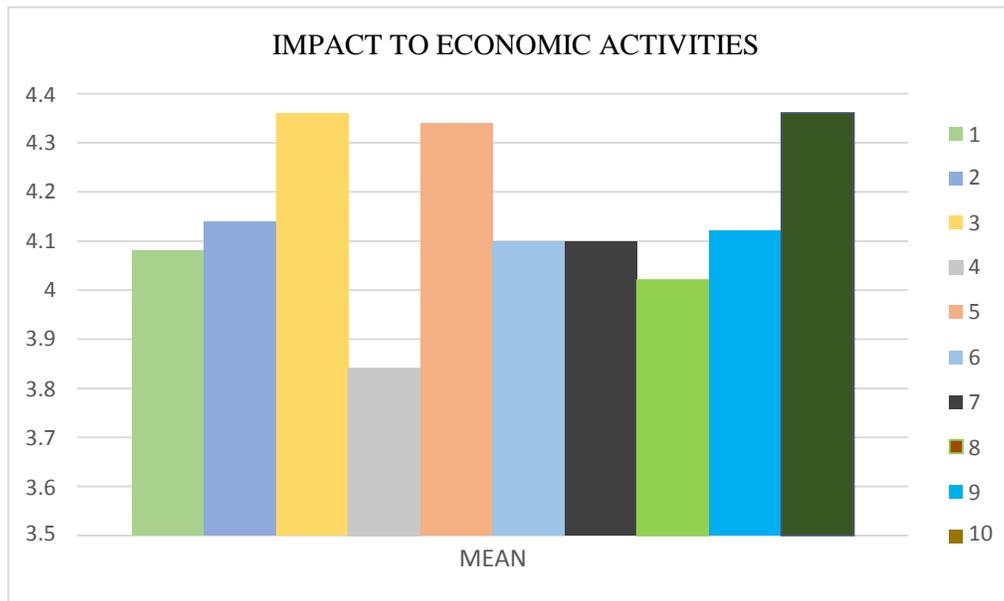


Figure 2. Mean Analysis of the impact of coastal erosion to the economic activities

For the second objectives, the qualitative method was used by interviewing lecturers of University Malaysia Terengganu. The finding from interview session was analysed by using the open coding process. There are six key codes which have been identified namely the FA for factors, TY for types of breakwater,

AD for advantages, DIS for disadvantages, CO for cost and OS for others solution. Table 4 shows the open coding process with the expert from UMT. (You need to explain this. It should not only be a table without explanation.)

Table 4. Open coding process with the expert from UMT

AGENCY	TOPIC	CODING	INTERVIEW STATEMENT
University Malaysia Terengganu (UMT)	FACTORS	FA	... coastal erosion happens mostly because of the development at sea area especially we know that in Terengganu we extend the airport. So it one of the factors that contribute to the coastal erosion... ... Mostly it happens because of the human factors and only sometime it happens because of natural...
	TYPE OF BREAKWATER	TY	... there are many types of breakwater to prevent coastal erosion. At Mengabang Telipot, we use Rubble Mound Breakwater... ... the others type is floating breakwater, submerged and reefs breakwater...
	ADVANTAGE	AD	... can protect from the waves energy... ... for increase the safety for villagers and activities at sea...
	DISADVANTAGE	DIS	... the higher cost... ... give harm to the ecosystem and fish... ...breakwater give the bad view for tourism activities...
	COST	CO	... the cost depends on the material, types and long... ... In Mengabang Telipot the cost is about RM 9 million...



Figure 3. Before the Coastal Erosion Happen



Figure 4. After the Coastal Erosion

CONCLUSION

Coastal erosion gives bad impact to the environment and economic activities at Mengabang Telipot. There are many solutions to prevent the coastal erosion before it becomes more serious. In Mengabang Telipot, they use the Rubble Mound breakwater to protect the shoreline in that area. Actually, it has many types of breakwater such as submerged breakwater, reef breakwater and floating breakwater. This breakwater can help to prevent the shoreline from erosion about 5 or more years depending on the structure and place. The structure is important to make sure it can hold in the long period of time. Coastal erosion can be reduced if all people are responsible to handle it by reducing the development at sea areas. The coastal erosion not only give the bad view to environment but also to the community.

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