ASSESSMENT OF BEACH MORPHOLOGICAL CHANGES AT PANTAI SEPAT

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SUPERVISOR’S DECLARATION

I hereby declare that I have checked this thesis and in my opinion, this thesis is adequate in terms of scope and quality for the award of the Bachelor Degree of Civil Engineering.

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Date      : JUNE 2018
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I hereby declare that the work in this thesis is based on my original work except for quotations and citations which have been duly acknowledged. I also declare that it has not been previously or concurrently submitted for any other degree at Universiti Malaysia Pahang or any other institutions.

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ASSESSMENT OF BEACH MORPHOLOGICAL CHANGES AT PANTAI SEPAT

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ABSTRAK

ABSTRACT

Analysis of beach morphology can determine the profile or physical attributes of a beach and thus obtain information about the short term trends (accretion and erosion) of coastal area. The processes of erosion and accretion are further intensified with the presence of seasonal variations effects. The study area was conducted at Pantai Sepat, which located in district of Pekan, facing the South China Sea view. The study area can be categorized as natural sandy beach area. Unlike beaches which slope to the sea for a few meters and then suddenly drop deep, Pantai Sepat beach seems to slope very gradually toward the sea. Several beach profiles were monitored approximately every two weeks start from November 20, 2017 until March 28, 2018 by using a total station by collecting horizontal distance and vertical distance in one fixed straight line. The temporary benchmark was identified and referred to sea tidal before the works started to get a long distance during a low tide. The rain gauge was installed at the study area in UMP Pekan. Then, the recorded rainfall data was analysed in order to investigate the effect of rainfall patterns to beach morphological changes. From rainfall data, the total rainfall depth for period of the study (128 days) is 1573.9 mm with the maximum daily data was recorded as 256.2 mm on 12 January 2018 with 256.2 mm rainfall depth and about 60 days were recorded as no rainfall. For monthly rainfall distribution, January 2018 was recorded as the wettest month with rainfall depth 771.2 mm. Meanwhile, February 2018 was identified as the driest month with 19.7 mm rainfall depth. Based beach profiles analysis, the erosion process was occurred at the upper and middle part while the accretion process was occur at the lower part of the beach. The highest rate of erosion occurred on January 19, 2018 because of the highest of rainfall depth collected from January 1, 2018 until January 18, 2018 as much as 747 mm depth while the highest rate of accretion occurred on February 28, 2018 affected by the lowest of rainfall depth collected from February 15, 2018 until February 28, 2018 as much as 9.2 mm only. Sieve analysis test also was conducted to determine the size of distribution D$_{50}$ every two weeks along the study period based on three different parts which is upper, middle and lower. The biggest size of particle is 0.28 mm at upper part on March 28, 2018 while the finest size of particle is 0.11 mm at lower part which is collected on December 4, 2017. As conclusion, beach profile at the study area was highly affected by the patterns of rainfall distribution which were significantly eroded during the wet period (December 2017 to January 2018) and accreted within dry period (February 2018 to March 2018). Meanwhile, for the particles size of the beach, D$_{50}$ were shown the biggest size at the upper part and the finest at the lower part of the beach profile along the study period.
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<table>
<thead>
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<th>Symbol</th>
<th>Meaning</th>
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<tbody>
<tr>
<td>%</td>
<td>Percentage</td>
</tr>
<tr>
<td>m</td>
<td>metre</td>
</tr>
<tr>
<td>mm</td>
<td>Millimetre</td>
</tr>
<tr>
<td>Abbreviation</td>
<td>Description</td>
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<tr>
<td>BSCS</td>
<td>British Soil Classification System</td>
</tr>
<tr>
<td>BS</td>
<td>British Standard</td>
</tr>
<tr>
<td>D$_{50}$</td>
<td>Medium size of sand</td>
</tr>
<tr>
<td>HMC</td>
<td>High Magnesian Calcite</td>
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<td>Aragonite</td>
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CHAPTER 1

INTRODUCTION

1.1 Background of Study

Beach consists of a narrow backshore and foreshore. Based on Figure 1.1, there are many physical changes that always occur for the beach bed such as ripples, flat bed, dunes and ripples, chutes and pools. Beach morphology refers to the prevailing morphology of a beach, including the waves and currents, the extent of the near shore zone, the width and shape of the surf zone, including its bars and troughs, and the dry or sub aerial beach.

Figure 1.1 Beach Topography

Source: Arnott (2009).

The height and width of the beach are influenced by the tides of the sea, which lies between land and sea. It is the physical characteristics of a formal combine to form a physical division that operates. The morphology of the coastal system unit composed of
coastal slopes, the distribution of the grain of sand, strength of waves, currents and tides that make up the coastal morphology. One element will change if other part is changing.

There are several factors that affect the coastal morphology such as types of soil, changes in the rise and fall of sea level, as well as sedimentary origin of the river, land erosion and wind. Beaches in Malaysia are very beautiful which are suitable for both leisure and family activities. There are many attractive beaches in Malaysia that can attract foreign tourists to Malaysia such as Port Dickson and Cherating. In addition, there are also clean beaches behind islands such as Langkawi, Pulau Kapas and Pulau Tioman. These beaches are called as sandy beach. Sandy beaches are composed of particles coming from eroded coral reefs in the ocean, sediment from the sea floor, and/or eroded rocks from nearby cliffs.

Climate is generally defined as average weather, and as such, climate change and weather are intertwined. Observations can show that there have been changes in weather, and it is the statistics of changes in weather over time that identify climate change. While weather and climate are closely related, there are important differences. In Malaysia there is almost no seasonal changes in climate, but there are existing of wet and dry periods. However, the climate of Malaysia is different and depending on which region you are. In the South of the Malacca and Kalimantan the climate is Equatorial, hot and humid, to the North – subequatorial monsoon. Monsoon winds blow towards the southwest from April to October and from October to February in the North-East of the country. During monsoon period in the North-Eastern coast of Malacca sometimes stops sea tourism. Strong, but brief rains throughout the year, so the rainy season as such in Malaysia.

On the West coast of Malaysia (Langkawi, Penang, Pangkor) the rainy season is not pronounced and almost falls from May to September; in April, May and October on the West coast of the Peninsula fall thunderstorms. On the East coast (Tioman Island, Redang) a more pronounced rainy season lasts from October to March. The rainy season is celebrated torrential rains continuing for two or three hours, they are usually in the afternoon. Because of the higher rainfall evergreen jungle on the East and the river network is very deep, though, and consists of short rivers. It also effects the changes of beach profile. In mountainous areas, the rains are often because the high peaks are
constantly cloudy. In General, rainfall in Malaysia is about 2000 mm per year, in the mountains reaches 5000 mm (Mohtar et al., 2015).

1.2 Problem Statement

The aim of this study was to study the changes of beach profile and analyse the beach behaviour due to rainfall effect. Besides, this study also to investigate about beach erosion and accretion processes due to seasonal changes in Pantai Sepat. Beach erosion involves the breaking down and removal of material along a coastline by the movement of wind and water. It leads to the formation of many landforms, combined with deposition and plays an important role in shaping the coastline. Beach sand can be different colours depending on what type of rock formed the sand. When a wave impacts a cliff face, air is forced into cracks under high pressure, widening them. Over long periods of time, the growing cracks destabilise the cliff and fragments of rock break off of it.

Seasonal changes in beach profiles discusses the natural variability in beach shape throughout the year. One of the most obvious changes in the coastal environment is that of the beach morphology, often quantified as the beach profile, which represents the shape of the topographic surface of the beach created by slicing through the beach from the offshore region to beyond the dunes. Beaches profiles change their shape by adjusting to the forcing conditions of the ocean (i.e. waves, tides, wind, and the resulting near shore currents).

1.3 Objectives

The objectives of the study are:

i. To determines morphological changes at Pantai Sepat.

ii. To investigate the rainfall effect on the beach profile changes.

iii. To evaluate the coastal erosion and accretion processes due to seasonal changes.

1.4 Scope of Study

This study was focused on beach morphological monitoring as stated in the objective of the study. In order to achieve these objectives, several tools were used in the
REFERENCES


