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LITHOFACIES INTERPRETATION OF CORE SAMPLES IN THE TANJUNG PASIR BEACH, TELUK NAGA, TANGERANG, BANTEN

Suwondo [1], Sundus Ghaida Noor Azizah[2*], Andi Krisyunianto[3], Agus Budiono[1]

[1]Physics Study Program, Faculty of Sciences and Technology, State Islamic University Syarif Hidayatullah Jakarta, Indonesia.
[2]Geological Engineering Study Program, Sriwijaya University,
[3]PT Geosain Delta Andalan (GDA Consulting),

[*] sgnazizah@ft.unsri.ac.id

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Abstract. This research was conducted at Tanjung Pasir Beach, Teluk Naga Sub-district, Tangerang Regency, Banten. The objective of this research was to analyze the sedimentary structures, describe lithology, and determine facies in a depositional environment. This facies interpretation can be as a reservoir analogue for subsurface interpretation in the Northwest Java Basin. The research data used include surface sand samples and core samples from Tanjung Pasir Beach. The facies interpretation shows that core at location 1 is dominated by carbonaceous shale with parallel lamination structures, indicating sedimentary of lagoon environment. In contrast, core at location 2 is predominantly composed of medium- to coarse-grained sandstone facies, representing a shoreface environment.

Keywords: facies, sandstone, shoreface, tanjung pasir.
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INTRODUCTION

Every research area has its own unique characteristics. Likewise, geological features in Indonesian regions will be different from those found outside the country. Tanjung Pasir Beach is an example of a coastal area where facies analysis was rarely conducted. This research involves direct observation of sediment materials and the sedimentation processes occurring at Tanjung Pasir beach. The main objective is to develop a facies cross-sectional model of Tanjung Pasir Beach through sediment coring in the coastal environment. The results of this research may serve as a geological analogue for subsurface interpretation

Regional Physiography

Tanjung Pasir Beach is located in Tanjung Pasir village, Teluknaga Sub-district, Tangerang Regency, Banten, Indonesia [1]. Regionally, the research area is part of the extensive northern coastal region of West Java, covering approximately 155.01 km. This coastal stretch extends about 35 km from east to west and protrudes inland by 4 to 10 km. [2] classified the physiographic zones of West Java based on its geological features, which include alluvial plains, folded hills, and volcanic mountains.

Jakarta Coastal Plain, this area is situated along the northern coast of the Java Sea, extending approximately 40 km from Serang to Cirebon. The zone is characterized by flat morphology and is predominantly covered by fluvial deposits, with some areas overlain by young volcanic mudflows[3].

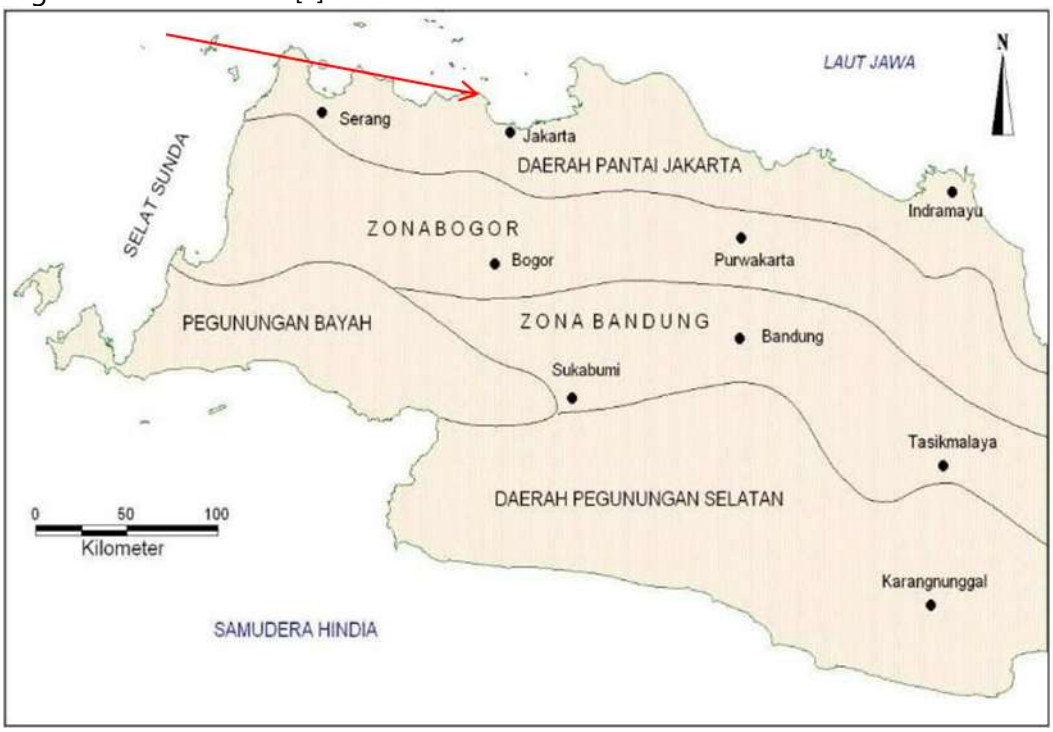

Figure 1 Physiography of West Java Region [3], the research area is indicated by a red arrow.

Regional Stratigraphy

The research area lies within the Jakarta tectonic system, characterized as a lowland region with an average elevation of approximately seven meters above sea level. However, around 40 percent of Jakarta consists of low-lying areas, where the ground surface lies 1 to 1.5 meters below the high tide level. The entire Jakarta area is classified as an alluvial plain, composed of sediment deposited by surface runoff and riverine flow within the area. In the Teluk Naga area, the supply of coastal sediments primarily originates from the deltaic deposits of the Cisadane River, transported by seawater and redistributed by prevailing northwesterly to southeasterly winds. Consequently, the shoreline of Tanjung Pasir, Teluk Naga has relatively experienced progradation due to sediment deposition from these deltaic sources.

The explanation of the regional stratigraphy of West Java begins in the pre-Tertiary period when West Java was a melange complex, which is a mixing zone between oceanic crust rocks and continental crust rocks. Consisting of metamorphic, volcanic, and

igneous rocks, which are known only from drilling data in the northern part of the West Java Sea [3].

METHODS

The research area is administratively located at Tanjung Pasir Beach within the Teluk Naga Sub-district, Tangerang Regency, Banten Province. Geographically, the research area is located at the coordinates 106° 40′53.7″ East Longitude and 06° 00′53.7″ South Latitude. The research location is depicted a red arrow in Figure 2.

Figure 2 The research location is shown by a red arrow [4].

Figure 3 outlines the stages of the research process, which includes the following steps:

1. Conducting a literature review prior to undertaking research.
2. Sampling, which consists of both surface and subsurface sampling (coring). Subsurface samples are obtained by inserting a PVC pipe into the ground and extracting sediment cores for analysis.
3. Describing the samples collected.
4. Interpreting the lithofacies.

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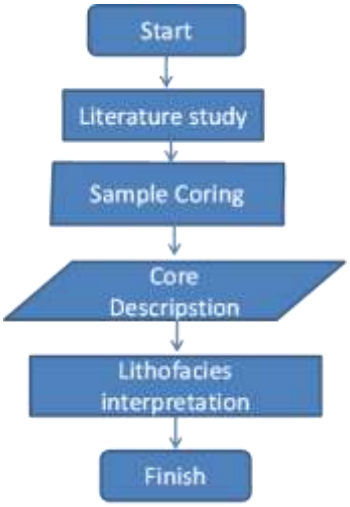

Figure 3 Research flow

RESULTS AND DISCUSSIONS

A. Surface Sediment Samples

Surface sediment samples were collected from multiple locations during this research. Sample description follow the guidelines outlined by [5]., and the grain size is determined based on [6]. The first sampling point (Point A) is located 10 metres inland from the shoreline, with a sampling depth of 0 cm. The sample is characterized as weathered surface sand with a light grayish-white color, as shown in Figure 4. No fossils were discovered. The sortation is medium to poor and it is classified as coarse sand based on its grain size. Grain shapes range from angular to highly angular. The sample is composed primarily of quartz, with possible feldspar content and remnants of foraminiferal shells. The depositional environment of this sample is interpreted as high-energy, likely influenced by strong wave action.

Figure 4. Surface Samples at location A

Following the surface sampling at Point A, the next sample was collected at Point B, as shown in Figure 5. Point B is located 15 meters from the shoreline, with a sampling depth of 0 cm. The sample is characterized as weathered surface sand with a light gray color and presence of marine biota activity. The sample shows moderate to good sorting, fine sand grain size, and subrounded grain shape. The sample is composed of quartz with possible feldspar content. Given its distance from the shoreline, the sample was likely deposited under relatively low wave energy conditions.

Figure 5. Surface Samples at Location B

Sampling at Point C was conducted closer to land, also 15 meters from the shoreline but at a depth of 10 cm. The sample is characterized as fresh sand (deeper/non-surface sampling), with a light gray color as shown in figure 6. It shows moderate to good sorting, fine sand grain size, and subrounded grain shape. It composed of quartz and possible feldspar content. The depositional environment is inferred to be characterized by relatively low wave energy.

Figure 6 Surface Samples at Location C

The fourth surface sample was collected at point D, with its appearance shown in Figure 7. The sample consists of sand and weathered clay, obtained from a depth of 5 cm at a location 30 meters from the shoreline within the lagoonal zone. It is well sorted, with fine to very fine grain sizes.

Figure 7 Surface Samples at Location D

B. Subsurface Sediment Samples (Core)

Following the completion of surface sampling, core sampling was conducted. The first core sampling location was approximately 30 meters from the shoreline, as shown in Figure 8. The core revealed a sediment thickness of 130 cm, with the facies predominantly composed of carbonaceous shale interbedded with very fine sand and silt. The shale is dark gray color. This sample has a parallel lamination sedimentary structure, with rounded grain shapes, a grain-supported fabric, and the presence of root traces

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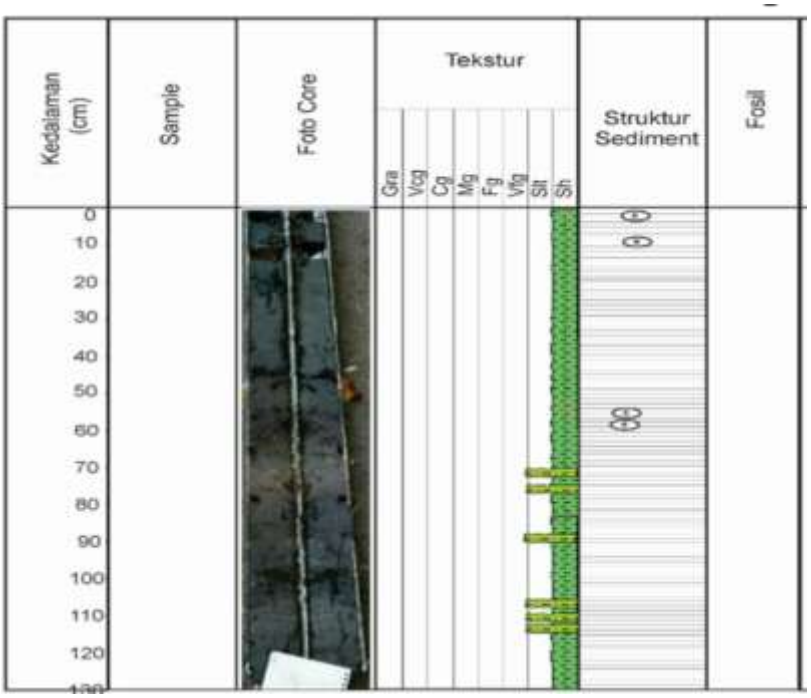

Figure 8 Core Sampling at Location 1 is on the lagoon

Core sampling from Location 2, which is situated in the coastal area, reveals two distinct facies within the 90 cm thick core as shown in Figure 9. Facies I consists of medium-grain sandstone with a dark gray to black color, poor sortation, sub-angular to angular grain shape, a grain-supported fabric, and a coarsening-upward sequence.
Facies II, identified as coarse-grain sandstone, with a dark gray to black color and poor sortation, angular to sub-angular grain shapes, a grain-supported fabric, cross-bedding sedimentary structures, and a coarsening-upward sequence. Parallel laminations and upward-coarsening sequences observed in the cores reflect varying energy conditions during deposition, consistent with sedimentary structures described by Allen [13].

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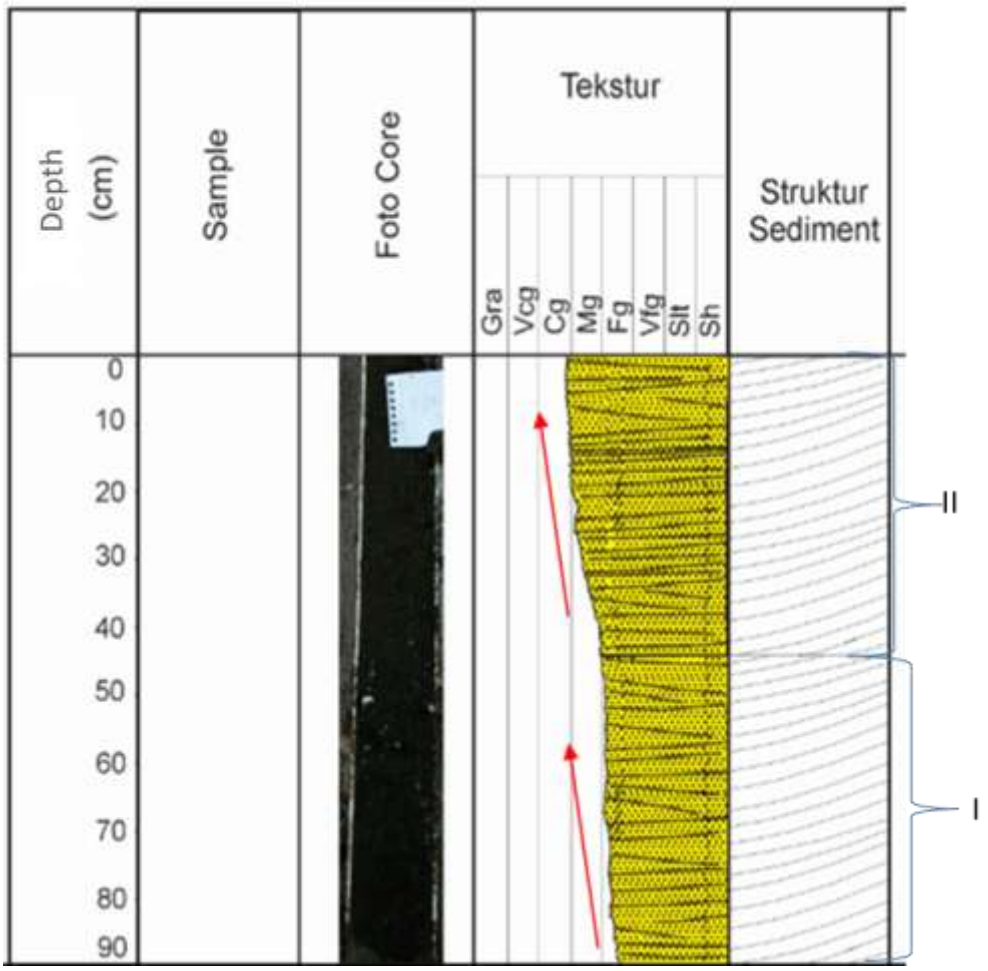

Figure 9 Core Sampling at Location 2 is in the shoreline

The facies cross-section model of the research area, developed based on [5]. and [7]., is shown in Figure 10. Core 1, which is predominantly composed of carbonaceous shale facies, is interpreted to represent a lagoonal depositional environment. In contrast, Core 2, characterized by medium- to coarse-grained sandstone facies, is associated with a shoreface environment.

Based on the analysis of surface samples, there are ripple marks at the location between the shoreline-up to 10 meters towards the land and the grain size is coarse sand. Surface samples have a grain size of Fine-Coarse sand located in a range of 10-15 meters from the shoreline towards the land. While the surface sample has a grain size of Fine-Coarse sand located in a range of 15-30 meters from the shoreline towards the land. The interpretation of these facies and the resulting model provides valuable insights into coastal depositional systems and may serve as an analogue for reservoir characterization in subsurface studies of the Northwest Java Basin.

As highlighted by Miall [12], understanding facies relationships and basin-fill architecture is crucial in interpreting sedimentary processes and potential reservoir settings in coastal and deltaic environments.

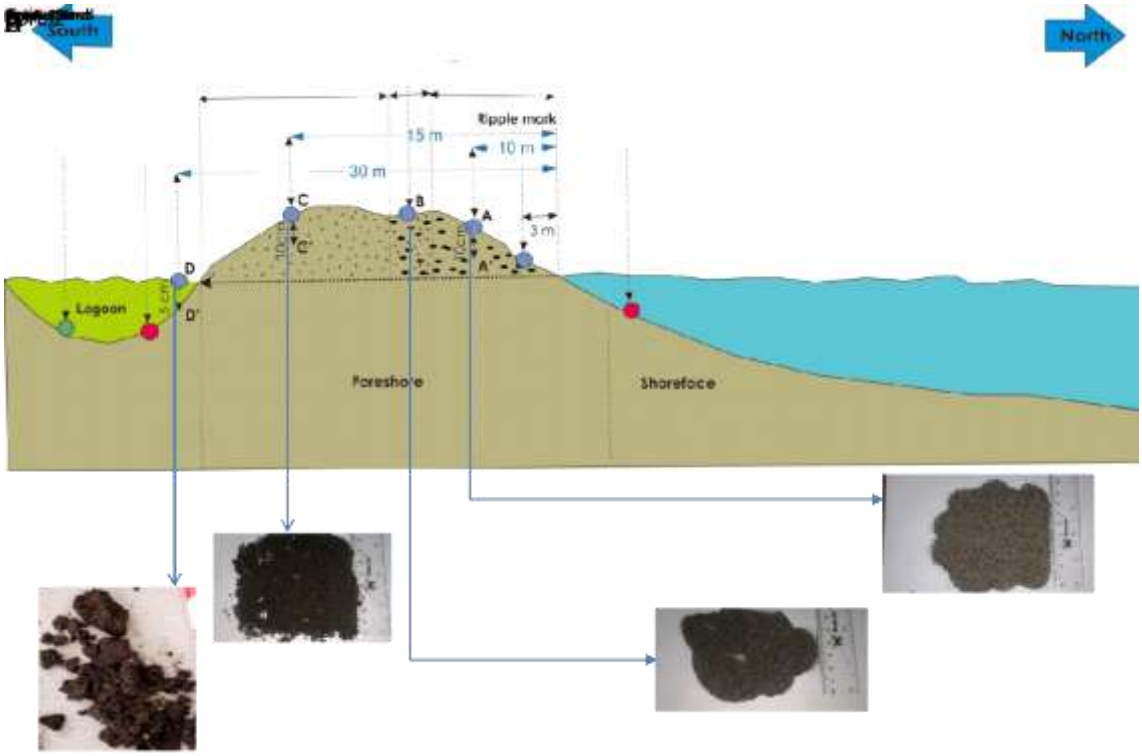

Figure 10 The coastal facies cross-section model of the research area (without scale)

CONCLUSIONS

Based on the analyzed core data, it can be concluded that :

- The facies at Core Point 1, indicative of a lagoonal environment, is predominantly composed of carbonaceous shale. In contrast, Core Point 2 represents a shoreface environment, characterized mainly by medium- to coarse-grained sandstone facies.
- The facies cross-section model has been successfully constructed to represent lagoonal, foreshore, and shoreface depositional environments.

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