LITOFASIES ANALYSIS IN THE CIPAMINGKIS RIVER ROCK FORMATION JATILUHUR, BOGOR, WEST JAVA.

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ABSTRACT

The Sedimentary rocks result from the breakdown of previously transported rocks deposited and lithified. Sedimentary rocks cover almost 80% of the earth's crust (Folk, 1974). The research was conducted in the Cipamingkis River, Jonggol District, Bogor Regency, West Java. The research area is included in the Cianjur Regional Geological Map Sheet (Sudjatmiko, 1972) and is included in the Dayeuhkaum Earth Map (1209 – 233) published by the Geospatial Information Agency (BIG). The Jonggol District, Bogor Regency, West Java, has a large river, the Cipamingkis R,iver, stretching from the northeast to the southwest of the study area. This river is included in the Jatiluhur Formation (Sudjatmiko, 1972). The facies is a rock body with a different combination of physical, chemical and biological characteristics from the surrounding rock body, which reflects its original conditions, namely the way it was transported and the way it was deposited. Two bodies of rock deposited simultaneously have different facies if they have differences in their physical, chemical and biological characteristics. Units and sediment structure components in the study area are grouped into six lithofacies: (1) Thin-Medium Sandstone Layer, (2) Massive Claystone, (3) Alternating Sandstone and Claystone, (4) Thick Sandstone Layer, (5) Alternating Fine Sandstone and Very Fine Sandstone, and (6) Slump Deposit. Description of facies by limiting physical and chemical characteristics is called lithofacies, and lithofacies is a facies analysis method by considering information about physical and chemical characteristics of rock layers (Nichols, 2009).

Keywords: *Sedimentary Rocks, Facies, Lithofacies, Cipamingkis River.*

INTRODUCTION

The study of sedimentary rocks is an important matter. Sedimentary rocks result from the breakdown of previously transported rocks deposited and lithified. Sedimentary rocks cover almost 80% of the earth's crust (Folk, 1974). Sedimentology is a branch of geology that studies the form and process of the formation of sedimentary rocks. In the formation process of sedimentary rocks, sedimentary particles undergo transportation from the rock of origin (provenance) to the place where they were deposited.

The research was conducted in the Cipamingkis River, Jonggol District, Bogor Regency, West Java (Figure 1). The research area is included in the Cianjur Regional Geological Map Sheet (Sudjatmiko, 1972) and is included in the Dayeuhkaum Earth Map (1209 – 233) published by the Geospatial Information Agency (BIG). The Jonggol District, Bogor Regency, West Java, has a large river, the Cipamingkis R,iver, stretching from the northeast to the southwest of the study area. This river is included in the Jatiluhur Formation (Sudjatmiko, 1972). The facies is a rock body with a different combination of physical, chemical and biological characteristics from the surrounding rock body, which reflects its original conditions, namely the way it was transported and the way it was deposited. Two bodies of rock deposited simultaneously have different facies if they have differences in their physical, chemical and biological characteristics.

The research area belongs to the Jatiluhur Formation (Sudjatmiko, 1972). The Jatiluhur Formation is well exposed along the Cipamingkis River. This is the oldest known formation in the northern part of the Bogor Basin. The spread of this formation starts from Purwakarta in the east continues to the west until it enters the Bogor Regency area (Sudjatmiko, 1972; Effendi, 1998). Volcaniclastic deposits from the Cantayan Formation cover the southern part of the Jatiluhur Formation. The northern region is in contact with limestones for the Klapanunggal claystone for the Subang Formation. The Jatiluhur Formation has a thickness of more than 1000 meters and is composed of a mixture of siliciclastic sedimentary rocks and limestones (Abdurrokhim, 2017). The age of the Jatiluhur Formation recorded on the Cipamingkis River trajectory is N13 – N16 (Solihin, 2016) (figure 2).

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RESEARCH METHOD

The activities carried out are outcrop observations in the field in the form of taking outcrop data (covering physical characteristics, sedimentary structure, the direction of movement, rock slope, rock thickness, rock contact, making lithological profiles and taking pictures as field evidence. Stratigraphic cross-section measurements or *MeasuredMeasured Sections* obtain detailed lithological data from the layers, which can later be classified into lithofacies. Besides measuring the stratigraphic profile, the description method is carried out to find out more details about the characteristics of each rock to be used as lithofacies.

Facies can be defined by a particular set of sedimentary features, such as lithological characteristics, texture, sequence of sedimentary structures, fossil content, colour, geometry, paleocurrent patterns, etc. Facies are produced by one or more processes operating in the depositional environment. There may be many different facies in sedimentary succession, but usually not many. Some facies may repeat occasionally or several times in succession. Facies can also change vertically or laterally into other facies with changes in one or more of their characteristics. In some cases, it may be possible to recognise subfacies sediments similar in many ways but exhibit some differences. After the various facies have been distinguished, a table is made with their multiple features (name, code, typical thickness or thickness range, grain size, sedimentary structure, fossil, colour, etc.).

RESULT AND DISCUSSION

The research area belongs to the Jatiluhur Formation, located in the western part of the Bogor Basin. Based on field observations, the constituent lithologies include sandstone and claystone. The sandstone in the research area is the main object studied in this study. The research was conducted on one main river, the Cipamingkis River. The rocks are exposed quite well in the study area by showing precise inter-layer locations. The general lithology in the study area is shale claystone and sandstone with very fine to fine grain sizes, moderately sorted, packed closed with carbonate properties, and in several places showing various sedimentary structures such as *cross* lamination and *parallel* lamination. Rock characteristics and their vertical changes can be seen from the measured stratigraphic cross-section due to outcrop observations in the form of a measured section in the study area. The various rock characteristics in the study area are divided into several lithofacies by considering the geological features present in each rock. The lithofacies distribution in the rocks in the research area is based on the results of outcrop observations in the field and interpretation studio without laboratory analysis.

Aspects that need to be considered in the division of lithofacies are based on rock descriptions. Namely, colour, thickness, distribution, sedimentary structure, and sediment texture in grain size, grain shape, and sorting outcrops or *hand specimens of rock found* from field activities. Layers, sedimentation units and sedimentary structural components are fundamental aspects of observation to form the basis for the division of lithofacies. Based on these aspects, the research area can be divided into six lithofacies, namely (1) thin-medium layer of sandstone, (2) massive claystone, (3) alternating sandstone and claystone, (4) thick layer of sandstone, (5) alternating fine sandstone and very fine sandstone, and (6) slump deposits.

(1) thin-medium layer of sandstone, This lithofacies consists of sandstone lithology with characteristics of medium/thin sized layers. In these lithofacies, there is a sedimentary structure in parallel lamination. This lithofacies has a fresh grey and weathered dark grey colour with grain sizes from very fine to fine. The thickness of the rock layers in this lithofacies ranges from 0.3 – 1.5 m (figure 3). The sedimentary structure present in these facies is parallel lamination on a thin layer of very fine sandstone, where this facies has similarities with the Bouma (Td) *division* (Bouma, 1962). However, generally, this sandstone layer is *structureless*. With the presence *features* of these sedimentary, saltational sediment deposition was identified and associated with low-density turbidity currents. The sandstone layers *structureless* represent suspended sedimentation (Bouma, 1962), and *planar bedding* and parallel laminates (Td) result from low-density turbiditiy currents.

(2) massive claystone, This lithofacies consists of claystone lithology with massive and shale characteristics. This lithofacies has a fresh colour of grey and a weathered colour grey blackish. The thickness of the rock in this lithofacies ranges from 2 – 45 m (figure 4). The presence of massive claystone in these facies indicates that the deposition of *homogenous mud is* in the *low energy regime*. Similarity with the Bouma (Te) *division* identified as a *suspension falls out* in low-density turbidity currents (Bouma, 1962).

(3) alternating sandstone and claystone; this lithofacies consists of sandstone and

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claystone lithology with alternating characteristics between sandstone and claystone. In these lithofacies, there is a sedimentary structure in the form of parallel lamination. The sandstone layer has fresh coloured weathered dark grey colours, while the claystone layer has a fresh grey colour and weathered grey colour. The thickness of the layer's rocking these lithofacies ranges from 0.1 - 2 m (figure 5). This lithofacies shows *features* sedimentary the form of parallel lamination in the sandstone layer. There is a similarity in the Bouma (Td, Te) *division*, which comes from the declining turbidity currents and *homogeneous mud* in the *low energy regime*. The type of fine grain and parallel laminates in the sandstone layer can be interpreted as indicating that low-density turbidity currents influence the depoturbidity mechanism. In contrast, the presence of claystone is interpreted as a *suspension fallout* for low-density turbidity flows (Bouma, 1962).

(4) thick sandstone layer, This lithofacies consists of sandstone lithology with characteristic thick layers. There are sedimentary structures in parallel lamination and cross lamination in these lithofacies. This lithofacies has a fresh grey and weathered dark grey colour with grain sizes from very fine to fine. The thickness of the rock layers in this lithofacies ranges from 1.5 - 7 m (figure 6). This lithofacies shows *features* sedimentary in the form of parallel lamination and cross lamination in the sandstone layer, where there are similarities to the Bouma (Tc, Td) *division*, which originates from low-density turbidity currents. The type of fine grain and the presence of parallel lamination and cross lamination in the sandstone layer can be interpreted that the depositional mechanism being influenced by the *lower flow regime* (Bouma, 1962).

(5) alternating fine sandstone and very fine sandstone; this lithofacies consists of sandstone lithology with alternating characteristics between very fine sandstone and fine sandstone. There are sedimentary structures in parallel lamination and cross lamination in these lithofacies. This lithofacies has a fresh colour of grey and a weathered shade of dark grey. The thickness of the rock layers in this lithofacies ranges from 0.5 to 2.3 m (figure 7). This lithofacies shows sedimentation in parallel lamination and cross lamination in the sandstone layer, where there are similarities to the Bouma (Tc, Td) *division*, which originates from low low-density turbidity currents. In these lithofacies, sediment is transported by *concentrated density flow* and settles rapidly and often (Pickering, 1986). The type of fine grain and the presence of parallel lamination and cross lamination in the sandstone layer can be interpreted as the lower flow regimebeingnfluences the depositional mechanism (Bouma, 1962).

(6) slump deposits, These lithofacies consist of layers that are folded randomly and winding, and in some places, some parts have been broken. These lithofacies can be found on the floor and river walls (figure 8). According to Pickering (1986), this lithofacies transportation process is due to *slide* and *slump* rotation and deposition *overloading* fine sediments. It settles when the movement of the lower *slope is* due to gravity.

CONCLUSION

The lithology of the research area consists of sandstone and claystone. The general lithology in the study area is shale claystone and sandstone with very fine to fine grain sizes, moderately separated, packed closed with carbonate properties, and in several places showing various sedimentary structures such as *cross* lamination and *parallel* lamination. The research area can be divided into lithofacieshofiacies: thin-medium sandstone layers, massive claystone, alternating sandstones and claystones, thick sandstone layers, alternating fine sandstones and very fine sandstones, and slump deposits.

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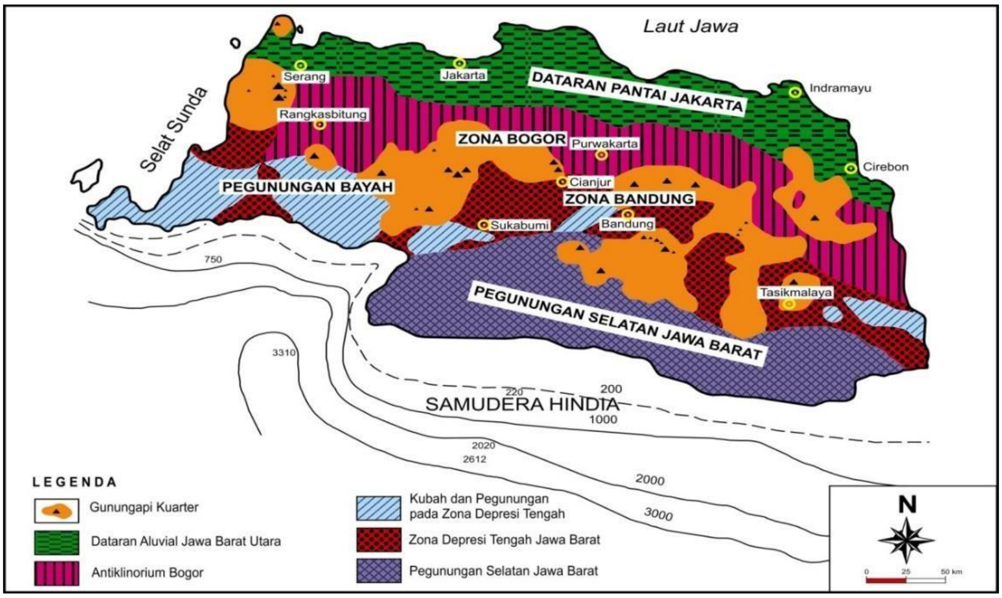

Figure 1. Regional Physiography West Java (Modified van Bemmelen, 1949)

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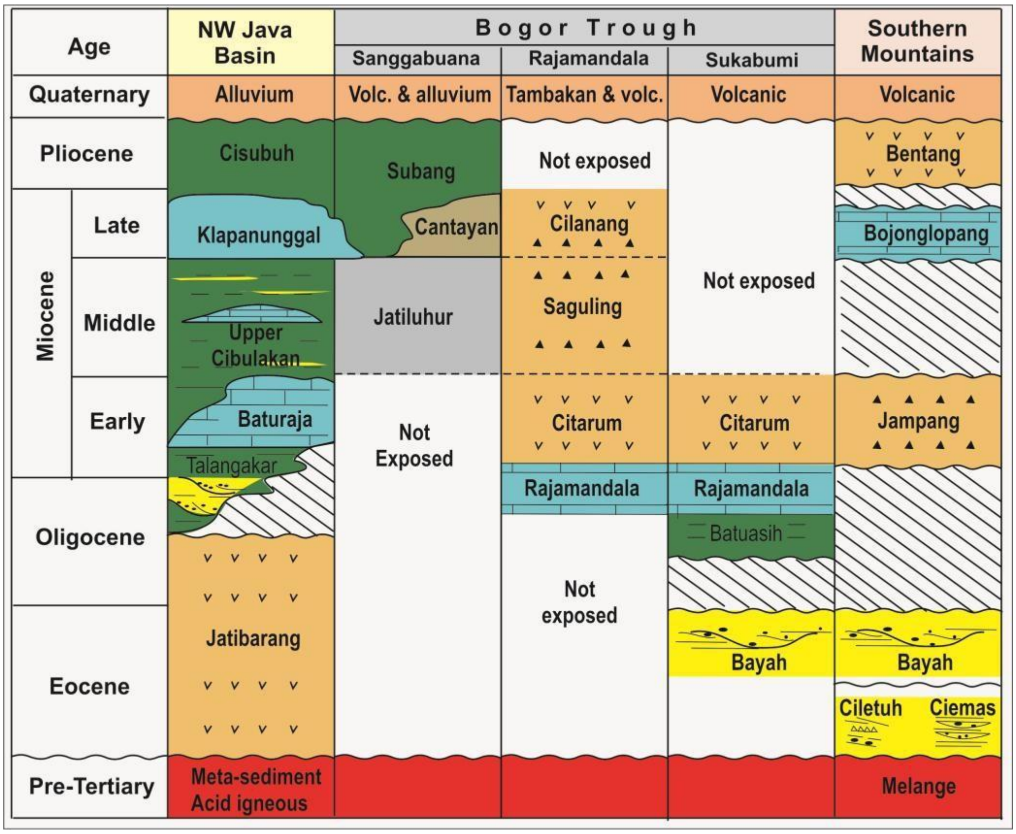

Figure 2. The stratigraphic sequence in the Bogor Basin and North West Java Basin (far left) was modified by Sujanto and Sumantri (1977), Martodjojo (2003), Suyono et al. (2005).

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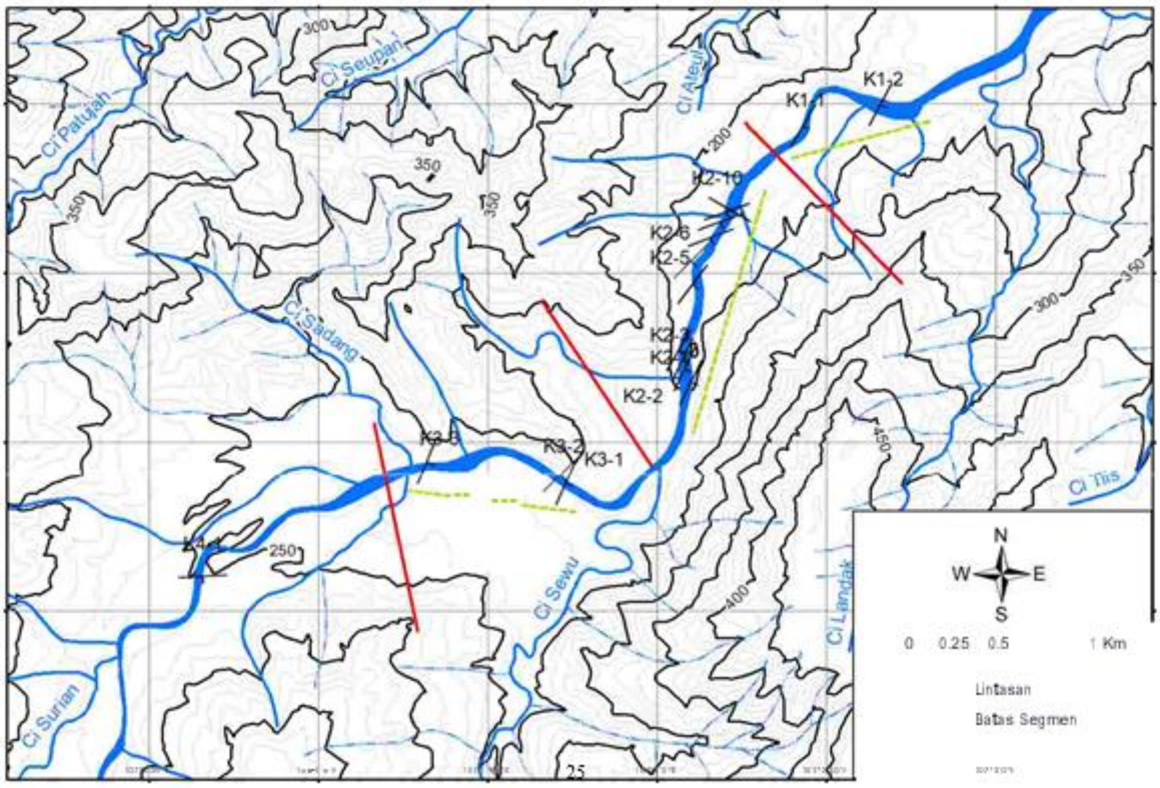

Figure 3. Research Area Measured Section Location at Cipamingkis River.

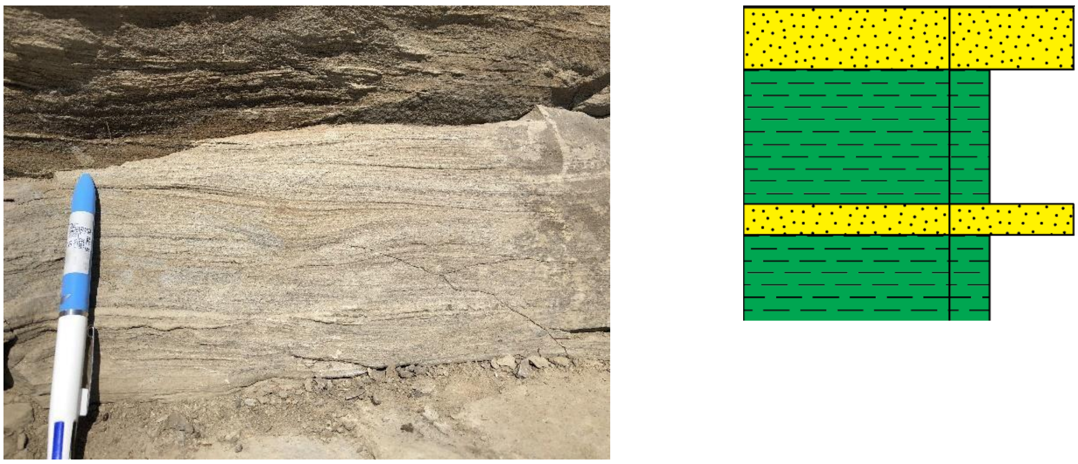

figure 4. thin-medium layer of sandstone

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Figure 4. Massive claystone

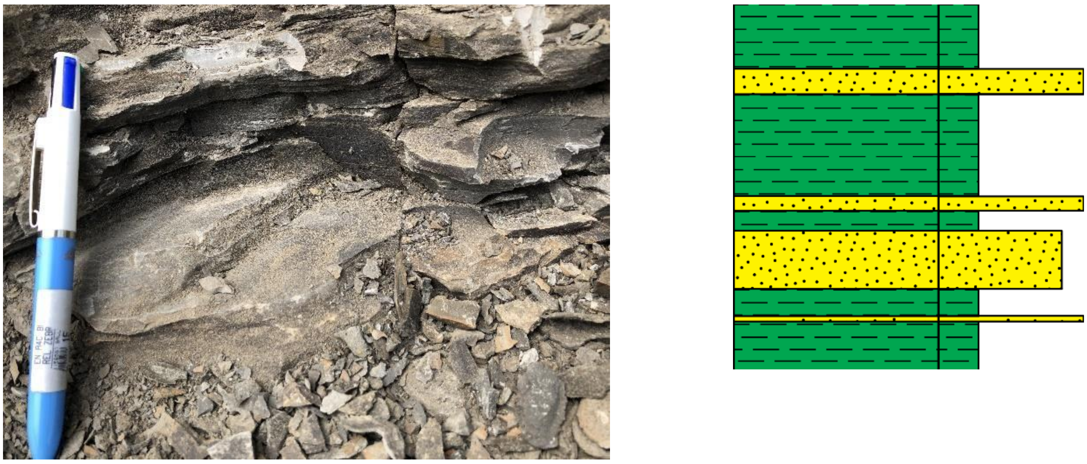

Figure 5. alternating sandstone and claystone

Figure 6. thick layer of sandstone

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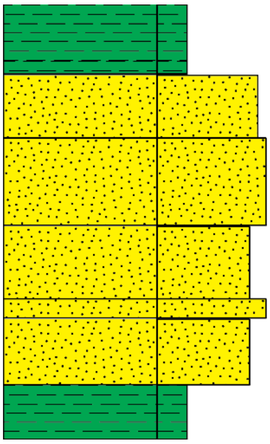

Figure 7. alternating fine sandstone and very fine sandstone

Figure 8. slump deposits

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