

Geological Synthesis in Pamarican District West Java - Indonesia*

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Abstract

Geographically, Pamarican District is located between 108.27'30'' – 108.32'30'' Eastern Longitude and 07.25'30'' – 07.29'30'' Southern Longitude and belongs to Digital Base Map of Indonesia (BAKOSURTANAL) from, Banjarsari sheet map (1308-422), and Raksa Baya sheet map (1308-511) through a scale map 1:12,500. This area administratively included into Ciamis Region, West Java Province with a research area 100 km². Physiographically, the research area is part of Southern Mountains Zone of West Java.

Geomorphology of Pamarican and its surround based on morphometry, morphography, and morphogenetic, is consist of five geomorphology unit, alluvial platform unit, very gently sloping sedimentary plain unit, very gently sloping volcanic plain unit, moderately slope hill with structural sediment unit, structural with steep slope hill unit.

Stratigraphy, according to characteristic lithotype in surface outcrop and petrography analysis, research area is divided into five parts of rock unit, arranged from the oldest to the youngest unit, are Tertiary Volcanic Breccia unit, Limestone unit, Carbonate Sandstone unit, Sandstone unit, Quaternary Volcanic Breccia unit, Alluvium.

Structural Geology, based on an observation in the surface field, this research area has several of structural condition, including fold (anticline-syncline) with relative trend orientation W-NW – E-SE, joint with relative trend orientation N-S, SE-NW Dip Slip Thrust Fault, and SE – NW strike slip dextral fault. These structures are result of NNE – SSW compressional force of Pliocene – Pleistocene tectonics period.

Geological History, begin at Late Oligocene, when volcanism activity delivered volcanic material that form tertiary volcanic breccias. Followed by Early Miocene Volcanism activity ceased and geological condition tend to be more stable, In Early Miocene Lime material growth and form limestone unit. In the Late Miocene age, sedimentary clastic materials were deposited in marine environment form Carbonate Sandstone unit. In the Middle Pliocene sedimentary clastic materials was deposited in Transition Zone form Sandstone unit. Compressive tectonic regime in Pliocene and Pleistocene time has deformed rock unit, and accommodate folding and faulting zone, on eventually changed the research area into land condition like present. In Pleistocene age, volcanic activity occurred, this activity delivered volcanic materials that form Quaternary Volcanic Breccias. At the Holocene – Recent, erosion process making result of surficial deposit in the of Alluvium unit.

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Purpose

The intent of this study was to determine the geological conditions of an area of research, and reconstruct the geological history of the study area. The purpose of this study was to collect and analyze geological data contained in the field, seen from the aspect of geomorphology, stratigraphy, structural geology and geological history.

Geomorphology

Geomorphology analysis, aims to determine the morphology conditions and also the processes, by using three main aspects, morfography, morphometry, and morphogenetic. Based on 3 aspects in general it will be known descriptively morphological conditions and the factors controlling the area of research, as well as, river drainage patterns, landform, forms the valley, class relief, elevation, slope, lithological influence, and also eksogen and endogen processes. Divided into 5 units geomorphology :

1. Alluvial Platform Unit
2. Very Gently Sloping Sedimentary Plain Unit
3. Very Gently Sloping Volcanic Plain Unit
4. Moderately Slope Hill with Structural Sediment Unit
5. Structural with Steep Slope Hill Unit

Stratigraphy

Stratigraphy analysis was to determine the stratigraphic position of lithologies in the study area. In addition it is to determine the characteristics of the type of lithology based on petrography analysis. And also to determine the age and depositional zones, based on the micropaleontology analysis. The study area can be divided into six rock units from the oldest to the youngest :

1. Tertiary Volcanic Breccia (Tomb)
Occupying an area of research by 15%. The lithology consists of, matrix Crystal Tuff (Schmidt, 1981), with components Andesite Porphyry (Travis, 1955). Stratigraphic relationship is unconformity with Limestone unit (Tmls) in upper part. Age of this unit is Late Oligocene - Early Miocene, with shallow marine depositional environment,(Sukamto, 1975).
2. Limestone (Tmls)
Occupying an area of research by 5%. The lithology dominated by, Limestone Reefs (Dunham, 1962), and few of Clastic Limestone - Packestone (Dunham, 1962). Stratigraphic relationship is unconformity with Tertiary Volcanic Breccia unit (Tomb) in lower part and Carbonate Sandstone (Tmcs) in upper part. Age of limestone unit is Middle Miocene (N9-N14), with shallow marine depositional environment (Inner Neritic 50m – Middle Neritic 100m).
3. Carbonate Sandstone (Tmcs) Occupying an area of research by 30%. The lithology consists of, Lithic Arenite Sandstone (Pettijohn, 1975), and Mudstone ((Pettijohn, 1975). Stratigraphic relationship is unconformity with Limestone unit (Tmls) in lower part and

Sandstone (Tpss) unit in upper part. Age of carbonate sandstone unit is Late Miocene – Early Pliocene (N16-N19), with deep marine depositional environment (Outer Neritic 200m).

4. Sandstone (Tpss)

Occupying an area of research by 15%. The lithology consists of, Lithic Tuff (Schmidt, 1981). Stratigraphic relationship is unconformity with Carbonate Sandstone unit (Tmcss) in lower part and Quarternary Volcanic Breccias unit (Qb) in upper part. Age of sandstone unit is Middle Miocene, with transition zone depositional environment (Kastowo & Suwarna, 1996).

5. Quarternary Breccia (Qb)

Occupying an area of research by 10%. The lithology consists of, matrix Vitric Tuff (Schmidt, 1981), with components Andesite Porphyry (Travis, 1955). Stratigraphic relationship is unconformity with Sandstone (Tpss) unit in lower part and Alluvium unit (Qa) in upper part. Age of quarternary breccia unit is Pliocene (Kastowo & Suwarna, 1996).

6. Alluvium (Qa)

Occupying an area of research by 20%. The lithology consist of a deposit of a clay, silt, sandstone, and gravel, left by erosion and flowing a river, and the process of its unit is still going on until Recent.

Geological Structure

Geological Structure analysis was to determine the structure of geology that developed in the research area, such as fold, joint, and fault. Structure analysis, it can also produce a reconstruction of the cross-section based on the value of the strike / dip in the surface, its useful to determine the stratigraphic positions on each lithologies unit. By using the straightness of the ridge on DEM, river pattern straightness, and joint analysis, its very useful to get the assumption of force and trend orientation that developed in the research area, the result of geological structure analysis are :

1. Based on DEM and River Pattern Straightness, give the assumption force and trend orientation is N-NE – S-SW
2. Fold that developed in the research area are divided into 3 types, namely by, Karanganyar Anticline, Cijobo Sinecline, and Malabar Anticlie.
3. Joint analysis using Rossete Diagram shows the force and trend orientation that developed in the research area N-S
4. Fault in the research are, divided into two types, SE-NW Dip Slip Thrust Fault, and SE – NW strike slip dextral fault.