

LATE MIOCENE TO HOLOCENE GEOLOGY OF JATIMULYA AREAS, MAJALENGKA DISTRICT, WEST JAVA-INDONESIA

Nadiyah Nur Rabbani^{1*}, Yuyun Yuniardi¹, Febriwan Mohamad¹

¹Faculty of Geological Engineering, Padjadjaran University, Sumedang, 45363, West Java, Indonesia

*Corresponding author: nadiyah22002@mail.unpad.ac.id

ABSTRACT

The study area is located along the active reverse Baribis fault segment. Geographically, it extends from 108° 12' 2.00" to 108° 14' 45.00" E and from 6° 47' 0.00" to 6° 45' 17.00" S which covers an area of approximately 25 km². The aim of this research is to clarify the geomorphological, lithological, stratigraphic, structural geological and geological potential characteristics of this site. They use methods such as geological mapping, laboratory analysis, DEM image interpretation and literature review. The region has been formed by both internal processes (tectonic and volcanic) and external processes (weathering and erosion). Geomorphologically, it contains gently sloping volcanic plains, moderately steep volcanic hills, steep structural hills, sloping structural plains and a sloping denudational plain. These accommodates multiple patterns, including parallel, rectangular and sub-dendritic drain styles. Field observations and stratigraphy studies indicates that there are lithostratigraphy formations, consist of the Claystone unit (Nmpbl), Sandstone Unit (Npbp), Limestone Unit (Npbg), Andesite Intrusion Unit (Sia) and Tuff unit (Qt). The major geological structure is a northwest-southeast region, and reverse fault that almost certainly coincides with the ridge and valley arrangement of this area. Geological resources consisted of non-metallic mineral assets of quarry such as sand and andesite while geological threats that are common in the area were landslides, earthquakes and flooding.

Keywords: Geological Mapping, Majalengka, Geomorphology, Structural Geology, Stratigraphy.

INTRODUCTION

The Jatimulya area, which belongs to Kasokandel District with a location in Majalengka Regency, West Java Province and geologically the coordinates of the site are located at 108°12'02.00"–108°14'45.00" E; every time 6°45'17.00"–6°47'60.00" S is an important research site on tectonics and sedimentary processes (Figure 1). The region is located within the eastern part of the Baribis Fault segment, an active west-east to northwest-southeast trending reverse fault system (Martodjojo, 1984), which is pivotal in controlling regional deformation patterns. Until now, geological studies in the Majalengka area are mostly only limited to regional geological mapping (Van Bemmelen, 1949; Djuri, 1995), stratigraphy and sedimentology of Bogor Zone (Isnaniawardhani et al., 2020) and tectonic evolution (Sukarman et al. Recent work based

on geophysical investigations has helped delineate the Baribis Fault geometry at a regional scale (Nurhandoko et al., 2025). Still missing, though, is thorough geological description at a regional mapping level inside the Jatimulya region.

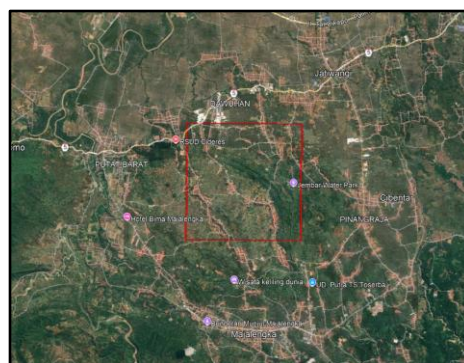


Figure 1. Location of the study area based on Google Earth satellite imagery

This research is conducted to examine the geomorphology of the study area, characterize the distribution and layering of rock formations, identify the orientation and classification of geological structures, interpret the geological evolution of the region, and evaluate both its geological characteristics and potential geological hazards.

REGIONAL GEOLOGY

Regional Fisiography

Van Bemmelen (1949), as cited by Martodjojo (1984), classified the physiography of West Java into five distinct regions: the Jakarta Coastal Plain, the Bogor Zone, the Bandung Zone, the Bayah Mountains Zone, and the Southern Mountains Zone. The classification reflects variations in landform characteristics, geological structures, lithological units, and the tectonic processes responsible for the geological evolution of these regions.

The Jakarta Coastal Plain Zone is characterized by relatively flat lowland landscapes predominantly composed of young alluvial deposits resulting from fluvial and marine sedimentation processes. In contrast, the Bogor Zone is recognized as a folded hilly region formed by intense deformation of Tertiary to Neogene sedimentary rocks. Meanwhile, the Bandung Zone is characterized by an intramontane basin surrounded by both active and inactive volcanic mountains, indicating the strong influence of volcanism and tectonic activity in the development of the region.

The study area is located within the Bogor Zone, a regional geological belt extending from Rangkasbitung through Bogor, Purwakarta, Subang, Sumedang, Kuningan, and Majalengka. This physiographic zone is characterized by structurally controlled hilly terrain that developed as a result of long-term tectonic processes. Geologically, the Bogor Zone is predominantly composed of deep-marine Tertiary sedimentary deposits that have undergone intense deformation caused by tectonic compression, resulting in the formation of a major Neogene anticlinorium. Subsequent tectonic reactivation further

modified this anticlinorial structure, producing numerous faults that are interpreted to have formed during the Pliocene–Pleistocene. These faulting events are associated with regional tectonic phenomena, including the development of the Lembang Fault and the uplift of the Southern Mountains (Wardhana et al., 2016). The Bogor Zone is a crucial area for geological research since it has a sophisticated geological evolution spanning millions of years and offers significant evidence of the interplay among deep-marine sedimentation, tectonic deformation, and volcanic activity (Van Bemmelen, 1949).

Regional Stratigraphy

There are many researchers who have documented the local stratigraphy (e.g. Van Bemmelen, 1949; Martodjojo, 1984; Djuhaeni and Martodjojo, 1989; Djuri, 1995). Published by Isnaniawardhani et al., the research area location is shown in the Majalengka Geological Map (2020). Displayed rock units chronologically range from the oldest to youngest rock layers:

- 1) The Subang Formation Claystone Member (Nmpsc) includes in some areas layers of hard marlstone limestone, dark gray limestone, nodules, and marlstone made of claystone.
- 2) The Kaliwangu Formation Sandstone Member (Npks) consists of sandstone and tuffaceous sandstone (Rachman et al., 2021).
- 3) The Kaliwangu Formation Claystone Member (Npkc) consists of claystone, sandstone, and lignite.
- 4) The Kaliwangu Formation Limestone Member (Npkl) consists of brownish-white limestone containing large foraminifera fossils and corals.
- 5) The Citalang Formation Sandstone Member (Npcs) consists of sandstone and tuffaceous sandstone.
- 6) Andesite (a) is an intrusive rock composed entirely of andesite in the form of a rift-like slab with a width of 20-30 meters. This intrusion penetrates sedimentary rocks of the Cinambo Formation, Halang Formation, Subang Formation, and Citalang Formation, estimated to be Quaternary in age (Djuri, 1995).

- 7) The Ciremai Volcanic Rock (Qhcrv) consists of breccia, tuffaceous sandstone, tuff, and lapilli, resulting from the Holocene eruption of Mount Ciremai. The volcanic units unconformably overlie marine sedimentary rocks (Djuri, 1995).
- 8) The Colluvial Deposit (Qc) consists of colluvial deposits, the youngest unit in the study area, and is Holocene to Recent in age. The deposits consist of loose material ranging in size from boulders to clay.

Regional Structural Geology

According to Van Bemmelen (1949), the tectonic evolution of West Java during the Tertiary can be divided into three main orogenic phases. The Oligo–Miocene orogeny marked the development of the Bogor Basin, which evolved from a fore-arc into a back-arc basin. This was followed by the Intra-Miocene orogeny, characterized by intense folding, faulting, and the formation of a geanticline south of Java, with northward-directed compressional forces producing west–east trending folds and southwest–northeast strike-slip faults, continuing from the Miocene to the Pliocene. The Plio–Pleistocene orogeny was dominated by volcanic activity and northward-directed tectonic forces, resulting in subsidence in the northern Bandung Zone and the development of folds and reverse faults in the Bogor Zone, extending from Subang to Mount Ciremai.

Based on the general structure of West Java, the fault lines based on their general direction can be divided into four main groups, namely the North – South Fault (Sunda Pattern), Northwest – Southeast Fault (Sumatra Pattern), Northeast – Southwest Fault (Meratus Pattern), and West – East Fault (Java Pattern).

RESEARCH METHOD

This research conducted through studio analysis and field observation (Rendra and Sukiyah, 2019) The pre-field phase consists of reviewing existing literature and analyzing remote sensing information derived from the Regional Geological Map and DEM images to recognize river systems, land features,

geological structures, lineaments, and ridges, which assists in creating route maps.

Field activities utilize the Tape and Compass Traverse method and the Field Orientation method. Both methods are used to identify lithology, measure geological structures, document outcrops and landforms, collect samples from 81 stations across the study area, and confirm geomorphological DEM image analysis with field observations.

A total of 18 samples representing the study area from the 81 stations were analyzed in the laboratory: 7 samples for micropaleontological analysis and 11 samples for petrographic analysis. The laboratory analysis activities aim to determine the detailed rock components, identify rock types, determine the genesis of the studied rocks, determine their ages, and identify their depositional environments. All data from the study area is compiled on the Geological Framework Map (Figure 2).

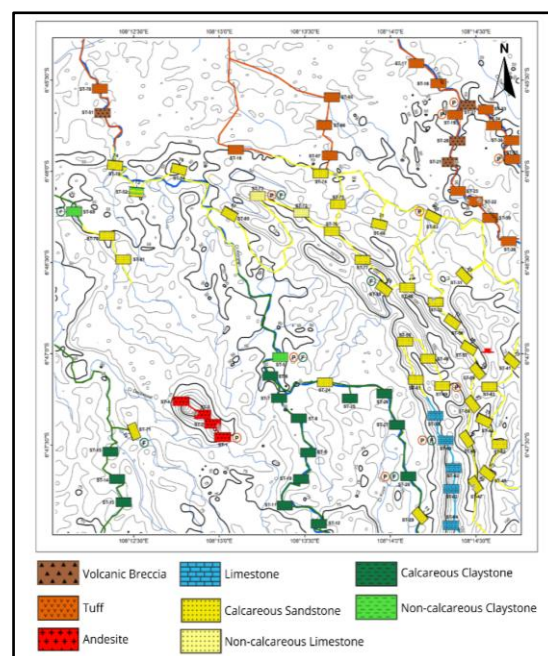


Figure 2. Geological Framework Map of the Research Area (scale 1:12,500)

Micropaleontological analysis took place in the Paleontology Lab, beginning with the stage of preparing by breaking down, cleaning, and sifting through rock samples until they were dried, followed by the identification of fossils with the aid of a stereo binocular microscope. At the same time, petrographic analysis of rock sections was conducted in the Mineralogy

and Petrography Laboratory using a polarizing microscope.

RESULT

Geomorphology of the Study Area

The study of geomorphology aims to understand the characteristics of landforms and the geological processes involved in their formation. It also investigates the connection between landscape features, the processes that produce them, and their spatial arrangement. Accordingly, the geomorphological map was developed using three key analytical components: morphology, morphometry, and morphogenesis.

Morphography

According to the classification of landforms modified from Van Zuidam (1985) and supported with Google Earth visual observations, there are two geomorphological units that can be distinguished in the study area (Figure 3a). Light green: Low hills (100-129 masl) are in this category, represented generally in the maps as low mountains and plains (< 100 masl), indicated by yellow and green colors.

Based on Howard's (1967) categorization in Van Zuidam (1985), drainage analysis reveals three distinct drainage patterns inside the research region (Figure 3b). The eastern sector shows a parallel drainage pattern (A) connected with long northwest-southeast trending hills. The main area has a rectangular drainage pattern (B) because of how river bends and reverse fault structures affect it. On the other hand, the western part shows a sub-dendritic drainage pattern (C), mostly found in the lowland.

Morphometry

The morphometric study in Figure 3c shows five slope classes based on Van Zuidam's (1985) categorization for the study area. Gentle slopes with gradients of 2 to 4 degrees are prevalent in the study area, covering almost half of the total area. Slopes with gradients between 4 and 8 degrees are also common in the region, covering approximately 25% of the total area. Steeper

slopes—8 to 16 degrees—are mostly found in the southeastern and southwestern parts of the study area and cover approximately 10% of the total area. With slopes ranging from 16 to 35 degrees, the southeastern and southwest parts are also quite concentrated and cover approximately 10% of the total area. The steepest slopes—35° to 55°—are mostly found in the eastern, southeastern, and southwest parts of the study area and cover approximately 5% of the total area.

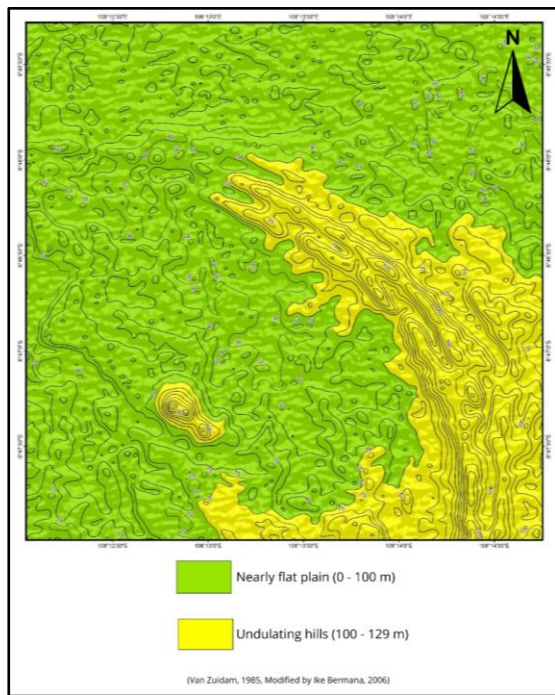
Morphogenetic

Landforms in the research area are the result of endogenous processes, such as tectonics and volcanism, and exogenous processes, such as weathering and erosion. Endogenous processes associated with volcanic activity are characterized by the emergence of andesite intrusions on Mount Tilu in the southern part and by Ciremai volcanic rocks with breccia and tuff lithologies in the northern part of the research area. In contrast, tectonic activity is characterized by geological structures, including active reverse faults that trend from northwest to south. The developing river flow patterns also indicate the presence of endogenous processes, namely tectonic activity, as evidenced by parallel and rectangular patterns. Indications of exogenous processes in the research area include rock weathering and alluvial deposits in the southern part of the study area. Analysis of ridge-and-valley patterns using DEM imagery and rosette diagrams indicates that northwest-southeast-oriented lineament patterns dominate the study area (Figure 3d).

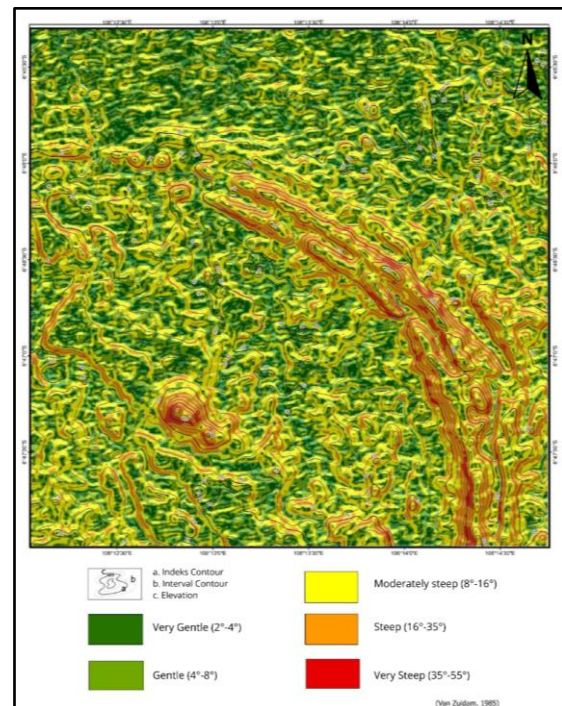
Geomorphological Units

An integrated assessment of morphographic, morphometric, and morphogenetic attributes identified seven geomorphological units within the study area (Figure 4). These units are described as follows:

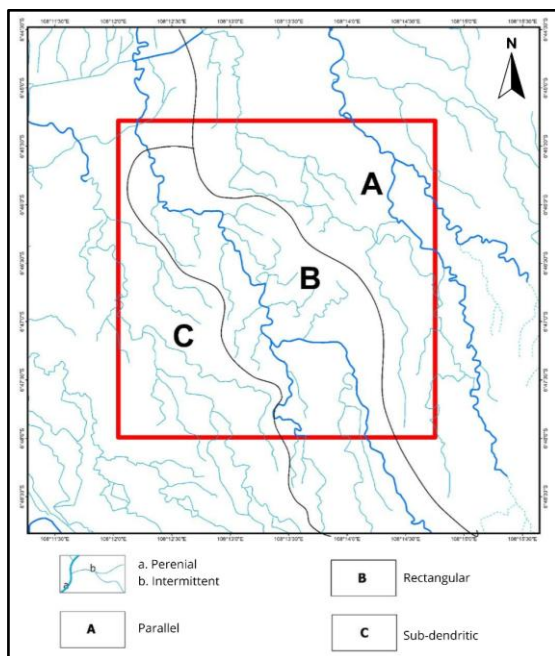
- 1) The Volcanic Slope Unit (Figure 5a), marked in red, is located north of the study area and covers 30% of it. It features a plain landform (25-100 masl) and U-shaped valleys with a parallel drainage pattern. It has a slope elevation of 0° to 2° and lithology of breccia, tuff, and lapilli.



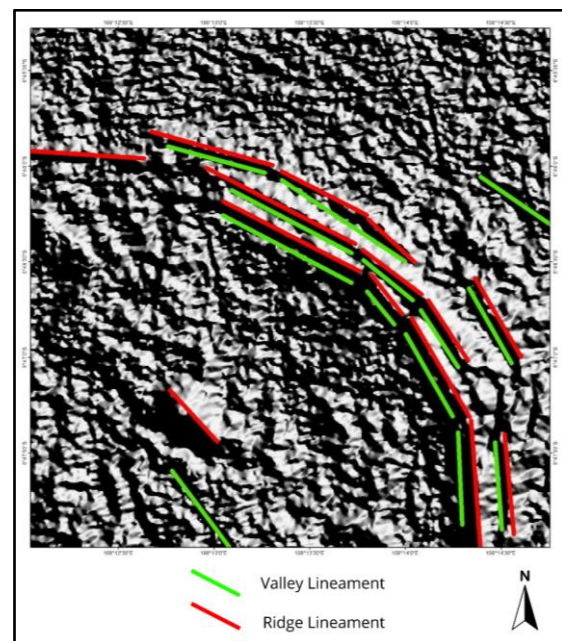
(a)



(c)



(b)



(d)

Figure 3. Geomorphological maps of the study area, including (a) landform units, (b) drainage patterns, (c) slope gradients, and (d) lineament distribution, each compiled at a scale of 1:12,500.

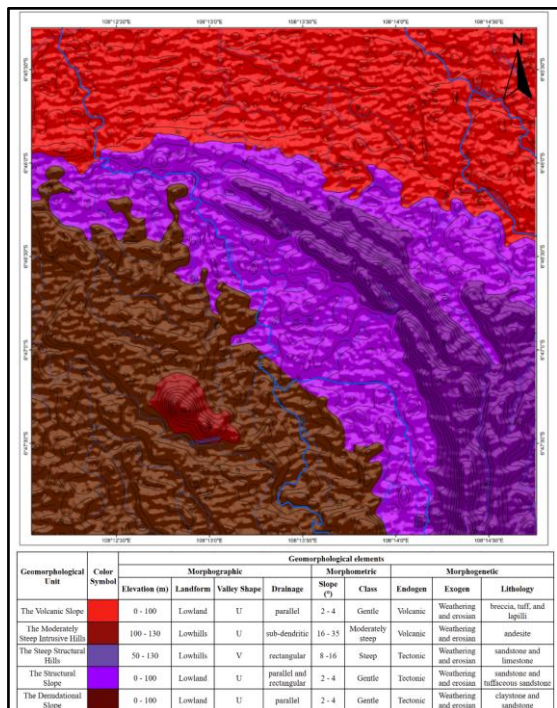


Figure 4. Geomorphology of the study area (scale 1:12,500)

- 2) The Moderately Steep Intrusive Hills Unit (Figure 5b), marked in dark red, is located southwest of the study area and covers 5% of the total study area. It is an andesite intrusive hill. The landform consists of low hills (100-130 masl) and U-shaped valleys with a sub-dendritic drainage pattern. It has a slope elevation of 16° to 35° and an andesite lithology.
- 3) The Steep Structural Hills Unit, indicated by dark purple (Figure 5c), extends from the west to the southeast of the study area and covers 15% of the total study area. The landform consists of low hills (100-130 masl) and V-shaped valleys with rectangular drainage patterns. Slope elevations range from 8° to 16°, with sandstone and limestone lithologies.
- 4) The Structural Slope Unit, indicated by light purple (Figure 5d), is located northwest to southeast of the study area and covers 25% of the total study area. It features lowlands (50-100 masl) and U-shaped valleys with parallel and rectangular drainage patterns. Slope elevations range from 2° to 4°, and the lithology is sandstone and tuffaceous sandstone.
- 5) The Denudational Slope Unit, indicated by brown (Figure 5e), is located west and

southwest of the study area and covers 25% of the total study area. It features lowlands (50-100 masl) and U-shaped valleys with parallel drainage patterns. Slope elevations range from 2° to 4°, and the lithology is claystone and sandstone.



(a)



(b)



(c)



(d)



(e)

Figure 5. Representative geomorphological units identified in the study area: (a) volcanic slope unit, (b) moderately steep intrusive hill unit, (c) steep structural hill unit, (d) structural slope unit, and (e) denudational slope unit.

Stratigraphy of the Study Area

Figure 6 illustrates the distribution of rock units recognized in the study area. These units were differentiated according to their lithological composition and the dominant physical characteristics of the rock successions. Rather than adopting formal lithostratigraphic nomenclature, the classification follows the informal framework outlined in the Sandi Stratigrafi Indonesia (2023). The stratigraphic interpretation also considers the association between lithological features and fossil assemblages to estimate the relative age of each rock unit (Pangaribuan et al., 2023).

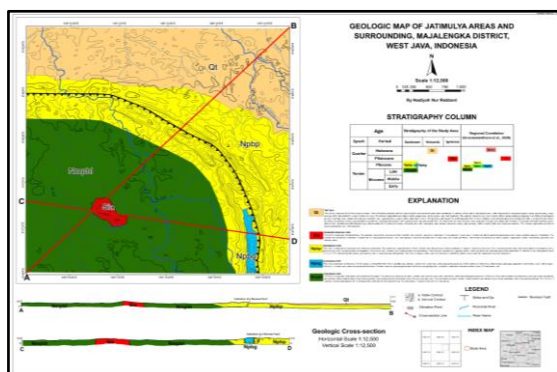


Figure 6. Geological Map of the Study Area (Scale 1:25,000)

The study area is divided into five rock units, from oldest to youngest:

- 1) The Claystone Unit (Nmpbl) is indicated in green (Figure 7a) and is composed predominantly of claystone, with a fresh light gray color and a brownish gray

weathering color, with clay grain size ($<1/256$ mm). It is predominantly non-carbonate, with some carbonate. Brittle hardness, grain mi shape, packing, and sorting are not observed. Petrographic sections show that the claystone is composed of 90% clay matrix and quartz microliths. Quartz, plagioclase, and oxide minerals, as well as skeletal fragments in the form of planktonic foraminifera fossils, were also observed. The relative age of this unit is Late Miocene-Early Pliocene (N17-N19), with a depositional environment ranging from outer neritic to bathyal (100-600 m).

- 2) The Sandstone Unit (Npbbp) is indicated by yellow (Figure 7b). It is composed of sandstone lithology with a fresh grayish-white color and a weathered brownish-gray color, very fine-to-coarse sand grain size, rounded-mid-angled grain shape, well-sorted, close-packed, hard, and massive. It is dominated by non-carbonate sandstone. Petrographic analysis shows that the sandstone is dominated by rock fragments, quartz, plagioclase, opaque minerals, and oxide minerals. The relative age of this unit is Early to Late Pliocene (N19-N21), with a depositional environment ranging from Middle to Outer Neritic (30-200 m).
- 3) The Limestone Unit (Npbg) is indicated by light blue (Figure 7c). It is composed of limestone lithology with a fresh yellowish-white color and a weathered brownish-yellow color, with calcarenite grain sizes (1/6–2 mm), well-sorted, close-packed, and hard rock hardness. A massive structure with depositional textures is observed, with the original components unbound. Petrographic analysis shows that the limestone incision is composed of skeletal material, a carbonate mud matrix, and a carbonate mineral cement. Several minerals, such as oxide minerals, quartz, and pyroxene, are also observed. The relative age of this unit is Early to Middle Pliocene (N18–N20), with a depositional environment ranging from the middle to the outer neritic zone (30–200 m).
- 4) The Andesite Intrusive Unit (Sia) is indicated by red (Figure 7d). It is composed of andesitic lava lithology with

a fresh blackish-ash color, a weathered brownish-ash color, and a medium crystal size (1-5 mm). It has a massive structure with a mesocratic color index. Petrographic analysis shows that the andesite has porphyritic texture, inequigranular grain-size uniformity, hypocrySTALLINE crystallization, and hypidiomorphic-allotriomorphic mineral forms, with plagioclase phenocrysts within a plagioclase microlith groundmass, forming a trachytic texture. Pyroxene, quartz, and opaque minerals are present; some of the pyroxene has been altered to chlorite. Based on regional proportions (Isnaniawardhani et al., 2020) and the law of superposition, this unit is dated to the Late Pliocene-Early Pleistocene.

- 5) The Tuff Unit (Qt) is indicated by the brown color (Figure 7e). Composed of tuff and volcanic breccia. The fresh tuff is yellowish-white, the weathered tuff is brownish-white, the grain size is fine-ash-lapilli, the grain shape is rounded-mid-angled, it is well sorted, tightly packed, brittle, and has a massive structure. The volcanic breccia consists of igneous rock fragments (andesite) and a groundmass of tuff. Petrographic analysis shows that the tuff is composed of rock fragments, vitric fragments, crystal fragments, and opaque minerals. Based on regional proportions (Isnaniawardhani et al., 2020) and the law of superposition, this unit is Holocene in age and originated from the eruption of Mount Ciremai. This finding is consistent with the interpretation of the Citalang Formation lithofacies as a fluvatile depositional environment in the form of braided rivers (Al hakim and Rizal, 2022).



(a)



(b)



(c)



(d)



(e)

Figure 7. (a) Claystone Outcrop; (b) Sandstone Outcrop; (c) Limestone Outcrop; (d) Andesite Intrusion Outcrop; (e) Tuff Outcrop

Structural Geology of the Study Area

1) Joint

Fracture data measurements were conducted at a single station using a random sampling method at ST-57, which consisted of sandstone lithology outcrops, with a total of 50 joints to identify stress patterns in the measured rock blocks. The fracture analysis results indicate a northwest-southeast orientation of the stress, while the fracture stereographic analysis indicates a dominant plunge value of 3 sigma. If this pattern persists consistently, it indicates the presence of a reverse fault (Anderson, 1951).

2) Fault

Although no direct fault planes, slickensides, or displaced stratigraphic markers were observed during field investigations, the dominant northwest-southeast structural trend identified from lineament analysis, fracture measurements, and DEM interpretation is consistent with the regional tectonic framework of the Baribis Fault Zone reported by previous studies (Nurhandoko et al., 2025). Therefore, the inferred reverse fault is interpreted as a regional structural influence rather than a directly observed fault within the study area.

DISCUSSION

Geological History of the Study Area

Reconstructing the geological evolution of the study area provides an understanding of the sedimentary history that extends from the Miocene to the Holocene. The reconstruction integrates stratigraphic relationships among rock units, paleontological evidence for chronological interpretation, and petrographic analyses to determine the mineralogical and textural composition of the rocks (Adam & Rochmana, 2022).

The oldest rock unit, represented by the Claystone Unit (Nmpbl), was deposited during the Late Miocene within an outer neritic to bathyal environment, as indicated by micropaleontological assemblages and fine-grained lithology. This depositional setting suggests relatively deep marine conditions consistent with the regional evolution of the Bogor Basin during the Late Neogene (Van Bemmelen, 1949; Martodjodjo, 1984).

During the Early-Late Pliocene, progressive shallowing of the depositional environment resulted in the accumulation of sandstone and limestone units. The interfingering relationship between these units indicates fluctuations in depositional environments associated with variations in relative sea level and sediment supply.

Andesitic intrusive rocks represent subsequent magmatic activity that affected the sedimentary succession. Based on field relationships and regional geological maps (Isnaniawardhani et al., 2020), the intrusion is interpreted to have occurred after deposition of the sedimentary sequence and

before emplacement of Quaternary volcanic deposits. This is similar to deposition in the Majalengka Sub-Basin which occurred from the Early Miocene to the Late Pleistocene (Philetas et al., 2019; Ambari et al., 2026).

Structural analysis indicates that the dominant structural trend is northwest-southeast (Haryanto et al., 2015), corresponding to ridge-and-valley alignments observed on DEM imagery and fracture orientation measurements. Though these structural patterns agree with compressional tectonics related with the Baribis Fault system, field studies found no direct evidence of reverse fault planes, slickensides, or displaced stratigraphic markers. Therefore, reverse faulting is seen from regional tectonic framework, fracture analysis, and geomorphological lineaments instead of from direct exposure of fault surfaces.

Volcanic activity of Mount Ciremai, which placed thick layers of volcanic breccia and tuffs over the older sedimentary formations across an unconformable contact, had a significant impact on the Quaternary geological development of the study region. Following these volcanic episodes, continuous weathering and erosion altered the local topography. At last, Holocene-Recent alluvial deposits indicating continuous fluvial deposition and surface weathering under current geological settings cover the stratigraphic column.

Potential Resources and Geological Hazards of the Study Area

Based on geological resource evaluation, the study area has major non-metallic mineral resources (Figure 8a), mostly found in the Girimukti, Batujaya, Jatimulya, and Ranji Wetan localities. These materials consist of andesite from Mount Tilu fit for construction uses, claystone for roof tiles and bricks, and sand minerals employed in building supplies. Mostly lithology and geomorphological settings govern their distribution. These results suggest that the region has significant economic value in terms of geological resources. Also, the area has tourist appeal as seen by Gunung Tilu in Batujaya and Jembar Waterpark in Ranji Wetan.



(a)



(b)

Figure 8. Potential resources and geological hazards in the research area: (a) sand and brick digging operations in Ranji Wetan; (b) a landslide accident in Jatimulya

The topographical features of the Jatimulya region showed the presence of several possible geological hazards (Figure 8b), mostly landslides, floods, and earthquakes regionally. Their frequency is regulated by land use, drainage conditions, geological structures, topography, and lithology interaction (Nurohim et al., 2018).

Areas with steep denudational slopes underlain by weathered volcanic rocks and severely fractured sedimentary rocks have somewhat high landslide susceptibility (Selaby et al., 2021). These geological factors lower slope stability, especially during times of heavy rain (Fathaya et al., 2023). Though no quantitative slope stability study was done for this project, the geomorphic features agree with often accepted West Java landslide-prone regions.

Flood susceptibility is mostly linked to river basins with low gradients and alluvial plains

where seasonal runoff builds up because of restricted drainage capacity. Unconsolidated alluvial deposits' distribution even raises the chance of local flooding during strong downpours.

Based on prior geological and geophysical data, the study area is located inside the tectonic domain of the Baribis Fault Zone, and is therefore interpreted as an active fault system (Nurhandoko et al., 2025). Still, field mapping turned up no clear proof of active fault displacement. Therefore, seismic risk analysis in this work mostly addresses the regional tectonic setting instead of direct field data.

Therefore, the geological danger evaluation provided here should be thought of as an initial geological assessment that could serve as a foundation for next quantitative risk assessment utilizing remote sensing, geophysical, or geotechnical methods.

STUDY LIMITATIONS

The geological interpretation offered in this work mostly draws on field geological mapping, petrographic observations, micropaleontological study, fracture counts, and Digital Elevation Model (DEM) interpretation. During field surveys, no direct evidence of reverse fault planes, slickensides, or subterranean fault geometry was found even if the noted structural trends fit the regional Baribis Fault system. Thus, the structural interpretation ought to be viewed as preliminary and limited by the data sets now on hand. To help to define the tectonic development of the study region, future studies combining geophysical surveys, structural analysis, trenching, and geochronological analyses are suggested.

CONCLUSION

Five geomorphological units, which together show the effects of endogenous and exogenous geological processes, were found in this study: volcanic plains, moderately steep intrusive hills, steep structural hills, structural plains, and denudational plains. The stratigraphic framework of the study region consists, in ascending order, the Andesite Intrusion Unit (Sia), Tuff Unit (Qt), Claystone Unit (Nmpbl), Sandstone Unit (Npbp), and Limestone Unit (Npbg). Reflecting a gradual

change in the basin's long-term geological development from deep-marine sedimentation to the present subaerial landscape, this stratigraphic succession records

Structural analysis shows prevalent northwest-southeast trends consistent with the local Baribis Fault system. Still, the projected reverse fault should be seen as an interpretation supported by geomorphological lineaments, fracture orientations, and the regional tectonic context because direct fault-plane evidence was not seen during field surveys.

Starting with marine sedimentation under compressional tectonics, followed by regression and conversion to terrestrial settings, and then impacted by extensional tectonics and magmatic intrusion during the Pleistocene, the geological record stretches from the Late Miocene to the Holocene. While Quaternary volcanic activity generated extensive tuff deposits that somehow hide the earlier features, later compressional reactivation caused folding, faulting, uplifting, and exposure of older layers.

While noting that landslide and flood susceptibility is regulated by lithology, slope form, drainage patterns, and geological structures, the survey also finds commercially useful non-metallic mineral resources as construction sand, clay, and andesite.

Combining field data with lab analysis gives the Jatimulya region a new geological framework that helps with regional geological mapping and might help with future economic resource assessment, risk analysis, and land-use planning in the Baribis Fault Zone.

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