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An Overview Of Landscapes And Stratigraphy In Tertiary And Quaternary Volcanic Regions Of East Java Indonesia

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Abstract: The research aims to analyze the aspects of geology, geomorphology, and hydrology as well as knowing the effects on socio-economic societies in each landforms. The research method used is a survey with the aim of finding evidence of landform deformation. The survey method is a method that directly reviews the existence of a phenomenon. The results showed that geological and geomorphological processes affected the condition of the land, and the condition of the land affected the hydrological conditions of a region, and affected the socio-economic conditions of the people in the area. Each landforms has its own characteristics, namely in the Puger area there is karst land, deposition due to ocean waves and aaeolian deposits, for Lumajang areas in the volcanic deposition area there is old volcanic land, both locations are located in the same zone namely southern mountain zone dominated by Mandalika formations. In the volcanic region of Mount Bromo, which is young volcanic land that has an age around the time of the Holocene or about tens of thousands of years ago with the main rock which is dominant in the middle region consisting of tuff, in the northern part of Besuki areas there are marine sediments composed of alluvium material. Stratigraphically the eastern Java region in the southern part of the southern mountain zone is older compared to other zones. Hydrologically the area in the southern mountain zone is prone to drought compared to other zones because it is composed of old volcanic rocks that have been consolidated. The actions that can be taken to conserve land need to be encouraged by the community and companies to contribute in maintaining and preserving the ecosystem while looking for economic opportunities.

Index Terms: Geology, Geomorphology Hydrology, Socio-economic

1 Introduction

East Java has 7 physiographic zones from the south and north. The eastern part of East Java consists of the Eastern Southern Mountain Zone and the Quaternary Volcanic Bow. These two zones have landforms in the form of beaches, mountain sediments, volcanoes and current phenomena. Formation of land owned can be a geographical object to find out the potential that can be managed or utilized by the community. Formation of land can review the habits of the community in daily activities. Landforms that have various potentials, especially in the economic field, also make use of landforms that are not uncommon to encounter deformations that damage the landforms. This situation also makes the problems faced by the community and has the potential to change the behavior that is used to be done in the community. 1) Sadeng Hill is a hill that has a limestone rock structure. Sadeng Hill includes the Puger geoglogic formation, the upper part consists of crystal and calcarenite limestone, at the bottom of which is a tufan sandstone intersection, a tuff of sandstone limestone fan. Around Sadeng Hill there is a Mandalika formation formed from Andesite Lava and Miocene or 23 million years old volcanic (screwed up) breccia, tuff breccia, interrupted tuffs with Oligocene lava and 30 million years old. community and various local and international companies. The use of Sadeng consists of cement, lime, fertilizer, and others. The people around Sadeng have used mineral content as building materials. 2) Pancer Beach is one of the southern coasts which has coastal and alluvium sedimentary rock structures. The coastal sedimentary rocks consist of loose sand containing magnets which are aged Holocene. Pancer Beach also has a distribution of alluvium rocks consisting of clay, mud, sand, gravel, gluttony and lumps with a Holocene age or ten thousand years. Pancer Beach is a tourist beach owned by Jember Regency and a destination in Puger District. Pancer Beach contains sand which can be used as building material. Pancer Beach is also the place for fishermen to go to sea. 3) Piket Nol is a southern crossing path that has a Semeru volcanic rock structure. Semeru volcanic rock consists of andesit-basal Lava rocks, Pleistocene tuffs. Piket Nol also have a breccia rock distribution consisting of mountain breccia and lava breccia that has a Pleistocene age or 3 million years. Piket Nol is the southern homecoming route that passes through the Semeru mountain valley. Piket Nol offers the beauty of Mount Semeru which can be seen from above the Perak Bridge. Piket Nol make transportation routes faster. Piket Nol can be a tourist attraction for the surrounding community and crossing the road. 4) Mount Bromo is a mountain that is on the Pacific volcanic track. Mount Bromo has a Tengger volcanic rock structure. The Tengger volcanic rock consists of volcanic sand, volcanic bombs, pumice pits and Holocene age. Mount Bromo also has a distribution of volcanic breccia, lava, tuff, tuff breccia, and this lava has a Holocene age or ten thousand years. Mount Bromo is a series of volcanoes that have great benefits, especially in the Tengger tribe culture. Mount Bromo is a holy place that is used as a place of worship for the Tengger tribe. Besides that, Mount Bromo has benefits as a tourism object. 5) Bentar Beach is one of the northern beaches that has the structure of

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alluvium rocks. The coastal alluvium rocks consist of clay, mud, sand, gravel, greasy and lumps that are of Holocene age. Bentar Beach also has a distribution of coral limestone rocks consisting of coral limestone, and coastal limestone. This rock has a Holocene age or ten thousand years. Pantai Bentar has been used by the community as a tourist attraction and a means of selling. People around the coast of Bentar can sell products offered to beach visitors. Pantai Bentar also has a distribution of mangroves. Mangroves can be an ecosystem for life on the coast of Bentar. In the research stratigraphy is needed as a geography aid to understand the structure of parts of a rock. Muriel Gargaud, Ricardo Amils [1] Stratigraphy is the correlation of the age of rocks to be the main focus. Stratigraphy can identify the age of rocks. Source rock is one of the formers of structural landforms found in an area. The source rock can have a wide distribution and old stratigraphy. According to Ilmi & Sunardi [2] Outcrops are very young and have not reached maturity for a source rock. The geomorphology of a region is the appearance of natural forms that have various forms. Morphology can classify the appearance of natural forms in a region. According to Raharjo [3] Classification of landforms is based on genesis, processes, and rocks. Each region has a different hydrological state. The hydrological state of a region can be formed by geological process factors. Geological process factors result in differences in landformsation such as watersheds, lakes, beaches or various waters on land. In the study examined by the authors have different results of the study, namely there is an explanation describing the state of the landforms with the socio-economic conditions found in the community in each landforms. Then also explained the changes in the community around the landforms caused by the exploitation of a landforms. Based on this, the author presents the novelty of the situation experienced by the community around the landforms. The nature of geography with the power of phenomena and landscape provides knowledge in understanding the relationship of spatial theory and spatial analysis expressed from spatial systems. Conceptually understanding geographic phenomena can be easily understood as a whole according to the results of the reflection of the observation of the introduction of landscapes in the field. Ikhsan, Kurnianto, Apriyanto, & Nurdin [4] Based on the explanation of the above research, the authors are interested in studying these issues with the title: Introduction of Geology, Morphology, Hydrology and Socio-Economics Landforms in Besuki Area, East Java, Indonesia.

2 Material and Methods

2.1 Description of the Location Research

The study was conducted on March 23-24, 2019. The research sites were in Sadeng Hill (8°21'13.3"S 113°28'35.6"E) and Pancer Beach (8°23'08.8"S 113°28'33.7"E), located in Puger District, Jember Regency. Mount Semeru volcanic deposits are located in the Gladak Perak area of Pronojiwo Village, Candipuro District, Lumajang Regency (8°10'53.8"S 113°01'09.8"E). Volcanic Mount Bromo in Sukapura District, Probolinggo Regency (7°54'33.2"S 112°56'59.1"E). and Sediment Marin Bentar Beach at Dringu District, Probolinggo Regency (7°46 '46,592"S 113°16'36,152"E).

2.2 Survey

This study researchers used survey methods or survey studies with data collection techniques carried out in this study used observation, interviews, and documentation. Data analysis techniques are carried out qualitatively by analyzing data from observations and identifying data and describing data into a discussion of stratigraphic conditions, source rock, geomorphology, and hydrology at the site.

3 Result and Discussion

3.1 Result

TABLE 1
GEOMORPHOLOGY

NO	LOCATION	LANDFORMS
1	Sadeng Hill	Karst Hills
2	Pancer Beach	Fluvial deposit, deposits due to ocean waves and aaeolian deposit
3	Piket Nol	Semeru vulcanic deposit
4	Mount Bromo	Volcanic Mountain
5	Bentar Beach	Marine Deposits

Source: *Research Result 2019*

The karst hills are the tip of the southern mountains, along Gunungkidul to the Blambangan peninsula. These karst hills are fossil corals that were buried in thousands of years ago that are composed of calcium carbonate. In karst fields there are many holes or ponors that function as channels of water entering the soil. The basic rock is immediately exposed because of the thin layer of soil. Vegetation on karst fields is only in the form of plants that do not need a lot of topsoil such as moss and teak trees. Pancer Beach is the formation of land resulting from the sedimentation process at the confluence of river and sea currents. Fluvial deposits occur at the mouth of a river where clastic sediments form a new island due to the deposition process of the material carried by the river. Precipitation occurs along the coast which is affected by ocean waves and causes the coastline to progress. On this beach there are also a few karst fields which are the result of the removal of the southern mountains. Aeolian deposits on Pancer beach form sandbanks due to the influence of the wind. Sand dune is composed of sand and soil derived from material carried by rivers and the sea and also influenced by the presence of structural land such as karst hills. The vegetation on sand dune is only a small plant that does not require much water. The landforms in the Piket Nol area is formed from the semeru volcanic magma burst process. There is no lifting process or the influence of wind on the formation of the land. Andesite base rock can also be seen directly on steep slopes and thin soil layers. The river on this volcanic land serves as a channel that flows lava flows, both hot lava and cold lava. But there is no sedimentation process but rather the deposition of the lava material. Vegetation on volcanic land is very diverse due to fertile soil factors and rich in organic matter, andisol and regosol, so that many plants can grow. Mount Bromo is a type of volcanic volcano where eruption eruptions produce most of the pyroclastic material dominated by volcanic ash. The caldera is a characteristic of Bromo land. The sea of sand is the youngest sediment which is the accumulation of ash and sand that comes out during eruption.

The material of Mount Bromo is only in the radius of the sea of sand while the outside land is formed by an older quarter. In the surrounding land there are weathered rocks which form a soil horizon and some do not undergo weathering processes, this is influenced by topographic or slope factors. Vegetation on relatively sloping land and has a land horizon can be overgrown with a variety of plants and is fertile. Whereas in the land where the basic rocks are immediately exposed or there is no soil horizon, only moss and a little pine are overgrown. Bentar beach is part of the north coast which has a gentle morphology. On the north coast there are not many waves that directly hit the beach. There are two processes in this marine land that are deposition of alluvial in river mouths and marine processes that form which are influenced by ocean waves. The influence of the wind on the north coast is not too large so the sea waves are not too dangerous. On the north coast intense sedimentation processes work because many river estuaries are found so that material buildup from the river. The indication that can be seen is that at least white sand, this is because of the influence of the material carried by the river. Marine sediment can be used as land for vegetation by planting mangroves.

TABLE 2

STRATIGRAPHY AND SOURCE ROCK

NO	LOCATION	SOURCE ROCK	AGE OF ROCK
1	Karst Hill	Limestone rock	The Miocene lasted 26 million years ago
2	Pancer Beach	Sediment rock	The Holocene lasted about 10,000 years ago and continues to grow today.
3	Piket Nol	Andesite rock	Plistocene geological time scale which was approximately 12 million years ago.
4	Mount Bromo	Tuff rock	Pleistocene or ranged 12 million years ago
5	Bentar Beach	Surface deposits	The Holocene lasted about 10,000 years ago and continues to grow today.

Source: *Research Result 2019*

Geologically the dominant northern region is formed by surficial deposits composed of holocene alluvium material consisting of clay, mud, sand, gravel, silt, lumps and crop residues. In these rock formations also found small scale limestone mixed with silt, sand and clay. The northern region is an area of pure alluvial plains, as evidenced by the absence of geological structures, such as faults found with a lot of sediment accumulation. The central area has a landforms of young volcanic forms. This landforms has geological conditions of young volcanic rocks that have a Quaternary age, which are characterized by volcanic soils. The main rock which is dominant in the middle region consists of tuffs. In the south it has a karst landforms, coastal sedimentation and volcanic deposits. While the underlying geology of the land is old volcanic rock caused by ancient volcanic activity. The dominant source rock consists of andesite lava, and volcanic breccias (screwed up), tuff breccia, tuff interlaced with lava and tuff. The age of this source rock is Tertiary-Oligocene.

TABLE 3

ROCK STRUCTURE

NO	LOCATION	ROCK NAME	MINERAL OF ROCK	ROCK STRUCTURE
1	Karst Hill	Limestone rock	Calcium carbonate mineral. Rock minerals are formed from minerals that exist in fossil corals. The deposited millions of years.	The structure of epigenetic rock is organic and low in porosity.
2	Pancer Beach	Sand stone	Minerals of quartz, silicates and carbonate minerals.	The rock structure is massive, cross bedding with epigenetic physical.
3	Piket Nol	Andesite rock	The mineral consists of Feldspar, garnet, hornblende, amphibole	The structure of the rock is aphanitic and porphyritic with epigenetic physical.
4	Mount Bromo	Sandy tuff	Rock minerals in the form of calcite and chlorite	The rock structure is epigenetic physically with pyroclastic texture.
5	Bentar Beach	Sand stone	Mineral rocks are hornblende mineral granules, biotite, orthoklas and quartz	The structure is mostly layered because of the deposition process that occurs every day for years. The mineral is also a little because of the precipitation results

Source: *Research Result 2019*

Karst land is a landforms that is formed due to the removal of material in the form of coral fossils deposited millions of years. These coral fossils form source rocks in the form of limestone sedimentary rocks. In limestone sedimentary rocks composed of calcium carbonate minerals, this is because coral fossils that form karst fields contain calcium carbonate minerals. Thus, karst land is dominated by calcium carbonate minerals. Volcanic zone consisting of cliffs at Piket Nol, mount bromo. The rock found in the volcanic zone is igneous rock, which is the main rock with its rock characteristics, namely hard and shiny black color which is rarely to be mined. Like andesite which has a mineral content in these rocks is basalt. In addition there are also mineral deposits of pyrite or chalcopyrite or similar types of iron and copper. In coastal landforms, the most dominant rocks are found in the form of sandstone. Sandstone is formed from sand which is composed of particles of particles or granules of minerals, rocks or organic matter then transported by water or wind and subject to precipitation. Sandstone is composed of hornblende mineral granules, biotite, orthoclasts and quartz.

TABLE 4
HYDROLOGY OF LANDFORMS

NO	LOCATION	WATER SPRINGS	WELL DEPTH	WATER QUALITY
1	Karst Hill	Well	1,6 m	Clean and drinkable
2	Pancer Beach	1) Excavation well at JLS Bridge Area 2) The area around the beach using water board 3) The area near the beach is a well drill	3,3 m	1) Clean and drinkable 2) Clean and drinkable 3) Not feasible and half salty
3	Piket Nol	Excavation well	>35 meter	Clean and drinkable
4	Mount Bromo	The source of mountain water is flowed through the pipe to the paralon and flows to the surface through the mountain ridge.	No well	Clean and drinkable
5	Bentar Beach	1) In the Bentar beach area 2) Only partially in the houses, water board, drill well, excavated wells and pumps	3,5 meter	Around the beach, it's not too good because the land is mud and not sand. In the houses of residents around Pantai Bentar the water quality is good.

Source: *Research Result 2019*

Coastal area hydrology, especially in the case studies of Pancer and Bentar Beaches is closely related to its constituent land which is mostly in the form of sand soil. Soil sand has a high water absorbency/permeability. With the arrangement of sand soils that have a loose and easily loose texture makes the water will easily experience infiltration or absorption but has a low ability to bind water so that the water will move down through the cavities of the soil. The layer that carries ground water in this coastal area is called the coastal aquifer layer. On coastal aquifers, groundwater has a hydraulic gradient towards the sea so that groundwater from land to sea takes place continuously, while sea water pressures from land to sea occur. The meeting of groundwater and seawater forms a field that is called an interface. Groundwater has a density that is smaller than sea water, so that in the field of groundwater interface it is always above sea water. Karst land has a unique hydrological system. In the dry season, karst land will look very arid. While in the rainy season water can be easily found on the surface of the land that is concave in shape. On karst land there is limited flow of surface water and underground water flow by ponor. The wells owned by the community are not on karst land which makes karst hydrology less impact on the community's water supply. However, the community faces drought in the dry season. Empirically, the area of the young volcano which has a high level of water infiltration is different from the mountains composed by old rocks, namely tertiary-aged rocks (Miocene-Pliocene) or before the quarter (present-day Plistocene). The peculiarity of the volcano region with its rock structure and texture is not only a potential source of disaster, but also functions as a water storage tank, both on the surface and below the surface.

3.2 Discussion

The findings obtained from this observation consist of: Geology, Geomorpholgy, Hydrology and Socio-Economics every landforms. 1) Sadeng Hill is a karst hill located in Puger District, Jember Regency, East Java. Morphologically, Karst Puger Hill is the southernmost part of the mountain range, which stretches along Gunung Kidul to Blambangan peninsula. In the geological history of the Southern Mountains of Java Island, the region has experienced increases and decreases in sea levels. The karst Sadeng hill is in the puger formation with stratigraphy on the upper part of the limestone and calcarenite, the lower part is the tufan sandstone, tuff and limestone sandstone. Limestone is composed of minerals formed from fossil corals which are deposited millions of years. These coral fossils are composed of calcium carbonate minerals. Yuskar, Choanji, & Buburanda [5]. Karst is a region with unique hydrology and is formed from a combination of high dissolution of rocks with well-developed porosity. This condition causes water that falls on the surface to flow through underground cracks and passages and collects in karst aquifers or underground rivers. On the Sadeng karst hill, many holes or ponors are found that function as the channels of water entering into the soil. However, on the Sadeng karst hill there is no underground water flow. This is caused by a non-intensive karstification process which is due to the lack of removal of karst bedrock. Rainwater is only contained in a basin on the surface of the karst. The depth of the well in the area around the Sadeng hills is 160cm. The existence of these wells has no effect from the nature of karst land. On the karst hill, there is also a basin of water that is collected from the formation of the results of limestone mining which is of poor water quality. In the dry season the community is faced with conditions of water shortages or drought. The type of vegetation in several landforms varies. This is because each landforms has different source rock and soil types. In karst hilly areas have less fertile soil types. The type of soil that has infertile properties results in agricultural land in critical karst hills. Vegetation on karst fields is only in the form of plants that do not need a lot of topsoil such as moss and teak trees. The karst compound is surrounded by settlements in the south west and north regions which make the mining aspect in the Sadeng karst hill a source of income for the surrounding community. The distance between the karst hills and residential areas is around 100 meters. Some companies uses traditional tools such as hammer or ledam. Other companies are still mining with the process of exploding dynamids, there are also mine using heavy equipment. This karst hill is not planned to be used as tourism, but is used specifically as mining. The slope of this hill slope is increasingly steep and is likely prone to landslides. Therefore the community also remains vigilant against this landslide disaster. 2) Pancer Beach is the southern coast located in Jember district, which is geographically located 8°23'08.8 "S 113°28'33.7"E the potential to develop a very strategic area, the potential of the region is supported by the construction of southern crossing lines with crossing This south economy and people's access to connectivity between regions will facilitate the density of traditional lanes passed by travelers. Suma [6] The geomorphological process of Pancer beach is the formation of land resulting from the sedimentation process in the river and sea currents. The fluvial deposition process occurs in the estuary with a clastic sediment increasing the coastline due to the deposition process of the material carried by the river. Precipitation occurs

along the coast which is affected by ocean waves and results in advanced coastlines. Aeolian deposits on Pancer beach form sand dunes composed of sand derived from material carried by rivers and the sea. Vegetation on sandbanks is only small plants and pandanus. The sedimentation process at Pancer beach is divided into two, the first sedimentation process deposited from the fluvial process. And the second deposition of precipitation from the sand dune formation originating from the accumulation of sand in a closed beach form. Besides sedimentary rocks at Pancer beach there are also igneous rocks on the coast or on the cliff coast. The beach cliff is formed from ancient volcanoes or part of ancient volcanoes in the south of Java. The igneous rock was formed at the time of the early oligocene until the end of the Miocene. Thus it was called the ancient Mount Merapi. Many of the igneous rocks there are rarely used by residents because of the difficult location in the mine. Cliff which is found is a mountain range that is lifted (horse), while the flat coast is a depression (graben). Puger's coastal livelihood, Puger is by promoting the wealth of natural resources from the sea located on the south coast, namely by becoming a fisherman, aquaculture, and there are also those who sell merchants, besides that Pancer beach is used as a mainstay of the district attractions. Puger. Earnings per day for a fisherman in the fish season can pocket 3 million rupiah per week for fishermen who work by using a boat. However, for fishermen who work by small boats can work every day and income is less than the fishermen who use sekocen boats, fish that are obtained by fishermen who use large boats or sekocen boats are mackerel and tuna fish. Around the coastal area of Pancer, the settlement is in the form of new housing. The settlement is located far from the crowd of the Puger district. Residents who inhabit the housing are interested in the proximity of employment in the form of aquaculture and cheap land prices. According to Nurdin, Ikhsan, Apriyanto, & Kurnianto [7] Population comes from outside the region who move to other areas with the aim to settle, looking for security and safety, learning, working. While locals go / moved from one area to another with the intention to live, work, or study, can in large quantities (TKI). Water resources at Pancer beach use the Water Board, because the water resources in Pancer are still not suitable for consumption because of the salty water conditions at Pancer beach, and that is why the water at Pancer beach cannot be consumed. There are some people who use water wells but the depth of the wells of Pancer beach residents is not so deep in just 3.3 meters. 3) Piket Nol located in Candipuro district, Lumajang Regency, is the result of the removal of igneous rocks in the plistocene period and the results of deposition which caused the formation of a river due to cold lava flow originating from Mount Semeru. In the Rejali river found deposits of material in volcanic areas at the end, so we can know the pattern of river flow. Deposition results show that the area is in the middle zone because it is dominated by sand deposits that have not yet experienced diagenesis. There are also many meanders found on this river because there are not too many currents. If cold lava occurs, the meander can run out and erosion may occur and all that is eroded is only easily released material. The material in cold lava content is sand, tuff (dust), and stone. While the material contained in hot lava is magma, rocks, sand, dust. If there is an eruption from Mount Semeru, the eruption has a type of tromboli eruption which occurs between 10-15 minutes. The rock found in this Piket Nol is igneous rock, which is the source rock with its rocky characteristics which are hard and shiny black which is rarely mined. The vegetation that can grow on the Piket Nol cliffs can grow a variety of plants including corn, teak trees, sengon, mahony, and many more that grow on a fairly thin soil horizon. Other pyroclastic materials found in volcanic areas are iron carried from Mount Bromo and Semeru. The characteristics of volcanic regions will affect how each andesite rock or volcanic rock that experiences weathering will produce regosol and andosol soils, for andosol soils with characterizes fertile soil, has very rich nutrients and organic ingredients. Volcanic landforms are prone to landslides, holding the burden of the amount of water entering. This mass wasting landslide is due to the fact that soils that have a fairly thin volume of soil are characteristic of organic structural areas, namely areas filled with slope. The existence of the run-off also erodes the soil organic matter, causing the slope to have a considerable load in accommodating run off. This is what causes the region into the zoning with very high landslide vulnerability level. Kurnianto, Apriyanto, Nurdin, Ikhsan, & Fauzi [8]. So that when there is excessive rain, rainwater will increase and burden the volume of land which will cause landslides. The advantages of volcanic landforms are superior in land, fertile soil quality, and also have excellent and topographical groundwater potential. If seen from the amount of vegetation that grows in this volcanic area, the source of water obtained can be at a depth of at least 35 meters. When viewed from socio-economic conditions, many residents work as sand miners around the river and traders around the Gladak Perak bridge. 4) Mount Bromo is a maar type and also quartery volcano located in the Probolinggo, Pasuruan, Malang and Lumajang regencies of East Java. Mount Bromo has the most active active volcanic cone after the formation of sand ocean caldera from the Gunung Tengger complex. The eruption eruption of Mount Bromo produced most of the pyroclastic material which was dominated by volcanic ash. The sea of sand is the youngest sediment which is the accumulation of ash and sand that comes out during eruption Zaennudin [9]. Vegetation on relatively sloping land and has a land horizon can be overgrown with a variety of plants. The type of bromo soil is andosol. This type of soil comes from ash and intermediete volcanic sand to a base with very high permeability and the top layer is very sensitive to erosion. The color of the soil is dominated by black with soil texture in general, sand to dusty clay with a loose or single grained structure. The economic and social conditions of the Mount Bromo community are fairly good. The main livelihood of the residents of Ngadisari Village (one of the villages on the slopes of Mount Bromo) is farming. In addition to farming the residents of Ngadisari utilize the tourism potential of Mount Bromo by taking side jobs such as horse guides (renting horses), warungs, jeep rentals, hawkers, renting villas, etc. The customs of the Ngadisari Village are fairly strong, seen from the citizens who always use traditional clothes and always carry out traditional ceremonies every Galungan, Kuningan, Nyepi, Kasada, etc. 5) Bentar beach is composed of alluvium which dominates the Probolinggo region which is composed of clay, mud, sand, gravel, greasy, lumps, and remaining plants that are holocene, and also there are several leprak formations which are composed of pliocene old sandstone, siltstone, clay, limestone and limestone which are crushed by pandak volcanic rocks composed of volcanic breccia and plistocene andesite-basalt lava, which are composed of coral limestone and sandstone stones that are holocene. This causes flat beach topography. Probolinggo Regency is part of the distal facies, namely the plain that is around the cone of the volcano. The basic material for making distal facies generally consists of sand coating. The coastal area also makes it possible to become a tourism location such as Bentar beach located in Probolinggo, East Java. Hermawan [10] said In the view of ordinary people, the

success of the development of tourist villages is the extent to which village tourism activities are able to improve the economic welfare of their local communities. In developing this tourist area according to Bahiyah, Wahyu H, & Sudarti [11] there needs to be participation and cooperation between the Probolinggo District Government and the community who will be able to develop tourism quickly so that many tourists will visit.

4 Conclusion

Changes that occur in each landforms have to do with the utilization of the resources contained. Communities experience social and economic adaptation with changing landforms conditions. Landforms have potential changes due to these two subjects. Environmentally friendly use can be a good step to maintain the sustainability of a landforms.

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