STUDY OF FLOOD CAUSES IN PESAREAN VILLAGE, ADIWERNA DISTRICT, TEGAL REGENCY

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ABSTRACT

Flood is a disaster that occurs in a watershed caused by an excess amount of water from the capacity of the river. Pesarean Village is a village located in Tegal Regency, Indonesia, which is often hit by floods, especially during the rainy season. The flood disaster was caused by the overflow of the Jembangan river which crossed the Pesarean village. This study aims to reveal the causes of flooding in the village of Pesarean. uses a quantitative research methodology with a descriptive approach, by processing primary data in the form of field observations and secondary data from local authorities. With result Pesarean Village is located in the lowlands and is crossed by the Jembangan River which overflows when it rains and causes flooding; The jembangan river is a tributary of the river that crosses Pesarean village and functions as a drainage, with conditions full of sedimentation resulting in obstacles to river flow and reduced rainwater storage capacity; Population density and land use, where the majority of settlements are settlements, reduce the carrying capacity of land as a water catchment.

Keywords : Flood, Rivers, Disaster mitigation

1. INTRODUCTION

The island of Java on the north side is in the form of a wide lowland that extends from the west end of Banten Province to the east end of East Java Province. North of Java there are rivers that are wide and long empties into the Java Sea. The topography of the northern part of the island of Java consists of coastal areas, coasts, lowlands, hills and mountains that lead to the middle to the part which is the main upstream area of the river (Asdak, Supian, & Subiyanto, 2018)

Floods are a seasonal trouble that occurs due to redundant water capacity, causing overflow. Floods are a seasonal trouble that occurs due to redundant water capacity, causing overflow. Flood is an event where generally dry land (not swamp area) is flooded with water, this is caused by high downfall and topographical conditions of the area in the form of lowlands to concave runoff that overflows and its volume exceeds the capacity of the drainage system or swash system. The circumstance of a flood tide disaster caused by the low infiltration capability of the soil, causing the soil be unfit to absorb water (Eldi, 2021). Low-lying areas have a high potential for flood disasters, this is the effect of the sloping morphology resulting in the inhibition of the water rate in surface runoff resulting from rain resulting in exceeding the capacity of rivers or drainage.

It was recorded that the flood disaster in January 2021 in the area of RT 27 RW 6 Pesarean Village, Adiwerna District, Tegal Regency reached 1 meter. Based on the results of interviews with residents of RW 6 Pesarean Village.

Based on that problem, the problem formulation of this research is "How are the causes of flooding in Pesarean Village?". The purpose of this study was to examine the causes of flooding in Pesarean Village, Adiwerna District, Tegal Regency.

2. METODS

This research was conducted using a quantitative method with a descriptive approach to reveal facts related to the causes of flooding in Pesarean Village,

Adiwerna District, Tegal Regency. Statistical data processing is done by descriptive statistical analysis. Data collection refers to collecting data on the geographical conditions of Pesarean village, causes of flooding, and land use. the data obtained from field observations and secondary data from the Pesarean village government and other government agencies

This research was conducted in Pesarean Village, Adiwerna District, Tegal Regency, Central Java. Held from October 15th, 2021 to November 20th, 2021.

3. RELATED RESEARCH/LITERATUR REVIEW

3.1. River

The river is a place where water flows over the surface of the earth. According to Government Regulation No. 31 of 1991, rivers are places and containers as well as water drainage networks starting from the springs to the estuary, bounded on the right and left as well as along the derivation by the border line. The river is a naturally formed drainage channel. However, in addition to their function as drainage channels and the water that flows through them, rivers constantly erode the subsoil beneath them and form river valleys through their existence. The river cliffs collapsed on the mountain, and large amounts of sediment buried in the riverbed were carried downstream by the river. This is due to the steep slope of the river in the mountains and the very high resistivity of the water flow, then the resistivity drops sharply as it reaches the plains. Thus, the charge contained in the river flow is gradually deposited or sedimented (Sosrodarsono,1984:4 in Khoirudin, 2019)

The river channel is categorized into three are:

a. The upstream part of the river is characterized by fast currents, large erosion at the bottom of the river. Thus the results of erosion are not only sand, gravel, or stone sediments that can be carried downstream.
b. The middle part is the part of the transfer from the upstream to the downstream and has a relatively gentler slope of the river bed so that the erosion strength is not too great and the direction of erosion is towards the bottom and sides and sedimentation occurs.
c. The downstream part has a gentle slope of the river bed so that the flow speed is slow, so the current is calm, the erosion due to the flow is small in a sideways direction and there will be a lot of sediment.

3.2. Flood Disaster

Flood is a hydrometeorological disaster that commonly occurs in coastal areas. Flood is a disaster caused by high rainfall without adequate drainage so that it can submerge areas that are not wanted by the people who live there. (Tobergte & Curtis, 2013). There are two major factors that cause flooding with natural causes and non-natural causes, which are natural: (a) heavy rain; (b) geographic influence on the river in the upstream and downstream areas; (c) sediment deposition; (d) the drainage network system is not working properly; (e) tides. which are unnatural in nature from human activities that live around the river, such as: (a) changes in the river diversion area caused by deforestation; (b) dumping garbage into rivers; (c) lack of maintenance of flood control structures; (d) lack of maintenance of river channels (Eldi, 2021)

3.3. Land Use

Land is a unit of land area that can be a resource for humans. Land use is all human intervention, both permanently and cyclically, with a group of natural and man-made resources, collectively called land, with the aim of meeting their needs.(Indah, Mokodompit, Kindangen, & Tarore, 2019)

Classification of Land Use According to the Regulation of the Minister of Agrarian Affairs / Head of the National Land Agency Number 1 of 1997 concerning Mapping Rural Land Use, Urban Land Use, Land Capability and Use of Symbols/Colors for Presentation and Maps (Nurfatimah, 2020)

Types of rural land use are:

1. Settlement land is an area of land that is used for groups of buildings on or rarely as a place for residents to live permanently.
2. Industrial land is an area of land used for economic activities in the form of processing raw materials into finished/semi-finished goods and/or semi-finished goods into finished goods.
3. Mining land is an area of land that is exploited for extracting excavated materials that is carried out openly and or closed.
4. Paddy field is an area of wet and/or dry agricultural land that is flooded with water periodically and/or continuously planted with rice and/or interspersed with sugarcane, tobacco, and/or other annual crops.
5. moor is an agricultural area that is never irrigated and the majority are planted with short-lived crops.
6. Plantation is an area planted with various types of perennials and/or seasonal crops and/or a combination of perennials and annuals or fruit plants and it is not clear which ones are prominent.
7. orchard is an area of land planted with perennials with one type of plant.
8. The steppe is an open area because it only grows low plants from the grass family and low shrubs.
9. Forest is an area overgrown with trees whose tree canopy can cover/rub against each other.
10. Inland waters are areas of land that are permanently inundated with water, either artificially or naturally.
11. open space is an area that is not cultivated because it is infertile and/or becomes infertile after being cultivated and is not overgrown with plants.
12. Others are areas; land used for infrastructure such as: roads, rivers, and canals which are man-made or natural.

4. RESULTS AND DISCUSSION

4.1 Geographical Conditions of Pesarean Village

Pesarean Village, Adiwerna District, Tegal Regency is located at coordinates - 6°55'37" Latitude and 109° 7'29" Longitude, with the north boundary of Kebasen Village, east of Lemahduwur Village, south of Adiwerna Village, west of Kaliwadas Village (Kepala Desa Pesarean, 2020). In Area 1,3 km^2 Pesarean Village consists of 37 Rukun Tetangga with 8 Rukun Warga. The air temperature in Pesarean Village ranges from 25°C to 34°C and the average rainfall per year is 2,407 mm, including in a maritime tropical climate (BPS, 2021)

The topographical condition of Pesarean Village is in the lowlands, located at 17 meters above sea level. Morphological a very gentle slope of 0-4%. The dominant rock lithology is Alluvium with Gley Hummus soil type (Dewi, 2020).

4.2 Cause of the flood in Pesarean Village

Flood disasters in Pesarean Village often occur after rain, the main cause of flooding in Pesarean Village is the overflow of the Jembangan River, the river that crosses this village. Kali Jembangan is a river with a width of 3-4 meters and a length of 17 km which is a tributary of the Gung River which originates at Mount Slamet and empties into the Java Sea.

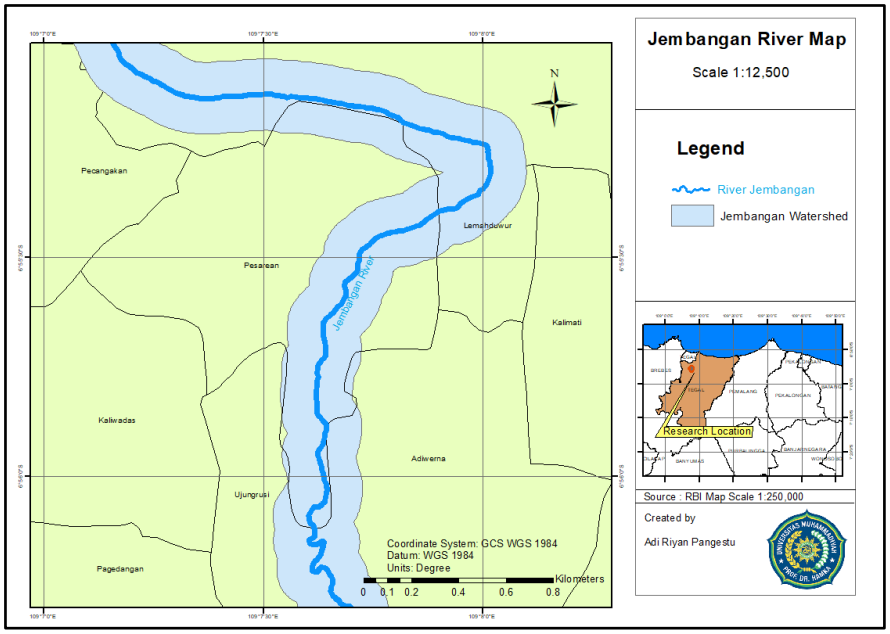


Figure 1. Jembangan River
Source : Rbi Map Scale 1:250,000

The condition of the Jembangan River in Pesarean Village is experiencing siltation due to sedimentation, so that only 2-3 meters of depth remain, This is caused by sedimentation of sludge, aquatic plants and domestic waste, causing the Jembangan River to have excess capacity when it rains. The overflow of water caused flooding and inundated parts of the Pesarean village.

Figure 2. Sedimentasion on Jembangan River
Source : google earth street view

Figure 3. Jembangan River's Flood
Source : Primary data

4.3 Pesarean's Land Use and

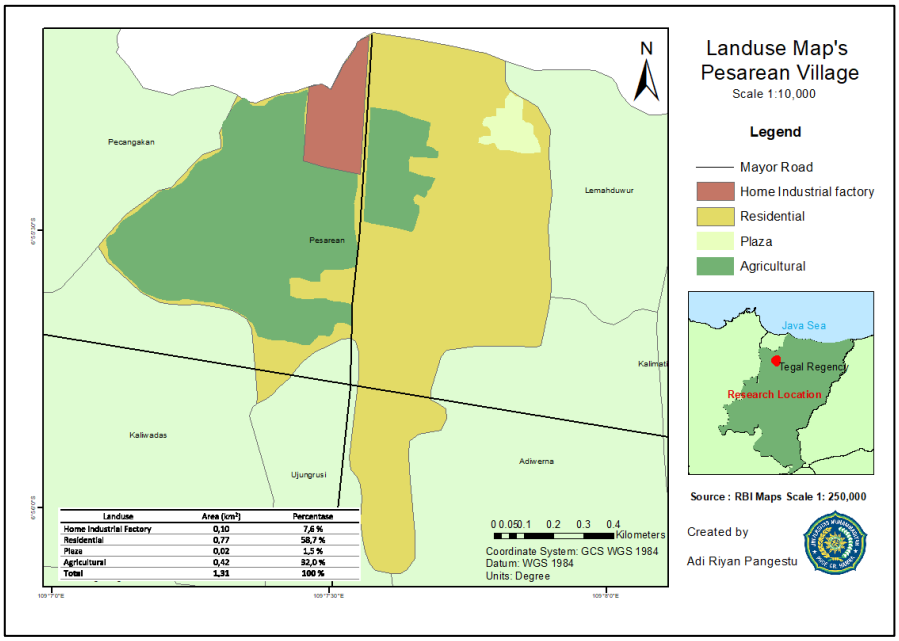
With an area of 1.31 km^2 which is divided into residential land use, agriculture, home industry and a park that contains the historical site of the tomb of Sunan Amangkurat I. Massive residential land use with a population of 12,627 people, calculated using the population density formula

$$Population\ Density = \frac{Population\ (people)}{Land\ area\ (km^2)}$$

$$Population\ Density = \frac{12{,}627\ people}{1.31\ km^2}$$

$$Population\ Density = 9{,}638/km^2$$

it can be concluded that Pesarean Village has a high population density. With a high population density and land use for the majority of settlements, the carrying capacity of the land is reduced to absorb stagnant water when it rains. The high population and its activities make the impact of a large flood disaster.



Landuse	Area (km²)	Percentase
Home Industrial Factory	0,10	7,6 %
Residential	0,77	58,7 %
Plaza	0,02	1,5 %
Agricultural	0,42	32,0 %
Total	1,31	100 %

Figure 4. Pesarean Landuse Map
Source : RBI Map Scale 1:250,000

5. CONCLUTION

The conclusions in this study are as follows:

a. Pesarean Village is located in the lowlands with 2,407 mm of rainfall and is crossed by the Jembangan River which overflows when it rains and causes flooding;
b. The jembangan river is a tributary of the river that crosses Pesarean village and functions as a drainage, with conditions full of sedimentation resulting in obstacles to river flow and reduced rainwater storage capacity;
c. Population density and land use, where the majority of settlements are settlements, reduce the carrying capacity of land as a water catchment.

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