

# Mitigation and Cause of Landslide Disaster in Kuningan District, West Java

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**Abstract:-** The danger of landslides still threatens several areas in Indonesia, including in Kuningan Regency. One of the areas that is prone to landslides is located in Kuningan Regency, which is part of several districts in West Java which have a high level of landslide events. This area has a relatively small area compared to regencies in other West Java regions. As many as 28 sub-districts with an area of approximately 32,922.586 hectares or around 27.5 percent of the district's area are potential areas for landslides. Based on the geological and geographical conditions, the area in Kuningan Regency has a high level of vulnerability to landslides. High rainfall is the dominant cause that affects landslides in the study area. There are points where landslides occur due to steep slopes, soil types that are prone to erosion and are very sensitive to humid/wet rainfall and geological conditions. With this landslide vulnerability map, it is hoped that it can be used as an anticipation to avoid areas that are prone to landslides. Mitigation efforts from the local government in tackling the risk of landslides by designing environmental arrangements such as building retaining walls on slopes

and closing rails that have the potential for landslides to occur.

**Keywords:-** Kuningan District, Landslide, Mitigation.

## I. INTRODUCTION

Indonesia has an area that is very prone to various kinds of disasters. Starting from natural disasters or non-natural disasters, such as tsunamis, earthquakes, forest fires, floods, landslides, volcanoes, droughts to the recent Covid-19 pandemic. So that Indonesia is one of the countries that has the potential or risk of natural disasters, which are likely to occur frequently every year. Indonesia is a country that has the potential or risk of natural disasters, which are likely to occur frequently every year. Hydrometeorological disasters, especially floods, are the dominating disasters in Indonesia in 2010 – 2020 apart from landslides and tornadoes (Azizah et al., 2022). It can be seen in the disaster composition chart by BNPB that the disasters that occurred in Indonesia were dominated by floods, landslides and tornadoes.

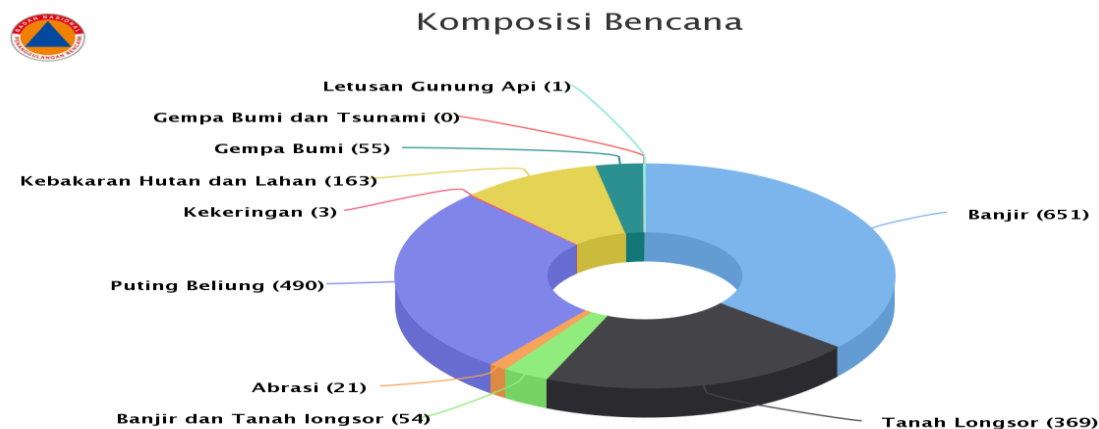


Fig. 1: The Composition of Disasters

Source : <https://dibi.bnpb.go.id/>

The danger of landslides still threatens several areas in Indonesia, including in Kuningan Regency. One of the areas that is prone to landslides is located in Kuningan Regency, which is part of several districts in West Java which have a high level of landslide events.

This area has a relatively small area compared to regencies in other West Java regions, but vulnerability to natural disasters that occurs is an unavoidable concern. The

geographical location of Kuningan Regency which is in an Indo-Australian plate fault, Kuningan Regency is located in the eastern part of West Java Province with an area of 1,195.7112 Km<sup>2</sup> located at coordinates 108<sup>0</sup> 23' – 108<sup>0</sup> 47' East Longitude and 6<sup>0</sup> 47' – 7<sup>0</sup> 12' south latitude. with variations in the highlands which are located under the foot of Mount Ciremai, medium plains, and lowlands resulting in very varied natural disasters including the proneness of landslides.

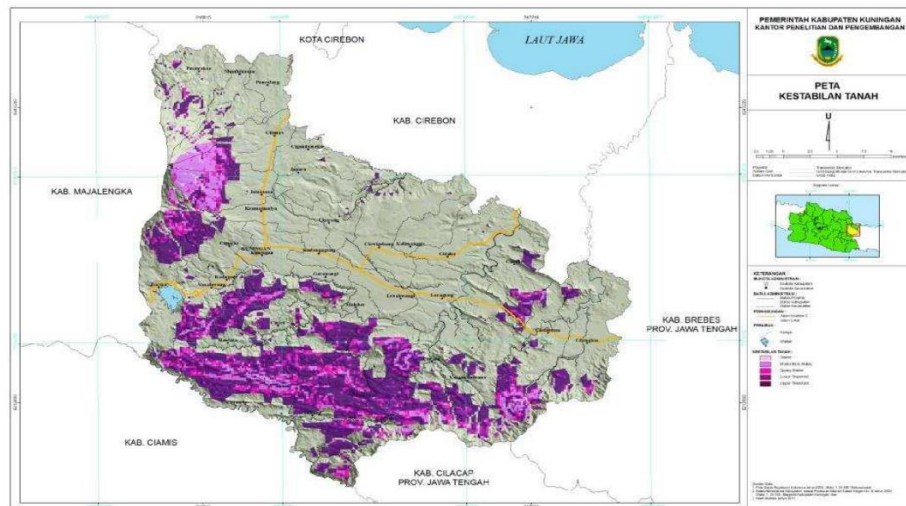


Fig. 2: Soil Stability Map

Source: Research and Development Office of the Government of Kuningan District

In the Land Stability Map by the District Government, Kuningan Research and Development Office, described that there are 28 sub-districts with an area of approximately 32,922.586 hectares or around 27.5 percent of the total area of the regency which are areas with the potential for landslides. With various levels of soil stability, the area of each region that has high vulnerability potential can be identified. The assumption is that the lower

(stable\_x0002\_upper threshold) the lower the stability value of the soil (it is said that landslides occur easily).

The high rainfall and sunlight also causes high weathering of rocks. Rocks that experience a lot of weathering will cause a decrease in rock strength which in turn forms layers of weak rock and thick residual soil. If this happens on a slope area, then the slope will be prone to landslides.

No	KIB	Wilayah	Kejadian
1	32.08.102.2021.03.24.1	Kab. Kuningan, Jawa Barat	Tanah Longsor
2	32.08.102.2021.03.16.1	Kab. Kuningan, Jawa Barat	Tanah Longsor
3	32.08.102.2021.01.22.1	Kab. Kuningan, Jawa Barat	Tanah Longsor
4	32.08.102.2020.12.26.1	Kab. Kuningan, Jawa Barat	Tanah Longsor
5	32.08.102.2020.12.02.1	Kab. Kuningan, Jawa Barat	Tanah Longsor
6	32.08.102.2020.10.03.1	Kab. Kuningan, Jawa Barat	Gerakan Tanah
7	32.08.102.2020.08.10.1	Kab. Kuningan, Jawa Barat	Tanah Longsor
8	32.08.102.2020.03.11.1	Kab. Kuningan, Jawa Barat	Tanah Longsor
9	32.08.102.2020.03.11.1	Kab. Kuningan, Jawa Barat	Tanah Longsor
10	32.08.102.2020.03.08.1	Kab. Kuningan, Jawa Barat	Tanah Longsor

Fig. 3: Landslide Disaster Data for Kuningan District

Source: <https://dibi.bnbp.go.id/>

It can be seen from the data made by the Disaster Management Authority that it has recorded that the Kuningan District often experiences landslides. Kuningan Regency is the highest district in West Java with the number of landslides.

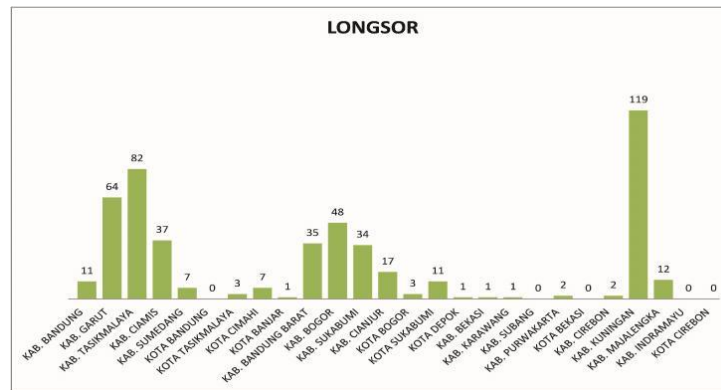


Fig. 4: Landslide Disaster in Kuningan District up to 119 cases

Source: <http://bpbd.jabarprov.go.id/>

**II. METHOD**

This study used a descriptive research method with a qualitative approach by collecting data to support the research. These data include maps, relevant previous research reports.

**III. DISCUSSION**

*A. Causative factor*

Landslides occur usually caused by water-saturated areas and the presence of gravitational forces. This happens because underground there is a layer that is slippery and impermeable (difficult to penetrate) water (Suryolelono, 2010). Factors causing landslides that occurred in Kuningan district were measured by scoring and weighting referring to Puslittanak (2004). Where there are 5 factors that influence the landslide disaster. Some of these factors are rainfall, rock type, slope, land cover and soil type.

Rainfall is the most important factor in the occurrence of landslides. Based on regional data, Kuningan Regency has high rainfall intensity ranging from <1500 mm/year to 3000 mm/year. Where there are two sub-districts with high rainfall intensity with a score of 4, namely Hantara and Panawangan Districts. Two sub-districts with moderate rain intensity are Darma and Cigambul sub-districts. Meanwhile, one sub-district that has low rainfall intensity is Seljambe Sub-District.

Kuningan Regency has moderate to high average rainfall intensity. Heavy rains that fall at the beginning of the season can cause landslides, because through the cracked soil water will enter and accumulate at the base of the slope, causing lateral movement. When it rains, water will seep into the cracked part of the ground so that the soil will quickly expand again.

There are two types of rocks found in the Kuningan district, namely sedimentary and volcanic rocks. It consists of several formations namely Halang Formation, Pemali Formation, Members of Mount Hurip, and Volcano Rocks. Hantara and Panawangan sub-districts have the highest score with a value of 2.25. Based on research, it is generally

dominated by sedimentary rocks which have a low level of resistance such as breccia, conglomerate or sandstone.

The slope at the study site varies from lowland to very steep. This is because based on the elevation the research location is located in a hilly area - high hills. There are 3 sub-districts that have a slope level of 0-> 45%, namely Darma, Seljambe and Cigambul sub-districts. The slope of 0-45% is in the Panawangan sub-district, and 15-> 45% in the Hantara sub-district which has the highest score with a score of 3.5. So that steep areas have the potential for landslides.

There are six land uses found in the research location. The uses of the land are settlements and residences, jungle forests, plantations, dry fields, shrubs, and rice fields. Land use at the research location has the highest score of 3.5. While the lowest score has a value of 3.25. Based on the data at the research location, there are four types of soil, namely Latosol, Mediterranean, Nitosol, and Planosol. There is only one subdistrict that has four types of soil, namely Panawangan and has the highest score of 3.

The community's habit in developing agriculture/plantation does not pay attention to the slope of the slope, the opening of new land on hillsides causes the surface of the slope to open without proper regulation of the water management (drainage) system, and the forms of bench terraces on these slopes need to be done to brake erosion rate.

The increase in population causes the development of settlements towards hilly areas (hillsides) which are not in accordance with land use, causing an increasingly heavy burden on the slopes (surcharge). Erosion at the foot of the slope due to river flow causes weakness of the foot of the slope, swelling and shrinkage of the slope-forming material, etc., causing an increase in shear stress and the potential for landslides to occur.

### B. Landslide Disaster Mitigation

Legislation and disaster management policies that have been issued by the central government should be able to be applied and implemented by local governments that are responsible for disaster management in their area as mandated in Law Number 24 of 2007. Government agencies that have roles and responsibilities in Disaster management must be able to position itself as a facilitator in an effort to synergize with other institutions, so that an institutional ego does not occur in disaster management, so that an effective working mechanism occurs.

Thus, like it or not, local governments are required to be able to develop a pattern of disaster management synergy in order to support the improvement of institutional quality and accountability. Coordinating the implementation of disaster management activities in an integrated and comprehensive manner is of particular concern in the pattern and management of natural disaster management in Kuningan District.

The mitigation efforts of the Kuningan Regency Regional Disaster Management Agency are to increase the capacity and participation of the community in an effort to optimize disaster mitigation in Kuningan Regency. One of the government's responsibilities in implementing disaster management is mitigation which has been mentioned in the Kuningan Regency Regional Regulation No. 06 of 2011 concerning Disaster Management Article 1 number 17, mitigation is a series of efforts to reduce disaster risk, both through physical development and awareness and capacity building in dealing with disaster threats.

The Kuningan Regency Regional Disaster Management Agency has an important role. As stated in the 1945 Constitution which was reaffirmed in Law Number 24 of 2007 concerning Disaster Management, it states that the Unitary State of the Republic of Indonesia is responsible for protecting the entire Indonesian nation and all of Indonesia's bloodshed to provide protection against life and livelihood, which is meant in it is protection against natural disasters. Disaster Management Authority in Kuningan Regency is also required to develop a good plan in order to direct the goals of the organization

The efforts made are Structural disaster mitigation is a preventive action taken to reduce the impact of natural disasters or reduce the impact of losses caused by natural disasters. Structural mitigation in general is building physically for disaster management before a natural disaster occurs. The Disaster Management Authority in Kuningan has carried out structural mitigation to prevent and reduce the occurrence of disasters, the structural mitigation carried out is building public facilities such as shelters for refugees, signs for evacuation routes, earthquake early warning tools, and strengthening disaster risk reduction forums in Kuningan Regency.

There are several mitigations that can be carried out by the community by repairing and cleaning drains every rainy season, diverting drains that are no longer feasible, constructing Cliff Retaining Walls by installing stones or

wire gabions, moving temporarily to a better location safety, closing the ponds with some kind of lid and closing the ground cracks.

In addition, the role of Disaster Management Authority can be seen from non-structural disaster mitigation in the form of policy-making efforts such as making a regional regulation. another is Spatial Planning Regulations, to revive various other activities that are useful for strengthening community capacity and preparedness. Non-structural policies or non-structural mitigation include legislation, planning of mitigation regulations, and community empowerment in disaster mitigation.

## IV. CONCLUSION

Based on the geological and geographical conditions, the area in Kuningan Regency is an area that has a high level of vulnerability to landslides. The assessment uses a reference for estimating calculations based on PUSLITANAK placing the factor of rainfall having the highest score.

This makes the rainfall factor the dominant cause affecting landslides in the study area. There are points where landslides occur due to steep slopes, soil types that are prone to erosion and are very sensitive to humid or wet rainfall and geological conditions. With this landslide vulnerability map, it is hoped that it can be used as an anticipation to avoid areas that are prone to landslides. Mitigation efforts from the local government in tackling the risk of landslides by designing environmental arrangements such as building retaining walls on slopes and closing rails that have the potential for landslides to occur.

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