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Vulnerability And Direction Of Landslide Disaster Mitigation In Pagedongan Sub-District, Banjarnegara District

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Abstract : This research was conducted in Pagedongan sub-district, Banjarnegara. Banjarnegara is a region with a high vulnerability to landslides with its topography. The purpose of this research are (1) to know the spread of landslide vulnerability in research area, (2) to arrange disaster mitigation effort to reduce landslide disaster. The method used is survey method with descriptive analysis. The landslide vulnerability map is derived from the unit unit of land analysis by weighting each parameter by the Analytical Hierarchy Process (AHP) method. Analysis of land units obtained from overlay parameters maps that have determined weight using ArcGIS application. Analytical Hierarchy Process is an analysis in decision making that is measured to get priority scale.

1. Introduction

Indonesia is a disaster-prone country, because the geographical location of Indonesia is located in a disaster-prone area through a ring of fire, and there are Euroasia, Indo-Australian and Pacific plates that make Indonesia rich in mineral reserves and have geological dynamics very dynamic resulting in the potential for earthquakes, tsunamis and landslides. Indonesia has many active volcanoes that can erupt at any time.

Disasters that often occur in Indonesia are natural disasters such as earthquakes, volcanic eruptions, tsunamis, tropical storms, floods, landslides and droughts. Natural disaster is a disaster caused by events or a series of non-natural events such as technological failure, epidemics, disease outbreaks. While Social Disaster is a disaster caused by human intervention events, among others, social conflicts between groups, between community communities, terrorism. Natural conditions that are prone to disasters cannot be avoided, but all can be minimized by the adverse impacts.

Banjarnegara Regency is one of the Regencies located in the Central Java Province, which is very vulnerable to landslide hazards. Banjarnegara is prone to landslide hazards because its topographic conditions have a very large slope, because it is in the form of hills or mountains. Based on slope data from the Regional Development Planning Agency (Bappeda) of Banjarnegara Regency; 21.32% of the area has a slope of > 40% of the total area, while 34.88% has a slope of 15-40% of the total area. As a result almost every year landslides occur in several districts in Banjarnegara Regency. Losses arising from landslides are very large and continue to increase every year.

Pagedongan sub-district which is the main area of research which is divided into 9 villages namely Kebutuh Jurang, Kebutuh Duwur, Duren, Lebakwangi, Gunungjati, Gentansari, Twelagiri, Pagedongan, and Pesangkalan. Pagedongan Subdistrict is included in the area that is prone to landslides, when viewed from its unstable slope conditions. In recent years several landslide events have been recorded in several villages, in Pagedongan District.

One method to study the landslide vulnerability that is widely used is Analytical Hierarchy Process (AHP). This method was developed by Saaty (1970) which is a method of decision making by describing complex multi-factor and multi-criteria problems into one hierarchy. There are several basic principles in solving problems with AHP, namely decomposition, comparative judgment, synthesis of priority and logical consistency. AHP utilizes expert perceptions or informants who are considered experts as the main input so that the weight of each parameter or criterion used in the study is obtained.

This study aims to determine the distribution of landslide vulnerabilities in the study area, and to prepare disaster mitigation efforts to reduce landslides.



2. Area of Study and Data

The scope of this research was carried out in Pagedongan Subdistrict, Banjarnegara Regency where this area is an area where landslides often occur.

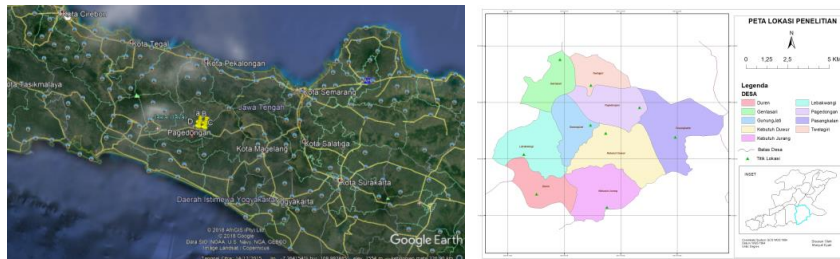


Figure.1 Research Location Map

3. Methodology

The data needed in this study are primary and secondary data. Primary data is collected through field survey methods, and interviews that aim to find out and explore information about actual landslide events and assessment data from experts for the AHP method. Secondary data used is a map of existing parameters to determine variables and rain and potential village data.

4. Result and Discussion

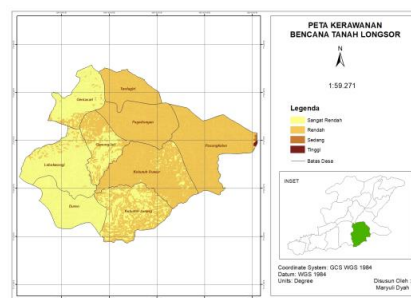


Figure.2 Landslide Vulnerability Map

The results of the data obtained by the landslide were 10 points which were not evenly distributed at the study site. Landslide locations conduct research conducted in the field and find location data that has been used for news on the internet.

The parameters used in determining the level of poverty are slope, geology, geological structure, land use and land.

The first location is at the edge of the main road Karangasambung-Pagedongan with a slope of 400, land use is used for gardens mixed with banana, cassava, albasia. Lithology is composed of weathered tuffaceous sand into red soil. Landslides in the form of falling soil and rock material, small impacts and potentially landslides can prevent access to the main road.

Second location is on the main road of Karangasambung - Banjarnegara hilly morphology with a slope of 170, land use is used for garden land mixed with the main crops of cassava, coconut, and teak. The soil is brownish red by forming a horizon of O, A and C. Litology in the form of tuffaceous sandstone that has weathering. Soil movement in the form of falling rocks that have the potential to disrupt the main road.

The third location in Duren Village, in this area was found the former rock soil material slides (debris slides) on the bedrock in the form of scaly and fild clay. The topography is hilly with a slope of 150 slopes, the soil is in the form of a brownish red soil, sand. A 30x5m avalanche dimension that threatens access to the field road at the top. The river flow at the bottom accelerates the avalanche process.

The fourth location is Gondang Asri, Duren, the morphology is in the form of hills with a slope of 150 slopes, the land is used as a garden mixed with cassava and acacia. The 50x7m landslide dimension has the potential to damage the surrounding roads and fields.

The fifth location, Duren Village, morphology in the form of curan hills with 230 slopes is used for mixed gardens. The soil is in the form of red soil, sand with a thickness of 3m resulting from weathering of tufaan sandstone. There is a threat of falling rocks with a dimension of 5 x 3 m which has the potential to interfere with village road access.

The sixth location of the Duren morphology village in the form of hills with 110 slopes, the land used as a mixed garden with the main plant in the form of acacia. Fall of rock and soil material that occurred on the edge of the village road near SD Duren with dimensions of 5 x 3 m. This avalanche threatens the school building above it.

Seventh Location of Lebakwangi Village, morphology in the form of hills with slope 340 with bedrock in the form of tuffaceous sand which has weathered into a brown, red soil with a thickness of 1m. The land used for gardens mixes with the main plants of Jabon, coffee and coconut.

The eighth location of Pesangkalan Village is located on the edge of dense resin forest with topography in the form of steep hills with 300 slopes, landslides in the form of falling rock material with dimensions of 3 x 2 m. The basic rock is marble with soil browned and thinly formed on the surface.

The ninth location of Pesangkalan Village, land is used for mixed gardens with hill topography, bedrock in the form of fused metamorphic rocks. Rock fall on steep slope cliffs with 4x6 m dimensions that could potentially interfere with road access.

5. Conclusion and recommendation

Judging from the context of the above mitigation stages, the research carried out in the Pagedongan Subdistrict entered the prevention and alert stage. This is because this study analyzes areas prone to landslide hazards to further determine the distribution of areas that have vulnerabilities. This mitigation is expected to reduce the danger of landslides. Based on analysis data on vulnerable areas, among others, Gunungjati Village is known that the village has a low potential for landslide-prone areas. Mitigation efforts in the area must be given priority in supervision to prevent and reduce the occurrence of landslides.

Mitigation must consider factors that cause landslide vulnerability, namely slope, soil type, geology, rainfall, geological structure and land use. Some of these factors, land use and slope are the two most dominant variables in forming the distribution of landslide-prone lands in the village. Mitigation efforts carried out should refer to these two factors. First, the land use factor that can be done is structuring the spatial layout by taking into account areas that have the potential for landslide hazards, in addition to the things that need to be considered are the use of paddy fields and conservation. Secondly, the slope factor, especially along Kebumen - Banjarnegara roads, where some of the areas have steep slopes, mitigation efforts that can be carried out are by installing gabion wire, as well as restoring the function of forests and protected forests on hill slopes that have been used as farming or agricultural areas. in addition, it is also necessary to limit the construction of settlements in areas prone to landslides.

Based on the results that have been achieved, the conclusion of the study is that the distribution of landslides in the study area is not evenly distributed, there are 33 landslide points which overall have an area of more than 1,000 m² at 10 points during field observation. Type of landslide is rock slide and earth slide. Pagedongan Subdistrict, all villages included in the category of disaster prone, there are criteria of high, medium, and low.

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