Study on Determination of Settlement Locations in PT. Batu Kapal, Sapa Raya Village, Tenga Sub-District, South Minahasa Regency

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Abstract

The development of housing development in Tenga District is indeed insignificant and only develops from existing conditions. Tenga District has directions for the development of residential areas oriented towards Agropolitan and Minapolitan. With good accessibility and supporting facilities, Tenga District has a fairly high development growth. In addition, with a letter from LOUIS GUNAWAN KHOE as Director of PT. Batu Kapal / HGU holder, who surrendered an area of + 20 Ha to be a suitable location to become residential land in the PT. Rock Ship. It started with the holder of PT. The fourth stone ship. Louis Gunawan Khoe submitted a proposal to develop PT. Batu Kapal to the Head of the North Sulawesi Provincial Plantation Office to obtain a Technical Recommendation for the extension of PT. Batu Kapal in March 2010, and on June 22, 2010 based on the Head of North Sulawesi Provincial Plantation Agency's Decree No. 1246/VI 2010 dated June 21, 2010 to conduct a field inspection at the plantation location of PT. Rock Ship. The purpose of this research is to find the biggest criteria from several existing criteria related to settlements and determine the location of settlements in accordance with PT. Batu Kapal in deliniation + 500 Ha. The study was conducted at PT. Batu Kapal, the research method is quantitative with AHP and GIS analysis. The results found: the criteria of not being in a protected area became an important criterion in determining the location of residential areas as a percentage of 51%, and the location of settlements that were in accordance with PT. Batu Kapal in delineation + 500 Ha is recommended in HGU certificate No. 10.

Keywords: Housing Development; AHP; GIS

Introduction

Settlement is part of a residential environment consisting of more than one housing unit that has infrastructure, facilities, public utilities, and has other supporting activities in urban or rural areas (Law No. 1 of 2011 concerning housing and settlements), while in (Law No. 4 1992) Settlement is as part of the environment outside the protected area, both in the form of urban and rural areas that function as residential or residential environments and places of activity that support lives and livelihoods. Settlements are often called housing and or vice versa. Settlement comes from the word housing in English, which means housing and human settlement, which means settlement. Housing gives the

impression of a house or a collection of houses along with the environmental infrastructure and facilities. Housing focuses on physical or inanimate objects, namely houses and land settlement. Whereas settlement gives the impression of settlement or collection of settlers along with their attitudes and behavior in the environment, so that the settlement focuses on something that is not physical or inanimate objects, namely humans (human). Thus, housing and settlements are two things that can not be separated and very closely related, in essence complementary.

It is realized that housing needs will continue to increase along with the increasing number of residents living in an area. These conditions can lead to new problems related to the increasingly limited availability of land. Housing and settlements, in addition to functioning as dwellings, also contribute to economic growth through the housing industry sector as a provider of employment opportunities driving the formation of large capital formation. The provision of housing becomes important because it can improve communities' welfare and quality of life of. The choice of location for a residential area has an important meaning in spatial aspects, because this will determine the durability of buildings, economic value, and the impact of settlements on the surrounding environment. In choosing the location of housing there are many criteria that must be met in order to get optimal results. On 29 June 2010 the head of the North Sulawesi Provincial Plantation Office issued a technical recommendation for the extension of the Cultivation Right to Land in accordance with the Spatial Planning of South Minahasa Regency. On July 23, 2010 the South Minahasa Regency working team conducted an inspection of the location of the PT. Batu Kapal is in the process of extending the land use rights, which must be adapted to the South Minahasa Regency Spatial Planning, one of which must have a community settlement of + 20 Ha.

On July 29, 2010 the recommendation to extend the right to operate on behalf of PT. Batu Kapal by the Regent of South Minahasa Regency No. 1075 / BMS / VII / 2010, the recommendation to extend the HGU is adjusted to the South Minahasa Regency Spatial Plan, there must be a Settlement of + 20 Ha. Herein lies the problem with the extension of PT. Batu Kapal has existed since April 9, 2013 and will end on April 09, 2038, but the status of the location of residential areas which is one of the requirements for the extension of PT. Batu Kapal up to now there is no clarity, let alone handover to the location of settlements from the PT. Batu Kapal to the village community of Sapa Raya. The study of determining the location of settlements in Tenga sub-district needs to be done considering that so far many housing developments have been carried out without well planned especially related to spatial and environmental problems. Therefore, in determining the location of housing development requires a careful planning and good management in order to be sustainable without damaging the environment. Likewise, with the determination of the location of housing in Tenga District required comprehensive planning taking into account the factors of choosing the location of housing construction in the area. The purpose of this research is to find important criteria from several existing criteria and find suitable settlement locations above PT. Batu Kapal in deliniation + 500 Ha.

According to Bintarto (1977) settlement is one of the land uses that shows buildings such as houses, market offices, roads, and yards that are the source of livelihood of the population while according to Sujarto, (2005) Settlements are a collection of a large number of houses located in a certain areas develop or are held, to be able to accommodate a large number of families who need them. According to Law Number 1 of 2011 concerning Housing and Settlement Areas, housing is a collection of houses as part of settlements, both urban and rural, which are equipped with infrastructure, facilities and public utilities as a result of efforts to fulfill decent housing. According to the Pd T-03-2005-C technical guidelines on Procedures for Selecting Priority Locations for the Development of Housing and Settlements in Urban Areas by the Ministry of Public Works, there are general requirements for housing and settlement locations. The location of the housing area must be in accordance with the land allotment plan stipulated in the local Spatial Plan or other spatial planning documents established by the local Regional Regulation, or meet the following requirements.

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Methodology

The research location is in Tenga District, precisely in the villages of Sapa, East Sapa and West Sapa, which can be seen in Figure 1.

Figure 1. Delineation of research locations

The method used Quantitative Method, to find out the most suitable location in the selection of settlement locations is by weighting using AHP (Analytical Hierarchy Process), while the method used to determine the location of housing is by spatial analysis using GIS (Geographic Information Systems).

Result and Discussion

A. Analysis Using AHP

The calculation results show the Consistency Ratio value of 0.098 (CR) <0.1 for all criteria so that the eigenvector value on each factor can be used because it meets the requirements. If the CR is lesser than 0.1 then the results can be called consistent. If the CR is greater than or equal to 0.1 then the results are not consistent and the paired matrix must be repeated to be made.

The analysis also shows that the criteria for not being in protected areas and disaster vulnerability have the highest percentage values of 51% and 25%, then the smallest is the condition of facilities and infrastructure by 4% and the height of MDPL by 3%. This shows that in selecting the location of settlements, the criteria of not being included in protected areas and not disaster prone areas are important criteria in determining them. More can be seen in the following tables and figures.

Table 1 Assessment results for each criterion

No.	Criteria	Score	Quality (%)
1	Not in a protected area	3,09	51%
2	Disaster hazard	1,47	25%
3	Land height is lesser than 1,000 meters	0,18	3%
4	Physical land (slope), not to exceed 15%	0,74	12%
5	Accessibility	0,30	5%
6	The condition of infrastructure is adequate	0,23	4%

Table 2 Ranking of selected locations

Choosen	Total Score	Rank	Information
HGU NO. 08	1,61	2	Corresponding
HGU NO. 10	1,63	1	Very According
HGU NO. 11	1,30	4	It Is Not in Accordance With
HGU NO. 12	1,46	3	Less According

So, the final result shows HGU No. 08 is suitable for settlement and HGU No.10 is very suitable for residential locations.

B. Spatial Analysis Using GIS

1. Protected Area

Understanding protection forests are often exchanged with protected areas and conservation areas in general. Conservation areas, or also commonly referred to as protected areas, usually refer to areas dedicated to protecting biological wealth as well as protected areas. Nature reserves and nature conservation areas as referred to in Law no. 5 of 1990. So, its function is clearly different from that of protected forests.

While protected areas have a broader understanding, where protected forests are included. Keppres No. 32 of 1990 concerning Management of Protected Areas states: "Protected Areas are areas designated with the main function of protecting the preservation of the environment which includes natural resources, artificial resources and the nation's historical and cultural values for the benefit of sustainable development."

In this study, in Sapa Raya Village, especially in the PT. Batu Kapal is not located in the Protected Area, although there are local protected areas and nature conservation areas and cultural reserves as shown on the map of the Overlay GIS which can be seen in Figure 2.

Figure 2. Deliniation of research locations with protected areas

2. Disaster Hazard

In this study the disaster hazard used is a landslide. As is known in 2018, precisely on February 10, 2018. Heavy landslides occurred between Blongko Village, Sinonsayang Subdistrict and Sapa Village, Tenga District. As a result of the landslide, one restaurant owned by the residents was carried by marterial stones, trees, mud and others to approach the Blongko beach. Fortunately, the incident did not result in fatalities. Access to the flow of traffic from Amurang goes to Kotamobagu and is otherwise paralyzed from Saturday to Sunday afternoon. The long queue of vehicles in the trans Sulawesi route is quite long. The results of the processed GIS turned out to be included in the delineation of PT. Batu Kapal. Can be seen in Figure 3.

Figure 3. Deliniation of research locations with disaster prone areas

The potential for soil movement on slopes depends on the condition of the soil and its constituent rocks, where one of the geological processes which is the main cause of soil movement is rock

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weathering, Selby (1993). A very intensive rock weathering process is often found in countries that have a tropical climate such as Indonesia.

The high intensity of rainfall and sunlight makes rock weathering process more intensive. Rock which has experienced weathering will cause rock strength to decrease which eventually forms weak rock layers and thick soil residue. If this happens on the slope, the slope will become critical. According to M. Taufik, et al (2016) high landslide prone areas are located on slopes that have a slope rate of 25% -45% and more than 45%.

At the research location, the type of soil is Alluvium (Qal): sand, clay, silt, mud, gravel, and crust, in the form of coastal, swamp and river deposits. And Volcanic Rock (TQpv): agglomerates, tuffs, andesitic-basaltic lava. See the picture more clearly.

3. MDPL Land Height

Meters above sea level (abbreviated as MDPL) is a term used to describe the height of a place above sea level, expressed in meters. This term is widely used in radio (both in broadcast and other uses) by engineers to determine the scope of coverage that a station can reach. This term is also used in flights, where all altitudes are recorded and reported.

The height on the map can be expressed in color or contour lines. The height of lakes, mountains, hills and other topographical points can also be expressed by numbers. For MPDL in the research location in the range of 0 - 250 m MDPL, through the processing of Google earth, it can be seen the height of HGU No. 08 is at 0-10 MDPL, HGU No. 10 is at 10 - 115 MDPL, HGU No. 11 are in the 115-230 MDPL and HGU No. 12 are at 230-250 MDPL for more details seen in Figure 4.

Figure 4. Delineation of research locations in MDPL

4. Physical Land (Slope)

Land surface morphology is a reflection of land shape conditions expressed in measurements such as slopes, height differences, erosion rates and flow patterns that greatly affect land stability. Two important parameters commonly used to express the stability of a land are slope and height difference. The slope of the slope affects the technical construction of settlements such as cut and fill activities and affect the construction of buildings. The assessment of slope as a parameter of land suitability for settlement is presented in the following slope class Table 5.

Table 5 Slope Grade

No.	Class	Criteria	Slope (%)	Value
1	Excellent	Flat	0 – 2	5
2	Good	Slope	2 – 8	4
3	Medium	Slightly tilted	8 – 15	3
4	Bad	Tilted	15 – 30	2
5	Awful	Steep	>30	1

Source: Van Zuidam (1979)

Table 6 Slope Classes and Morphological Units

No	Slope	Description (%)	Morphology Unit
1	0 – 8	Flat	Plain
2	8 – 15	Sloping	Smooth relief hills
3	15 – 25	Rather steep	Medium relief hills
4	25 – 45	Steep	Rough relief hills
5	> 45	Very steep	Very rough relief hills

Source: Van Zuidam (1983)

Basically, hilly or mountainous areas that form sloping land are prone to land movement. Slopes with slopes of more than 20 ° (or around 40%) have the potential to move or landslides, but not always slopes or sloping land have the potential for landslides depending on the geological conditions that work on these slopes, Karnawati (2003).

Can be seen that the suitability of land use suitability for settlements is in the slope of 0-15%. Conditions at HGU No. slope study location. 08 is at 8-15%, HGU No. 10 are at 8-15%, 25-40% and more than 40%, HGU No. 11 and HGU No. 12 are at 25 - 40% and> 40%. More details can be seen in the following picture:

Figure 5. Delineation of research locations in the slope class

5. Accessibility / Close to Activity Centers and City / Workplace Services

According to the Kimpraswil Department (2002 in Hartadi, 2009), one of the basic physical requirements of a settlement is accessibility. Accessibility is defined as the possibility of achieving to and from the settlement area where the easier it is to reach an area will further increase the activities in the area including the growing population or settlement.

Accessibility is the ease of moving from one place to another in an area which is closely related to distance (Bintarto, 1979). In this study the consideration for accessibility factors is the distance to the main road, namely arterial and collector roads. The distance map to the main road is obtained from processing the road network data using the measure tool. This processed product can be obtained by HGU No. 08 the distance is 3 Km, HGU No. 10 the distance is 3 Km, HGU No. the distance is 1.75 Km and HGU No. 12 the distance is 1.5 Km. It is shown in Figure 6.
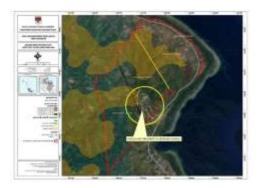

Figure 6. Accessibility close to the activity center

6. Condition of Adequate Infrastructure

Utility Availability, based on observations of the availability of Utilities, especially the road network, electricity is already available at the study site, which is connected to the Trans Sulawesi access road.

Facility Availability, the facilities referred to in this study are in the form of health facilities and Educational Facilities. For this facility, there are two adjacent locations, namely Sapa Raya Village and Blongko Sinonsayang Village.

Health facilities are one of the facilities that is the first priority that must always be held to support health services for the surrounding community. The lowest level health facility in each district is the Public Health Center.

Tenga District does not yet have a Public Health Center, but only has a helper Public Health Center located in Sapa Village. The needs of public health center services lead to health centers in the Sinonsayang District. This condition is considered insufficient to serve the community, for this reason, in the future, it requires new Public Health Center units in line with the increase in new settlements.

Educational facilities are one of the considerations in the selection of housing locations because they play an important role in efforts to improve the quality of human resources. Viewed from the aspect of location, housing close to educational facilities will greatly facilitate the time efficiency. The educational facilities in Kasihan consist of various levels of education from kindergarten (TK) to high school (SMA). At the kindergarten level there are 1 kind of Sapa village, 1 unit of West Sapa village, 1 level of East Sapa village, 2 levels of SD Sapa level, West Sapa village and East Sapa village do not have an SD, at Sapa level SLTP there is no village West Sapa 1 piece, East Sapa village 1 piece. Then at the high school level the three villages do not yet have. The people of Sapa Raya village go to SMA 1 Sinonsayag and SMK 1 Sinonsayang.

C. GIS Analysis Results

Processed GIS based on the criteria above, after going through the super impose stage produces a map of the direction of the location suitable for settlement, found in the HGU. No. 08 and 10.

Conclusion

This research can be concluded as follows the criteria of not being in a protected area become an important criterion in determining the location of residential areas as a percentage of 51%, then the criterion for disaster hazard has a value of 25%, then the smallest is the condition of facilities and infrastructure by 4% and the height of the MDPL by 3%.

Location of settlement in accordance with the above the Cultivation Right of PT. Batu Kapal in delineation +500 Ha can be found in HGU certificate No. 08 and No. 10. However, it is recommended only No. 10 bearing in mind that HGU No.08 is too close to the beach and goes along the shoreline so that it risks damaging the beach environment.

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