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SUITABILITY OF SETTLEMENT LAND IN THE SOUTH COASTAL AREA BONE BOLANGO REGENCY

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Abstract:

Bone Bolango Regency is a regency that has a coastal area in the south which consists of the districts of Kabila Bone, Bone Beach, Bulawa, Bone Raya and Bone. In accordance with the Regional Regulation of Bone Bolango Regency Number 5 of 2021 concerning the Bone Bolango Regional Spatial Plan (RTRW) 2021-2041 the Bone Bolango coastal area which includes 5 sub-districts including Bone Raya Sub-district is a sub-district that is included in the Urban System Plan area which will be the center of activities. local area (PKL), but in the Bone Bolango Coastal area, when viewed from the capability and suitability of residential land, road infrastructure as accessibility is one of the variables of concern. In addition, the rapidly increasing population growth rate creates various problems, especially problems related to land availability. Therefore, the purpose of this study is to determine the suitability of residential land in the Bone Bolango Coastal Area, using Matching and Map Overlay Analysis Techniques using a Geographic Information System (GIS) with variables such as soil type, slope, land use, rainfall and distance from the road. As for the results of the research on the suitability of residential land, the area of land suitability class S2 covers a residential area of 5532.05 ha or 33.33% of the total area of settlements in the Bone Bolango Coastal Area. The area of this S2 class includes Kec. Bone Pante, Bone Raya and Bone, The area of this S3 land suitability class covers an area of 1887.05 hectares of residential land or 14.81% of the total residential area in the Bone Bolango Coastal Area. The area that is included in the S3 land suitability class includes the Districts of Kabila Bone, Bone Pantai and Bulawa. This area of land suitability class N covers a large area of 8605.42 hectares or 53.53% of all settlements in the Bone Bolango Coastal Area

Keywords: Land Suitability, Settlements, Coastal Areas, Geographic Information Systems

INTRODUCTION

The need for houses / settlements / shelter is increasing over time, so it becomes an important thing to be provided. There is no balance between the available land and the number of people who want to build is a problem that must be addressed immediately in order to meet the need for houses/settlements/dwellings. Therefore, planning in the development of housing/settlement areas is a solution to overcome the problems mentioned above. The carrying capacity of a residential area is defined as how an area is able to provide land as a place to live for a number of residents properly (Muta'ali 2015).

The increasing demand for land in an area that is identical to a built-up area requires that land use planning in areas that are predominantly densely populated and located in disaster-prone areas be carried out optimally. One of the considerations that must be made in planning a land to be utilized is by considering the physical aspects of the land consisting of geology, morphology and hydrology and social community. The built-up area in this case is a village or settlement, including fields, cemeteries and schools that can appear simultaneously or partially in one place.

In accordance with the Regional Regulation of Bone Bolango Regency Number 5 of 2021 concerning the Bone Bolango Regional Spatial Plan (RTRW) 2021-2041 the Bone Bolango coastal area which includes 5 sub-districts including Bone Raya Sub-district is a sub-district included in the Regional Urban System Plan area which will become the center for local activities (PKL), and for the function of this local activity center area, namely as a center for industrial and service activities serving the coverage of a district scale area or several sub-districts and the PKL area functioning as a transportation node serving a district scale or several sub-districts. Then for the Kabila Bone and Bone Pantai sub-districts, which are sub-districts included in the Regional Service Center (PPK), the function of the PPK itself is as a

center for industrial and service activities that serve the coverage of a sub-district scale area or several villages and the PKL area serves as a transportation node that serves sub-district or village scale.

Settlements are part of the environment outside the protected area, both within the scope of urban and rural spaces, and also have a function as a residential environment and a place for activities that support livelihoods and livelihoods. Residential areas in urban areas, which are often referred to as residential areas, have regular physical forms. Most of the houses in residential areas face regularly towards the existing road frame and most consist of permanent buildings, walled in, and equipped with electric lighting. The road framework is laid out in stages starting from highways, connecting roads to environmental or local roads. According to the Department of Kimpraswil 2002 in Harjadi, 2009, one of the basic physical requirements of a settlement is accessibility. Accessibility is defined as the possibility of reaching to and from the residential area where the easier it is to reach an area, the more activities in that area will increase, including the growing population or settlements.

A land use unit represents nothing more than a mental construct designed to facilitate inventory and mapping activities (Malingreau and Rosalia, 1981 in Purwantoro, 2012). Identification, monitoring and evaluation of land use need to be carried out every certain period, because it can be the basis for in-depth research on human behavior in using land. Thus, land use becomes an important part of efforts to plan and consider in formulating spatial policies in an area. Land use is an important element in regional planning. According to Campbell (1996 in Purwantoro, 2012), besides being an important factor in planning, basically urban planning is land use planning. The appearance of land use changes with time, namely the state of the appearance of land use or its position changes over a certain period of time.

Determining the location of residential land according to Khadiyanto (2005) requires observation, testing, and measurement of several parameters, namely slope angle, soil class, soil group index, rock point load index, rock wear index, rock layer structure, surface erosion, sheet erosion, mass movement, water movement, rain intensity, flow density, and ground swing. Hardjowigeno (2011) based on the provisions of USDA 1983 stipulates land suitability criteria for settlements (buildings without basement and a maximum of three floors) namely land subsidence, flooding, soil water content, wrinkle development potential, soil class based on Unified, slope, depth of rock expanse, hard solids depth, rock weight percentage, and landslide hazard.

Land suitability has a classification quoted from FAO (1976) which is distinguished according to its level: order, class, subclass, and unit. Order is defined as a general suitability where at that level the classification is distinguished according to (Suitable = S) and not suitable (Not Suitable = N). in this case, the class is a level below the order (Suprapto, 2016). Based on this, the land suitability class in detail is divided into:

1) The suitable order (S) is classified into three levels, namely very suitable (S1), moderately suitable (S2) and marginally suitable (S3) and the unsuitable order (N) is not classified into a certain level. This applies to the type of detailed scale mapping (1:25000 – 1:50000)
2) Further scale mapping (1:100000 – 1:250,000) classes are classified as suitable (S), conditionally suitable (CS) and not suitable (N)

Table 1: Classification of Land Suitability Class

Class	Classification	Information
S1	Very Appropriate	Land does not have a real or visible limiting factor when juxtaposed with sustainable land use, or there are limiting factors whose influence is not so significant that it will not reduce land productivity on an ongoing basis.
S2	Quite Appropriate	There are limiting factors that have sufficient influence on land productivity and usually require additional inputs. These factors in general can still be overcome without changing the structure significantly
S3	Marginal Appropriate	There is a severe limiting factor, and it has a great influence on productivity. Requires additional input more than the S2 classification, which requires large capital and often requires intervention from the government or the private sector because these factors are very difficult to overcome on their own.
N	It is not in accordance with	Land is not suitable because there are limiting factors that are very difficult or even impossible to overcome.

Source: Module 5 Land Suitability Survey for Basic Level Irrigation Planning Technical Training (Suprapto, 2016)

The criteria for determining the feasibility of land for settlements based on the guidelines for technical criteria for cultivation areas include:

1. For newly developed residential areas covering an area of 40% – 60% of the available land area, and for certain areas adjusting to the characteristics and environmental carrying capacity of the related area;
2. For the density of buildings in the newly developed undeveloped residential area, the maximum number of buildings is 50 houses/ha and has adequate public facilities;
3. Residential areas must be equipped with the following:

a. Waste water disposal network according to SNI 03-1733 2004 standard;
b. Clean water network according to standards, both in quality and quantity. The minimum capacity for household connections is 60 liters/person/day and general faucet connections is 30 liters/person/day;
c. Rainwater disposal system which has sufficient capacity so that the housing environment is free from standing water. The waste disposal network complies with the requirements of SNI 03 - 3242 1994 concerning Procedures for Waste Management in Settlements;
d. Providing educational facilities in the designated settlement area related to the type of facilities provided, the number of residents as supporters, floor area and minimum land area, radius of achievement, as well as location and completion;
e. Providing health facilities with requirements equivalent to educational facilities;
f. Provide facilities for open spaces, parks, and sports fields;
g. Providing trading facilities;

The purpose of this study is to determine the existing conditions of community settlements in the Bone Bolango coastal area, and to determine the suitability of settlement land for its use in the Bone Bolango coastal area.

RESEARCH METHODS

The approach in the research entitled the suitability of residential land in the southern coastal area of Bone Bolango is by using a descriptive approach and a spatial approach. A descriptive approach to the existing conditions of settlements will be carried out by managing information about the characteristics of settlements in the coastal area of Bone Bolango. This descriptive approach can describe and explain existing phenomena by providing a clear picture and in accordance with the facts in the field in detail which is then presented in the form of maps, pictures, and described presentations.

Then to obtain land suitability, physical aspects and land use approaches will be used to determine land suitability in the Bone Bolango Coastal Area. In general, the research methods used are qualitative and quantitative with the data used mostly secondary data originating from related agencies. The analytical method used is overlay or overlap and comparison (matching) in the Arcgis 10.8 application.

Data analysis techniques used in this study include comparison techniques (matching) and map overlay methods, which are described as follows: (1). Comparison Method (Matching). This method is a way of assessing land suitability by comparing the variables of land suitability parameters between regional conditions and certain predetermined criteria. The data about the parameters of the area conditions were obtained from field data and secondary data. The physical parameters in this study only used 5 physical parameters in determining the level of suitability of residential land in the coastal area, then these five parameters were analyzed overlay on the ArcGIS application, then the parameters are as follows :

Table 2 Classification of Soil Types According to Their Sensitivity to Erosion

No	Type of soil	Information
1.	Regosol, Litosol, Organosol, Renzina	Very Sensitive
2.	Andosol, Laterit, Grumosol, Podsol, Podsolik	Sensitive
3.	Brown Forest Soil, Non Calcic Brown, Mediteran	Less Sensitive
4.	Latosol	Somewhat Sensitive
5.	Alluvial, Glei Planosol Hydromorphic Gray Soil, Literita Groundwater	Not sensitive

Source: Minister of Agriculture Decree No. 837/KPTS/UM/11/1980

Table 3 Classification of Slope

Slope Class	Slope	Information
1	0 – 8%	Flat
2	8 – 15%	Sloping
3	15 – 25%	Slightly Steep
4	25 – 45%	Steep
5	> 45%	Very Steep

Source: Minister of Agriculture Decree No. 837/KPTS/UM/11/1980

Table 4 Classification of Rainfall Intensity

No	Intensity (mm/year)	Information
1.	< 2500	Very low
2.	2500 - 3500	Low
3.	3500 – 4500	Currently
4.	4500 – 5500	Tall
5.	> 5500	Very high

Source: Minister of Forestry Regulation No. 32/MENHUT-II/2009

Table 5 Classification and criteria Distance to main road for Settlement.

No	Class	Criteria
1	0-1 Km	Very Appropriate
2	1-3 Km	In accordance
3	3-5 Km	Not suitable
4	5 > Km	It is not in accordance with

Source Suprapto in Siagian, et al. 2015

FINDINGS AND DISCUSSION

The development of settlements in the South Coastal Region of Bone Bolango is still centered following the main road network, which consists of residential houses, religious facilities, educational facilities, trade and service facilities, public facilities and government facilities.

Bone Bolango Regency has an area of 1,915.44 km2. The sub-district which has the largest area is Pinogu District, which is 496.00 Km2, while the District which has the smallest area is South Bulango District, which is 0.29 Km2.

Most of the conditions in Bone Bolango Regency are in the form of highland areas where the area is located at an altitude between 7-95 meters above sea level. Based on the land conditions, it can be divided into 3 types of land conditions, first, upland land conditions with slopes above 20 - 40%. This land condition can be found in the Districts of Suwawa, Bone Beach, Kabila Bone and North Bulango. For the second, the condition of the land is hilly. This land can be commonly found in Bone Bolango Regency. While the third condition of land with low surface. This condition can be found in the Districts of Tapa, Suwawa and Kabila. In accordance with the limitations of this study, it only focuses on a few sub-districts in Bone Bolango district, precisely in the southern coastal area which includes 5 sub-districts including Kabila Bone, Bone Pantai, Bulawa, Bone Raya, and Bone. Looking at the sub-districts in the coastal area, the population of Kabila Bone is very high compared to several districts in the coastal area with a population of 11,598 people or 7.01% with an annual growth rate of 1.43% of the total population of all sub-districts in Bone Regency. Bolango.

According to the Basic Agrarian Law of 1960, Land Use is the structure and pattern of land use, whether planned or not, which includes land supply, land use, land use and maintenance. The classification of land use types found in the South Coastal Area of Bone Bolango Regency is shown in the image below:

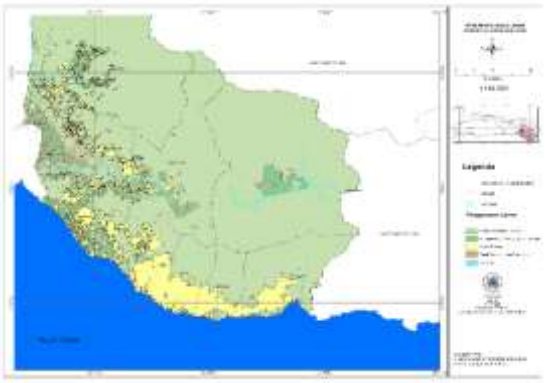

Figure 1 Land Use Map of Bone Bolango

Based on the results of identification using interpretation of satellite imagery and analysis of field data, it can be seen that land use in the coastal area of Bone Bolango is as follows:

Table 6: Land use in the Bone Bolango Coastal Area

No	Land Use	Area_PL (Ha)	Percentage %
1	Forest, Plantation, Pond	27465,29	58,74
2	Water Body	47,54	0,10
3	Dry Land Agriculture, Moor, Rice Field	2649,63	5,67
4	Open Land, Built Land	1873,01	4,01
5	Shrubs	14723,15	31,49

Source: 2022 data analysis

Based on field data and map data of soil types in Bone Bolango Regency, it can be classified that the type of soil in the coastal area of Bone Bolango is Podsolic soil type as shown in the picture above, Podsolic soil type is soil type derived from quartz sandstone.

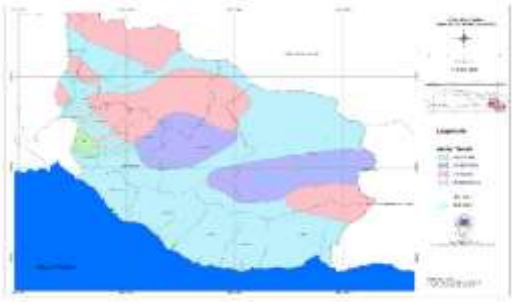

Figure 2 Soil Type Map Bone Bolango

Based on the slope in the South Coastal Area of Bone Bolango, it is classified as 25-40%, the slope is the dominant slope in the coastal area, about 41.84 percent of the area in the coastal area, while the gentle slope only has an area of 3 ,24% of the total area in the coastal area of Bone Bolango,

Table 7. Classification of Slope Slope of Bone Bolango Coastal Area

No	Slope Classification	Area_Slope (Ha)	Percentage %
1	> 40 %	1630,02	3,49
2	25 - 40 %	19563,85	41,84
3	15 - 25 %	19250,00	41,17
4	8 - 15 %	4797,82	10,26
5	< 8 %	1516,92	3,24

Source: 2022 Analysis Results

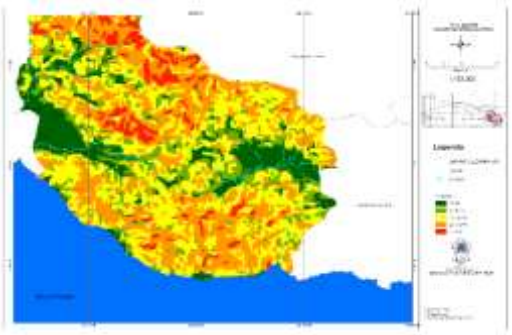

Figure 3 Slope Map of Bone Bolango

Based on rainfall data that does not dominate the Kabila Bone and Bone Pantai sub-districts, namely the medium category with an intensity of 3500-4500 mm/year with an area of 11037.11 ha or 23.45% of the total area in the southern coastal area of Bone Bolango. Meanwhile, the rainfall that dominates the sub-districts of Bulawa, Bone Raya, Bone and Part of Bone Beach is the high category with an intensity of 4500-5500 mm/year with an area of 35721.50 ha or 76.55% of the total area in the southern coastal area of Bone. Bolango.

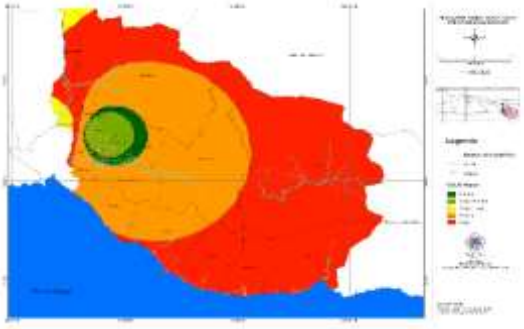

Figure 4 Rainfall Map of Bone Bolango

Based on the Road Network Map, Bone Bolango Regency can be classified based on the criteria of distance to residential areas, which for coastal areas Residential areas follow the pattern of road currents where field observations have been made that settlements in the Bone Bolango coastal area follow the flow of the highway, so that settlements in the area are only a distance away. 50 meters from the highway.

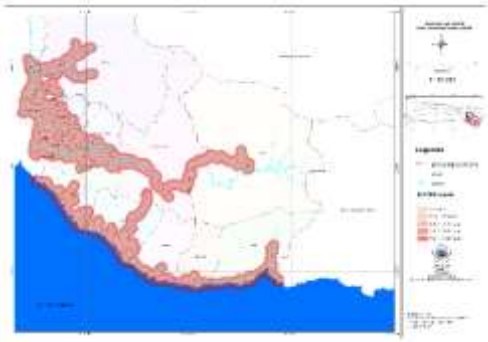

Figure 5 Bone Bolango Road Buffering Map

The results of the evaluation of land suitability for settlements in the Bone Bolango Coastal Area show that there are 3 classes of land suitability for settlements. Land suitability class for settlements includes suitability class S2 which is suitable land for settlements but with few obstacles, land suitability class S3 with several inhibiting factors, land suitability class N is land that is close to unsuitable for residential areas, and land is not very suitable when used as a residential area. residential area.

Table 8 Land Suitability for Settlements in the Southern Coastal Area of Bone Bolango

No	Class Land suitability	Large (Ha)	% Large	Residential Locations in the District
1	**S2**	5532,05	33,33	District Bone Beach, Bone Raya and Bone
2	**S3**	1887,05	14,81	District Kabila Bone, Bone Beach, Bulawa
3	**N**	8605,42	51,85	District Kabila Bone, Bone Beach and Bulawa, Bone, Bone Raya

Source of Analysis Results, 2022

Figure 6 Map of Land Suitability for Bone Bolango Coastal Settlement

CONCLUSION

The development of settlements that lead to the southern coastal area of Bone Bolango includes the Districts of Kabila Bone, Bone Pantai, Bulawa, Bone Raya, and Bone, it turns out that several locations are included in the land suitability category of class S2, class S3, and class N.. The following describes the distribution land suitability class in the Southern Coastal Zone of Bone Bolango.

The area of land suitability class S2 covers a residential area of 5532.05 ha or 33.33 % of the total area of settlements in the Bone Bolango Coastal Area. The area of this S2 class includes Kec. Bone Pante, Bone Raya and Bone. This area is an area that has a land suitability class of S2, meaning a good area to be built as a residential area. This S3 land suitability class area covers an area of 1887.05 hectares of residential land or 14.81% of the total residential area in the Bone Bolango Coastal Area. Areas that are included in the S3 land suitability class include the Districts of Kabila Bone, Bone Pantai and Bulawa. The area is classified as good enough (medium) for the development of residential areas. The land suitability class area N covers a large area of 8605.42 hectares or 53.53% of all settlements in the Bone Bolango Coastal Area. This area includes the Districts of Kabila Bone, Bone Beach, Bulawa, Bone Raya and Bone.

Based on the findings of the study showing that there are residential lands located in coastal border areas and in steep topography covering an area of approximately 14.81% of the total residential land area, relocation priority should be made to other residential land classified as S2 (appropriate). This can threaten the safety and comfort of the community. The development and development of residential areas should be directed at lands that are truly in accordance with the criteria for suitability of residential land and also provide explanations and directions to community members regarding the appropriate land use regulations and provisions. Socialization of the suitability of residential land to the community can be in the form of a spatial plan containing clear and firm regulations regarding appropriate land directions as residential areas and prohibitions on the allocation of residential areas in areas other than those specified.

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