The Level of Critical Land in West Lombok Using Geographic Information Systems

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ABSTRACT

Critical land is land that is caused by a decrease in the quality of the land as a medium for vegetation and a medium for water management, which causes the land to be degraded due to various types of land resource use that do not pay attention to the land. continuity. This study aims to analyze and map the level of criticality of land in the spatial pattern of West Lombok Regency. The analytical method used in determining the critical level of land in this study is the overlay method of spatial data based on parameters from the Regulation of the Director General of Watershed Management and Social Forestry Number: P.4 / V-SET / 2013 Regarding Technical Guidelines for Compiling Spatial Data for Critical Land, which consists of: indicators of land cover, slope, erosion hazard level, productivity, and management. The results of this study are the classification of the criticality level of land in protected forest areas, agricultural cultivation areas and areas outside forest areas which consist of lands with critical, moderately critical, potentially critical, and non-critical calcifications.

Keywords: Critical Land, Regulation, Geographic Information Systems.

1. INTRODUCTION

The increasing population growth in each region causes the need for land is also increasing[1]. Because land is resources that are very important in meeting the needs of human life, so a lot of land is used either as space needs living, cultivating crops, and as a supporting capacity for economic activity. In addition, the occurrence of environmental destruction such as deforestation or activities illegal logging, mining and quarrying activities C, industrial activities and improper agricultural practices (agrochemical contamination) in land use causes a decrease in the quality of the land as media to grow plants and media to regulate the resulting water system land becomes degraded [2]. Where this condition certainly causes a land becomes critical [3] [4] [5] [6]. Critical land is not able to be effectively used for agricultural land, as a medium for regulating water management, as well as protection natural environment [7]. The main characteristics of critical land is bare, seems arid and even rocks appear on the ground and are generally located in areas with hilly land topography or steep slopes [8].

West Lombok Regency is a district that has the morphology of areas that are hilly / mountainous, plains, and coastal areas topography varies from flat, gentle and steep slopes. Diversity the morphology of the area, West Lombok Regency has saved natural resources are quite abundant, such as fertile land, areas forests, producing mining materials, and many other wealth resources other natural forces, both classified as biotic and abiotic utilized by the community. But in using it, the community West Lombok Regency still doesn't pay attention to sustainability land. One of the cases of environmental destruction that occurred in the Regency West Lombok, namely in the form of forest encroachment that occurs in the area Nuraksa Forest Park (Tahura) covering an area of 12 Ha. Forest encroachment This is done by burning the forest area for clearing new planting land for the community. Where is the result of forest encroachment it has been estimated that state losses amounting to IDR 45.07 billion [9].

Based on the regional characteristics which are the main characteristics of critical land and there are still environmental destructive practices in the form of encroachment forest which causes the land to be degraded thus causing land to become critical in West Lombok Regency. Based on data from the Environment and Forestry Service of Nusa Tenggara Province West, in 2018 West Lombok Regency has critical land which is in the status of a production forest area of 2,111 Ha, a

forest area protected 2,209 Ha, conservation forest area 434 Ha, and outside the forest area 61 Ha.

Based on the conditions described in the paragraph above, there are various factors that cause land to become critical in the West Lombok Regency area. So that critical land becomes one of the problems in West Lombok Regency. In addition, considering the need for land that continues to increase along with the population increase while the land area does not increase. Therefore, in this study the researcher attempted to determine the level of criticality of land in West Lombok Regency.

2. METHOD

The type of research used in this research is quantitative research with a descriptive approach.

2.1. *Research Sites*

The location of this research is West Lombok Regency which has the morphology of the hilly / mountainous, plains and coastal areas. Geographically, West Lombok Regency is located between 115o 49.12 '04 "- 116o 20" 15.62 "East Longitude, and 8o 24" 33.82 "- 8o 55" 19 "South Latitude. West Lombok Regency itself has an area of 1,053.92 Km2 which is divided into 10 sub-districts.

2.2. *Data analysis method*

The data analysis method used to determine the level of criticality of land in West Lombok Regency is by scoring techniques and spatial data overlay methods based on the parameters of the Regulation of the Director General of Watershed Management and Social Forestry Number: P. 4 / V-SET / 2013 Regarding Technical Guidelines for Spatial Data Compilation Critical Land in the following diagram (Figure 1).
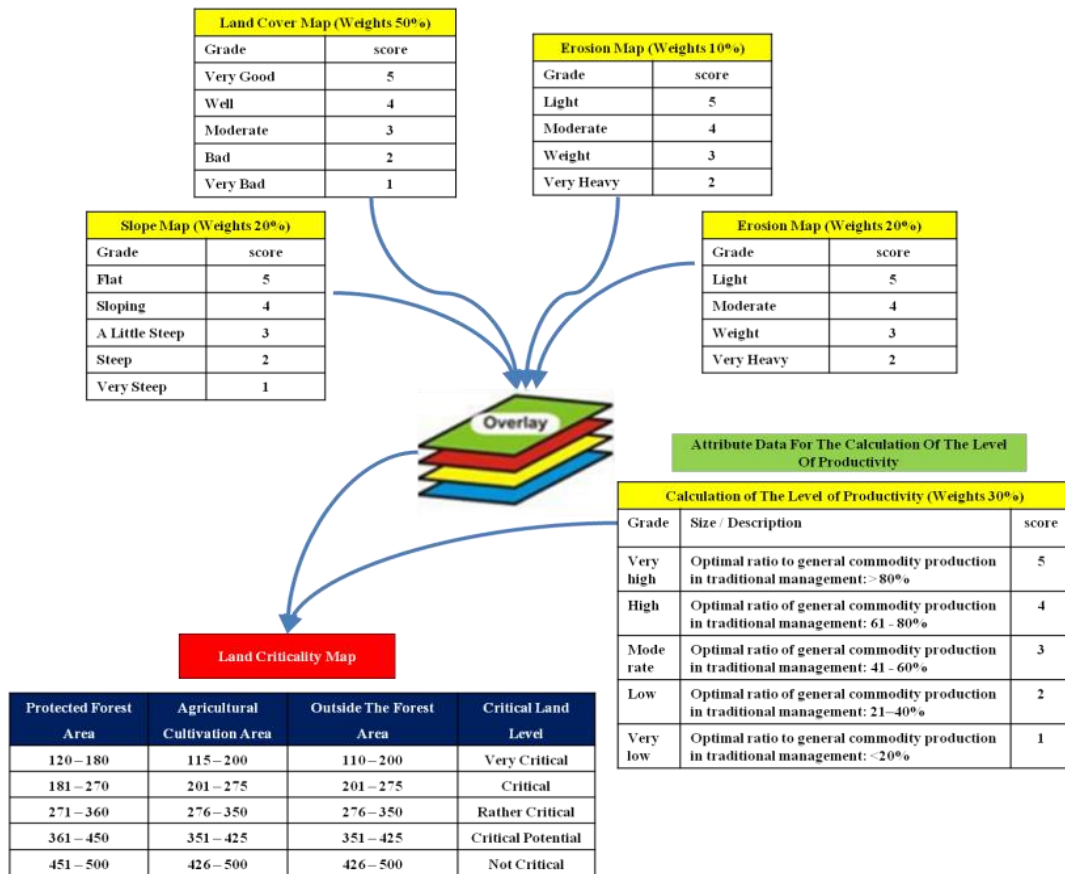
Land Cover Map (Weights 50%)

Grade	score
Very Good	5
Well	4
Moderate	3
Bad	2
Very Bad	1

Erosion Map (Weights 10%)

Grade	score
Light	5
Moderate	4
Weight	3
Very Heavy	2

Slope Map (Weights 20%)

Grade	score
Flat	5
Sloping	4
A Little Steep	3
Steep	2
Very Steep	1

Erosion Map (Weights 20%)

Grade	score
Light	5
Moderate	4
Weight	3
Very Heavy	2

Overlay

Attribute Data For The Calculation Of The Level Of Productivity

Calculation of The Level of Productivity (Weights 30%)

Grade	Size / Description	score
Very high	Optimal ratio to general commodity production in traditional management: >80%	5
High	Optimal ratio of general commodity production in traditional management: 61 - 80%	4
Mode rate	Optimal ratio of general commodity production in traditional management: 41 - 60%	3
Low	Optimal ratio of general commodity production in traditional management: 21–40%	2
Very low	Optimal ratio to general commodity production in traditional management: <20%	1

Land Criticality Map

Protected Forest Area	Agricultural Cultivation Area	Outside The Forest Area	Critical Land Level
120 – 180	115 – 200	110 – 200	Very Critical
181 – 270	201 – 275	201 – 275	Critical
271 – 360	276 – 350	276 – 350	Rather Critical
361 – 450	351 – 425	351 – 425	Critical Potential
451 – 500	426 – 500	426 – 500	Not Critical

Figure 1 Data Analysis Method

3. RESULT AND DISCUSSION

3.1. *Land Cover*

The results of land cover analysis in West Lombok Regency show that land cover with very good class has the largest area, namely 49,092.43 Ha. And the land cover that has the least area is in the bad land cover class of 1,528.78 Ha. The area for land cover with good class has an area of 13,097.51 Ha. At land cover with medium class, it has an area of 9,396.59 Ha. And land cover with a very bad class, which has an area of 32,276.69 Ha. The following is the data on the results of land cover classification in West Lombok Regency (Table 1 and Figure 2).

Table 1. Classification of Land Cover

Grade	Percentage of Header Cover (%)	Score	Score × Weigh (50)	Area (Ha)
Very Good	> 80	5	250	49.092,43
Well	61-80	4	200	13.097,51
Moderate	41-60	3	150	9.396,59
Bad	21-40	2	100	1.528,78
Very Bad	< 20	1	50	32.276,69

3.2. Slope

The results of the slope classification in the West Lombok Regency area are dominated by a slope of 0 - 8% with a flat slope class having an area of 30,064.48 Ha. The slope area of 8-15% with gentle slope class has an area of 17,535.48 Ha. Slope slope 15-25% with a rather steep slope class has an area of 18,183.47 Ha. Then the slope of 25 - 40% with steep slope class has an area of 26,191.48 Ha and on slopes> 40% with very steep slope class has an area of 13,417.09 Ha. Where the slope that has slope class is getting steep, the more sensitive it will be to erosion so that the risk of critical land will also be even greater. The following is the weighting data on the slope parameters of West Lombok Regency (Table 2 and Figure 3).

Table 2. Calcification of Slope Slope of West Lombok Regency

Slope	Grade	Score	Score × Weight (20)	Area (Ha)
0 – 8 %	Flat	5	100	30.064,48
8 – 15 %	Sloping	4	80	17.535,48
15 – 25 %	A Little Steep	3	60	18.183,47
25- 40 %	Steep	2	40	26.191,48
>40 %	Very Steep	1	20	13.417,09

3.3. Erosion Hazard Level

The results of the analysis of the status of the erosion hazard level in West Lombok Regency are dominated by the level of severe erosion hazard with an area of 37,915.51 Ha (35.98% of the area of West Lombok Regency). Meanwhile, the risk of erosion in West Lombok Regency, ranging from moderate to very severe, has an area of 66,960.94 Ha (63.54% of the area of West Lombok Regency). This shows that the area of West Lombok Regency is at risk of extensive erosion hazards so that the risk of developing critical land will also be even greater. The following is a table of the status of erosion hazard levels in West Lombok Regency (Table 3 and Figure 4).

Table 3. Status of Erosion Hazard Level in West Lombok Regency

Erosion Rate (ton/ha/year)	Erosion Hazard Grade	Erosion Hazard Level	Score × Weight (20)	Area (Ha)
< 15	I	Very Light	0	13343.42
15 - 60	II	Light	5	25087.64
60 -180	III	Moderate	4	19714.32
180 - 480	IV	Weight	3	37915.51
> 480	V	Very heavy	2	9331.11
Total				105392.00

3.4. Calculation of the Level of Productivity

The classification of agricultural productivity in West Lombok Regency is from very high class and low class. Where in general the amount of productivity of agricultural products in the West Lombok Regency is very high class (the ratio to the production of general commodities is optimal in traditional management:> 80%). Except in the area of Batulayar Subdistrict, which has a low agricultural productivity classification (Ratio to optimal general commodity production in traditional management: 21-40%). The following is a table of agricultural product productivity in West Lombok Regency in 2019 (Table 4).

Table 4. Productivity of Agricultural Products in West Lombok Regency in 2019

| Sub-district | Productivity of Agricultural Products in West Lombok Regency in 2019 | | | | | | |
	Harvested Area (Ha)	Production (Ton)	Productivity (Ton/Ha)	Amount of Productivity (%)	Grade	Score	Score × Weight (30)
Sekotong	17232	99736.70	5.79	116.15	Very High	5	150
Lembar	5969	32775.20	5.49	107.17	Very High	5	150
Gerung	8569	52054.00	6.07	105.40	Very High	5	150
Labuapi	3719	20426.73	5.49	102.47	Very High	5	150
Kediri	3766	24251.10	6.44	116.62	Very High	5	150
Kuripan	3526	20214.70	5.73	107.48	Very High	5	150
Narmada	5911	33139.70	5.61	96.40	Very High	5	150
Lingsar	3953	22855.50	5.78	102.56	Very High	5	150
Gunungsari	2251	15364.15	6.83	120.78	Very High	5	150
Batulayar	1918	2941.50	1.53	29.11	Low	2	60

3.5. Management

The results of the management classification show that the management of protected forest areas in West Lombok Regency is complete. Then the management value for determining critical land in the West Lombok Regency is given a value of 50.

Table 5. Classification of management for determination critical land in West Lombok Regency

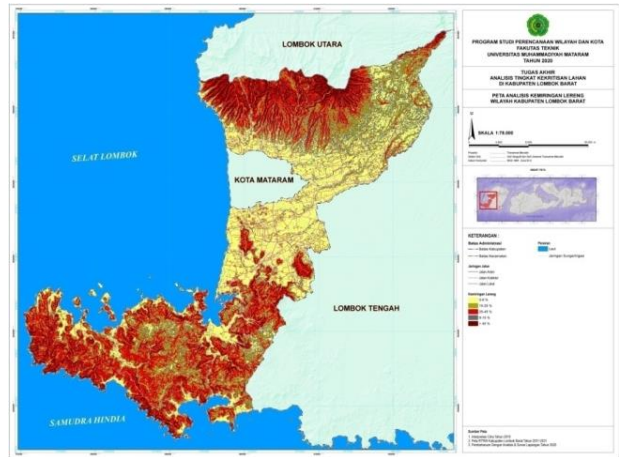| Management of Protected Forest Area | Completeness of Management Aspects | | Size/ Description | Score | Score × Weight (10) |
	There is	there is no			
Area boundaries exist	√				
Supervision safeguards exist	√		Complete *)	5	50
Extension carried out	√				
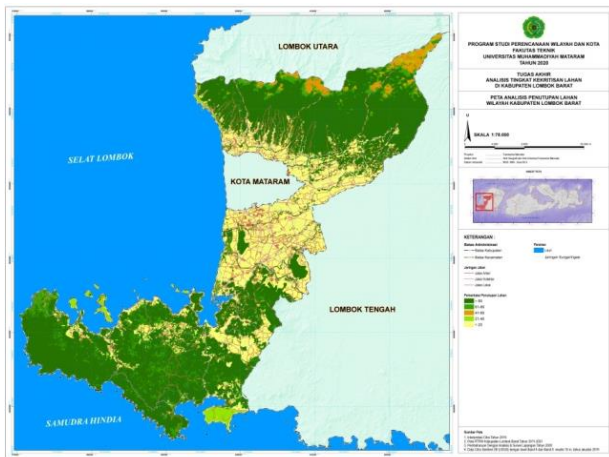
Figure 2 Land Cover
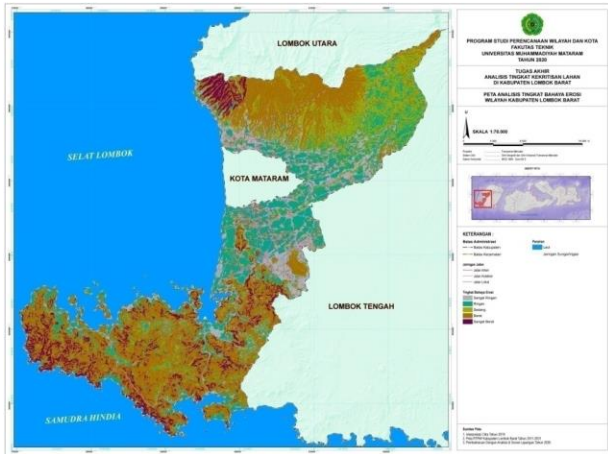

Figure 3 Slope
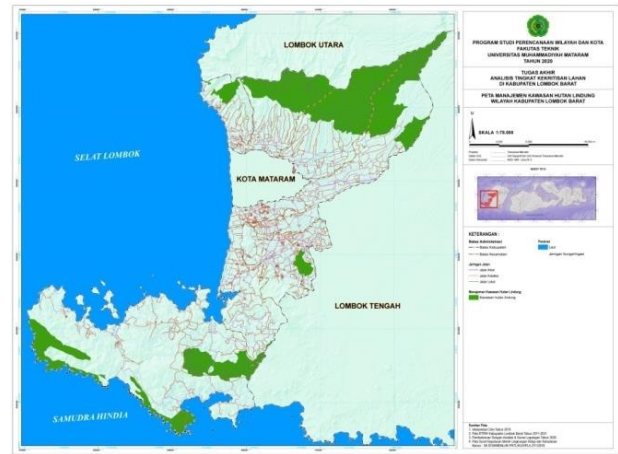
Figure 4 Erosion Hazard Level

Figure 5 Management

3.6. The Level of Criticality of Land in Protected Areas

The results of the analysis of the criticality level of land in the protected forest area of West Lombok Regency are 3,714.38 Ha of land with a rather critical land classification. While the classification for potentially critical land has an area of 5,619.37 Ha. Where the level of land criticality that dominates in the protected forest area of West Lombok Regency is land with non-critical classification covering an area of 15,745.19 Ha (Figure 6).

3.7. The Level of Soil Criticality in the Cultivation Area

The results of the analysis of the criticality level of land in the agricultural cultivation area of West Lombok Regency, that the level of criticality of the land that dominates is land with non-critical classification covering an area of 24,689.35 Ha. The critical land classification has an area of 56.34 Ha and for the land area with a slightly critical classification it has an area of 206.19 Ha. While the classification of critical potential lands has an area of 875.36 Ha (Figure 7).

3.8. The Critical Level of Land in Outer Areas Outside the Forest Zone

The results of the analysis of the criticality level of land in areas outside the forest area of West Lombok Regency, there is a level of criticality with the critical land classification having an area of 587.37 Ha and slightly critical land covering an area of 3,122.53 Ha. Meanwhile, the dominant land criticality level is land with non-critical classification with an area of 43,637.05 Ha. And the classification of critical potential land has an area of 7,138.87 Ha (Figure 8).
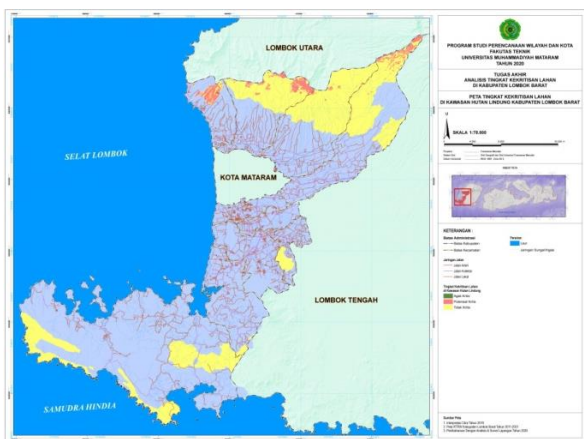

Figure 6 The level of criticality of land in protected areas

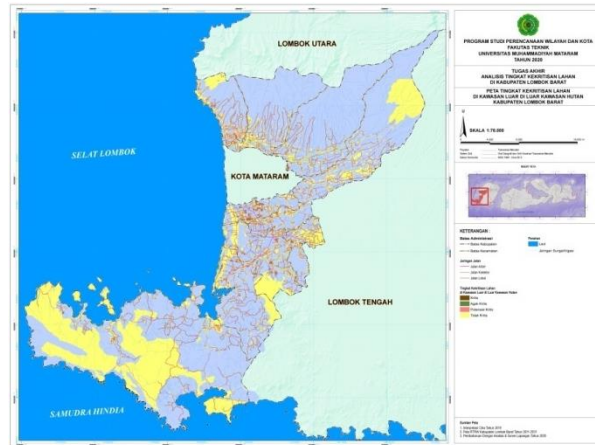**Figure 7** the level of soil criticality in cultivation area

Figure 8. The critical level of land in outer areas outside the forest zone

4. CONCLUSION

The level of criticality of land that dominates in the protected forest area of West Lombok Regency is land with non-critical classification covering an area of 15,745.19 Ha. Then the level of criticality of land in the agricultural cultivation area of West Lombok Regency, that the level of criticality of the land that dominates is land with non-critical classification covering an area of 24,689.35 Ha. And for the level of land criticality that dominates in the outer areas outside the forest area of West Lombok Regency, namely land with non-critical classification with an area of 43,637.05 Ha.

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