

**EVALUATION OF LAND SUITABILITY FOR AGROFORESTRY  
DEVELOPMENT BASED ON THE LEVEL OF CRITICAL LAND  
IN THE PACET HILL AREA, MOJOKERTO REGENCY**

**UNDERGRADUATE THESIS**



**Submitted by :**

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SURABAYA  
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To Fulfil the Requirements in Obtaining a Bachelor of Agriculture Degree  
Agrotechnology Study Program



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**APPROVAL SHEET**

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# EVALUATION OF LAND SUITABILITY FOR AGROFORESTRY DEVELOPMENT BASED ON THE LEVEL OF CRITICAL LAND IN THE PACET HILL AREA, MOJOKERTO REGENCY

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## ABSTRACT

Pacet Hill is a steep volcanic landscape with high erosion risk and varying levels of land degradation. This study evaluates land suitability across different critical land levels to identify priority crops for sustainable agroforestry development. Field surveys, soil analyses, and spatial assessments were conducted from February to August 2025 across approximately 104 hectares. Land characteristics including climate, slope, soil texture, nutrient status, and erosion hazard were assessed using a matching-based suitability approach supported by scoring, correlation, and regression analysis. Results show that slope, erosion hazard, and nutrient limitations are the major constraints on land productivity. Arabica coffee and avocado exhibited the highest suitability, while cayenne pepper and cabbage require additional management interventions. The land-suitability regression model produced an adjusted  $R^2 = 0.60$ , indicating that 60% of variability in suitability scores is explained by the evaluated parameters. Land criticality was predicted using the equation  $Y = -0.38(\text{slope}) - 4.85(\text{pH}) + 7.09(\text{C-organic}) + 55.6(\text{N-total}) + 0.8(\text{CEC}) + 616$ , with adjusted  $R^2 = 0.633$  and  $p < 0.05$ , demonstrating strong explanatory power for degradation conditions. The correlation between land suitability and criticality was very weak ( $r = 0.2236$ ), suggesting that although both relate indirectly through erosion-driven processes, they represent different environmental dimensions. These findings provide a spatial basis for soil conservation strategies and support sustainable agroforestry planning in the Pacet Hill region.

**Keywords:** Land Suitability, Land Criticality, Agroforestry, Erosion Hazard, Soil Properties, Pacet Hill

## ABSTRACT

Pacet Hill is a steep volcanic landscape with a high risk of erosion and varying degrees of land degradation. This study evaluates land suitability at various levels of criticality to determine priority commodities in sustainable agroforestry development. Field surveys, soil analysis, and spatial analysis were carried out from February to August 2025 on an area of about 104 hectares. Land characteristics, including climate, slope, soil texture, nutrient status, and erosion hazards, were assessed using a matching-based suitability approach supported by scoring systems, correlation analysis, and regression analysis. The results of the study show that slope, erosion hazard, and nutrient limitations are the main factors that limit land productivity. Arabica and avocado coffees show the highest levels of suitability, while chili peppers and cabbage require additional management interventions. The land suitability regression model yields a value of Adjusted  $R^2 = 0.60$ , which indicates that the 60% variability of the suitability score can be explained by the parameters analyzed. Land criticality was predicted using the equation  $Y = -0.38(\text{slope}) - 4.85(\text{pH}) + 7.09(\text{C-organic}) + 55.6(\text{N-total}) + 0.8(\text{CEC}) + 616$ , d Adjusted  $R^2 = 0.633$  and  $p < 0.05$ , which shows the model's strong ability to explain land degradation conditions. The correlation between land suitability and land criticality was very weak ( $r = 0.2236$ ), suggesting that although the two are indirectly related through erosion processes, they represent different environmental dimensions. These findings provide the basis for soil conservation strategies and support sustainable agroforestry planning in the Pacet Hill region.

**Keywords:** Land Suitability, Land Criticality, Agroforestry, Erosion Hazard, Soil Properties, Pacet Hil

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