

PEMETAAN ZONA KERENTANAN GERAKAN MASSA DENGAN MENGGUNAKAN METODE *ANALYTICAL HIERARCHY PROCESS (AHP)* DESA NGORO ORO, KECAMATAN PATUK, KABUPATEN GUNUNG KIDUL

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INTISARI

Penelitian ini bertujuan untuk melakukan analisis zonasi kerentanan terhadap gerakan massa di wilayah Desa Ngoro-Oro, Kecamatan Patuk, Kabupaten Gunungkidul, Daerah Istimewa Yogyakarta. Pemilihan lokasi penelitian didasarkan pada karakteristik geomorfologi berupa perbukitan dengan lereng terjal hingga sangat terjal serta kondisi batuan yang telah mengalami pelapukan intensif, yang berdasarkan peta PVMBG termasuk dalam klasifikasi zona kerentanan gerakan tanah dengan tingkat rendah hingga tinggi. Metodologi penelitian mencakup beberapa tahapan utama. Pertama, dilakukan identifikasi dan analisis terhadap empat parameter utama pengontrol gerakan massa, yaitu: kemiringan lereng (47,1%), jarak dari struktur geologi (28,4%), litologi (17,2%), dan tata guna lahan (7,4%). Pengambilan data lapangan dilaksanakan melalui survei geologi terpadu, sementara data kemiringan lereng diperoleh dari pengolahan Digital Elevation Model (DEM) menggunakan perangkat lunak ArcGIS 10.8. Proses pembobotan parameter dilakukan dengan menerapkan metode Analytic Hierarchy Process (AHP), sedangkan validasi model menggunakan analisis Area Under Curve (AUC). Hasil penelitian menunjukkan distribusi zona kerentanan gerakan massa sebagai berikut: zona kerentanan rendah mencakup 34,13% wilayah studi, zona kerentanan sedang 38,52%, dan zona kerentanan tinggi 20,8%. Namun demikian, nilai AUC sebesar <70% mengindikasikan bahwa model yang dikembangkan masih memiliki tingkat akurasi yang terbatas. Berdasarkan temuan penelitian, dapat disimpulkan bahwa: (1) model prediksi kerentanan gerakan massa yang dikembangkan belum mencapai tingkat optimal dalam hal akurasi, dan (2) diperlukan pengembangan lebih lanjut untuk meningkatkan validitas model. Rekomendasi untuk penelitian selanjutnya meliputi: (a) perluasan cakupan parameter dengan memasukkan variabel klimatologi dan parameter geoteknik, (b) penerapan metode alternatif seperti Frequency Ratio atau Logistic Regression, serta (c) pelaksanaan uji laboratorium untuk menentukan sifat fisik dan mekanika batuan secara komprehensif.

Kata kunci: Zonasi kerentanan, gerakan massa, *Analytic Hierarchy Process*, Gunungkidul, mitigasi bencana geologi

SUSCEPTIBILITY MAPPING OF MASS MOVEMENTS USING THE ANALYTICAL HIERARCHY PROCESS (AHP) IN NGORO ORO VILLAGE, PATUK DISTRICT, GUNUNGKIDUL REGENCY

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ABSTRACT

This study conducts a comprehensive analysis of mass movement susceptibility zonation in Ngoro-Oro Village, Patuk District, Gunungkidul Regency, Special Region of Yogyakarta. The selection of the study area was predicated upon its distinctive geomorphological characteristics, featuring steep to precipitous hill slopes with extensively weathered rock formations, which according to the Center for Volcanology and Geological Hazard Mitigation (PVMBG) classification fall within the spectrum of low to high susceptibility zones for mass movements phenomena. The methodological framework encompassed several critical phases. Primarily, a systematic identification and quantitative assessment of four principal mass movement controlling parameters was undertaken: slope gradient (weighted at 47.1%), proximity to geological structures (28.4%), lithological characteristics (17.2%), and land utilization patterns (7.4%). Field data acquisition was executed through comprehensive geological surveys, while topographic parameters were derived from Digital Elevation Model (DEM) processing utilizing ArcGIS 10.8 spatial analysis software. The parameter weighting procedure employed the Analytic Hierarchy Process (AHP) multicriteria decision-making technique, with subsequent model validation performed through Receiver Operating Characteristic (ROC) curve analysis. The analytical results delineate the spatial distribution of mass movement susceptibility zones as follows: areas of low susceptibility constitute 34.13% of the study region, moderate susceptibility zones account for 38.52%, while high susceptibility areas comprise 20.8% of the total extent. However, the Area Under Curve (AUC) metric of <70% suggests suboptimal predictive accuracy of the developed model. The principal conclusions drawn from this investigation are twofold: (1) the current susceptibility prediction model demonstrates insufficient predictive capability, and (2) substantial model refinement is warranted to enhance its operational validity. Prospective research directions should incorporate: (a) expansion of predictive parameters to include climatological variables and geotechnical indices, (b) implementation of alternative modeling approaches such as Frequency Ratio analysis or Logistic Regression modeling, and (c) laboratory characterization of physico-mechanical rock properties to augment the empirical foundation of the susceptibility assessment.

Keywords: Susceptibility zonation, mass wasting, Analytic Hierarchy Process, Gunungkidul, geological hazard mitigation