

INTISARI

KAJIAN POTENSI BAHAYA GEMPABUMI DI KOTA AMPANA BERDASARKAN DATA *HORIZONTAL TO VERTICAL SPECTRAL RATIO* (HVSR)

Oleh

HENDRIK LEOPATTY
23/526498/PPA/06656

Kota Ampana, Sulawesi Tengah, terletak di zona seismik aktif dengan sumber gempa dekat (Patahan Ampana, Barone, Balantak, dan Batui) dan riwayat gempa besar (Mw 8,6 tahun 1939; Mw 7,6 tahun 2000; Mw 6,2 tahun 2021) serta kompleksitas geologi berupa Aluvium, Terumbu Koral Kuarter, Kompleks Mafik dan Formasi Bongka. Penelitian ini mengevaluasi potensi bahaya gempa dengan penekanan pada rekahan tanah melalui metode *Horizontal to Vertical Spectral Ratio* pada 80 titik pengukuran mikrotremor menggunakan *seismometer short-period TDS-303* dan *mini broad-band MBB 120S*.

Analisis frekuensi dominan (f_0 : 0,24–4,54 Hz), faktor amplifikasi (A_0 : 1,06–5,15), dan indeks kerentanan gempa (K_g : 0,5–56,9) mengidentifikasi zona rawan di pesisir dan Bandara Tanjung Api Ampana dengan sedimen tebal situs kelas E dan D. Nilai percepatan puncak tanah (PGA) menggunakan rata-rata geometrik model ASK14, BSSA14, CB14 dan CY14 menghasilkan nilai 74,7–116,3 gal (MMI V-VI), lebih rendah dari studi probabilistik 490 gal oleh Irsyam dkk. (2017) akibat pendekatan deterministik berbasis data gempa 1909–2024 (bukan skenario gempa terburuk). Potensi penguatan guncangan dan kerusakan signifikan dapat terjadi di Kelurahan Bonerato, Bailo Baru, Bailo, Ampana, Labiabae, Uentanaga Bawah, Muara Toba, Dondo, Dondo Barat, Uentanaga Atas, serta di sisi utara Desa Malotong, sebagian Desa Buntongi, selatan Desa Labuan, dan barat Desa Pusungi.

Integrasi parameter kecepatan gelombang geser 30 m (V_{s30}), PGA, K_g , Kedalaman Muka Air Tanah, ketebalan sedimen, dan kemiringan lereng dalam metode *Simple Additive Weight* (SAW) menunjukkan potensi rekahan tanah kategori sedang (skor 0,40–0,62), terutama di zona transisi geologi (aluvium-terumbu koral) dengan akuifer dangkal. Hasil memperlihatkan konsistensi antara analisis *Ground Shear Strain* (elastis-plastis) dan SAW dengan pembobotan subjektif melalui validasi kestabilan. Implikasi penelitian menekankan pentingnya pengintegrasian data mikrotremor dan karakteristik lokal dalam strategi mitigasi risiko, penguatan infrastruktur di area V_{s30} rendah, serta tata ruang adaptif berbasis zonasi bahaya gempa.

Kata Kunci: Ampana, bahaya gempa, HVSR, rekahan tanah, SAW.

ABSTRACT

ASSESSMENT OF EARTHQUAKE HAZARD POTENTIAL IN AMPANA CITY BASED ON HORIZONTAL-TO-VERTICAL SPECTRAL RATIO (HVSr) DATA

Oleh

HENDRIK LEOPATTY
23/526498/PPA/06656

Ampana City, Central Sulawesi, lies in a seismically active zone near the Ampana, Barone, Balantak, and Batui faults, with a history of significant earthquakes (1939 Mw8.6; 2000 Mw7.6; 2021 Mw6.2) and complex geology (alluvium, Quaternary coral reefs, mafic complex, Bongka Formation). This study evaluates seismic hazards, focusing on ground fissure potential, using the Horizontal-to-Vertical Spectral Ratio method at 80 microtremor measurement points with TDS-303 and MBB 120S seismometers.

Dominant frequency analysis (f_0 : 0.24–4.54 Hz), amplification factor (A_0 : 1.06–5.15), and seismic vulnerability index (K_g : 0.5–56.9) identified hazard-prone zones along the coastal area and Tanjung Api Ampana Airport, characterized by thick sediments of site classes E and D. Peak ground acceleration (PGA), calculated using the geometric mean of ASK14, BSSA14, CB14, and CY14 models, ranges from 74.7 to 116.3 gal (MMI V–VI), which is lower than the probabilistic estimate of 490 gal by Irsyam et al. (2017), due to the deterministic approach based on earthquake data from 1909 to 2024 (excluding worst-case scenarios). Potential ground motion amplification and significant damage may occur in Bonerato, Bailo Baru, Bailo, Ampana, Labiabae, Uentanaga Bawah, Muara Toba, Dondo, Dondo Barat, Uentanaga Atas, and the northern part of Malotong Village, parts of Buntongi Village, the southern part of Labuan Village, and the western part of Pusungi Village.

Integration of V_{s30} , PGA, K_g , depth to Ground Water Level, sediment thickness, and slope inclination in the Simple Additive Weight (SAW) method revealed moderate potential for ground fissuring (score: 0.40–0.62), particularly in transitional zones (alluvium-coral reefs) with shallow aquifers. Despite subjective weighting, results demonstrated consistency between elastoplastic Ground Shear Strain analysis and SAW outcomes. The study underscores the necessity of incorporating microtremor data and local geological characteristics into adaptive spatial planning, infrastructure reinforcement in low V_{s30} areas, and risk-based zoning policies to mitigate seismic hazards.

Keywords: Ampana, seismic hazard, HVSr, ground fissure, SAW.