Geomorfologi dan Distribusi Endapan Nikel Laterit di Daerah X, Kabupaten Halmahera Tengah, Provinsi Maluku Utara = Geomorphology and Distribution of Lateritic Nickel Deposits in Area X, Central Halmahera Regency, North Maluku Province

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Abstrak

Penelitian ini bertujuan untuk mengkaji hubungan antara kondisi geomorfologi, geokimia batuan, dan distribusi endapan nikel laterit di Daerah X, Kabupaten Halmahera Tengah, Provinsi Maluku Utara. Wilayah ini secara geologi berada dalam Mandala Halmahera Timur yang tersusun atas kompleks ofiolit dan batuan ultrabasa seperti harzburgit, lherzolit, dan dunite yang berperan sebagai batuan induk pembentuk laterit. Metode yang digunakan meliputi analisis geomorfologi berbasis data topografi dan klasifikasi bentuk lahan geomorphon, analisis geokimia batuan dasar menggunakan data X-Ray Fluorescence (XRF), serta pemetaan distribusi kadar dan ketebalan endapan laterit melalui interpolasi Inverse Distance Weighting (IDW). Hasil penelitian menunjukkan bahwa bentuk lahan seperti ridge, spur, dan shoulder pada kemiringan 2°–15° serta elevasi antara 700–900 meter cenderung memiliki ketebalan laterit yang lebih besar dan kadar nikel yang lebih tinggi, menjadikannya zona prospektif utama. Zona saprolit memiliki kadar Ni tertinggi, mencapai lebih dari 2,5%, dengan komposisi geokimia yang mengindikasikan tipe laterit Hydrous Magnesium Silicate (HMS). Hubungan negatif antara kemiringan lereng dan ketebalan limonit mengindikasikan peran penting topografi terhadap intensitas pelapukan dan pelindian unsur. Selain itu, analisis geokimia batuan menunjukkan bahwa harzburgit merupakan litologi dominan dengan sebaran kadar Ni yang luas, sedangkan kadar tertinggi tercatat pada litologi dunite dan lherzolit meskipun dengan jumlah data yang terbatas. Temuan ini memperkuat peran faktor geomorfologi dan komposisi kimia batuan dalam pengendalian pembentukan serta sebaran endapan nikel laterit, dan dapat dijadikan acuan dalam eksplorasi tahap awal di wilayah studi.

.....This study aims to examine the relationship between geomorphological conditions, bedrock geochemistry, and the distribution of lateritic nickel deposits in Area X, Central Halmahera Regency, North Maluku Province. Geologically, the study area lies within the Eastern Halmahera Belt, characterized by ophiolitic complexes and ultramafic rocks such as harzburgite, lherzolite, and dunite, which serve as the primary protoliths for lateritization. The research methodology includes geomorphological analysis based on topographic data and geomorphon-based landform classification, geochemical analysis of bedrock using X-Ray Fluorescence (XRF), and spatial distribution modeling of nickel grade and laterite thickness using the Inverse Distance Weighting (IDW) interpolation method. The results indicate that landforms such as ridges, spurs, and shoulders with slope gradients between 2°–15° and elevations ranging from 700 to 900 meters above sea level tend to exhibit thicker lateritic profiles and higher nickel concentrations, marking them as highly prospective zones. The saprolite zone shows the highest nickel content, exceeding 2.5%, with geochemical characteristics indicative of the Hydrous Magnesium Silicate (HMS) laterite type. A negative correlation between slope angle and limonite thickness suggests that topography significantly influences leaching intensity and elemental accumulation. Furthermore, bedrock geochemical analysis reveals harzburgite as the dominant lithology with a wide range of Ni content, while the highest Ni grades are found

in samples identified as dunite and lherzolite, although data for these rock types are limited. These findings highlight the crucial roles of geomorphology and geochemical composition in controlling the formation and spatial distribution of lateritic nickel deposits, offering valuable insights for early-stage mineral exploration in the study area.