

PENGARUH PERUBAHAN PENGGUNAAN LAHAN AKIBAT AKTIVITAS INDUSTRI NIKEL TERHADAP BENCANA BANJIR DI DAS BAHODOPI KABUPATEN MOROWALI

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INTISARI

Aktivitas industri nikel di Daerah Aliran Sungai (DAS) Bahodopi, Kabupaten Morowali telah menyebabkan perubahan penggunaan lahan yang masif. Area pertambangan mengalami kenaikan secara signifikan dari 0,69% (2011) menjadi 8,85% (2022) dengan konversi hutan lahan kering sekunder turun 10,09%. Perubahan lahan tersebut menyebabkan 28 kejadian banjir berulang di Desa Bahomakmur, Labota, dan Lalampu selama periode 2018-2025. Namun demikian, hubungan kuantitatif antara perubahan lahan akibat aktivitas industri nikel dengan bencana banjir belum dikaji secara empiris menggunakan pemodelan hidrologi. Studi ini akan mengkaji dampak perubahan penggunaan lahan dengan banjir menggunakan pendekatan model hidrologi.

Penelitian ini menggunakan model SWAT (Soil and Water Assessment Tool), untuk menganalisis dampak perubahan lahan terhadap respons hidrologi. Data yang digunakan meliputi data penggunaan lahan, data jenis tanah, data kelerengan, DEM SRTM, data curah hujan harian, data iklim, dan data debit sungai. Selanjutnya model divalidasi dengan kriteria koefisien determinasi (R^2) dan Nash-Sutcliffe Efficiency (NSE) untuk membandingkan debit simulasi terhadap data observasi.

Hasil validasi model menghasilkan $R^2 = 0,61$ dan $NSE = 0,54$ yang menunjukkan kinerja model dapat diterima. Peningkatan aliran permukaan sebesar 17,6% (dari 1.360 menjadi 1.600 mm/tahun) dan penurunan kapasitas infiltrasi hingga 11,3% (dari 710 mm menjadi 630 mm/tahun). Hasil tersebut mengindikasikan degradasi fungsi hidrologis yang ditandai dengan dominannya limpasan permukaan dibandingkan dengan infiltrasi. Hasil kajian menunjukkan terdapat 9 Sub DAS kritis berdasarkan nilai CN. Untuk itu, perlu prioritas penanganan mitigasi dan pengelolaan lingkungan pada Sub DAS kritis tersebut.

Kata kunci: Perubahan Penggunaan Lahan, Industri Nikel, Banjir, DAS Bahodopi, Curve Number, Model SWAT

**THE EFFECT OF LAND USE CHANGE
RESULTING FROM NICKEL INDUSTRIAL ACTIVITIES ON
FLOODING IN THE BAHODOPI RIVER BASIN, MOROWALI REGENCY**

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ABSTRACT

Nickel industrial activities in the Bahodopi Watershed, Morowali Regency, have led to massive land-use changes. Mining areas increased significantly from 0.69% in 2011 to 8.85% in 2022, resulting in a 10.09% decline in secondary dryland forest cover. These transformations have triggered 28 recurring flood events in the villages of Bahomakmur, Labota, and Lalampu between 2018 and 2025. Despite these occurrences, the quantitative relationship between nickel industry-driven land-use change and flood disasters has not been empirically examined through hydrological modeling. This study evaluates the impact of land-use change on flooding using a hydrological modeling approach.

This research utilizes the Soil and Water Assessment Tool (SWAT) model to analyze the impact of land-use changes on hydrological responses. The datasets incorporated include land use, soil types, slope gradients, SRTM Digital Elevation Models (DEM), daily rainfall, climate data, and river discharge records. The model was validated using the Coefficient of Determination (R^2) and the Nash-Sutcliffe Efficiency (NSE) to compare simulated discharge against observed data.

The model validation yielded $R^2 = 0.61$ and $NSE = 0.54$, indicating acceptable model performance. Findings show a 17.6% increase in surface runoff (from 1,360 to 1,600 mm/year) and an 11.3% reduction in infiltration capacity (from 710 mm to 630 mm/year). These results signify a degradation of hydrological functions, characterized by the dominance of surface runoff over infiltration. The study identified 9 critical sub-watersheds based on Curve Number (CN) values; consequently, priority must be given to mitigation efforts and environmental management within these critical sub-watersheds.

Keywords: *Land Use Change, Nickel Industry, Flooding, Bahodopi Watershed, Curve Number, SWAT Model*