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Analisis Variabilitas Erodibilitas Tanah Berbasis Digital Soil Mapping untuk Rekomendasi Konservasi Lahan di Sub-DAS Ngrowo, DAS Brantas
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INTISARI

Erodibilitas tanah merupakan salah satu faktor penting yang menentukan kerentanan tanah terhadap erosi sehingga informasi distribusi spasialnya diperlukan untuk mendukung perencanaan konservasi lahan. Penelitian ini bertujuan memetakan distribusi spasial faktor erodibilitas tanah menggunakan pendekatan *Digital Soil Mapping* (DSM), mengevaluasi akurasi model EPIC, Shirazi, dan Torri, serta menganalisis faktor-faktor yang berasosiasi dengan variasi erodibilitas tanah di Sub-DAS Ngrowo, DAS Brantas. Data sifat tanah berupa fraksi pasir, debu, lempung, dan karbon organik tanah dari SoilGrids digunakan untuk menyusun peta prediksi pada kedalaman 0–30 cm dan 30–60 cm. Nilai K acuan dihitung berdasarkan analisis laboratorium sampel tanah dari 30 titik pengamatan pada kedua kedalaman. Akurasi model dievaluasi menggunakan *Mean Absolute Error* (MAE) dan *Root Mean Square Error* (RMSE), sedangkan faktor terkait variasi erodibilitas dianalisis melalui regresi linear berganda metode *stepwise*. Hasil menunjukkan bahwa distribusi spasial erodibilitas tanah heterogen pada kedua kedalaman. Model Torri memiliki akurasi terbaik, dengan MAE dan RMSE masing-masing 0,00295 dan 0,00338 pada kedalaman 0–30 cm serta 0,00344 dan 0,00432 pada kedalaman 30–60 cm. Fraksi tekstur tanah dan karbon organik tanah merupakan faktor yang paling konsisten berasosiasi dengan variasi erodibilitas, sedangkan *bulk density* dan kemiringan lereng berkontribusi pada model dan kedalaman tertentu. Hasil penelitian ini memberikan informasi mengenai distribusi spasial dan variasi erodibilitas tanah yang dapat digunakan sebagai salah satu bahan pertimbangan dalam perencanaan konservasi lahan di Sub-DAS Ngrowo, dengan tetap memperhatikan faktor-faktor lain yang mempengaruhi erosi.

Kata kunci: *Digital Soil Mapping*, erodibilitas tanah, SoilGrids, model empiris, konservasi lahan

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ABSTRACT

Soil erodibility is an important factor determining soil susceptibility to erosion; therefore, information on its spatial distribution is needed to support land conservation planning. This study aimed to map the spatial distribution of soil erodibility using the *Digital Soil Mapping* (DSM) approach, evaluate the accuracy of the EPIC, Shirazi, and Torri models, and analyze factors associated with variations in soil erodibility in the Ngrowo Sub-watershed, Brantas Watershed. Soil properties, including sand, silt, clay, and soil organic carbon fractions, were obtained from SoilGrids to generate prediction maps at depths of 0–30 cm and 30–60 cm. Reference soil erodibility (K) values were calculated from laboratory analyses of soil samples collected at 30 observation points at both depths. Model accuracy was evaluated using *Mean Absolute Error* (MAE) and *Root Mean Square Error* (RMSE), while factors associated with variations in erodibility were analyzed using stepwise multiple linear regression. The results showed that the spatial distribution of soil erodibility was heterogeneous at both depths. The Torri model achieved the highest accuracy, with the lowest MAE and RMSE values of 0.00295 and 0.00338, respectively, at 0–30 cm and 0.00344 and 0.00432, respectively, at 30–60 cm. Soil texture fractions and soil organic carbon were the factors most consistently associated with variations in erodibility, whereas bulk density and slope contributed to certain models at specific depths. The findings provide information on the spatial distribution and variability of soil erodibility, which can serve as a basis for consideration in land conservation planning in the Ngrowo Sub-watershed, while accounting for other factors affecting erosion.

Keywords**:** *Digital Soil Mapping*, soil erodibility, SoilGrids, empirical models, land conservation.