

## SIMULASI EROSI MENGGUNAKAN MODEL SIMWE DI LONGSOR KALISARI, KABUPATEN MAGELANG

Oleh Muhammad Hanif Adiprana

20/458613/GE/09296

### INTISARI

Longsor di Dusun Kalisari, Desa Margoyoso, Kecamatan Salaman mulai mencapai kesetimbangan. Perkembangan geomorfologi pada longsor Kalisari perlu diamati untuk mengetahui besaran sedimen tererosi yang akan dideposisikan di Sungai Bompon, terlebih mengetahui karakteristik erosi-deposisi di longsor non-vegetasi dan di longsor bervegetasi. Dengan demikian, penelitian ini bertujuan untuk mengetahui karakteristik erosi-deposisi di longsor Kalisari. Penelitian ini bertujuan untuk (1) Menganalisis lokasi dan besar laju erosi-deposisi dengan model SIMWE (2) Menganalisis karakteristik erosi-deposisi di longsor non-vegetasi dan longsor bervegetasi, dan (3) memvalidasi hasil simulasi dengan pengukuran lapangan

Penelitian ini dilakukan dengan mensimulasikan laju erosi-deposisi dengan model SIMWE (Simulated Water Erosion). Parameter masukan sederhana berbasis raster berupa DTM (Digital Terrain Model), curah hujan dan durasinya, koefisien manning, laju infiltrasi, koefisien kapasitas pelepasan sedimen, koefisien kapasitas transpor sedimen, dan tegangan geser kritis tanah. Kejadian hujan yang dijadikan masukan yaitu kejadian hujan pada tanggal 6 Maret 2024 (84 mm/jam, 30 menit) dan 26 Maret 2024 (38,6 mm/jam, 65 menit) Hasil dari pemodelan ini berupa raster ketebalan aliran dan laju erosi-deposisi (*time-limited*). Penelitian dilakukan secara deskriptif kuantitatif.

Laju erosi (positif) pada gawir, kepala, badan, dan kaki longsor secara berturut-turut sebesar 0,0008 kg/m<sup>2</sup>s, 0,025 kg/m<sup>2</sup>s, 0,28 kg/m<sup>2</sup>s, dan 0,056 kg/m<sup>2</sup>s. Rata-rata laju deposisi (negatif) pada gawir, kepala, badan, dan kaki longsor secara berturut-turut sebesar -0,0006 kg/m<sup>2</sup>s, -0,02 kg/m<sup>2</sup>s, -0,1 kg/m<sup>2</sup>s, dan -0,04 kg/m<sup>2</sup>s. Laju erosi-deposisi pada longsor non-vegetasi lebih besar daripada laju erosi-deposisi di longsor bervegetasi. Perbedaan curah hujan lebih, morfologi, kelerengan, dan karakteristik saluran drainase mengakibatkan perbedaan ketebalan aliran dan laju erosi-deposisi. Model tervalidasi dengan memvalidasi DTM (*Digital Terrain Model*), aliran permukaan, dan erosi-deposisi.



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**Simulasi Erosi Menggunakan Model SIMWE di Longsor Kalisari, Kabupaten Magelang**  
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Kata kunci : Pemodelan, SIMWE, erosi-deposisi, anatomi longsor, non-vegetasi dan bervegetasi.

## EROSION SIMULATION USING THE SIMWE MODEL IN THE KALISARI LANDSLIDE, MAGELANG REGENCY

By Muhammad Hanif Adiprana

20/4585613/GE/09296

### ABSTRACT

The landslide in Kalisari, Margoyoso Village, Salaman District is going to reach equilibrium. The denudation process in the form of landslides is now shifting towards an erosional process. Monitoring the geomorphological development of the Kalisari landslide is necessary to determine the amount of eroded sediment that will be deposited in the Bompon River, especially to understand the erosion-deposition characteristics in non-vegetated landslides and vegetated landslide. Therefore, this study aims to understand the erosion-deposition characteristics of the Kalisari landslide. The objectives of this study are to (1) analyze the location and rate of erosion-deposition using the SIMWE model, (2) analyze the erosion-deposition characteristics in non-vegetated and vegetated landslides, and (3) validate of the simulation results to the field measurements.

This study simulates the time limited erosion-deposition rate using the SIMWE (Simulated Water Erosion) model. Simple raster-based input parameters include DTM (Digital Terrain Model), rainfall and its duration, Manning's coefficient, infiltration rate, sediment detachment capacity coefficient, sediment transport capacity coefficient, and critical shear stress. The rainfall events used as inputs are those on March 6, 2024 (84 mm/hour, 30 minutes) and March 26, 2024 (38.6 mm/hour, 65 minutes). The results of this modeling are in the form of raster flow depth and erosion-deposition rates (time-limited). The study is conducted in a descriptive quantitative manner.

Erosion-deposition locations occur at the scarp, head, body, and toe of the landslide with erosion rates (positive) of 0,0008 kg/m<sup>2</sup>s, 0,025 kg/m<sup>2</sup>s, 0,28 kg/m<sup>2</sup>s, and 0,056 kg/m<sup>2</sup>s, respectively. Meanwhile, the deposition rates (negative) are -0,0006 kg/m<sup>2</sup>s, -0,02 kg/m<sup>2</sup>s, -0,1 kg/m<sup>2</sup>s, and -0,04 kg/m<sup>2</sup>s, respectively. The erosion-deposition rate in non-vegetated landslides is higher than in vegetated landslides. Differences in rainfall excess, area size, morphology, slope, and drainage channel characteristics result in variations in



flow-depth and erosion-deposition rates. The model is valid by validating DTM (Digital Terrain Model), flow-depth, and erosion-deposition rate.

Keyword : Modelling, SIMWE, Erosion-Deposition, Landslide Anatomy, non-vegetated and vegetated.