EROSION HAZARD ANALYSIS USING THE RUSLE MODEL IN THE UPPER OPAK SUB WATERSHED, SLEMAN REGENCY (YOGYAKARTA) AND KLATEN REGENCY (CENTRAL JAVA)

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ABSTRACT

Increased population growth leads to land-use pattern changes that often do not align with conservation principles. This condition escalates the potential for erosion, particularly in the upstream area of the Opak Sub-watershed (DAS), which plays a strategic role in maintaining hydrological stability from upstream to downstream. This study aims to analyze the erosion hazard level in the Opak Sub-watershed upstream using the Revised Universal Soil Loss Equation (RUSLE) model, integrated with Geographic Information Systems (GIS) and remote sensing data. The Rainfall Erosivity (R) factor was calculated from 10 years of rainfall data, the Soil Erodibility (K) factor was derived from physical and chemical analysis of 10 soil samples, the Topographic (LS) factor was computed from DEMNAS imagery, and the Cover-Management (C) and Support Practice (P) factors were extracted from Sentinel-2A imagery through supervised classification using the Maximum Likelihood method and MSAVI vegetation index analysis. Research results indicate that erosion rates range from 0 to 163,892 tons/ha/year. Out of a total area of 6,785.33 ha, 2,585.08 ha (38.10%) falls into the Very Severe (>480 tons/ha/year) erosion hazard category. Overall, 92.43% of the total area of the Opak Sub-watershed upstream has an erosion rate exceeding the tolerable limit (T_m of 10.89 tons/ha/year), indicating the necessity for comprehensive conservation measures.

Keywords *: watershed, erosion, remote sensing, RUSLE*