

ESTIMASI LAJU EROSI DENGAN METODE USLE UNTUK ARAHAN KONSERVASI LAHAN DI DAS BRIBIN BERBASIS *GOOGLE EARTH ENGINE*

Disusun oleh:

Resta Oktafiati

21/481666/SV/19831

INTISARI

Laju erosi menjadi indikator penting dalam menilai tingkat degradasi lahan di berbagai Daerah Aliran Sungai (DAS) di Indonesia, termasuk di DAS Bribin yang merupakan kawasan prioritas pemulihan. Karakteristik geomorfologi karst yang curam, ditambah tekanan antropogenik seperti aktivitas tambang dan alih fungsi lahan, memperparah kondisi kekritisan lahan di wilayah ini. Penelitian ini bertujuan untuk mengestimasi laju erosi menggunakan metode *Universal Soil Loss Equation* (USLE) berbasis *Google Earth Engine* (GEE), mengidentifikasi tingkat bahaya erosi, serta menyusun arahan konservasi lahan berdasarkan kondisi biofisik DAS.

Penelitian ini menggunakan metode *Universal Soil Loss Equation* (USLE) berbasis *Google Earth Engine* (GEE). Data yang digunakan meliputi curah hujan (R), erodibilitas tanah (K), panjang dan kemiringan lereng (LS), penutup lahan (C), serta praktik konservasi (P). Laju erosi yang diperoleh kemudian digabungkan dengan kedalaman solum tanah untuk menentukan tingkat bahaya erosi (TBE). Selanjutnya dilakukan penilaian tingkat kekritisan lahan mengacu pada Perdirjen PDASHL P.3/2018 dan penyusunan arahan konservasi disusun dengan teknik vegetatif dan mekanik berdasarkan karakteristik dan kondisi lahan.

Hasil pemodelan menunjukkan distribusi erosi dipengaruhi oleh variasi curah hujan, lereng, tanah, dan penggunaan lahan. Tingkat bahaya erosi dengan kategori Sedang banyak tersebar merata di seluruh wilayah, sementara kelas Berat hingga Sangat Berat dengan persentase masing-masing 14,60% dan 25,13% terkonsentrasi di bagian barat daya dan timur DAS yang ditandai oleh lereng curam dan solum tanah dangkal. Arahan konservasi difokuskan secara intensif pada wilayah dengan kondisi ekstrem, sementara pada area yang lebih stabil diterapkan konservasi ringan yang adaptif. Seluruh hasil divisualisasikan dalam aplikasi interaktif berbasis *Earth Engine Apps* bernama *EroSave*, yang dirancang untuk memperluas akses dan pemahaman spasial mengenai kondisi lahan dan strategi konservasi di DAS Bribin.

Kata kunci: USLE, erosi, konservasi lahan, *Google Earth Engine*, DAS Bribin

***ESTIMATION OF SOIL EROSION RATE USING THE USLE METHOD
FOR LAND CONSERVATION DIRECTION IN THE BRIBIN WATERSHED
BASED ON GOOGLE EARTH ENGINE***

Arranged by:

Resti Oktafiati

21/481666/SV/19831

ABSTRACT

Soil erosion is an important indicator in assessing land degradation in many watersheds in Indonesia. One of them is the Bribin Watershed, which is categorized as a priority restoration area. The steep karst geomorphology and anthropogenic pressures such as mining and land conversion have worsened the critical land conditions in this region. This study aims to estimate soil erosion using the Universal Soil Loss Equation (USLE) method based on Google Earth Engine (GEE), identify erosion hazard levels, and formulate land conservation strategies based on the watershed's biophysical conditions.

The research applied the USLE method on the GEE platform, using rainfall (R), soil erodibility (K), slope length and steepness (LS), land cover (C), and conservation practices (P) as input parameters. The estimated soil erosion was then combined with soil solum depth to determine the erosion hazard level. Further, land criticality assessment was conducted following the PDASHL Regulation P.3/2018, and conservation recommendations were formulated through vegetative and mechanical techniques adapted to the land characteristics.

The modeling results show that the distribution of erosion is influenced by variations in rainfall, slope, soil type, and land use. Areas classified as Moderate erosion hazard are widely distributed, while Severe and Very Severe classes, accounting for 14.60% and 25.13% of the watershed respectively, are concentrated in the southwest and east regions, characterized by steep slopes and shallow soils. Conservation recommendations were developed using vegetative and mechanical techniques, tailored to the land's specific characteristics and conditions. Intensive conservation is prioritized in extreme areas, while lighter, adaptive conservation is applied in more stable zones. All outputs are presented in an interactive Earth Engine App called EroSave, designed to enhance access and spatial understanding of land conditions and conservation strategies within the Bribin Watershed.

Keywords: *USLE, erosion, land conservation, Google Earth Engine, Bribin Watershed*