

ABSTRAK

EVALUASI HUBUNGAN SPASIAL-TEMPORAL ANTARA PERUBAHAN TUTUPAN LAHAN DAN AKUMULASI SEDIMEN DI DAS WAY KURIPAN MENGGUNAKAN PEMODELAN QSWAT+

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Perubahan tutupan lahan di DAS Way Kuripan dapat meningkatkan limpasan permukaan, erosi, dan akumulasi sedimen pada saluran sungai. Kondisi ini dapat mengganggu fungsi hidrologi DAS dan menyebabkan pendangkalan sungai, terutama di wilayah hilir. Penelitian ini bertujuan untuk mengevaluasi karakteristik biofisik DAS Way Kuripan, memodelkan erosi menggunakan QSWAT+, menganalisis hubungan antara sedimentasi, debit sungai, dan perubahan tutupan lahan, serta menentukan arahan prioritas pengelolaan sedimentasi. Penelitian ini menggunakan metode deskriptif kuantitatif dengan pendekatan spasial-temporal. Estimasi erosi dan hasil sedimen dilakukan menggunakan metode Modified Universal Soil Loss Equation yang terintegrasi dalam Soil and Water Assessment Tool Plus. Data yang digunakan meliputi DEM, jenis tanah, kelerengan, tutupan lahan tahun 2018, 2020, 2022, dan 2024, curah hujan, serta data iklim. Hasil penelitian menunjukkan bahwa DAS Way Kuripan didominasi oleh tanah Kambisol Eutrik sebesar 41,66% dan Andosol Distrik sebesar 18,49%. Tingkat erosi didominasi oleh kelas sangat ringan, yaitu kurang dari 15 ton/ha/tahun, tetapi kelas erosi ringan dan sedang meningkat pada beberapa tahun pengamatan. Hubungan antara debit sungai dan sedimentasi tergolong lemah dan tidak linier, dengan nilai R^2 sebesar 0,4094 dan model hubungan $Q_s = 0,00207 Q_w^{0,633}$. Perubahan tutupan lahan menunjukkan penurunan Hutan Rimba sebesar 5,08%, dari 14,20% pada 2018 menjadi 9,12% pada 2024. Sebaliknya, Perkebunan meningkat sebesar 22,39%, dari 35,30% menjadi 57,69%. Distribusi sedimen pada 37 saluran sungai tidak merata antar tahun. Tahun 2020 memiliki sedimen tertinggi sebesar 256.250 ton, diikuti tahun 2022 sebesar 199.010 ton, tahun 2024 sebesar 172.929 ton, dan tahun 2018 sebesar 57.725 ton. Hasil penelitian ini menunjukkan bahwa pengelolaan sedimentasi perlu diprioritaskan pada saluran dengan akumulasi sedimen tinggi, disertai konservasi tanah dan air, rehabilitasi vegetasi, serta perlindungan sempadan sungai.

Kata Kunci: Akumulasi Sedimen, Tutupan lahan, Debit sungai, Erosi

ABSTRACT

Evaluation of the Spatio-Temporal Relationship Between Land Cover Change and Sediment Accumulation in the Way Kuripan Watershed Using QSWAT+ Modeling

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Land cover change in the Way Kuripan Watershed can increase surface runoff, erosion, and sediment accumulation in river channels. This condition may disrupt watershed hydrological functions and cause river shallowing, especially in downstream areas. This study aimed to evaluate the biophysical characteristics of the Way Kuripan Watershed, model erosion using QSWAT+, analyze the relationship between sedimentation, river discharge, and land cover change, and determine priority directions for sediment management. This research used a quantitative descriptive method with a spatio-temporal approach. Erosion and sediment yield were estimated using the Modified Universal Soil Loss Equation integrated into the Soil and Water Assessment Tool Plus. The data used in this study included DEM, soil type, slope, land cover maps for 2018, 2020, 2022, and 2024, rainfall, and climate data. The results showed that the Way Kuripan Watershed was dominated by Eutric Cambisol soils at 41.66% and Dystric Andosol soils at 18.49%. The erosion level was dominated by the very slight class, which was less than 15 tons/ha/year. However, slight and moderate erosion classes increased in several observation years. The relationship between river discharge and sedimentation was weak and non-linear, with an R^2 value of 0.4094 and a relationship model of $Q_s = 0.00207 Q_w^{0.633}$. Land cover change showed a decrease in forest area by 5.08%, from 14.20% in 2018 to 9.12% in 2024. In contrast, plantation area increased by 22.39%, from 35.30% to 57.69%. Sediment distribution across 37 river channels was uneven between observation years. The highest sediment distribution occurred in 2020 at 256,250 tons, followed by 2022 at 199,010 tons, 2024 at 172,929 tons, and 2018 at 57,725 tons. These findings indicate that sediment management should focus on channels with high sediment accumulation, supported by soil and water conservation, vegetation rehabilitation, and riparian buffer protection.

Keywords: *Sediment Accumulation, Land cover, River discharge, Erosion*