

PERBANDINGAN CURAH HUJAN SATELIT DAN OBSERVASI TERHADAP PEMODELAN DEBIT DI DAS CITANDUY HULU

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ABSTRAK

Daerah Aliran Sungai (DAS) Citanduy Hulu memiliki peran penting dalam pengelolaan sumber daya air, namun keterbatasan data curah hujan sering menjadi kendala dalam pemodelan debit sungai. Penelitian ini bertujuan untuk membandingkan akurasi curah hujan berbasis satelit produk dari *Global Precipitation Measurement* (GPM) dan *National Aeronautics and Space Administration Prediction of Worldwide Energy Resources* (NASA POWER) terhadap data curah hujan observasi serta mengevaluasi pengaruhnya terhadap pemodelan debit sungai menggunakan *Soil and Water Assessment Tool* (SWAT). Analisis dilakukan dengan menilai kesesuaian data curah hujan berdasarkan akurasi, simulasi debit harian dengan SWAT, optimasi parameter nilai *Curve Number* (CN) dengan SWAT-CUP, serta evaluasi akurasi model debit. Hasil analisis perbandingan akurasi data curah hujan satelit GPM dan NASA POWER menunjukkan bahwa GPM memiliki korelasi lebih baik, tetapi keduanya masih menunjukkan bias dan kesalahan tinggi. Hasil pemodelan debit dengan berbagai input curah hujan menunjukkan performa yang rendah dengan akurasi nilai NSE negatif, RMSE yang tinggi, korelasi yang lemah, dan cenderung *underestimate* dengan nilai CN rata-rata 78,94. Namun, optimasi parameter nilai CN menggunakan SWAT-CUP untuk debit simulasi tidak meningkatkan akurasi secara signifikan dengan nilai CN rata-rata 59,05. Hasil ini mengindikasikan bahwa data curah hujan satelit, khususnya GPM dan NASA POWER, masih memiliki keterbatasan dalam merepresentasikan kondisi hidrologi DAS Citanduy Hulu. Oleh karena itu, diperlukan koreksi bias pada data satelit serta optimasi parameter model lain untuk meningkatkan akurasi pemodelan debit sungai.

Kata Kunci: DAS Citanduy Hulu, Curah Hujan Satelit, Pemodelan Debit, SWAT, SWAT-CUP

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COMPARISON OF SATELLITE AND OBSERVED RAINFALL ON DISCHARGE MODELING IN THE UPSTREAM CITANDUY WATERSHED

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ABSTRACT

The Upstream Citanduy Watershed has an important role in water resources management, but limited rainfall data is often an obstacle in river discharge modeling. This study aims to compare the accuracy of satellite-based rainfall products from Global Precipitation Measurement (GPM) and National Aeronautics and Space Administration Prediction of Worldwide Energy Resources (NASA POWER) to observational rainfall data and evaluate its effect on river discharge modeling using the Soil and Water Assessment Tool (SWAT). The analysis was conducted by assessing the suitability of rainfall data based on accuracy, daily discharge simulation with SWAT, and optimization of Curve Number (CN) values with SWAT-CUP, as well as evaluating the accuracy of the discharge model. The results of the accuracy comparison analysis of GPM and NASA POWER satellite rainfall data show that GPM has a better correlation, but both still show high bias and error. Discharge modeling results with various rainfall inputs show low performance with negative NSE accuracy, high RMSE, weak correlation, and tend to underestimate with an average CN value of 78,94. However, parameter optimization of CN values using SWAT-CUP for simulated discharge did not significantly improve accuracy with an average CN value of 59,05. These results indicate that satellite rainfall data, especially GPM and NASA POWER, still have limitations in representing the hydrological conditions of the Upstream Citanduy Watershed. Therefore, bias correction of satellite data and optimization of other model parameters are needed to improve the accuracy of river discharge modeling.

Keywords: The Upstream Citanduy Watershed, Satellite Rainfall, Discharge Modeling, SWAT, SWAT-CUP

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