# Analisis Kesesuaian Data Citra Satelit Global Precipitation Measurement (GPM) terhadap Stasiun Pengukur Hujan di DAS Citarum Hulu = Analysis of the Suitability of Global Precipitation Measurement (GPM) Satellite Data with Rain Gauge Stations in The Upper Citarum Watershed

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Abstrak

Curah hujan merupakan parameter penting dalam pengelolaan sumber daya air, terutama di wilayah dengan topografi kompleks seperti DAS Citarum Hulu. Tingginya variabilitas spasial akibat perbedaan elevasi menyebabkan keterbatasan representasi curah hujan dari data stasiun pengamatan konvensional. Oleh karena itu, penelitian ini bertujuan untuk mengevaluasi kesesuaian data curah hujan satelit Global Precipitation Measurement (GPM) terhadap data stasiun pengukur hujan melalui analisis spasial, koreksi bias, dan evaluasi akurasi. Data yang digunakan meliputi curah hujan harian dari 23 stasiun selama 2013 – 2023 dan data satelit GPM IMERG V07. Koreksi dilakukan menggunakan metode smoothing spline, dan evaluasi menggunakan tiga metrik: Nash-Sutcliffe Efficiency (NSE), Root Mean Square Error (RMSE), dan Percent Bias (PBias). Hasil awal menunjukkan deviasi signifikan dengan kesalahan relatif 149 – 516%. Setelah koreksi, akurasi meningkat secara signifikan dengan nilai NSE mencapai 0,78 – 0,92 dan PBias mendekati 0%. Namun, nilai RMSE masih dalam kategori tidak memuaskan (4,16 – 8,65 mm), yang menunjukkan deviasi individual masih tinggi. Secara keseluruhan, metode smoothing spline efektif meningkatkan akurasi data satelit secara umum,tetapi penyesuaian tambahan diperlukan untuk mengakomodasi variabilitas lokal dan kejadian hujan ekstrem.

.....Rainfall is a crucial parameter in water resource management, especially in regions with complex topography like the Upper Citarum Watershed. The high spatial variability due to elevation differences limits the representativeness of rainfall data from conventional observation stations. Therefore, this study aims to evaluate the suitability of Global Precipitation Measurement (GPM) satellite rainfall data against ground-based rain gauge data through spatial analysis, bias correction, and accuracy assessment. The data used include daily rainfall from 23 stations during 2013–2023 and GPM IMERG V07 satellite data. Bias correction was performed using the smoothing spline method, and evaluation was conducted using three metrics: Nash-Sutcliffe Efficiency (NSE), Root Mean Square Error (RMSE), and Percent Bias (PBias). Preliminary results indicate significant deviations, with relative errors ranging from 149% to 516%. After correction, accuracy improved significantly, with NSE values reaching 0.78–0.92 and PBias approaching 0%. However, RMSE values remained unsatisfactory (4.16–8.65 mm), indicating that individual deviations were still high. Overall, the smoothing spline method effectively enhanced the general accuracy of satellite data, but further adjustments are needed to account for local variability and extreme rainfall events.