Pemodelan Ketersediaan Air Menggunakan Hydrologic Engineering CenterHydrologic Modeling System pada
Daerah Aliran Sungai Batanghari untuk Mendukung Pertanian Berkelanjutan
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PEMODELAN KETERSEDIAAN AIR MENGGUNAKAN *HYDROLOGIC ENGINEERING CENTER–HYDROLOGIC MODELING SYSTEM* PADA DAERAH ALIRAN SUNGAI BATANGHARI UNTUK MENDUKUNG PERTANIAN BERKELANJUTAN

INTISARI

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Ketersediaan air pada suatu Daerah Aliran Sungai (DAS) dipengaruhi oleh respons hidrologis terhadap curah hujan dan karakteristik fisik wilayah. Penelitian ini bertujuan menganalisis karakteristik debit aliran, debit andalan Q30, Q50, Q80, dan Q90, serta variasi ketersediaan air pada 18 Sub DAS di DAS Batanghari menggunakan model *Hydrologic Engineering Center–Hydrologic Modeling System* (HEC-HMS). Model terdiri atas 772 *subbasin*, 1.084 *reach*, 1.087 *junction*, dan 17 *sink*. Simulasi menggunakan metode *Soil Conservation Service Curve Number* (SCS-CN) dan *Soil Conservation Service Unit Hydrograph* (SCS-UH). Kalibrasi menggunakan data debit harian tahun 2025 dari Pos Duga Air MA Kilis, Debai, Tembesi, dan Sei Duren. Evaluasi model menghasilkan nilai *Nash-Sutcliffe Efficiency* (NSE) sebesar 0,621–0,851, *Root Mean Square Error Standard Deviation Ratio* (RMSE Std Dev) sebesar 0,40–0,60, dan *Percent Bias* (PBIAS) sebesar 16,76%–33,34%. Simulasi secara umum mengikuti pola debit observasi, meskipun tiga pos memiliki PBIAS mencapai atau melebihi batas ±25%. Analisis pada 18 Sub DAS menunjukkan variasi ketersediaan air antarwilayah dan periode setengah bulanan. Sub DAS Batang Tembesi memiliki debit andalan Q30 sebesar 1.005,125–2.741,368 m^3/s, sedangkan Sub DAS Bernai sebesar 21,003–60,580 m^3/s. Variasi debit berkaitan dengan perbedaan luas daerah tangkapan, nilai *Curve Number* (CN), *Hydrologic Soil Group* (HSG), tutupan lahan, topografi, dan kerapatan jaringan sungai.

Kata kunci: Ketersediaan air, DAS Batanghari, HEC-HMS, kalibrasi, debit andalan.

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WATER AVAILABILITY MODELING USING THE HYDROLOGIC ENGINEERING CENTER–HYDROLOGIC MODELING IN THE BATANGHARI RIVER BASIN TO SUPPORT SUSTAINABLE AGRICULTURE

ABSTRACT

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Water availability in a watershed is influenced by the hydrological response to rainfall and the physical characteristics of the area. This study aims to analyze flow discharge characteristics, dependable flows (Q30, Q50, Q80, and Q90), and variations in water availability across 18 sub-watersheds within the Batanghari watershed, using the Hydrologic Engineering Center–Hydrologic Modeling System (HEC-HMS) model. The model comprises 772 sub-basins, 1,084 reaches, 1,087 junctions, and 17 sinks. Simulations were conducted using the Soil Conservation Service Curve Number (SCS-CN) method and the Soil Conservation Service Unit Hydrograph (SCS-UH) method. Calibration was performed using daily discharge data from 2025, obtained from the MA Kilis, Debai, Tembesi, and Sei Duren gauging stations. Model evaluation yielded Nash-Sutcliffe Efficiency (NSE) values ranging from 0.621 to 0.851, a Root Mean Square Error-standard deviation ratio (RSR) between 0.40 and 0.60, and a Percent Bias (PBIAS) ranging from 16.76% to 33.34%. In general, the simulations followed the observed discharge patterns, although three stations exhibited PBIAS values reaching or exceeding the ±25% threshold. Analysis of the 18 sub-watersheds reveals variations in water availability across different regions and semi-monthly periods. The Batang Tembesi sub-watershed shows a Q30 dependable flow ranging from 1,005.125 to 2,741.368 m^3/s, while the Bernai sub-watershed ranges from 21.003 to 60.580 m^3/s. These variations in discharge are attributed to differences in catchment area, Curve Number (CN) values, Hydrologic Soil Groups (HSG), land cover, topography, and river network density.

Keywords: Water availability, Batanghari watershed, HEC-HMS, calibration, dependable flow