

INTISARI

Perubahan penggunaan lahan, seperti berkurangnya hutan dan meningkatnya area terbangun, secara langsung menurunkan kapasitas infiltrasi dan meningkatkan risiko banjir. Fenomena ini diduga menjadi penyebab utama meningkatnya frekuensi banjir di DAS Ogan. Oleh karena itu, penelitian ini bertujuan menganalisis pengaruh perubahan tersebut terhadap debit banjir menggunakan pemodelan HEC-HMS, serta mengidentifikasi sub DAS paling kritis dan menghitung besaran kontribusinya.

Model hidrologi HEC-HMS dibangun dengan beberapa data seperti hujan rancangan diperoleh dari hasil analisis frekuensi yang kemudian didistribusikan secara jam-jaman menggunakan metode PSA 007. Sementara itu, nilai *Curve Number* (CN) yang merepresentasikan dampak perubahan lahan dihitung untuk setiap sub DAS berdasarkan peta penggunaan lahan dan jenis tanah pada masing-masing periode analisis. Adapun parameter hidrologi lainnya, seperti *lag time* dan *recession constant*, diperoleh melalui proses kalibrasi dan validasi model pada data pengamatan di AWLR Terusan, yang hasilnya kemudian diterapkan untuk keseluruhan DAS Ogan.

Model HEC-HMS yang digunakan menunjukkan kinerja 'Sangat Baik' setelah melalui kalibrasi, dan validasi yang dibuktikan dengan perbaikan nilai RSR dari 0.9 (parameter awal) menjadi 0.5. Hasil penelitian menunjukkan perubahan penggunaan lahan meningkatkan nilai CN dan debit banjir di DAS Ogan. Analisis korelasi membuktikan adanya hubungan linear yang sangat kuat ($r=0.96$) antara kenaikan nilai CN dengan peningkatan debit yang artinya semakin besar skala perubahan penggunaan lahan (kenaikan CN), maka semakin besar pula skala peningkatan debit banjirnya. Meskipun demikian, respons hidrologisnya bersifat non-linear, di mana sub DAS S-8 teridentifikasi sebagai area paling kritis karena menunjukkan sensitivitas tertinggi terhadap perubahan lahan, dengan rasio dampak mencapai 2.8 kali lipat. Sub-DAS kritis ini dihitung memberikan kontribusi sebesar 59.72% pada periode 2013-2023 terhadap total peningkatan debit banjir di outlet utama DAS Ogan.

Kata kunci: Perubahan Penggunaan Lahan, Transformasi Hujan-Aliran, Banjir, HEC-HMS.

ABSTRACT

Changes in land use, such as reduced forest cover and increased built-up areas, directly decrease infiltration capacity and increase flood risk. This phenomenon is suspected to be the main cause of the increasing frequency of floods in the Ogan watershed. Therefore, this study aims to analyze the impact of these changes on flood discharge using HEC-HMS modeling, as well as identify the most critical sub-watershed and calculate the magnitude of its contribution.

The HEC-HMS hydrological model was built with several data inputs, such as design rainfall obtained from frequency analysis results, which were then distributed hourly using the PSA 007 method. Meanwhile, the Curve Number (CN) values, representing the impact of land use changes, were calculated for each sub-watershed based on land use maps and soil types for each analysis period. Other hydrological parameters, such as lag time and recession constant, were obtained through model calibration and validation processes using observational data from AWLR Terusan, the results of which were then applied to the entire Ogan watershed.

The HEC-HMS model used showed 'Very Good' performance after calibration and validation, as evidenced by the improvement in RSR values from 0.9 (initial parameter) to 0.5. The research results indicate that land use changes increase CN values and flood discharge in the Ogan watershed. Correlation analysis proves a very strong linear relationship ($r=0.96$) between the increase in CN values and the increase in discharge, meaning that the greater the scale of land use change (increase in CN), the greater the scale of flood discharge increase. Nevertheless, the hydrological response is non-linear, where sub-watershed S-8 is identified as the most critical area because it shows the highest sensitivity to land changes, with an impact ratio reaching 2.8 times. This critical sub-watershed is calculated to contribute 59.72% in the 2013-2023 period to the total increase in flood discharge at the main outlet of the Ogan watershed.

Keywords: *Land Use Change, Rainfall-Runoff Modeling, Flood, HEC-HMS.*