ABSTRAK

Banjir yang diakibatkan oleh luapan Sungai Klawing sempat melanda Kabupaten Purbalingga Bulan Desember 2020. Di lansir oleh BPBD Purbalingga, ratusan rumah di enam desa yang berbatasan dengan Sungai Klawing terendam oleh banjir. Dalam upaya mengurangi dampak kerugian banjir yang semakin membesar, identifikasi wilayah yang terdampak banjir merupakan hal yang sangat penting. Salah satu cara dalam mengidentifikasi wilayah banjir adalah menggunakan bantuan citra satelit *Synthetic Aperture Radar* (SAR) yang diakuisisi oleh Satelit Sentinel-1. Dengan metode *Change Detection Approach* serta nilai *threshold* yang dilakukan pada citra Sentinel-1 SAR melalui *platform* Google Earth Engine, muka air banjir dapat dideteksi secara efektif dan akurat.

Pada penelitian ini, citra satelit Sentinel-1 SAR dengan polarisasi VH yang digunakan yaitu 3 citra pada saat sebelum banjir (citra referensi): 19 Desember 2019; 19 November 2020; dan 25 November 2020; dan sesudah kejadian banjir, yaitu 13 Desember 2020. Nilai *threshold* digunakan dengan rentang 1,20 sampai dengan 1,24. Selain itu, penelitian ini juga membandingkan hasil sebaran wilayah banjir menggunakan Google Earth Engine dengan hasil sebaran banjir menggunakan *software* berbasis hidrologi. HEC-HMS (*Hydrological Engineering Center-Hydrologic Modelling System*) digunakan untuk mencari hidrograf debit banjir yang terjadi pada Daerah Aliran Sungai Klawing, sementara HEC-RAS (*Hydrological Engineering Center-River Analysis System*) digunakan untuk memodelkan sebaran banjir yang terjadi akibat hidrograf banjir yang dihasilkan HEC-HMS. Pemodelan hidrograf banjir di HEC-HMS dan genangan banjir di HEC-RAS menggunakan hidrograf banjir dengan tinggi hujan 88,70 mm, 42,13 mm, dan 65,42 mm dengan variasi distribusi hujan jam-jaman yaitu 3, 5, dan 8 jam.

Analisis perbandingan dilakukan dengan mencari luas irisan antara kedua hasil luas sebaran banjir pada Google Earth Engine dan HEC-RAS. Dilakukan sebanyak 81 analisis luas irisan berdasarkan variasi parameter tanggal citra referensi, nilai *threshold*, tinggi hujan, dan distribusi hujan jam-jaman. Hasil menunjukkan bahwa luas irisan terbesar memiliki nilai persen perbandingan antara luas irisan dengan luas gabungan hasil banjir sebesar 21,09%. Kecilnya nilai tersebut mendadakan bahwa hasil pemodelan genangan banjir menggunakan Google Earth Engine dan HEC-RAS kurang selaras. Akan tetapi, hasil sebaran banjir dari kedua *software* tersebut menunjukkan kesamaan wilayah yang terdampak oleh banjir.

Kata Kunci: Banjir, *Synthetic Aperture Radar* (SAR), Google Earth Engine, HEC-HMS, HEC-RAS.

ABSTRACT

Flooding caused by the overflowing Klawing River hit Purbalingga Regency in December 2020. As reported by BPBD Purbalingga, hundreds of houses in six villages bordering the Klawing River were submerged by floods. In an effort to reduce the impact of flood losses that are getting bigger, identifying areas affected by flooding is very important. One way to identify flooded areas is to use the help of Synthetic Aperture Radar (SAR) satellite images acquired by the Sentinel-1 Satellite. With the Change Detection Approach method and threshold values performed on Sentinel-1 SAR images through the Google Earth Engine platform, flood water levels can be detected effectively and accurately.

In this study, Sentinel-1 SAR satellite images with VH polarisation were used, namely 3 images before the flood (reference images): 19 December 2019; 19 November 2020; and 25 November 2020; and after the flood event, namely 13 December 2020. Threshold values were used with a range of 1,20 to 1,24. In addition, this study also compared the results of flood area distribution using Google Earth Engine with the results of flood distribution using hydrology-based software. HEC-HMS (Hydrological Engineering Center-Hydrologic Modelling System) is used to find the flood discharge hydrograph that occurs in the Klawing River Watershed, while HEC-RAS (Hydrological Engineering Center-River Analysis System) is used to model the flood distribution that occurs due to the flood hydrograph generated by HEC-HMS. Flood hydrograph modelling in HEC-HMS and flood inundation in HEC-RAS used flood hydrographs with rainfall heights of 88,70 mm, 42,13 mm, and 65,43 mm with variations in hourly rainfall distribution of 3, 5, and 8 hours.

Comparative analysis was conducted by finding the area of intersection between the two results of flood distribution area in Google Earth Engine and HEC-RAS. A total of 81 slice area analyses were conducted based on variations in the parameters of reference image date, threshold value, rainfall height, and hourly rainfall distribution. The results show that the largest slice area has a percent comparison value between the slice area and the combined flood result area of 21,09%. The small value implies that the results of flood inundation modelling using Google Earth Engine and HEC-RAS are less aligned. However, the flood distribution results from both software show similarities in the areas affected by flooding.

***Keywords**: Flood, Synthetic Aperture Radar (SAR), Google Earth Engine, HEC-HMS, HEC-RAS.*