

INTISARI

Banjir bandang merupakan salah satu bencana alam yang dapat menimbulkan dampak secara signifikan terhadap kehidupan manusia seperti korban jiwa, kehilangan harta benda, kerusakan infrastruktur dan lingkungan alam. Banjir bandang terjadi di DAS Tabo-Tabo pada bulan April tahun 2011 yang menyebabkan 4 orang meninggal dan 43 unit rumah mengalami kerusakan.

Penelitian ini bertujuan untuk menganalisis dan memahami karakteristik DAS Tabo-Tabo kaitanya dengan banjir bandang yaitu: 1) distribusi spasial dan temporal curah hujan, 2) respon hidrologi dan peranan masing-masing Sub-DAS terhadap banjir bandang, 3) distribusi spasial potensi banjir bandang dan 4) faktor-faktor yang menyebabkan dan mempengaruhi serta mekanisme terjadinya banjir bandang. Metode kuantitatif dan kualitatif diterapkan dengan mengintegrasikan data penginderaan jauh dan sistem informasi geografi berdasarkan aspek meteorologi, hidrologi dan fisiografi DAS. Aspek meteorologi berupa karakteristik spasial dan temporal hujan dianalisis dari data curah hujan harian stasiun periode 1989-2014 dengan menggunakan metode statistik, Isohyet dan Mononobe. Aplikasi Hec-HMS dan metode Melchior digunakan untuk analisis aspek hidrologi banjir bandang. Data DEM TerraSAR dan citra Landsat 8 digunakan untuk mengekstraksi karakteristik morfometri dan parameter fisiografi DAS lainnya dengan hubungannya terhadap distribusi potensi banjir bandang di wilayah penelitian. Korelasi Spearman diterapkan untuk analisis hubungan antara karakteristik hidrologi banjir bandang dengan karakteristik fisiografi DAS.

Hasil penelitian menunjukkan bahwa kejadian banjir dan banjir bandang di DAS Tabo-Tabo, berasosiasi dengan pola distribusi spasial curah hujan yang searah dengan bentuk DAS dan rata-rata terjadi pada tahun dengan total curah hujan di atas 3.000 mm. Respon hidrologi tanggal 24 April 2011 menunjukkan bahwa SubDAS Jennae memiliki debit puncak, debit bajir rencana dan kontribusi terhadap proses banjir bandang yang paling tinggi dibandingkan dengan Sub-DAS Soreang dan Leang-Leang. Distribusi potensi banjir bandang di DAS Tabo-Tabo bervariasi dari kategori sangat rendah sampai sangat tinggi. Wilayah hulu sampai tengah didominasi oleh potensi banjir bandang kategori sedang, sedangkan wilayah tengah sampai hilir didominasi oleh kategori rendah. Banjir bandang di DAS Tabo-Tabo pada tanggal 24 April 2011, dipicu oleh karakteristik curah hujan dan dipengaruhi oleh faktor karakteristik kerapatan vegetasi, kondisi tanah dan lereng DAS. Interaksi antara curah hujan sangat lebat (>20 mm/jam) yang berlangsung sekitar 2 jam dengan tekstur tanah liat dan infiltrasi rendah serta lereng yang curam menghasilkan debit puncak banjir sekitar $20.000 \text{ m}^3/\text{detik}$.

Kata Kunci: Banjir Bandang, Hidro-Meteorologi, Fisiografi DAS, Geo-Informasi, DAS Tabo-Tabo

ABSTRACT

Flash flood is one of the natural disasters. It can caused the significant impact of human life such as fatalities and properties losses, infrastructure and natural environment damage. In April 2011, Flash floods occur in the Tabo-Tabo Watershed which caused 4 people died and 43 houses damaged.

This study has 4 research objectives. They are to analyze and understand the characteristics of 1) the spatial and temporal distribution of rainfall; 2) the hydrology response and the respective role of the sub-watersheds to flash floods; 3) the spatial distribution of flash flood potential; 4) the cause and influence factors and mechanism of flash flood incidence. Quantitative and qualitative methods applied by integrating remote sensing data and geographic information system based of the meteorology, hydrology and physiographic aspect of watershed. Meteorological aspects such as spatial and temporal characteristics of rainfall are analyzed from daily rainfall station data period of 1989-2014 using statistical, Isohyets and Mononobe method. The Hec-HMS app and Melchior method are used to analyze the hydrology of flash flood. TerraSAR DEM and Landsat 8 imagery data are used to extracting the characteristics of the morphometric and the other physiographic parameters of watershed with relation of the flash flood potential distribution in the research area. Spearman correlation applied to the analysis of the relation between the flash flood hydrology with physiographic characteristics of watershed.

The results of the research show that the flood and flash flood incidence in the Tabo-Tabo watershed, associated by the spatial patterns of rainfall distribution in the same direction with the watershed shape and average occurred in the year with total of rainfall is above 3,000 mm. the hydrologic response on the 24th April 2011 show that the Jennae sub-watershed has a highest of the peak discharge, design flood and the contribution to the flash flood process compared with Soreang and Leang-Leang sub-watershed. Distribution of flash flood potential in the Tabo-Tabo watershed varying from very low to very high category. The upstream to middle area of watershed is dominated by the medium flash flood potential category, while the middle to downstream dominated by low category. Flash floods in the TaboTabo watershed on the 24th April 2011, triggered by the precipitation characteristics and influenced by factor is the vegetation density, soil conditions and slope characteristics of watershed. The interaction between very heavy rainfall (> 20 mm/hour) which takes approximately 2 hours with the clay texture and low infiltration of soil and steep slopes are generating flood peak discharge approximately 20,000 m³/s.

Keywords: Flash Flood, Hydro-Meteorology, Physiographic, Geo-Information, Tabo-Tabo Watershe