

PEMODELAN BAHAYA BANJIR PENGAL SUNGAI LUK ULO DI KECAMATAN KARANGGAYAM DAN KARANGSAMBUNG KABUPATEN KEBUMEN

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INTISARI

Sungai Luk Ulo merupakan salah satu sungai besar yang terdapat di DAS Luk Ulo. Adapun DAS Luk Ulo memiliki kawasan aliran sungai bagian hulu yang disebut DAS Lk Ulo Hulu. Sistem DAS bagian hulu ini memiliki luas sebesar 269,05 km² sehingga mampu mengalirkan air menuju outlet DAS dalam jumlah yang sangat besar. Adapun outlet DAS Luk Ulo Hulu merupakan dataran aluvial yang rawan terhadap bahaya banjir. Berdasarkan kondisi tersebut diperlukan pemodelan banjir penggal sungai Luk Ulo akibat debit luaran outlet DAS Luk Ulo Hulu. Penelitian ini bertujuan untuk menentukan debit rancangan DAS Luk Ulo Hulu dan memodelkan secara spasial banjir akibat debit rancangan tersebut pada kala ulang 2, 5, 10, 25, dan 50 tahunan.

Tahapan yang digunakan untuk mencapai tujuan penelitian meliputi analisis hidrologi (analisis curah hujan dan hidrograf banjir) dan simulasi genangan banjir. Debit rancangan diperoleh dengan cara mengalikan hidrograf satuan sintetik GAMA-I dengan hujan efektif setiap kala ulang. Pemodelan genangan banjir dilaksanakan menggunakan aplikasi HEC-RAS dengan metode 2D unsteady flow. Hasil pemodelan yang didapat divalidasi menggunakan data historis kejadian banjir pada tahun 2011. Adapun data historis diperoleh melalui survei lapangan dengan mewawancarai salah satu warga setempat.

Hasil penelitian menunjukkan nilai hujan kala ulang untuk kala ulang 2, 5, 10, 25, dan 50 tahunan masing-masing 139, 172, 190, 208, dan 220 mm. Debit rancangan maksimum terjadi pada jam ke-9 dengan waktu dasar 41 jam. Adapun debit rancangan maksimum setiap kala ulang adalah 506, 704, 810, 926, dan 1001 m³/s. Secara umum sebasaran spasial terhadap genangan banjir lebih dominan ke arah timur badan sungai meskipun dalam kala ulang 50 tahunan nampak sebaaran genangan yang lebih merata baik di kii maupun kanan badan sungai. Hasil lain yang diperoleh terhadap sebaran genangan banjir tersebut adalah semakin kecil probabilitas kejadian hujan ekstrim luas area genangan semakin meluas menjauhi badan sungai.

Kata kunci : banjir, genangan, kala ulang

FLOOD HAZARDS MODELLING OF THE LUK ULO RIVER IN KARANGGAYAM AND KARANGSAMBUNG DISTRICT, KEBUMEN REGENCY

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ABSTRACT

The Luk Ulo River is one of the major rivers in the Luk Ulo watershed system. The Luk Ulo watershed has an upstream watershed area which is then called the Luk Ulo Hulu watershed. This upstream watershed system has an area of 269.05 km² so that it can drain a substantial amount of water to the watershed outlet. The Luk Ulo Hulu watershed outlet is an alluvial plain prone to flooding. Based on these conditions, it is necessary to model the flooding of the Luk Ulo river cut off due to the output discharge of the Luk Ulo Hulu watershed outlet. This study aims to determine the design discharge of the Luk Ulo Hulu watershed and to spatially model the flooding due to the design discharge at 2, 5, 10, 25, and 50-year return periods.

The steps to achieve this goal include hydrological analysis (rainfall analysis and flood hydrograph) and flood inundation simulation. The design discharge was obtained by multiplying the hydrograph of the synthetic unit GAMA-I by the adequate rain at each repeating period. The flood inundation modeling was carried out using the HEC-RAS application with the unsteady flow method. The modeling results obtained were validated using historical data on flood events in 2011. The historical data was obtained through a field survey by interviewing one of the residents.

The results showed that the return values for the 2, 5, 10, 25, and 50-year were 139, 172, 190, 208, and 220 mm, respectively. The maximum design discharge occurs at the 9th hour with a base time of 41 hours. The maximum design discharge for each period is 506, 704, 810, 926, and 1001 m³/s. In general, the spatial distribution of flood inundation is more dominant towards the east of the river body, although in the 50-year return period, it appears that the distribution of inundation is more even on the left and right of the river body. Another result obtained for the distribution of the flood inundation is that the smaller the probability of extreme rain events, the wider the inundation area extends away from the river body.

Keywords : flood, inundation, return period