

Evaluation of Reliability Flood Control System Based on Uncertainty of Flood Discharge, Case Study Wulan River, Central Java, Indonesia

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Abstract : The failure of flood control system can be caused by various factors, such as not considering the uncertainty of designed flood causing the capacity of the flood control system is exceeded. The presence of the uncertainty factor is recognized as a serious issue in hydrological studies. Uncertainty in hydrological analysis is influenced by many factors, starting from reading water elevation data, rainfall data, selection of method of analysis, etc. In hydrological modeling selection of models and parameters corresponding to the watershed conditions should be evaluated by the hydraulic model in the river as a drainage channel. River cross-section capacity is the first defense in knowing the reliability of the flood control system. Reliability of river capacity describes the potential magnitude of flood risk. Case study in this research is Wulan River in Central Java. This river occurring flood almost every year despite some efforts to control floods such as levee, floodway and diversion. The flood-affected areas include several sub-districts, mainly in Kabupaten Kudus and Kabupaten Demak. First step is analyze the frequency of discharge observation from Klambu weir which have time series data from 1951-2013. Frequency analysis is performed using several distribution frequency models such as Gumbel distribution, Normal, Normal Log, Pearson Type III and Log Pearson. The result of the model based on standard deviation overlaps, so the maximum flood discharge from the lower return periods may be worth more than the average discharge for larger return periods. The next step is to perform a hydraulic analysis to evaluate the reliability of river capacity based on the flood discharge resulted from several methods. The selection of the design flood discharge of flood control system is the result of the method closest to bankfull capacity of the river.

Keywords : design flood, hydrological model, reliability, uncertainty, Wulan river

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