

KAJI ULANG OPERASI PINTU *SPILLWAY* WADUK WONOGIRI UNTUK PENGENDALIAN BANJIR DI WILAYAH SUNGAI BENGAWAN SOLO HULU

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ABSTRACT

Bengawan Solo often produces flooding and creates sufficient damage and loss. One of flood control efforts in the upstream Bengawan Solo River Basin is conducted through the operation of Wonogiri Reservoir during flood season. Changes in land use and characteristics of high resolution rainfall in the catchment area of Wonogiri Reservoir allow changes of inflow hydrograph. Therefore, a study to evaluate the operational pattern of Wonogiri Reservoir and to improve the performance of flood control is urgently required.

Two important analyses are carried out to clarify the flood control issue, i.e. inflow flood hydrograph based on the current land use and the operating rule of spillway gates for flood period. The current inflow flood hydrographs are obtained by using a semi distributed rainfall-runoff model. For this purpose the 2, 60, 500 and 5500 (PMF) year return period of flood hydrographs are simulated with input the calibrated watershed parameters and hourly design rainfall distribution of the current condition. The hydrologic simulation results are then used to simulate several scenarios of reservoir flood routings for obtaining the optimum spillway gates operation. The optimum flood control is determined by considering the controlled water level (+ 135.3 m MSL) and the extra flood water level (+ 139.1 m MSL) as the critical boundaries of water level during flood period.

The results of the study indicate that the watershed response to the peak discharge changes considerably. The current land use produces flood inflow hydrographs that higher than the design flood hydrographs, both peak discharge and total runoff volume. For the spillway gates operation, it is found that the operating rule for the PMF has to be modified. In order to avoid high risk of dam over-topping, full opening gate is operated when the water level in the reservoir reaches +136.6 m MSL instead of +138.2 m MSL. Besides, the spillway gates operation time should be monitored every 15 minutes when the water level reaches +136.4 m MSL and outflow discharge arrangement is a multiple of 50 m³/s. Generally, it is concluded that Wonogiri Reservoir is still able to control the extreme floods with special consideration for the PMF. Real time flood forecasting facility is necessary to improve the performance of reservoir operation for flood control purpose.

Keywords: *Wonogiri Reservoir, flood control, current flood hydrograph, spillway operation*