

ABSTRACT

The objective of this dissertation was to determine the most effective sediment flushing system on a floodway of three sediment flushing types. The three types of sediment flushing were overflow, bypass, and under sluice. To determine which was the most effective, that most flush sediment in the same time period, then an empirical model of effectiveness of each type of sediment flushing were built. The prototype (existing) of this study was the Floodway Sedayu Lawas, located in Lamongan, East Java Province.

This study used a hydraulic physical model test. The model was built and tested at the Laboratory of Balai Sungai Surakarta, within a period of 3 months. It was made with a 1:66.667 undistorted scale. The variables of this study were sediment weight (W_s , kg), water depth (H , m), sediment mass density (ρ_s , kg/m³), sediment diameter (d_s , m), water velocity (v , m/s), and water discharge (Q , m³/s). The hydraulic physical model test conducted with two kinds of variation, the water discharge and the flush gate wide. There are three kinds of water discharge variation, namely: the water discharge on high tide condition = 101 m³/s, the water discharge on average tide condition = 110 m³/s, and the water discharge on low tide condition = 114 m³/s. There are 3 types of wide flush gate variation, namely: a width of 5 m, 10 m and 15 m. The weight of sediment flushed measured after 1 hour model running. The result of this study were:

- 1) $W_s = 38725 H^2 \rho_s d_s \left(\frac{v Q}{H^3 g} \right)^{0,827}$ for overflow type,
- 2) $W_s = 21649 H^2 \rho_s d_s \left(\frac{v Q}{H^3 g} \right)^{0,948}$ for under sluice type, and
- 3) $W_s = 16586 H^2 \rho_s d_s \left(\frac{v Q}{H^3 g} \right)^{0,996}$ for bypass type.

The most effective sediment flushing system for floodway was overflow type. It is capable to flush sediment 3.39 times more than without any flushing channel (existing).

Keywords: bypass, floodway, overflow, sediment flushing, under sluice.