ABSTRACT

The problem faced by reservoirs in Java is fast sedimentation resulting in a reduction in the capacity of reservoirs and economic life of the reservoir. Reservoir operation rules have not take into account the release of sediment, and the service life is limited by the capacity of the dead storage. In reality, not all the sediment settles in the dead storage. Managing both water and sediment are required to extend the life of the reservoir. To sustain the reservoir function can not neglect the fulfillment of current needs and this can be achieved if the deposition of sediments in death storage as much as possible with minimal sedimentation rate. Reservoir operation regulate the release to meet the needs of water and is one of the factors that affect sedimentation. So it would need to be done study the effect of reservoir operations on the reservoir performance and sedimentation.

This study is aimed obtaining the effect of changes in dam operations on reservoir performance and sedimentation in the reservoir. The purpose of this study were to analyze the effects of changes in reservoir operations on the performance of the reservoir, to analyze the effects of changes in reservoir operations on the pattern of sediment deposition in reservoirs, and to formulate an optimal operation model for minimizing deposition of sediments.

The study was conducted by modeling the operation of reservoir with a dynamic program and the modeling of reservoir sedimentation with 3D numerical models. Changes in reservoir operations focused on the changes due to differences in the duration of time flushing, initial of time flushing, the objective function of reservoir operation and reservoirs system. The sediment deposition in reservoir model does not take into account the effect of wind and temperature. The prototype used was The Wonogiri reservoir, both before and after the construction of the sediment storage reservoir.

The result shows that changes in reservoir systems produce different reservoir performance. The New Reservoir System produces the best performance. The New Reservoir System is more reliable, with an average reliability of 91.29%. The average resilience 0.35 and the average time it takes to return satisfactory is 2.84 period. On average 0.42% water needs are not being met from a failure, with an average deficit of 2.26 million m^3 each period failed. The maximum value of the deficit ratio is 0.79% or 31.37 million m^3. Flushing is performed at the end of the rainy season has a better performance.

Reservoir sedimentation simulations result that the sediment is more settles on the effective storage and the flood storage. Reservoir sedimentation simulation results that the smallest sedimentation rate is on the New Reservoir System, an average of 3.03 million m^3/ year. Deposition of sediments in and around the intake at the New Reservoir System is the smallest, with an intake elevation average +125.05 m. Reservoir water level generated during the operation conducted by the reservoir operation scenarios affect the pattern of sediment deposition that occurs in the reservoir.

The optimal model to minimize the sediment deposition is a reservoir operation that has the objective function for flushing and also to meet the needs of water, where flushing is done for 3 months in the period of December I – February II.

Key word : Reservoir operation, reservoir sedimentation, reservoir sedimentation control