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NUMERICAL MODELING OF SEDIMENT TRANSPORT IN A TYPICAL LARGE RESERVOIR WITH RESPECT TO MEANDER EFFECTS ON SEDIMENT FLOW PATH

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In the conducted study, a typical large concrete dam, is modeled which will be built on a river with a great amount of flood and sediment yield. The river is located in semi-arid area with significant meanders along its path that induced in massive floods rife with sediment loads. The reservoir is used for hydropower and water supply purposes.

The average annual sediment yield is about 1/15 of reservoir active storage and the mean annual discharge of the river is 60 times greater than the reservoir storage capacity; consequently this dam will be in the range of Sluicing and Flushing operation respecting basic classification of reservoirs by Di Silvio, (1996). In order to maintain active storage of the reservoir from sedimentation threat, the steel lined Bottom outlets are considered for flushing.

In this research two 1D model which can simulate long-term assumed reservoir Flushing and Sluicing hydraulics is deployed; the *GSTARS v.4.0* 1D model and *HEC-RAS v.4.1*. Due to different assumptions developed in these models for sediment transport, bed evolution and reservoir hydraulics simulation, authors tried to test and evaluate the results of using these models for the mentioned reservoir. Strategies which were used for this research are: 1) maintaining reservoir normal water level along with sluicing operation (for both annual discharge and 2 year flood), 2) modeling flushing operation with various flushing discharge and 3) long term sedimentation longitudinal profile evolution for a defined period.

A thorough discussion is made over flushing and sluicing proficiency for this type of reservoirs, investigating the application of sluicing techniques. Results showed that for reservoirs with the assumed conditions either flushing or sluicing will not vary significantly in protecting the active storage from sedimentation threat. Also it was observed from the results that a typical reservoir similar to the current case is much better saved by sluicing operation rather than flushing technic. Another important result which was found is for *HEC-RAS v.4.1* that made the authors to conclude that the current model based on the *SI* system of units cannot predict the desired parameters accurately.

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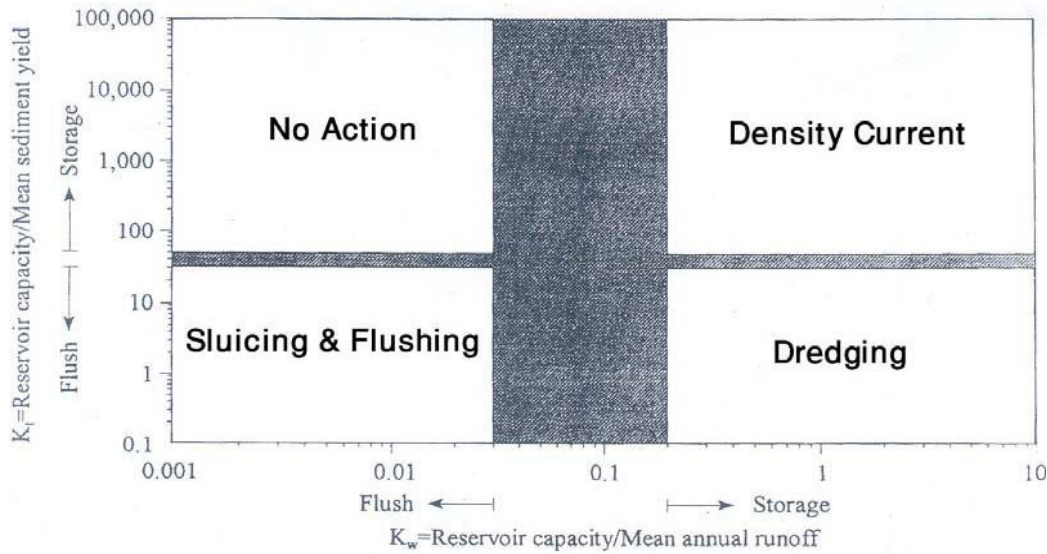
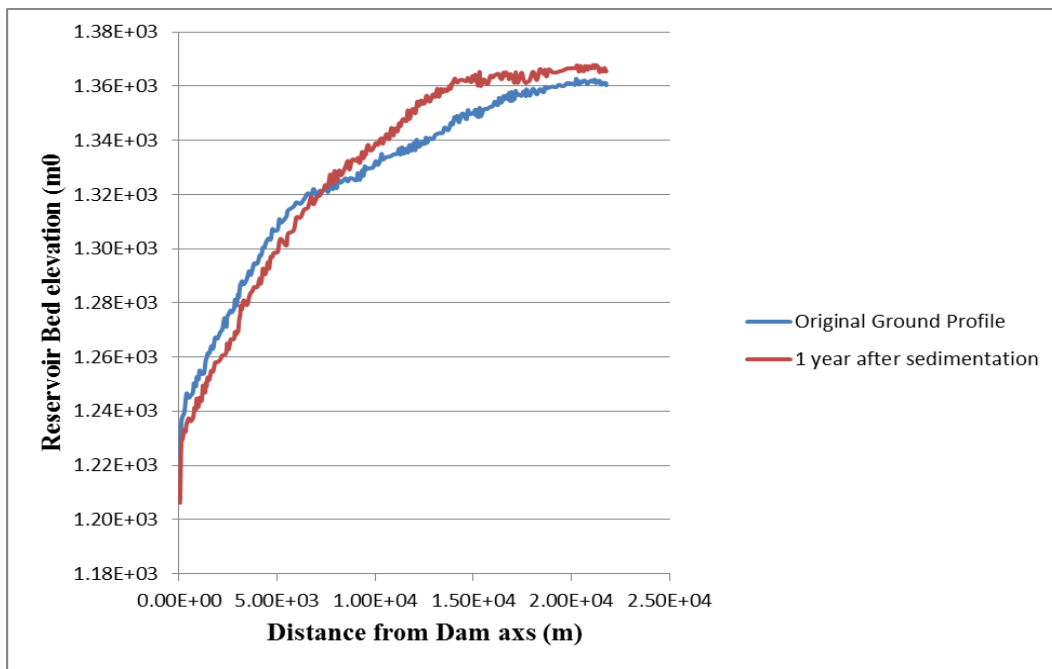Figure 1 Basic Classification of reservoirs (Di Silvio, 1996).

Figure 2 Reservoir Longitudinal Profile

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