ABSTRACT

A thorough investigation of the two-dimensional (2D) modelling of sedimentation processes in the Pillur Reservoir, a vital water supply for Coimbatore and the neighbouring areas of Tamil Nadu, is presented in this thesis. A major sedimentation problem has affected the Pillur Reservoir's storage capacity and water supply dependability since it was built across the Bhavani River. This study models sediment transport and deposition patterns in the reservoir using the HEC-RAS 2D modelling framework, considering the various inflows from the Bhavani, Kundah, Nirala Pallam, and Katteri rivers. Utilising available hydrological and sediment data, the model is calibrated and validated. The outcomes are then examined to see how sediment accumulation affects reservoir operations and water supply intakes. This study shows how 2D hydrodynamic modelling can help manage reservoir sedimentation and guide future actions for comparable water infrastructure in the area.

The simulated water level at FRL 426 m extends up to around 5.9 km upstream of the dam, and the reservoir capacity is projected to the FRL level. At chainage 5980m, the river has a velocity which reduces in the reservoir upstream and downstream. The reduction in velocity implies sediment deposition.

A smooth average curve was fitted to the plot made from average daily flow data. HEC-RAS employs 2 sediment transport functions for 2D, all of which are investigated in this study. The Wu formula provides good agreement when examining sediment deposition profiles and sediment flushing from reservoirs.