

Bachelor <u>or</u> Project Thesis HS 2020



Examiner Prof. Dr. Robert Boes Supervision: NN, Dr. Ismail Albayrak

Sustainable reservoir sediment management techniques: efficiency of flushing and bypassing concepts

Reservoir sedimentation is a severe problem affecting the sustainable use of reservoirs for multiple purposes such as electricity production, water supply, and flood retention. Sedimentation causes loss of useful reservoir volume, endangering the reservoir's purposes and possibly dam operation safety and resulting in financial losses. Moreover, the trapping of sediments behind dams has negative environmental effects like river bed incision and eco-morphological impoverishment of downstream river reaches. Sediment routing is an efficient sediment management concept to mitigate reservoir sedimentation. Sediment bypassing, e.g. through Sediment Bypass Tunnels (SBTs, Figure 1), and sediment flushing through low-level outlets are typical routing techniques. The unit water volume needed to bypass a unit volume of sediment, equivalent to a mean sediment discharge concentration, is a key parameter to assess the desilting efficiency. Furthermore, the relationship between the sediment concentration and the unit cost of sediment discharge can be used as a decision benchmark to evaluate the applicability of the measures. In this study, sediment and discharge data from various reservoirs in Switzerland and abroad, where either sediment flushing or SBT routing or both are applied, will be collected and the efficiencies of these two measures will be determined and compared. Finally, a cost-effectiveness analysis will be conducted and recommendations for reservoir sediment management will be given.



Fig. 1: Photo from Solis SBT outlet during operation in June 2019 (Source: VAW)

Contact: Ismail Albayrak Hydraulic Engineering Division HIA - C55, 44 632 97 44 albayrak@vaw.baug.ethz.ch Particular information: Language: English Thesis can be written in English or German