Handling Sediment Transfer in Practice

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Introduction: Two sides of a problem. Every year almost 2 % of worldwide reservoir volume is lost due to sedimentation. This loss is not even compensated by the actual new build of dams, in many cases making reservoirs not sustainable. By 2050, more than 25 % of all reservoirs will be inoperable due to sedimentation [1]. At the same time, due to climate change there is an increased need for additional water storage. Thus sedimentation becomes a major problem for those who do not take sedimentation into account at an early stage or ignore effects too long. Sedimentation is not only an issue within a reservoir. The other side of sedimentation is missing sediment downstream, leading to massive erosion [2]. The German River Rhine alone faces a sediment deficit of 2.5 million tons per year due to sediment retention in its tributaries reservoirs. Even massive and extremely costly addition of "artificial" sediment does not catch up with annual significant bed erosion.

Methods: Need for a solution. Conventional approaches to deal with the problem are either simply giving up a reservoir one day, perform questionable flushing or to do costly dredging and landfill, if at all applicable. To distract sediment from the river or to abruptly silt up river reaches cause other problems and lead to further cost and environmental impacts. But in recent years, a competitive and environmental friendly technique of continuous sediment transfer has been developed in conjunction with RWTH Aachen University of Technology and also successfully implemented in practice since 2011 [3]. Sediment transfer is restored in a near nature way, at the same time providing maximum cost efficiency. Ecological benefits evolved and reservoir storage capacity is restored and maintained. By not taking sediment as a problem but as a natural condition to deal with, a sustainable and advantageous solution can be gained with great success.

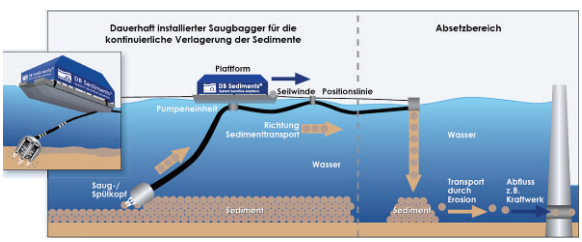

Fig. 1: ConSedTrans Process

Results: Where other methods fail in re-gaining sediment transfer due to operational, hydrological or other reasons, the permanently installed equipment for this process is of astonishing small size. A sediment transfer in significant extend is gained by fully automated and steady operation. There is no interruption in reservoir or other operation, not even during equipment installation. To allow for a near-nature transfer, maximum particle size as well as transfer rate can be adjusted.

Fig. 2: Sample for ConSedTrans Equipment

Discussion: Main parameter for sediment transfer is the actual sediment transfer capacity of the downstream river. Therefore the vessels are equipped with sediment metering devices. Many additional practical, legal, ecologic and economic aspects and experiences will be given within the full paper.

References: [1] WCD: *The Report of the World Commission on Dams*, London/Sterling, Earthscan Publications (2000), [2] R. Frings et al. (2014): *Today's sediment budget of the Rhine River channel, focusing on the Lower Rhine Embayment*. Geomorphology Volume 204, 1 January 2014, Pages 573–587, [1] H. Schüttrumpf and M. Detering: *Innovative sediment handling to restore reservoir capacity*, Dams and reservoirs under changing challenges / Ed. by Anton J. Schleiss, ISBN: 978-0-415-68267-1, pp 345- 352, 2011, CRC Press