Relevance of the Saale River for the sediment management in the Elbe catchment

Evelyn Claus[1], Gudrun Hillebrand[1], Peter Heininger[1]

[1]Federal Institute of Hydrology (BfG), Am Mainzer Tor 1, 56068 Koblenz, Germany Phone: +49-261-13065281
E-mail:claus@bafg.de

Introduction: The first Elbe management plan prepared under the WFD (2010-2015) highlights contaminated sediments and unbalanced sediment conditions among the main reasons for the failure to meet the WFD management objectives. As a consequence, the member states in the International Commission for the Protection of the Elbe River (ICPER) decided to develop a sediment management concept in preparation for the management cycle from 2016 to 2021. For the first time, an integrated sediment management concept was developed in support of management planning in a large international river basin [1, 2]. This poster deals with the relevance of the Saale River for the sediment management in the Elbe basin [3].

The Saale River: Figure 1 gives an overview of the suspended sediment transport (S_s) in the Elbe basin. The particular relevance of the tributary Saale is clearly demonstrated.

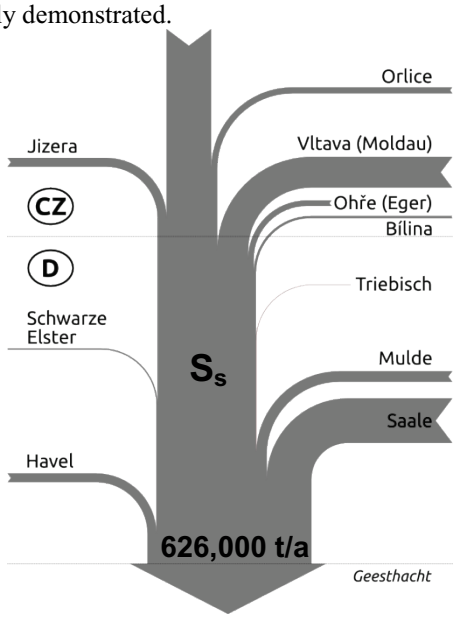

Fig. 1: Suspended sediment flows in the Elbe basin

The Saale sub-basin comprises a highly developed region with a strong economy and very long and intensive industrial and mining traditions. Historical pollution from industrial and mining activities as well as present-day point- and non-point emissions are sources of sediment contamination. Contaminated sediments in the Saale and in its tributaries act, in turn, as sources of contaminants and may adversely affect the environmental conditions and the uses of the Elbe downstream even to the North Sea [1, 2]. The lower part of the Saale is flow-regulated. 12 weirs with navigation locks are operated only along the 124 km of the navigable river.

Results and Discussion: Huge amounts of contaminated sediments have accumulated over decades in the impoundments with their lock and weir systems. Their transport and mobilisation is mainly caused by navigation (operation of the locks, dredging) and floods. In order to better understand the transport processes, three major impoundments were studied between 2010 and 2013 [3]. The investigation comprised a detailed horizontal and vertical characterisation of the sediments in terms of quantity, structure and contaminants. The investigation period included measurements before and after the extreme flood of June 2013.

Most critical for the fine sediment quality are heavy metals (Hg, Cd, Pb, Ni, Zn, Cu), PAHs, TBT and dioxins/furans. Contaminated fine sediments are concentrated in channels upstream and downstream of the ship locks but not in the free flowing parts of the Saale and in the weir canals.

As a mean, 128,000 tons (cf. Fig. 1) of suspended sediment are transported into the Elbe (2003 - 2008) mainly via the weirs. In the impoundments of the navigable part of the River Saale approximately 140,000 tons of fine and potentially mobile sediment are stored (2013). The potentially mobile fine sediment layer has a mean thickness of approximately 40 cm. From 2012 to 2013 nearly 19,000 tons were freshly deposited. In addition to the mobile portion, old consolidated sediments were detected with a thickness of more than two meters.

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