Artificial bed load supply at the River Elbe – investigation and realization

Petra Faulhaber¹ and Matthias Alexy¹

With 6 figures and 1 table in the text

Abstract: River bed erosion leads to various problems for navigation, river structures, flood safety, groundwater level and flora and fauna. A feasible measure to reduce this degradation process is to compensate for the deficit of bed load by artificial bed load supply. Since 1996 field experiments have been performed to investigate the stabilizing effect of artificial bed load feeding on the river bed in the upper reaches of the River Elbe. These field experiments were accompanied by investigations with a numerical bed load transport model to improve the knowledge about how much feeding is required to stabilize the river bed.

Introduction

In a section of the German part of the River Elbe between Mühlberg and Wittenberg (km 120 to 230), called the Erosion Reach (Fig. 1), the river suffers from a steady degradation process which has been observed since the 19th century. Locally, the maximum erosion rate amounts to 2 cm per year (BAW 1996; Faulhaber 1998, 2000b). The progressive bed erosion induces a lowering of the surface water and groundwater levels in the floodplains as the water levels follow the deepening river bed. This affects the flood regime (frequency, extent, duration) with impacts on flora and fauna. Furthermore, it threatens the stability of constructions, such as bridges, and river regulation structures like groynes.

The natural degradation process was accelerated by man. For centuries man has been seeking to control the rivers in one way or another. After the rivers were embanked, many changes in the river channel and the embanked floodplains occurred by human intervention. Also the surroundings of the River Elbe have become a cultural landscape. Therefore, today most of the causes of the erosion cannot be taken away.

There is a variety of reasons for the erosion in the Erosion Reach. The acceleration of the degradation process is caused by river regulation, i.e. restriction of discharge area by dykes, restriction of meandering and bank erosion by bank

¹ Authors’ address: Bundesanstalt für Wasserbau (Federal Waterways Engineering and Research Institute), Küßmaulstr. 17, 76187 Karlsruhe, Germany; E-mail: faulhaber@baw.de

DOI:10.1127/Lr/15/2003/539
(c) 2012 www.schweizerbart.com