
Sedimentation upstream the Iffezheim barrage on the river Rhine, Germany

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ABSTRACT

Sediment processes and morphological changes at the Iffezheim barrage are to be studied. The situation and a numerical approach to investigate current changes is presented.

Problem and objective

Sediments are deposited in the weir channel of the river Rhine at Iffezheim, which result in a raised water level. Situated on the upper Rhine, deposits of roughly 150.000m²/a must be dredged by WSA Freiburg in accordance with specified flood protection levels. The fine sediments are contaminated with HCB, meaning that the removal is consequently costly.

The area of deposition is being investigated and subjected to several studies.

The aim of this study is to find (engineering) measures to reduce the sedimentation, since according to the Water Framework Directive, the free passage of sediment is required. An understanding of the mechanisms of sedimentation and erosion in the area is therefore necessary.

Changing situations

In 2013 the hydrodynamic situation will change due to the installation of a fifth turbine in the powerstation. This will affect the sedimentation even more strongly than changes to the hydrology and river bed (due to deposition and dredging) have done in the past.

Methods

An understanding of the local sediment processes and a good representation in a hydrodynamic model is to be reached. To achieve this, a 3D numerical model is being developed using the software Telemac. Direct coupling within the sedimentological module allows the bed evolution to be examined.

Before sedimentation can be analysed, a good representation of the hydrodynamic situation must be simulated. Currently, a k-epsilon model is being used to model

turbulence.

A triangular mesh of the required resolution can be built due to the existence of high resolution areal echo sounding measurements. The time for computation must be small enough to model the morphological changes, but the resolution must be high enough to give unambiguous and readily applicable results.

Hydrodynamic situations which critically influence deposition are to be identified and the Influence of the fifth turbine on the sedimentation is to be analysed.

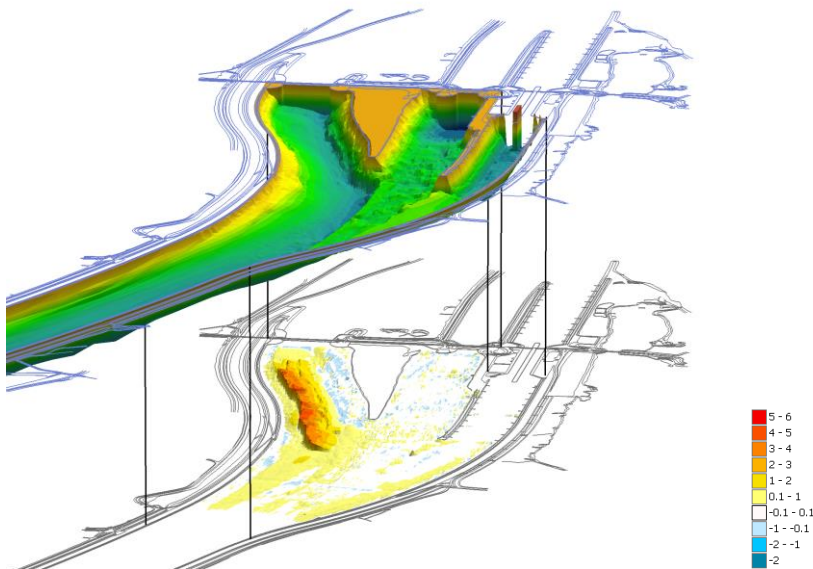


Figure 7: Investigation area and topographic difference representing the sediment depositions within 32 months.

REFERENCES

Schmidt, A., T. Brudy-Zippelius, R. Kopmann und M. Imiela: Investigations to reduce sedimentation upstream of a barrage on the river Rhine. In: De Conceicao Cunha, M., Brebbia, C.A. (Ed.): Water Resources Management III. Progress in Water Resources Vol XI, WIT Press 2005, S. 145 -154.