Adaption to climate change in the Este catchment

Climate change will have far-reaching effects on hydrodynamics and the morphology of the entire hydrological system of the Lower Elbe and its tributaries such as e.g. the Este River (Nehlsen et al., 2012). The essential aim of the research project KLEE is to develop within 3 years a detailed integrated concept for the mitigation of negative effects resulting from climate change for the Este River. The entire catchment area will be considered in the context of a large-scale approach. Potential adaption measures will be analyzed and assessed in detail and will then be summarized in a guideline. In addition, a permanent network of all stakeholders will be established in order to reach an early involvement of the stakeholders into the planning process and to achieve wide acceptance of the planned measures.

OVERVIEW

The main steps of the KLEE project are summarized as follows:
1) Measurement and monitoring of relevant components of the hydrological and sedimentological system of the Este River and its catchment
2) Recalibration and extension of existing numerical models (Nehlsen et al., 2012)
3) Analyses of the effects of climate change on the hydrological and sedimentological system using numerical models
4) Analyses of local adaption measures and assessment of the effects on the entire system
5) Development of a catalogue of adaption measures including positive and negative effects as well as an economic, legal and social assessment of feasible and accepted solutions
6) Implementation of pilot projects

Parallel to these work packages, a permanent project board is installed and learning and action alliances (LAAs) will be performed in order to ensure stakeholder participation at an early stage for the optimisation of adaption measures.

PROJECT AREA

The project area of KLEE covers the catchment of the Este River (fig. 1). The river is divided into two main parts: The upper Este is a typical moraine river. The catchment area is dominated by agricultural use. The lower Este is a marsh river, which is dominated by the tidal influence of the Elbe. From these different conditions, different interests for sediment management and for flood protection are arising.

While the Este River originally was a narrow, strongly meandering river, it is now heavily influenced by human interventions (fig. 2).

MAIN CHALLENGES

First investigations on potential impacts of climate change on the hydrological and sedimentological system of the Este River and its catchment have been carried out within the research project KLIMZUG NORD (Nehlsen, 2011). Main challenges have been identified as follows:

i) Flood protection
ii) Sediment management
iii) Bank erosion in the river (fig. 4)
iv) Soil losses in the catchment (fig. 3)

NUMERICAL MODELLING AND ASSESSMENT OF MEASURES

The general effectiveness and potential of different adaption measures have been analyzed within the KLIMZUG NORD project. As a result, some measures (e.g. reactivation of the natural potential for water and sediment retention) have been identified as positive where further analyses and development of the solutions are making sense in order to develop a reasonable adaption to climate change. These solutions will be developed and analyzed in terms of feasibility and effectiveness on the local scale as well as under economic, legal and social aspects. In detail the following measures will be considered:

- Creation of additional storage capacity for flood retention
- Measures for the retention of water and sediment
- Restoration of the natural morphodynamic conditions

One example for the minimization of soil losses in the catchment is an adapted land cultivation. Figure 6 shows the effectiveness of mulch seeding.