Towards integrated river basin management in the Vistula river basin, Poland

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1. The Vistula River

The Vistula River is Poland's longest river – 1068,3 km. It flows from the source on the slopes of Barania Góra to the mouth on the Baltic coast. Its catchment area is 194 103 km^2. Floods in the middle course of the Vistula are caused by the sudden melting of snow in the south of Poland (March – April) or heavy rainfall in (particular) the Western Carpathians. In 1997 and 2001 the flood peak exceeded 700 cm (measuring point Puławy). The cautionary water level is at 400 cm. During the night of (August, 3^d, 2001) the dike near the village of Kępa Gostecka breached.

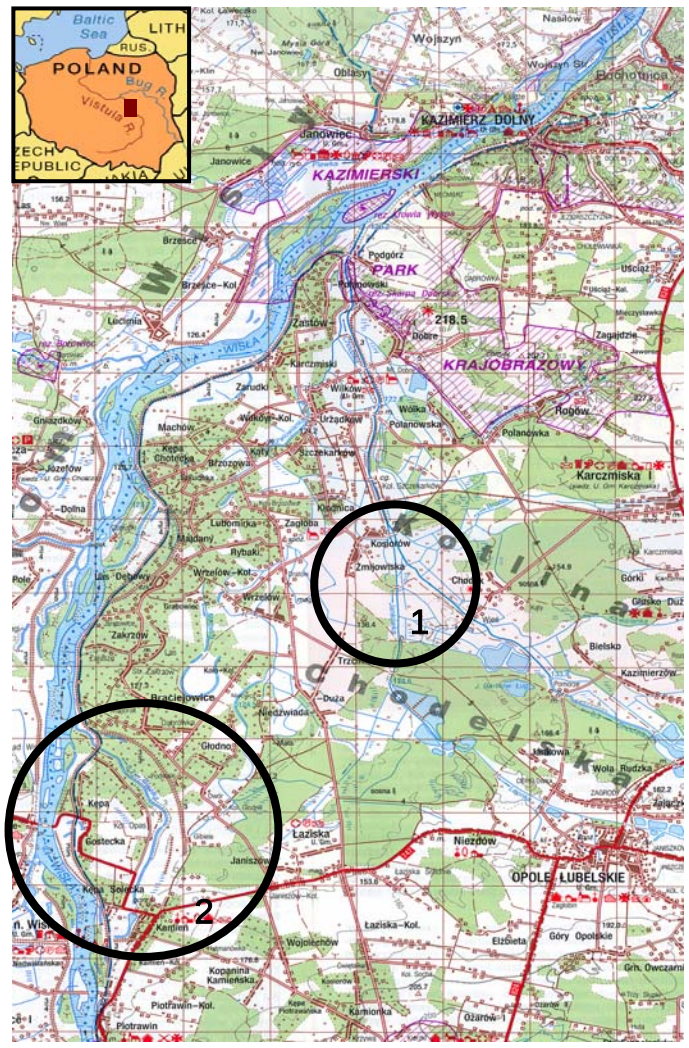
Dike breach near the village of Kępa Gostecka, August, 3^d, 2001

2. Dike breach saved Warsaw

Because of the dike breach near Kępa Gostecka downstream located cities like Warsaw did not suffer from floods. However, the local water managers have strengthened the dike near Kępa Gostecka recently. This means that the next flood will affect Warsaw. In Poland it is not common practice yet to consider the whole river basin when identifying appropriate land use and flood protection measures.

Within the cooperation framework of the Radboud University and the Catholic University of Lublin, 4 PhD-research projects were started focusing on alternative land use and flood protection measures that would combine safety, economic interests and ecosystem values taking upstream and downstream effects into account.

The research project studies from various viewpoints the feasibility of a retention reservoir near Kosiorów Village (1 on the map) and the construction of a side-channel (2). These viewpoints are a) socio-economic aspects, b) changes in the vegetation c) microbial processes in the soil and d) land use and water management.



Topographical map of the mid section of the Vistula river.

3. Soil and vegetation processes

Constructing by-passes or water retentions areas will trigger changes in the hydrology and the microbial processes in the soil. Subsequently these processes will determine potential agricultural productivity and/or succession of the natural vegetation. It goes without saying that knowledge related to these processes are indispensable to determine the economic potentials of the area. Two PhD students will focus on the microbial and vegetation succession issues respectively.

Water retention or the construction of by-passes will restore biodiversity and contribute to safety but will also have some constraints for agriculture. (Photo: Kępa Solecka; insert Rorippa amphibia L.)

Morphodynamics of the Vistula river

4. Socio-economic aspects:

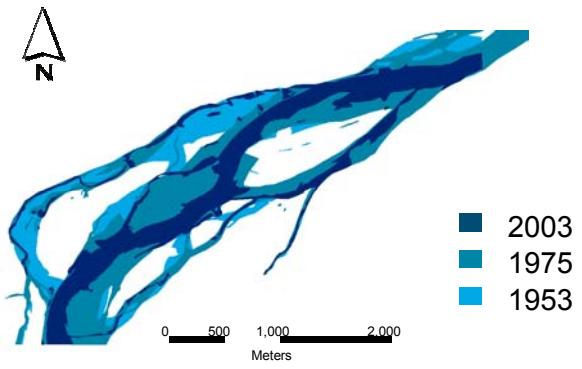
This part of the research will focus on the question: Is it possible to bring a community from fear-based rigid reliance on dykes to a more relaxed, flood-accommodating life-with-the river? The study methods are: questionnaires, interviews and participatory observation. The goal is to provide means and channels of communication with local actors along with negotiating their participation in the whole design.

5. Land use & water management

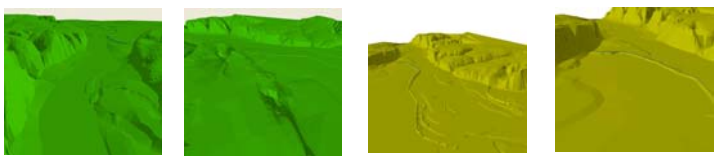
To understand the driving forces behind the morphological changes and land use patterns landscape changes over the period 1950 – 2005 will be mapped and analysed with Geographic Information System (GIS) techniques. Within the GIS environment ecological, socio-economic as well as a-biotic and biotic data will be mutually linked.

Making use of landscape ecological classification methods, sustainability indicators and ecological risk models, various scenarios of land use and water management can be compared and their feasibility studied.

The results can be visualized as GIS-maps, tables, graphs, but also as computer animations.



River bed changes 1953 - 2003



Digital Elevation Model which can be used in animations