Geophysical Research Abstracts,
Vol. 10, EGU2008-A-08341, 2008
SRef-ID: 1607-7962/gra/EGU2008-A-08341
EGU General Assembly 2008

Potential of non-structural flood mitigation measures

J. Komma, G. Blöschl

Institute of Hydraulic and Water Resources Engineering (Vienna University of Technology), Vienna, Austria (komma@hydro.tuwien.ac.at / Fax: +43 1 58801 22399 / Phone: +43 1 58801 22316)

In this paper we analyse the relative effect of non-structural flood mitigation measures for the example of the Kamp catchment in Austria. The main idea is to decrease flood peaks through (a) retaining water in the landscape and (b) providing additional inundation areas along the main stream (room for the river). To increase the retention of excess rainfall in the landscape we introduced two different measures. One measure is the increase of water storage capacity in the study catchment through the change of land use from agriculture to forest. The second measure is the installation of many small sized retention basins without an outlet (micro ponds). The micro ponds are situated at the hill slopes to intercept surface runoff. Additional inundation areas are provided at some feasible locations along the main stream through terrain lowering (earth works).

The study catchment at the Kamp river with a size of 622 km^2 is located in north-eastern Austria. For the simulation of the different scenarios a well calibrated continuous hydrologic model is available. The hydrological model consists of a spatially distributed soil moisture accounting scheme and a flood routing component. The spatial and temporal resolutions of the model are 1 x 1 km^2 and 15 minutes. The results of the hydrologic scenarios are used as input for one dimensional hydro dynamic simulations. For the hydraulic simulation the well known HEC-RAS model is used. The cross section geometry is based on field measurements and a digital terrain model with a spatial resolution of 10 meters.

For the assessment of the land use change scenario the hydrologic model parameters for wooded areas forFare transferred to areas that are currently not forested. Through

higher storage capacities in the wooded areas the scenario of afforestation helps to reduce flood peaks. The micro ponds are represented in the hydrological model by a bucket storage component. It is filled by a fraction of the simulated direct runoff and drains into the groundwater with a constant percolation rate. To gain an additional storage capacity of 800000 m^3 about 8000 micro ponds (volume of 100m^3 / pond) would be necessary.

The different measures were analysed for ten flood events of different types (convective, synoptic, wet and dry initial conditions) and scales (small, medium and large floods). The results indicate that small and medium flood events can be reduced using non-structural flood mitigation measures. In the case of large flood events the peak reduction is very small.