Geophysical Research Abstracts,
Vol. 10, EGU2008-A-05035, 2008
SRef-ID: 1607-7962/gra/EGU2008-A-05035
EGU General Assembly 2008

1 Development of automated floodplain delineation tools in the GIS using progressive change of input parameters

1.0.1 F. Hartvich (1), J. Jedlička (2)

(1) Dept. of Engineering Geology, Institute of Rock Structure and Mechanics, Czech Academy of Sciences, Prague, Czech Republic), (2) Dept. of Cartography and Geoinformatics, Fac. of Science, Charles University in Prague, Czech Republic (hartvich@irsm.cas.cz / Fax: +420 284680105 / Phone: +420 266009233)

The widespread use of the GIS systems and implementation of new tools allowed for enhanced exploitation of digital elevation models (DEM) for many purposes. A possibility of delineation of a floodplain using the DEM has been spotted early, there are, however, several obstacles to be dealt with, such as input data quality and variability of the valley systems.

Within the scope of the project „Long-term changes of riparian ecosystems in the floodplains of rivers hit by extreme floods“, we have been developing a GIS-based automated routine for the delineation of the floodplain, based on the morphometrical properties of the relief. Regardless of data accuracy and reliability limitations, an automated floodplain calculation is a valuable aid in flood protection policy as the detailed mapping of vast catchments is both costly and time-consuming. In addition, it may help in selection of critical segments within the catchment where the limited resources for the fieldwork should be aimed. This contribution summarizes the newest step in the routine development process - the use of progressively changing inputs.

In the previous stage, we based the models on morphological and topographical properties of the relief, such as the slope inclination of the relief, abruptness of its change, height above the river course, the distance from the river, etc. Each parameter is weighed according to probability of floodplain existence in the raster cell. The source of data for the DEM were the contour lines of 1:10 000 digital topographic map with the interval 2 or 5 m.

Having calibrated and applied these models on the Sázava and Blanice Rivers, and after comparing the results with the field mapping records, we concluded that using a single formula on the whole catchment could be improved if we managed to change the equations fluently along the rivers course. In order to approximate the model to the reality, we decided to change the parameters, such as the relative height above river or the buffer width, progressively from the river source to the closing profile. The model was applied on the catchment of Opava River.

Based on geodetic profiles and direct field observation in the lower part of the river, we derived the parameters for the closing profile. Using the Model Builder in the ArcGIS environment we designed a model for progressive parameter change. For example, the relative height of maximum floodplain reach changes from 7 m (closing profile) to 0 m (river source).

The resulting raster of calculated floodplain extent was compared with original attitude raster (stable parameters), field mapping results and with a set of control GPS points of floodplain limits. This verification of the model validity showed that the progressive change of parameters greatly improved the model performance and calculated floodplain extent is very close to the reality.