Geophysical Research Abstracts
Vol. 16, EGU2014-7993, 2014
EGU General Assembly 2014

The experimental use of a statistical algorithm and GIS for detecting the spatial reach of the impact of a dam reservoir on the development of a river channel. The case of the Dunajec and the Białka rivers, the Polish Carpathians

Maciej Liro
Poland (maciej.liro@uj.edu.pl)

The determination of the spatial reach of the impact of dam reservoirs on the development of river channels is a key issue in fluvial geomorphology, river engineering and ecology. Until now the impact of dam reservoirs on river channels above these structures has been poorly explored. In particular, there has been no answer to the question: What is the spatial reach of changes in a river channel above a dam reservoir? and Is the reach of these changes broader than the reach of the backwater itself? To answer these questions, a statistical algorithm searching for channel sections homogeneous with respect to a given parameter and the threshold values between them was experimentally used in this paper. The study was conducted on the example of the channels of two rivers (the Dunajec and the Białka) flowing into the Czorsztyński Reservoir (CR) (Polish Carpathians) built in 1997. Information on the width, the average annual migration rate of a channel and the erosion and lateral accumulation in the river channel was used as input parameters. This information was collected using GIS software from 5 sets of orthophoto maps and georectified aerial photographs taken before (1977, 1982, 1994) and after (2003, 2009) the construction of the CR in the channel sections of the Dunajec and the Białka, of 4700 m and 1900 m in length above the CR. The spatial-temporal pattern of changes in the structure and dynamics of the channel identified by the statistical algorithm shows that the changes interpreted as the impact of the reservoir (change in the channel width, lateral erosion, lateral acumulation and migration rate) had a reach in the river channel of about 1000 m broader than the reach of the reservoir's backwater. Sections of changed structure (width) coincided spatially with sections of changed dynamics (migration rate). The paper shows that statistical algorithms may be useful in the detection of sections of channels transformed by the impact of hydrotechnical developments.