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PRINCIPAL CHANGES IN CHANNEL MORPHOLOGY INDUCED BY MAN IN THE CZECH CARPATHIANS

HRADECKÝ J.[1]
[1]Department of Physical Geography and Geoecology, Faculty of Science, University of Ostrava, Chittussiho 10, 710 00 Ostrava, Czech Republic, phone: +420 596160825, jan.hradecky@osu.cz

ABSTRACT

Long-term human activity has led to fundamental transformation of the morphology of a channel-alluvial segment of streams and changes in the character and intensity of fluvial geomorphologic processes. The paper summarizes existing knowledge of factors of morphodynamic changes in channels and alluvia of Carpathian streams and brings an outline of the concept of further research in the area. The transformation of streams is presented on the example of two typical gravel carrying streams in the area of the Carpathian flysch – Kopytná and Morávka Rivers. Special attention is paid to the concept of disturbation zones of the streams and a biogeomorphologic aspect of anthropogenous impacts. River pattern was analysed by means of historical maps and aerial photographs. Detailed geomorphologic mapping concentrated on the overall analysis of fluvial landforms adverting to changes in the general development of the streams. Several fundamental geomorphologic trends were identified in studied segments of the selected Carpathian streams. The first trend is related to the change in land use in the historic period when deforestation of mountain areas caused the increase in the amount of bed-load in the streams and influenced the course of flood waves on the streams. A significant source of sediments came from the activation of debris flows in the upper parts of the basins. Another type of anthropogenous impact consisted in stream regulations that culminated in the second half of the 20th century totally transforming the geomorphologic regime of the streams. Typical measures included longitudinal profile changes by means of constructions changing stream gradient conditions (block slides, wing dams, weirs and valley dams). Another form of human impact was represented by the regulation of longitudinal profile by means of bank fortification (concrete fortification, riprap, rockfill, wood fortification, etc.). This resulted in the occurrence of new conditions to which the streams react by more intensive displays not only in extreme situations such as floods but also during average system functioning. All these interferences often caused non-reversible changes in channel morphology. The most distinct type of the changes is transformation from gravel carrying anabranching streams into streams with accelerated deep erosion and bedrock channel development. In the case of Morávka River channel deepening of 6 – 8 m under its own alluvium into flysch bedrock has been observed during the last 40 years.

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