

## **Hydrological and geomorphological consequences of beavers activity in the Struga Czechowska valley (Tuchola Pinewood Forest, Poland)**

Dariusz Brykała (1), Piotr Gierszewski (1), Mirosław Błaszkiwicz (1), Jarosław Kordowski (1), Sebastian Tyszkowski (1), Michał Słowiński (1), Michał Kaszubski (1), and Achim Brauer (2)

(1) Polish Academy of Sciences, Institute of Geography and Spatial Organization, Torun, Poland (darek@geopan.torun.pl), (2) Helmholtz Centre Potsdam. GFZ German Research for Geosciences. Section 5.2 - Climate Dynamics and Landscape Evolution, Potsdam, Germany (brau@gfz-potsdam.de)

Since last years, after the process of beavers' (Castor fiber) reintroduction to the Polish environment, on the Struga Czechowska river (Tuchola Pinewood Forest, Poland) was observed large beaver activity, especially along the outlet from the Lake Głębozec. It expresses in relief transformation of the valley bottom and its slopes. Created by beavers small ponds functioning as local sediment traps. Periodically the dams were destroyed. This led to rapid water drainage. The effects of such events were observed in the period between December 2014 and May 2015.

Inventory of beaver dams along the Struga Czechowska river, which had made in 2015, shows that dams were distributed on average every 50 m. There were 30 dams on three sections of river. Only 6 were built there in 2015, and the remaining were older and abandoned, but one-third of them still damming water of stream. The average water damming by beaver dams amounts 0.2 m, and maximum 0.6 m. The width of the beaver dams reached there almost always the value of 3 m, and their height reached average up to 0.8 m was identical to the bankfull depth.

Cascade character of the beaver dams operation has its consequences in functioning of erosional and accumulation parts of watercourses (alternately). Analysis of hydrograph of the Struga Czechowska water levels shows, that since December 2014 there were nine rapid drainages of beaver ponds located above the paleolake Trzechowskie. Damaged dams were very quickly rebuilt, and water in ponds was again stored. The average time of restoration the dam amounts 10 hours, and maximum 3 days.

Rapid flows from beaver ponds resulted in intensive bottom and lateral erosion of stream channel and a creation of soil falls on the slopes of valley below destroyed dams. Products of erosion were accumulated along watercourse at a distance of 200 meters, and then in the stream channel in form of sandy bars. Especially intensive accumulation occurred at flat surface of paleolake. Maximum thickness of flood deposits amounts 28 cm. In terms of grain size, flood deposits were represented as fine and medium sands well and moderately sorted. Similar sandy interbeddings in peat-lacustrine sediments were found in sediment cores taken at the mouth of the the Struga Czechowska valley to the paleolake Trzechowskie. Can not be excluded that at least some of them may be the result of rapid flows, also including beaver ponds. Studying the effects of contemporary beaver activity, especially the effects of beaver dams failures, may be helpful for paleoenvironmental interpretations.

This study is a contribution to the Virtual Institute of Integrated Climate and Landscape Evolution Analyses – ICLEA– of the Helmholtz Association, Grant No VH-VI-415.