

Historical reservoir construction: potential hotspot of anthropogenic induced sediments in lowland Northeastern Romania

Mihai Niculita (1), Mihai Ciprian Margarint (1), and Paolo Tarolli (2)

(1) Geography Department, Geography and Geology Faculty, Al. I. Cuza University of Iasi, Carol I, 20A, 700506, Iasi, Romania (mihai.niculita@uaic.ro), (2) Department of Land, Environment, Agriculture and Forestry, University of Padova, Agripolis, Viale dell'Università 16, 35020 Legnano (PD), Italy

The Northeastern Romania lowland is well known for its reservoir construction history and sedimentation all over the last 500 years. These reservoirs were in general small (under 1 million m³), shallow (4 – 5 m in depth, but with water levels of up to 3 m) and frequently dry during the summer or winter. Their construction was requested by the dryness of the climate, the reservoirs being used for water storage, pisciculture, for cereals mills and fuller mills. After their filling, the dam morphology was kept and became smooth over time. The dams were also cut in the spillway area in order to evacuate the groundwater, so the reservoir bottom could be used as pasture. This anthropic intervention created a concentration of flow at high water discharges in the spillway area, which allowed the evolution of gullies on the flat lacustrine bottom.

We identified about 20 sites where this process of gullies affecting reservoir bottoms occurred in the last 75 years. For each site we estimated the volumes and mass of the eroded sediments using LIDAR DEMs, and established a temporal scale of gully activity using aerial imagery for estimating the rate of process. The total volume of eroded area is over 1000000 m³, individual gullies volumes ranging from 2000 to 10000 m³. The maximum depth of the gullies is around 4 m, which is in general the maximum depth of reservoir sediments; the length of the gully systems is between 30 to 1500 m. The shape of the gully channels is branched, which we believe is because the formation and evolution of these landforms is related to the water flow at high discharge. We describe also similar patterns of gullies developed on flat floodplains of the study area and which are in general older than 75 years. The importance of the study of these erosional patterns is related to the potential of the reservoir bottoms to become erosional hot spots. In the study area there is an increase of extreme rainfall events, which coupled with the presence of over 500 inventoried abandoned reservoirs show the potential of the acceleration of erosional processes, with theirs negative consequences.