



Gully erosion of lowland old anthropic lakes beds

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Anthropic lakes are seen as sediment traps within the fluvial system. Their decommissioning is rarely followed by other sediment conservation measures and usually the fluvial system steadily remobilize the sediments mainly through channel incision. Sometimes extreme hydrological events activate erosional features as gullies, which generate quick sediment remobilization. We present such a case of gullies affecting the dry bottom of filled anthropic lakes from Jijia Hills, NE Romania. The dry climate from this lowland area imposed the construction of small reservoirs (under $1,000,000 m^3$) with shallow water levels of up to 3 m used mainly for water storage and pisciculture. On the abandoned dry reservoir bottoms gully landforms initiated, in a first stance, starting from the point where the dam was breached (in the central part or in the spillway area) in order to evacuate the groundwater and the reservoir bottom to be used as pasture land. The evolution of the gullies progressed into straight/meandered channels, sometimes with multiple branches. The extraction of the gully was done manually from a Digital Terrain Model (DTM) having a cell size of 0.5 m supported by contour lines, slope maps and edge detection of slope. Although there are much faster semi-automatic and automatic ways used for the extraction of the geomorphometric features, the manual extraction was preferred for its high accuracy results. The gully delineation was continuously verified in 3D perspective and by topographic profile checking. The created inventory consists of more than 500 gullies found mostly on the second and third Strahler order catchment dry bottom reservoirs whose morphometric variables are directly related to the dimension of filled reservoir. Thus, there are recorded lengths of 1-2 m for newly created gullies of up to 800-1000 m for the most developed ones, with big variations of the width depending on the shape of the gully channel and the evolution stage of the gully. The depth of the gullies is ranging from 20-30 cm to 4-5 m and is depending on the initial size of the reservoir, the depth of sediment fill and by the height of the dam. The volume of eroded sediments varies from a few m^3 to up to $10,000 m^3$ for individual gullies, with a total volume of eroded area over $1,000,000 m^3$. Considering the resulted volumes these types of gullies represent one of the most important sediment source areas in Jijia Hills region. The bottom reservoir gullies inventory and the produced sediment volumes was further used to perform a cluster analysis in order to delineate hot-spots of sediment sources of north-eastern Romania lowland. This aspect has a great practical importance considering that the majority of these gullies are not fully developed, and their further evolution will become an important source of sediment production. In the same study area there are dry abandoned reservoirs which can become areas where the studied types of gullies can appear in the near future, if the climate change will increase the torrential rainfall.