

## **Sediment budget for Rediu reservoir catchment, North-Eastern Romania**

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Sediment budgets are a useful tool for geomorphologic analysis, catchment management and environmental assessment, despite the uncertainties related to their assessment. We present the sediment budget construction and validation for a small catchment of 9.5319 kmp (953.19 ha) situated in the North-Eastern part of Romania.

The Rediu reservoir was built between 1986 and 1988, on Rediu valley, a left tributary of Bahlui river, north-west from Iași city. The catchment of the reservoir has 6.5 km in length and 2.5 km in maximum width, the altitudes decreasing from 170 m in the northern part, to 52 m in the southern part. The valley is symmetric, the altitude of the hillslopes going between 200 m to 75 m in one km length, in the transversal section with the maximum width. The floodplain is narrow having between 20 m to 210 m (in the area of confluence with Breazu tributary). The mean slope of the catchment is 6.4 degree, the maximum slope being 24.6 degrees. The length of channels which show banks of up to 2 m is 19.98 km.

The land is used predominantly as crops (58.1 %), 16.7 % being covered by pastures (from which over half are eroded), 11.5 % percent of the catchment being covered by planted forests, 9.2 % by rural constructions and roads, 2.9 % by hayfields, 1.5 % by lakes and 0.1 % by orchards.

Beside the Rediu reservoir, there are three ponds (15 771, 1761 and 751 sqm) in the catchment. We considered the trap efficiency for the reservoir and the ponds to be 95%.

Aerial images from 1963, 1978, 1984, 2005, 2008, 2010, 2012 and 2014 were used to assess the state of geomorphological processes before and after the reservoir construction. After 1970 a gully system situated in Breazu tributary sub-catchment and several active landslides along the main valley left side were forested. Beside these processes, soil erosion and human impact by constructions are the main processes generating sediment in the study area.

The sediment yields were quantified by estimating the quantity of sediments which entered in Rediu reservoir since its construction. The method for volume calculation was the comparison through geomorphic change detection of two DEMs representing the initial bathymetry (1986 – taken from 1:5 000 scale topographic maps) and a bathymetry surveyed in 2012. The total sediment quantity deposited in the reservoir is 73 947 t (54 776 cbm \* 1.35 t/cbm) in the 24 years of operation (1988 to 2012) which means a rate of 3.23 t/ha/y.

Soil erosion estimated with RUSSEL2 and its routing through the fluvial system of Rediu reservoir catchment was modelled using WaTEM/SEDEM 2006 model. The modelled quantity of sediments deposited yearly in the Rediu reservoir is 2626 t, which mean 2.75 t/ha. The catchment produce 4803 t, meaning 5.04 t/ha/y from which 2.17 t/ha/y are deposited along the flowpaths, only 0.12 t/ha/y being exported downstream the Rediu reservoir. The difference between the measured and modelled values, 0.48 t/ha/y we argue that is related to the input generated by the human impact, mainly by construction activities. Taking into account that in the near future, the constructions and roads will extend, because of the vicinity with Iasi city, is of great importance to monitor erosion process.