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High sedimentation rate in the Dunajec backwater upstream the Czorsztyn Reservoir, southern Poland.

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To reconstruct the rate of overbank sedimentation within the backwater zone of the Czorsztyn Reservoir I analysed 20 samples of sediments deposited on the banks of the Dunajec channel at various distance from the reservoir. To estimate sedimentation rate for deposits under consideration, riverbed gravels were dated by using ortophotomaps. The Czorsztyn Reservoir was built in 1997 for electricity production and flood protection purposes. The maximum water stage variations in the reservoir reach 19.24 m. During maximum reservoir stage the Dunajec backwater floods approximately 1500 m upstream. The samples were taken in a location situated within the newly forming Dunajec delta where muds and medium-grained sands of over 150 cm in thickness were deposited in the reservoir at the average deposition rate of minimum 9.6 cm annually. On the Dunajec floodplain in the zone where the river flows into the reservoir the thickness of overbank sediments deposited from the reservoir construction in 1997 is 260 cm. There are various types sands and mud deposited at the average rate of 18.6 cm/year. At a point located on the floodplain at the distance of 1200 m from the reservoir, the backwater does not inundate the river banks. The floodplain is built of mud with sand intercalations. The deposit thickness is about 80 cm and is similar to those of other floodplain sites beyond the backwater. The rate of sediment deposition on the Dunajec floodplain within the backwater zone is very high compared to those of other reservoirs in the Polish Carpathians. This causes a rapid rise of river banks within that zone and increases its erosion resistance. This may lead to the channel narrowing and decreasing its ability to lateral channel migration in the future. If such high sedimentation rate within the Czorsztyn Reservoir backwater zone is maintained, the delta will develop rapidly.