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Effects of land use and climate changes on small reservoir siltation in the agricultural belt of European Russia

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Abstract

Small reservoirs of agriculture-dominated areas experience severely increased sediment input caused by soil erosion on cultivated slopes, also accompanied at some locations by gully erosion. This causes rapid decrease of the reservoir water storage and shortened periods of functioning. In this paper we discuss several examples of the ^{137}Cs -based short-term siltation chronology of small reservoirs located in different landscape zones within the agricultural belt of European Russia. From two to four time marks could have been established in ^{137}Cs depth distribution curves constructed from detailed depth-incremental sampling of reservoir infill sediment, allowing reconstruction of sediment microstratigraphy and deposition rates. In combination with other independent information sources this provides insight on the relative importance of recent land use changes and climatic variability in controlling sediment delivery within small agriculture-dominated fluvial systems. In combination with sediment redistribution studies, it has become possible to construct closed sediment budgets for catchments of several reservoirs and make a quantitative assessment of sediment delivery variability. Such information is important for appropriate design and management of small agricultural reservoirs in Russia. Copyright © 2013 IAHS Press.

Keywords

Agricultural land, Climate changes, Deposition rates, European Russia, Microstratigraphy, Sediment delivery, Siltation, Small reservoirs, Soil erosion