



Analysis of suspended sediment transport in a mesoscale catchment in northern Mongolia

Philipp Theuring and Michael Rode

Helmholtz-Centre for Environmental Research – UFZ, Department of Aquatic System Analysis and Management, Germany
(philipp.theuring@ufz.de)

The input of fine sediments has an important impact on the ecological status of rivers. In case of the investigated 15.000km² Kharaa catchment in Mongolia it is assumed to be the main source for pollutants and nutrients. The identification of the sediment sources and the quantification of sediment transport are therefore important for river management measures, especially in semi-arid Mongolia where massive climate and land use changes are expected. Since data scarcity is a central problem in the investigated area a monitoring scheme has been developed, providing continuous data on discharge, turbidity and temperature at selected sites.

In this study two different models are tested to describe sediment transport on a mesoscale. The semi distributed, conceptual hydrological and nutrient transport model HYPE is used to model the runoff in the catchment. The model has been development based on the HBV-model that allows the use of coupled sub basins.

Secondly a regional catchment scale sediment budget model (SedNet) is employed to calculate the sediment budget. This model uses a DEM, land use- and soil maps and climate data and is taking into account also hill slope, gully- and riverbank erosion.

Sediment source fingerprinting is used to identify and localize the most important sediment sources in the catchment. Geochemical tracer techniques for spatial source identification, using major elements (e.g. Si, Al, Mg, Fe, Na, K, P) and trace elements (e.g. Ba, Pb, Sr, Zn) are applied. Samples from the river junctions of the outlet of each sub basin into the main tributary were taken and the fine sediment fraction (<10µm) has been analysed. The contribution of each sub basin of the suspended sediment in the main tributary has been assessed with the help of a mixing model.

Further sampling has been conducted on a selection of topsoil eroding surface reference sites and on stream banks, in order to gain information about the importance and proportions of surface-, stream bank and gully erosion in the catchment. These samples are used for an isotope fingerprinting using the atmospheric fallout radionuclides ¹³⁷Cs, ²¹⁰Pb and ⁷Be. Preliminary results suggest that only a small part of the catchment contributes considerably to total sediment load.

The coupling of the catchment model with an in stream River Water Quality model in the future will lead to a better understanding of the influencing factors on the aquatic ecosystems in the Kharaa River and allow the analysis of land use and climate change scenarios.