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Sediment sources and its transport pathways in the Kharaa catchment, northern Mongolia

P. Theuring and M. Rode

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

Soil erosion and its subsequent transport towards and within rivers is complex, dependent on many catchment properties, hydrology and land use. However, little is known about the sources and fate of suspended sediment (SS) in the 15.000km2 Kharaa study catchment in Mongolia. This study focuses therefore on a qualitative identification of sediment sources and the quantification of the suspended sediment transport in the catchment. Geochemical sediment source fingerprinting in combination with isotope fingerprinting is used to identify and localize the most important sediment source areas in the catchment and assess their contribution to the suspended sediment load. More than 1000 grab samples from 22 river junctions of the outlet of each sub basin into the main tributary were taken in the period from 2009 to 2011. Their fine sediment fractions (<10μm) have been analysed for major elements (e.g. Si, Al, Mg) and trace elements (e.g. Ba, Pb, Sr,) using ICP-MS. The contribution of each sub basin to the SS in the main tributary has then been calculated using mixing model analysis. Additionally, isotope fingerprinting was used to assess the importance and contribution of surface, stream bank and gully erosion on total sediment load of the catchment. Biannual samples of 12 topsoil eroding surface reference sites, 4 stream banks and 4 suspended sediment samples were analysed for the atmospheric fallout radionuclides Cs-137, Pb-210 and Be-7 using gamma ray spectrometry. The sediment budget of the catchment was calculated with the help of the regional catchment scale sediment budget model (SedNet. Results suggest that only a small part of the catchment contributes considerably to the total sediment load and that gully and bank erosion might be the dominating sources in the catchment that lead to fine sediment intrusion and ecosystem degradation in the riverbed in the midstream regions. Also there seems to be a difference in erosion behaviour between spring and fall, with a higher contribution from surface erosion during summer rainfall. Future work will concentrate on scenario analysis modelling of the sediment transport in the catchment with HYPE as well as uncertainty analysis of the model.