

## **Recent developments in river water quality in a typical Mongolian river basin, the Kharaa case study**

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**Abstract** The objective of this study is to evaluate current water quality conditions in the Kharaa River basin in northern Mongolia. Based on surveillance data from the Mongolian environmental authorities and our complementary monitoring scheme, we evaluated nutrient and sediment bound heavy metal contamination on a sub-basin scale. Although the headwaters of the Kharaa represent natural background conditions (total nitrogen (TN) 0.46–0.58 mg N L<sup>-1</sup>, total phosphorus (TP) 0.011 to 0.018 mg P L<sup>-1</sup>) and population densities within the catchment are very low (<10 inhabitants km<sup>-2</sup>), the river basin is facing relatively high anthropogenic pressure on water quality in the middle and especially in the lower reaches (total nitrogen 1.50–1.52 mg N L<sup>-1</sup>, total phosphorus 0.18–0.26 mg P L<sup>-1</sup>). The main contributors to these nutrient emissions are urban settlements with a high proportion of households without connection to wastewater treatment plants and, to a lesser extent, agricultural land use. The nutrient levels have a significant eutrophication potential in the Kharaa River. Heavy metal concentrations in river sediments show a high variability within the river system. Especially elevated concentrations of As, Pb and U can be related to the impact of mining activities in parts of the basin. The drinking water abstraction through bank filtration showed initial alterations of raw water quality indicated by slightly increasing concentrations of heavy metals and pollution indicators like chloride and boron. The results of the Kharaa River basin case study are related to water quality conditions in other Mongolian river basins.

**Key words** nutrients; heavy metals; water quality monitoring; rivers; Mongolia