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# Characteristics of recent pollution profiles from three comparable rivers – Examples from old industrial and past mining regions of the International River Basin District Meuse in Central Europe

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Rivers are a transition system for contaminants, which are adsorbed to fine sediments. (Re-) Mobilization, transport and accumulation are the controlling factors in fluvial systems, which influence the processes of relocation and sedimentation. Contaminants can be stored during a long time in depositional areas such as floodplains or at the riverbed until further remobilization takes place.
In this study, pollution profiles of three small rivers – Geul, Wurm, and Inde River – with neighboring catchments are compared. The study area is situated within the International River Basin District Meuse (border triangle between Belgium, the Netherlands and Germany) and is part of the oldest cultural landscapes in Europe, influenced by industry and mining. All three rivers are characterized by similar properties like catchment size ($\sim$ 350 km$^2$), length ($\sim$ 55 km), altitude difference (210 to 260 m), discharge ($\sim$ 3.5 m$^3$ s$^{-1}$ in the lower course), channel width ($\sim$ 10 m), and flow regime (perennial and pluvial). Although similarities concerning the natural settings and the land use exist, there are significant differences. The history of all three catchments is closely connected with the occurrence of coal and ore deposits, and varies due to the geological setting. Even though the mining sector disappeared in the study area, there are still dumps and contaminated sites as their legacy. Modern pollution sources like industries, municipal wastewater, and traffic areas became more relevant over time.
A resuspension method after Lambert and Walling (1988) was used to collect "suspendible riverbed sediments" from different river reaches. Those sediments are defined as a mixture of recent riverbed sediments coming from the riverbed itself, from the floodplains, and from the hinterland. The suspendible riverbed sediments can be potentially mobilized during flood events. After sampling, the fine-grained fractions (< 63 $\mu$m) were analyzed with an energy dispersive polarized Spectro Xepos X-ray fluorescence (XRF) device. Using the eight trace elements Cr, Ni, Cu, Zn, As, Cd, Sn, and Pb, the variability of pollution profiles and contaminant loads are investigated and compared.
The comparison of the three neighboring catchments and the identification of potential pollution sources allow to distinguish between natural geogenic background conditions and human impact. The relevance of pollution sources and the differences between them can be observed evaluating the fingerprint of each river.