# Metal inventory of the floodplain of the mining-impacted Geul River, The Netherlands

Marcel van der Perk (1), Veronica Arribas Arcos (1), Laura Miguel Ayala (1), Hans Middelkoop (1), and Björn Scheepers (2)

(1) Utrecht University, Department of Physical Geography, Utrecht, Netherlands (m.vanderperk@geo.uu.nl), (2) CSO Adviesbureau voor Milieu-Onderzoek B.V., Maastricht, The Netherlands

The Geul River, a 60 km long tributary in the southern Netherlands and eastern Belgium, has long been impacted by historic mining activities in its headwaters. Zinc (Zn) and lead (Pb) mining took place since Roman times and reached its peak in the late $19^{th}$ and early $20^{th}$ century until the mines closed in the 1920s. This has resulted in widespread contamination of the floodplain due to overbank deposition of contaminated sediments. This study aims to quantify the total metal inventory of the approximately 20 km long Dutch section of the Geul River floodplain between Cottessen at the Belgium-Dutch border (50°45′25″N, 5°56′09″E) and Meerssen (50°52′35″N, 5°46′11″E). For this purpose, 74 1.7 m - 2.5 m deep corings (5 cm diameter) were conducted distributed over nine transects. The cores were sampled every 10 cm. The resulting 1248 soil samples were air-dried, homogenised, and analysed for Zn and Pb using a Thermo Fisher Scientific Niton® XL3t-600 handheld XRF analyser. The metal inventory at each coring location was calculated by the sum of the product of the metal concentration, soil bulk density, and depth increment (0.1 m). Multiple regression analysis was used to relate the metal inventories to distance to the Dutch-Belgium border and distance to the river channel. Subsequently, the regression equation was used to interpolate the metal inventories across the entire Geul River floodplain. The resulting map of metal inventories can be used to assess and model past, current, and future sediment-associated metal transfer and redistribution in the Geul catchment.