



Spatial and temporal variation of lead contamination in floodplain sediments in the southern Pennine uplands, UK

J.J. Rothwell (1,2), N. Batchelder (2) and M.G. Evans (2)

(1) Department of Environmental and Geographical Sciences, Manchester Metropolitan University, Manchester, UK, (2) Upland Environments Research Unit, School of Environment and Development, The University of Manchester, Manchester, UK. (j.j.rothwell@mmu.ac.uk)

Sediment-associated metal contamination of floodplain environments downstream of metalliferous mining and smelting activity has been widely documented, but the impact of diffuse sources of metal pollution on upland floodplain environments has received relatively little attention. The peat soils of the southern Pennine uplands are contaminated with high concentrations of industrially derived, atmospherically deposited lead. Active erosion of peat soils has led to the release of lead into the fluvial system of this upland area. Floodplain sediments downstream of contaminated and eroding peatland catchments may provide a record of lead export from such peatland areas. Surface (0 - 2 cm) and sub-surface sediments from vertical profiles were collected from a floodplain environment in the southern Pennines in order to investigate the spatial and temporal variation in lead contamination and to identify the dominant factors controlling variation in lead contamination. Lead concentrations in floodplain soils vary from 20 to 145 mg kg⁻¹. Higher surface lead concentrations were associated with fine-grained, organic-rich sediments, located approximately 30 m from the river channel on an elevated zone of the floodplain. The vertical lead profiles for the sub-surface sediments displayed no clear trend. Variation in lead concentrations in sub-surface sediments cannot be explained by differences in sediment composition. Temporal variability in the delivery of metal contaminated sediment and/or post-depositional processes may explain the vertical pattern of lead in the sub-surface sediments. Erosion of these floodplain soils has the potential to re-introduce lead back

into the fluvial system.