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Nineteenth century flooding and pollutant loadings from the first industrial city

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Between 1750 and 1900 the city of Manchester was transformed. In the city and surrounding towns enormous volumes of fine-grained sediments (clays, silts and sands) were generated and much of this material, contaminated with heavy metals and other pollutants, ended up in urban river channels that became choked with sediments. Water quality was dire. Urban channels were then periodically scoured by large floods from steep headwater catchments that evacuated sediments and deposited them on the wide rural floodplain downstream.

The nature and extent of sediment pollution in the city and the volume of material transported by rivers can be established by studying floodplain deposits, a vital aspect of the history of the first industrial city that is now being explored. Towards the end of the nineteenth century, the Manchester Ship Canal (MSC) destroyed much of the valley floor of the Mersey-Irwell system downstream of the city. When the MSC opened at the beginning of 1894 it was the largest inland navigation of its kind in the world. We have identified well-preserved sedimentary records – that were not excavated or buried during the construction of the ship canal – that span this crucial period.

High-resolution sampling of sediments has allowed reconstruction of large flood events, pollution history, and contaminant flux using detailed grain size and X-ray fluorescence analyses for the period up to 1887 when the construction of the MSC began. These constitute a geological archive of natural and anthropogenic environmental change before and during the Industrial Revolution. This paper presents natural baseline conditions for the Mersey-Irwell system, contaminant profiles for sediment-bound heavy metals, a record of exceptionally large floods for the nineteenth century, and the trajectory of change following the Industrial Revolution. This forms part of a larger project to establish the nature and extent of sediment pollution over the period of the Industrial Revolution in the Mersey-Irwell catchment, an important new proxy for the evolving quality of the river environment in the world's first industrial city.