



Spatial patterns of phosphorus within water and channel bed sediment in two urban rivers, northwest UK.

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The Rivers Medlock and Irk, Greater Manchester, UK, are predominantly urban systems that have received inputs of both domestic and industrial wastes since the 19th Century. Consequently, the nutrient status of these rivers has been poor. The contemporary phosphorus content of water and channel bed sediments were investigated to determine sources of nutrients within the catchments. The River Medlock had orthophosphate (OP) concentrations ranging from 0.02 – 1.01 mg l⁻¹ with 33% of samples classed as ‘high’ and 11% as ‘very high’, according to the English Environment Agency’s General Quality Assessment Classification for OP in rivers. The River Irk contained higher levels with a range of 0.03 – 2.00 mg l⁻¹ and 69% of samples were classed as ‘excessively high’. OP levels showed a general increase with distance downstream, with concentrations being ‘very low’ to ‘moderate’ within the upper reaches. Point sources dominated the observed spatial variability of OP within the water, as peaks in concentration consistently corresponded with inputs from wastewater treatment works (WWTWs), combined sewage overflows and tributaries that receive inputs from WWTWs. Within the channel bed sediments, total phosphorus (TP) in the <2 mm fraction reached concentrations of 1,096 µg g⁻¹ in the River Irk and 1,802 µg g⁻¹ in the Medlock. Controls on sediment TP concentrations are more complex than that found within the water and cannot be explained by inputs from point sources alone. Channel bed sediments provide a transient store for phosphorus and any slight changes in the physico-chemical conditions within the fluvial environment can modify their status from a sink to a source. The improved identification of these sources of nutrients are, therefore, a key requirement in order to increase the quality of both water and sediment, hence reducing the risk of eutrophication of fresh water-bodies.