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The effect of land use on phosphorus content of streambed sediment in the Taw catchment, UK.

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Diffuse phosphorus (P) transfer from agricultural land has increasingly been recognised as a major contributor to eutrophication of streams, lakes, estuaries and coastal waters. As dissolved P in stream water strongly interacts with streambed sediments, streambed sediment P concentrations has the potential to provide an integrated measure of catchment P status and a risk to water quality. This study aims to relate streambed P concentrations to the proportion of agricultural land use in the upstream catchment. For this purpose, surficial streambed sediment samples were collected at 23 sites in the upper Taw river in Devon, UK (catchment size = 53 km^2), and its main tributaries, and at 16 sites in the small, nearby Den Brook headwater catchment (catchment size 48 ha) during summer 2006. The sediment samples were analysed for total P, organic carbon and grain size distribution. Four sampling locations that were evidently influenced by point source emissions from animal waste, a sewage treatment plant, or industrial discharge were omitted from further data analysis.

Linear regression analysis showed that clay content (particle size < 2 μm) and organic carbon content explain 51% of the total spatial variation of streambed P concentrations. The resulting regression equation was used to standardise the streambed P concentrations to a standard streambed sediment with 6% organic carbon and 5.3% clay, which represent the mean values for all sampling locations. The standardised streambed P concentrations in the main branch of the Taw river (N = 9) increase with

the proportion of intensively used agricultural land in the upstream catchment. However, this relationship is not significant ($R^2 = 0.191$; $p = 0.239$). This strongly suggests that the spatial configuration of land use is an important factor in the transfer of P from land to water and streambed sediments.