



The stability of surficial fine sediment deposits in lowland chalk streams

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Lowland chalk streams in the UK are experiencing increased deposition of fine sediment due to changes in land-use practices, channel modifications, and groundwater abstraction. The fine sediment is linked to benthic habitat degradation, the obstruction of surface-groundwater flow, and the storage of contaminants, such as pesticides and heavy metals. While research has been conducted on the provenance, transport, deposition, and storage of fine sediment in chalk streams, none has expressly investigated erosion. Therefore a key step is missing in our understanding of sediment dynamics in these systems.

A yearlong field survey was conducted in two reaches in the Frome-Piddle Catchment (Dorset, England) to quantify the stability of surficial fine sediment deposits. Sediment stability is dependent on both hydrodynamic conditions and sediment erodibility, so water flow velocities and in situ erodibility measurements were recorded. These measurements were paired with sediment cores for analysis of the physical, chemical and biological properties of the sediment. The results indicate that hydrodynamic conditions vary spatially and temporally as a result of the distinctive annual hydrograph and seasonal macrophyte growth. Sediment erodibility exhibits seasonal variations, with low thresholds for erosion in winter and high thresholds in spring and late summer. Consequently, the stability of fine sediment deposits varies substantially over space and time, which has important implications for sediment transport models.