



Human impact on late-Holocene sediment transfers: typology, controlling factors and scaling issues

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During the course of the Holocene, humans have impacted the sediment dynamics of hillslopes, river channels and even global river systems, mostly with ever-increasing intensity. However, there is no clear one on one relation between the intensity of human presence (population density) and the magnitude of impact on sediment transfers. Several thresholds have to be crossed for coupling between the various landscape elements in a river catchment to occur, ensuring that anthropogenic landscape disturbances impact larger spatial systems; moreover, these thresholds vary between regions. Furthermore, the nature of human interaction is important as well. Land use change can be considered the most important human impact controlling sediment transfers in the landscape in the past. Nowadays, and depending on the spatial scale, technical interventions are more important not only for sediment flux but also for channel behaviour and morphology. These artificial structures may either couple or decouple the various subsystems of a river catchment. Apart from land use change and engineering practices, humans have also impacted sediment delivery and fluvial morphology indirectly through interventions (or non-interventions) in the complex ecosystem of rivers and floodplains. Overall, the complexity of human impact on fluvial systems has clearly increased through time, making unravelling this impact from current-day sediment archives and predicting the impact of future human disturbances on river and sediment behaviour a major challenge. The construction of multi-temporal sediment budgets and the application of distributed geomorphic models are two tools that can provide a solution to these challenges.

Several of these aspects of the human impact on sediment dynamics will be illustrated by case studies from a variety of environments in Belgium, Turkey and the USA, along with some global considerations of sediment transfers.