



Impacts of land-use change on catchment sediment connectivity: a numerical experiment using CAESAR

Marco Van De Wiel (1) and Thomas Coulthard (2)

(1) Coventry University, Centre for Agroecology, Water and Resilience, Coventry, United Kingdom
(marco.vandewiel@coventry.ac.uk), (2) University of Hull, Hull, United Kingdom

Sediment connectivity is not implemented explicitly in most process-based landscape evolution models. Instead it is an emergent dynamic resulting from the iterated interactions between local sediment transport processes which are explicitly formalized in the models. This study investigates sediment connectivity as an emergent dynamic, using the CAESAR landscape evolution model. The numerical experiment focuses on the upper catchment of the River Swale, UK. Three hypothetical land-use scenarios are simulated, each with a slightly different land-use configuration: one where the whole catchment is assumed to be fully forested and two where the catchment is partially deforested to grassland. Analysing and contrasting differences in simulated erosion and deposition patterns between these scenarios illustrates how land-use changes in one part of the landscape can affect sediment processes in another part. Results indicate that this type of sediment connectivity, driven by land-use change, indeed emerges in the simulations and that it operates in both downstream and upstream directions.