

## **Understanding the relationship between sediment connectivity and spatio-temporal landscape changes in two small catchments**

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The degree of linkage between the sediments sources and downstream areas (i.e. sediment connectivity) is one of the most important properties controlling landscape evolution.

Many factors have been found to affect sediment connectivity, especially at the catchment scale. In particular, the degree of linkage between different areas within a catchment depends largely on the morphological complexity of the catchment (relief, terrain roughness, stream network density and catchment shape) and the combined effects of vegetation, such as land use changes and land abandonment. Moreover, the analysis of the spatial distribution of sediment connectivity and its temporal evolution can be also useful for the characterization of sediment source areas. Specifically, these areas represent sites of instability and their connectivity influences the probability that a local on-site effect could propagate within a multiple-events feedback system.

Within this framework, the aim of this study is to apply a geomorphometric approach to analyze the linkage between landscape complexity and the sediment connectivity at the catchment scale. Moreover, to assess sediment delivery, the index of connectivity (IC) proposed by Cavalli et al. (2013) was used to evaluate the potential connection of sediment source areas with the main channel network.

To better understand the relationship between morphological complexity of the catchment's landscape and the sediment spatial distribution and mobilization, two catchments with different size and geomorphological and land use characteristics were analysed: the Rio Frate and Versa catchments (Oltrepo Pavese, Southern Lombardy, Italy). Several shallow landslides, which represents the main sediment source area type in the catchments, were triggered especially in the period from 2009 to 2013. Moreover, relevant modification of land use and drainage system during last decades, especially related to land abandonment, have conditioned the sediment connectivity of these two catchments.

To analyse these different aspects, IC was applied by using different stream networks densities. This allowed to investigate the sediment connectivity changes according to different landscape settings. Moreover, a multi-temporal, land-use change analysis was carried out to evaluate its role on the sediment dynamics.

Finally, a sediment delivery assessment was performed. Shallow landslides inventories, with the identification of extent, location and typology of landslides phenomena, were used to better characterize the sediment supply to the channel network. This analysis represents an important step toward the realization of a useful tool for the improvement of sediment management strategies.

### Reference:

Cavalli C., Trevisani S., Comiti F. & Marchi L. (2013) - Geomorphometric assessment of spatial sediment connectivity in small Alpine catchments. *Geomorphology*, 188, 31–41.