



A modified index to evaluate the sediment connectivity at the catchment scale in Mediterranean torrents

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In Mediterranean environments, where soil erosion rates are often not tolerable, sediment connectivity at the watershed scale needs accurate evaluation tools. Quiñonero-Rubio et al. (2013) proposed the Catchment Connectivity Index (CCI) to describe hydrological and geomorphological factors. It requires the combination of considerable skills to data sources and demanding field surveys. In order to improve the index and to simplify its application, in this study we propose a modified version of the CCI, the mCCI, that produces a more efficient description of the hydrological and geomorphological parameters composing CCI and, thanks to the large use of GIS software, making easier its applicability for operators with less field experience.

The mCCI is applied in a torrent of Calabria (Southern Italy) to evaluate the sediment connectivity at the catchment scale, by comparing four scenarios: a combination of check dam presence or not and land use or not, in 1955 and in 2012. This case study has shown how and by what extent the natural and human impacts (climate and land-use changes and check dam installation) have affected the geomorphic processes influencing sediment circulation in the studied basin throughout six decades. From 1955 to 2012, a general decrease in sediment connectivity has been caught by the mCCI, as a result of the combined effects of greening-up processes of the catchment (due to both natural afforestation and human-induced reforestation) and the installation of check dams, which have decreased the catchment potential to circulating sediments. Overall, the mCCI can be used as an analytical tool to evaluate the influence of past or future changes in natural and human-induced changes in land use and climate actions to give support to land planners in watershed management tasks.