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Sediment Connectivity Index changes in an Andean catchment affected by two subsequent wildfires. Analysing the forest cover changes to improve the IC calculation.

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During the last decade, sediment connectivity has been widely used and studied in many topics related to physical geography and geomorphology. It is defined as the degree of linkage of sediment fluxes between different compartments of a system, and it can be considered as a useful approach to detect changes in sediment routing also after large disturbances as, for instance, wildfires. In this study, the adaption and application of the Index of Connectivity (IC) was carried out in the Chilean catchment of Rio Toro (11 km2). The Rio Toro catchment was affected by two subsequent wildfires in 2002 and 2015, respectively. Wildfires can be considered as large disturbances that lead significant geomorphological and hydrological changes mostly due to: i) the alteration of the vegetation cover, structure and typology; ii) the changes in soil structure and moisture and iii) the increase of water repellence. In order to assess how the IC responds to these disturbances, two types of analysis have been developed in the present study: i) a multitemporal analysis from 2001 to 2018; ii) a short term analysis considering only the 2015 wildfire. The former was carried out taking advantage from freely available Landsat Multispectral Bands Image and Alos Palsar DEMs (resolution of 12.5 m), while the latter was based on Google Earth's Images and UAV dataset collected in January 2019. Thus, in the first analysis, in order to detect the general dynamics of forest cover and to compute a basic land use classification (i.e. bare soil, shrub/regrowth vegetation, native forest), the calculation of Normalized Difference Vegetation Index (NDVI) was performed. In the second analysis instead, a supervised classification on high-resolution data allowed to obtain more detailed land use classification. Furthermore, in order to determine the weighting factor in the IC model, different Manning's coefficients were derived as a parameter of resistance to sediment flux, according to the land use characteristics. Preliminary results demonstrated the applicability of this approach, permitting to better comprehend not only the changes in qualitative terms (IC), as well as the predominant changes in forest cover defining the preferential source areas that are also contributing in large wood recruitment from hillslopes to the channel network.