EGU22-5456
https://doi.org/10.5194/egusphere-egu22-5456
EGU General Assembly 2022

Contribution of a windthrow-affected area to the suspended sediment transport in an Alpine Mountain catchment: a focus on the snowmelt period.

Giacomo Pellegrini[1], Riccardo Rainato[1], Luca Mao[2,3], and Lorenzo Picco[1,4,5]
[1]Department of Land, Environment, Agriculture and Forestry, University of Padova, Legnaro (PD), Italy (giacomo.pellegrini@phd.unipd.it)
[2]School of Geography and Lincoln Centre for Water and Planetary Health, University of Lincoln, Lincoln, UK
[3]Instituto de Geografía, Pontificia Universidad Católica de Chile, Chile
[4]Faculty of Engineering, Universidad Austral de Chile, Valdivia, Chile
[5]RINA – Natural and Anthropogenic Risks Research Center, Universidad Austral de Chile, Valdivia, Chile

In many environments, climate change causes an increase in the frequency and magnitude of Large Infrequent Disturbances (LIDs). LIDs make fragile areas, as mountain basins, even more vulnerable. Among all LIDs, windthrows are one of the most relevant disturbances affecting the Alpine region. Windthrows can affect the forest cover and morphological settings at the basin scale (e.g., due to associated landslides), changing the supply of sediments to river networks and affecting the cascading processes. This work aims to measure the sediment contribution of a managed windthrow-affected area during the snowmelt (1st April - 15th June 2021) in the Rio Cordon basin (5 km^2, eastern Italian Alps). The study reach crosses the area affected by windthrow and receives sediments from six sediment sources. Two multiparameter sondes measuring the turbidity and the water level were installed upstream and downstream the windthrow-affected area. Moreover, water samples and salt dilution discharge measurements were collected to obtain the rating curves and calibrate the turbidity meters in order to derive suspended sediment loads (SSL). The cumulative precipitation registered 231.2 mm during the entire 2021 snowmelt period. The total runoff recorded was 3,054,239 m^3 and the total SSL at the outlet was 109 t. Two relevant events peaking at 1.13 and 1.86 m^3 s^{-1} were recorded in the study period, and in both cases the SSL was higher at the downstream end of the reach (+4.4% and +4.0% respectively). However, clockwise hysteresis loops were identified in both sections and events. Although these preliminary results suggest that the managed windthrow-affected area can be a potential source of sediment, the greatest contribution of sediments seems to have been provided by other sediment sources, either or both located on the slopes and in the channel bed upstream the monitoring area. This study represents a suitable way of understanding the cascading processes in a mountain basin, to improve both risk-and conservation-related management strategies. Further analysis to comprehend the all-seasons basin responses are undergoing.