

Large wood budget assessment along a gravel bed river affected by volcanic eruption: the Rio Blanco study case (Chile).

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Wood in riverine environments exerts different functions on ecological and geomorphic settings, influencing morphological processes, and increasing risks for sensitive structures. Large wood (LW) is defined as wood material, dead or alive, larger than 10 cm in diameter and 1 m in length. Natural hazards can strongly increase the presence of LW in waterways and flood events can transport it affecting the ecosystem and landscape. This study aims to increase the knowledge of wood budget, considering the effects of two subsequent slight flood events along a sub-reach of the Rio Blanco gravel bed river, in Chilean Patagonia, strongly affected by the eruption of Chaiten volcano in 2008. The volcanic eruption affected almost 3,5 km² of evergreen forest on the southern (left) bank, because of primary direct effects from pyroclastic density currents and lahar-floods that caused deposition up to 8 m of reworked tephra, alluvium, and wood on floodplains and terrace along the Rio Blanco. After the eruption, there was a considerable increase of LW into the main channel: into the bankfull channel, volume exceeds 100 m³/ha. Field surveys were carried out in January and March 2015, before and after two slight flood events (Recurrence Intervals lower than 1 year). The pre-event phase permitted to detect and analyze the presence of LW into the study area, along a 80 m-long reach of Rio Blanco (7500 m²). Every LW element was manually measured and described, a numbered metal tag was installed, and the position was recorded by GPS device. In January, there was a total amount of 113 m³/ha, 90% accumulated in LW jams (WJ) and 10% as single logs. The LW was characterized by mean dimensions of 3,36 m height, 0,25 m diameter and 0,26 m³ volume, respectively. The WJ are characterized by wide range of dimension: volume varies from 0,28 m³ to 672 m³, length from 1,20 m to 56 m, width from 0,40 m to 8,70 m and height from 0,20 m to 3 m, respectively. After the flood events, field monitoring in March 2015 permitted to detect the changes and assess the LW budget. Floods flooded mainly the left bank of the active channel, because of the presence of a high bar on the right. The 47,5% of the tagged LW, 54,5 m³, was transported downstream by the water flux, but if considering only the surface between the left bank and the high bar on the right, the 91% of tagged LW was transported.. This study increases the ability to quantify wood storage and predict its mobility in a gravel-bed river affected by catastrophic events, improving the opportunity to understand wood transport and budget. This research was funded within the Department TeSAF, University of Padova (Italy) and, by the Chilean research Project FONDECYT 1141064 "Effects of vegetation on channel morphodynamics: a multiscale investigation in Chilean gravel-bed rivers".