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Hazard indicators for woody debris recruitment and subsequent transport phenomena in Alpine rivers

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The flash flood events happened in recent years in the rivers of the Alpine Regions have clearly shown the significant role played by the transported woody debris in "hydraulic system collapse" like cross sectional obstruction and straightforward floodplain inundations or furthermore bridge failure due to increased dynamic loadings on structural elements. In order to enhance preparedness and detect critical river tracts where transported driftwood can reduce partially or totally the theoretically available cross sectional area, woody debris recruitment areas and strips along riverbanks and in-stream transport trajectories have to be identified. As a successive step for each critical cross section along the river a reachability indicator is calculated. This procedure gives quail-quantitative insights on the one hand into possible woody debris transport scenarios and suggests on the other hand where riparian wood management could be cost-effective in order to reduce combined flash flood - woody debris impact. The computational procedure involves the assessment of riparian forest structure using airborne laser scanning data and landscape metrics for the derivation of the normalized crown model, a proposal for the subdivision of the forested areas into “resistance to flooding” functional classes depending on the impact forces given by previously executed 2D hydrodynamic simulations and the structural properties of the wood, the formalization of a reachability calculation algorithm that permits to evaluate

the cross-section's exposure to woody debris transport. The results of this preliminary work could, if further refined, be used to develop a GIS-integrated simulation model. Woody debris transport related hazards fall into the broader category of water-related hazards, therefore an omission in considering the results in an incomplete analysis of the last and therefore in an underestimation of the overall hazard situation.