

The importance of post-event documentation and analysis of flash floods for increased resilience of mountain areas

Marco Cavalli¹, Stefano Crema¹, Alessandro Sarretta¹, Marco Piantini¹, Jacopo Rocca¹ and Lorenzo Marchi¹

¹National Research Council (CNR), Research Institute for Geo-Hydrological Protection (IRPI), Hydrogeomorphology Research Group (HRG), Padua, Italy

Background

The increasing frequency of intense rainstorms due to climate change will most likely result in an increase in the occurrence of flash floods that represent extremely destructive phenomena in various mountainous areas. The spatial and temporal scales at which flash floods occur, combined with those of conventional rainfall and discharge measurement networks, make these events particularly difficult to monitor, and urge opportunistic, event-based observation strategies. Increasing knowledge about flash floods is crucial for society to enhance preparedness, mitigate risks, and safeguard lives and infrastructure from the devastating impacts of these natural hazards.

Method

Effective documentation of flash floods requires integrated post-event investigation strategies that include indirect reconstruction of peak discharge from flood marks, observation of geomorphological processes, and transport and accumulation of large wood material. This contribution introduces a project named “APPARE - Analysis and Documentation of Flash Floods for Increased Resilience in Mountainous Areas” recently funded in the frame of the extended partnership RETURN (Italy’s recovery and resilience plan - NextGenerationEU). The APPARE project aims to enhance the understanding of flash flood dynamics and the resilience of hilly and mountainous territories. Specific objectives of the proposal include: i) Refinement of analysis and survey procedures for reconstructing peak discharges based on flood marks and topographic surveys of cross sections affected by floods; ii) collection of new discharge data using the aforementioned procedure in small hilly and mountainous basins affected by flash floods, along with concurrent documentation of geomorphic effects for a thorough understanding of the event; iii) knowledge transfer and dissemination of project results to share insights and positively impact the affected communities.

Conclusion

Post-flood field data collection and analysis are a fundamental requirement to adequately characterize the response of mountain basins and streams to flash floods. An important project outcome will be the transfer of know-how on field survey procedures and the dissemination of results to professionals and personnel from organizations involved in watershed management in mountainous areas. Knowledge dissemination will raise awareness among affected communities and management agencies about best practices for documenting and analyzing flash floods. Consequently, this will enhance their ability to confront similar events in the future, thereby increasing the resilience of the affected areas.