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Documenting historic and recent extreme floods in Kashmir

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Kashmir has been frequently subjected to massive floods along its history. The recent extreme flood events which occurred during September 2014, March 2015 and September 2015 have revealed the high vulnerability of its population. Causes of recent extreme flood events have been attributed to the bowl shaped topography, intense land-use changes and unfavorable climatic change conditions at the onset of the monsoon as well as due to the occurrence of westerly disturbances. This reality implies new challenges to authorities and calls for the development of suitable adaptation strategies focusing on a minimization of the expected negative impacts on inhabitants during future extreme floods.

In this context, long-term records can improve our understanding about the flood frequency as well as changes in climate - and land-use - linkages. In this communication, we present an extensive flood records from Kashmir by combining historical descriptions with tree-ring records from headwater catchments as well as with the existing flow gauge records. Historical sources include old records from archives of the Irrigation and Flood Control Department of flood events which have taken place at Jhelum River, but also old pictures and other documents about the river system, going back in time to the British period. At the headwater catchment, we additionally perform tree-ring analyses coupled with classical palaeohydraulic techniques to reconstruct the magnitude and occurrence of recent, yet ungauged extreme events. Both sources of data have been compared and merged with the existing flow records in order to provide a clearer picture about flood phenomena in this region.

Historical archives corroborate the assumption that that Srinagar (the main city of Kashmir), as well as the surroundings crops land, have been frequently affected by floods. Although the oldest records are from the 19th century, dense annals including information about water levels are available after the 18th century, especially during the British period. This information is currently being processed to reconstruct peak discharge by mean implementation of two-dimensional hydraulic models. The tree-ring dataset has allowed to date unrecorded events and to estimate its magnitude based on one-dimensional equation. Currently, we are working to include this non-systematic information into regional flood frequency to redefine the flood hazard at Srinagar, but also to understand changes in climate triggers and land use conditions. Moreover, it is expected that the gained knowledge about long-term flood changes in the region has implication in risk assessment via improve the risk perception of different actors involved in Disaster Risk Management. This information will be transferred into early warning system based on mobile device to improve the resilience of population in the following decades.