

River discharge reveals anomalously dry spring seasons in western Nepal

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The hydrology of rivers in the greater Himalayan region is influenced by several confounding factors such as rain, snowmelt, and glacier melt. The precise linkages of these factors to river discharge, however, is not clearly known and continues to be a topic of active research. Here, we use station-based daily river discharge data from Nepal to investigate spatio-temporal characteristics of 22 river catchments with areas ranging from 629 sq km to 43000 sq km in the Nepalese Himalayas. We make the following observations: (1) We find that the deseasonalized time evolution of river discharge in the Karnali basin in west Nepal is different from the rest of the country. The difference in hydrology corroborates existing literature on the Karnali basin - it is climatologically drier and economically poorer with most people living on subsistence agriculture. (2) Our analysis further reveals a nontrivial interannual variability, in particular the occurrence of several anomalously dry spring seasons in which river flow fell to 30% lower than the usual for that time of the year. (3) Further investigation of synoptic-scale climatological factors, which could potentially cause the anomalously low discharge, indicate changes in meridional wind in the north Pakistan region as a possible influencing factor. As an outlook we propose a new West Nepal Discharge Index, which provides a reliable indicator of interannual variability of the Karnali basin, after taking into account intra-seasonal and climatological trends.