EGU21-16589
https://doi.org/10.5194/egusphere-egu21-16589
EGU General Assembly 2021

Hydropower in the Himalayan hazardscape

Wolfgang Schwanghart[1], Ugur Öztürk[1], Sumit Sen[2], Ankit Agarwal[2], and Oliver Korup[1]
[1]Institute of Environmental Science and Geography, University of Potsdam, Germany
[2]Indian Institute of Technology Roorkee, Roorkee, India

The 7 February Chamoli flood once again unveiled the vulnerability of Himalayan hydropower. On its destructive path downstream, the flood inflicted the loss of two nearby hydropower projects and damaged at least two more projects further downstream.

The flood is the third in a series of events with severe impact on the Himalayan hydropower sector. Uttarakhand was among the Indian states affected most by the 2013 Indian floods. Heavy rain, snow melt, and a glacial lake outburst flood damaged and partly destroyed more than 20 hydropower projects. The Gorkha Earthquake in 2015 led to damages to >30 projects, leading to a temporary loss of 34% of the hydropower generated in Nepal.

Analysis of these events reveals that neither flood discharge nor ground shaking were the primary processes responsible for the losses. Instead, the majority of damage was caused by geomorphological processes including landslides and rockfall, debris flows and extreme sediment discharges.

Only 20% of the ~500-GW hydropower potential is currently tapped in the Himalayas. This share is likely to increase given the high energy demands in the rapidly growing economies of the Himalayan countries.

With many opportune sites along large rivers being already occupied, there is a trend towards developing hydropower further upstream at higher elevations and closer to glaciated areas.

We argue that these developments and the past events highlight the need for a reappraisal of the Himalayan hazardscape. Risk analysis should increasingly incorporate processes such as glacial lake outburst floods and extreme sediment discharge events, and particularly aim to better understand hazard cascades which originate in glaciated and steep headwater catchments.