



Notes from the Field: Recent Glacier-Related Flood Events in High Mountain Environments

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The development of glacial lakes from receding glaciers, contained by either terminal moraines or bedrock, is commonly linked with global warming trends that have occurred since the end of the Little Ice Age (LIA). Such lakes are prone to sudden and catastrophic drainage, popularly known as glacial lake outburst floods (GLOF), that is most commonly initiated by snow and ice avalanches. Although GLOFs continue to dominate the focus of both peer reviewed and popular media articles alike, a range of other cryospheric processes and hazards exist that are in need of further research attention and mitigation technologies. Those discussed in the multi-media presentation include (a) englacial conduit floods, (b) permafrost-linked rockfall that can initiate floods, and (d) earthquake-linked glacial lake floods. It is suggested that our understanding of these hazards could be strengthened through the use of more field-based studies; the investigation of glacier flood events as soon after their occurrence as possible; and incorporation of the insights and experiences of local people. How scientists can more quickly and effectively share the results of their high mountain hazards research with decision-makers; and how decision-makers and governments can deliver more timely mitigation programs, are areas that are also suggested as being in need of further strengthening.

Bullet Bio (short version): Alton C. Byers, Ph.D. is a mountain geographer, conservationist, and mountaineer specializing in applied research, high altitude ecosystems, climate change, glacier hazards, and integrated conservation and development programs.

Suggested Readings:

Byers, A.C., Shugar, D., Chand, M., Portocarrero, C., Shrestha, M., Rounce, D., and Watanabe, T. (forthcoming). Three recent and lesser-known glacier-related flood mechanisms in high mountain environments. Forthcoming in *Mountain Research and Development*, Spring 2022.

Byers, A.C., Byers, E., Shrestha, M., Thapa, D., and Sharma, B. 2020. A rockfall-induced glacial lake outburst flood, upper Barun valley, Nepal. *Landslides* March 2019, Volume 16, Issue 3, pp 533–549. Available at: <https://doi.org/10.1007/s10346-018-1079-9>

Byers, A.C., Chand, M.B., Lala, J., Shrestha, M., Byers, E.A., and Watanabe, T. 2020. Reconstructing the History of Glacial Lake Outburst Floods (GLOF) in the Kanchenjunga Conservation Area, East

Nepal: An Interdisciplinary Approach. *Sustainability* 2020, *12*, 5407. <https://www.mdpi.com/2071-1050/12/13/5407>

Byers, A.C., Byers, E., McKinney, D., and Rounce, D. 2017. A field-based study of impacts of the 2015 earthquake on potentially dangerous glacial lakes in Nepal. *Himalaya, Journal of the Association for Nepal and Himalayan Studies*, Vol. 37: No. 2, Article 7. Available at: <http://digitalcommons.macalester.edu/himalaya/vol37/iss2/7>

Rounce, D., Byers, A. C., Byers, E. A., and McKinney, D. C.: Brief Communications: Observations of a Glacier Outburst Flood from Lhotse Glacier, Everest Area, Nepal, *The Cryosphere Discuss.*, doi:10.5194/tc-2016-239. Available at: <http://www.the-cryosphere.net/11/443/2017/>, 2017.