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Regional-specific differences in the formation of glacier lakes and their hazard potential in the Central Andes

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The presentation focuses on the environmental conditions of the formation of glacier lakes and their distribution in terms of their regional-specific hazard potential in high mountain regions of the Tropics and Subtropics. Glacier lakes are one of the most striking landscape elements of the recent global trend of glacier retreat. Among others, since the 1950s in the Tropical Andes as well in the Himalayas proglacial lakes have formed exponentially, generally dammed by Holocene (Neoglacial / Little Ice Ages) morainic arcs. They may attain a size in the range of about several kilometres in length and a volume of about 100 Mio. m^3. Glacial lake outbursts have produced multi-stage, high-magnitude geomorphological events with considerable damage for settlements and their infrastructure located down- and upstream of the glacier lakes. These catastrophic events are often generalized with a high hazard potential for settlements in the entire mountain range. However, a closer look at the regional scale reveals that different hazard scenarios exist due to distinct glacier lake types and in particular distinct locations of settlement zones. Apart from the eye-catching and well recognizable proglacial lakes on satellite images, the more "invisible" glacial lakes, such as temporary, but large-scaled glacier-dammed lakes and englacial lakes may pose a latent thread. The technical capabilities of their hazard management are rather limited. A classification of glacier lake types will be presented for the Central Andes (08°S-35°S) with an emphasis on the regional- and type-specific transformation of the hazard potential during the 20th century. The environmental conditions of their formation will be discussed as a function of topographical, climatic and sedimentary influences. Glacier recession may be connected with lake formation, but only certain glaciers are prone to the formation of glacial lakes. The research results from the Andes will be compared with case examples from the Himalaya-Hindukush-Karakoram-Region (75-80°E). The investigations are partial results of a research project on the glacial geomorphology of the Andes financed by the Alexander von Humboldt-Foundation.

Iturrizaga, L. (2011): Glacier lake outburst floods. In: Singh, V.P., Singh, P., Haritashya, U.K. (Eds.), Encyclopedia of Snow, Ice and Glaciers, Springer, 381-399.

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