

Glacial lakes in the headwaters of the Amu Darya river, Central Asia: spatial distribution and temporal development

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The sources of the Amu Darya, one of the most important rivers of Central Asia, are located in the glacierized Pamir, Alai and Hindukush mountains sensitive to climate fluctuations. During the last decades, numerous lakes have evolved in the forefields of the retreating glaciers, others are dammed by landslides or old moraines. Some of these lakes pose a threat to the mountain communities downstream. At least two significant glacial lake outburst floods (GLOFs) were recorded in the study area during the last ten years. On the contrary, lakes may also offer a potential for hydropower generation. Furthermore, they mirror the dynamics of the high-mountain environment. Consequently, up-to date information on the lakes present in the watershed is required. A comprehensive multi-temporal lake inventory for the upper catchment of the Amu Darya river was prepared and analysed, based on sets of satellite images from the late 1960s to 2010, helicopter surveys and field investigations.

More than 2000 lakes exist in the area, most of them are located between 4200 and 4800 m a.s.l., many are directly related to retreating glacier tongues. In-detail analysis was focussed on this type of lakes, most of which have experienced a significant growth over the entire observation period. Whilst there is evidence that the growth of some of the larger glacial lakes has decelerated in the last 10 years, others are starting to evolve, illustrating the dynamics of the glacial and periglacial environment.