

Glacial Lake Variation and Hazard Assessment of Potential Outburst Flood in Hindu Kush-Himalayan Region

LIU Shiyin, YAO Xiaojun, Wang Xin

(State Key Laboratory of Cryosphere Science, CAREERI, CAS, Lanzhou

Gansu730000, China)

In the face of global warming, most glaciers have been retreating at an unprecedented rate in recent decades, resulting in a rapid variation of glacial lakes and a concomitant increase in the potential threat of GLOFs occurring in Hindu Kush-Himalayan (HKH) region. Thereby it is very important for deciders and residents to understand the glacial lake variation and damage degree and the scope of its potential outburst flood. Based on the inventory of glacial lakes in ICIMOD, and supplementary image data, such as topographic map, ASTER image, Landsat TM image in HKH region, the two phase inventories of glacial lakes were achieved. The contrast result indicates that the glacial lake variations are characterized by “the number of glacial lake decreasing while the area of glacial lake increasing” as a whole. Apart from those breached glacial lakes, most of the lakes that disappeared are either not glacier-fed or are minor supraglacial ponds which merged to form a single more large lake. In addition, the increasing trends in glacial lake area are mostly contributed by the moraine-dammed glacial lakes which are directly bound up with glaciers. By contrast, the variation of glacial lake in southern Himalaya is more prominent than in northern Himalaya. In order to detect the potentially dangerous glacier lake, six indexes are put forward including type, area, area variation, pondage of glacial lake, loose level of dam, and distance between its mother glacier. Most potentially dangerous glacial lakes have not yet been studied by field investigation because of their high altitude, remote location, considerable wide range and involving eight countries, so it is impossible to assess the damage of all glacial lakes with high risk, and the Longbasa Lake and Pida Lake with high breaching probability in Pumqu watershed were chosen to calculate the damage degree as a case. The result shows that the consequence of the burst flood is very catastrophic and will cause loss of life and money including residents, livestock, cultivated land, bridges, and roads in China.

Key words: glacial lake; hazard assessment; GLOF; HKH