



## Assessment of Potentially Dangerous Glacial Lakes in Chinese Himalayas

YAO XIAOJUN, LIU SHIYIN, and WANG XIN

State Key Laboratory of Cryospheric Science, Cold and Arid Regions Environmental and Engineering Research Institute,  
Chinese Academy of Science, Lanzhou Gansu 730000, China

**Abstract:** Glacial lake outburst floods (GLOFs) are catastrophic discharges of water resulting primarily from melting glaciers. In the face of global warming, most Himalayan glaciers have been retreating at a rate that ranges from a few meters to several tens of meters per year, resulting in an increase in the number and size and size of glacial lakes and a concomitant increase in the threat of GLOFs. In the past 50 years, 16 GLOF events which were reported in Tibet had caused the loss of human lives as well as severe damage to local infrastructure. Based on the combination of temperature and precipitation of these 14 failed moraine-dammed lakes, the climatic background could be classified into 4 types, that is, warm-wet, warm-arid, cold-wet and near common weather condition. Under different climatic background types, the outburst mechanisms can be further divided into 5 types and 21 modes based on the analysis of 31 failed moraine-dammed lakes documented all over the world. As to a potentially dangerous moraine-dammed lake, all possible breach modes under each climatic background are firstly described and its qualitative possibilities are given by experts, then the decision-making trees are formed and the breach probability of the potentially dangerous moraine-dammed lake can be calculate. The breaching probabilities of the 143 potentially dangerous moraine-dammed lakes were calculated one by one using the decision-making trees model in Chinese Himalayas. The calculating results show that there are 44 lakes with very high breaching probability, 47 lakes with high breaching probability, 24 lakes with median breaching probability, 24 lakes with low breaching probability, 4 lakes with very low breaching probability. The 91 lakes with very high and high breaching probability rate should be requested in the next steps of detailed assessment and should be took into account in local infrastructure construction, such as road, hydropower station and residential plan, etc.

**Key words:** GLOF, Chinese Himalayas, Dangerous Glacial Lakes