

## **Changing glacial lakes and associated outburst floods risks in Nanda Devi Biosphere Reserve, Indian Himalaya**

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**Abstract** Glacial lakes and associated outburst floods (GLOFs) have increased in the Himalayan region due to climate change during the last century that has led to huge losses to society. Therefore, the present study was undertaken to map glacial lakes, their increasing extent, and associated damage potential in Nanda Devi Biosphere Reserve (NDBR), Indian Himalaya. The glacial lakes were mapped on Landsat TM (3 November, 2009 and 6 November 2010) and Landsat MSS satellite images (15 November 1976 and 26 October 1979) to assess their changing area. Potential GLOFs sites have been identified and studied for their damage potentials using site characteristics and past occurrence of GLOFs. A total of 35 lakes were mapped, of which 14 lakes are located at more than 4500 m. The size and damage potentials of lakes have increased. Some lakes grew so much that they merged to form a big lake. All of these are potential GLOFs and can cause severe damage to society.

**Key words** glacial lakes inventory; glacial lake outburst flood; climate change; Indian Himalaya