

Assessment of trend of supraglacial lake development in Western Nepal

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SUMMARY

ABSTRACT

Glacier lakes are good storehouse of fresh water but they are also hazardous, as they can cause devastating glacial lake outburst floods (GLOFs) downstream. So, glacial lakes need to be mapped and monitored to assess both their potential hazard risk and their resource value. Understanding glacier and glacial lake dynamics is important for disaster resilience and safety of property and lives. Remote sensing has been proven to be the most quick, easy and useful method for mapping glacial lakes and monitoring lake dynamics. In this research, remote sensing technique is used for analysing the trend of expansion of supraglacial lake in the Himalayas of Western Nepal. The study focuses on a supraglacial lake called 'Diki Cho' of Myagdi district in Nepal. Landsat ETM+/TM and Sentinel images from 2003 to 2023, spanning eight time points (2003, 2006, 2009, 2012, 2014, 2017, 2020, 2023) and PALSAR DEM are used in this study. For identification of glacial lake, NDWI is calculated and threshold value is fixed which varies for images from different dates. For the lake boundary delineation, manual interpretation technique is also used. To avoid misinterpretation of mountain shadows, slope maps prepared from DEM are used. Only the areas having slope <10 degrees have been considered as lake surface. GIS and Google Earth Engine platform are used for overall work. Finally, a quantitative analysis of formation and development trend of the lake over the twenty years is done. To explore the lake area response to climate change the available meteorological data (temperature, precipitation) is used. Field verification was challenging so to verify the results high resolution images available in free platforms like Google Earth are used. It is found that the lake area development in 2009-2023 has been significant (more than double) compared to other periods due to rapid temperature rise. And the change has been observed in adjoining glaciers feeding water in the lake. The findings suggest the impact of climate change on Himalayan glaciers and highlight the importance of continuous monitoring of the region

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for the disaster resilience and safety of life and property downstream.

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