Submitted Abstract

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First Author First Name Last Name	 Sandip Tanu Mandal
Submitting Author First Name Last Name	 Sandip Tanu Mandal
Correspondence	sandip.tanu@gmail.com
Co-Authors **>> E-Mails will be not listed**	Sharma, Milap Chand
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Abstract

Glaciers in the High mountain regions and ice caps outside the polar regions cover ~680000 km2, about 4.2 % of the total ice-covered Earth surface. Mountain glaciers are key indicators of climate change on both a global and temporal scale. There has been substantial glacier mass loss since the Little Ice Age, and especially in the last century, glacier recession has been remarkable. The Hindukush Himalaya and Karakoram (H-K-H) regions are some of the most glaciated regions outside the polar regions. Recent estimates of glacier area for the H-K-H region, based on mapping using satellite imageries, is ~40800 km2 (Himalaya, ~22800 km2; Karakoram, ~18000 km2). Snow and glacial meltwaters have immense importance in the continuous fresh water supply for drinking, irrigation, hydroelectricity generation. Any loss of mass in the glaciers will directly impact the socio-economic conditions of the millions downstream. Snow and Glacier-melt runoff from the Himalayas maintain the perennial flow of the Indus, the Ganga, and the Brahmaputra river systems.

Glaciers are threatened by climate change. On a global scale, glacier changes have an immense impact on processes of global importance such as sea-level rise, Hydrology of glacier melt-water fed rivers, freshwater balance of oceans. Scientific studies indicate that glaciers in the 'Third Pole' are retreating at rates comparable to those in other parts of the world and confirm that the rate has accelerated in the past century. But, the pattern of the recession is not uniform throughout the region. Many factors, such as local topography, local climate influence the changes in these glaciers. This study tries to present a detailed account of glaciers in the Milang watershed in the Lahaul region of the Western Himalaya. It tries to assess changes in the area and length of the glaciers using remote sensing data and field observations. In the watershed, glaciers have lost around 5.35 ±0.45 % area between 1971 and 2021 and have seen formation and expansion of two pro-glacial lakes. The glaciers have retreated at an average rate of 4.38 ±0.43 m year-1 during the same period. However, the retreat rate varies highly among the glaciers. This study also investigates the influence of different topographic parameters, debris cover etc. on variable glacier changes.