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Trend analysis of Changing Pattern of Snowfall and Precipitation over the Time Period of 1979 to 2014 in Alpine region of Uttarakhand, Western Himalaya, India

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Himalayan mountain region lying in the northern piece of Indian sub-continent is among those zones which bears the most geologically fragile situations and are additionally a vault of biodiversity, new water stockpiling and environment administrations. The Himalaya is one of the world's largest and mostly inaccessible area of glaciers outside the polar regions and provides glacier-stored water to the major perennial rivers of India throughout the year and to their river basins also. Glacier is a large ice mass formed by accumulation, compaction and re-crystallization of snow and firn due to stress of its own weight. Glacier with steep slopes of bedrock may retreat with slower rate or may even advance because downslope movement of glacier will continuously feed ice to lower altitude. Increased retreating rate of glaciers can be considered as an indicator of climate change. In the course of recent three decades, the occurred changes can be explained with exploitative land utilization which is among the primary drivers of changing snow cover, vegetation covers and profitability in western Himalayas locale. In a region where field-based research is tiring because of heterogenous and high elevation, measuring the changes in aforesaid using Remote Sensing techniques can give basic data regarding varying patterns of Snowfall and Precipitation. This paper studies the trend analysis of changing Snowfall and Precipitation patterns using SWAT and MODIS data (1979–2014 and 1999 to Present) over Uttarakhand Himalaya and its association with altitudinal gradient. This paper investigates the trends in maximum (P_{max}), minimum (P_{min}) & mean (P_{mean}) Snowfall and Precipitation in the annual, seasonal and monthly time-scales for 54 stations in the 5 regions of Uttarakhand's Western Himalayan region which are categorized on the basis of elevation, from year 1979-2014. Statistical approaches are used to examine the effect of change in pattern of snowfall and precipitation upon the phenology of vegetation, fresh water ecosystems, agricultural productivity, decreasing snow line, increasing tree line & change in duration of the seasons etc of the study area.