

## Monitoring snow cover of Northern Himachal Himalaya, India using geoinformatics

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Seasonal snow cover is a vital natural resource in the Himalaya. Snow cover monitoring provides an indicator of climate variability and is a prerequisite to estimates of freshwater storage. It is difficult to obtain snow cover information on repetitive basis using ground conventional techniques from vast snow covered areas of Northern Himachal Himalaya, which is at high altitude, rugged and inaccessible. Satellite remote sensing has proven useful tool for real-time, year-round and large spatial coverage for monitoring and process studies over vast, rugged and remote areas. This task is ideally accomplished from space-borne satellite imagery. The paper aims to present detailed inventory of snow cover and change in snow cover area from 1989 to 2011 of Northern Himachal Himalaya. The study primarily uses Landsat TM mosaic (30 m spatial resolution) acquired from Global Land Cover Facility (GLCF) and Earth Explorer website for the month September-October when the seasonal snow cover is minimal. The Survey of India toposheet of 1:250000 scale and SRTM DEM of 90 m spatial resolution has been used for reference purpose. Normalised Difference Snow Index (NDSI) has been used to calculate the areal coverage of snow. The analysis of the NDSI result depicts an overall decrease in snow cover in all the three district of Northern Himachal Himalaya with varying magnitude. In Chamba district around 16 per cent snow area has been deglaciated from 1989 to 2011. In Lahaul and Spiti district total snow cover area during the year 1989 used to be 4,414 sq km which has come down to only 2,085 sq km. The total loss is around 17 per cent while the total loss in snow area in Kinnaur district is 36 per cent which is around 2,271 sq km area during the same period. Further, the classification analysis and the management of the database in the GIS with the final presentation of the results in a good visual layout, were performed by using software ERDAS Imagine 9.3 and Arc GIS 10.

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