



Satellite-based inventory and monitoring: snow and glaciers of the Himalayas

Most detailed study till date

13th June, 2011

The Himalayan glaciers are a valuable national and global resource – they possess the largest concentration of ice outside of the Polar Regions; regulate global climate; feed most of northern India’s perennial rivers; and are an important indicator of climate change. However, this source of water is not permanent, as glacial dimensions change with the climate. It therefore becomes imperative to use rigorous science to understand future changes in the extent of Himalayan snow and glacier cover.

So far, studies on Himalayan Glaciers have been scanty, and limited to a few glaciers. Bridging this gap in mapping and inventorying is essential for the planning and management of water resources, and space-based monitoring has been found to be a viable and useful alternative. Towards this, an extensive study on ‘Snow and Glaciers of the Himalayas’, and a study on “Snow and Glaciers of the Himalayas: Inventory and Monitoring” - Discussion Paper II, carried out under the joint project of the Ministry of Environment and Forests and Department of Space, were released by the Minister of Environment and Forests, Mr. Jairam Ramesh, on 8th June at the Space Applications Centre (SAC), Ahmedabad.

Releasing the publications, Jairam Ramesh said: *“This is the most detailed satellite-imagery based glacier study ever done in the Himalayas. 75% of these glaciers have shown retreat at an average rate of 3.75% in 15 years; 8% have shown an advance and another 17% have exhibited stability. Also, for the first time, an inventory of glaciers in the extended Indus-Ganga-Brahmaputra Basins has been attempted: the total count is now around 33,000. Of these, anywhere between 10,000 and 15,000 glaciers would be glaciers within India’s geographical boundaries. I hope these publications will inspire informed, science-based discussion and debate on the subject.”*

Major findings: Snow cover and glacier extent has been monitored regularly for the entire Indian Himalaya, from 2004-05 to 2007-08. An extensive inventory, using satellite-based mapping was conducted across glaciated regions across the Indus, Ganga and Brahmaputra river basins.

- A total of 32392 glaciers were mapped in the three basins
- Total glaciated area is estimated at 71182.08 km²



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- India alone has 16,627 glaciers covering an area of 40,563 km²
- Over 2700 glaciers monitored
- Of 2767 glaciers, 2184 are retreating, 435 are advancing, and 148 glaciers show no change

This study has been the culmination of four years of work done by the Space Applications Centre (SAC), Indian Space Research Organisation, Ahmedabad. The SAC has been instrumental in developing remote sensing-based techniques and models to understand the state of the Himalayan glaciers and cryosphere.
