

Snow Cover and Glacier Change Study in Nepalese Himalaya Using Remote Sensing and Geographic Information System

Arun Bhakta Shrestha¹ and Sharad Prasad Joshi²

¹ *International Centre for Integrated Mountain Development, Nepal*

E-mail: abshrestha@icimod.org

² *Water and Energy Commission Secretariat, Nepal*

ABSTRACT

Snow cover and glaciers in the Himalaya play a major role in the generation of stream flow in south Asia. Various studies have suggested that the glaciers in the Himalaya are in general condition of retreat. The snowline is also found to be retreating. While there are relatively more studies on glaciers fluctuation in the Himalaya, studies on snow cover is relatively sparse.

In this study, snow cover and glacier fluctuation in the Nepalese Himalaya were studied using remote sensing techniques and geographic information system. The study was carried out in two spatial scales: catchments scale and national scale. In catchments scale two catchments: Langtang and Khumbu were studied. Intermittent medium resolution satellite imageries (Landsat) were used to study the fluctuation in snow cover and glacier area in the two catchments. In the national scale study coarse resolution (MODIS) imageries were used to derive seasonal variations in snow cover.

An indication of decreasing trend in snow cover is shown by this study, although this result needs verification with more data. The snowline elevation is in general higher in Khumbu compared to Langtang. In both catchments, snowline elevation are higher in east, south-east, south and south-west aspects. The areas of snow cover in those aspects are also greater. The study provides the first multi-year temporal variation in snow cover extent in Nepal. According to the analysis of MODIS data, the snow cover extent over the country is highest during late winter and spring, while it is lowest during summer monsoon season. The snow cover area shows dynamic nature and the variability during late winter and spring is quite large.

The snow covered territory of Nepal was divided into four subsections: east, central, west and far-west, and snow line elevations for these subsections were derived from MODIS data. Generally, the snowline elevation is lower in the west than in the east, although the central region shows relatively lower snowline elevation, not following the general zonal trend.

Key Words: Snow cover, glacier fluctuation, satellite imageries, trend, snowline
