Understanding Cryosphere-Climate Interaction and Societal Response in the NW Himalaya, India

Human activities in the world have certainly brought about a discernible change not only in the natural landscape that he/she lives on but also on the atmosphere and hydrosphere that make this the only known habitable planet. It is now a reality that global ice/snow cover, the most sensitive climatic indicator to climate change, has shown large scale shrinkage and recession post industrial revolution.

Almost half a billion population of India and South Asia depends on the snow/glacier melt waters for the basic livelihood, i.e. agriculture and food and energy, of late. One also has to remember that these rivers glaciers/snow are the future source of green-energy that our country intends to harness in the immediate future.

The Miyar, our monitoring watershed, is a major watershed of River Chandrabhaga (Chenab) in Himachal Pradesh, India. This basin of ~936 km2 contains 76 ice bodies, with 16 valley glaciers of varied dimensions. Glaciers still cover ~25% (232 km2) of the total basin area and provide year-round availability of water. Ironically, being a designated cold desert, this region is entirely dependent on the snow and glacier melt for irrigation and the domestic purposes. Population of 2330 is spread over 11 census villages, ranging from 2890 m (Shakoli) to 3500 m (Khanjar) above sea level. Most of these villages are located on the glacial deposits of the early Holocene Advance, thus making existence precariously vulnerable to climate induced disasters. There is irrevocable evidence of settled

population activity on a higher altitude (3700 m asl) until about middle of the 18th Century, close to the glacier terminus. Our results indicate that the Dark Ages Period (12-17th Century) was warmer compared to the present day, allowing them to grow traditional crops, before they were ousted by climate change, that too, towards cold.

This basin remained isolated until late 1990s. Given such exclusivity, this basin was selected for an experimental study to evaluate the impact of climate change, cryosphere reserve and the process of adaptation and resilience. The present recession and waning of glaciers in the basin, and other regions of the Himalaya, is in consonance with the rest of the world trend of losing this fresh water resource. The rivers originating from the Himalaya support over a billion population in the frontal areas of the Himalaya!!! Therefore, this losing trend of cryosphere area may lead to measurable consequences downstream; however, the terminuses still stand above 4000 m above sea level and considerable ice still exists throughout, which invariably receive considerable precipitation in solid state year round. This small piece of research would illustrate; a) Cryosphere changes in recent past and on a millennial scale; b) Probable climate induced migrations in the recent past; c) Diversification in agriculture & resilience; d) and the future promise for development within this basin and beyond (trans-national rivers), be it a positive or negative climate change scenario.