

Mountain Eco-system

Communities inhabiting mountain ecosystems are highly dependent on natural resources for their livelihood and therefore are particularly vulnerable to changing weather conditions such as the higher temperatures, altering rainfall patterns, receding glaciers, permafrost thawing, etc

The thresholds for vulnerability are still unknown in specific local contexts, as local benchmarks, and climate specific vulnerability is unmapped.

Climate Vulnerability in North Western Himalayas

(Extract from Vulnerability Assessment study by Environics Trust, 2011)

North Western Himalayas-Physiographic Features

The Himalayan system has a distinctive climate of its own, which in turn impacts the climate of Indian subcontinent and Tibetan plateau. The range forms a barrier which prevents the frigid, dry winds from the arctic blowing southwards keeping the sub-continent warmer than the corresponding temperate regions in the other continents.

The Himalayan region contains the largest area under glaciers and permafrost outside of polar caps(116,180 km² of glacial ice), large parts of this region receive seasonal snow. Together they form a unique reservoir which feed ten of Asia's largest rivers, sustaining lives of billion plus people.

Higher Himalayas hold resources such as glaciers, River systems (glacial as well as non-glacial), biodiversity, high altitude plants and species. The middle Himalayas and Valleys are dotted with hydroelectric projects, reserve forests & submerged areas. The forest cover of around 42% acts as a carbon sink besides providing fruits and other benefits.

Yet the Himalayan region is considered to be poor in economic terms (in terms of revenue generation) as environmental services are poorly understood and valued.

The main issue of climate change in the Himalayan region is in protecting its resource integrity and fragility in whatever situation these exist and narrowing the misbalance and disintegration of closely dependent natural resources which can increase the vulnerability of the resources as well as the living beings (human beings and species).

Impact of Climate Change

- Seismic Vulnerability: The vulnerable are the urban population and people in slip potential regions of the Himalayas
- Modification of Glacial Systems and Reduction in Snowfall: According to 4th assessment study of IPCC, Himalayan glaciers are melting at a faster pace since late seventies. A recent study concluded that almost 75% of Himalayan Glaciers are receding at a faster rate
- Rainfall: IMD (Indian Meteorological Department) observations show that events of extreme rainfall have increased by 50% during the past 50 years
- Agriculture in around 70-80% of the region is rain-fed. Increasingly erratic weather changes in particular time and space has given hardships to the farming community, impacting the productivity The reducing agricultural diversity is adding to the vulnerability of the hill farming community

- Extreme Weather Events: Extreme weather events leading to cloudbursts are a phenomenon known in the Himalayas and have devastating consequences. Compilation of reported cloudbursts

In addition, there has been an increasing trend in hailstorms and flash floods.

The Case of Hydropower

Hydro power projects have only added to the vulnerability of the local communities as they have rendered the rivers non-functional, affecting the environmental needs of living beings in its catchment or dependent on the rivers. The current scheme of things need a cumulative assessment and rethinking on rationalization of energy as these schemes have high natural resource diversion potential i.e. farming land and forest land directly impinging over the rights and livelihoods of the population directly involved in collection, land based activities and chain of such activities dependent upon them.

Issues around Afforestation and Deforestation

The Compensatory Afforestation which is purported to be a counter measure for replacing (displacing or decrease in the carbon stock) the carbon sink, ultimately affects the rights of people and makes their livelihood vulnerable.

Reducing Risks Due to Climate Change

In case of Himalayas, since most communities are highly dependent on the natural resources that are sensitive to the changing climate, are extremely vulnerable. Reducing their vulnerability would involve building resilience to these impacts, as well as increasing their adaptive capacity, to the reducing the risks and therefore are highly vulnerable to climate change.

Early warning system

There is need for an early warning system on earthquakes, floods, landslides, droughts, and wildfires. In order to protect people from such catastrophic events, there is an urgent need to have comprehensive disaster management units that has access to satellite data.

Himalayan communities face such events on a regular basis, there is plethora of indigenous knowledge that can be used to create a community-based flash flood risk management plan. The best solution is usually a combination of small-scale structural and non-structural measures (Arun B Shrestha, 2010) such as existing natural storage, like groundwater recharge systems, bunds, and temporary runoff collection areas. A comprehensive ecosystem framework is needed to explore the potential and opportunities at the river basin level holistically.

In order to cope with changing climate we need to fill the current knowledge gap in understanding the response of glacier systems to climate change. The current state of knowledge in regard to vulnerability of natural wetlands is minimal and this gap needs to be filled by extensive research of the wetlands in the region.

Watershed Management:

Watershed management, through improved land cover and water conservation practices can help to maintain soil moisture and support rainwater harvesting. An approach based on participation of community members and local civil society organizations is likely to succeed in creating in creating sustainable watershed.

Groundwater Aquifers:

Ground water aquifers are natural sources of water, due to changing climate and mismanaged developmental activities the flow of water in most of the aquifers is going down. However, there is very limited scientific knowledge about the groundwater aquifer systems in the Himalayan region, and detailed studies need to be conducted in different parts of Himalaya to have a comprehensive knowledge of the system.

Reservoirs:

Any new large dam would only add to the problems in the already vulnerable region. However, if the natural lakes are used to harness and store glacial and snow melt water at high altitude, it could provide solutions to both water stress and perils of dams.

Increase Resilience:

The systematic collection of data and information about the Himalayan mountain system is critical for improved understanding of climate change.

In a land that once had thousands of varieties of rice, it is difficult to find anything outside a few popular varieties in the markets today. Fortunately owing to the harsh terrain, Himalayan region still have more biodiverse farming than any other part of India.

It would be critical at this point to create seed banks of local indigenous varieties of seeds to save them from extinction; their loss could be an absolute loss of genetic diversity in Himalayan agriculture and would be an end to any further research on indigenous varieties.

Alternative Livelihood:

The Himalayan region are endowed with an extensive variety of high value, low volume products, such as non-timber forest products (NTFPs), medicinal and aromatic plants (MAPs), and honeybee products, and are suitable for cultivating temperate and off-season crops. This could be one area for further exploration to create alternate livelihood options.

Enhancing Adaptive Capacity:

Interaction with the communities and the growing research suggests that strengthening social networks and collective action could be the key to enhance adaptive capacity of the mountain communities. In terms of climate change, collective action is at the core of adaptation decisions related to the management of resources associated with agriculture, forestry and other resource dependent livelihoods (Adger, 2003) and strength of social networks mark the quality of collective actions.

Further readings & Resources

1. Indian Network on ethics and Climate Change - Case study on Climate Change and Communities in the glacial margins by Academy for Mountain Environics, Dehradun. 1966. [R.E31d.82]
2. Mountain Biodiversity and Climate Change by International Centre for Integrated Mountain Development. [R.E31d.62]
3. Floods, Flood Plains and Environmental Myths - State of India's Environment by Centre for Science and Environment, New Delhi. Pp174. 1996. [B.Y01.C1]
4. Witnessing Change - Glaciers in the Indian Himalayas (CD), WWF India, NewDelhi. Dec-2010. [L.E31d.V409]