Traditional Knowledge Systems in adaptation to Climate Change: Insights from Indian Himalayan Region

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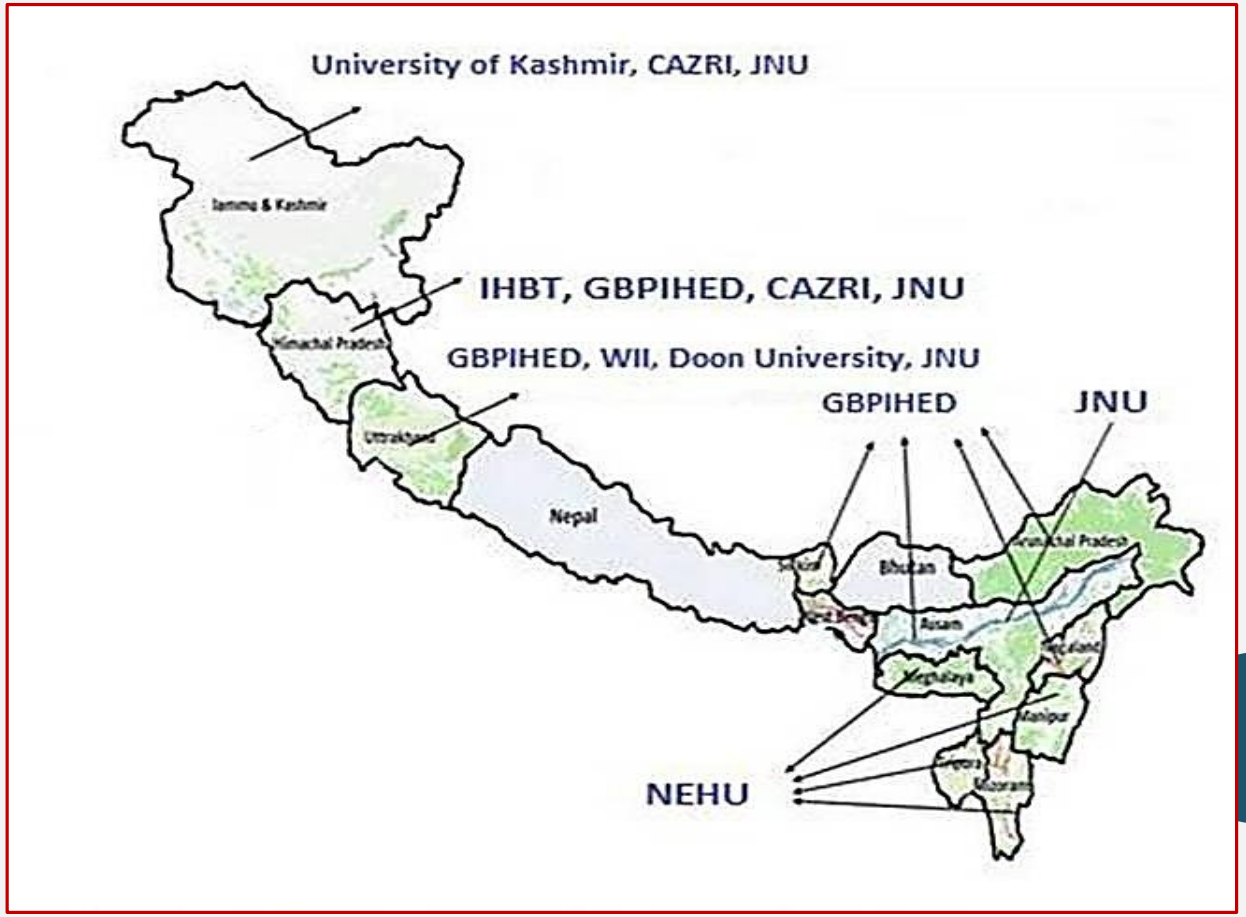
Indian Himalayan Region

- India is vulnerable because Himalaya is vulnerable
- Himalayan region is warming at much higher rate than average global rate (Singh et al. 2010)



Climate Change Indicators in IHR

- Glacier recession (Mukhopadhya 2006; Planning Commission Task Force Report 2010)
- Hydro-meterological disasters increasing (intensity and frequency): Flashfloods (Leh 2010; Kedarnath 2013; Kashmir 2014 and Manipur 2015.), landslides (Malpa and Ukhimath, UK; Kullu valley, H.P.)
- Drying of springs (Negi 2002; Tambe et al. 2012)
- Observed duration of turbidity in the snow-fed rivers
- Upward movement of the species (*P. wallichiana* Dubey et al. 2003; *Rhododendron sp*. Singh et al. 2010)
- Higher growth dynamics of species Gomukh, UK (Singh and Yadav 2000)
- Changing phenophases in some tree species *Rhododendron sp.* (early flowering); *Myrica esculenta* (early fruit ripening)
- Incidents of non-seasonal forest fires: prolonged dry spell (between monsoon-WD) causing non seasonal fires (Semwal 2010)
- Exposed riverbeds – cyclic pattern of snow-fed rivers

- CC is happening but along with other changes (socioeconomic, sectoral policies, acculturation and market force), simultaneously.
- Decoupling of CC is a difficult task- “Himalaya represents an integrated system”
- It is only prudent to address simultaneously with the above mentioned drivers responsible for bringing a wide range of changes at local level.
- Rural communities in the IHR are most vulnerable to climate change because of their low adaptive capacity. We beg to differ as well as agree.

TK can contribute to Climate Change adaptation

- Out of 701 indigenous groups of India, **170 groups inhabit the IHR** and are the repositories of vast array of traditional knowledge
- Represents **hundreds of year long natural experiments** (in securing livelihoods harmoniously in this fragile and marginal yet natural resource rich region of the world) (IPCC 2014)
- TK related to Climate Change is not fully evolved
- **It is often a Weather Related Knowledge** (Berkes 2012)
- Local communities in the region have developed many local weather adaptive practices which emerged in response to changes in weather for centuries

Weather related adaptation practices

- Fragmented land holdings
- High agrobiodiversity within different agroclimatic zones
- Food, grain and fodder storage
- Introduction of new crops/varieties/medicinal plants
- Identification of safe habitation
- Weather forecast/predictions
- *Khal-chaals system* for water conservation
- Change in size and composition of the livestock
- Change in house architecture in Ladakh

Probabilities are high that selective adoption of scientifically assessed such traditional practices may help in addressing multiple challenges imposed by the climate change.

- **Fragmented land holdings:** to capitalize upon different niches and minimize absolute crop failure (Maikhuri et al. 1997)

- **High agrobiodiversity** and thus food security maintenance at household level. (Zhu et al. 2000; Prasoon 2008; Saxena and Rao 2009)
- ***Khimanand ki ghodi, Jhaidu*** (rice variety) – hailstorm resistant
- ***Rekher* or *Syal Satti, Misri* and *Thangya*** varieties of wheat- snowfall resistant
- Wide edible bioresources: (plants and animals) including medicinal plants
- Help combat the pest attacks: incidences in Ladakh (2006, 2011, 2015)
- Cultural events for managing pests: (North east- weevils)

- **Food, grain and fodder storage:**
- *Kothars* (UK), *Pang-dzod* (Ladakh), *Nesukis* of Zemes (Assam)

Kothars (UK)

Pang-dzod (Ladakh)

Nesukis of Zemes (Assam)

Introduction of new crops/varieties/medicinal plants

- **Gaddis of Kangra, Himachal**: Shift from traditional crops/varieties (wheat, barley, mustard, maize and buckwheat) to cultivation of new species/varieties (cauliflower, cabbage, broccoli, radish, carrot, coriander, pea, garlic and pumpkin), which was earlier not possible due to low temperature.
- **Farmers of Uttarakhand:**

1. Owners of apple orchards in Ramgarh (UK), shift to **cultivation of peaches** as the climate has become warmer and the chilling effect required was gone, affecting their livelihood.

2. Farmers have started **cultivation of medicinal plants** in Nanda Devi, UK.

- **Tangkhuls of Manipur:**

Adzuki bean
Pegion pea
Tree bean



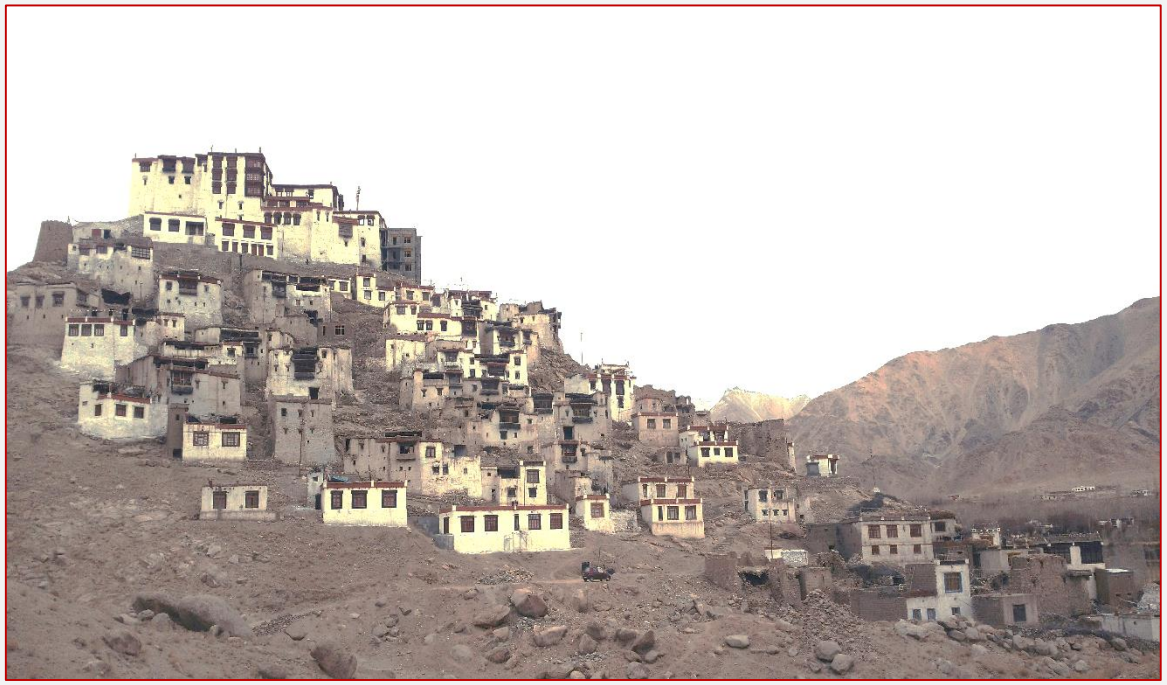
Introduced Crops (Shimrah 2017)

Earlier this crop was unsuitable to grow due to cold climatic condition but now it is growing luxuriously plus have high market demand.

Identification of safe habitation

- Avoiding geo-hydrologically weak zones
  River beds, landslide, etc.
  Alnus nepalensis – landslide

- Monasteries, palaces, villages
  (elevated land surface)



Weather forecasting/predictions

In Ladakh, traditional almanac called ***Lotho*** is used by the ***Onpos*** (astrologers) to predict the weather related information for the year. These predictions are used to carry out agricultural activities by the locals (Angchuk and Dubey, 2006).

Khal-chaal water percolation pit system

Help in potable water recharge
Water for livestock
Water body
Efficacy proven in Sikkim and UK*

Planting of trees near water bodies:
Bioremediation (*Celtis australis* Ozturk et al. 2017)
Sacred species (Peepal, *Prunus ceracoides)*

Change in size and composition of the livestock

(Monpas of Arunachal; Kannauras of Himachal)

> Proliferation of **yak-cattle** hybridization
> Duration of migration has expanded by 2-3 months

> Increased pastoral residence time by a week.

Change in house architecture

High rainfall in **July-Aug**

Flashfloods in **2010**, 2013, 2015 and 2017

Less snowfall, warm winters

Traditional: **Use of Mud bricks, roofing with willow, bushes of *Stachys tibetica* and mud**, thick walls and small windows and doors.

Adaptation: **Use of cement, steel/plastic sheets on roofs,** bigger windows and doors.

True. Indigenous communities are “vulnerable” (dependence of natural resources plus the loss of TKS due to several factors)

Nevertheless, TKS have the adaptive capacities which can be harnessed by the formal systems (**Tu Youyou – Artemisinin**)

And we are documenting a whole range of TKS in IHR for creating a sound database for formal system to take advantage of this traditional wisdom

Thank you