

Pollination in small scale farming systems – working with smallholder farmers in Indian Himalaya



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The Himalaya...

A complex interplay - climate & geology; human & natural processes

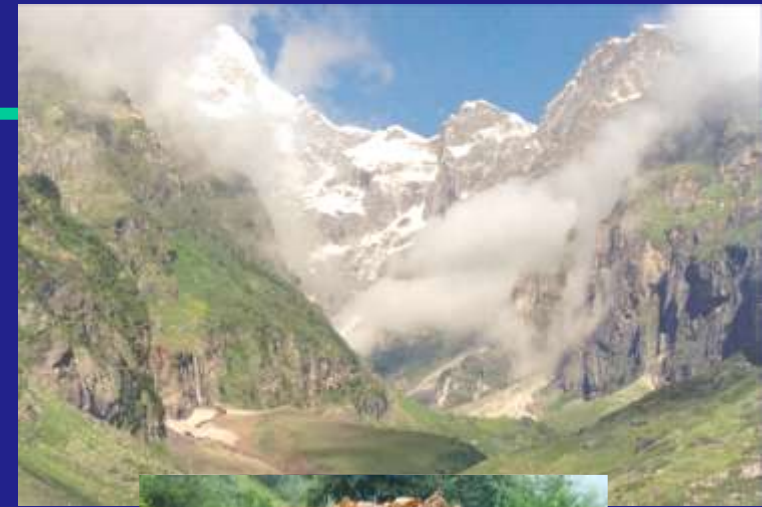
- **Highest**
- **Fragile**
- **Youngest**

- Longitudinal
- Latitudinal
- Altitudinal



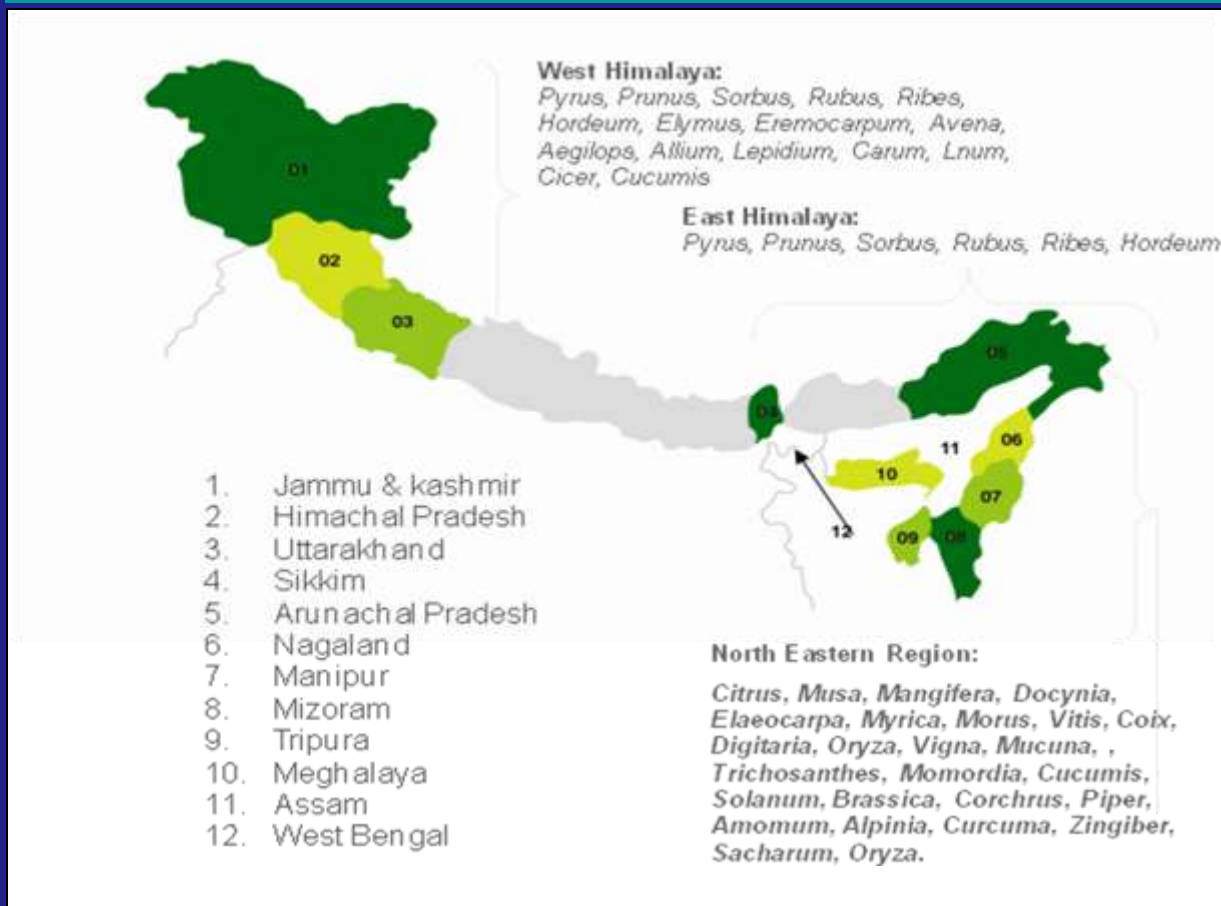
The Indian Himalaya...

- **Great mountain chain**
 - long. $73^{\circ} 15' E$ to $96^{\circ} 45' E$ (> 3000km length)
 - lat. $25^{\circ} 40' N$ to $36^{\circ} 30' N$ (80-300 km width)
 - altitude 150 to >8000m asl
 - spread over 12 states
- **Young and geologically active**
 - still rising
- **Diverse ecological features and robust human history**
 - representative ecosystems
 - supports over 50 million people
(>500 million people in Gangetic plains)
 - rich socio cultural diversity (>175 tribes)
- **Unique and diverse bio resources**
 - >29% endemic taxa of India
- **Heavy dependence on bioresources**
 - high stress on ecosystem structure & functioning



IHR- biogeographic diversity & centers of plant origin...

Trans	Ladakh Mountains & Tibetan Plateau
Himalaya	North West, West, Central, East
North East	Brahamaputra Valley & North East Hills



Himalayan Biodiversity

- realized potential...



Over 80% population is involved in agriculture, animal husbandry, forestry and other biodiversity dependent vocations

Recognized diversity of:

Medicinal plants [*IHR - over 1748 (23.4% of India) plants of medicinal value*]

Wild edibles [*IHR - > 675 species*]

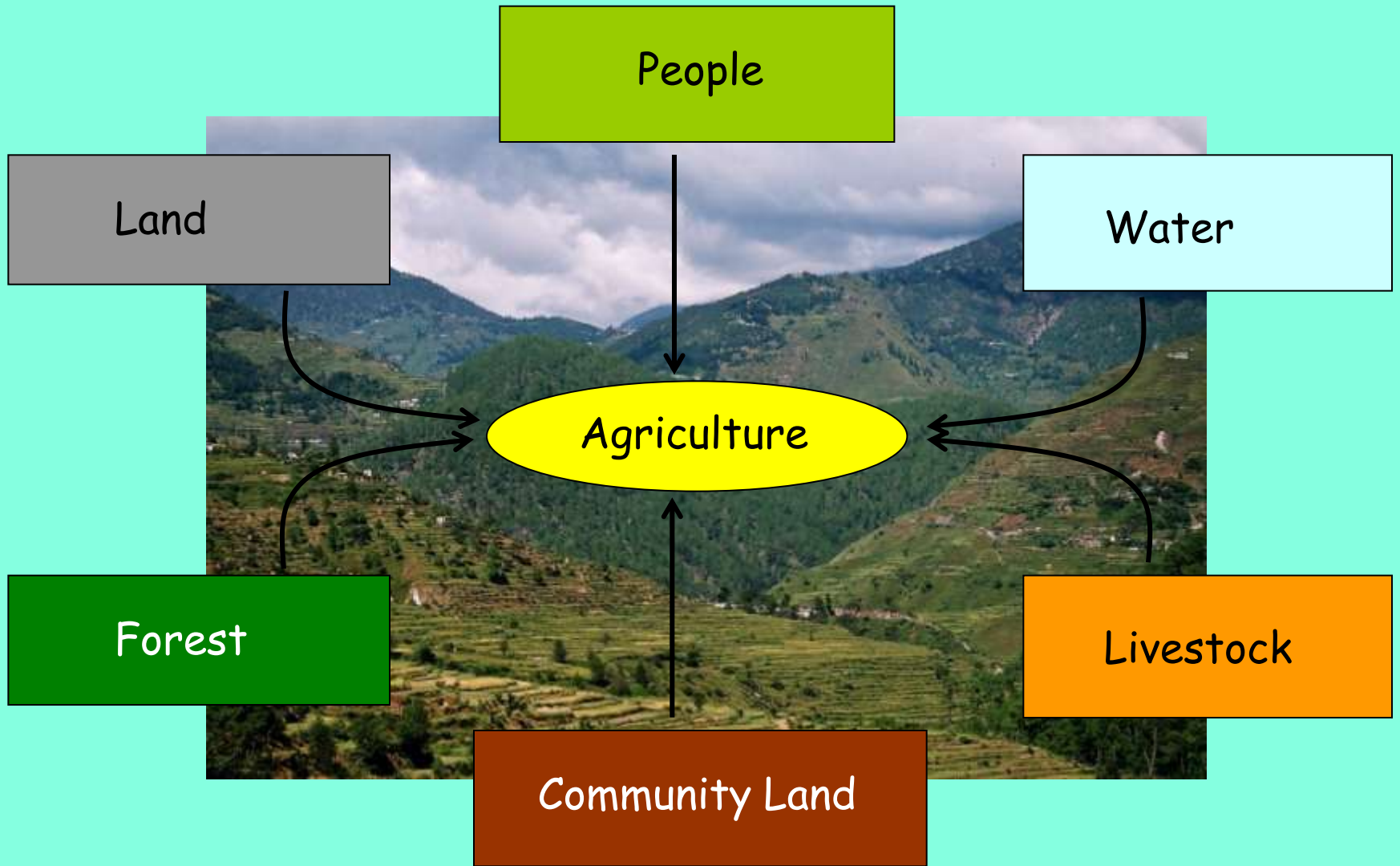
Other non timber forest produce (NTFPs)

IHR – farming systems ...



Resources	Problems	Opportunities
Agriculture	Low productivity & rainfed Small and scattered holdings (< 0.5 ha) High soil loss Minimal use of advanced technology Conversion Crop raiding	Multiple crops (insurance) – maintenance of diversity Organic by default – niche products Mosaic of land-use classes – wild diversity and multiple habitats
Waste land	Tragedy of commons Low productivity & high biotic pressure Encroachment	Flow of goods and services Maintenance of habitats – wild diversity

Mountain Agriculture and its Diverse Linkages



IHR – farming communities...

Largely ignorant of pollination & pollinators, yet perform number of pollinator friendly practices

- **Mixed and diversity of cropping – round the year supply of food/fodder/vegetables, etc.**
- **Primarily the organic agriculture with low or no inputs of chemical fertilizers/pesticides, etc.**
- **Maintenance of natural sites/habitats (forests & grassland patches) surrounding the crop lands; strong agro-forestry agro-pastoral systems**
- **Strong traditions of bee keeping and religious sentiments**



IHR – farming communities...

Willingness to learn – increased participation



- Training of Trainers
- Farmers interaction meetings
- Field level demonstrations
- Para taxonomists
- Record keeping
- Pollination management

Working on long-term solutions...



Catch them young

Teach

Appreciate

Nurture

Associate

Acknowledge

Affection

Motivation



Committed workforce...



IHR – linking with volunteers...

- Survey and sampling of biodiversity
- Enumeration of bee flora/wild pollinators, nesting habitats and foraging behaviour
- Monitoring phenology of the selected plants of human use , collection of weather data
- Quantification of forest ecosystem goods and services (such as fuelwood, fodder, manuring leaves, NTFPS, etc.)
- RRA/PRA/FGDs on perceived climate change and coping mechanisms



Himalayan Biodiversity – towards harnessing potential...

Tangible dimensions of TEK derived from intangibles

Economic: *traditional ethnobiology (lesser-known plants and animals harvested from the wild and used for food and medicine)*

Socioecological: *the ways in which traditional societies conserve and use biodiversity to manage soil fertility, nutrient cycling, and soil moisture regimes.*

Sociocultural: *the cultural spiritual, and religious belief systems of mountain people which are centered around ‘sacred species’, ‘sacred groves’ and ‘sacred landscapes’*