

Disaster Management:

Disaster threat, Traditional practices, Policy interventions and way forward

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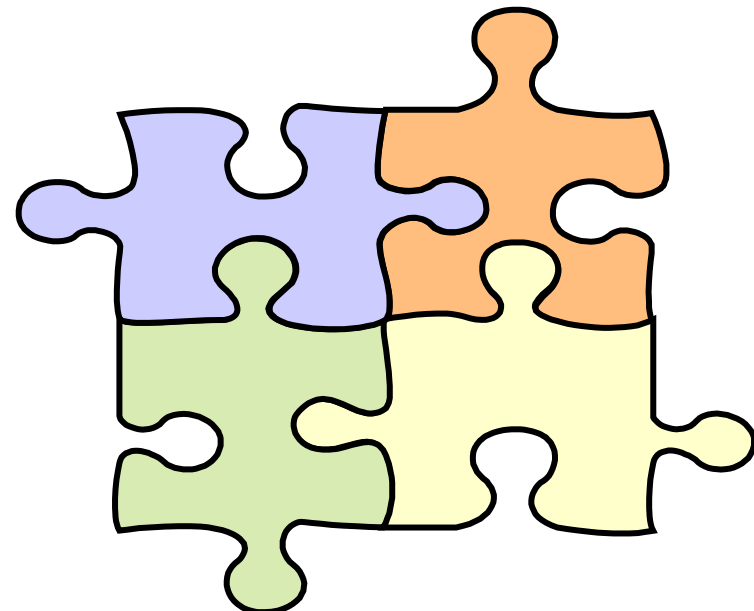
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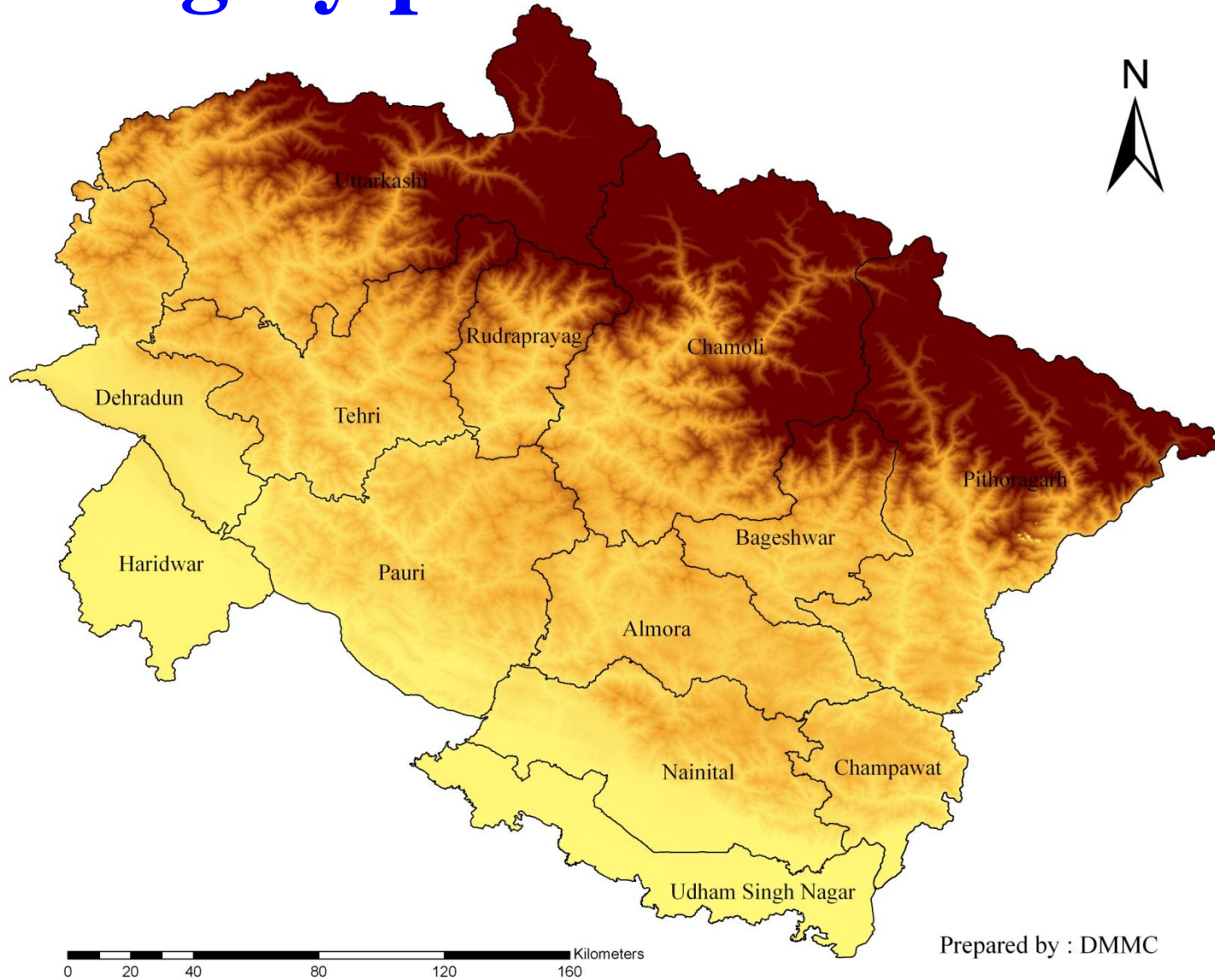
Presentation outline

- **Disaster scenario: Uttarakhand**
- **Traditional disaster management practices**
- **Way forward**



Uttarakhand / Himalaya:

Highly prone to disasters



Disaster proneness owed to

High relief

Ongoing tectonism

High seasonal precipitation

Evolutionary history of the terrain

**Geomorphic evolution of
Himalayas is still taking place at
a fast pace**



Gohna 1934

**Gohna lake
was created
on Birahi
Ganga by a
landslide in
1894**

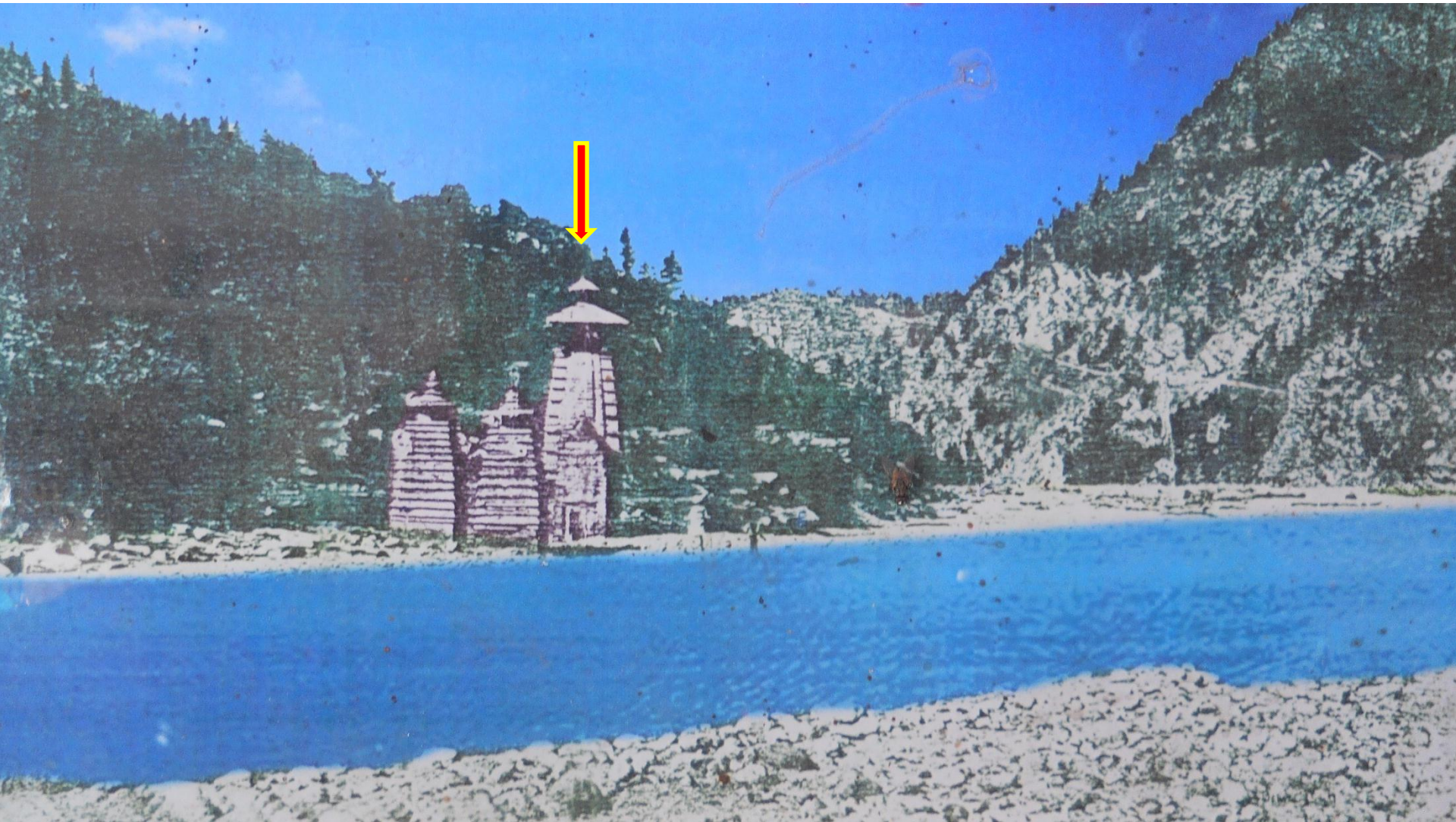
Gohna February 2008



Gohna 2012



Kalp Kedar, Dharali 1866



Kalp Kedar, Dharali 2007



Kalp Kedar, Dharali April, 2013



Natural hazards in Uttarakhand

Earthquake

Landslide

Floods / Flash flood

Natural hazards in Uttarakhand

Cloudburst, Hailstorms

Avalanche

Forest Fire

Drought

Factors enhancing the vulnerability

Lack of awareness

Unplanned growth

Difficult approach

Factors enhancing the vulnerability

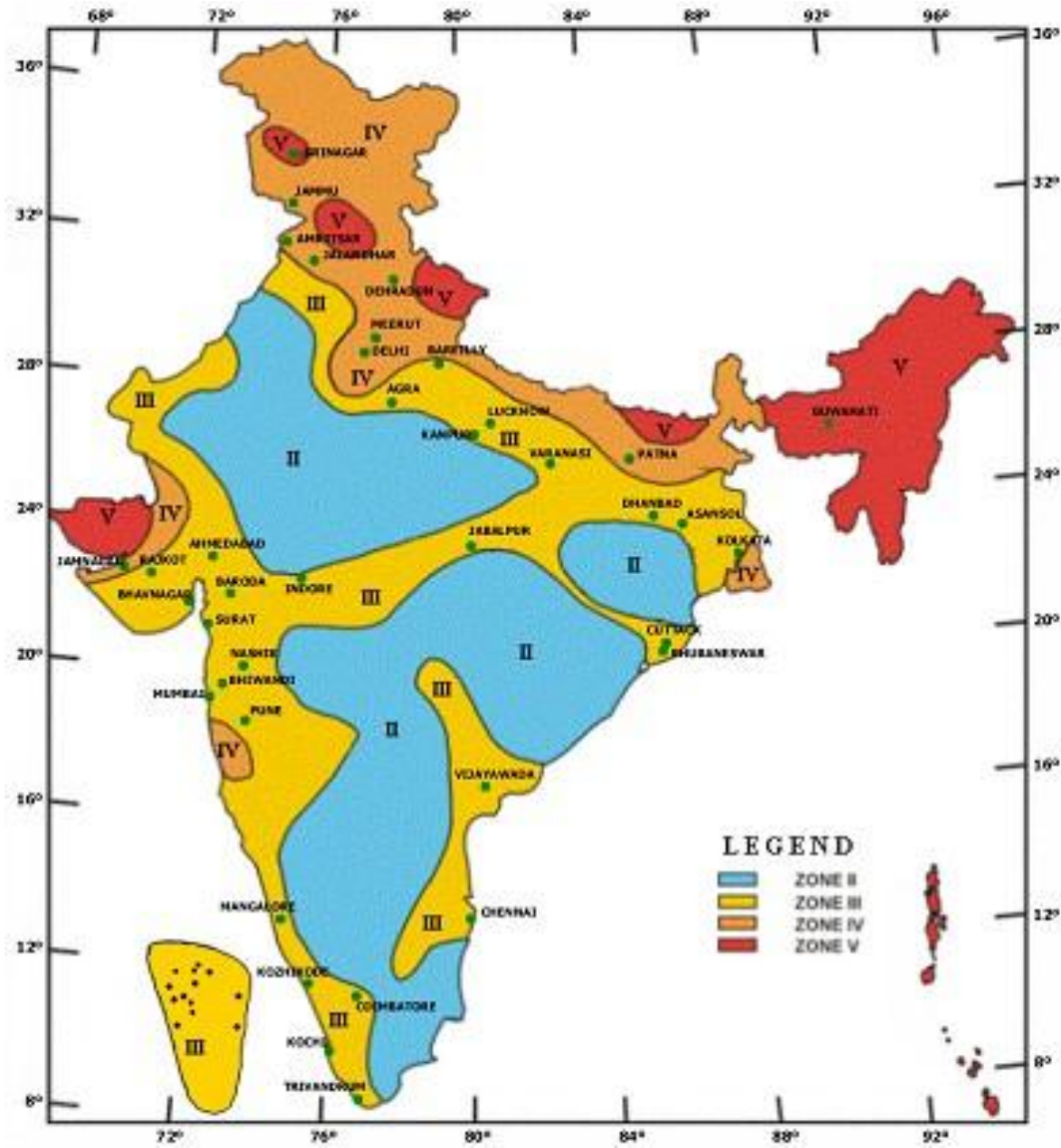
Concentration of population

**Lack of land use / debris disposal
policy**

**Non existence / non compliance of
regulations**

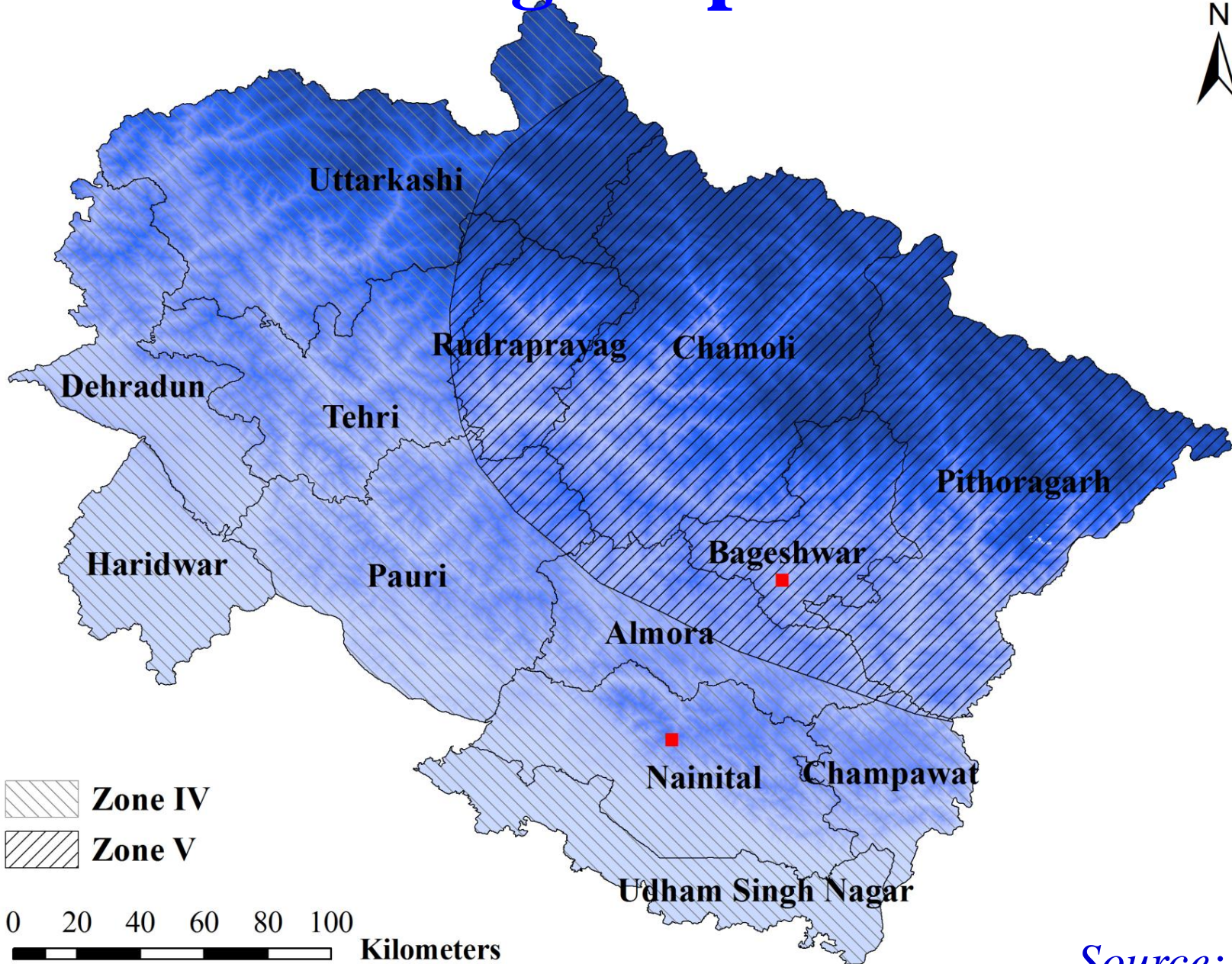
Earthquake


Seismic Zoning Map of India



Source: IS 1893

Seismic Zoning Map of Uttarakhand



 Zone IV
 Zone V

0 20 40 60 80 100
 Kilometers

Source: IS 1893

**Uttarakhand is located between the epicenters
of two Great earthquakes ($M > 8$ on Richter
Scale);**

**Bihar – Nepal earthquake of 1935
($M = 8.3$) to its east**

and

**Kangara earthquake of 1905
($M = 8.6$) to its west**





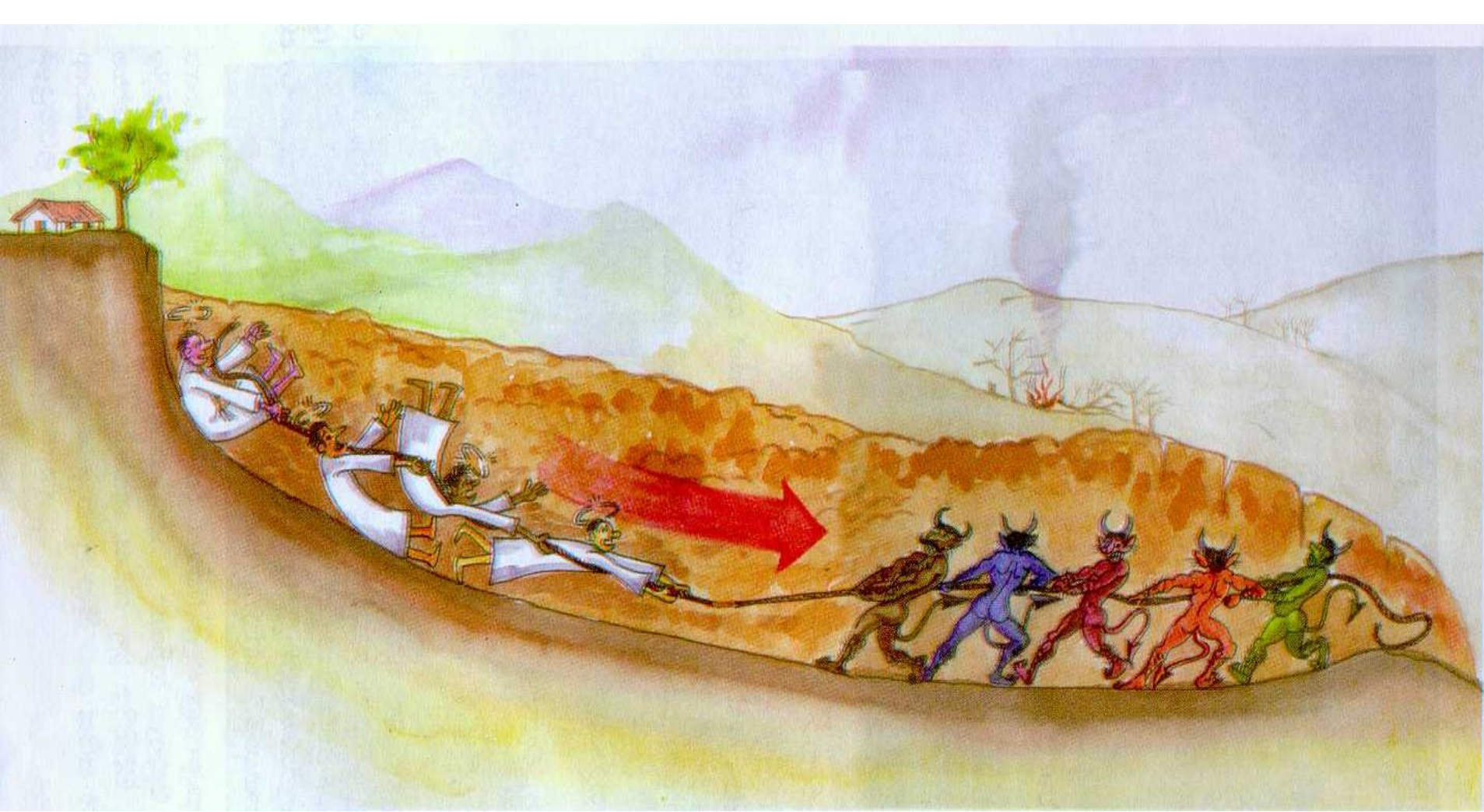
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Landslides, cloudburst and flash floods

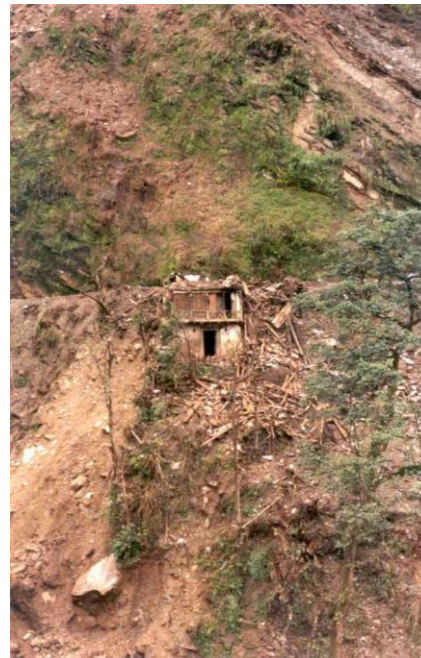


Phata Landslide of 16th July, 2001

Casualties - 15 persons



Byung Gad Landslide of 16th July, 2001



Casualties - 5 persons



**Malpa Landslide
(Rock fall) of 1998**

Casualties > 250



Okhimath Landslide of 1998
Casualties > 100

Flash Flood

Sudden flooding

**Sudden rise in the discharge of
seasonal streams**

No warning time



Cloudburst

**Heavy rainfall in localised area
within small time duration**

**Causes sudden rise in the discharge
of seasonal streams**

Human toll of landslides and flash floods in Uttarakhand

2001	28	2008	77
2002	37	2009	66
2003	19	2010	220
2004	56	2011	68
2005	74	2012	176
2006	19	2013	4218
2007	57	2014	66
Total		5181	
Average		370	
Average w/o 2013		74	

**Forest fire, cloudburst, failure of rains
and hailstorms together with avalanche
are other disasters that take a heavy toll
in Uttarakhand.**

Human toll of road accidents in Uttarakhand

Year	Incidents	Deaths	Injured
2005	-	90	118
2006	55	202	477
2007	186	400	1143
2008	216	543	1163
2009	181	278	1026
2010	162	354	771
2011	144	251	749
2012	217	361	929
2013	183	290	718
2014	150	253	624
Total	1494	3022	7718
Average	166	302	772

**Traditional resource
management practices
and
vulnerability reduction**



Water:

A must for survival

but also cause of many disasters

Landslide

Flood / flash flood

Drought ..



View of a traditional Chahal (recharge pit)





Water Resource Management

**People could now settle down on the
upper reaches away from streams
and rivers**

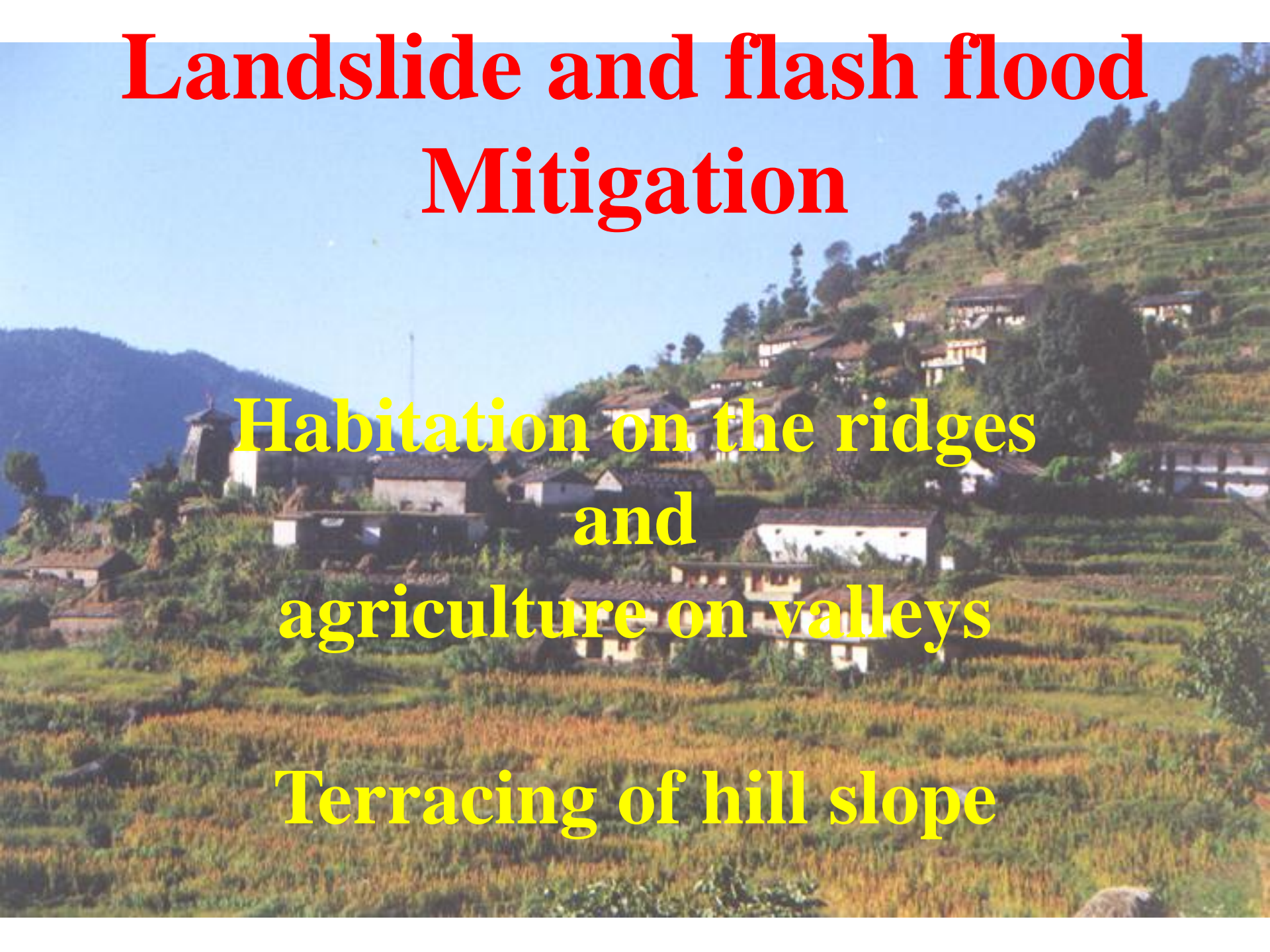
Water Resource Management

Jungle guls

Landslide and flash flood Mitigation

**Habitation on the ridges
and
agriculture on valleys**

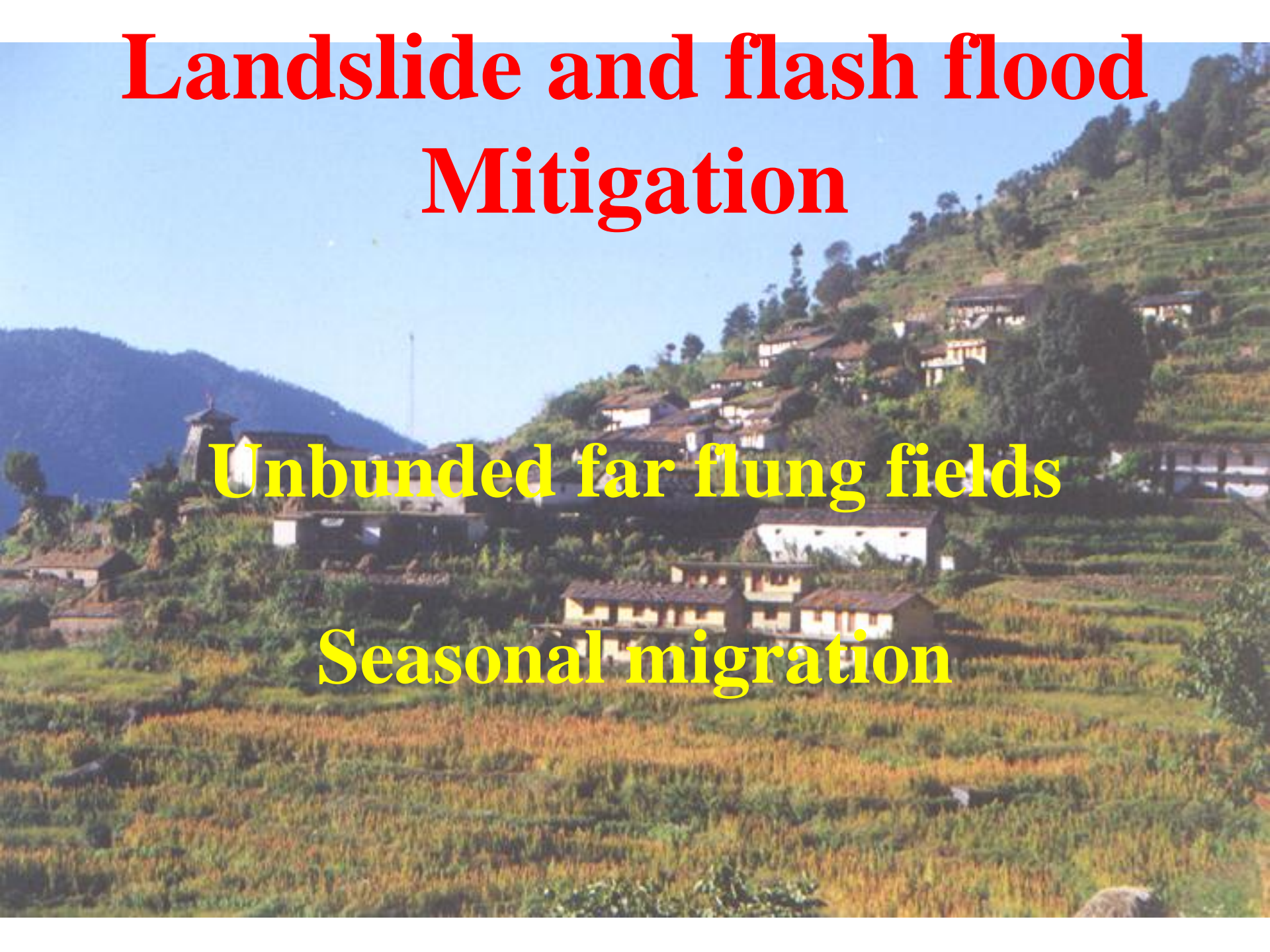
Terracing of hill slope



Landslide and flash flood Mitigation

Unbunded far flung fields

Seasonal migration



Earthquake safety



Multistoreyed houses common in the region

**Different words to identify four
different floors in Kumaoni**

**Koti Banal
architecture:
1,000 year
old
earthquake
resistant
houses**



Drought Management

**Development of drought resistant
crop varieties**

Landholding pattern

Recent innovations for managing road accidents

A landscape photograph showing a wide valley with a winding river. The river flows through a field of green and brown vegetation. In the background, there are large, light-colored mountains under a clear sky. The text is overlaid on the image in a bold, red, serif font.

**Disruption of traditional
practices**

**Dawn of Money Order
Economy**

A scenic landscape at sunset or sunrise. The sky is filled with soft, colorful clouds in shades of blue, purple, and orange. The sun is low on the horizon, creating a warm glow. In the foreground, there are dark silhouettes of trees and mountains. The overall mood is peaceful and serene.

Thank you all for being a wonderful audience