

Reconciling local knowledge on climate change with scientific data: A case study from Lachen valley, Eastern Himalayas.



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INTRODUCTION

Climate Change and the Himalayas

- Increased by 1.5°C and annual precipitation by **163mm** between 1982 and 2006



- Lack of baseline data

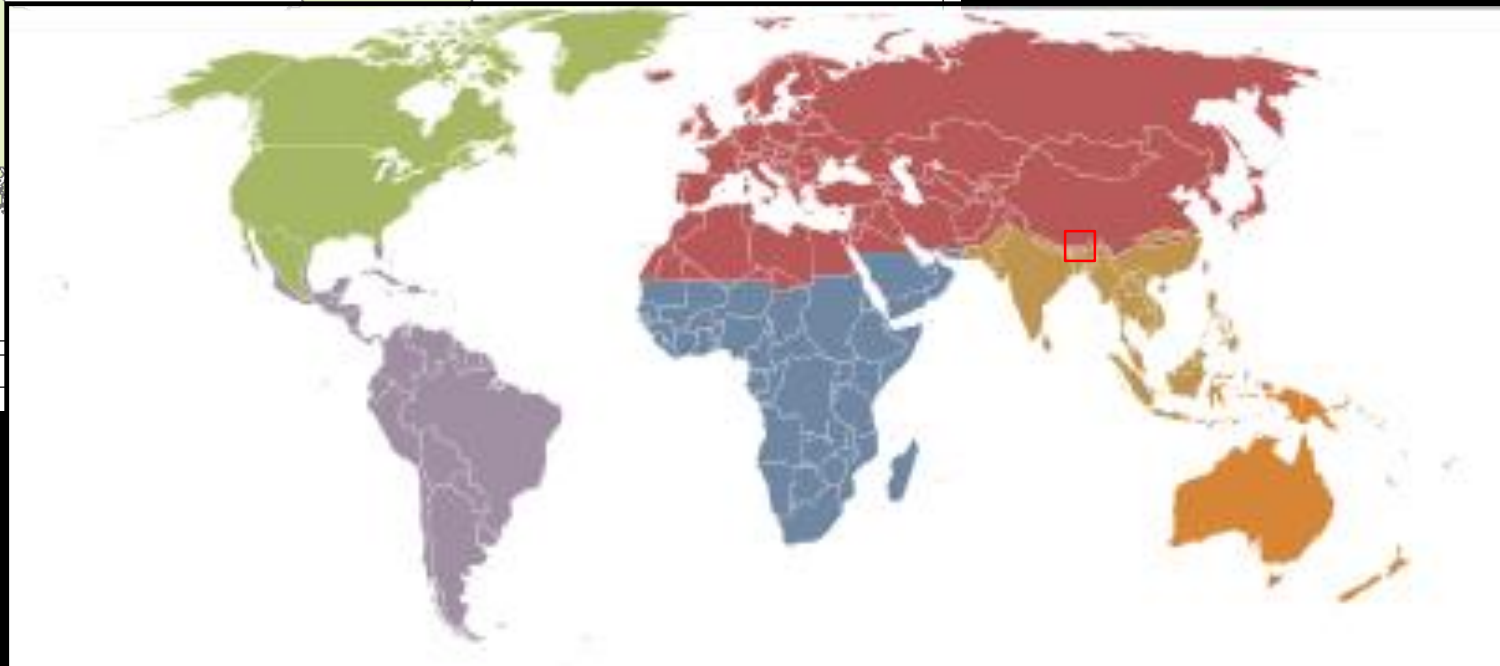
INTRODUCTION

Climate change and Indigenous peoples

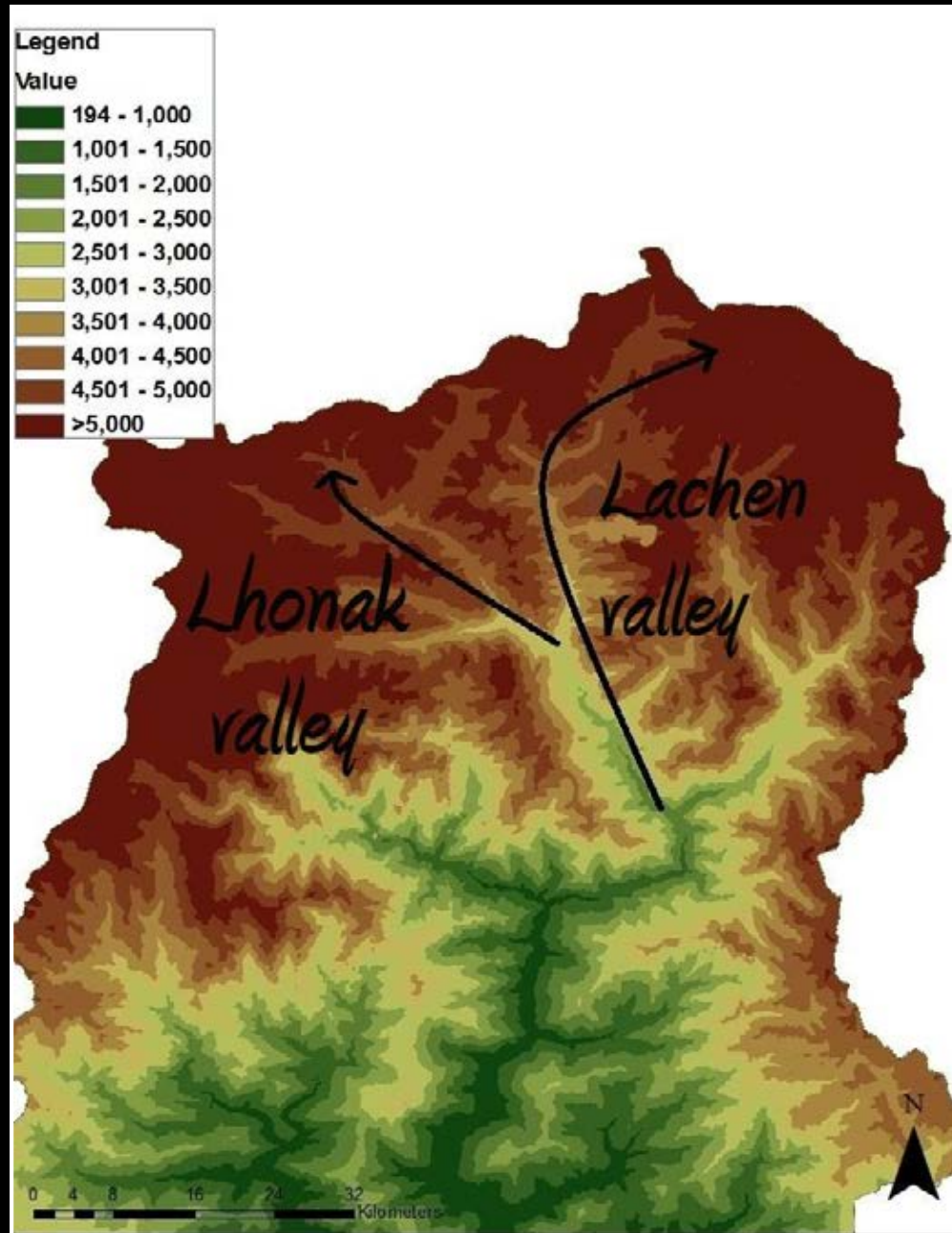
- Indigenous people → canary in the coal mine.
- **SCALE**
Climate change and human responses
- TEK can be used as long term baseline datasets developed over years of trial and error



STUDY SITE



STUDY SITE





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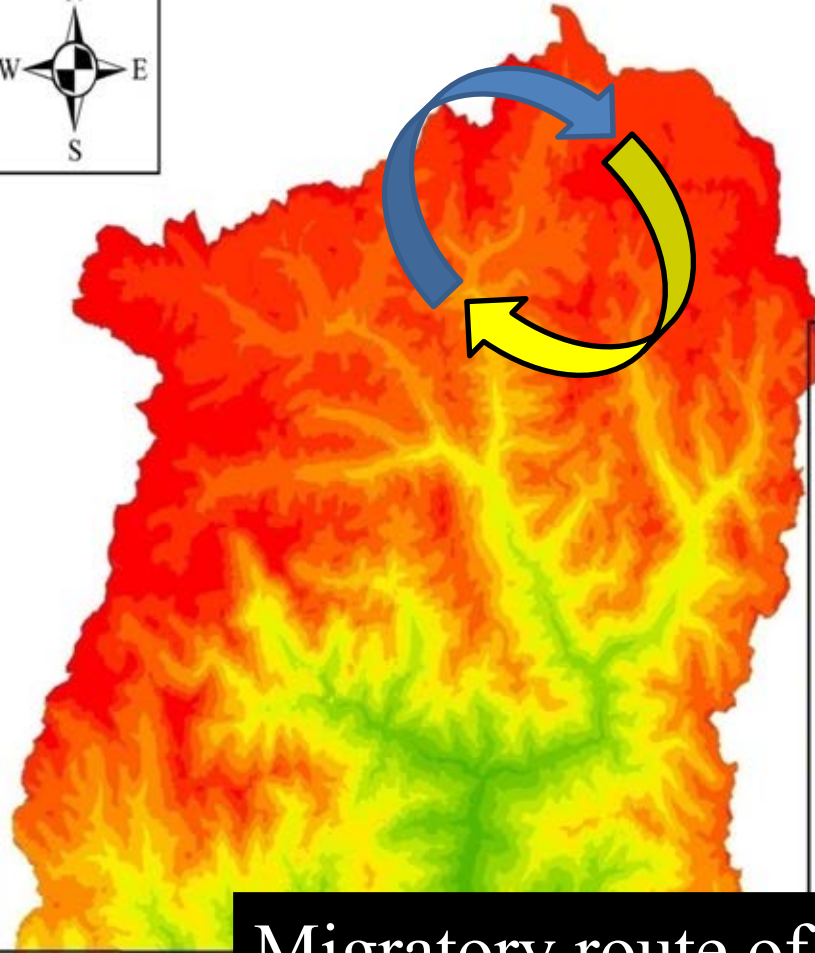
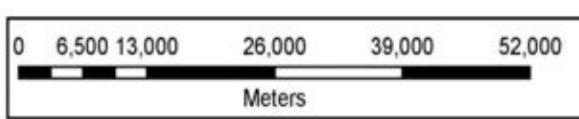
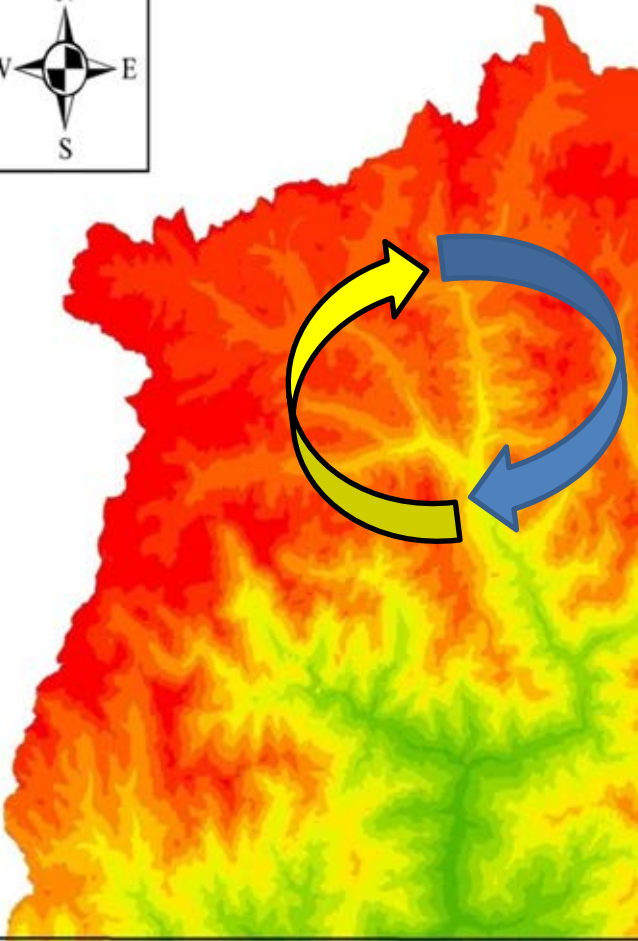
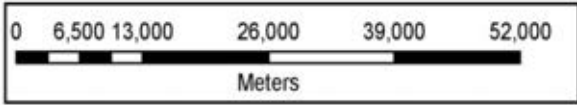
3800 m
amsl to
about
7000 m
amsl

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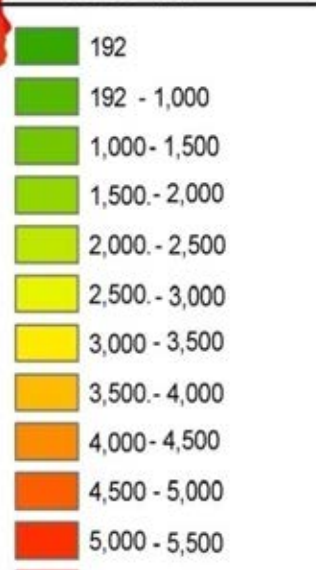


2000m
amsl
to about
3800m
amsl





LEGEND



Migratory route of Lachenpas

- Summer Migration
- Winter migration

Migratory route of Dokpas

- Summer Migration
- Winter migration

Medicinal

Edible

Aromatic



Meeboldia
horridula



Arisaema
griffithii



Rhododendron
anthopogon

Dependency on livestock products



Making
hard
cheese for
sale



Making yak fur carpets and
man preparing the yak tail for
sale



Dokpa
selling yak
butter

The Dzumsa

- Recognized by GOI in 1985
- Annually elected body
- 12 village representatives
 - 2 Pipons (headmen)
 - 6 Gembos (advisors)
 - 2 Tsiptos (accountants)
 - 2 Gyapons (messengers)



Dzumsa

```
graph TD; Dzumsa --> Migration; Dzumsa --> Fodder; Dzumsa --> Sowing; Migration --> Pasture; Fodder --> Reserves; Sowing --> Benefits;
```

Dates for migration

Allows pasture re-growth over a season

Dates for fodder collection

Provides equal opportunity for putting up their winter reserves

Sowing and harvesting;
selection of crops

1. Based on TEK potentially higher yield and productivity
2. Co-ordinates community's effort to protect crops from freely roaming livestock

METHODS

Participatory Rural Appraisal (PRA)

- Focus Group Discussions -[n]=6
- Participatory and non participatory observations
- **Semi structured questionnaires [n]=44**
 - Lachenpas-35(around 15%) of 227
 - Dokpas- 9 (60%) of 15

METHODS



**Semi structured
questionnaires:**

1. Observations
2. Perception
3. Implication
4. Impacts on their
lives and livelihoods

METHODS

- Certain precaution is necessary in conducting perception studies.
 - Sampling errors
 - Non-sampling errors and biases
- To minimize biases
 - The sample was drawn randomly
 - The questions were framed in a way that it would not lead respondents to certain presumption or biases.
 - Perceptions collected through household surveys were verified through focus group discussions and key informant surveys.

METHODS

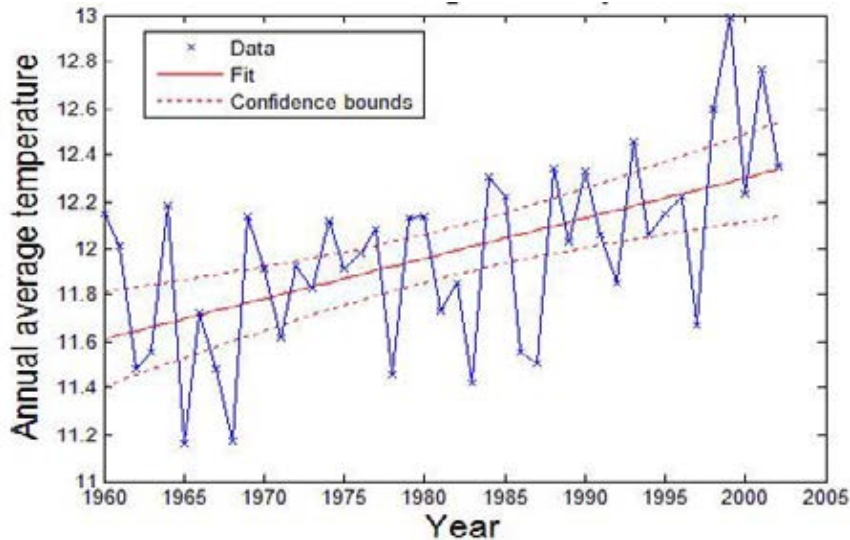
Data set for temperature

- Climate Research Unit (CRU) TS2.1 dataset from the Tyndall Centre for Climate Change Research, School of Environmental Sciences, University of East Anglia in Norwich, UK.
- Resolution: interpolated (on a 0.5° latitude-longitude grid) global monthly rainfall and temperature data from 1901 to 2002 (Mitchell and Jones, 2005).

RESULTS AND DISCUSSION

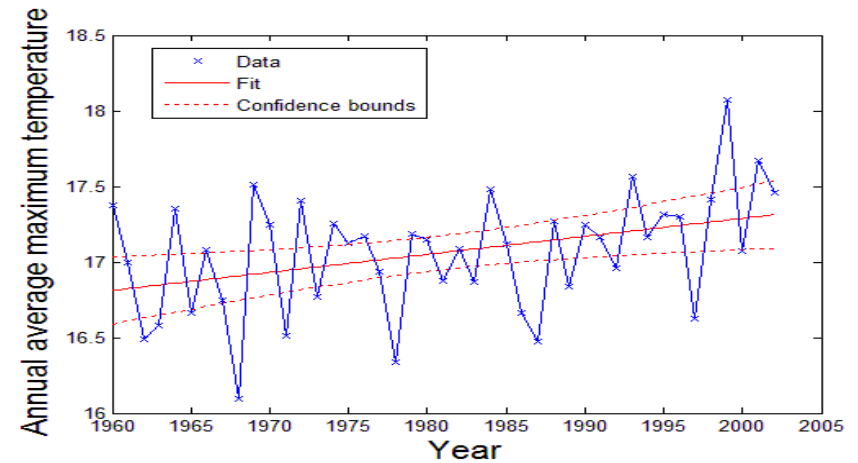
Overall warmth

Annual mean temperatures



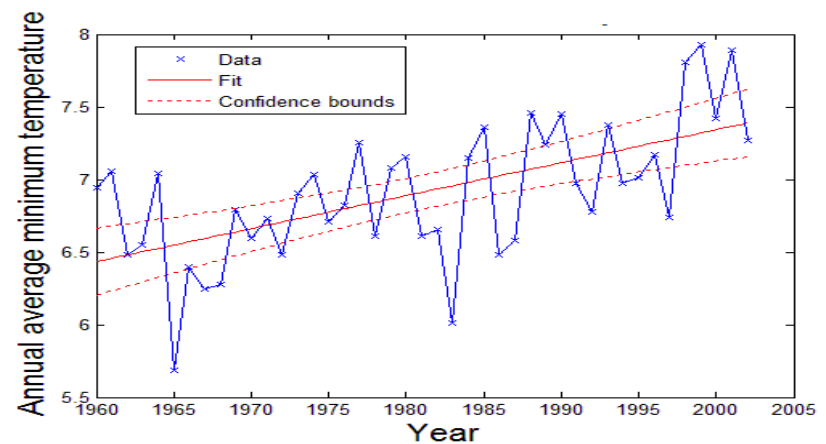
Increased by 0.74°C

Annual maximum temperatures



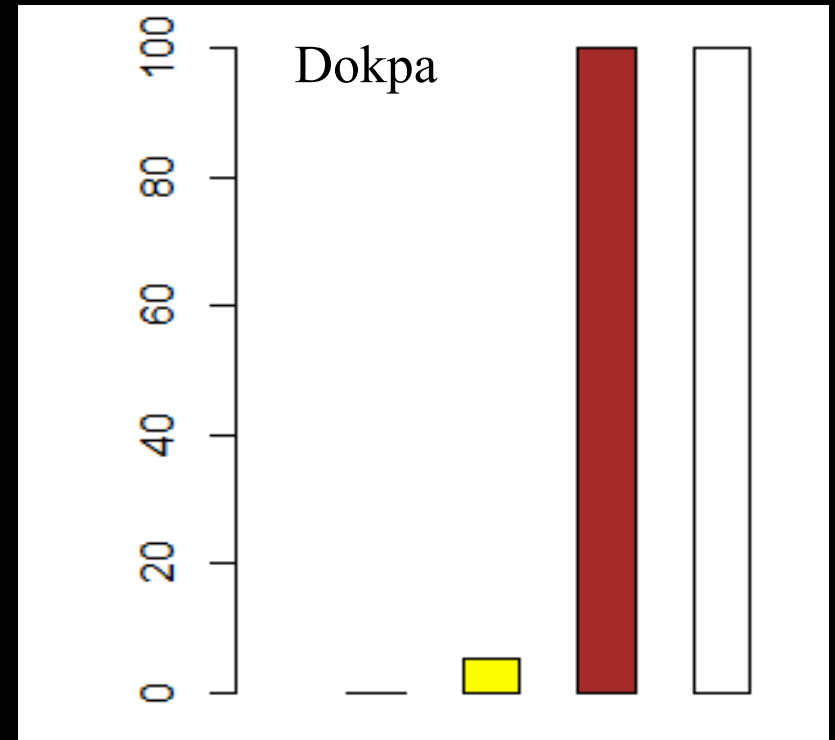
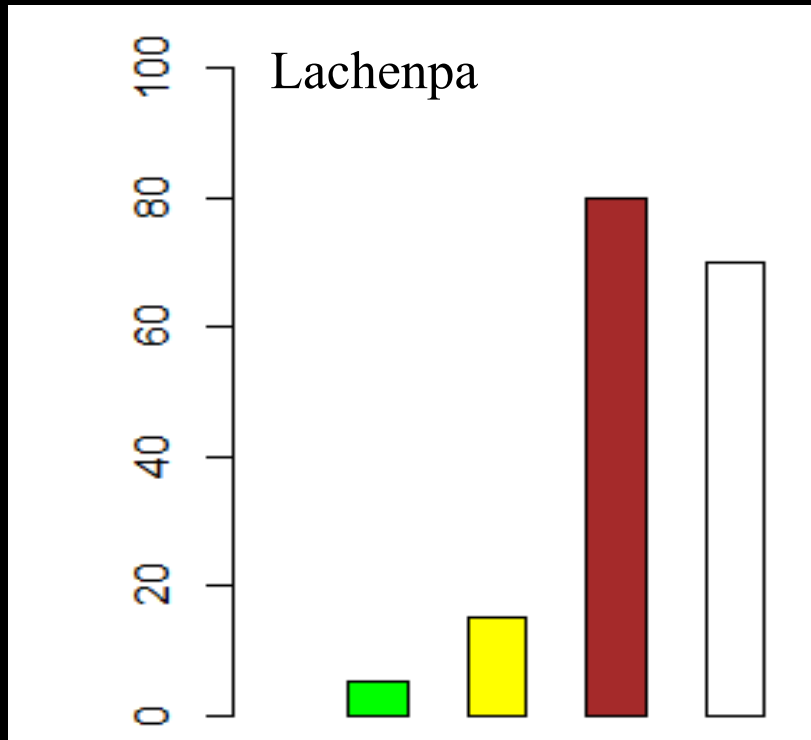
Increased by 0.51°C

Annual minimum temperatures



Increased 0.97°C

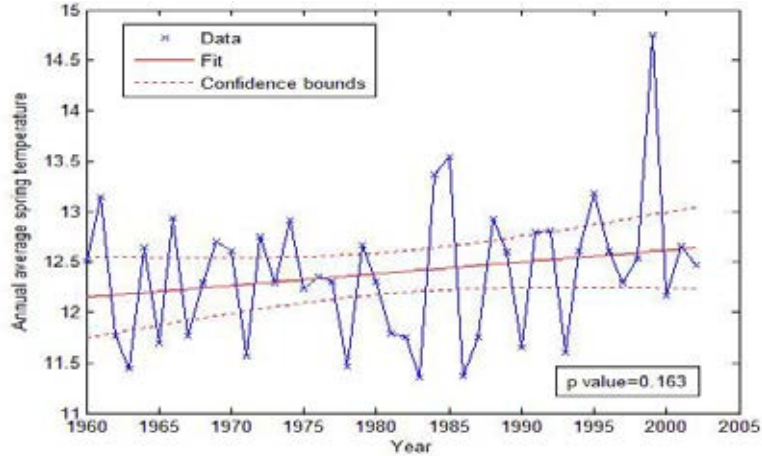
RESULTS AND DISCUSSION



- Spring
- Summer
- Autumn
- Winter

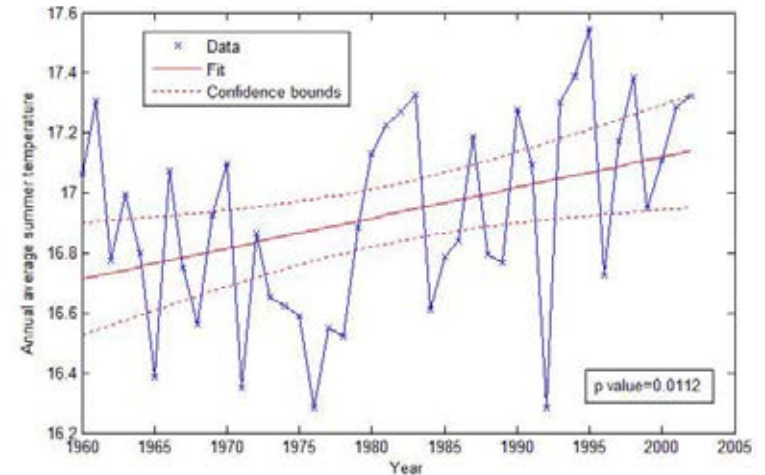
RESULTS AND DISCUSSION

Annual mean spring temperatures



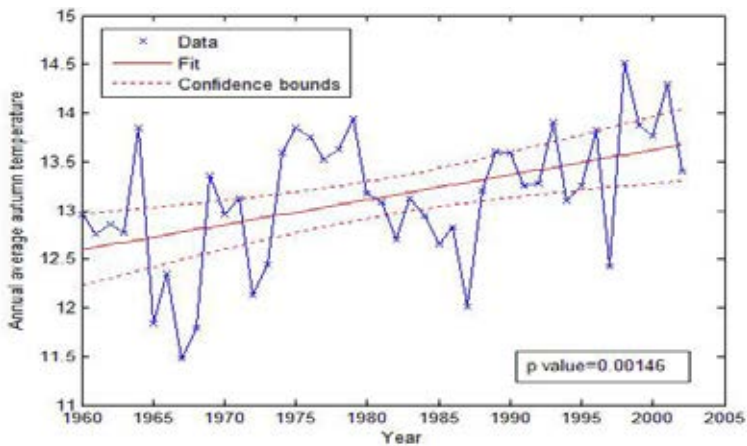
Increased by 0.34°C

Annual mean summer temperatures



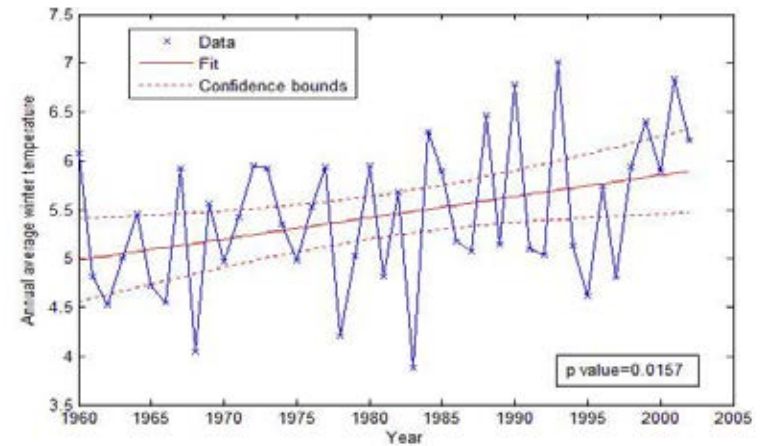
Increased by 0.50°C

Annual mean autumn temperatures



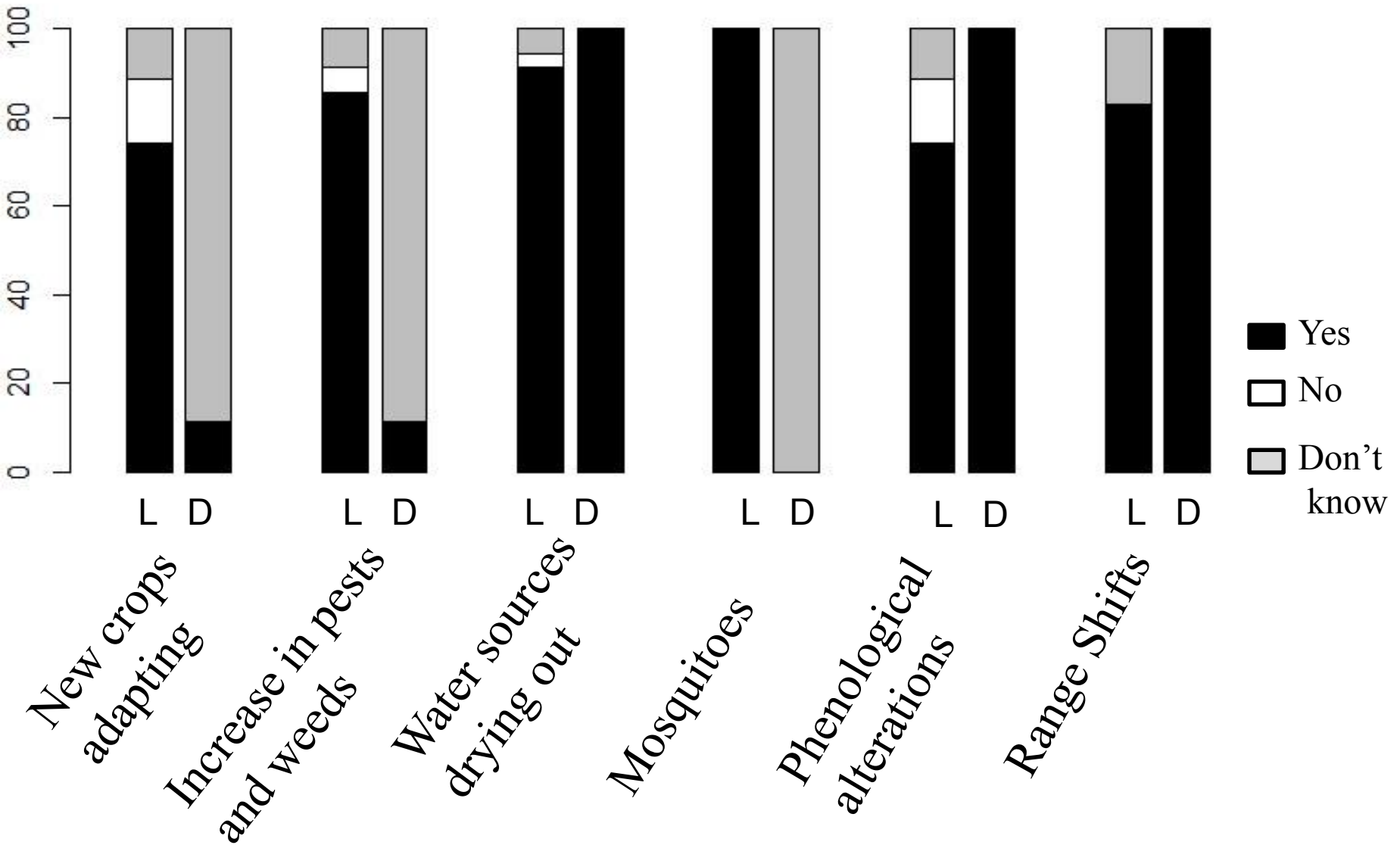
Increased by 1.10°C

Annual mean winter temperatures

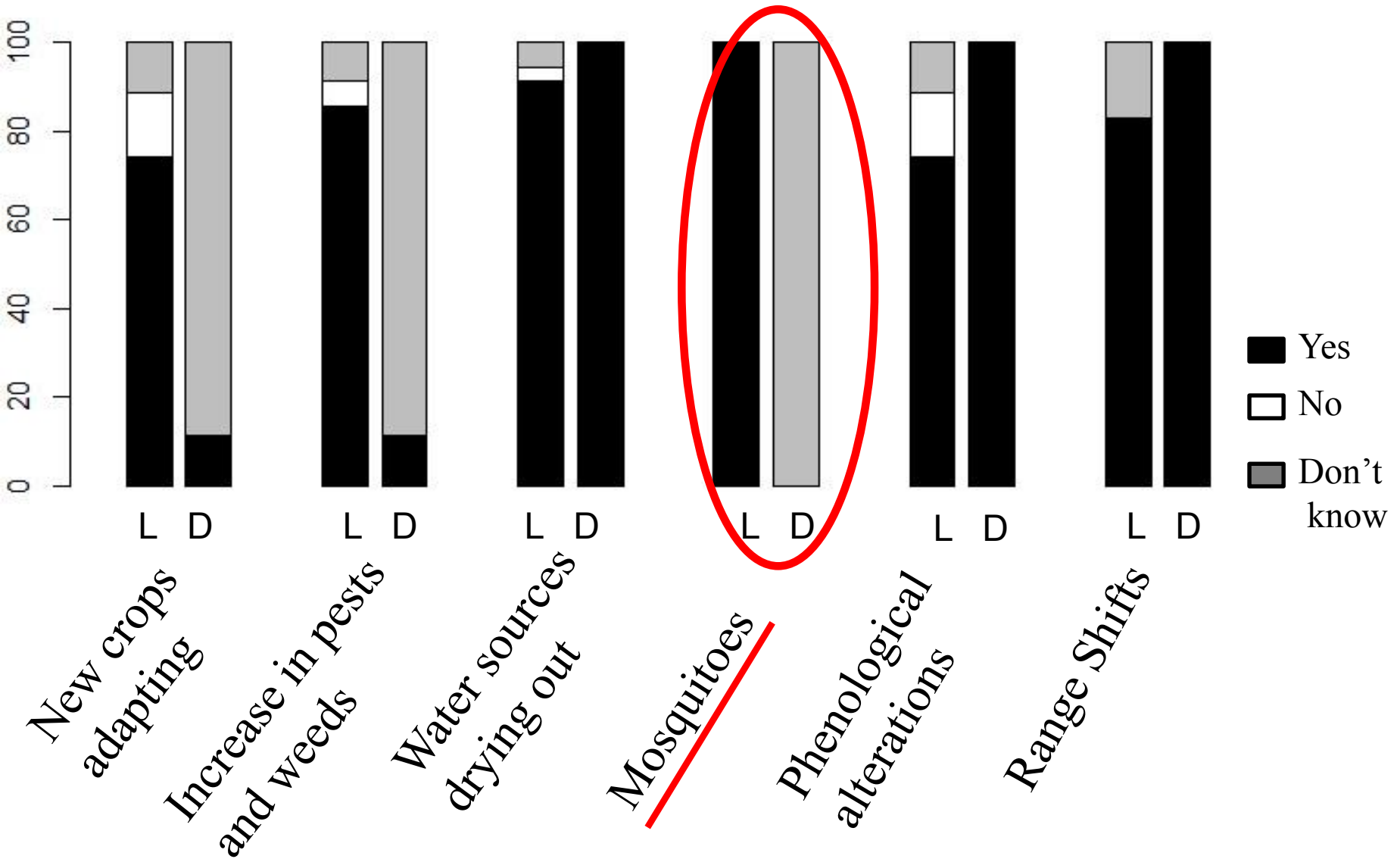


Increased by 0.94°C

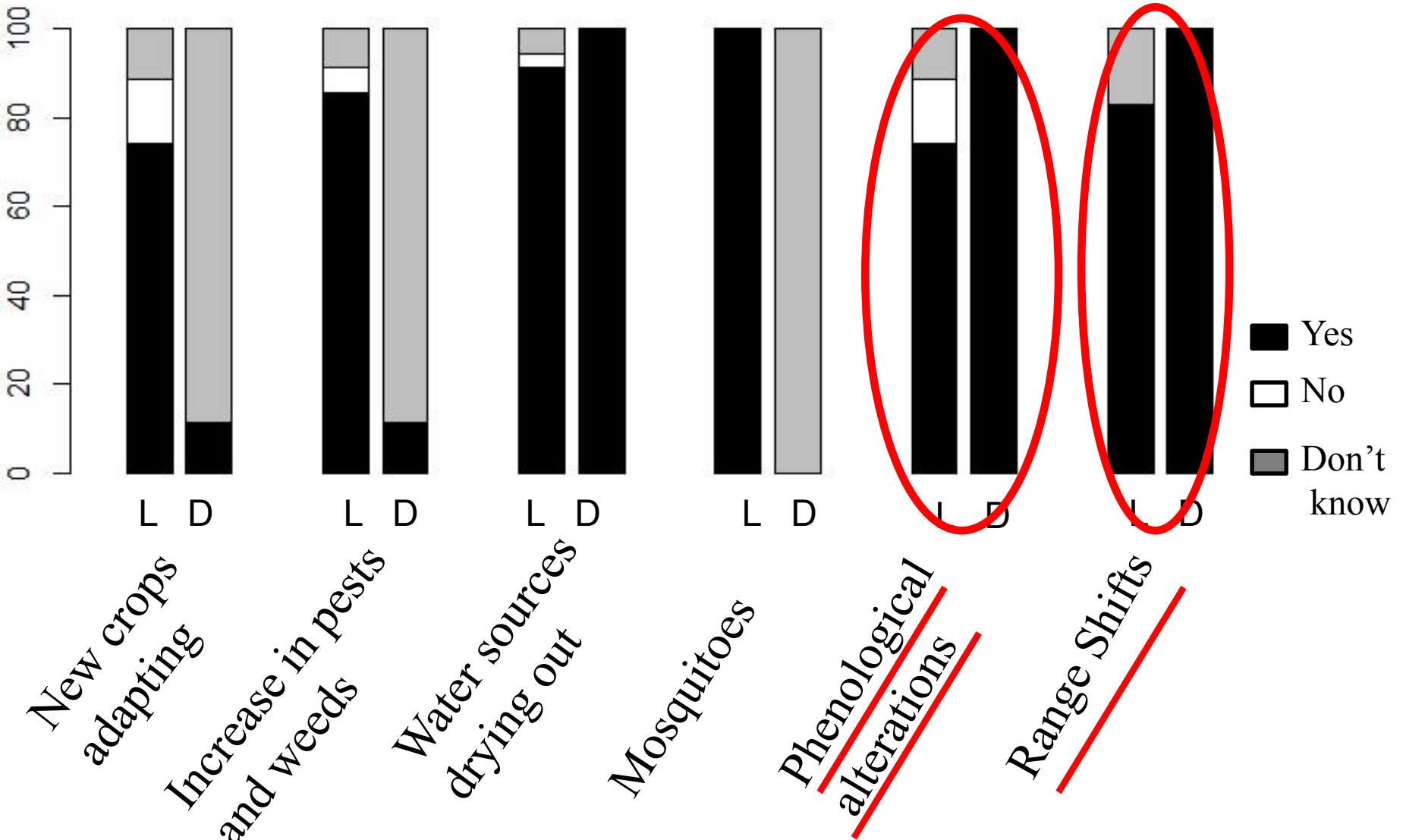
RESULTS AND DISCUSSION



RESULTS AND DISCUSSION



RESULTS AND DISCUSSION



Thinner ice

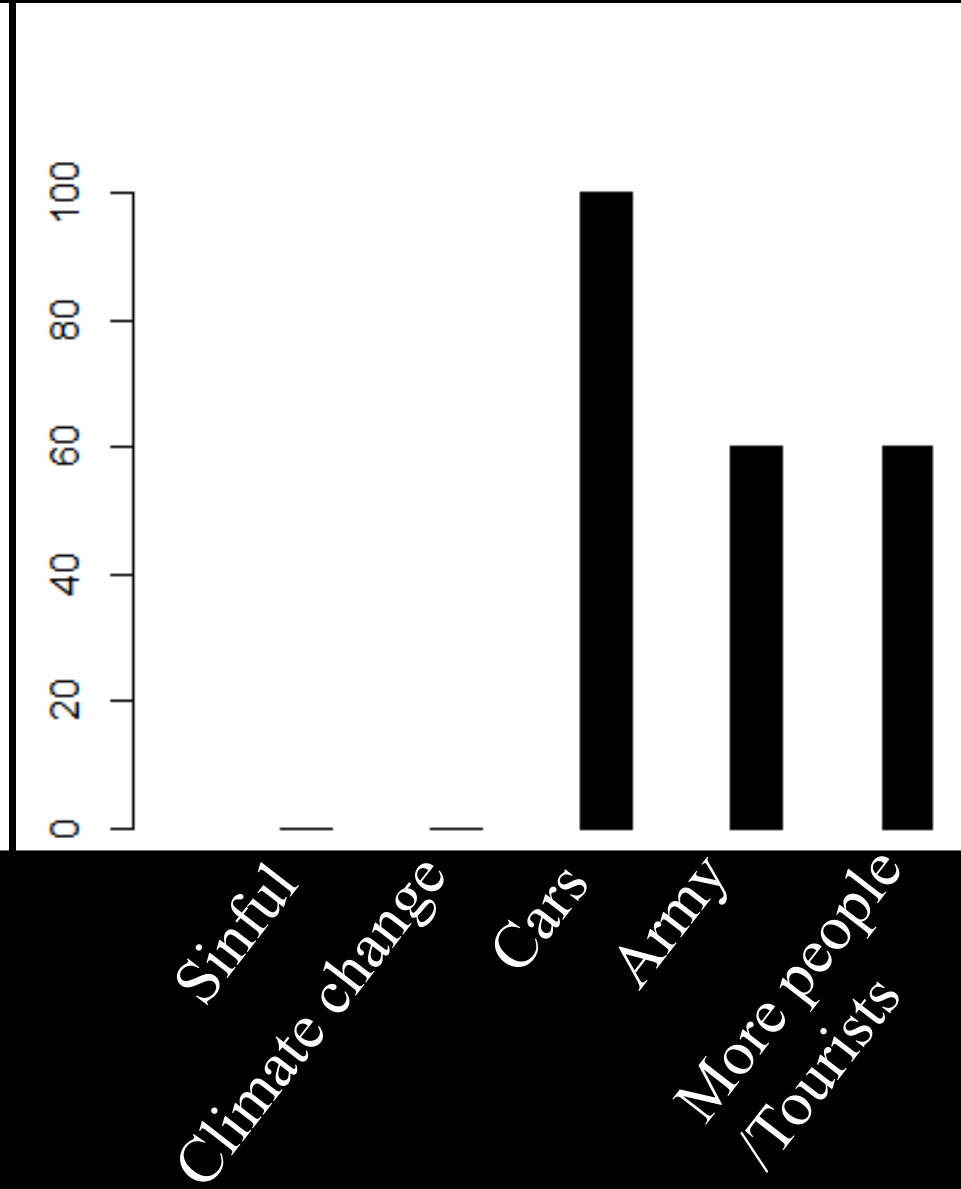
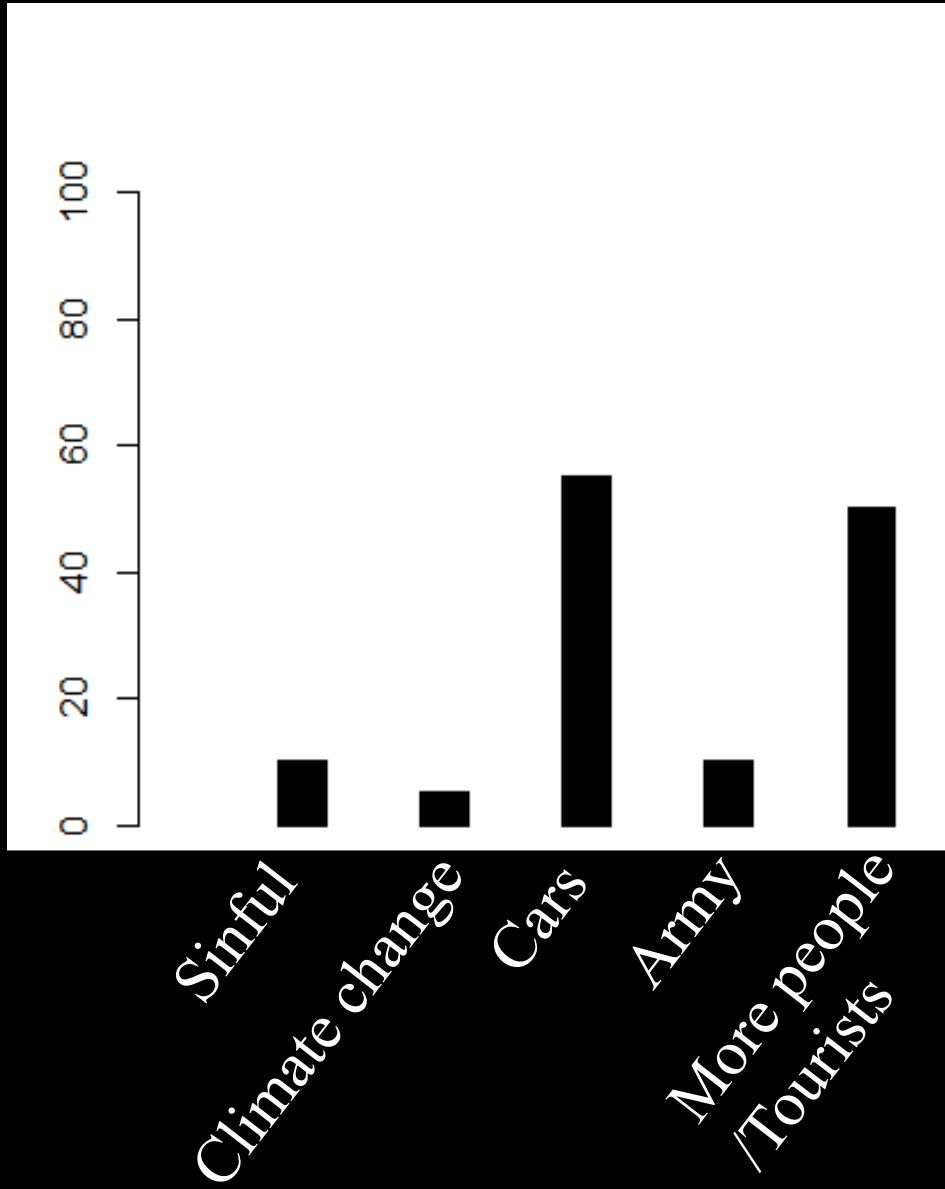


“Thinner ice makes crossing ice bridges more dangerous nowadays”

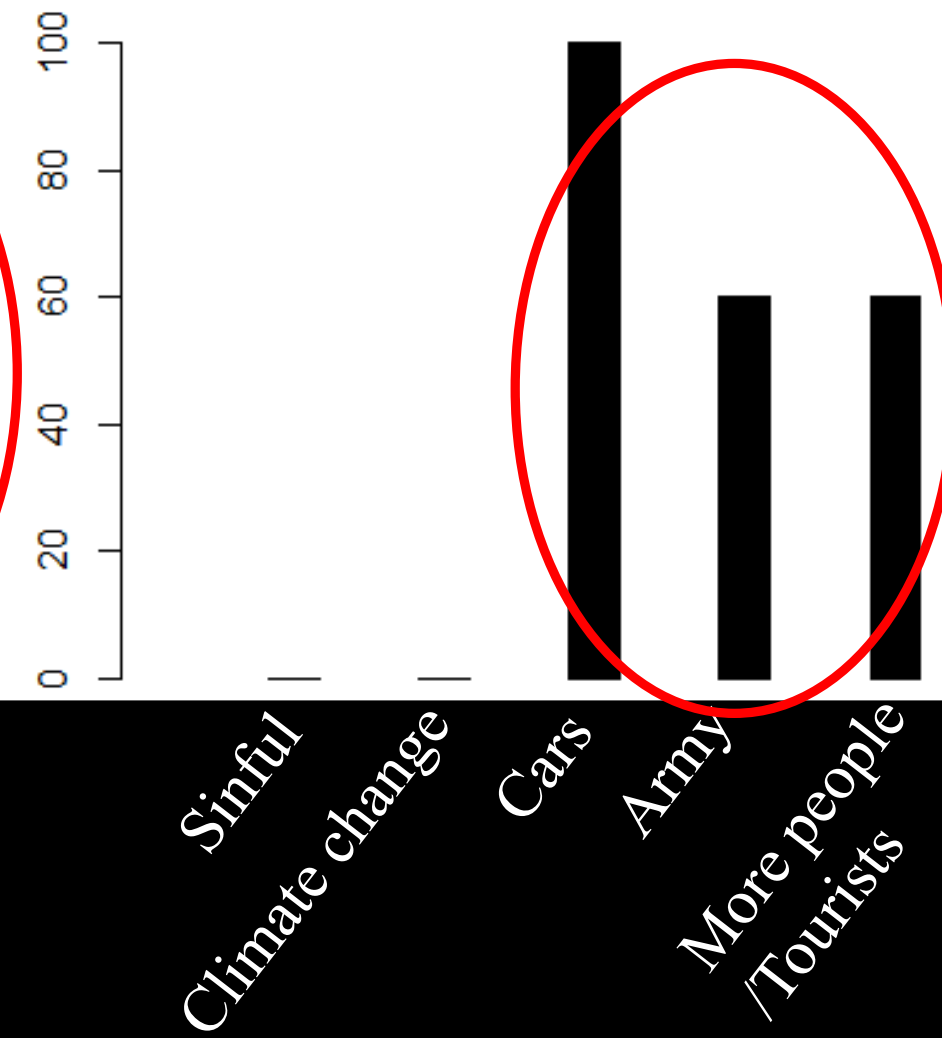
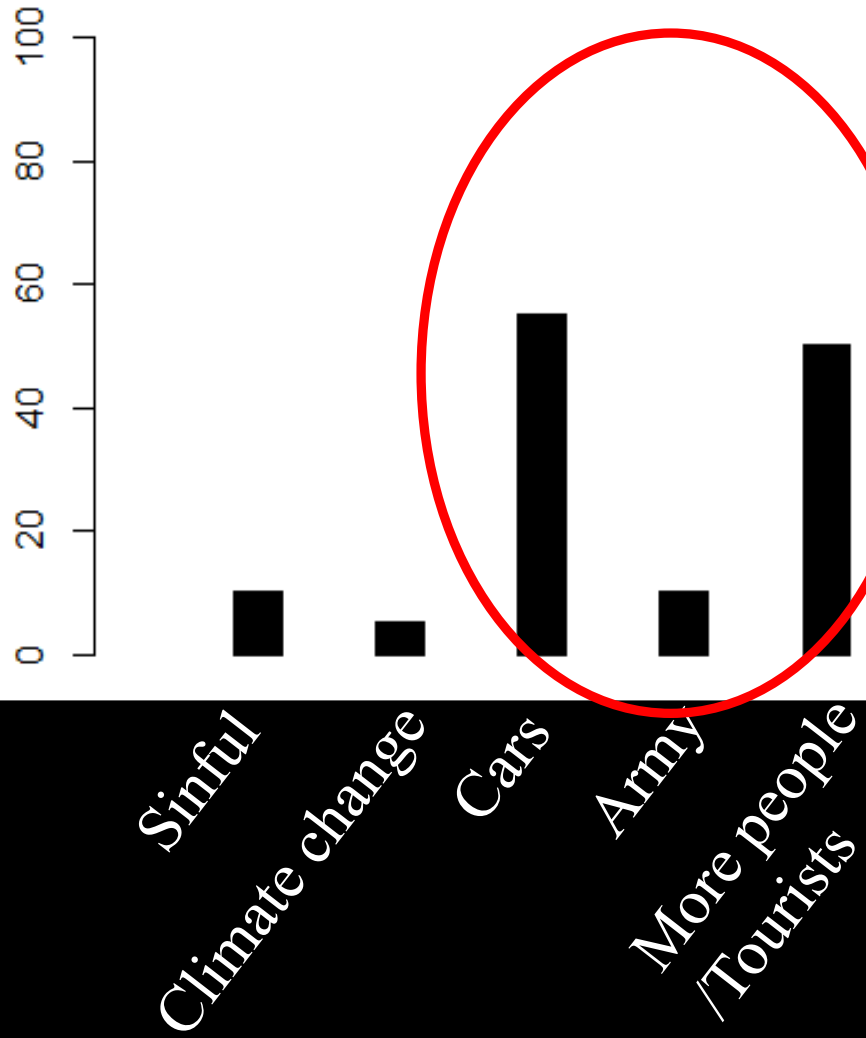
“During the monsoons rivers suddenly swell up making them more dangerous than before”



Reasons for observed changes



Reasons for observed changes



Impacts on grazing pastures



Impacts on
grazing pastures
and the response

Impacts on
agriculture and the
response

Dzumsa

1. Slaughter or sale
of sheep banned for
three years.

2. Prayer flags believed
to decrease snowfall
have been banned.

Lachen-9000ft/2730m (amsl)
Maize, cabbages, pumpkins

Thangu -12,500 ft/ 3790m
(amsl)

Carrots

Gochung-14500 ft/ 4390m
(amsl)

potatoes

Impacts on religious sentiments



“The Mountains have been reduced to old balding men, with just a few wisps of white hair left at the top. We worshipped the mighty snow clad mountains; alas, our God, our culture is threatened.”

CONCLUSION

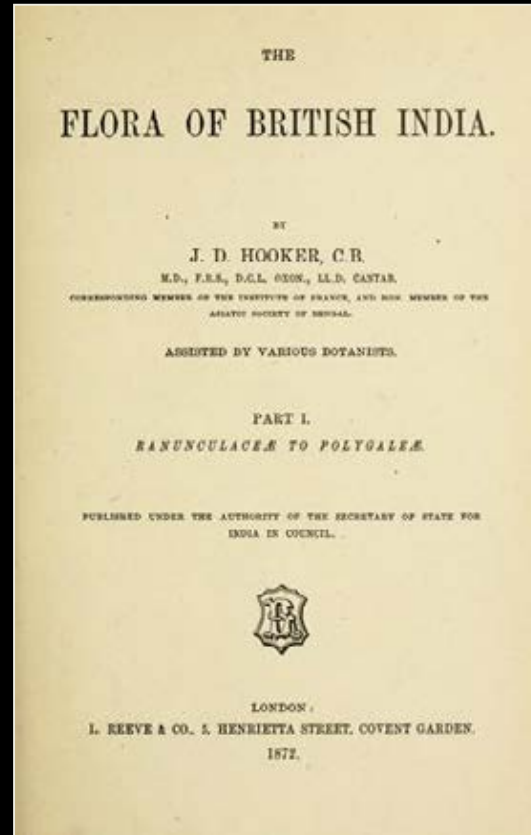
- The results of our study confirm certain climate change indicators
- Results conform to scientific findings from around the world, supporting the credibility of community perceptions
- Traditional knowledge can be an important source of information
- **HOLISTIC APPROACH-**
Integration and feedback loops



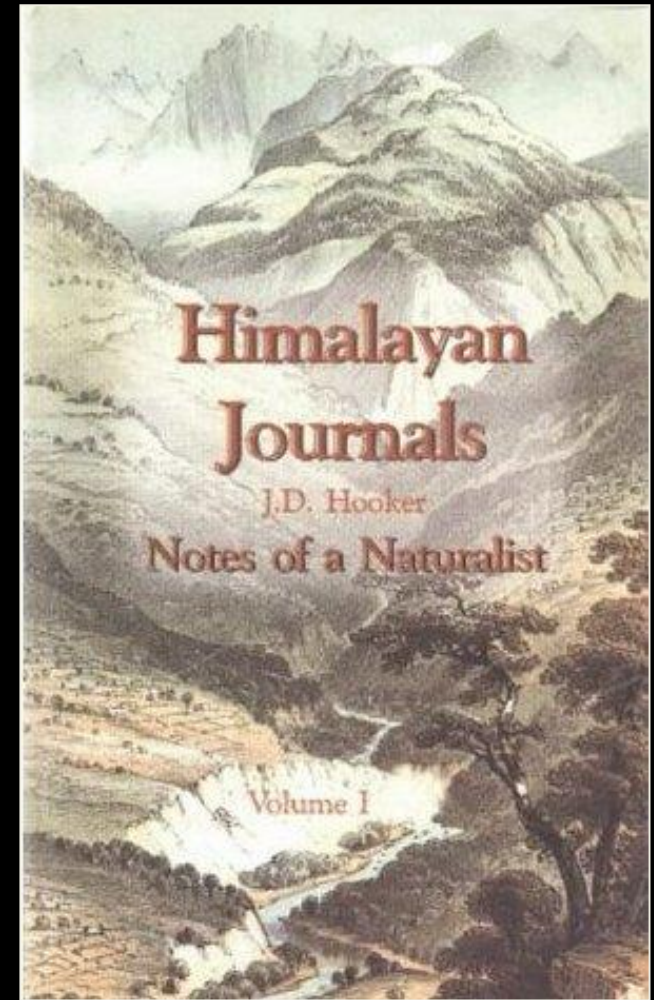
CONCLUSION



**Traditional
Ecological
Knowledge**



**Flora of British
India by Sir J.D.
Hooker 1850-
1872 A.D.**



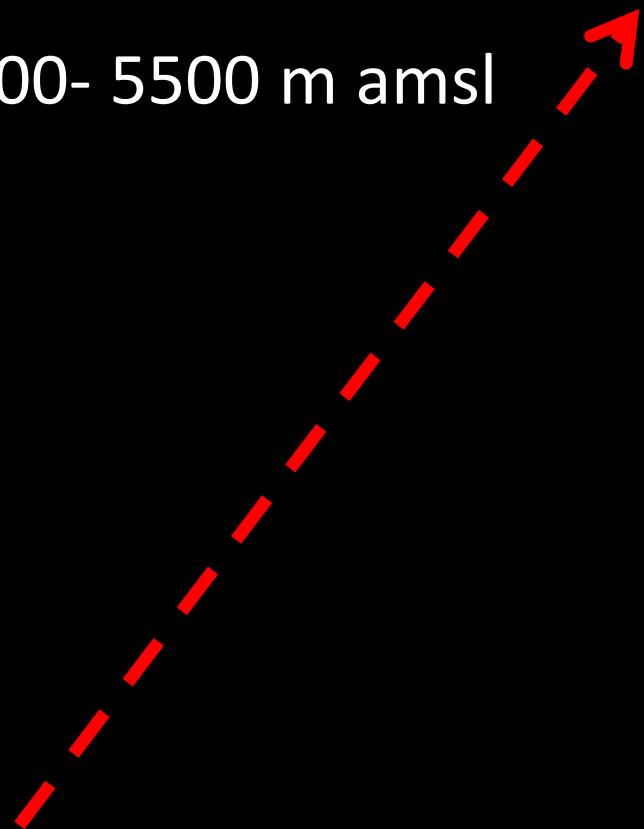
**Himalayan Journals Notes
of Naturalist by
Sir J.D. Hooker- 1850 A.D**



4500- 5500 m amsl

3500- 4500 m amsl

2500-3500m amsl





Rheum nobile

Previous max alt: **4500m**

Now found at: **4784m**



Gentiana ornata

Previous max alt:

4500m

Now found at:

5212m



Primula primulina

Previous max alt:

4500m

Now found at:

4824m



Bistorta macrophylla

Previous max alt:

4500m

Now found at:

4724m

CONCLUSION

- Traditional peoples have much to offer the discourse on and actions countering climate change.
- Empowered to exercise self-determination to deal with climate change that threatens their traditional livelihoods, indeed their very existence.
- Local perceptions, adaptations, responses and solutions must be kept in mind while being inclusive of the traditional institutions like the Dzumsa to effectively develop and implement adaptation and mitigation strategies.

ACKNOWLEDGEMENTS

- **People of Lachen Valley and the Dzumsa**
- **The Sikkim Forest Department**
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- **NORAGRIC Small Grants Program**



Photo credit: Tenzing Ingty

A wide-angle landscape photograph of a mountain valley. In the foreground, a river winds through a lush green meadow in a series of large, sweeping loops. The valley is flanked by steep, rocky mountainsides covered in patches of green grass and shrubs. In the distance, more rugged mountain peaks are visible, some partially shrouded in mist or low-hanging clouds. The sky is filled with soft, white and grey clouds. The overall scene is serene and majestic.

Thank you