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- Recognized as a Center for Excellence in Conservation Sciences
- MISSION - “Promote socially just conservation and sustainable development”





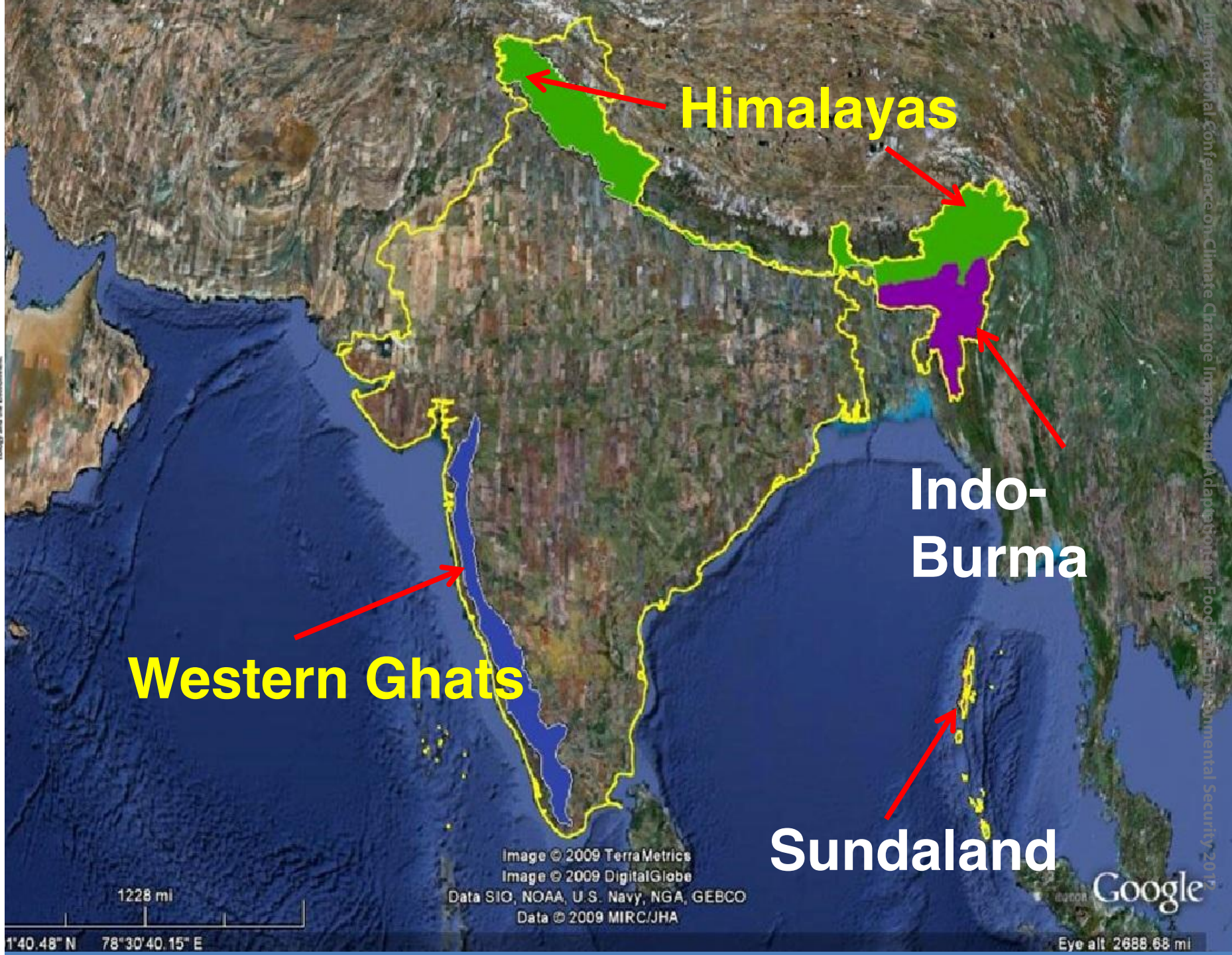
Image © 2009 TerraMetrics

Data SIO, NOAA, U.S. Navy, NGA, GEBCO

©2008 Google

3°02.70" N 78°24'58.29" E

Eye alt 7106.06 mi



Indo-Burma

Western Ghats

Sundaland

Image © 2009 Terra Metrics
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Data © 2009 MIRC/JHA

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1°40.48" N 78°30'40.15" E

Eye alt 2688.68 mi

Eastern Himalayas



Response of agro-pastoral indigenous communities to the cascading effects of climate change-studies from Sikkim, Eastern Himalayas, India



INTRODUCTION

Climate Change and the Himalayas

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



- Lack of baseline data

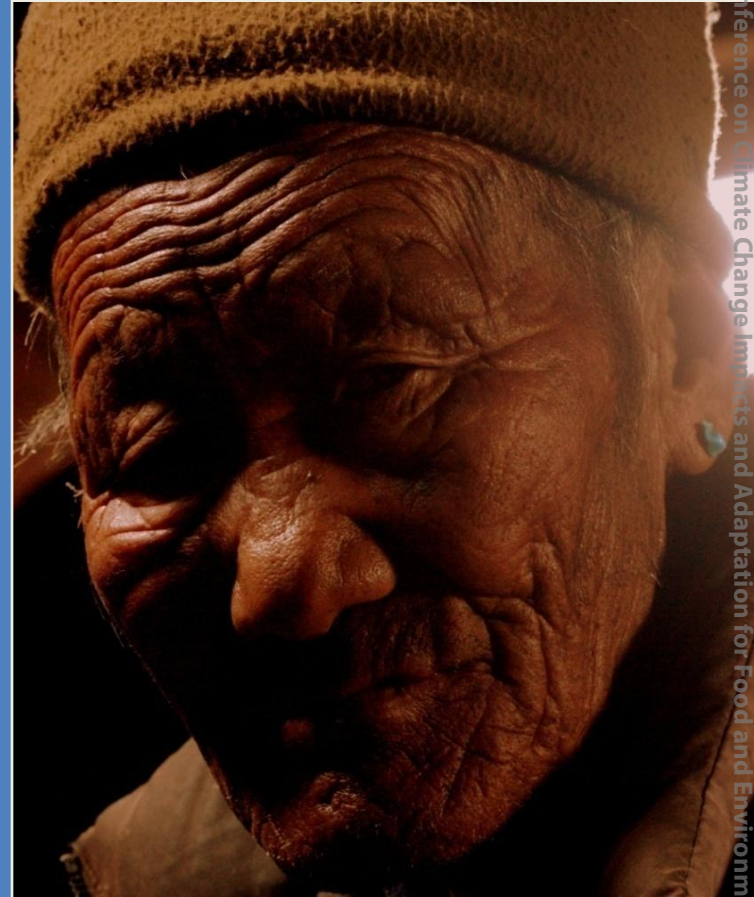
INTRODUCTION

Climate change and Indigenous peoples

- Indigenous people → canary in the coal mine.

- **SCALE**
Climate change and human responses

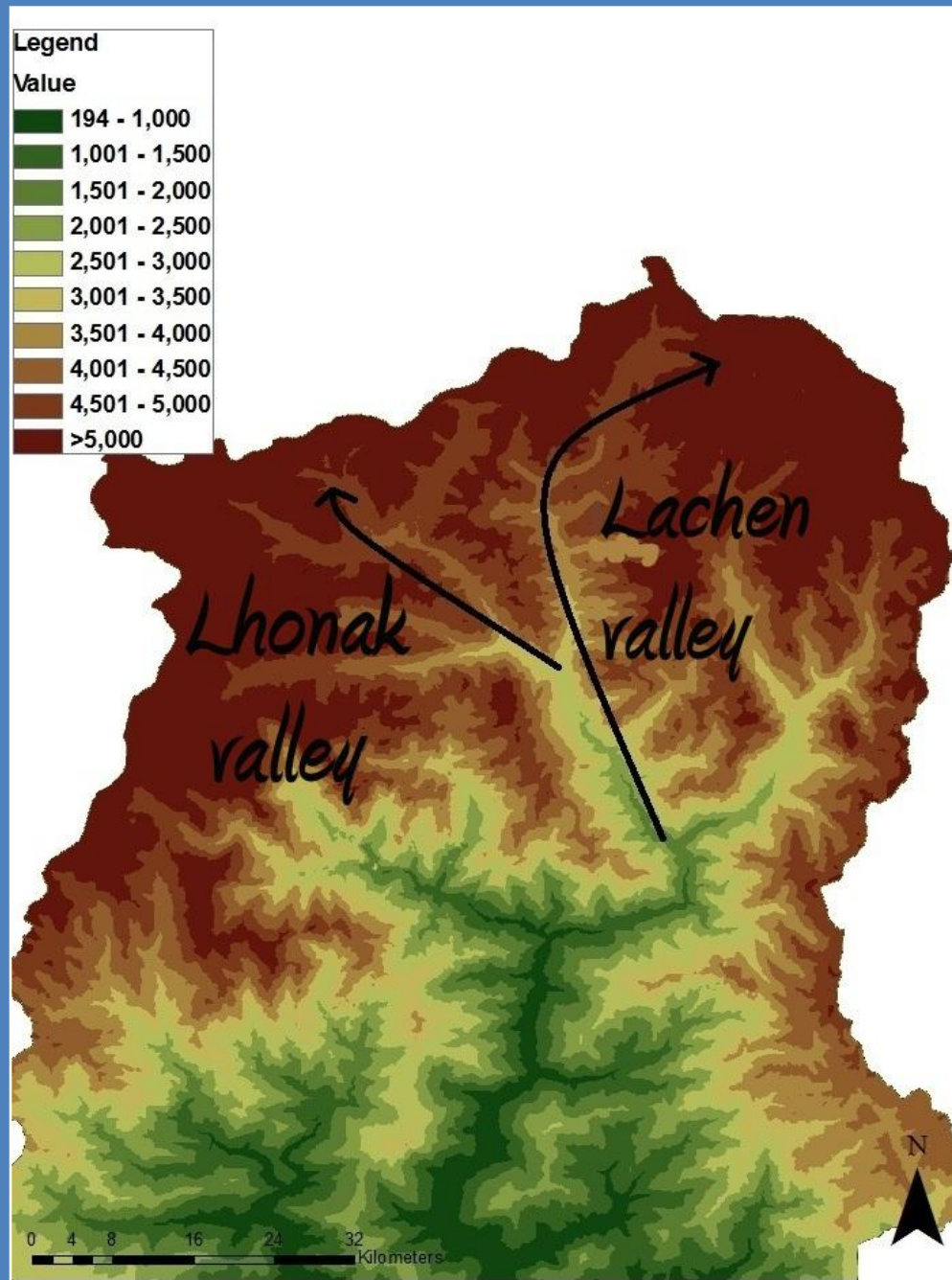
- TEK can be used as long term baseline datasets developed over years of trial and error



STUDY SITE



STUDY SITE





3800 m
amsl to
about
7000 m
amsl

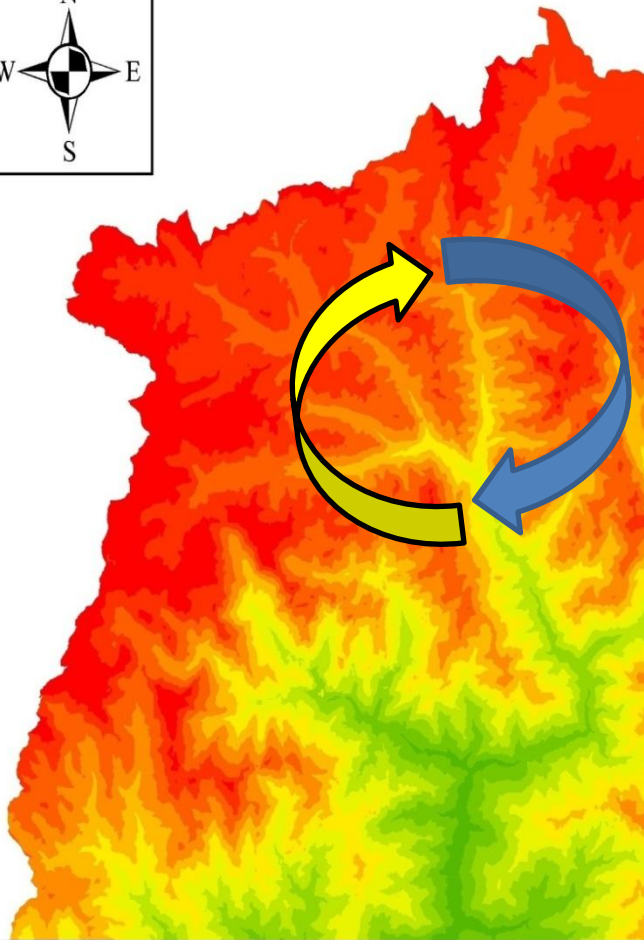
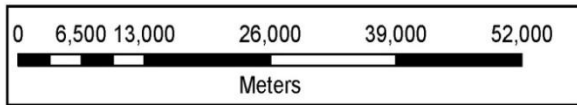


L A C H E N P A



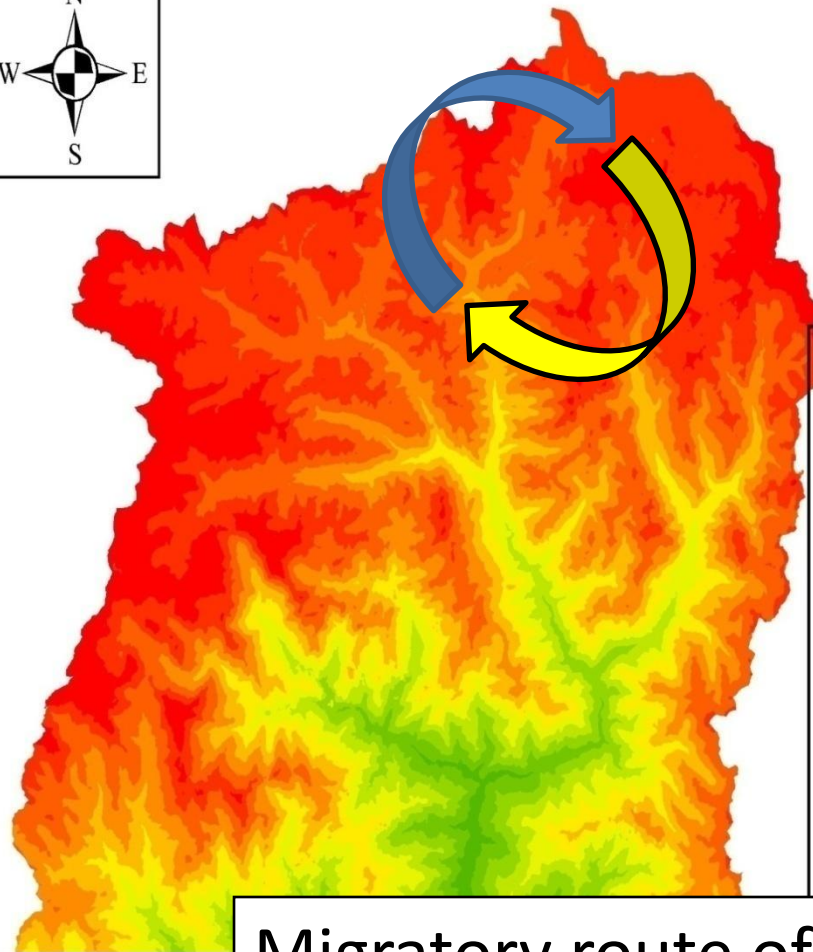
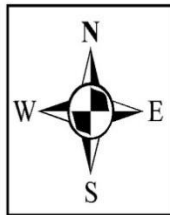
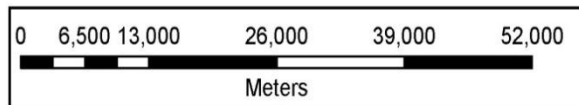
2000m
amsl
to about
3800m
amsl





Migratory route of Lachenpas

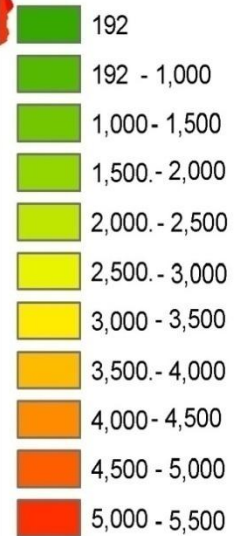
- Summer Migration
- Winter migration



Migratory route of Dokpas

- Summer Migration
- Winter migration

LEGEND



Medicinal



Edible



Aromatic



*Mecanopsis
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

- Annually elected body
- 12 village representatives
 - 2 Pipons (headmen)
 - 6 Gembos (advisors)
 - 2 Tsipos (accountants)
 - 2 Gyapons (messengers)



Dzumsa

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 dates ; **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

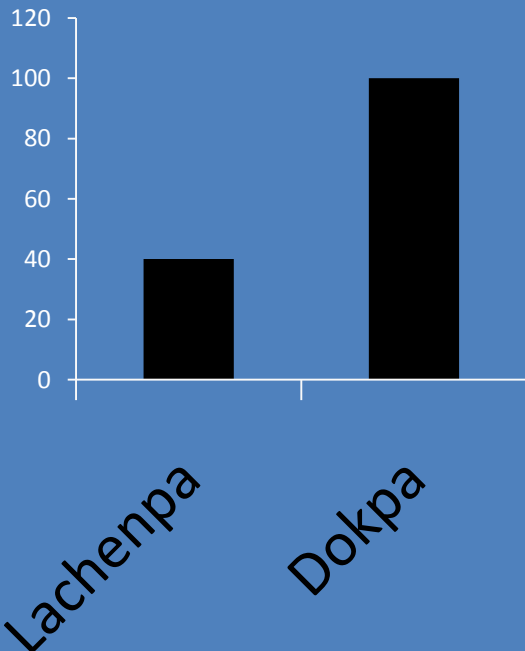
METHODS

- 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.

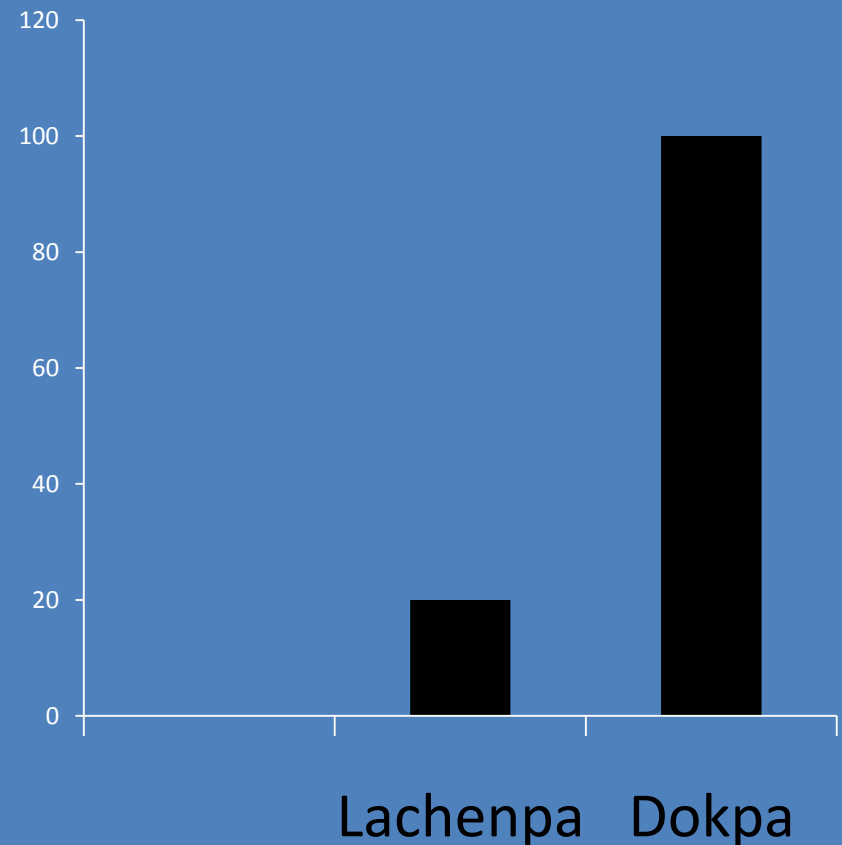
RESULTS AND DISCUSSION

- Overall warmth
- Less snow
- Water sources drying out
- Shift in seasons

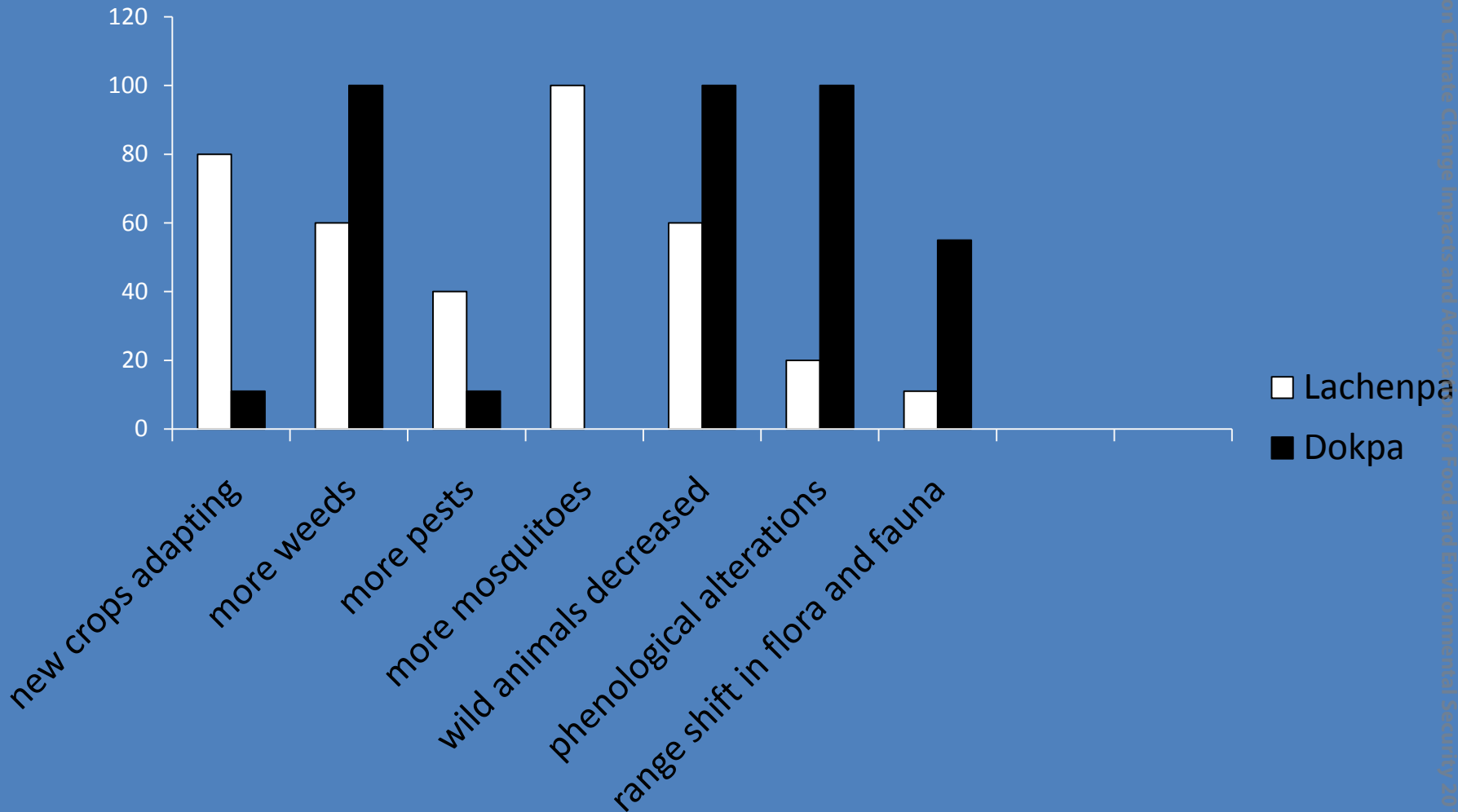
Late monsoon



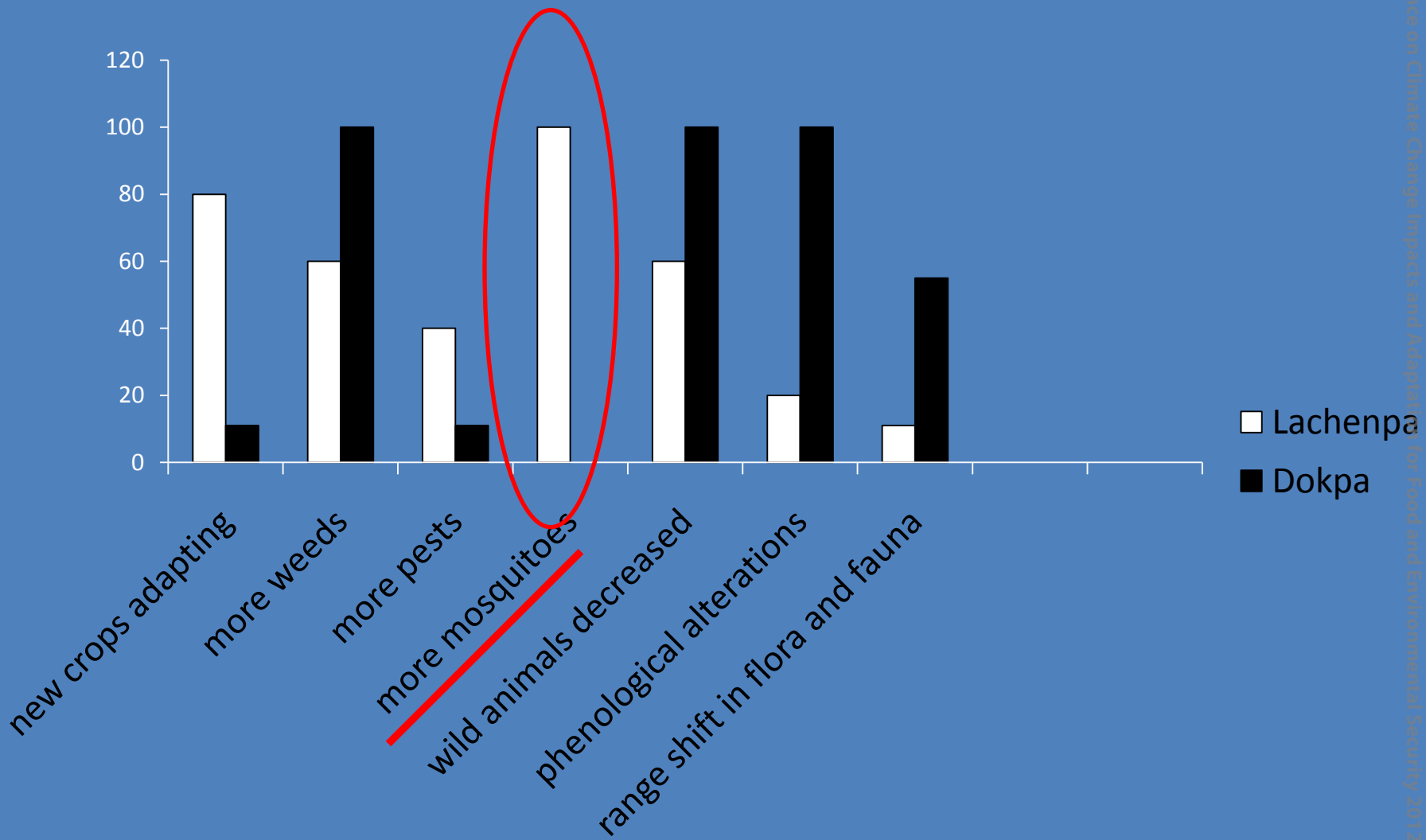
Early summer



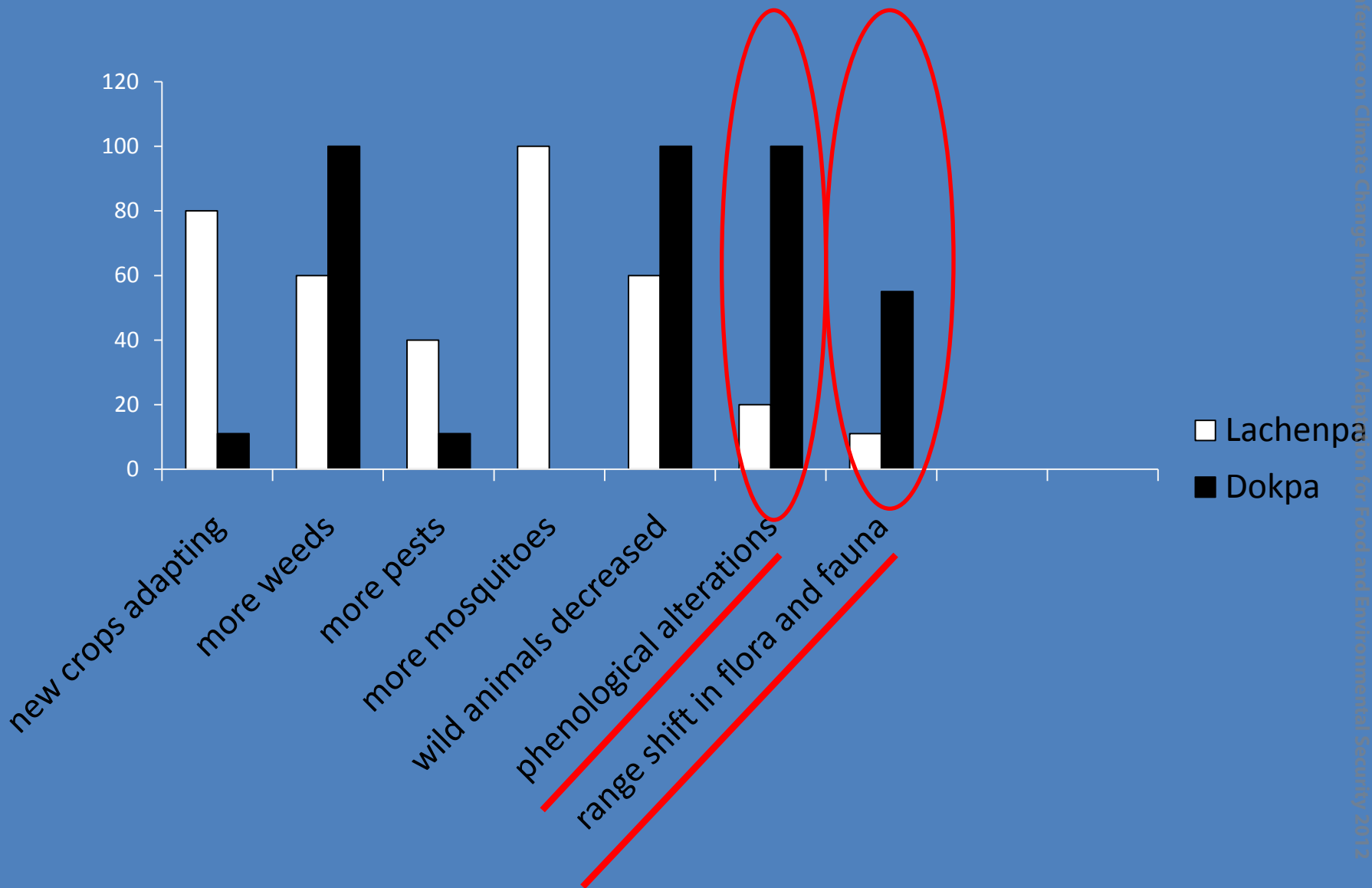
RESULTS AND DISCUSSION



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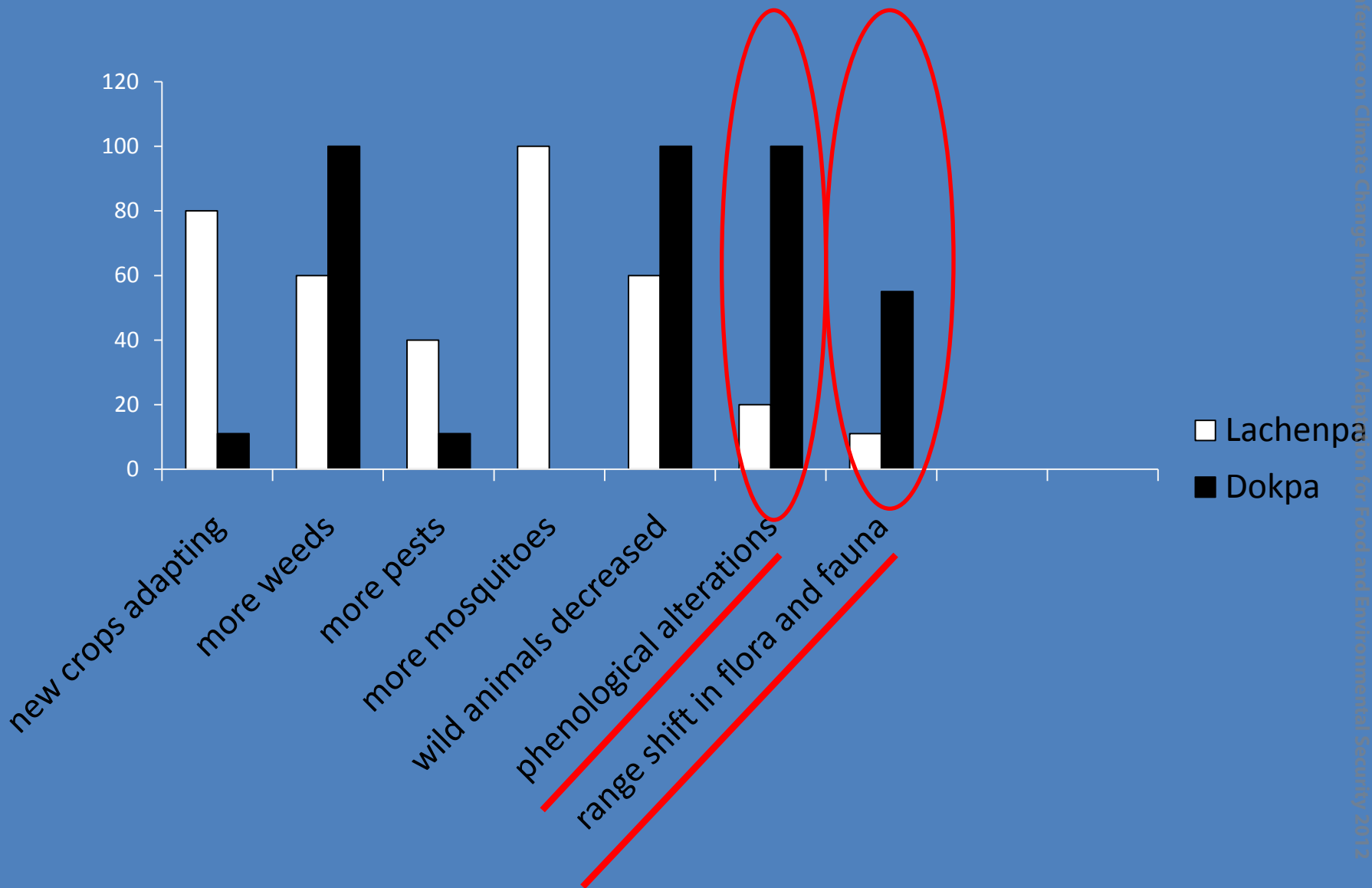




Rhododendron arboreum

- Before flowered in Late April-May
- Nowadays flowers in March

RESULTS AND DISCUSSION



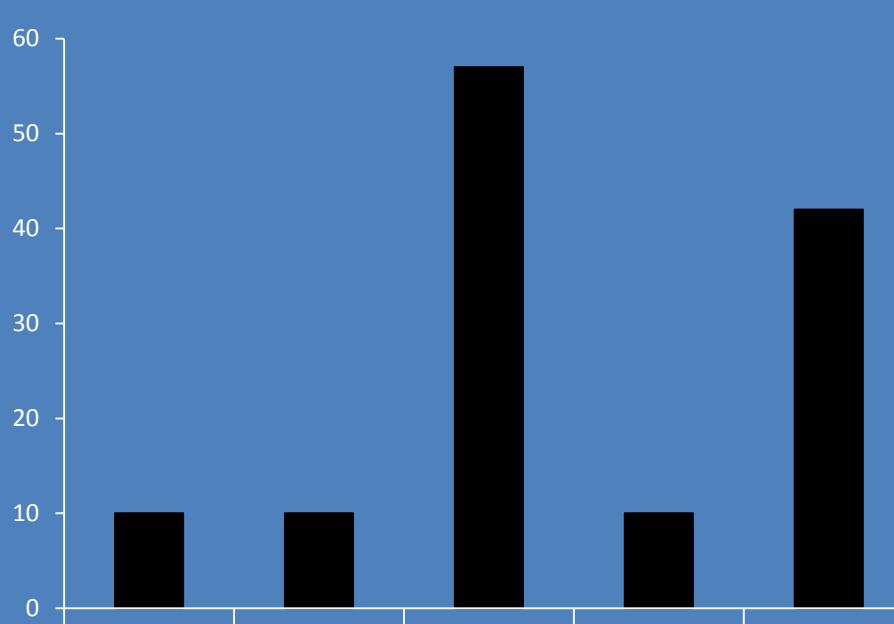
Thinner ice



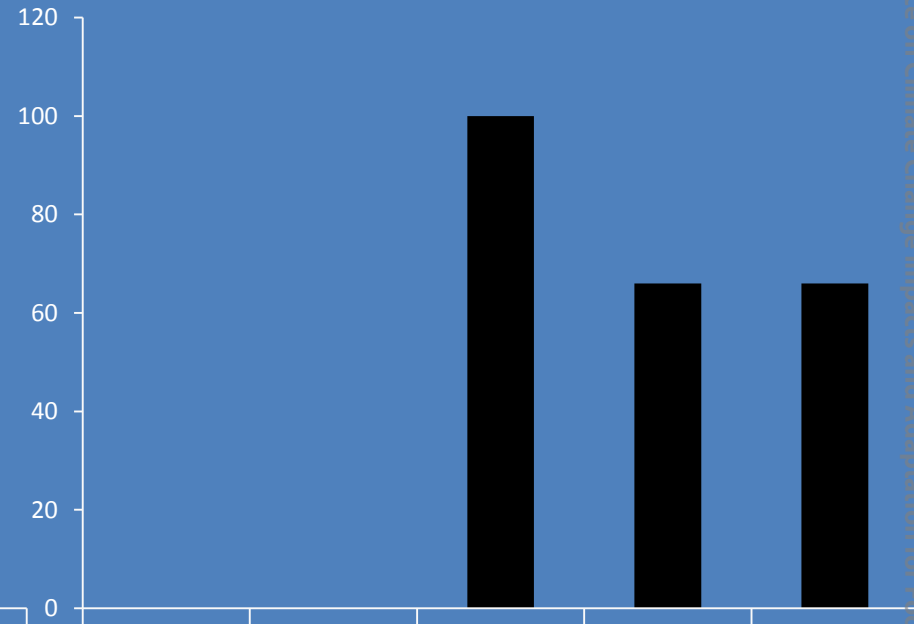
“Thinner ice makes crossing frozen streams more dangerous nowadays”

Reasons for observed changes

Lachenpa

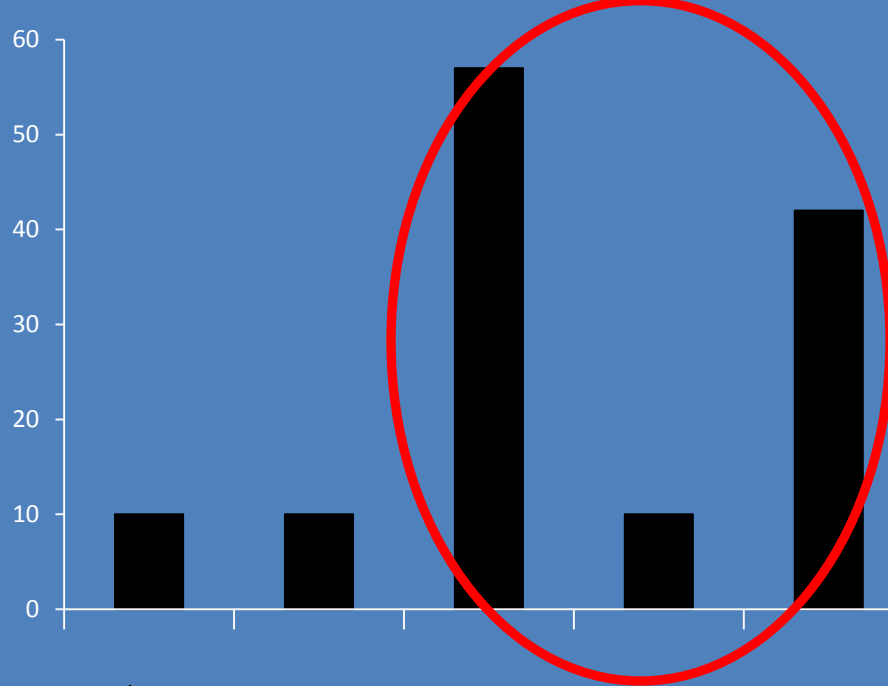


Dokpa

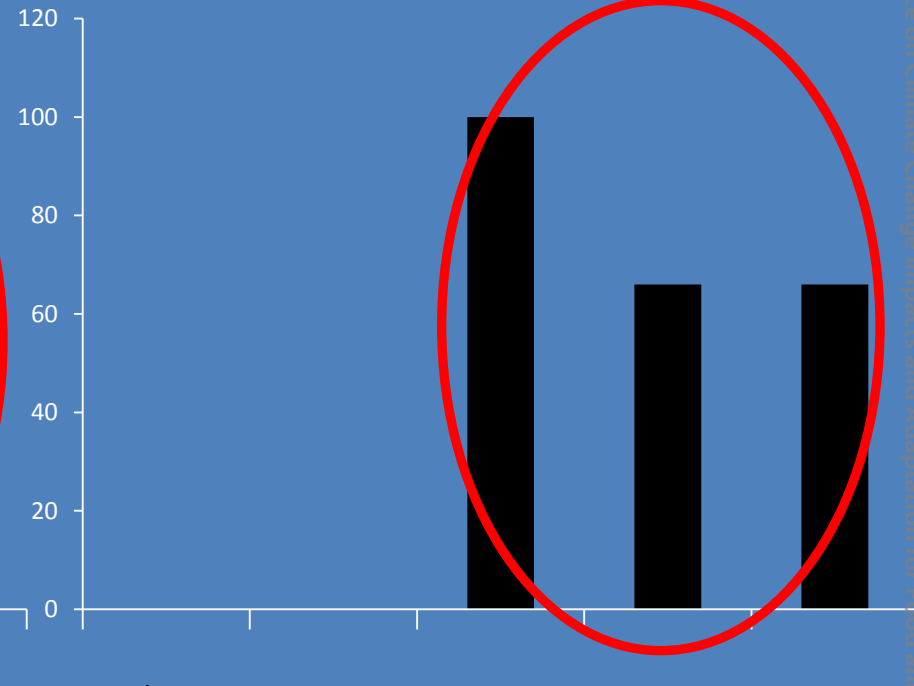


Reasons for observed changes

Lachenpa



Dokpa



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 (amsl)
**Maize, cabbages,
pumpkins**

Thangu (12,500 ft amsl)
Carrots

Gochung-(14500 ft amsl)
potatoes

Impacts on religious sentiments



“The Mountain’s have been reduced to old balding men, with just a few white hairs (snow cover) left at the top. We worshipped the mighty snow clad mountains, alas our God, our culture is threatened”

CONCLUSION

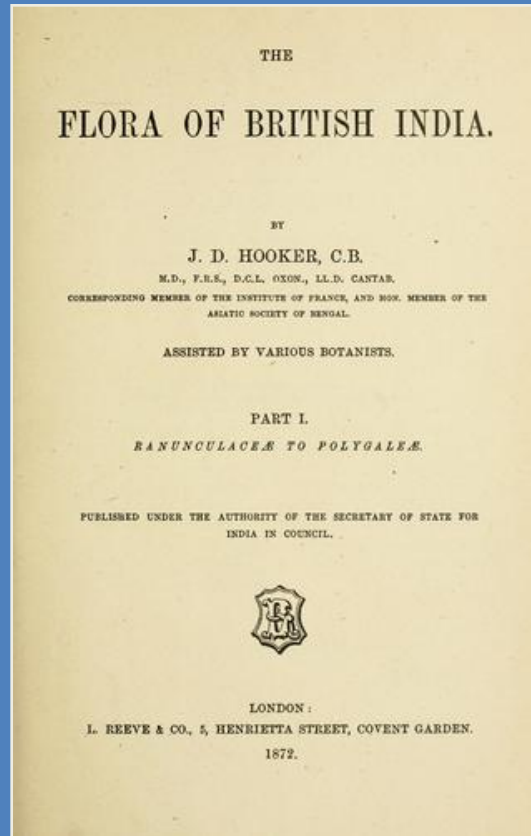
- The results of our study confirm certain climate change indicators
- Results conform to numerous scientific findings from around the world, further suggesting the method's and results' scientific credibility
- Traditional knowledge-
important sources of information
- HOLISTIC APPROACH-
Integration and feedback loops.



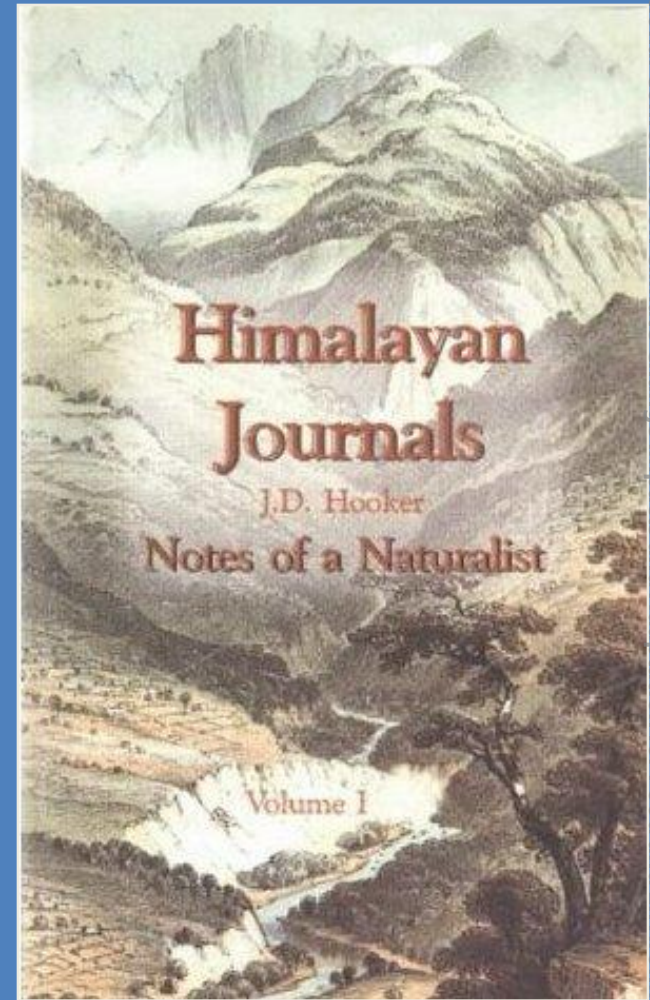
CONCLUSION



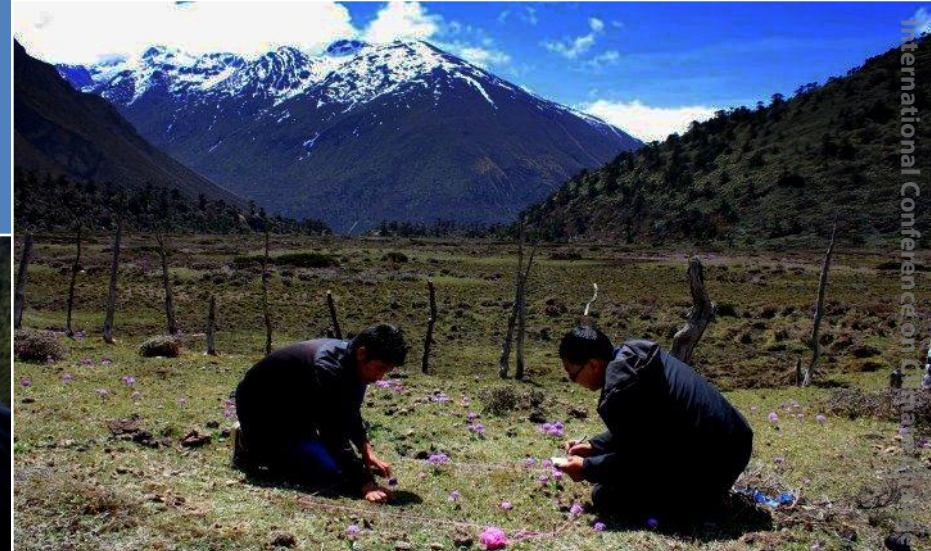
Traditional
Ecological
Knowledge



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 maximum
range size: **4500m**
Located at **4784 m**



Gentiana ornata
Previous
maximum range
size: **4500m**
Located at **5212m**



Primula primulina
Previous
maximum range
size **4500m**
Located at **4824 m**



*Bistorta
macrophylla*
Previous
maximum range
size: **4500m**
Located 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
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Thank you

OTC

