

International Society for Ecological Economics (ISEE)

Bi-annual meeting, August 2014

Reykjavik, Iceland

Reinmar Seidler et al. (ATREE & Univ. Massachusetts Boston)

“Can Ecosystem Services be leveraged to link social and environmental goals in dynamic Eastern Himalayan mixed-use landscapes?”

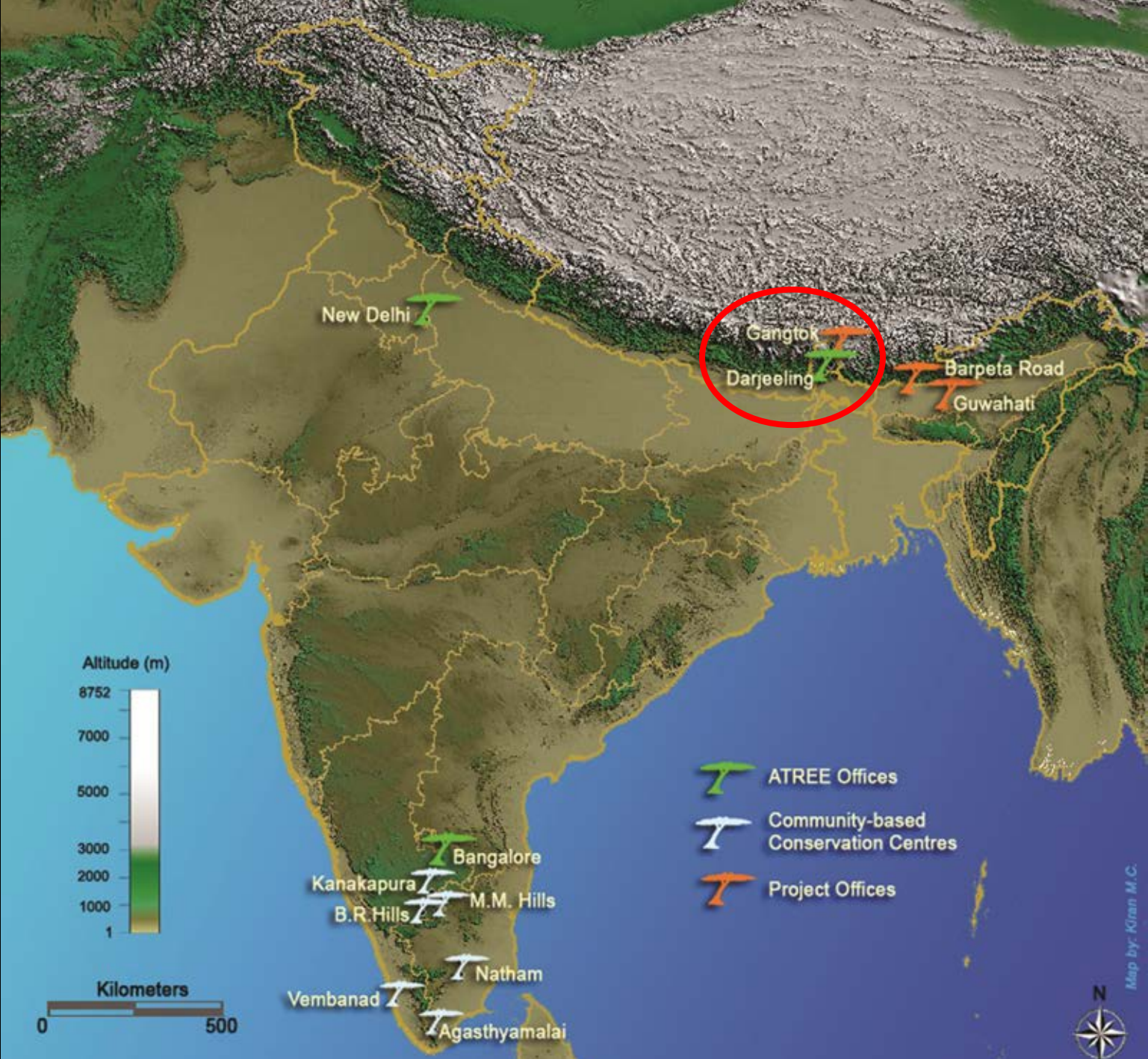
ATREE: Ashoka Trust for Research in Ecology and the Environment

Can Ecosystem Services be leveraged to link social and environmental goals in dynamic Eastern Himalayan mixed-use landscapes?

Reinmar Seidler, Tenzing Ingty, Anand Gazmer, Chirag Rai, Pashupati Chaudhary, Kamaljit S. Bawa



Where we work



Singalila National Park, Darjeeling District



Evolutionary center of *Rhododendron*
diversity



Lhonak Valley,
N. Sikkim District

Roles of ES

in Darjeeling & N. Sikkim rural economies

- Do ES have **positive net economic value** to local communities in this study area?
- **'Co-production'** (Lele et al 2013) **of ES** is increasingly seen as just one among a broadening portfolio of livelihood options:
 - tourist industry
 - employment migration
 - rural employment programs (MGNREGA, etc.)
 - other wage labor...

Roles of ES

in Darjeeling & N. Sikkim rural economies

- Important ES are unavailable (under interdiction): hunting (= HWC), logging (= *Cryptomeria*, *Cinchona* plantations; HWC)...
- How are rural montane populations negotiating this changing employment landscape?
- How are their perceptions of the value of 'nature's services' changing?
- Are rural labour shortages altering the traditional role of agriculture in some communities?
- How might this affect the possibilities for policy-level support and incentives for ES production?

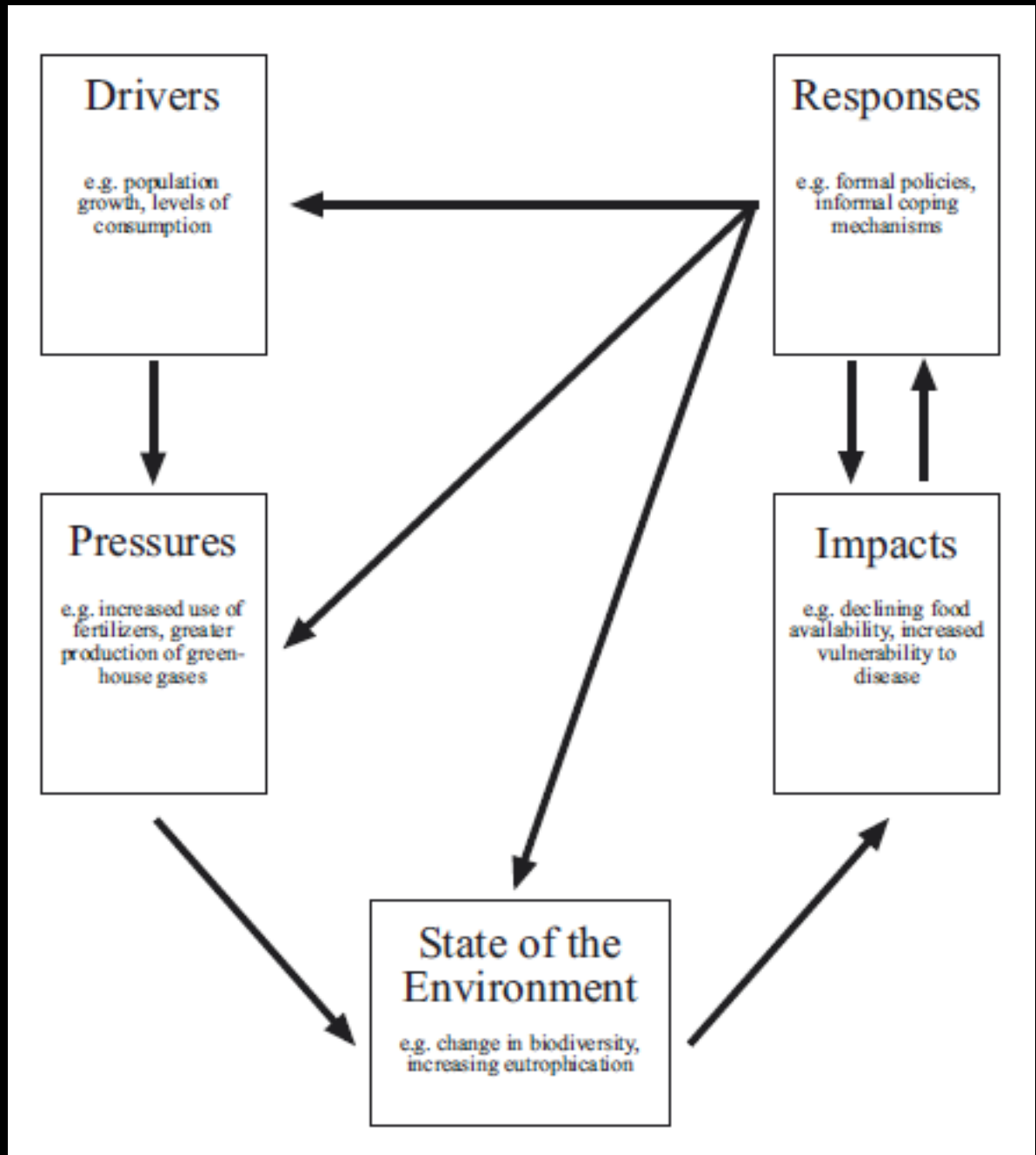
ATREE Program Goal:

Develop 'disaggregated' understanding of local Drivers, Pressures, States, Impacts & Responses (DPSIR)

1. **Measure ES** access, total usage and associated time budgets (fuel wood, fodder, water) at the household level
2. **Measure EDS** ('disservice') impacts, estimate risks and document current adaptive strategies (HWC, CC)
3. **Document** changing impacts and perceptions of **alternative livelihood opportunities** (urban growth & NFE: tourism, MGNREGA, migration/remittance...)

DPSIR framework

Drivers -
Pressures -
States -
Impacts -
Responses -



DPSIR critiques

(Carr et al 2007)

DPSIR ...

1. "...cannot address the impact of **aggregated, informal responses** on the drivers and pressures ..."
2. implicitly creates an "unexamined, **unacknowledged hierarchy of actors** ..."
3. "...**reproduces existing inequalities** between actors and stakeholders within current approaches"

AND

4. Repair "requires more than an '**add and stir**' solution, where aggregated, informal local responses become **another letter in the framework...**"

Clive Spash (ISEE, Reykjavik 2014)

1. **New Resource Economics**: Neoliberal economic relations in sheep's clothing...
2. **Ecological Pragmatism**: Crude utilitarian sell-out (ES!!)...
3. **Social Ecological Economics**: The *real* Ecol Econ...

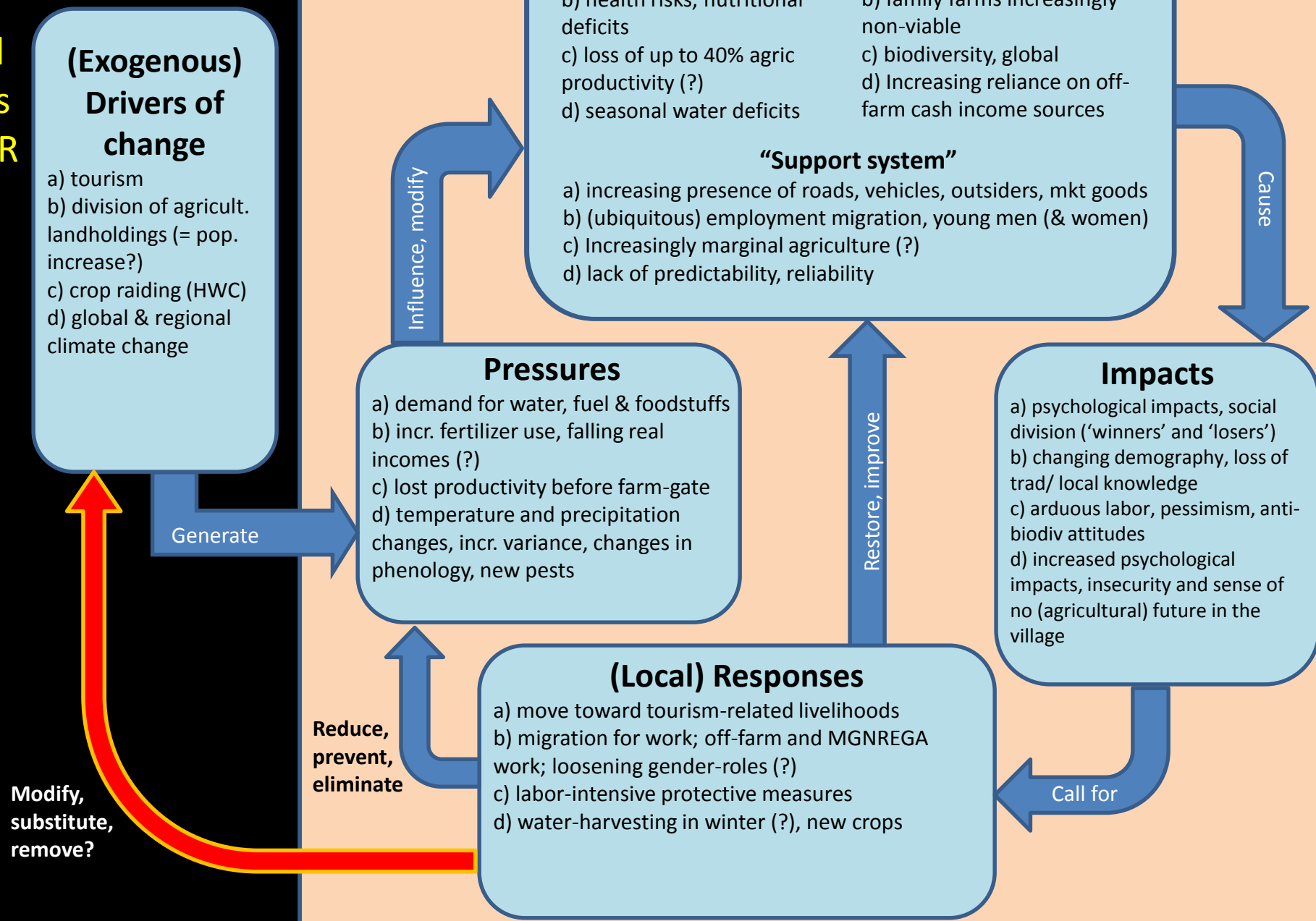
DPSIR critiques

(Carr et al 2007)

- Critiques of **development practice** more broadly...
- DPSIR: anything more than a **tool** – a logical sequence of elements to **guide** multidisciplinary research?
- Choice of **foci** remains key...

Modified DPSIR framework:

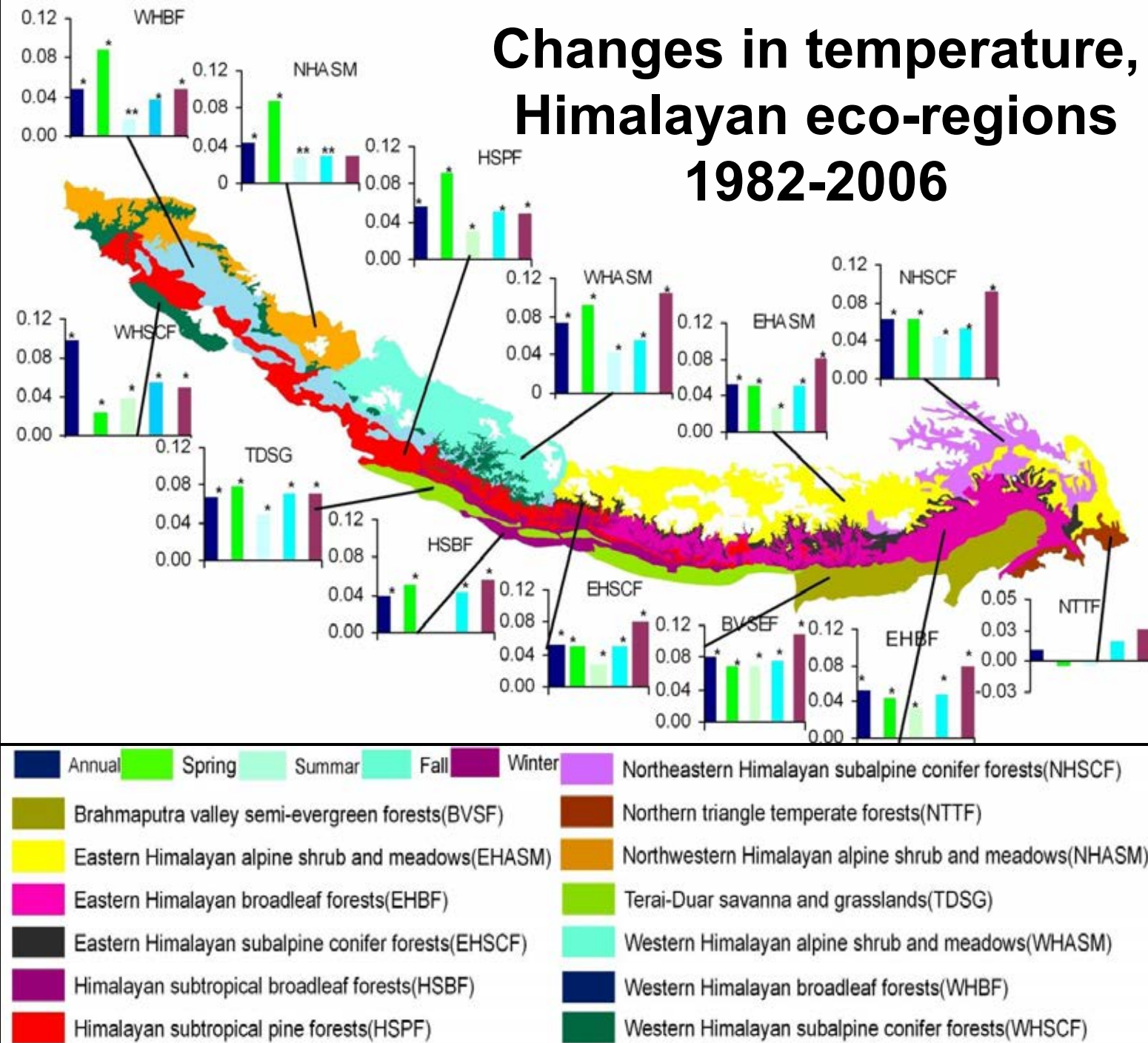
Preliminary hypothetical relationships among DPSIR elements – based on interviews and FGD...



“What’s going on here??”

Contributions to scientific knowledge on CC (1)

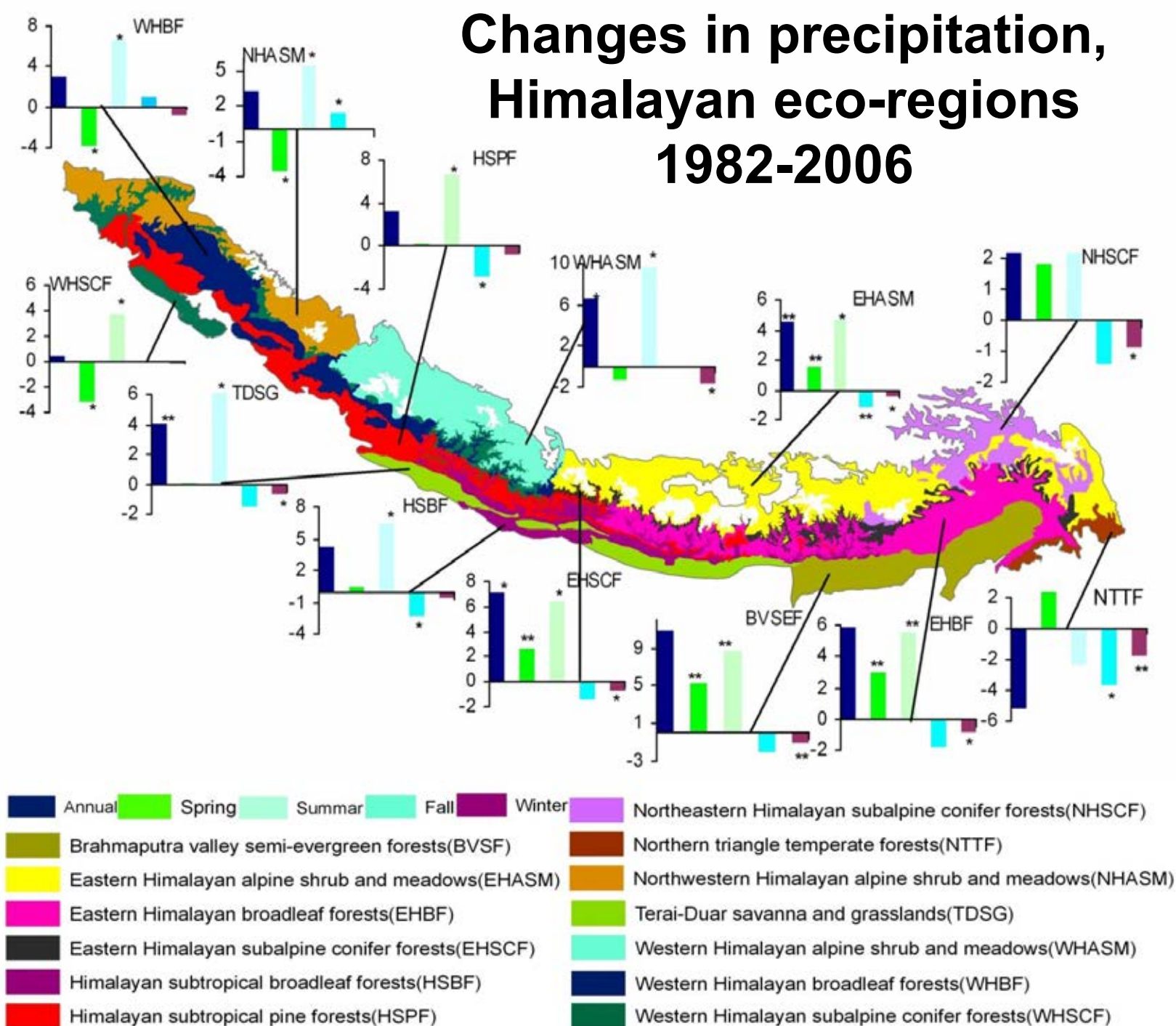
Changes in temperature, Himalayan eco-regions 1982-2006



Shrestha and Bawa 2012

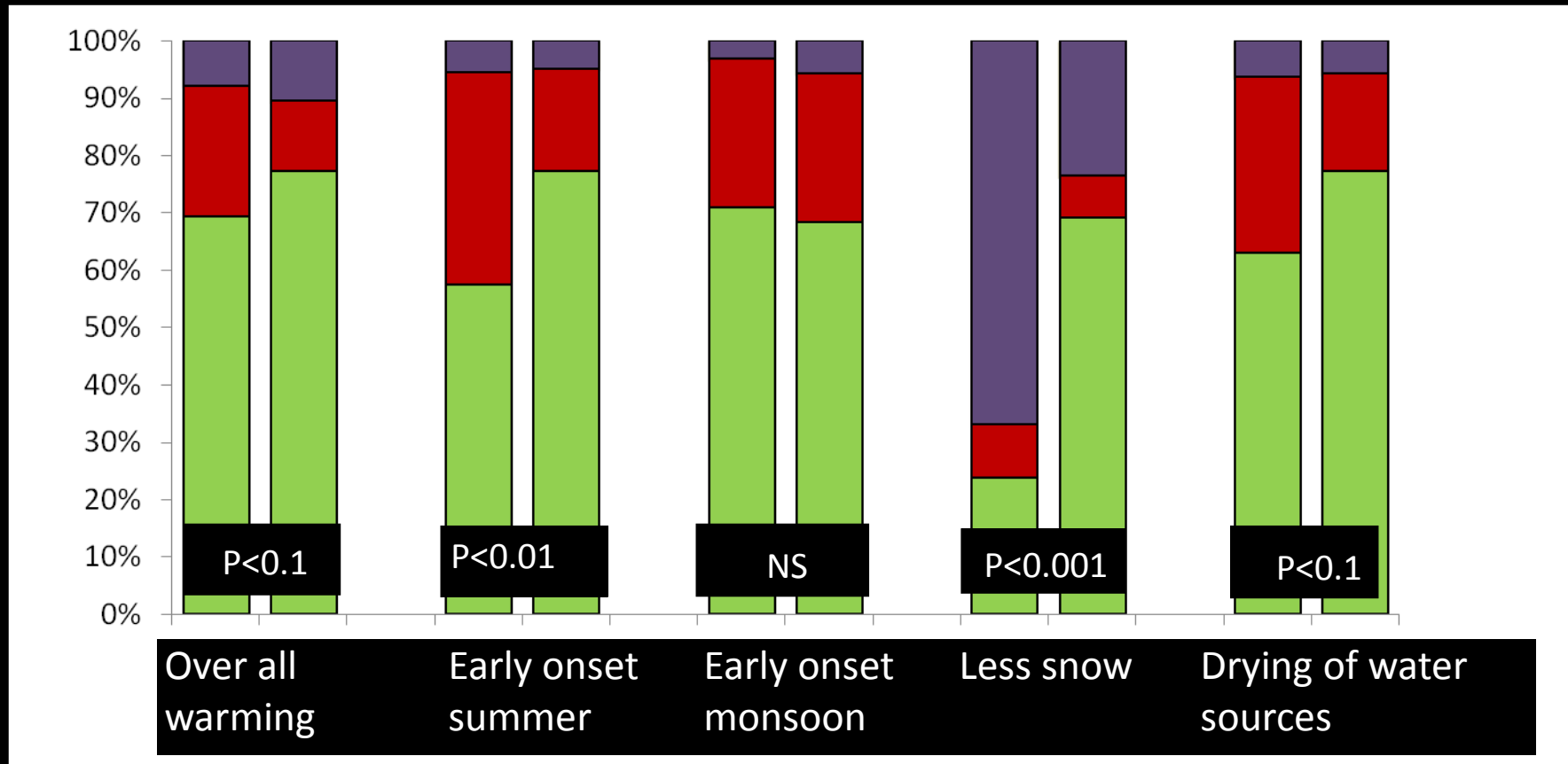
Contributions
to scientific
knowledge
on CC (2)

Changes in precipitation, Himalayan eco-regions 1982-2006



Shrestha
and
Bawa
2012

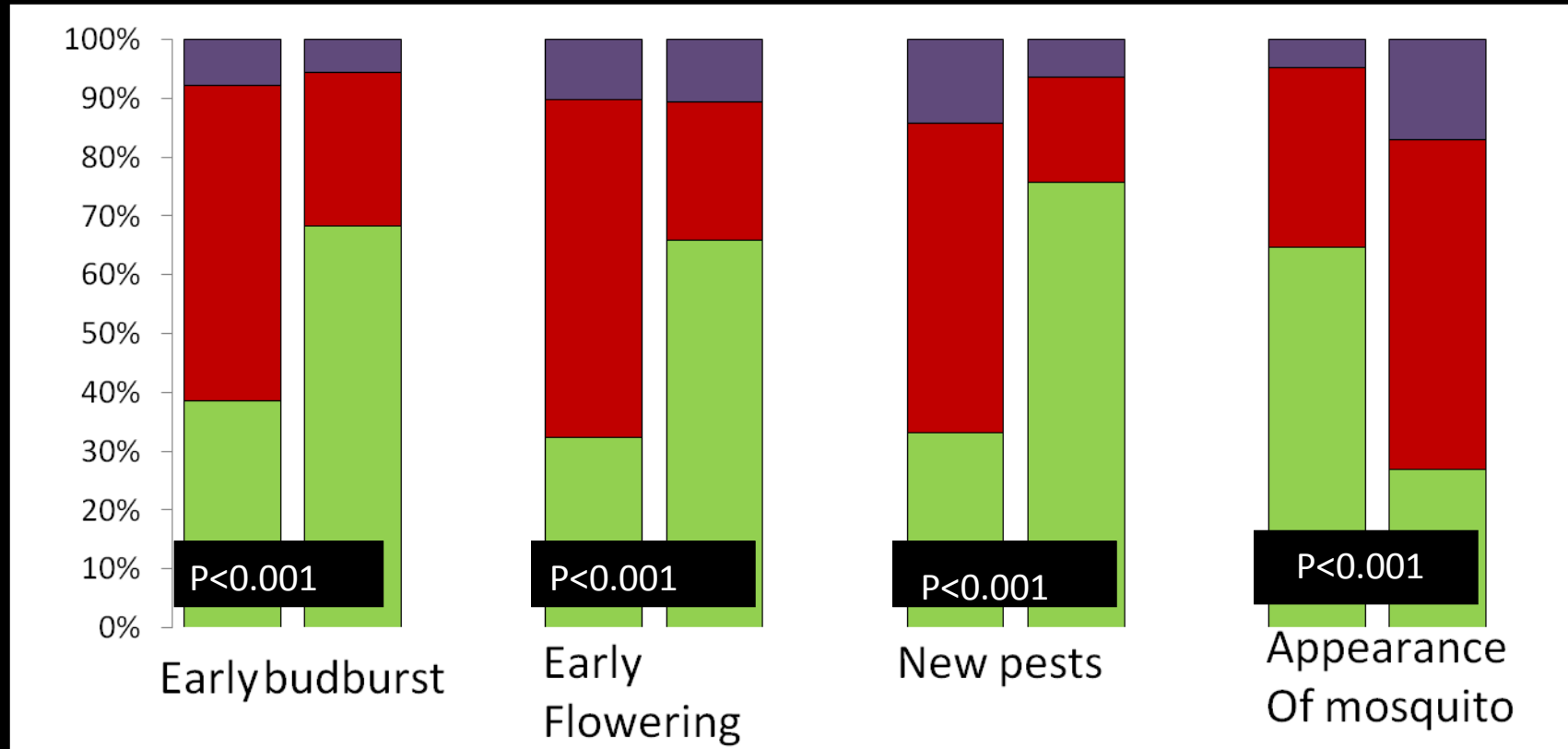
Local perceptions of climate change impacts in the Eastern Himalaya



Experienced change No change Don't know

Left bars = Low altitude (~1500m, 127 HHs); Right bars = High altitude (>2100m, 123 HHs)

Local perceptions of climate change impacts in the Eastern Himalaya



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Lake Gurudongmar, N. Sikkim (5,210m)

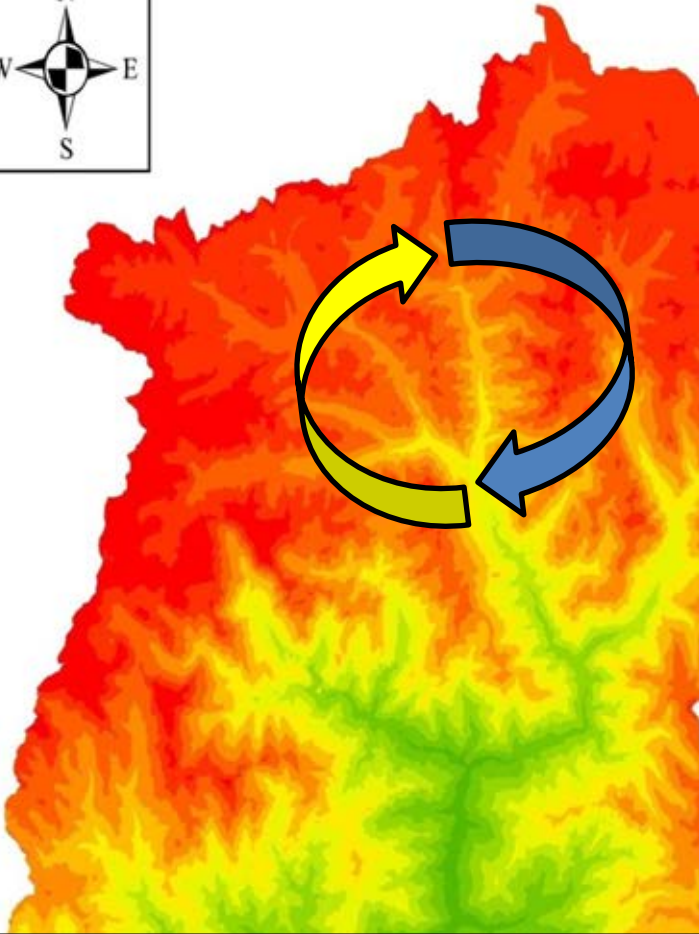
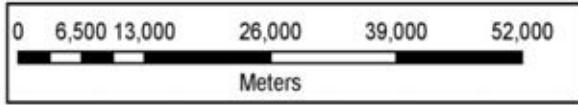
Indigenous communities of Lachen and Lhonak valley

Dokpa
3800m-7000m



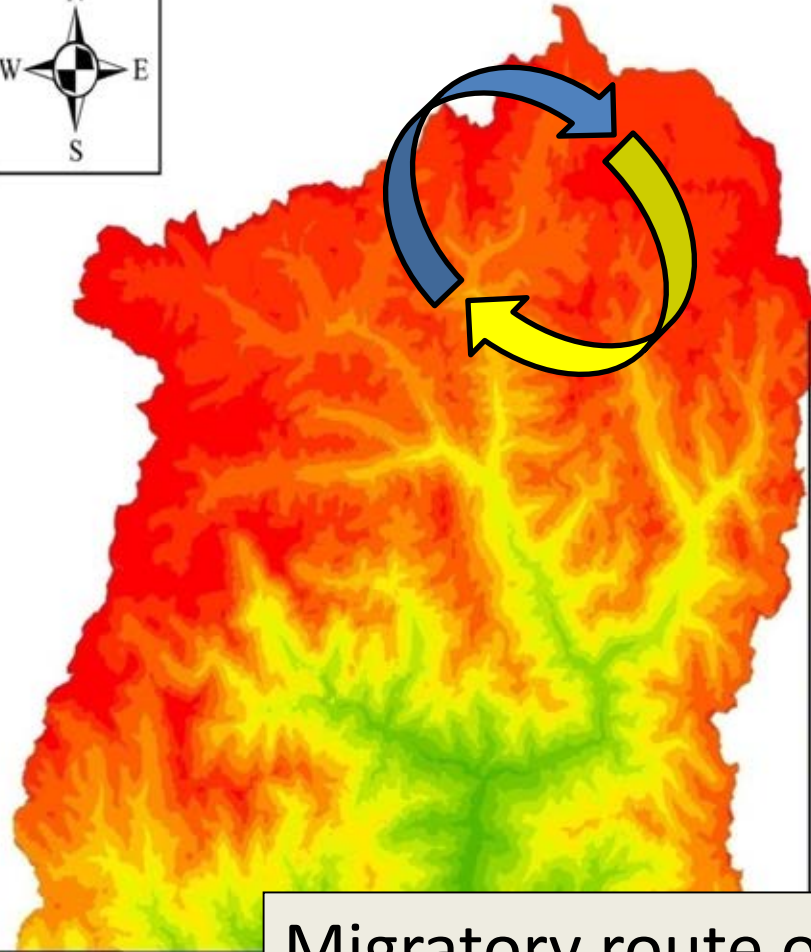
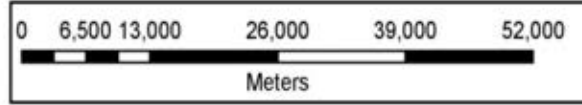
Lachenpa
2000m-3800m





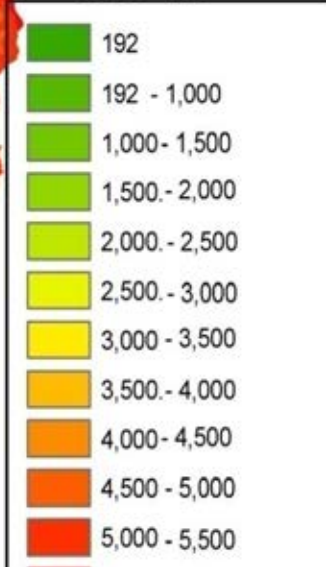
Migratory route of Lachenpas

- Summer Migration
- Winter migration



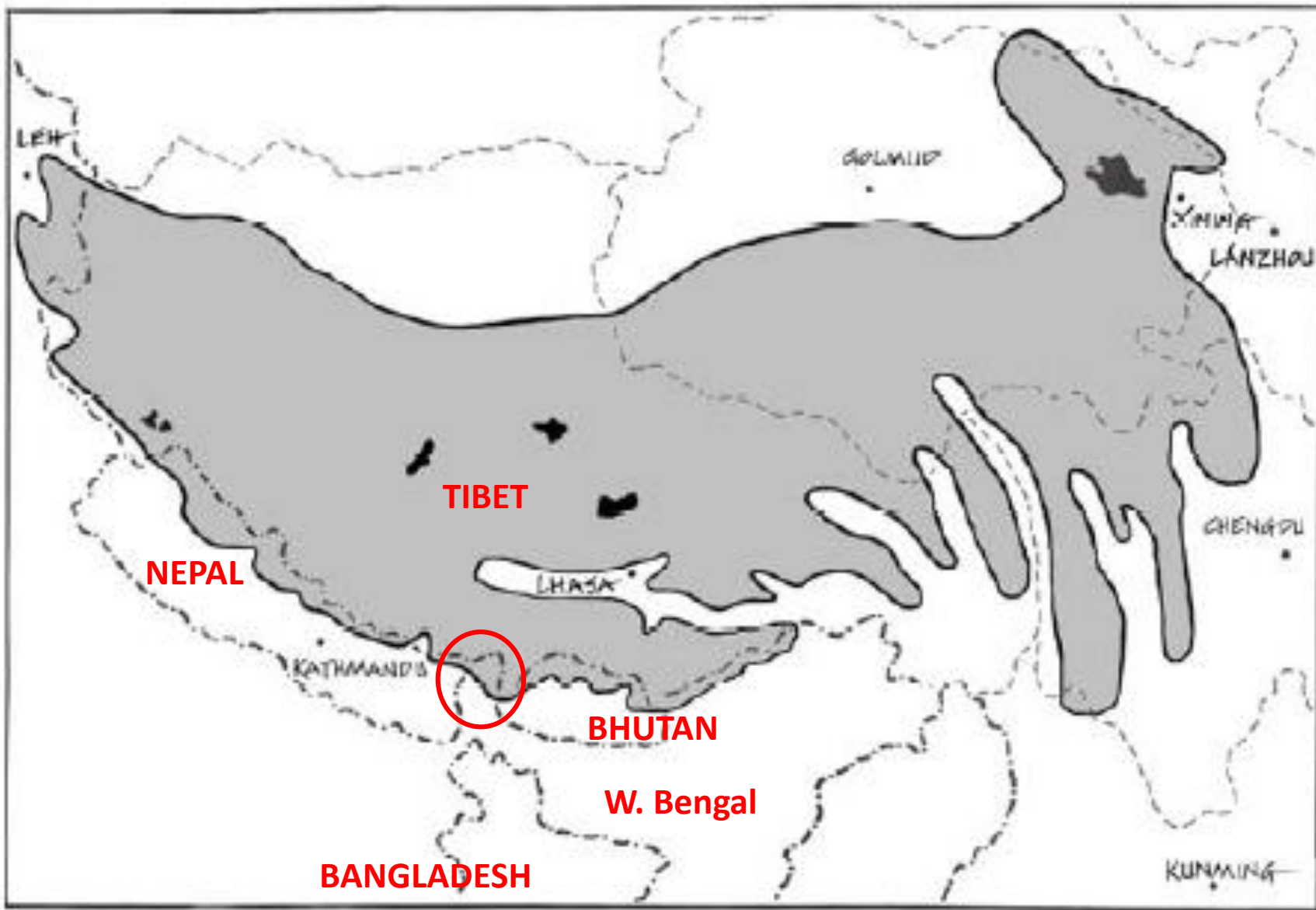
Source: Aster DEM

LEGEND

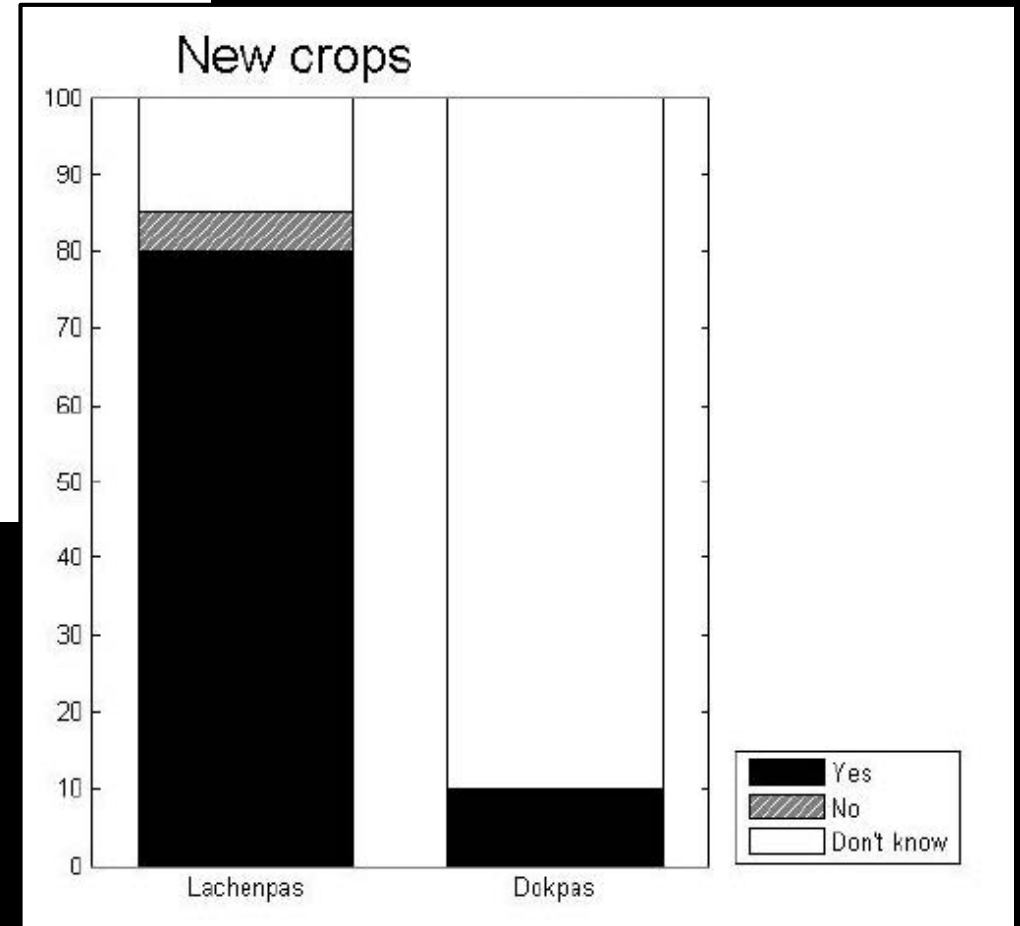
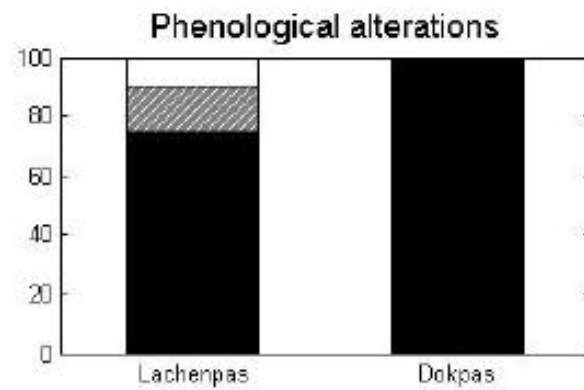
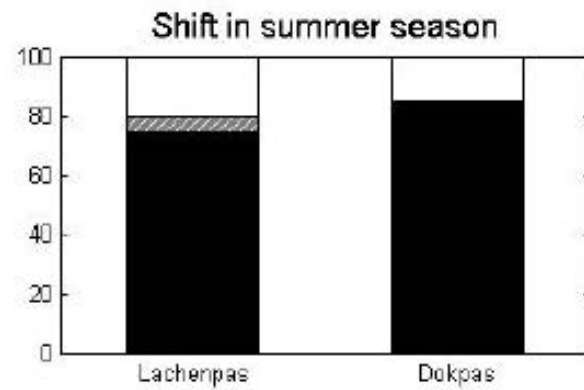
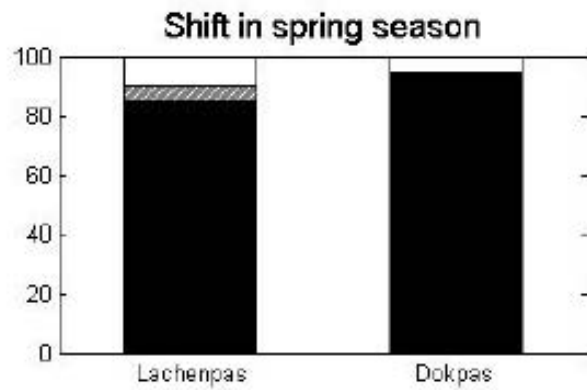


Migratory route of Dokpas

- Summer Migration
- Winter migration



Map of the Tibetan Nomadic Pastoral Area



Comparing community perceptions of seasonal changes (Lachenpa and Dokpa communities)



Fig.1: Consistent perceptions of the 2 communities on decreasing snow fall

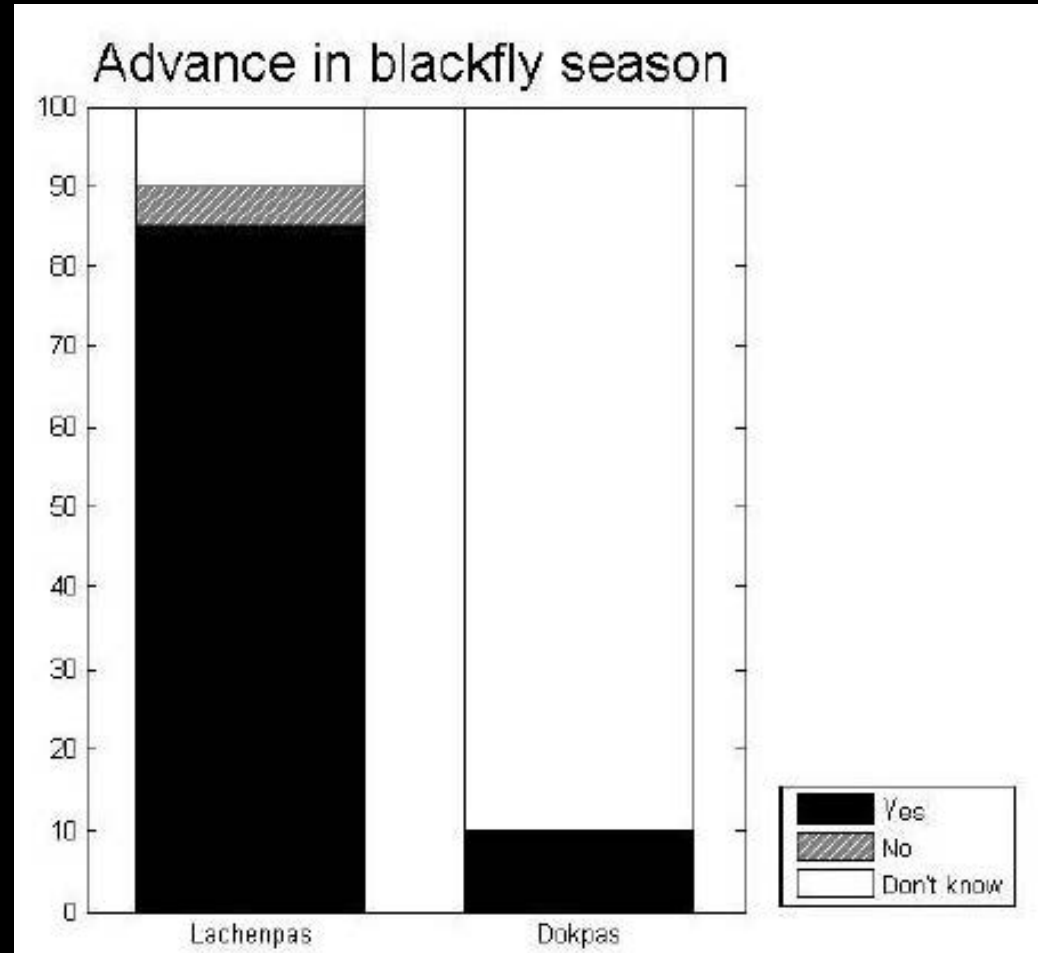
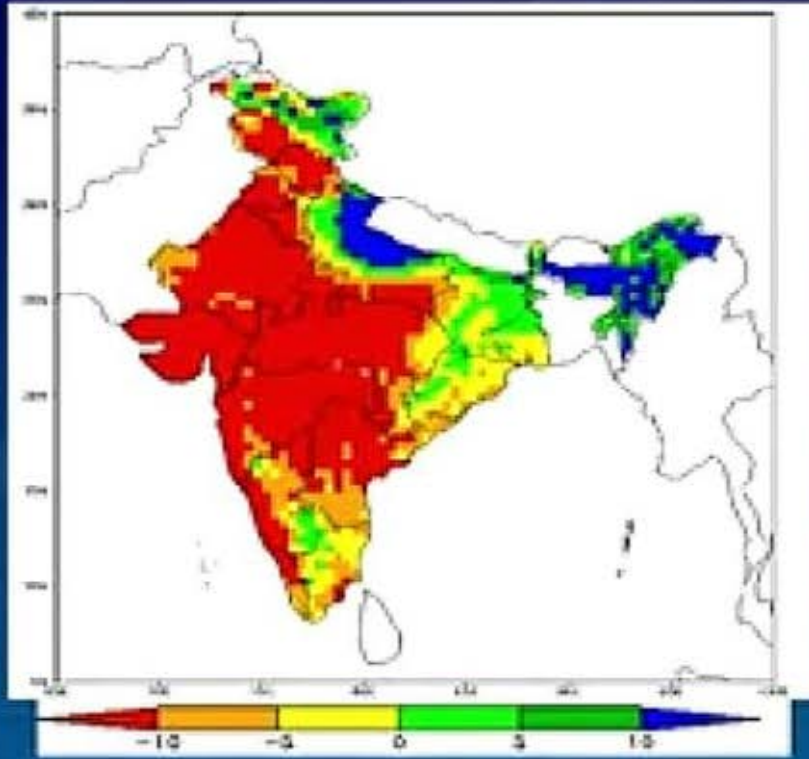


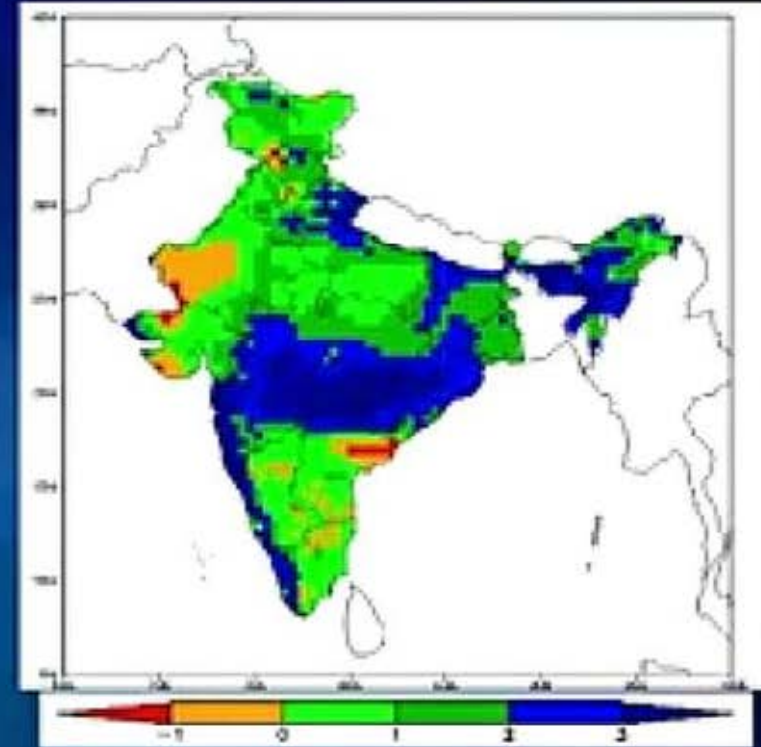
Fig.4: Perception of the 2 communities on whether black-flies are appearing earlier in the year.

India: Decrease in Rainy days but increase in Heavy Rain events



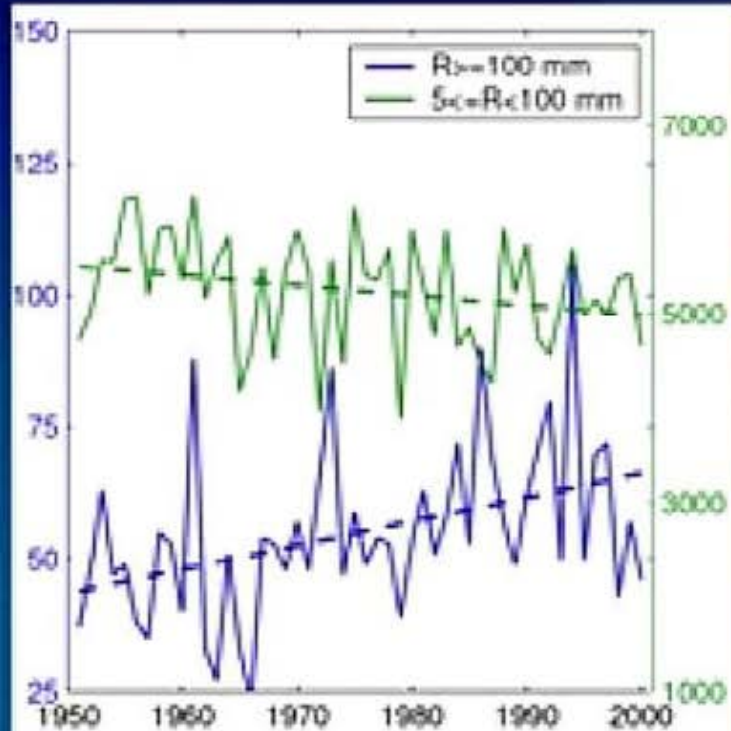
Decrease in rainy days
and increased dry spells

BUT



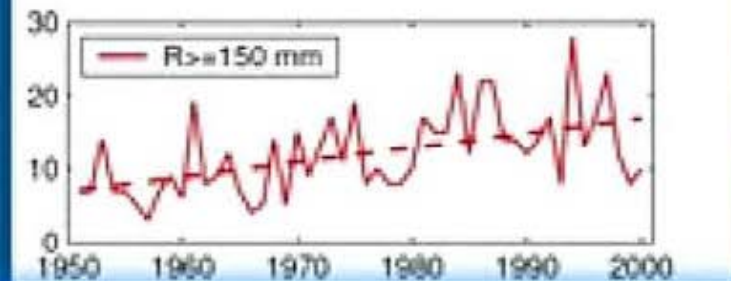
More intense rainfall
More Flash Floods

Changes in the Frequency of Extreme Rainfall

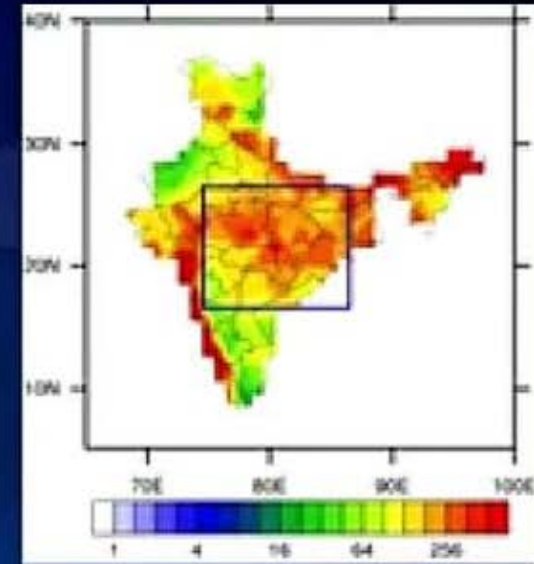


Low & Moderate events

Heavy events (>10cm)



V. Heavy events (>15cm)



Cyclone AILA at Frymal village, Darjeeling -25May2009

**Expected
impact:
Increasing
severity of
cyclones...**



Cyclone Aila, May 2009



Teesta bazar during Cyclone AILA (26May09)

It is hard to imagine that just 3 days of intense rain during Cyclone AILA resulted in the level of water rising to where it almost reached the houses along the road from Kalimpong towards Darjeeling



The same spot on 13Jun09



Sikkim, Sept 2011

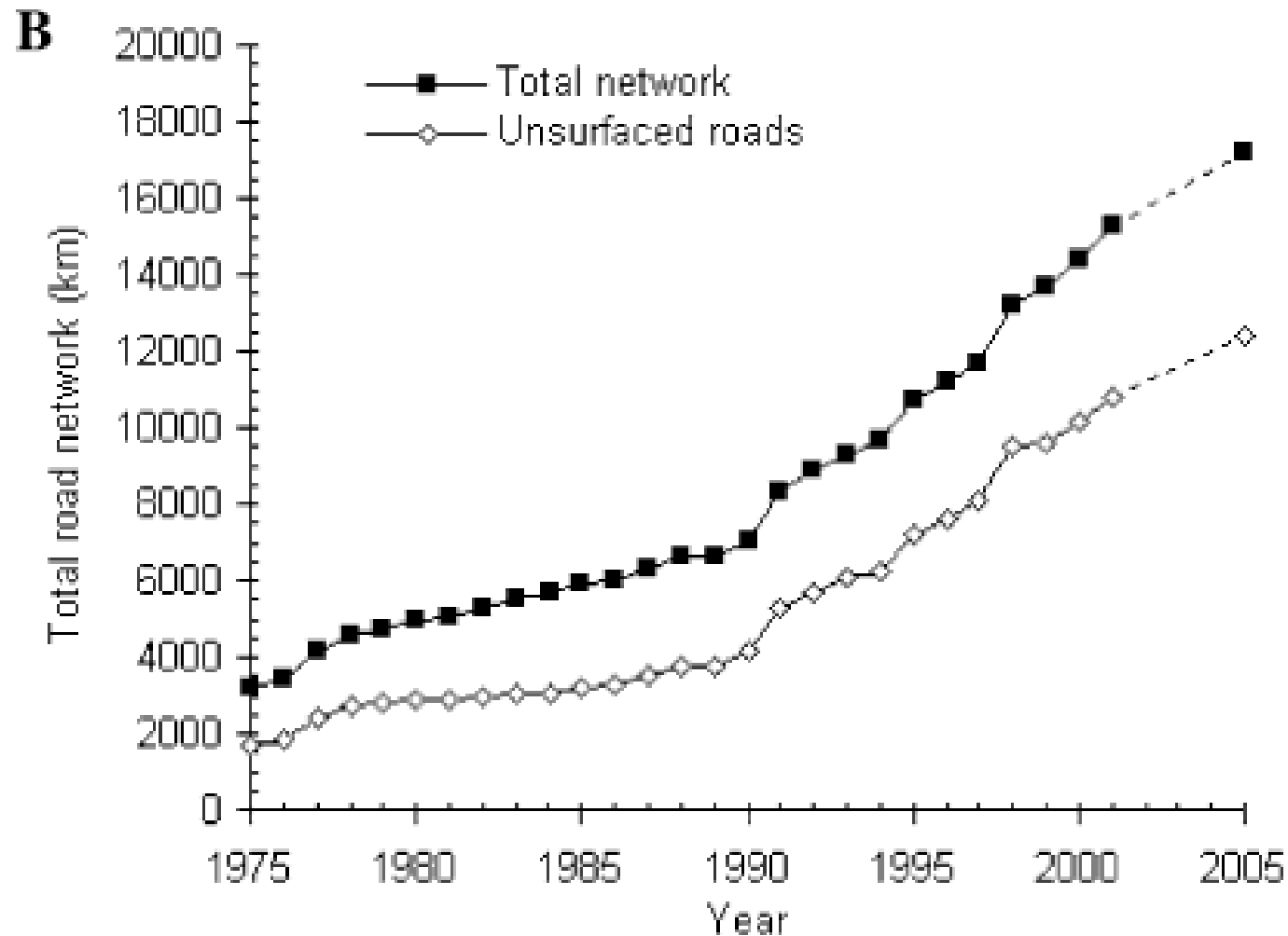


Tindharia,
Darjeeling district,
Sept 2011

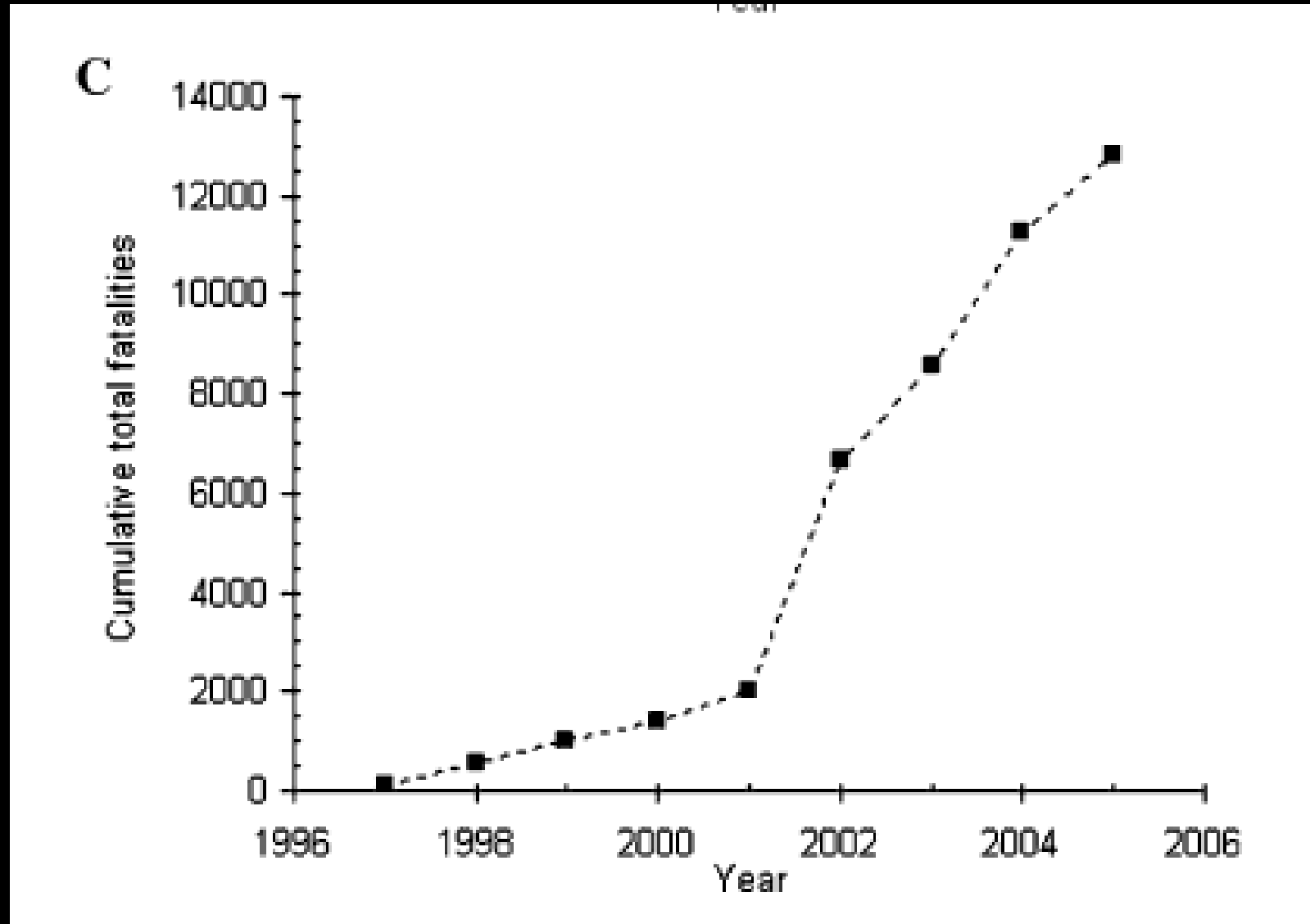




Expansion of the rural road network in Nepal, 1975-2005



Increase in total landslide fatalities in Nepal, 1997-2005



Petley et al 2007

How do communities perceive risks to their lives and livelihoods?

Answers vary widely...

Is variation due

- to spatial / geographical / ecological variation, or
- to individual perception?

1. Marketing of produce: transport difficulties in absence of roads...



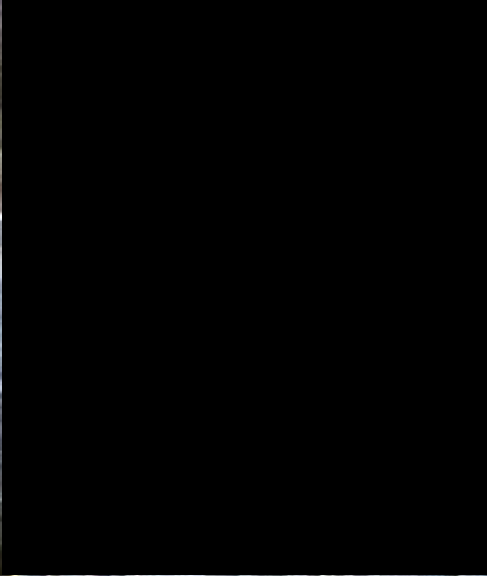
2. Crop raiding by wild animals...



Crop-raiding animals

1. Wild boar
2. Porcupine
3. Deer, hare
4. Macaques, yellow-throated martens, bird spp...
5. [Leopard??]

(Much variation among individuals & villages in relative ordering of these threats)



Cryptomeria japonica
60-80 yrs



3. Declining land productivity:

top-soil loss; poor soil mgmt; often, marginal soils, steep slopes, heavy rain...

Cook stoves

- 3 billion people--open fire
- Millions--ill health
- 4 million premature deaths



Improved Cook Stoves (ICS)



Traditional stove

New ICS



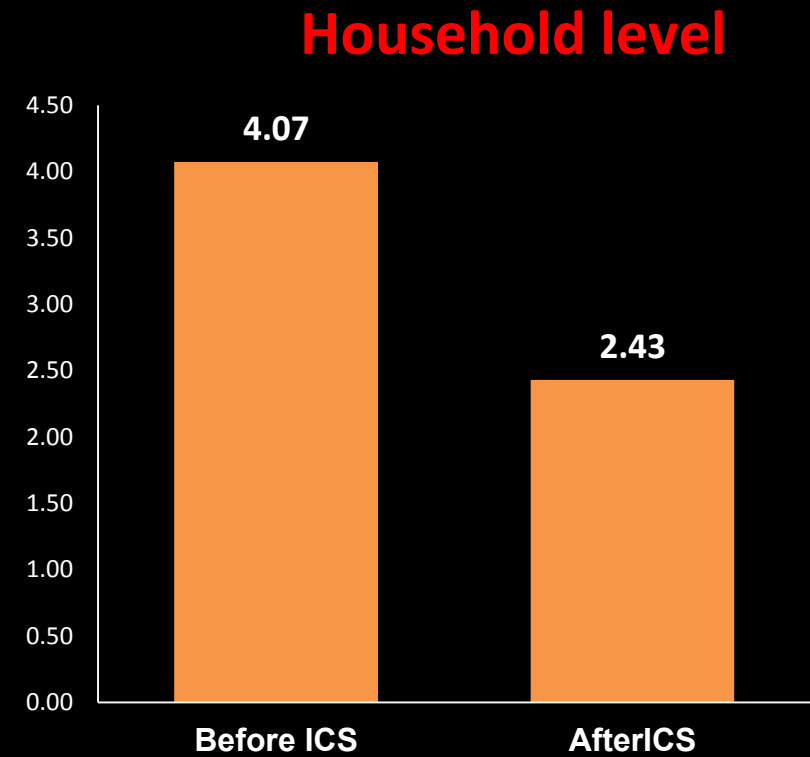
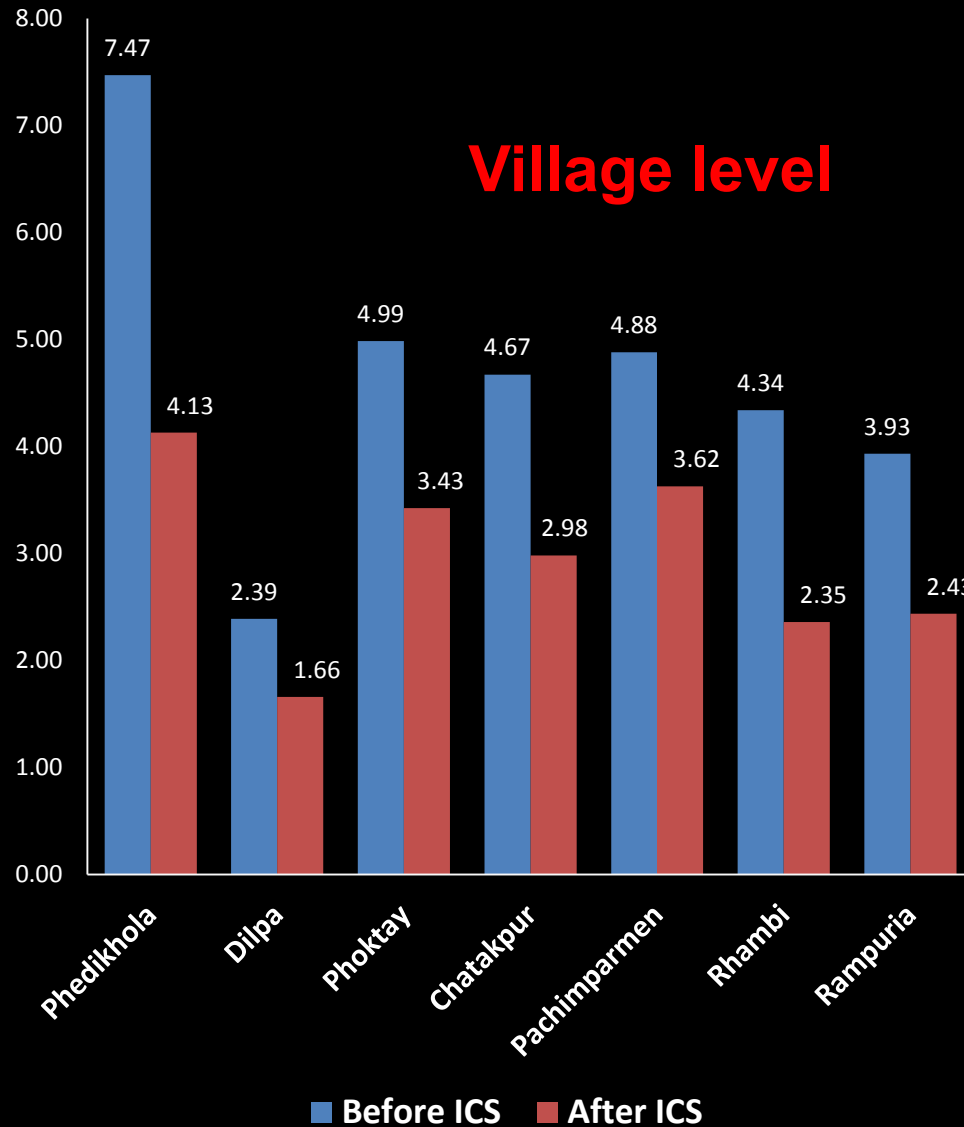
- *Tamang-style* stove (Nepal)
- 200 households in 10 villages, 2013-2014
- Community-based stove technicians
- Locally available materials
- Cost: <\$25/stove



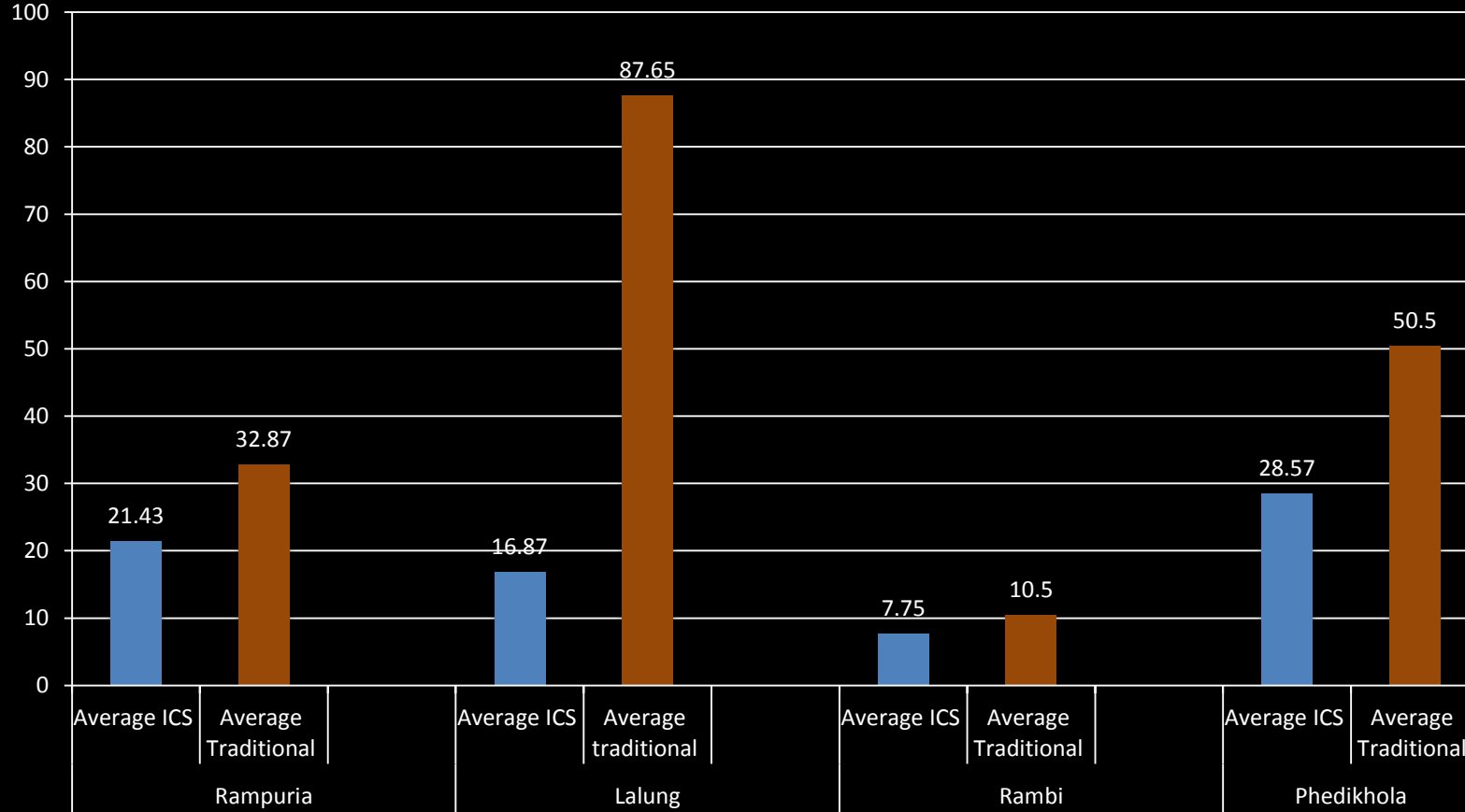


Fuel wood consumption, before & after installation of ICS

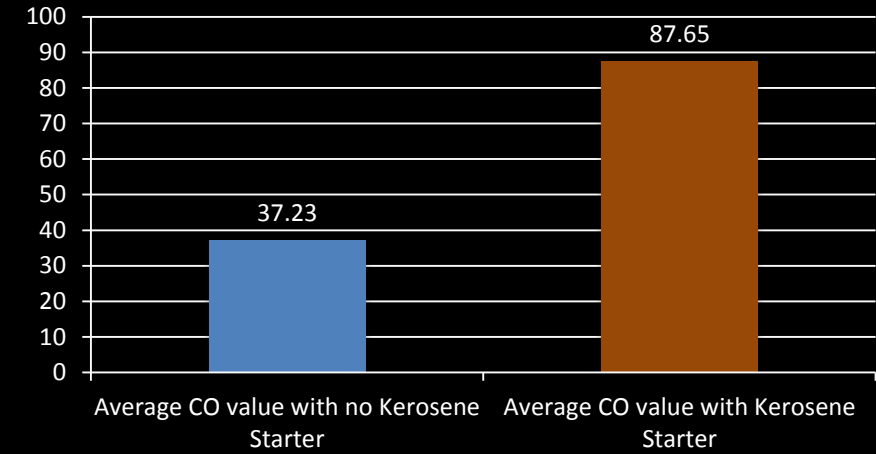
Village & Household levels (kgs/day/capita) – monsoon season



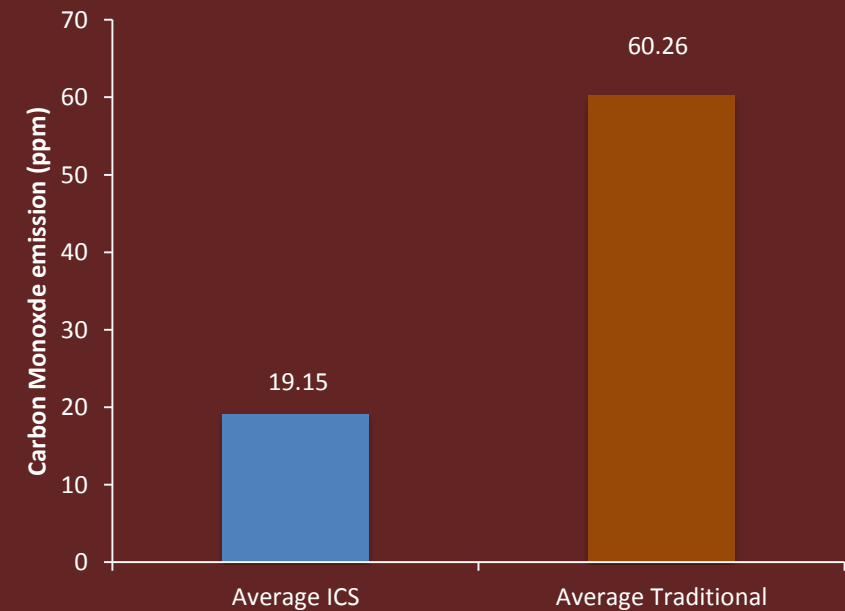
ICS and Trad Stove Mean CO Emissions in four villages of Darjeeling District



CO Emissions in Trad Stoves using Kerosene Starter vs. Trad Stoves using no Kerosene Starter



Mean CO Emissions from ICS and Traditional Stoves



CO levels from traditional stoves surprisingly high

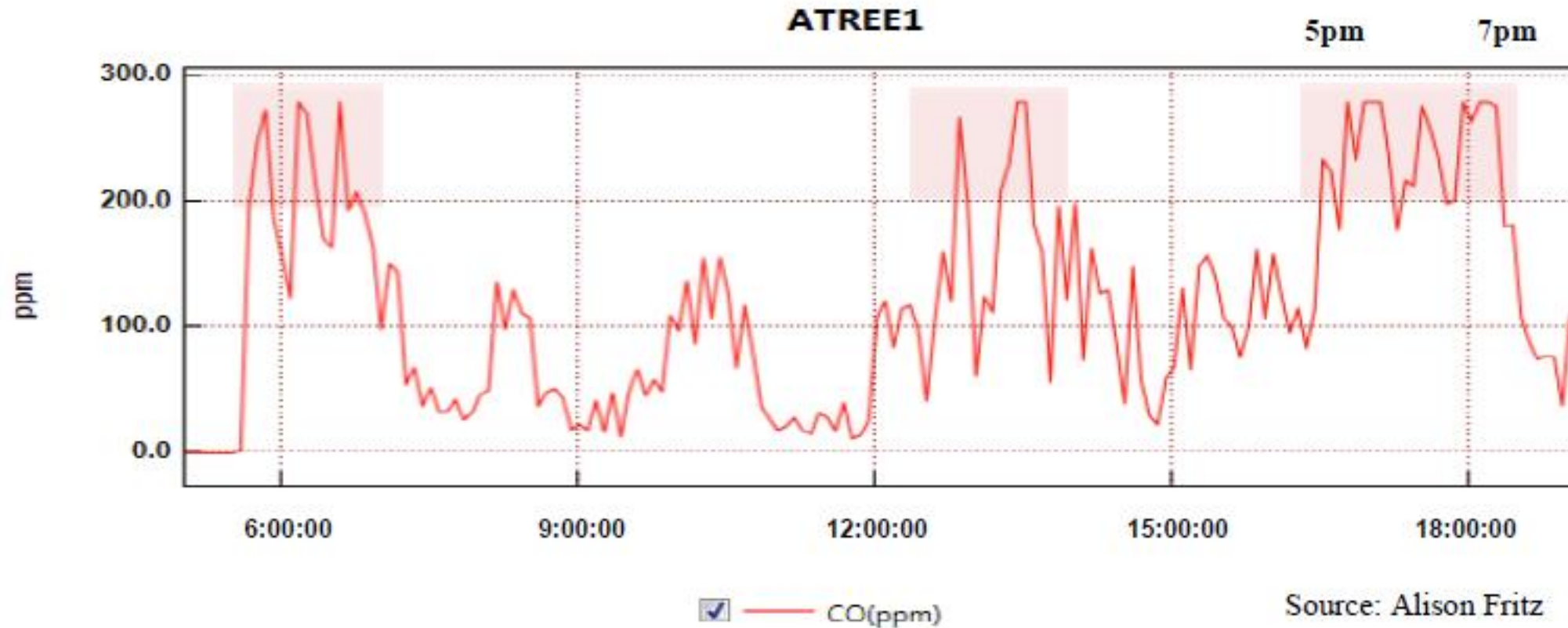


Fig. 5: CO levels measured at intervals of 5 mins (June 18, 2014) in a Lalung (SWS) household

WHO guidelines: over 200ppm is dangerous!

Number of ICS and Traditional Cook Stove Households Reporting Symptoms of Chest Illness, Headache, Cough and Eye Irritation

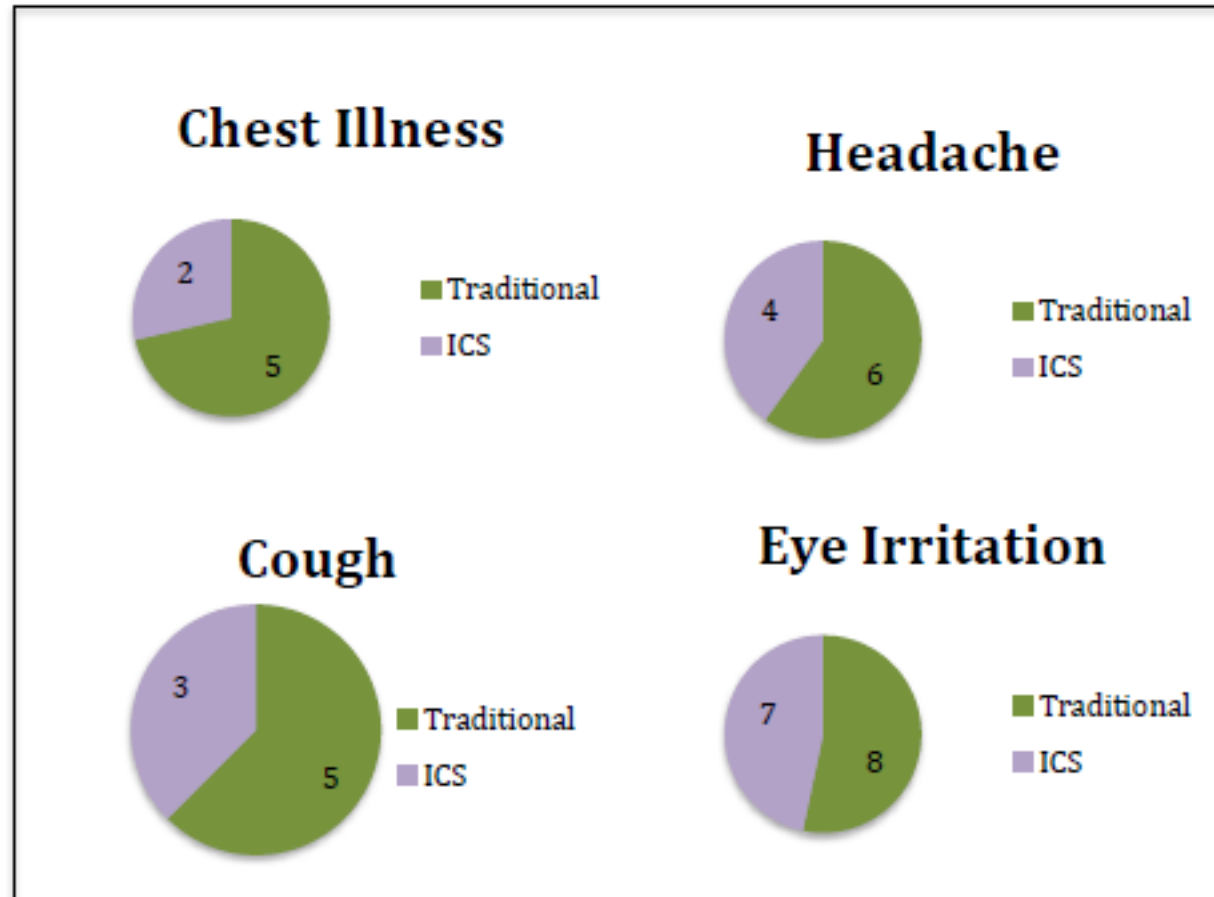


Figure 6: Breakdown of Households Reporting Symptoms of Chest Illness, Headache, Cough and Eye Irritation from Results of Household Survey

Source: Alison Fritz

Impacts (preliminary data)

- Reduced emissions = Better respiratory health, lower BC (PM) deposition...
- Reduced fuel wood use = Saved time, increased security...
- Cleaner kitchen & pans!

But LPG is still the preferred solution for most...

Summary

- Do ES form the basis for attractive livelihoods?
 - [Co-production stipulation]
 - [Given social & legal constraints imposed on ES extraction]
- Transition from “partial subsistence-production landscape” (provisioning ES) to “aestheticization” of the natural landscape (cultural ES) ??
- In general, is ES production less interesting to people than ES aggregation ??
 - Represents current development pathways...?