



UNIL-FGSE Workshop
3 Dec 2013, Lausanne

Impacts of out-migration on land management in mountain areas

Schwilch G., Jaquet S., Liniger HP, Centre for Development and Environment CDE, University of Bern, Switzerland

Sudmeier-Rieux K., Penna I., Jaboyedoff M., Centre for Research on Terrestrial Environment CRET, University of Lausanne, Switzerland

Kaenzig R., Institute of Geography, University of Neuchâtel, Switzerland

Impacts of out-migration on land management in mountain areas

Table of Content

1. Introduction
2. Research project and questions
3. Research methodology
4. Findings and outcomes
5. Conclusions and outlook

Mountain land use

e.g. Nepal



e.g. Tajikistan



B. Wolfgramm

S. Jaquet

Land degradation





Land degradation affects livelihoods



G. Schwilch



HP. Liniger

Outmigration



B. Wolfram



B. Wolfram

B. Wolfram



K. Sudmeier-Rieüx

Research Project

SUSTAINABLE LAND MANAGEMENT IN MOUNTAIN REGIONS OF BOLIVIA AND NEPAL IN THE CONTEXT OF OUTMIGRATION, CLIMATE CHANGE AND DISASTER RISK REDUCTION

- > Funded by the Swiss Network for International Studies SNIS, based in Geneva
- > Duration: 2 years (2013-2014)
- > 2 study areas:
 - Quillacollo District of Bolivia
 - Panchase area of Western Nepal
- > 7 institutes/NGO's involved



AGROECOLOGÍA
UNIVERSIDAD
COCHABAMBA



HELVETAS
Swiss Intercooperation



Research questions

- > how land management in mountains is being affected by outmigration (and in the context of natural hazards and climate change)
- > which measures are needed to increase resilience of livelihoods and land management practices
- > **understanding of the resilience** of managed land resources in order to enhance adaptation to environmental and socio-economic variability, and
- > **evidence of the impact of Sustainable Land Management (SLM)** on the mitigation of environmental threats

Sustainable Land Management (SLM)



SLM is defined as the use of land and water resources, including **soils, water, animals and plants**, for the **production** of goods to meet **changing human needs**, while simultaneously ensuring the **long-term** productive potential of these resources and the maintenance of their **environmental functions**.



Spain

G. Schwilch



Morocco

G. Schwilch

- > economically viable
- > socially acceptable
- > ecologically compatible

SLM for Climate change adaptation & mitigation, desertification and biodiversity



H.P. Liniger

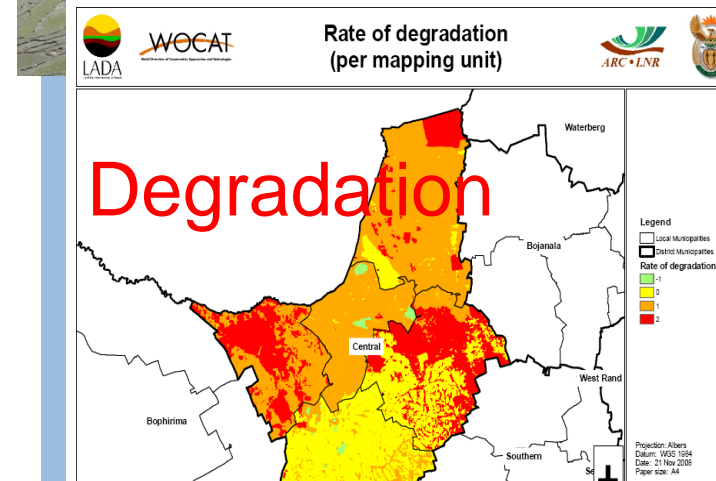
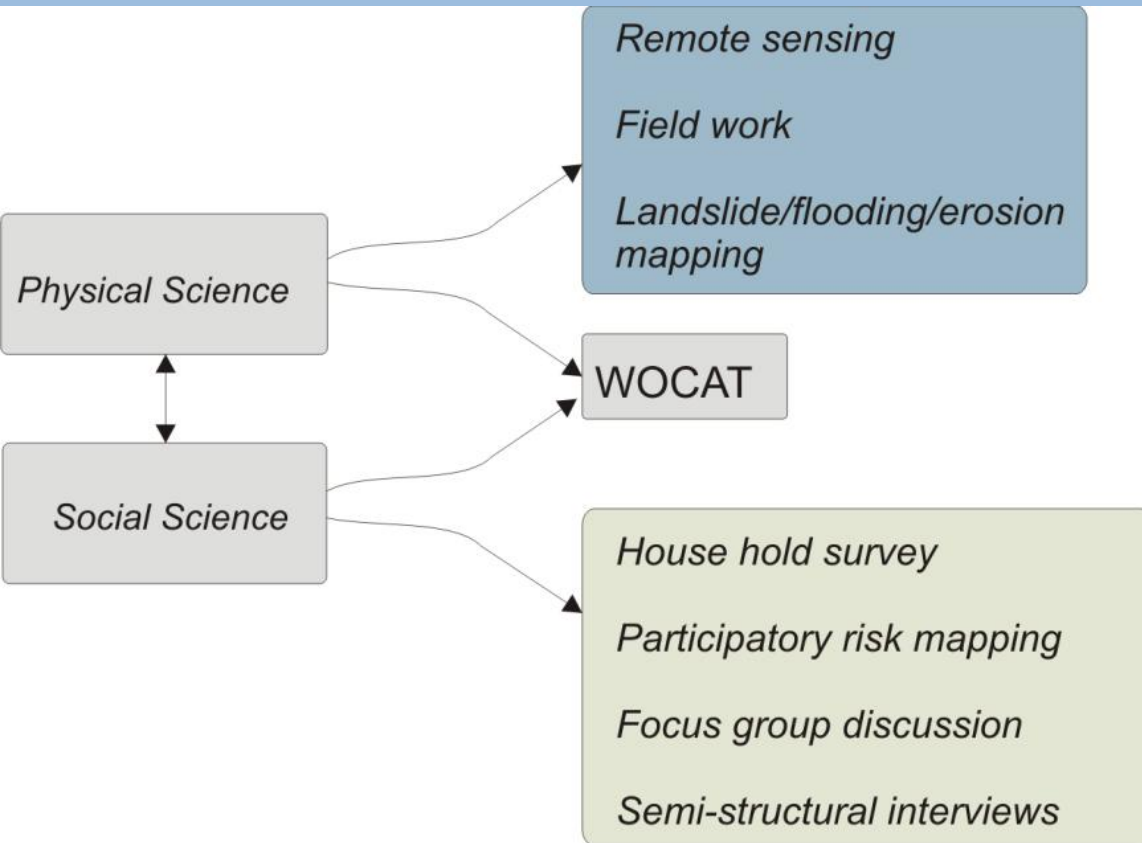


G.Schwilch



H.P. Liniger

Methodology



WOCAT



Schweizerische Eidgenossenschaft
Confédération suisse
Confederazione Svizzera
Confederaziun svizra

Swiss Agency for Development
and Cooperation SDC



u^b

UNIVERSITÄT
BERN

CDE
CENTRE FOR DEVELOPMENT
AND ENVIRONMENT

WORLD OVERVIEW OF CONSERVATION APPROACHES AND TECHNOLOGIES

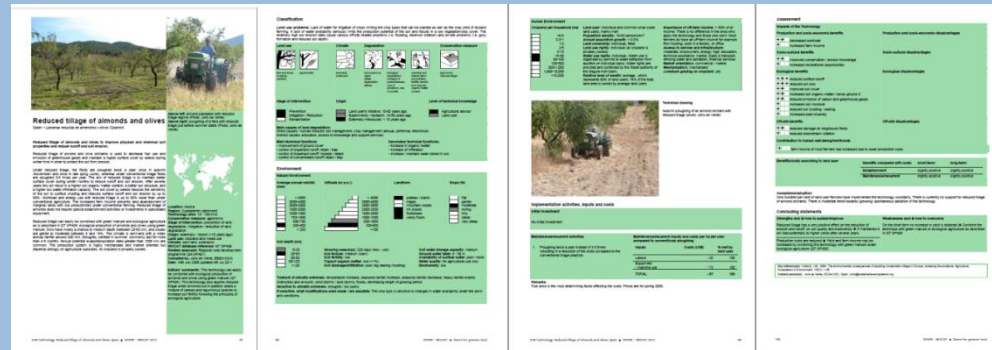
- > Building on existing **wealth of knowledge**
- > Understanding **local adaptations and innovations**
- > Assessing **SLM impacts**
- > Providing **options for spreading**

A common global platform for SLM



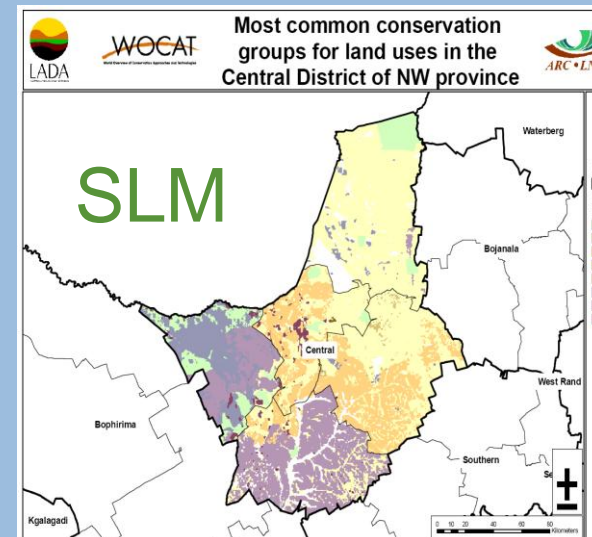
WOCAT methodology

1. **SLM technologies and approaches already applied** in the study sites of Nepal and Bolivia.




2. **Spatial overview** of the distribution and characteristics of land degradation and conservation/SLM activities at the study site level by producing maps.

3. **Effectiveness and impact** of existing SLM technologies and approaches and their **resilience** considering CC and migration.



Mapping questionnaire & database

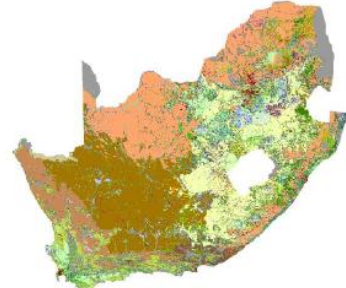
«Participatory expert assessment»



WOCAT
World Overview of Conservation Approaches and Technologies

DESIRE

LADA
Land Degradation Assessment in Drylands



Questionnaire for
**Mapping Land Degradation
and Sustainable Land Management.**
(QM)

VERSION 1.0



LADA World Overview of Conservation Approaches and Technologies
MAP

Map Data Management

28 mapping unit id's found matching your search criteria.

View / Edit / Delete data

Country: ▾

Base map edition: ▾

Select a mapping unit

- Sub-division 1: ▾
- Land use system: ▾
- Mapping unit id: ▾

Order by: ▾

Sort order: ▾

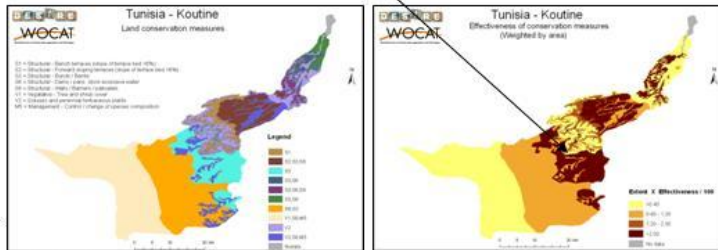
List of mapping unit id's

Local assessment



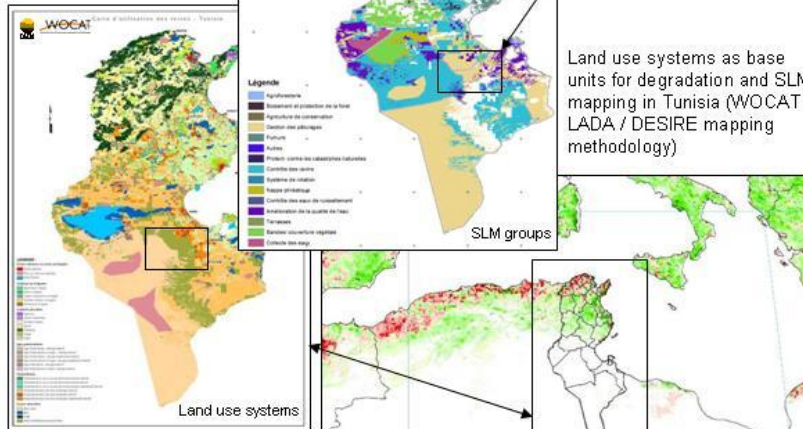
WOCAT SLM Technology and Approach documentation of water harvesting, e.g. Jessour, LADA local level assessment; DESIRE test implementation & monitoring.

SLM measures and their effectiveness in the Zeuss-Koutine watershed. SLM mapping identifies several effective traditional water harvesting systems



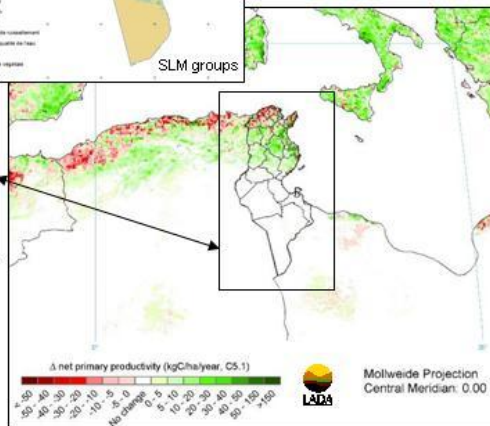
Watershed assessment

National assessment



Land use systems as base units for degradation and SLM mapping in Tunisia (WOCAT / LADA / DESIRE mapping methodology)

Change in net primary productivity 1981 – 2006 (NDVI analysis)
E.g. 'no change' where traditional water harvesting in Zeuss-Koutine



Global assessment



Integration of methods and scales:

- > global, unified approach to the assessment and monitoring of SLM
- > monitor progress of SLM upscaling

Schwilch G., Bestelmeyer B, Bunning S., Critchley W., Herrick J., Kellner K., Liniger H.P., Nachtergaele F., Ritsema C.J., Schuster B., Tabo R., van Lynden G., Winslow M. 2011. **Experiences in Monitoring and Assessment of Sustainable Land Management.** *Land Degradation & Development* **22**: 214-225. Doi 10.1002/ldr.1040

Land Use System (LUS)

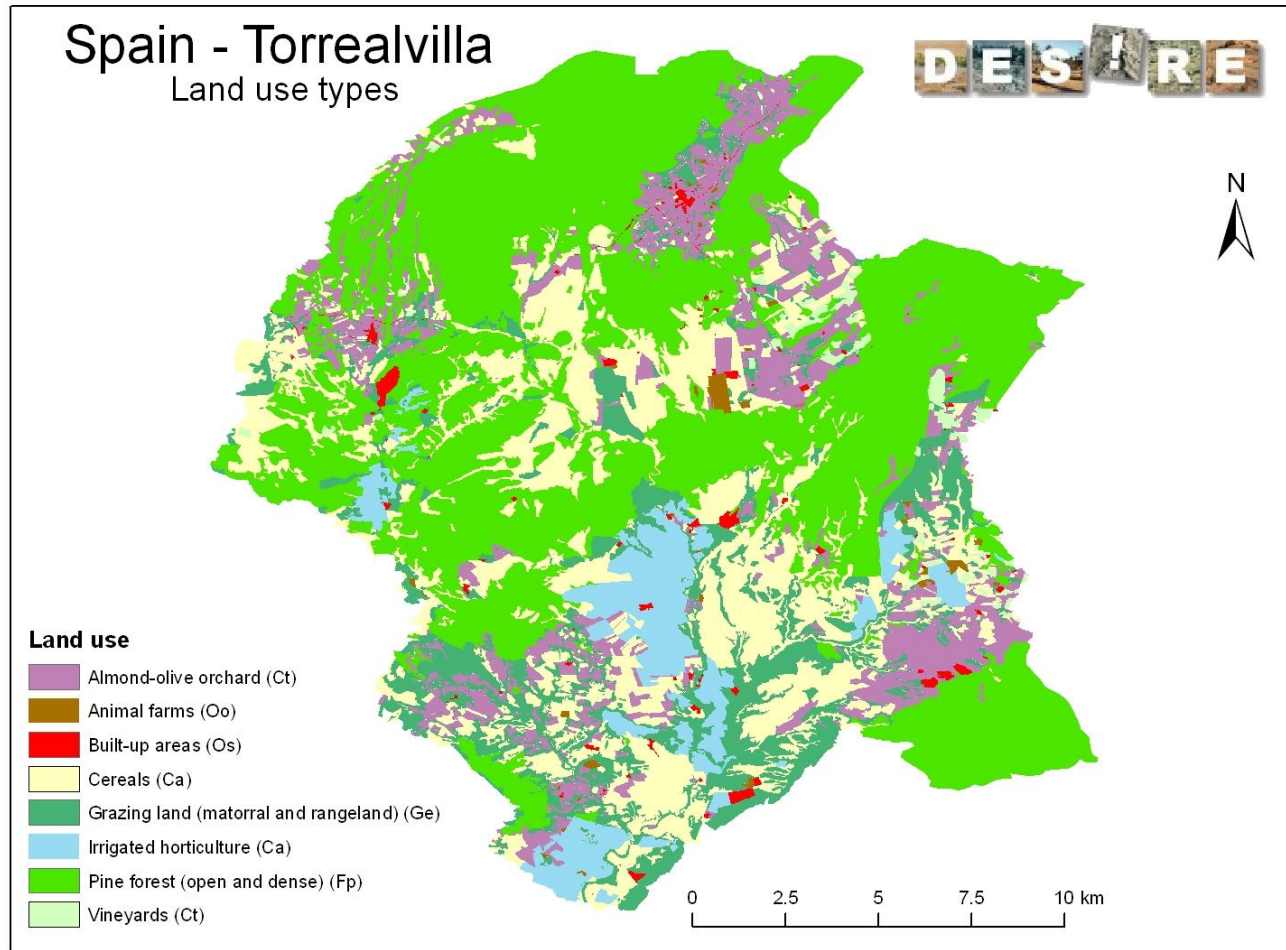
Type

Area trend

Intensity trend

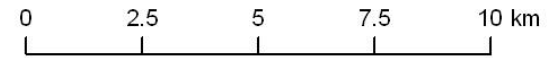
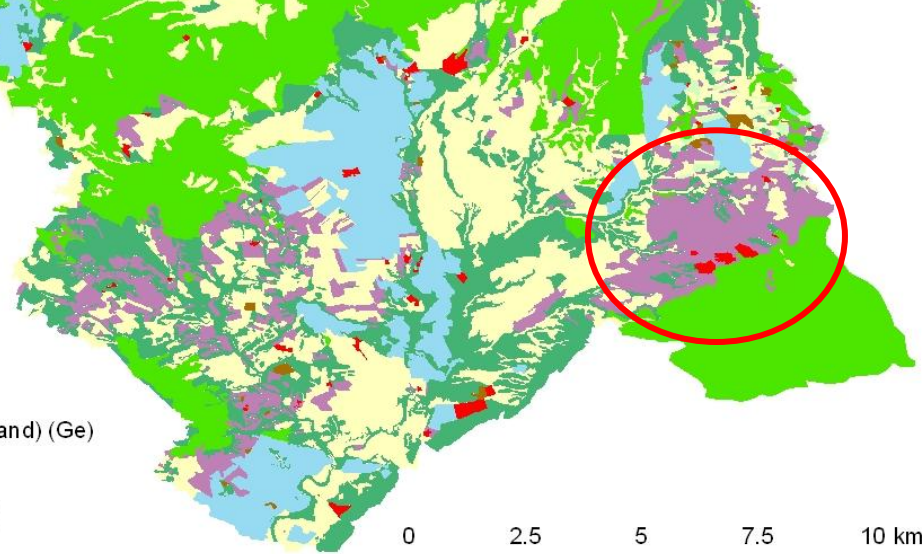
Degradation per LUS	Conservation/SLM per LUS
Type	Name / Group / Measure
Extent (area)	Extent (area)
Degree	Effectiveness
Rate	Effectiveness trend
Impact on ecosystem services (type and level)	Impact on ecosystem services (type and level)
Direct causes	
Indirect causes	Degradation addressed
Recommendation	

Land use as base map



Land use

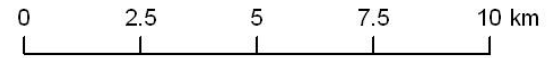
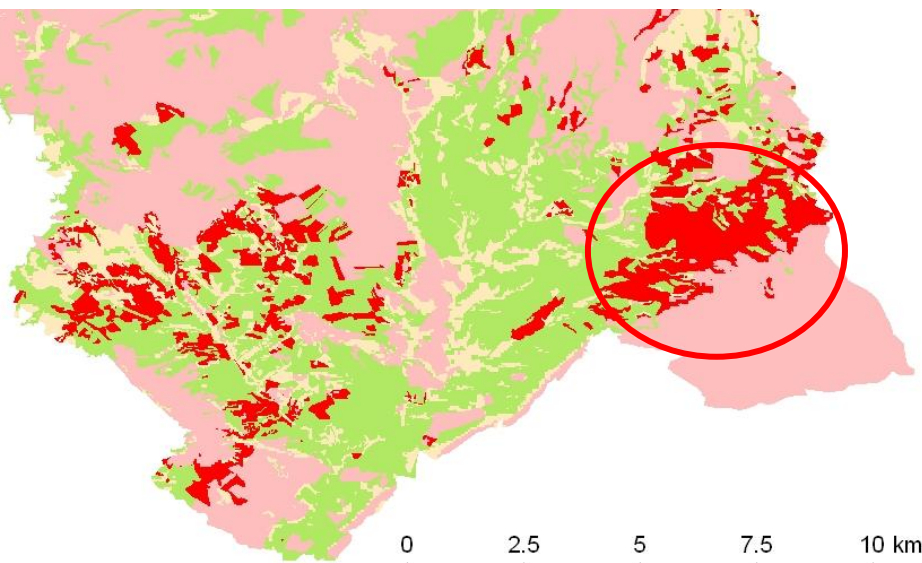
- Almond-olive orchard (Ct)
- Animal farms (Oo)
- Built-up areas (Os)
- Cereals (Ca)
- Grazing land (matorral and rangeland) (Ge)
- Irrigated horticulture (Ca)
- Pine forest (open and dense) (Fp)
- Vineyards (Ct)

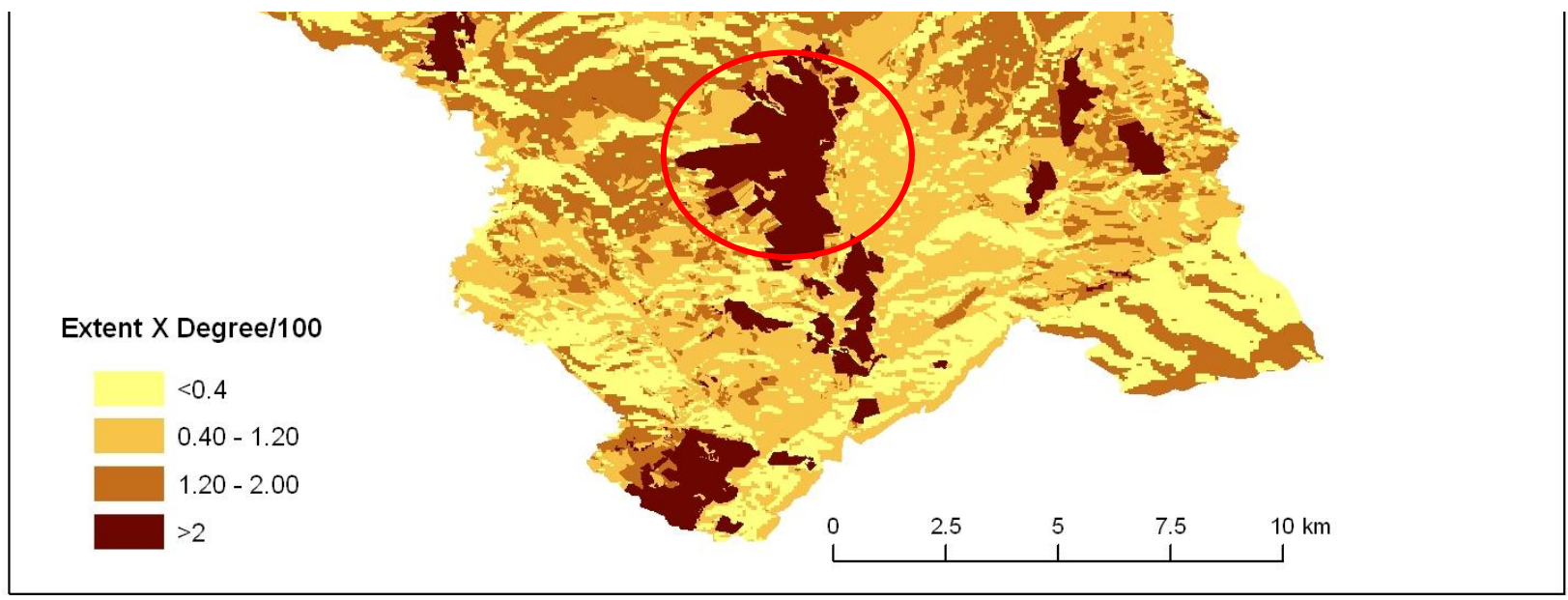
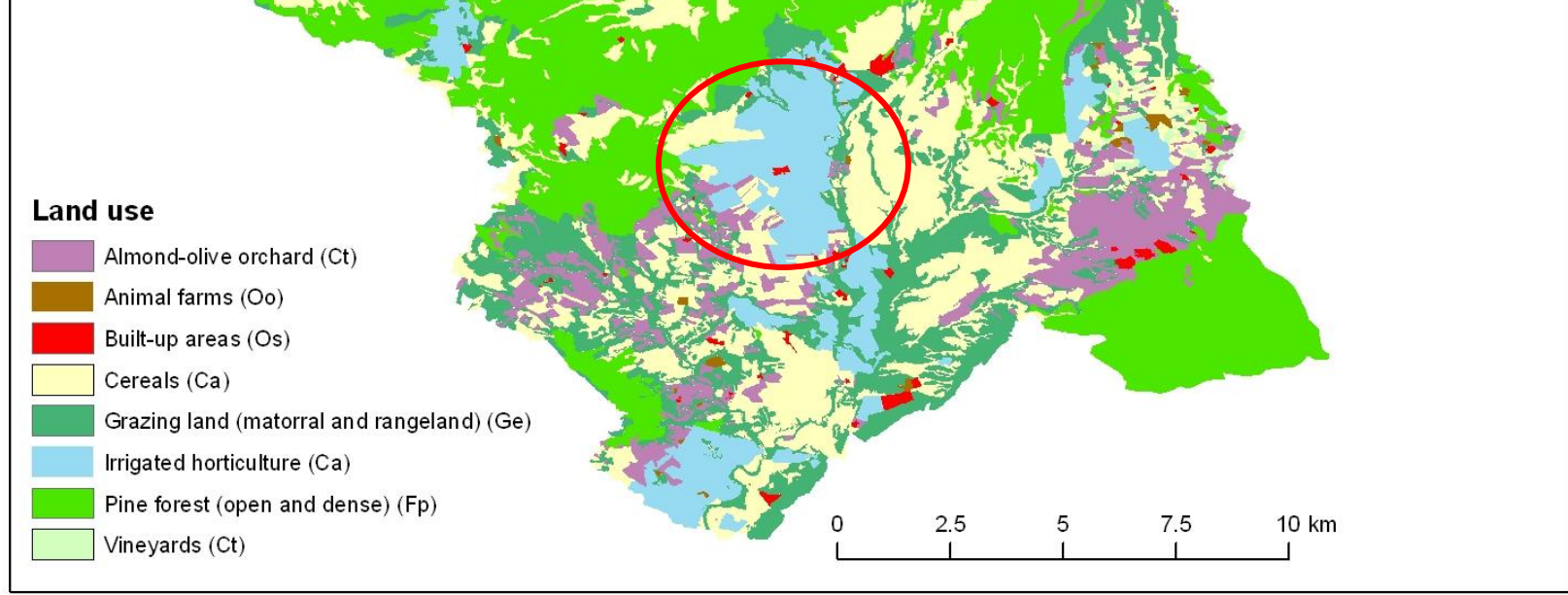


Area trend

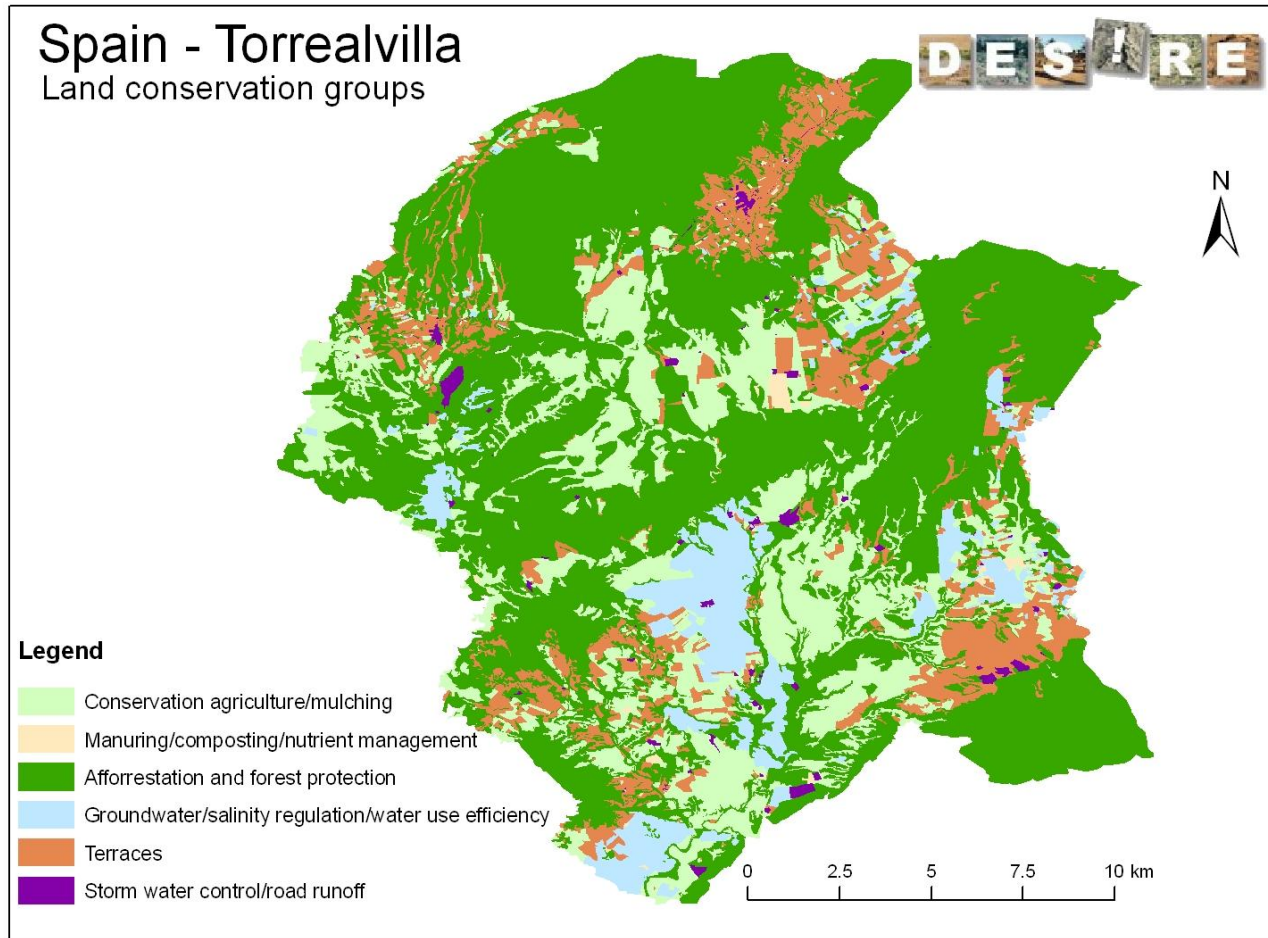
Legend

- Rapidly increasing
- Slowly increasing
- Remains stable
- Slowly decreasing





Sustainable Land Management (SLM)



Impact on Ecosystem Services & Indicators

P Productive Services & indicators

- (P1) production (of animal / plant quantity and quality including biomass for energy) and risk
- (P2) water (quantity and quality) for human, animal and plant consumption
- (P3) land availability

E Ecological services (regulating / supporting) & indicators

- (E1) water cycle: floods, storms, excessive rains
- (E2) water cycle: drought, dry season flow, availability of water
- (E3) organic matter status
- (E4) soil cover (vegetation, mulch, etc.)
- (E5) soil structure: surface (eg sealing and crusting) and subsoil affecting infiltration, water and nutrient holding capacity, salinity etc.
- (E6) nutrient cycle (N, P, K) and the carbon cycle (C)
- (E7) soil formation (including wind-deposited soils)
- (E8) biodiversity
- (E9) greenhouse gas emission
- (E10) (micro)-climate (wind, shade, temperature, humidity)

-3 : high negative impact
 -2 : negative impact
 -1 : low negative impact

S Socio-cultural services and human well-being & indicators

- (S1) spiritual, aesthetic, cultural landscape and heritage value
- (S2) education and knowledge (including indigenous knowledge)
- (S3) conflicts
- (S4) food security, health and poverty
- (S5) net income
- (S6) private and public infrastructure (buildings, roads, dams, etc.)

1 : low positive impact
 2 : positive impact
 3 : high positive impact

Findings and outcomes

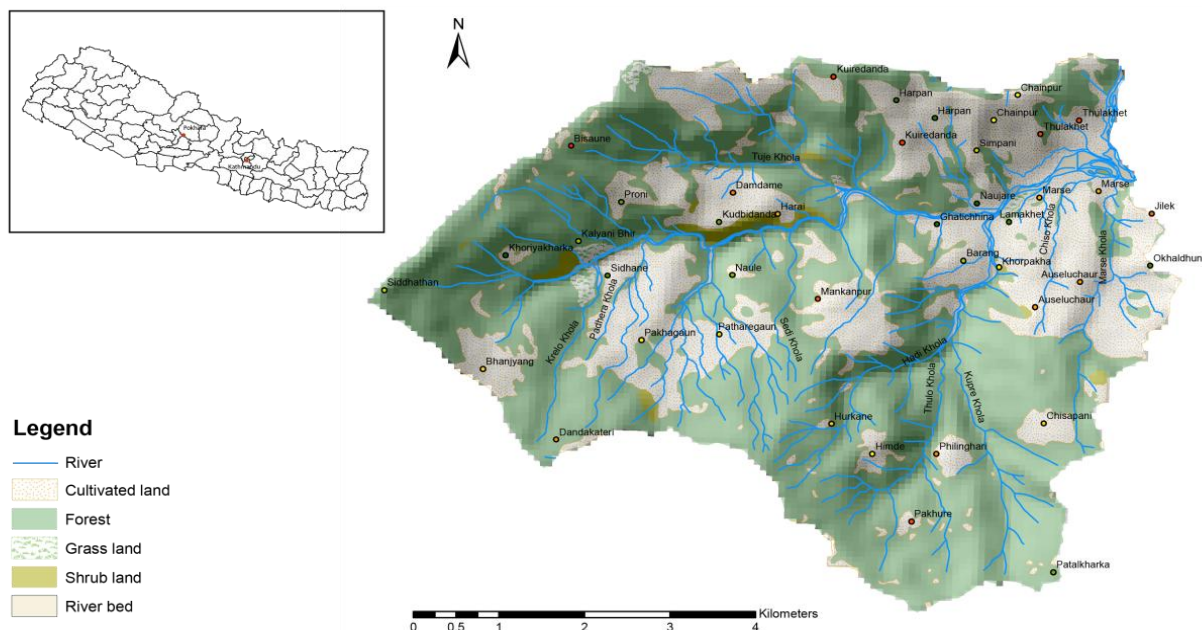


First results from Nepal and Bolivia field studies



Nepal – research area

Harpan River Watershed



Kaski district stats:

Precipitation 5000mm/yr

Sub-tropical/ temperate/
thick soils

850-2750 m.a.s.l.

109.7 pers/km²

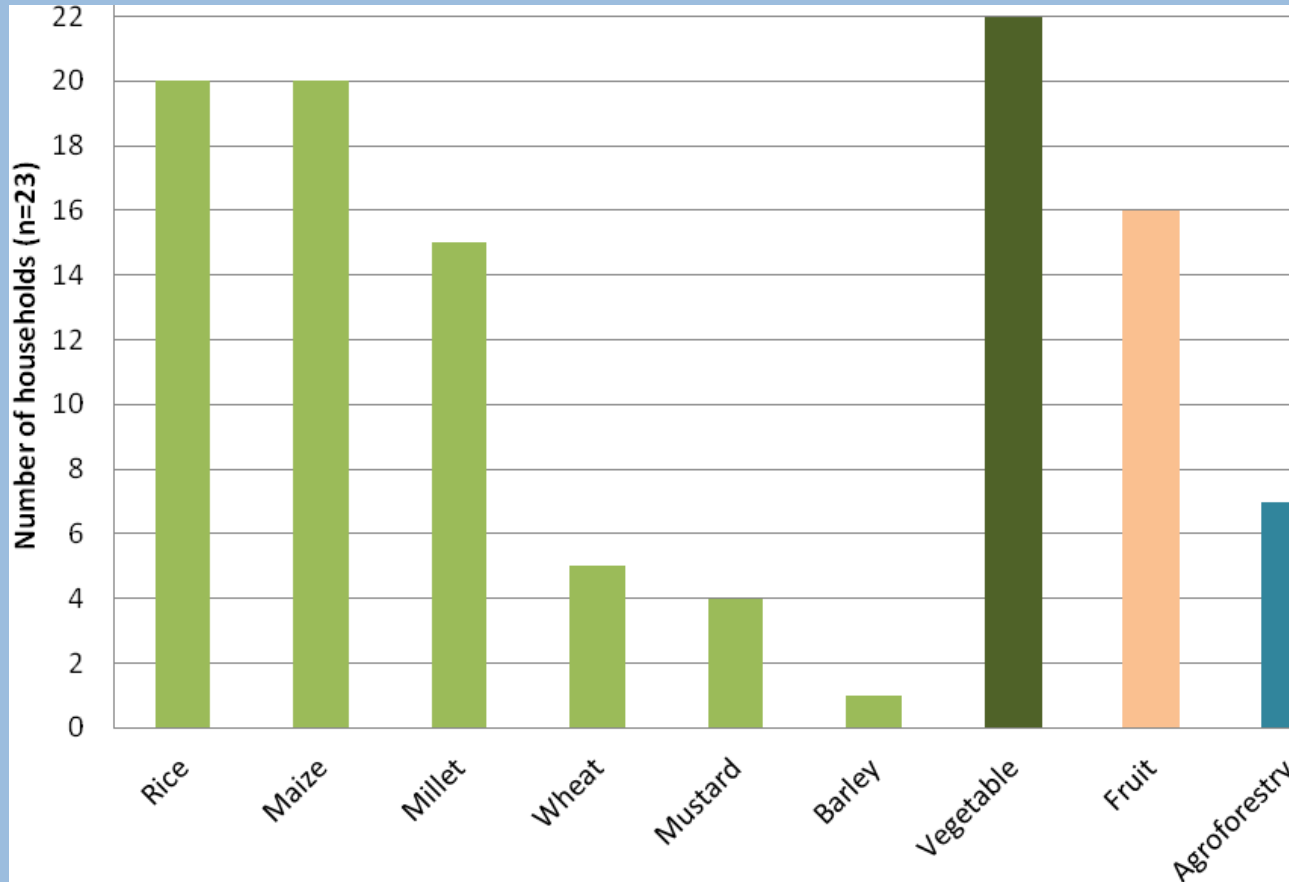
HH size: 5.3 persons

Literacy rate: 82%

Source: VDC Profile CBS, 2011

Major cropping: rice, maize, millet, vegetables, fruits

Nepal: land use



Nepal: land degradation

- > Soil erosion by water: mass movements, landslides, floods
- > Biological degradation: reduction of vegetation cover, decline of species diversity and quality
- > Fertility decline



Buried agricultural terraces

Nepal: SLM

- > Community forestry
- > Vegetable farm
- > Coffee plantation (agroforestry)



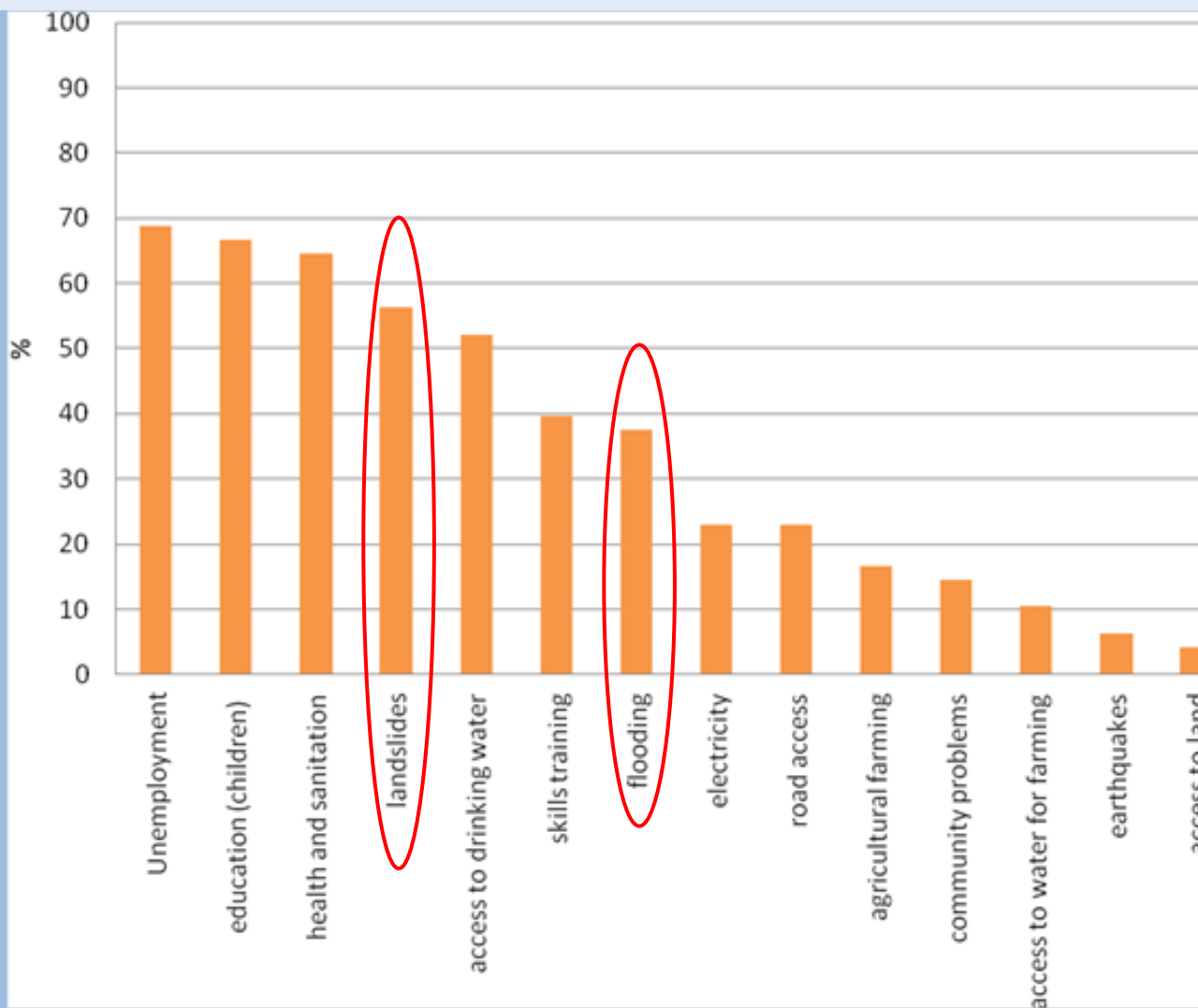
S. Jaquet

Nepal – migration and land management

- > High number of men living abroad
-> significant remittances transferred home
- > Women left behind -> women overburdened with additional male work, traditionally not allowed (roofing, ploughing)
- > Land abandonment: opportunities for lower caste groups to gain access to cropping
-> lack of agricultural knowledge?
- > Increased soil erosion?

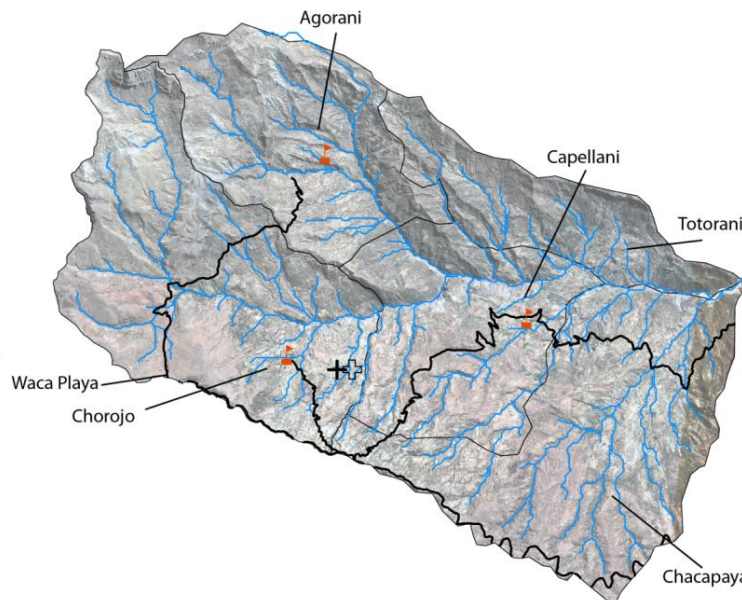
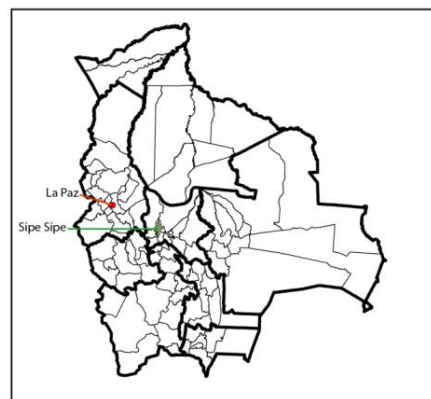


Nepal: main concerns of respondents



Bolivia – research location

Jatun Mayu watershed



Legend

Infrastructure

- + Cemetery
- School
- Church
- Road
- River
- Community



Jatun Mayu stats:

Precipitation 600 mm/yr

Semi-arid/ thin soils

2700 - 4565 m.a.s.l.

Appr. 30 persons/km²

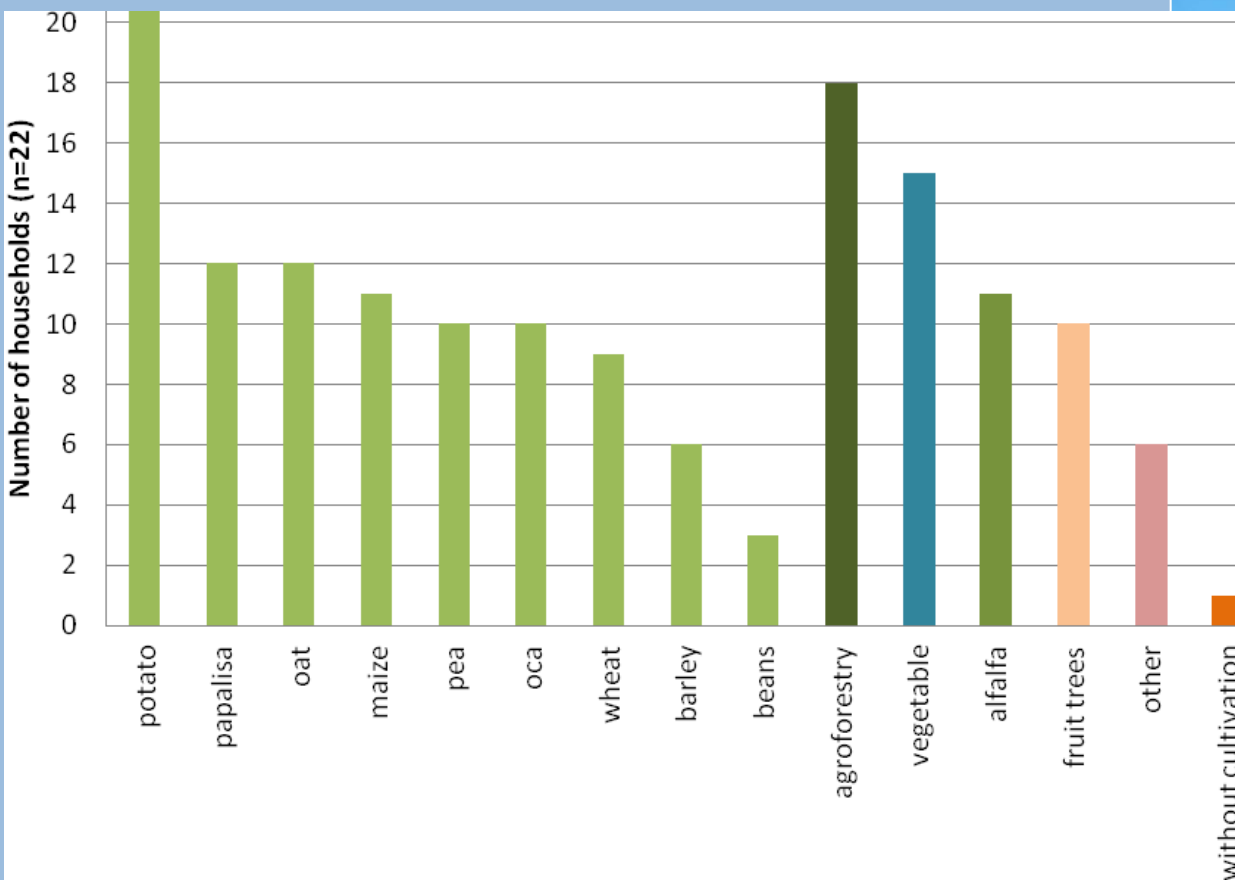
HH size: 3.8 - 4.5
persons

Literacy rate: 78.1%

Source: Census, 2011

Bolivia: land use

Anyoka community management



Alfalfa fodder production

Bolivia: land degradation

Mainly soil erosion by water and wind: mass movements / landslides, loss of topsoil / surface erosion, gully erosion



Effects of gully development on agricultural lands and infrastructure

Bolivia: SLM

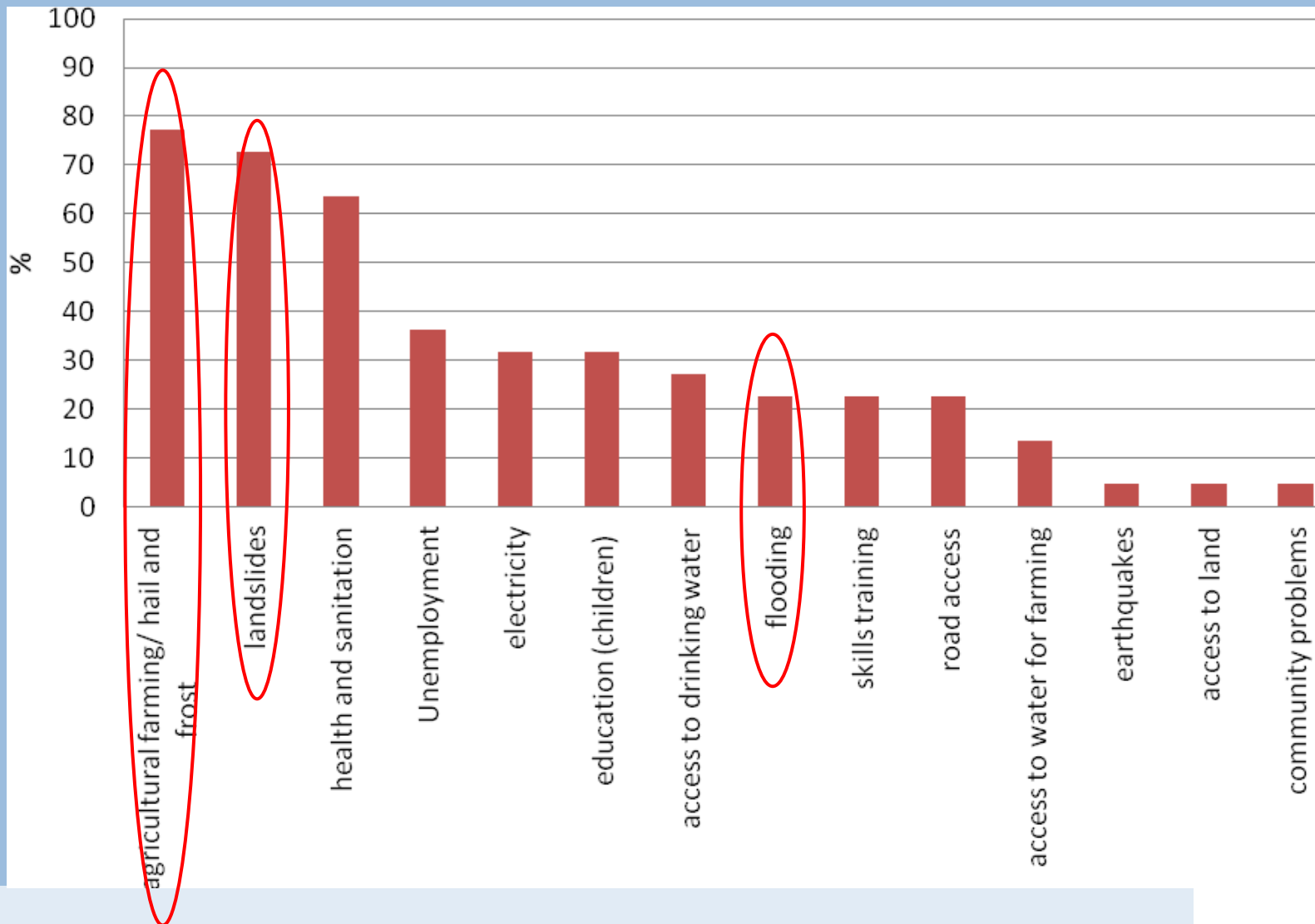
- > Terraces
- > Gabion walls
- > Grass strips



Bolivia: migration and land management

- > Clear decrease of the labour force: entire families are migrating
- > Some families living in the valley below: ensure basic work on the land parcels -> less time for agriculture and land management
- > Temporary migration of men for some weeks to months during low season for cash
- > Consequences on overall land management and erosion are not yet clear (will be further explored)
- > Whether land is being abandoned is unclear (reluctance of people to speak about sensitive land tenure)

Bolivia: main concerns of respondents



Conclusions and outlook

In spite of differences, both study sites present similar issues

- > Natural and human induced active **land degradation** processes **affecting** the local **livelihood**
- > Outmigration **reducing labour force** and thus affecting land management
- > Outmigration and (changing) climate conditions challenging
 - the **traditional** management strategies,
 - the transfer of **knowledge** (key for adaptation),
 - and coping **capacity** against natural hazards

Outlook

- > **Assess** and **map** Land Degradation (LD) and Sustainable Land Management (SLM) and its **impacts**
- > Further **explore the links** between migration, land degradation and sustainable land management -> link WOCAT mapping with livelihood data and visualisation tools
- > Understand the **vulnerability** and **resilience** of land management and livelihoods -> identify indicators
- > Identify **mitigation measures** in collaboration with stakeholders

Thank you

gudrun.schwilch@cde.unibe.ch



HP. Liniger