Integrated watershed management to create multifunctional landscapes: implementation and monitoring

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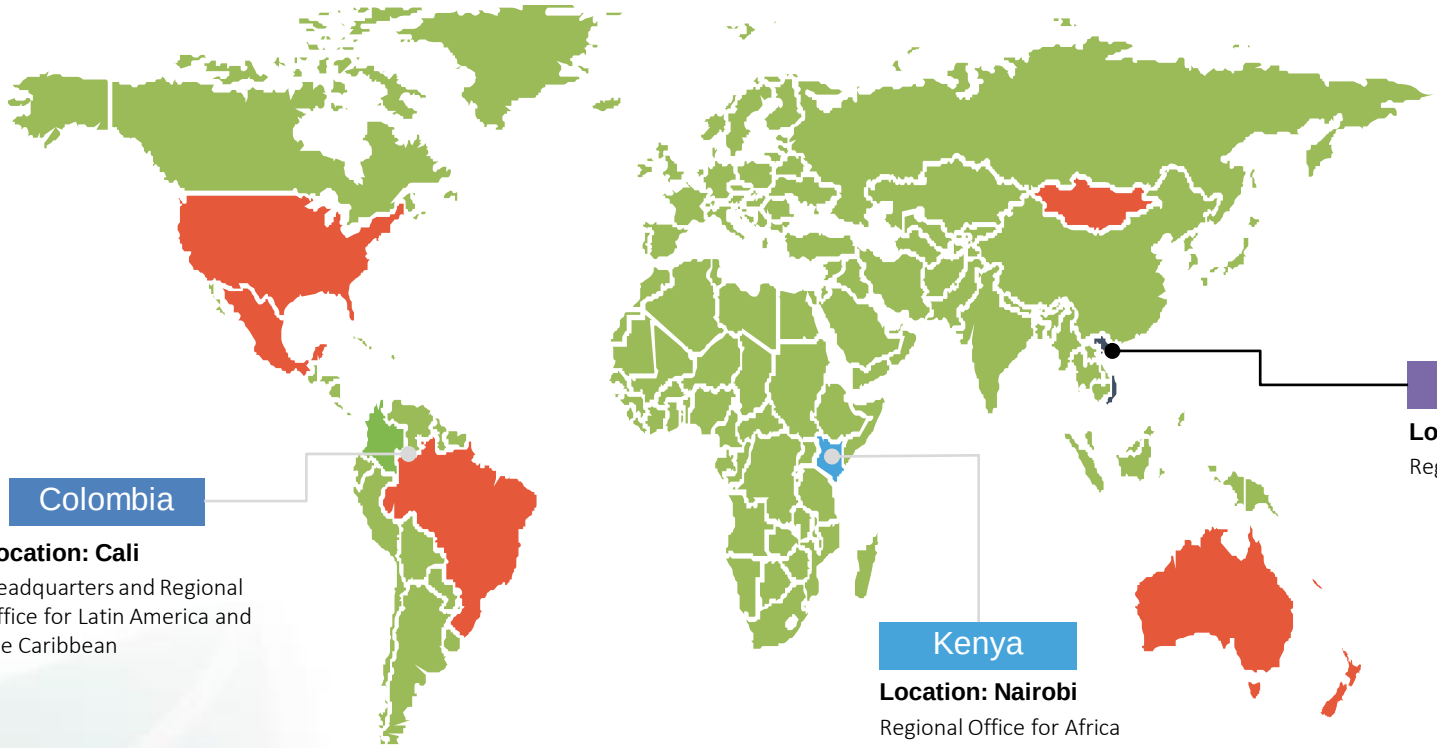
CIAT WORLDWIDE

Science to Cultivate Change



Colombia

Location: Cali

Headquarters and Regional Office for Latin America and the Caribbean

Kenya

Location: Nairobi

Regional Office for Africa

Vietnam

Location: Hanoi

Regional Office for Asia

- **53 countries globally**
- **30 African Countries**
- **Regional offices at six African countries**

Major Thematic Areas

Science to Cultivate Change

Forages

More and better forages to increase milk and meat production, and reduce the impact of livestock on the environment.

Decision and Policy Analysis

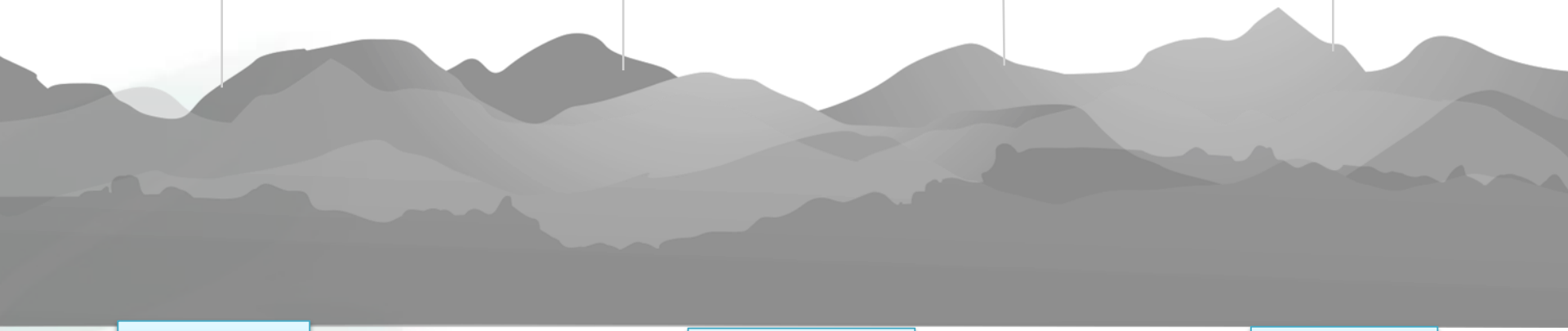
ClimaPe-smart agriculture to adapt to uncertainties of climate change, provide climate information services, linke people to market

Soils and Landscapes

Improve soil fertility and health, and reverse land degradation, climate change and ecosystem services.

Agrobiodiversity

New and better crop varieties, crop management and markets to improve crop productivity and nutrition.



Gender

Nutrition

Market

1. Background

Ethiopia is characterized by:

- **High and increasing human and livestock population;**
- **Poor and degraded land and water resources;**
- **Continued climate change and increasing variability;**
- **Poor economy to support sustainable livelihoods and maintain environmental stability.**

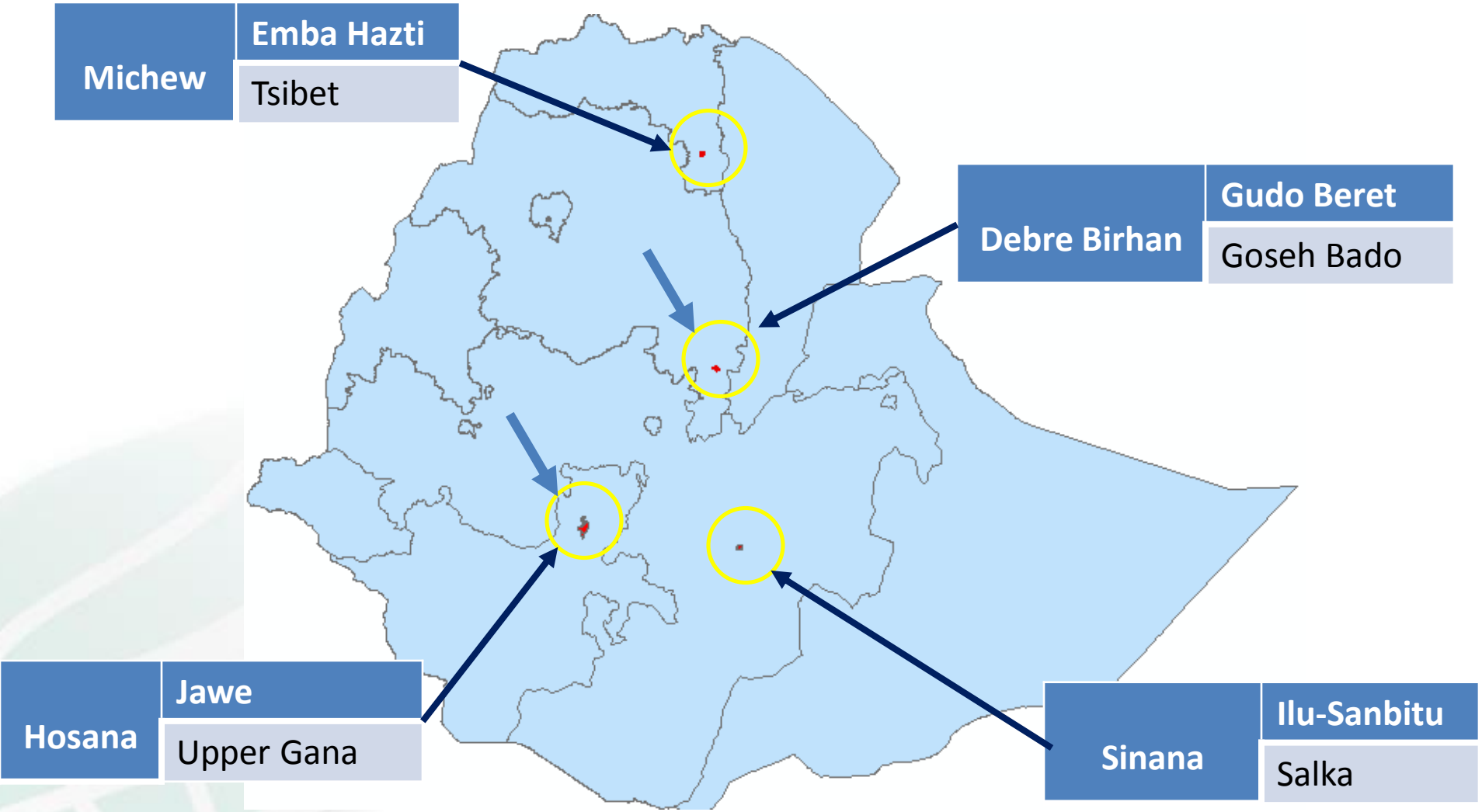
- **Sustainable land management through complementary technologies that provide multiple benefits – improve livelihoods and enhance ecosystem services**

- **Implement sequence of activities involving key stakeholders and partners – co-identify problem areas, drivers and possible options.**

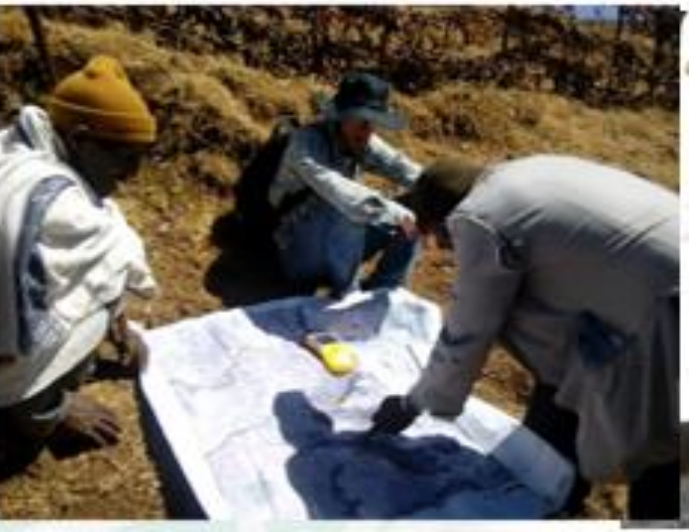
1a. Study site(s)

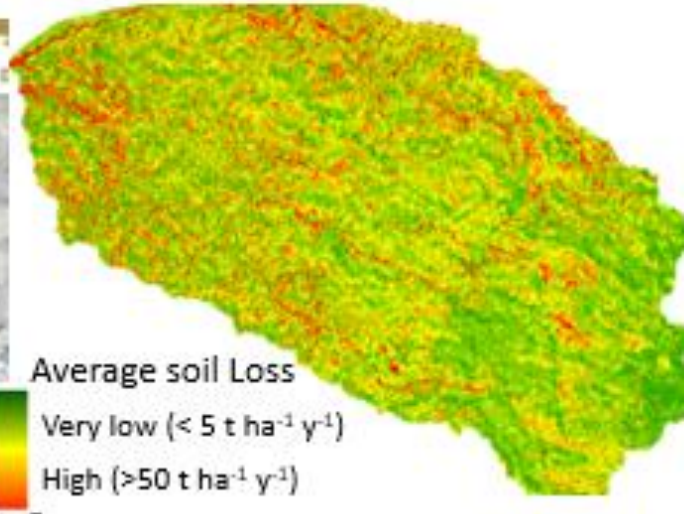
Ethiopian highlands – four regions – “wheat belt”

Integrated watershed management component of the Africa RISING project

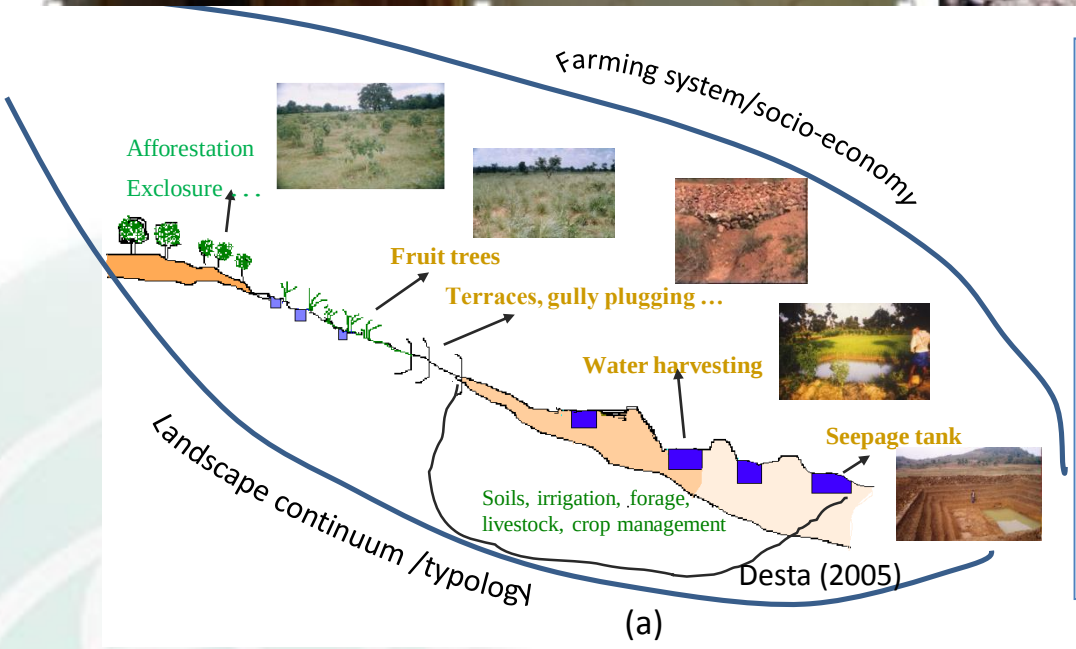


2. What are the major problems and where do they occur?

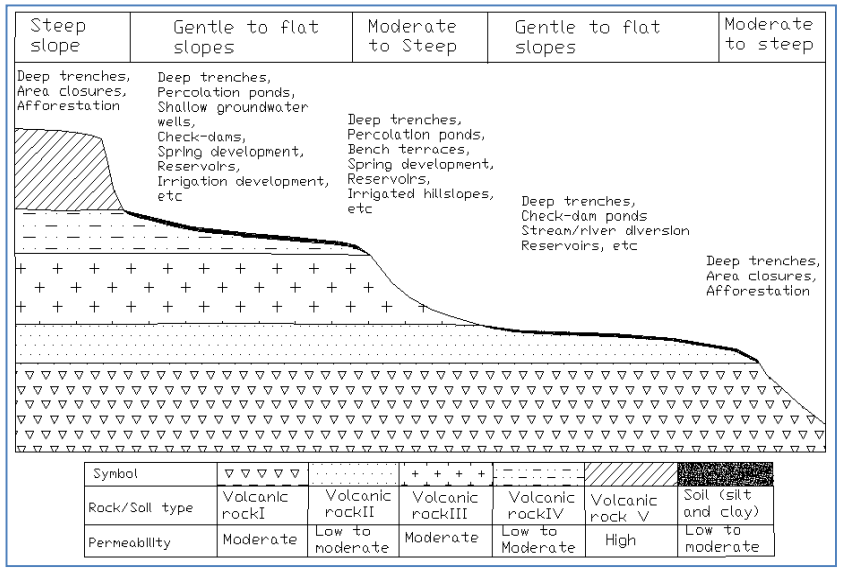




3. What are the required interventions: what placed where



(a)



(b)

- Landscape continuum
- Site-specific
- Multiple benefits
- Analytical model

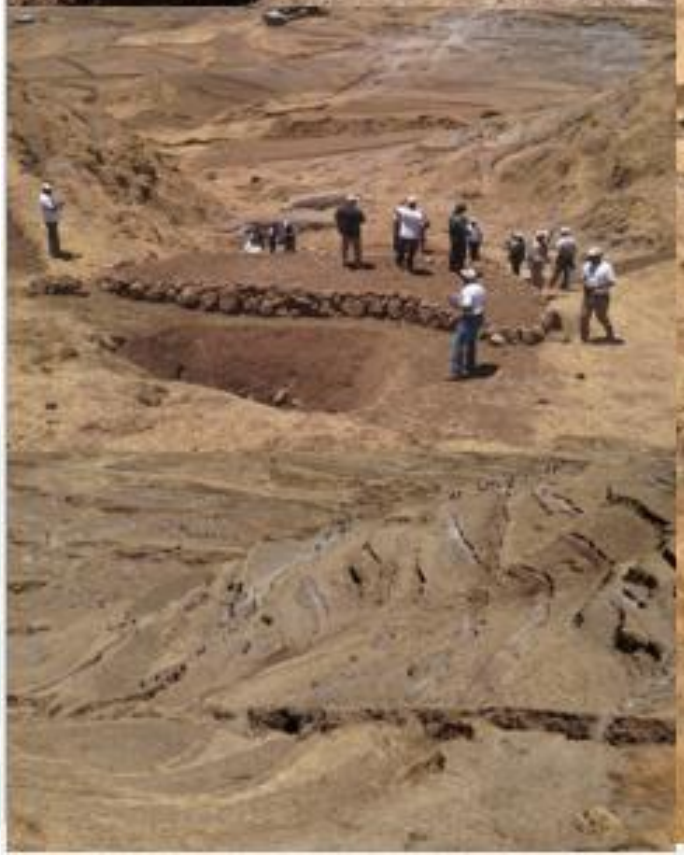
4. What is required: capacity development

Visit interventions to evaluate success and assess gaps …

Exchange visit to success areas (Abraha Wa Atsbaha, Michew) to share experiences…

Involved farmers, extension officers, University staff, BoA, and district as well as Kebele level administration

5. Implementation of options



5. Implementation …

- Mosaic of options'

6. Evidence generation + monitoring …

- Different approaches considering scale and interest group: farm – catchment – watershed …

6.1. Field visit, document …

6. Evidence generation …

6. Evidence generation – baseline data …

Automated weather station

Soil moisture measurement

Infiltration measurement

6.2. Collect biophysical and socio-economic data – co-located

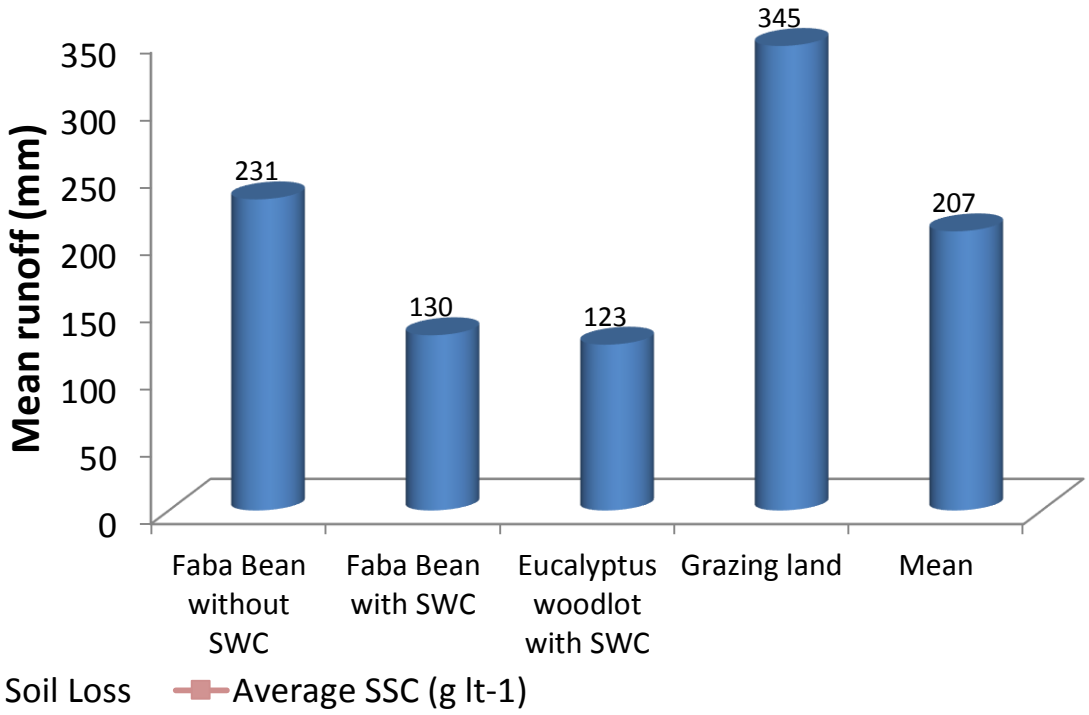
Interview - what farmers perceive of interventions

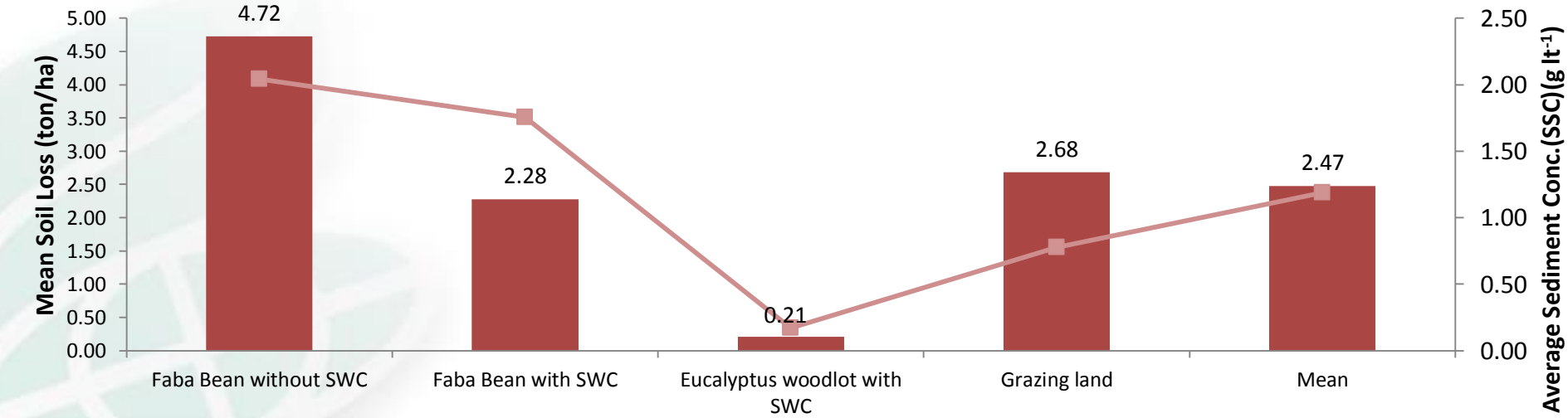
Soil sample

Hydrological stations

6. Evidence generation

6.3. Plot level erosion/runoff assessment and monitoring



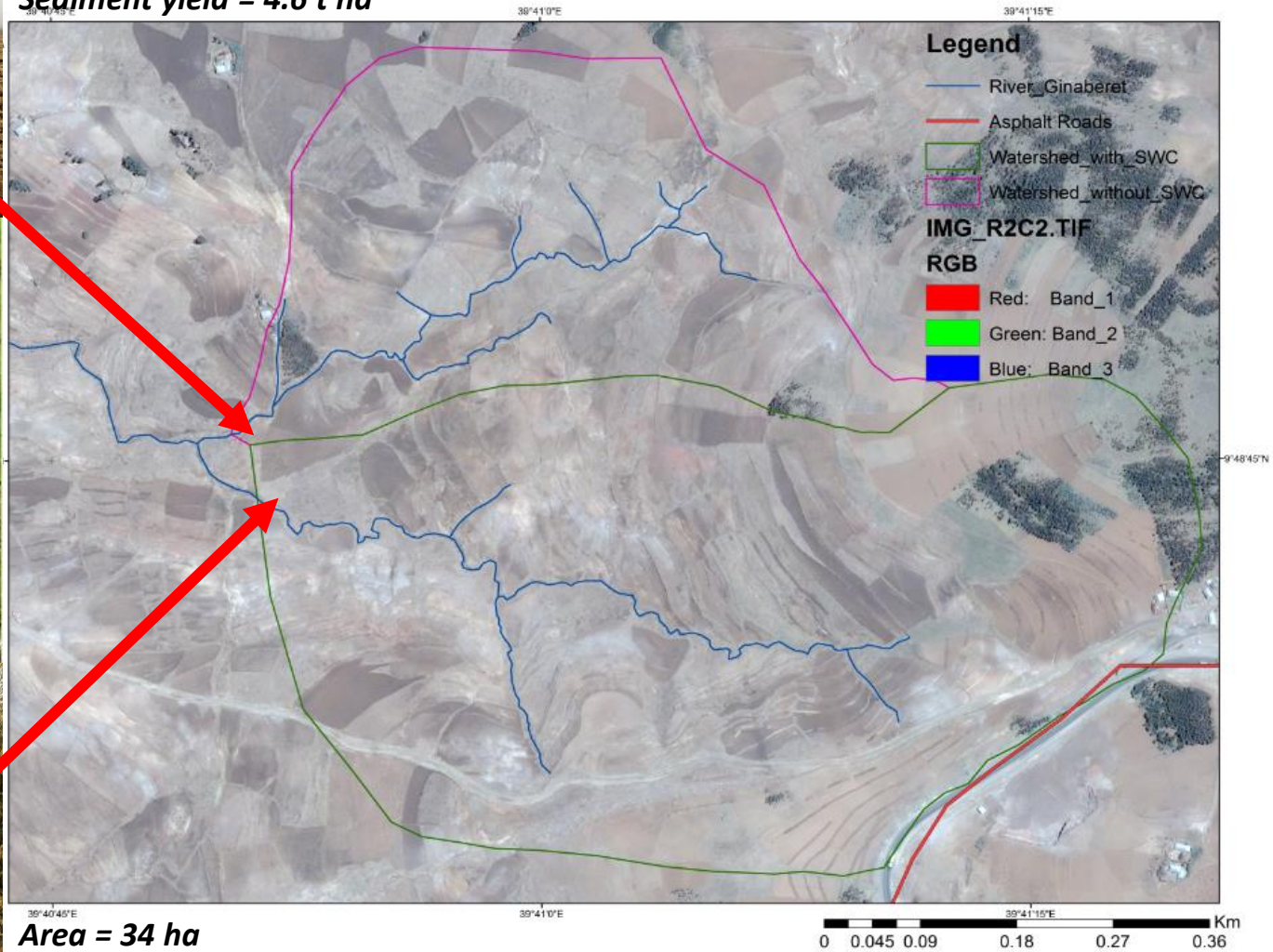


Research – evidence generation

6.4. Erosion and runoff assessment at catchment scale

A rea= 22 ha
Discharge = 4798 m^3 ha^{-1}
Sediment yield = 4.6 t ha^{-1}

Less water retention
More erosion

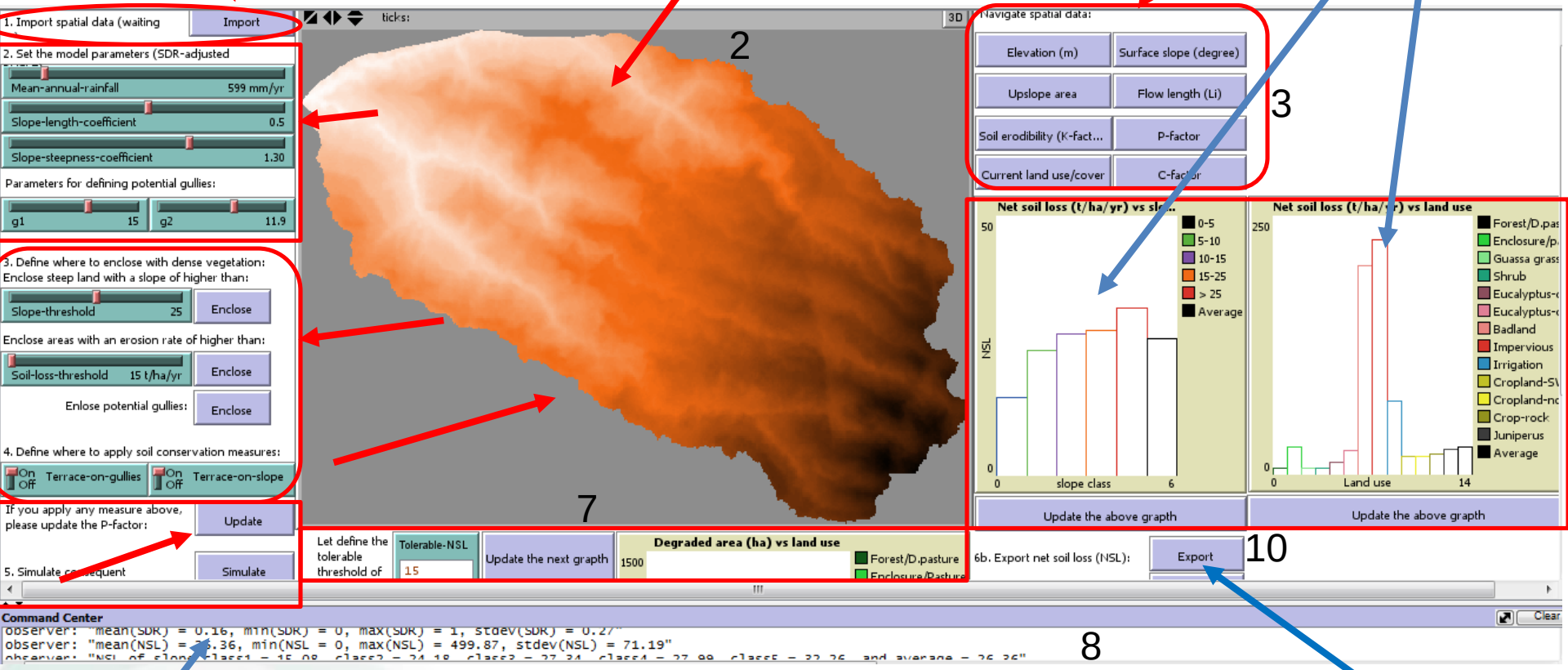


Area = 34 ha
Discharge = 3981 m^3 ha^{-1}
Sediment yield = 0.92 t ha^{-1}

More water retention
Less erosion

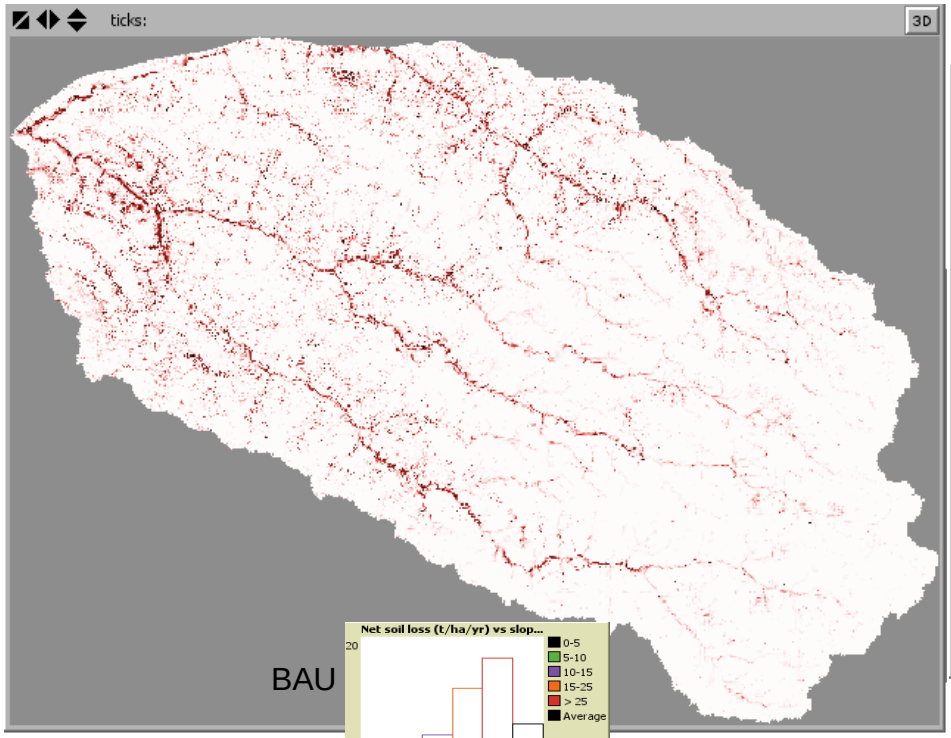
6. Evidence generation

6.5. Modelling tool – hotspot mapping and simulating impacts of SLM options

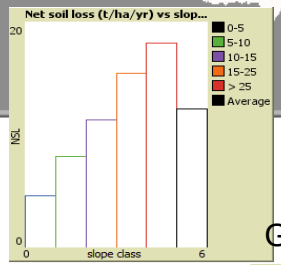


Graphical interface to facilitate soil erosion prediction and simulate the impacts of management interventions

6.6. Different scenarios in relation to baseline

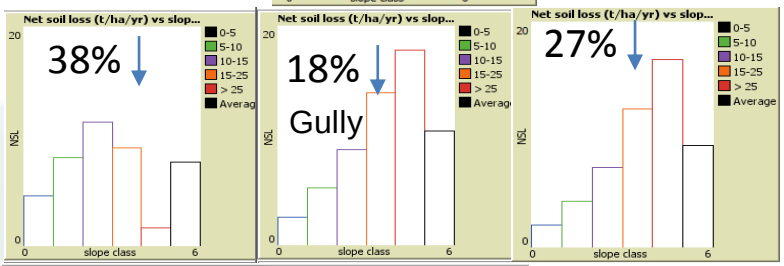


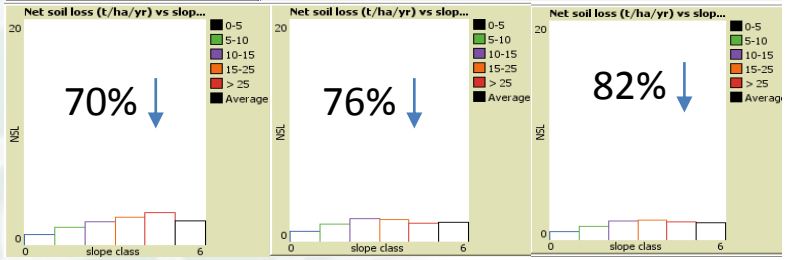
BAU



Slope > 20 %

Gully 5m buffer

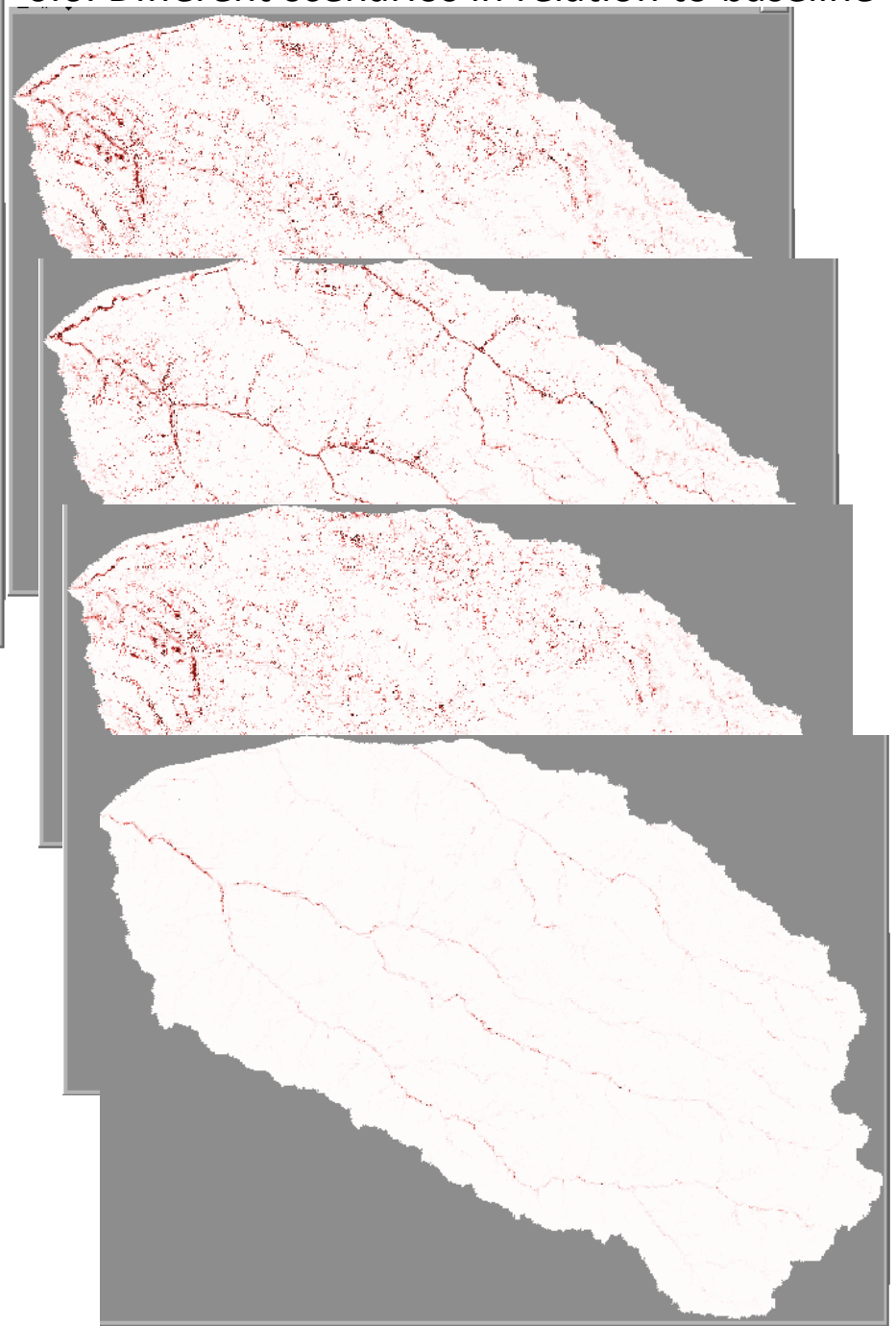


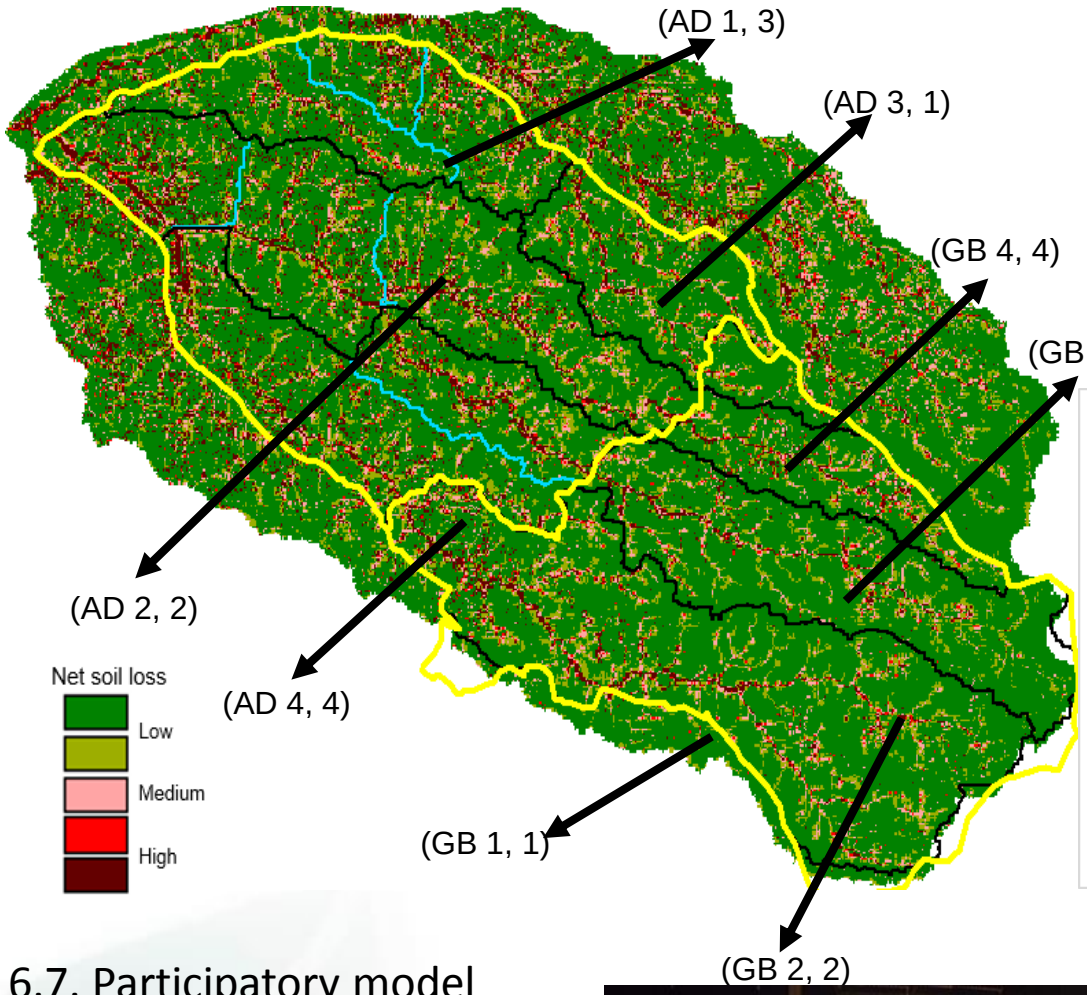


Hotspots >10

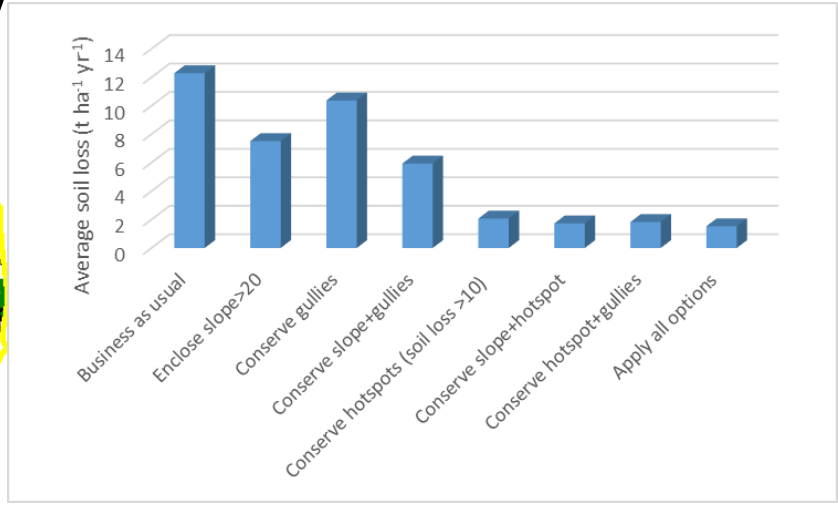
Slope + Hotspots

All options





Communities also discussion on simulation results

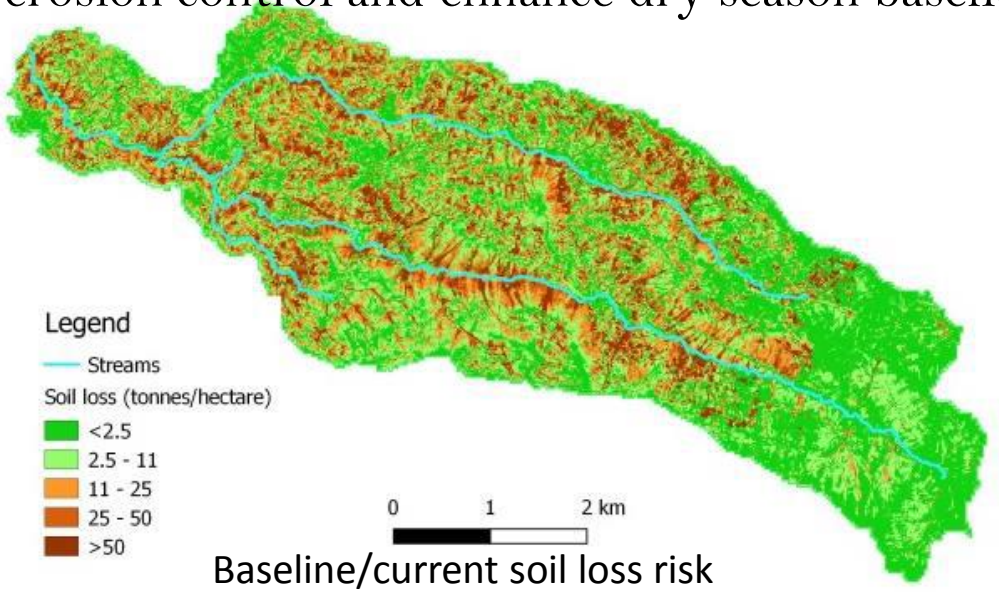


6.7. Participatory model evolution

- Gudo Beret watershed – 100% agreement
- Adisghe watershed - 50% agreement

6. Evidence generation ….

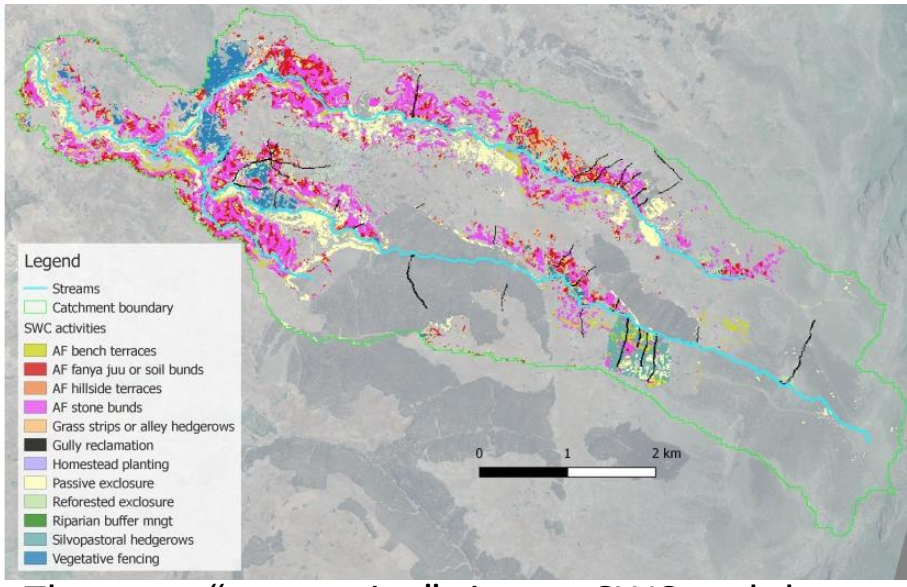
6.8. Predict the "most responsive" sites from which the most benefits – onsite and offsite – can be obtained. These have potential to enhance two ecosystems services: erosion control and enhance dry season baseflow



Baseline/current soil loss risk

A "basket of activities" and set of "rules" governing their allocation.

- Resource Investment Optimization System (RIOS) used to rank pixels acc. to key factors that reduce erosion and improve baseflow
- Soil loss is reduced by 35% and ΔS+D (a proxy for baseflow) is enhanced by 30%.
- Requires targeting 600 hectares.



The most "responsive" sites to SWC and the recommended activities

Conclusion

- Participatory and field-based problem analysis for targeting.
- Co-implementation of linked technologies across landscape continuum.
- Exchange visit was very inspiring.
- Capacity development – 2 PhDs, 4 MScs (‘watershed component’)
- Interventions with multiple benefits are attractive.
- Woreda level meetings to reflect on development and plan future options
- Assessment of impact at plot and landscape levels approaches.
  - Erosion plots established on different land uses and management levels
  - Hydrological stations established at ‘conserved’ and ‘non-conserved’ landscapes
- Landscape management tool to evaluate impacts of interventions and identify efficient options.
  - Identify places most likely to be “responsive "to SWC activities and return ‘multiple benefits’

Acknowledgement

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- Debre Birhan ARC, Areka ARC, Worabe ARC
- Basona Worena woreda office of agri,, Lemo Woreda office of agri.
- Farmers both in Basona and Lemo
- District level administration in both sites