" Climate Smart Villages" as epicenter of Green growth in Ethiopia

(Belay Simane and Benjamin Zaithic)



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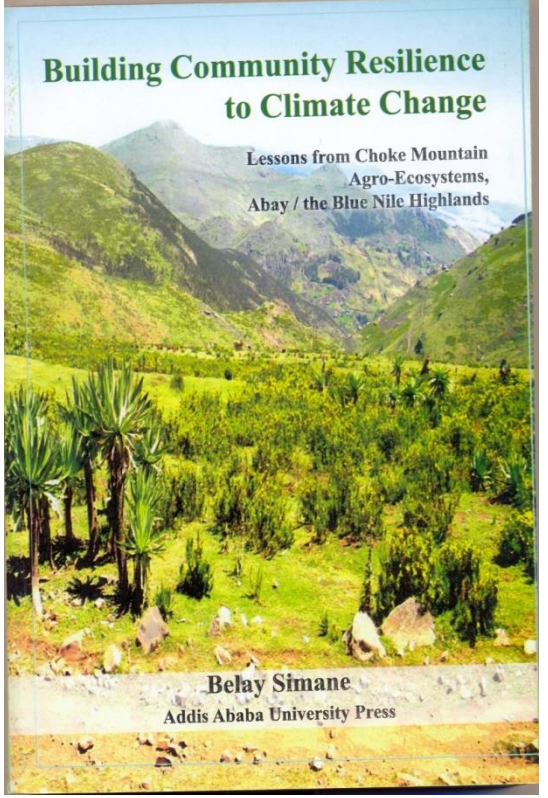
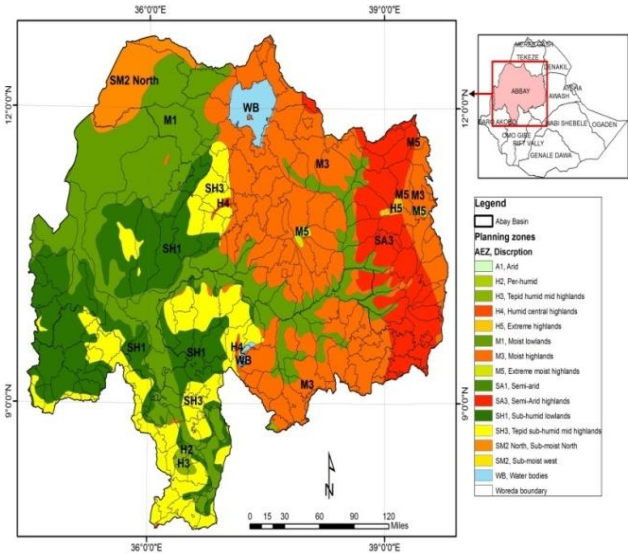
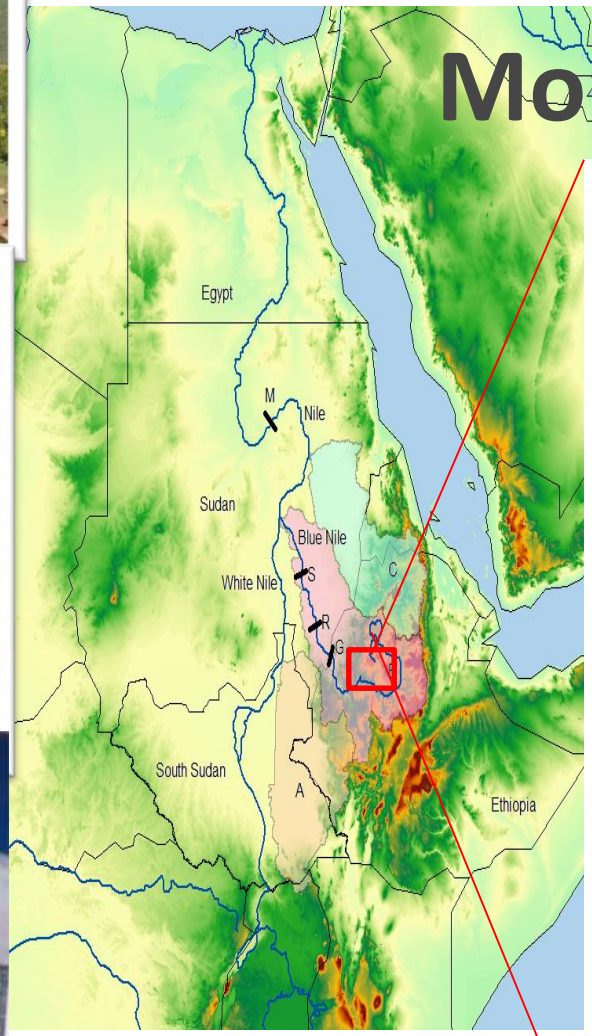
Introduction

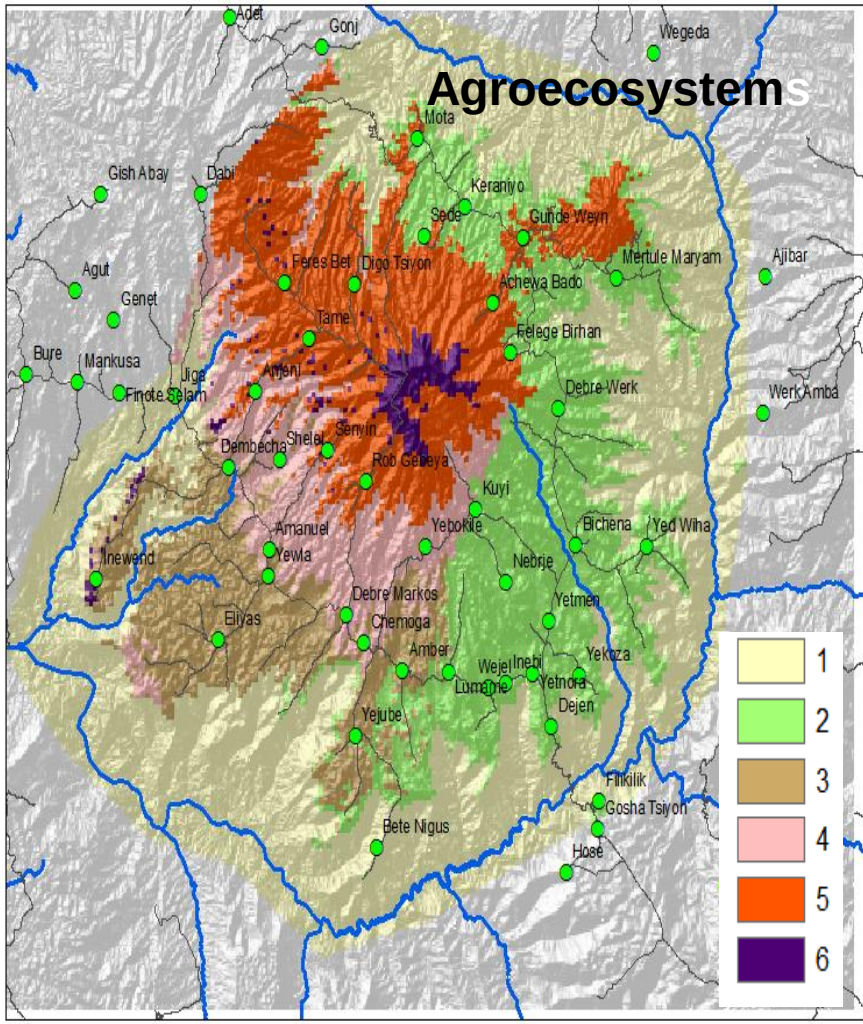
- Climate change and food security are two of the most pressing challenges.
- Highly vulnerable to climate change impacts.
- Adaptation to climate change is a dynamic process.
- Adaptation is also a highly localized problem,.



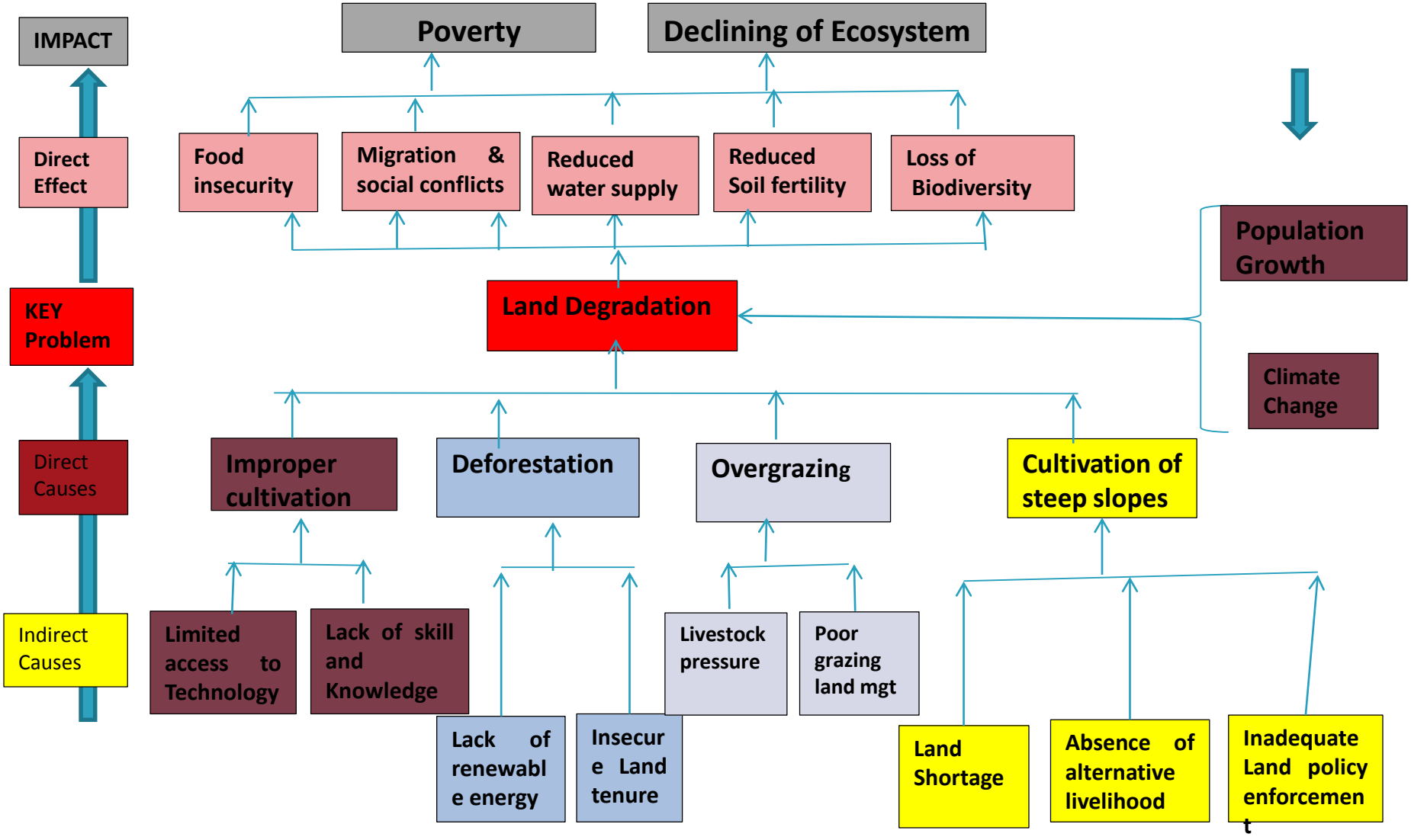


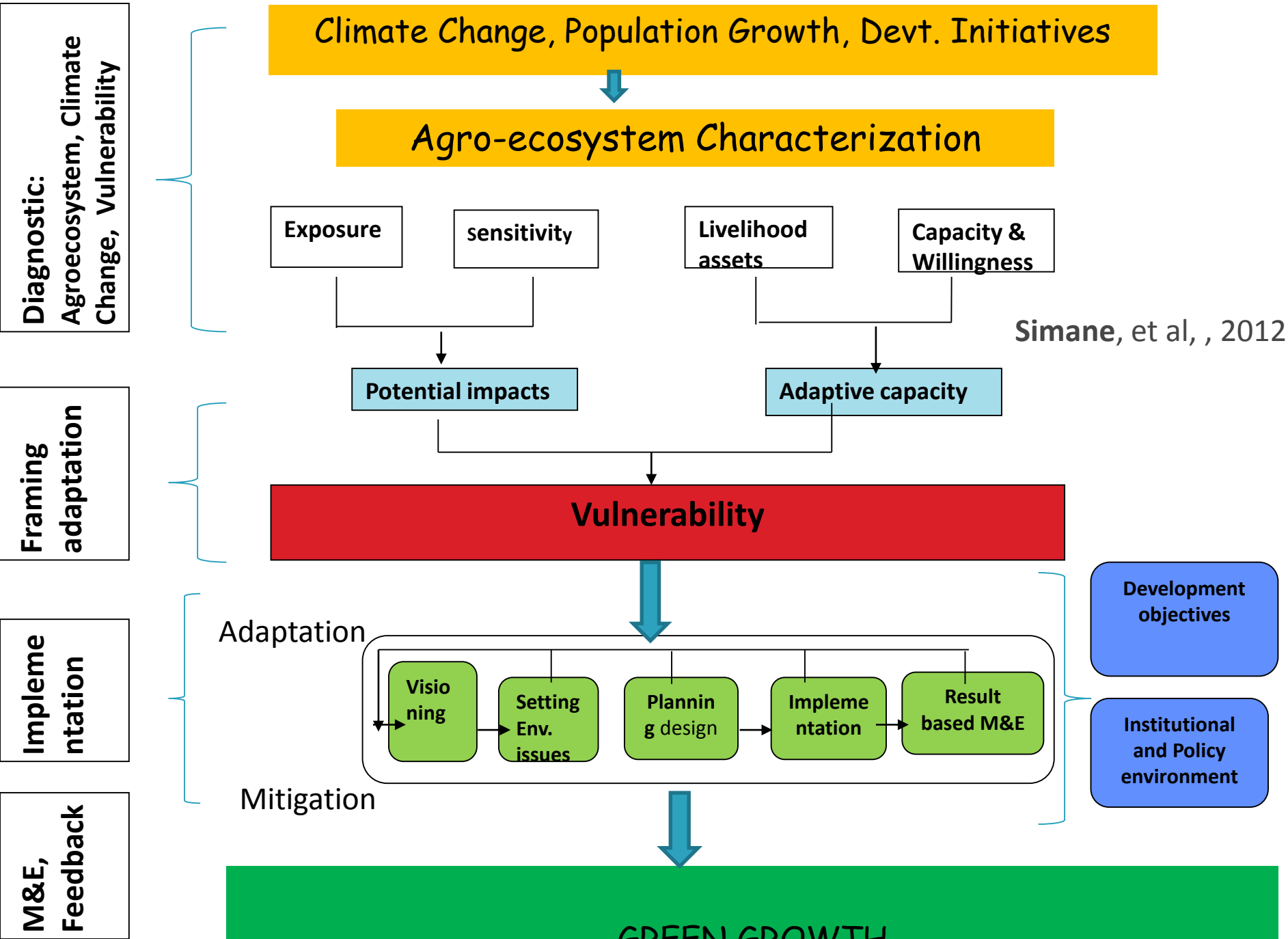
Relevance of Choke Mountain Ecosystem



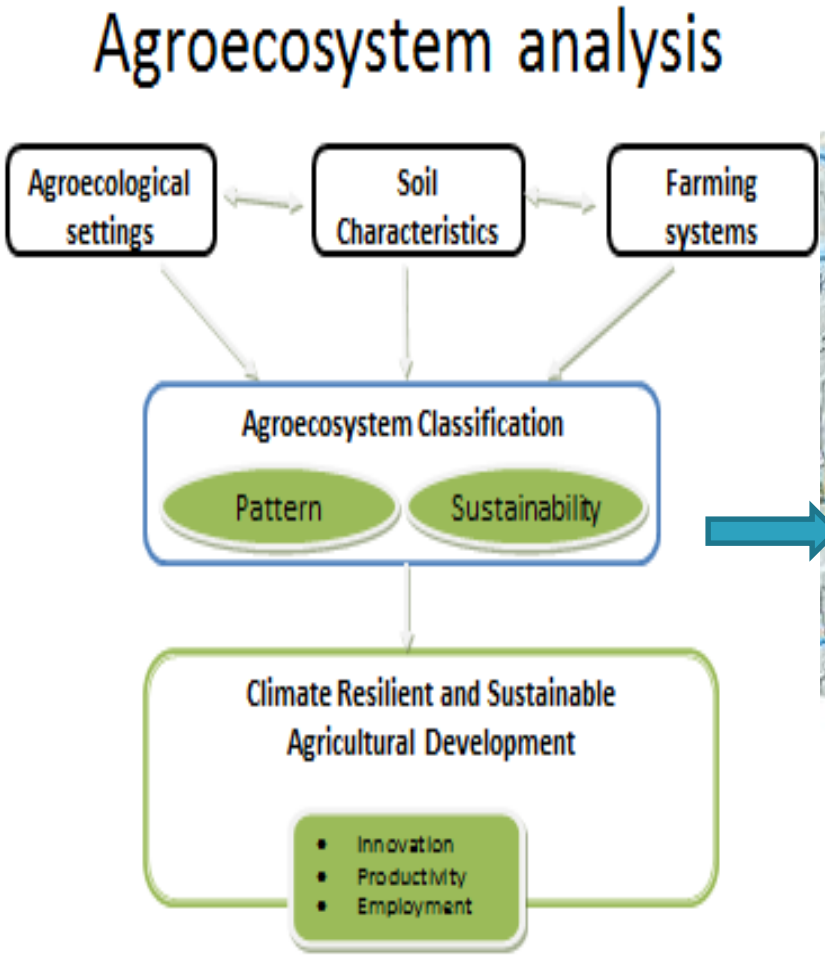


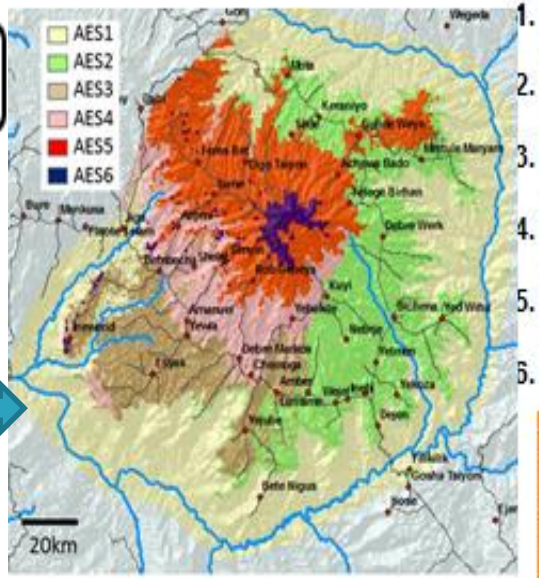
Problem Tree Analysis





Simane, et al, , 2012.





Simane, et al, , 2013

Understanding the context

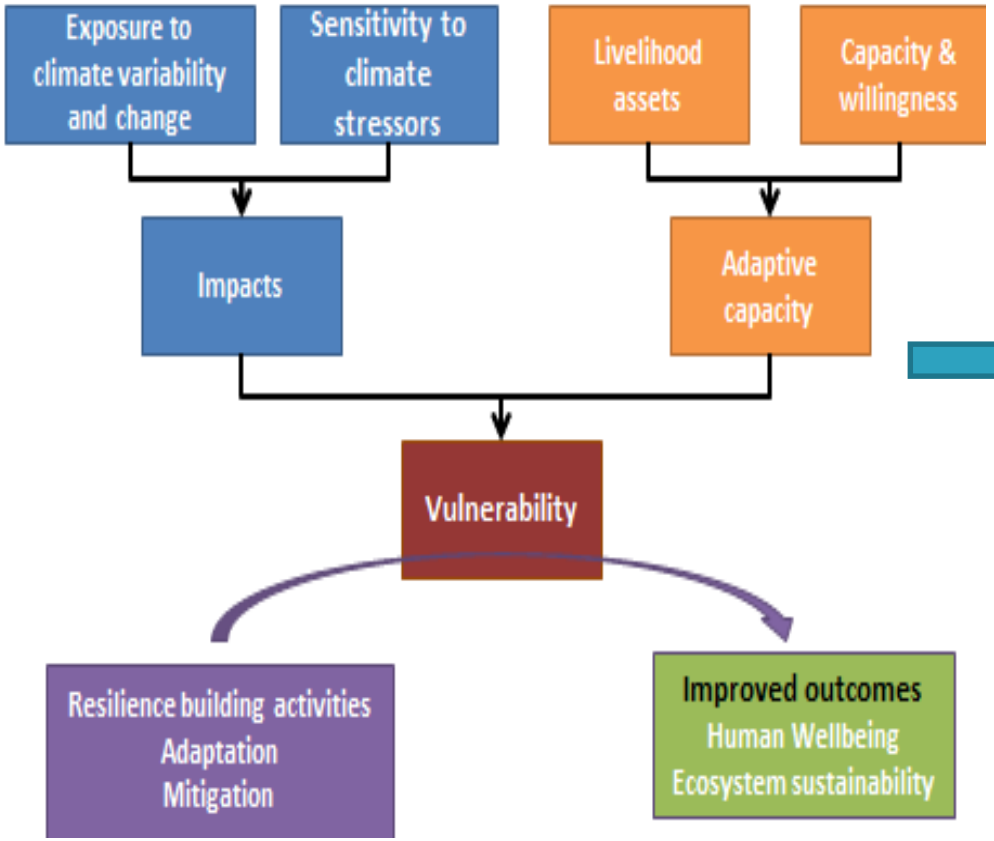
1. Lowland and valley fragmented agroecosystems(AES 1; 7,200 km²)
2. Midland plains with black soil (AES 3,200 km²)
3. Midland plains with brown soils (AE 3; 1,600 km²
4. Midland Sloping Lands (AES4; 1,30 km²
5. Hilly and Mountainous highlands (AES5; 2,400 km²
6. Afro Alpine (AES6; 250 km²

Constraints

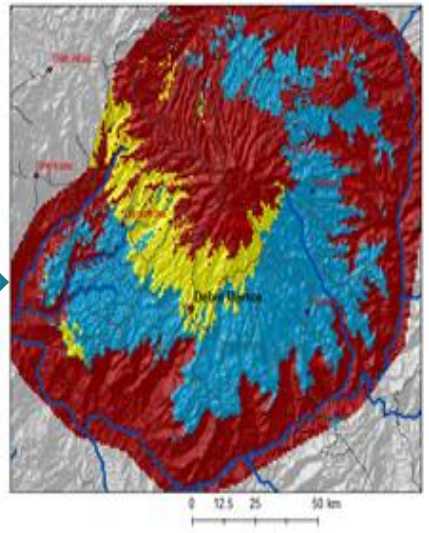
1. *Land degradation*
2. *Soil Acidity*
3. *Deforestation*
4. *Water logging*
5. *Limited local-level capacity (Linkage)*
6. *Limited access to technologies*
7. *Market*
8. *Forage dvt.*
9. *Climate Change*

Belay Simane, Benjamin F. Zaitchik and MutluOzdogan, 2013. Agroecosystem Analysis of the Choke Mountain Watersheds, Ethiopia. *Sustainability* **2013**, *5*, 592-616.

Premise: Understanding climate impacts and vulnerabilities of local communities and ecosystems will enhance local adaptation options



Vulnerability Index for each AES on Choke Mountain. Red = highly vulnerable; yellow = moderately vulnerable; blue = less vulnerable.



- Adaptation must be based on a solid understanding of local vulnerability,.
- The LVI-IPCC offers a framework to evaluate and understand climate change vulnerability at household to community level.

Simane, et al, , 2014.

= highly vulnerable (62%;
= moderately vulnerable (8%);
= less vulnerable (30%).

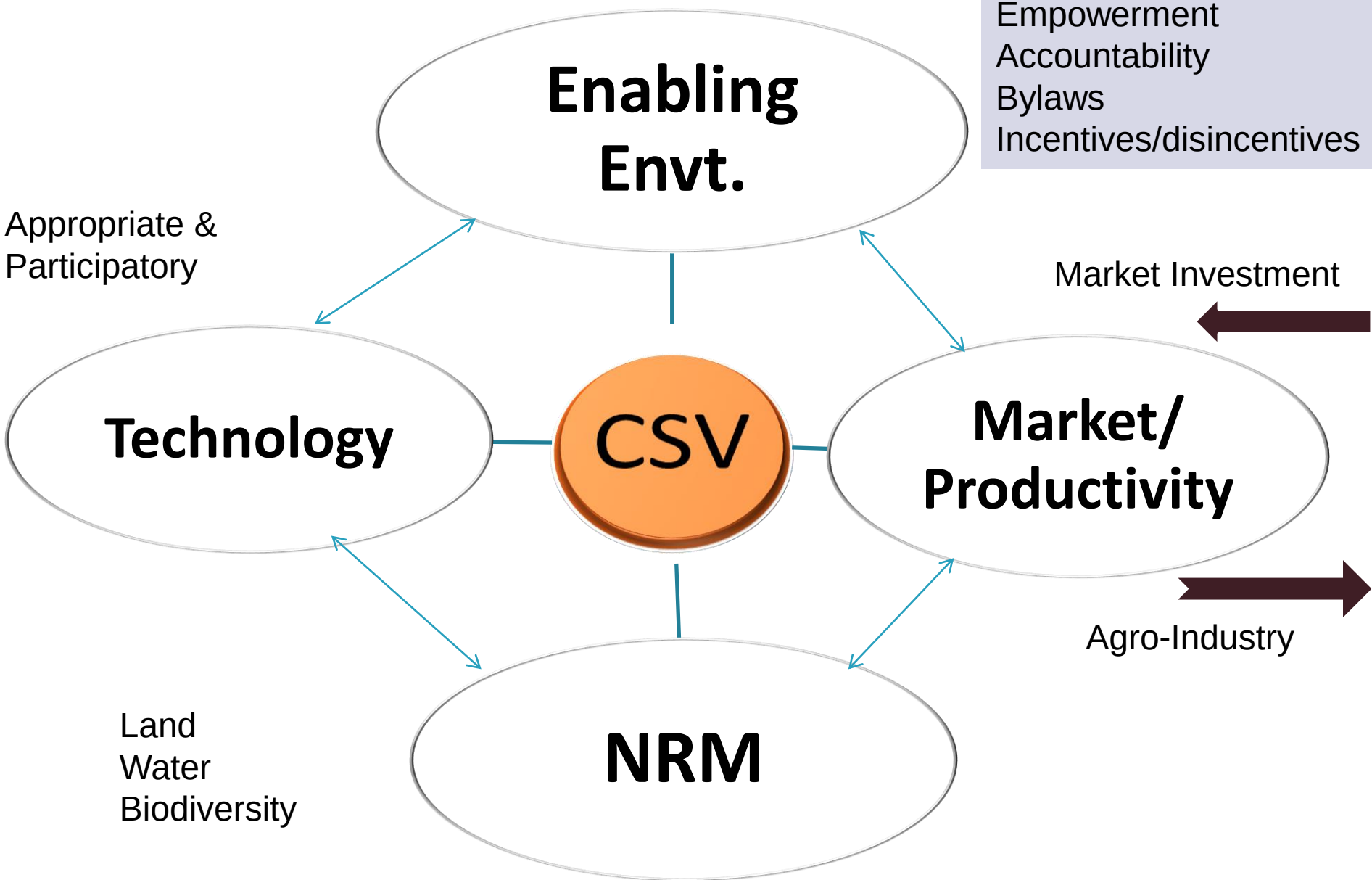
Belay Simane, Benjamin F. Zaitchik and Jeremy D. Foltz, 2014.Agroecosystem-specific climate vulnerability analysis: application of the livelihood vulnerability index to a tropical highland region. *Mitig Adapt Strateg Glob Change (2016) 21:39-65*

Technology Packages

AES	System	Packages	Remarks
AES1	Biofarm system (Permaculture) Agroforestry,	the use of live fences or intermingled crops, grasses and trees (economically useful trees and shrubs, MPTs)	economically useful trees and shrubs
AES2	Vertisol management & Conservation	BBM technology, crop rotation, double cropping,	intensification
AES3	Conservation agriculture	fertilizer, improved seed and varieties, agronomic practices such as plant density, weeding, intercropping, crop rotation, use of organic matter	intensification
AES4	Sloping land management	Slopping Agricultural Land Technology (SALT), Agroforestry, composting, fertilizer including lime, and planting contour hedgerows with nitrogen-fixing plants.	economically useful trees and shrubs
AES5	Biofarm system (Permaculture)	the use of live fences or intermingled crops , grasses and trees (economically useful trees and shrubs), fertilizer including lime	economically useful trees and shrubs
AES6	Protected Area IUCN 4	Community based forest management	PES

1. Setting up Climate-Smart Village

Governance
Participation
Empowerment
Accountability
Bylaws
Incentives/disincentives



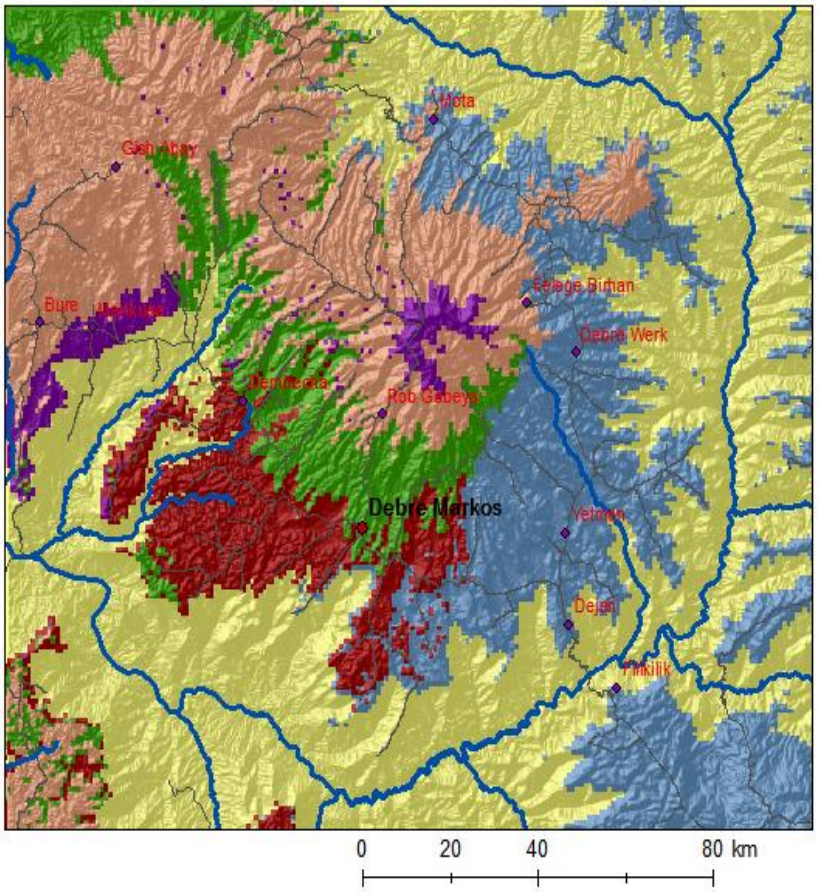
Climate Smart Agriculture

- CSA integrates the three dimensions of SD (economic, social and environmental) by jointly addressing food security and climate challenges.
- CSA is not a set of practices that can be universally applied, but rather an approach that involves different elements embedded in local contexts.
- CSA relates to actions both on-farm and beyond the farm, and incorporates technologies, policies, institutions and investment.

Climate-smart villages (CSV)

- **CSVs** are sites where researchers, local partners, and farmers collaborate to evaluate and maximize synergies across a portfolio of climate-smart agricultural interventions.
- A **dynamic village where communities are mobilized for action to meet their basic needs/food security and protect the natural resource base.**

Conceptual framework of CSV



Climate Smart Villages: Epicenter for Green Growth

- It is **integrated and holistic**. It achieves synergy among programs in agriculture, water, energy and building community spirit with a momentum of accomplishment involving the entire village population.
- It is **economically sustainable**. The primary resources for the strategy come from the local people themselves and by making existing local government resources more effective. Income generation is built into the strategy from the start.
- It is **environmentally sustainable**. People at the CSV will learn small-scale, environmentally sound green technologies such as water harvesting, biogas, composting and irrigation technologies such as drip irrigation.

Research question:

- What practical steps can smallholder farmers take to adapt their agricultural practices to secure dependable food supplies and livelihoods? And
- Can they do this while also decreasing greenhouse gas emissions or increasing carbon sequestration, thereby decreasing future climate change?

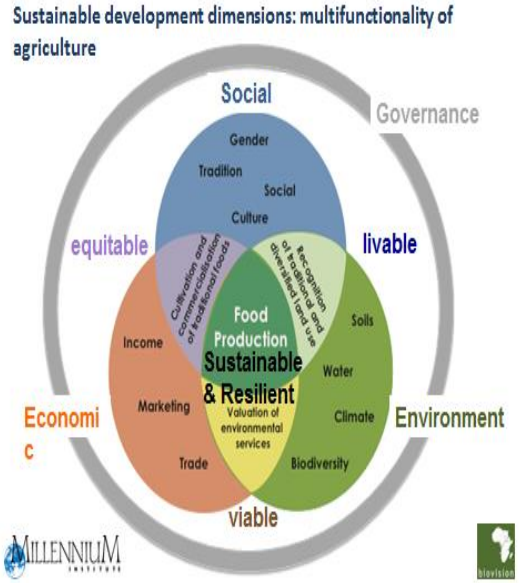
Development question:

- What green options exist to improve the livelihoods and food security of the small-scale farmers, while significantly reducing environmental risks and ecological scarcitie in a rapidly changing environment, and
- What roles do local, regional, and national interests and actors play in the selection of these options?

Project aims:

This project aims to demonstrate how early action on *Climate-Smart* Village can act as a driver of *green growth in the Blue Nile through*

- **Local Institution**: introducing green technologies to technology-impoverished (subsistence) communities through a locally-owned business model institution (CSV), (FTC center based)
- **Capacity Building**: sustaining community-based education and awareness on green Economy via establishing local institutions,
- **Demonstration:** increase the rate of innovative green technologies by a holistic approach taking the major natural resource and marketing as appropriate "entry points" … for example, agriculture, water, energy, sanitation, health, access, and entrepreneurship,
- **Establish Green Enterprises** (giving emphasis to youth and women) and
- **Scaling up** best sustainable green technologies and approaches by establishing business model enterprises outside CSVs.

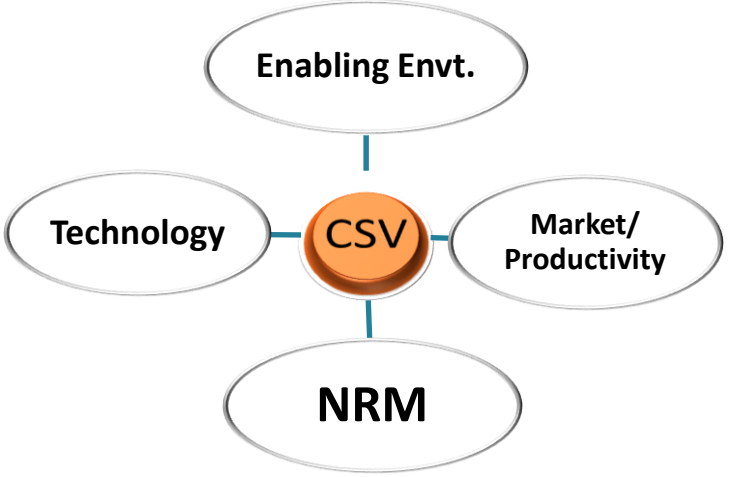


Intervention: Conservation tillage

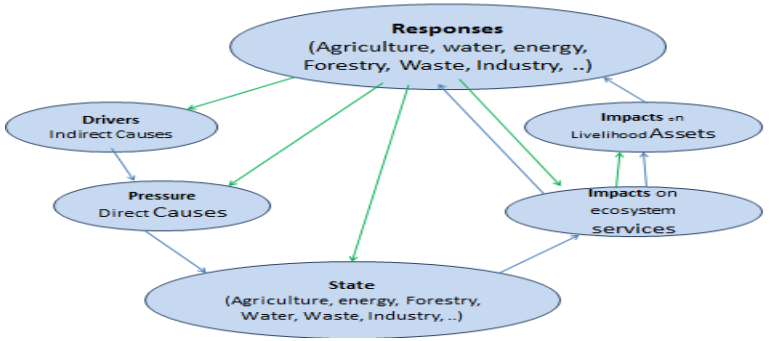
- Increase infiltration (reduce waterlogging and breakdown of SCS)
- Enable farmers avoid cross plowing
- Save crop land (widening of spacing, leave out SCS in moderate slopes)

Key Activities:

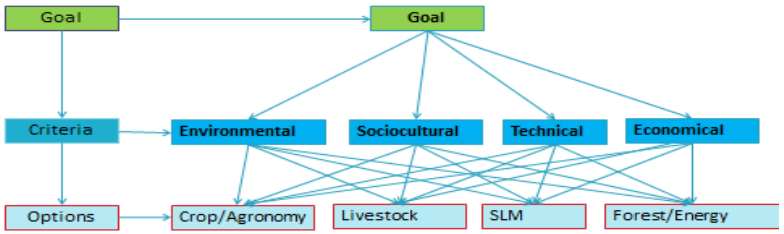
1. Setting up Climate-Smart Village
2. Conducting the baseline survey
3. Capacity building
4. Prioritizing interventions
5. **Implementing forecast-based resilience strategies**
6. Monitoring and evaluating progress
7. Scaling up and scaling out



DPSIR framework



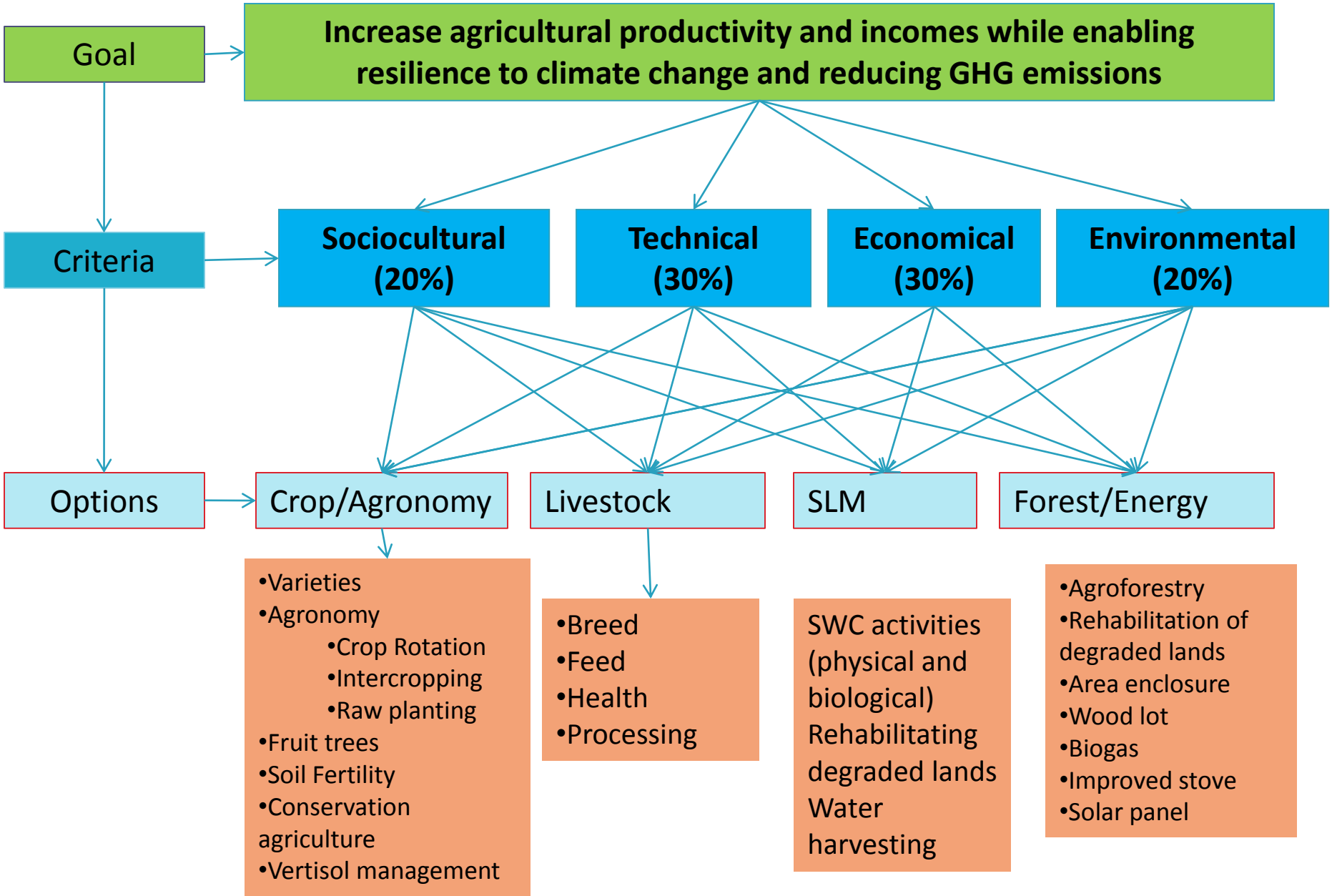
Framework for the selection of adaptation options using MCA



Menu of Technology options

Crop management	Livestock management	Soil and water management	Agroforestry	Integrated food energy
• Improved Varieties • Intercropping with legumes • Crop rotations • New crop varieties (e.g. drought resistant) • Improved storage and processing techniques • Greater crop diversity	• Improved feeding strategies (e.g. cut 'n carry) • Rotational grazing • Fodder crops • Grassland restoration and conservation • Manure treatment • Improved livestock health • Animal husbandry improvements	• SWC activities • Conservation agriculture (e.g. minimum tillage) • BBM • Contour planting • Terraces and bunds • Planting pits • Water storage (e.g. water pans) • Alternate wetting and drying (rice) • Improved irrigation	• Boundary trees and hedgerows • Nitrogen-fixing trees • on farms Multipurpose trees • Woodlots • Fruit orchards	• Biogas • Solar panels • Improved stoves • _

Framework for the selection of adaptation options using MCA



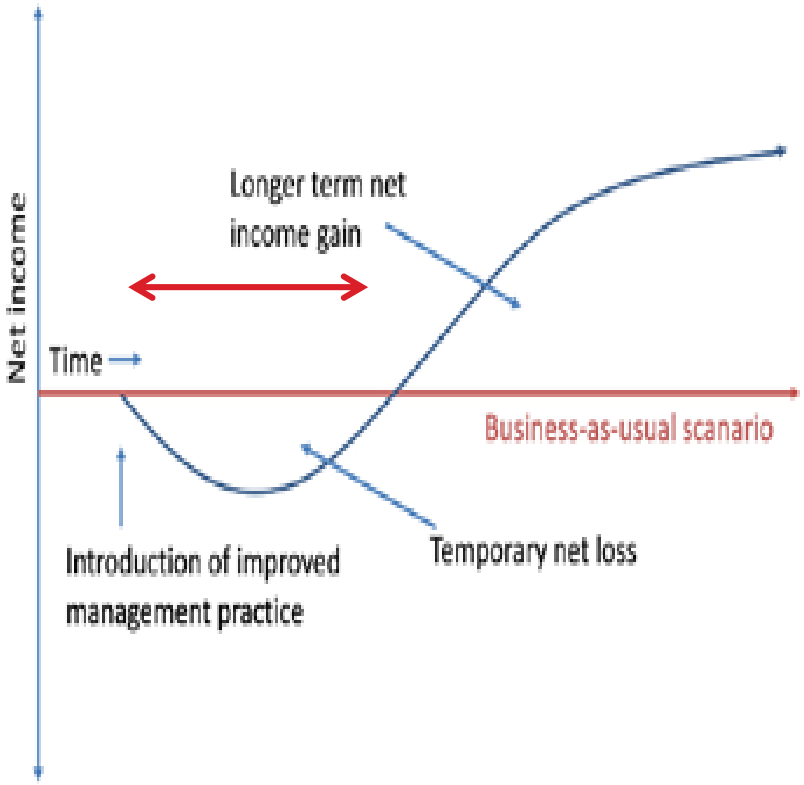
Category	AES1	AES2	AES3	AES4	AES5	AES6
Crop	• Improved varieties (Sorghum, H. Bean) • Intercropping (sorghum and H bean,) • Crop rotation • Raw planting • Home Gardens (Family drip irrigation)	• Improved varieties (D. wheat, B. Wheat,, Barely, Bean) • Crop rotation • Double cropping (Lentil, Grass pea, Chick pea • Raw planting • Home Gardens Threshing machines	• Improved varieties Appropriate type and rate of fertilizer • Intercropping (Maize + bean) • Crop rotation (wheat, bean, Niger seed) • Raw planting • Home Gardens • threshing machines	• Improved varieties of crops • Intercropping (Potato + bean) • Crop rotation • Home Gardens (Family drip irrigation) • ,	• Improvement of local • Intercropping (Potato + bean) • Crop rotation (wheat/Triticale , bean, potato) • Improved varieties • Appropriate rate & method of planting	
Livestock	• Beekeeping, • Poultry production • hedge row planting Acacia spp.,	• Fattening • hedge row planting Acacia spp., •	• hedge row planting Acacia spp., •	• hedge row planting Acacia spp.,		• Cut and Carry system
Sustainable Land Management.	• Boundary tree plantation (Moringa olifera, mango, Acacia a), etc • Biological SWC (bund plantation/ Susbania, Lucinea, etc, fruit trees) • Compost preparation • Water harvesting	• Use of BBM • Biological SWC (grass strip) • Compost • Full recommended fertilizer • Gully treatment and rehabilitation	• Minimum tillage • Contour Ploughing (avoid criss-cross ploughing) • Biological SWC (grass strip) • Compost	• Subdivide fields and introduce crop rotation (wheat/Triticale, bean, potato) • Appropriate type, time and rate of fertilizer including liming • Compost • Alley cropping	• Appropriate type, time and rate of fertilizer including liming • Compost •	Category VI (Protected area with sustainable use of natural resources)
Forest	• Reforestation of degraded lands (Jatrofa carcas) • Rehabilitate and sustainably manage natural forests • Establish Non-timber and Production forests • Establish apiculture value chains • Wetland management	• Reforestation of degraded lands • Rehabilitate and sustainably manage natural forests • Establish Non-timber and Production forests •	• Reforestation of degraded lands • Agroforestry (Bisana (Croton macrostachyus) Wanza (Cordia africana) • Rehabilitate and sustainably manage natural forests • Establish Non-	• Reforestation of degraded lands • Agroforestry (Acacia spp., Susbania, Trilucer, Medium chiller apple and Peach trees) • Rehabilitate and sustainably manage natural forests • Establish Non-timber and Production forests	• Reforestation of degraded lands • Agroforestry (Apple, Susbania, Trilucer, Peach trees) • Alley cropping (Gesho, Bamboo, Apple, Potato • Rehabilitate and sustainably manage	• Rehabilitate and sustainably manage natural forests •

Technology

- It must bring a **visible and immediate benefit**, economic or otherwise.
- The benefit must be substantial enough to convince the farmers to change their ongoing practices.
- the costs incurred must be able to be covered by the farmer.
- The introduction of new technologies should be followed up by an extension service for a long period of time.

Challenges

- CSA is both knowledge and capital intensive
- Subsistence farmers find it hard to innovate and invest in better management systems.
- Many CSA practices incur establishment and maintenance costs and
- it can take considerable time before farmers benefit from them.



Short term income losses often inhibit smallholders from investing in management practices that provide long term benefits

Key challenges for scientists

"You can give us the science -
but what do you expect us to do with it?"

- Understand context
- Understand the audience and how they absorb knowledge
- Ensure information delivery supports local need
- Influencing and ensuring impact as an 'outsider' requires significant effort and sustained engagement

Key challenges for scientists

- **Climate risk not linked in** to communities yet and there are weak linkages e.g. scientists-tools-people
- **Usefulness of information**:
  - Accessibility
  - Usability
  - Trustworthiness/Legitimacy
  - Credibility
  - Reliability and Robustness

Acknowledgements

- PEER: Bringing seasonal forecasts to the farmer: participatory Climate Smart Villages for Green Growth in Ethiopia. 2016-2019 .
- NILE-NEXUS: Opportunities for a sustainable food-energy-water future in the Blue Nile Mountains of Ethiopia. Belmont Forum. 2016-2019.
- INFEWS/T1: Understanding multi-scale resilience options for climate-vulnerable Africa. NSF
- CNH: Agroecosystem-based Climate Resilience Strategies in the Blue Nile Headwaters of Ethiopia . 20012-2017..
- Building Resilience to Climate Change in Ethiopia: a Thematic Research (AAU). 20010-2018.