CLIMATE-SMART Agriculture 2015

Global Science Conference

March 16-18, 2015
Le Corum, Montpellier France

Potential for taking climate smart agricultural practices to scale: Examples from Sub-Saharan Africa

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International Maize and Wheat Improvement Center (CIMMYT)

Montpellier

March 16-18, 2015

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Presentation Outline

- The SSA Region
- Agriculture and Climate Change (CC) in SSA
- Responses to Climate Change in SSA
- Examples of Successful CSAs in SSA
- Conclusion

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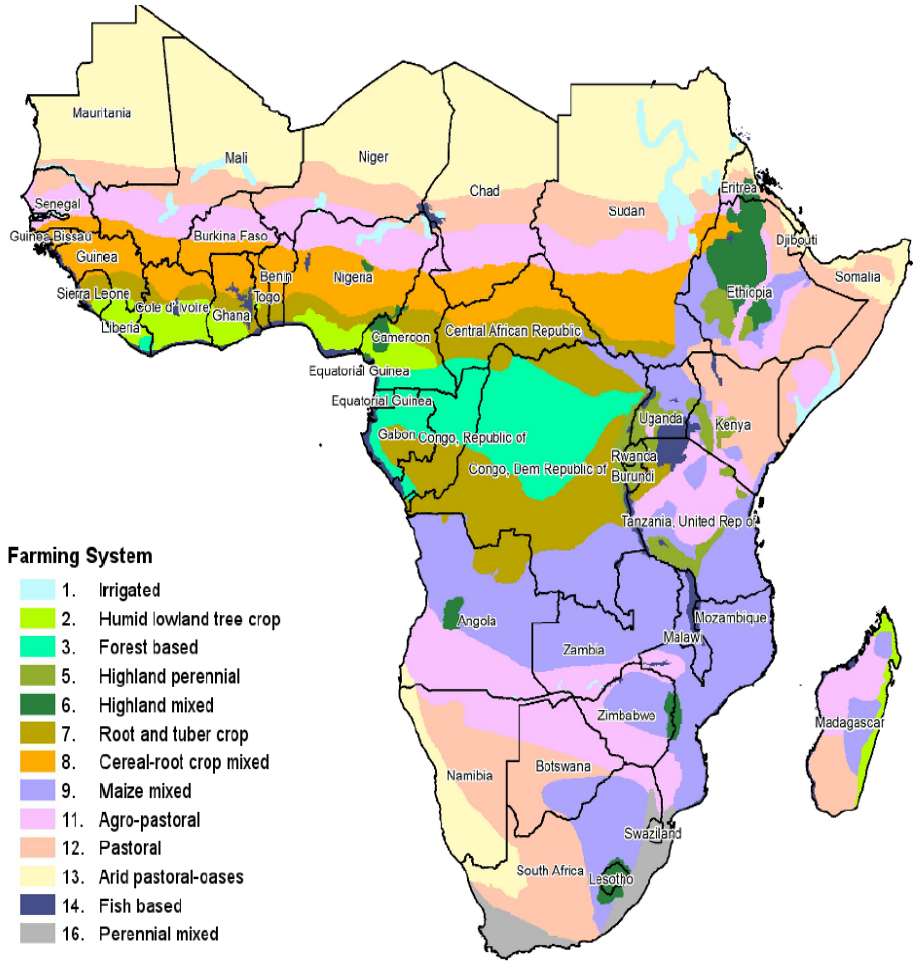
The Sub-Saharan Africa Region

- **a rapidly developing region**
  - over 800 million people
  - huge agro-ecological, farming system and cultural diversity
- **undernourished people:**
  - 223 million (current)
  - increase by 132 million by 2050 due to climate change (WRI, 2014; AGRA, 2014)
- **will require 360%** as much food production in 2050 as in 2006 to feed its growing population (WRI, 2014).



Garrity et al., 2012

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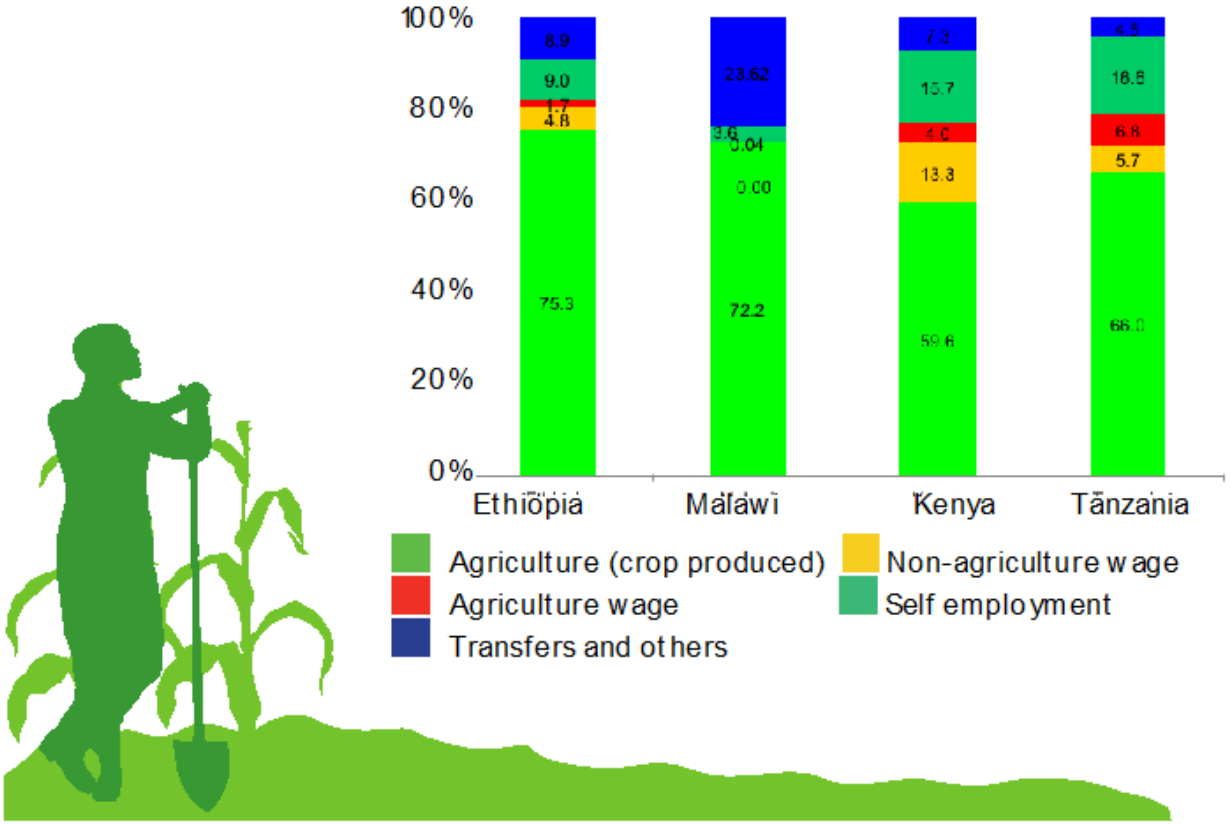
Agriculture is the major source of income



Agriculture contributes the largest share of income in all countries (no less than 60% in Kenya and 75% in Ethiopia). It follows that increasing its productivity is fundamental to improve household welfare. Non-agricultural wage employment rates are very low at a maximum of 13% in Kenya. Similarly, self-employment ranges between 4% in Malawi and 17% in Tanzania.

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Agriculture and Climate Change in SSA

Characteristics of Ag in SSA

- **Smallholder farmers:**
  - 80% of all the farms
  - primary producers of agricultural production,
  - directly employ >175 million people
  - ~70% are women
  - low-input/low-output subsistence Ag.
  - resource and access constrained
  - low productivity (yield, labor)
  - Spend about 60% of income (<$2.00 per day) on food (AASR, 2014).

Challenges posed by CC

- adds to the exiting challenges
- making worse the tight resources constraints
- more erratic weather patterns
- extreme weather events
- threaten food production
  - food price hikes
  - increase vulnerability of SHs
  - accelerate rural poverty

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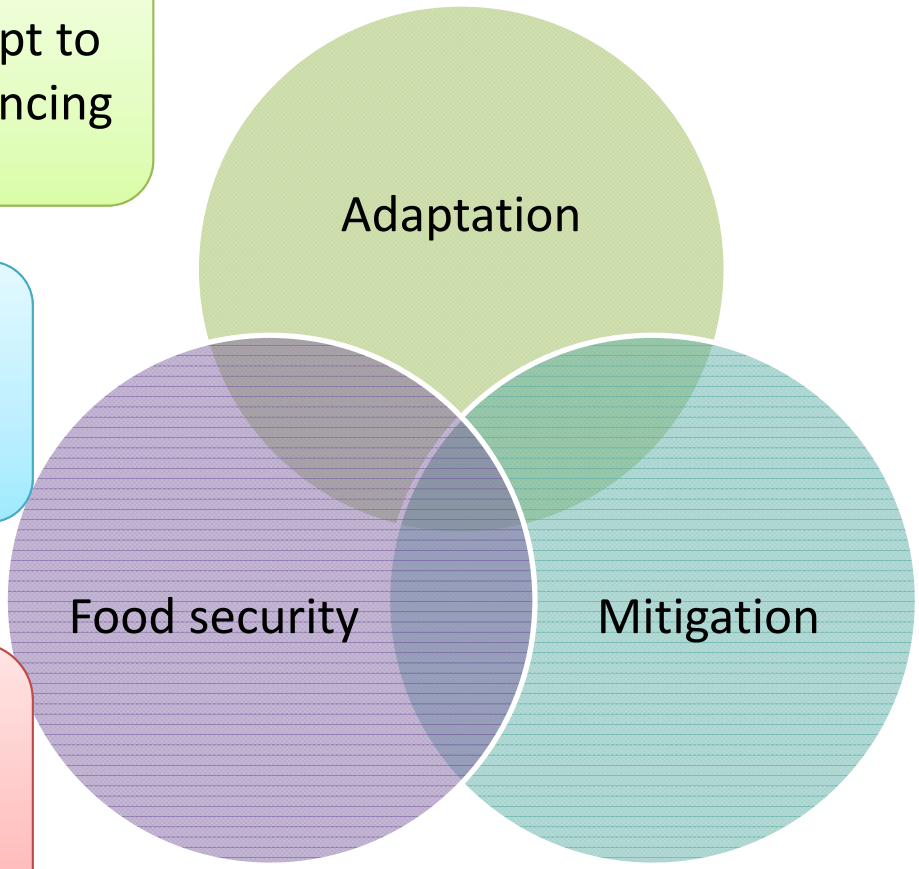
Responses to Climate Change in SSA

There are interventions applicable to African farming systems that help smallholders adapt to CC while reducing GHG emissions and enhancing food security.

CSA is an approach for addressing food security challenges under the new realities of climate change.

AU has started using synergies and tradeoffs among food security, adaptation and mitigation as a basis for reorienting agricultural policies and practices in response to climate change (AASR, 2014).



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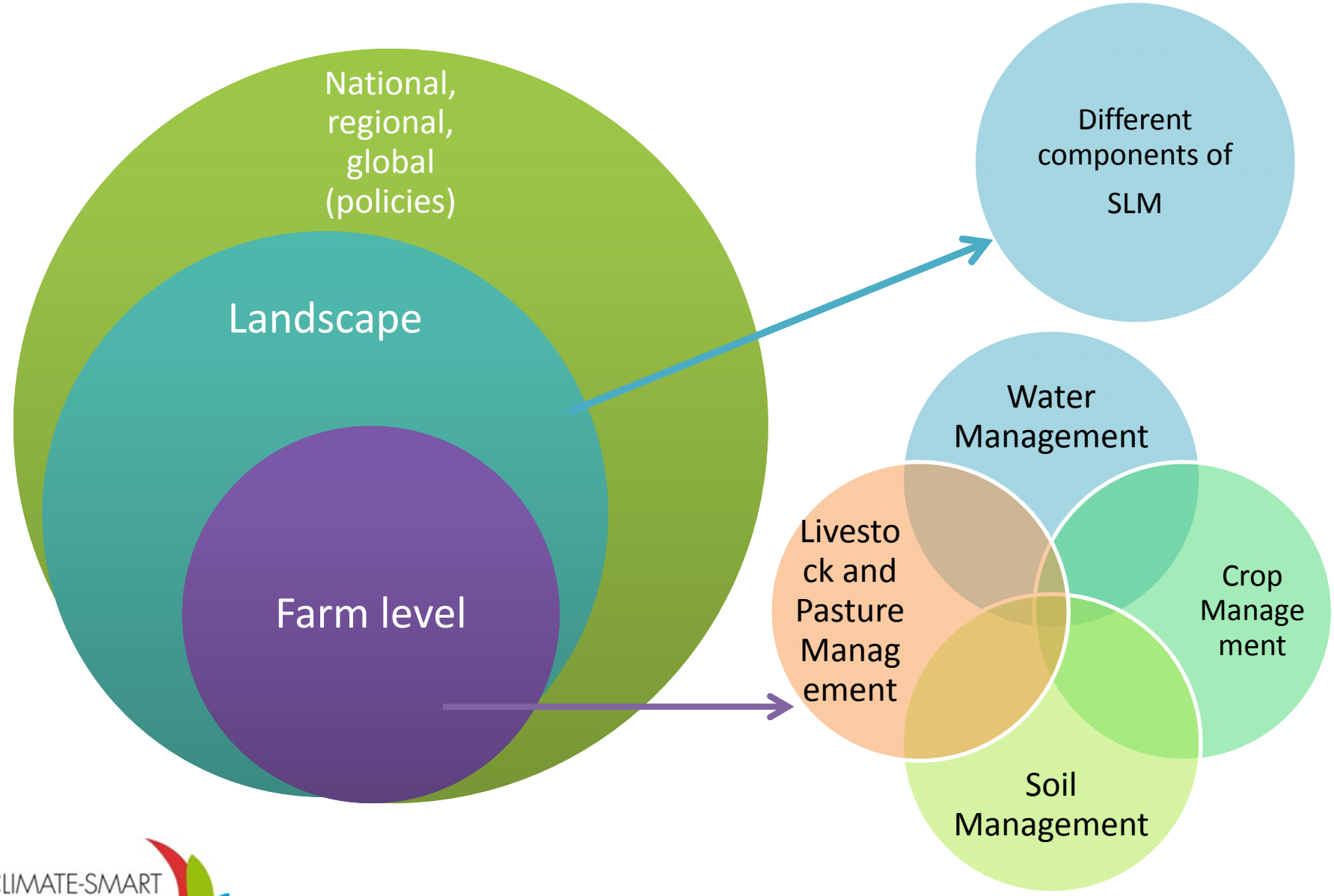
CSA at different Scales



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Arslan A., 2014

Examples of Successful CSAs in SSA

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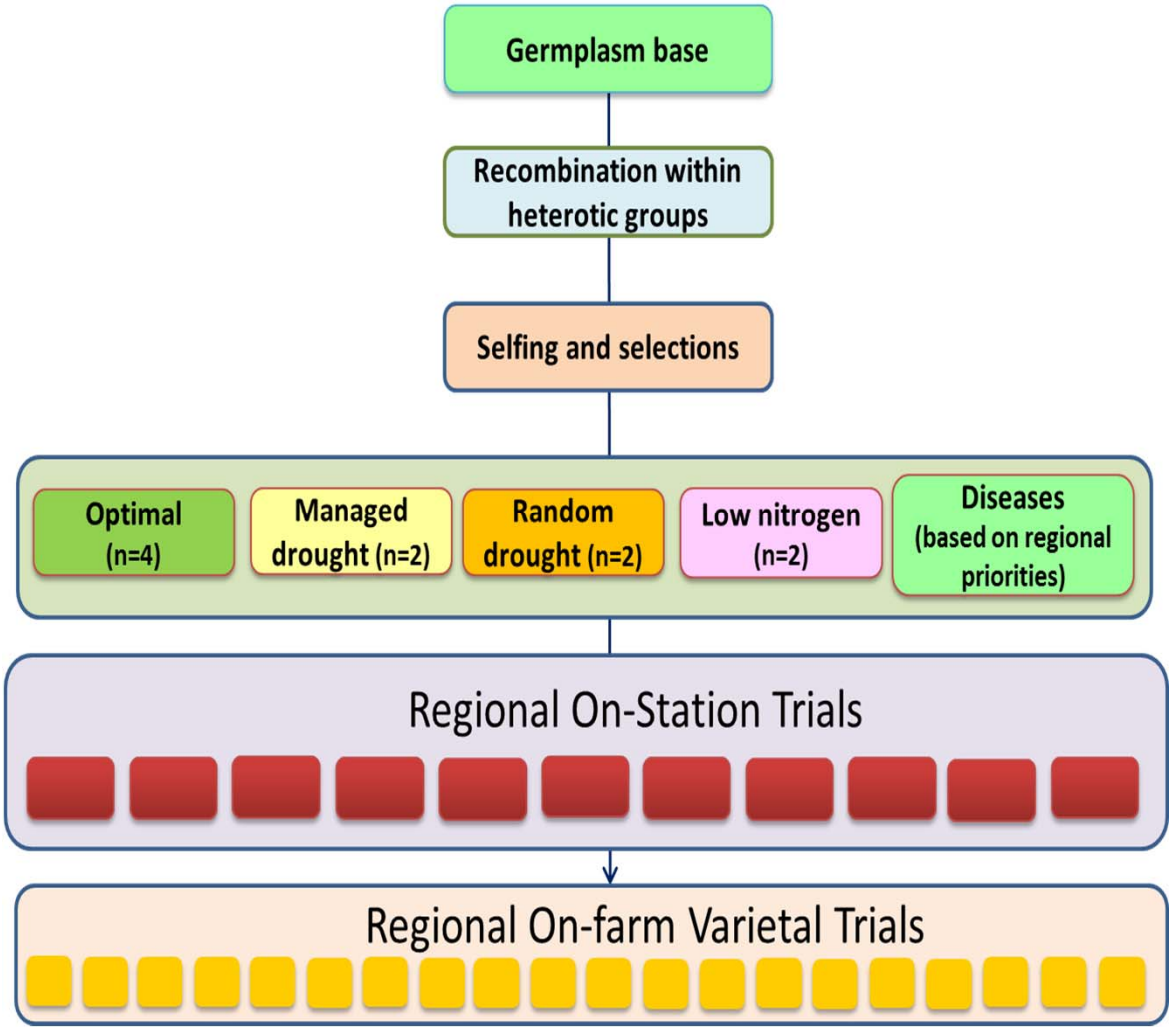
Drought Tolerant Maize Varieties



Prasanna BM, 2014

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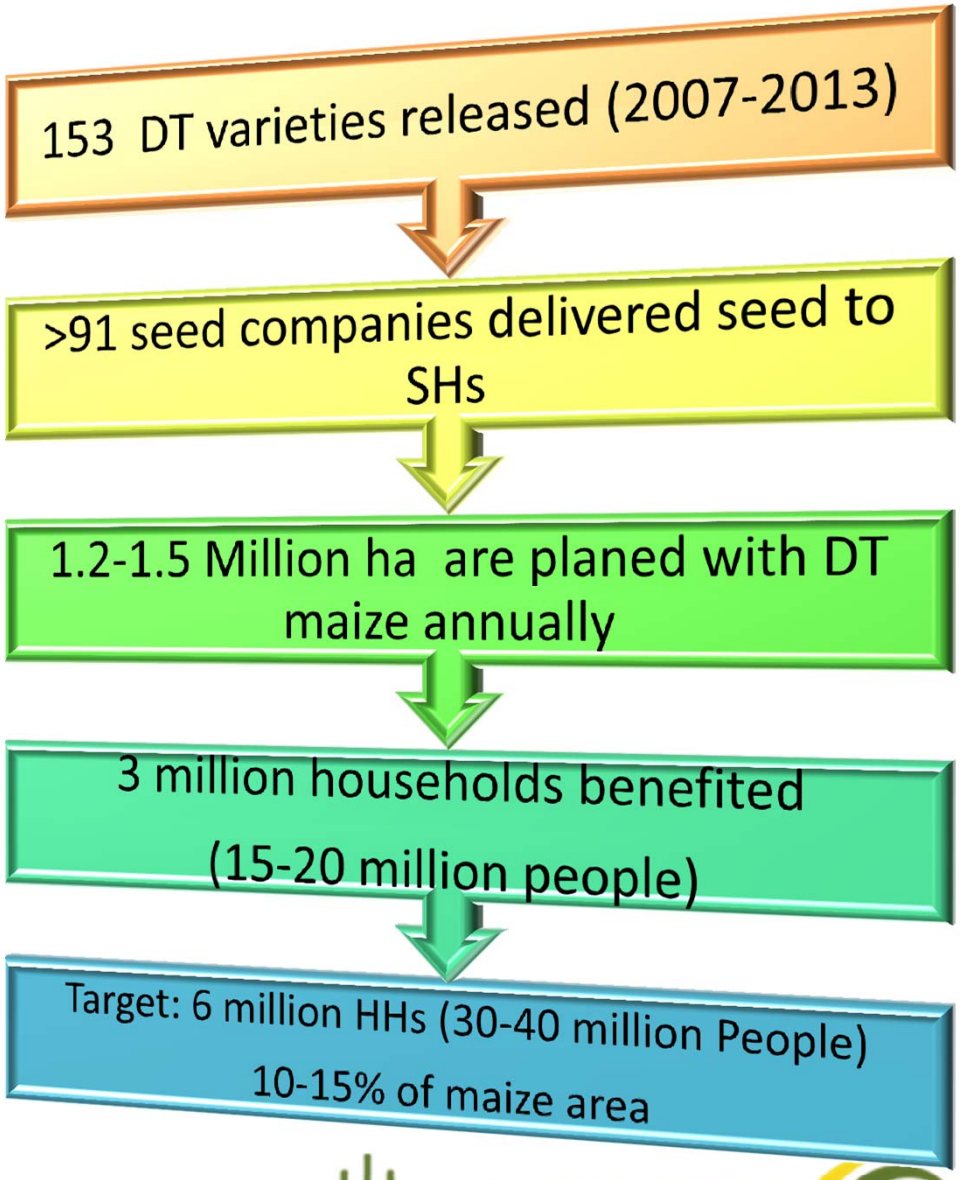
Adoption of drought tolerance maize varieties



Country	% HH growing DT maize (2013)
Angola	65
Malawi	86
Zambia	15
Zimbabwe	80
Ethiopia	16
Kenya	7
Tanzania	18
Uganda	83
Benin	5
Ghana	24
Mali	52
Nigeria	11

Prasanna BM, 2014

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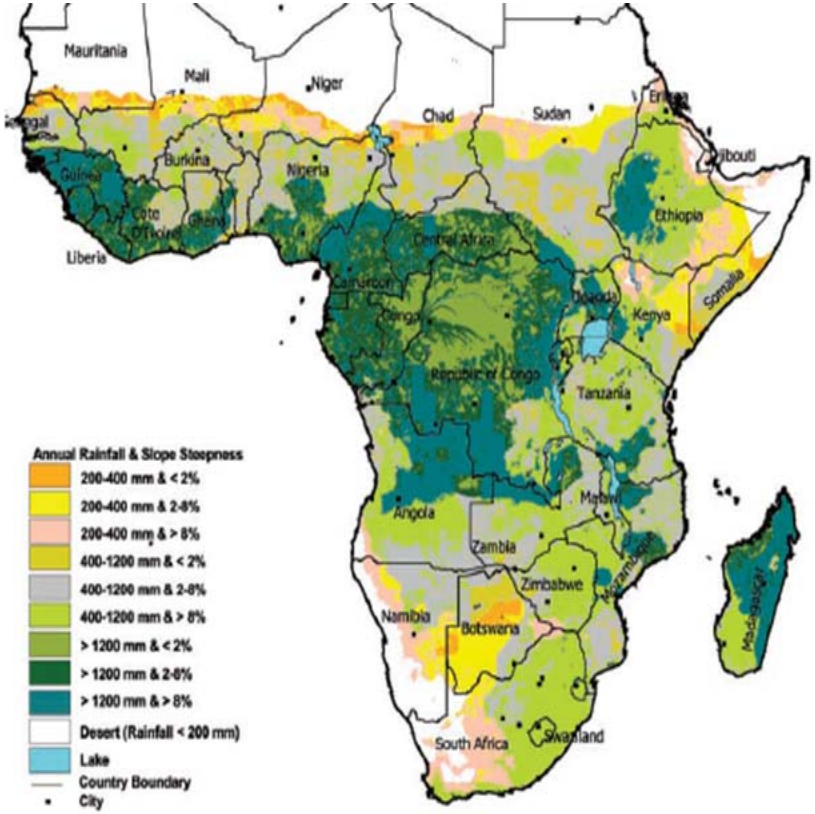
Water Harvesting

Rainfed agriculture and WH

- Approximately **75% of the poor depe**nd on **rain-fed agriculture** for their livelihoods.
- In sub-Saharan Africa the proportion is over **90% of the population**, generating 30-40% o GDP (NWP, 2007)
- Water harvesting solutions must cope with both extreme rainfall and extreme droughts that come with CC.
- The potential for rainwater harvesting in SSA is enormous . It is estimated that the gross volume of harvestable runoff is about 5,195 km3 (Malesu *et al*., 2006).
- If only 15% of the rainwater in SSA were harvested, it would be more than enough to meet all the water needs of the continent.

Relative potential for rainwater harvesting in SSA



Malesu *et al*., 2006

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In-situ and ex-situ water harvesting

MOA, 2014

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Water harvesting ….

Millions of people in SSA practice different forms of WH structures

East Africa: Ethiopia, Kenya

Southern Africa: Malawi, RSA, Zambia, Zimbabwe

West Africa: Ghana, Burkina Faso, Mali, Niger, Nigeria

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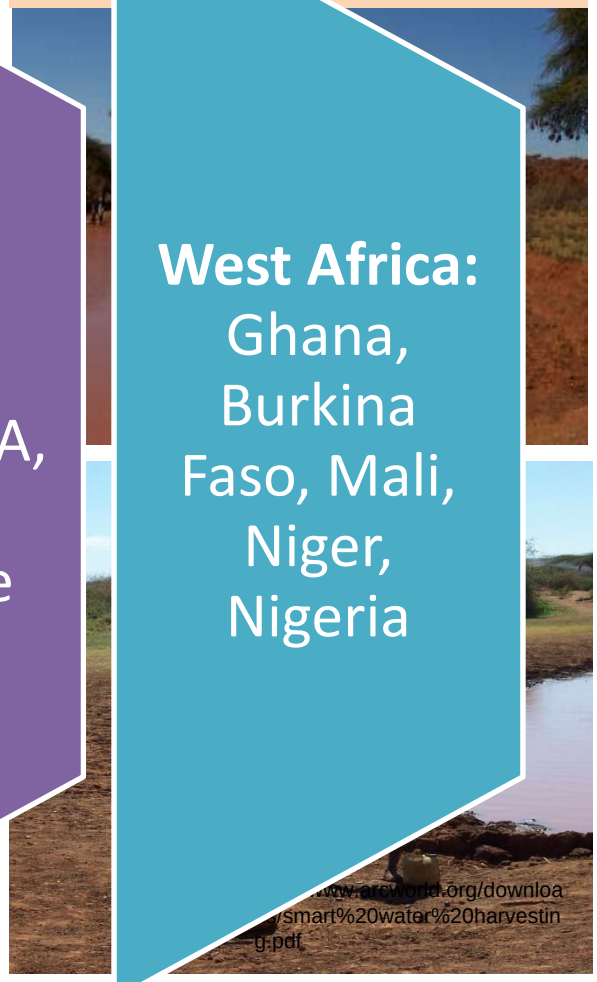

www.areyworld.org/downloa
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Sustainable Intensification Practices (SIPs)

Sustainable intensification practices– achieving increased outputs from the same cropped areas with reduced negative environmental impacts

Identifying feasible pathways for the intensification of maize-legume cropping systems

SIMLESA, CIMMYT

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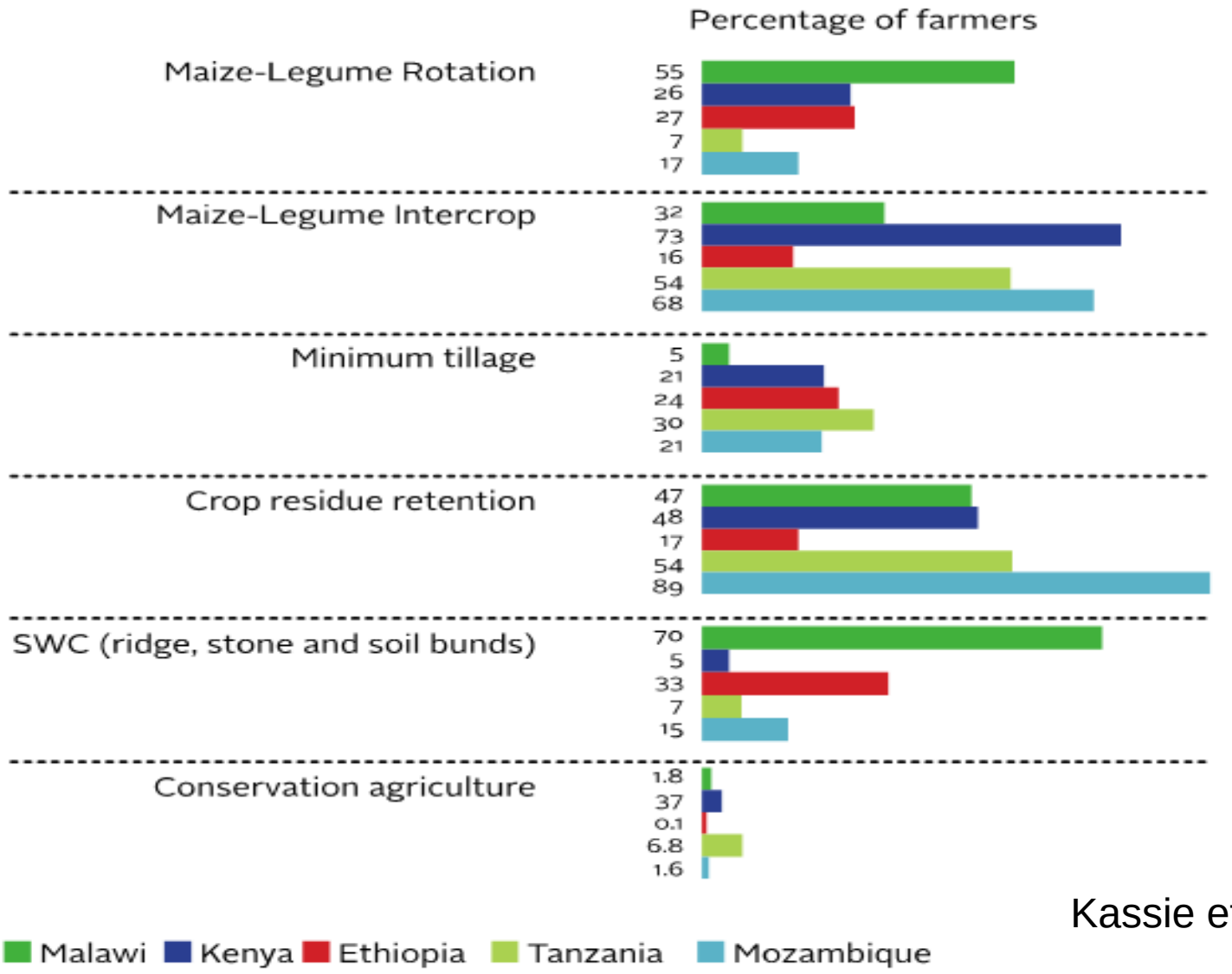
Adoption of SIPs in ESA



Kassie et al., 2015)

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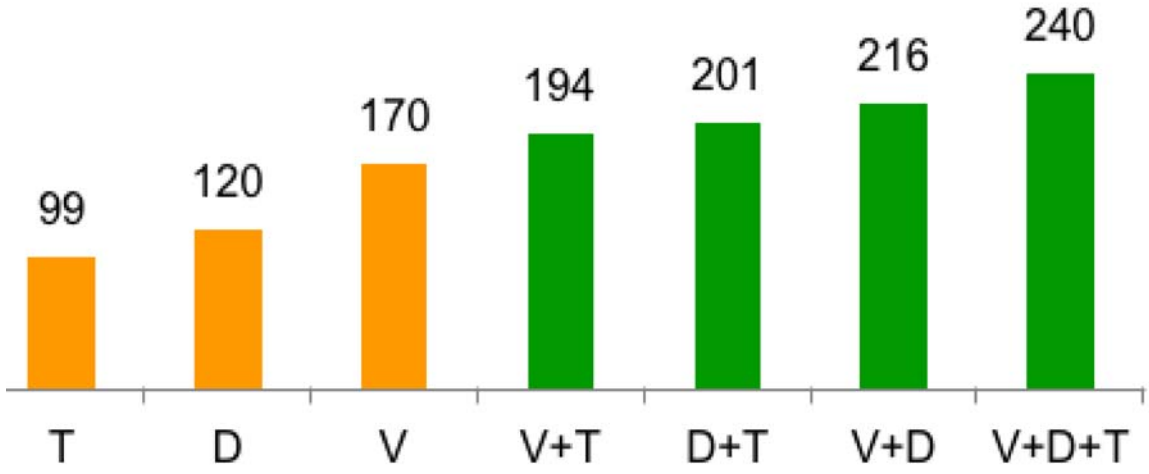
Additional income from adoption of multiple Sustainable Intensif cation Practices (SIP) in Ethiopia (USD/ ha)



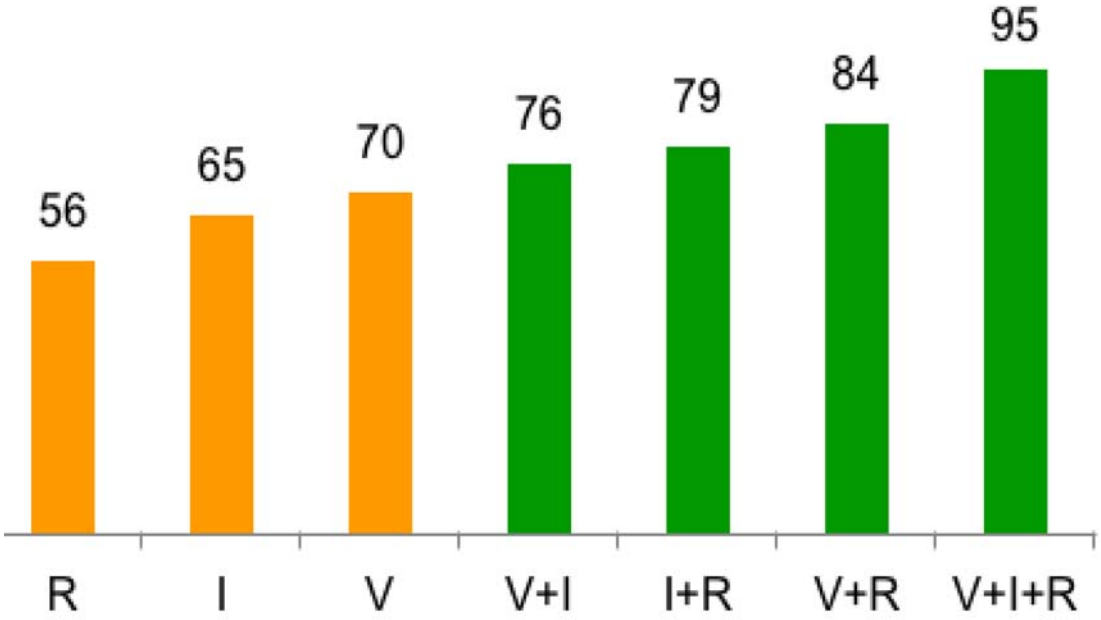
Note: V-Improved maize varieties; D-Crop diversif cation (legume-maize intercropping & rotation), T-Minimum tillage (zero/ one pass).

Adoption of SIPs resulted in higher additional income but the highest additional income was obtained from joint adoption of SIPs. The contribution of improved maize varieties to additional income increases by 14-41% when they are jointly adopted with other SIPs. The study is based on nationaly representative data collected by SIMLESA Adoption Pathways Project and CRP-maize funds.

Source: SIMLESA 2010 and AP 2013 surveys

Kassie et al., 2015)

Additional income due to multiple adoption of SIPs in Malawi (in USD/ ha)



Note: V-Improved maize varieties; I-legume-maize intercropping, and R-legume-maize rotation).

Kassie et al., 2015)

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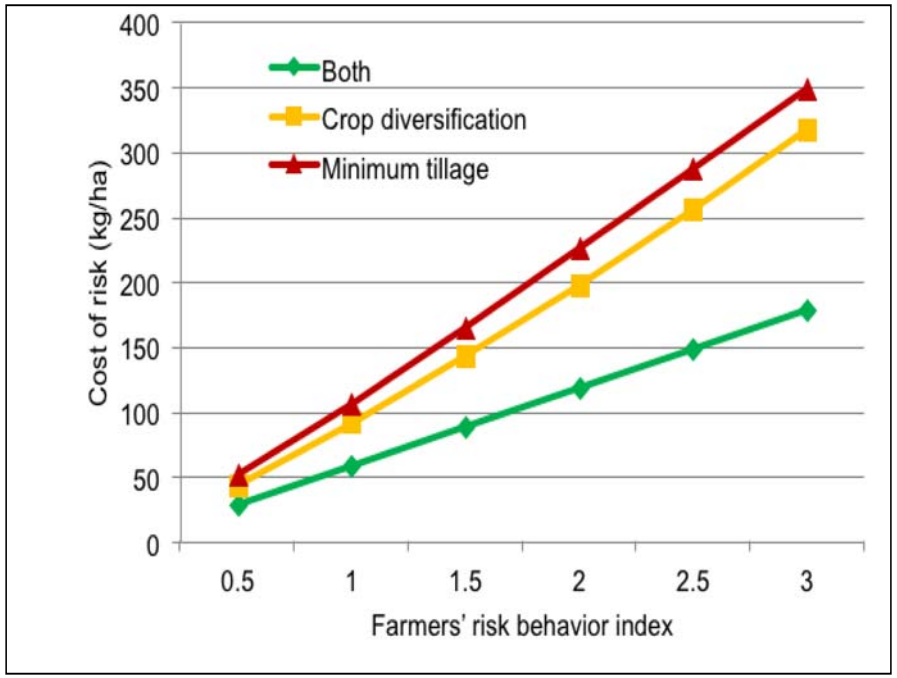
Impact of SIPs on cost of risk and HH food security

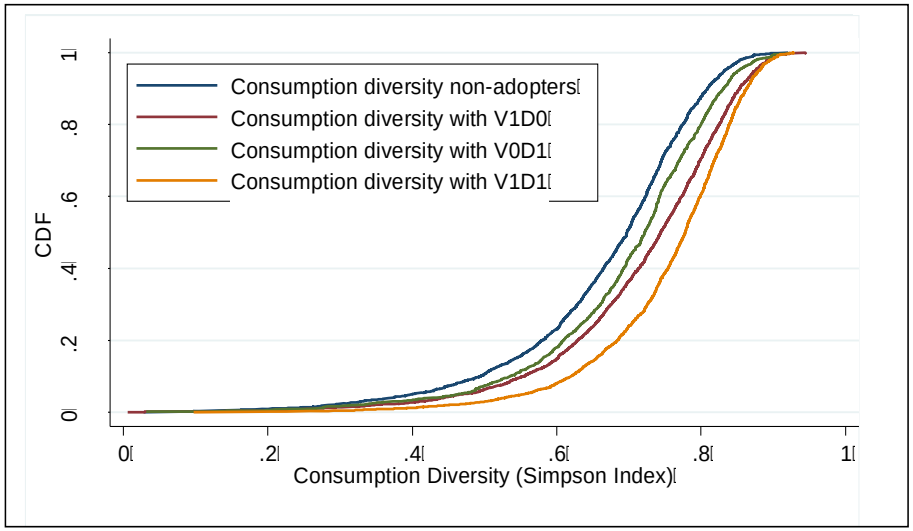
Impact of SIPs on cost of risk in Malawi



Adoption of SIPs reduces cost of risk but greater reduction was achieved with joint adoption. This analysis is based on nationaly representative data.

Source: SIMLESA 2010 survey

Technology diversif cation and nutrition security in Ethiopia



Note: V-Improved maize varieties; D-Crop diversif cation (legume-maize intercropping, and legume-maize rotation).

Adoption of technologies is not only increase crop income and reduce crop failure but can also increase food diversity. Joint adoption of improved maize varieties with good agronomic practices increased household nutrition diversity or security. This result is based on national representative panel data analysis (2010 and 2013 data).

Kassie et al., 2015)

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Climate Smart Sustainable Land Management

Climate-smart sustainable land management (CSA-SLM) practices are those that simultaneously and sustainably increase productivity, strengthen resilience, and contribute to the mitigation of climate change by reducing greenhouse gas emissions and sequestering carbon on farmlands (FAO, 2010; World Bank, 2012; Beddington, 2013).

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Soil and water conservation on degraded landscapes (mass mobilization)

The Problem

Consultation + mobilization + action

Benefit

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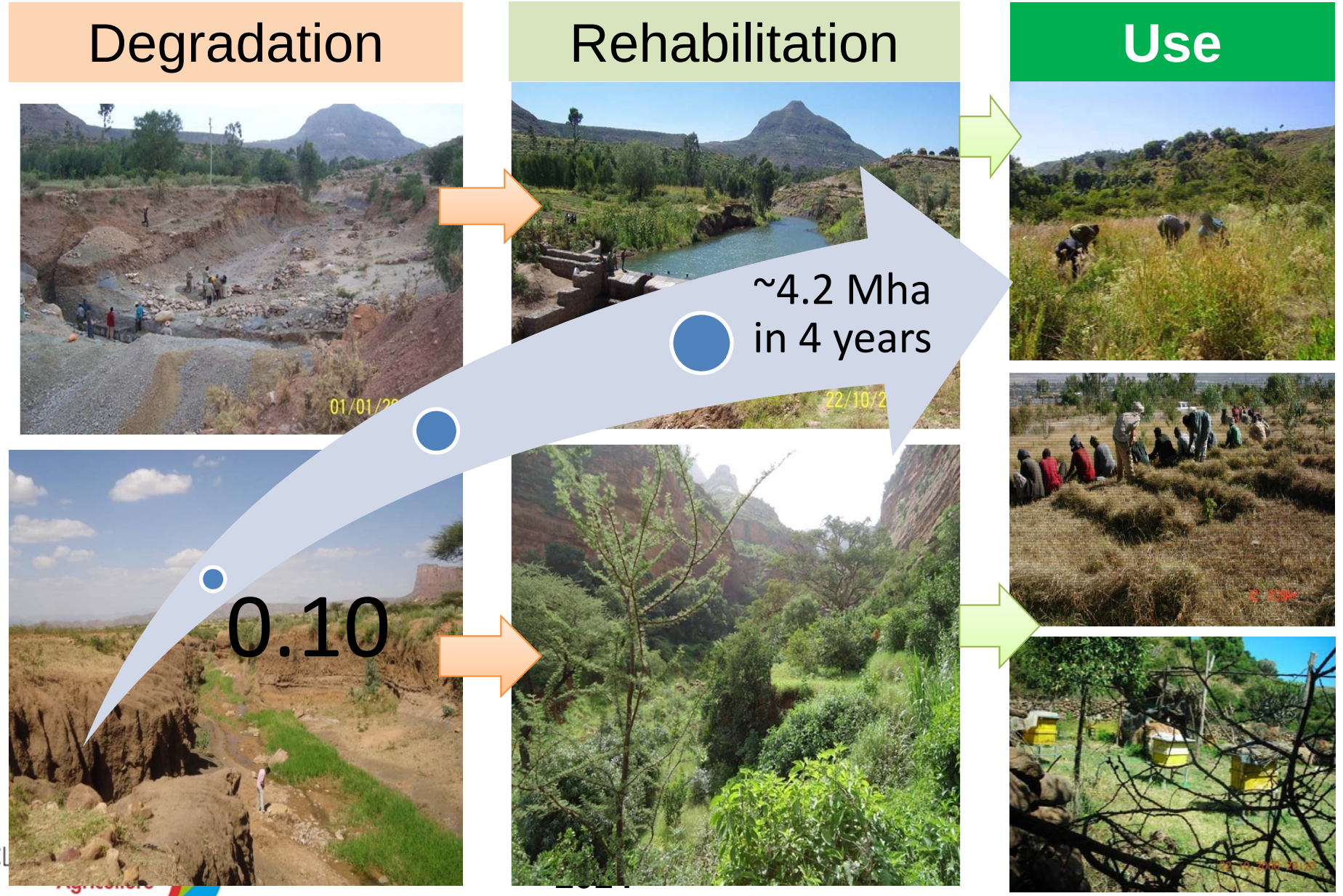
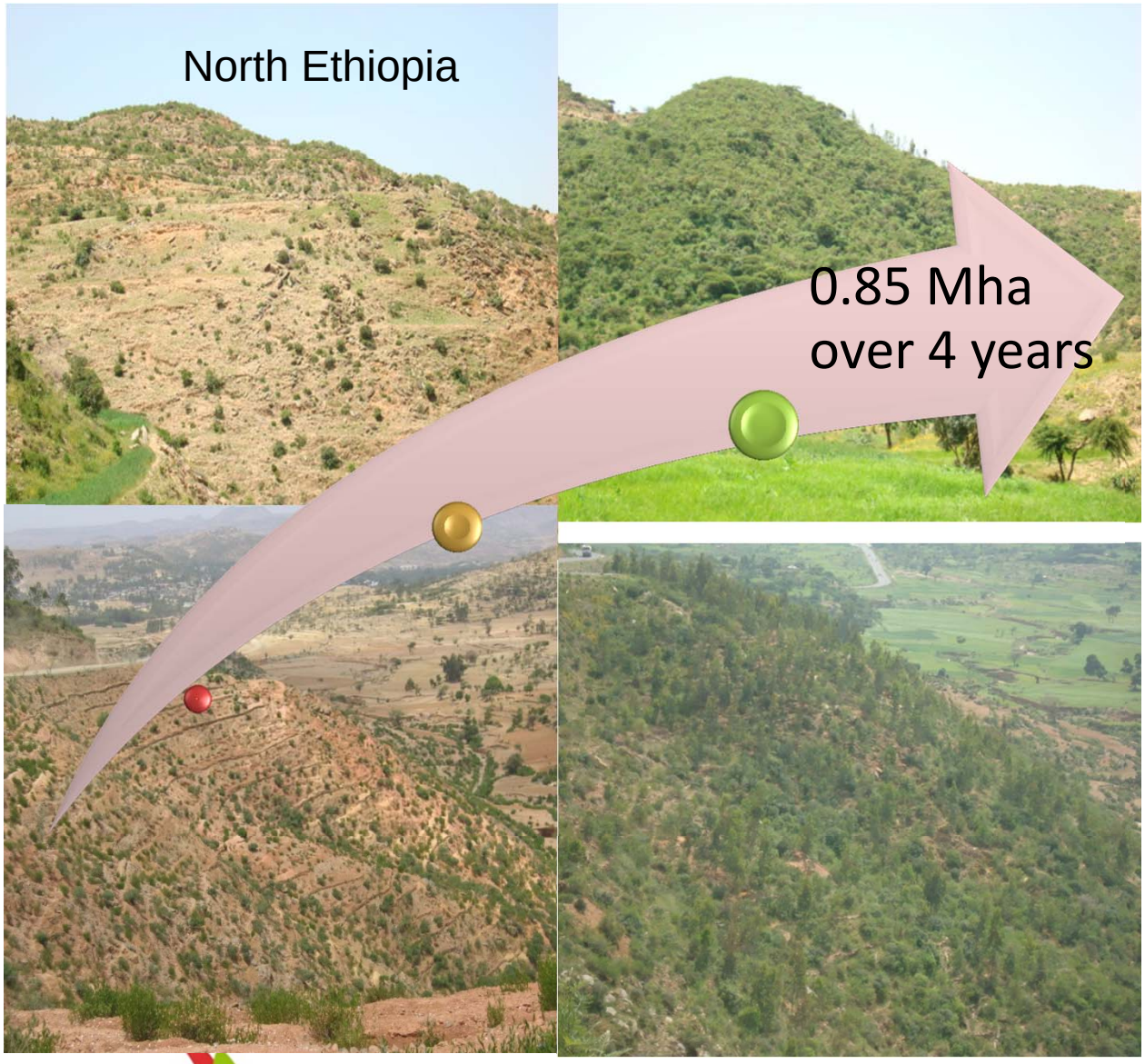
Rehabilitation of degraded land in drought prone areas



Rehabilitation by area enclosure



TRSBA, 2014

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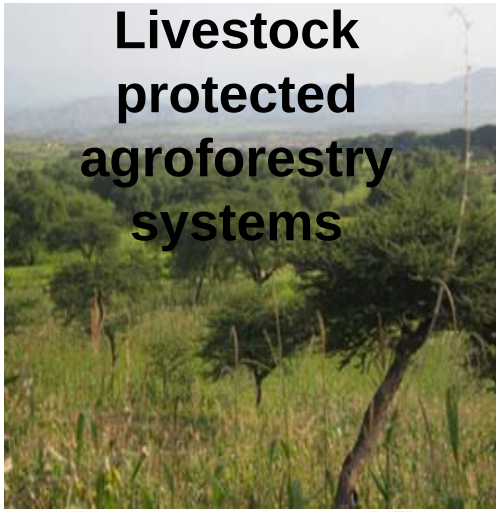
Climate smart agroforestry systems

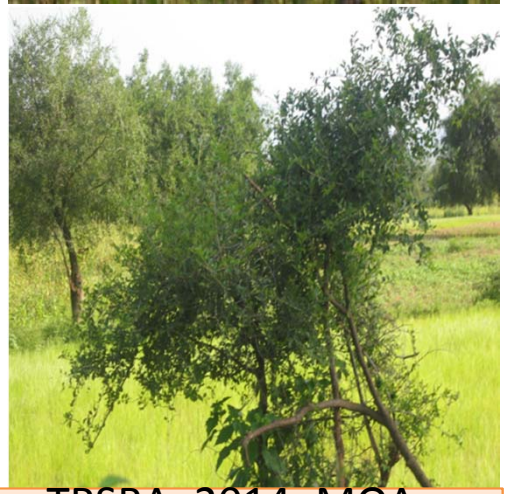
Multipurpose trees on farm land

Permanent tree/bush cash crops on farm land



Fruit trees on farm land

Agorestry for apiculture on enclosed farm land



TRSBA, 2014; MOA, 2014; AASR, 2014

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Examples

Farmer Managed Natural Regeneration

- Kenya
  - Kenya Agricultural Carbon Project (KACP)
  - signed an Emissions Reduction Purchase Agreement (ERPA) with the World Bank's BioCarbon Fund
  - >5,000 farmers in 800 farmer groups adopted the SLM methodology (Lager 2011).
- Ethiopia
  - Humbo Carbon Project (2,728 ha)
  - to sequester over 880,000 metric tonnes of CO_2e over 30 years
- Niger
  - >200 million trees reestablished; 4 million land restored
  - >0.5 million tones of grain per year (Speranza, 2014)
  - Sequestration of carbon
- Malawi, Zambia and Rwanda
  - thousand of farmer grow trees for fertilizer and fruits

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Agro-advisory services

- **Communicating weather- and climate-based agro-advisories** – The adoption and success of CSA technologies and practices depend on the effective delivery of agro-advisory services.
  - Many countries in SSA are trying to provide agro-advisories (success varies greatly)
    - **Disaster risk reduction** and climate risk management, including early warning, preparedness, emergency response, and post-disaster recovery (IGAD, SADC)
    - Cell-phone based information service delivery in Uganda
    - Mali's 30-yearAgromet advisory by involving farmers through rain gauges
    - Integrated agro-advisories (decision support tools-e.g. Ethiopia),
    - index-based insurance (e.g., Kenya; Ethiopia)

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Conclusion

- Carefully planned and executed CSA's :
  - increased farm income by up to 50%
  - increased household food security by 35-73%
  - decreased vulnerability to drought (enhanced resilience)
  - increase farm resource utilization and decreased GHG emissions
  - increased C-sequestration and C-stock in the soil

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Conclusion…

- There is a huge potential for scaling- up and scaling-out successful technologies if :
  - Consultation and engagement of local communities
  - Community capacity building
  - Use of technologies that are simple, cost effective and replicable
  - creating opportunities for cross-community and cross-country learnings
  - strengthening public-private-NGO partnerships
  - supporting community initiatives through favorable policies and institutions
  - commitment of governments
  - effective use of available resources for productive purposes (e.g., safety net programs)

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Thank You!
Merci