
# Assessing adaptation and mitigation options at multiple scales in the developing world

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# Outline

- CCAFS
- Regional scenarios
- Household, community-level modelling
- Evaluating different adaptation and mitigation options
- Concluding remarks

# CCAFS objectives

1. Identify and develop **pro-poor adaptation and mitigation practices, technologies and policies** for agriculture and food systems.
2. Support the inclusion of agricultural issues in **climate change policies**, and of climate issues in **agricultural policies**, at all levels.

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## Climate Variability and Change

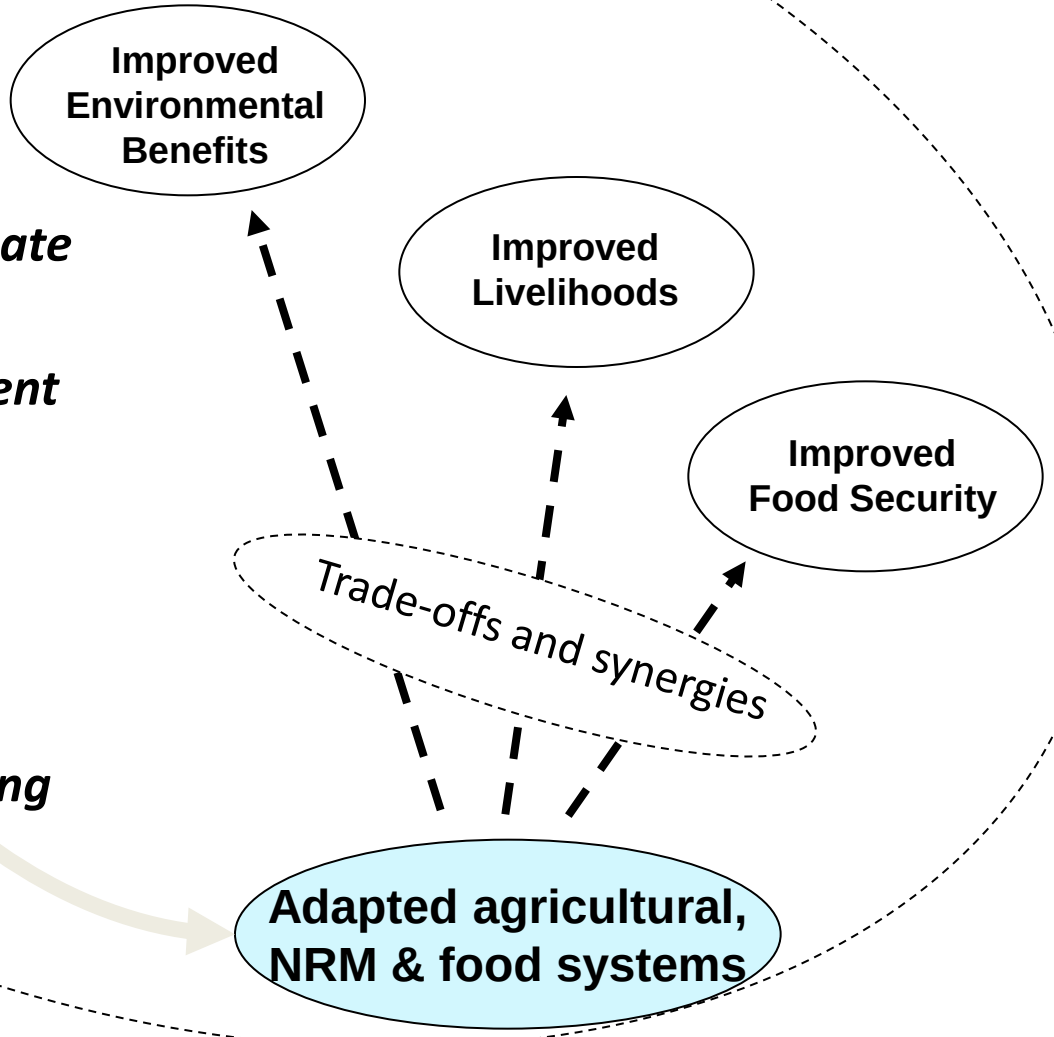
*Technologies, practices, policies and capacity enhancement:*

***1. Adaptation to Progressive Climate Change***

***2. Adaptation Pathways for Current Climate Risk***

***3. Poverty Alleviation through Mitigation***

***4. Integration for Decision Making***

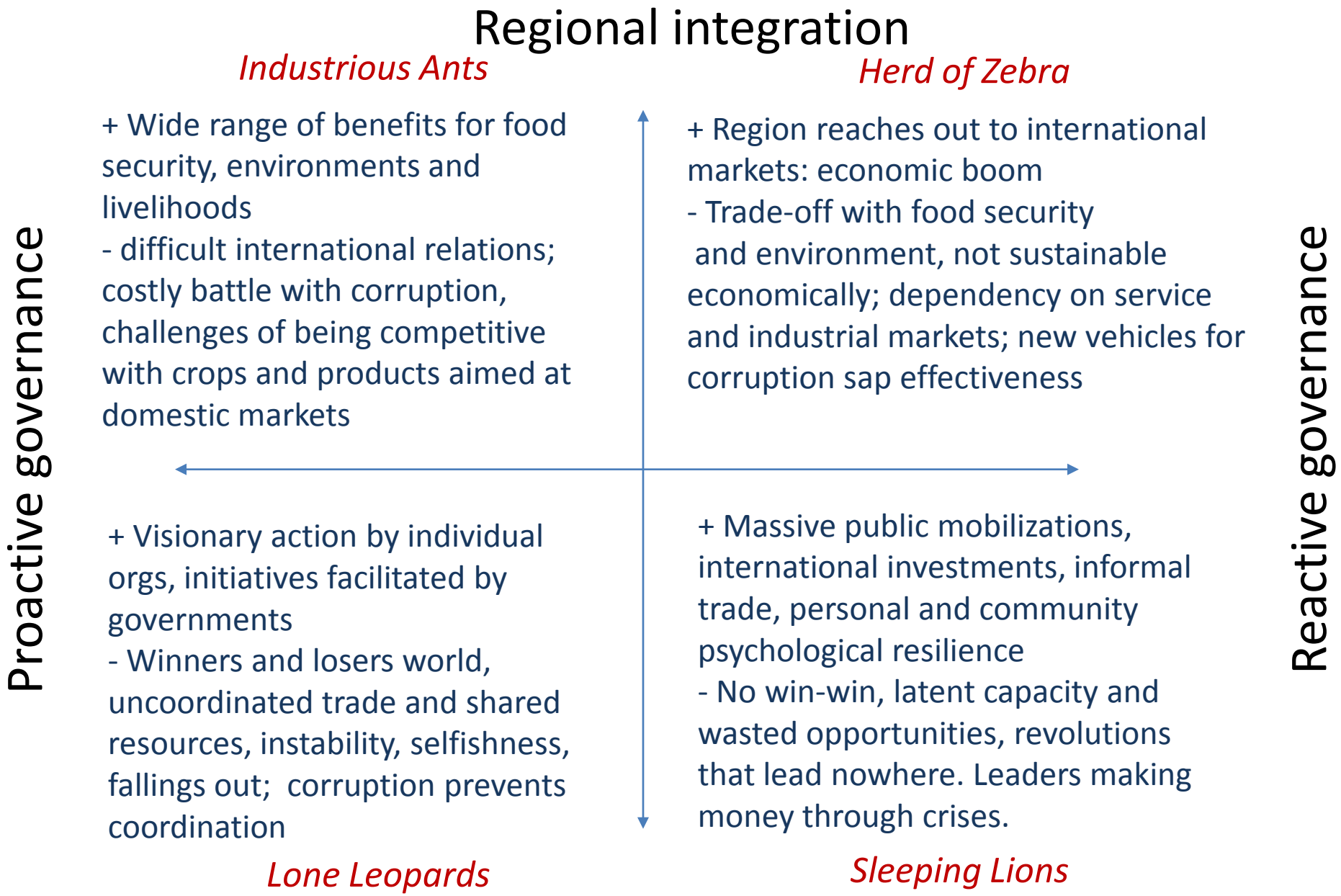


# Regional scenarios & visioning in E Africa, W Africa, S Asia

Exploring interacting socio-economic and climate uncertainties regarding food, environments and livelihoods with regional policy makers, private sector, civil society, media, researchers

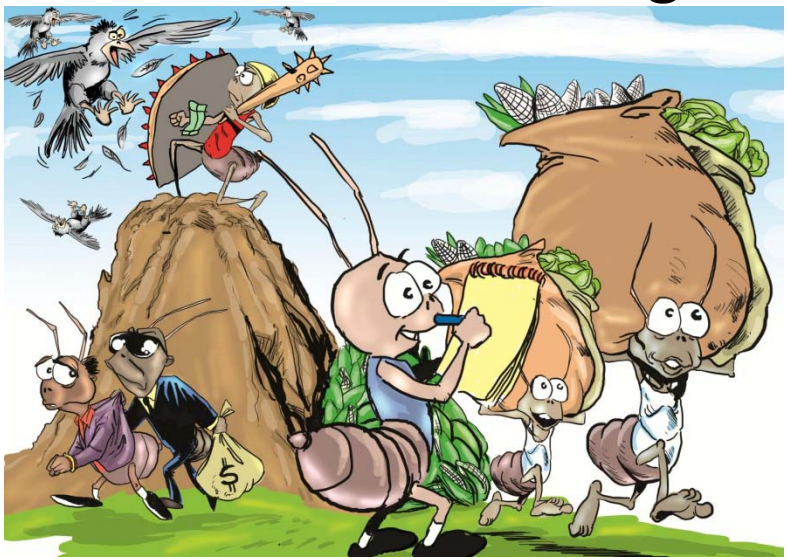
**Scenarios:** alternate *plausible futures* to help understand key **uncertainties** we need to deal with and evaluate the **feasibility** of policies, strategies, technologies to do with adaptation, risk management, pro-poor mitigation

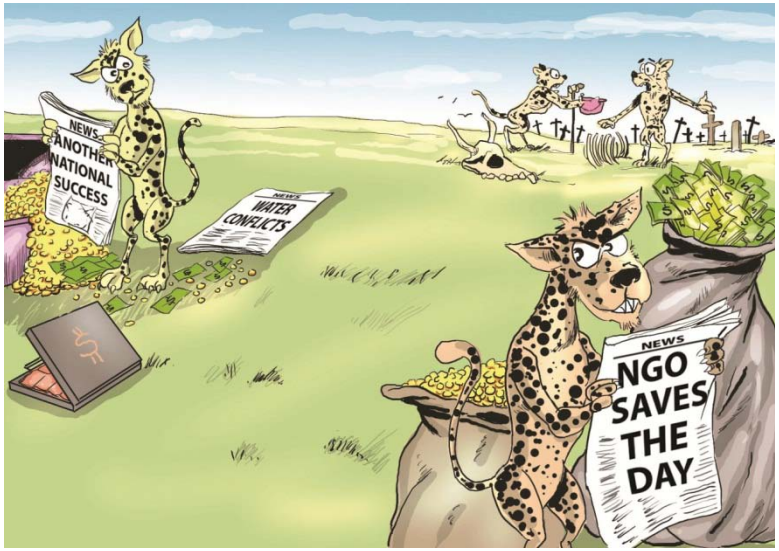
**Qualitative:** narratives, conceptual models, images, videos
**Quantitative:** graphs, maps, interactive models

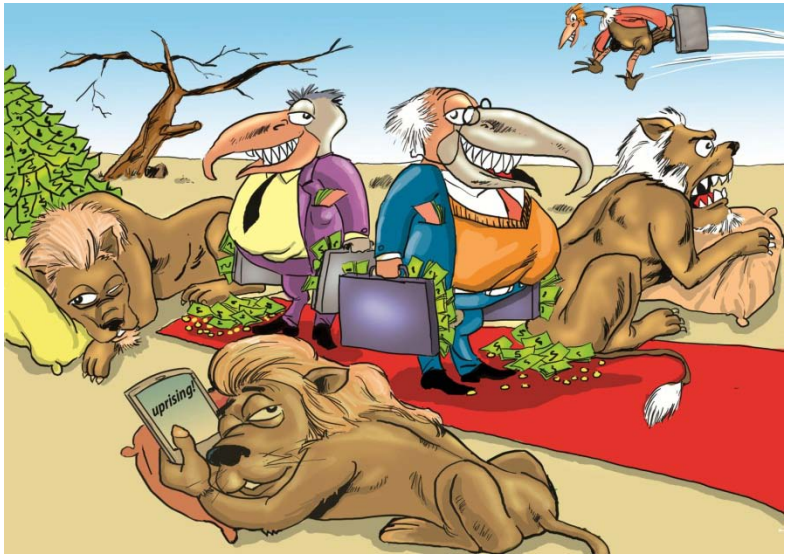

Regional integration
Industrious Ants
+ Wide range of benefits for food security, environments and livelihoods
- difficult international relations; costly battle with corruption, challenges of being competitive with crops and products aimed at domestic markets
Herd of Zebra
+ Region reaches out to international markets: economic boom
- Trade-off with food security and environment, not sustainable economically; dependency on service and industrial markets; new vehicles for corruption sap effectiveness
Proactive governance
Reactive governance
+ Visionary action by individual orgs, initiatives facilitated by governments
- Winners and losers world, uncoordinated trade and shared resources, instability, selfishness, fallings out; corruption prevents coordination
+ Massive public mobilizations, international investments, informal trade, personal and community psychological resilience
- No win-win, latent capacity and wasted opportunities, revolutions that lead nowhere. Leaders making money through crises.
Lone Leopards
Sleeping Lions
Fragmented status quo

Regional integration

Proactive governance






Reactive governance

Fragmented status quo

# Strategic futures: scenarios

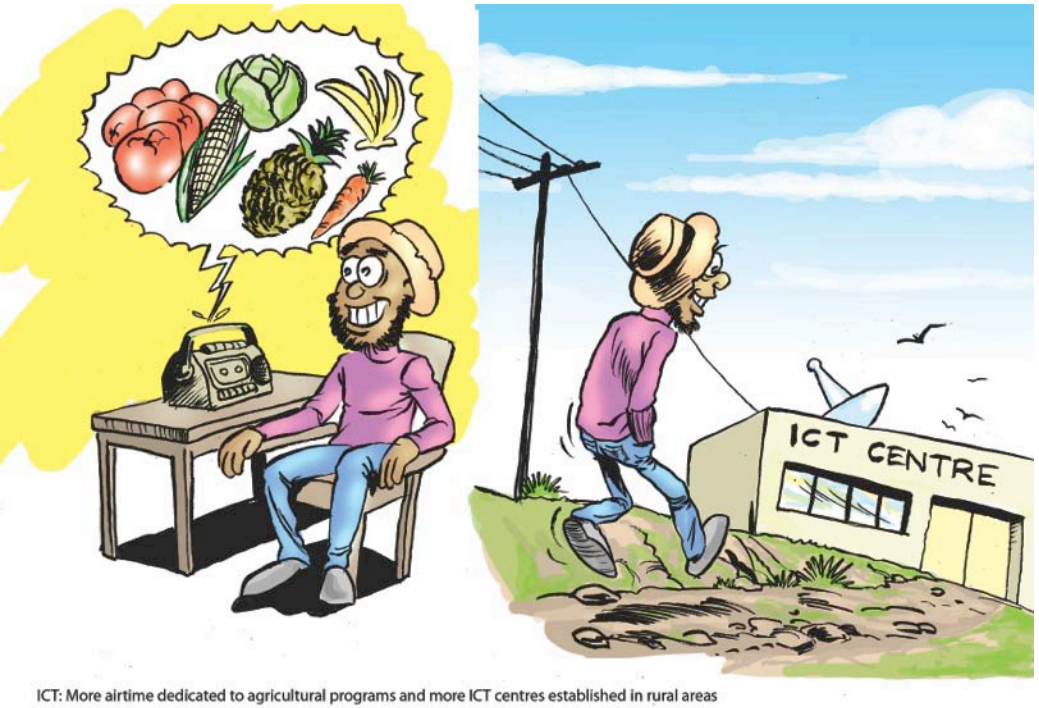

Example: National sovereignty fears holding back achievement of a vision of a more integrated and competitive East African Community

**Quantified** for each scenario using IMPACT and GLOBIOM:

- GDP
- Yields, production costs, prices, trade measures for crops and livestock
- Area change for a range of arable land types and livestock production systems
- Forest and other non-agricultural land cover change
- Various indicators for quantity and quality of water systems
- Infrastructure change
- Effects of IT developments
- Indicators for livelihoods and social capital

www.ccafs.cgiar.org/scenarios

# An example: cassava under one East African scenario




ICT: More airtime dedicated to agricultural programs and more ICT centres established in rural areas

## 'Industrious Ants' Scenario:

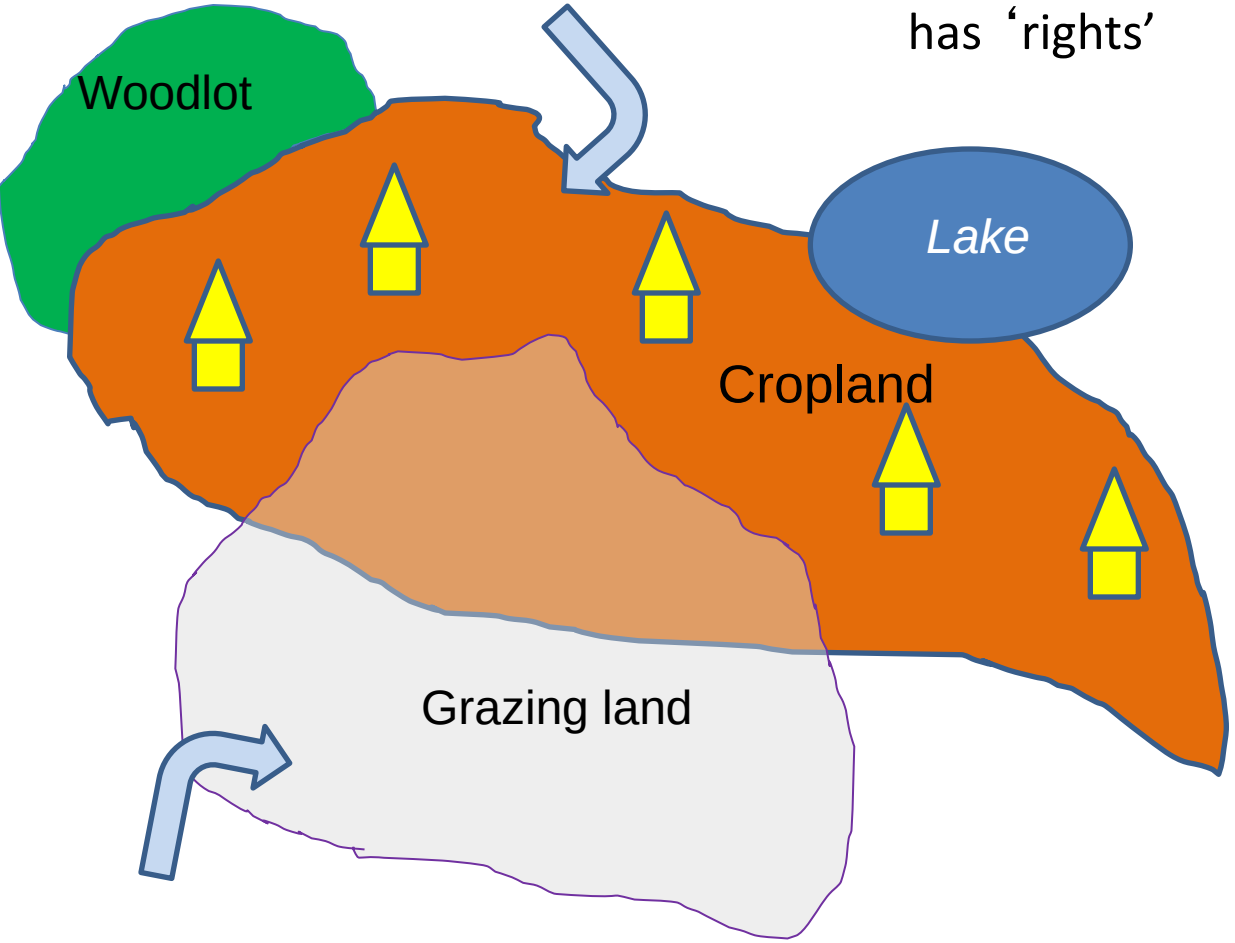
- EA moves towards regional political and economic integration
- State and non-state actors take a proactive stance towards food security, environment and livelihoods

**Cassava:** Could be an important crop for adaptation – more productive under rising temperatures and has unrivalled drought resistance. Under the 'Ants' scenario, **cassava production costs decrease by 50%** **and** **yields increase by 30%** plus high demand **- a "climate smart" crop**, compared to scenario with **no regional integration and a reactive stance ('sleeping lions')** – low demand, and cassava functions as a **food security crop**

# What might the impacts of such changes be on households and communities?

Need understanding of how they operate now, and what drives decision making:

- Households are linked to parts of the landscape: who is using what part, who has 'rights'




- Which parts of livelihoods are not linked to land
- Interfaces in the landscape: conflicts and synergies
- Links to the wider landscape: knowledge, germplasm, safety nets
- Past 'extreme events' and coping strategies
- And so on …

# Household & community-level modelling

Impact-household

Integrated Modeling Platform for Mixed Animal-Crop Systems

**Data collection protocol**

- Climate
- Family structure
- Land management
- Livestock management
- Labour allocation
- Family's dietary pattern
- Farm's sales and expenses
- Mitigation practices

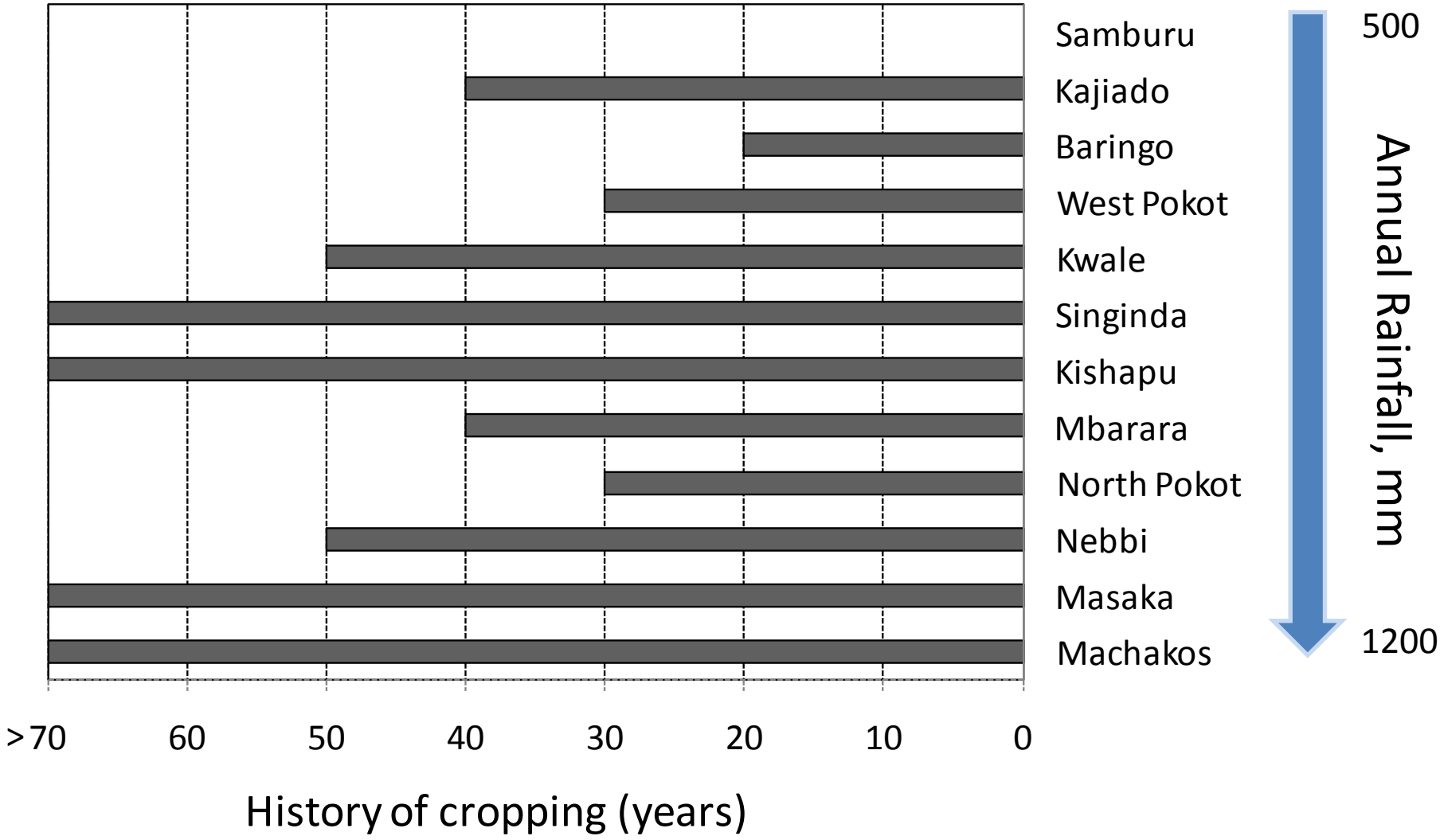
Broad context provided by the regional scenarios

→ Impacts on key outcomes of different adaptation options

Hybrids of systems dynamics, mathematical programming, agent-based models

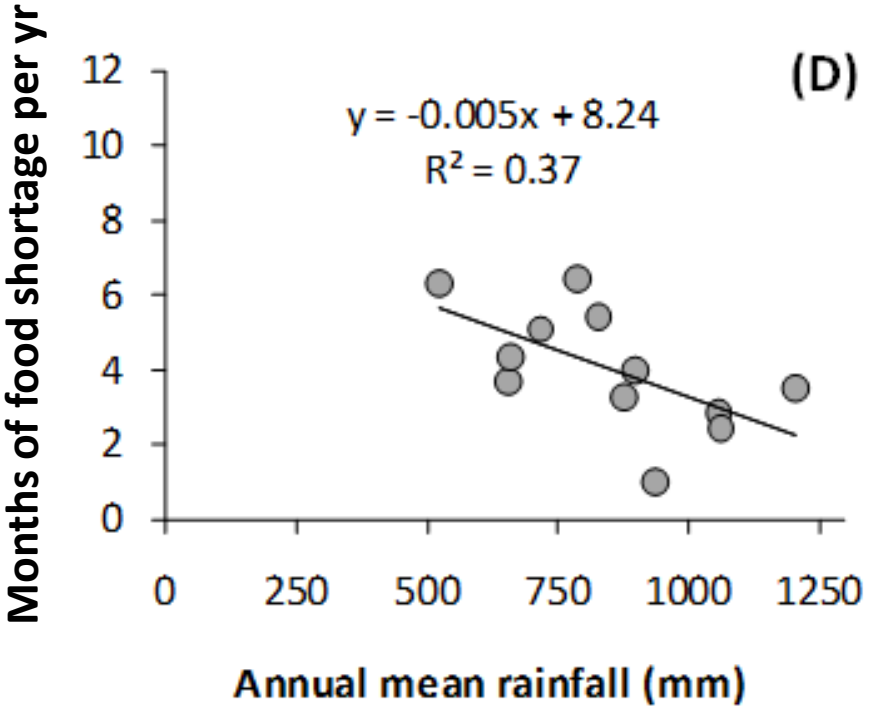
Some development work needed: moving towards a small community of practice

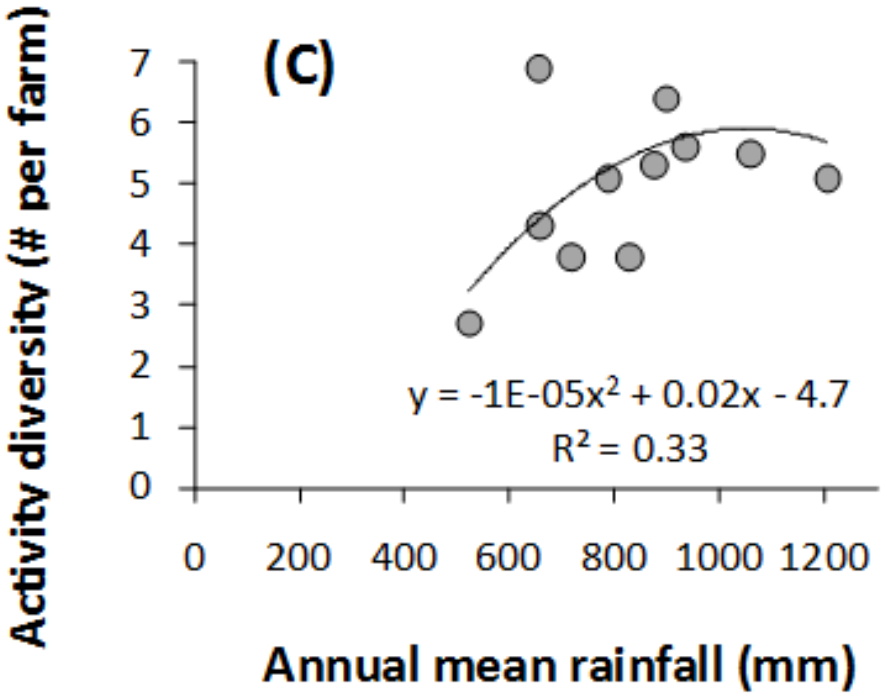
# History of cropping at 12 sites in East Africa




Rufino et al. (2012)

# Rainfall, food shortages, enterprise diversity …

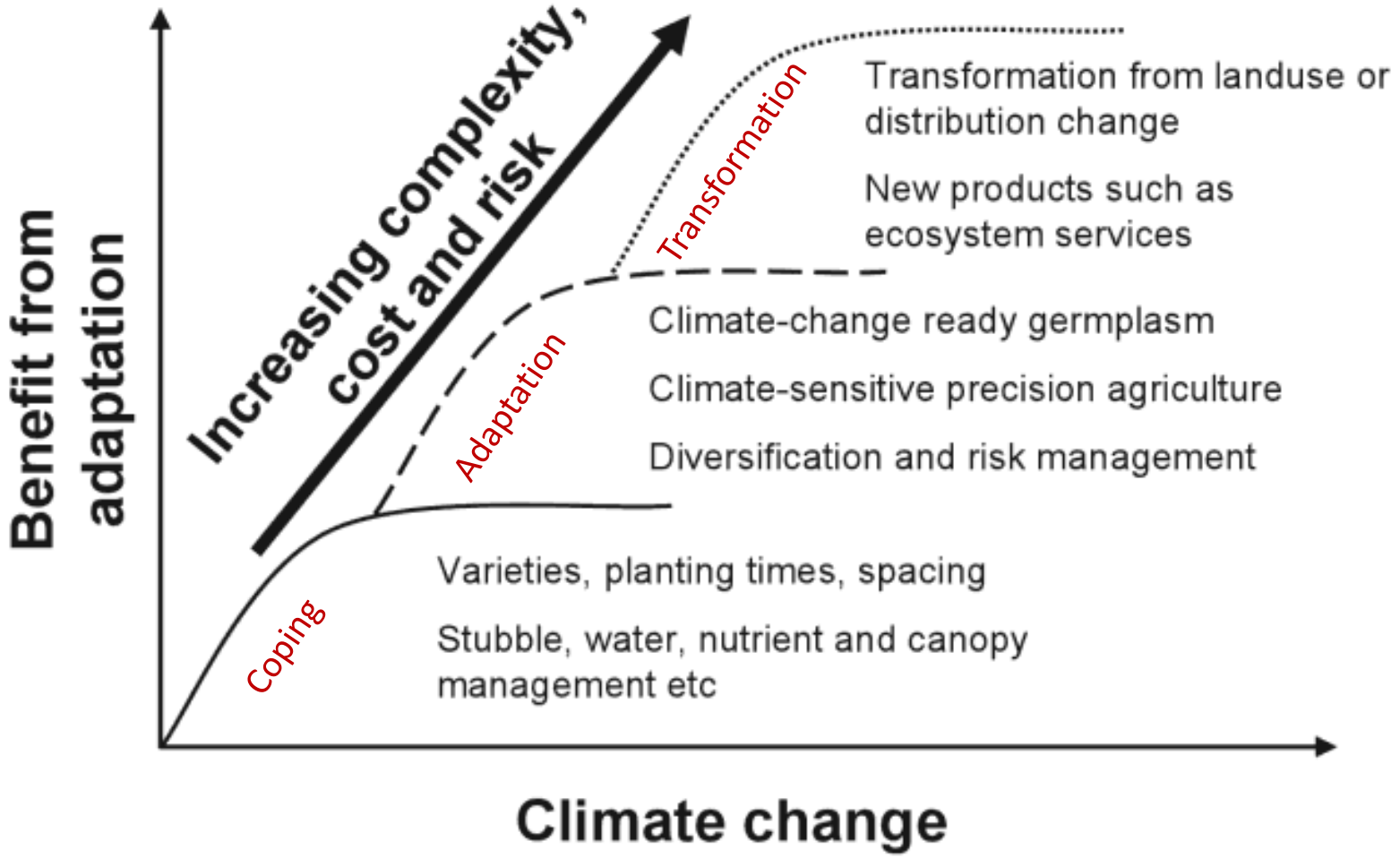



*How far can "adaptation" go in such systems – when will other livelihood strategies be needed under particular scenarios?*
*Then, what are the implications for GHG emissions?*

Rufino et al. (2012)

# Incremental and more transformational adaptations as climate change effects increase




Stokes & Howden, 2011

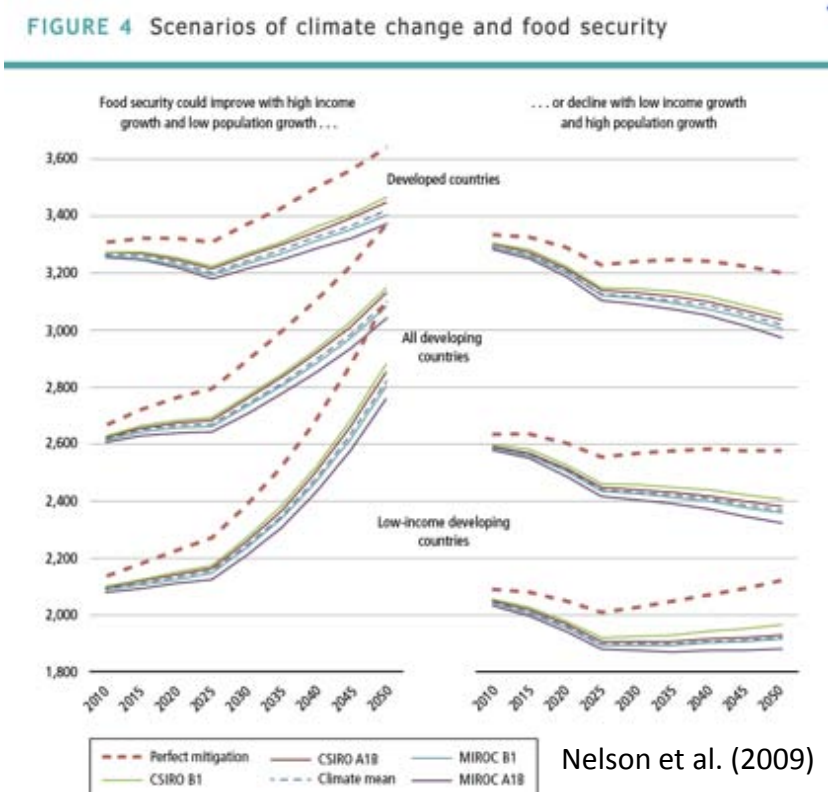
# Mitigation options

Developing a low-emissions agriculture tool (2013-2014):

- Interactive platform to test options
- Optimize for food production, adaptation, energy, ecosystem services
- Use scenarios to inform context

Developing a CGIAR-wide protocol to measure all GHGs at the whole-farm and landscape levels

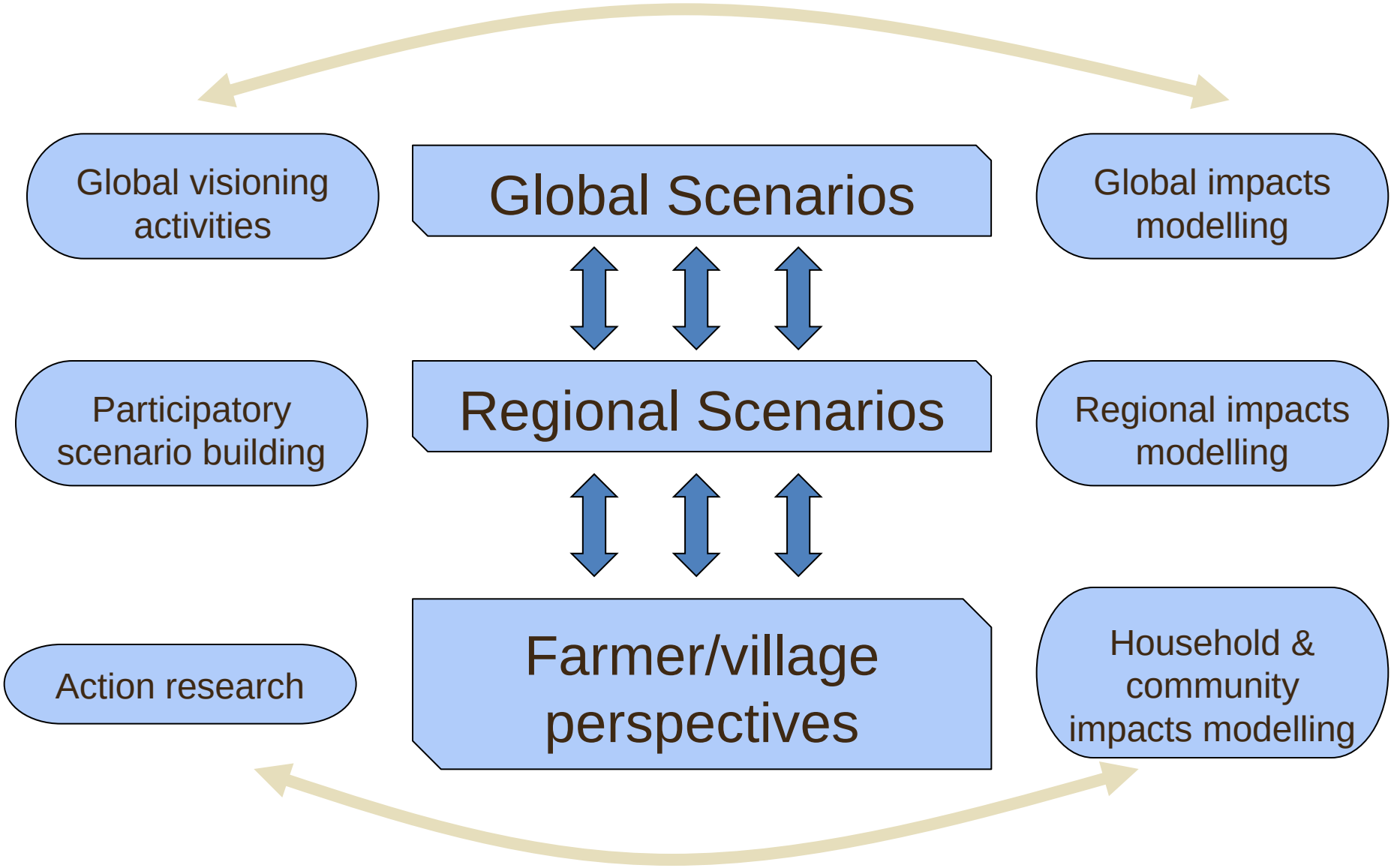
- Linked to food production, food security, incomes, management practices
- To include system/spatial prioritization methods to identify where to sample most efficiently




Nelson et al. (2009)

# Assessing different options at different levels

## Robustness, iteration



# Concluding remarks

- ***Importance of linking different levels of analysis***

  Need to evaluate outcomes at different levels: globe, region, community, household:

  - Which are the robust options that may offer benefits at different levels under a range of different plausible futures?

  - What are the limits to adaptation: when/how do stressors become so great as to induce transformative change?

- ***Importance of assessing synergies, trade-offs (making sure we have appropriate tools to do this)***

  - Activities that are good for both adaptation and mitigation (e.g. agroforestry in mixed crop-livestock systems, carbon payments)

# Concluding remarks

- ***Importance of adding value, building on what already exists: developing models, data sets, methods versus using what already exists***

  Links to other on-going efforts:
  - Global Futures (global integrated assessment modelling)
  - AgMIP (agricultural model inter-comparison and improvement)
  - Many global data initiatives (Consortium for Spatial Information, HarvestChoice, …)

- ***Importance of building capacity in the target regions in modelling, scenario work, decision support***

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