A novel methodology for ex ante assessment of climate change adaptation strategies

examples from East Africa

Jetse Stoorvogel, Lieven Claessens, John Antle
Philip Thornton, Mario Herrero

WAGENINGEN UNIVERSITY
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International conference on crop improvement, ideotyping, and Modelling for African cropping systems under climate change

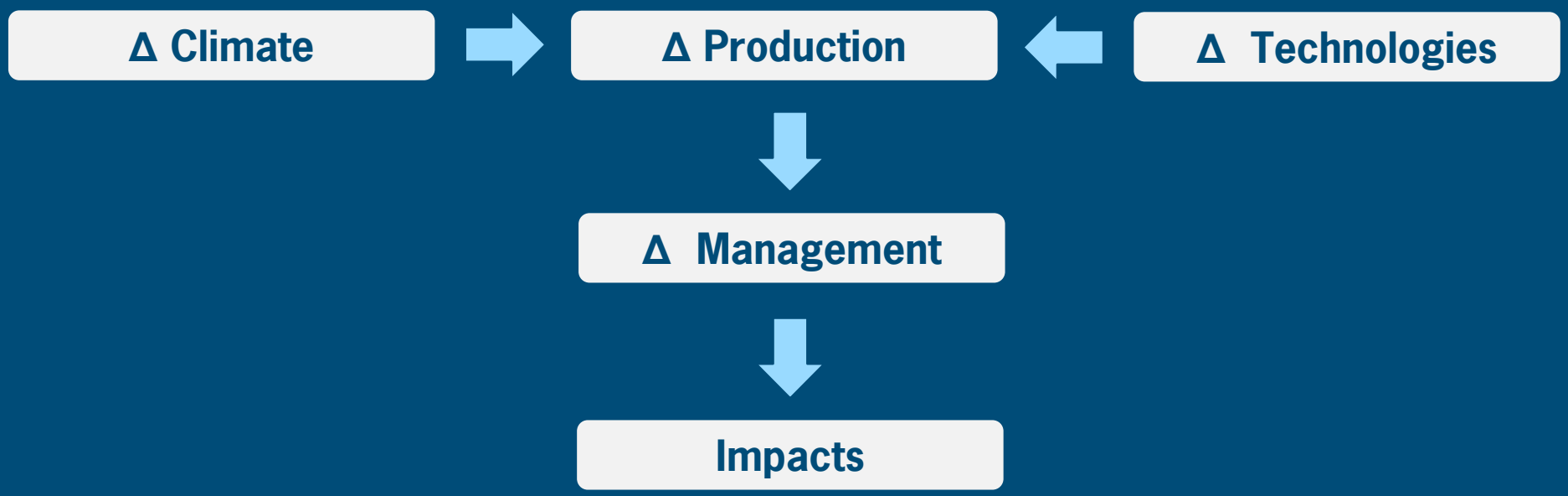
Backgrounds

- Current farming systems in Eastern Africa
  - Semi-subsistence
  - Close to threshold
  - Climate change
  - Sensitive to climate change
- Application for Vihiga

Objectives

- Assess the impacts of climate change
- Design a methodology to evaluate adaptation strategies
- Test this methodology to identify breeding targets

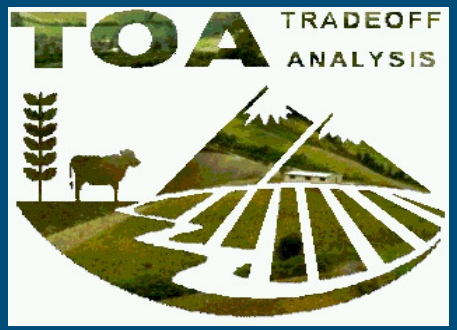
Methods


Δ Climate
Δ Production
Δ Technologies
Δ Management
Impacts

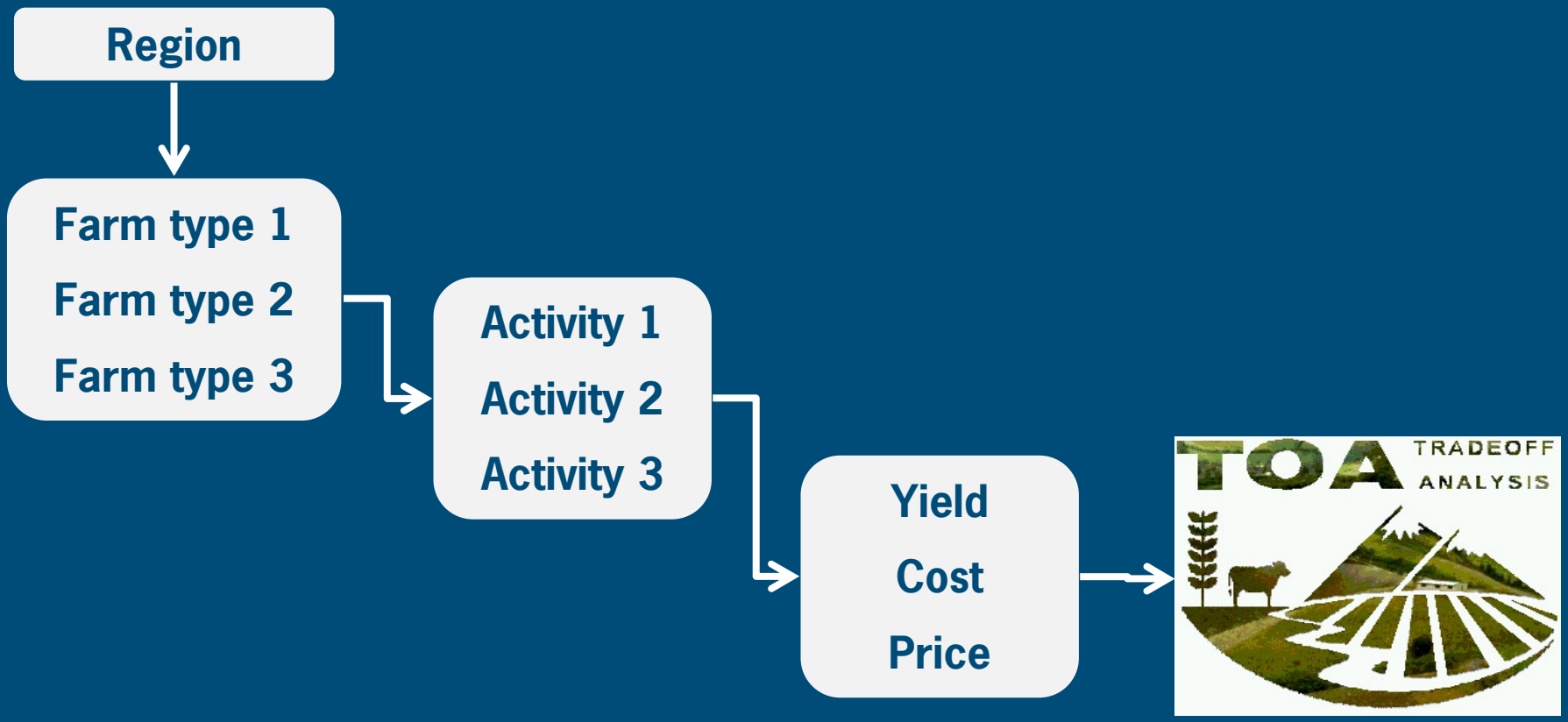
Tradeoff Analysis

Two versions

- Full model
  - Models management decisions at the field level (including *e.g.* crop allocation and fertilizer use).
  - Integrates crop growth models, econometric models, and environmental impact models.
  - Data intensive
- Minimum data model
  - Compares two systems
    - With and without climate change
    - With and without new technologies



Tradeoff Analysis - MD



Climate change in Vihiga

	1970-2000	2040-2060	% change
Rainfall (mm)	1701	1301	-24
Tmin (°C)	16.9	18.9	12
Tmax (°C)	25.4	28.3	12

- 1 model: ECHAM4 (Max Planck)
- 1 scenario: A1B (Rapid economic growth)
- Yearly total (rainfall) and averages (temperature)

Yield effects of climate change Vihiga district

		Yield (kg / ha)	
		Maize	*Bean*
Year	*2000*	3838	1479
	2030	1786	1045
	2050	1672	1052

Spatial variation of crop yield response to climate change in East Africa

Philip K. Thornton [a,*], Peter G. Jones [b], Gopal Alagarswamy [c], Jeff Andresen [c]

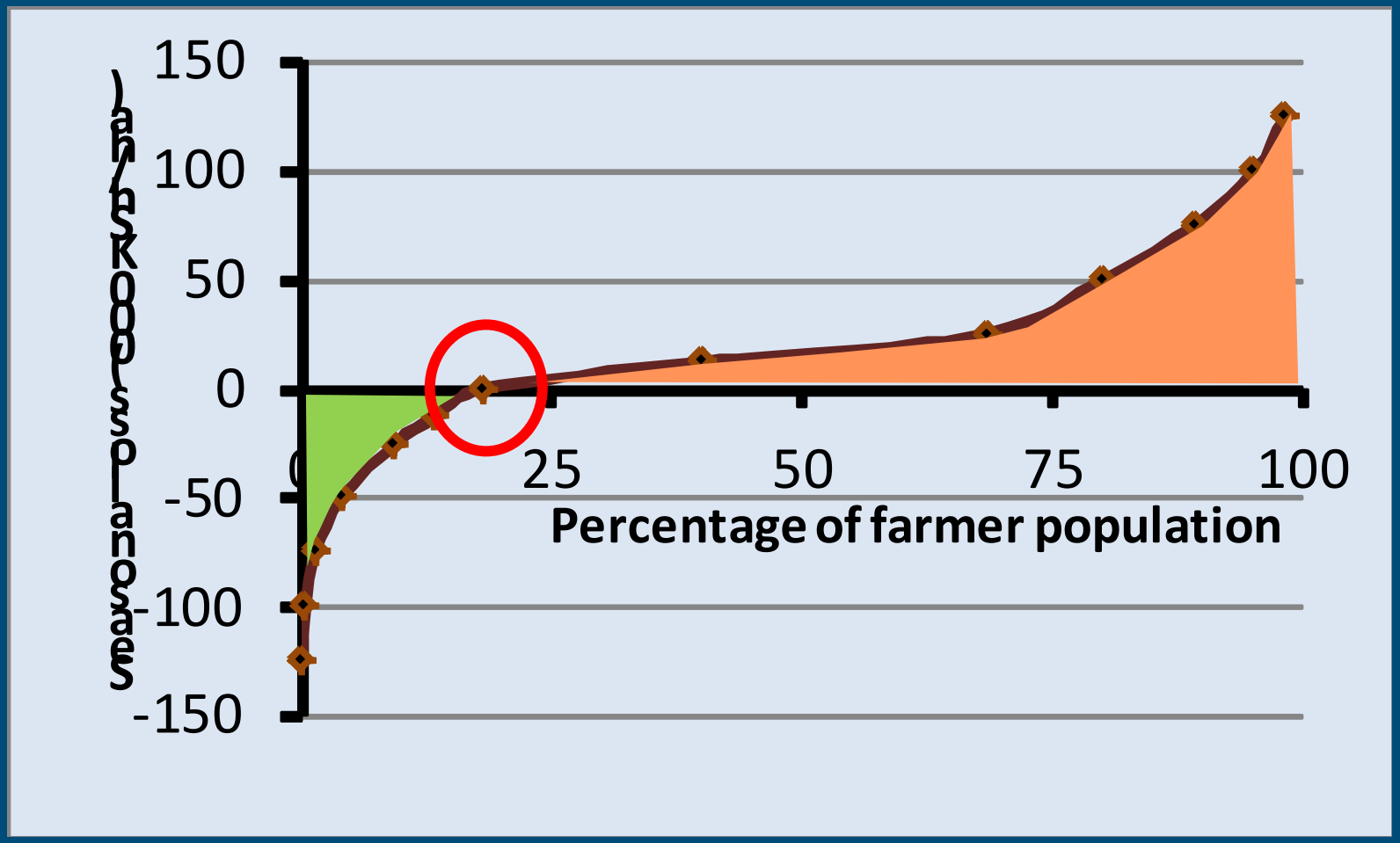
[a] International Livestock Research Institute (ILRI), PO Box 30709, Nairobi 00100, Kenya
[b] Waen Associates, Y Waen, Islaw'r Dref, Dolgellau, Gwynedd LL40 1TS Wales, United Kingdom
[c] Department of Geography, Michigan State University, East Lansing, MI 48824, USA

Integrated analysis of climate change

Vihiga district

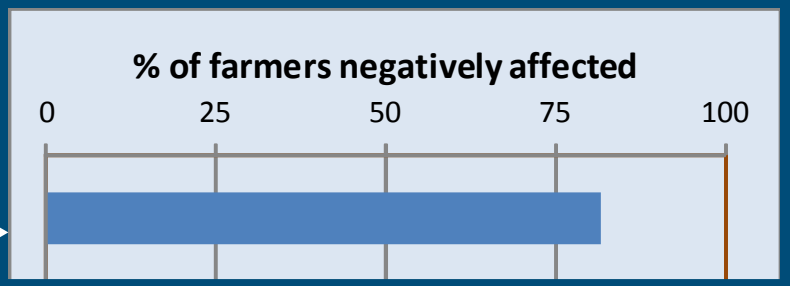
- Two groups of farmers (with and without livestock)
- Main activities: maize, beans, napier, livestock, sweet potatoes
- Analysis comparing situation with and without climate change
- Evaluate various adaptation strategies

Impact of climate change on farming systems

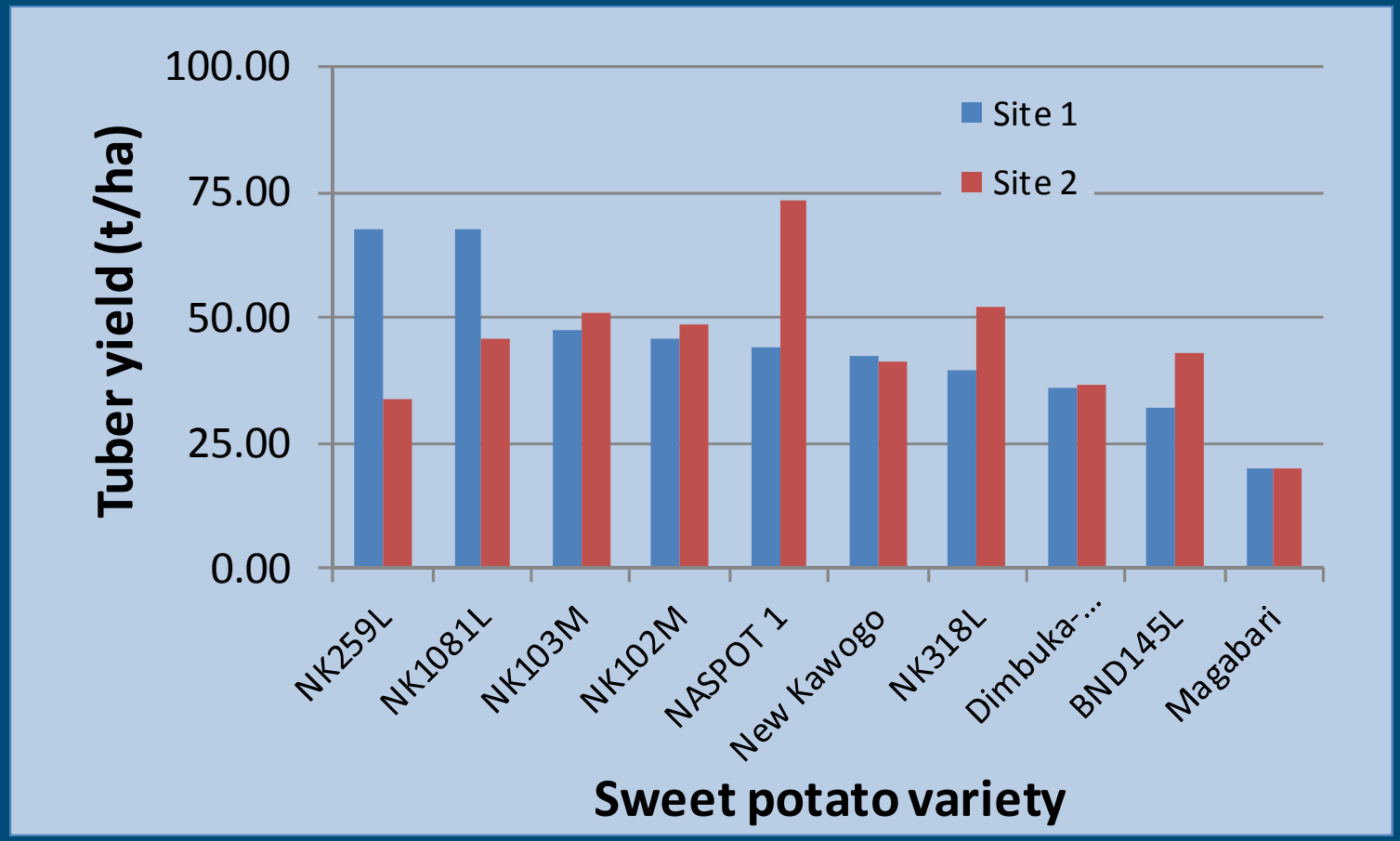


Integrated analysis of adaptation strategies

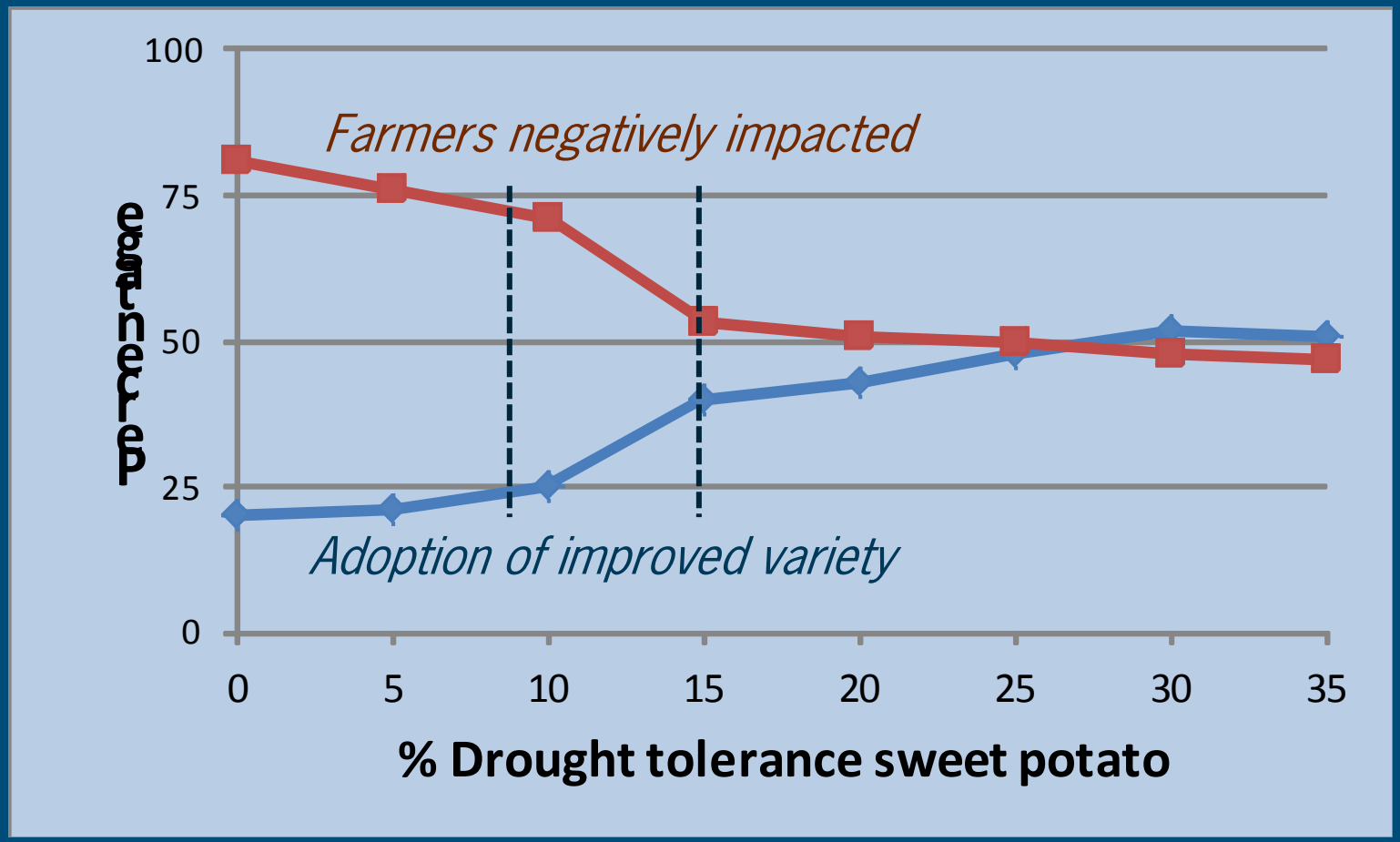
- Base



Crop varieties and adaptation



Drought resistant varieties in Vihiga



Discussion

- A large percentage of the farms in Vihiga will be negatively impacted by climate change.
- Introduction of dual purpose sweet potato offsets climate change impacts
- Uncertainties in climate change projections
- The MD-TOA approach offers a rapid integrative analysis for exploring options

Vielen Dank

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