



Department of Geography and Geology

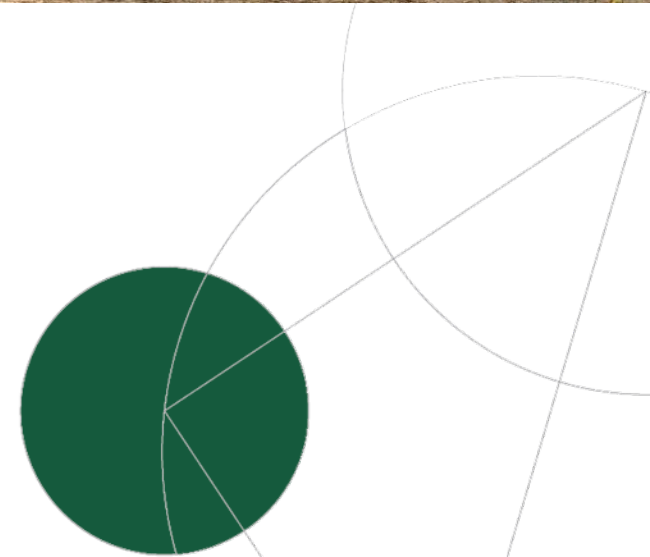
## Coupled human–environment interaction - the adaptive capacity of rural societies

### Experiences from Mazombe/Ilula, 1960s to 2010



CLIVET Workshop – Dar es Salaam,  
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Torben Birch-Thomsen



## Coupled human– environmental systems

Concerned with developing conceptual models that include:

- environmental and social factors
- feedbacks at different levels of spatial and temporal scales
- and identifying the driving forces of change

Ref. Fox et al. 2003; GLP 2005; Haberl et al. 2006; Lambin and Geist 2006; Marcussen and Reenberg 1999; Scoones 1999; Walker et al. 2006; Zimmerer and Bassett 2003

## Adaptive capacity

Associated with factors such as:

- institutional structures
- flexibilities in norms and legal frameworks
- resource distribution inequities

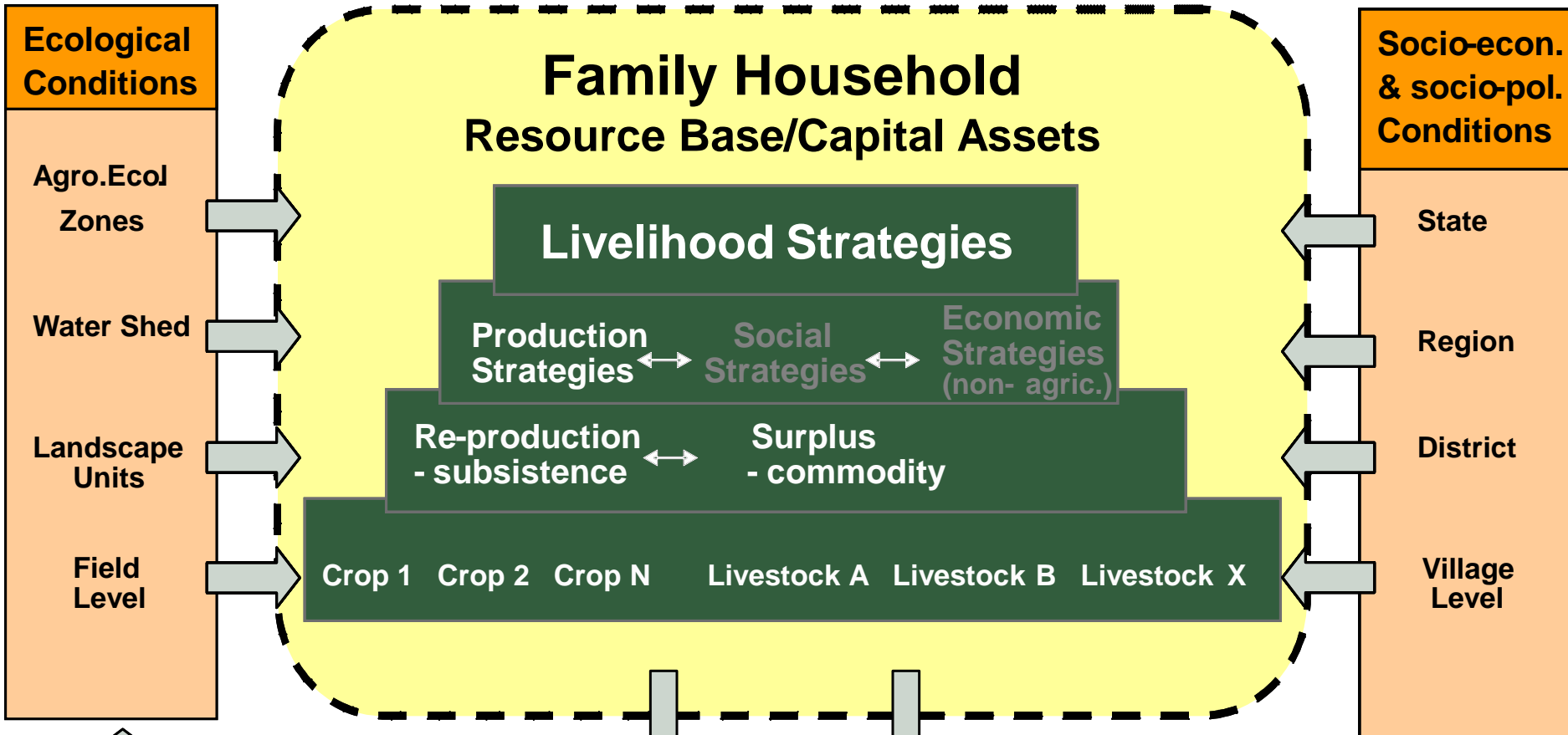
On a more local scale:

- access to various forms of assets (capital, service, knowledge, technology)
- perception of risk and impacts
- freedom to use resources to mitigate future risks

The 'room for maneuver' for individual households determines the options available as well as the barriers to adaptation

Ref. Yohe and Tol 2001; Eakin et al. 2006; Reenberg et al 2008

'Room for maneuver'



**Possible impact of decision making**

<u>Positive effects:</u>	<u>Negative effects:</u>
- Improved crop/ livestock integration	- Deforestation
- Decreased erosion	- Increased erosion
- Secure land rights	- Increase in land competition

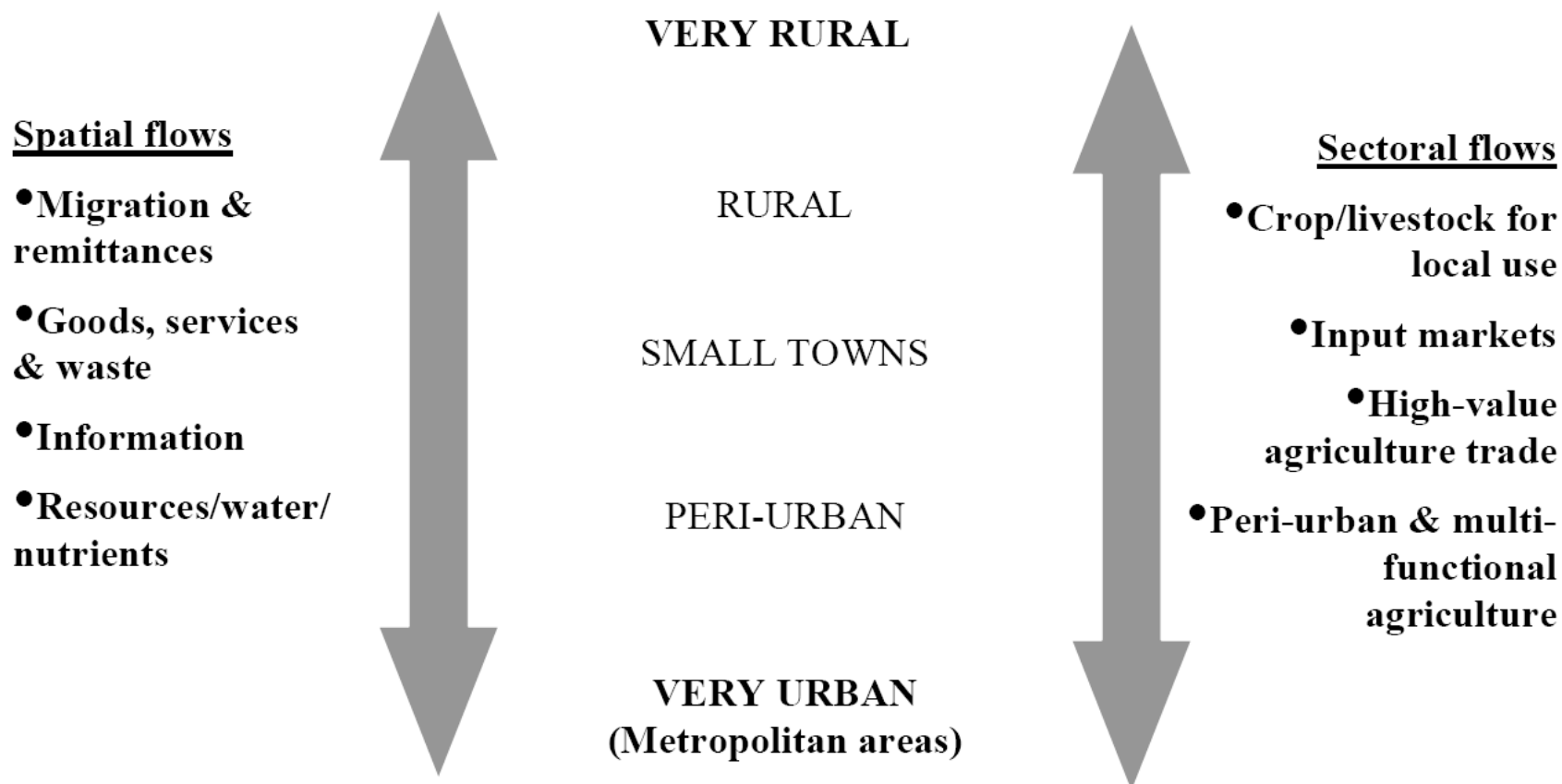
Feed-back

Feed-back



# Multi-spatial livelihood

Figure 1. The stylized rural-urban continuum



## Rural-urban linkages

'Rural–urban linkages include flows of agricultural and other commodities from rural based producers to urban markets, both for local consumers and for forwarding to regional, national and international markets; and, in the opposite direction, flows of manufactured and imported goods from urban centres to rural settlements' (Cecilia Tacoli 2004)

## Multi-spatial livelihood

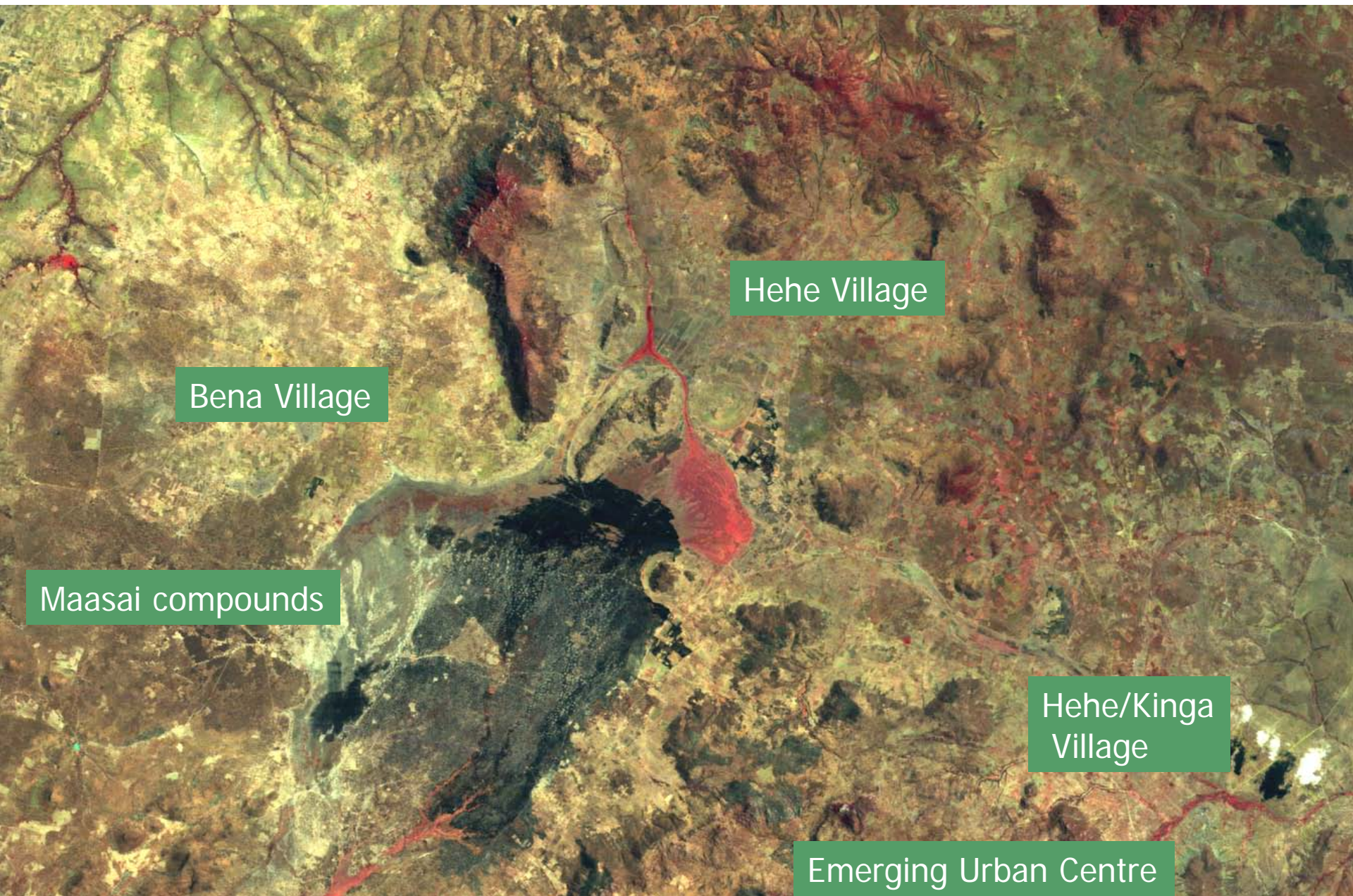
'Households construct their livelihoods on the basis of assets and livelihood opportunities available to them, both in town and in rural home.

A house hold combining urban and rural livelihood sources is a household with a multi-spatial livelihood (Foeken & Owuor 2001)



# Landsat TM image of Ismani and Mazombe Divisions – Iringa Region

– multiple stakeholders and different strategies



Bena Village

Hehe Village

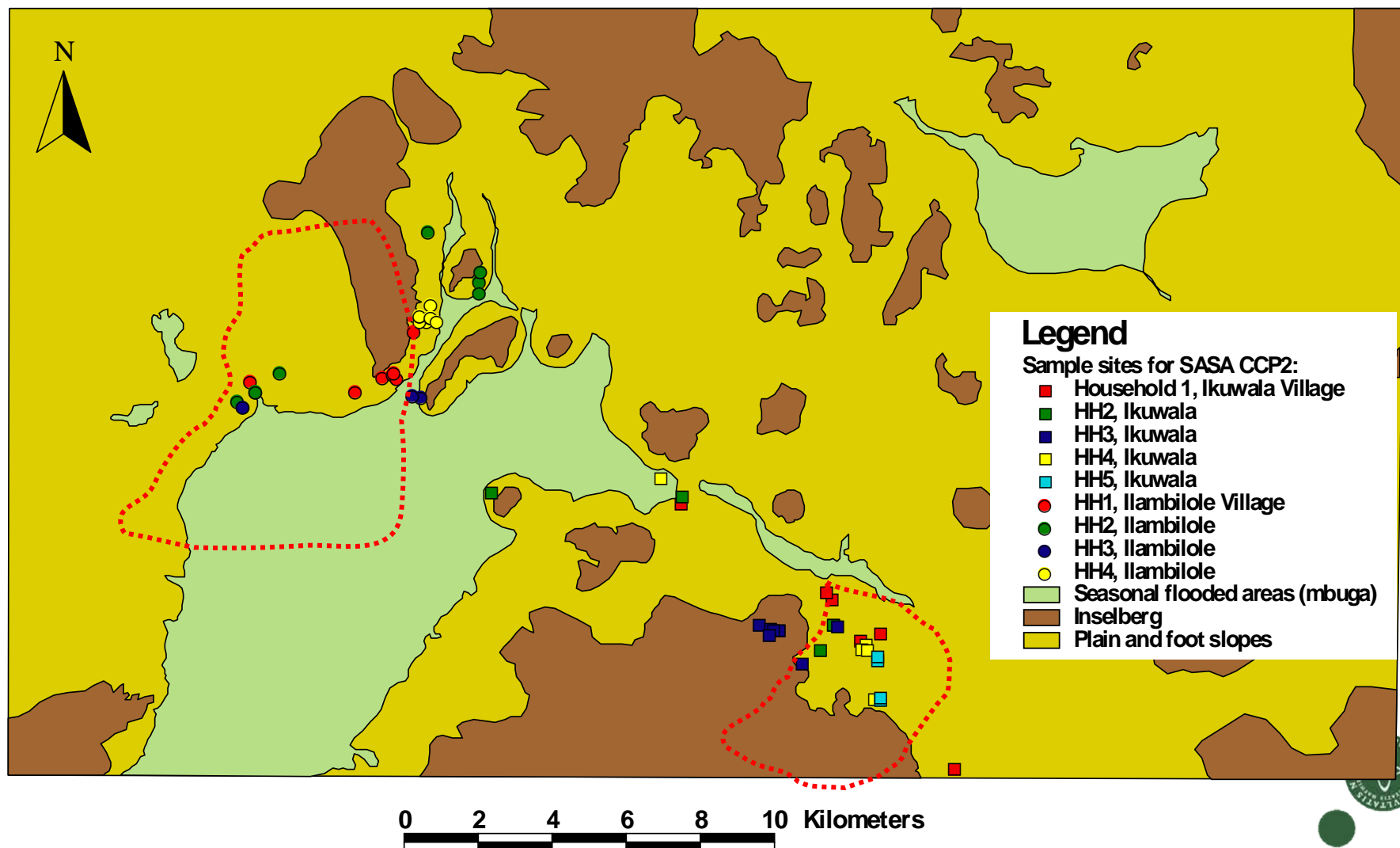
Maasai compounds

Hehe/Kinga  
Village

Emerging Urban Centre

# Location of sample sites for the SASA ccross-cutting study 2

Related to land units in the study area, Mazombe/Ismani, Iringa District



## Arable land within cultivation cycle, 1956-2000

(excluding inselbergs and seasonal flooded areas)

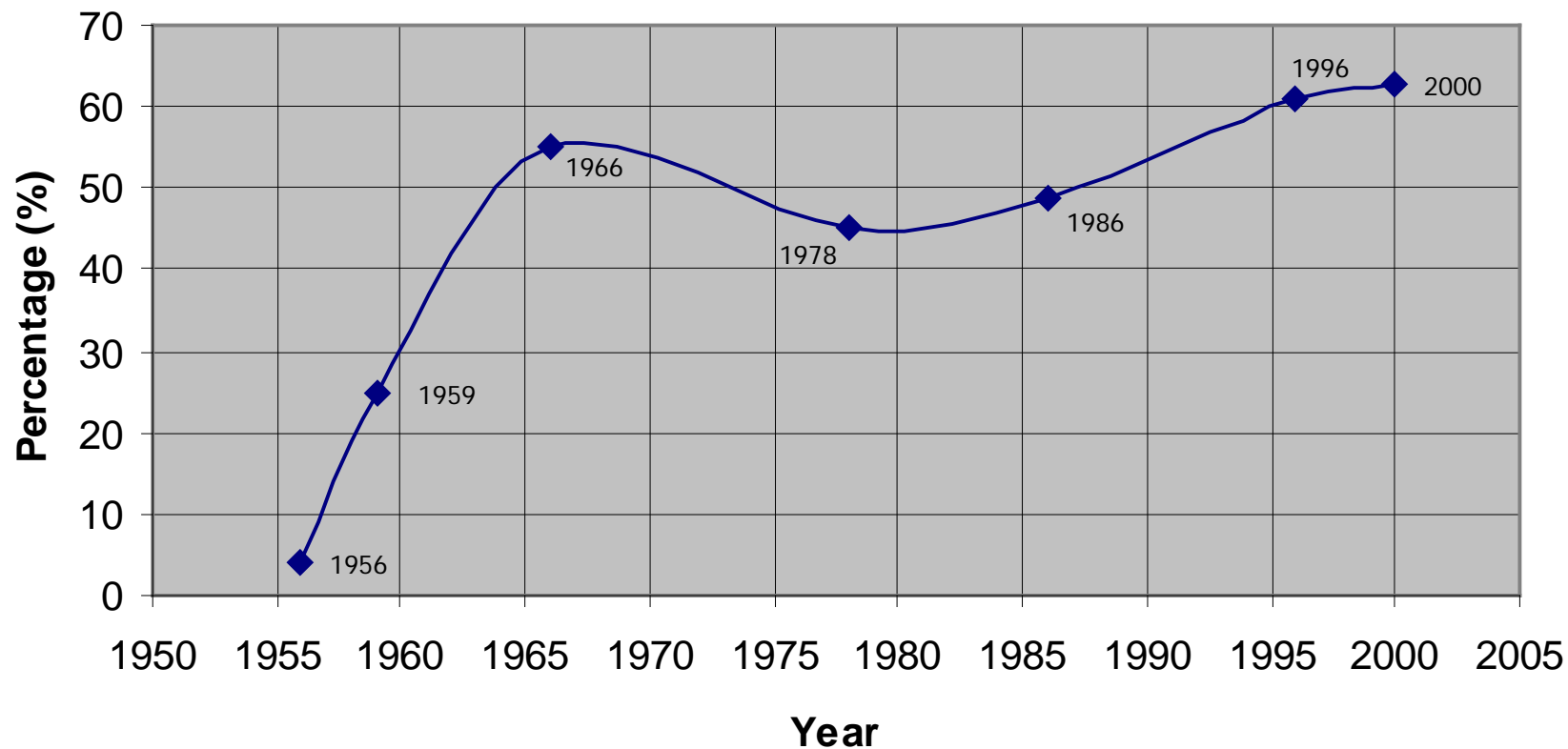


Image Source and Fieldwork	Village Level Land Use History	Context History	Indicators of Environmental Change
Aerial photos 1955/59	<b>1950s:</b> livestock the main livelihood, cultivation minor; few inhabitants	<b>1954</b> all weather road to Dar es Salaam completed	Clearing of vegetation on foot slopes and plain for cultivation; decrease in fallow period
Corona satellite image 1966	<b>1960s:</b> change in production system from cattle to crop; ridge cultivation; introduction of animal traction	<b>1961/62</b> cattle disease; <b>Immigration and scattered settlements</b>	Increasing erosion problems on foot slopes (sheet and gullies)
Aerial photos 1977	<b>1970s:</b> increased adoption of animal traction for ploughing; flat cultivation; expansion of cultivation on the foot slopes; increased maize production	<b>1968-69</b> cattle disease <b>1970s:</b> population growth of 3.6% <b>1974</b> Villagization <b>1974-79</b> efforts to establish piped water in the village	
SPOT image 1986	<b>Early 1980s:</b> introduction of tomatoes <b>1980s:</b> agricultural expansion in the hills	<b>1980s:</b> population growth of 2.1% <b>1986</b> liberalization of economy	Deforestation in the hills for cultivation and charcoal
Landsat TM 1993 Fieldwork 1994 96	<b>1990s:</b> adoption of sunflower; trade in land; cultivation of marginal land	<b>1995/96</b> drought	Expansion of cultivation into the swamp; lack of grassing area
Landsat TM 1996 Fieldwork 1998 + 2003 Landsat TM 2000	Agricultural expansion in the swamp/mbuga and hills	<b>1997/98</b> floods	Cultivation of marginal land



## Adaptive strategies and manoeuvring in the 2000s according to resource base/capacity

To counter the short and long-term crises, stresses, shocks and trends, the household often, beside its main occupation, develop a mix of other livelihood sources, be it in the town and/or from the rural home, plot or rural part of the household:

### Resourceful HH

- Investing in town house (multi-spatial LH)
- Stay in town during the dry season – move back in rain season to cultivate their land
- Hire or buy land elsewhere

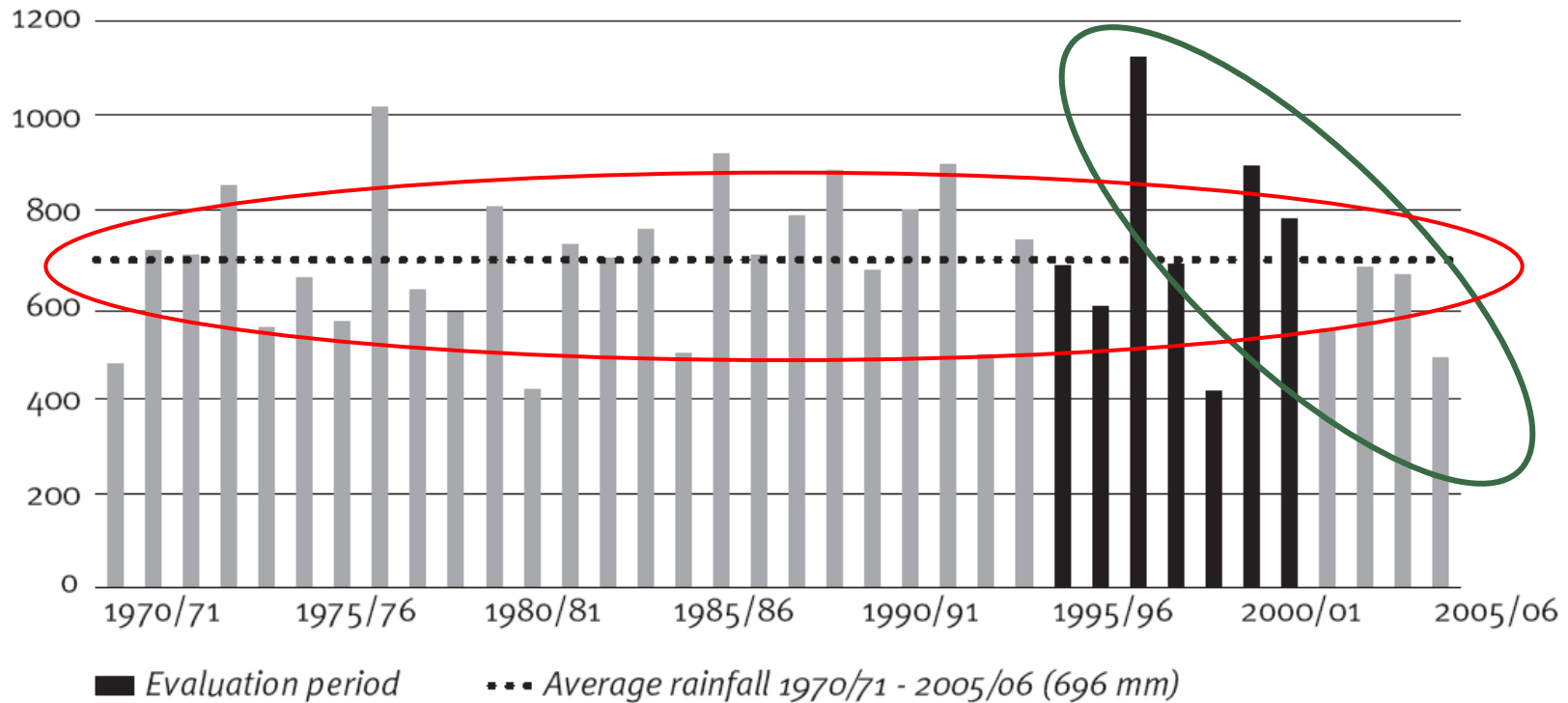
### Poorer HH

- Temporary labour migration in the dry season (rural-rural or rural-urban)
- Decreased number of meals per day
- Selling of small animals to buy food



# Peoples perception of climate change

Figure 36: Annual Precipitation in Iringa from 1970-2006  
(mm)



Source: Iringa Maji Depot – Station 97.35014



# Triple exposure

Population Growth



Globalization



Climate Change



'Room for maneuver'

