

Climate change and adaptation ILRI's agenda



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Climate change and adaptation

A large global community is working on climate change issues across sectors and disciplines:

- Inventories of greenhouse gases (EPA, IPCC, RIVM)
- Climate prediction and modelling (universities/research centres)
- Adaptation options (NGOs, IARCs, universities, industry, private sector – not everybody with a pro-poor and vulnerability focus)

Livestock issues in developing countries are not well articulated or well studied

Globally, ILRI is only a small player, so strategic partnerships are key

There are niche areas where poverty, livestock and climate change issues overlap

ILRI's niche

- Some of the regions that will be most affected by climate change are places with large numbers of vulnerable poor people that depend on livestock as a key livelihood strategy (semi-arid areas)
- There is a need to identify:
 - how are these regions likely to change in the future as a result of climate change and other drivers
 - Livelihood strategies and the role of livestock for poor communities
 - What are the magnitudes of the expected impacts of CC on these agro-ecosystems and on livestock
- Key areas: targeting, feeds, rangeland management, water, land use, crop production, distribution of diseases, etc



ILRI's niche (2)

- Adaptation options
 - Understanding the capacity to cope developed over the years by these communities
 - New, alternative adaptation options (i.e. feeding strategies, breeding, payments for ecosystems services, disease management, etc)
- Providers and mechanisms for implementation of adaptation options (partnerships)



On-going research on climate change and livestock at ILRI

Vulnerability assessment for the Greater Horn of Africa (IDRC CCAA)

Anticipating, adapting to, and coping with climate risks in Kenya (KACCAL)

Dynamic Interactions among People, Livestock, and Savanna Ecosystems under Climate Change (NSF)

Targeting and priority setting of climate change adaptation options (ASARECA)

Adapting to climate change and climate variability in livestock systems in marginal, rapidly-changing areas of East and southern Africa (BMZ)

Climate change, Agriculture and Food Security (CGIAR Climate Change Challenge Programme)

ILRI's work on climate change adaptation

Framework for climate change adaptation work:

- Analytical and diagnostic studies
 - Identifying hotspots of climate change and vulnerability
 - Vulnerability assessment to identify intervention options
 - Climate change scenarios and assessing *ex-ante* adaptive responses and impacts on livestock communities and ecosystems
- Test feasibility of promising adaptation options, support design and formulation of adaptation strategy
 - Assess feasibility of index based livestock insurance (IBLI) for large populations facing co-variate risks linked to climate change
 - Identify institutional arrangement to deliver livestock insurance product to the poor, particularly women
 - Build capacity of research and non-research actors



ILRI's work on climate change adaptation

- Support implementation of adaptation projects
 - Pilot testing of adaptation interventions eg. IBLI
 - Results based monitoring and evaluation, focusing on what works, what does not work, and why, lessons learned and issues for scaling up

Vulnerability and climate change

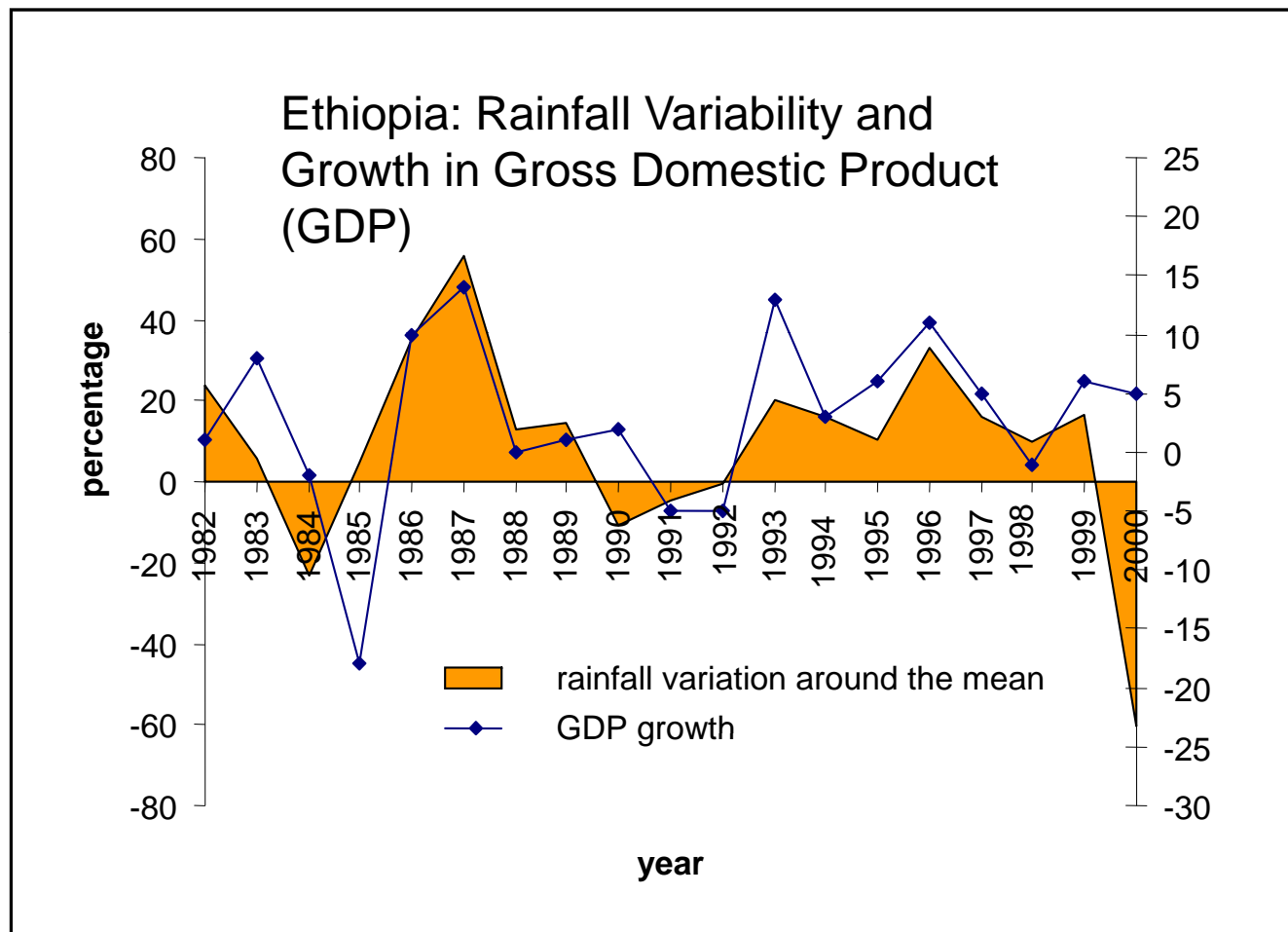
Targeting Adaptation Investments in Africa



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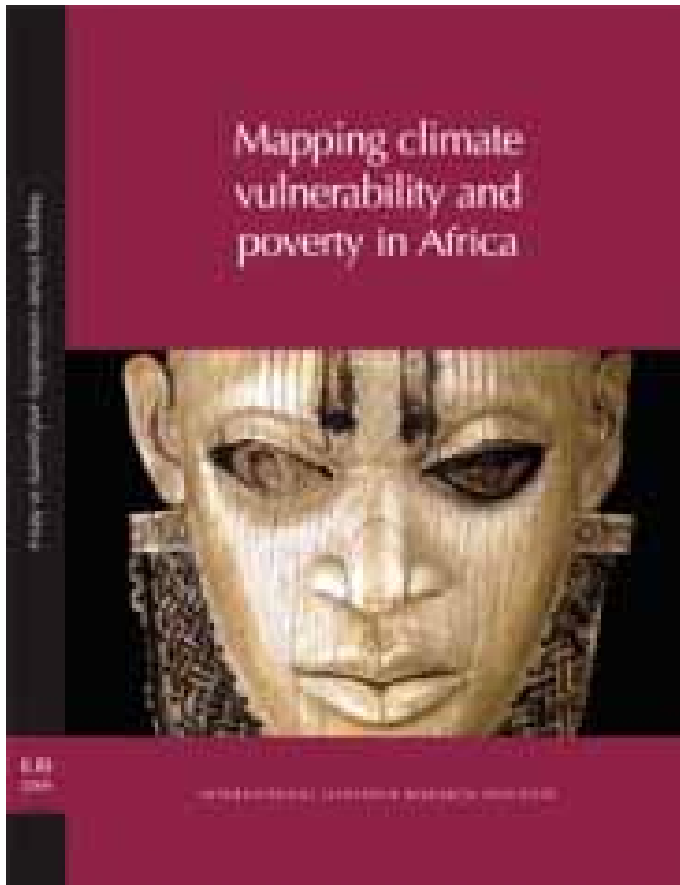
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Why is climate change so important to poor countries?



de Jong (2005), World Bank (2005)

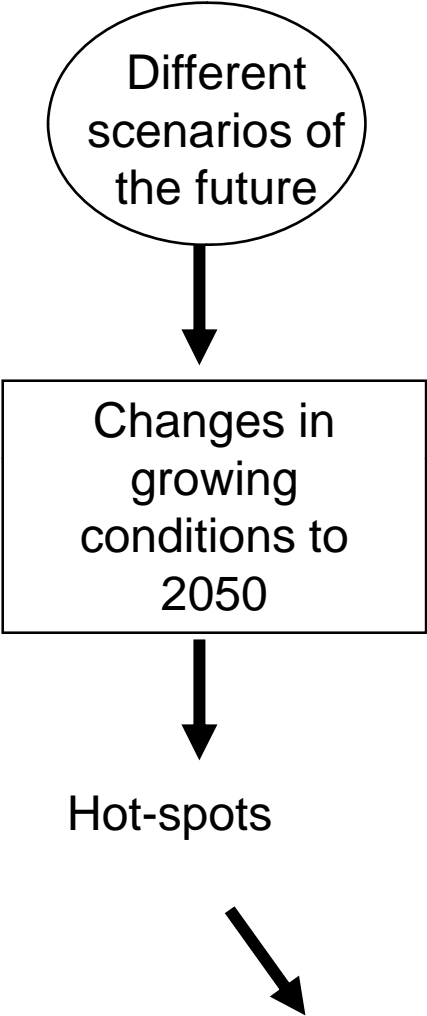
Mapping Climate Vulnerability and Poverty in Africa



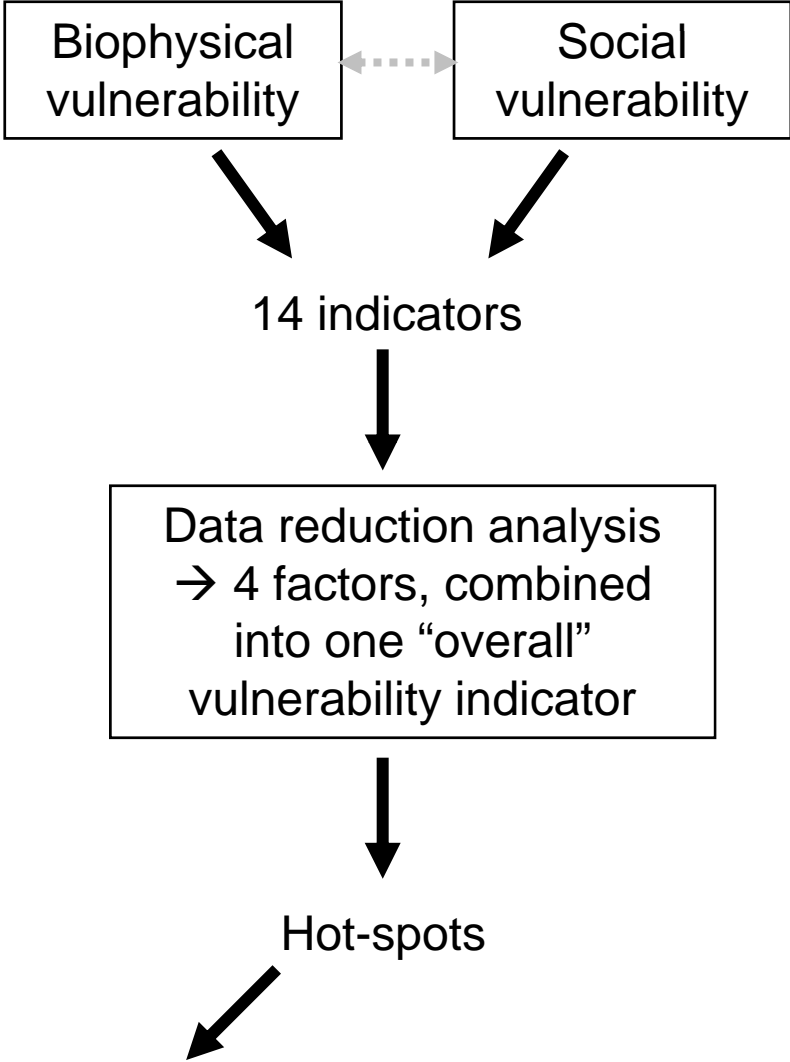
Many people who have contributed least to climate change may suffer the greatest livelihood consequences

ILRI with the African Centre for Technology Studies (ACTS) and The Energy Resources Institute (TERI)

Climate Change Risk / Impact



Vulnerability



Hot-spots of climate risk AND vulnerability

14 vulnerability indicators used in ILRI study

Data at different scales: country, province, 18 km²

Physical capital

- Market access (ILRI)

Natural capital

- Crop suitability (FAO, GLC2000)
- Soil degradation (GLASOD)
- Water availability (FAO Water Atlas)

Social capital

- Human poverty index (HDI)
- Governance (World Bank)

Financial capital

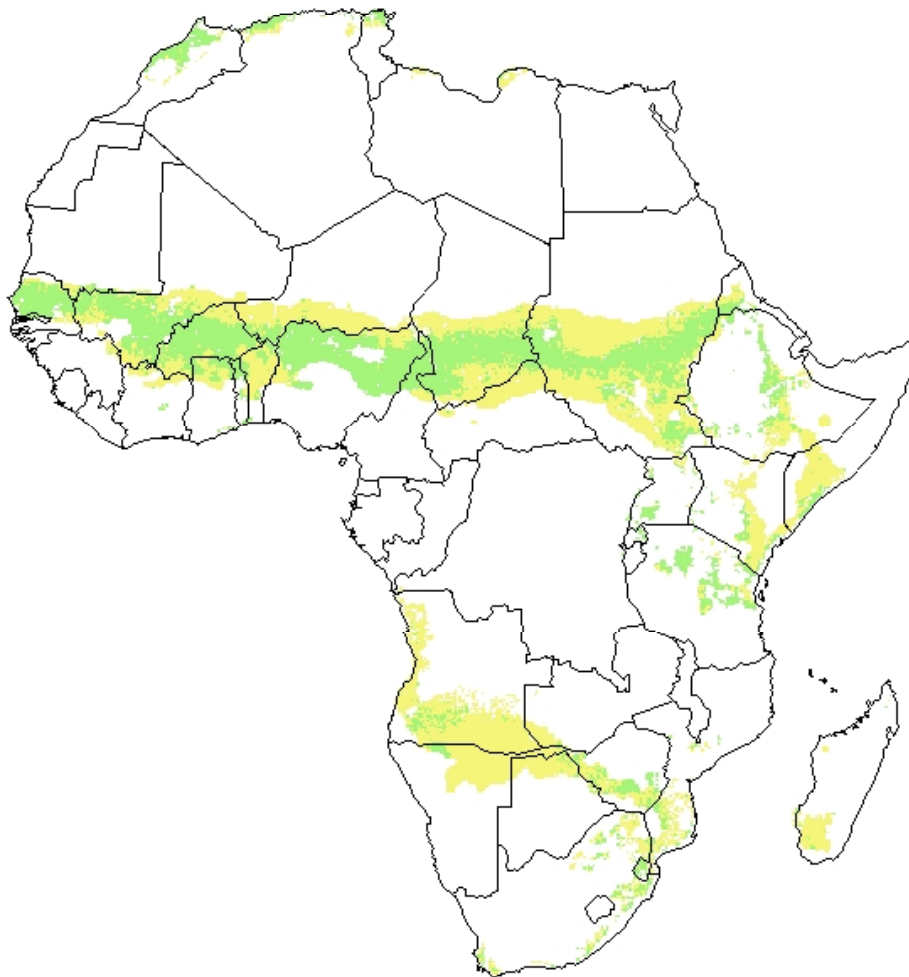
- Agriculture as % of GDP (World Bank)
- Imports vs Exports (World Bank)

Human capital

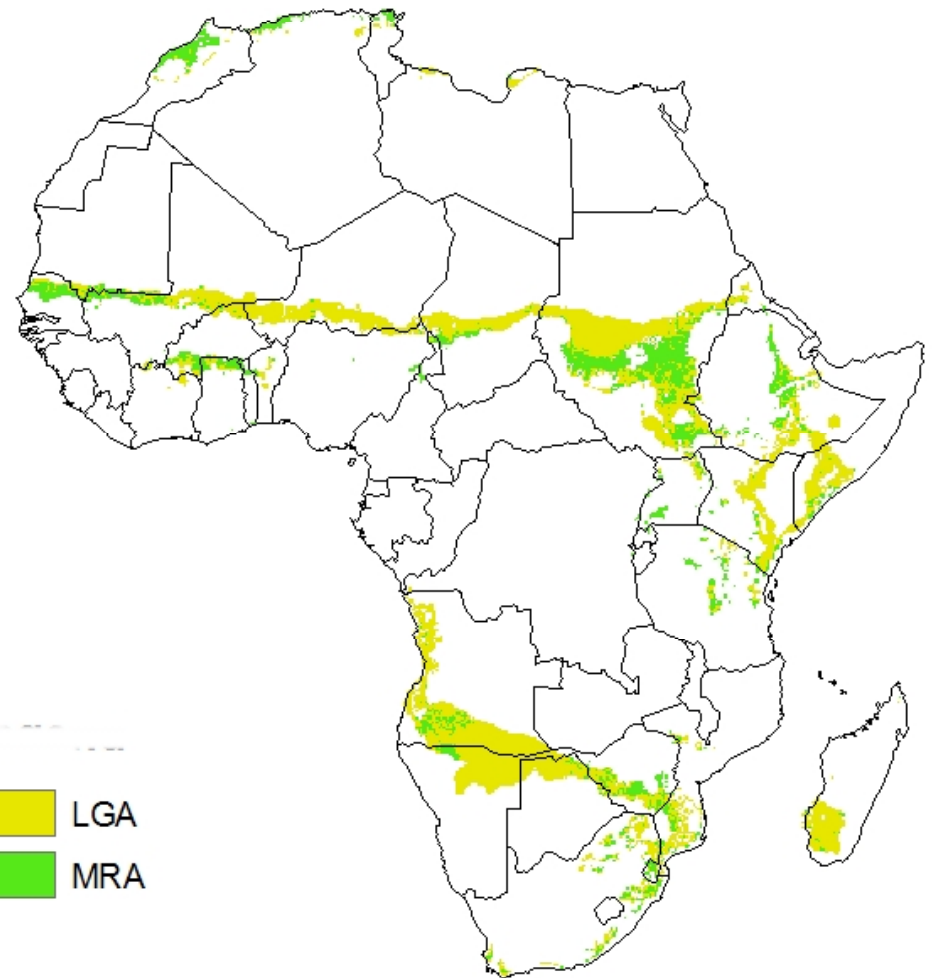
- Stunting (FAO, CIESIN)
- Infant mortality (CIESIN)
- Wasting (CIESIN)
- Public health expenditure (HDI)
- Malaria risk (MARA)
- HIV/AIDS prevalence (HDI)

Areas within the LGA (arid-semiarid livestock) and MRA (arid-semiarid mixed) systems projected to undergo >20% reduction in LGP to 2050: HadCM3

A1

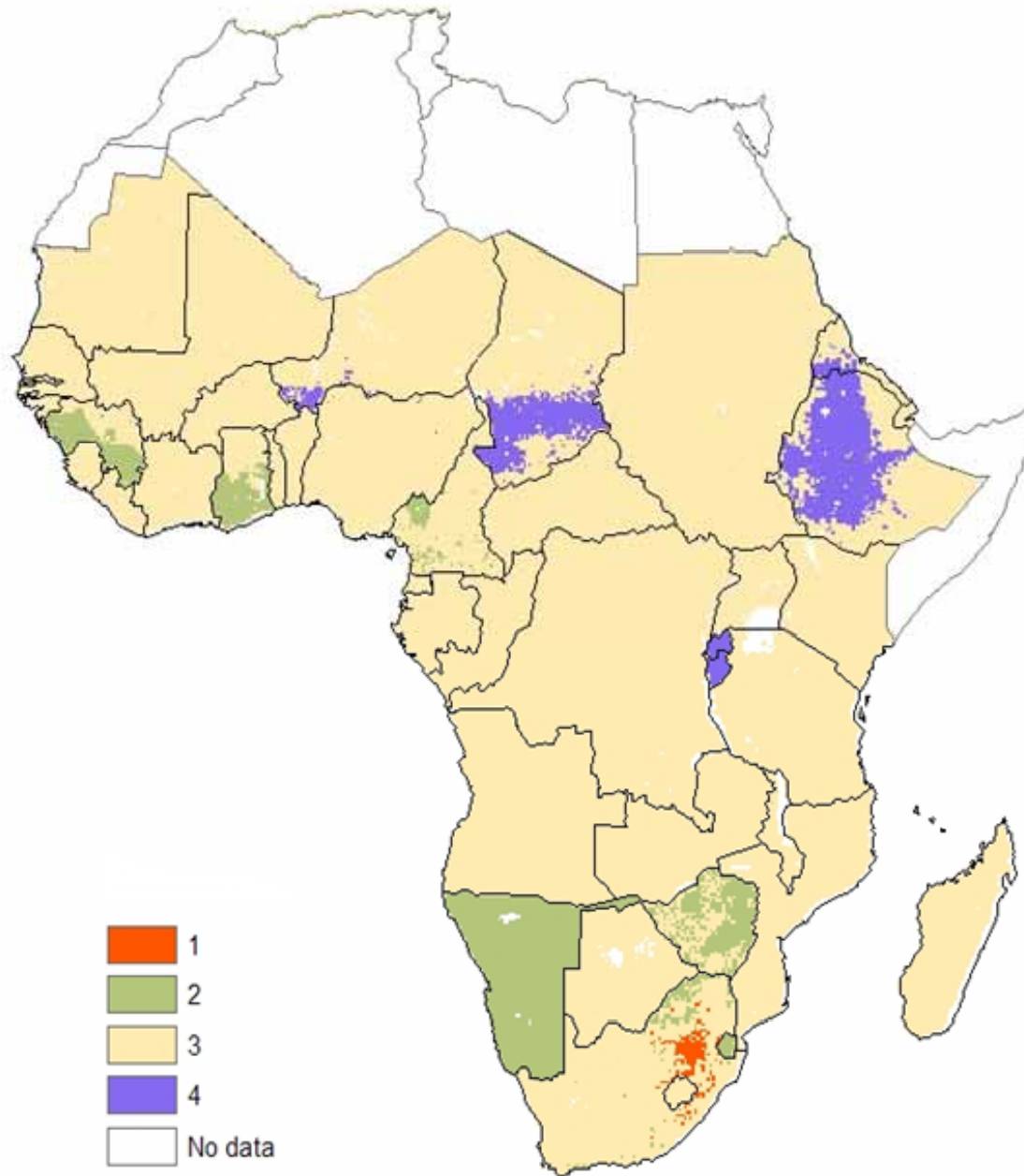


B1



Quartiles of the overall vulnerability indicator

Mapped at systems level within each country. Quartile 1, “less vulnerable”; quartile 4, “more vulnerable”



Synthesis of hot-spots

MRA, mixed rainfed arid-semiarid systems

LGA, rangeland arid-semiarid systems

	Highest vulnerability quartile (4)	Second-highest vulnerability quartile (3)
Possibly severe LGP loss (>20% to 2050)	<ul style="list-style-type: none"> • Some MRA systems in Sahel • Mixed rainfed and highland perennial systems in Great Lakes region of E Africa • LGA systems in parts of E Africa 	<ul style="list-style-type: none"> • MRA, LGA systems in large parts of Sahel • Livestock systems and some mixed systems in parts of E and southern Africa • Coastal systems in E and parts of southern Africa
Possibly moderate LGP loss (5-20% to 2050)	<ul style="list-style-type: none"> • Mixed systems in parts of E Africa 	<ul style="list-style-type: none"> • Coastal systems of parts of W Africa • Tree crop systems in parts of W Africa • Forest-based systems in central Africa • Root-based and root-mixed systems in south central Africa

Use such information as one input to evaluating trade-offs (e.g., numbers of poor versus density of poor) in relation to specific development criteria

Livestock System Consequences and Adaptive Responses



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Livestock and Climate Change

Specific bio-physical impacts

- Will have important impacts at system level which are poorly understood
- Specific livestock system components that will be affected include:
 - Disease emergence and distribution
 - Feed and water availability
 - Adaptation and survival of livestock

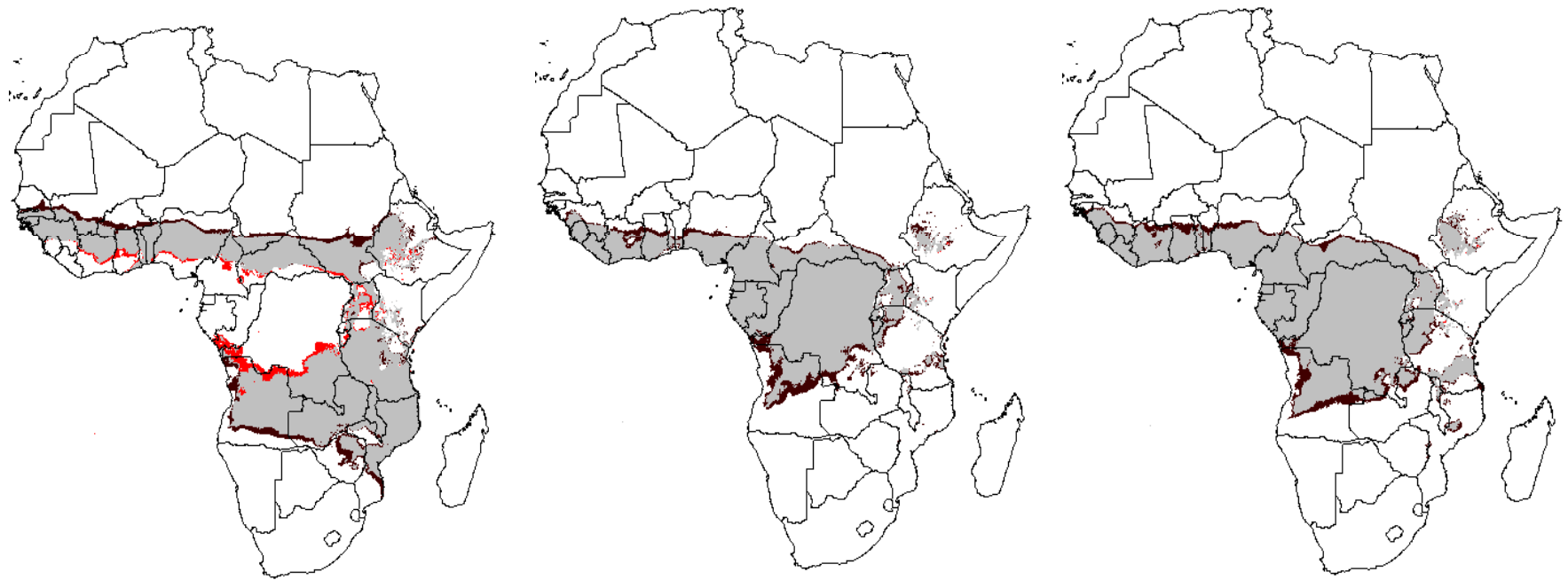
Livestock and Climate Change Complexities and Vulnerability

- Household and local impacts and response options likely to be complex and recommendation domains of limited scale
- Impacts and adaptations to them will be dynamic and non-linear
- Climate and other shocks will affect power, governance and equity relations that will disadvantage the vulnerable

Animal Diseases and Climate Change

- Major global changes in the distribution of vector-borne diseases to new “warmer” habitats (blue tongue of sheep in Europe, “highland” malaria in Africa)
- Climate is an important but not the only driver of change in disease distribution (population, intensification of systems)

Tsetse Distribution and Climate Change

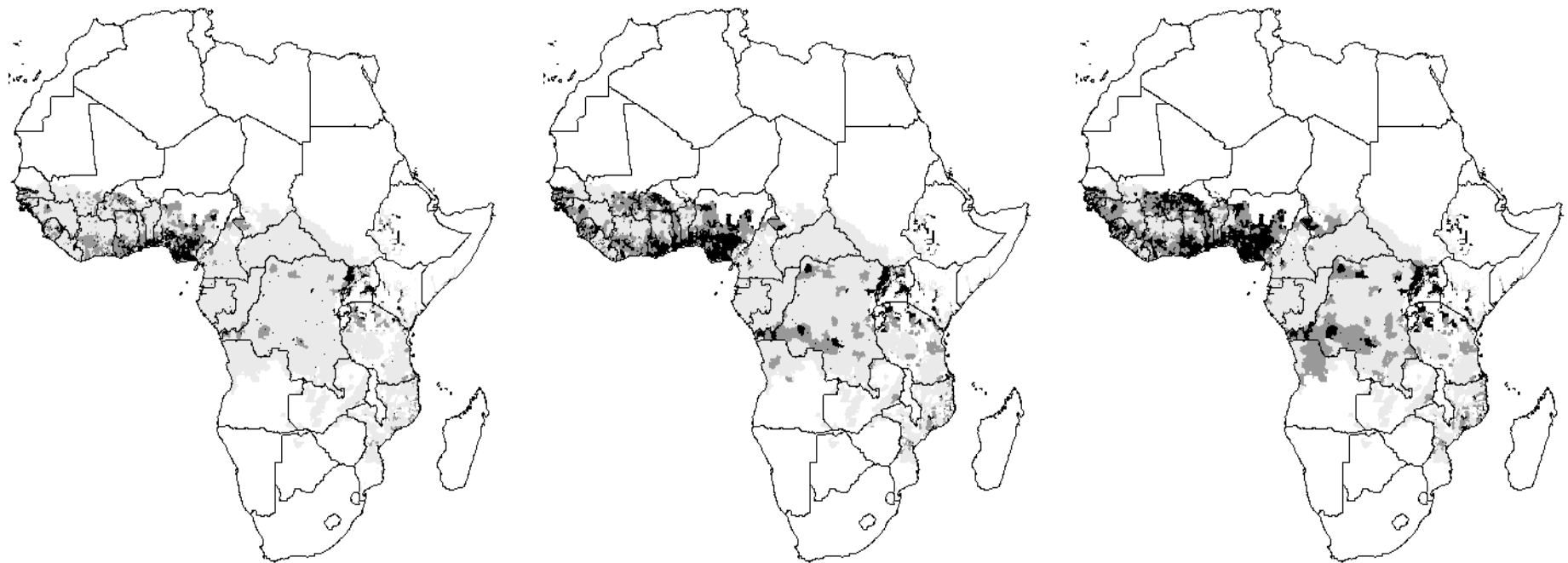


Model predictions for to changes in tsetse distribution to 2030 from current distributions for morsitans (left), fusca (centre) and palpalis (right) tsetse groups as a result of changes in length of growing period

- No change: Absent
- Presence to Absence
- Absence to Presence
- No change: Present

Tsetse Distribution and Population Growth

Current tsetse distribution (left) and conservative scenario for changes in populations of *morsitans* and *fuscus* to 2015 (centre) and 2030 (right) as a result of human population growth



- High populations
- Declining populations
- Low populations
- No tsetse

Rift Valley Fever

Source FAO, 2006

- Associated with climate variability (flooding in drier areas and rapid expansion of vectors)
- Relatively predictable – response capacity can be planned

Feed, Fodder, Climate and other Changes

- Adapting crops to changed conditions
 - Species composition changes (browse vs grazing)
 - Changes in primary productivity of species
 - Nutritional quality changes
- Tradeoffs – conservation agriculture, feeds, fuel,
- In semi-arid areas – importance of feed from food crop failures

Modeling feed productivity under climate change – maize stover in East Africa

	Baseline	ECHam4		Hadley CM3	
		A1FI	B1	A1FI	B1
	2000	2030	2030	2030	2030
Above-ground Biomass (MT)	47,470	49,311	49,004	50,228	49,560
Grain (MT)	14,125	15,137	15,075	15,506	15,286
Stover (MT)	33,345	34,174	33,929	34,722	34,274
Ruminants (# in LU)	20,818,330				
Digestible dry matter	18,340	18,796	18,661	19,097	18,851
Metabolisable energy (ME, '000 MJ)	273,429	280,227	278,218	284,720	281,047
ME Differences ('000 MJ)	0	6,798	4,789	11,291	7,618
Additional number of animals able to be maintained		745	525	1237	835

Animal Breeding and Genetic Resources

- **Managed intensifying systems**
 - Match breeds to feed and health
 - Cross-breeding to fit risks
- **Adaptive systems**
 - Identification, conservation and utilization of adaptive genes
 - Opportunities for transfer of breeds between tropical regions (Sahiwal, Boran)

Livestock Research Opportunities

- Mitigation
 - Technical (feed efficiency, manure handling)
 - Ecological services (CDM)
- Adaptation
 - Testing adaptation options in current extreme environments relevant for future change
 - Diversification strategies for resilience, critical role for building response capacity of local institutions supported by enabling policies

Livestock Research Opportunities

- Analysis of Tradeoffs is critical
 - Economic growth versus equity versus environmental sustainability
 - Strengthen evidence base for important negotiations between rich and poor countries
- Climate challenges linked to development challenges
 - Responses to climate vulnerability similar to other shocks (coping strategies, insurance mechanisms, institutional response capacity)

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Better lives through livestock

Animal agriculture to reduce poverty, hunger and environmental degradation in developing countries

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