

September 29th - 30th, 2016
Palmeraie Golf Palace,
Marrakesh



29 - 30 septembre 2016
Palmeraie Golf Palace,
Marrakech

HIGH-LEVEL MEETING ON THE INITIATIVE FOR THE ADAPTATION OF AFRICAN AGRICULTURE TO CLIMATE CHANGE "AAA"

RENCONTRE DE HAUT NIVEAU SUR L'INITIATIVE POUR L'ADAPTATION DE L'AGRICULTURE AFRICAINE AUX CHANGEMENTS CLIMATIQUES "AAA"

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IFPRI

Africa: Adapting to climate change through innovations

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High-Level Meeting on the Initiative for the Adaptation of African Agriculture to Climate Change ("AAA")

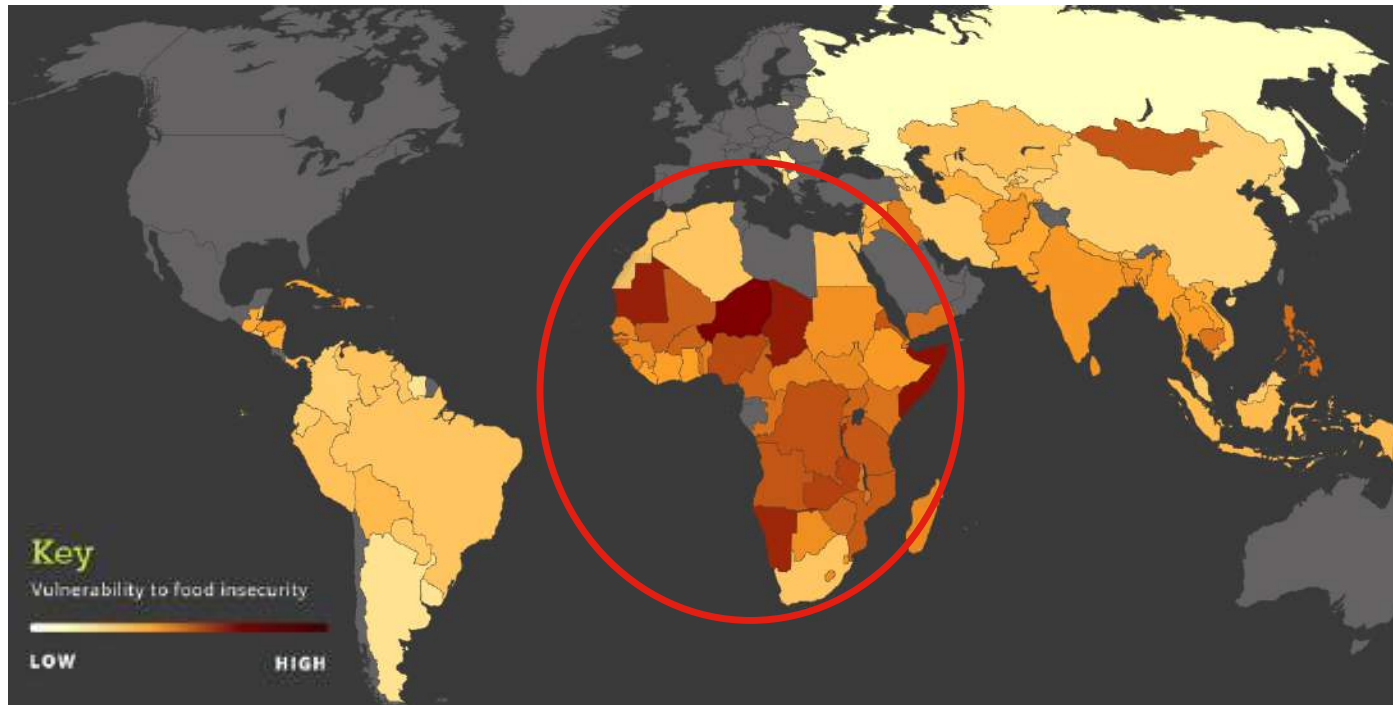
Marrakech | September 29, 2016

Overview

- **Africa's food systems at risk due to climate change**
- **Triple burden of malnutrition a rising challenge AND agricultural investments remain low**
- **Climate-resilient food systems critical to feed Africa healthily and sustainably**
- **Innovations in technology, policy, and institutions key for climate adaptation**

Africa: Highest levels of food insecurity and climate vulnerability

Vulnerability index of food system to climate-related hazards, 2010



Vulnerability measured as

- **Exposure** to climate-related hazards
- **Sensitivity** of national agricultural production to climate-related hazards
- **Adaptive capacity**—measure of capacity to cope with climate-related food shocks

Effects of climate change in Africa vary, but predominantly negative

Regional-level effects by 2050

North Africa

- Broadest range of impacts
- Positive yield changes for roots and tubers
- Extremely negative impact on rainfed oilseed production

West, central, and south Africa

- Consistently negative yield impacts across all crops

East Africa

- Potential to positive yield impacts in roots, tubers, pulses

Commodity-level effects

Cereals

- Most consistent decline across Africa—5% to 20% compared with NoCC in 2050

Oilseeds; fruits and vegetables

- Negatively hit across Africa, severity depends on region

Pulses

- Up to 10% decline in rainfed yields by 2050 compared to NoCC (except East Africa)

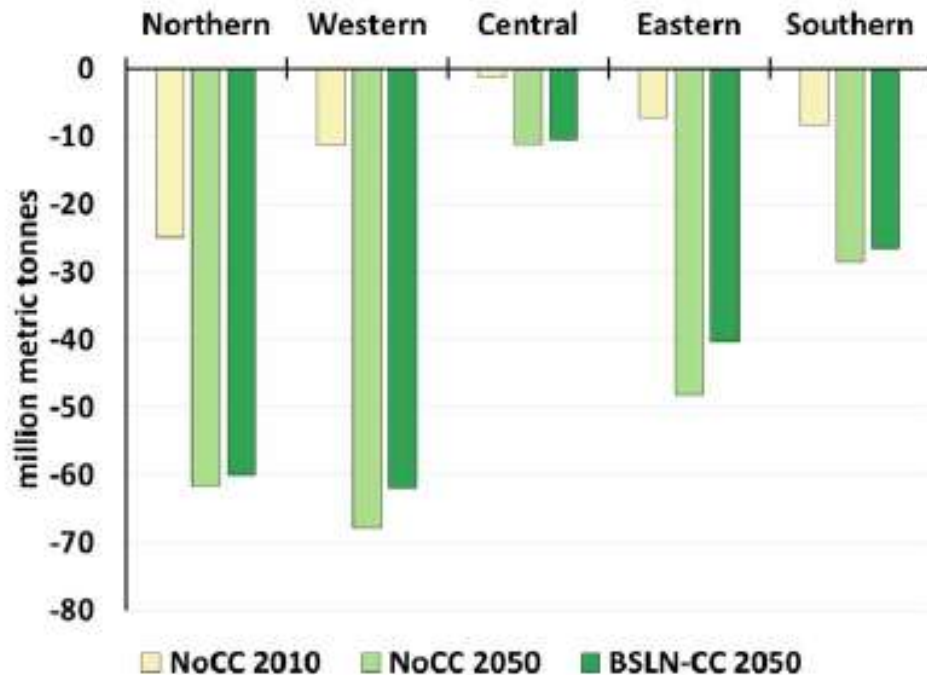
Climate change to worsen water stress in Africa by 2050

- **Mixed water stress effects across landscape**
 - Different climate models show varied precipitation patterns
- **Inability to smooth out water consumption**
 - Rainfed agriculture dominant in Africa showing more widespread and dramatic effects
- **Production affected**
 - In some rainfed systems, stress will severely curtail production—unless there is significant adjustment to production practices (e.g. investment in irrigation expansion in Morocco)

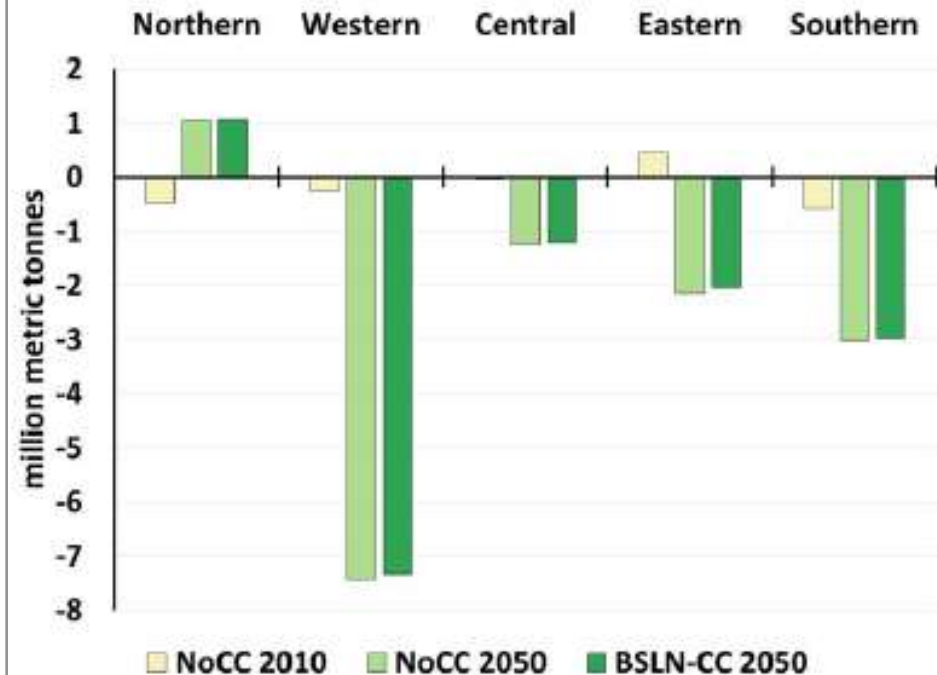


Climate change will affect Africa's net trade (1)

Cereals



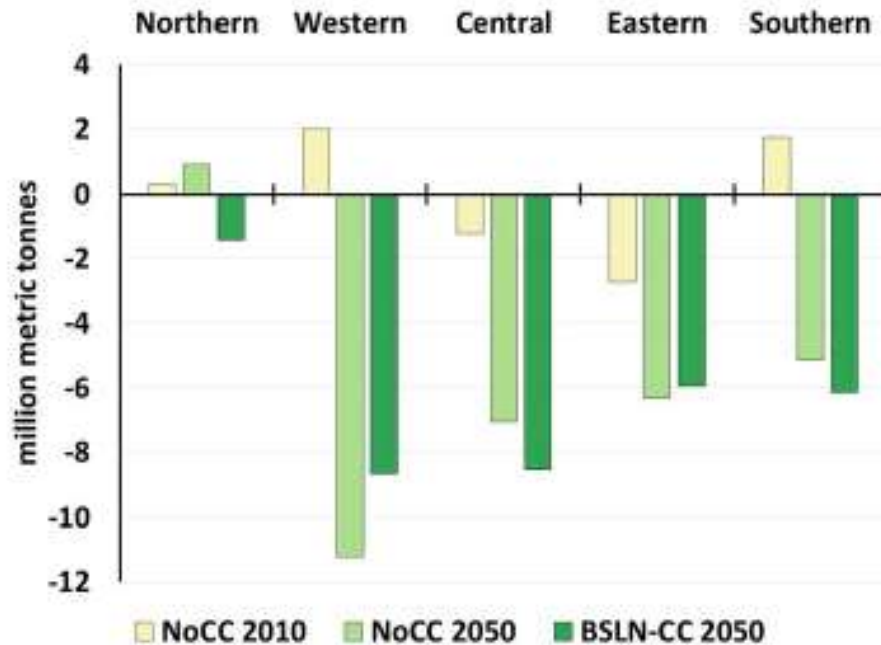
Meats



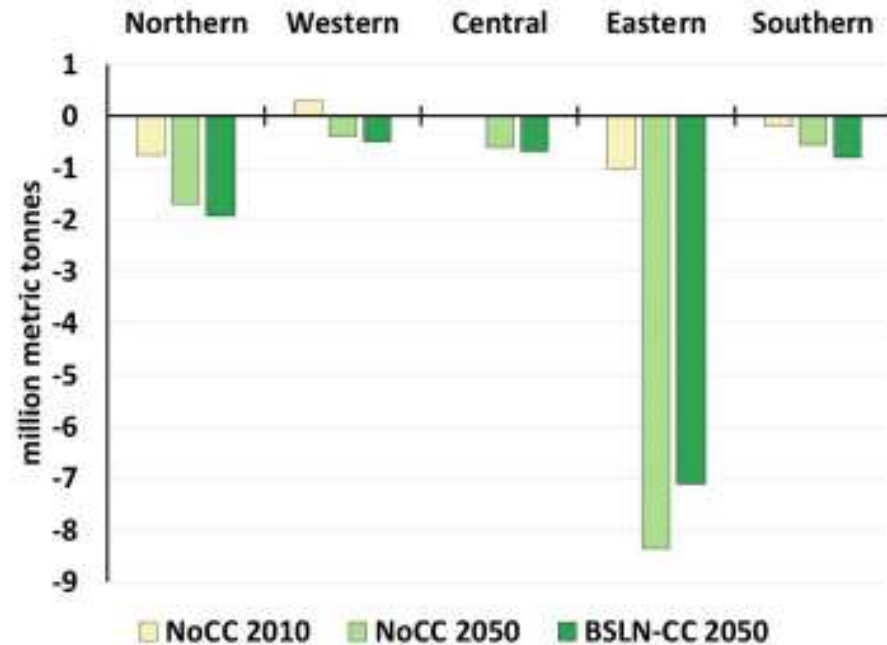
- Climate change expected to negatively impact supply of commodities
- Demand anticipated will not match production
- Big increase in imports expected

Climate change will affect Africa's net trade (2)

Roots & Tubers



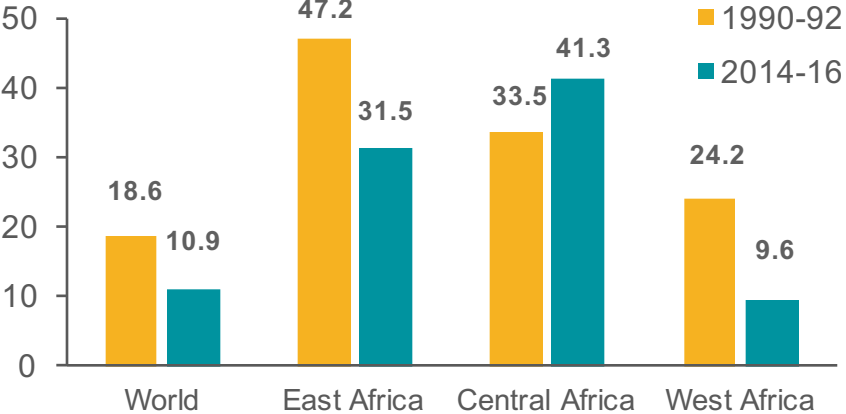
Pulses



- **Roots and tubers:** Trade spread more evenly, except North Africa
- **Pulses:** May be locally important, but globally insignificant
- In rare cases, Africa's comparative advantage leads to consistent net export positions (e.g. fruits and vegetables from North Africa)

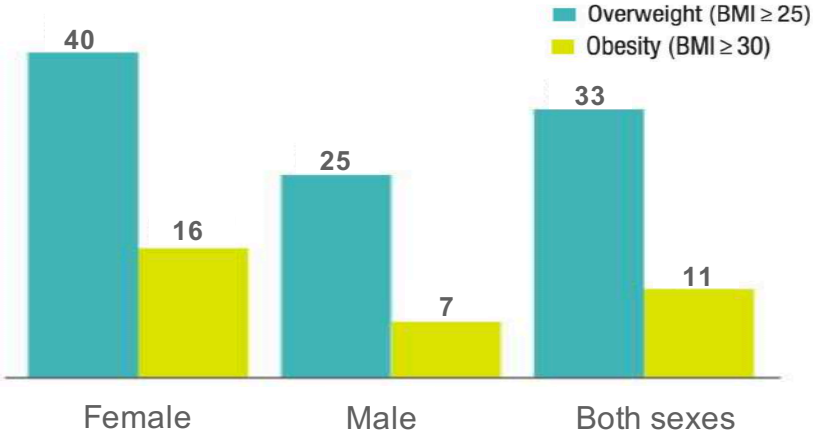
Triple burden of malnutrition a rising challenge in Africa

Prevalence of undernourishment (%)



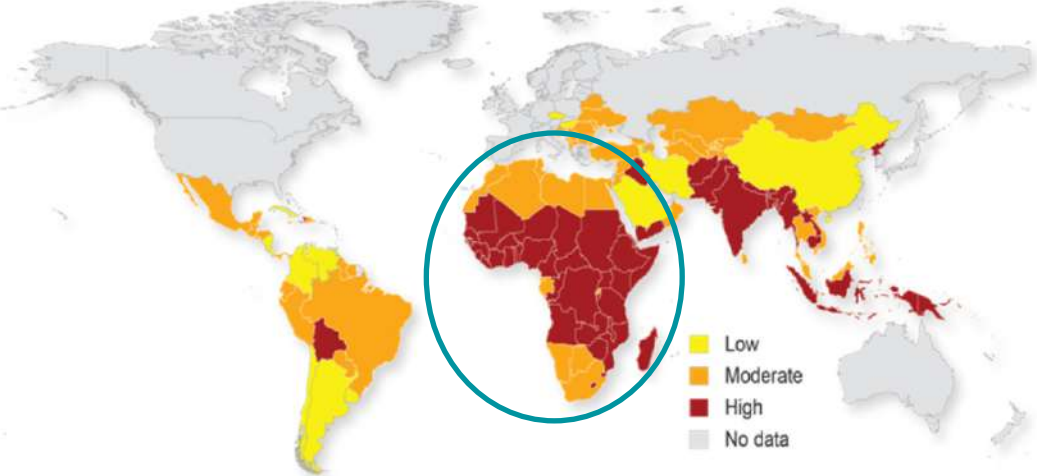
Source: FAO 2015

Prevalence overweight and obesity, 2014 (%)

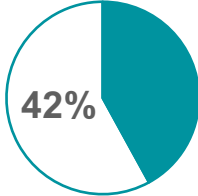


Source: WHO 2015

Prevalence of micronutrient deficiencies

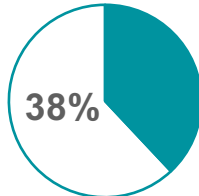


2011



Under-5 vitamin A deficiency

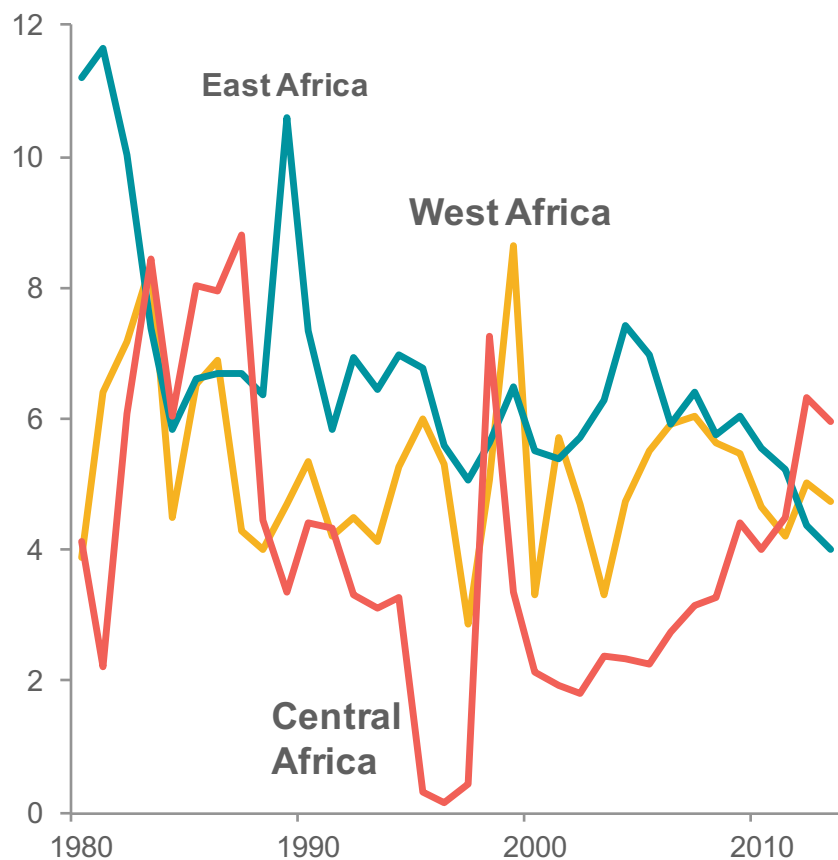
2013



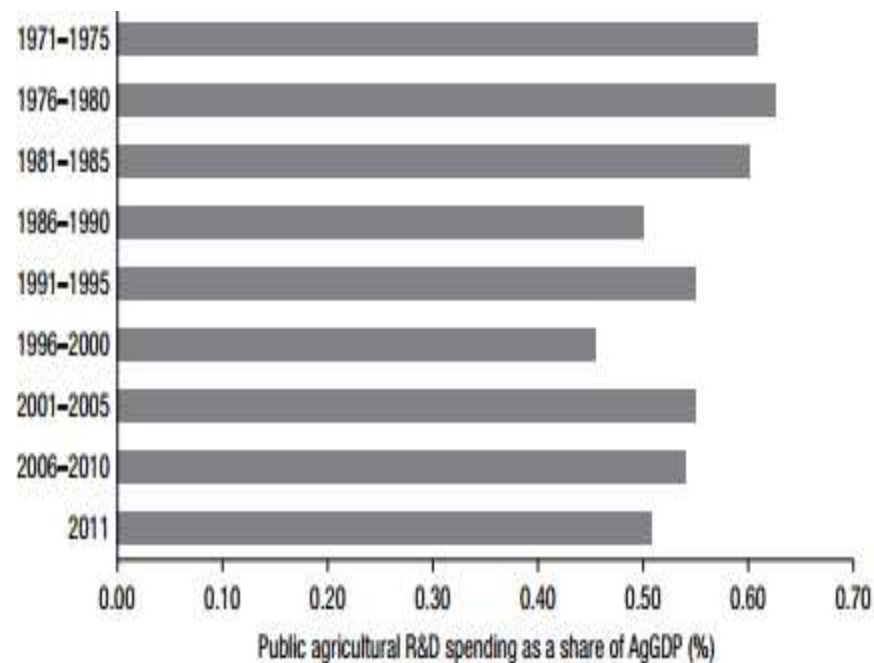
Pregnant women anemia

AND agricultural investments remain low

Government agric. expenditure
(% of total expenditure, 1980-2013)



Agric. R&D spending as share of Agric. GDP, SSA (1971-2011)



Steady decline: 0.59 to .51 percent from 2006 2011

Climate-resilient food systems needed to feed Africa healthily and sustainably

New food systems

Productive & efficient

Environmentally sustainable & climate-smart

Inclusive

Nutrition- & health-driven

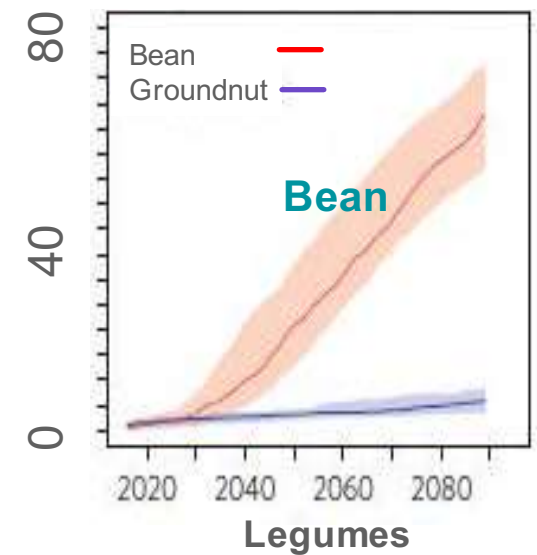
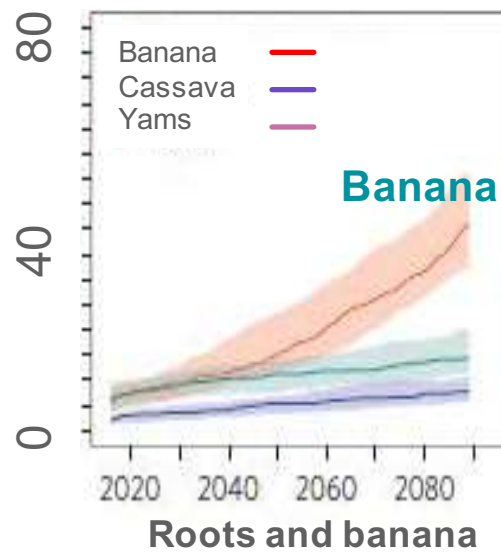
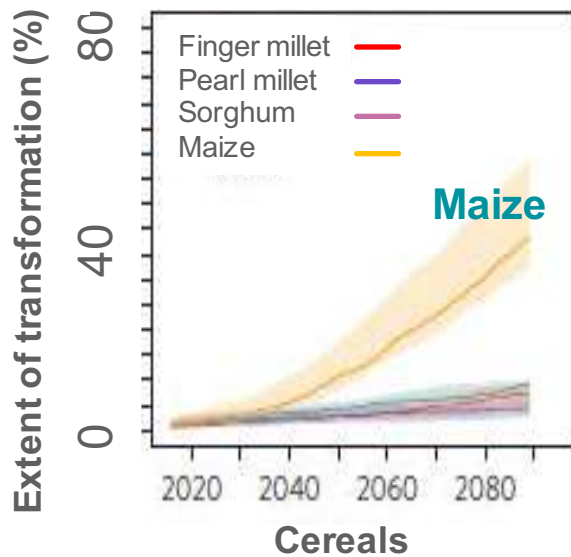
Business-friendly



Climate adaptation critical to achieve numerous SDGs

Africa's production systems—transformation needed for better climate adaptation

SSA: Extent of land that should be transformed from one crop to another (%)



What is needed:

- Incremental adaptation, i.e. marginal changes
- Policy changes for transformation readiness
- Transformational adaptation (shifts in production systems)

Enormous diversity in African food systems— context specificity critical for climate adaptation

Assessment of adaptation alternatives at farm scale needed, require:

Biophysical models

- Represent interactions between crops and livestock adequately for robust evaluations

Whole-farm models

- Track flows of cash, interactions of financial, physical resources in farm household system; quantify trade-offs
- Constraints: Lack of systems data

Scenarios of the future

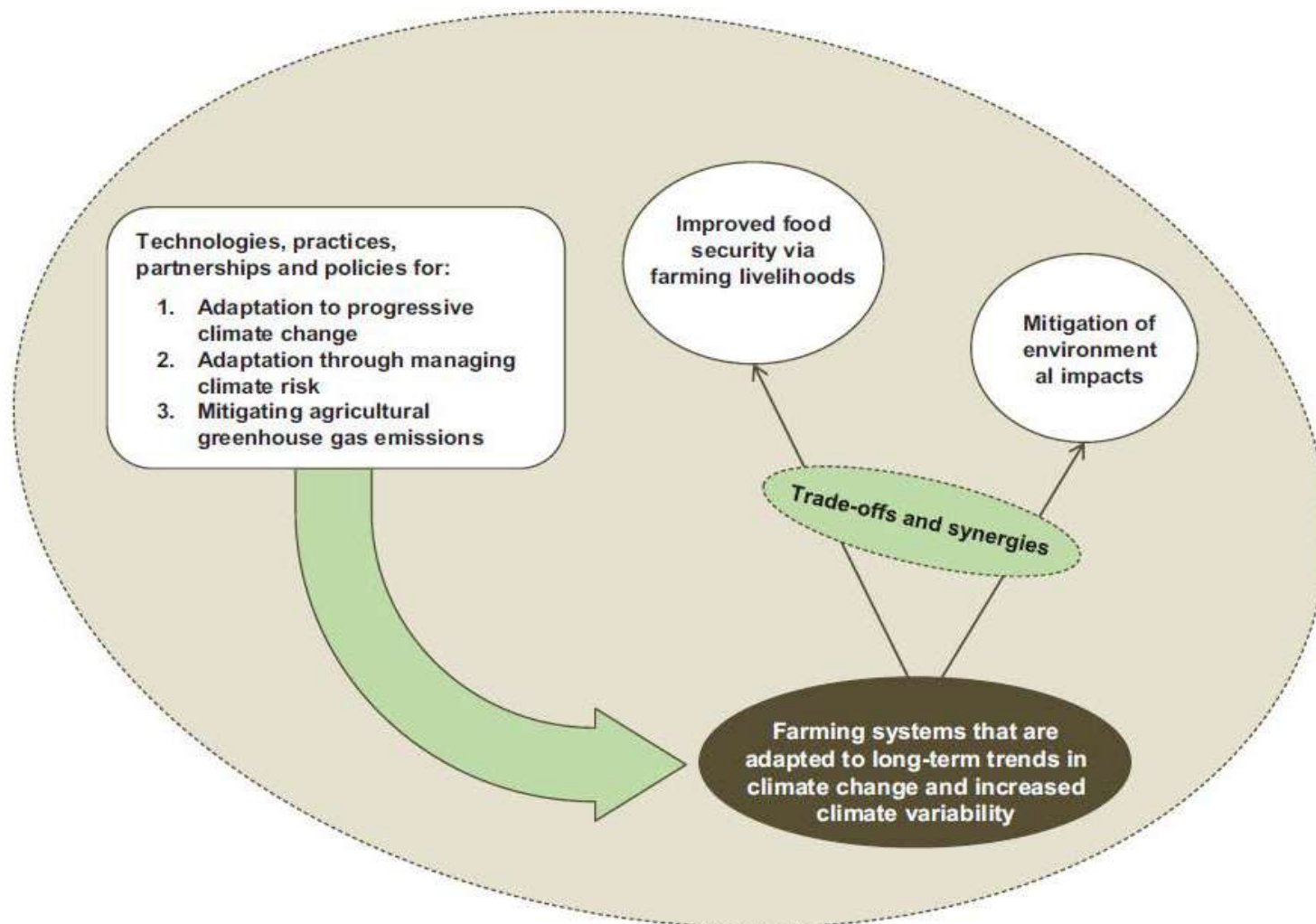
- Explore participatory regional, national, or local socio-economic scenarios

Measures of adaptation success

- Indicators that combine objective asset / poverty measures at household level with governance, policy factors at community, national levels

Innovation in policy, technologies, institutions key for climate adaptation in Africa

Pathways to improve food security and nutrition under climate change



Policy innovations: Targeting climate adaption

Climate and agric. information—women

- **East Africa:** Women, when aware, more likely or just as likely as men to adopt CSA practices (Twyman et al. 2014)
- Targeting women with climate and agric. information likely to result in adaptation

Social protection for climate adaptation—smallholders

E.g. Zambia Child Grant Program (Asfaw et al., 2016)

- Participating households had much lower negative effects of weather shocks; poorest households had greatest gains

Climate-smart agriculture—youth

E.g. Climate Smart Alliance Youth Group

- Online platform to share findings, seek advice on CSA
- Target countries: Togo, Nigeria, Cameroon, DRC

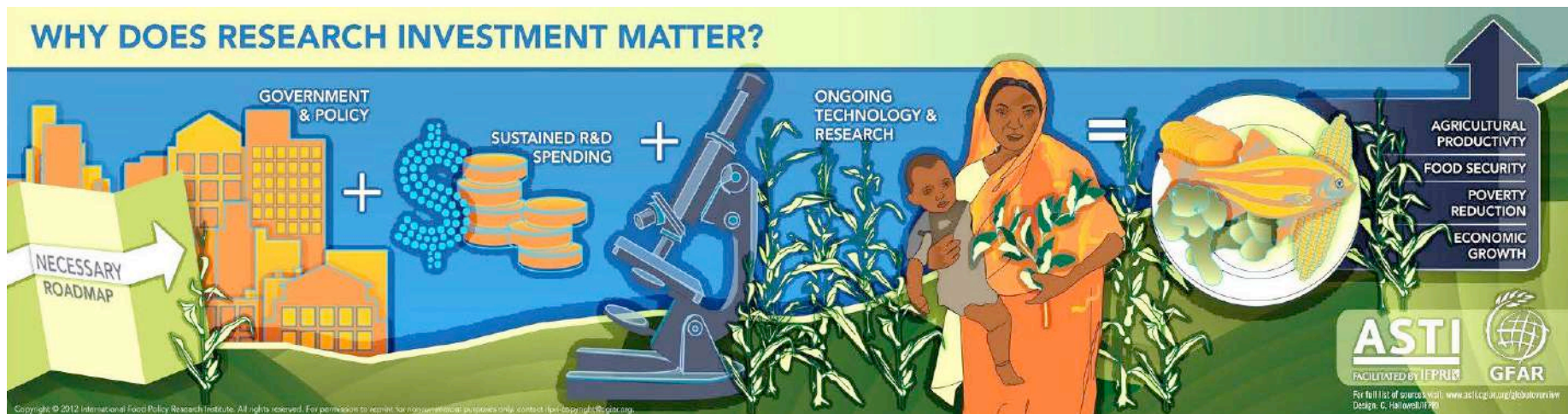
Policy innovations: Implementing reforms for climate-smart policies

- **Reform input subsidies**
 - Convert input subsidies (e.g. on fertilizer, improved seeds) to investments in agricultural R&D, carbon finance, conservation agriculture, etc.
- **Promote low carbon policy and market incentives**
 - E.g. providing carbon finance to small farmers to incentivize adoption of sustainable farming practices
 - Integrate small farmers into carbon trading markets
- **Support and align climate-smart agriculture with national policy and a legal and regulatory framework** (Nyasimi et al. 2014)



Technological innovations: Investing in sustainable intensification technologies

Invest in agric. R&D for climate adaptation



Advance frontiers for sustainable intensification and nutrition-driven technologies

- Involves more outputs (esp. nutrition) with more efficient use of all inputs (on a durable basis)
- Reduces environmental impact, builds resilience, increases natural capital and flow of environmental services
- E.g. Breeding high yielding, climate-ready, high-nutrient crop varieties

Sustainable intensification technologies— great potential in Africa

Investing in climate-ready varieties

E.g. C4 Rice

- Drought and heat resistant; thrives in hot, arid environments
- Trials: Increased rice yields (50%) and N-use efficiency (30%) (IRRI 2012)

Making farming precise

E.g. Microdosing in Niger, Mali, Burkina Faso

- Millet yields increase by over 50%
- Crops are better able to absorb water (The Montpellier Report 2013)

Harnessing beneficial genes

E.g. New rice for Africa (NERICA)

- Resistant to local pests/diseases, tolerant of poor nutrient conditions mineral toxicity
- Uganda: Rice imports halved; farmers' incomes increased (The Montpellier Report 2013)

Win-win solutions can be achieved with climate-smart agriculture practices

Global adoption of climate-smart agriculture (CSA) practices

Description	Maize	Wheat	Rice
Production (% change)	+2.3 - +2.4	+2.3 - +2.2	+2.2 - +2.2
Price (% change)	-4.9 - -5.4	-6.2 - -7.3	-7.6 - -7.9
Area (% change)	-0.1 - -0.5	-1.0 - -1.2	-1.2 - -1.3
Pop risk of hunger (% change)	-3.4 - -3.1		
Malnourished children (% change)	-0.8 - -0.9		
Yearly mean emission reduction (million tons CO ₂ eq.)	20.4 - 13.9		

Climate-smart agriculture—promising outcomes for Africa



Great Green Wall of Sahara and Sahel Initiative

Burkina Faso, Niger, Senegal:
Restored 50,000 ha of agroforestry system, boosted production



Sustainable Agricultural Development of Highlands Project

Morocco: No-till technique boosted wheat yields at least 25%, up to 300%



Indian Ocean Commission-Smart Fish Program

Helps integrate climate-smart fisheries and aquaculture into national, regional food security action plans

Institutional innovations: Supporting climate-smart solutions

Promote climate-resilient food value chains

E.g. Cocoa value chain in Ghana

- Mainstreams CSA in cocoa-based farming systems through applied climate science, certified supply chains, impact investing
- Partnership between agricultural / climate scientists, voluntary certification bodies, and impact investors

Support climate-friendly financial arrangements

E.g. Adaptation for Smallholder Agriculture Programme

- Gives smallholders access to climate finance that promotes adaptation
- Shares knowledge on CSA, land management, postharvest practices and technologies, and women's empowerment
- 8 million smallholders to benefit by 2020

Strengthening capacity critical to promote climate-smart agricultural innovation systems in Africa

Restructuring traditional to climate-resilient value chains—new knowledge needed

- Improve capacities for climate strategy formulation, policy design, and implementation
- Create incentives and opportunities to attract and retain best talents
- Foster partnerships between national agric. research systems and int'l ones, incl. CGIAR

Agricultural Innovation System (AIS)

- Improves linkage between research institutions and other actors for agricultural growth and structural transformation
- Necessary for new climate knowledge generated to be effectively used
- Relies on innovative capacity across rural economy
- E.g. SSA Challenge Program; African Highlands Initiative

Source: Lynam, Methu, and Waithaka 2016