

MULTI-SECTORAL NUTRITION STRATEGY

Global Learning and Evidence Exchange

East and Southern Africa Regional Meeting



Climate Change and Nutrition: Impacts and Options for Action

Katherine Dennison & Moffat Ngugi, Bureau for Food Security (CSI)



GOAL 2



END HUNGER, ACHIEVE FOOD SECURITY AND
IMPROVED NUTRITION AND PROMOTE
SUSTAINABLE AGRICULTURE

SUSTAINABLE DEVELOPMENT GOALS

More at sustainabledevelopment.un.org/sdgsproposal

NepGlaciers: 1899, 1921, 2009



West Rongbuk Glacier and Mount Everest, taken in 1921, below 2009

Fundamental Concepts & Definitions

Weather: state of the atmosphere around us at a given time:

Temperature | **precipitation** | **humidity** | *wind* |
precipitation

Climate: average over a certain timespan and space e.g.

Time – pre-industrial, 1980s-present

Space – global climate, Sahelian climate, local climate

Climate is what you expect, Weather is what you get!

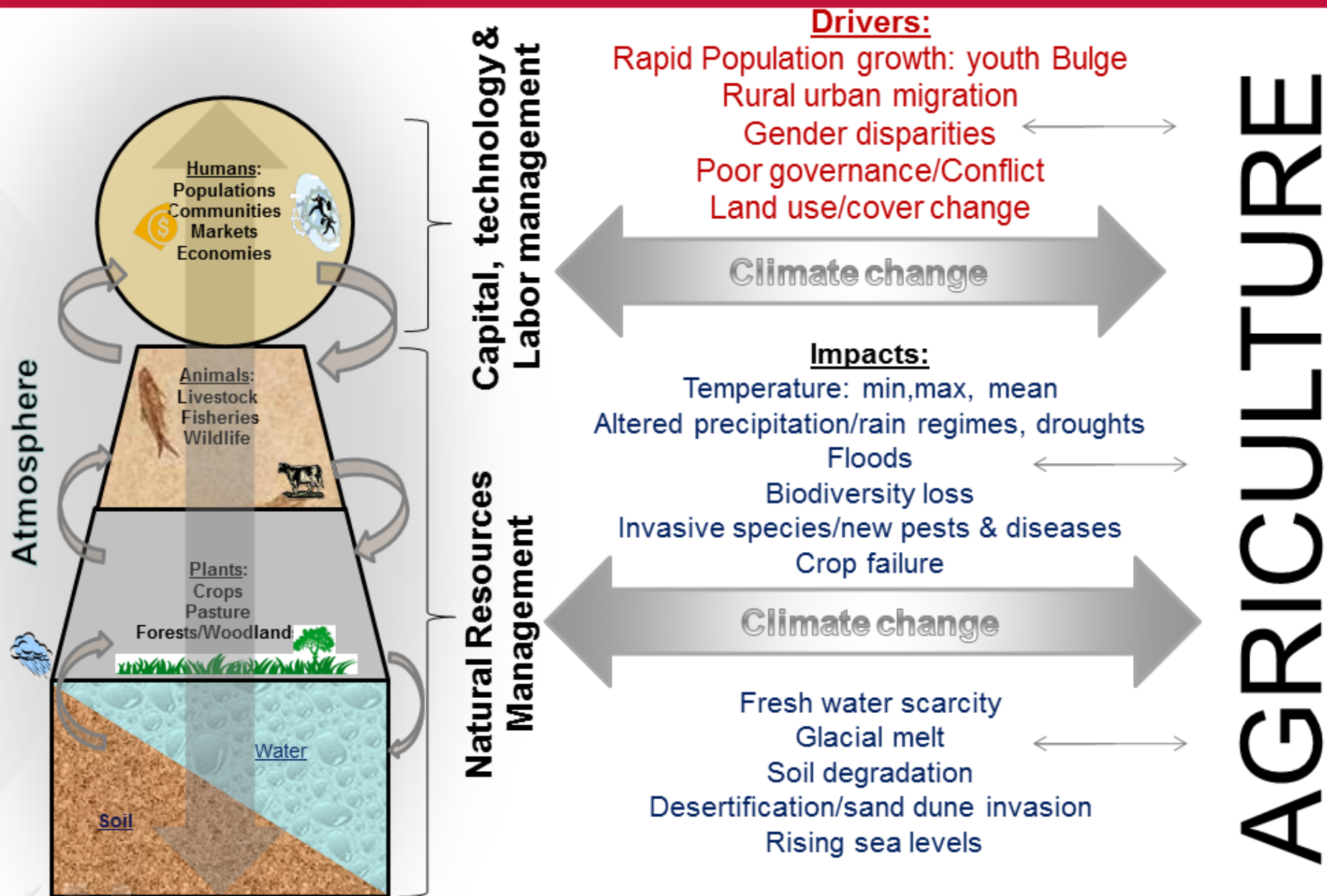
Climate Change:

- Shift in statistical properties of the climate system considered over long periods of time
- Changes in the mean state and/or variability of the climate

Integration of Climate Change, NRM & Agriculture

Components

Challenges



Intersection of Climate Change and Agriculture

- Climate change poses major risks
 - Erratic temperatures, precipitation changes, rising sea levels and the increase in frequency and severity of extreme weather events.
- Small-holder farmers, pastoralists and fishers especially vulnerable as their production systems often lack the resources to manage an effective response to climate threats.

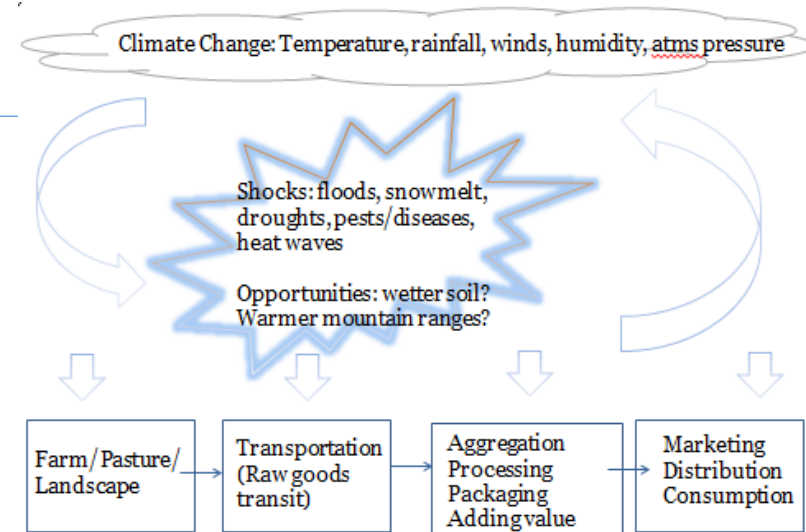
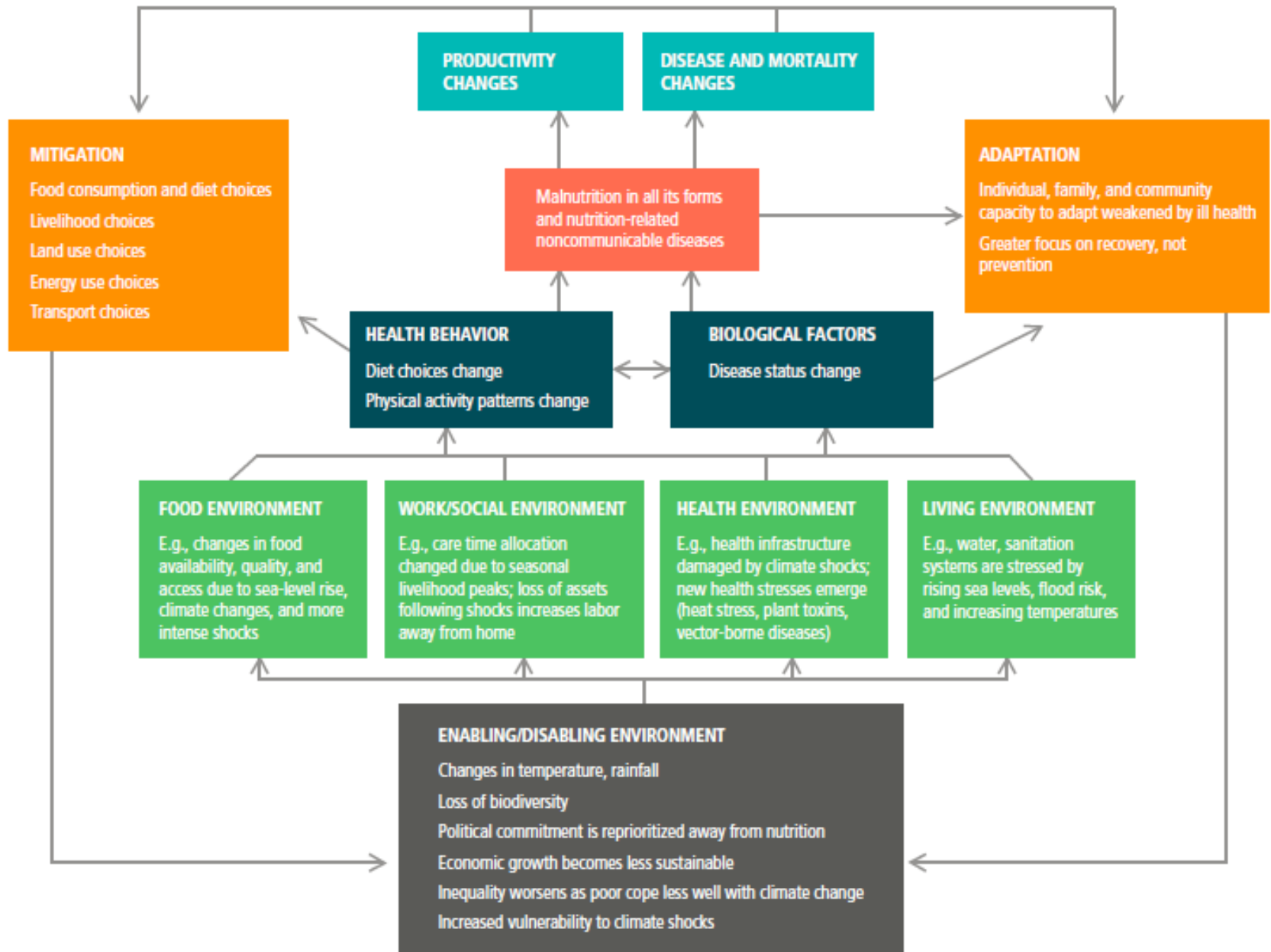


Image from <http://bit.ly/1BhCdBb>

FIGURE 6.1 Conceptual links between climate change and nutrition



Climate and Weather (rainfall, temperature) affect Nutrition by:

1. Agricultural Production

2. Health, Disease



Climate Change will exacerbate undernutrition through three main causal pathways:

- impacts on household access to sufficient, safe and adequate food;
- impacts on care and feeding practices; and
- impacts on environmental health and access to health services



Food and Agriculture Organization
of the United Nations



Global Forum
on Food Security
and Nutrition

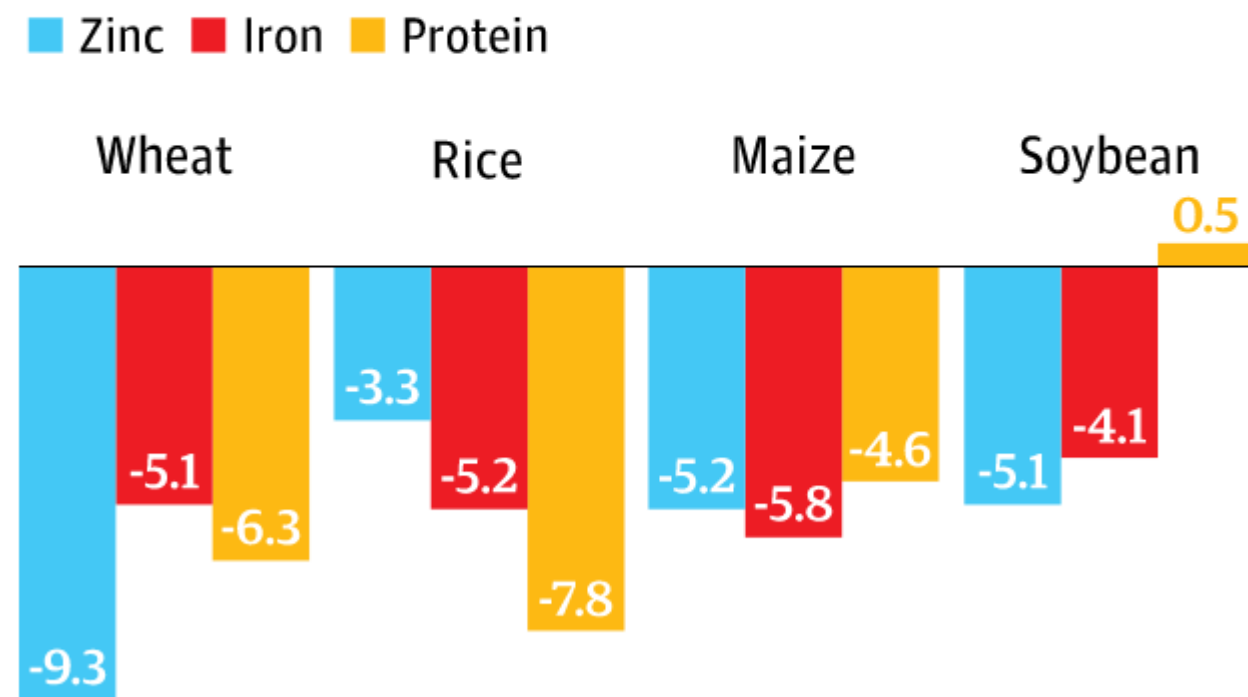
Temperature, Precipitation and Birth Weight in Africa

- Temperature and precipitation may impact birth weight outcomes.
- Maternal nutrition experiences may link birth weight and climate variability.
- Birth weight outcomes are impacted by changes in the number of hot days and precipitation amounts.
- The linkages between birth weight and climate exist apart from socio-economic variability.

Grace et al. Global Environmental Change Volume 35, November 2015, Pages 125–137

High CO2 cuts crop nutrients

Percentage under CO2 levels expected in 2050,



Rising levels of CO2 are affecting human nutrition by reducing levels of very important nutrients in key food crops. Crops grown in the high-CO2 atmosphere of the future could be significantly less nutritious,

SOURCE: NATURE

Extended Data Table 4 | Percentage change in nutrient content at elevated [CO₂] compared with ambient [CO₂] for all nutrients

	C3 grasses						C3 legumes						C4 grasses					
	Wheat			Rice			Field Peas			Soybean			Maize			Sorghum		
	%	95% CI	P-value	%	95% CI	P-value	%	95% CI	P-value	%	95% CI	P-value	%	95% CI	P-value	%	95% CI	P-value
Zinc (ppm)	-9.3	(-12.7,-5.9)	<.0001	-3.3	(-5.0,-1.7)	<.0001	-6.8	(-9.8,-3.8)	<.0001	-5.1	(-6.4,-3.9)	<.0001	-5.2	(-10.7,0.6)	0.077	-1.3	(-6.2,3.8)	0.603
Iron (ppm)	-5.1	(-6.5,-3.7)	<.0001	-5.2	(-7.6,-2.9)	<.0001	-4.1	(-6.7,-1.4)	<.0001	-4.1	(-5.8,-2.5)	<.0001	-5.8	(-10.9,-0.3)	0.038	1.6	(-5.8,9.7)	0.674
Phytate (mg/g)	-4.2	(-7.5,-0.8)	0.009	1.2	(-4.6,7.4)	0.7	-5.8	(-11.5,0.1)	0.055	-1.3	(-3.7,1.2)	0.303	-6.1	(-15.0,3.7)	0.215	12.8	(-15.8,51.1)	0.418
Protein	-6.3	(-7.5,-5.2)	<.0001	-7.8	(-8.9,-6.8)	<.0001	-2.1	(-4.0,-0.1)	0.039	0.5	(-0.4,1.3)	0.267	-4.6	(-13.0,4.5)	0.312	0.0	(-4.9,5.2)	0.993
Mn (ppm)				-7.5	(-12.0,-2.8)	<.0001	-2.5	(-4.2,-0.8)	0.005	-1.4	(-3.5,0.8)	0.204	-4.2	(-10.5,2.5)	0.215	1.7	(-4.5,8.3)	0.596
Mg (%)				-0.9	(-2.3,0.6)	0.24	0.0	(-1.3,1.4)	0.960	-3.5	(-4.3,-2.8)	<.0001	-5.7	(-9.9,-1.3)	0.011	-0.2	(-5.1,4.9)	0.944
Cu (ppm)				-10.6	(-13.8,-7.1)	<.0001	-2.7	(-5.1,-0.3)	0.025	-5.7	(-8.0,-3.4)	<.0001	-9.9	(-19.3,0.7)	0.066	-2.9	(-7.1,1.5)	0.190
Ca (%)				2	(-0.8,4.9)	0.16	-0.5	(-4.2,3.3)	0.787	-5.8	(-7.3,-4.2)	<.0001	-2.7	(-16.9,13.9)	0.734	11.2	(-5.2,30.3)	0.190
S (ppm)				-7.8	(-8.8,-6.8)	<.0001	-2.2	(-3.6,-0.7)	0.003	-2.9	(-3.5,-2.2)	<.0001	2.1	(-2.2,6.7)	0.342	-0.2	(-5.4,5.2)	0.936
K (%)				1.1	(-0.3,2.5)	0.13	2.2	(0.6,3.8)	0.008	0.1	(-0.8,1.0)	0.857	-2.7	(-3.1,-2.2)	<.0001	3.0	(-2.7,9.1)	0.308
B (ppm)				5.1	(1.9,8.4)	0.002	-1.9	(-3.9,0.1)	0.057	-6.4	(-9.1,-3.6)	<.0001	4.9	(-1.0,11.1)	0.107	-0.3	(-9.3,9.6)	0.952
P (%)				-1.0	(-2.4,0.4)	0.160	-3.7	(-6.8,-0.5)	0.023	-0.7	(-2.2,0.9)	0.379	-7.1	(-9.0,-5.1)	<.0001	0.3	(-4.0,4.9)	0.881

Sample sizes for each crop type are identical to those listed in Table 1.

2015 Global Nutrition Report
calls for greater collaboration
between nutrition and climate
change communities.

- Changes in climate patterns expected to negatively impact nutrition by

- reducing production,
- influencing disease prevalence,
- increasing post-harvest losses.



- Diet choice and associated production systems imply varying resource footprints, affecting climate outcomes.
- ***Continue to promote Dietary Diversity!***

Climate change can undermine development

- **Agriculture**

Temperature increases and changes in precipitation can affect crop yields, with subsequent impacts on food security and livelihoods.

- **Health**

Changes in temperature and precipitation can shift the range and incidence of vector-borne diseases

- **Infrastructure and ecosystems**

Sea level rise and storm surge can harm vital coastal ecosystems, infrastructure, and settlements

- **Democracy and Governance**

The impacts of climate change can compound pre-existing and overlapping social, political, and economic stresses

ALSO...CLIMATE CHANGE CAN PROVIDE NEW OPPORTUNITIES FOR DEVELOPMENT

- **Agriculture**

Changes in temperature and precipitation may provide opportunities to cultivate different crops that are more suitable for changing climate conditions

- **Health**

Increased concern about climate-related diseases may provide new entry-points for expanded public health education and awareness-raising

- **Infrastructure and ecosystems**

The need to relocate infrastructure from high risk areas may provide opportunities for ecosystem restoration

- **Democracy and Governance**

Increased water scarcity may be an impetus for new coalitions to address common concerns

A working definition of CSA

- Sustainably increasing agricultural productivity and incomes;
- Adapting and building resilience to climate change; and
- Reducing and/or removing greenhouse gas emissions, where appropriate (the FAO definition uses possible).



Development Policy Context for CSA



- September 23, 2014 President Obama issued Executive Order #13677 on Climate-Resilient International Development at the UN Secretary-General's "Climate Summit"
- USG joined many other nations and organizations in launching the Global Alliance for Climate Smart Agriculture

USAID Implementation Plan

- October 1, 2015: Climate risk screening required for new R/CDCS
- FY 2016:
 - Missions incorporate climate risk management in R/CDCS
 - Climate change facilitators provide support as requested
 - Climate risk management for sample (~20) projects and activities
 - PAD/Activity-level guidance developed
- October 1, 2016: Climate risk screening and management required for new projects and activities



CLIMATE CHANGE IS A **THREAT** TO GLOBAL NUTRITION



Diminishes
key crops' nutrients



Slows growth
of food production



Spreads pests,
diseases, & pathogens



THE CHICAGO COUNCIL
ON GLOBAL AFFAIRS

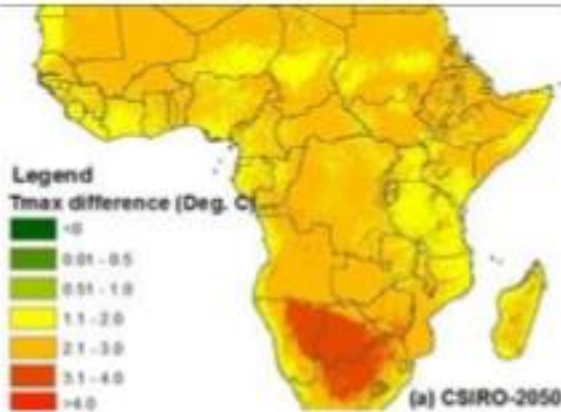
#GlobalAg

thechicagocouncil.org/globalag

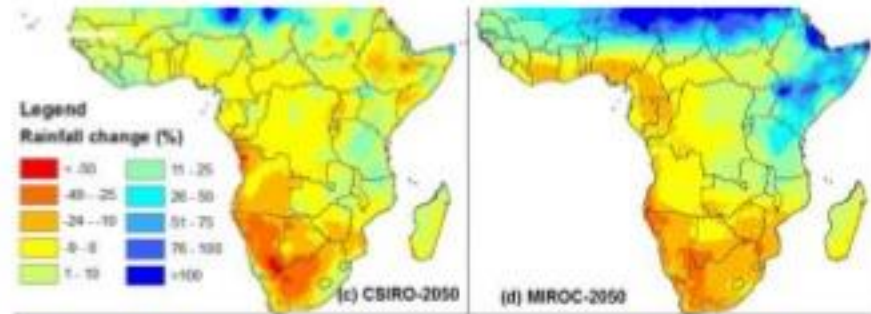
Sources: Bebber et al. 2013; Myers et al. 2014; Nelson 2014.

East Africa is also a major hotspot for climate change

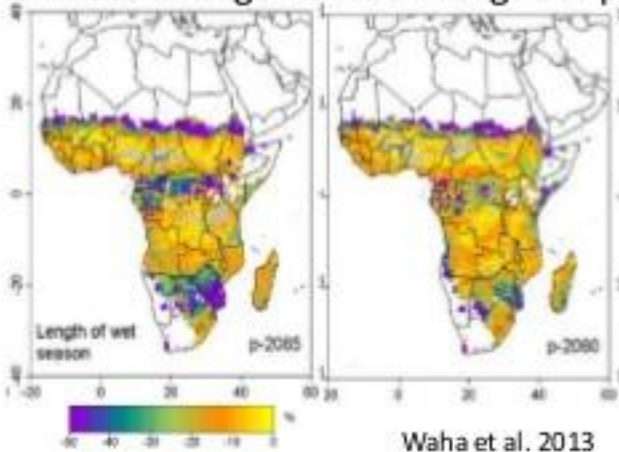
Maximum temperatures



Rainfall uncertainties



Climate change - season length impact



yield losses under climate change

