

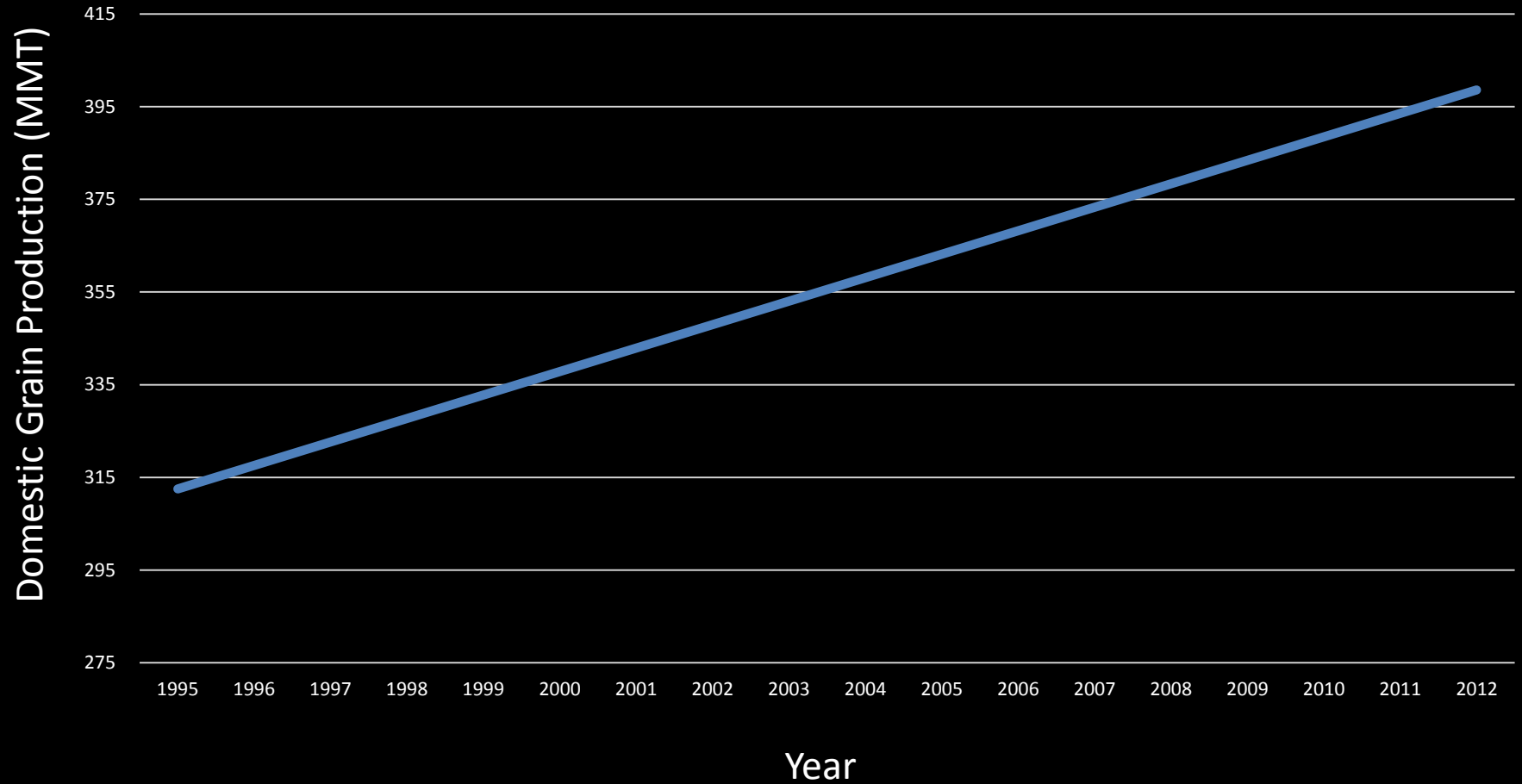
Climate Change and Food Security

An Overview

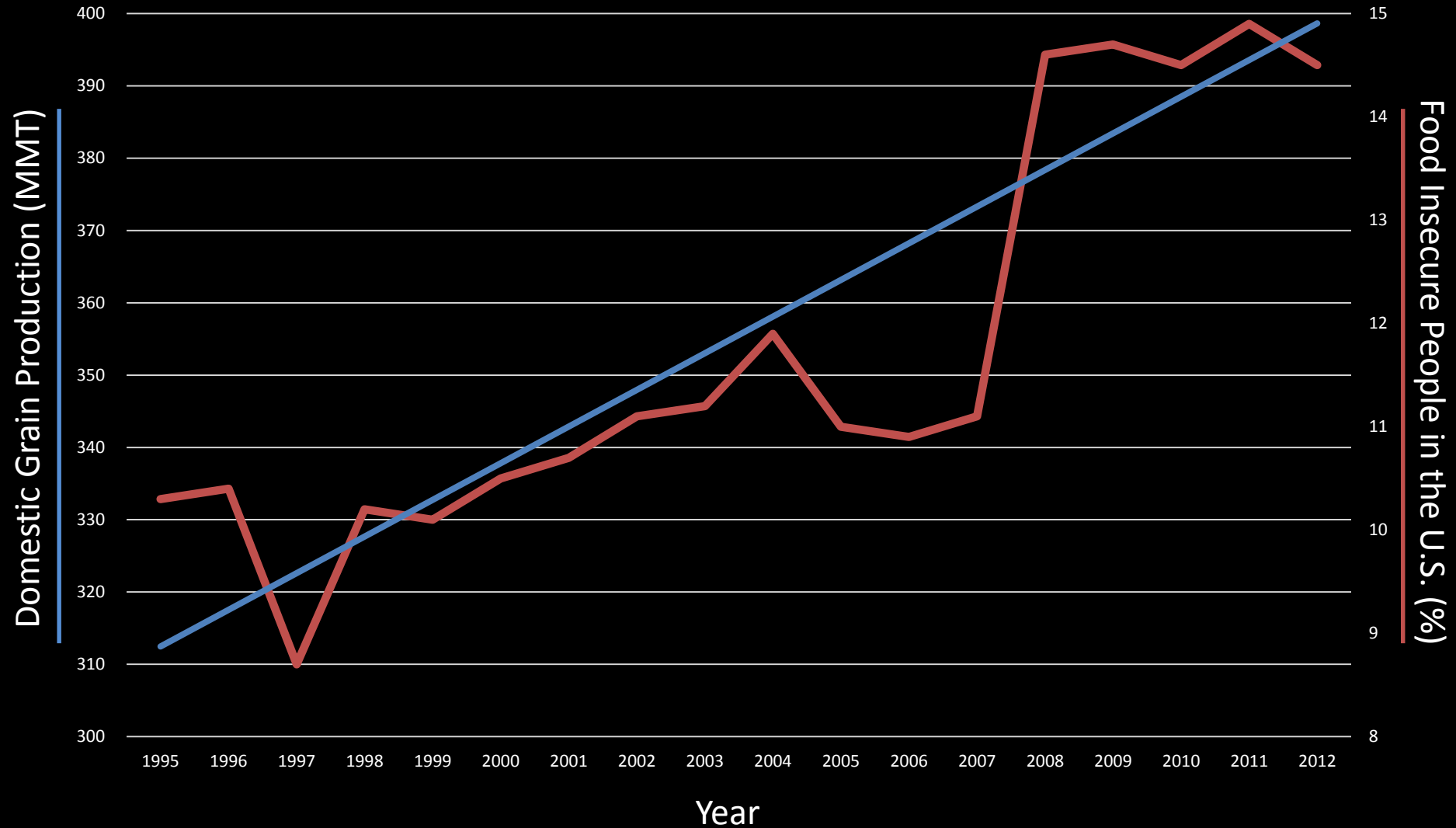


Scott Wallace / World Bank

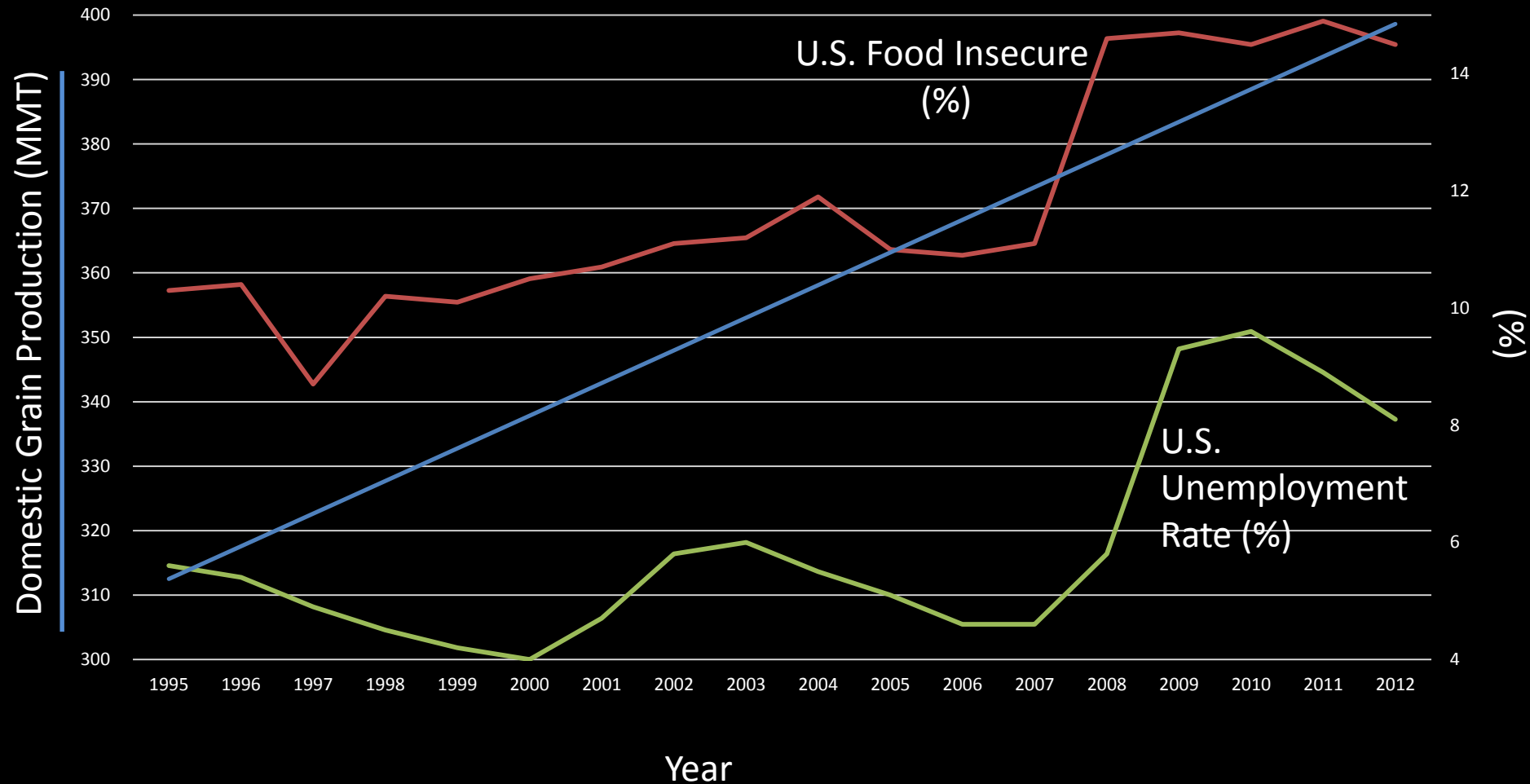
U.S. Agricultural Production Trend



U.S. Agricultural Production and Food Insecurity



U.S. Food Insecurity, Agricultural Production, and Unemployment



Food Security – What Is It?

Food security exists when all people, at all times, have physical and economic access to sufficient safe and nutritious food that meets their dietary needs and food preferences for an active and healthy life.

-1996 World Food Summit



Yuri Mechitov / World Bank

Food Security

Stability of:

Availability

- Production
- Distribution
- Exchange



Access

- Affordability
- Allocation
- Preference

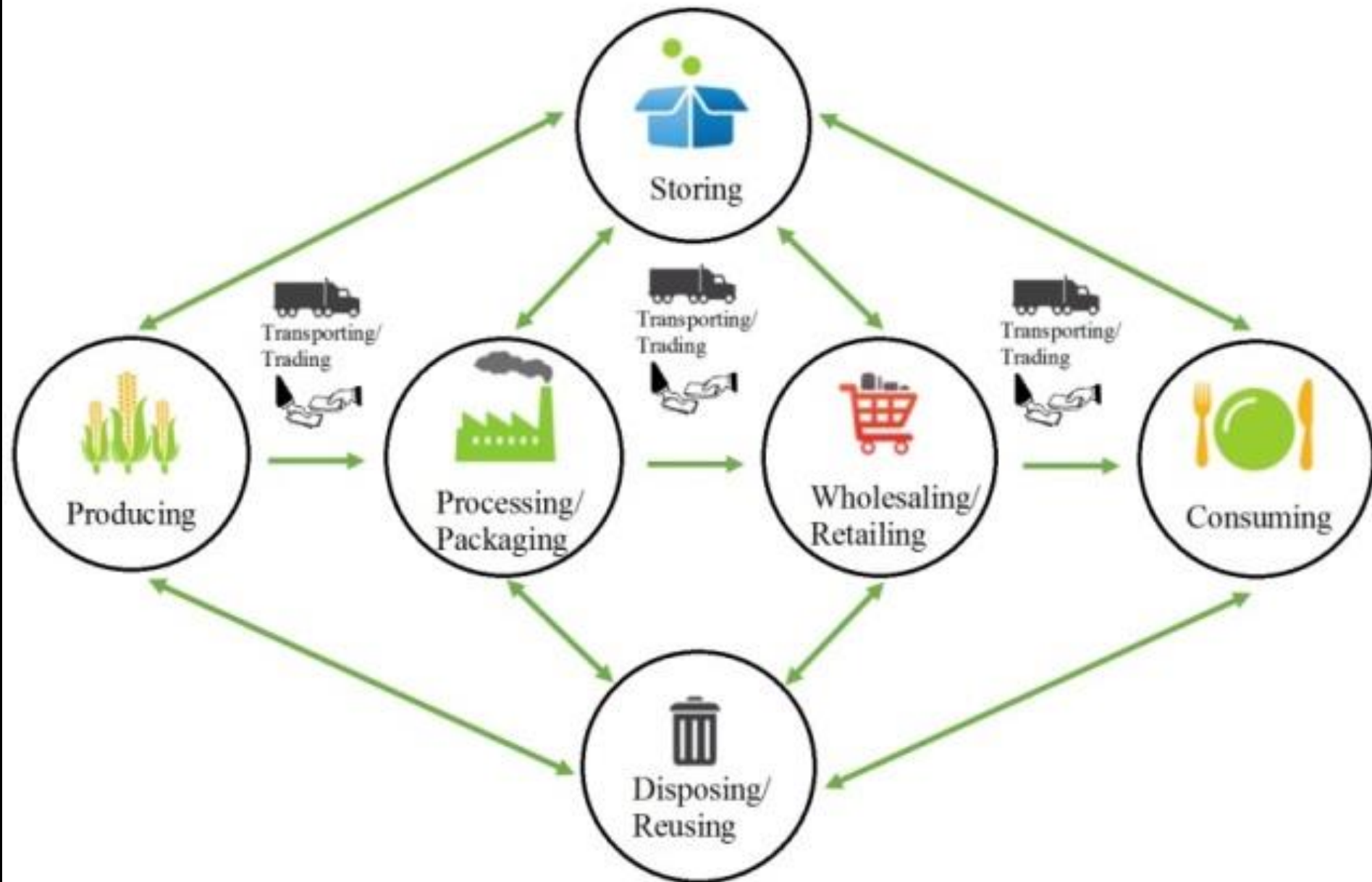


Utilization

- Nutritional Value
- Social Value
- Food Safety



The Food System

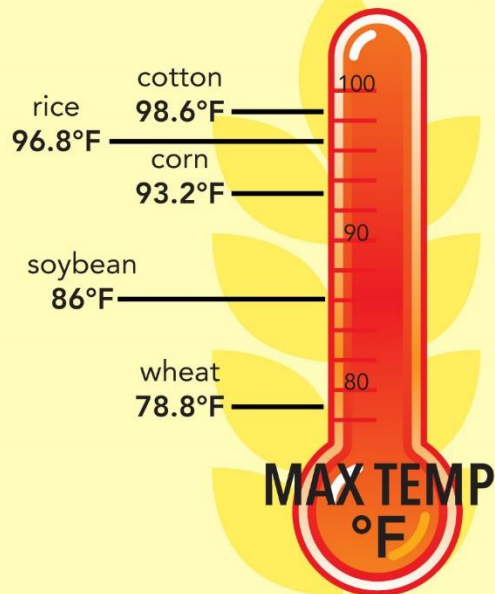


Direct and Indirect Production Effects

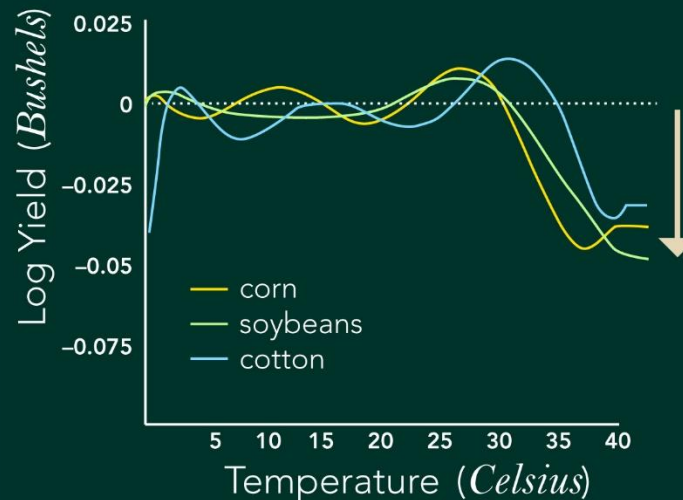
C R O P S

The rising temperature helps crops grow up to a point, but when it gets too hot, yield takes a sharp dive

Max temp varies among different crops:



TEMPERATURE vs YIELDS



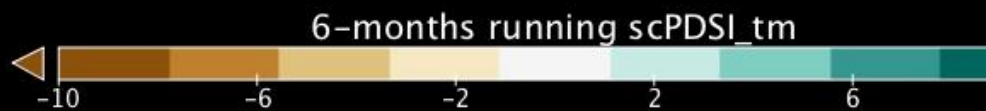
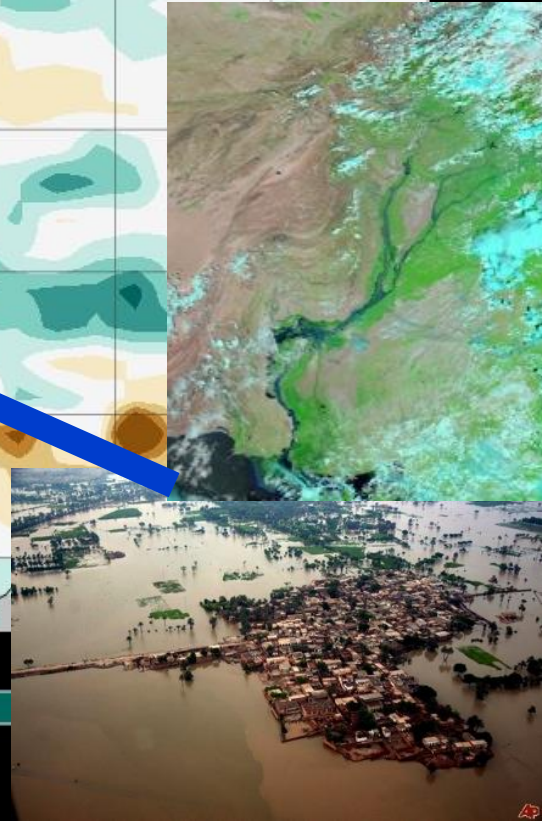
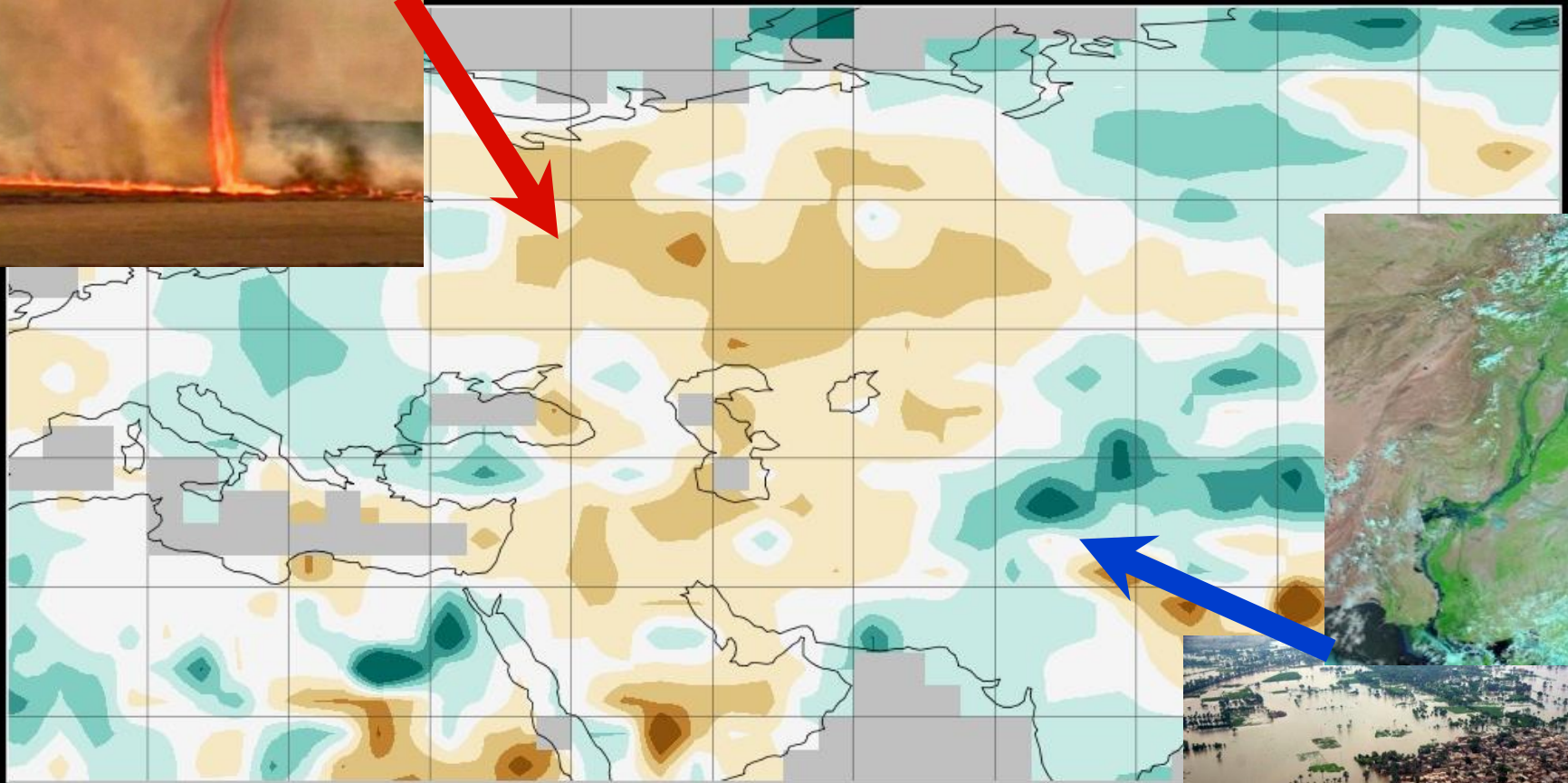
Direct

- Temperature
- Precipitation
- Extreme Events
- CO₂

Indirect

- Weeds
- Insects
- Disease
- Fire
- Economics
- Trade

2010 Russian Drought / Pakistani Flooding



LIVESTOCK

The heat will stress livestock and their food sources

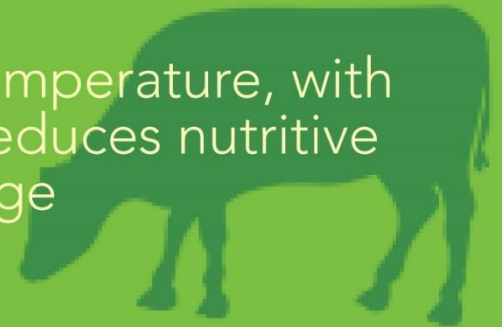
HEAT STRESS HAS A DIRECT AFFECT ON ANIMAL PRODUCTIVITY

- ▶ Reduces pregnancy rates
- ▶ Expands time needed for animals to reach market weight
- ▶ Reduces milk production
- ▶ Affects post-absorptive metabolism, reducing nutrient intake



GRAZING LAND WILL ALSO BE NEGATIVELY AFFECTED BY HEAT AND ACCOMPANYING DROUGHT

- ▶ In southwest, warmer temperature reduces grazing land productivity, with more drought
- ▶ Increasing temperature, with rising CO₂, reduces nutritive value of forage

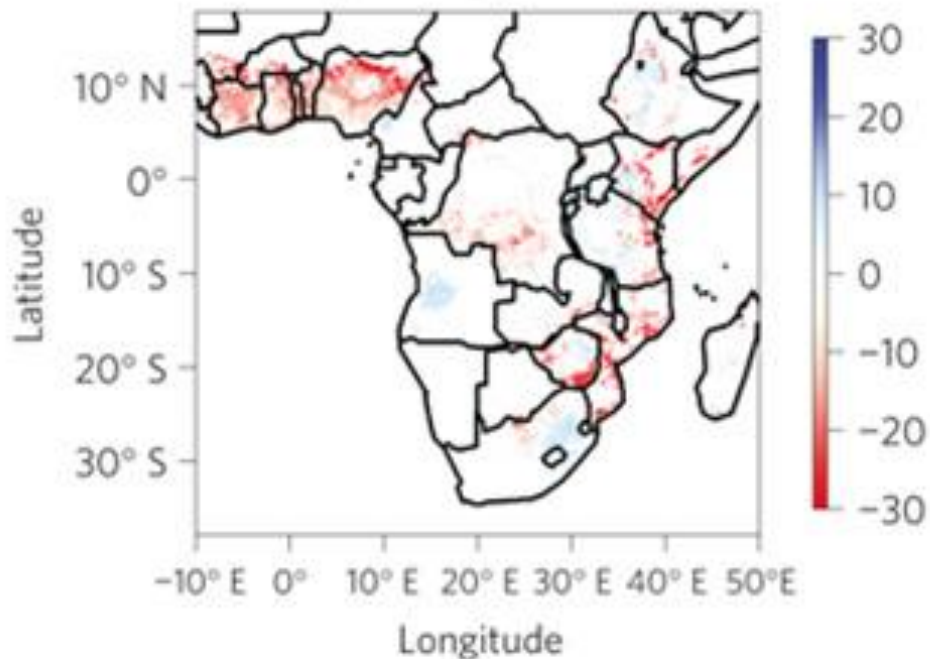


Farmers are Adaptable

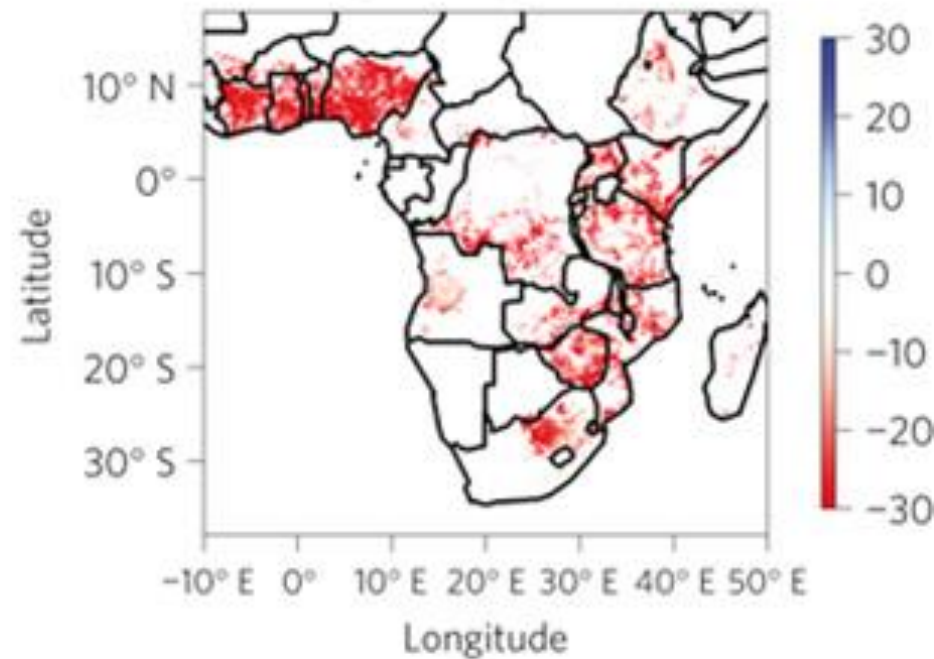


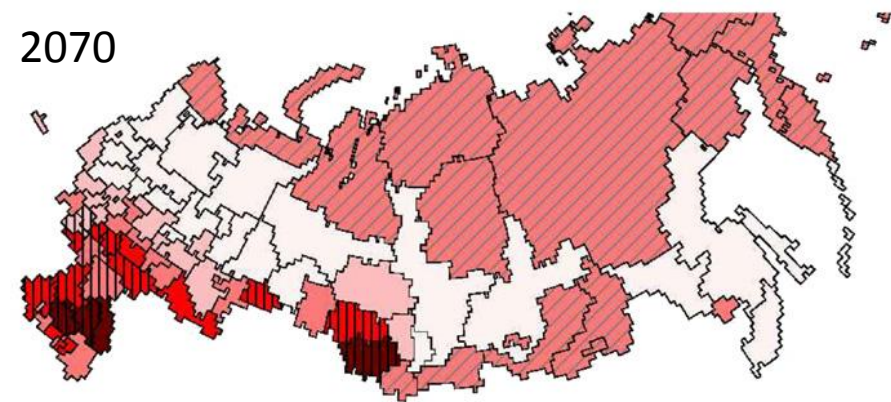
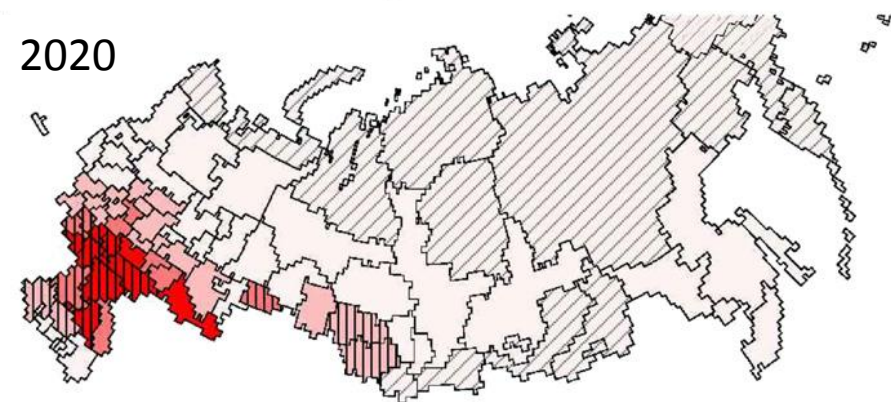
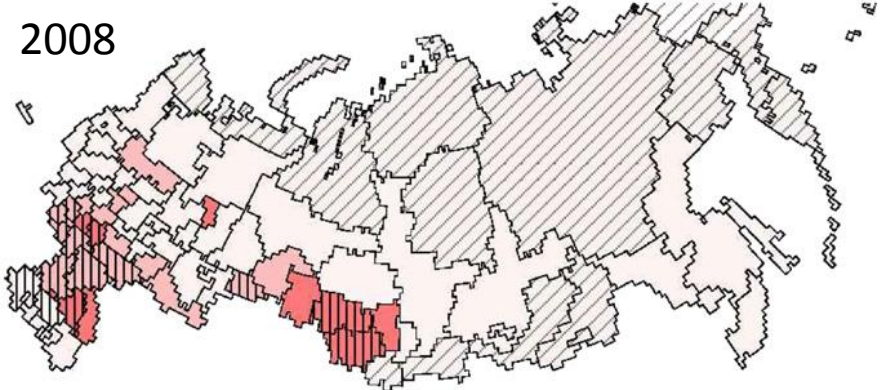
African Corn Production

Δ yield (%) for +1 °C, optimal management, present areas



Δ yield (%) for +1 °C, drought management, present areas





**Number of Years per
Decade with Shortfalls**



Main Crop Growing Region



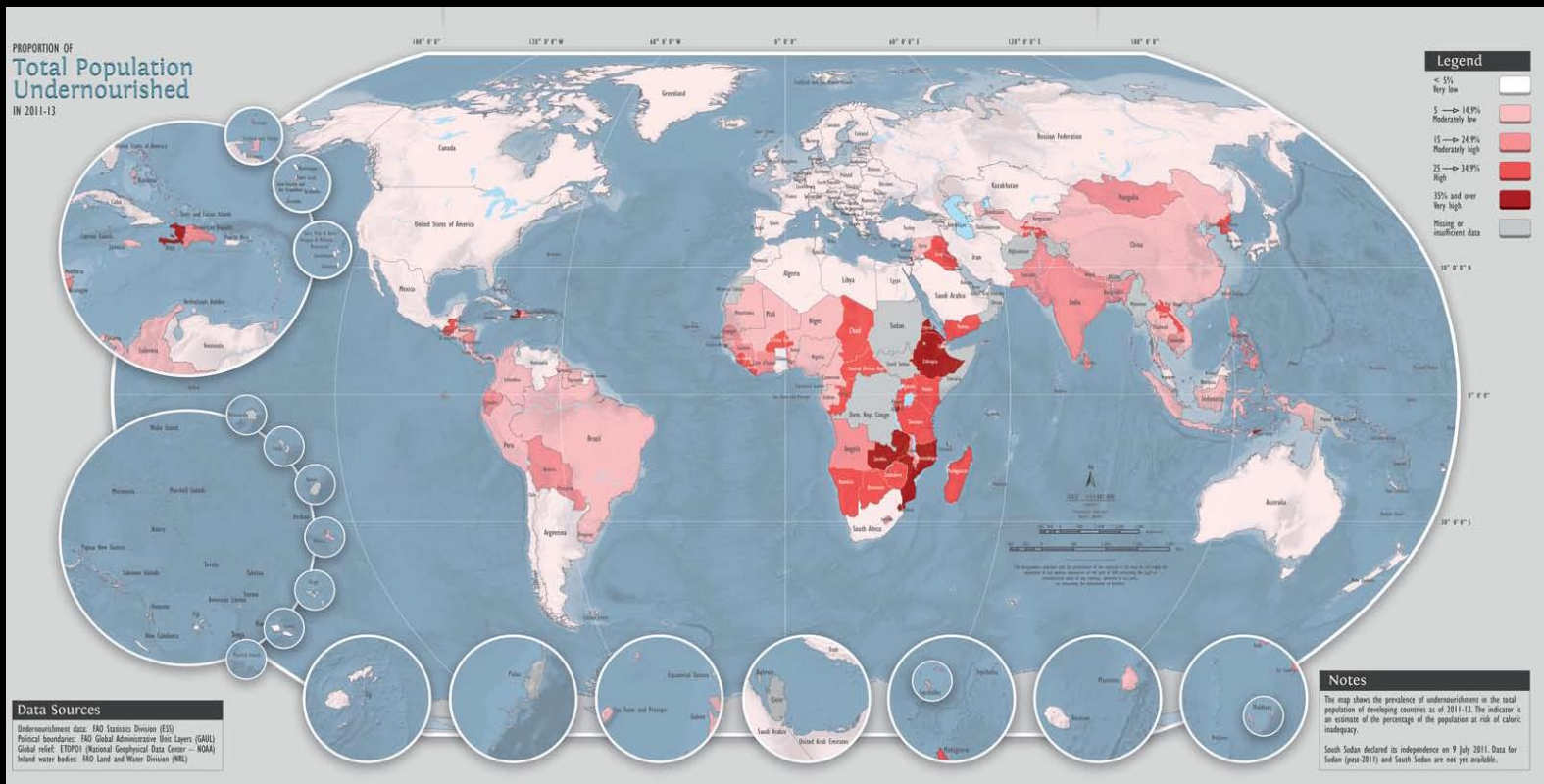
No Simulated Local Production
(totally dependent on main
crop growing regions)

Shortfalls in Russian Production

Given Anticipated Changes in Climate

Access

By affecting yields and the geography of agriculture and other elements of the food system, climate change also affects the cost of food.



Utilization

Climate Change and Food Safety



(B. Horn)



Dr. Rita Mendes and Dr. Iolanda Gomes

THE NUTRITIONAL QUALITY OF THE PLANTS CAN ALSO DECREASE DUE TO CO₂



DECREASED PROTEIN CONTENT

protein contents
were lowered under
elevated CO₂
(350 to 550 ppm) by
-4% to **-13%**
in wheat



DECREASED ZINC CONTENT

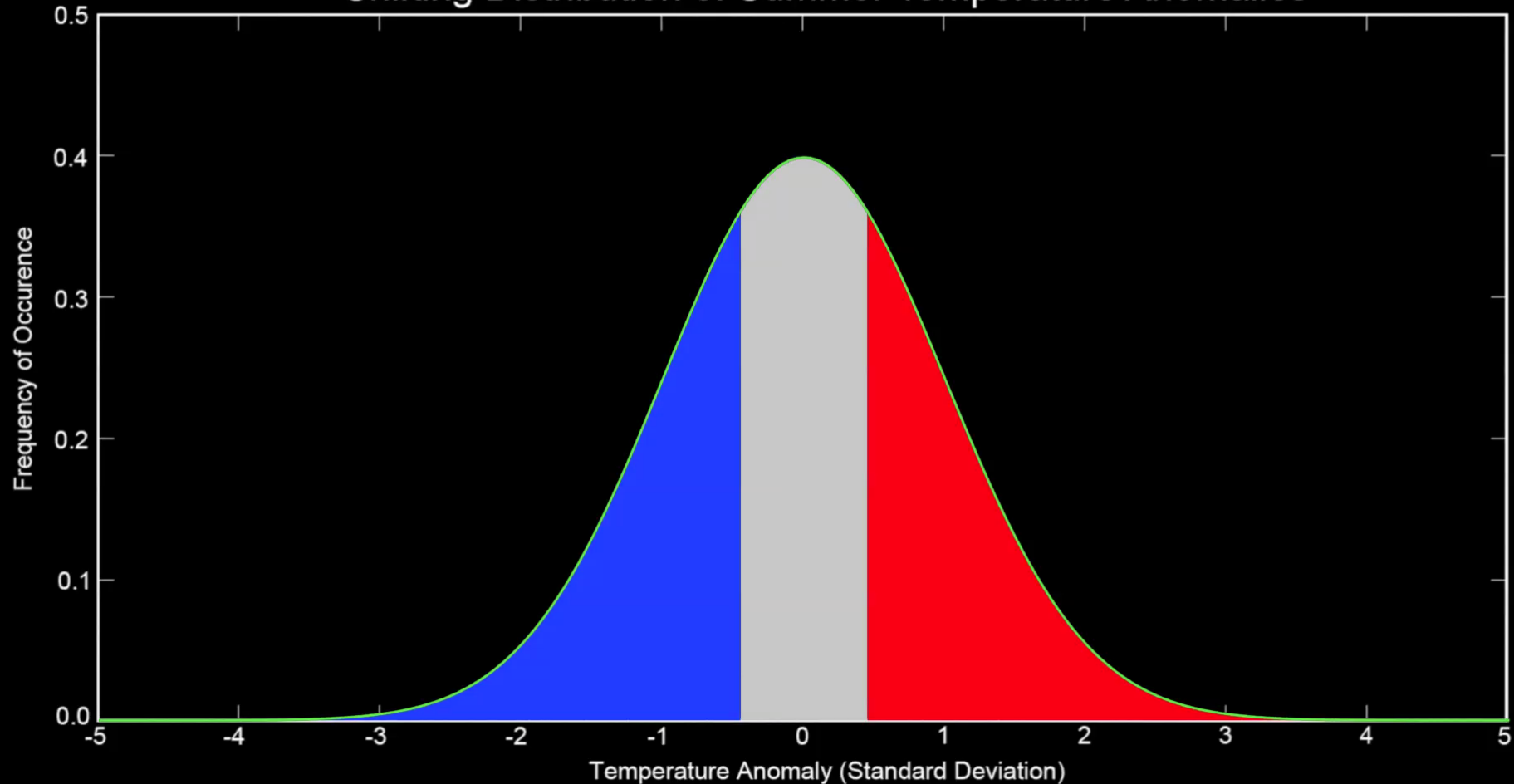
wheat grains grown
at elevated CO₂
(546 to 586 ppm) *had*
9.3% lower zinc
than those grown at
ambient CO₂



DECREASED IRON CONTENT

wheat grains grown
at elevated CO₂
(546 to 586 ppm) *had*
5.1% lower iron
than those grown at
ambient CO₂

Shifting Distribution of Summer Temperature Anomalies



Animation Courtesy of NASA

ENVIRONMENT

357 COMMENTS

Industry Awakens to Threat of Climate Change

By CORAL DAVENPORT JAN. 23, 2014

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WASHINGTON — Coca-Cola has always been more focused on its economic bottom line than on global warming, but when the company lost a lucrative operating license in India because of a serious water shortage there in 2004, things began to change.

Today, after a decade of increasing damage to Coke's balance sheet as global droughts dried up the water needed to produce its soda, the company has embraced the idea of climate



SUBSCR



THE RUNDOWN

A BLOG OF NEWS AND INSIGHT

UKRAINE MIDDLE EAST IMMIGRATION

ECONOMY

Guacamole at Chipotle could be climate change's next casualty

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BY RUTH TAM March 4, 2014 at 6:23 PM EDT



Photo by Flickr user threelayercake

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SUPPORTED BY

Asda: 95% of our fresh produce is already at risk from climate change

The UK supermarket to put hard figures against the impact climate change will have on its global fresh produce supply chain

Jo Confino

theguardian.com, Friday 25 April 2014 02:00 EDT

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The campaign against Drax aims to reveal the perverse effects of biofuels
Replacing fossil fuels with biofuels may sound like a good idea but dig a little deeper and there's a dark side to it
13 comments



John Bird, founder of the Big Issue, asks:

Join the network

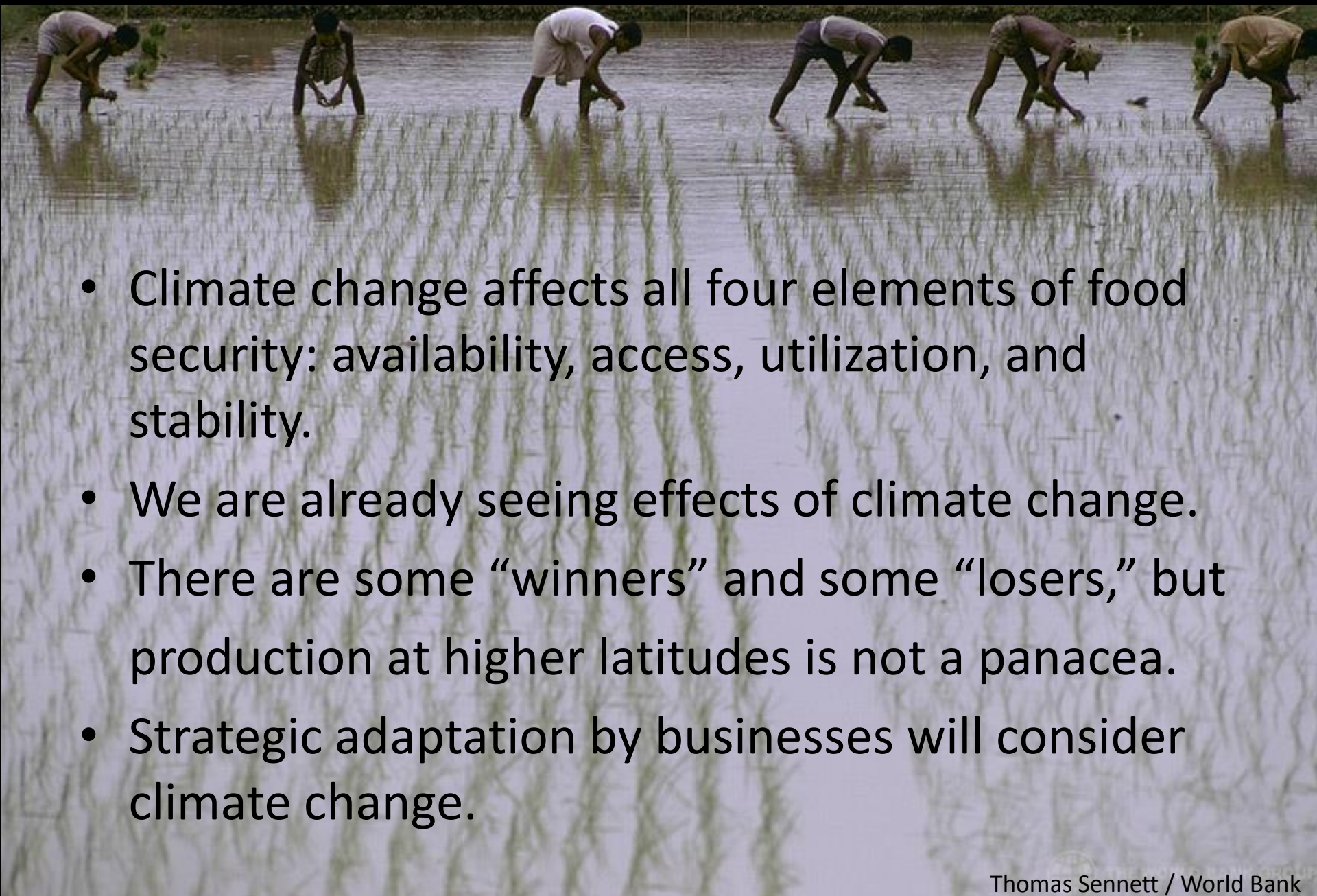
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Sustainability hubs

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- » Food
- » International
- » Social enterprise
- » Social impact
- » Supply chain
- » Sustainable design
- » Sustainable fashion

95% of the entire fresh produce range sold by Asda is already at risk



- Climate change affects all four elements of food security: availability, access, utilization, and stability.
- We are already seeing effects of climate change.
- There are some “winners” and some “losers,” but production at higher latitudes is not a panacea.
- Strategic adaptation by businesses will consider climate change.

To Deal with Food Security, You Need to Think About Climate Change

