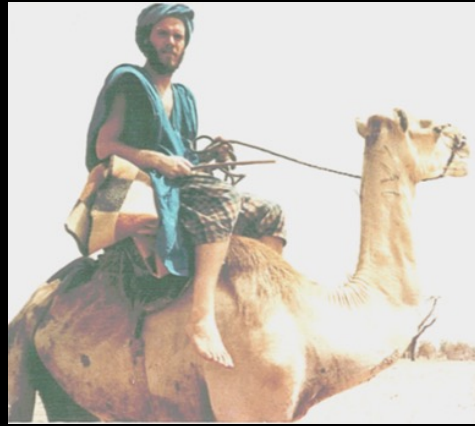


# IMPACTS OF THE WAR IN UKRAINE ON GLOBAL FOOD SECURITY

## BILL PAYNE

- Extension Agent in Mauritania (Peace Corps)
- Crop Physiologist with International Center for Crop Research in Semi-arid Tropic in Niger.
- Dryland Systems Agronomist, Oregon State Univ. , Pendleton Center
- Crop Stress Physiologist, Texas A&M Amarillo Research and Extension Center
- Research Director , Borlaug Institute for International Agriculture, Texas A&M
- Director, CGIAR Research Program on Dryland Systems (25 countries)
- Chair, Scientific Advisory Committee to UN Convention to Combat Desertification
- Dean, College of Agriculture, Biotechnology and Natural Resources, University of Nevada, Reno



# Scary Headlines Regarding the Effect of the War and Other Inflationary Forces on Food Security

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**BUSINESS | EARNINGS**

## Grain Traders' Profits Rise as Ukraine War Tightens Global Food Supply

Higher commodity prices for wheat, corn, and strong consumer demand boost ADM, Bunge



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An Archer Daniels Midland grain facility in Mendota, Ill. ADM reported a 53% profit increase for its latest quarter.  
PHOTO: DANIEL ACKER/BLOOMBERG NEWS

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## Ukraine war to cause biggest price shock in 50 years - World Bank

By Jonathan Josephs  
Business reporter, BBC News

© 26 April | Comments



Ukraine is a major exporter of crops such as sunflower oil but the war has reduced supplies

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**WORLD | AFRICA**

## Decade-High Food Prices Drive Poverty and Unrest in Africa

Africans face a wave of inflation causing food insecurity, driving some to emigrate to escape the spiralling cost of living



A market in downtown Kampala, Uganda, one of the African countries where food prices are at a 10-year high.  
PHOTO: ESTHER RUTH MBABAZI FOR THE WALL STREET JOURNAL

By Nicholas Bariyo [Follow](#)  
Feb 15, 2022 8:43 am ET

# Exporters and Importers of Wheat

## Top 20 Largest Wheat Exporters in the World

Total Top 20 Countries		183,825,390	
Rank	Countries	Tonnes	% Of Top 20
1	Russia	43,965,626	23.92%
2	Canada	22,874,184	12.44%
3	United States	22,499,006	12.24%
4	France	18,940,343	10.30%
5	Ukraine	16,373,389	8.91%
6	Australia	12,352,837	6.72%
7	Argentina	11,724,765	6.38%
8	Kazakhstan	6,198,354	3.37%
9	Romania	5,880,518	3.20%
10	Germany	5,228,857	2.84%
11	Bulgaria	4,170,662	2.27%
12	Hungary	2,156,619	1.17%
13	Czechia	1,884,966	1.03%
14	Poland	1,790,319	0.97%
15	Lithuania	1,689,997	0.92%
16	Pakistan	1,650,824	0.90%
17	Latvia	1,570,806	0.85%
18	Serbia	1,107,384	0.60%
19	Slovakia	926,978	0.50%
20	Mexico	838,956	0.46%

Source: FAOSTAT.org (2018)

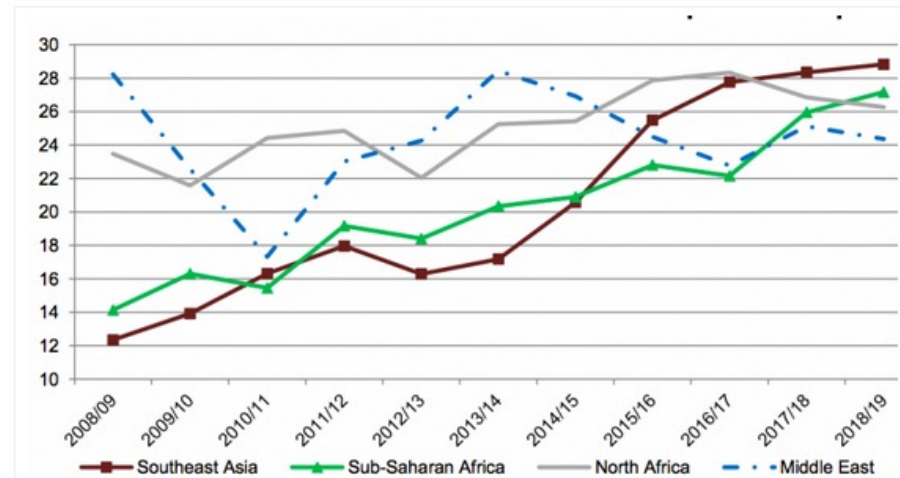
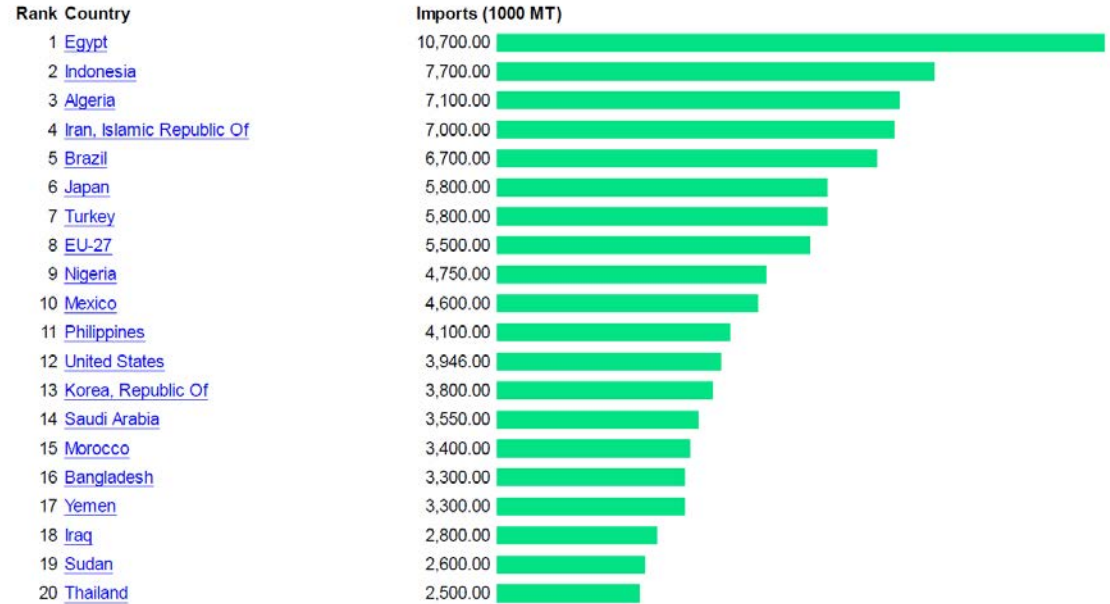


Chart 1. Southeast Asia (mauve line) imported more wheat than the Middle East (blue line) from 2015/16 and sub Saharan Africa (green) is forecast to overtake North Africa (grey) for the first time in 2018/19. (Tonnes millions) source USDA



## WE KNOW WHAT HAPPENS WHEN PEOPLE CAN'T AFFORD A NUTRITIOUS DIET

- Mali data during 2008 recession, which also caused food price spikes and led to stunting, wasting, and underweight
- Diets shifted to less expensive but less nutritious ones in an effort to keep stomachs full
- Protein and micro-nutrient rich foods such as meat and eggs are sold rather than consumed or fed to children to buy grain and other cheaper foods
- Serious implications for immune and cognitive system development in children

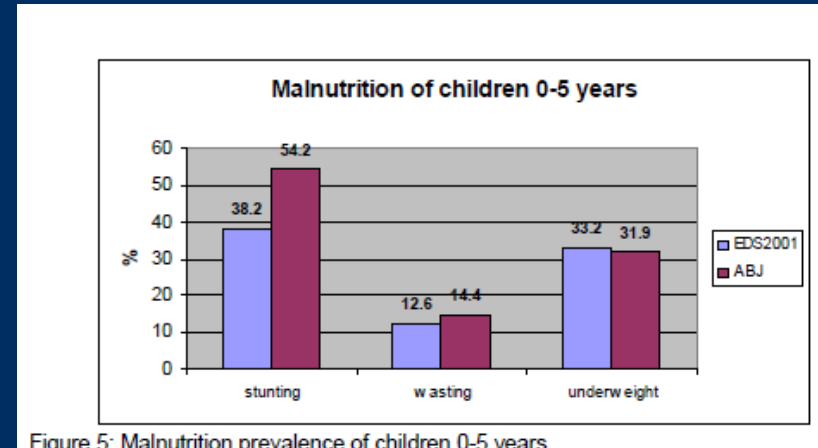


Figure 5: Malnutrition prevalence of children 0-5 years

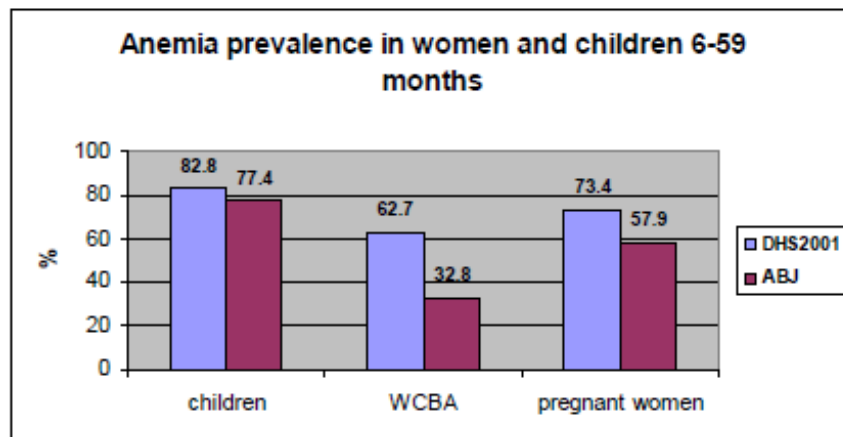


Figure 7: Anemia prevalence for women (pregnant and non pregnant) and children 0-5 years



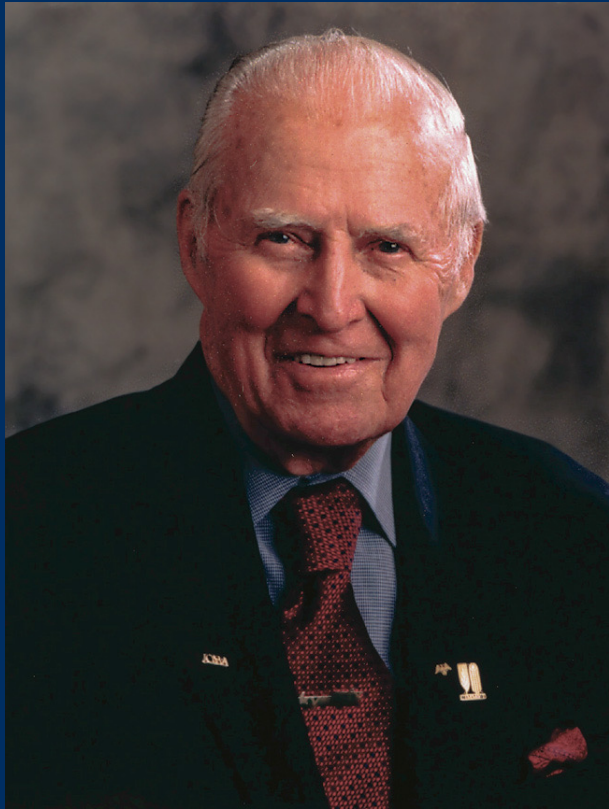
Haitian mud cakes

Old Wheat Varieties: Tall, late, tended to lodge, low N response of grain, susceptible to a number of diseases



Modern Wheat Varieties: Early, semi-dwarf, strong stalks, disease-resistant





**NORMAN BORLAUG**



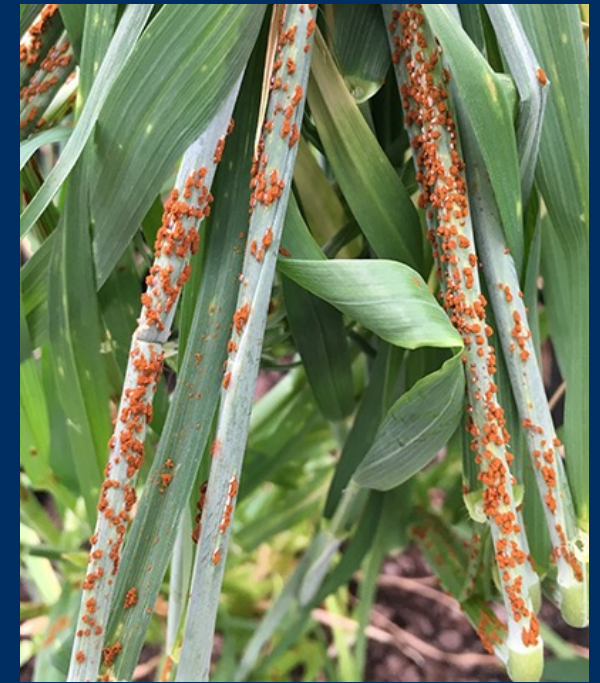
**Awarded Nobel Peace Prize in 1970 for his contributions to world peace through increasing food supply.**

**Credited with saving over a billion lives as “Father of the Green Revolution.”**

**Wrote and spoke extensively on linkages between food security, economic development, political stability, and peace.**

**Norm was very worried towards his last years about UG99 stem rust, a disease initially found in Uganda, for which initially there was no known genetic resistance.**

**He knew that, as a planet, we were not food secure and were one step ahead of famine**



**Wheat Stem Rust Ug99**

**Initially no known genetic resistance anywhere in the world**

# Grocery Store Shortages Are Back. Here's Why.

A worker shortage exacerbated by the omicron surge has led to empty meat cases and moldy produce nationwide

by [Lisa Held](#) | Jan 19, 2022, 9:53am EST



Alex Wong/Getty Images



Chandan Khanna/AFP via Getty Images

# Reno Nevada, January 2022

**Nevada is not food-secure**

**It ranks as the eighth most food-insecure state for its entire population....**

**And the third most food-insecure state for children**

**Nevada is extremely vulnerable to supply chain interruptions with regard to food**

**Fires, earthquakes, floods, landslides and snow can quickly interrupt food supply to the state**

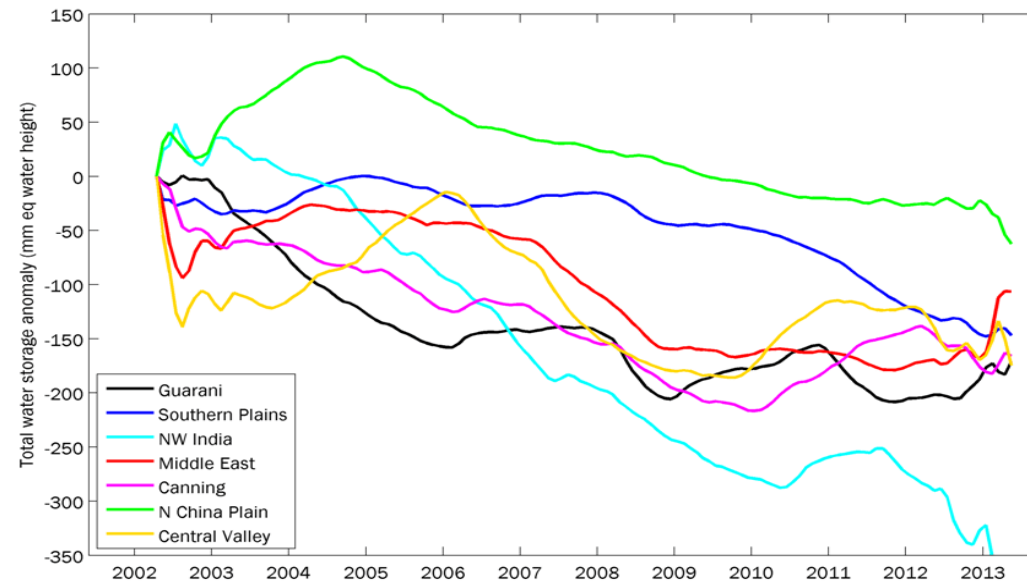


**“Measurements from NASA’s GRACE satellite mission, launched in 2002, have revealed unsettling trends in the world’s major aquifers: they are almost all declining.”**

Two billion people use aquifers as a primary drinking water source, and groundwater accounts for roughly one-third of the world’s water withdrawals. **The highest rates of groundwater depletion are in the world’s largest food-growing regions:** California’s [Central Valley](#), the [Ogallala Aquifer](#) of the American Great Plains, the plains of [northern China](#) and [northwest India](#), as well as the [Tigris and Euphrates River Basin](#).

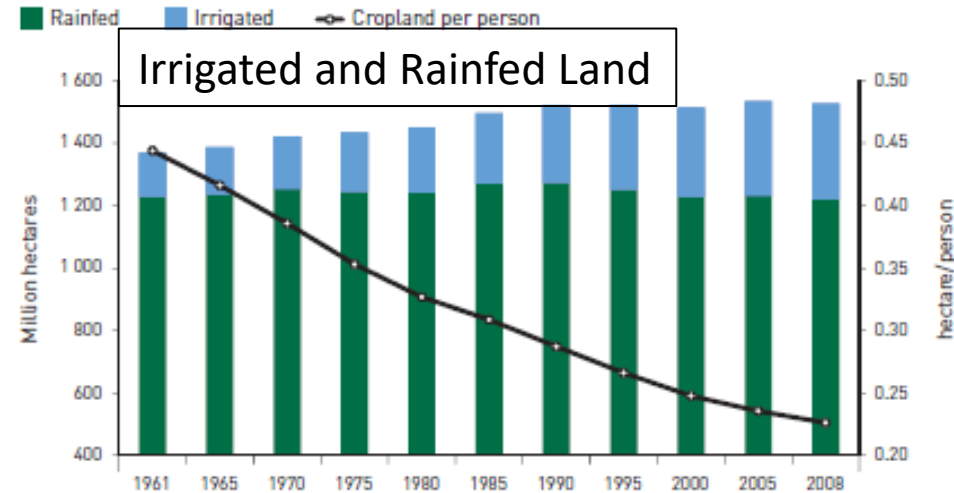
“Further declines in groundwater availability *may well trigger more civil uprising and international violent conflict in the already water-stressed regions of the world, and new conflict in others,*”

J. S. Famiglietti, The Global Groundwater Crisis, Nature Climate Change, November 2014



**Cropland per person continues to decline dramatically**

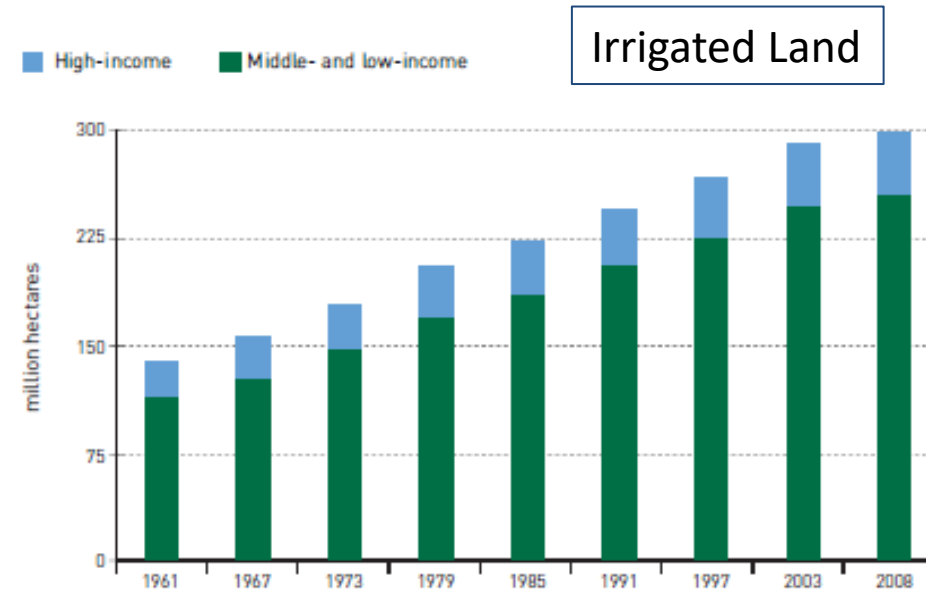
FIGURE 1.2: EVOLUTION OF LAND UNDER IRRIGATED AND RAINFED CROPPING [1961-2008]



Source: FAO (2010b)

**Income-based disparities exist, with middle- and low-income populations more dependent upon irrigation for food security**

FIGURE 1.4: AREA EQUIPPED FOR IRRIGATION

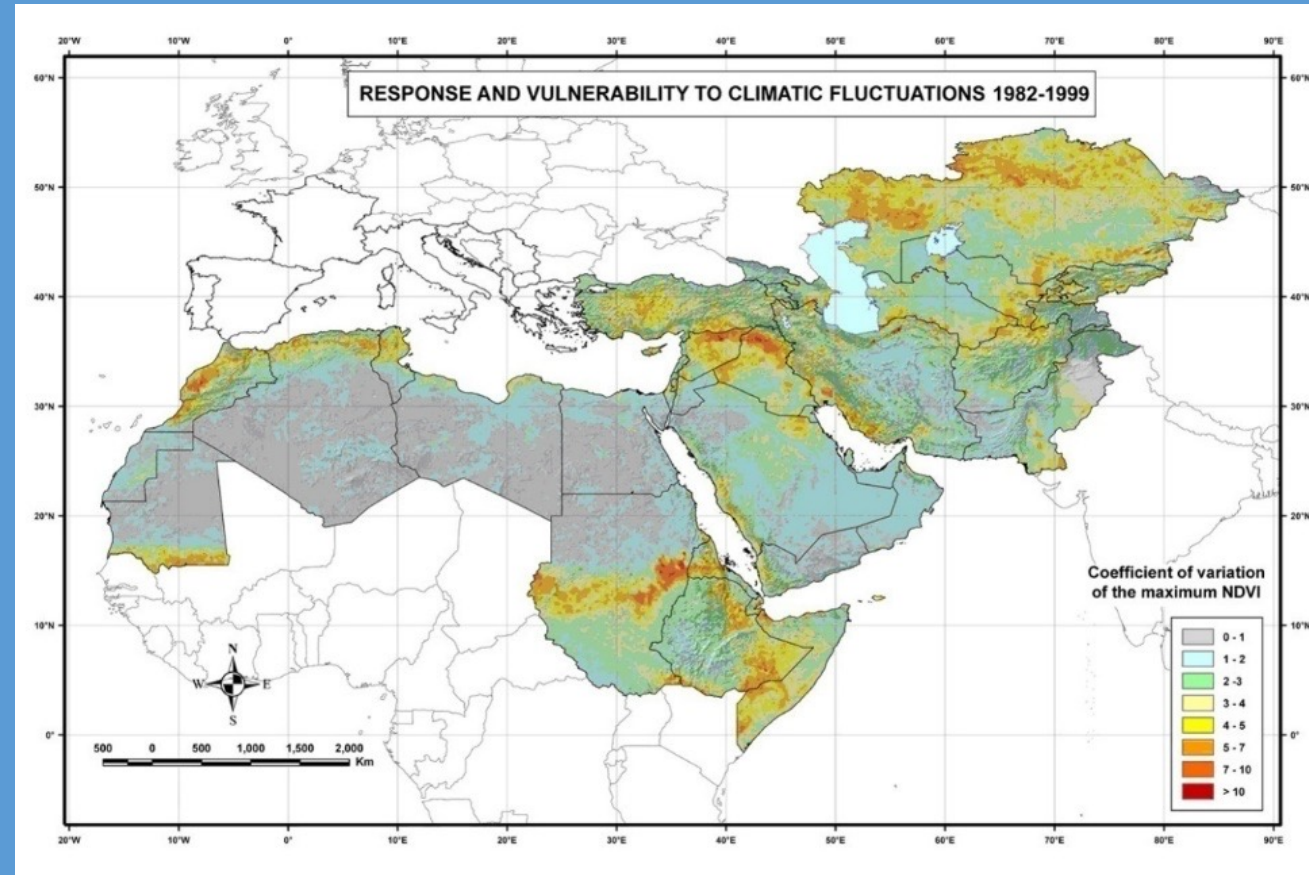


Source: FAO (2010b)

# Climate Change Severest Impact: Near East, North & Sub-Saharan Africa

## Major threats

- Temperature extremes – both heat and cold
- Water scarcity
- Loss of agro-biodiversity through habitat loss
- Increased vulnerability of pastoralists
- Smaller and more erratic harvests
- These stresses can contribute to conflict



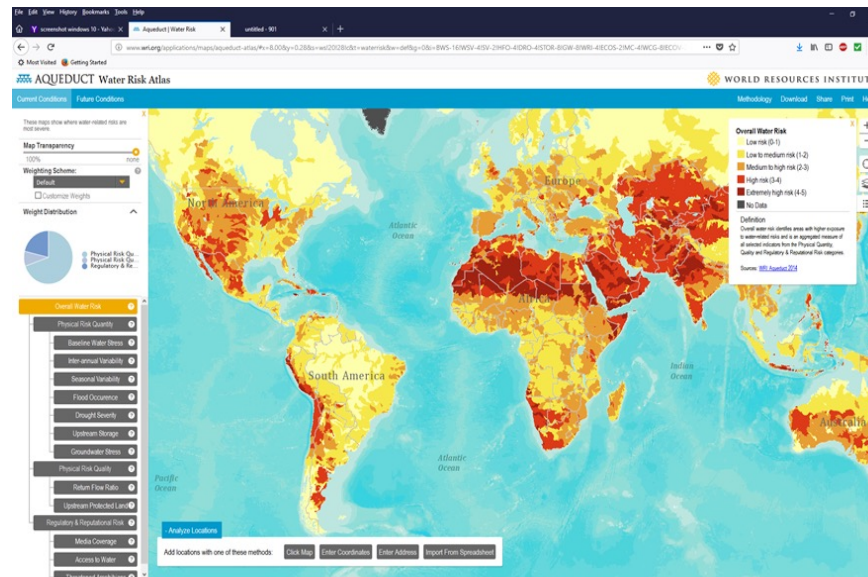
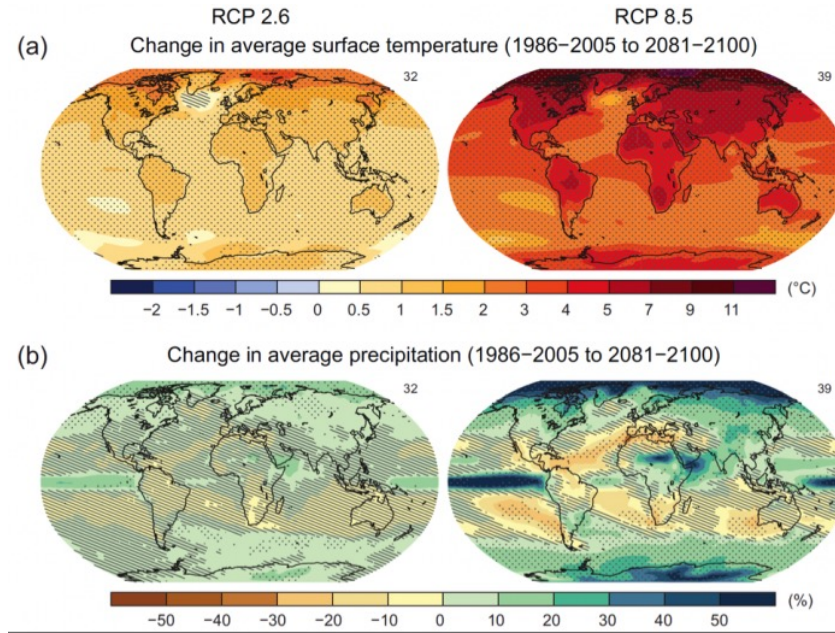
Hot spots of vulnerability to climate change in Central and West Asia and North Africa

## Conflict and Migration

The UN Security Council recognizes outmigration as a threat to peace and security, particularly where ethnic and social tensions exist.

The IPCC noted that the greatest single impact of climate change would be human migration. *The most repeated prediction is 200 million by 2050.*

Migration will not be gender-neutral because women as a group are poorer and less powerful than men.

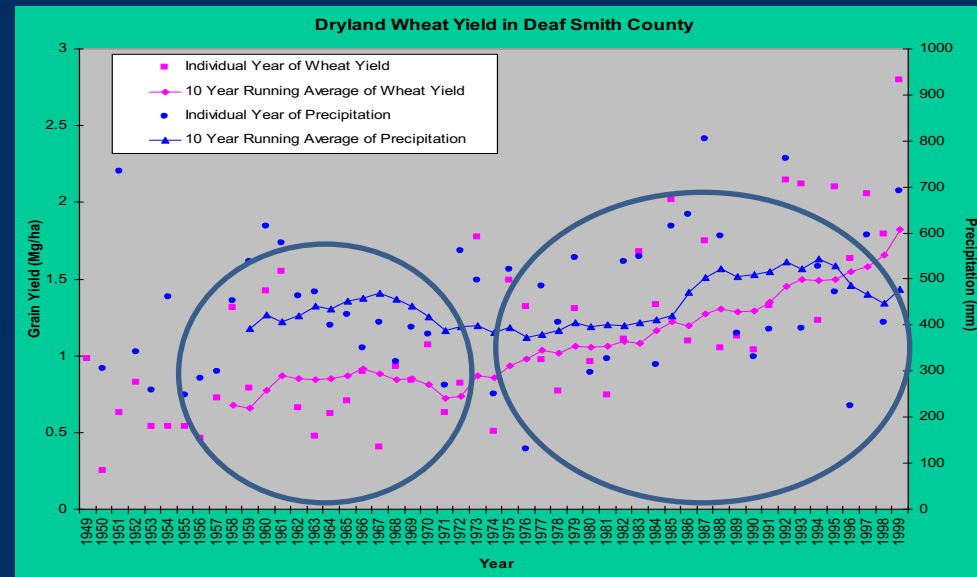
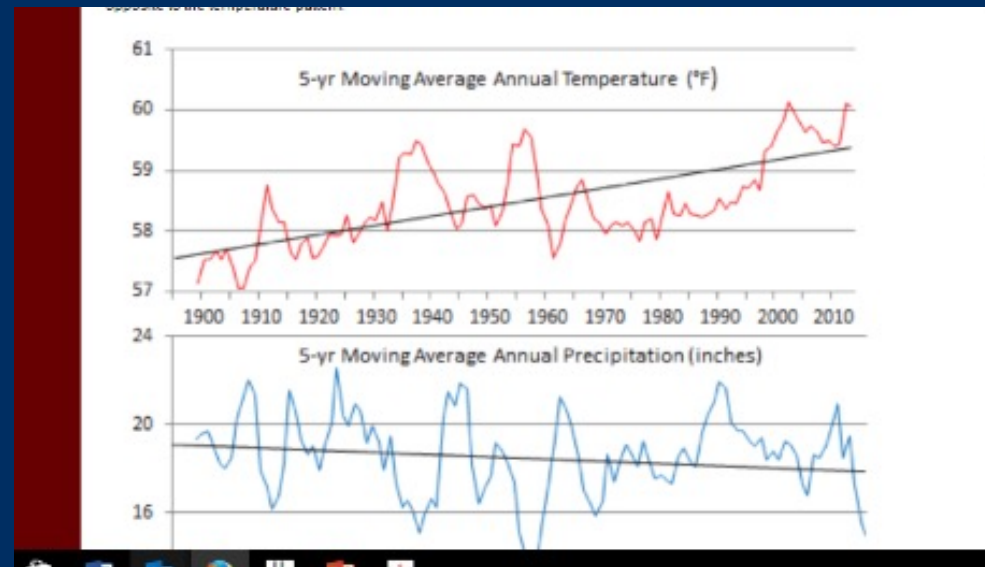


# Technical Solutions Require Investments in Research and Human Capacity

Climate change 1949-1999 in TX  
Panhandle

Technological challenges to  
mitigating effects of climate change  
on crop productivity are staggering  
but manageable

More research investment, including  
in topics historically neglected, is in  
order



Climate and dryland wheat yield,  
Texas Panhandle. Yield increases through better  
management and genetics

— College of —  
Agriculture, Biotechnology  
& Natural Resources



University of Nevada, Reno

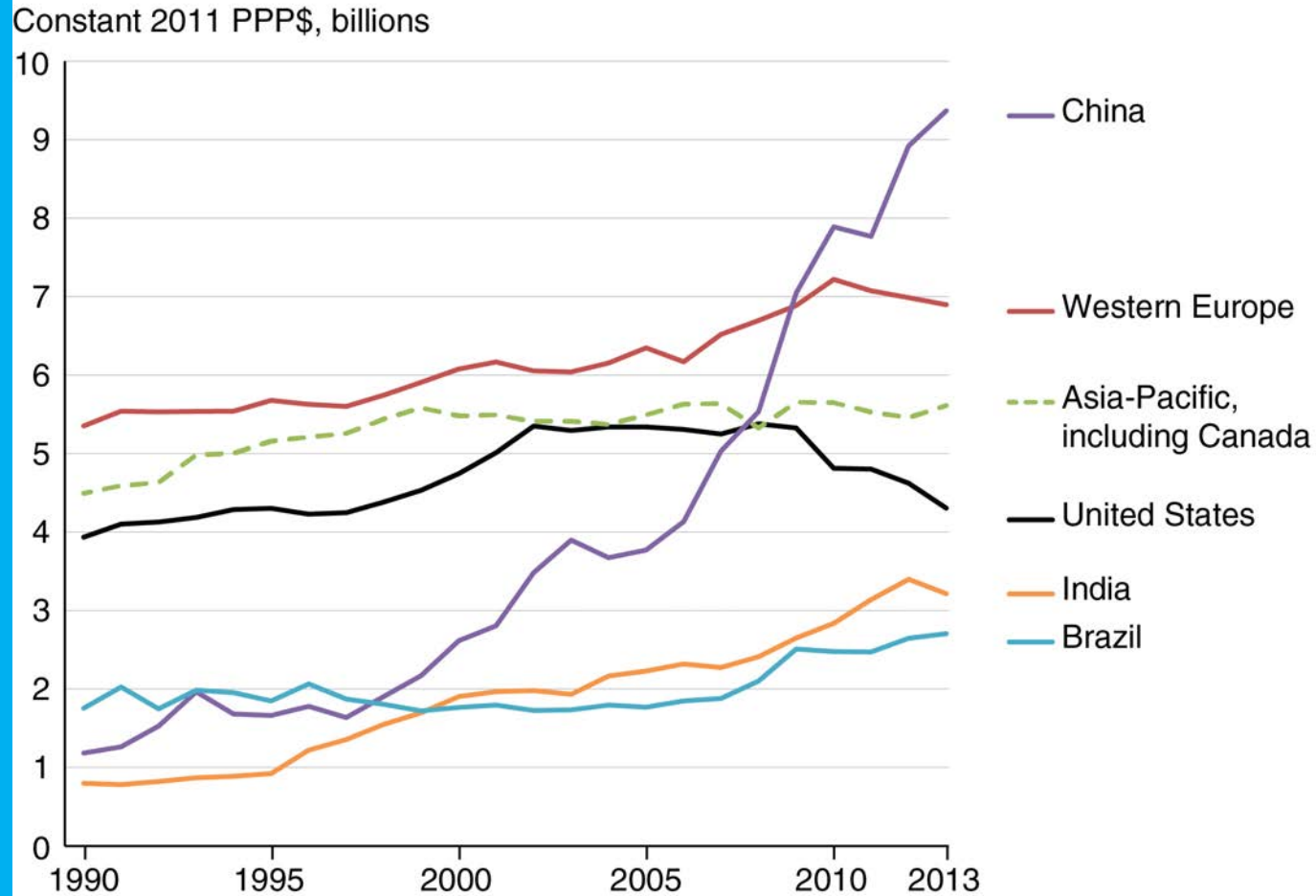
# Declining US Public Investment in Agricultural Research

## Recommendations of the Conference

Anson Bertrand and Donald Plucknett (1988)

“It will be necessary for both governments and researchers to devote more attention and resources to dryland farming problems than has been done historically”

U.S. public sector funding for agricultural R&D falls as spending by China and India rises



PPP = purchasing power parity.

Source: USDA, Economic Research Service and Agricultural Science and Technology Indicators (ASTI), Organisation for Economic Cooperation and Development.

# HIGH PAYING JOBS WITH FEW TAKERS

Program	Work force supply (Enrollment)	Workforce Demand	Current Supply/ Demand	Projected Demand Growth	Projected Hires per month
Ag Economics, Business, and Management	5,264	41,780	13%	7%	2,281
Ag Mechanization and Engineering	1,596	505,042	0%	4%	25,340
Animal Sciences	6,181	56,013	11%	4%	2,399
Plant and Soil Science	2,752	116,898	2%	7%	5,079
Food Science and Technology	1,346	36,570	4%	6%	2,031
Other Life Sciences*	14,918	80,199	19%	7%	2,746

— College of —  
Agriculture, Biotechnology  
& Natural Resources

