

# The Daily Bread

Rosamond “Roz” Naylor

Director, Center on Food Security and the Environment  
Professor, Department of Environmental Earth System Science  
William Wrigley Senior Fellow, Freeman Spogli Institute for International  
Studies and Woods Institute for the Environment



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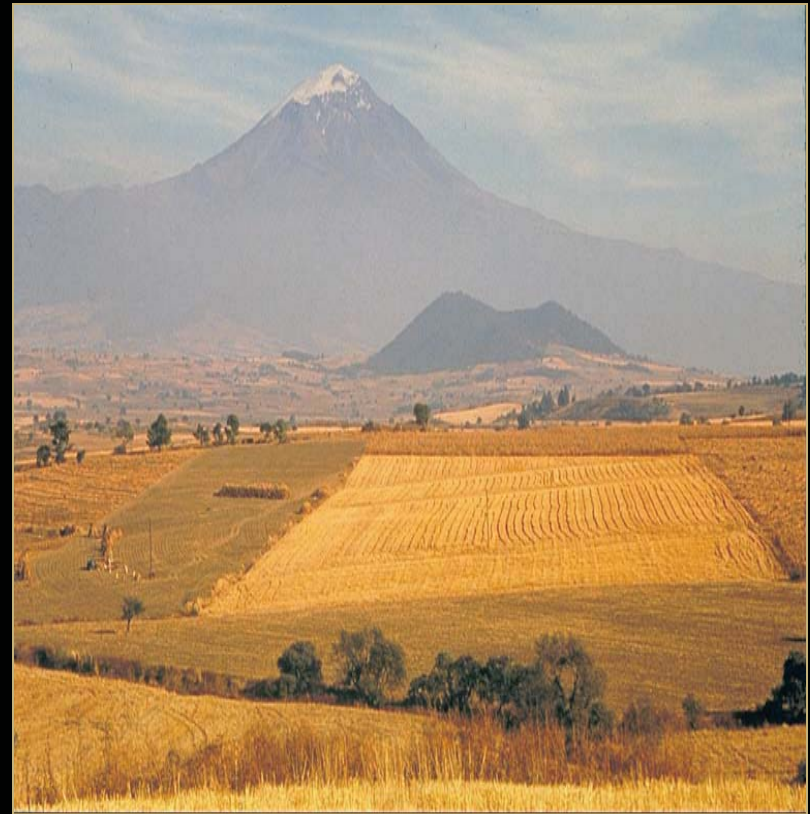
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Charles Crooke Auchincloss: 1881-1961

# Challenges for the 21st Century

- How to feed a more populous and richer world in the decades to come?
  - With global climate change?
  - Without destroying the environment in the process?
- How to provide food access to the ~1 billion people who remain chronically hungry?
- How to address food insecurity within traditional national security circles?



# Food Security



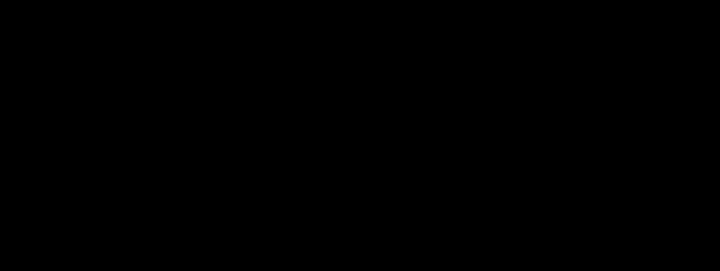
When all people at all times have physical and economic access to the food necessary to lead a healthy and productive life.

- FAO

World Bank estimates:

Pop <\$1/day: 15%

Pop <\$2/day: 50%





# The 9 billion-people question

A special report on feeding the world | February 26th 2011

### Core crop price spikes stoke food inflation

Corn price (cents per bushel)



Wheat price (cents per bushel)



Soyabean price (cents per bushel)



Source: Thomson Reuters Datastream



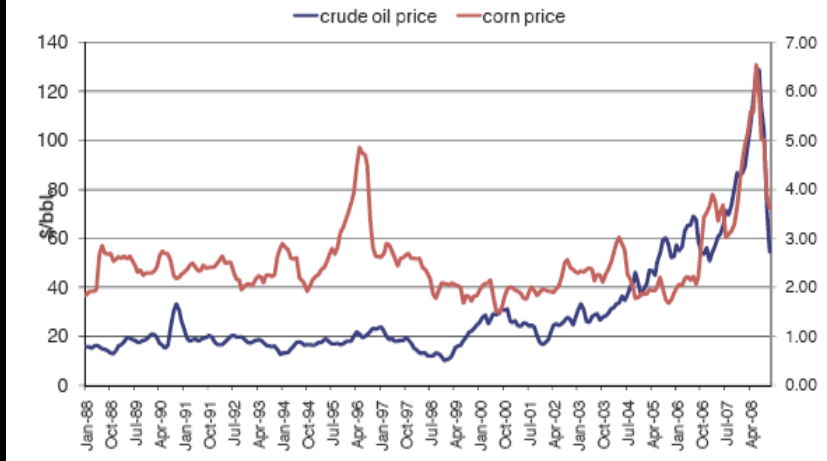
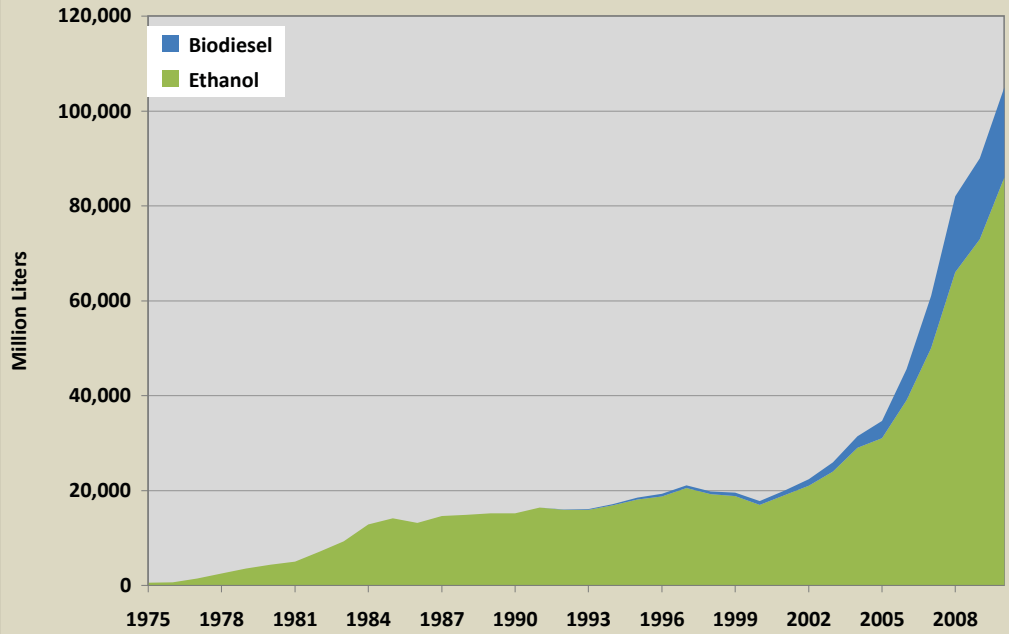
# Frontier Issues

1. Biofuels
2. Land expansion and acquisition
3. Aquaculture
4. Climate
5. Distributed Irrigation
6. Food and Security



# 1) Crop-Based Biofuels Boom

Figure 1. World Ethanol and Biodiesel Production, 1975–2010



s: Corn price, USDA; oil price, DOE/EIA, refiner composite crude oil acquisition price.

Over 40% of the US corn crop is now used for ethanol;

The share of ethanol in US corn consumption now exceeds that of livestock for first time



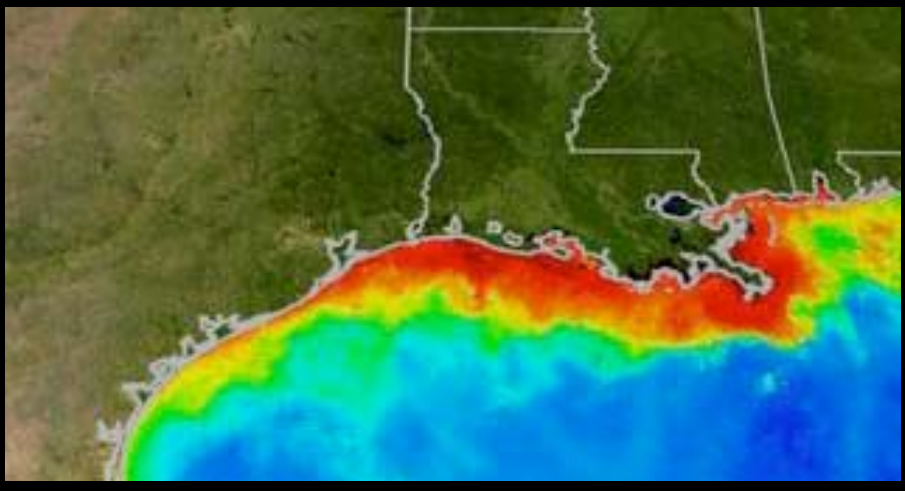
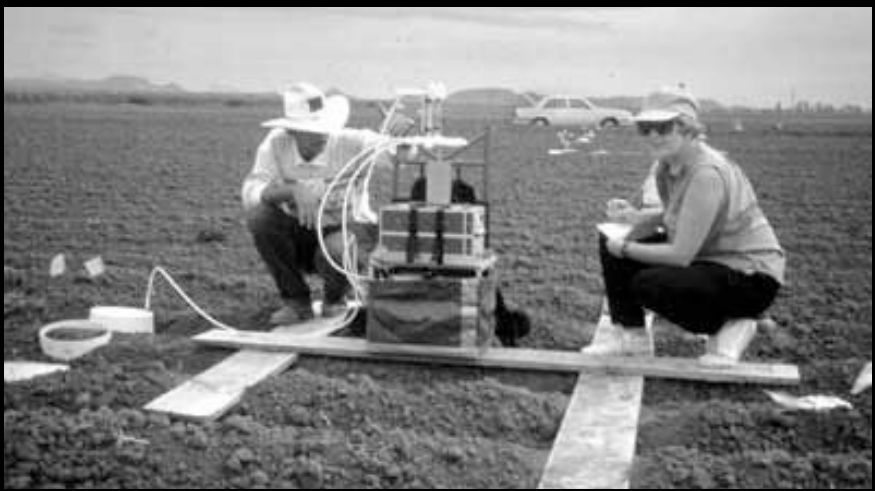
U.S. ethanol policy may be the single most significant contributor to world food price instability.

The Global Costs of  
**AMERICAN**  
**ETHANOL**

*by Rosamond L. Naylor & Walter P. Falcon*

“Mess up the corn market, and you pretty much mess up everything...”  
(anon. market analyst)

# Agricultural Intensification



## 2) Land Expansion and Acquisition



% achieved through area expansion  
(1995-2009)

- Brazil soy: 81%
- Asia oil palm Asia: 92%





- 42 million ha in 2008-09
- Land speculation when financial markets have low yields
- 75% land sales in Sub Saharan Africa
- Countries with weak land institutions, “under-utilized”  
e.g., Sudan, Zambia, Mozambique, Madagascar

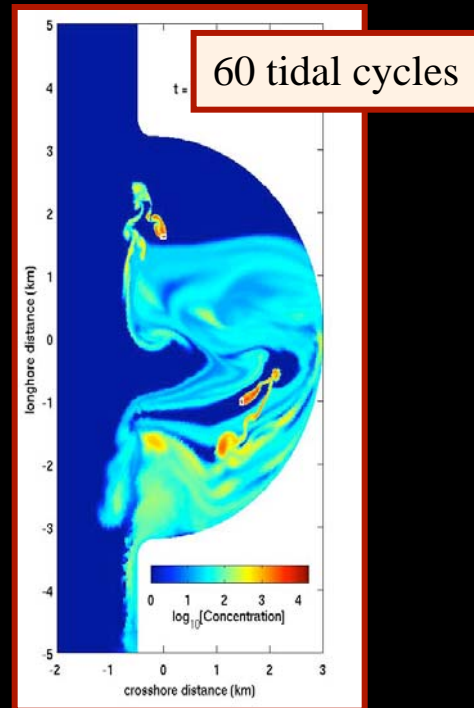
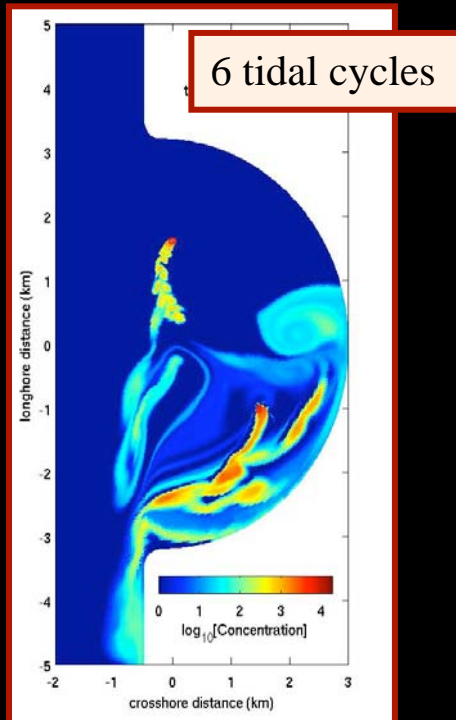
# 3) Aquaculture: Intensive Fish Production



# Lessons from Industrial Animal Production



# Feedlots of the Sea?

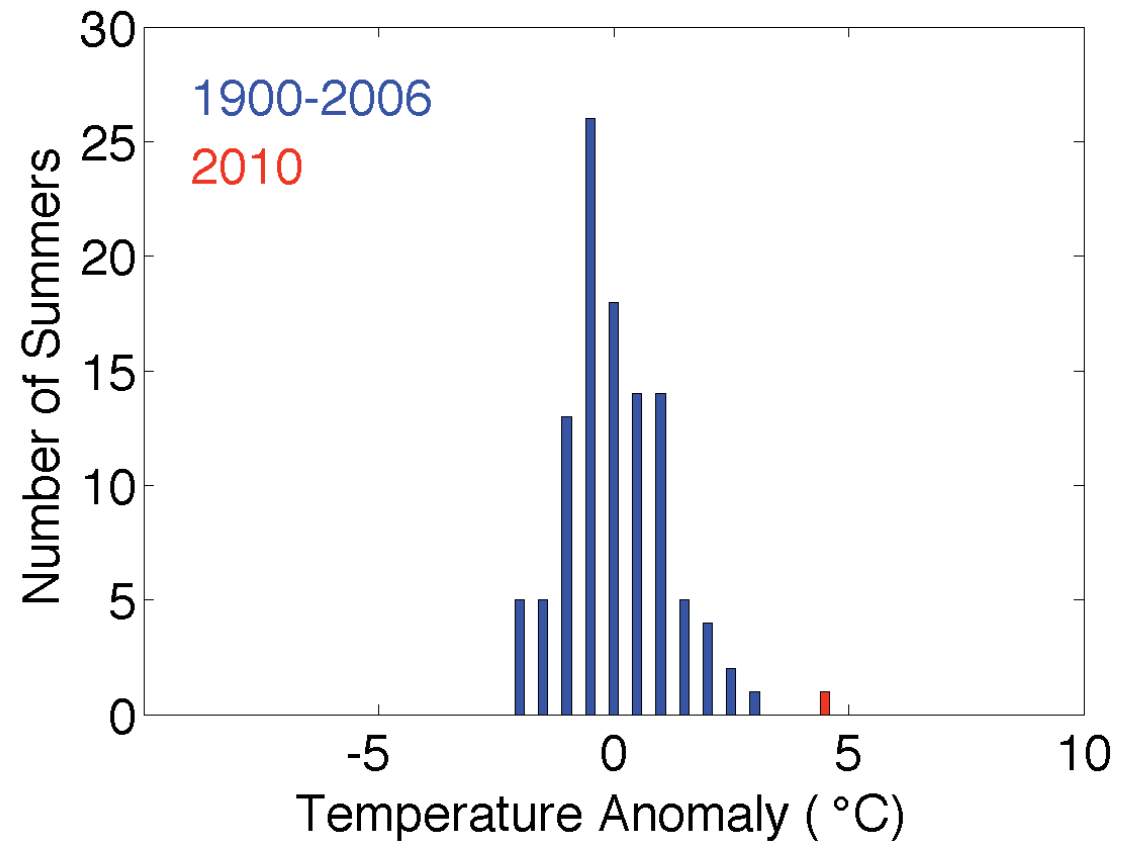
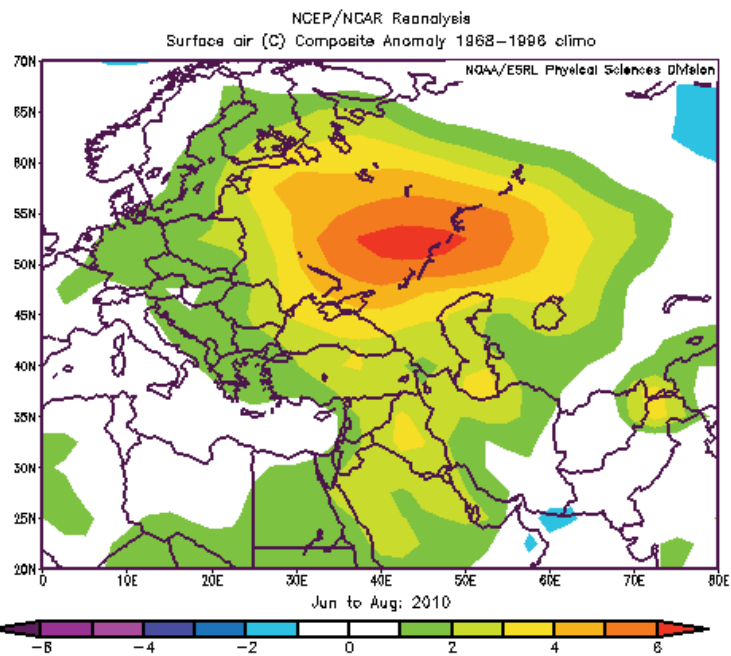




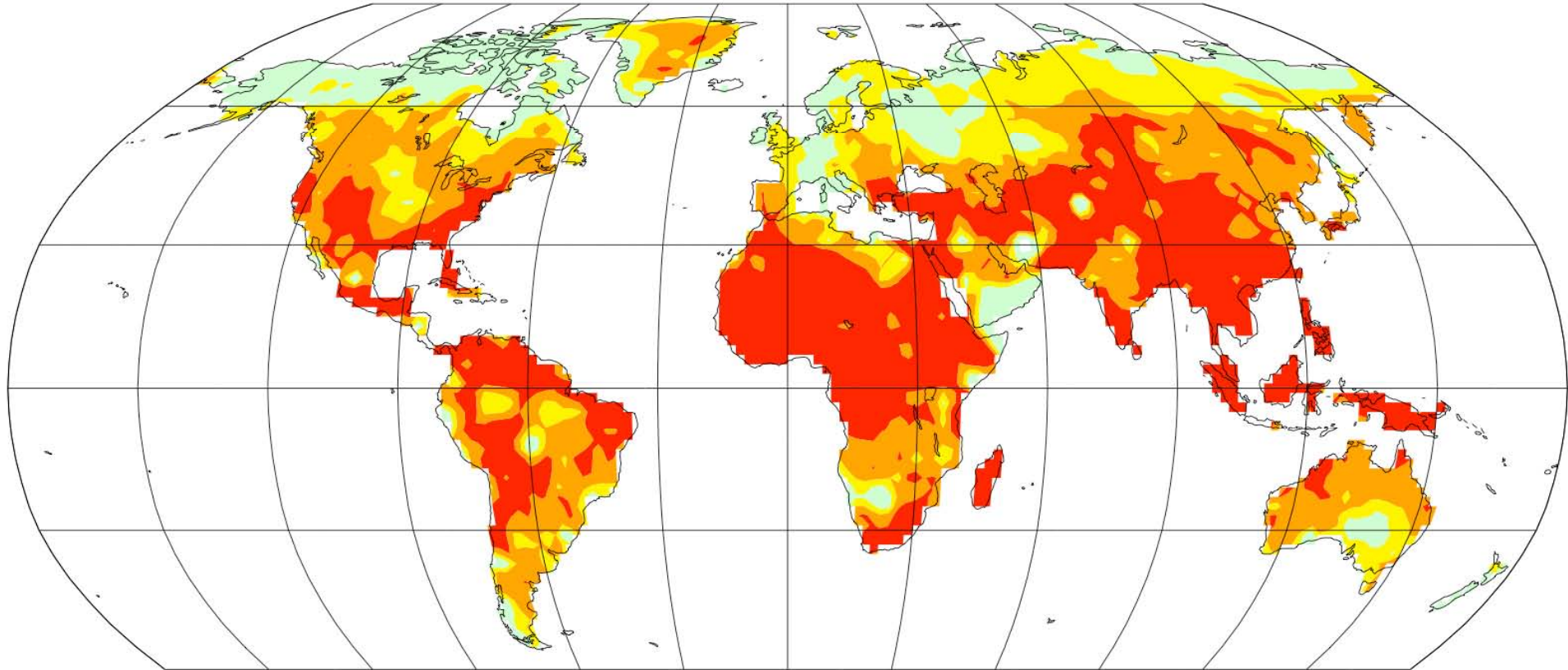
# 4) Global Climate Change



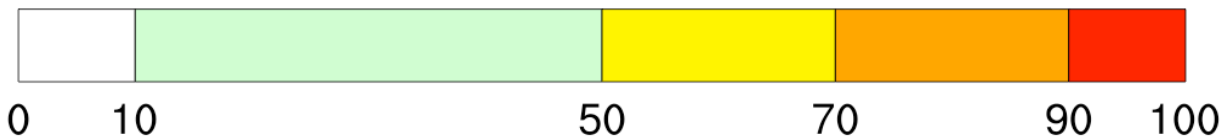
# Heat Wave in Russia's Prime Wheat Region, 2010



## Summers in 2080-2100 Warmer than Warmest on Record



percent (%)

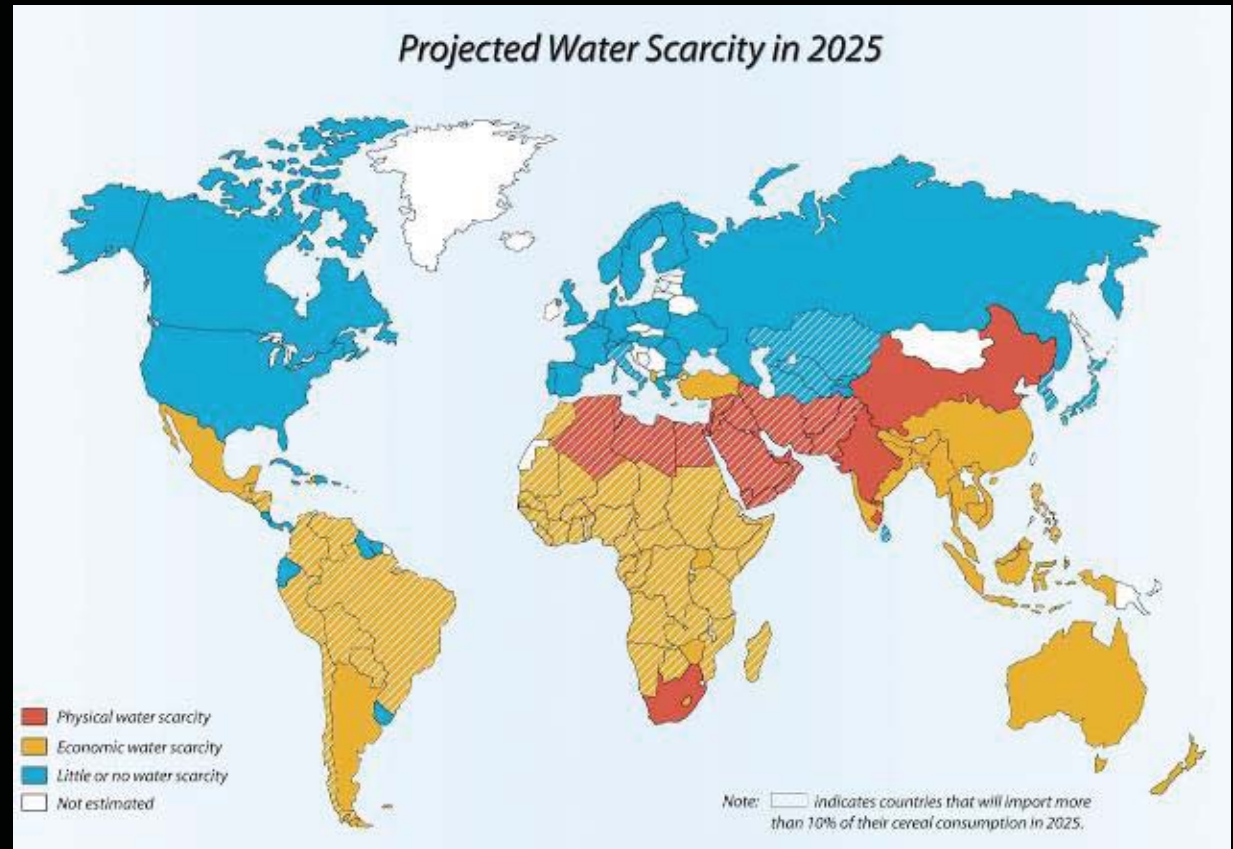


(IPCC Predictions, 4th assessment, 23 models, A1B scenario)

# Water scarcity for food production?

*Physical scarcity:*  
Not enough  
water.

*Economic Scarcity:*  
No  
infrastructure  
to make water  
available to  
farmers.

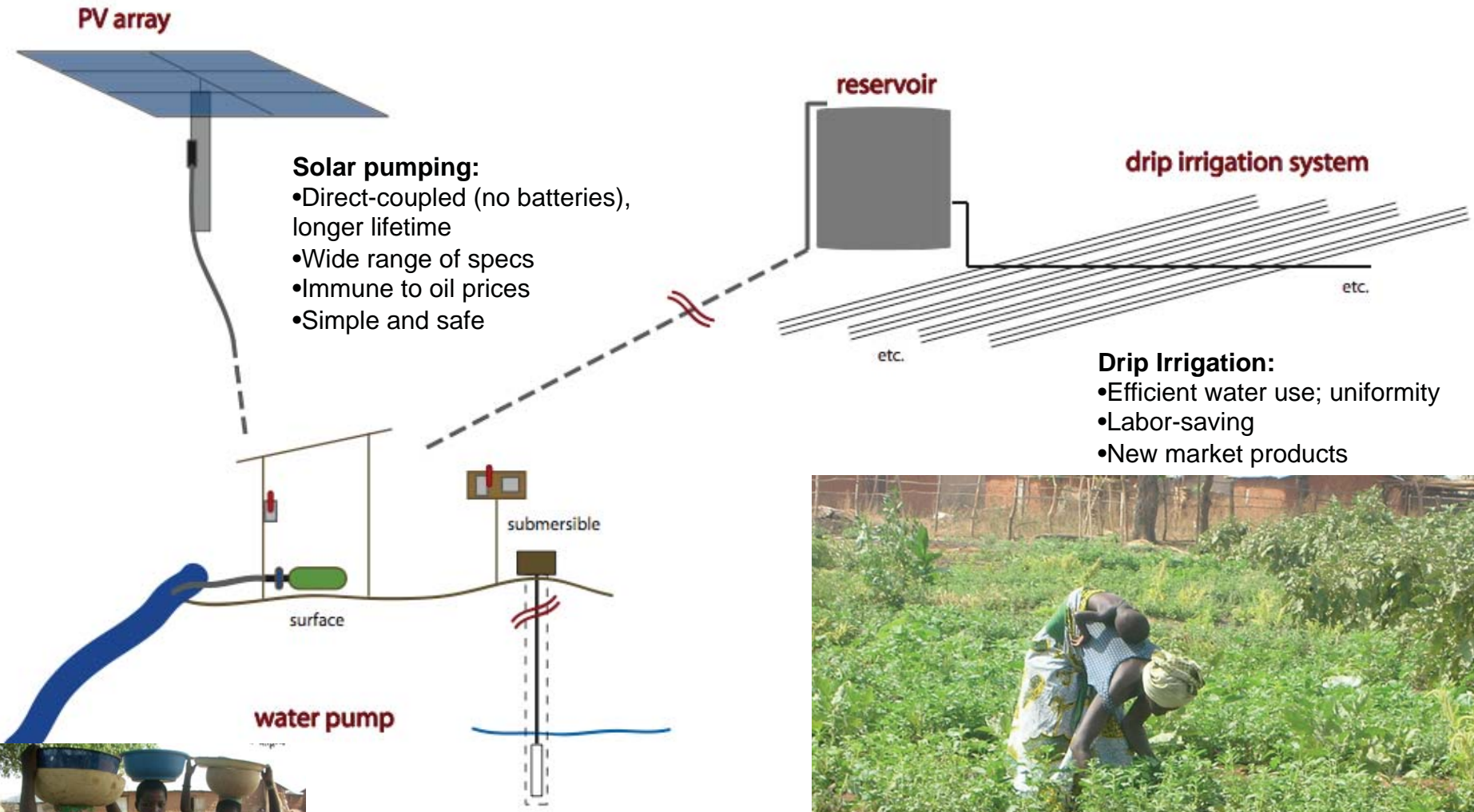


Source: IWMI

Also a problem for consumption...

A third of the world's population will suffer from water scarcity in 2025

# 5) Distributed Irrigation: Ex of Solar Drip



# 6) Food and Security



## What Kills People? Estimated annual totals, decadal avg ~ 2000

Terrorism (intl + domestic)	3,000
Direct battle deaths (combatants)	20,000
Direct civilian deaths from conflict (e.g. genocide)	50,000 - 100,000
Indirect civilian deaths from conflict	500,000 - 1 mil
Hunger and malnutrition	6 mil - 8.4 mil

Please join us...

## REDEFINING SECURITY ALONG THE FOOD/HEALTH NEXUS

A special conference exploring the root causes of global underdevelopment

THURSDAY, NOVEMBER 10, 2011



### KEYNOTE SPEAKERS

**KOFI ANNAN** former Secretary-General, the United Nations

**ROBERT GATES** former U.S. Secretary of Defense

**JEFF RAIKES** CEO, Bill & Melinda Gates Foundation

With panels featuring Stanford faculty and outside experts



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