



Opportunities and Challenges for Tomorrow's Global Food System

Dr. Greg Pillar
Assistant Professor of
Environmental Science
and Chemistry



Opportunities and Challenges for Tomorrow's Global Food System

Part I – The Current Situation...

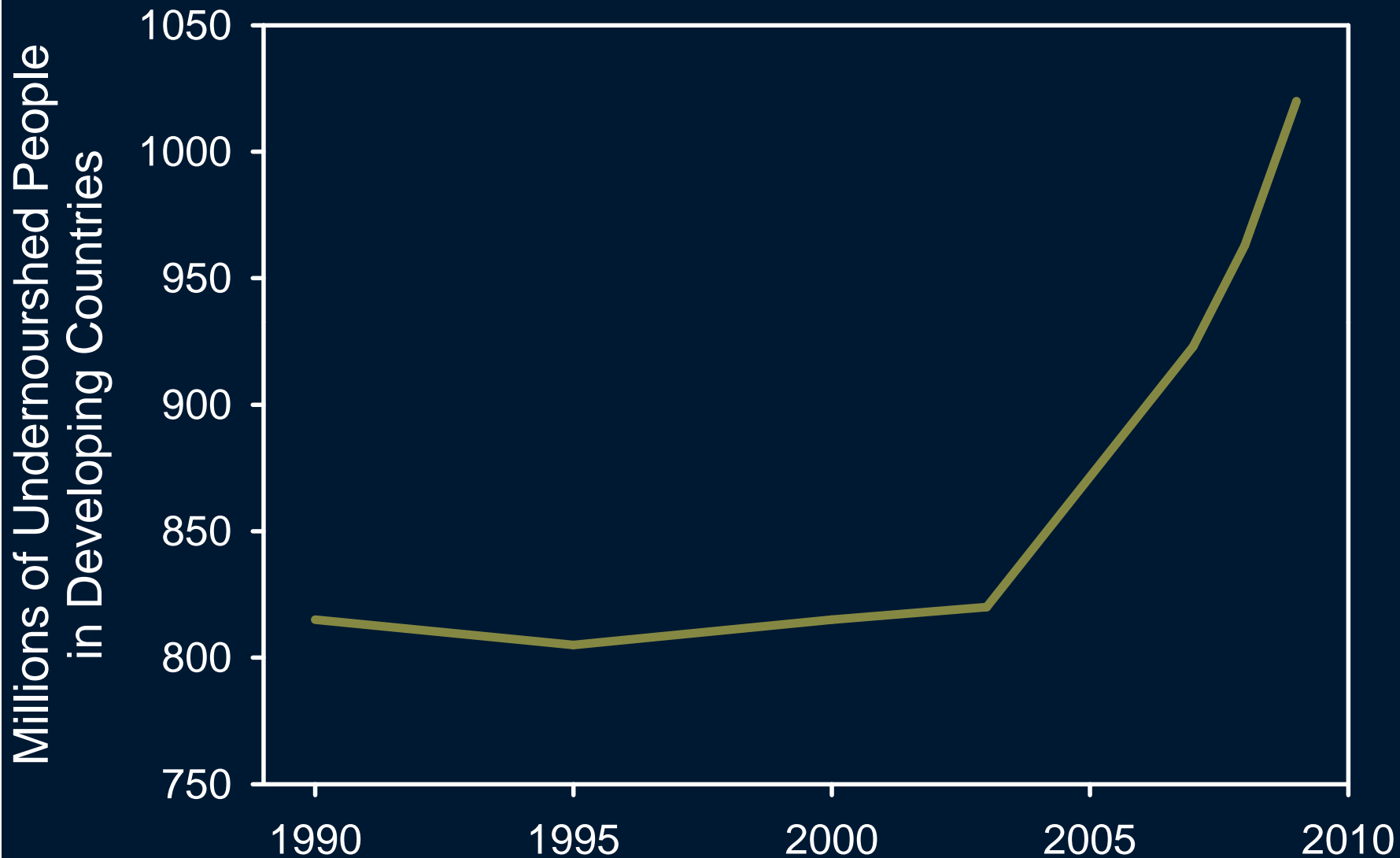
Dr. Greg Pillar
Assistant Professor of
Environmental Science
and Chemistry

4/22

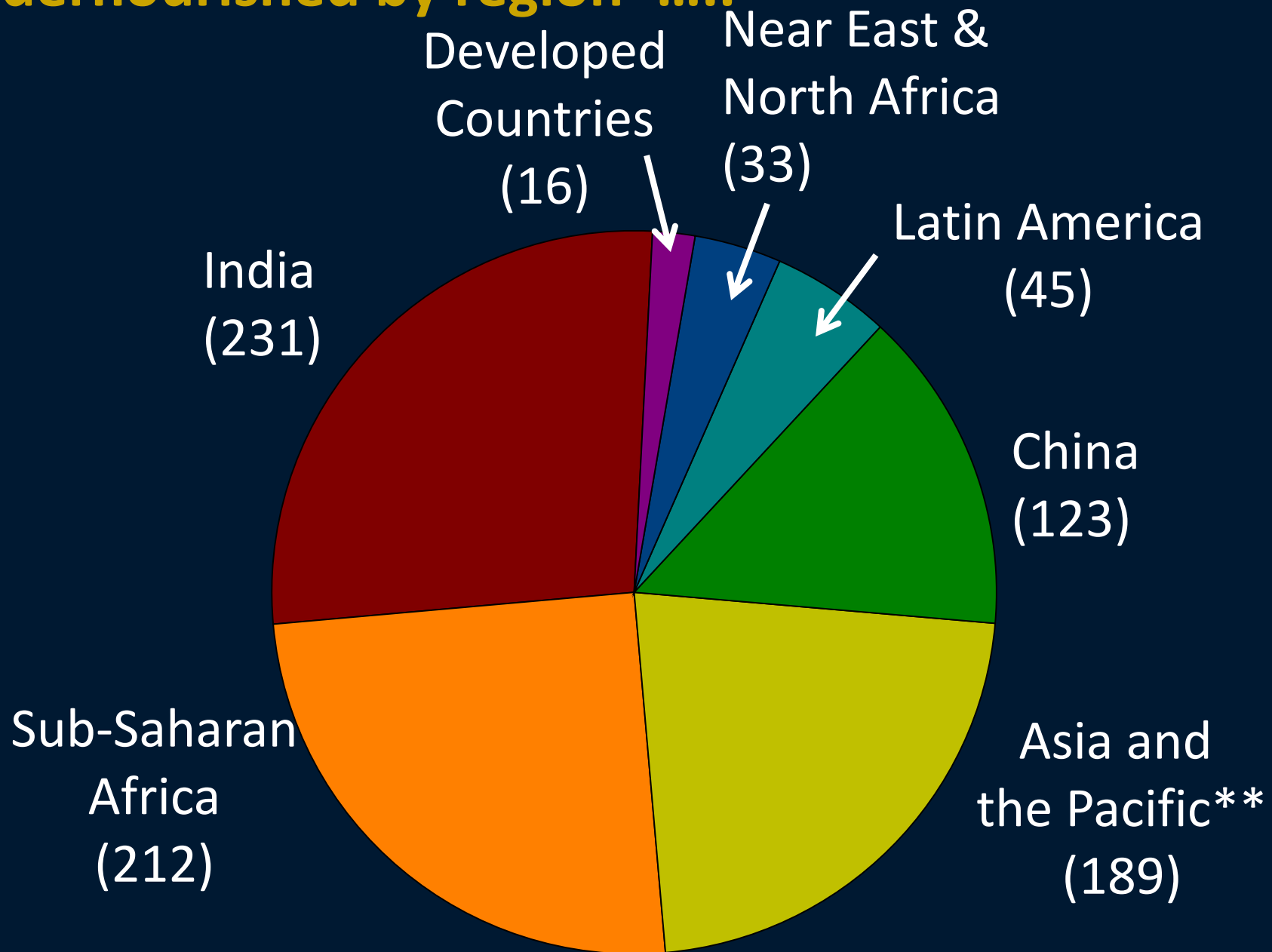
JEFF PARKER ©2004 FLORIDA TODAY



The Food Situation.....



Undernourished by region*



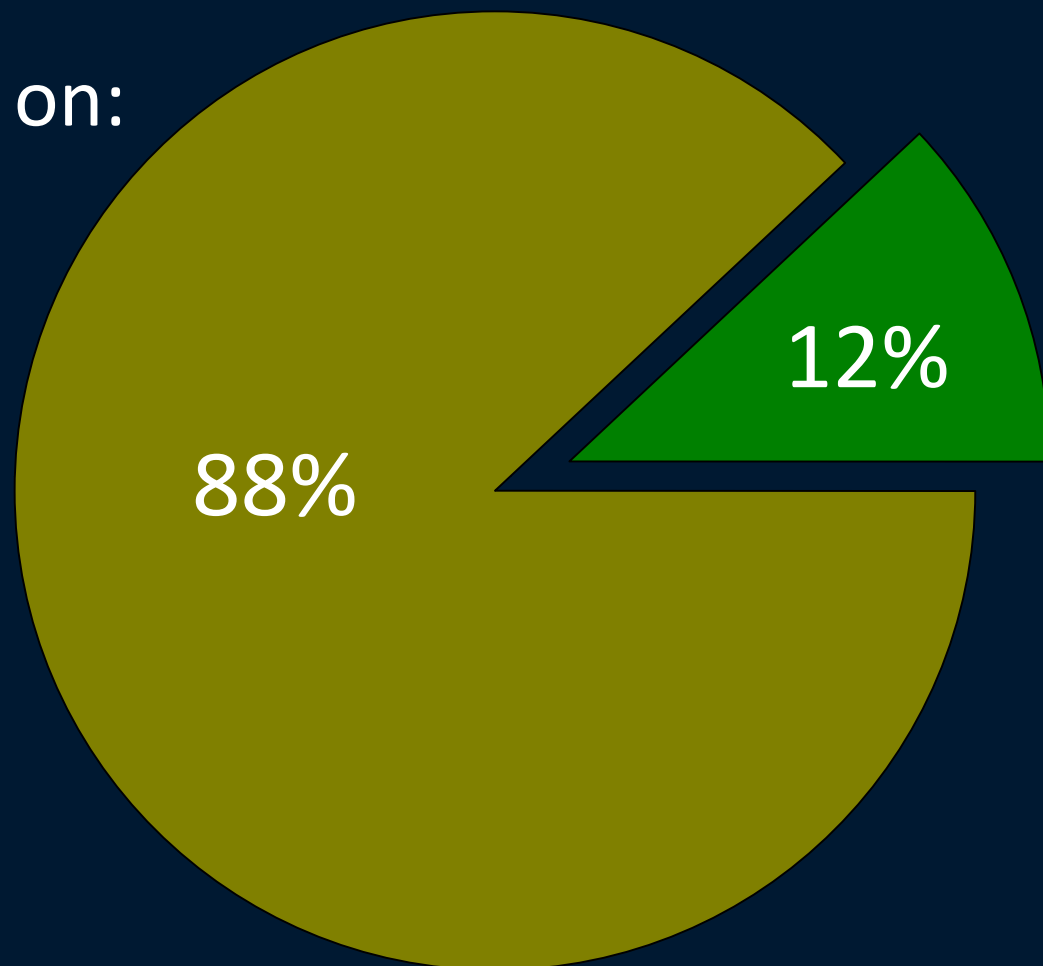
*based on 2005 data



**excluding China and India

FAO, 2008

The Food Situation.....

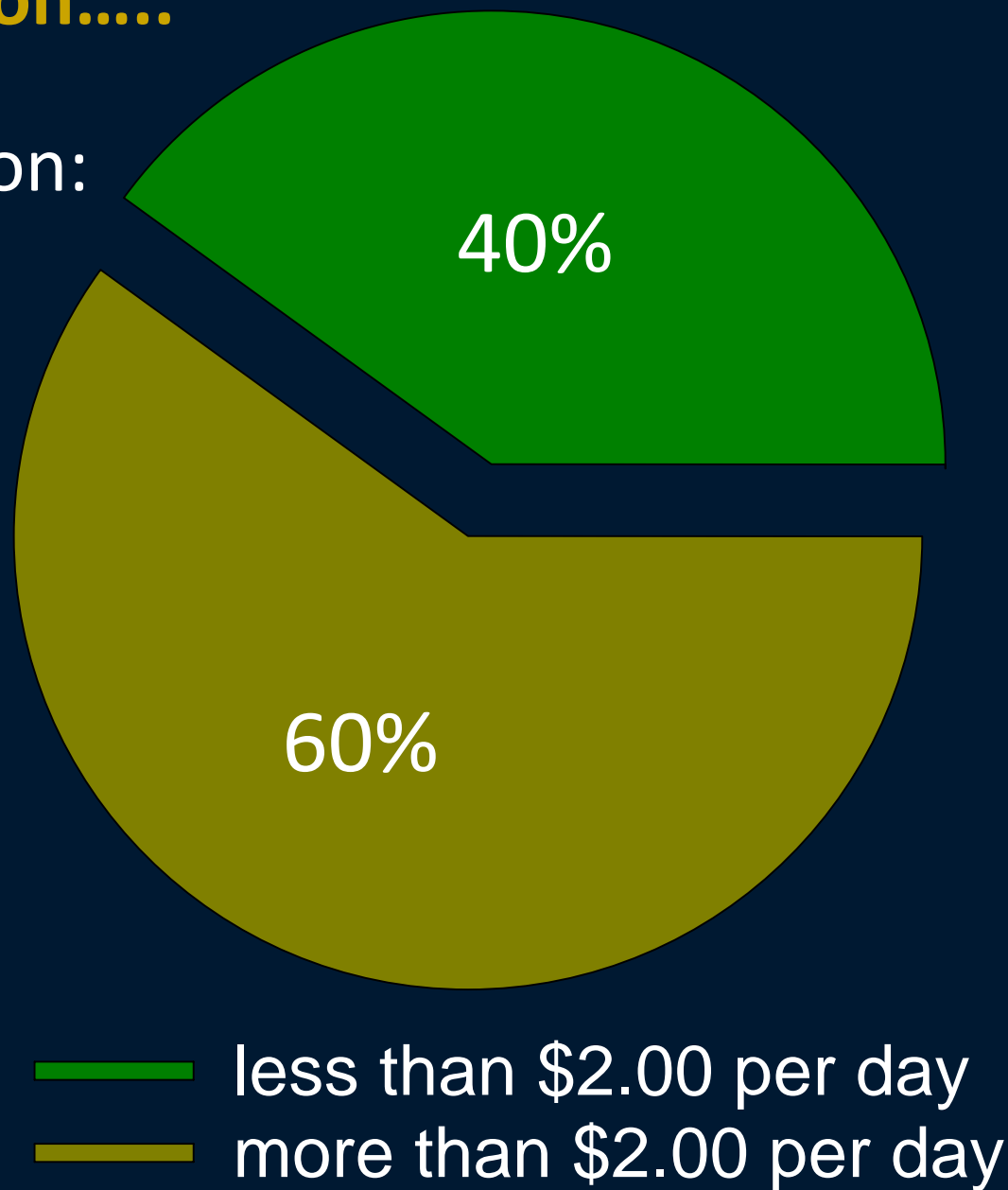
People who live on:



-  less than \$1.00 per day
-  more than \$1.00 per day

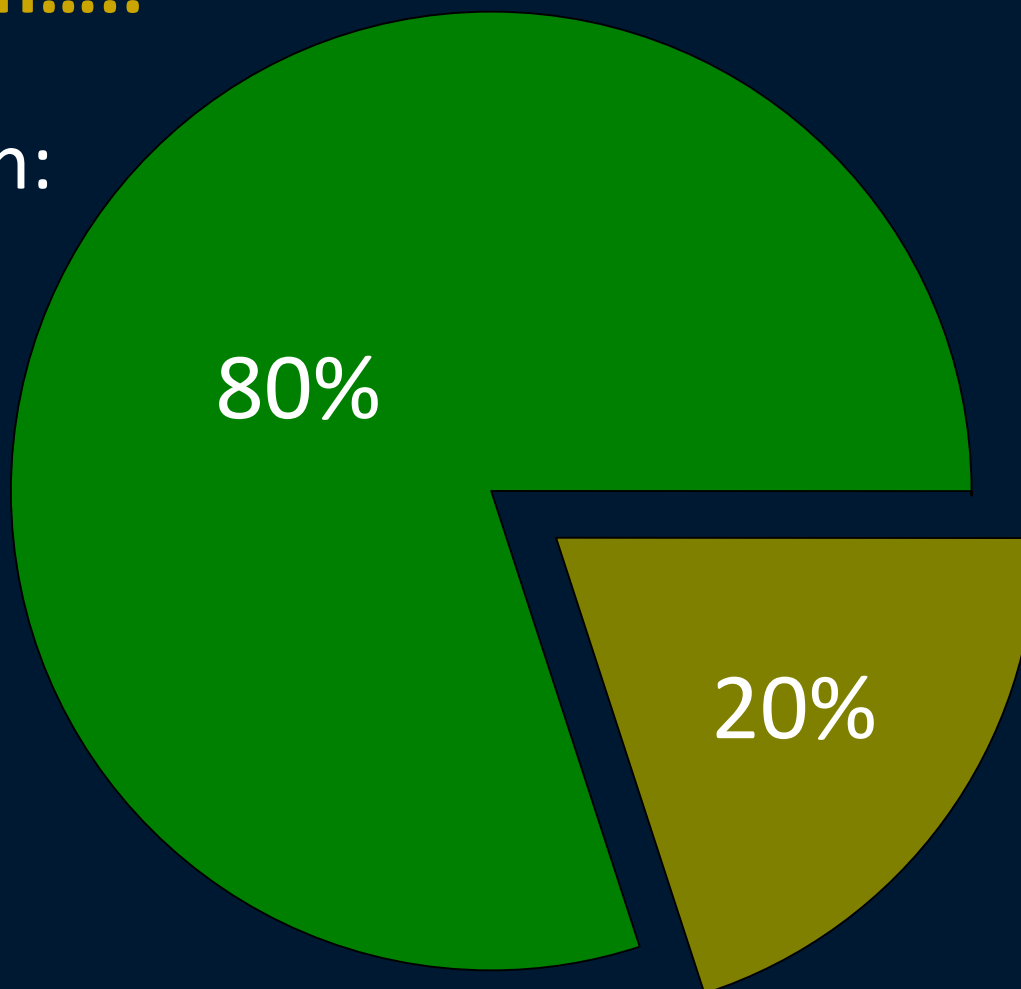
The Food Situation.....

People who live on:



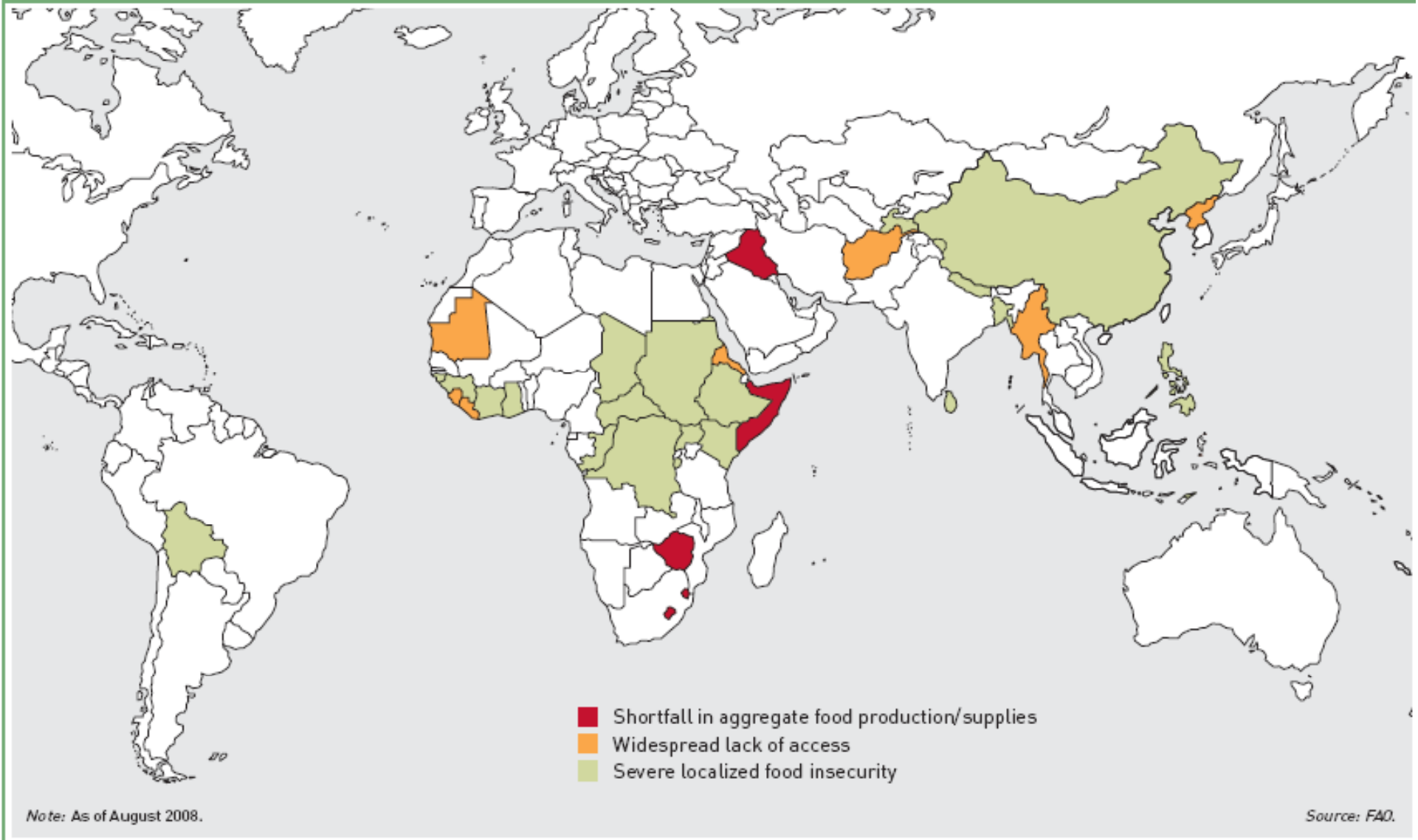
The Food Situation.....

People who live on:

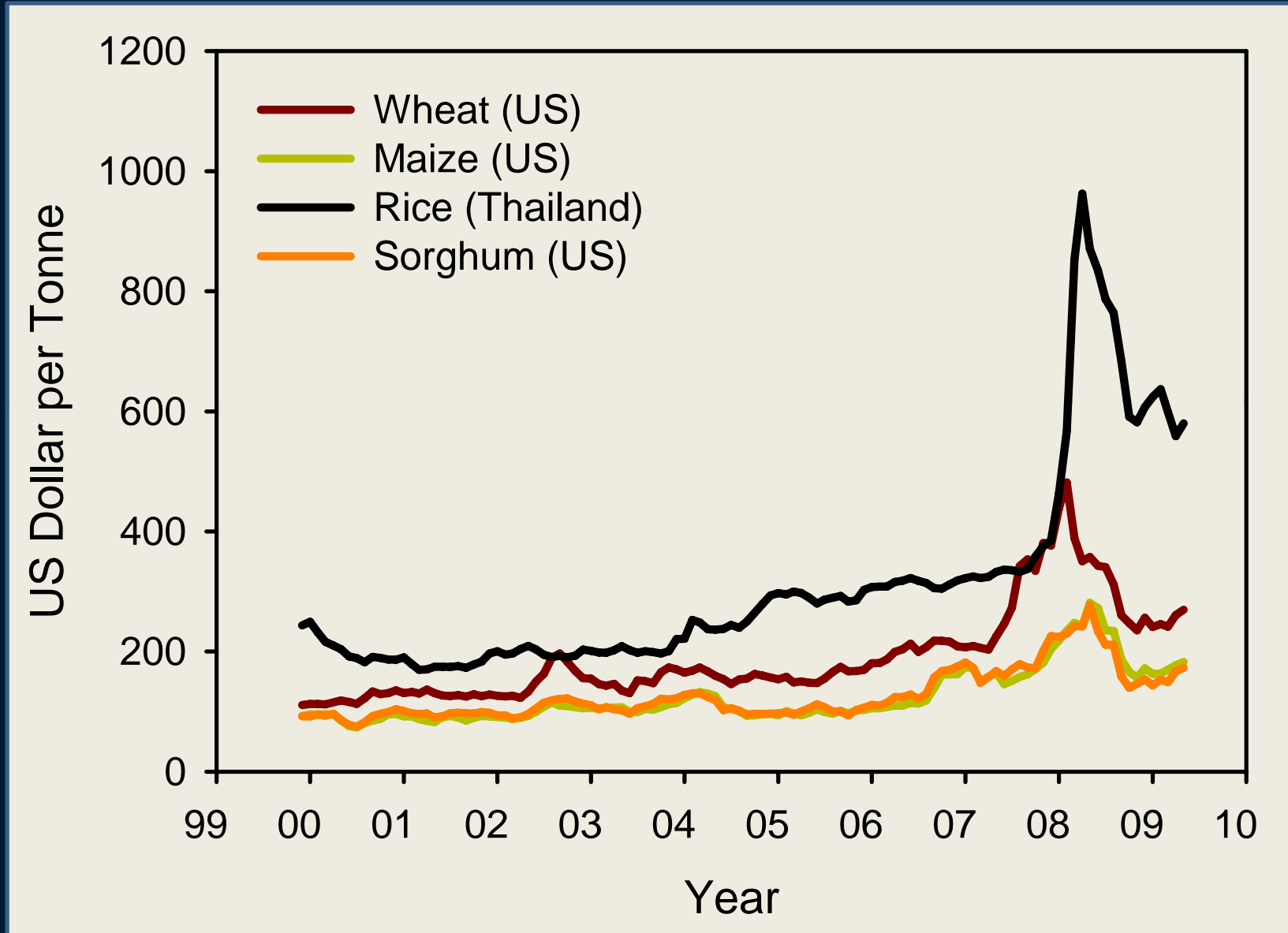


- less than \$10.00 per day
- more than \$10.00 per day

The Food Situation.....



The Food Situation.....



Price of wheat, maize, rice and sorghum between 1999 and 2009

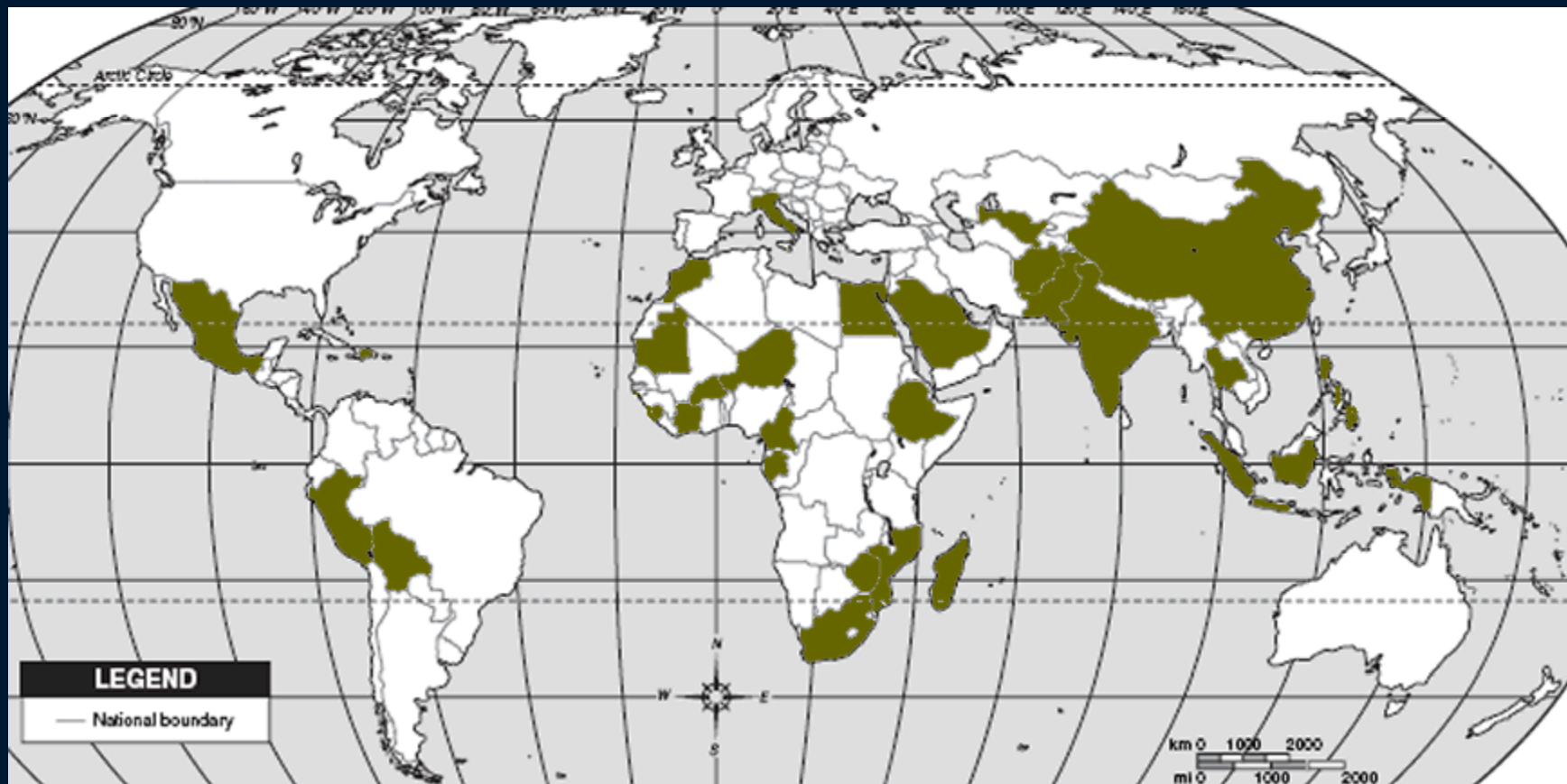


United States: The Revis family of North Carolina
Food expenditure for one week: \$341.98



Chad: The Aboubakar family of Breidjing Camp
Food expenditure for one week: 685 CFA Francs or \$1.23

The Food Situation.....



More than 40 countries have experienced protests due to food prices over the last 3 years.

“Pasta” protests in Italy



“Tortilla” protests in Mexico



“Bread” protests in Egypt

www.standeyo.com
www.msnbc.com
www.usatoday.com
www.bbc.com

“Mud Cookies” in Haiti where the cost of 2 cups of rice was selling at \$0.60 in January 08, up 50% from the previous year. These cookies sell for about \$0.05 each.



By Ariana Cubillos, AP

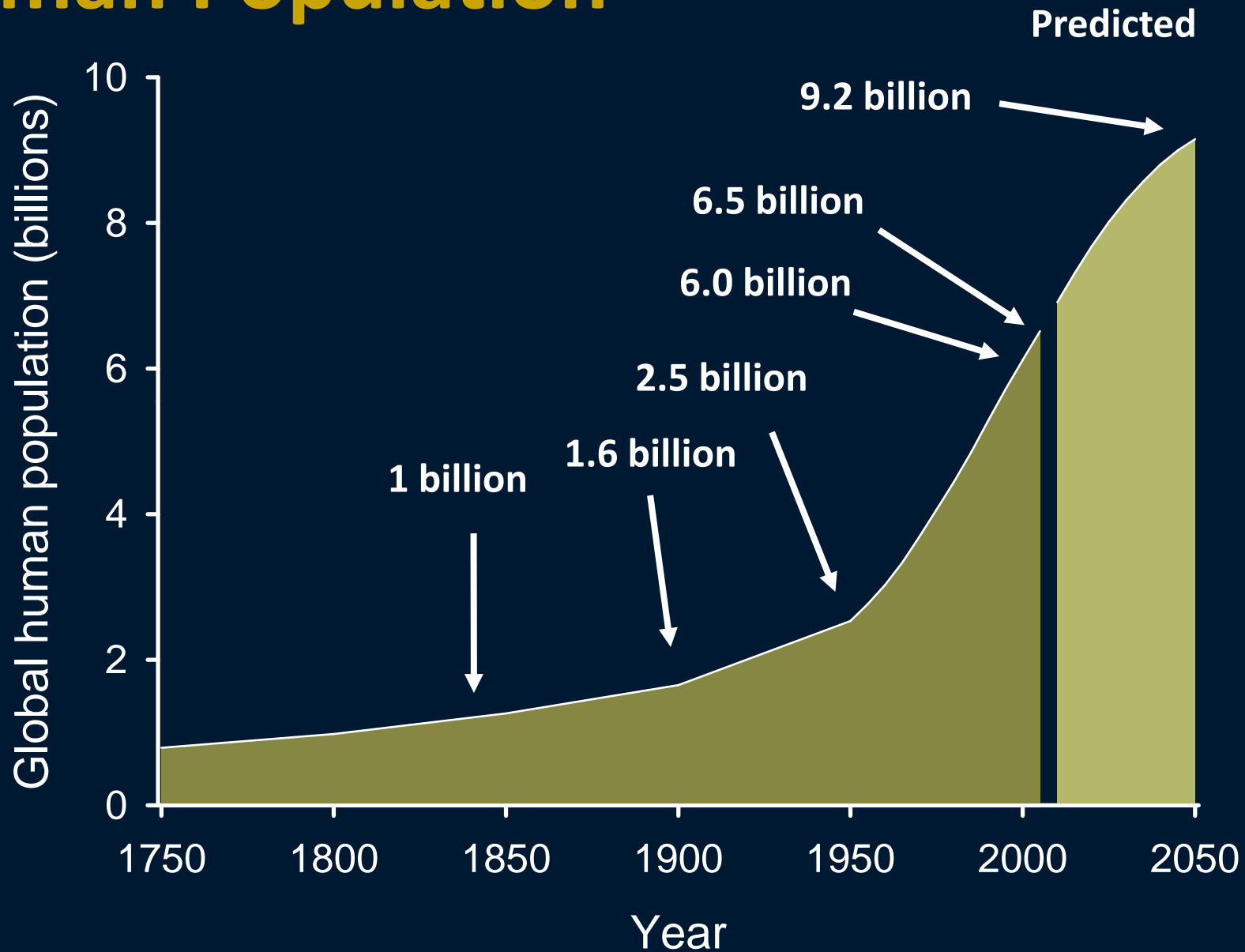


Opportunities and Challenges for Tomorrow's Global Food System

Part II – The Challenges...

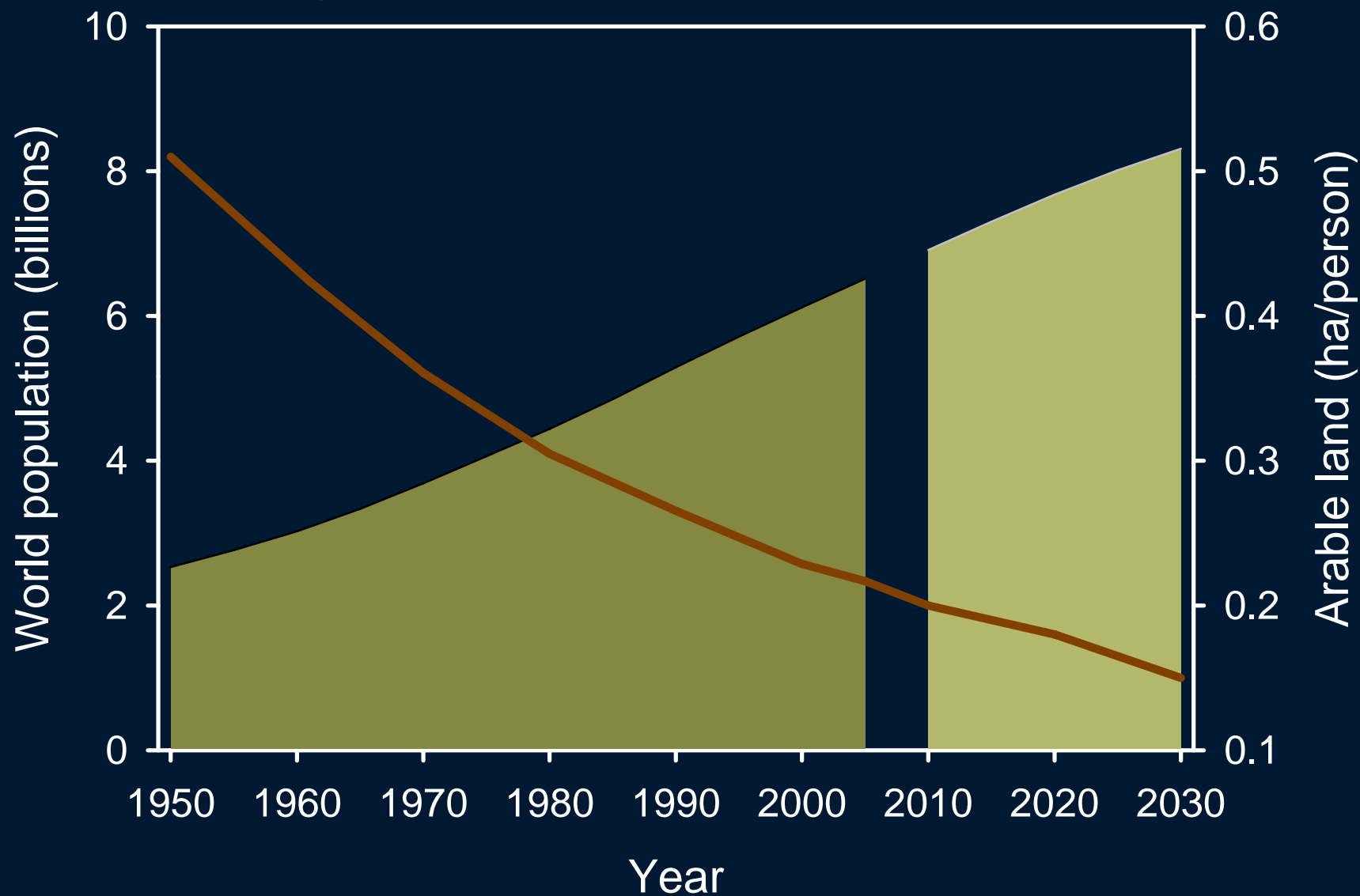
Dr. Greg Pillar
Assistant Professor of
Environmental Science
and Chemistry

Human Population



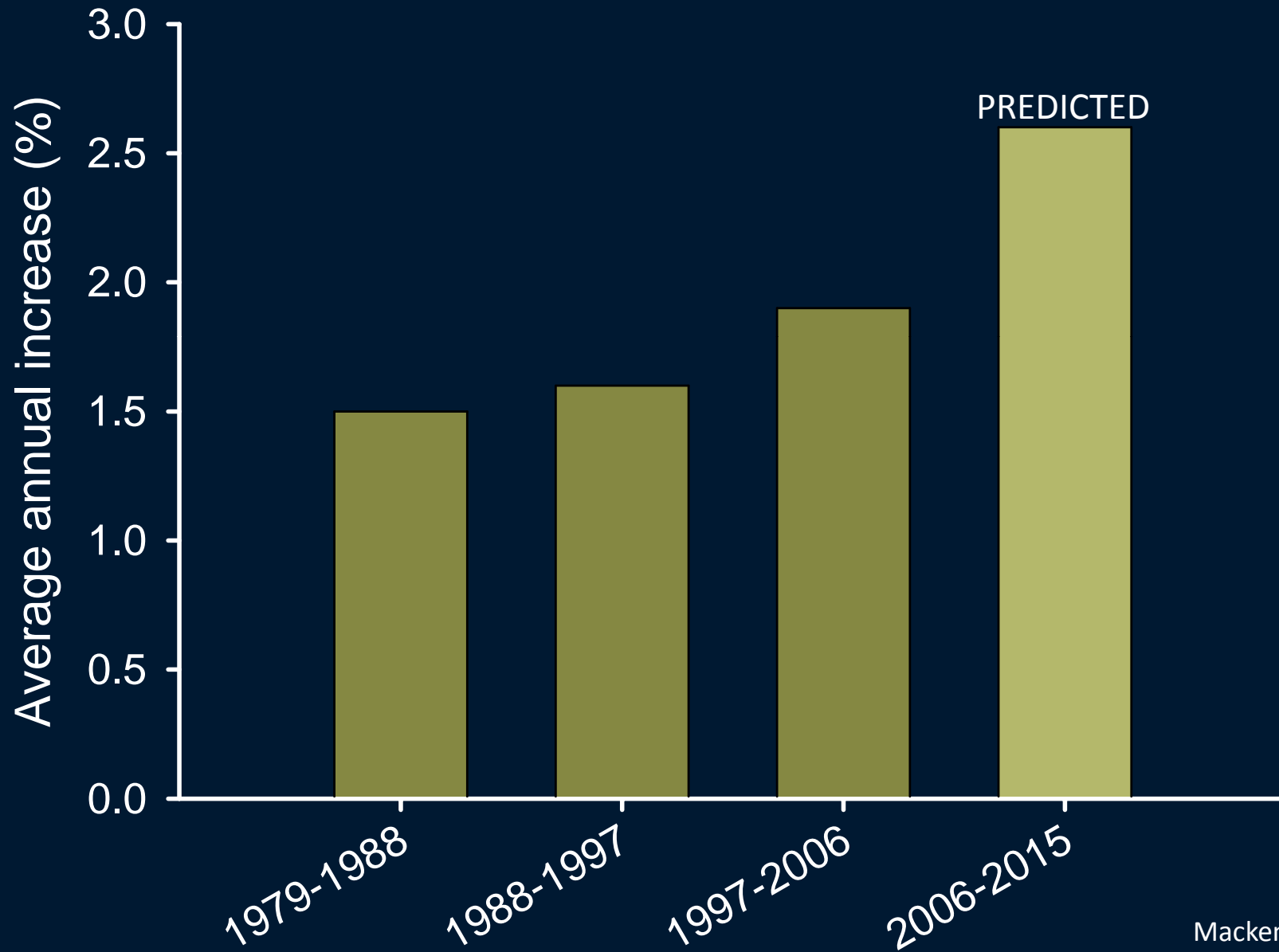
2.5 people per second (80 million per year)

Human Population

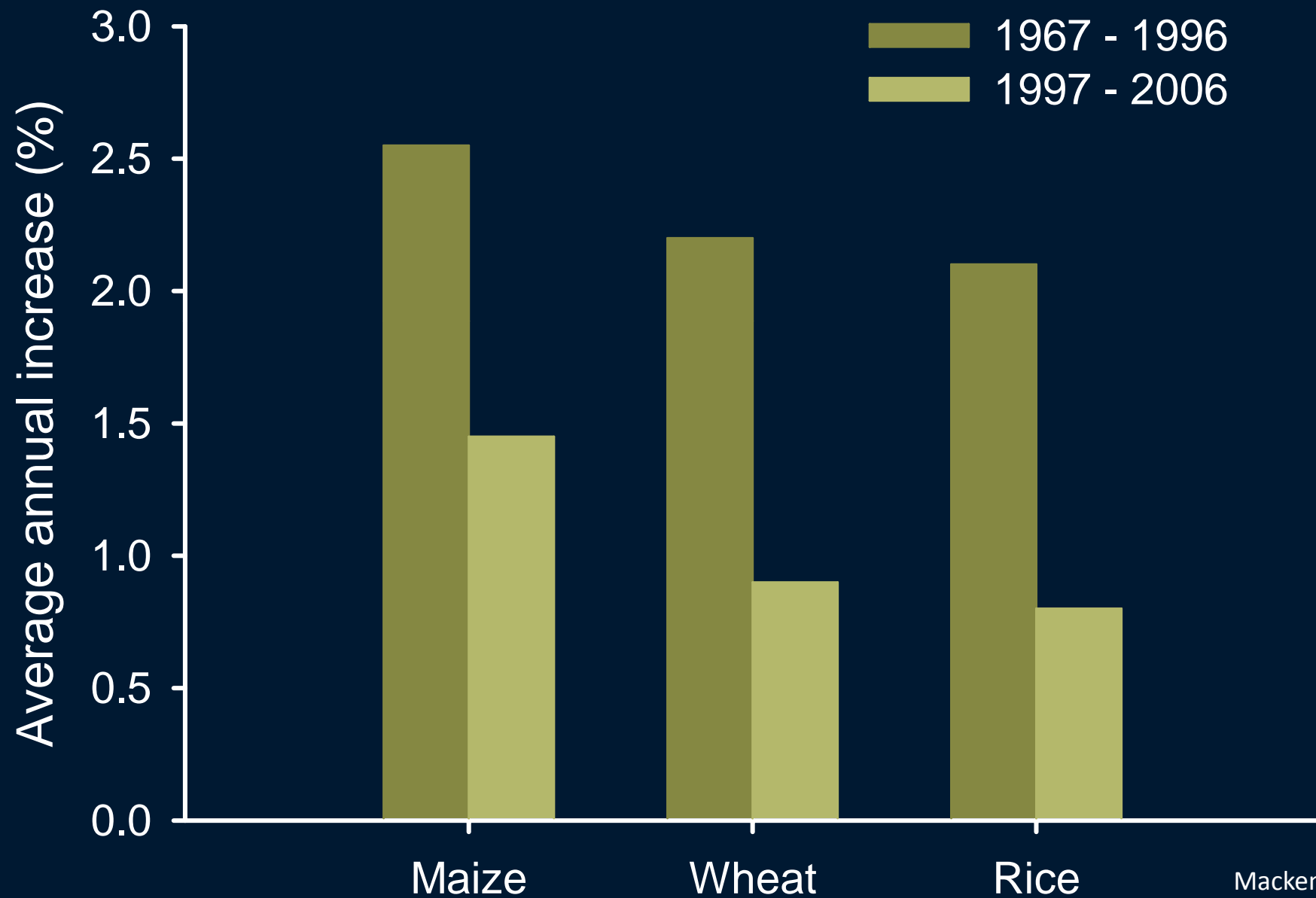


- Human Population
- Human population (projected)
- Arable land

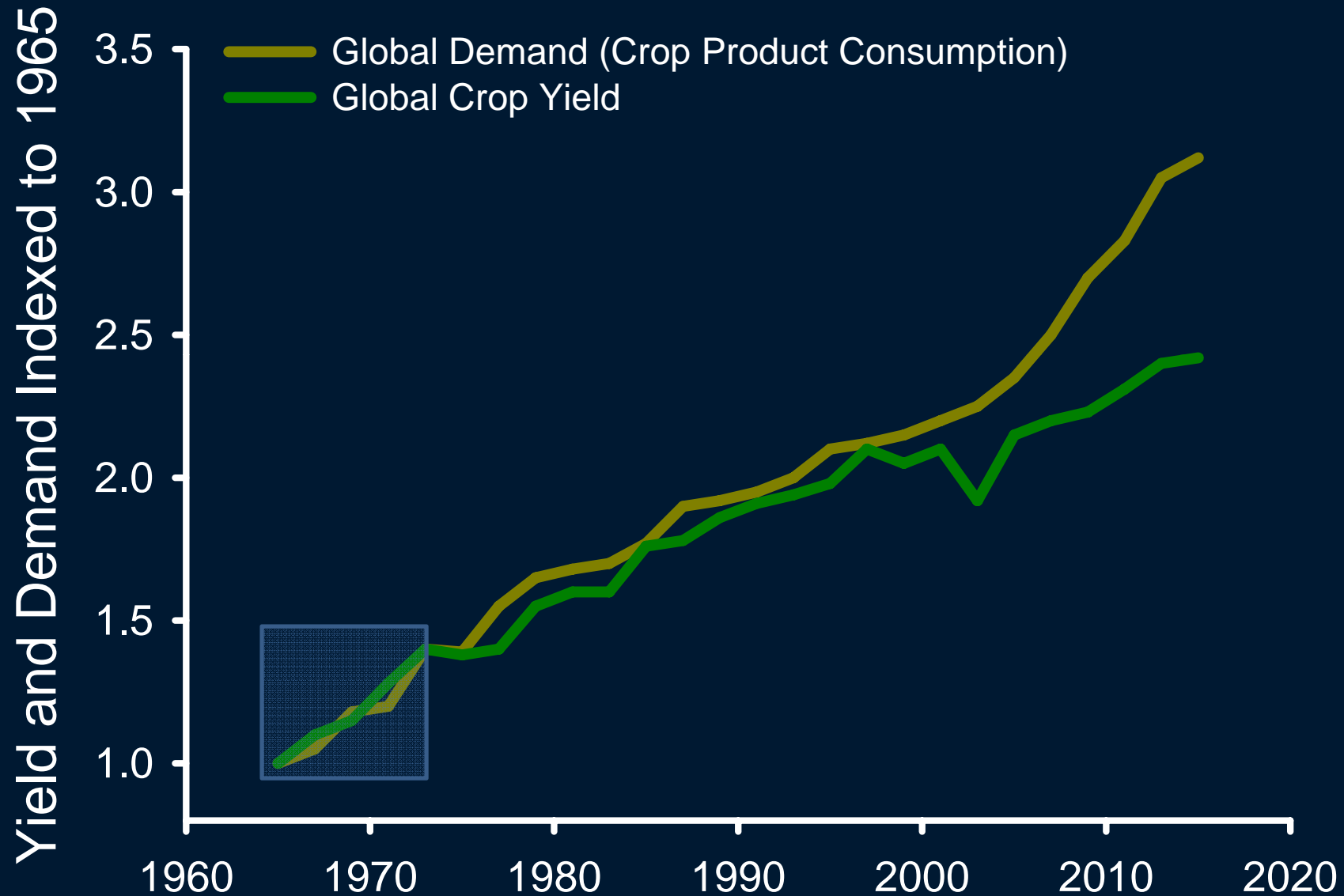
Demand....



Supply

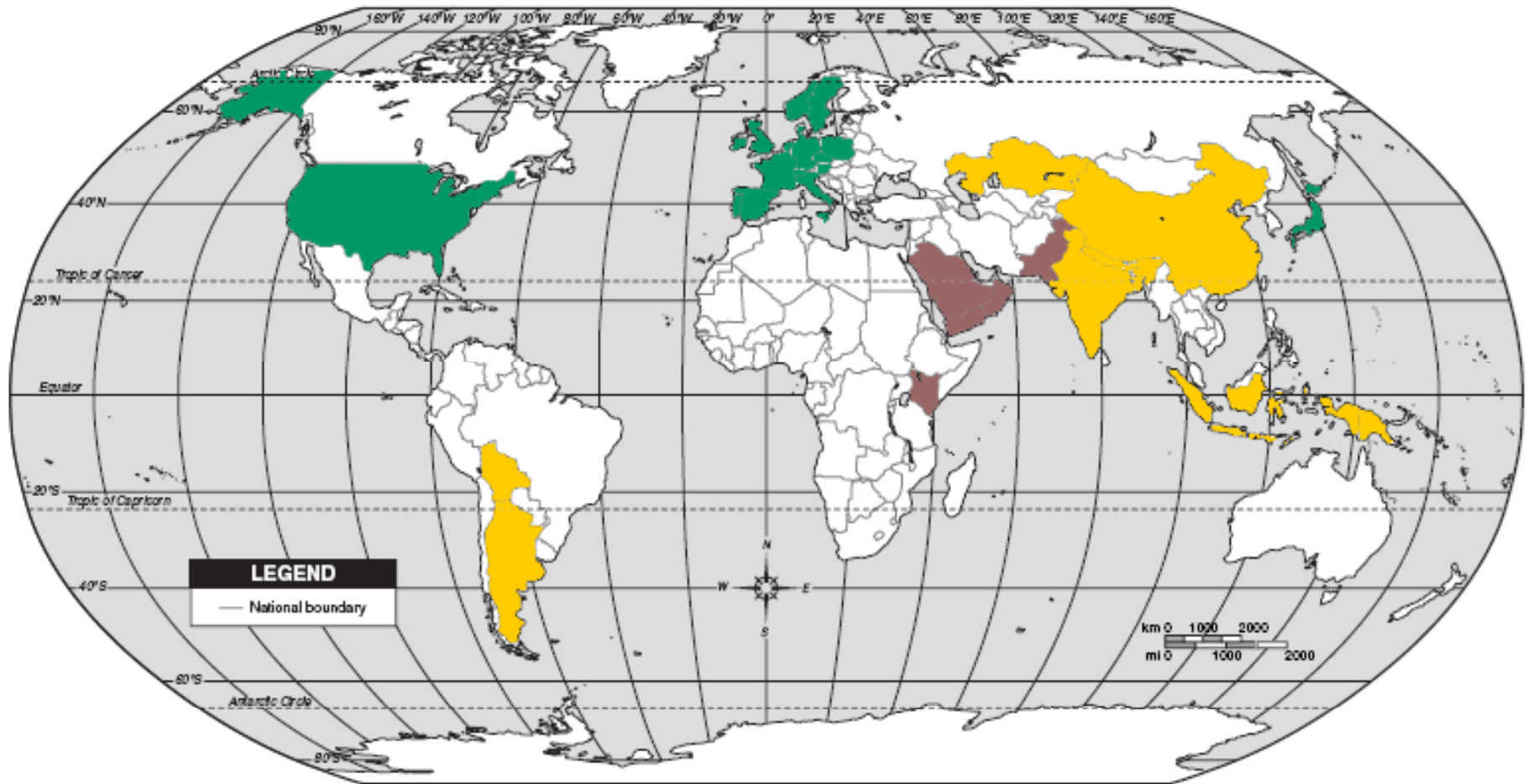


Supply & Demand....



modified from Doyle & Zavislak, 2008
Goldman Sachs, 2007

Supply & Demand....



Subsidies



Import-Dependence

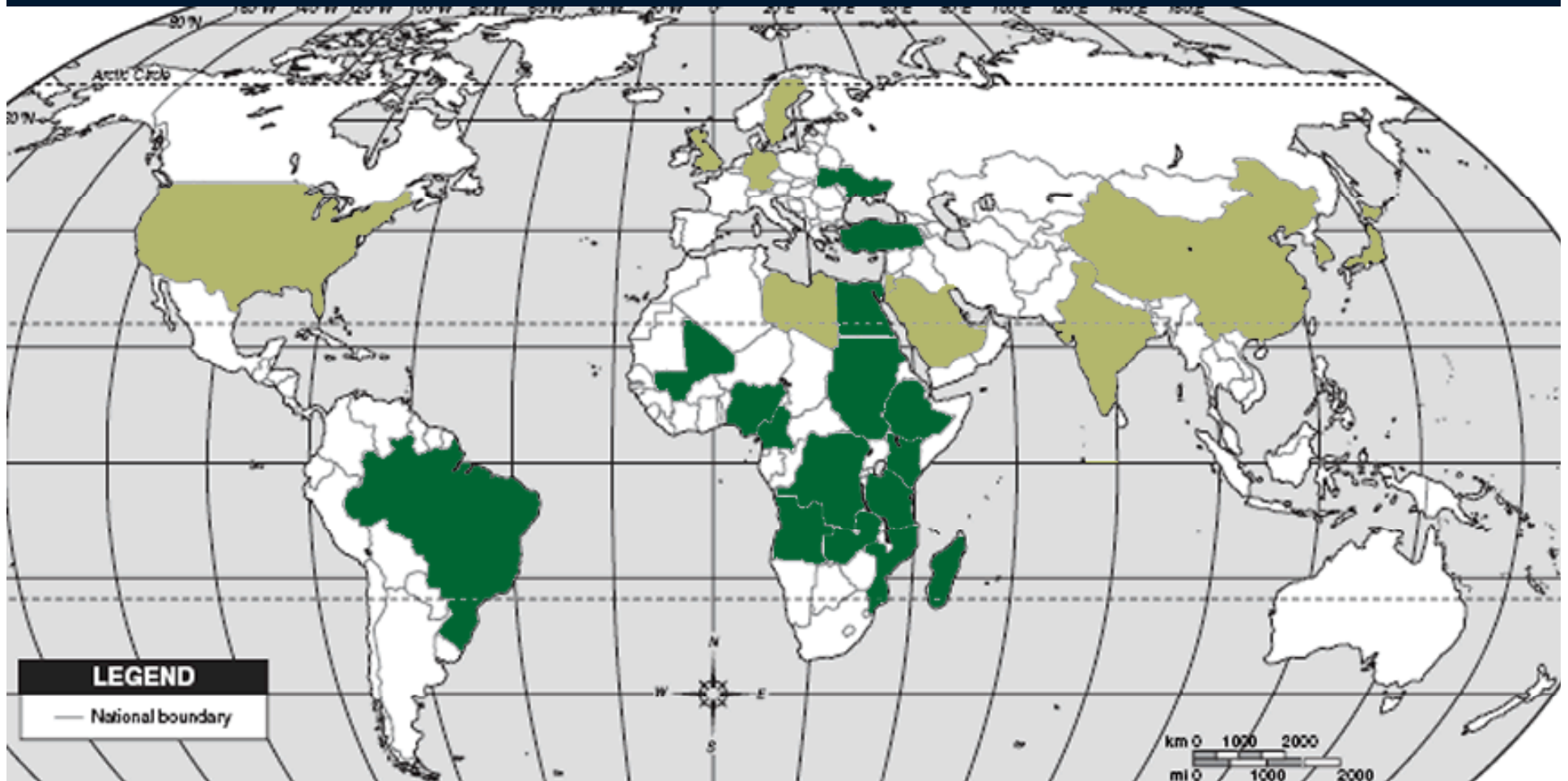


Hoarding

Additional factors that have influenced supply and demand of cereal grains over the last few years

modified from Doyle & Zavislak, 2008

“Land Grabbing”



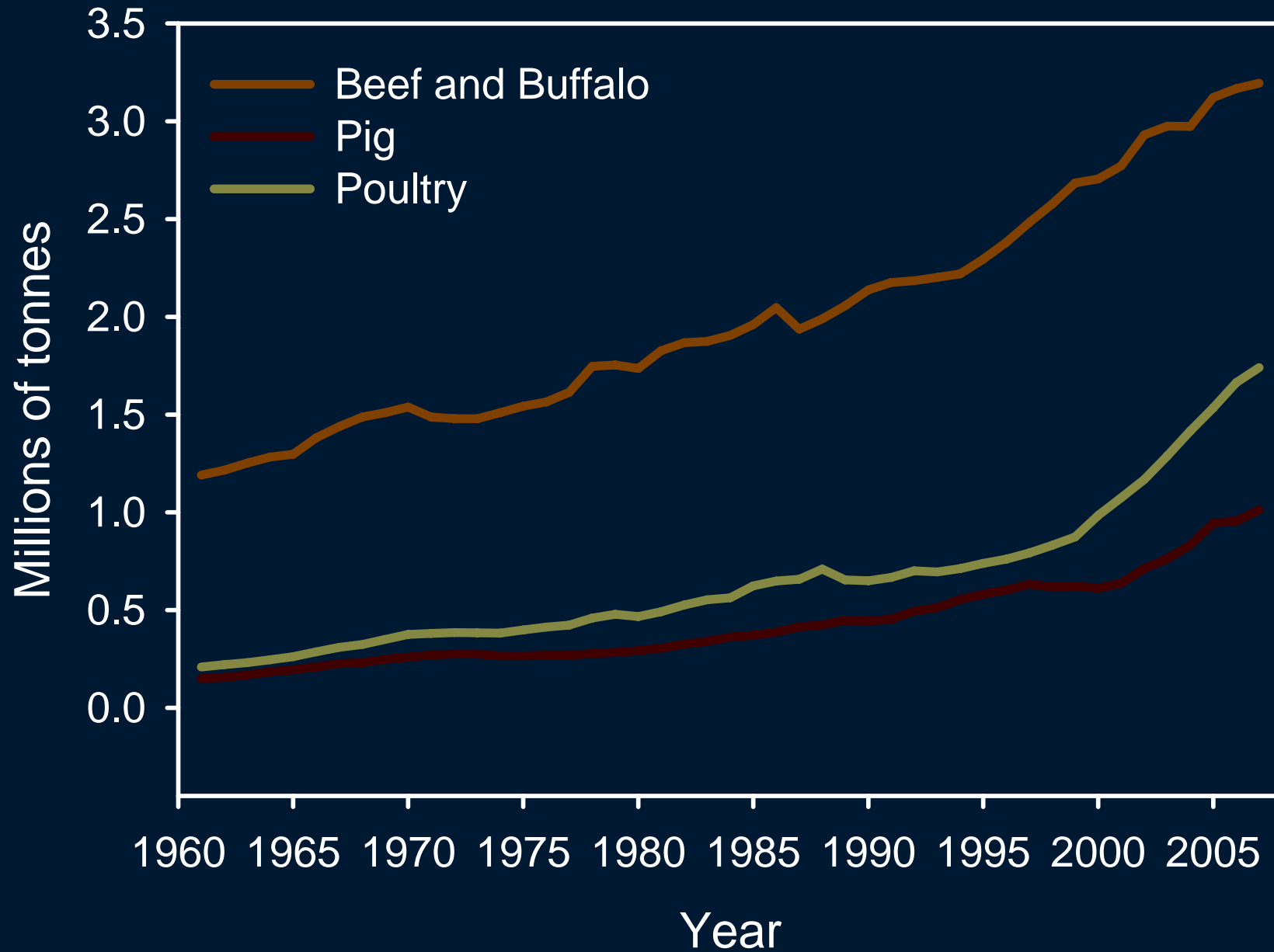
Selling Land



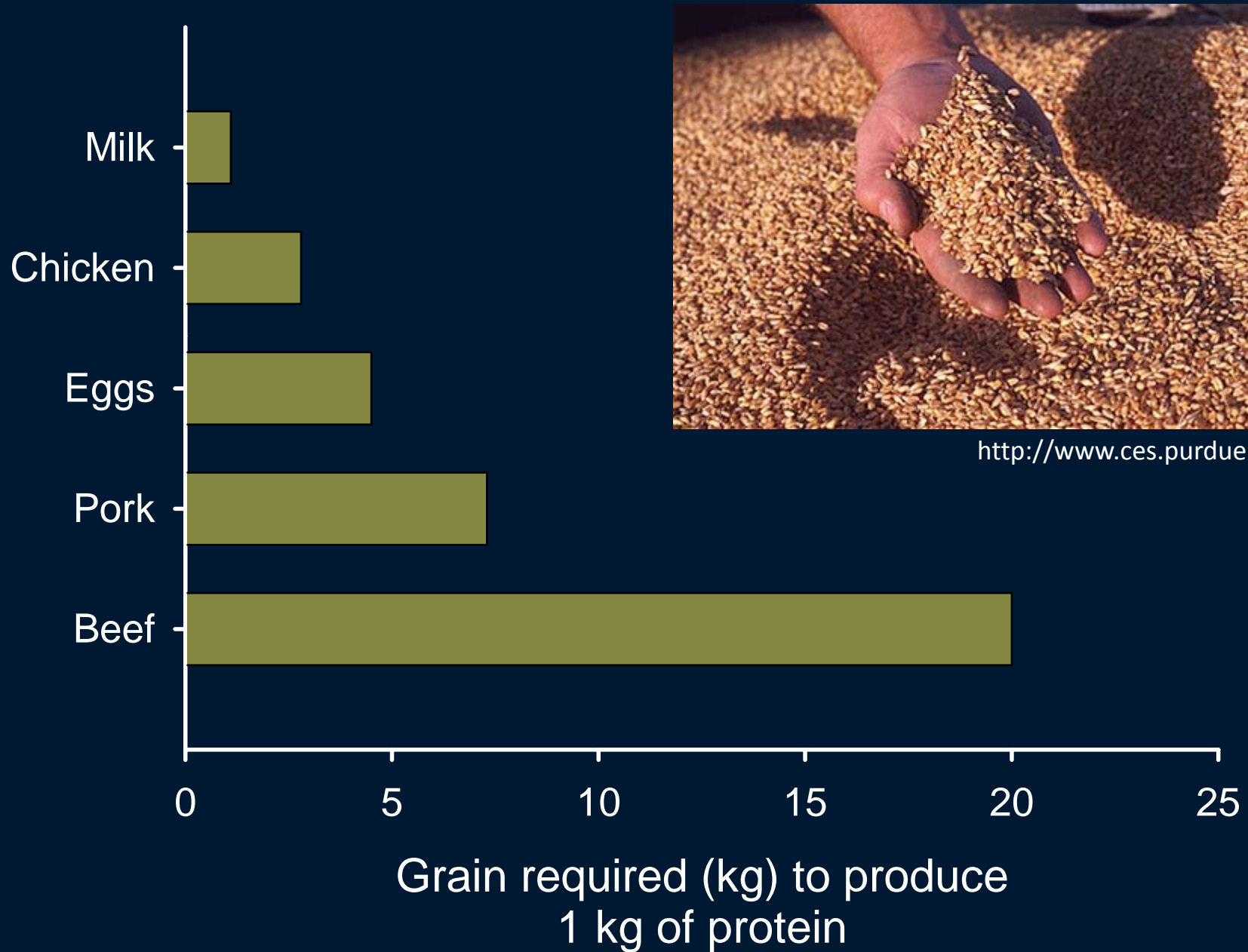
Purchasing Land

Countries that have bought and sold land for
meat and/or grain production

Meat Production – Developing Countries

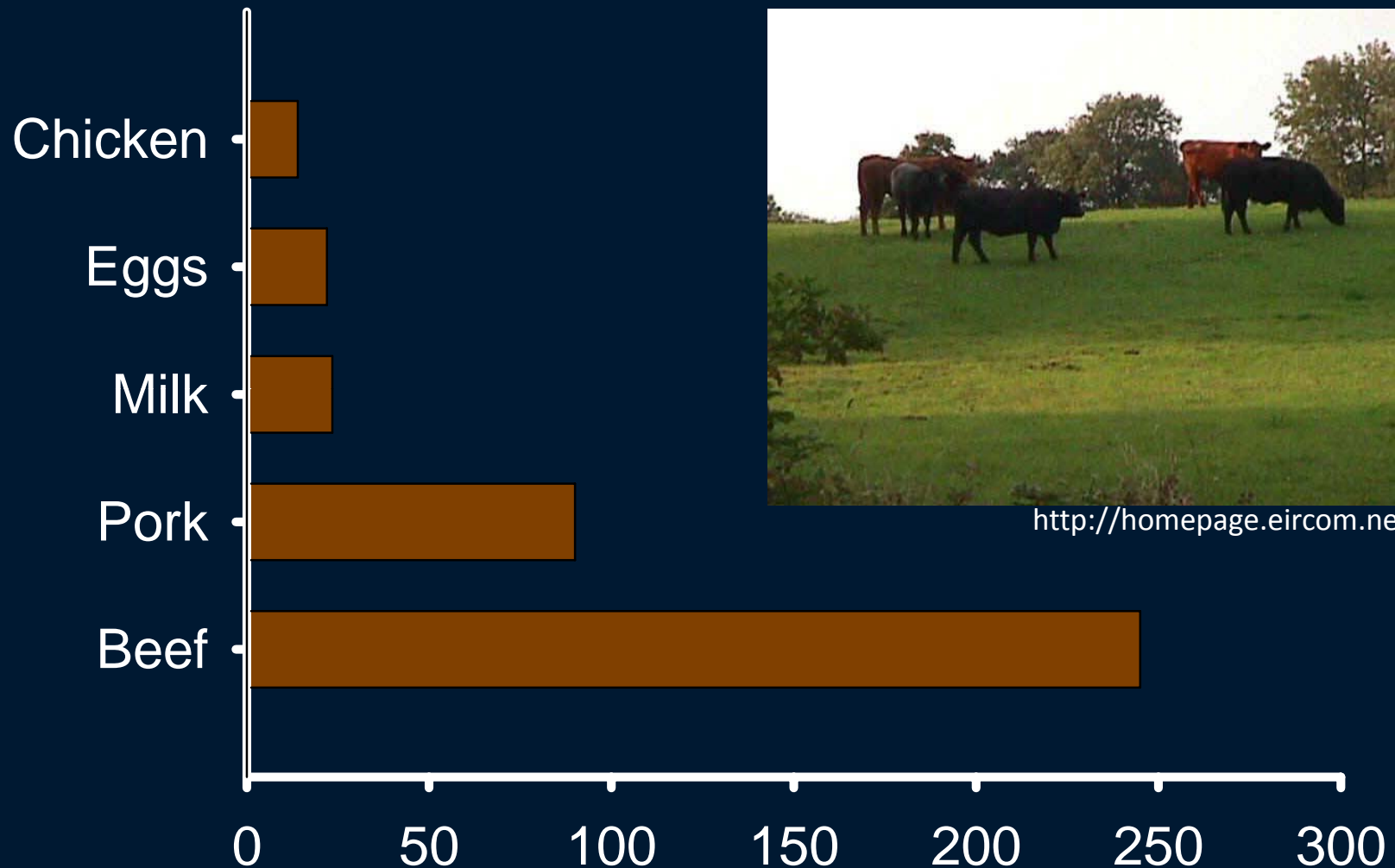


Meat Production - Grain



<http://www.ces.purdue.edu>

Meat Production - Land



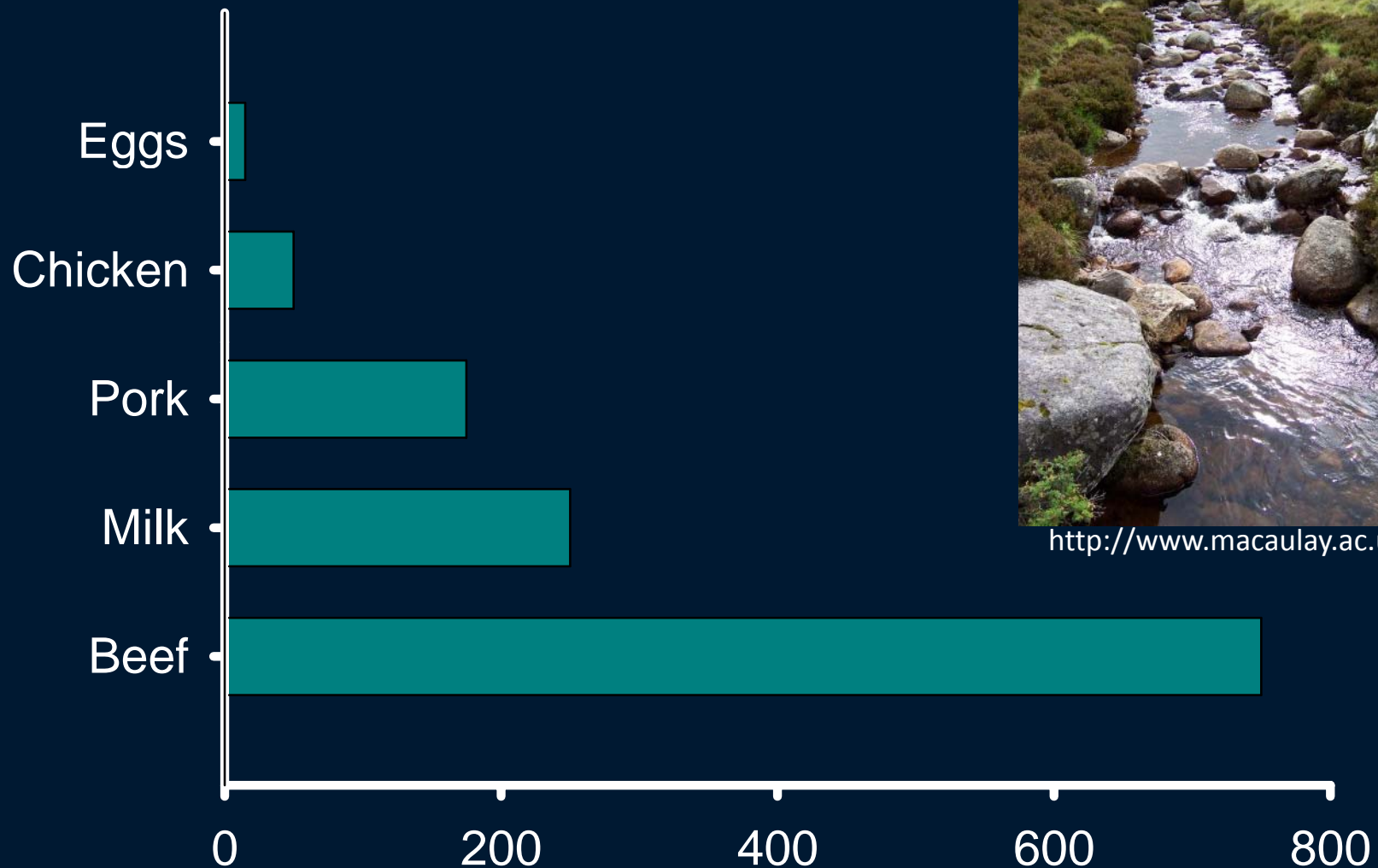
<http://homepage.eircom.net>

Land required (m²) to produce 1kg of protein



Gary Kazanjian – NY Times

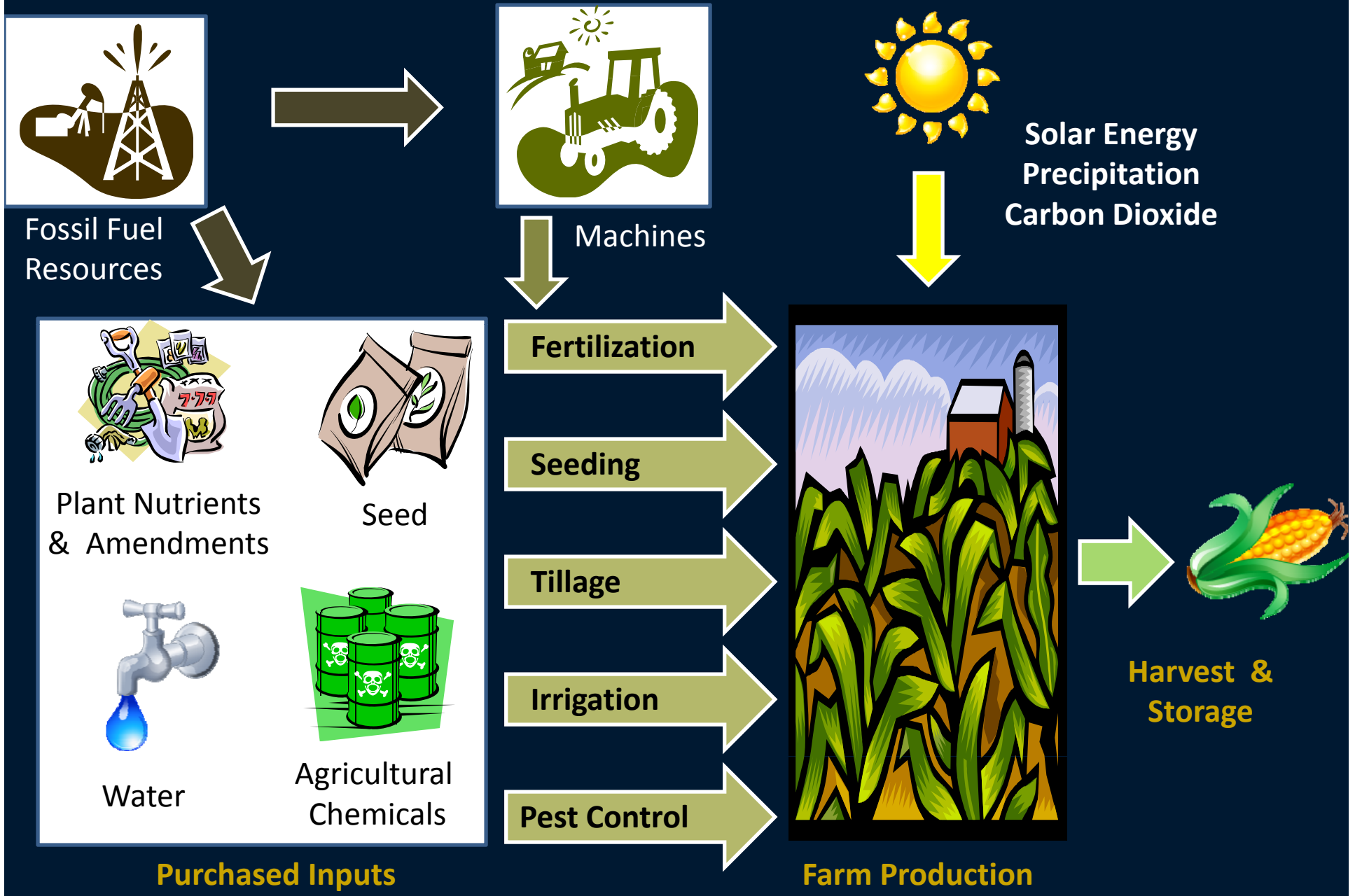
Meat Production - Water



<http://www.macaulay.ac.uk>

Water required (kg) to produce 1 kg of protein

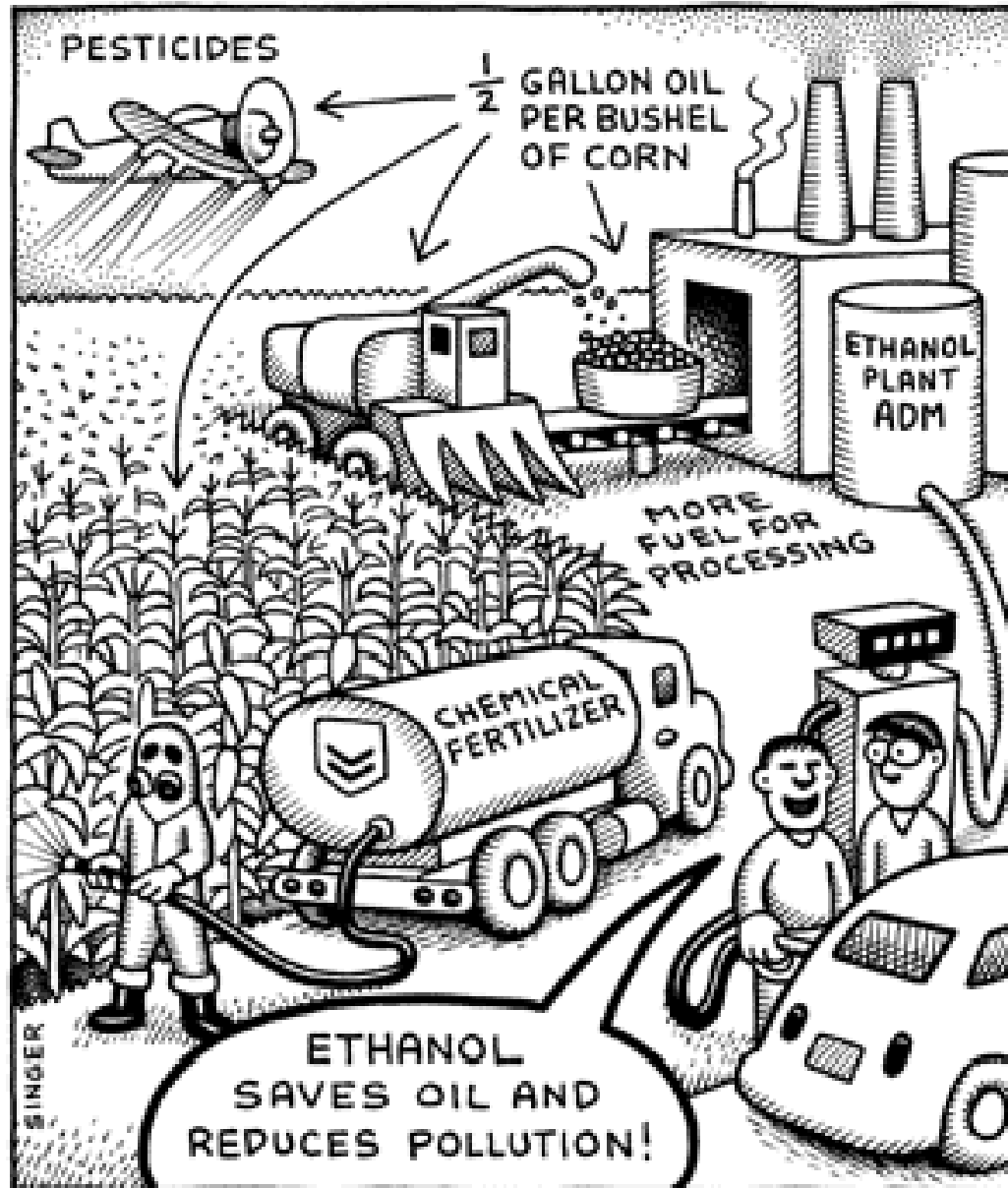
Monoculture – Input Intensive Farming



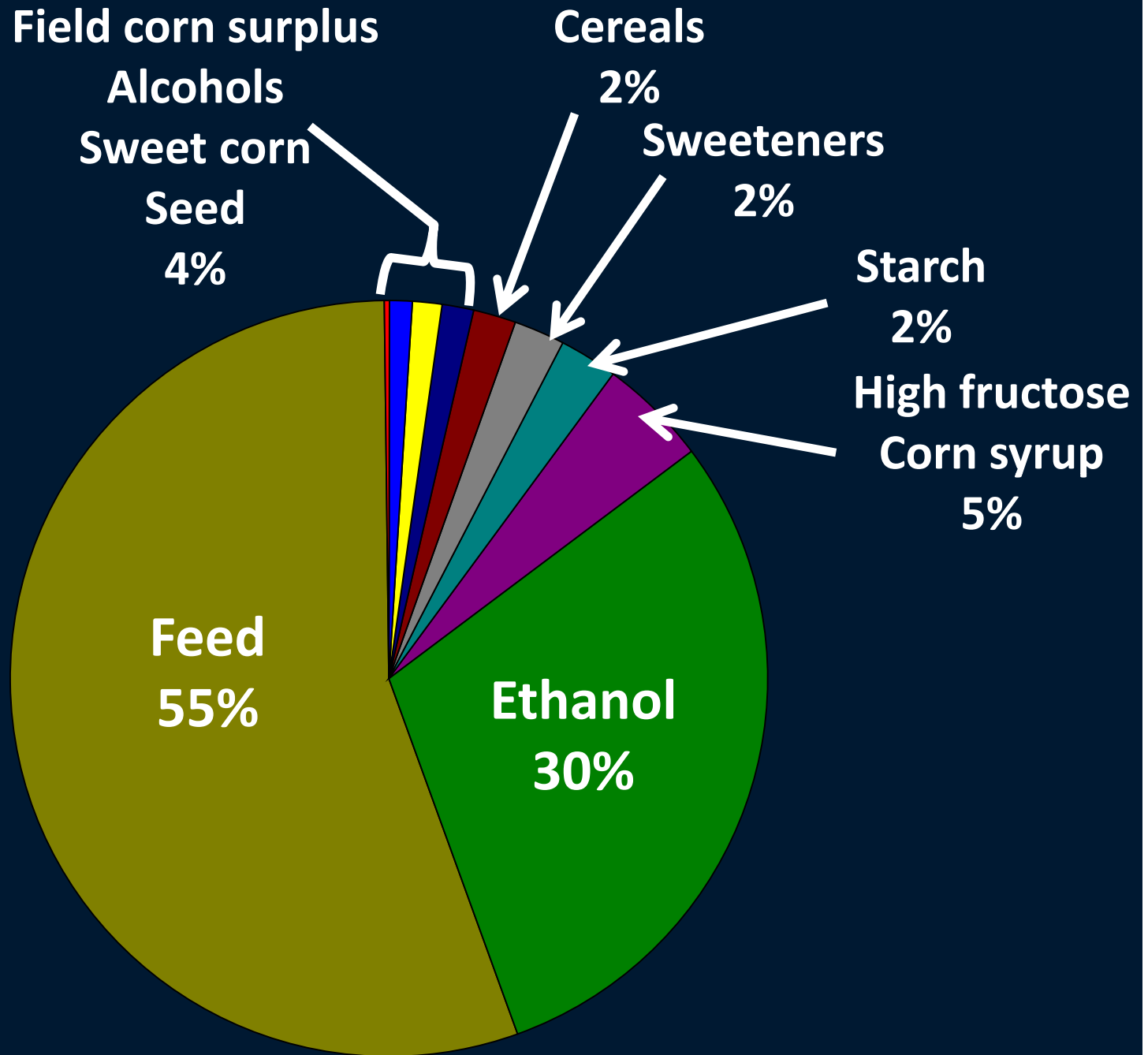
Biofuels

NO EXIT

© Andy Singer



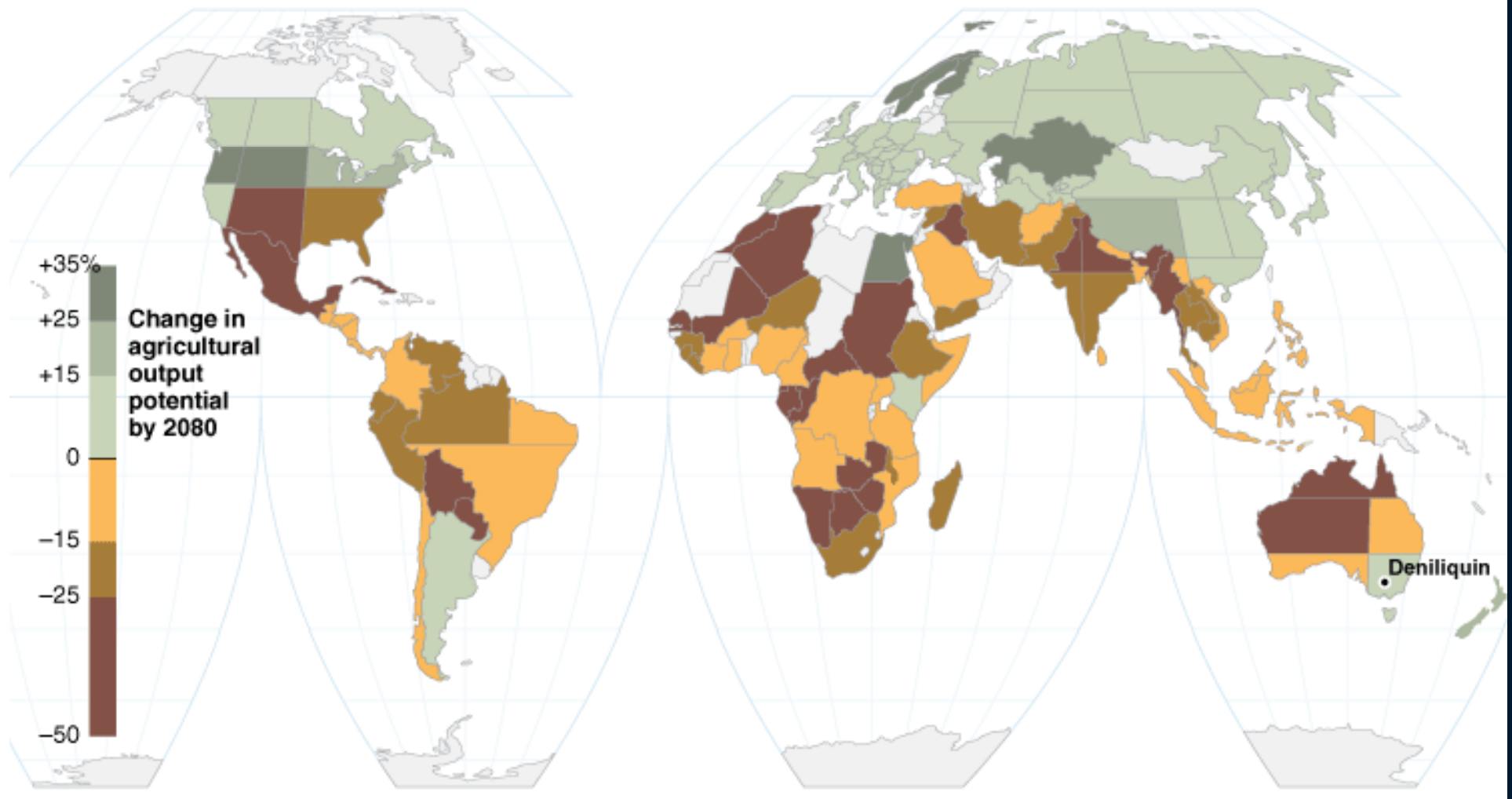
Biofuels



National Corn
Growers Association, 2008

Total Annual U.S. Non-Export Corn Production: 10.5 billion bushels

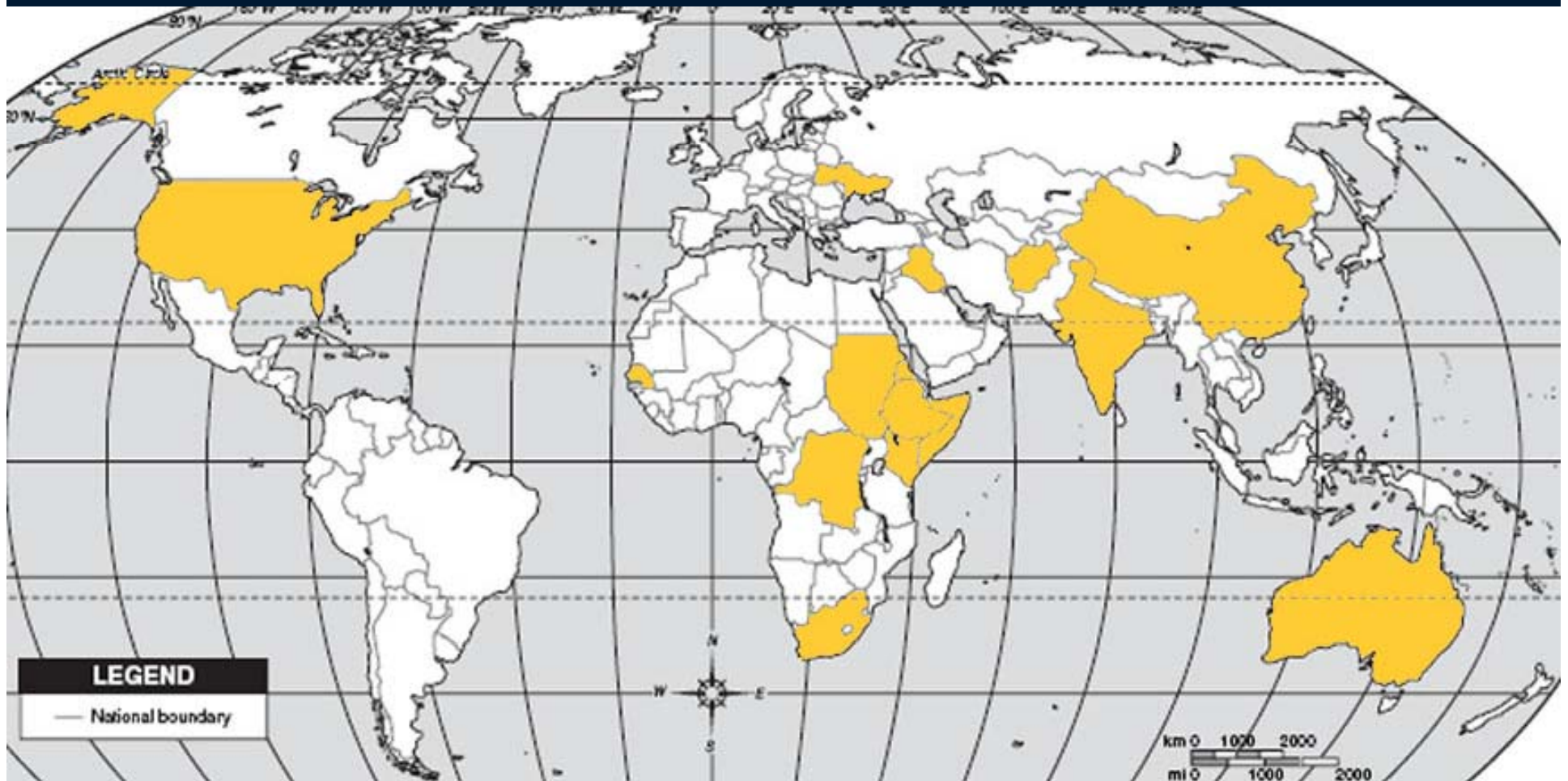
Global Climate Change



Graphic by the NY Times

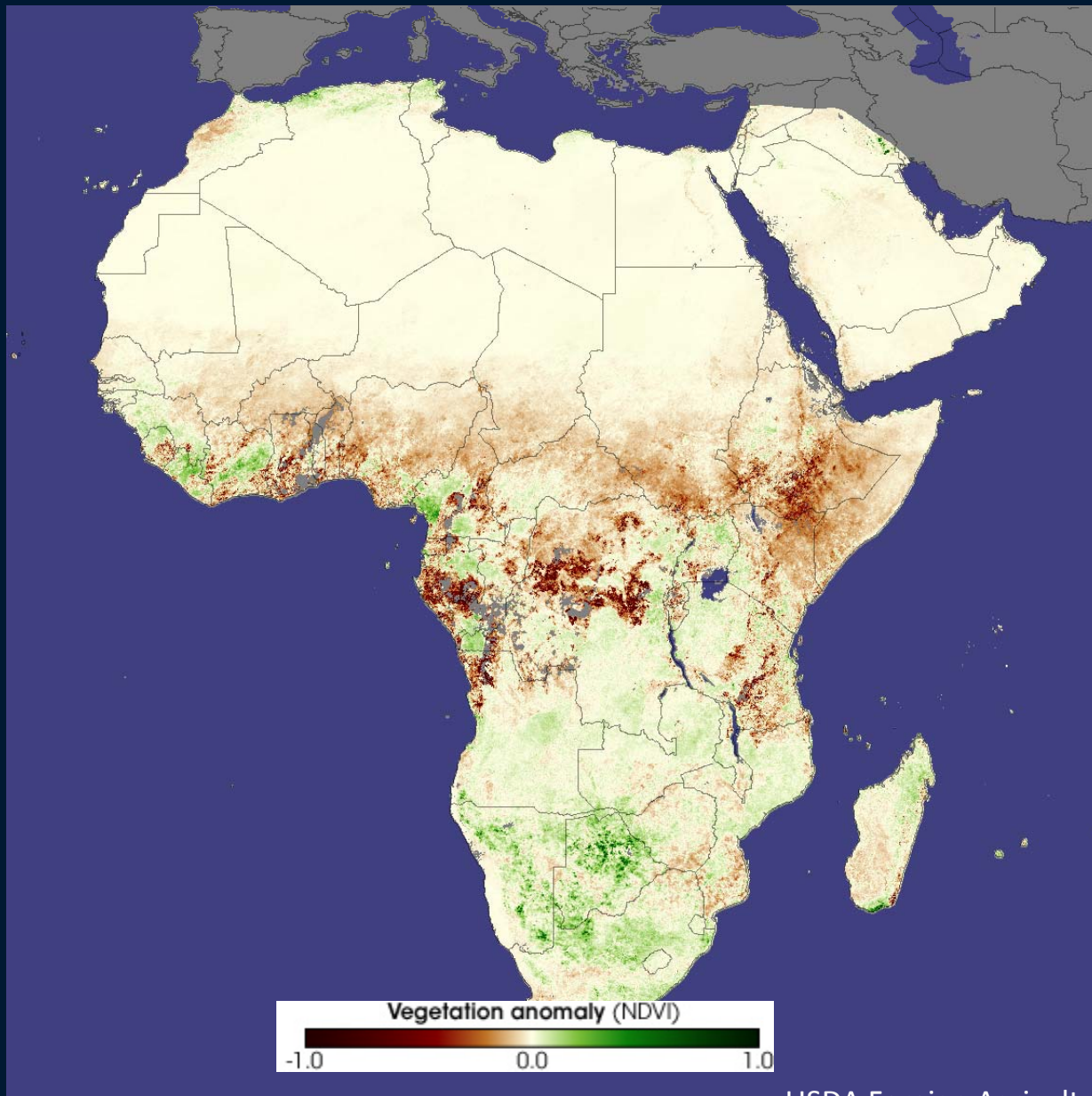
Data Source - "Global Warming and Agriculture: Impact Estimates by Country" by William R. Cine, Peterson Institute, 2007

Global Climate Change



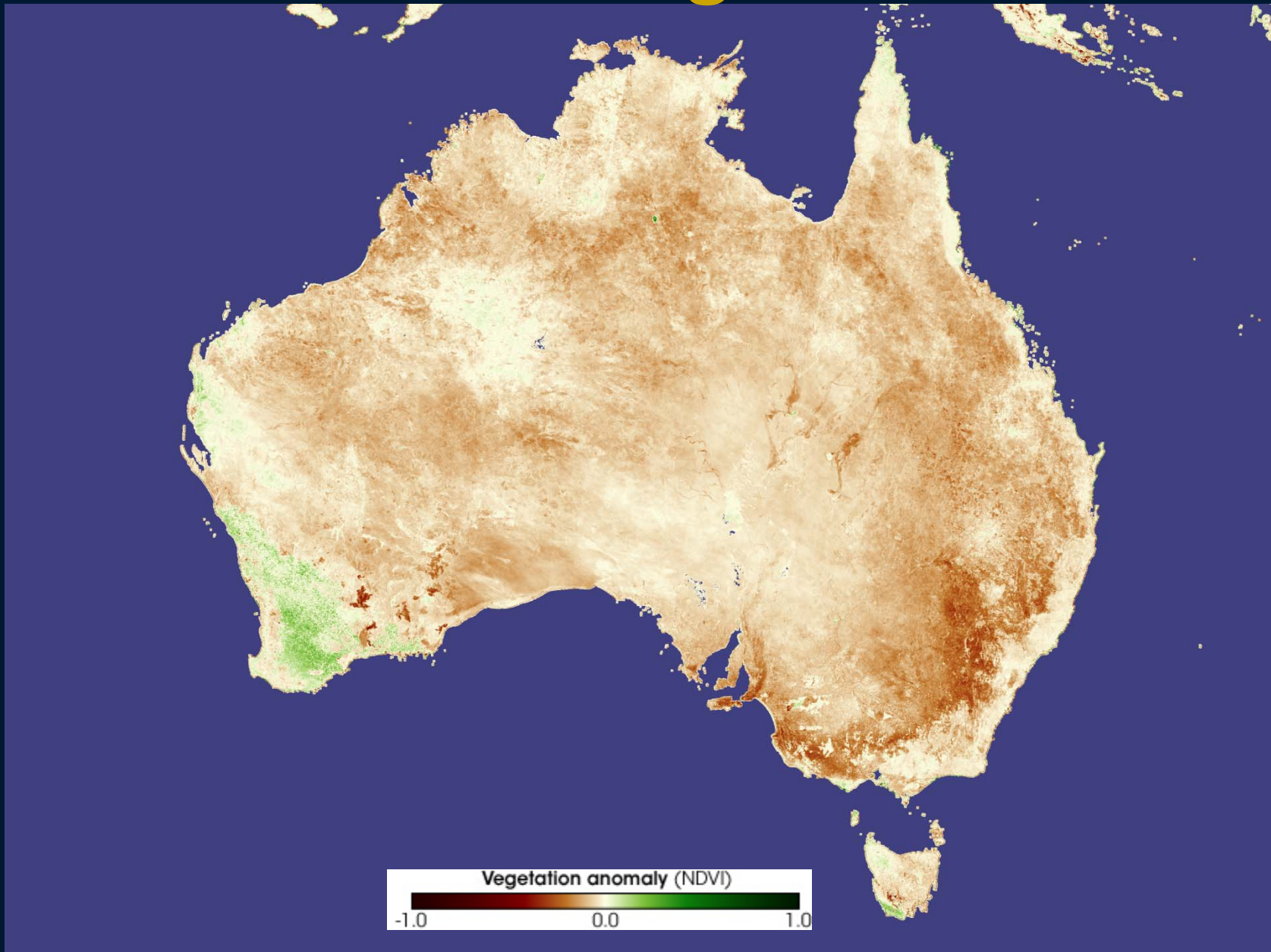
Countries that have experienced reductions in Food production due to extreme weather events (droughts and/or flooding) over the last several years

Global Climate Change



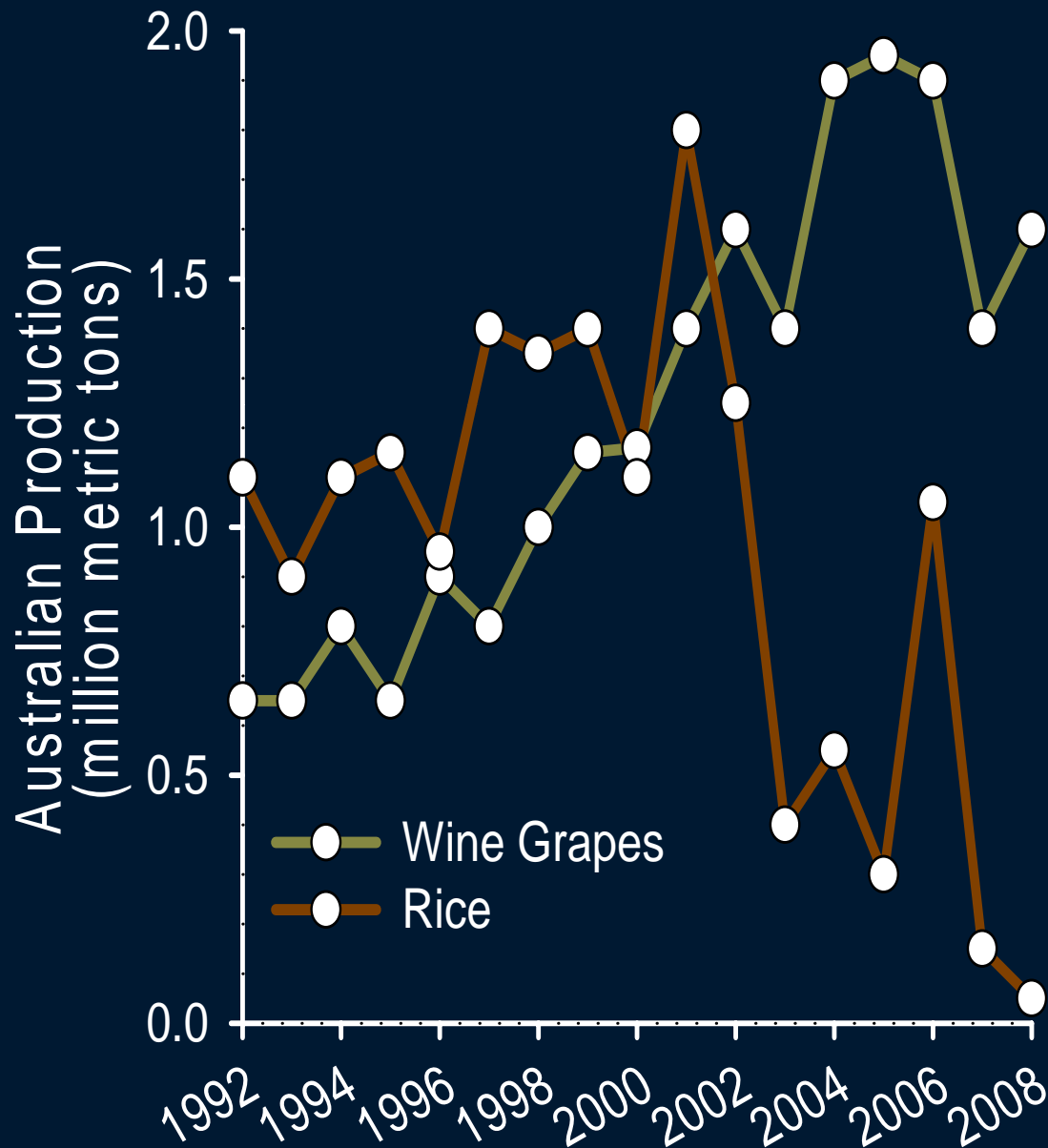
USDA Foreign Agricultural Service & NASA, 2005

Global Climate Change



USDA Foreign Agricultural Service & NASA, 2005

Global Climate Change

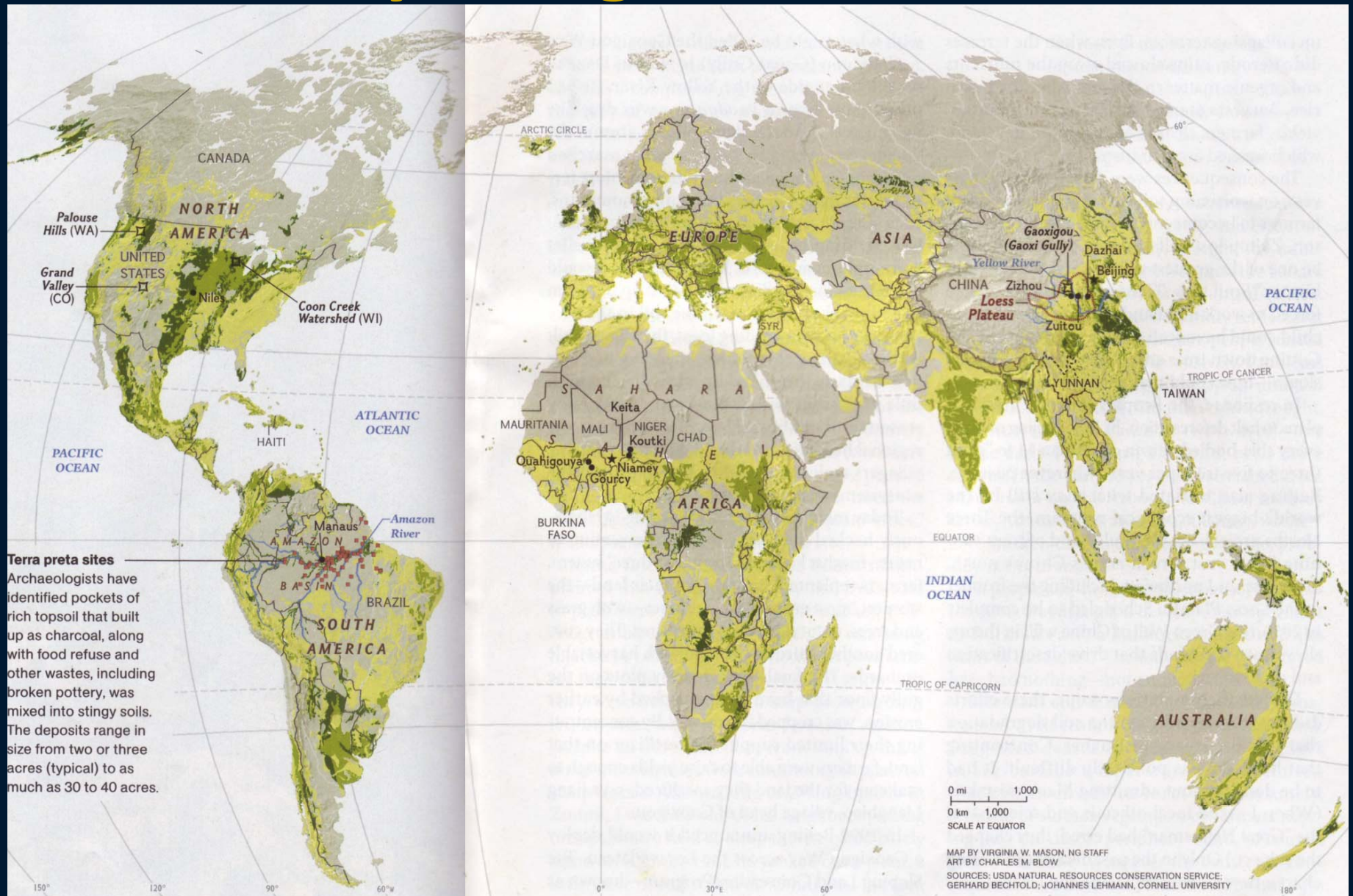


Justin Mott, NY Times

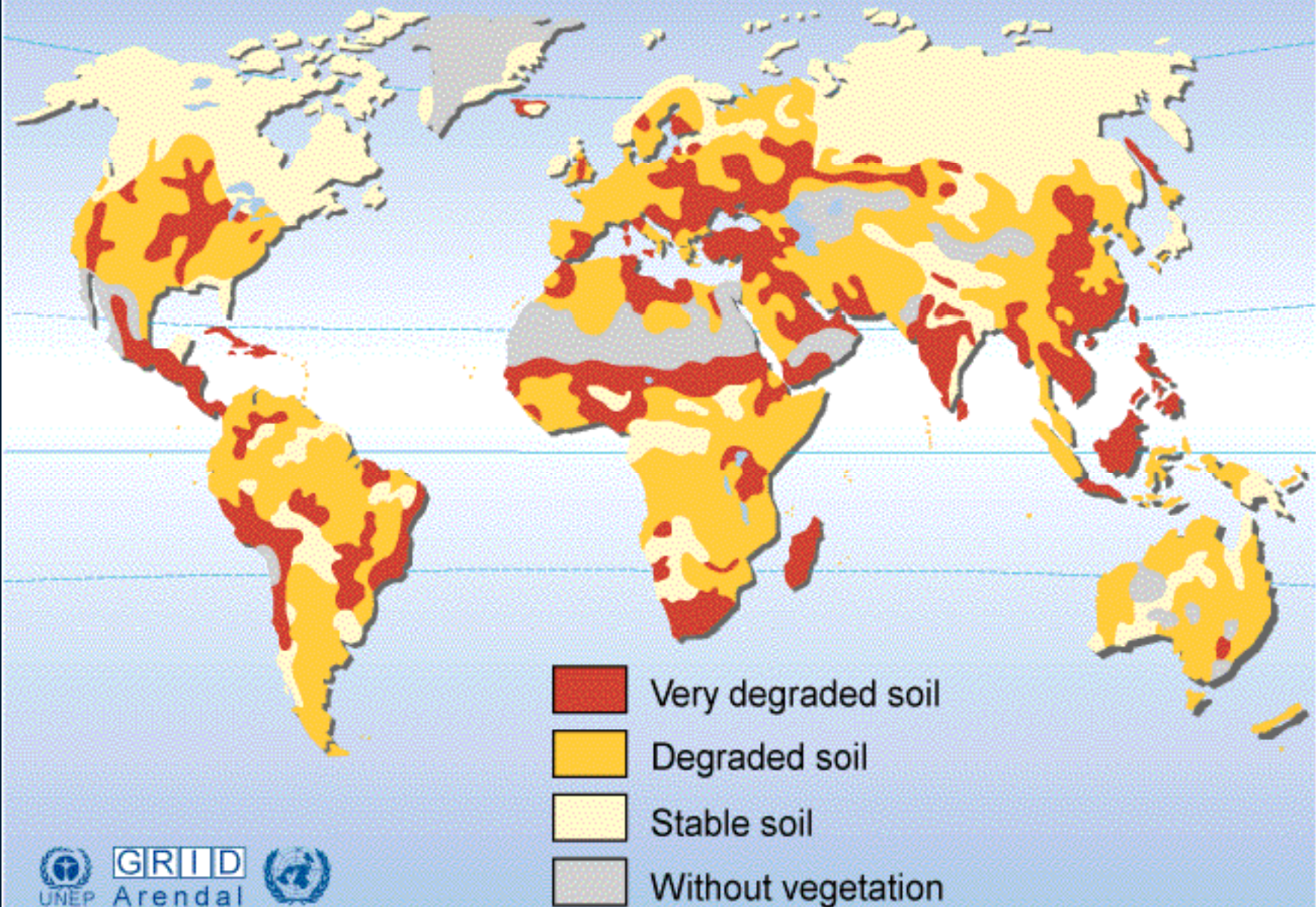


Amy Toensing

Soil Fertility / Degradation



Soil degradation



GRID
Arendal



Are we approaching another Food Revolution?



Copyright © 2007 Pearson Education, Inc., publishing as Benjamin Cummings



Opportunities and Challenges for Tomorrow's Global Food System

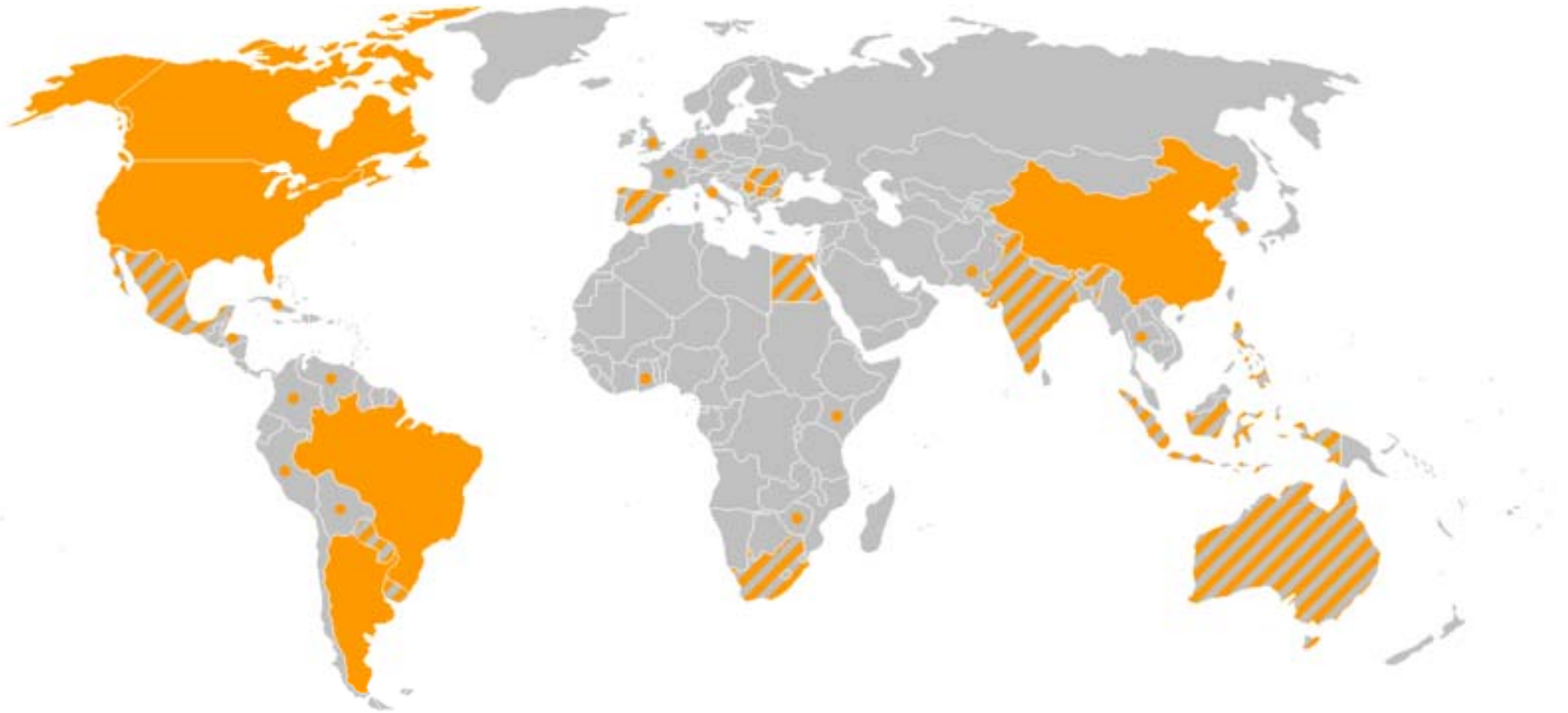
Part II – Needs and Opportunities...

Dr. Greg Pillar
Assistant Professor of
Environmental Science
and Chemistry

Increase Supply – GMOs

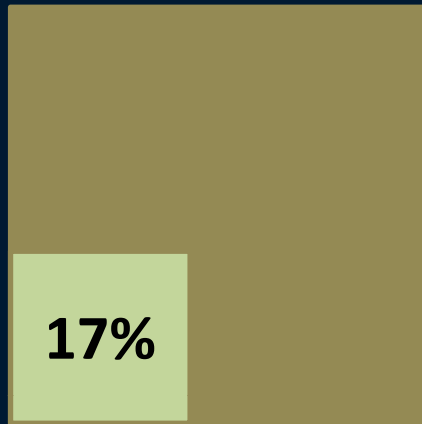


Increase Supply – GMOs



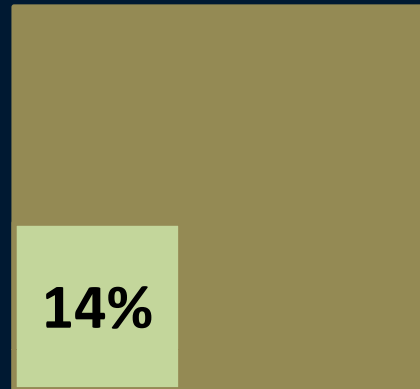
Land Use....

1.1 billion hectares



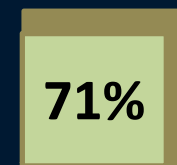
**Sub-Saharan
Africa**

1.0 billion hectares



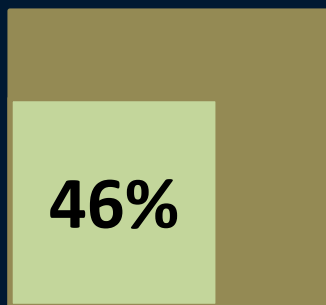
**Central/South
America**

0.20 billion hectares



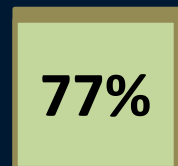
China

0.38 billion hectares



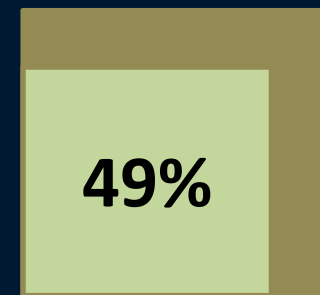
Europe

0.21 billion hectares





India

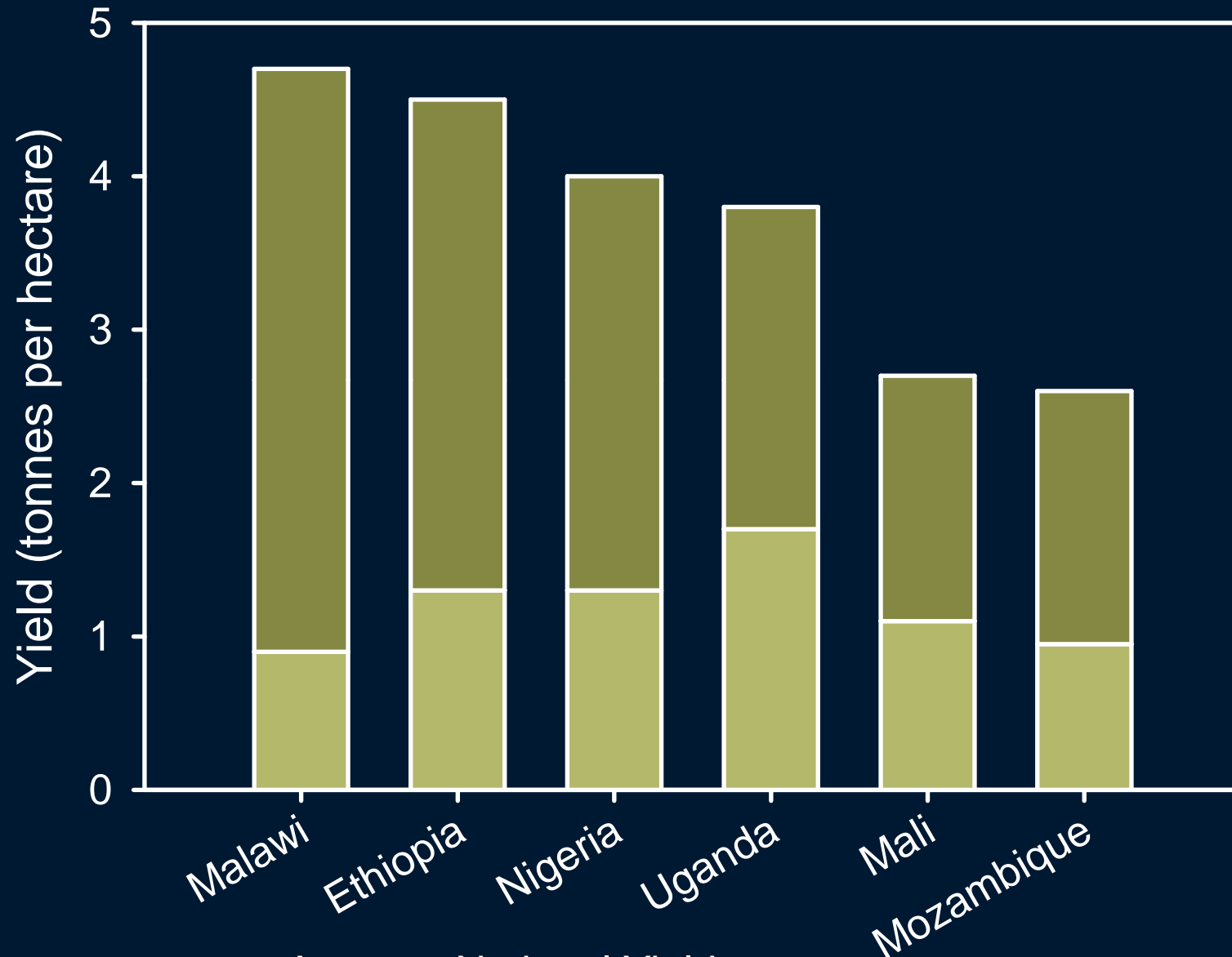
0.36 billion hectares



**United
States**

 Planted Crops
 Total Arable, Rain-Irrigated Land

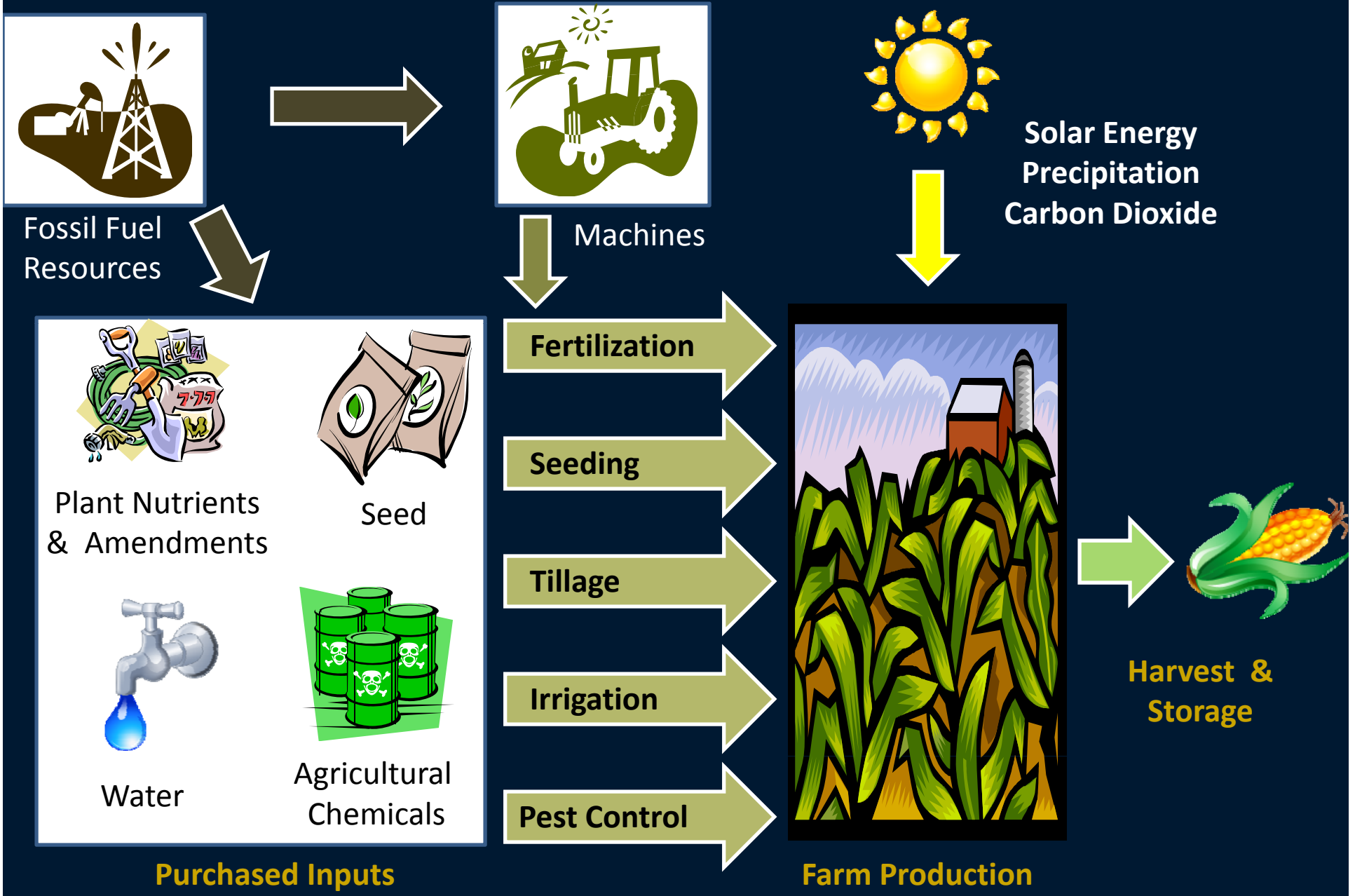
Increase Supply – Land Management



Legend:
Average National Yield
Potential Yield (Plot Demonstrations)

modified from Mackenzie, 2008

Reduce Inputs – Increase Production



Soil Fertility / Degradation

“The history of every nation, is eventually written in the way in which it cares for its soil”

-- Franklin D. Roosevelt



Photos by Jim Richardson, National Geographic

Increase Supply – Land Management



Urban Farming



Justin Sullivan / Getty

Urban Farming

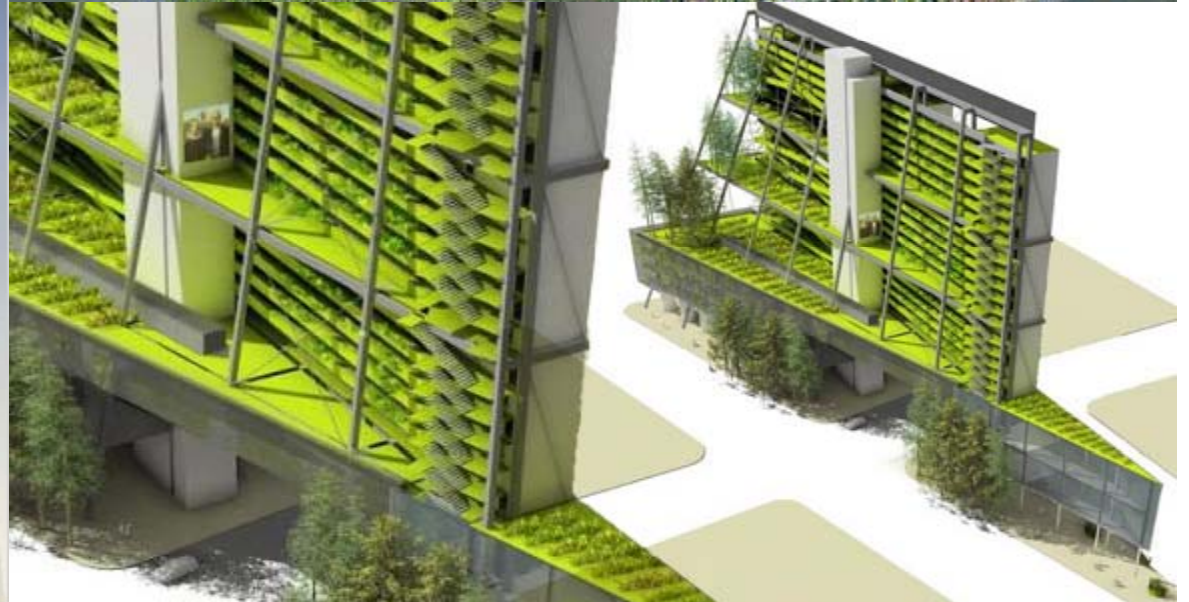


<http://riotofreasons.blogspot.com>

Urban Farming



<http://greensgrow.org>



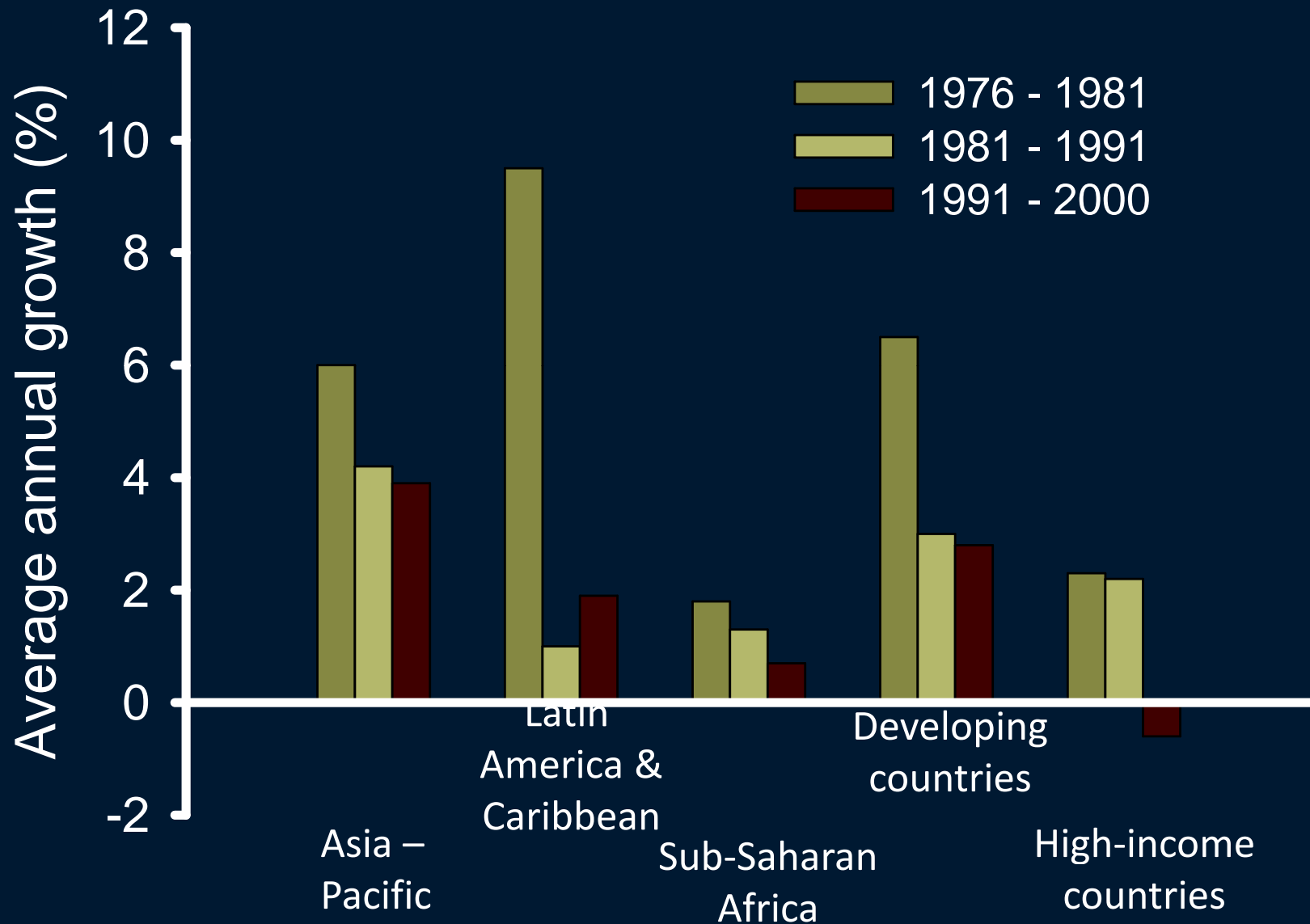
<http://gliving.com>

<http://activplace.com>

<http://www.verticalfarm.com/>

<http://greenbrooklyn.com>

Research and Development Spending



Modified from Pardey, Beintema, Dehmer and Wood, 2006

Food Sovereignty



Change the Culture



Thank You!

Dr. Greg Pillar

Assistant Professor of
Environmental Science
and Chemistry

Queens University of Charlotte

Web: <http://www.queens.edu>

Email: pillarg@queens.edu