

# **Short Term Thinking Leads to Satisfying, Pyrrhic Victories.**

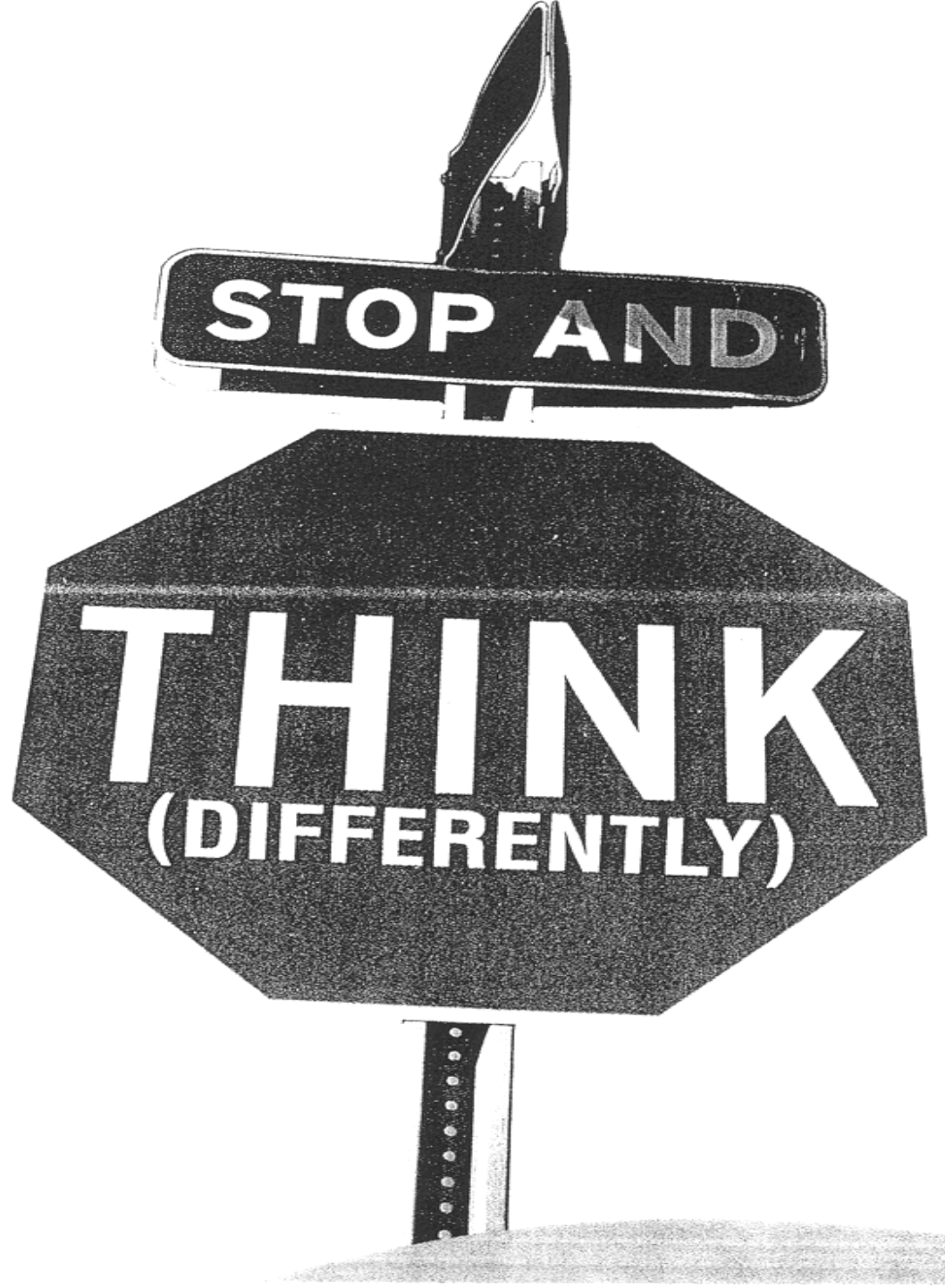
**Stay Ahead of the  
Waves of Change !**

Martin Apple, PhD

President

Council of Scientific Society Presidents

<http://thecssp.us>



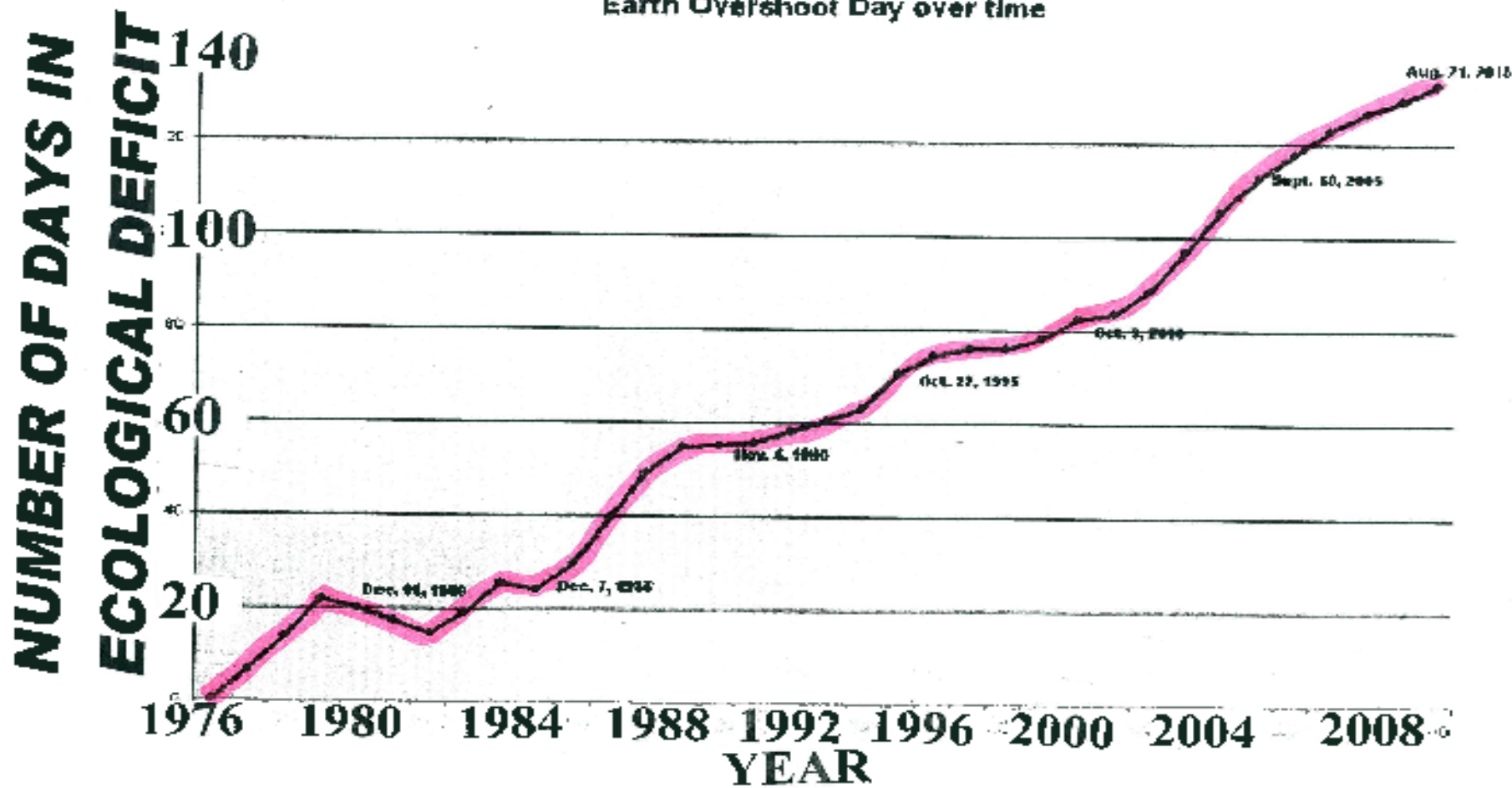
**Make 21st  
Century  
Novel Food  
Crops by  
Writing  
New DNA  
Code in  
Food  
Sources?**

# Science Sustainability Challenges & Food Security

- **1] New economic system not dependent on either population growth nor biosphere damage.**
- **2] Restoration of global land and water ecosystems to state of vibrant flourishing.**
- **3] Morally acceptable substantial cutback in global population to fit Earth's eco-capacity.**
- **4] Affordable, sustainable energy that improves ecosystem health across our fragile Biosphere.**
- **5] Sustainable, sufficient, clean, fresh water**
- **6] Interlacing dozens of new sciences/technologies to find creative new solutions to daunting problems and stimulate new knowledge growth**

# # Days/Yr Human Demand (as calculated by the Ecological Footprint) *exceeds* Nature's Supply (as calculated by Biocapacity.) 1975-2010

Earth Overshoot Day over time



# London School of Economics 2009 Study

**Birth control may be the world's best tool for fighting climate change. By preventing the creation of new polluters, contraceptives are a far cheaper solution than windmills and solar plants**

**In USA each baby → 1,644 tons of CO<sub>2</sub>, most from coal fired power & vehicle use.**

**Found that \$220 billion, spent over the next 40 years, might prevent half a billion births and prevent 34 billion tons of CO<sub>2</sub>. The cost, measured in 2020, would be about \$7 for each ton reduced, -- far cheaper than solar power at \$51, or wind power at \$24.**

# **Food Production: Key Reason Ecosystems Degrade**

- **Habitat conversion:** Approximately 43 percent of tropical and subtropical forests and 45 percent of temperate forests have been converted to croplands.
- **Overexploitation:** >70 percent of global freshwater is used for agriculture (consumptive use).
- **Invasive species:** Introduction of aquatic alien fish species has led to the extinction of native species across the world.
- **Pollution:** Only a fraction of the Nitrogen applied as fertilizer is used by plants, the rest ends up in inland waters and coastal systems, creating eutrophication and dead zones.
- **Climate change:** Agriculture directly contributed to around 14 percent of global greenhouse gas emissions in 2005 and drives additional emissions through its role in deforestation.

# **Re-think Food Production Model** (WRI)

## **Today's Approach**

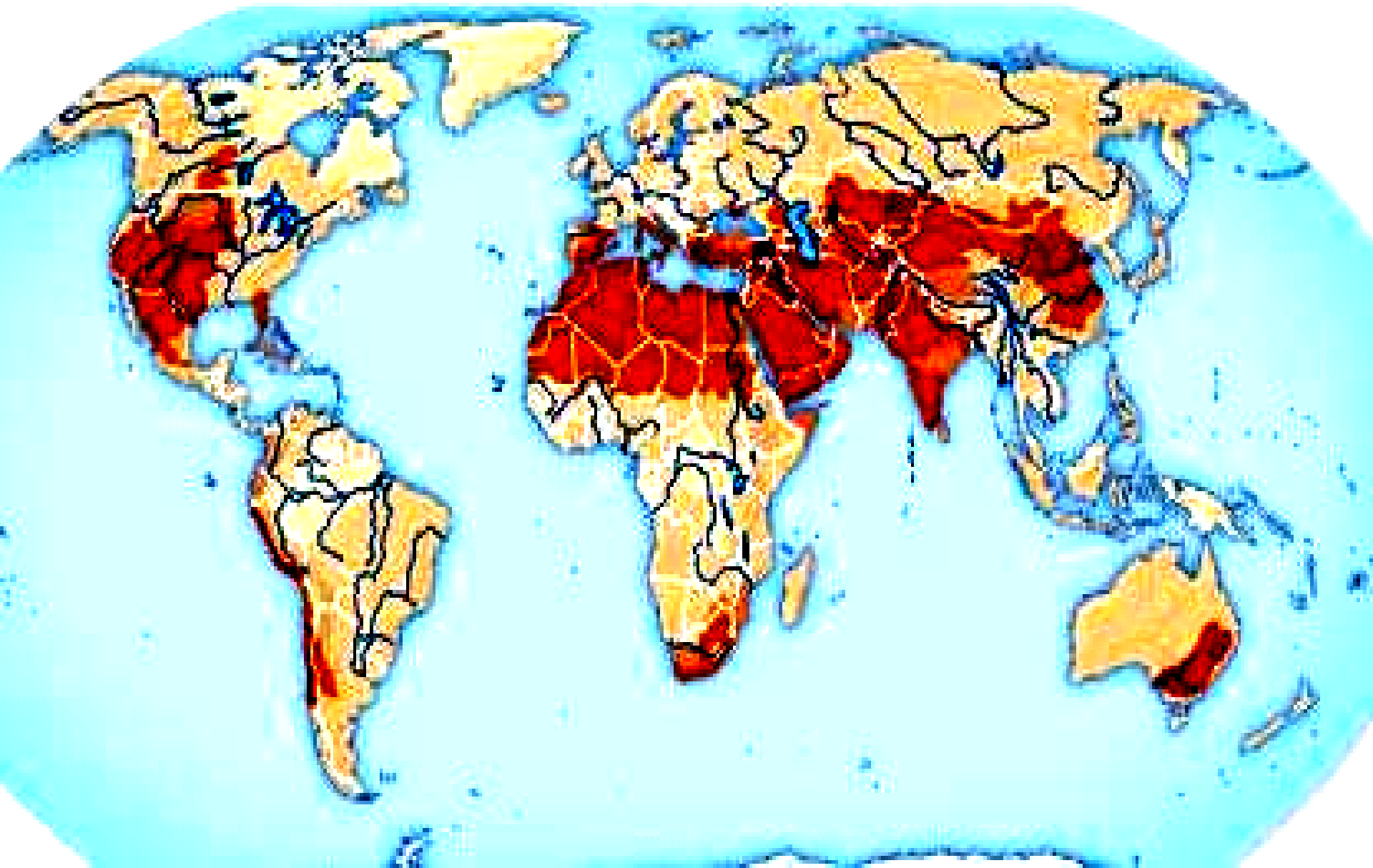
- **Expand Food Production into Forests**
- **Focus Efficiency on Labor, Machinery**
- **Increase Yield Through Increased Inputs**
- **Manage for Predictable Output**

## **Needed By Tomorrow**

- **Restore Degraded Land for Food Production**
- **Focus Efficiency on Land Stewardship, Water, Ecosystem Resources, Energy**
- **Increase Yield Through Crop Diversity, Climate Adaptation, Cutting Food Waste, Input Efficiency**
- **Manage for Climate Change Uncertainty**

# Rapid Decline in Water Tables (red)

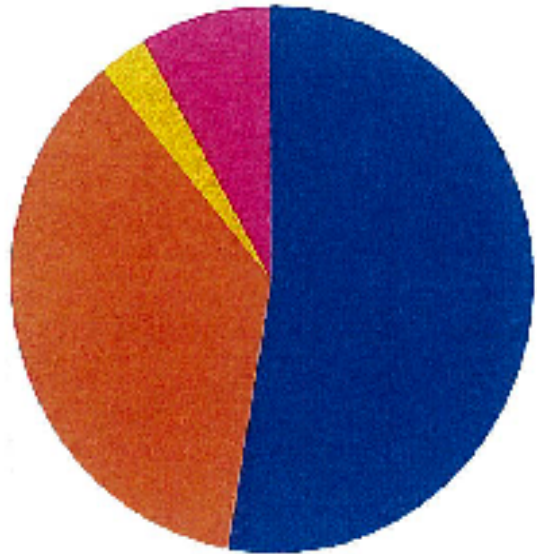
Glassman 2011







# Growing Food: Water Requirements Vary Widely: Diet Matters

<b>Crop/Food</b>	<b>Water Requirement</b> <u>(KiloGm of water per KiloGm of food)</u>
<b>Potato</b>	500 to 1,500
<b>Wheat</b>	900 to 2,000
<b>Alfalfa</b>	900 to 2,000
<b>Sorghum</b>	1,100 to 1,800
<b>Corn/Maize</b>	1,000 to 1,800
<b>Rice</b>	1,900 to 5,000
<b>Soybeans</b>	1,100 to 2,000
<b>Chicken</b>	3,500 to 5,700
<b>Beef</b>	15,000 to 70,000

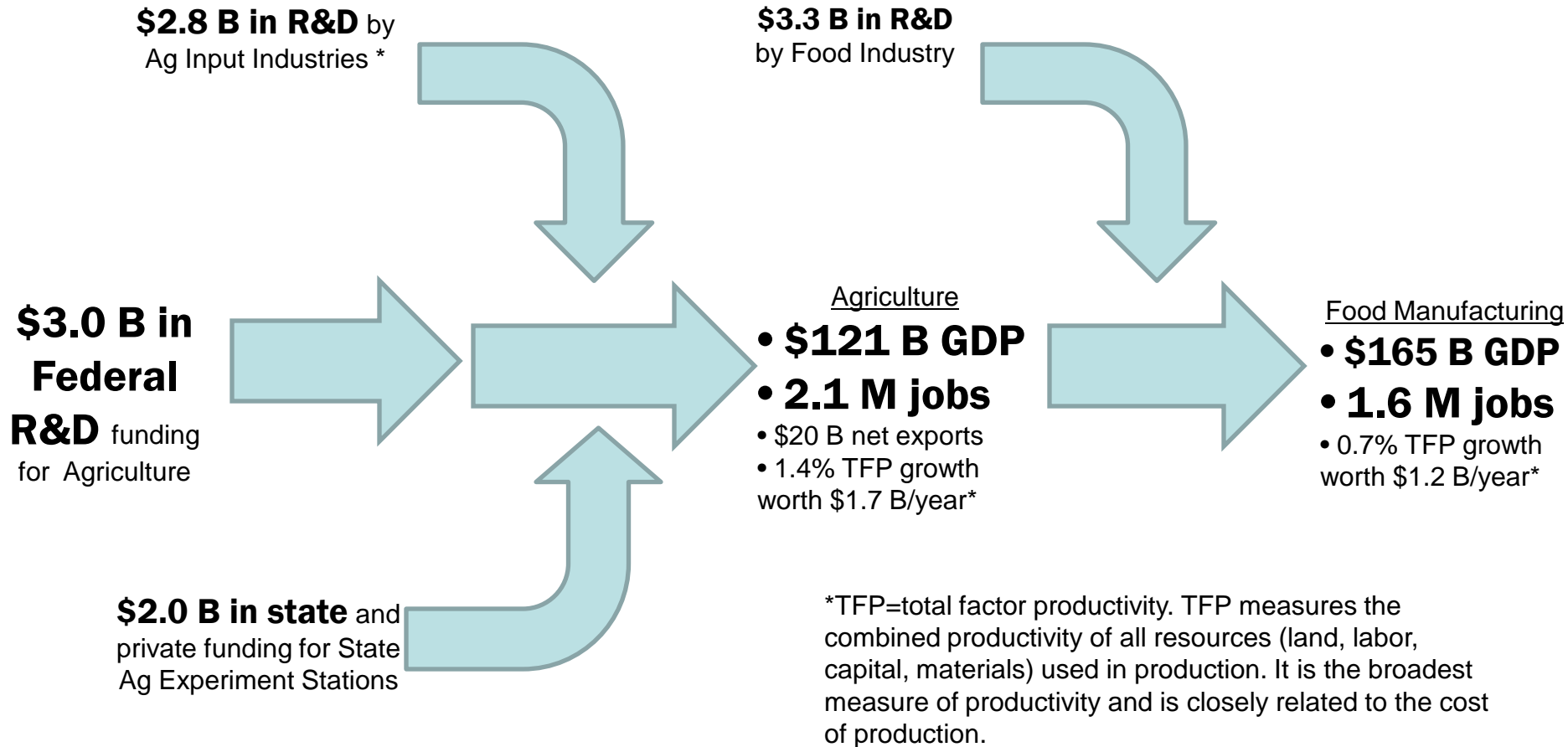
# How Important Do You Think Scientific Research Is To Job Creation and Economic Recovery?



	Very important	<b>53%</b>
	Somewhat important	<b>36%</b>
	Not too important	<b>3%</b>
	Not at all important	<b>8%</b>

SOURCE: NATIONAL POLL, MAY 2010, CHARLTON RESEARCH COMPANY FOR RESEARCH!AMERICA

# Macroeconomic Impact of U.S. Ag R&D



Sources: Public ag R&D from CRIS; **Ag input R&D are preliminary estimates from unpublished ERS study (in review)\***; **Food industry R&D and GDP from OECD. Employment and food manufacturing TFP from BLS. Ag TFP growth from ERS. Figures are for 2006 except TFP growth which is 2000-08 annual average.**

# Why Science in Time of Economic Crisis?

## SCIENCE BUILDS OUR NATIONAL COMPETITIVE EDGE

- **Science, the Discovery of New Knowledge, is the FOUNDATION of.....**

Our National Innovation...

Our National Security...

New Jobs, New Markets...

Healthier Environment...

Your Family's Health...

**Strong Support of Science is in the National Interest !**