Global Food Systems & Conservation
in an Age of Weather Variability

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SVP Markets
WWF-US
“If you don’t know where you’re going, any road will get you there.”
global food

40 years = 8,000 years
population × consumption
$\times 1 = 7$

$\times 2 = 18$
Global trends by 2050

Source: United Nations
70% will live in cities
### The China phenomenon

<table>
<thead>
<tr>
<th>Country (Year Range)</th>
<th>Population at start of growth period</th>
<th>Years to double GDP per capita$^1$</th>
</tr>
</thead>
<tbody>
<tr>
<td>Britain (1700-1855)</td>
<td>9M</td>
<td>155</td>
</tr>
<tr>
<td>US (1820-1873)</td>
<td>10M</td>
<td>53</td>
</tr>
<tr>
<td><strong>China (1983-1995)</strong></td>
<td>1,023M</td>
<td><strong>12</strong></td>
</tr>
<tr>
<td>India (1989-2006)</td>
<td>822M</td>
<td>17</td>
</tr>
</tbody>
</table>

1 Time to increase GDP per capita (in PPP terms) from 1,300 to 2,600 USD  

Source: Angus Maddison, University of Groningen

China doubling of GDP was **12x** the speed of Britain during the Industrial Revolution at **100x** the scale  

400 million lifted out of poverty
Countries with >5% GDP growth (2010-2011)

Countries where China is a top trading partner

Source: UN Comm Trade
Commodity prices

Source: Grilli and Yang; Stephan Pfaffenzeller; World Bank; International Monetary Fund (IMF); Organisation for Economic Co-operation and Development (OECD); UN Food and Agriculture Organization (FAO); UN Comtrade; McKinsey analysis
we need more from less
we must make production more efficient

intensification is key
choose your system

productivity needs to double
we can’t afford to focus on everything or just one thing
we have to be strategic
the issue isn’t **what** to think

it’s **how** to think
on a finite planet, should consumers have a **choice** about sustainable products?

or should **all choices** be more sustainable?
Total greenhouse gas emissions by supply chain tier associated with household food consumption in the U.S.

- Red meat
- Dairy products
- Cereals/carbs
- Fruits/vegetables
- Chicken/fish/eggs
- Other misc.
- Beverages
- Oils/sweets/condiments

Climate impact (metric tons CO₂e/household-yr)

World daily caloric intake

<table>
<thead>
<tr>
<th></th>
<th>Direct Consumption</th>
<th>Indirect Consumption (animal feed)</th>
</tr>
</thead>
<tbody>
<tr>
<td>wheat</td>
<td>560</td>
<td>540</td>
</tr>
<tr>
<td>rice</td>
<td>375</td>
<td>326</td>
</tr>
<tr>
<td>corn</td>
<td>245</td>
<td>245</td>
</tr>
<tr>
<td>sugarcane/beet</td>
<td>185</td>
<td>185</td>
</tr>
<tr>
<td>soybeans</td>
<td>65</td>
<td>65</td>
</tr>
<tr>
<td>potatoes</td>
<td>60</td>
<td>60</td>
</tr>
<tr>
<td>palm oil</td>
<td>50</td>
<td>50</td>
</tr>
<tr>
<td>barley</td>
<td>45</td>
<td>45</td>
</tr>
<tr>
<td>sorghum</td>
<td>45</td>
<td>45</td>
</tr>
<tr>
<td>sunflowers</td>
<td>44</td>
<td>44</td>
</tr>
<tr>
<td>cassava</td>
<td>43</td>
<td>43</td>
</tr>
<tr>
<td>rapeseed</td>
<td>42</td>
<td>42</td>
</tr>
<tr>
<td>peanuts</td>
<td>40</td>
<td>40</td>
</tr>
<tr>
<td>cotton seed oil</td>
<td>12</td>
<td>12</td>
</tr>
</tbody>
</table>
World farmed seafood and beef production, 1950-2012

Source: EPI based on FAO, USDA
Earth Policy Institute – www.earth-policy.org
beef takes 60% of land, produces 1.3% of calories.
Environmental impact of U.S. beef production reduced by improved productivity

*all values expressed per lb of beef produced

food security is national security
Top food exporting countries, 2002-12 (oilseed & cereals)
Drought-affected countries, 2012
Increase in demand
trade barriers for food are greater than any other sector
Agricultural subsidies

$19 \text{ B/year} \ (US) \\
$67 \text{ B/year} \ (EU) \\
$140-\$160 \text{ B/year} \ (China) \\
$10 \text{ or } \$52 \text{ B/year} \ (Brazil)$
so, where are the biggest agricultural subsidies?
40% for food

Source: UMN Global Landscapes Initiative
5% desert
18% mountains, lakes, rivers
2% cities
12% parks
23% more for food by 2050
Countries where parks have been downgraded or taken off the books entirely (1990-2013)

Source: WWF PADDtracker.org
freeze
the footprint of food
weather
Variability
heat waves
drought
floods
hurricanes
fires
Global drought forecast 2030-2039

Source: UCAR, PDSI 2012
Extreme weather—food

• Food security for rural & urban poor
• Loss of rural income
• Increased ambiguity about planting
• Productivity gains eroded
• Increased variability—but negative impacts are more common
US 2012 drought

• By 2013 soil moisture had not recovered
• Recharge required 16” of rainfall over normal
• Recharge with normal rains requires 2-3 years
• Continued drought compounds yield declines and recovery times
• Soil organic matter “burns”, affecting future yields and profits

Credit: Associated Press

Source: University of Missouri School of Natural Resources, 2013
Suitability of cocoa production

Current

Suitability
- Barely
- Marginal
- Good
- Very good
- Excellent

Source: Armando Isaac Martinez, a.i.martinez@cgiar.org; Narioski Castro
Suitability of cocoa production

Source: Armando Isaac Martinez, a.i.martinez@cgiar.org; Narioski Castro
Land suitable for coffee cultivation - Mexico

Source: Adapted from 'Escenarios del Impacto del Clima Futuro en Areas de Cultivo de Cafe en Mexico' by CIAT in 2012
Costa Rica’s coffee-growing regions and the elevation range in which most Costa Rican coffee is grown.

Source: Coopedota, other Costa Rican farms, The Specialty Coffee Association of Costa Rica; Mark Nowlin, The Seattle Times
### Production Losses from Coffee Fungus in Central America

<table>
<thead>
<tr>
<th>Country</th>
<th>Coffee as % of Total Exports</th>
<th>% of Coffee Growing Area Affected by Coffee Fungus</th>
<th>People Employed by Coffee Industry</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nicaragua</td>
<td>19.3</td>
<td>37%</td>
<td>158,000</td>
</tr>
<tr>
<td>Honduras</td>
<td>17.7</td>
<td>25%</td>
<td>1,000,000</td>
</tr>
<tr>
<td>Guatemala</td>
<td>11.3</td>
<td>70%</td>
<td>500,000</td>
</tr>
<tr>
<td>El Salvador</td>
<td>8.7</td>
<td>74%</td>
<td>95,000</td>
</tr>
<tr>
<td>Costa Rica</td>
<td>3.6</td>
<td>64%</td>
<td>110,000</td>
</tr>
</tbody>
</table>

Sources: IDB; ICO; FT graphic
Arabica coffee production

Sources: US Department of Agriculture; Bloomberg; New York Times
Food prices and social unrest—2004-2012

in the short term
climate smart agriculture =

efficient production
in the medium to long term?
crops & geographies will shift and trade more important
Priority commodities
7 BILLION consumers

300-500 COMPANIES control 70% trade of each commodity

1.5 BILLION producers
Priority commodities

China

India
by 2050 we need to **double** net food availability
productivity & efficiency
and
waste & consumption
waste
1 out of 3 calories
“dance with the one that brung you”

genetics
US corn yields

- Hybrid double-cross introduced
- Hybrid single-cross introduced

1 ton per hectare
<table>
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<th>Orphan crops</th>
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<tbody>
<tr>
<td>palm oil</td>
</tr>
<tr>
<td>millet</td>
</tr>
<tr>
<td>peanut</td>
</tr>
<tr>
<td>cowpeas</td>
</tr>
<tr>
<td>cassava</td>
</tr>
<tr>
<td>vine spinach</td>
</tr>
<tr>
<td>plantain</td>
</tr>
<tr>
<td>coco yam</td>
</tr>
<tr>
<td>sorghum</td>
</tr>
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</table>
agriculture takes 70% of all water used by people
1 liter of water = 1 calorie
better practices
100 times better
which gives us more food?
recognizing the best or moving the rest?
Reward the best, or move the rest?

- Government regulation
- Voluntary standards

Performance shift: worse → average → better

Number of producers
salmon aquaculture
Global Salmon Initiative

- CEOs of 15 producer companies
- 70% of global production
- 100% ASC certified by 2020
- Share performance data
rebuild soils

250 M hectares by 2030
moving sustainability from **niche** to **norm**
one company
Unilever’s commitment: 100% sustainable ingredients
one country
Origin Green
IRELAND

Working with nature

Bord Bia
Irish Food Board

Growing the success of Irish food & horticulture
Ireland’s commitment

• All food exports
• 100% certified by 2016
• Reputation is key, not premiums
• Government, private sector and producers working together
Components of S&P 500 market value

<table>
<thead>
<tr>
<th>Year</th>
<th>Tangible assets</th>
<th>Intangible assets</th>
</tr>
</thead>
<tbody>
<tr>
<td>1975</td>
<td>17%</td>
<td>83%</td>
</tr>
<tr>
<td>1985</td>
<td>32%</td>
<td>68%</td>
</tr>
<tr>
<td>1995</td>
<td>68%</td>
<td>32%</td>
</tr>
<tr>
<td>2005</td>
<td>20%</td>
<td>80%</td>
</tr>
<tr>
<td>2009</td>
<td>19%</td>
<td>81%</td>
</tr>
</tbody>
</table>

Source: Ocean Tomo
“You can’t wake a person who’s pretending to sleep”

Oromo proverb
think about it