“Global Scarcity: A Spanish Perspective”

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(Co-authored with Insa Flachsbarth, Ramón Llamas and Bárbara Willaarts)
Two ideas

Global water scarcity is driven by (1) world’s present and future food demand

Source: UN, World Population Assessment 2014
Two ideas

and

There is (2) global water environmental insecurity
(pollution, overabstraction at massive scales)
But

There are solutions for both scarcity and environmental insecurity

(water is a renewable resource)
Main issues

1. Global water scarcity
2. Spain: The history of water use expansion in two slides
3. Why food markets are crucial
4. Technology and development
5. Outlook
1. Global water scarcity

- Expansion of trade and globalisation
- Environmentally-driven scarcity
- Risk perceptions
- Water and food security
1. Global water scarcity

- Expansion of trade and globalisation
- Environmental scarcity
- Risk perceptions
- Water and food security

Source: WTO (2014)
1. Global water scarcity

- Expansion of trade and globalisation
- Environmental scarcity
- Risk perceptions
- Water and food security

Source: Sato, Qadir, Yamamoto, Endo, & Zahoor (2013)
Agricultural Water Management
1. Global water scarcity

Global Risks reports 2007-2015, World Economic Forum, Davos

- Economic
- Environmental
- Geopolitical
- Societal
- Technological
### 1. Global water scarcity

**GLOBAL TRENDS 2030: AN OVERVIEW**

<table>
<thead>
<tr>
<th>MEGATRENDS</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Individual Empowerment</strong></td>
<td>Individual empowerment will accelerate owing to poverty reduction, growth of the global middle class, greater educational attainment, widespread use of new communications and manufacturing technologies, and health-care advances.</td>
</tr>
<tr>
<td><strong>Diffusion of Power</strong></td>
<td>There will not be any hegemonic power. Power will shift to networks and coalitions in a multipolar world.</td>
</tr>
<tr>
<td><strong>Demographic Patterns</strong></td>
<td>The demographic arc of instability will narrow. Economic growth might decline in “aging” countries. Sixty percent of the world’s population will live in urbanized areas; migration will increase.</td>
</tr>
<tr>
<td><strong>Food, Water, Energy Nexus</strong></td>
<td>Demand for these resources will grow substantially owing to an increase in the global population. Tackling problems pertaining to one commodity will be linked to supply and demand for the others.</td>
</tr>
</tbody>
</table>
1. Global water scarcity

Water and food security

Food 75%
- Animal products 40-50%

Source: Hoekstra, Mekonnen, 2012.PNAS
1. Global water scarcity

• The world population will be between 40-75% larger than today in the lifetime of many of today’s children
• Sub-Saharan Africa, 1bn today to between 3.5bn and 5bn in 2100

Source: UN, World Population Assessment 2014
2. Spain: history of water use expansion
2. Spain: history of water use expansion in two slides

Blue virtual water exports and imports (1965-2010)

Source: Duarte, Pinilla, Serrano (2014), Reg Environ Change
2. Spain: history of water use expansion in two slides

**Green** virtual water exports and imports (1965-2010)

Source: Duarte, Pinilla, Serrano (2014)., Reg Environ Change
2. Spain: history of water use expansion in two slides

**Green** and **Blue** virtual water exports and imports (1965-2010)

Globalization and natural resources: the expansion of the Spanish agrifood trade and its impact on water consumption, 1965–2010

Rosa Duarte · Vicente Pinilla · Ana Serrano
2. Spain: history of water use expansion in two slides

<table>
<thead>
<tr>
<th>Year</th>
<th>Grains Production (mill t.)</th>
<th>Annual Precipit (mm)</th>
</tr>
</thead>
<tbody>
<tr>
<td>2012</td>
<td>17</td>
<td>535</td>
</tr>
<tr>
<td>2013</td>
<td>25</td>
<td>717</td>
</tr>
</tbody>
</table>

25-17 = 8 mill t. ~ 8 km³
2. Spain: history of water use expansion in two slides

**Some commodities**

**Net Trade (2013)**
- Cereals ~ - € 2 bill
- Oil seeds ~ - € 1.8 bill
- Livestock ~ + € 4 bill

**Total int’al trade (2013):**
- Imports € 252 bill
- Exports € 224 bill
- Ballance: -€28

Source: S.G. Analysis, Prospective and Coordination — Subsecretary’s office — MAGRAMA email: sgapc@magrama.es
Reproduction is authorised provided the source is acknowledged. Document must be referenced like “International Trade Analysis. February 2013”
3. Why international food trade is so important
3. Why food markets are crucial

Figure 3.2: Global food trade (trillion calories): 1970-2010

Source: Prakash and Christopher L. Gilbert. Chap. 3., FAO (2010)
3. Why food markets are crucial

The World in 2030

- Genes as commerce (*Alec Ross*)
- The democratization of media to fight rights abuses (*Kenneth Roth*)
- Women controlling their fertility (*Nancy Birdsall*)
- Digital ID cards (*Edward Lucas*)
- **A second food revolution** (*John Norris*)
- More open borders (*Charles Kenn*)
- High-tech classrooms (*Neera Tanden*)
- Recognizing the rights of the poor (*William Easterly*)
- Real civic engagement (*Ralph Nader*)
- Closing the gender gap (*Melanne Verveer*)
- Setting few—but smart—targets (*Bjorn Lomborg*)
- Technology for the good (*Vivek Wadhwa*)
- Investing in childhood education and health (*Esther Dyson*)

30 percent of all food is lost between field and fork

The Doha round of global trade negotiations will make the world $11 trillion better off by 2030
3. Why food markets are crucial

4. Technology, habits and agricultural development
4. Technology, habits and agricultural development

- Focus on **yield gaps and intensification** (better than expansion)
- Reducing **Food waste**
- The meat challenge, change of **diets** (a question of tastes and prices)
4. Technology, habits and agricultural development

<table>
<thead>
<tr>
<th>Gains in Agricultural Productivity</th>
<th>Maize</th>
<th>Wheat</th>
<th>Rice</th>
</tr>
</thead>
<tbody>
<tr>
<td>World</td>
<td>2.33</td>
<td>1.82</td>
<td>2.73</td>
</tr>
<tr>
<td>North America</td>
<td>2.19</td>
<td>1.75</td>
<td>1.38</td>
</tr>
<tr>
<td>West Europe</td>
<td>3.73</td>
<td>1.32</td>
<td>3.21</td>
</tr>
<tr>
<td>Eastern Europe</td>
<td>2.54</td>
<td>1.93</td>
<td>3.19</td>
</tr>
<tr>
<td>Asia &amp; Pacific (exc-China)</td>
<td>1.96</td>
<td>2.88</td>
<td>2.96</td>
</tr>
<tr>
<td>China</td>
<td>4.39</td>
<td>0.81</td>
<td>5.76</td>
</tr>
<tr>
<td>Lat Am&amp; Caribbean</td>
<td>2.01</td>
<td>3.22</td>
<td>1.67</td>
</tr>
<tr>
<td>Sub-Saharan Africa</td>
<td>1.3</td>
<td>1.7</td>
<td>2.88</td>
</tr>
</tbody>
</table>

Source: Alston, Martin & Pardey (2014)

In Chavas, Hummels and Wright. "The economics of food price volatility. NBER
4. Technology and development

## Gains in Agricultural Productivity

Global and regional growth annual rates of selected crops (1961-2010)

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<thead>
<tr>
<th></th>
<th>Maize</th>
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<tr>
<td>1961-1990</td>
<td>2.33</td>
<td>2.73</td>
<td>2.14</td>
</tr>
<tr>
<td>1991-2010</td>
<td>1.82</td>
<td>1.03</td>
<td>1.09</td>
</tr>
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In 20 years, slowed productivity growth **missed**

- Yield gains of maize: 10%
- Yield gains of wheat: 48%
- Yield gains of rice: 22%

Huge water and land-use savings have been missed
Scenarios for South America agriculture

The Urban water challenge

<table>
<thead>
<tr>
<th>Population</th>
<th>Number of Cities</th>
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</thead>
<tbody>
<tr>
<td>Cities with Population of 1,000,000 +</td>
<td>457</td>
</tr>
<tr>
<td>Cities with Population of 500,000 +</td>
<td>1,063</td>
</tr>
<tr>
<td>Cities with Population of 150,000 +</td>
<td>2,896</td>
</tr>
</tbody>
</table>

Source: http://www.statisticbrain.com/
5. Outlook
5. Outlook

- Semi-arid countries’ water economy is closely related to world’s markets and affected by its megatrends

- Drought risks can be mitigated by strategic trade of agricultural production and wise allocation mechanisms

- Irrigated agriculture, even if it’s large, can help manage water scarcity
Water and food security is crucial in the MENA region, and strategic for Spain.

Spanish water companies supply water to 100 million people abroad (solid scientific and training base).
Gracias - Thank you

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www.ceigram.upm.es

www.fundacionbotin.org