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SLIDES: Water Footprints: Consciousness Raising Meets Risk Management

Steve Malloch

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Water Footprints: Consciousness Raising Meets Risk Management

Steve Malloch
National Wildlife Federation
March 2009
You can’t manage what you can’t measure

[T]he most important figures that one needs for management are unknown or unknowable...but successful management must nevertheless take account of them.
CARBON FOOTPRINT

Remember, "Objects in mirror are closer than they appear."
Figure 1: Proportion of the U.S. Adult Population in the Six Americas

Proportion represented by area

- Alarmed: 18%
- Concerned: 33%
- Cautious: 19%
- Disengaged: 12%
- Doubtful: 11%
- Dismissive: 7%

Highest Belief in Global Warming
Most Concerned
Most Motivated

Lowest Belief in Global Warming
Least Concerned
Least Motivated

Maibach et al., 2009
Does it make sense for a water-short state like Israel to export oranges?

What is the international flow of water embedded in goods?

Does that flow matter? Is looking at it useful?

Arjen Hoekstra
Virtual water is the water ‘embodied’ in a product, not in real sense, but in virtual sense. It refers to the water needed for the production of the product.

Global trade in goods and services brings along global trade in ‘virtual water’
The Water Footprint of a product is the same as its ‘virtual water content’, but includes a temporal and spatial dimension: when and where was the water used.
The Water Footprint of a product is the volume of fresh water used to produce the product, summed over the various steps of the production chain.
The Water Footprint consists of three components:
BLUE (consumptive use of withdrawn water)
+ GREEN (consumptive use of soil moisture from precipitation)
+ GREY (dilution/pollution)
Assessing the Water Footprint of a product requires analysis of the full production chain.

Raw material production + Processing + Distribution + Retail + (Consumer + Disposal ?)
# The water footprint of products

<table>
<thead>
<tr>
<th>Product</th>
<th>Water Footprint</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 lb wheat</td>
<td>155 gallons</td>
</tr>
<tr>
<td>1 lb rice</td>
<td>410 gallons</td>
</tr>
<tr>
<td>1 sheet paper</td>
<td>2.6 gallons</td>
</tr>
<tr>
<td>1 lb cheese</td>
<td>600 gallons</td>
</tr>
<tr>
<td>1 lb pork</td>
<td>575 gallons</td>
</tr>
<tr>
<td>1 lb beef</td>
<td>1860 gallons</td>
</tr>
</tbody>
</table>
### The water footprint of beverages

<table>
<thead>
<tr>
<th>Beverage</th>
<th>Gallons</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 glass beer</td>
<td>19 gallons</td>
</tr>
<tr>
<td>1 glass milk</td>
<td>52 gallons</td>
</tr>
<tr>
<td>1 glass OJ</td>
<td>45 gallons</td>
</tr>
<tr>
<td>1 glass wine</td>
<td>120 gallons</td>
</tr>
<tr>
<td>1 cup tea</td>
<td>8 gallons</td>
</tr>
<tr>
<td>1 cup coffee</td>
<td>36 gallons</td>
</tr>
</tbody>
</table>

Sources: Waterfootprint.org
How is Water Footprint Being Used?

- Corporate risk management
- Corporate branding and social responsibility
- Advocacy
- Ethics based social marketing
Association of Certified Chartered Accountants

*Water: The Next Carbon?*

- Physical Risk
- Financial Risk
- Regulatory Risk
- Reputational Risk

ACCA 2009
Starbucks Coffee

- Coffee = 37 gallons/cup, global, less for Starbucks sourced
- Milk = 1000 to 1 for that splash of cream
- Latte = 50 gallons
Levi Strauss
Life Cycle of 501 Jeans

- 920 gallons of water
  - 49% growing the cotton
  - 45% washing at home
  - 6% processing
- Working on washing, worrying about cotton
Soda

- 2 liter bottle:
  - 1.3 gallons in the factory
  - 85-120 gallons for the ingredients
Virtual Water
Net Import

Waterfootprint.org
Change in Annual Runoff

Colored States – >8 of 12 GCM’s Agree

Milly et al., 2008
Advocacy

Water, Human Rights
- WWF – Water content of a latte
- Bottled water campaigns
## Energy

<table>
<thead>
<tr>
<th>Fuel Source</th>
<th>Water gallons/MMBTU</th>
</tr>
</thead>
<tbody>
<tr>
<td>coal to liquid</td>
<td>41-60</td>
</tr>
<tr>
<td>coal to gas</td>
<td>11-26</td>
</tr>
<tr>
<td>tar sands</td>
<td>20-50</td>
</tr>
<tr>
<td>oil shale</td>
<td>8-38</td>
</tr>
<tr>
<td>oil</td>
<td>1-2</td>
</tr>
<tr>
<td>oil EOR</td>
<td>14-2.5k</td>
</tr>
<tr>
<td>coalbed methane</td>
<td>1-161</td>
</tr>
<tr>
<td>soy biodiesel</td>
<td>14k-75k</td>
</tr>
<tr>
<td>corn ethanol</td>
<td>2.5k-24k</td>
</tr>
</tbody>
</table>

Cameron et al 2006
Ethanol and Water Footprint

• 2007 Energy bill goal- 35 billion gallons of ethanol
• A bushel of corn:
  Consumes 4000 gallons water
  Yields 2.5 gallons ethanol

17 Million Acre-Feet of Water
Consumer Choice

Rise & Shine
- Toilet: 6 gallons/flush
- Low-flow toilet: 1.3 gallons/flush
- Shower: 3.8 gallons/minute
- Low-flow shower: 2.3 gallons/minute
- Faucet: 5 gallons/minute
- Low-flow faucet: 1.5 gallons/minute

Breakfast
- Coffee: 37 gallons
- Tea: 9 gallons
- Eggs: 3.6 gallons/egg
- Cereal with milk: 22 gallons
- Apple: 1.8 gallons
- Orange: 1.3 gallons

Lunch
- Soda (16 oz. bottle): 33 gallons
- Water (16 oz. glass): 1.25 gallons
- Hamburger: 63.4 gallons
- Salad: 31 gallons

Total: 127 gallons
Total: 44 gallons
Amount saved: 83 gallons

Total: 49 gallons
Total: 25.8 gallons
Amount saved: 23.2 gallons
You Throw Away 26% of Food You Buy
How Do We Manage Water in a Carbon-Constrained/Climate Disrupted Economy?
How Do We Manage Water in a Carbon-Constrained/Climate Disrupted Economy?

- Efficiency and conservation
- Integrated water management
- Linking water with forest/floodplain/growth management
- Accounting for embedded energy
- Incorporating water scarcity/variability in policy, strategy, risk management, consumer choice
New Mexico’s Dairy Footprint

2007 Herd – 342,000, 7.3 billion pounds of milk

1 L milk = 1000 L water

Water Footprint = 2.6 Million Acre-Feet
Yakima at a Glance

- About 3.4 MAF annual runoff
  - 1 MAF BuRec storage
  - 1 MAF snowpack storage
  - 2.5 MAF annual BuRec delivery

- 560,000 irrigated acres
  - 1/3 in trees and vines - increasing
  - About $1.3 Billion annual production

- Longstanding salmon issues

- Flood, water quality, groundwater depletion
Yakima Climate Projections

- **Precipitation**
  - +1% by 2020
  - +2% by 2040

- **Snowpack loss**
  - 27-29% by 2020
  - 37-44% by 2040
  - 53-65% by 2080

Elsner et al., 2009
Yakima Project: Agricultural Water Supplies

- Chance of >25% Delivery Reduction for the Junior 51% of BuRec Contractors
  - Historic - 14%
  - 2020 – 27-32%
  - 2040 – 33-36%
  - 2080 – 50-77%

Vano et al., 2009
Supply Options

- BuRec – 2008 No Action Alternative
  - $7 billion, GW to Hanford, $50 million in pumping cost
Climate Resilient Community Approach

- Approach – use the supply reality to shift the solutions towards climate resilient approaches
- Supply
  - Reservoir expansion
  - Off-stream storage
- Integrated Approach
  - Fish and supply “improve together”
  - Demand management, transfers, efficiency, exchanges
  - Flood issues
- Outreach and Education
  - Climate impacts
  - Flood
  - Groundwater
  - Fundamental shifts in expectations and economy – Water Footprint
So What Use is Water Footprint?

- Corporate responsibility and risk management
- Consumer education about water use, scarcity, variability and climate impacts
- Analysis of policy and project choices
- Changing water politics
More Information

- Waterfootprint.org
- Pacific Institute (several reports, most recent May 2009)
- Association of Chartered Certified Accountants (Water: the Next Carbon? April 2009 report)