WHAT IS A WATER FOOTPRINT?

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February 20, 2015

The Water Footprint Network

www.waterfootprint.org

Overview of Presentation

- The Water Footprint (WF) concept
- WF of a product
- WF of a geographic region
- WF of a company
- What can we do

The Water Footprint Concept

What is a Water Footprint?

"Water Footprint" is a measure of water use equal to total volume of freshwater used to produce goods and services consumed

Water Footprint

Water Footprint can be calculated for:

- A product over its entire supply chain
- A company or business (1 or more products)
- A consumer
- A city or state
- A nation
- Globe

The total Water Footprint of the average consumer in the world

*The Water Footprint of a consumer considers both **direct** and **indirect** water use*

3.8% of the Water Footprint relates to home water use

96.2% of the Water Footprint is ‘invisible’, related to the products bought on the market

91.5% agricultural products, 4.7% industrial products

Source: Hoekstra & Mekonnen (2012) The Water Footprint of Humanity, *PNAS*

Water Footprint of a Product

The Water Footprint of a Product

The volume of freshwater used to create a product, summed over the various steps of its production chain

A Water Footprint includes a temporal and spatial dimension (when and where the water was used)

Source: Hoekstra et al. (2011) *The Water Footprint Assessment Manual*, Earthscan, London, UK

The Water Footprint of a Product

Green Water Footprint

Volume of rainwater incorporated into a product

Blue Water Footprint

Volume of surface or groundwater evaporated or incorporated into a product

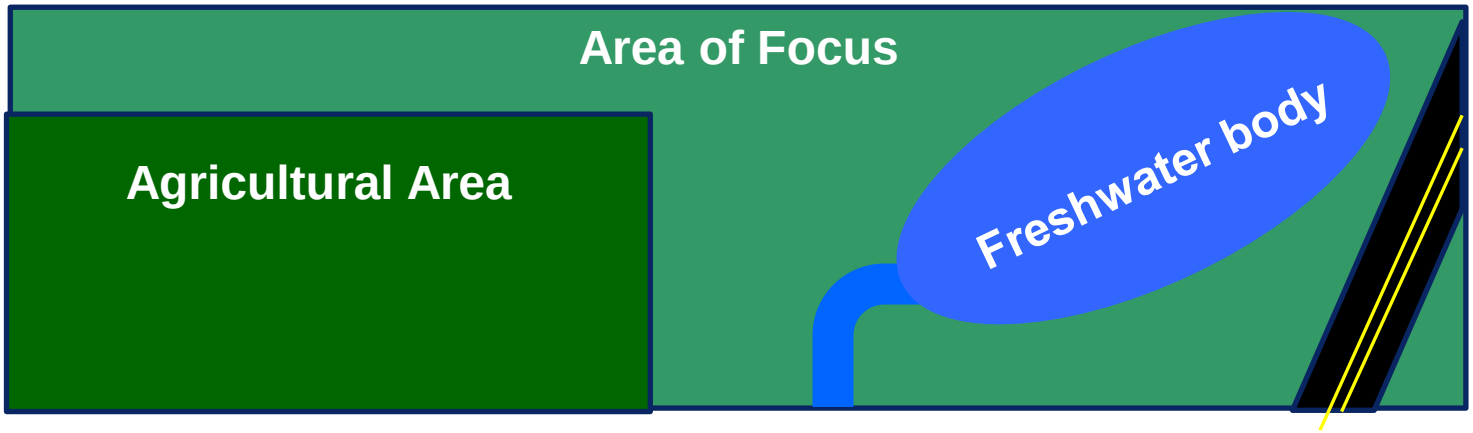
Grey Water Footprint

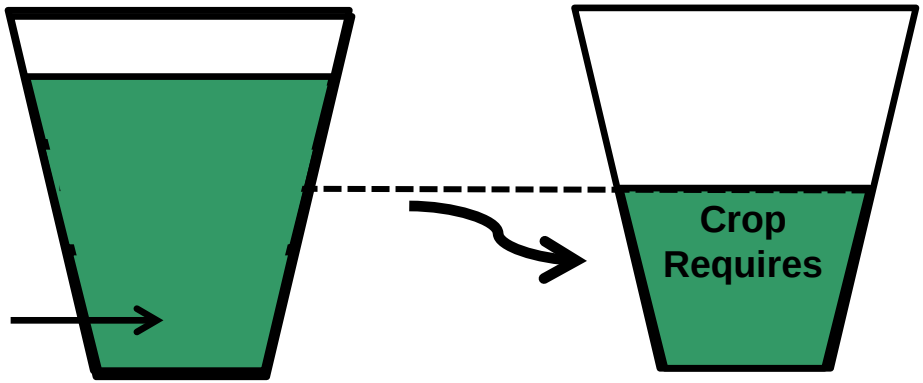
Volume of polluted water

Source: Hoekstra et al. (2011) *The Water Footprint Assessment Manual*, Earthscan, London, UK

Water Footprint Accounting/Assessment

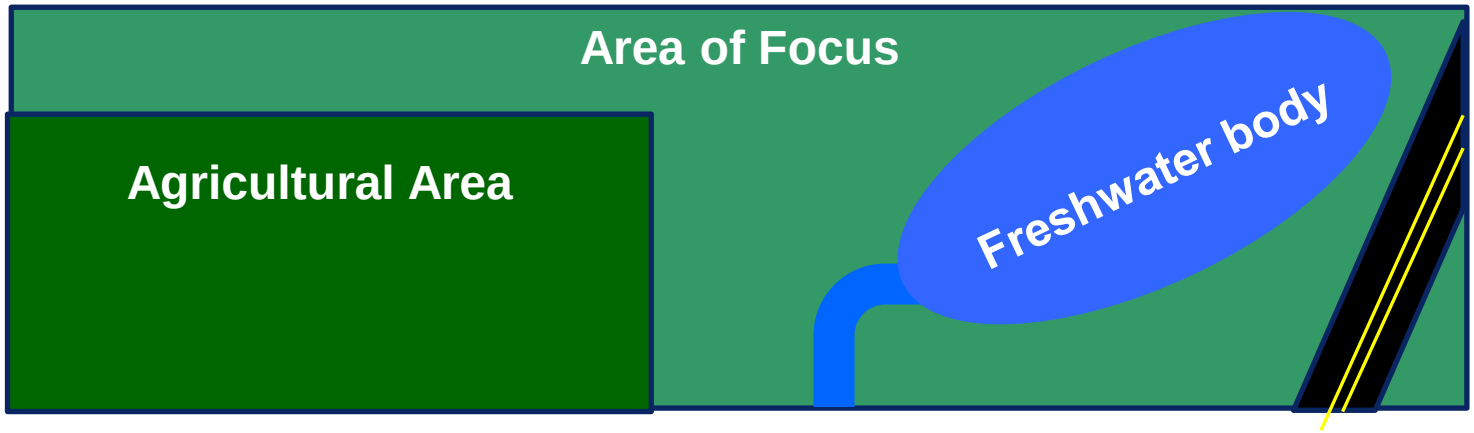
Example: Green Water Footprint versus Availability

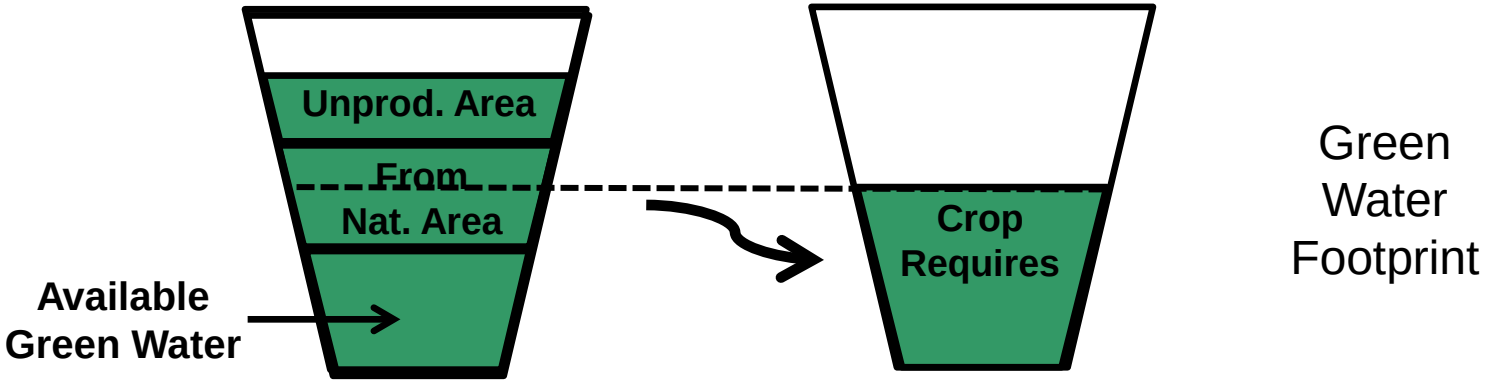




Green Water Footprint

Example: Green Water Footprint versus Availability





Green Water Footprint

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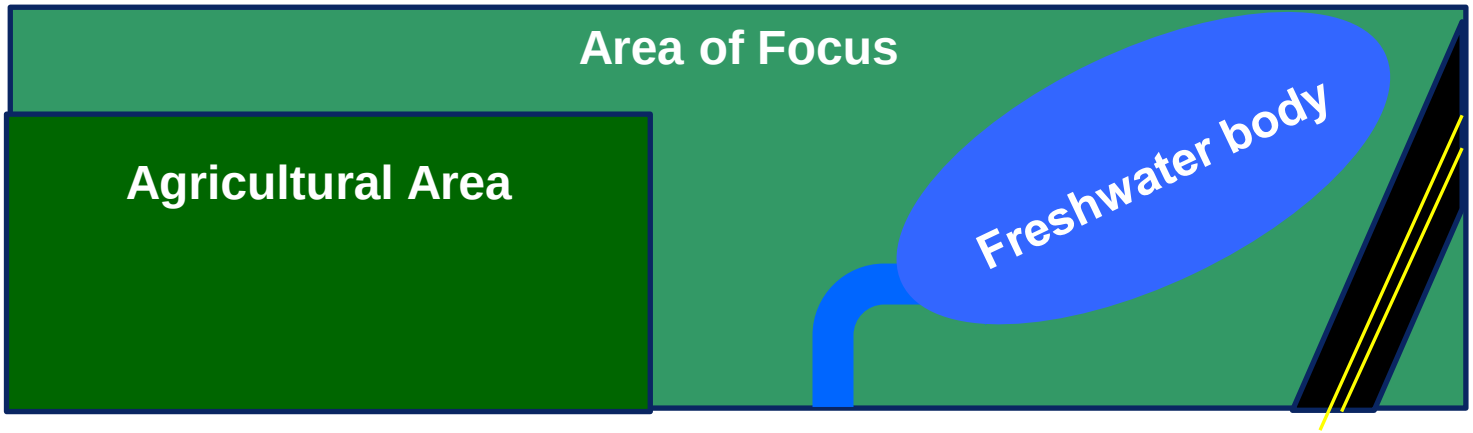
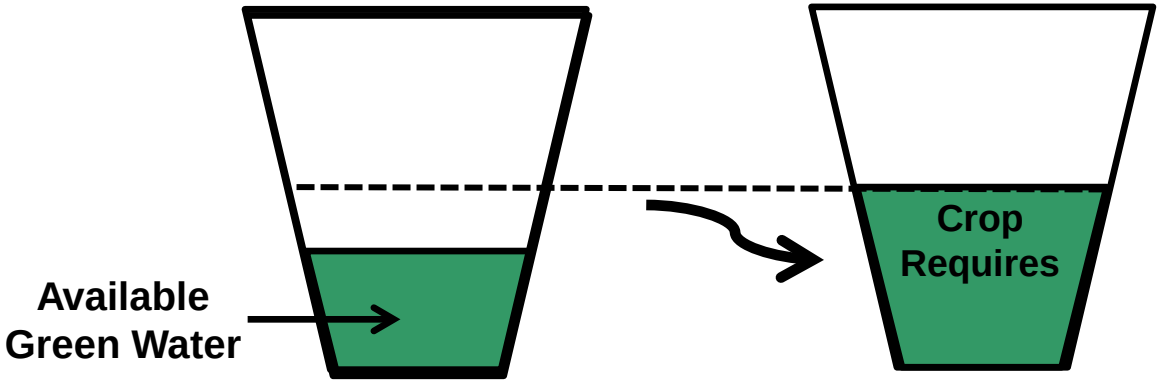
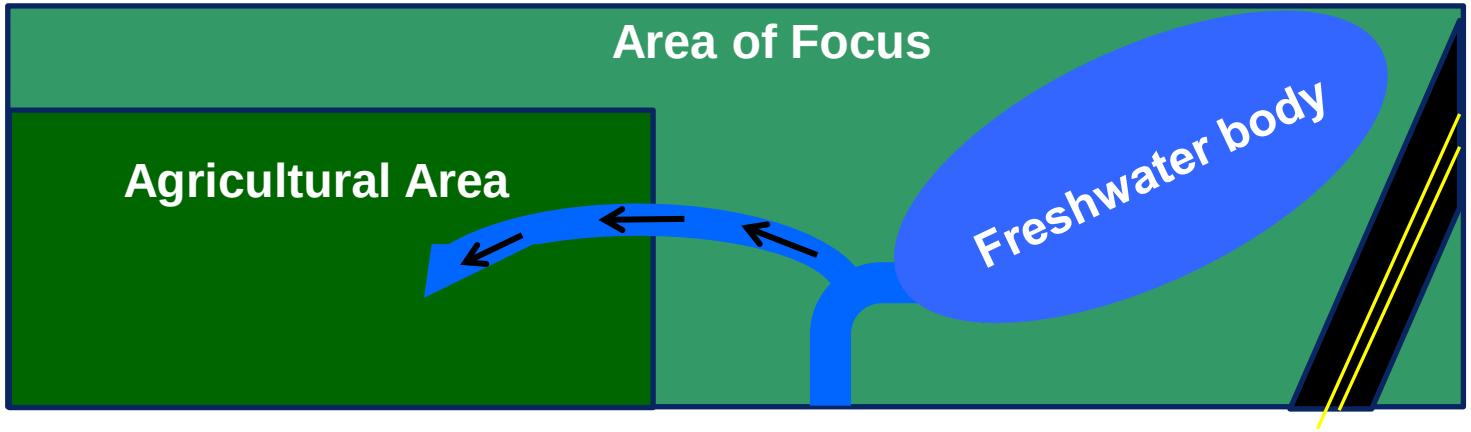
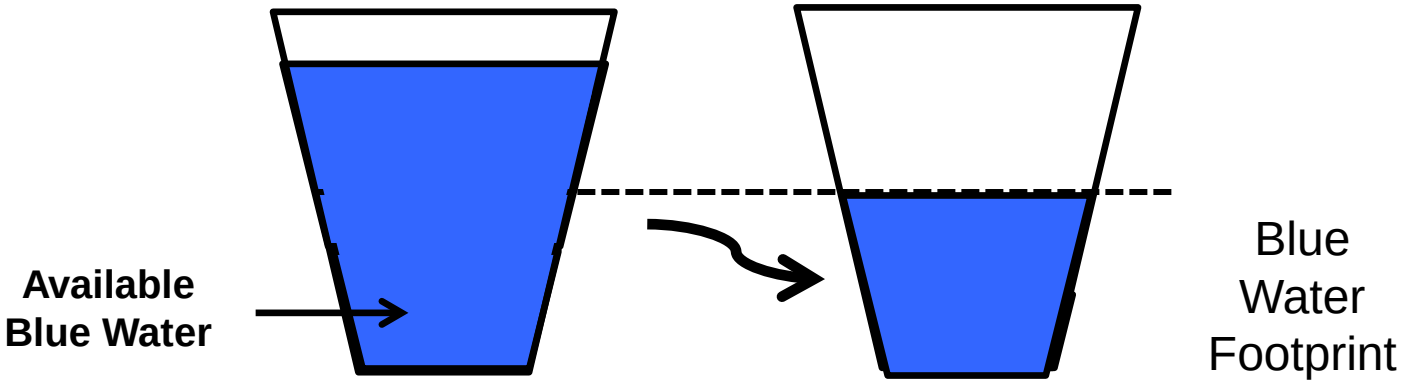




Green Water Footprint

Example: Blue Water Footprint versus Availability





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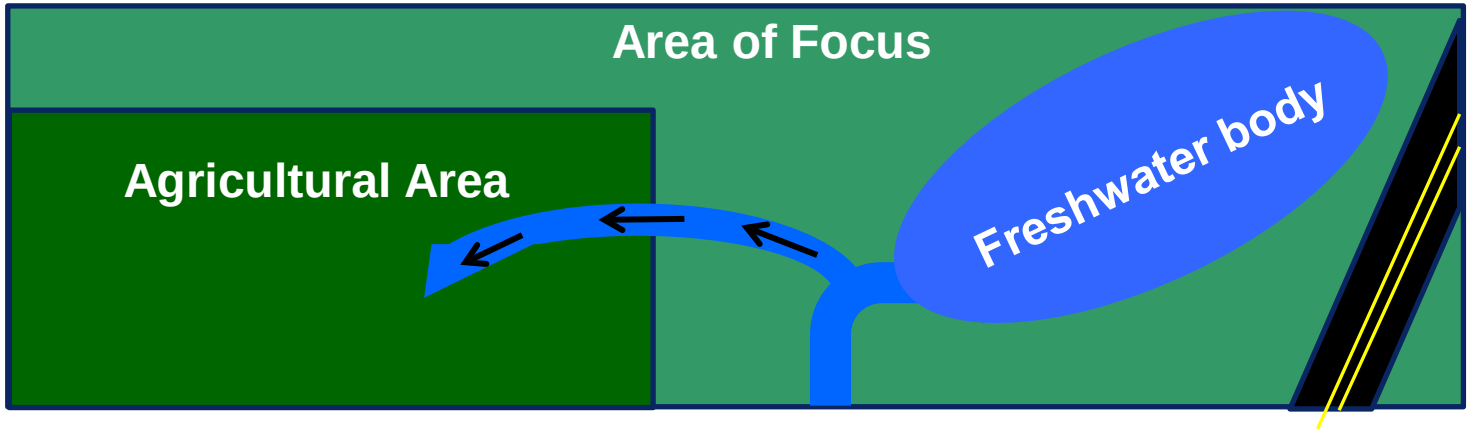

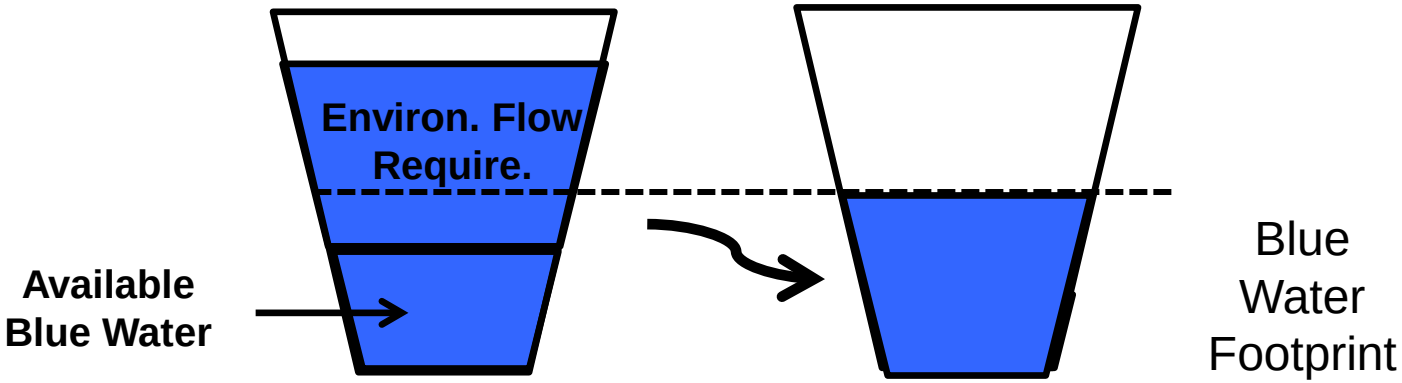

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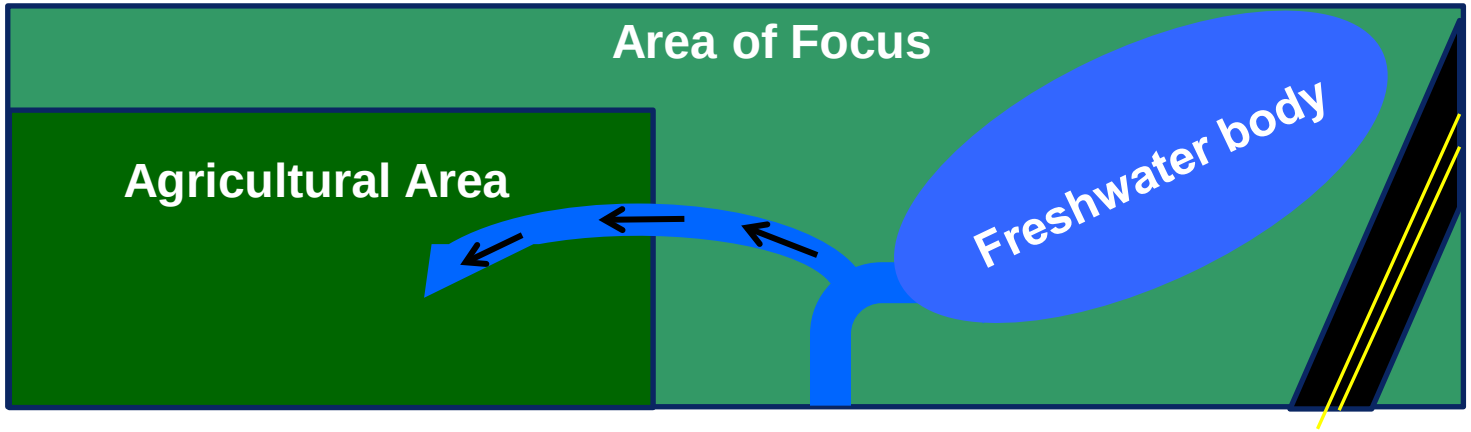

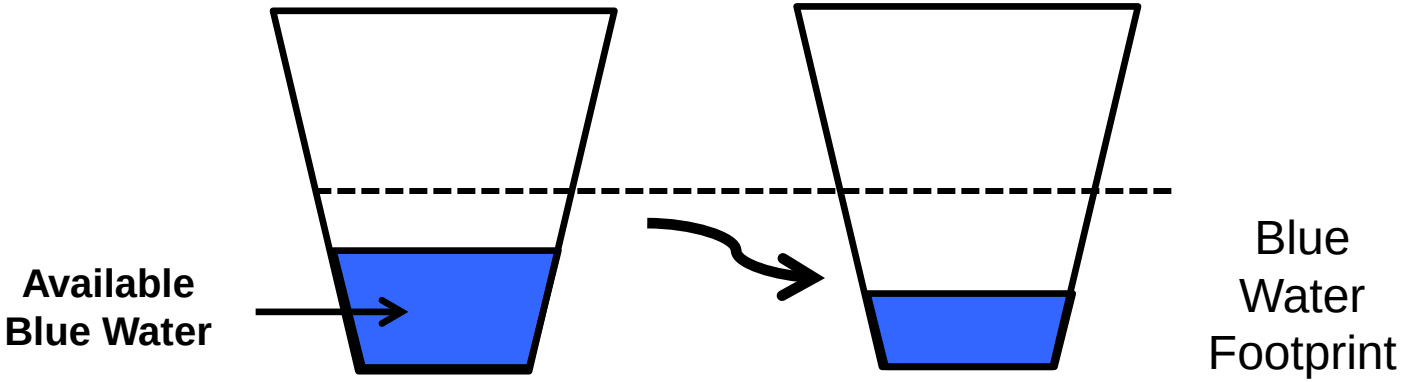

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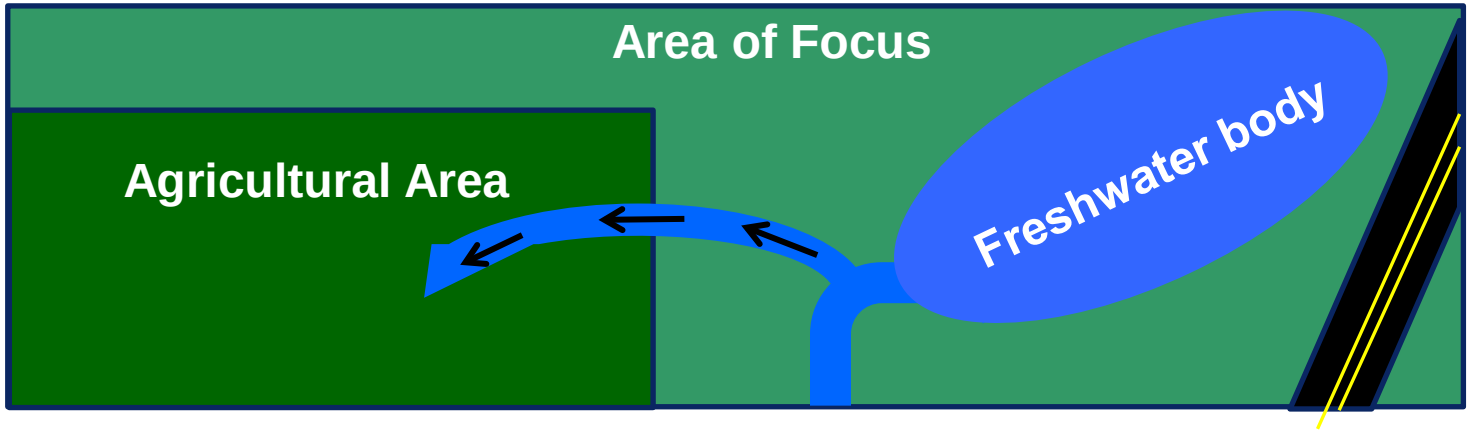
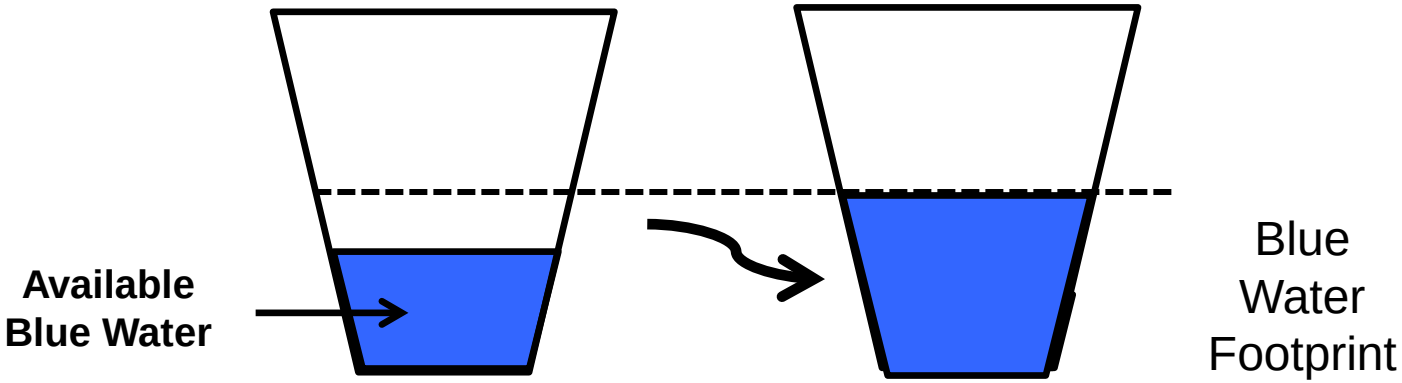




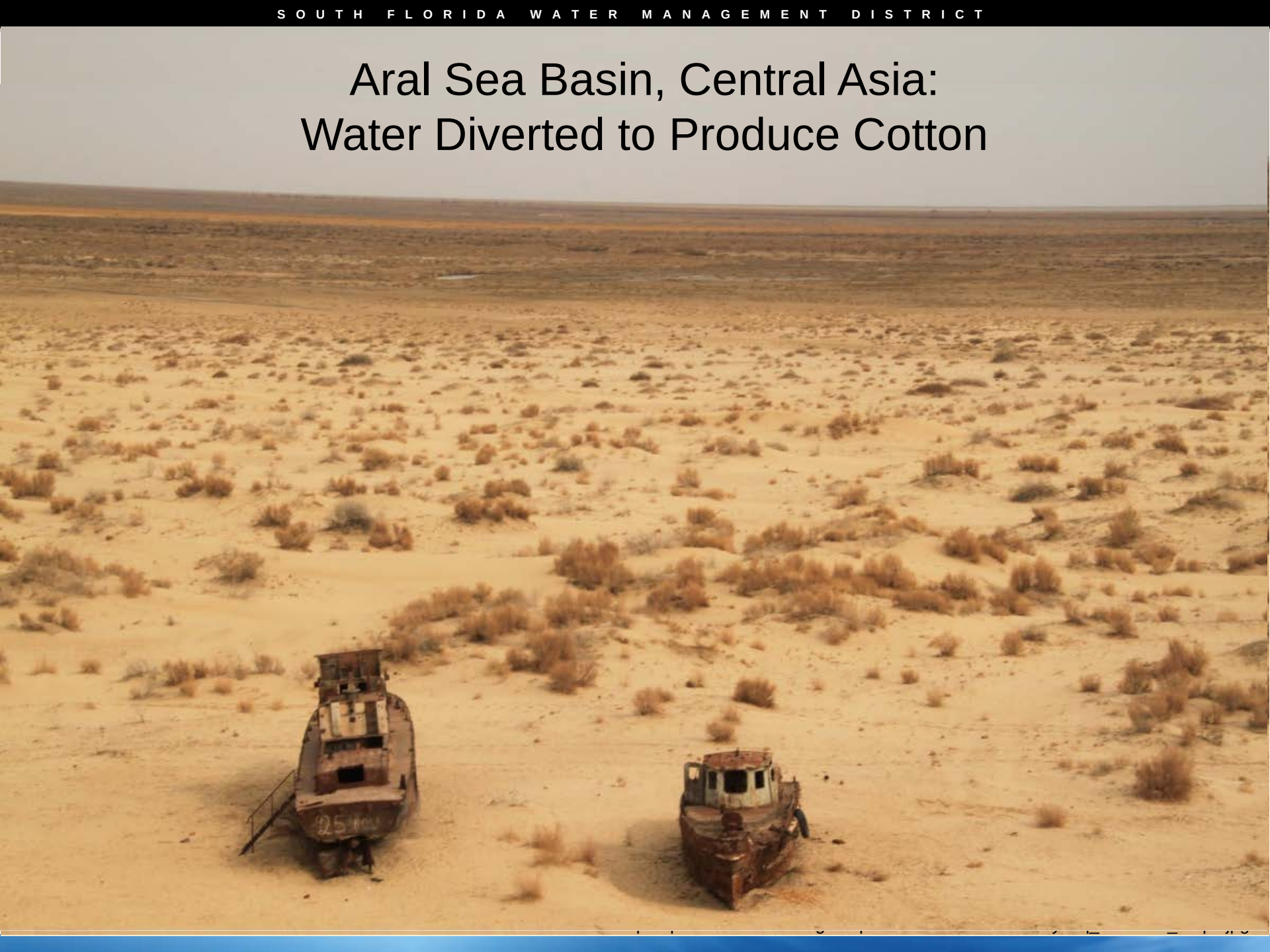
Blue Water Footprint vs. Blue Water Availability

Subsidence
(lowering of ground elevation)
is a global problem

In the United States, more than 17,000 square miles in 45 States have been directly affected by subsidence

Source: Hoekstra et al. (2011)
The Water Footprint Assessment Manual, Earthscan, London, UK
http://water.usgs.gov/edu/earthgwlandsubside.html

Aral Sea Basin, Central Asia: Water Diverted to Produce Cotton



Aral Sea Basin, Central Asia: Water Diverted to Produce Cotton

Source: NASA

http://upload.wikimedia.org/wikipedia/commons/1/13/Moynaq_Aral-Sea_Ships.jpg

Grey Water Footprint

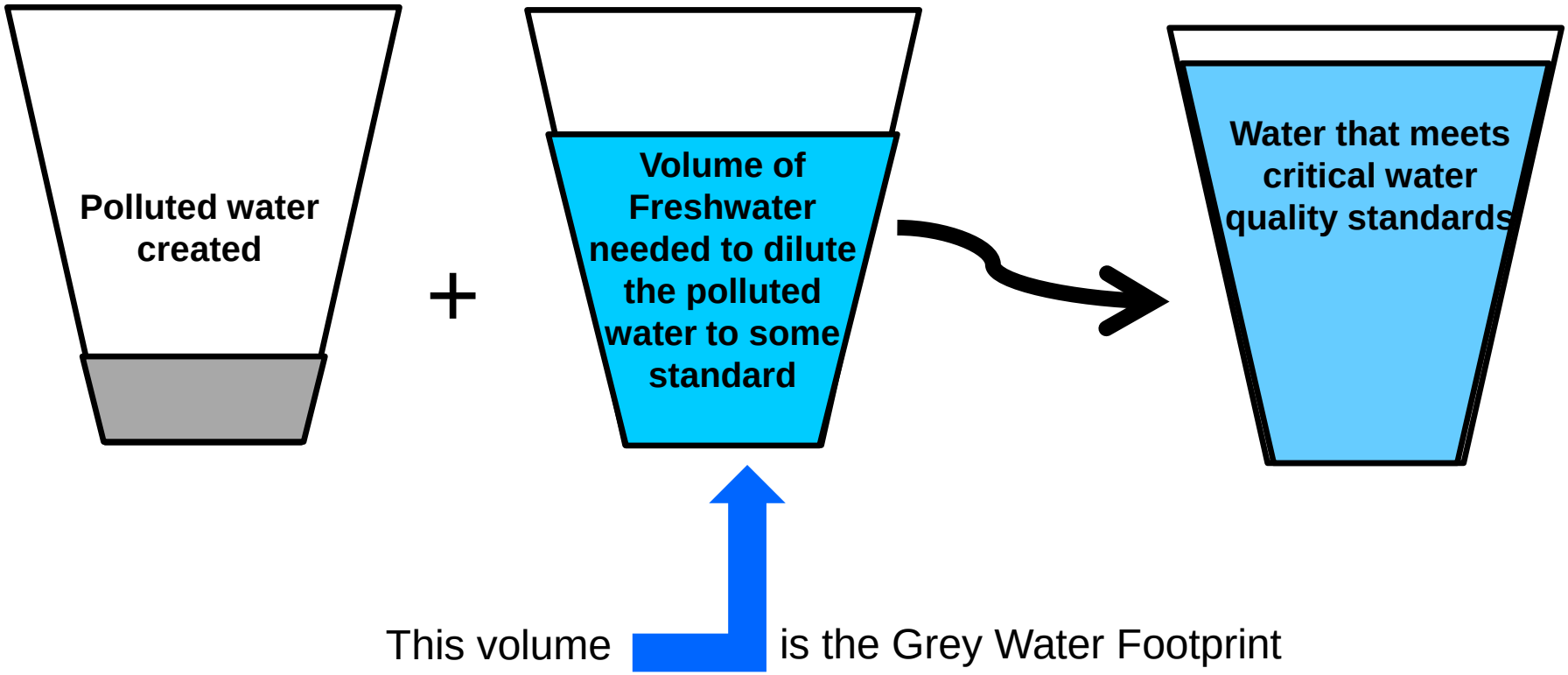
- Related to the volume of polluted water created during the production of a product in its full supply-chain

…but it is not the volume of polluted water itself

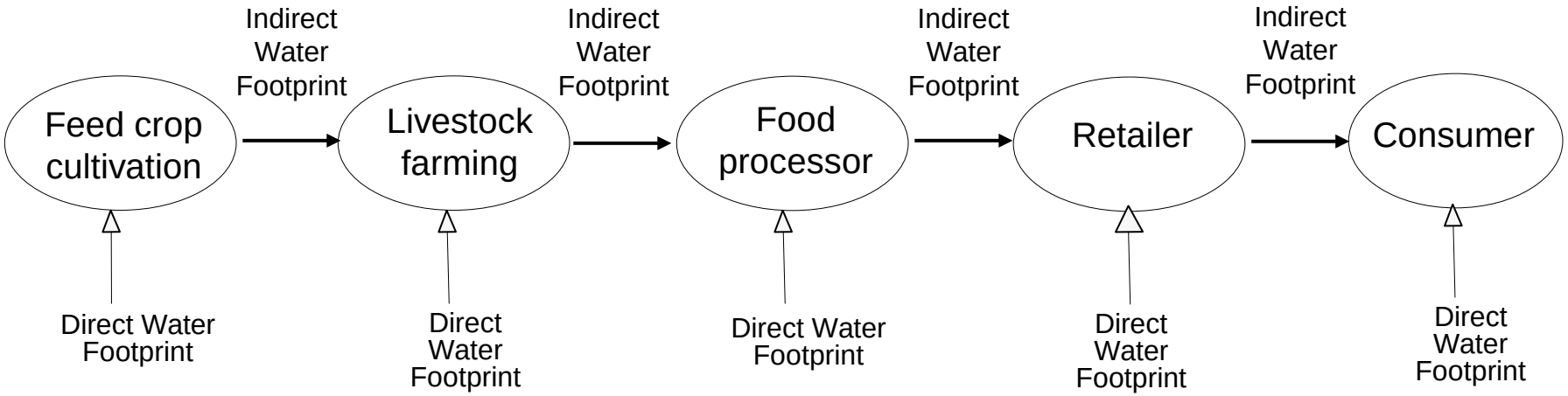
- **It is the volume of water that is required to dilute pollutants whereby the quality of the water remains above (some) water quality standards**

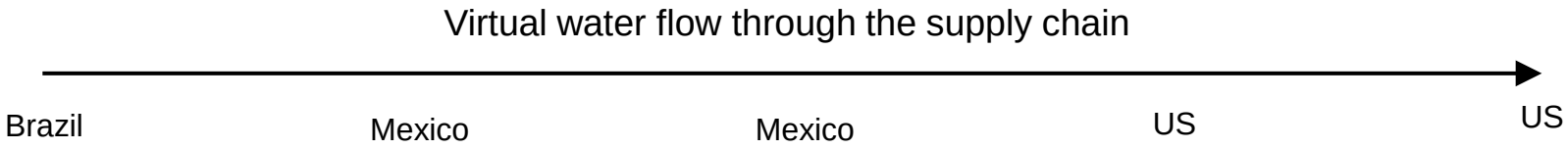
Source: Hoekstra et al. (2011) *The Water Footprint Assessment Manual*, Earthscan, London, UK

Grey Water Footprint



Water Footprints Accounting – Example Beef





Source: Hoekstra et al. (2011) *The Water Footprint Assessment Manual*, Earthscan, London, UK

This Has Been Done for Many, Many Items…

Item	Unit	Gallons
Beef	1 lb	1,861
Pork	1 lb	576
Chicken	1 lb	468
Pizza	Small Pie	333
Bananas	1	42
Coffee	8oz	37
Bread	1 slice	11
Tea	8oz	9
Pasta	ONE Noodle	1
Soda	16 oz 0.125 gals	2
Bottled water	1 lt 0.26 gals	1.39

Item	Unit	Gallons
Jeans	1 pair	2,000
Cotton T-Shirt	1	660
Paper	1 Sheet	2.6
Paper Napkins	10	0.7
Plastic bottle	1 lt bott.	1.6

Diet	Gallons/Day
Omnivore	951
Vegetarian	610
Vegan	400

Water Footprint Assessments

WFs in a specific river basin

- Blue & Green availability
- Grey assimilation critical loads

Use benchmarks (*Our WF versus similar*):

- Products
- Processes
- Consumers
- Companies

Source: Hoekstra et al. (2011) *The Water Footprint Assessment Manual*, Earthscan, London, UK

Water Footprint Assessments

Four Steps (Beef Example):

1. Identifying the scope of the investigation
2. Quantifying target water footprint over specified space and time
3. Assess the environmental, social and economic sustainability of this water footprint; and
4. Formulate a response strategy

Source: Hoekstra et al. (2011) *The Water Footprint Assessment Manual*, Earthscan, London, UK

Water Footprint: Global Perspective

World Population February 2015 = 7.3 billion

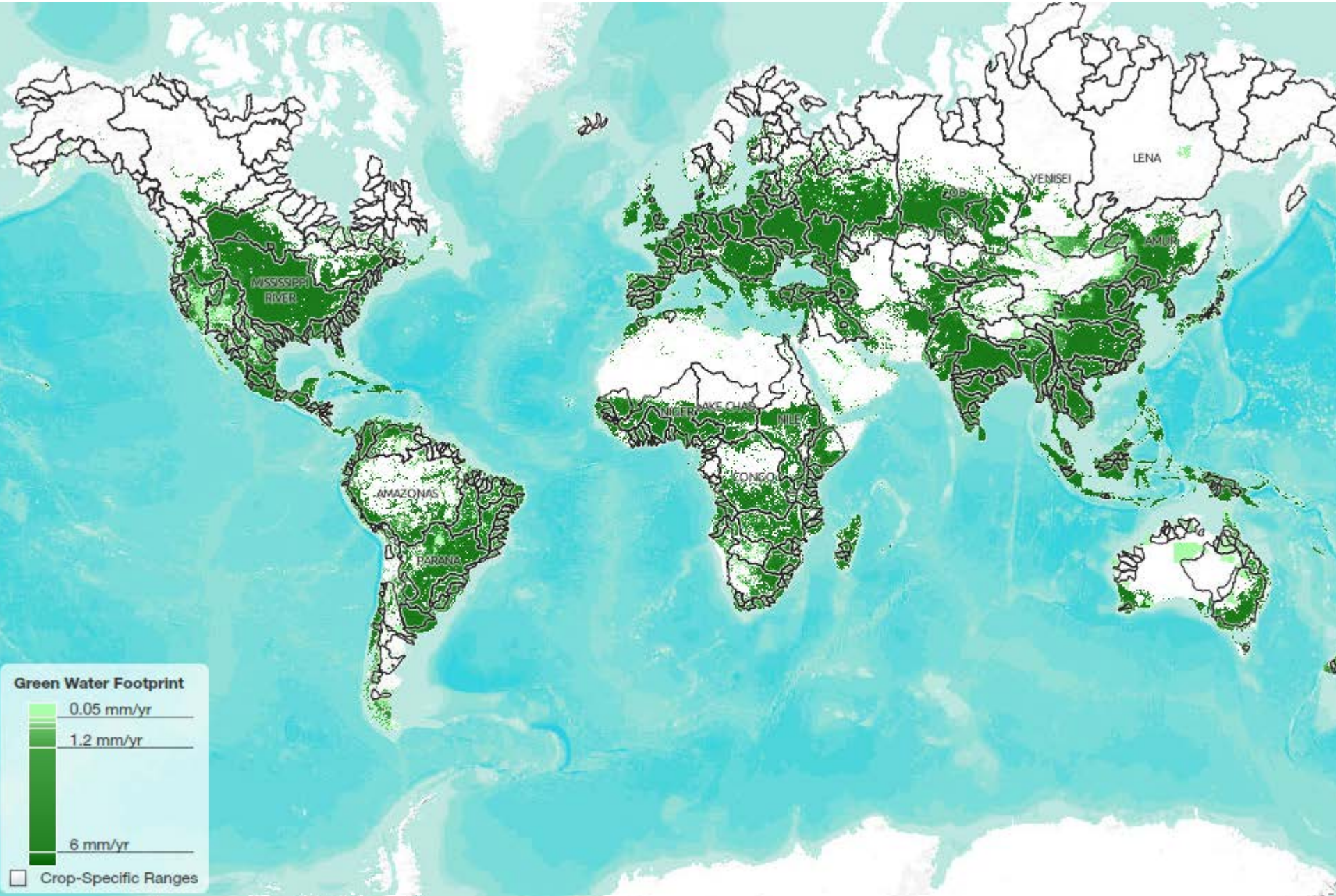
*"**Three billion more people** are going to be on this planet [by 2050]. Somehow, we're going to have to use the same amount of water we use today."*

- Stuart Orr, Freshwater Footprint Project

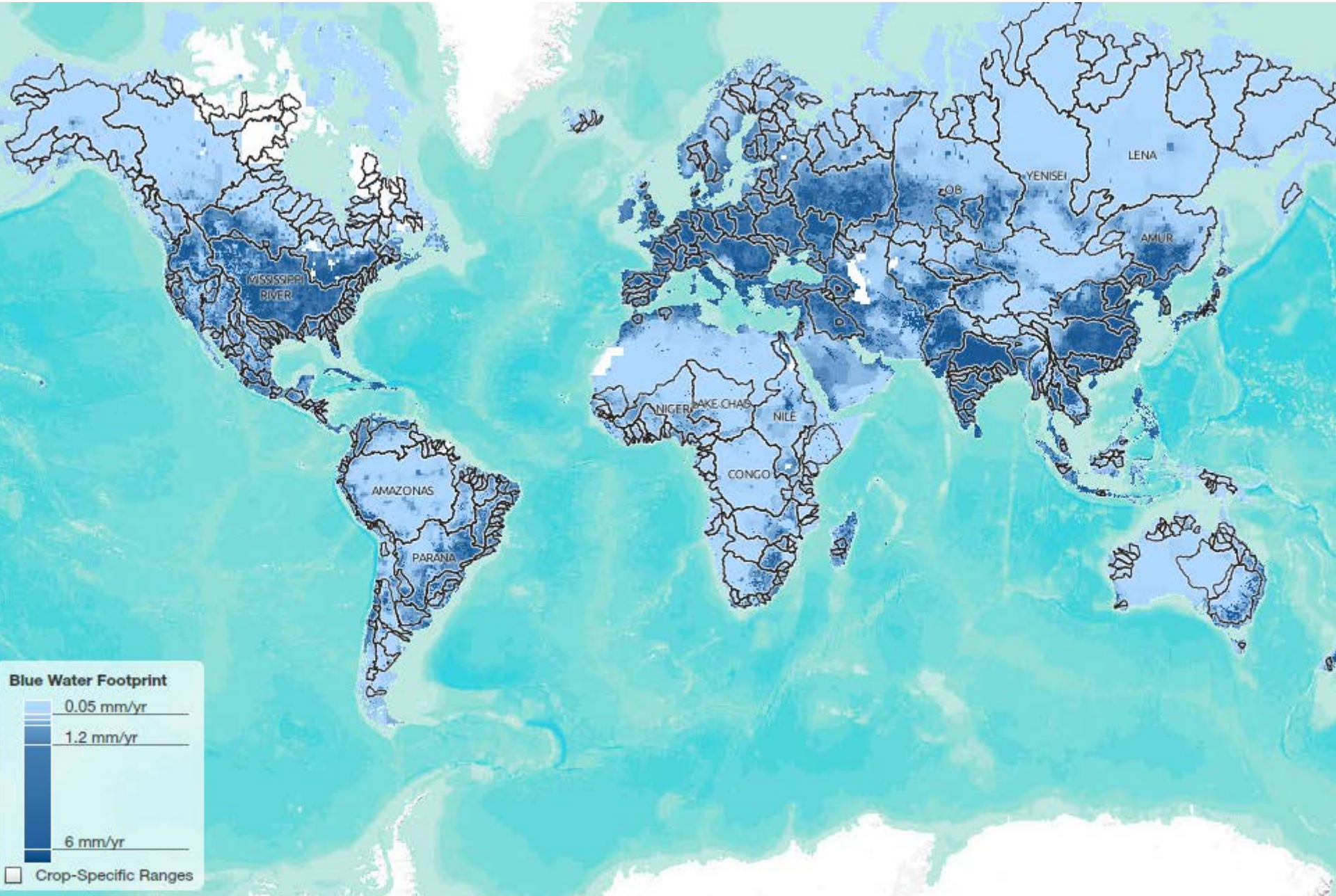
WWF

Water scarcity affects about <u>2.7 billion people</u>
for at least one month each year

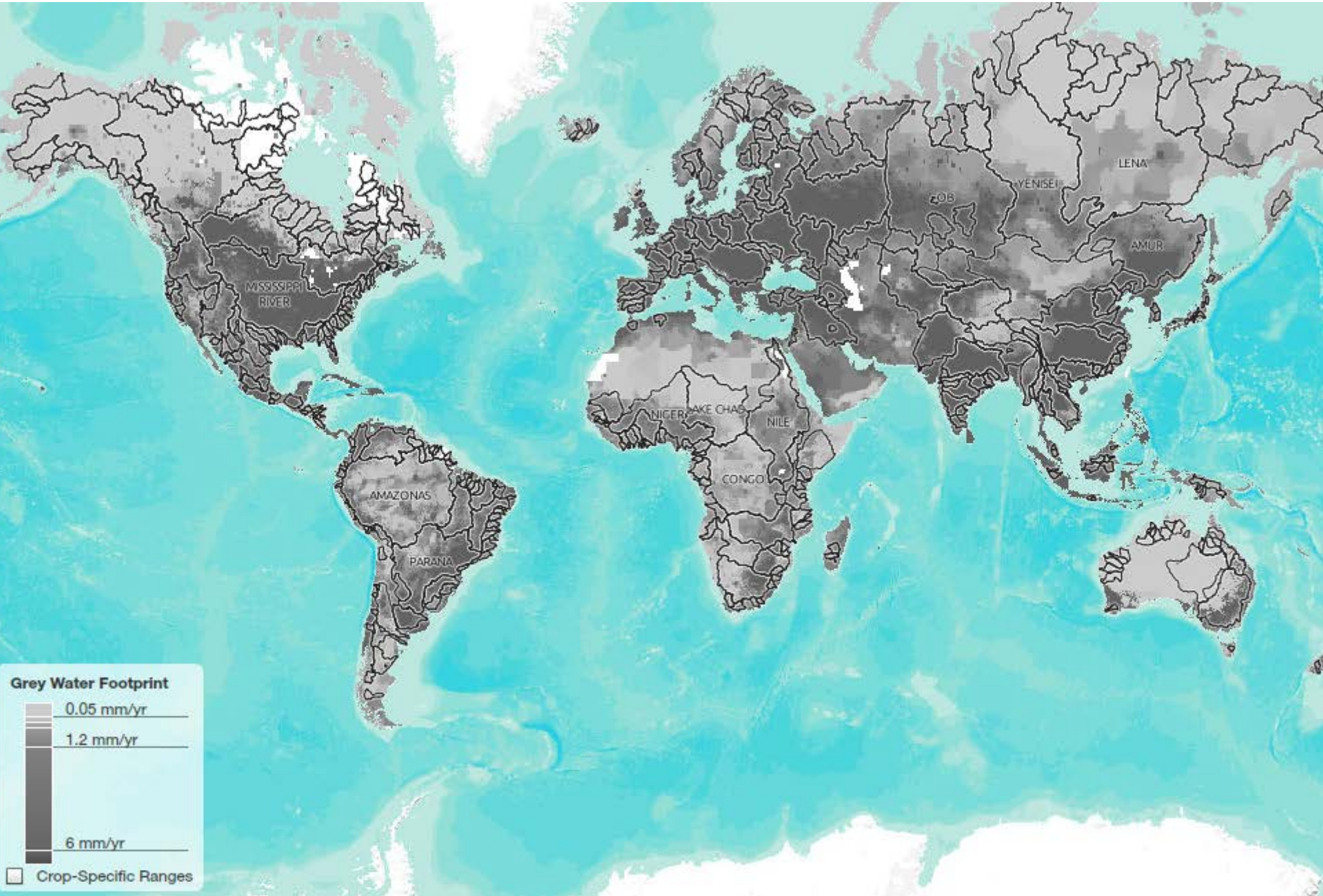
Green Water Footprint of Humanity (Use of Rainwater)



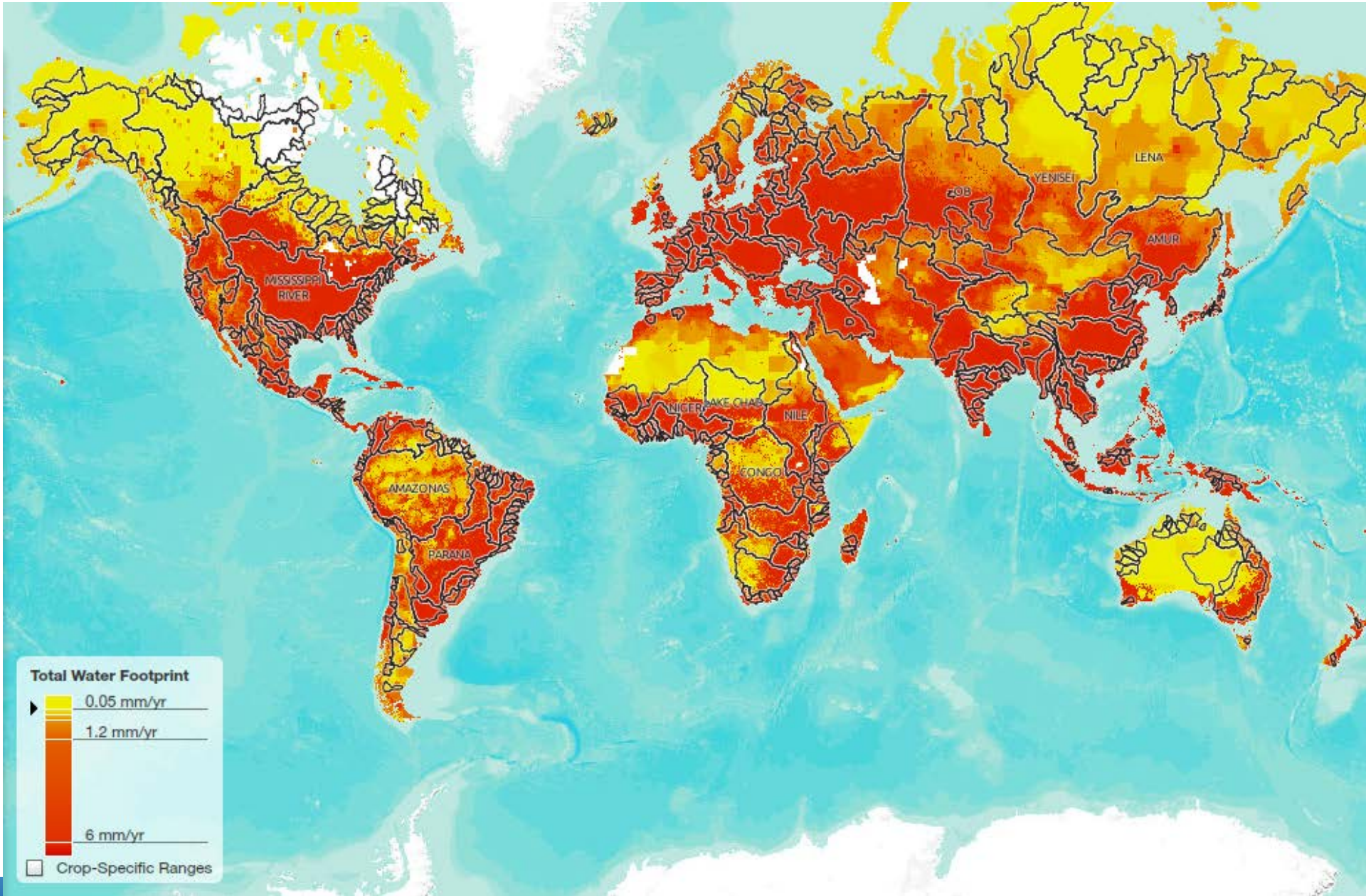
Blue Water Footprint of Humanity (Use of Surface & Groundwater)



Grey Water Footprint of Humanity (Pollution)



Global Water Footprints



Global Dimension of Water Footprints Starts at National Levels

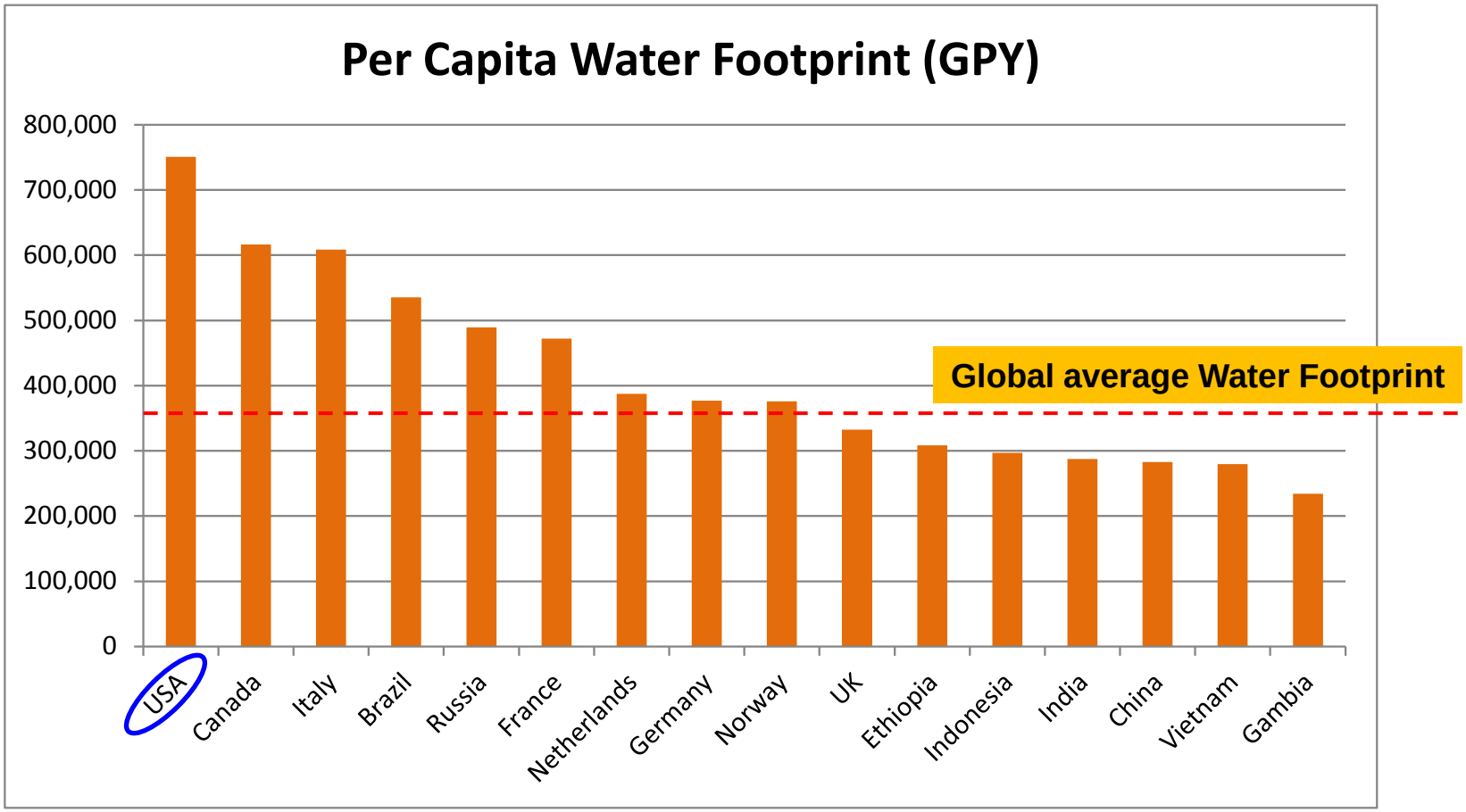
Water Footprint of national consumption
Total amount of freshwater used to produce the goods and services consumed by the inhabitants of the nation

It consists of two components:

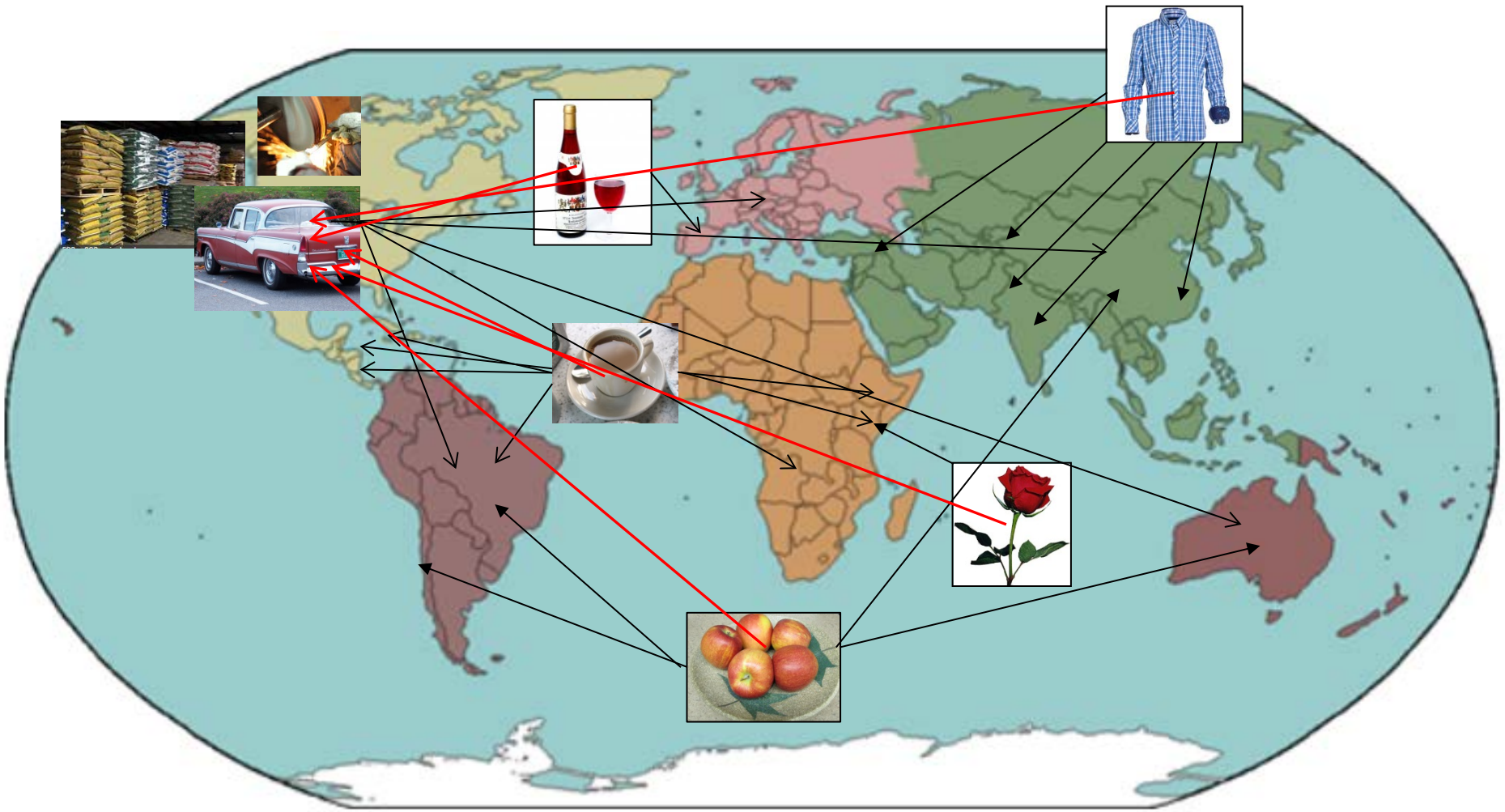
1. **Internal** Water Footprint, i.e. the water use inside the country

2. **External** Water Footprint, i.e. the water use in other countries

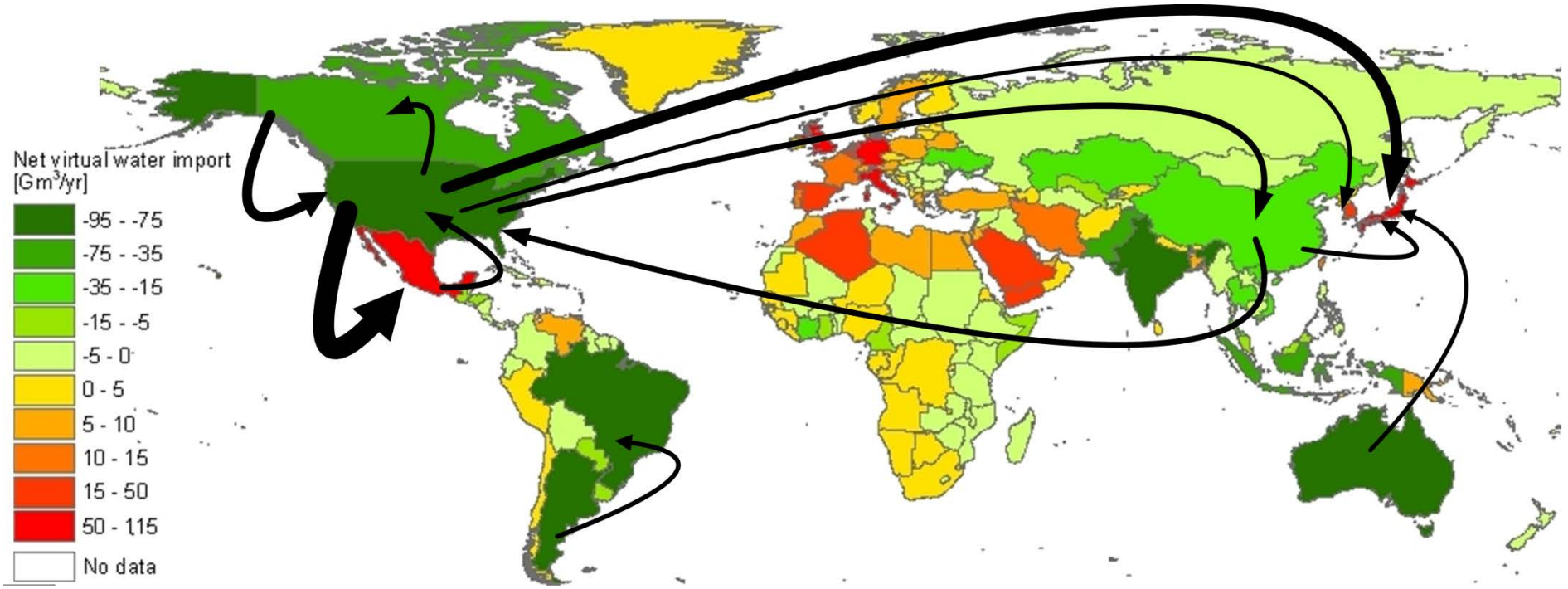
National Water Footprints (Gallons/Year/Person)



National Virtual Water Balances



National Virtual Water Balances



Arrows show gross virtual water flows
>15 Gm^3/yr (or 2.6 x 10^{29} gallons)

Source: Hoekstra & Mekonnen (2012) The Water Footprint of Humanity, *PNAS*

Water Footprint of a Business

Why Should a Business care beyond than their own water utility bill?

Source: Hoekstra et al. (2011) *The Water Footprint Assessment Manual*, Earthscan, London, UK

Average Potable Water and Sewer Rates for 110 Utilities in S. Florida

Gallons	Expense
20,000	$185
50,000	$426

- The availability of easily accessible, relatively clean groundwater is becoming more and more scarce
- Increased demand on existing infrastructure will lead to costly replacement or capacity upgrades

Water and sewer rates are expected to increase further in the future

But that's not all… Water and Sewer Rates May Not Constitute Your Full Water Expense

- Trade waste charges for BOD, oil and grease, solids
- Water heating
- Chemicals treatments for cooling towers
- Sludge removal
- Trade waste testing
- Electricity charges
- Depreciation expenses on pre-treatment equipment

Your TRUE cost of water can be almost double your water/sewer costs

Why Should a Business Care?

There are Risks to Not Paying Attention:

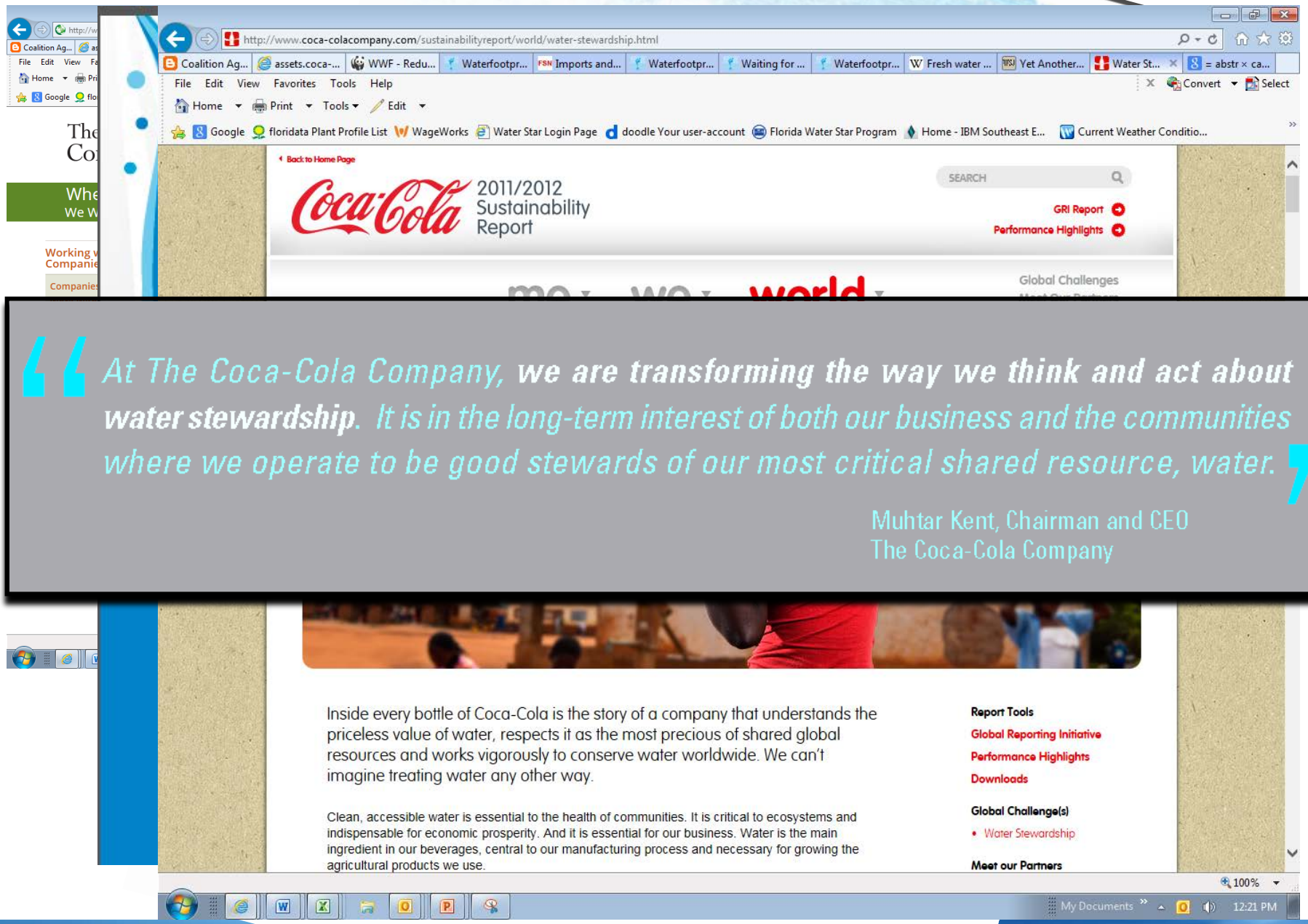
- **Physical** – *Will there be water to make the products we need/use?*
- **Regulatory** – Tightening of restrictions of water use in-country or abroad
- **Reputation** – Corporate image can suffer for poor stewardship
- **Financial** – Any of the above can lead to increased costs or reduced revenues

Source: Hoekstra et al. (2011) *The Water Footprint Assessment Manual*, Earthscan, London, UK

The Coca Cola Company

New Delhi, 4 Oct 2006

Government authorities in India have declared the groundwater around Coca-Cola's bottling plant in Mehdiganj as "over-exploited" – a category indicating the highest level of stress on the water resources. Over-exploited indicates more water being extracted from the aquifer than replenished – a highly unsustainable state.



> *At The Coca-Cola Company,* ***we are transforming the way we think and act about water stewardship.*** *It is in the long-term interest of both our business and the communities where we operate to be good stewards of our most critical shared resource, water.*
>
> Muhtar Kent, Chairman and CEO
> The Coca-Cola Company

Water Footprint Assessment – Examples from Business

"*Despite the challenges involved, Water Footprinting is poised to grow. Unilever PLC, which owns 400 food and household brands, estimates that it saved about **$26 million** by reducing water waste in its factories from 2001 to 2007.*"

THE WALL STREET JOURNAL. U.S.

U.S. NEWS

Yet Another 'Footprint' to Worry About: Water

Taking a Cue From Carbon Tracking, Companies and Conservationists Tally Hidden Sources of Consumption

By ALEXANDRA ALTER

Updated Feb. 17, 2009 12:01 a.m. ET

It takes roughly 20 gallons of water to make a pint of beer, as much as 132 gallons of water to make a 2-liter bottle of soda, and about 500 gallons, including water used to grow, dye and process the cotton, to make a pair of Levi's stonewashed jeans.

Though much of that water is replenished through natural cycles, a handful of companies have started tracking such "water footprints" as a growing threat of fresh-water shortages looms. Some are measuring not just the water used to make beverages and cool factories, but also the gallons used to grow ingredients such as cotton, sugar, wheat, tea and tomatoes. The drive, modeled partly on

So What Can We Do?

Reducing Humanity's Water Footprint – Consumers

Reduction of the direct Water Footprint:

- Water saving fixtures & equipment etc.

Reduction of the indirect Water Footprint:

- Change consumption patter
- Choose the sustainable version of products
- Use less energy (fuel, electricity…)

"Save water in the supermarket and at the mall"

Asking product transparency from businesses and regulation from governments

Source: Hoekstra (2013) *The Water Footprint of Modern Consumer Society*, Routledge, London, UK

What Can Your Company/Business do?

Reduce its operational Water Footprint by:

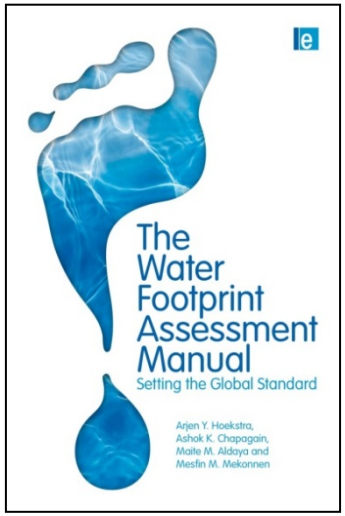
- Conduct a water audit of company facilities
- Improve water use efficiency at its own operations
- Bring water pollution to zero (reduce, recycle and treat before disposal)

Cut supply-chain Water Footprint by:

- Assess your suppliers
- Making supply agreements with certain standards with suppliers or
- Changing suppliers
- Make supply chains fully transparent to consumers

Get Going:

- Set quantitative water-footprint reduction targets
- Benchmarking
- Product labelling
- Certification
- Water Footprint reporting



The Water Footprint Assessment Manual Earthscan, London, UK, 2011

What Can Governments Do?

- Water Footprint caps by river basin
- Water Footprint benchmarks by product
- Product transparency
  - Product labeling
  - Certification of industries
  - Water Footprint reporting/disclosure
- Global Water Footprint reduction targets
- Full-cost water pricing
- Coherent energy-water strategies

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Water hub

From Guardian Sustainable Business

Will we ever see water footprint labels on consumer products?

Displaying water inputs on consumer items is an idea floated frequently, but is it any closer to becoming reality?

Will Henley

Guardian Professional, Friday 23 August 2013 16.11 BST

Jump to comments (5)

On average it takes 15,400 litres of water to make 1kg of beef. Photograph: Bon Appetit/Alamy

What's the take home?

Start thinking about your *overall* Water Footprint.

What you do and how you do it affects the water security of many people and places.

Improving your company/city/personal water use efficiency is great, but just a start.

We ~~can~~ must all be a part of a more water-secure future.

Questions?

Visit:
www.waterfootprint.org

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