Water Footprinting

Is Less More?

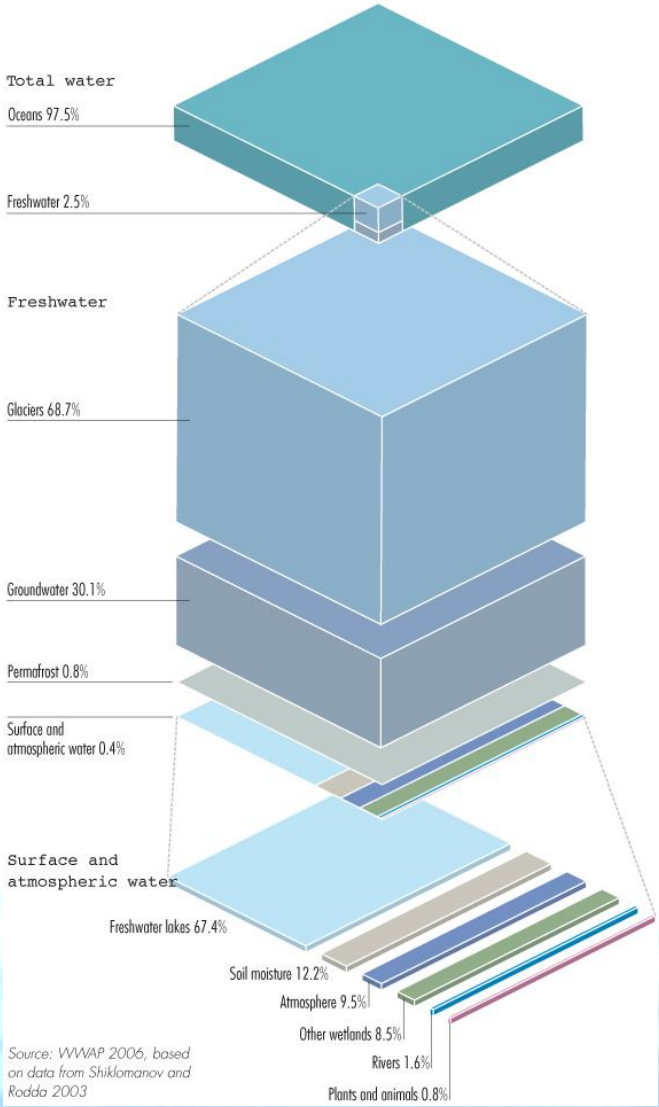
Wendy M. Larson
May 12, 2011

LimnoTech
Water | Environment | Scientists | Engineers

Overview

- Global water trends and issues
- Water footprinting
  - What is it?
  - How is it calculated?
  - How has it been used?
  - Where is it going?
- Related water stewardship initiatives

Global Distribution of the World's Water



Two-thirds of the world's population will face a lack of water in less than 20 years if current trends in climate change, population growth, rural to urban migration and consumption continue.

-UN Deputy Secretary General Asha-Rose Migiro, 2009

10 Year Projections

TRENDS

Population Growth: Increase of 1.5 billion to 8 billion by 2020

Climate Change: 0.8 degree increase by 2020

Global Development: Dramatic increase in number of developed economies

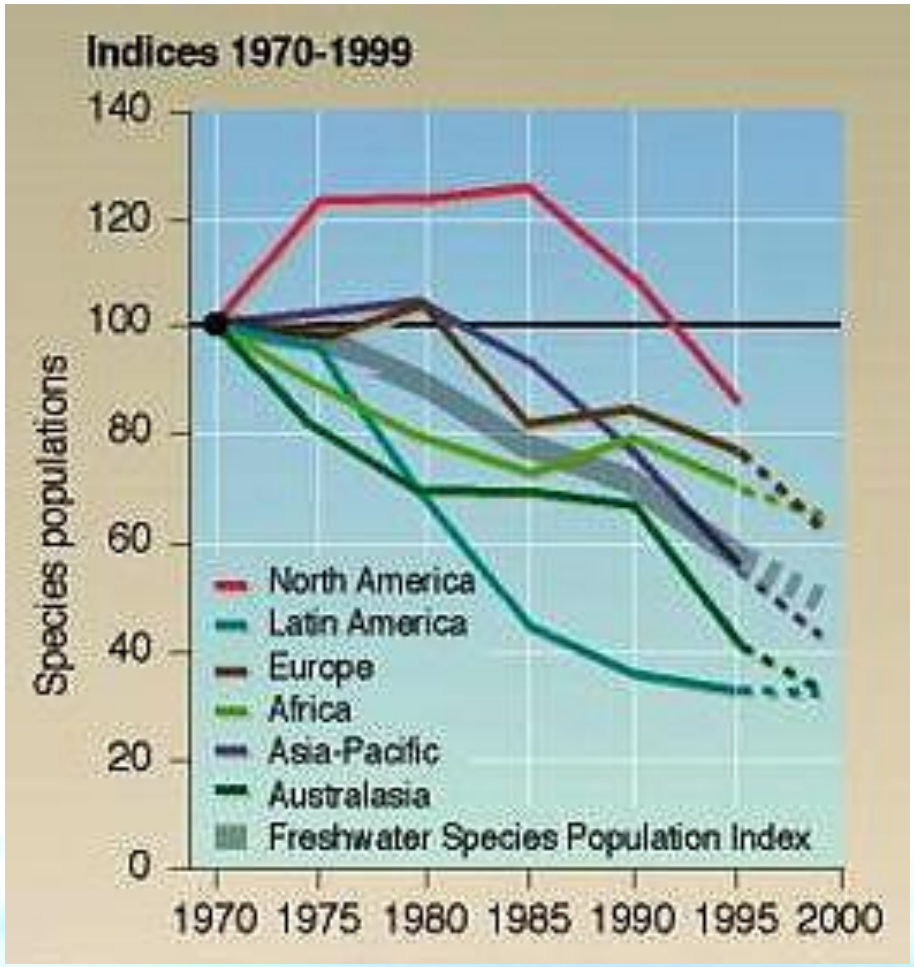
EFFECTS

- Significant increase in competition for water
- Increased prices
- Increased conflict
- Public sector response
- Demand for investment in water infrastructure

Health and Water

- 1 billion people lack access to safe water.
- 6,000 children die every day from diseases associated with lack of access to safe water.
- Most of the cities where large numbers of people live without taps and toilets have plentiful water supplies.

Decline in Freshwater Species

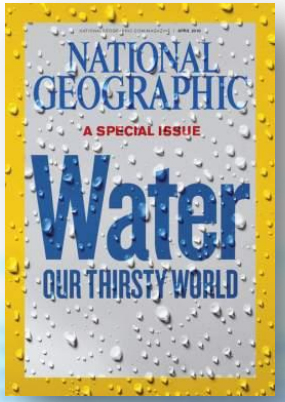


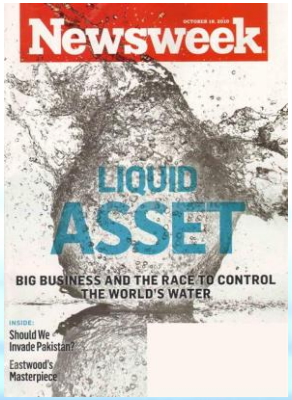
Increased Awareness

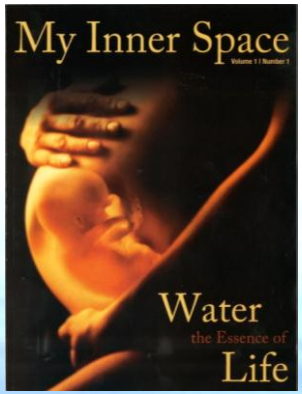
circle of blue
Reporting the Global Water Crisis

2009 Globescan and Circle of Blue survey of 32,000 people from 15 countries found:

- More than 90% perceived “water pollution” and “freshwater shortage” as serious problems.
- 78 % said that companies have a clear role and obligation to find solutions.







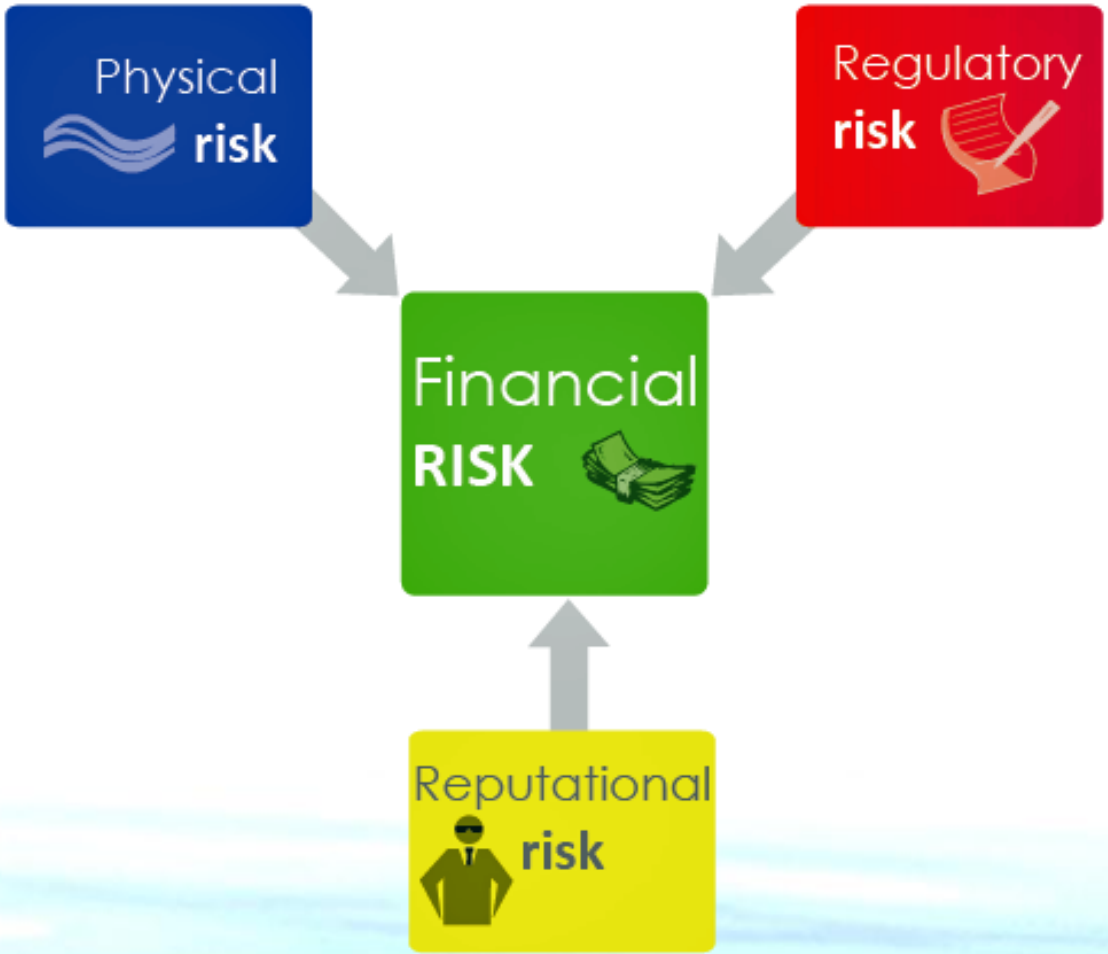
Consumer Demand

15% increase in coffee sales in UK after sourcing 100% of its coffee from Rainforest Alliance Certified farms.

Walmart
Save money. Live better.

Supplier Sustainability Assessment required of > 100,000 global suppliers.

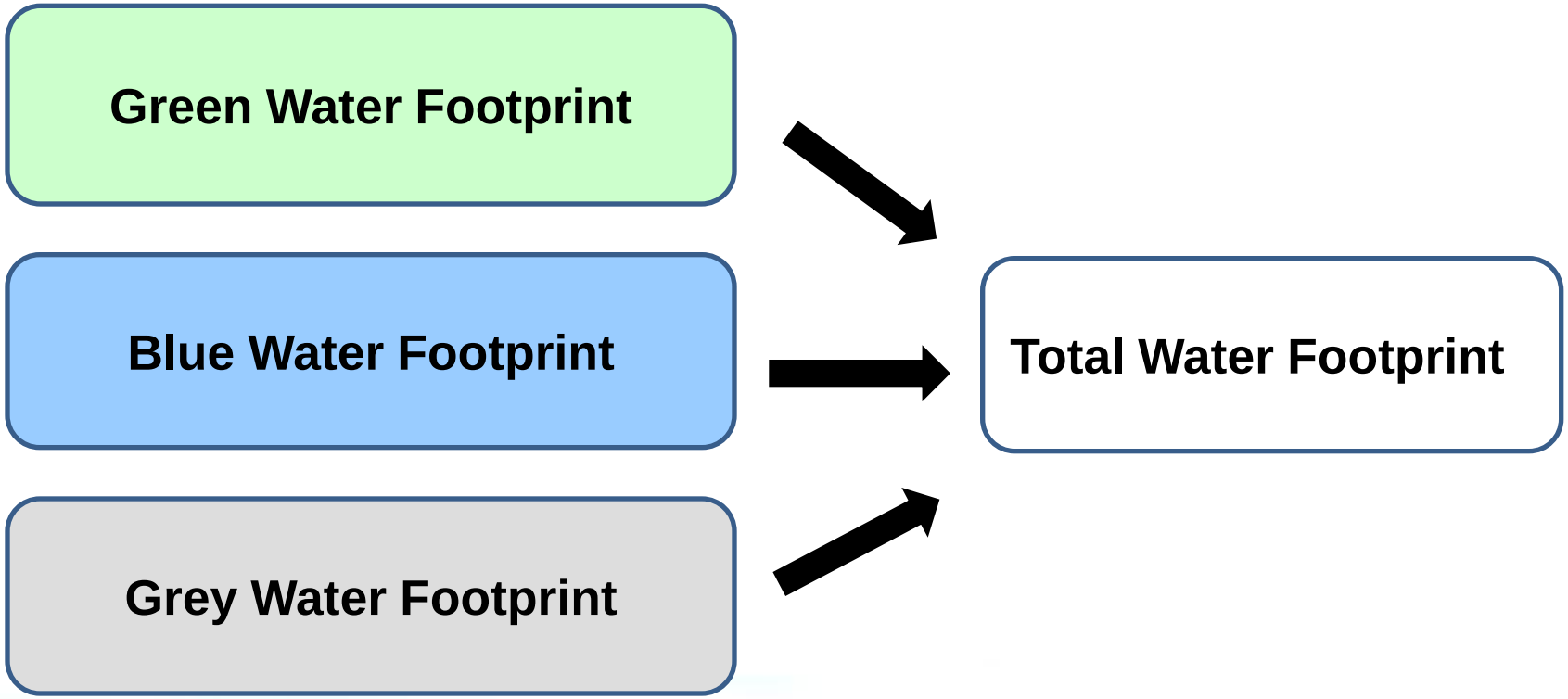
Business Risk



Water Footprint Network

- Virtual Water
  - Water “embedded” in a product
- Water Footprint
  - Total virtual water to produce a product, summed over the various steps of the production chain
  - Measured in terms of water volumes *consumed* and/or *polluted*.
  - Includes *where* & *when* the water was used

Colors of a Water Footprint



Green Water Footprint

- Consumptive use of rainwater temporarily stored on or in the soil:
  - Evaporation from soil
  - Evapotranspiration from plants
- Rainwater incorporated into plant biomass

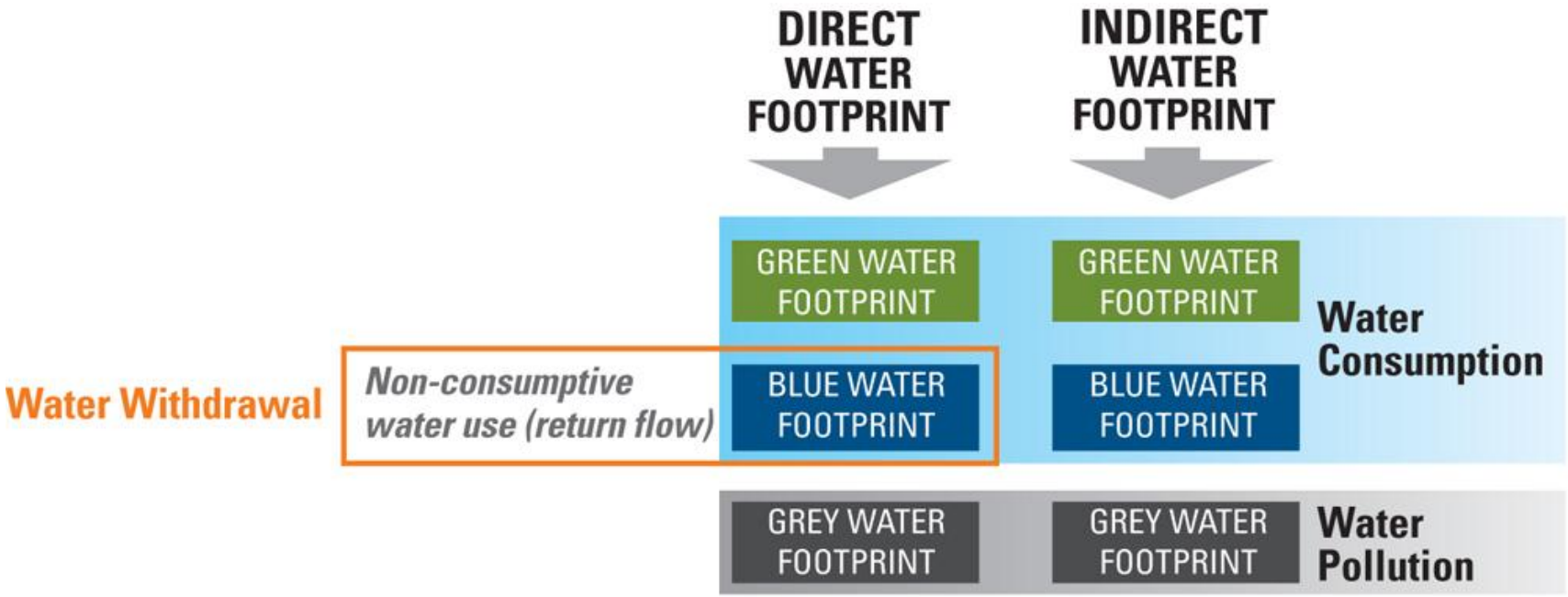
Blue Water Footprint

- Surface or groundwater:
  - Lost through evaporation and transpiration
  - Incorporated into a product
  - Returned to different catchment or the sea

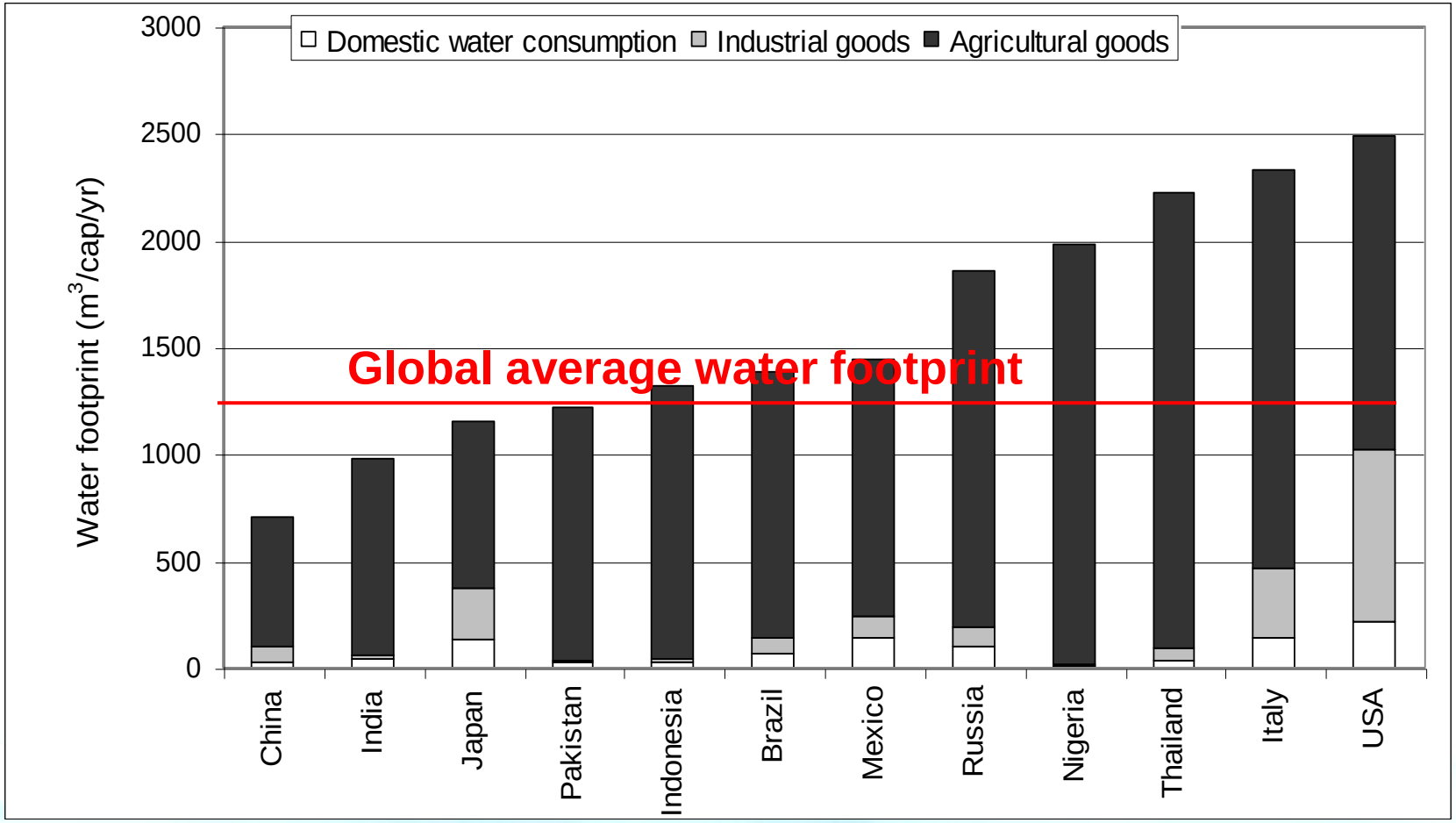
Grey Water Footprint

- Volume of *polluted water* that associates with the production of a product in its full supply chain.
  - Equals *volume required to dilute pollutants* to such an extent that the quality of the water remains above water quality standards.

Direct and Indirect Consumption

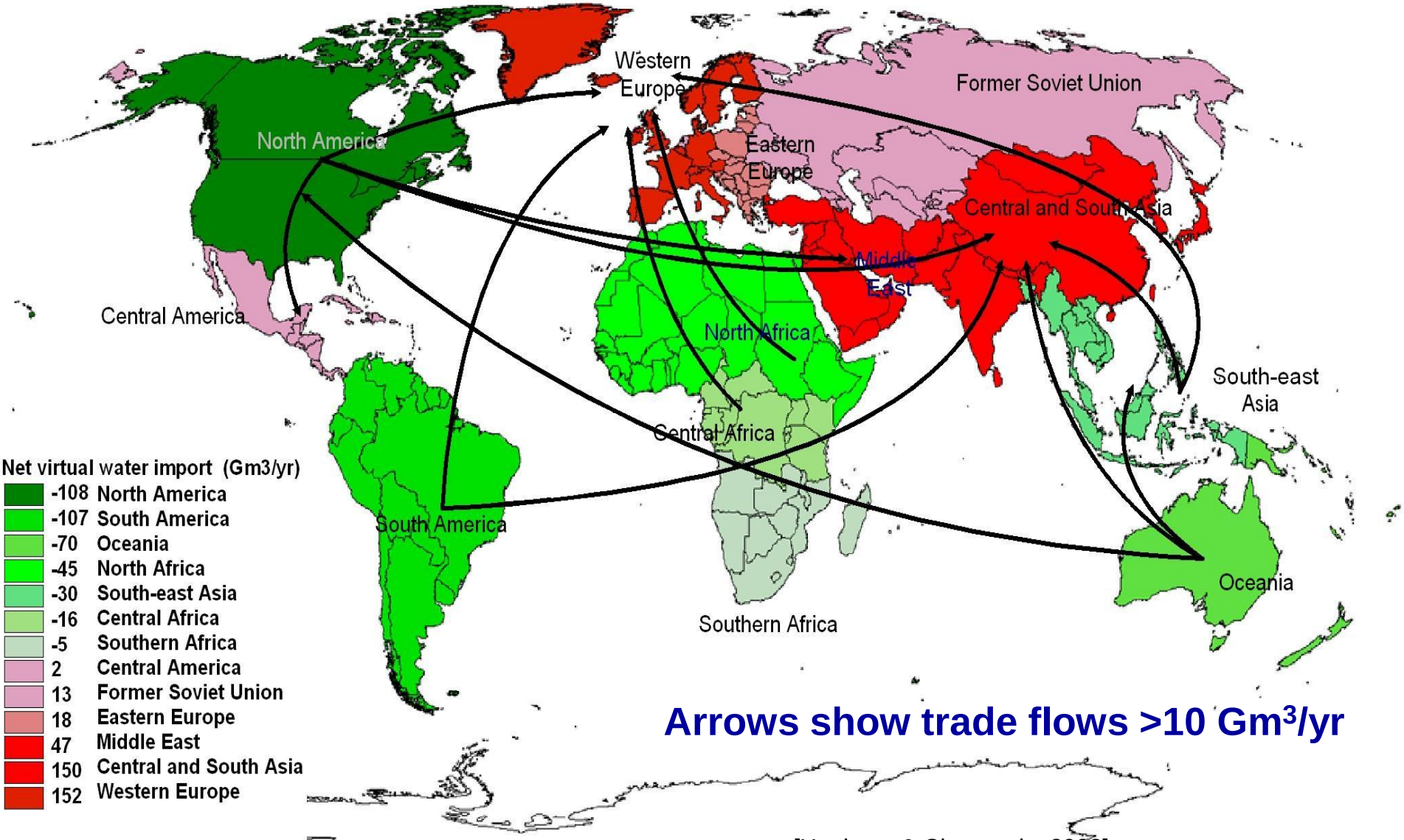


Humanity's Water Footprint



Regional virtual water balances

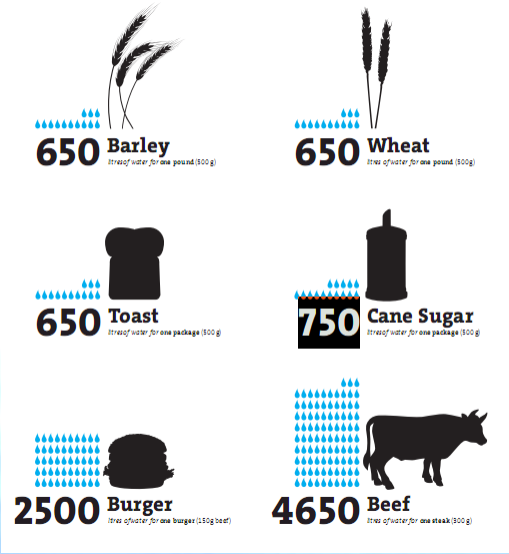
(only agricultural trade)



[Hoekstra & Chapagain, 2008]

Case Studies

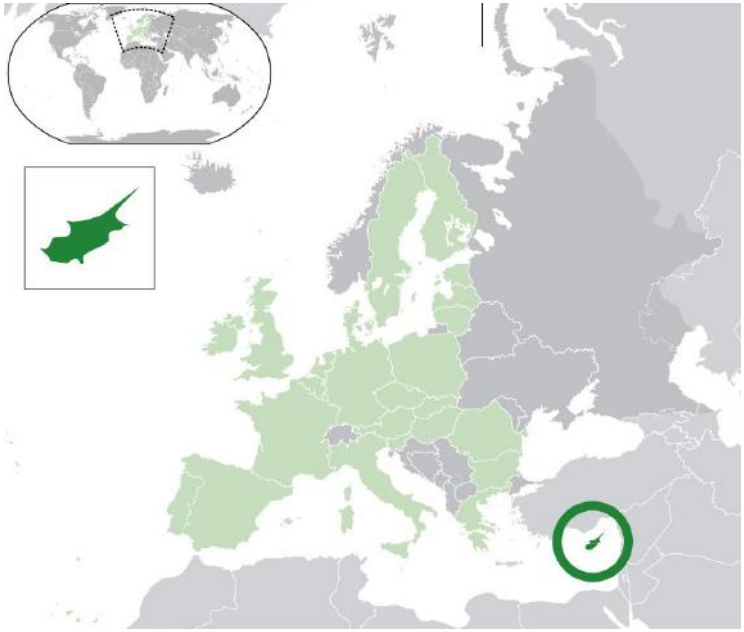
- How can water footprinting be useful to governments?
  - Water policy in Cyprus[1]
- How can water footprinting be useful to consumers and companies?
  - Product water footprints



[1]C. Zoumides, A. Bruggeman& T. Zachariadis. 2010. The Water Footprint of Crop Production in Cyprus. Presentation at Water Footprint Seminar; Stockholm World Water Week

Water Policy Case Study - Cyprus

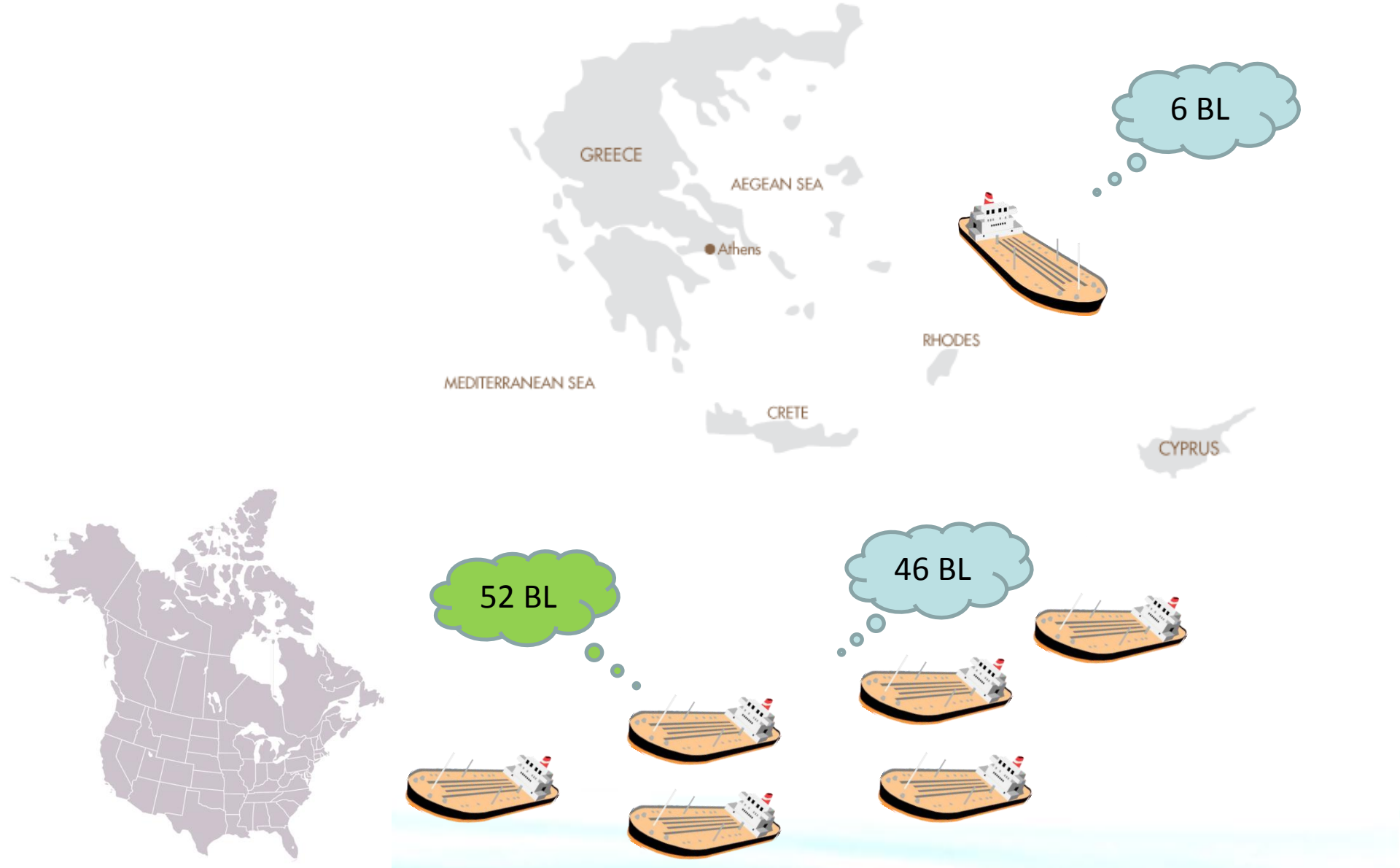
- Drought every 2-3 consecutive years
- Irrigation-based agriculture
- Increasing demand due to tourism
- Reservoirs 10% full in 2008
  - Water rationing
  - **Expensive water imports from Greece**



Water Policy - Cyprus

- 1960-2000: No drop of water to the sea
  - Increase storage capacity by building dams
  - Subsidize farming for food security
- Since 2000: Independence from climatic conditions
  - Desalination plants
  - Recycle sewage water for agricultural use and groundwater recharge

Rueters: Goat on sun-baked bed of Cyprus' largest reservoir at Kouris.


GREECE
AEGEAN SEA
Athens
RHODES
MEDITERRANEAN SEA
CRETE
CYPRUS
6 BL
52 BL
46 BL

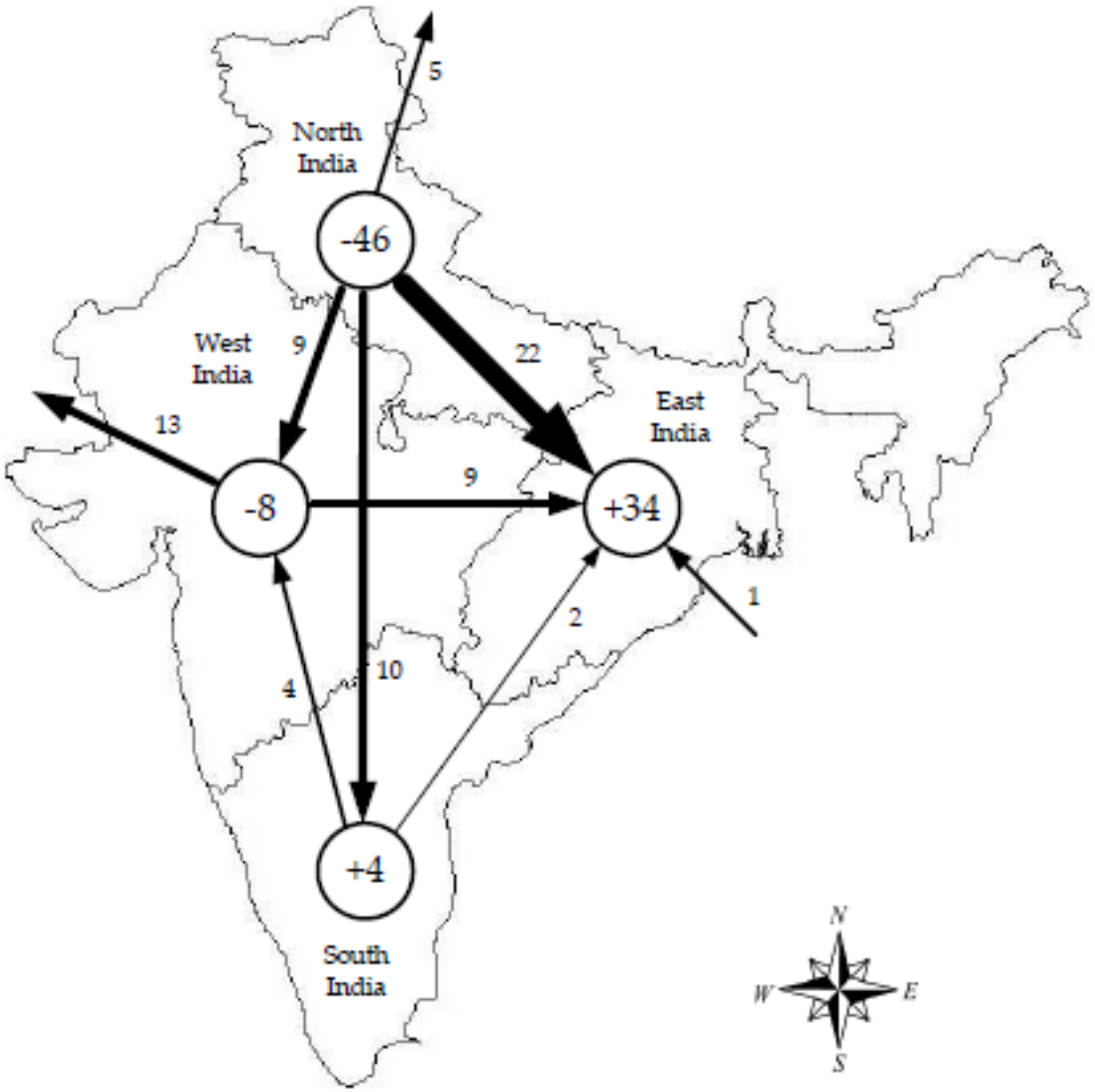
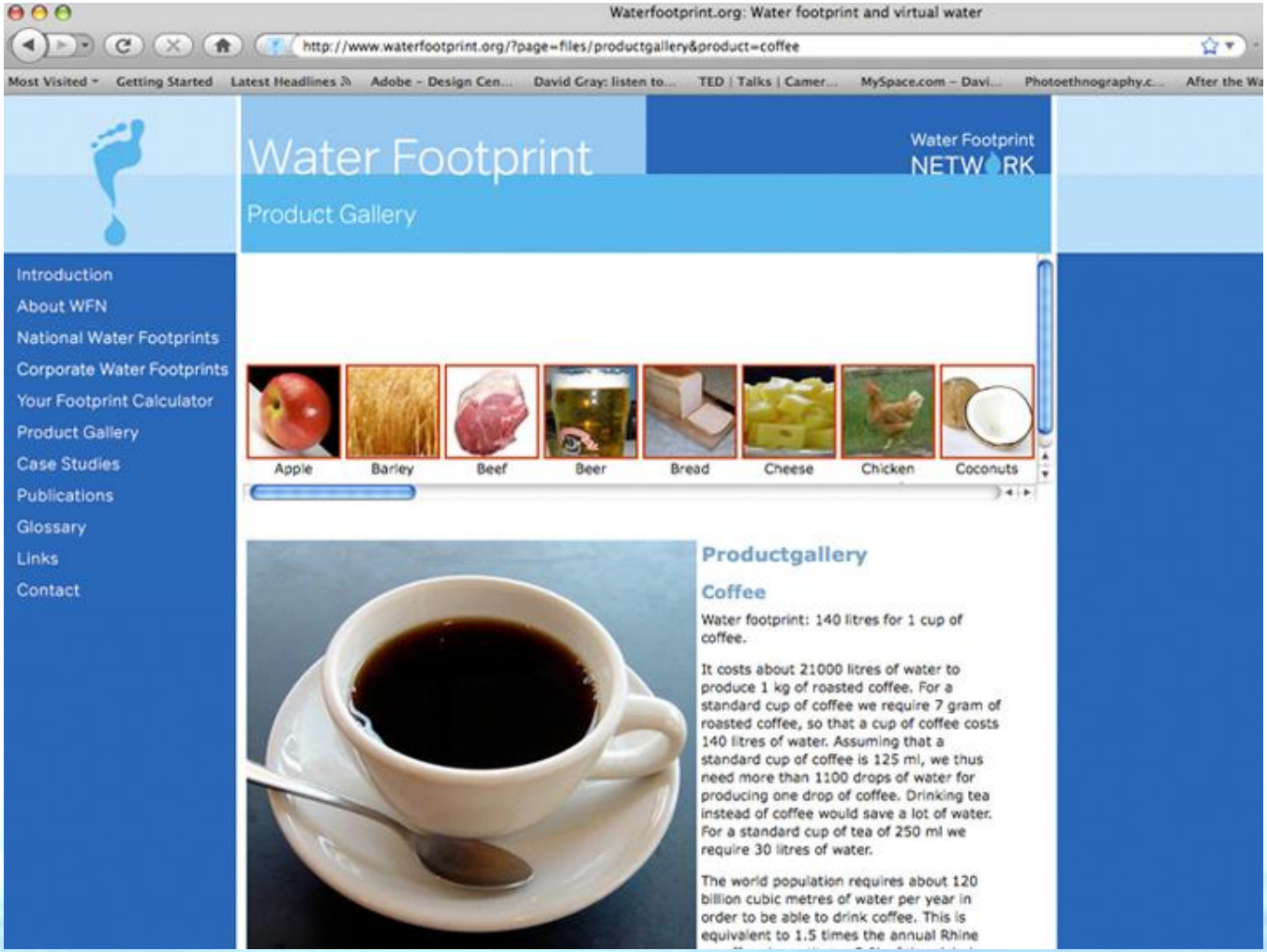


Figure 3. Inter-regional virtual water flows (10^9 m^3/yr), as estimated by Kampman et al. (2008).

How can water footprinting be useful to governments?

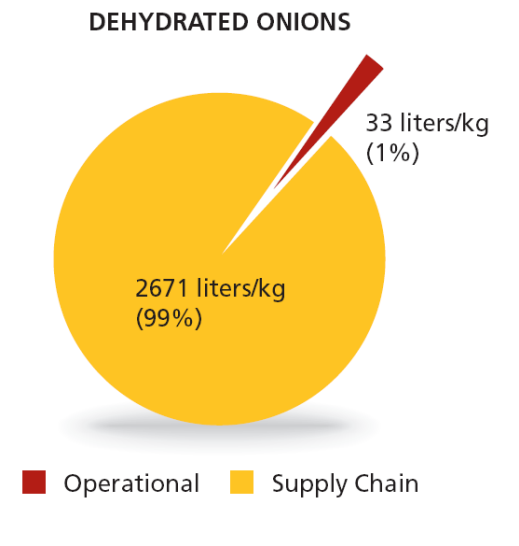
- Increased understanding of water use
  - Where is the most water used in water-scarce regions?
  - Where and when are water resources most vulnerable to depletion and pollution?
- Management and planning tool
  - Where focus efforts to improve water efficiency and productivity?
- Policy tool
  - How optimize water allocations to maximize environmental, economic and social benefits?

How can water footprinting be useful to consumers and companies?



Product Water Footprints

- Most pilots in food & beverage industry
- Most water footprints address operational use only
- For agriculturally-derived products, it's all about the crops



Example: Water footprint of dehydrated onions for Jain Irrigation Systems, India

Salad
150 gallons

Salmon Pasta Salad
102 gallons

Chicken and beef kabob with couscous
569 gallons

Pita Bread
12 gallons

Grilled Vegetables
130 gallons

Dessert
305 gallons

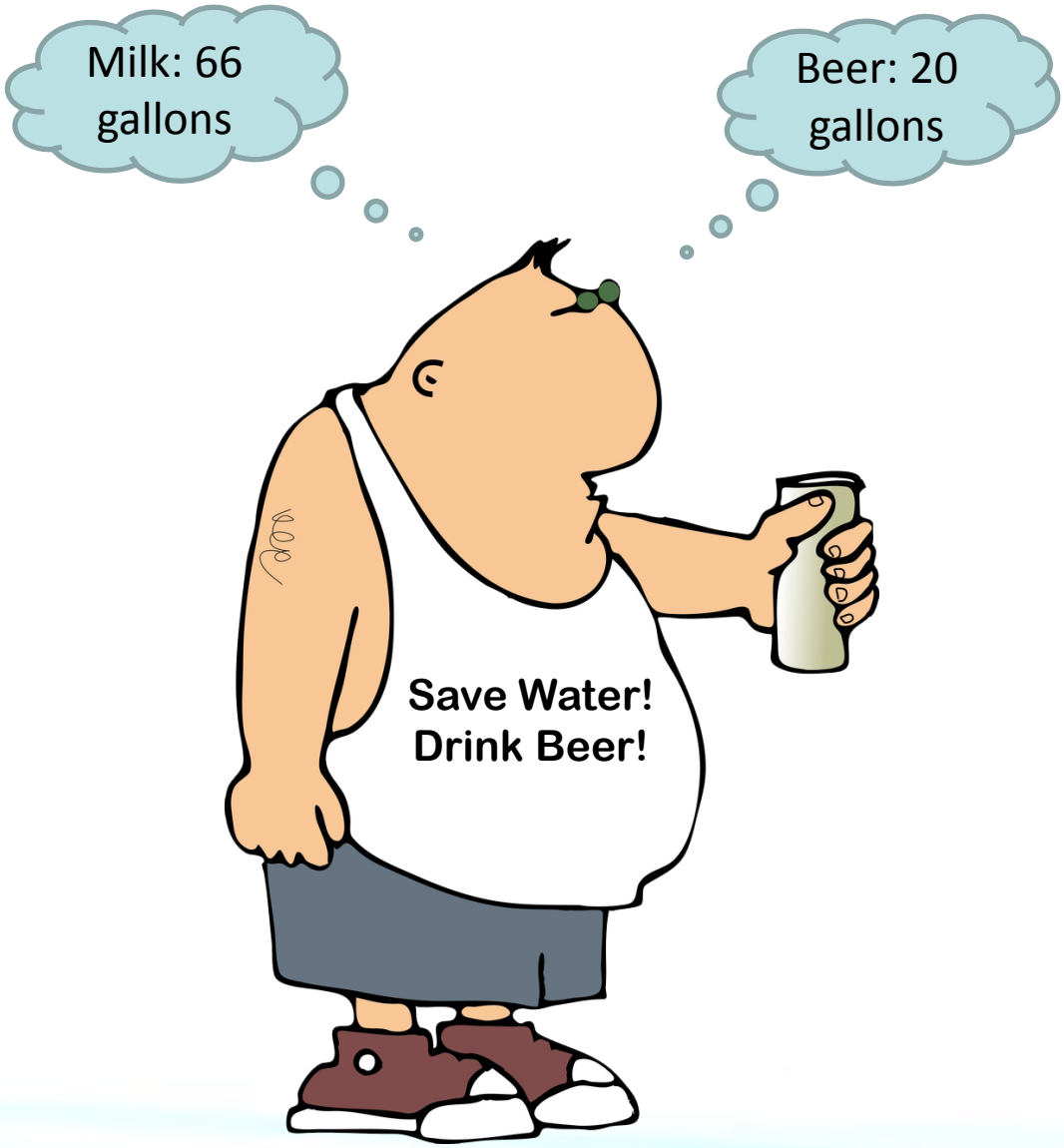
Tea (250 ml)
8 gallons

Coffee (125 ml)
37 gallons

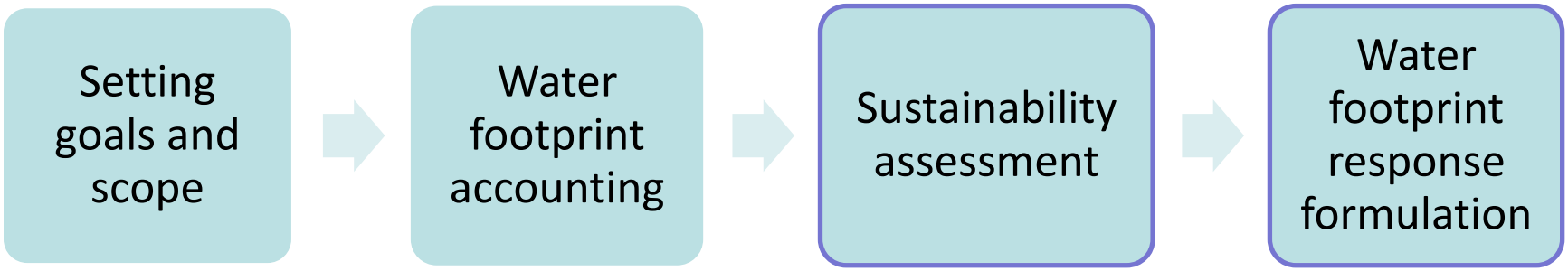
Carbonated drink (250 ml)
41 gallons

Milk (250 ml)
66 gallons

Beer (250 ml)
20 gallons


Milk: 66 gallons
Beer: 20 gallons
Save Water!
Drink Beer!

Four Phases of a WF Assessment



Linking Consumption to Impacts

Aral Sea

Potential Reduction Strategies for Companies

- Reduction of the operational water footprint
  - water saving in own operations
- Reduction of the supply-chain water footprint
  - Influencing suppliers
  - Changing to other suppliers
- Transform business model to incorporate or better control supply chains


Calories?
Fair Trade?
Carbon Footprint?
Water Footprint?!
Nutrition?
Organic
Fats?

Other Global Water Initiatives

- Aquawareness
- Alliance for Water Stewardship
- BIER Water Footprint Working Group
- Carbon Disclosure Project -Water Disclosure
- Corporate Water Gauge
- Federation House Commitment to Water Efficiency
- Global Environmental Management Initiative (GEMI)
- Global Reporting Initiative
- Global Water Tool (WBCSD)
- UNEP/SETAC Life Cycle Initiative
- Strategic Water Management Framework (Australia minerals)
- UN CEO Water Mandate
- Water Brief for Business
- Water Footprint Network
- Water Footprint Neutrality and Efficiency Project (UN)
- Water Neutral Offset Calculator
- WaterSense Certification Scheme
- Water Stewardship Initiative
- ISO Water Footprint Standard

Stated Objectives of Water Stewardship Initiatives

- Calculate current water use or consumption for comparison
- Comply with certification or standards programs
- Measure progress toward corporate sustainability goals
- Assess business risks associated with water scarcity in operations and the supply chain
- Facilitate communications with public, customers, and suppliers

ALLIANCE FOR WATER STEWARDSHIP

Water Stewardship and Certification



www.allianceforwaterstewardship.org

Water Environment Federation the water quality people

EWP The Voice of Water

WWF

The Nature Conservancy Protecting nature. Preserving life.

PACIFIC INSTITUTE

Water Stewardship Initiative

water witness ...because we're all downstream

Summary

- Water footprinting is a young science
  - Some aspects are more mature than others
- Water footprint number alone does not paint the whole picture
- No one tool does it all - many other initiatives in play
  - Different roots & objectives
  - Different capabilities & applications

“When water disappears there is no alternative.”

-Vandena Shiva

Extra Slides

Salad

- Lettuce (1 oz): WF – 1 gallon
- Onions (0.5 oz): WF – 2 gallons
- Tomatoes (1 oz): WF – 1 gallon
- Cucumber (1 oz): WF – 2 gallons
- Olives (0.5 oz): WF – 33 gallons
- Olive oil (20 ml): WF – 122 gallons

Total – 150 gallons

Salmon Pasta Salad

- Salmon (4 oz): WF – 0 gallons
- Heavy cream (sub milk – 4 oz): WF – 31 gallons
- Pasta (1/4 pound): WF – 58 gallons
- Baby spinach (6 ounce): WF – 13 gallons

Total – 102 gallons

Chicken and Beef Kabob with couscous

- Couscous (4 oz semolina): WF – 58 gallons
- Chicken meat (3.5 oz): WF – 102 gallons
- Beef (3.5 oz): WF – 406 gallons
- Onions (0.5 oz): WF – 1 gallons
- Bell pepper (0.5 oz): WF – 1 gallons

Total – 569 gallons

Grilled Vegetables

- Bell pepper (2 oz): WF – 6 gallons
- Yellow squash (2 oz): WF – 5 gallons
- Zucchini (2 oz): WF – 5 gallons
- Eggplant (2 oz): WF – 5 gallons
- Asparagus (2 oz): WF – 22 gallons
- Onions (1 oz): WF – 2 gallons
- Crushed pepper (0.5 tbsp): WF – 28 gallons
- Olive oil (10 ml): WF – 56 gallons

Total – 130 gallons

- Pita (1 oz of wheat bread): WF – 12 gallons
- Dessert (250 g of peanut M&M): WF – 305 gallons
- Coffee (125 ml): WF – 37 gallons
- Tea (250 ml):WF – 8 gallons
- Orange juice (200 ml): WF – 45 gallons
- Carbonated sweet drink (250 ml): WF – 41 gallons
- Beer (250 ml): WF – 20 gallons