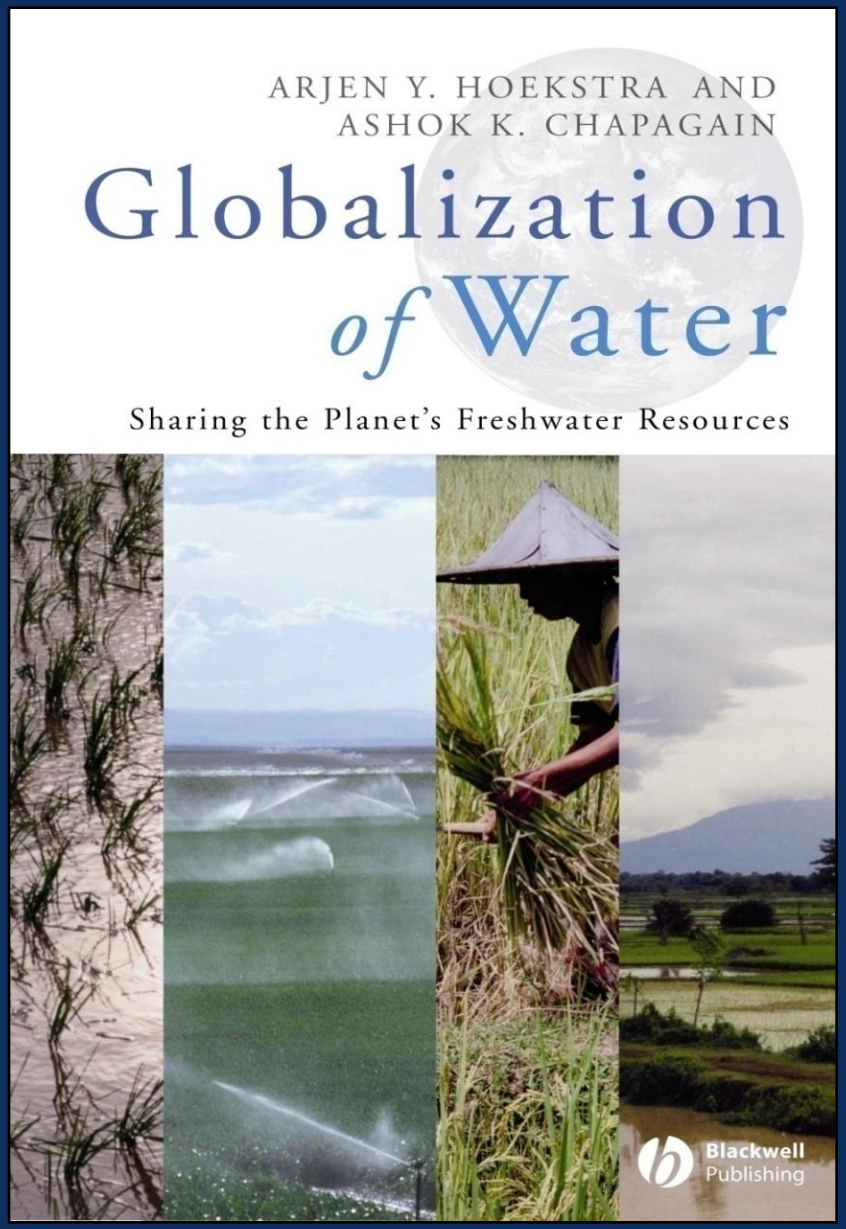
A Comprehensive Introduction to Water Footprints

Arjen Hoekstra

Professor in Water Management – University of Twente – the Netherlands

Scientific Director – Water Footprint Network



Overview Presentation

1. The water footprint of products

2. The relation between consumption, trade and water

3. The water footprint of a business

4. From concept to practice
   - Water footprint impact assessment
   - Reducing and offsetting water footprints

5. Conclusion

6. The way forward

1

The water footprint
of products

Water footprint of a product

► the volume of fresh water used to produce the product, summed over the various steps of the production chain.

► when and where the water was used:
a water footprint includes a temporal and spatial dimension.

► type of water use:
green, blue, grey water footprint.

Water footprint of a product

Green water footprint

- volume of rainwater evaporated.

Blue water footprint

- volume of surface or groundwater evaporated.

Grey water footprint

- volume of polluted water.

Production chain **cotton**

Cotton plant —Harvesting→ Seed-cotton — Ginning

Ginning → 0.63/0.18 → Cotton seed → Hulling/extraction

Hulling/extraction → 0.16/0.47 → Cotton seed oil → 1.07/1.00 → Cotton seed oil, refined

Hulling/extraction → 0.51/0.33 → Cotton seed cake

Hulling/extraction → 0.10/0.20 → Cotton linters

Ginning → 0.35/0.82 → Cotton lint → 1.00/1.00 → Cotton, not carded or combed → Carding/Spinning

Carding/Spinning → 0.05/0.10 → Garnetted stock

Carding/Spinning → 0.95/0.99 → Cotton, carded or combed (yarn) → Knitting/weaving

Knitting/weaving → 0.95/0.99 → Grey fabric → Wet processing → 1.00/1.00 → Fabric → Finishing → 1.00/1.00 → Final textile

Knitting/weaving → 0.05/0.10 → Yarn waste

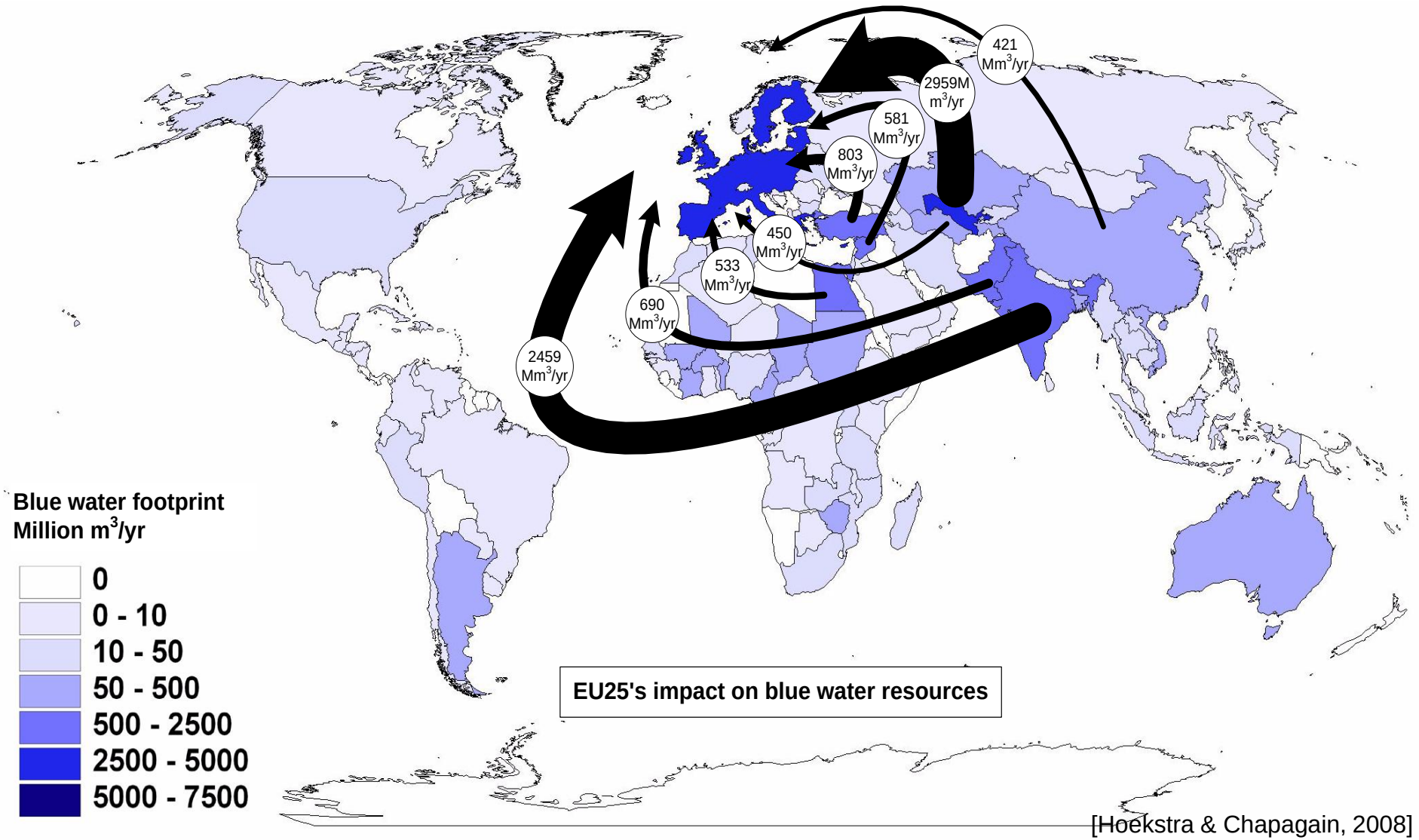
Legend

$\frac{0.35}{0.82}$ ← Product fraction

$\frac{0.35}{0.82}$ ← Value fraction

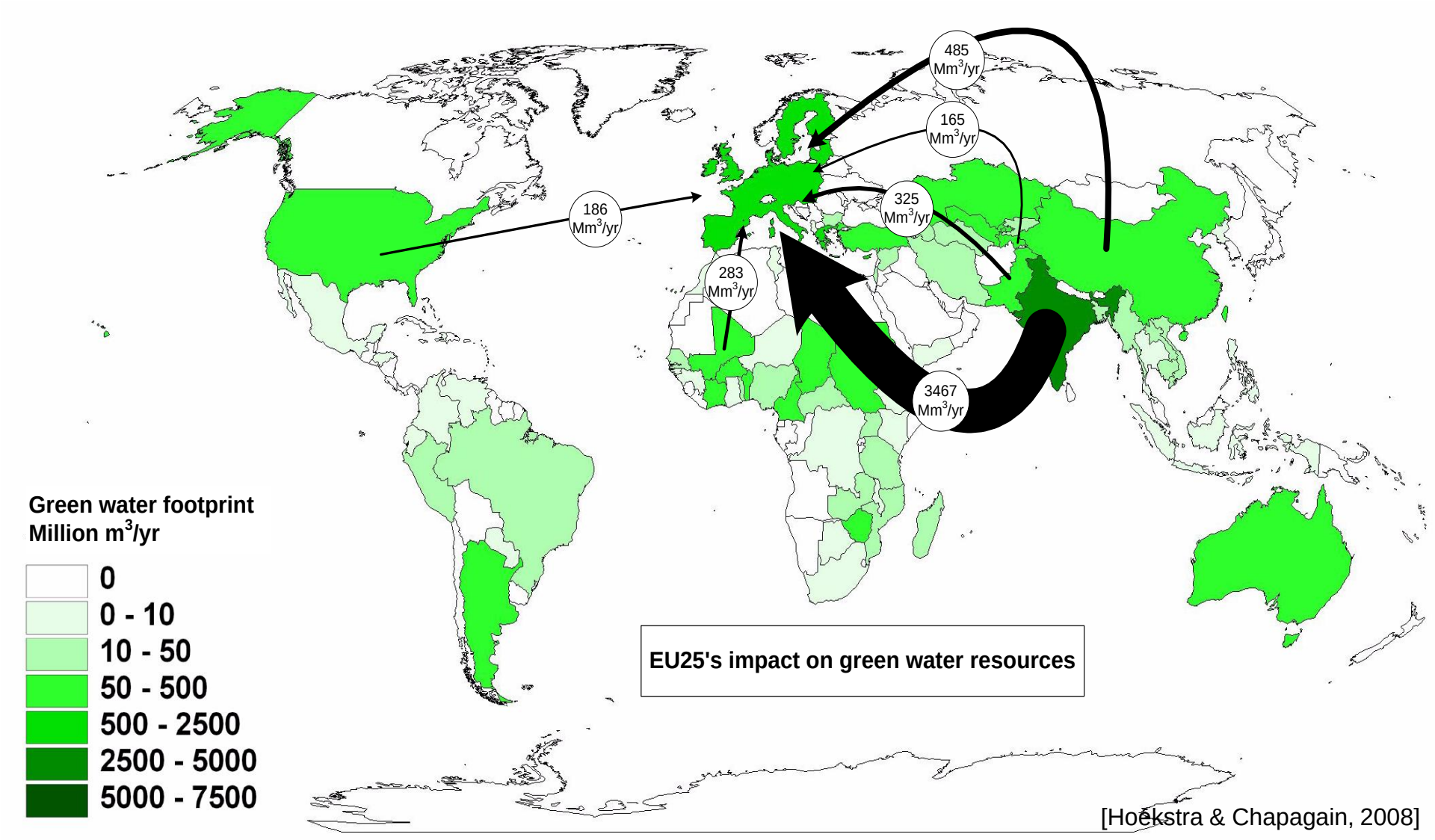
[Hoekstra & Chapagain, 2008]

Water footprint of EU's cotton consumption (blue water)



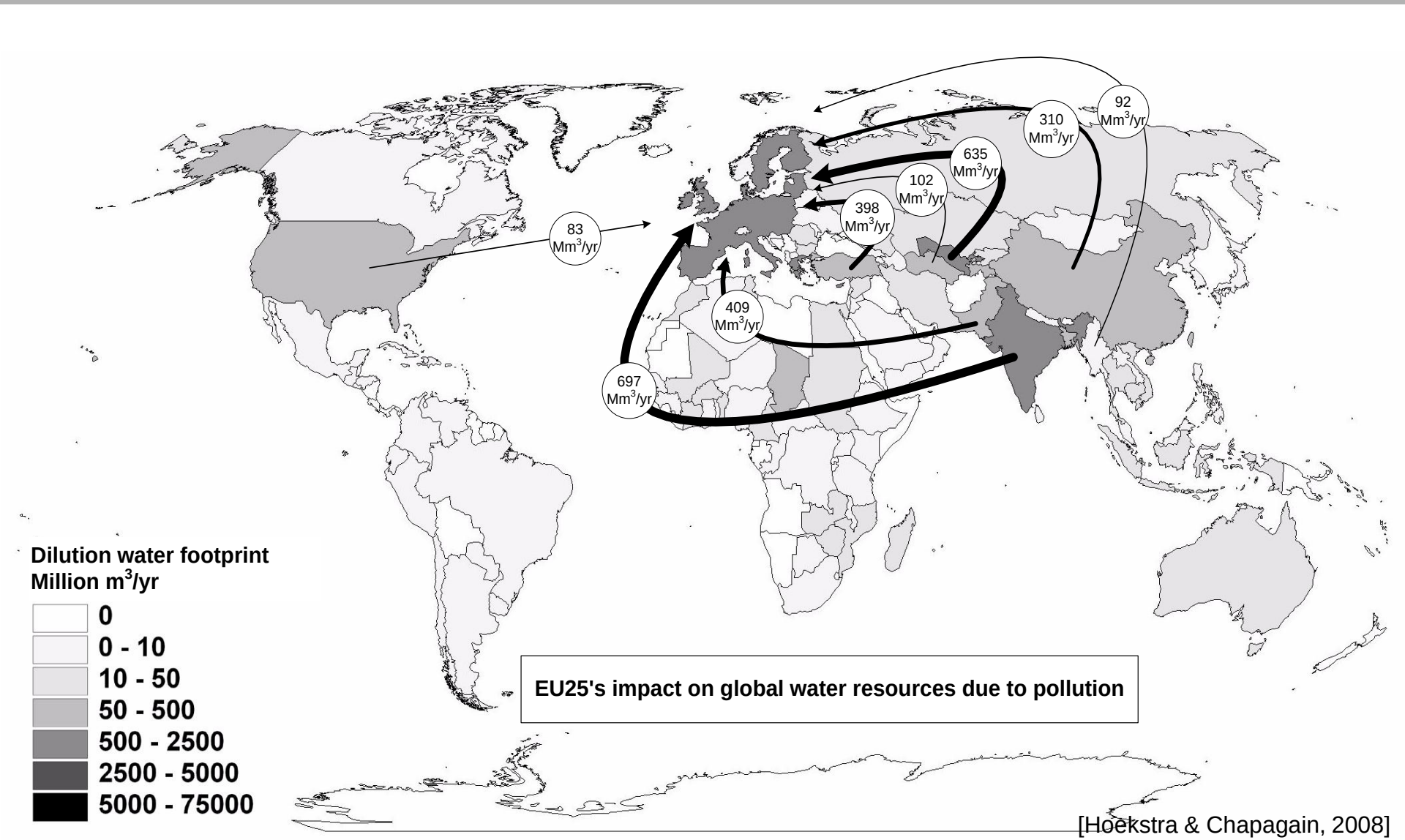
[Hoekstra & Chapagain, 2008]

Water footprint of EU’s cotton consumption (green water)



[Hoekstra & Chapagain, 2008]

Water footprint of EU's cotton consumption (grey water)



[Hoekstra & Chapagain, 2008]

The water footprint:
making a link between consumption in one place and impacts on water systems elsewhere

Shrinking Aral Sea

The water footprint:
making a link between consumption in one place and impacts on water systems elsewhere

Endangered Indus River Dolphin

[Photo: WWF]

[Hoekstra & Chapagain, 2008]

[Hoekstra & Chapagain, 2008]

[Aldaya & Hoekstra, 2009]

[Hoekstra & Chapagain, 2008]

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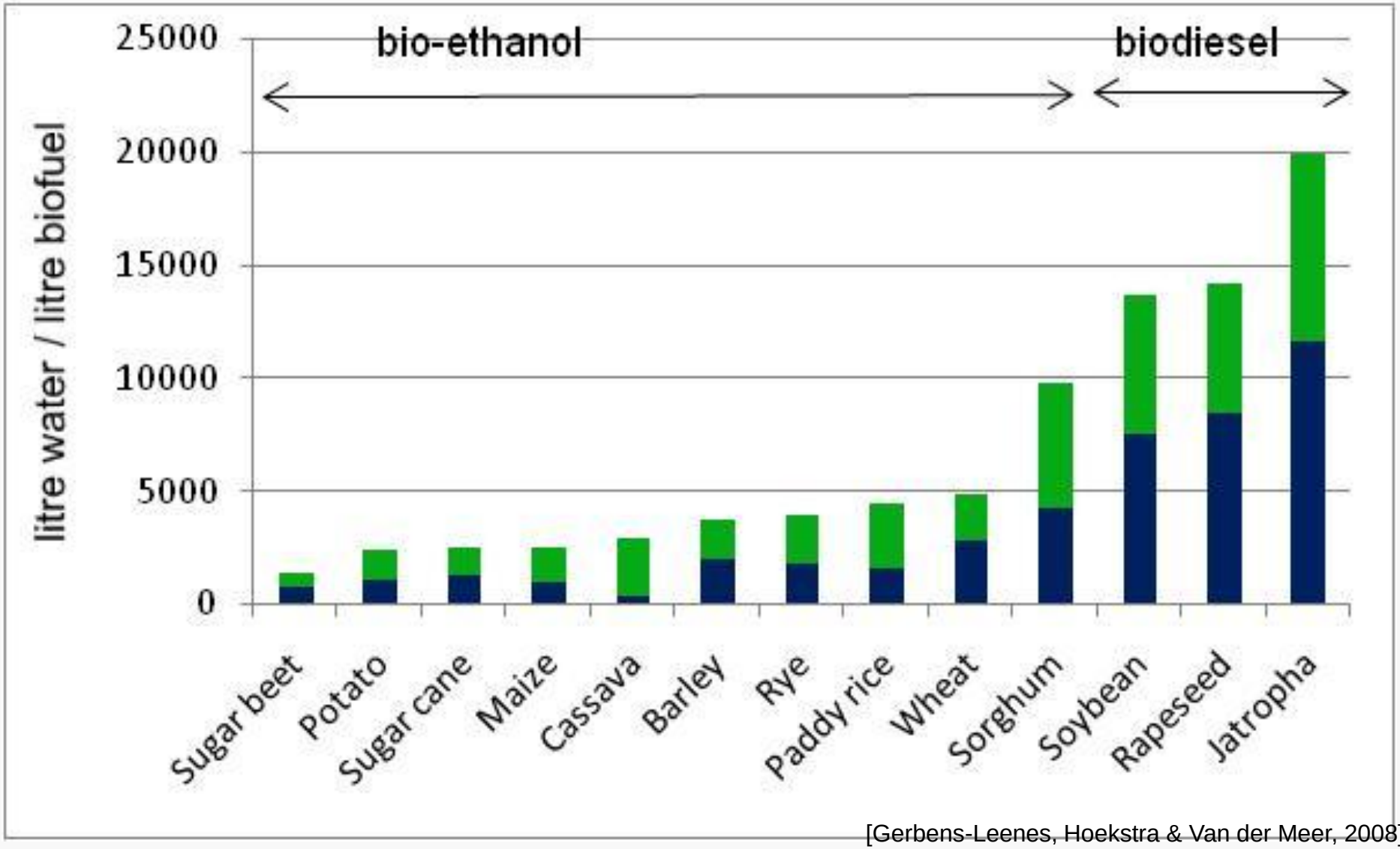
[Hoekstra & Chapagain, 2008]

[Hoekstra & Chapagain, 2008]

Water footprint of biofuels from different crops [litre/litre]



[Gerbens-Leenes, Hoekstra & Van der Meer, 2008]

2

The relation between consumption, trade and water

Water footprint of a nation

► total amount of water that is used to produce the goods and services consumed by the inhabitants of the nation.

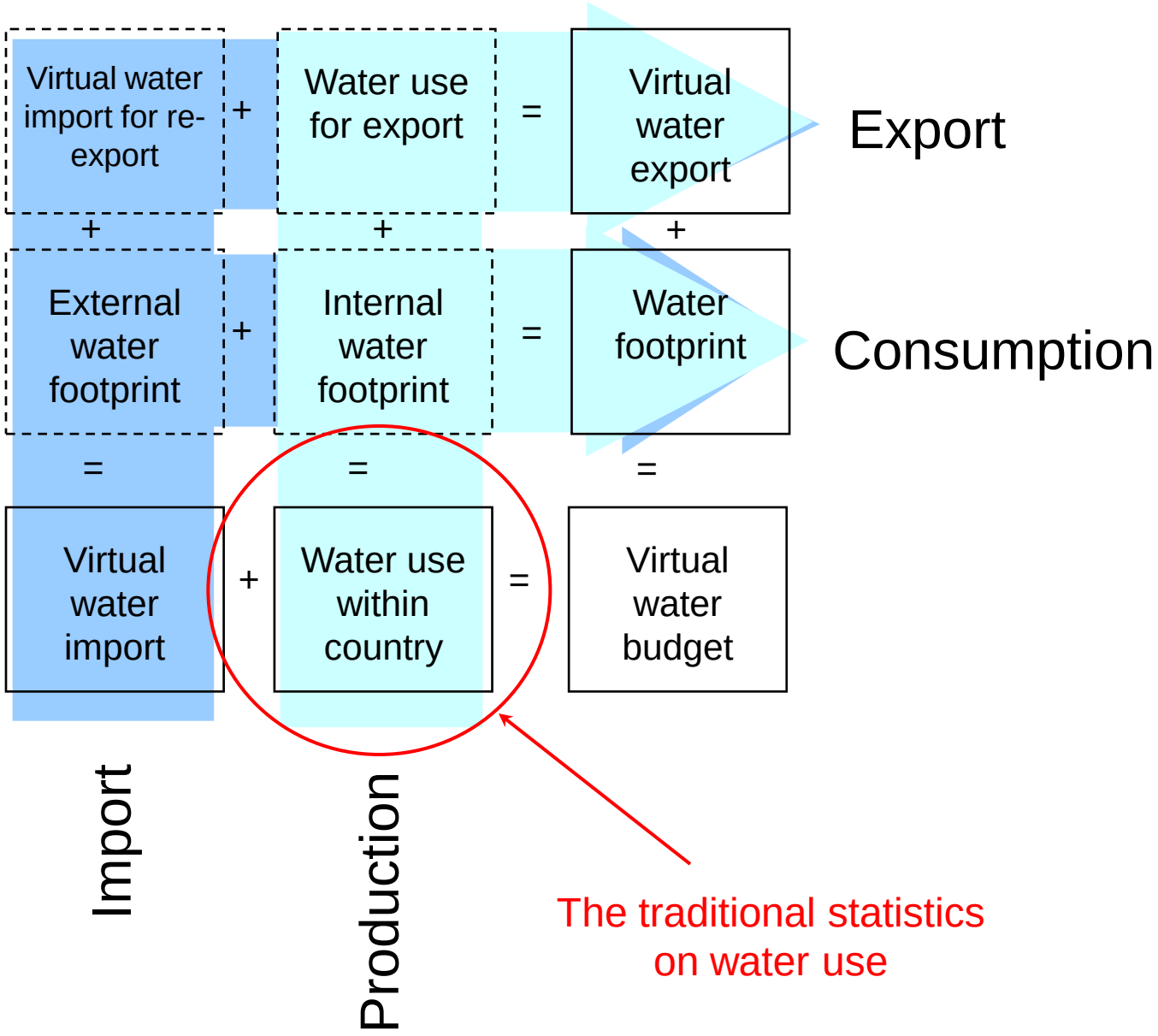
► two components:

- internal water footprint – inside the country.
- external water footprint – in other countries.

Water footprint of a nation

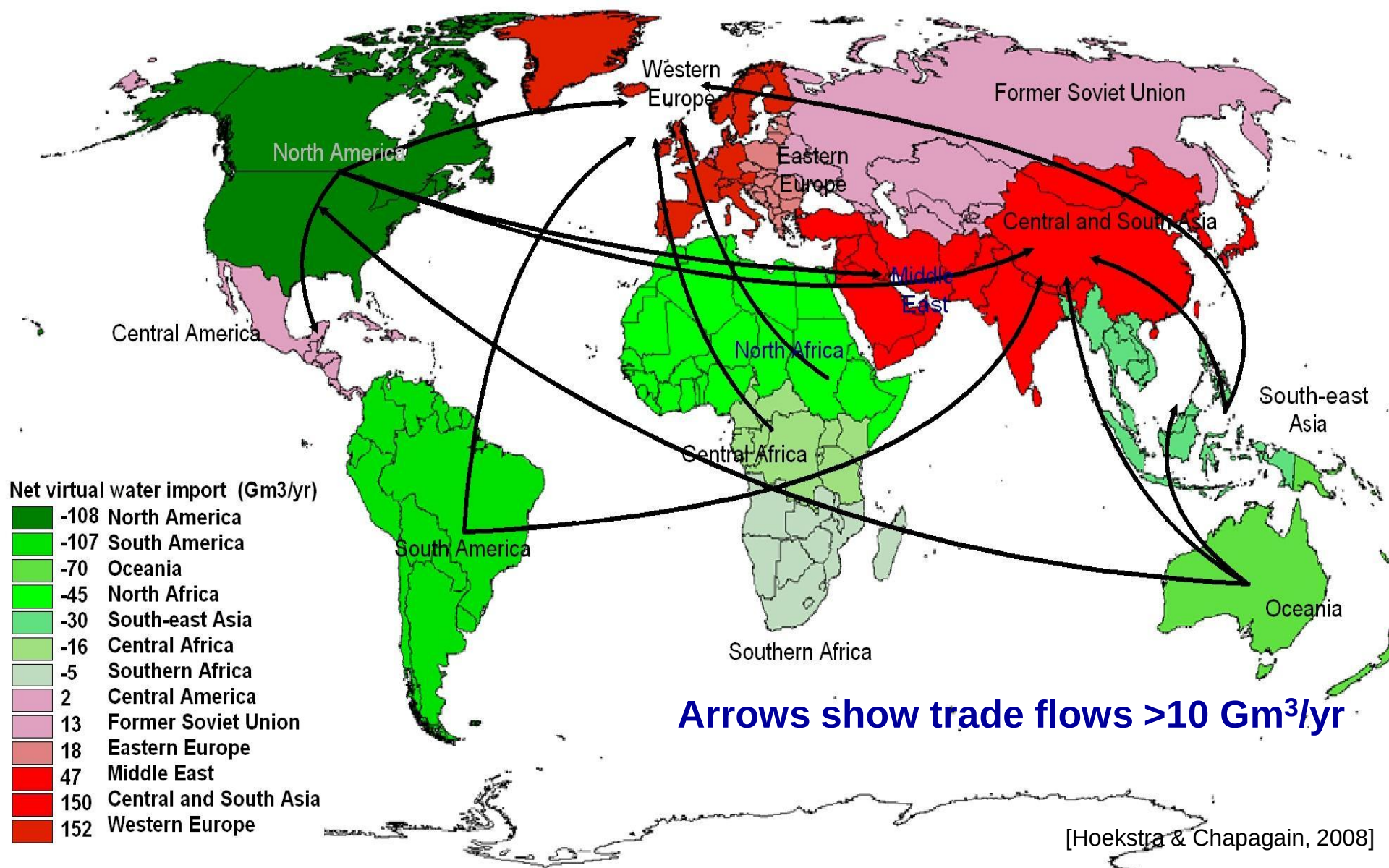
- National water footprint =
  national water use
  + virtual water import
  – virtual water export

National water accounting framework



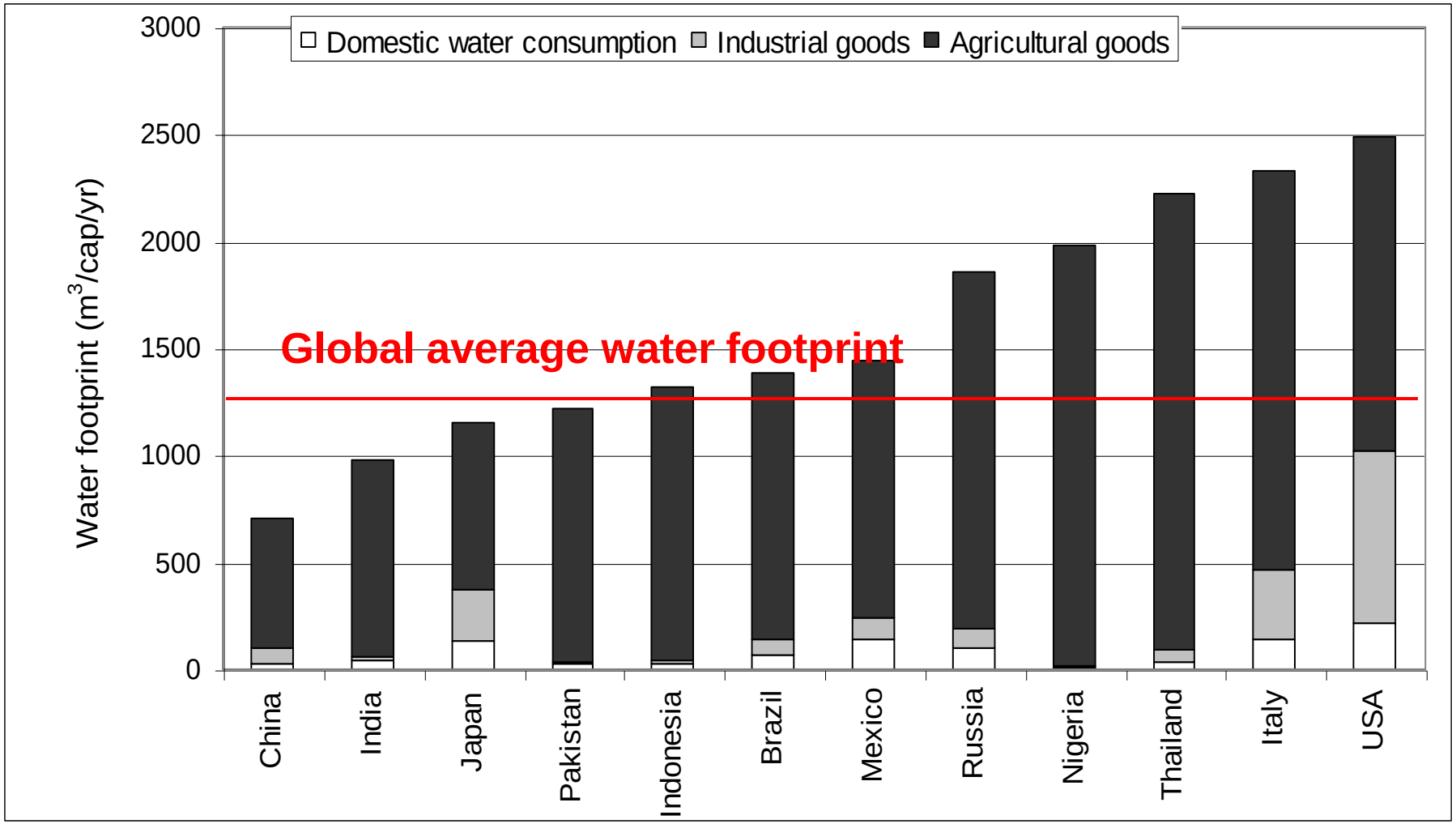
Regional virtual water balances

(only agricultural trade)



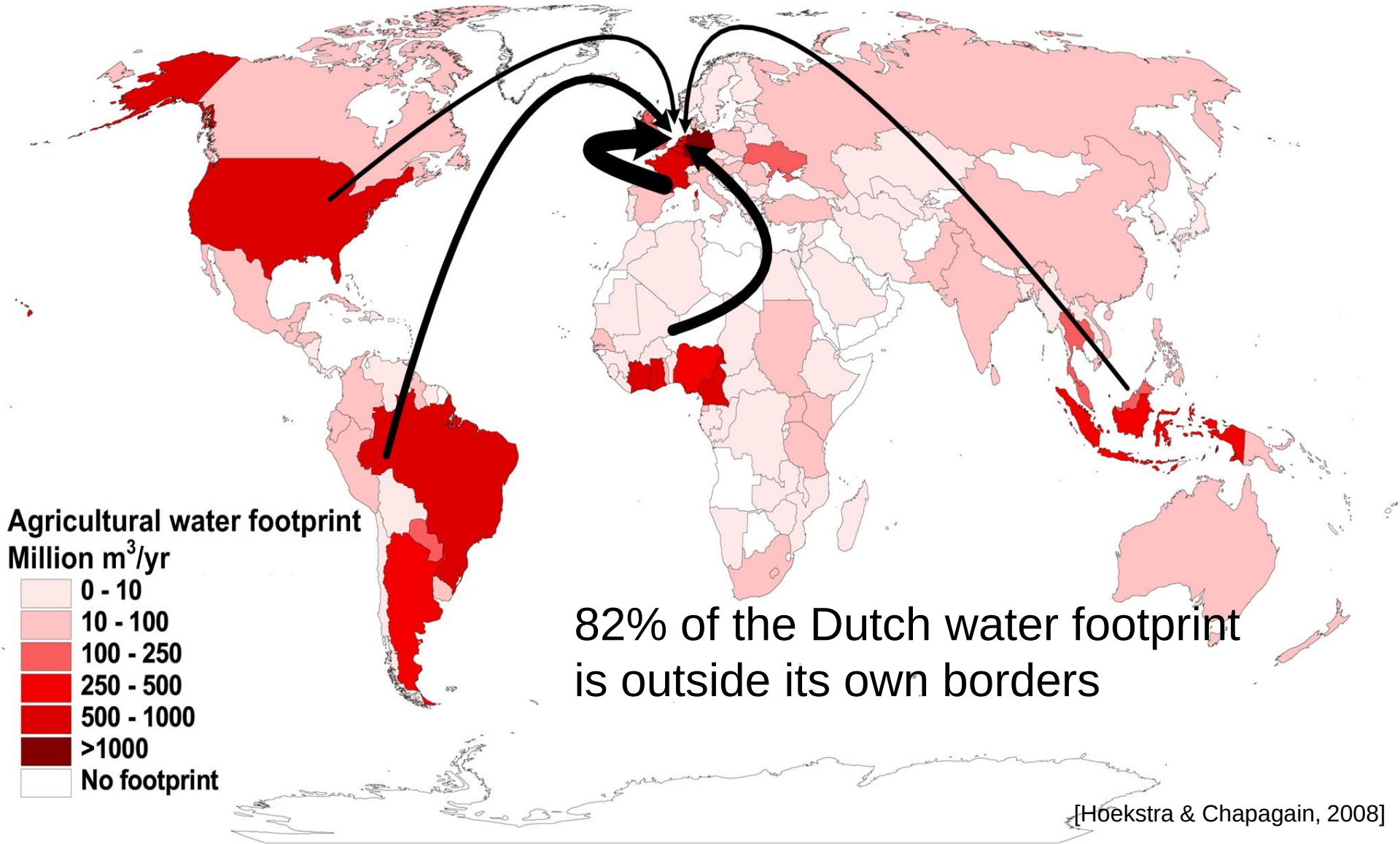
[Hoekstra & Chapagain, 2008]

Water footprint per capita



[Hoekstra & Chapagain, 2008]

Global water footprint of the Netherlands



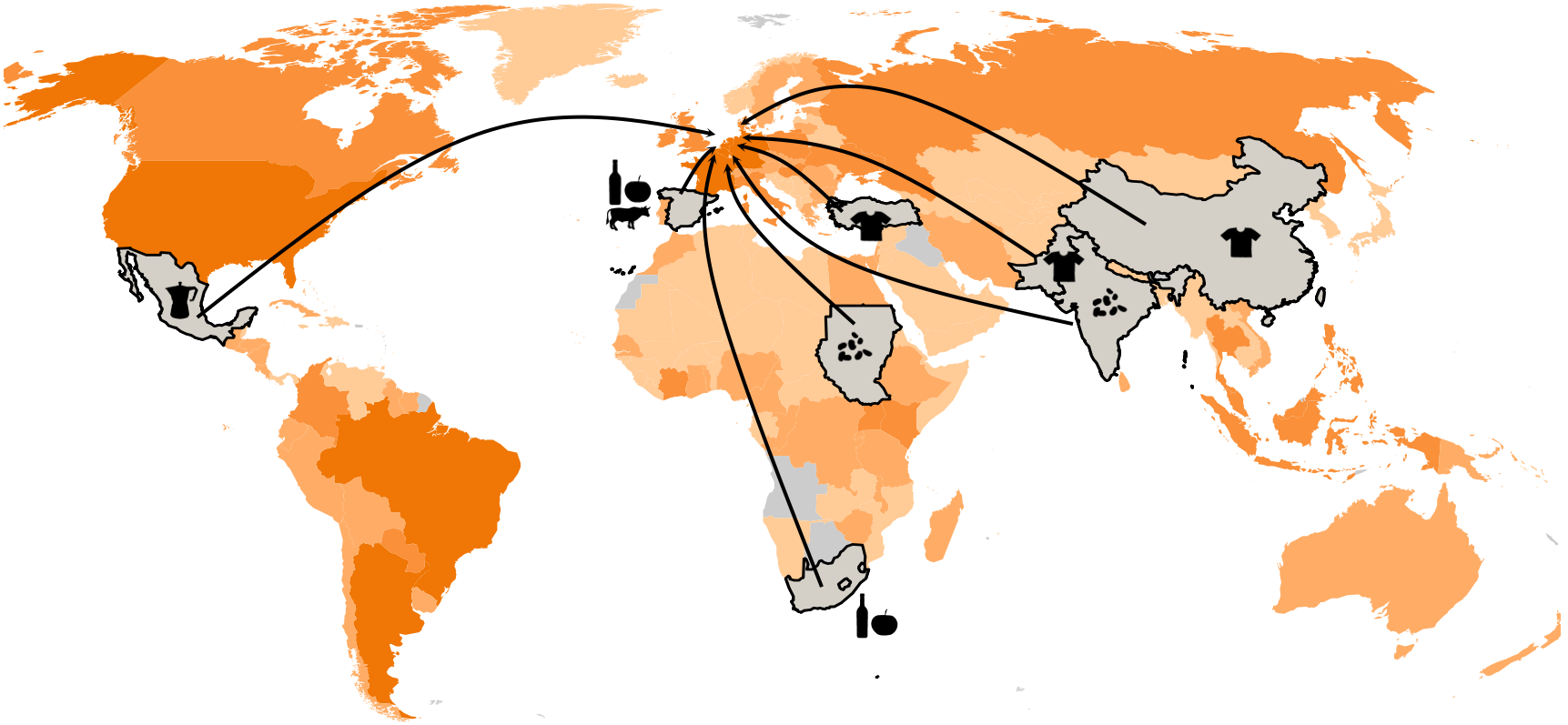
82% of the Dutch water footprint is outside its own borders

[Hoekstra & Chapagain, 2008]

Environmental Water Scarcity Index

[Smakhtin, Revenga & Doll, 2004]

The impact of the water footprint of the Netherlands: hotspots



External water footprint for agricultural products (10^6 m^3)

- 0 - 10
- 10 - 100
- 100 - 1000
- > 1000
- Hotspots

Main product category in hotspot

- Fruit, nuts and wine
- Oil crops and oil from oil crops
- Coffee, tea, cocoa and tobacco
- Livestock and livestock products
- Cotton products

3

The water footprint of a business

Water footprint of a business

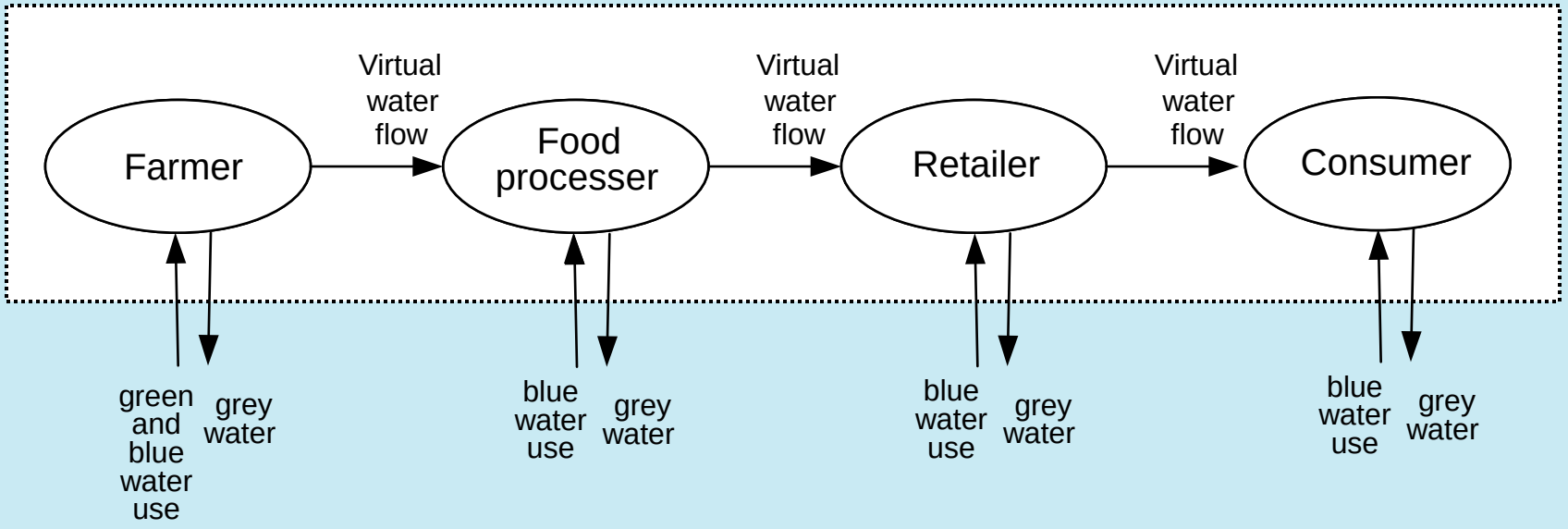
Operational water footprint

- the direct water use by the producer – for producing, manufacturing or for supporting activities.

Supply-chain water footprint

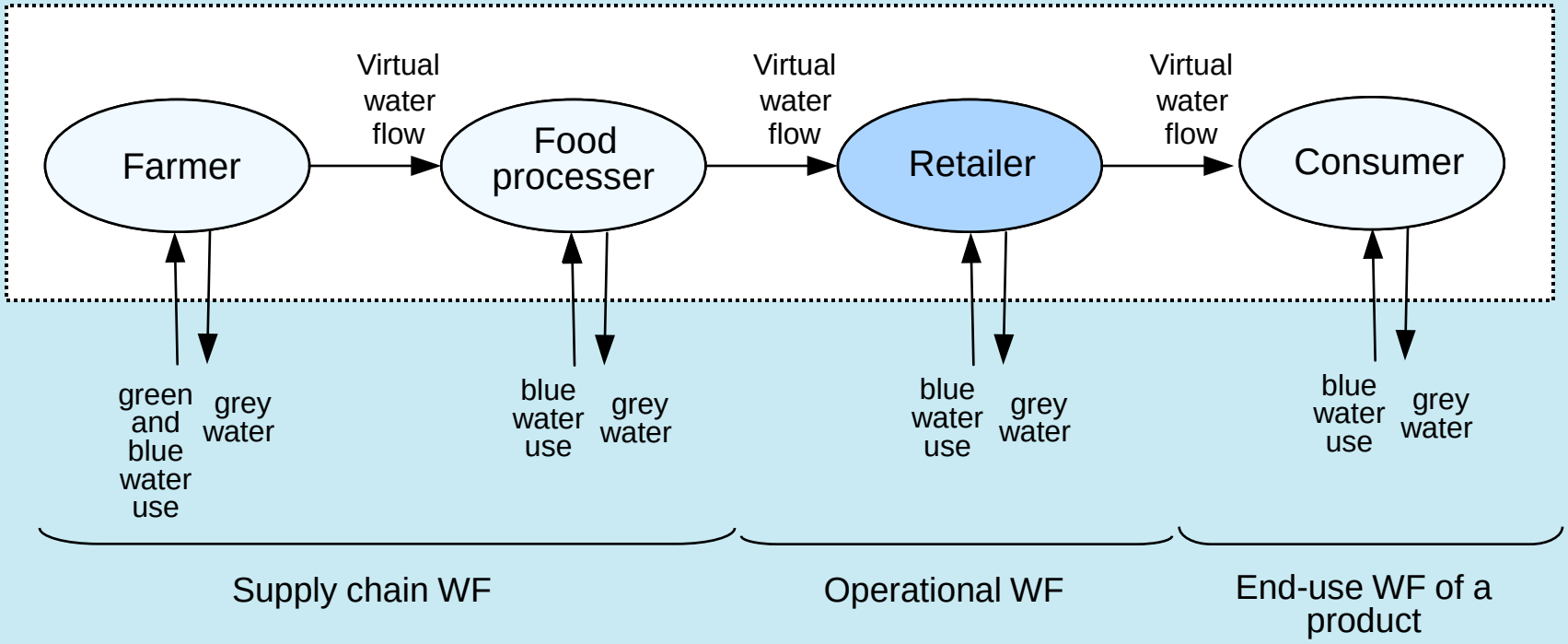
- the indirect water use in the producer's supply chain.

The virtual water chain



[Hoekstra, 2008]

The water footprint of a retailer

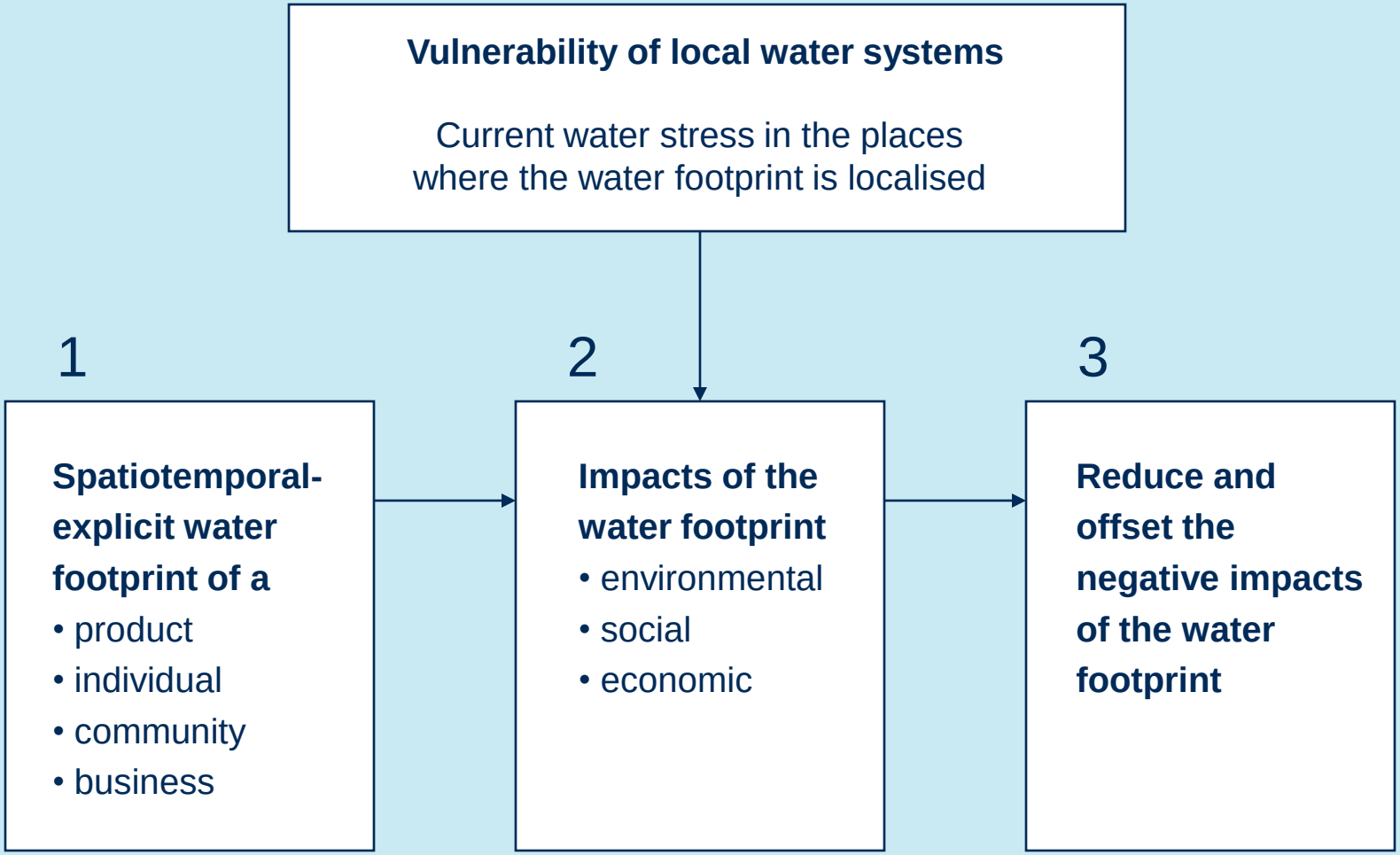


[Hoekstra, 2008]

4

From concept to practice

From water footprint accounting to policy formulation



[Hoekstra, 2008]

Water footprint impact assessment

Global map of where the water footprint is located

Global map of where water systems are stressed

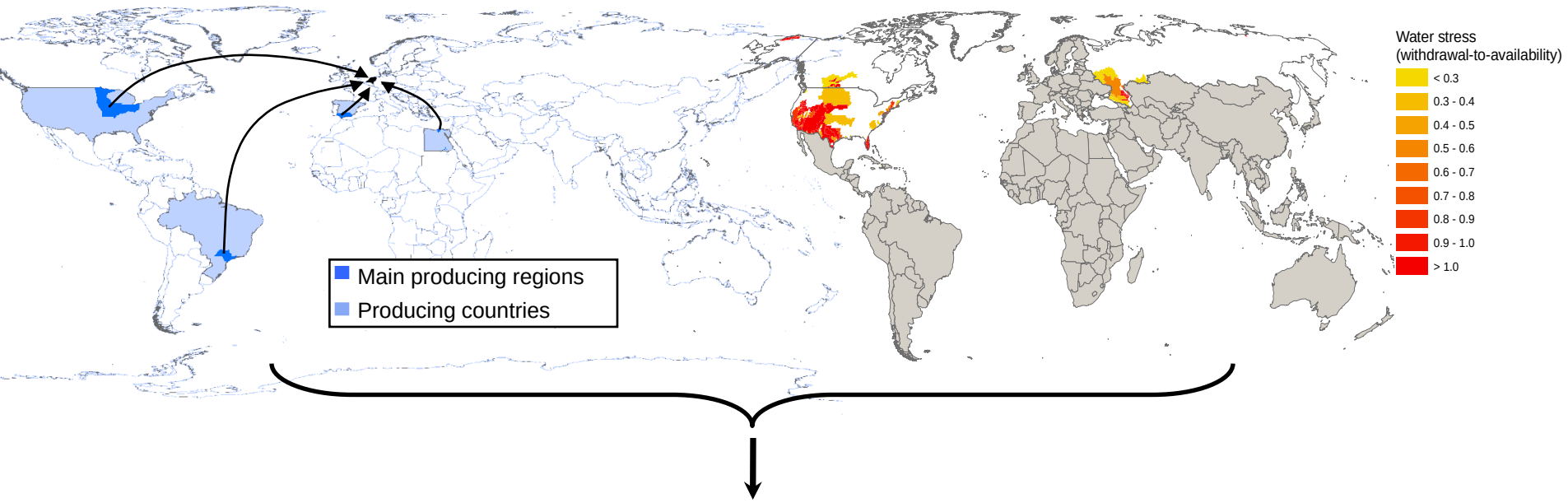
Overlay

Global hotspot map

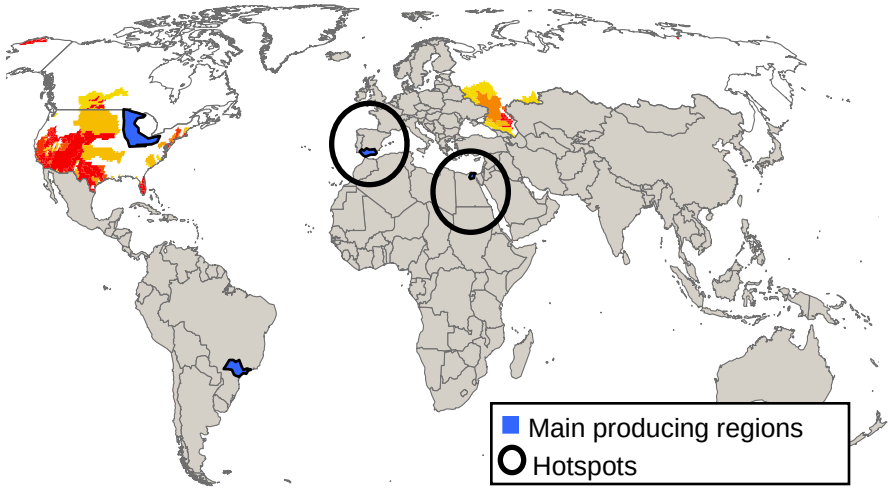
Hypothetical example

Global water footprint of a business located in the Netherlands

Environmental water scarcity



Hotspots



Hotspots are spots where

(1) the business has a substantial water footprint

(2) water is stressed.

Reducing and offsetting the impacts of water footprints

Reduction: all what is ‘reasonably possible’ should have been done to reduce the existing water footprint; do not undertake water-using activities if better alternatives are available.

Offsetting: the residual water footprint is offset by making a ‘reasonable investment’ in establishing or supporting projects that aim at a sustainable, equitable and efficient use of water in the catchment where the residual water footprint is located.

[Hoekstra, 2008]

Shared responsibility and an incremental approach

- Consumers or consumer or environmental organizations push businesses and governments to address water use and impacts along supply chains.
- Some businesses act voluntarily in an early stage.
- Governments promote businesses in an early phase and implement regulations in a later phase.

6

The way forward

Mission: Promoting sustainable, equitable and efficient water use through development of shared standards on water footprint accounting and guidelines for the reduction and offsetting of impacts of water footprints.

Network: bringing together expertise from academia, businesses, civil society, governments and international organisations.

Status today: 29 partners from six continents

Water Footprint

Water Footprint NETWORK

Introduction

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[Spanish] [Italian] [French] [German] [Turkish]

People use lots of water for drinking, cooking and washing, but even more for producing things such as food, paper, cotton clothes, etc. The water footprint is an indicator of water use that looks at both direct and indirect water use of a consumer or producer. The water footprint of an individual, community or business is defined as the total volume of freshwater that is used to produce the goods and services consumed by the individual or community or produced by the business.

16000 litres water → 1 kg beef

The relation between consumption and water use

"The interest in the water footprint is rooted in the recognition that human impacts on freshwater systems can ultimately be linked to human consumption, and that issues like water shortages and pollution can be better understood and addressed by considering production and supply chains as a whole," says Professor Arjen Y. Hoekstra, creator of the water footprint concept and scientific director of the Water Footprint Network. "Water problems are often closely tied to the structure of the global economy. Many countries have significantly externalised their water footprint, importing water-intensive goods from elsewhere. This puts pressure on the water resources in the exporting regions, where too often mechanisms for wise water governance and conservation are lacking. Not only governments, but also consumers, businesses and civil society communities can play a role in achieving a better management of water resources."

New in 2008: Book on 'Globalisation of Water'

The 2007-paper on 'Water Footprints of Nations'

Water Footprints of Nations

The 2008-paper on 'Water Neutrality'

Water Neutral

Download other publications

List of publications

Some facts and figures

Water Footprint

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Productgallery

Coffee

Water footprint: 140 litres for 1 cup of coffee.

It costs about 21000 litres of water to produce 1 kg of roasted coffee. For a standard cup of coffee we require 7 gram of roasted coffee, so that a cup of coffee costs 140 litres of water. Assuming that a standard cup of coffee is 125 ml, we thus need more than 1100 drops of water for producing one drop of coffee. Drinking tea instead of coffee would save a lot of water. For a standard cup of tea of 250 ml we require 30 litres of water.

The world population requires about 120 billion cubic metres of water per year in order to be able to drink coffee. This is equivalent to 1.5 times the annual Rhine

Water Footprint

Water Footprint NETWORK

Your Footprint Calculator » Extended Calculator

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Your individual water footprint is equal to the water required to produce the goods and services consumed by you. Please take your time and feel free to use the extended water footprint calculator to assess your own unique water footprint. The calculations are based on the water requirements per unit of product as in your country of residence.

Note: put decimals behind a point, not a comma (e.g. write 1.5 and not 1,5).

Select a Country

Food consumption

Cereal products (wheat, rice, maize, etc.)	kg per week
Meat products	kg per week
Dairy products	kg per week
Eggs	number per week
How do you prefer to take your food?	High fat
How is your sugar and sweets consumption?	High
Vegetables	kg per week
Fruits	kg per week
Starchy roots (potatoes, cassava)	kg per week
How many cups of coffee do you take per day?	cup per day
How many cups of tea do you take per day?	cup per day

Domestic water use

Indoors

How many showers do you take each day?	number per day
What is the average length of each shower?	minute per shower