



Mahidol University
Wisdom of the Land



Water Footprint, Water Globally: Pathways to Sustainability

Voranuch Wangsuphachart

Department of Social and Environmental Medicine,
Faculty of tropical Medicine, Mahidol University

Email: voranuch.wan@mahidol.ac.th

Planet Earth is a watery place



**Water covers most
of the planet Earth**

**About 70 % of the
planet is covered in
the ocean**

How much water is there on, in, and above the Earth?

- **326 million trillion gallons**
- **97% of the water on the planet is in the oceans**

Planet Earth is a watery place

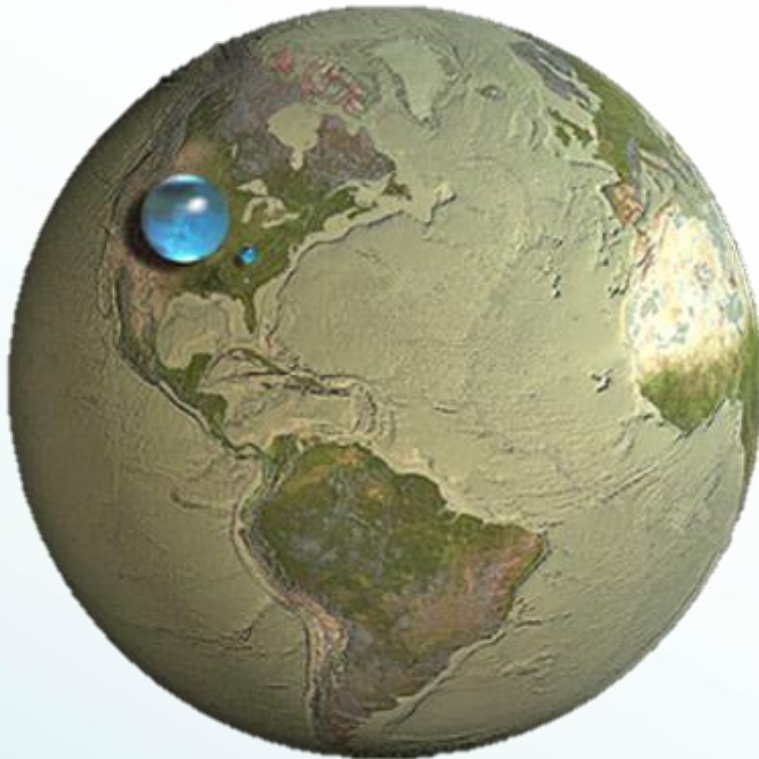


But just 3% is fresh water

The same water
that existed on Earth
billions of years ago
still exists today

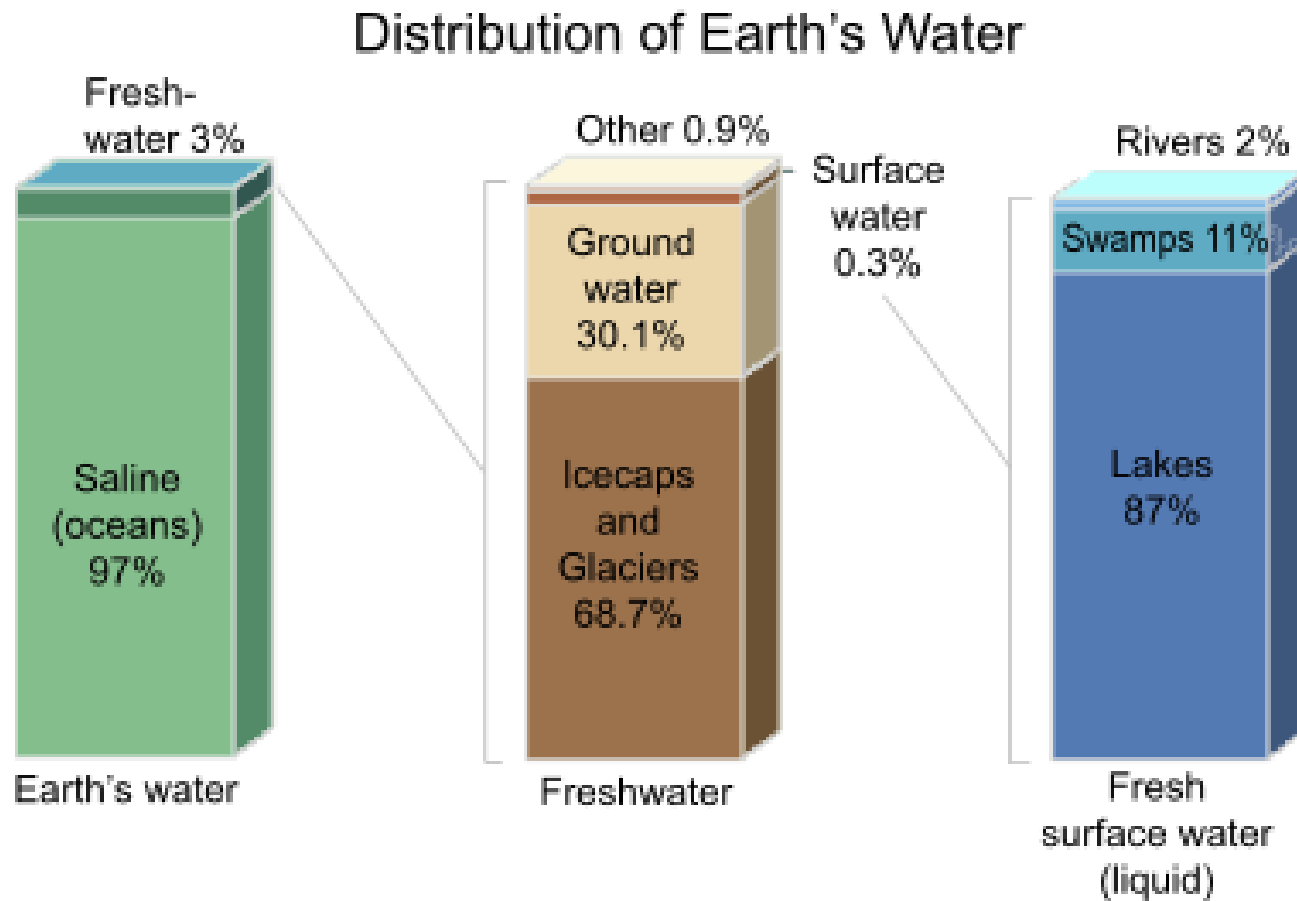


All Earth's water in a bubble



**Volume of largest
water sphere,
representing all
water on, in, and
above the Earth
= $1,386 \times 10^6 \text{ km}^3$,
and 1,385 km in
diameter**

Graphical distribution of the locations of water on Earth





What is water footprint?



Concept of water footprint of a product



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



Water footprint calculation

$$WF = VW + C$$

WF = Water footprint of a product (m³/year)

VW = Virtual water of a product (m³/ton)

**C = Quantity of raw material used
for production (ton/year)**

Source: Hoekstra-Hung, 2002; Hoekstra-Chapagain, 2007

Water footprint calculation

$$VW = VW_{\text{green}} + VW_{\text{blue}} + VW_{\text{gray}}$$

VW = Virtual water of a product (m³/ton)

VW_{green} = Rain water in soil (moisture form)

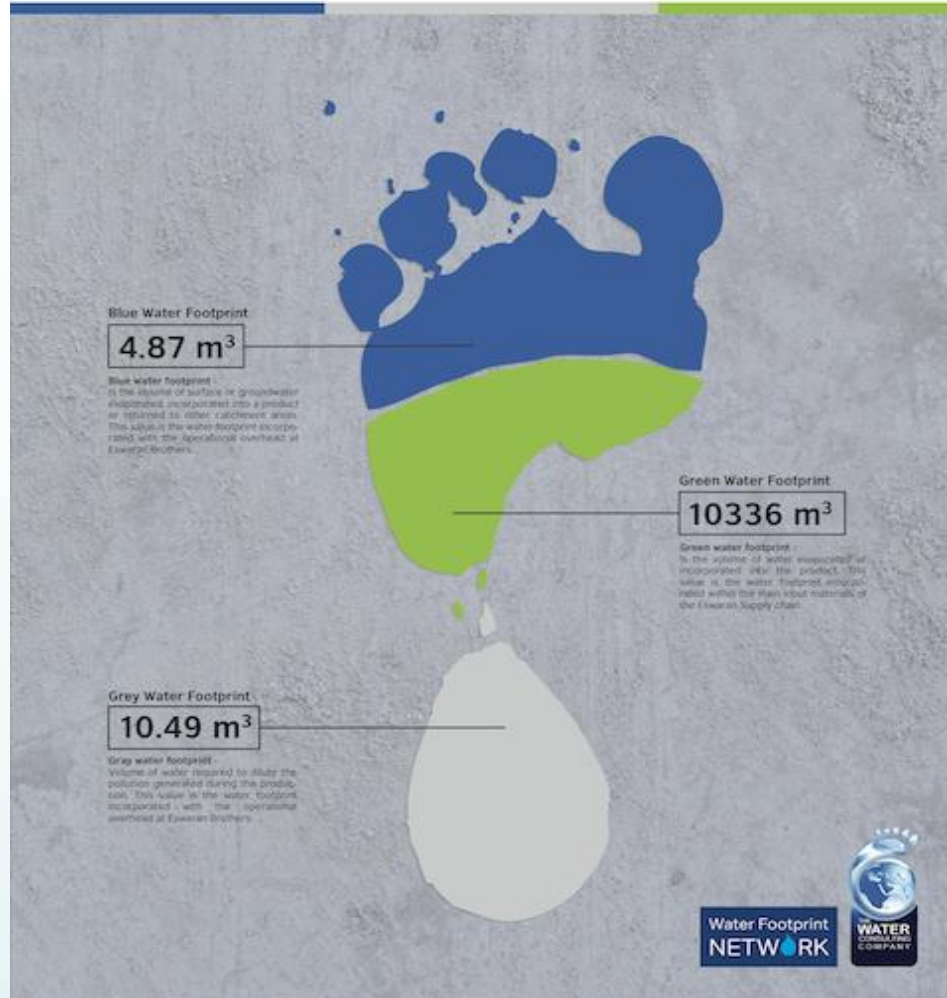
VW_{blue} = Surface and ground water

**VW_{gray} = Amount of water used to treat
waste water**

Hoekstra-Hung, 2002; Hoekstra-Chapagain, 2007



This certifies that **Eswaran Brothers Tea Exports (Pvt) Ltd** has measured its organizational water footprint in accordance with the globally accepted Water Footprinting Manual set by the Water Footprint Network of the Netherlands. This assessment was conducted by the Water Consulting Company and it certifies hereby that the aforesaid organization has a total water footprint of 10351.36 m^3

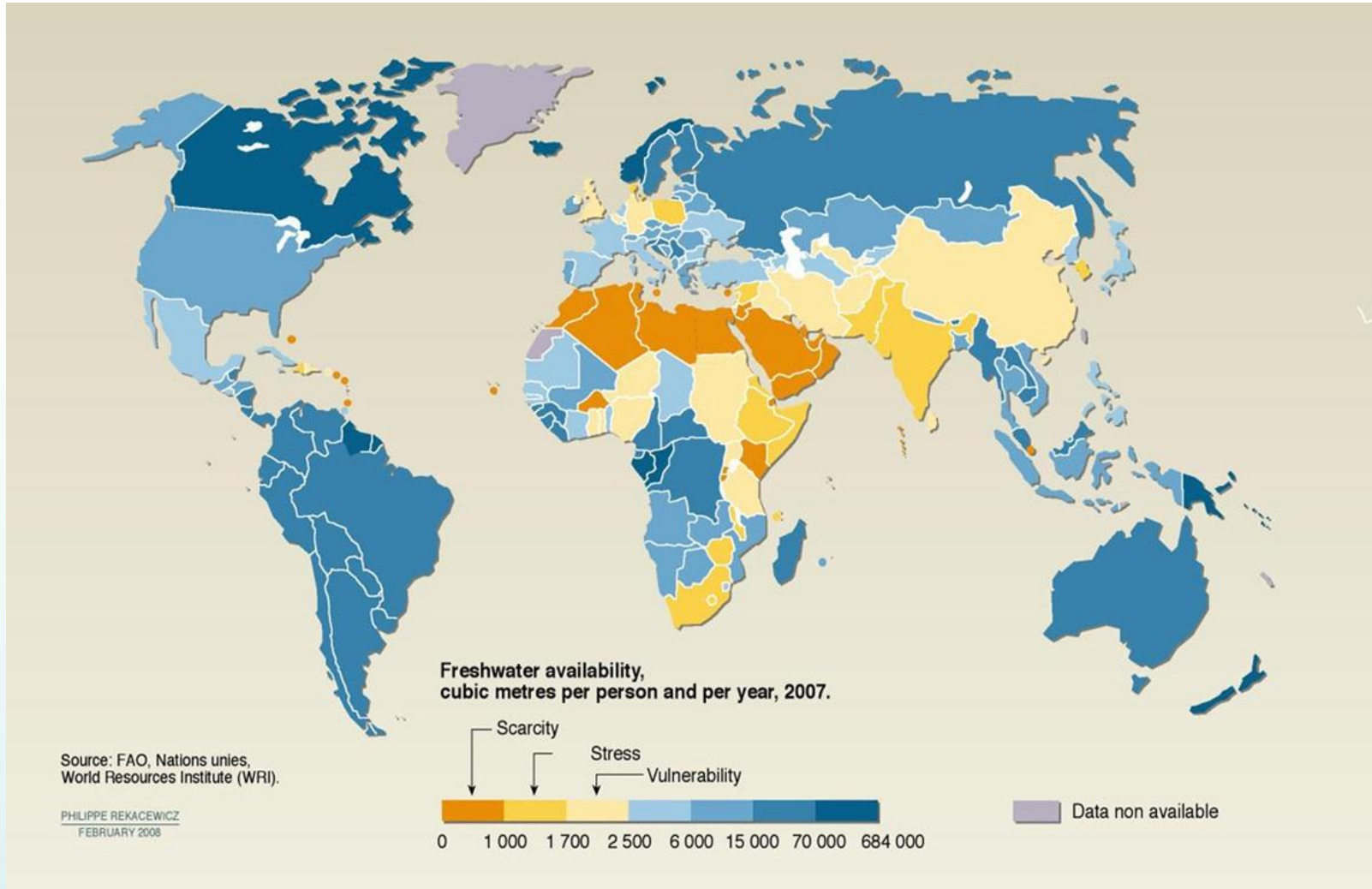


Average water footprint of the top five nations

COUNTRY	AVERAGE WATER FOOTPRINT (m³/cap/year)
United States of America	2,842
Italy	2,400
Thailand	2,250
Nigeria	2,000
Russia	1,900

Examples of average product water footprint for Thailand

PRODUCT	AVERAGE GLOBAL WATER FOOTPRINT (m³/ton)	AVERAGE THAILAND WATER FOOTPRINT (m³/ton)
Rubber	13,747	7,952
Processed chicken	4,325	5,443
Rice	2,628	3,592
Sugar	1,666	2,049
Tapioca	563	467



WATER FOOTPRINT

Virtual water embedded in products

→ For the full poster featuring many more products and in-depth information, visit: www.virtualwater.eu

One drop (shown in the illustrations) is equivalent to 50 litres of virtual water (production-site definition). All figures shown on this poster are based on exemplary calculations and may vary depending on the origin and production process of the product.

The water footprint of a product (a commodity, good or service) is the volume of freshwater used to produce the product, measured at the place where the product was actually made. It refers to the amount of the water used in the various steps of the production chain.

DATA: Hoekstra, A.Y.; Chapagain, A.K. (2008) Globalization of water: Sharing the planet's freshwater resources Blackwell Publishing, Oxford, UK www.waterfootprint.org
DESIGN: Timm Kakeritz, www.virtualwater.eu
TYPEFACE: TheSans and TheSeri, Lucias de Groot



650 Barley
litres of water for one pound (500 g)



650 Wheat
litres of water for one pound (500 g)



1400 Sorghum
litres of water for one pound (500 g)



2500 Millet
litres of water for one pound (500 g)



650 Toast
litres of water for one package (500 g)



750 Cane Sugar
litres of water for one package (500 g)



90 Tea
litres of water for one pot (750 ml)



840 Coffee
litres of water for one pot (750 ml)



2500 Burger
litres of water for one burger (150 g beef)



4650 Beef
litres of water for one steak (300 g)



1000 Milk
litres of water for one litre



2500 Cheese
litres of water for one big piece (500 g)



Our Water Footprint



How Much Water does it take to Produce...

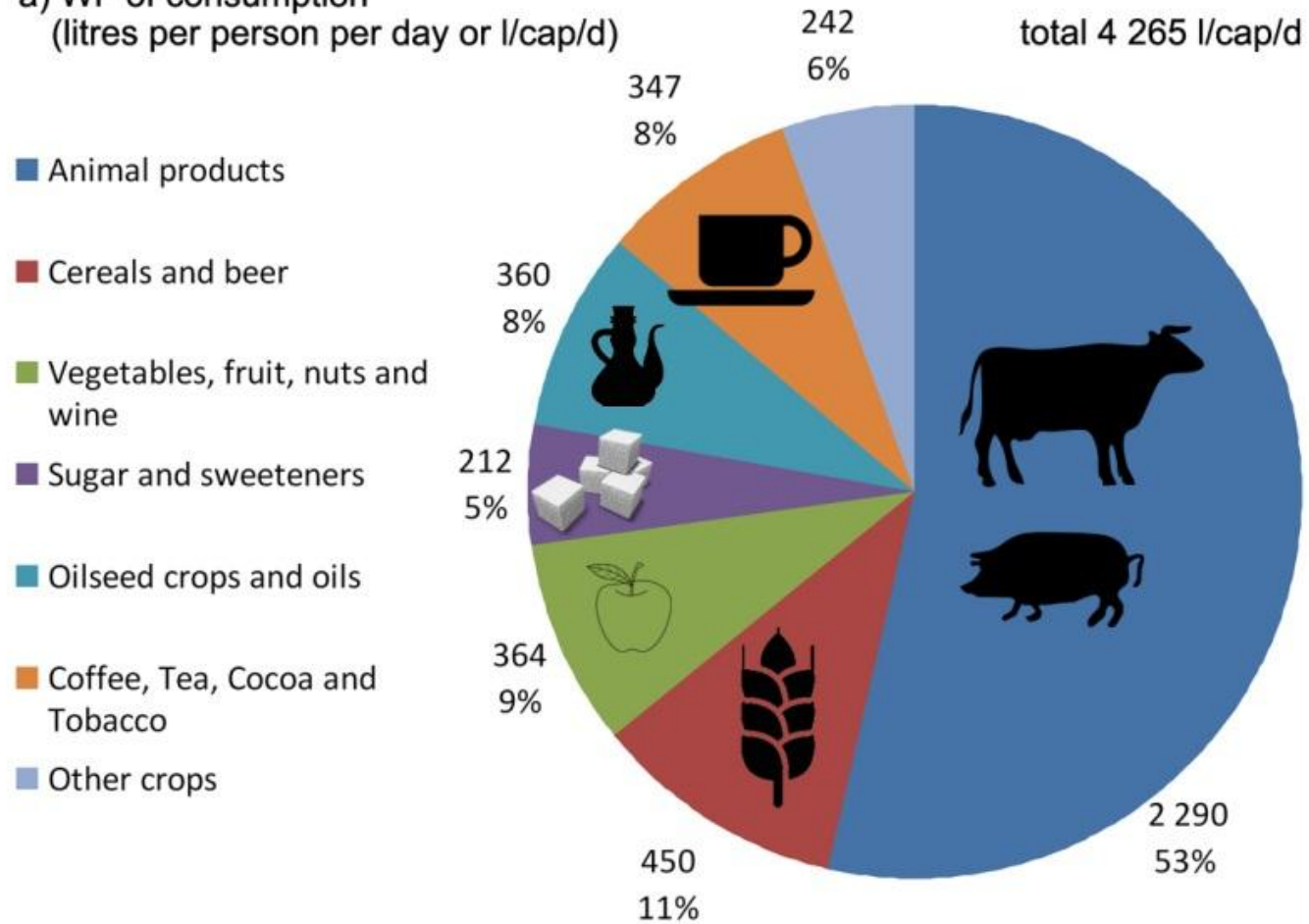
<p>1 Litre Tap Water</p>  <p>1 Litre</p>	<p>1 Litre Bottled Water</p>  <p>5 Litres</p>	<p>1 Cup Tea</p>  <p>30 Litres</p>	<p>1 Cup Coffee</p>  <p>140 Litres</p>	<p>1 Kg Corn</p>  <p>900 Litres</p>	<p>1 Kg Wheat</p>  <p>1300 Litres</p>	<p>1 Kg Soybeans</p>  <p>1800 Litres</p>	<p>1 Loaf Bread</p>  <p>960 Litres</p>
<p>1 Whole Orange</p>  <p>50 Litres</p>	<p>1 Glass Orange Jc</p>  <p>170 Litres</p>	<p>1 Whole Apple</p>  <p>70 Litres</p>	<p>1 Glass Apple Jc</p>  <p>190 Litres</p>	<p>1 Dozen Eggs</p>  <p>2400 Litres</p>	<p>1 Kg Chicken Meat</p>  <p>3900 Litres</p>	<p>1 Kg Pork</p>  <p>4800 Litres</p>	<p>1 Kg Beef</p>  <p>15,500 Litres</p>

Choose more often to **DRINK TAP WATER**, **EAT WHOLE UNPROCESSED FOODS** and reduce your carbon footprint by **BUYING LOCAL PRODUCTS**

Visit www.waterfootprint.org to learn more



a) WF of consumption
(litres per person per day or l/cap/d)

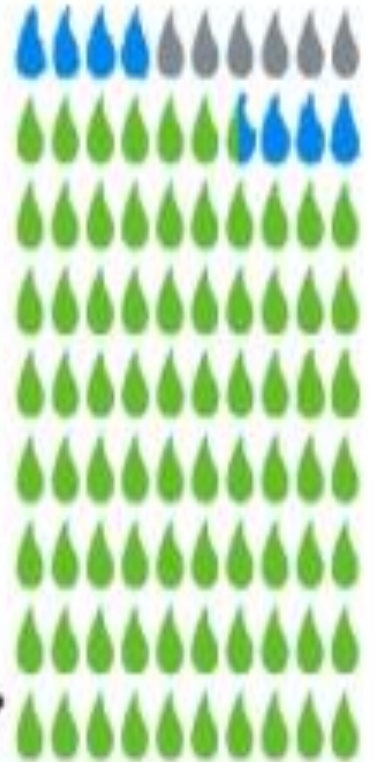


- Animal products
- Cereals and beer
- Vegetables, fruit, nuts and wine
- Sugar and sweeteners
- Oilseed crops and oils
- Coffee, Tea, Cocoa and Tobacco
- Other crops



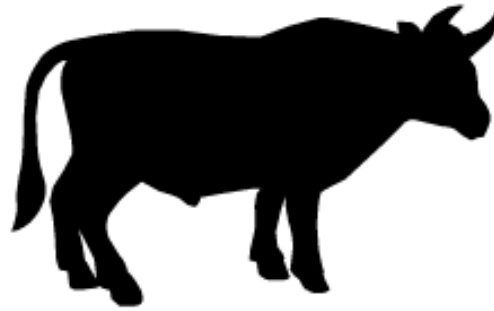
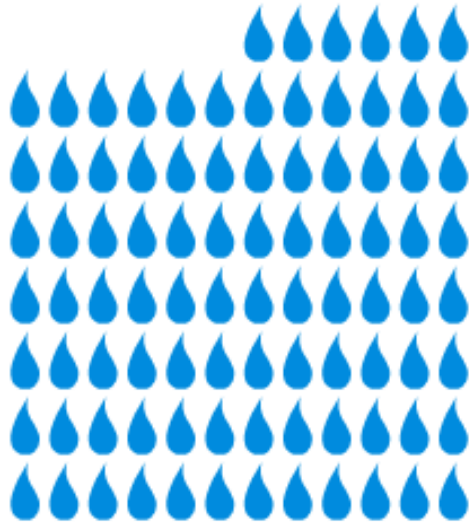
Beef

1900 litres for 125gr





VIRTUAL WATER




4500

litres of water for
one steak (300g) of
Beef







**One 150 gm of burger
= 2,400 litres of
embedded water**

Sector		Global Water Footprint
Meat Processing		● ●
Dairy Products		● ● ●
Fruits & Vegetables Processing		● ●
Soft Drinks & Bottled Water		● ● ●
Brewing, Wine & Spirits		● ● ●
Cooking Oils & Fats		●

Key: ● ● ● High ● ● Medium ● Low

Source: Frost & Sullivan analysis.



DIRECT WATER FOOTPRINT
214 m³/yr

MY WATER FOOTPRINT
1401 m³/yr

GLOBAL AVERAGE 1240m³/yr
CROATIA 1688m³/yr

INDIRECT WATER FOOTPRINT
1187 m³/yr

THE WATER THAT I ACTUALLY USE



WATER SAVING TOILETS + CLOSING THE COVER



WATER SAVING SHOWERHEAD + 3 MINUTES OF SHOWER



CLOSING THE TAP DURING TEETH BRUSHING AND DISH WASHING



LESS LOADS OF LOUNDRY

VIRTUAL WATER OF THINGS I USE

SMALLER WF

- 6100 (Pig)
- 4800 (Cow)
- 3900 (Chicken)
- 4000 (Goat)

VEGETARIAN

- 5000 (Wheat)
- 1800 (Beans)
- 1300 (Rice)
- 900 (Lentils)
- 900 (Soybeans)
- 900 (Corn)
- 350 (Apple)
- 250 (Banana)
- 10 (Paper)

15 500 l / 1 kg /

NO WATER SCARCITY

LESS MEAT

- /1l / 960 (Beer)
- /1 cup / 140 (Coffee)
- /1kg / 24000 (Beef)
- 300 (Wine)
- 30 (Tea)
- 1500 (Canned Beans)
- 16600 (Pork)
- 2700 (T-SHIRT)
- ARTIFICIAL FIBER MATERIALS

LESS PAPER PRINT

CHANGING HABBITS

DIRECT WATER FOOTPRINT
77 m³/yr



SUBSTITUTION OF A PRODUCT

INDIRECT WATER FOOTPRINT
554 m³/yr



REDUCED WATER FOOTPRINT
631 m³/yr



WATER FOOTPRINT HEINEKEN



Water is of vital importance for brewing



www.riversymposium.com

Heineken towards improvement for sustainable development



REDUCTION IN
WATER
CONSUMPTION
SINCE 2008



Water Sanitation and Hygiene

Water for All



Sustainable use of water: How to?

- **Shorter shower**
- **Shorter head shower**
- **Low flow toilet**
- **Changing eating habits**
- **Eating less meat**
- **Wasting less food**
- **Using green products**
- **Etc.,**

Sustainable use of water

