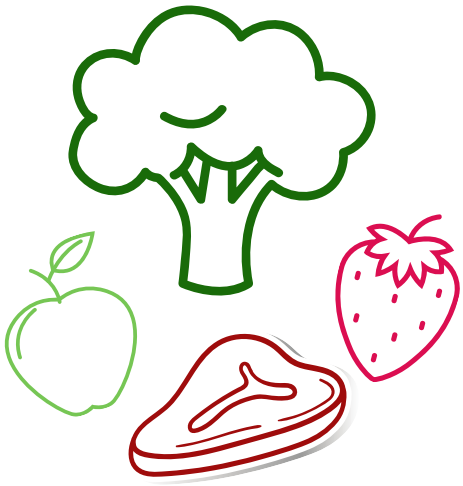
How Much Water do You Eat?



Audience: 13 years and over

Duration: 1 to 2 h

Evaluate the amount of water on your plate

Find out through a quiz and a recipe how much water is used to produce certain foods, i.e. the water footprint

Abrinord
OBV de la rivière du Nord

Objectives:

Understand the impact of our food choices on the planet's drinking water resources.

- *Identify the foods that consume the most water.*
- *Make conscious choices to better consume the water resource*

Required material :

- *Tables of average water footprints of food*
- *Quiz (1 per student or pairs)*
- *Recipe (1 per student or pairs)*

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Context

Introduction (10 min)

Introduce the following basic concepts :

What is a water footprint?

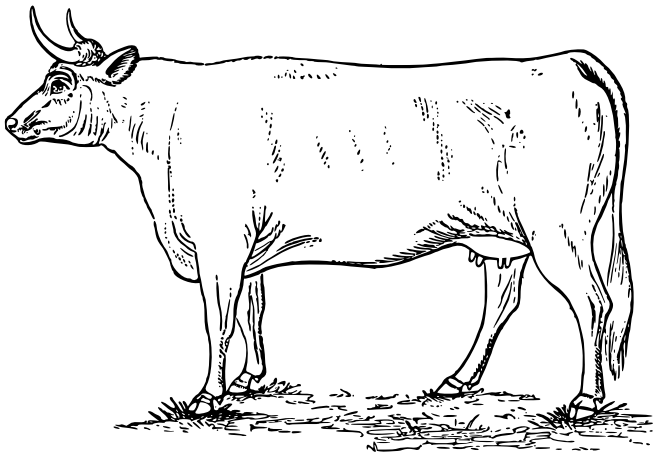
The water footprint of a product (good or service) is the total volume of freshwater used directly or indirectly to produce the item (food or industrial), in all phases of its manufacturing and processing.

How is the production water footprint calculated?

To measure the water footprint of a product (good or service), one must consider both:

- *Blue water: groundwater or surface water used;*
- *Green water: water from rain or moisture in the soil, consumed or released by evapotranspiration;*
- *Grey water: the water needed to dilute or treat the released pollutants.*

For example, one cow produces 200 kg of meat. One must calculate the water needed to grow the grain that will feed the beef (3 million liters), the water it will drink (24,000 L), as well as the water needed for the maintenance of the animal, the processing of the meat and the water needed to treat the manure and other pollutants (7,000 L), that is to say, 94% of green water, 4% of blue water and 3% of grey water. It will therefore take 3,031,000 L of water for 200 kg of beef.



Context

Introduction (10 min)

What is the situation in Canada?

The water footprint varies greatly from one country to another since consumption habits depend on the country's culture. In addition, the water footprint of a food can vary depending on the country of origin and production methods. Depending on the farming and irrigation techniques or the climate, the water footprint may be higher or lower.

In Canada, the average water footprint for consumption is about 6,400 L per person per day, the equivalent of flushing the toilet 1,000 times a day or taking 100 five minute showers.

1.
2.
3.

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Course of the activity

Water footprint evaluation (1 h)

This activity, in quiz format, can be complemented by calculating the water footprint of a cooked dish.

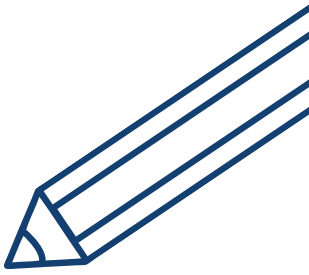
1. To introduce foods, ask students for their favorite foods in the following categories: meats, fruits, vegetables, beverages, peanuts and nuts. Write the answers on the board.
2. Students can raise a hand to share their hypotheses about the water footprint of certain foods on the board. Give some examples using the Tables of average water footprint of food to compare water footprints.

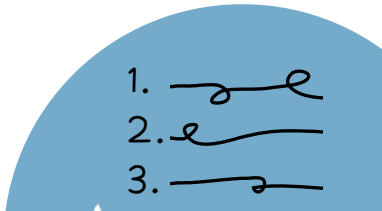
Quiz

1. Have students take the quiz individually or in pairs.
2. Correct with the Quiz (answer sheet)

Recipe

1. In teams or individually, using the Tables of average water footprint of food and the Recipe, students must calculate the water footprint of the dish to be prepared, in liters per serving.
2. Correct with the Recipe (answer sheet)





Quiz (answer sheet)

1. *Rank the following meats and meat alternatives in descending order of water footprint (L/kg): chicken, beef, tofu and pork.*

    1. *Beef (15 415 L/kg)*
    2. *Pork (5 988 L/kg)*
    3. *Chicken (4 325 L/kg)*
    4. *Tofu (2 523 L/kg)*

2. *Rank the following alternative proteins in descending order of water footprint(L/kg): dried chickpeas, dried peas, dried lentils and tofu.*

    1. *Lentils (dried) (5 874 L/kg)*
    2. *Chickpeas (dried) (4 177 L/kg)*
    3. *Tofu (2 523 L/kg)*
    4. *Peas (dried) (1 979 L/kg)*

3. *Rank the following vegetables in descending order of water footprint (L/kg): olive, carot, brocoli, avocado, corn and potato.*

    1. *Olive (3 015 L/kg)*
    2. *Avocado (1 981 L/kg)*
    3. *Corn (1 222 L/kg)*
    4. *Potato (287 L/kg)*
    5. *Broccoli (285 L/kg)*
    6. *Carrot (195 L/kg)*

4. *Rank the following fruits in descending order of water footprint (L/kg): pineapple, strawberry, mango, apple, orange et plum.*

    1. *Plum (2 180 L/kg)*
    2. *Mango (1 800 L/kg)*
    3. *Apple (822 L/kg)*
    4. *Orange (560 L/kg)*
    5. *Strawberry (347 L/kg)*
    6. *Pineapple (255 L/kg)*

Quiz (answer sheet)

5. *Why does soy milk (275 L/kg) have a water footprint almost 4 times smaller than cow's milk (1 020 L/kg)?*

Cow's Milk :

- *Long process over several years*
- *Water for food*
- *Water for drinking*
- *Water for care and maintenance*
- *Wastewater produced and water necessary for its treatment.*

Soy Milk :

- *Short one season process*
- *Water for growing soybeans*
- *Water for processing into soy milk*
- *Process water and wastewater*
- *Fewer steps and by-products*

6. *What are the benefits of promoting the water footprint?*

- *It is a tool to raise awareness about the use of water in the production of our goods. Even if we don't see this water, it is still consumed indirectly.*
- *The water footprint makes it possible to evaluate the impact of certain products on the water resource and compare them.*

Quiz (answer sheet)

7. What criticisms might there be in comparing the water footprint of certain products?

- The volume per 1 kg of product can vary greatly. For example, the volume of one kilogram of dried lentils is much larger than the volume of one kilogram of tofu, since tofu is wet and a large part of the mass is water. It would be better to measure water footprints in L/kcal to be more accurate.

- Product usage can also vary greatly. For example, although the water footprint of olive oil is high (14,400 L/kg) compared to that of ab apple (822 L/kg), a person would use only 30 ml of olive oil (423 L of water), whereas they would eat a whole apple.

- The water footprint depends greatly on the location of production and the type of crop. Growing broccoli in hot, drought-prone areas, such as California, will require much more irrigation water than a location with cooler, rainy weather.

8. What can you do to reduce your water footprint?

- Eat less products with a high water footprint such as beef, almonds, avocados, olives or plums, and promote the consumption of products such as tofu, chicken, carrots, watermelon, etc.

- Remain aware of the impact of food choices on the environment and water resources

- Aim at cultivation methods or favor products with more optimal and efficient production methods

- Favour products from locations where water accessibility or quantity is not an issue

Recipe (answer sheet)

Using the Tables of average water footprint for food, determine the water footprint of the following dish in litres per serving.

Oven-baked macaroni with rosée sauce,

from Caroline McCann

Gives 4 servings

Ingredients :

Tomato Sauce

• *15 ml (1 tbsp) of olive oil*	*216 L*
• *1 peeled and diced onion*	*34 L*
• *2 cloves of minced garlic*	*9,4 L*
• *796 ml (8 oz) of tomato puree*	*567,71 L*
• *30 ml (2 tbsp) of tomato paste*	*28,2 L*

BECHAMEL

• *30 ml (2 tbsp)of butter*	*166,8 L*
• *30 ml (2 tbsp) of wheat flour*	*19,97 L*
• *250 ml (1 cup) of 2% milk*	*255 L*
• *340 g of macaronis*	*628,8 L + 750 ml of cooking water*
• *500 ml (2 cups) of mild cheddar*	*5294,44 L*

Final answer : 1805,27 L / serving

Student's booklet - Quiz

Answer the following questions to the best of your knowledge

1. *Rank the following meats and meat alternatives in descending order of water footprint (L/kg): chicken, beef, tofu and pork.*

   1. 3.
   2. 4.

2. *Rank the following alternative proteins in descending order of water footprint(L/kg): dried chickpeas, dried peas, dried lentils and tofu.*

   1. 3.
   2. 4.

3. *Rank the following vegetables in descending order of water footprint (L/kg): olive, carrot, broccoli, avocado, corn and potato.*

   1. 4.
   2. 5.
   3. 6.

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Student's booklet- Quiz

4. *Rank the following fruits in descending order of water footprint (L/kg):*
   pineapple, strawberry, mango, apple, orange and plum

1. 4.
2. 5.
3. 6.

5. *Why does soy milk (275 L/kg) have a water footprint almost 4 times smaller than cow's milk (1020 L/kg)?*

Student's booklet - Quiz

6. *What are the benefits of promoting the water footprint?*

7. *What criticisms might there be in comparing the water footprint of certain products?*

8. *What can you do to reduce your water footprint?*

Student's booklet - Recipe

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- *250 ml (1 cup) of 2% milk*
- *340 g of macaronis*
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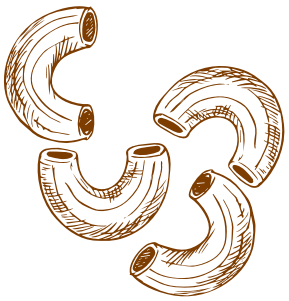
Student's booklet - Recipe



Oven-baked macaroni with rosée sauce,

from Caroline McCann

Preparation :

1. *Prepare the tomato sauce; heat the olive oil in a saucepan over medium heat. Add onion and garlic cloves. Cook for 3 minutes or until onion is translucent.*
2. *Add the tomato purée and the tomato paste. Reduce heat to medium-low and cook for 15 minutes. Remove from heat and blend in a hand mixer.*
3. *Prepare the béchamel sauce by melting the butter in a saucepan over medium heat. Once melted, add the flour at once and cook for 1 minute while stirring.*
4. *Add milk and whisk to prevent lumps from forming. Season and set aside.*
5. *Preheat oven to broil. Cook macaroni in 750 mL of boiling water based on package directions. Drain, but do not rinse.*
6. *In a large bowl, combine drained macaroni, tomato sauce and béchamel sauce. Season. Stir in 150 mL mild cheddar cheese and mix well. Transfer to a rectangular glass pan.*
7. *Spread remaining cheese on top of macaroni. Bake for 5 minutes or until top is golden brown.*
8. *Remove from oven and let it rest for a few minutes before serving.*

Enjoy your meal!

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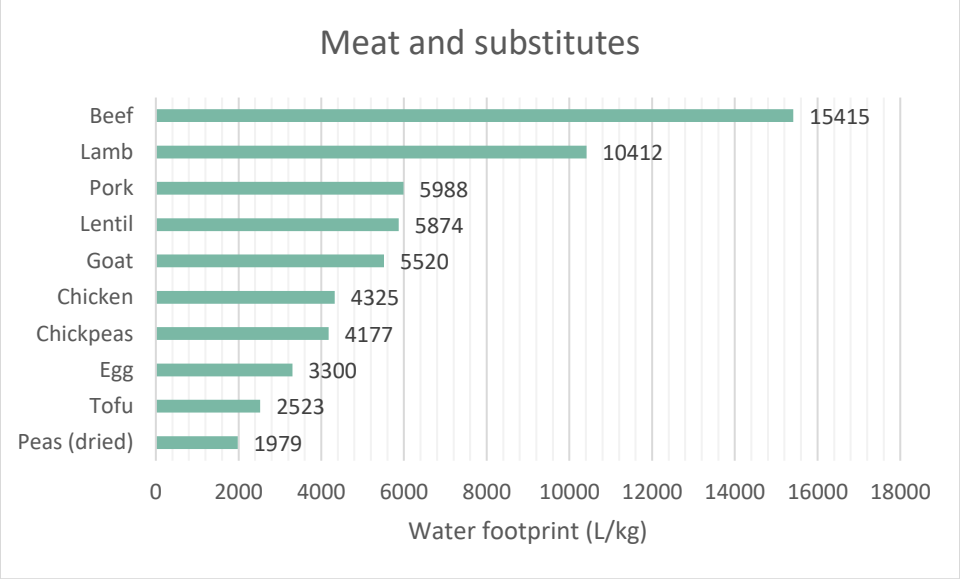
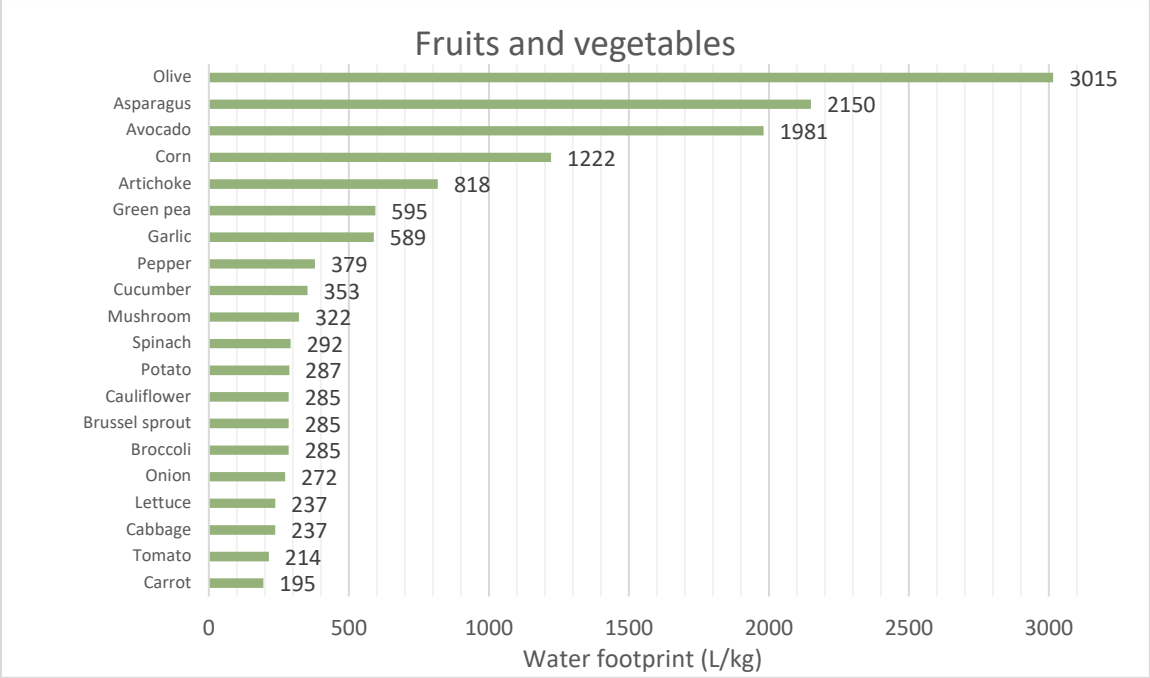
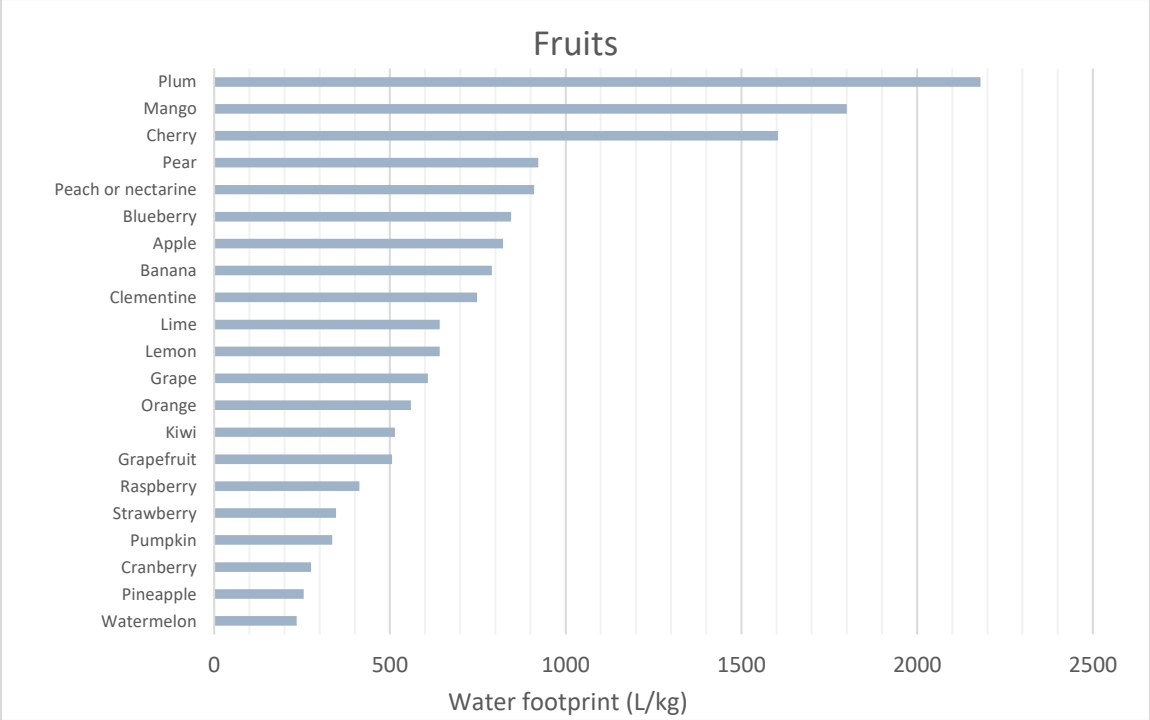
Tables of average water footprint of food



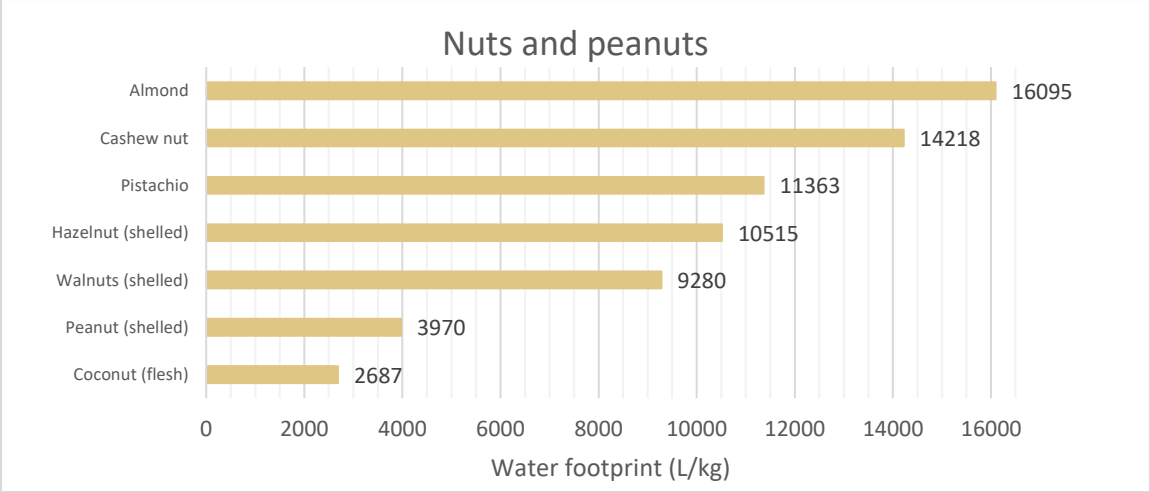
Meat and substitutes	Quantity	Average water footprint (L)	Average water footprint (L/kg)
Beef	200 g	3 083	15 415
Lamb	200 g	2 082,4	10 412
Pork	200 g	1 197,6	5 988
Lentil	100 g	587,4	5 874
Goat	200 g	1 104	5 520
Chicken	200 g	865	4 325
Chickpeas	100 g	417,7	4 177
Egg	1 egg (60 g)	198	3 300
Tofu	200 g	504,6	2 523
Peas (dried)	100 g	197,9	1 979



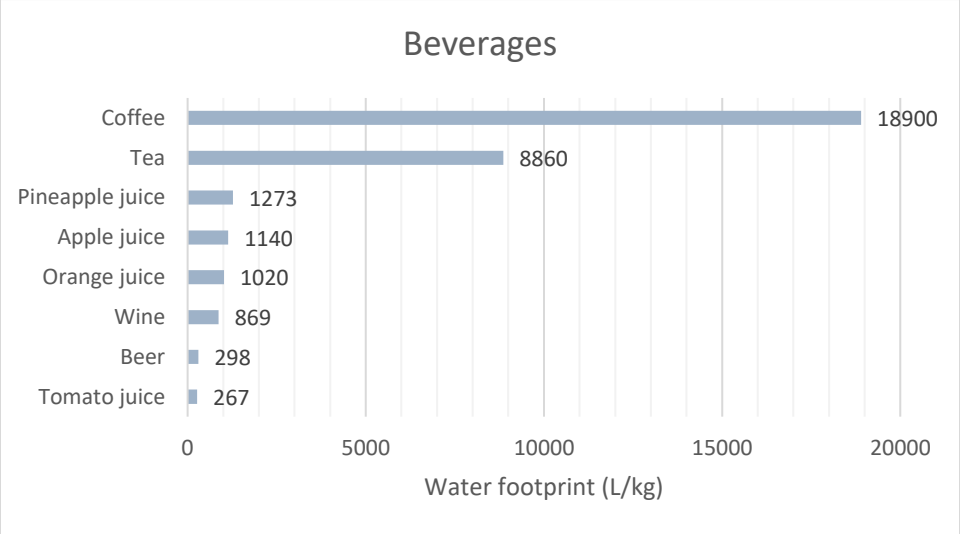
Vegetables	Quantity	Average water footprint (L)	Average water footprint (L/kg)
Olive	2 olives (15 g)	45,2	3 015
Asparagus	5 asparagus (250 g)	537,5	2 150
Avocado	1 avocado (140 g)	277,3	1 981
Corn	1 cob (250 g)	305,5	1 222
Artichoke	1 artichoke (400 g)	327,2	818
Green pea	100 g	59,5	595
Garlic	1 clove (8 g)	4,7	589
Pepper	1 pepper (75 g)	28,4	379
Cucumber	1 cucumber (400 g)	141,2	353
Mushroom	1 mushroom (15 g)	4,8	322
Spinach	1 bag of spinach (170 g)	49,6	292
Potato	1 medium potato (150 g)	43,1	287
Broccoli	1/2 broccoli (250 g)	71,3	285
Brussel sprout	1 Brussel sprout (90 g)	25,7	285
Cauliflower	1/4 cauliflower (250 g)	71,3	285
Onion	1 onion (125 g)	34,0	272
Cabbage	1/4 cabbage (300 g)	71,1	237
Lettuce	1 lettuce head (300 g)	71,1	237
Tomato	1 tomato (70 g)	15,0	214
Carrot	1 carrot (125 g)	24,4	195



Fruits	Quantity	Average water footprint (L)	Average water footprint (L/kg)
Plum	1 plum (110 g)	239,8	2 180
Mango	1 mango (350 g)	630	1 800
Cherry	20 cherries (130 g)	208,5	1 604
Pear	1 pear (250 g)	230,5	922
Peach or nectarine	1 peach (200 g)	182	910
Blueberry	1 pint (170 g)	143,7	845
Apple	1 apple (200 g)	164,4	822
Banana	1 banana (150 g)	118,5	790
Clementine	1 clementine (100 g)	74,8	748
Lemon	1 lemon (110 g)	70,6	642
Lime	1 lime (100 g)	64,2	642
Grape	20 grapes	608	608
Orange	1 orange (200 g)	112	560
Kiwi	1 kiwi (90 g)	46,3	514
Grapefruit	1 grapefruit (250 g)	126,5	506
Raspberry	1 pint (170 g)	70,2	413
Strawberry	1 strawberry (10 g)	3,5	347
Pumpkin	500 g	168	336
Cranberry	10 cranberries (17 g)	4,7	276
Pineapple	1 pineapple (850 g)	216,8	255
Watermelon	1/4 watermelon (500 g)	117,5	235



Nuts and peanuts	Quantity	Average water footprint (L)	Average water footprint (L/kg)
Almond	100 g	1 609,5	16 095
Cashew nut	100 g	1 421,8	14 218
Pistachio	100 g	1 136,3	11 363
Hazelnut (shelled)	100 g	1 051,5	10 515
Walnuts (shelled)	100 g	928,0	9 280
Peanut (shelled)	100 g	397,0	3 970
Coconut (flesh)	100 g	268,7	2 687



Beverages	Quantity	Average water footprint (L)	Average water footprint (L/kg)
Coffee	1 cup (250 ml)	264,0	18 900
Tea	1 cup (250 ml)	27,0	8 860
Pineapple juice	1 glass (200 ml)	249,0	1 273
Apple juice	1 glass (200 ml)	230,0	1 140
Orange juice	1 glass (200 ml)	200,0	1 020
Wine	1 glass (200 ml)	109,0	869
Beer	1 glass (200 ml)	74,0	298
Tomato juice	1 glass (200 ml)	66,8	267

Other

Other	Quantity	Average water footprint (L)	Average water footprint (L/kg)
Cocoa butter	10 g	339,4	33 938
Cocoa powder	1 tea spoon (5ml, 2,2 g)	53,3	24 238
Cocoa bean	100 g	1 992,8	19 928
Chocolate (40%)	1 bar (100 g)	1 719,6	17 196
Olive oil	1 cup (250 ml)		14 400
Cotton	1 shirt	2 495	10 000
Coconut oil	10 g	44,9	4 490
Raisins	1/3 cup (40 g)	97,3	2 433
Sugar	1 tea spoon (5ml, 4 g)	7,1	1 782
Margherita Pizza	1 pizza (725 g)	1 259,0	1 737
Potato chip	1 bag (200 g)	208	1 040
Tomato paste	1 tea spoon (5ml, 5,5 g)	4,7	855
Tomato puree	1 cup (250 ml, 250 g)	178,3	713
Tomato ketchup	1 tea spoon (5ml, 5,5 g)	2,9	530