

The water you eat

Canadian Geographic's July/August 2018 issue explores how 'virtual water' is moving around and crossing borders in the food and products Canadians produce. Using the infographic and the following questions, explore how water plays a role in our lives both directly and indirectly, where it is going and what we can do as climate change and population growth continue to challenge this precious resource.



Check for understanding

1. What makes Canada's freshwater situation different from other countries?

2. Explain what a water footprint is and why it is important.

3. What is meant by "virtual water"?

4. What must you consider when you determine the water footprint of a person?

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5. Examine the hamburger infographic and complete the chart below ranking the items that use the most amount of water to the least. Identify the Canadian export.

PRODUCT	WATER FACTS	CANADIAN EXPORT(S) INVOLVED

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Calculate your water usage:

- a. Determine all the ways you use water on a daily basis and calculate your water usage for one day using the following global average estimates (source: WasteWater Gardens International, International Water Consumption Data Table, wastewatergardens.com/pdf/WWG_InfoSheet_InternationalWaterConsump.pdf). You can also use the water footprint calculator resource located in the resources below and calculate your water usage online.

IN THE BATHROOM	Flushing the toilet (21.2 L) Taking a shower (105 L) Taking a bath (50 L) Brushing your teeth (8 L) Doing laundry (15 L per load)
IN THE KITCHEN	Cooking (10 L) Washing the dishes (42 L) Using the dishwasher (15 L)
OUTSIDE	Watering the lawn (8 L per square meter)

- b. Determine ways you can reduce your water usage.

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Extend your geographical thinking

Using the resources provided below, research an item that you use on a daily or weekly basis and how much water goes into creating this. Create your own infographic sharing how much water is used to produce this product and share it with the class, school or community.

Resources

- The Water We Eat
- Water Footprint
- UN Water
- *Canadian Geographic* protect your watershed
- Water Aid
- FortWhyte Alive outdoor water lesson plans
- Water footprint calculator

The water you eat

A massive amount of 'virtual water' is moving around regions and crossing borders in our food and other products

By Nick Walker

Climate change, population growth and big industry. When you think about how these and other forces are reshaping the water needs of nations around the globe, you probably don't picture a hamburger to help make sense of the issue. You're more likely, perhaps, to imagine a future in which Canada and other water-wealthy countries supply water-scarce regions with fresh water by pipeline and tanker. After all, Canada has nearly seven per cent of the world's renewable fresh water and less than half of one per cent of the world's population — more renewable water per person than any other country.

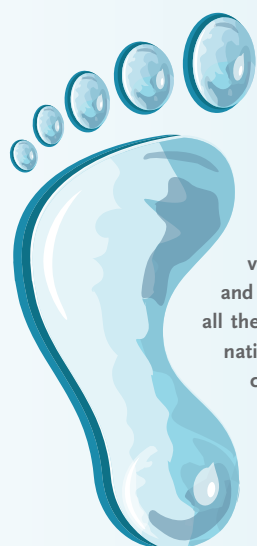
But the hamburger here represents a different kind of mass water consumption already underway: the billions of cubic metres of water being taken out of numerous watersheds, poured into agricultural and industrial processes and products that are then moved around Canada or shipped off to other parts of the world. This is the far-ranging fate of "virtual water," which refers to every drop consumed or polluted during growing, raising or manufacturing — be it a beef cow, a head of lettuce, a scoop of wheat or the fuel that powers transport vehicles.

There is no legislation to track or limit this kind of water consumption and displacement on mass industrial scales, and little is known about how much virtual water is being moved between water-scarce and water-rich regions of Canada, but the best *export* estimates are that more than 95 billion cubic metres (Bm³) of virtual water — most of it tied up in grain, livestock and

fuels — leaves Canada each year (roughly 60 per cent of it going to the United States), while a little more than 35 Bm³ is imported in other products. That works out to an annual net loss of about 60 Bm³, or as the environmental non-profit The Council of Canadians frames it in their report *Leaky Exports: A portrait of the virtual water trade in Canada*, enough water to fill Toronto's Rogers Centre stadium to the top 37,500 times.

Only Australia loses more water in this way. And although *Leaky Exports* was published back in 2011, no study of Canada's virtual water footprint has been commissioned by a federal government to date. "We lack a comprehensive understanding of how our freshwater resources are being used and how that impacts different regions of our own country," says Tom Gleeson, a hydrogeologist with the University of Victoria. This is about knowing how much virtual water we can afford to export, he says, whether to the United States, China or Jordan, but also about how we should be distributing water-intensive production between Canada's regions.

Read on for more about the national virtual water picture, and to find out how a single item — in this case a cheeseburger — can have a big water impact. An important part of Canada's water future involves everyone, from various levels of government to individuals, putting a value on this kind of water consumption. It may be "virtual," but it's no less real than the water in your tap. ☀



Canada's big WATER FOOTPRINTS

Every item, person, business, watershed and nation has a unique "water footprint." For a hamburger, it's all the fresh water required to produce its ingredients; for a person, it's the total volume of water used for drinking, cooking and cleaning plus the virtual water tied up in all the goods and services they consume. A national water footprint is the sum of its citizens' and industries' water footprints. At almost **6,400 litres a day** per capita, Canadians have one of the largest water footprints on Earth — the vast majority of it coming from the virtual water content of the food we eat.

Imagining **60 Bm³ OF WATER** (Canada's estimated net virtual water export)

The full average
flow of the
**ST. LAWRENCE
RIVER FOR
70 DAYS**



**2.4 MILLION
OLYMPIC SWIMMING
POOLS:** enough to
cover more than
**50 PER CENT
OF NOVA SCOTIA**



THE 2,000+ LITRE CHEESEBURGER

By *conservative* estimates, the products that make up this cheeseburger account for more than 2,000 litres of water,* which is like filling a bathtub seven times or more than 330 toilet flushes. Even though agriculture accounts for just five per cent of Canada's total water withdrawal (compared to thermal power generation, at 67 per cent, the manufacturing sector, at 11 per cent, and households, at nine per cent) a full 83 per cent of the water it uses is not returned to the watershed.

💧 = 1% OF VIRTUAL WATER (VW) CONTENT OF CHEESEBURGER



CONDIMENTS

VIRTUAL WATER: 60-100 L



The virtual water content of one teaspoon (around 5 ml) of mustard seed is about **6.5 litres**. Mayonnaise, meanwhile, is mostly oil and eggs: one litre of canola oil requires more than **3,000 litres of water** to produce, while a single egg takes about **140 litres**.



BACON (60 g)

VIRTUAL WATER: 230 L



A safe estimate of the virtual water content of pork is about **3,280 litres/kg**. Canada has exported an average of 5.3 million hogs to the United States each year since 2013, which works out to more than **1.7 Bm³ VW**.



CHEESE (30 g)

VIRTUAL WATER: 150 L



It takes about **5,000 litres of water** to make a kilo of cheese (factoring in the water behind the four to eight litres of milk required). In 2017, Canada exported more than 8,800 tonnes of milk and 10,000 tonnes of cheese, representing **50 million m³ VW**, but this does not take into account the 150,000 tonnes of other dairy products exported that year.



BUN (50 g)

VIRTUAL WATER: 70 L



Canada exports an average of 17.7 million tonnes of wheat (grain and flour) each year, representing a massive **23.6 Bm³ VW**. Grains and oilseeds such as Canola are the country's largest agricultural exports. Crops and livestock raised on irrigated land (such as southern Alberta, which is Canada's most irrigated region) have the largest water footprints.



VEGGIES (35 g)

VIRTUAL WATER: 5-10 L



Vegetables and fruits typically have much lower virtual water content than meat and dairy. Canada imports roughly 1.9 million tonnes of vegetables and 2.7 million tonnes of fresh fruit each year, mainly from the United States, Mexico and South America. We export less than half as many tonnes of veggies and one tenth as much fruit.



BEEF (150 g)

VIRTUAL WATER: 1,615 L



The water footprint of beef is the highest of the commonly consumed meats (**10,770 litres/kg**, or six to seven times more water than a kilogram of chicken requires). In 2017, cattle exports to the United States were about half of what they were in 2014, but still accounted for **3.4 Bm³ VW**.

* Virtual water content estimates are based on global averages. Water consumption for different products varies across regions depending on water availability.

