

## WATER CONSUMPTION

### What is water consumption?

There are two ways in which we can classify our water use. One type is in-stream use; this includes hydroelectric power, boating and swimming, for example. While in-stream activities do not use up the water, they can degrade the water quality through pollution. The other type of water use is the withdrawal of water, and this classification includes household use, industry use, irrigation, livestock watering and thermal and nuclear power. Most withdrawals are consumptions, meaning that the activity uses the water and does not return it to the source.

The amount of water that is taken (or withdrawn) from the source is called the water intake, and the amount that is returned is called the water discharge. The difference between the water intake and the water discharge is the amount consumed.

$$\text{Water intake} - \text{Water discharge} = \text{Consumption}$$

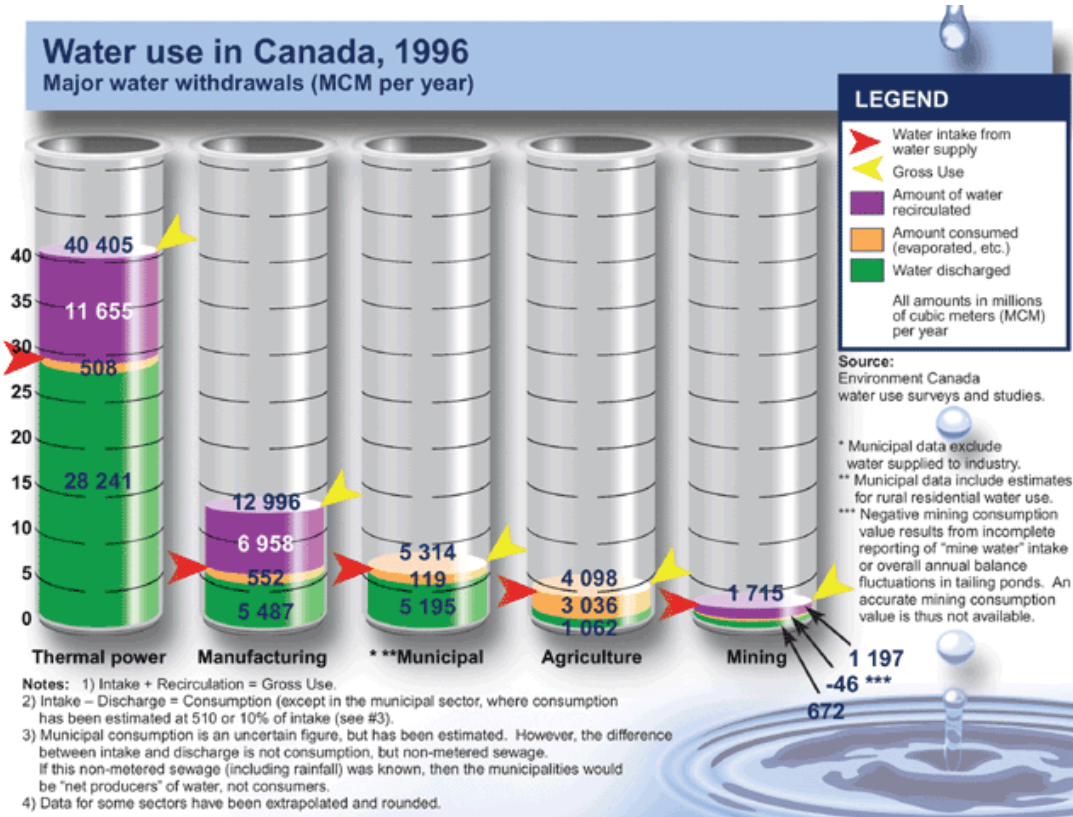
The total amount of water that is used is called the gross water use. The difference between the gross water use and the water intake is equal to the amount of water that is recirculated. The recirculated amount is expressed as a recycling rate and is a good indicator of water efficiency.

$$\text{Gross water use} - \text{Water intake} = \text{Amount recirculated (or recycling rate)}$$

### What are the major causes of water consumption?

In 1996, Environment Canada found that the major withdrawal uses of water were for thermal power generation, manufacturing, municipal use, agriculture and mining. The following diagram illustrates the amount of water that was withdrawn for each use, as well as the amount that was recirculated, consumed and discharged. While thermal power generation withdraws the greatest amount of water, agriculture consumes much more water than thermal power generation does. Also note that there is no indication of recycled water in the home, making domestic water use very inefficient.

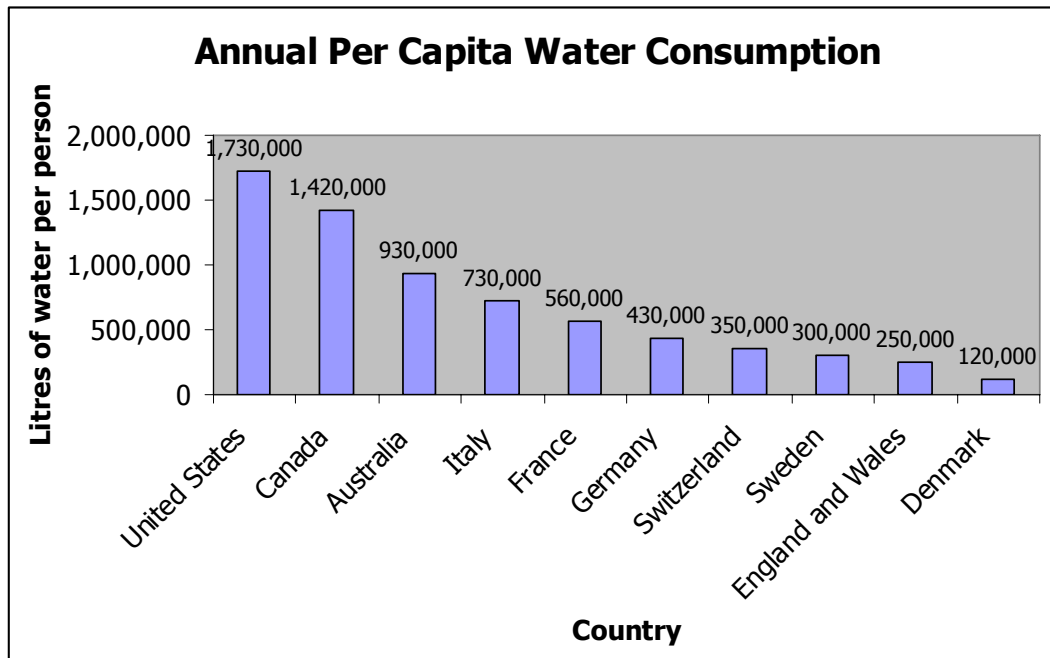
It is also important to notice that the consumption rate for the mining sector is inaccurate, due to a lack of data. In fact, the oil sands mining operations in Alberta consume great quantities of water. To produce one barrel of synthetic crude oil requires between 2 and 5 barrels of water. Each year, more than 300 million cubic metres of water are diverted from the Athabasca River in Alberta. With the planned expansions, the amount of withdrawn water could increase to more than 500 million cubic metres of water each year! As well, oil mining is quite inefficient in the area of water recycling, and a great deal of the withdrawn water ends up in tailings ponds. Of the water taken from the Athabasca River for mining in Alberta's tar sands, only 10 percent is returned to the river; the remainder is consumed or sent to tailings ponds, because it is too polluted to enter the river. For more information about oil mining, see the [Oil Fields](#) fact sheet.



### Breakdown of Water Consumption by Sector in Canada

#### The statistics say what???

The statistics from the Organisation for Economic Co-operation and Development (OECD), as shown in the following graph, say that in 2004 the average Canadian used 1420 m<sup>3</sup> of water. That is equal to the amount that would flow from your kitchen tap if you left it running for almost three months! Among the countries that are OECD members, Canada had the second greatest consumption per capita, second only to the United States, where the average person used 1730 m<sup>3</sup> of water! The numbers that are given in the following graph include water consumption for agricultural and industrial operations, as well as for residential use.



**Annual Per Capita Water Consumption**

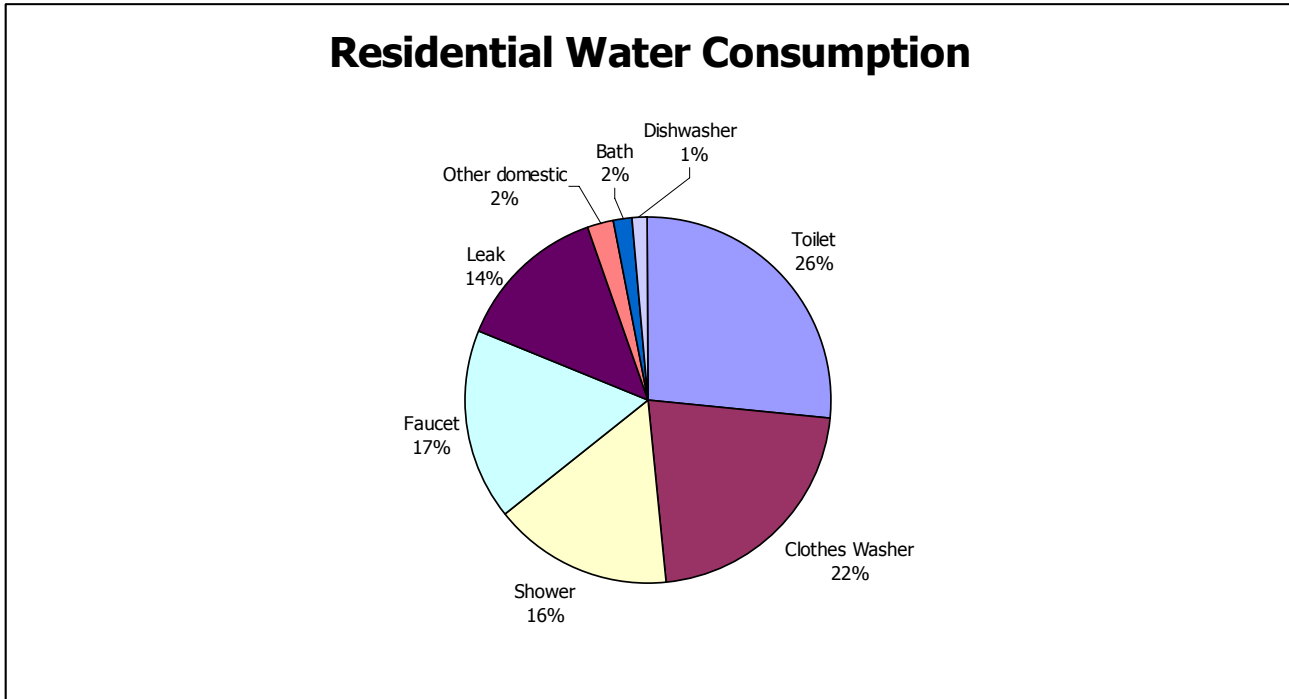
That's a lot of water! Now let's leave industry and agricultural water consumption behind for a moment and consider only residential water use. According to the OECD, for residential purposes, each Canadian used about 335 litres of water each day in 2001. That doesn't seem too bad when you compare that with the Americans, who used around 380 litres of water for residential purposes each day. But the average Italian uses about 25 percent less water than the average Canadian, the average Swede uses 40 percent less water, and the average person in France uses 55 percent less water.

If the daily consumption rate doesn't concern you, consider this: In 2001, the average Canadian used just over 122,000 litres of water, while the average person in Denmark used less than 50,000 litres of water. And that's just one person! Multiply that by the population of each country, and Canada has a serious water consumption problem! For more information, see the math lesson titled "[I use THAT much water?!](#)" in the Operation Water Flow section and the "[Water and the World](#)" and "[Water and North America](#)" lesson plans in the Operation Water Health section.

A number of factors can influence per capita consumption of water, including human rights concerns. The average per capita water consumption in Israel is about 280 litres. However, in the Israel occupied Palestinian Territories, the average Palestinian consumes only about 60 litres of water per day! That means the average person in Palestine uses nearly 80 percent less water than the average person in Israel. For more information about how human rights issues impact water availability, see the [Human Rights](#) fact sheet.

The diagram below illustrates the breakdown of residential water use. At least half of the water that we use is unnecessary. This includes leaks, plumbing problems, the over-watering of lawns and washing cars. In the summertime, municipal water use peaks, because between half and three quarters of all municipally treated water is used for watering lawns. The unnecessarily high

consumption rates result in higher costs of water treatment, because the water that is being used for washing cars and watering lawns has been treated to drinking water quality guidelines. The water treatment costs can be in the form of water treatment devices, such as filters and chemicals, or energy, which is required to treat the water. There are now devices to separate blackwater (which is typically sewage) from greywater (which is typically water from dishwashers and showers), as the greywater can undergo minimal treatment and then be used for watering lawns and other purposes that do not require treated drinking water. For more information about alternative wastewater treatment processes, see the [Wastewater Treatment](#) fact sheet.



**Residential Water Consumption;**  
<http://www.epa.gov/watersense/pubs/indoor.html>

### How much water is do I really need?

Countries like Canada are using ten to twenty times more water than is necessary to meet basic human needs. In developing countries, 20 to 30 litres of water per person per day are considered adequate for basic human needs. In Canada, we generally use that amount of water in one or two flushes of the toilet! The chart below lists the amount of water that is required for domestic purposes, according to the World Health Organization:

Level of allocation	Use	Amount (litres per person per day)
Minimum 'survival' allocation (sustainable for only a few days)		<b>5-7</b>
	Drinking	3-4
	Food preparation and cleanup	2-3
Medium term allocation (sustainable for a few months)		<b>15-20</b>
	Drinking	3-4
	Food preparation and cleanup	2-3
	Personal hygiene	6-7
	Laundry	4-6

**Minimum Amount of Water Required Per Person Per Day;**

[http://www.searo.who.int/LinkFiles/List\\_of\\_Guidelines\\_for\\_Health\\_Emergency\\_Minimum\\_water\\_quantity.pdf](http://www.searo.who.int/LinkFiles/List_of_Guidelines_for_Health_Emergency_Minimum_water_quantity.pdf)

Indian and Northern Affairs Canada (INAC) is responsible for all water treatment in First Nations communities in Canada. According to INAC Operating Instruction #14, each person on a community distribution system is allocated 235 litres of water per day; each person on a truck haul system (such as using a cistern) is allocated 120 litres of water per day. The allocation for non-Aboriginal communities depends on provincial guidelines, but is probably similar to the 2002 Saskatchewan allocation of 456 litres per person per day. That means that non-Aboriginal communities are being allocated nearly double the amount that Aboriginal communities are being given!

The Safe Drinking Water Foundation’s opinion is that 235 litres per person per day is a perfectly adequate amount of water to use. This reduction in water consumption can easily be achieved through water conservation measures. Unfortunately, even in First Nations communities, INAC continues to fund only the cheapest toilets, which account for a large percentage of total water consumption. There are, however, Aboriginal communities that are installing low flush toilets, which use only two to four litres of water per flush, compared with 13 to 18 litres for a standard toilet. This demonstrates that Aboriginal communities can lead the way in both water treatment and water conservation measures.

Dual-flush toilets are an improvement of low-flush toilets, because they offer small flushes (around two to three litres) and large flushes (around four to six litres), so that double-flushing is not necessary. Dual-flush toilets have become the norm in many countries, including most of Europe, China and Australia. A common water conservation adaptation in Japan is connecting the sink drain with the toilet, so that the water that people use to wash their hands can be used next time the toilet flushes. The math lesson in Operation Water Flow called [“I use THAT much water?!”](#) goes into more depth about water consumption, and how water consumption can be reduced.

**Water is cheap and I can afford it. Why should I bother trying to conserve water?**

Since 1850, some 1300 glaciers have lost 25 to 75 percent of their mass, and most of this decrease has occurred in the last 50 years. The eastern slope of the Rocky Mountains has shrunk to its lowest level in 10,000 years and what is left is becoming increasingly polluted. In 2001, more than 2600 Canadian industrial facilities reported discharging chemicals into water bodies. Safe drinking water is becoming scarcer, though the price of water does not reflect this scarcity. Despite the great demand for water, prices remain low. The chart below illustrates the price per cubic metre of water in various countries around the world. Canada has, by far, the lowest price out of any of these countries.

Country	\$/M <sup>3</sup>
Germany	\$1.91
Denmark	\$1.64
Belgium	\$1.54
Netherlands	\$1.25
France	\$1.23
United Kingdom of Great Britain and Northern Ireland	\$1.18
Italy	\$0.76
Finland	\$0.69
Ireland	\$0.63
Sweden	\$0.58
Spain	\$0.57
U.S.A	\$0.51
Australia	\$0.50
South Africa	\$0.47
Canada	\$0.40

**Cost of Water in Various Countries as of 2001;**

[http://www.unesco.org/water/wwap/facts\\_figures/valuing\\_water.shtml](http://www.unesco.org/water/wwap/facts_figures/valuing_water.shtml)

Perhaps a high price on water would encourage Canadians to use less water. Recall that, in 2004, the average Canadian used 1,420 cubic metres of water. Well, the average person in Germany used only 430 cubic metres of water in 2004. And the average person in Belgium used only 650 cubic metres of water. And the average person in France used only 560 cubic metres of water. It appears that putting a price tag on water encourages people to use water more wisely.

And Canadians have demonstrated that they are willing to pay more for their water. As waterborne illnesses are becoming more common, and outbreaks are occurring in communities just like our own, sales of bottled water are increasing. In 1995, the average Canadian bought 17.9 litres of bottled water, and by 2000, that number was up to 27.6 litres. According to the United States Natural Resources Defense Council, bottled water costs between 240 and 10,000 times more than tap water. Despite this, sales of bottled water are on the rise, because people are concerned about the quality of the water that they are drinking.

Due to media coverage, Canadian citizens are aware of waterborne disease outbreaks from contaminated tap water. However, most people do not realize that many types of bottled water originate from municipal sources, and probably have not even had additional treatment! Bottled water, in Canada, is regulated under the Federal Food and Drug Act, but there are only a handful of regulations, and most of them cover labeling requirements. For example, Toronto tap water

undergoes 650 bacterial tests each month, while bottled water is tested much less frequently. Even when bottled water is tested, it may not be safe by the time it reaches the consumer. As bottled water sits on shelves in grocery stores and homes, the plastic bottles can leach dangerous chemicals into the water. For information about bottled water, including the health concerns associated with plastic bottles, see the fact sheet about [Bottled Water](#) or read [Banned! Top chefs just say no to serving bottled water - and yes to helping the environment](#), recently published in People Magazine.

The cost of food and water in isolated communities in the north is significantly higher than in the majority of Canada. In Pond Inlet, Nunavut, a four-litre jug of milk costs about \$20, while the same amount of pop costs about \$4. According to INAC, in 1997, approximately 80 percent of women in Pond Inlet reported running out of money to buy food. Companies, such as Coca-Cola, then subsidize pop, because they can make significant profits in remote northern communities, by offering pop at prices less than other beverages.

[Ok, I agree; we need to conserve water. But how can I make a difference?](#)

Don't be discouraged from conserving water because you think one person can't make a difference. In Regina, in the 1980s, water consumption was out of control. The city initiated some conservation measures; the water consumption quickly decreased by over 25 percent and has remained stable ever since. The following are a list of conservation tips:

- When bathing, fill your bathtub only one quarter full. If you shower, try to limit your shower to approximately five minutes.
- Check your water meter; if you don't have any water running but the meter is moving, you may have a leak. Check your taps regularly to make sure they aren't leaking (a leak of one drop each second wastes approximately 10,000 litres of water each year: that amount of water could fill 85 bathtubs!).
- Drink room temperature water, instead of running the tap until it is cold. It is actually healthier to drink room temperature water than cold water.
- If you must have cold water, store drinking water in a jug in the fridge. Just remember to clean the container regularly.
- Don't leave the tap running at unnecessary times, such as when you are brushing your teeth, shaving, or washing dishes.
- If you use a dishwasher, use the short cycle and make sure that the dishwasher is full. The short cycle uses approximately 32 litres of water, as compared with 40 to 54 litres with the regular cycle.
- When doing laundry, set the level appropriately. Front loading washing machines use less water than top loading washing machines.
- If you wish to water your lawn, do it earlier in the morning, because that is when the least amount of evaporation and runoff will occur. Or, use a cistern or rain barrel and collect rainwater to use on your lawn and garden. Plant native grass and plants, or plant shrubs and trees in your yard, as these require less water. Oscillating sprinklers are quite inefficient and up to 50 percent of the water is wasted through evaporation.
- If you have a swimming pool, cover it when not in use (approximately half of the water in your pool will evaporate over one year, if left uncovered).
- Wash your car with a sponge and bucket, instead of a hose or pressure washer. This can save up to 300 litres of water each time you wash your car!
- Make sure your toilet doesn't continue to run after you flush it (as this can waste up to 200,000 litres of water each year). A regular toilet uses 18 litres of water per flush. If you

replace this with a toilet that uses 6 litres of water per flush, your total indoor use of water will be reduced by approximately 30 percent!

- Consider installing a low-flow showerhead, which cuts the amount of water used for a shower in half (that can save more than 50 litres of water each time you shower!)
- Some provincial governments and the Canadian government offer grants to people who are willing to make their home more energy efficient, which may include grants for low-flush toilets.
- For more information about water consumption, including costs, see the lesson plans and resources in the [Operation Water Flow](#) section.

In the words of one conservation slogan, "Let's keep it on tap for the future."

The Safe Drinking Water Foundation has educational programs that can supplement the information found in this fact sheet. Operation Water Drop looks at the chemical contaminants that are found in water; it is designed for a science class. Operation Water Flow looks at how water is used, where it comes from and how much it costs; it has lessons that are designed for Social Studies, Math, Biology, Chemistry and Science classes. Operation Water Spirit presents a First Nations perspective of water and the surrounding issues; it is designed for Native Studies or Social Studies classes. Operation Water Health looks at common health issues surrounding drinking water in Canada and around the world and is designed for a Health, Science and Social Studies collaboration. Operation Water Pollution focuses on how water pollution occurs and how it is cleaned up and has been designed for a Science and Social Studies collaboration. To access more information on these and other educational activities, as well as additional fact sheets, visit the Safe Drinking Water Foundation website at [www.safewater.org](http://www.safewater.org).

### Resources:

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United Nations. 2006. Water for Life Decade: Fact Sheet. <http://www.un.org/waterforlifedecade/factsheet>.

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