

# WATER FOR ALL

## CHALLENGES AND RESOURCES

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PHOTO: WAGGSWORLD.ORG

“ We shall not finally defeat AIDS, tuberculosis, malaria, or any of the other infectious diseases that plague the developing world until we all have also won the battle for safe drinking-water, sanitation, and basic health care. ”

*Kofi Annan, United Nations Secretary-General*



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# Introduction

***A person can live for up to a month without food, but only days without water.***

Water is perhaps the single most necessary material need for human beings. But in so many parts of the world, water is not the easiest thing to come by. This challenge explores how water impacts people's lives all over the globe.

The activities in this challenge address a number of water topics, but there are many more that could be explored. Feel free to investigate!

Possible topics for this challenge could include:

*Clean drinking water*

*Access to water*

*Sanitation*

*Water and Hygiene*

*Privatization of water*

*Overuse*

*Drought*

*Watersheds*

*Water Sourcing*

*Irrigation*

*Contamination*

Those completing the challenge will need to spend enough time with the issue to get a proper and lasting understanding of the topic. So this challenge should be done over at least a few different meetings in order to get the most out of it.

To be awarded a crest, each participant should have:

- learned about, thought about, and explored ideas about water, both locally and internationally;
- taken some action to make a positive difference to other people or communities; and,
- reflected upon what she has learned and experienced.

# WATER - LIFE'S ESSENTIAL

We need clean water to drink, in order to be physically and mentally fit and healthy. We also need to have a sufficient supply of water that is easily accessible to meet our daily hygienic and personal needs. But over a billion people in the world do not have it. This fact and the lack of sanitation result in over two million people dying from water-related diseases every year. In the developing world, 5,000 children die every day from diarrhoea caused by unsafe water and poor sanitation.

## SOME BASIC FACTS....

- Water covers 75 per cent of the Earth's surface — 97.5 per cent of that is salt water, only 2.5 per cent is freshwater.
- Icecaps and glaciers hold 74 per cent of the world's freshwater. Almost all the rest is deep underground, or locked in soils as moisture or permafrost. Only 0.3 per cent of the world's freshwater is found in rivers or lakes.
- Less than one per cent of the world's surface or below-ground freshwater is accessible for human use.
- Water is becoming scarce due to higher pollution levels and habitat degradation. Contamination denies as many as 3.3 billion people access to clean water supplies. In developing countries, an estimated 90 per cent of wastewater is discharged directly into rivers and streams without treatment.
- According to the World Wildlife Fund, the amount of water worldwide that is polluted is actually more than the total amount contained in the world's ten largest river basins.

## WATER & HEALTH...

- Dehydration leads to a deterioration of cognitive functions, such as short term memory.
- Brain tissue consists of 85 per cent of water; when it is dehydrated the level of energy production in the brain decreases, reducing a person's ability to concentrate.
- The Institute of Medicine in the US advises that adult women consume 2.2 litres (about 9 cups) a day.

## WOMEN AND WATER...

- Many women and children in developing countries spend hours each day walking miles to collect water. This water is usually dirty and unsafe but they have no alternative.
- Collecting water is extremely time consuming. One of the most serious effects is that children, particularly girls, often do not have the time to attend school, and adults cannot spend these hours working for wages.
- Girls are also prevented from going to school because of lack of adequate sanitation facilities, especially when they are menstruating.

## ACCESS TO WATER...

- In the past 20 years, more than 2.4 billion people have gained access to safe water supplies and 600 million to improved sanitation. Nevertheless, 1 in 6 people still have no regular access to safe drinking water.
- The lack of clean water close to people's homes affects people's time, livelihoods and quality of life.



PHOTO CREDIT: UNEP/Jinda Uthairanumas

## SANITATION AND WATER....

- 4 out of 10 people in the world (2.4 billion) do not have somewhere safe and clean to go to the toilet.
- Diarrhea is the second biggest killer of children under five worldwide (after pneumonia) but in most cases it can be prevented through safe water, sanitation and hygiene education.
- According to the World Health Organization, safe disposal of children's feces could result in a 40% reduction in childhood diarrhea.

## CONSERVING WATER...

- The average Sub-Saharan African uses 10-20 litres of water a day – compared to 300 litres used each day by people living in a European city, or 600 litres a day used by people who live in American or Japanese cities!
- Running a tap uses 7-12 litres a minute. Sprinklers and hoses use about 20 litres a minute. Flushing a toilet uses 6-20 litres.
- Water supplies are falling while the demand is dramatically growing at an unsustainable rate. Over the next 20 years, the average supply of water worldwide per person is expected to drop by a third and yet water consumption has almost doubled in the last 50 years.
- Within 25 years, half the world's population could have trouble finding enough freshwater for drinking and irrigation.
- Water problems are more related to mismanagement than scarcity.
- Up to 50 per cent of urban water and 60 per cent of water used in agriculture is wasted through leaks and evaporation.
- Logging and land conversion to accommodate human demand has shrunk the world's forests by half, contributing to increased soil erosion and water scarcity.
- Currently, 40% of the world's people are subject to serious water shortages. Conditions may get worse in the next 50 years as populations grow and as global warming disrupts rainfall patterns.

# GUIDING AND WATER

*Guiding has long spoken and acted out on the topic of water. The following are activities and resources already happening in other Guiding organizations.*

## Water Awareness



The World Association of Girl Guiding and Girl Scouting chose "Think About Water" as the theme for World Thinking Day in 2008. WAGGGS produced a number of activities and fundraising ideas on the topic of water; these can be found at [www.worldthinkingday.org](http://www.worldthinkingday.org).



Newfoundland Girl Guides created a challenge badge to celebrate the Decade of Water For Life (2005 - 2015). It can be found on their website, [www.ggcnf.org](http://www.ggcnf.org).



Water for Tomorrow is an educational program promoting water conservation. Activities and images (featuring mascot Holly Heron) are available through Program Committee, on the Newfoundland Girl Guides website, or at the Environment Canada website.

[http://www.ec.gc.ca/water/en/info/pubs/explore/e\\_contnt.htm](http://www.ec.gc.ca/water/en/info/pubs/explore/e_contnt.htm)

# Water Projects through Mutual Aid

## Togo - Project Alodo

The aim of this project was to provide drinking water to the women of Gamé and their families. Improving access to clean drinking water to the villagers meant avoiding illnesses such as diarrhoea, salmonella, gastro-enteritis and parasitic guinea worm infections, in turn improving health and quality of life.

The project also provides girls and young women with information about water and health, and raised awareness on the dangers of drinking polluted water.

Thanks to a donation by Girlguiding UK to the WAGGGS Network, this project was fully funded.

## Nepal - Clean Water Project

This project taught local people, Scouts and students proper use of latrine and necessity of clean drinking water. It also raised awareness about the importance of sanitation in daily life.

Hygiene education was given to 3,200 people from seven districts including Scouts, leaders and community people. Latrine constructions are continuing.

This WAGGGS Network project was funded by the Association Des Girl Guides Luxembourgeoises.

## Kenya - Water Harvesting Project

This project installed four water tanks with pumps, providing water to over 100,000 people who come to Kenya Headquarters every year for training, meetings, projects, camping, visits of dignitaries, as well as the ten Headquarters staff.

This project was completed thanks to funding by Girl Guides of Canada.

## Local Advocacy

Sunset Hill area Girl Guides in Alberta, Canada raised over \$500 for African Well Fund in 2006, by collecting donations throughout the month of May by participating in AWF's Walk a Mile in Her Shoes penny fundraiser program.

Each year the district undertakes an international fundraising project. 14 year old Pathfinder Siobhan Owen suggested African Well Fund as the 2006 beneficiary. Siobhan and her district manager Pauline talked to each unit about the need for access to clean water in Africa and about how the money they raised would be used to help. When speaking to the units Siobhan would bring a 4 litre jug of water along and the girls would take turns trying to carry it around the room on their heads to get an idea of the effort involved in having to transport water each day.

Nearly 100 girls ages 6 -18 participated. Girls liked the idea that they were helping the women and girls who bear the burden of collecting water each day.

**Please note that this is a good example of advocacy and fundraising ideas, but all fundraising efforts should now only support the Canadian World Friendship Fund and WAGGGS initiatives, as per GGC policy.**



# THE CHALLENGE

This challenge is divided into three types of activities...

## ***Engage***

These activities highlight the issue of water in active, hands-on ways. They are designed to start your unit thinking and feeling about the importance of water.

## ***Educate***

With your unit, learn more about water issues around the world. These activities explore global water topics in more depth.

## ***Empower***

These activities take action on helping to ensure water for all. This might include either peer education or advocacy (or both).

In order to complete the challenge, you must complete at least 3 activities in each of the 'Engage' and 'Educate' sections, and 2 'Empower' activities.

It isn't necessary to do sections or activities in a certain order, but you may want to hold off on 'empower' activities until the later part of your challenge.



PHOTO CREDIT: OXFAM CANADA

## Remember...

Debriefing is actually the most important part of educational activities like this...make sure you leave just as time to discuss and reflect on the activity as you do the activity itself.

Make sure girls get the opportunity to explore topics about water that peak their curiosity. Don't worry if you are unfamiliar with these topics, this is a great opportunity to learn together as a unit! (The glossary at the end of the challenge can brief you on many basic ideas on water-related topics.)

Most of the activities in this challenge can also go towards general program work. Once you've finished the challenge, go through your program and see what else you may have completed along the way.



PHOTO CREDIT: burgeap and EC

# Engage

*These activities are meant to get girls experiencing water issues. They are meant to get girls asking questions about water topics, which can be researched in the Educate section of the challenge.*

*Girls should do at least 3 activities from this section. At least one should be a global activity and one should be a local activity.*

## 1. In many countries, girls spend much of their day carrying water to their family. Simulate this experience with a Water Walk.

An average day for many looks like this: walk on average 6 km to a water station, fill a container averaging 30 lbs, then walk 6 km back. Try a tenth of this - walk 600m to a station with backpacks filled with 30 lbs, then walk back.

If you're on a hike, you could load everyone's gear into one bag and have the girls take turns carry it. (Measure how long each girl can carry it before getting tired.) Or make it a relay race!

### TALKING POINTS

- Remember that the 600m only represents 10% of a typical journey.
- How did this experience make you feel?
- If you had to collect water like this, how do you think this would affect your daily life? What part of your daily schedule would you have to cut out?
- How would having better access to water change lives?

### FOLLOW-UP

Investigate why people have to travel so far to collect safe drinking water, or what people and/or organizations are doing about providing better access to safe drinking water.



PHOTO CREDIT: UNICEF/HQ99-0460/Giacomo Pirozzi

## 2. Have a speaker from Engineers Without Borders, etc. come and speak about different water filtration methods used abroad.

### TALKING POINTS

- Ask the speaker about their experiences working on water issues.
- Are these methods complicated? Expensive?
- What keeps these methods from being used in many places around the world?

## 3. Make your own water filter.

### TALKING POINTS

- How clean is your water? Do you think it's safe for drinking?
- Would you drink it?

## 4. Catch water in a tap for 2 minutes. Try to see how long you can make that water stretch and last you through the day.

### TALKING POINTS:

- Did you make it through the day? If not, how far in the day did you get?
- How did you decide what to spend the water on?
- How much of the water did you use for drinking water?
- What if you had children or sick people to take care of? Would those change your priorities?

### **Fact Facts on Safe Drinking Water**

- 1.1 billion people in the world lack access to safe drinking water
- 50% of hospital beds worldwide are occupied by people suffering from waterborne diseases
- 6,000 people—mostly children—die each day because they lack safe drinking water
- On average, people in the developing world walk several miles per day to fetch safe drinking water for their families

**5. Keep a water diary for 3 days. Use the information box to right to calculate how much water common activities use.**

**TALKING POINTS**

- It isn't necessary to compare how much each girl used, but to together get a sense of how much water we typically use. Ask questions like, "How many of you used more than \_\_\_\_ litres of water?"
- How much water do you use? More or less than you thought?
- What did you spend the largest amount of water on?
- How much of your water do you use for hygiene reasons?
- Is there anything you think you would cut back on? If you had to?
- This activity can be discussed both locally and globally. (Locally, in terms of conserving against overuse, globally, compare to use in other countries.)

**6. Watch a documentary about water.**

**TALKING POINTS**

- How would you feel in those situations?
- Did certain things surprise you?

**7. Do a relevant activity out of the Water For Tomorrow series.**

- A shower uses 30 litres of water every five minutes.
- A bath uses 90 litres of water.
- Flushing a toilet uses nine litres of water.
- Flushing the toilet with a brick in the cistern uses seven litres of water.
- Using the washing machine uses 95 litres of water.
- Washing dishes in a dishwasher uses 40 litres of water.
- Washing the dishes in the sink uses 15 litres of water.
- Washing the car with a bucket uses ten litres of water per bucket.
- A watering can holds four litres of water.
- A sprinkler uses 540 litres of water per hour.
- Cleaning your teeth with the tap running uses six litres of water.
- Cleaning your teeth with the tap off uses one litre of water.
- Washing your hands and/or face uses four litres of water.
- A paddling pool holds 400 litres of water.
- Filling a kettle uses 2.5 litres of water.

**8. Share stories about sanitation. Divide the group into five regions. There are information cards on each region included in this challenge. Have each group tell the story in a skit for the rest of the group.**

TALKING POINTS

- How did you feel about your situation? Did you think there was a way to change it?
- Which region do you think has the greatest problem?
- How does sanitation affect other parts of people's lives?

**9. Visit your local water treatment plant.**

TALKING POINTS

- How complicated is the process to treat water?
- Did certain things surprise you?
- Follow-up: learn about water treatment in other cities and/or other countries.

**10. Learn where your water comes from – visit your local watershed.**

TALKING POINTS

- Is water easy to come by in your area?
- How much filtration is needed for your water? Is this typical?
- Did certain things surprise you?

**11. Do something active about something of interest to your group.  
Create a game, arrange a field trip...**



# E d u c a t e

*These activities are meant to encourage girls to research and learn more about water issues. These activities could follow up on the activities completed in the Engage section of the challenge.*

*Girls should do at least 3 activities from this section. At least one should be a global activity and one should be a local activity.*

1. Look into how women are responsible for water duties around the world. Present this to the rest of your unit.
2. Learn more about Mutual Aid projects that have been completed on the topic of water. Where are these happening? What was the outcome?
3. Investigate the details of waterborne illnesses. Which ones are the most common? Where are illnesses prevalent? How are they prevented?
4. Make a resource list about global water issues.
5. Have each girl learn about one type of treatment for safe drinking water. Share stories with the unit.
6. Find out about water-related diseases that are carried in Canada, and how to prevent them.
7. Find out about the different ways water gets contaminated. How do you un-contaminate water? How many of these are preventable? Are there ways GGC can help?
8. Research a country with a different economy than Canada. What water problems do you share? What problems are different?
9. Research water access globally. Which countries have access problems and why?
10. Do a relevant activity out of the Water For Tomorrow series.

# E m p o w e r

*These activities are meant to get girls acting and advocating on what they have learned about water. These activities could follow up on the activities completed in the Educate section of the challenge.*

*Girls should do at least 2 activities from this section. If possible, one could be a global activity and one a local activity.*

1. Participate in an advocacy campaign about one water issue you find important.
2. Organize a fundraiser for water projects.
3. Organize an activity or event about a water topic of your choice to give at a District/Area event.
4. Prepare a display for a District/Area event about something you learned in this challenge.
5. Make a public awareness presentation, etc. that educates about something you learned in this challenge.
6. Create your own activity for this Water Challenge and submit it to Provincial International Committee.



# WATER GLOSSARY

*Need help getting started?*

*Use this resource and glossary to gain more information on water topics that interest you. Useful web resources, case studies or “search engine words” can be found under each topic.*

## **Access & Availability:**

Accessing water is the ability for the people of a particular region to have and get the water they need for their daily lives. Water access is one of the hottest topics due to the problem that of water resources are not equal in the world. Some countries have an abundance of water, and other countries have very little. Canada for example has 9% of the global freshwater resources (and less than 1% of the worlds population). Many countries in Central Africa or the Arab Region, on the other hand, have very little. Sometimes there is not enough infrastructure (i.e. dams, pipes, taps) for people to get safe drinking water, even if there is water available. Approximately 1.1 billion people do not have access to safe drinking water (UN).

Even in Canada; however, some areas have regular droughts or less storage available to meet all the demands at certain times of the year. Sometimes water restrictions are put in place to make sure there is enough water for necessary functions (drinking, cleaning, industry). As populations grow in certain regions, more stress is put on the water system.

## **Biodiversity loss:**

Biodiversity is the variety and number of species in a given area. The water we use for ourselves and our industries is also used by mammals, fishes, birds, invertebrates and micro-organisms. Biodiversity in lakes, rivers and the oceans is in decline for a large number of reason, mostly due to human influence. For instance, building a dam for storing water will alter the flow of water in the river below. Some species can only survive with specific water speeds (velocity), temperatures and amounts and will no longer be able to survive.

Other factors affecting biodiversity loss in water include: covering streams in urban areas, pollution, introduced invasive species, groundwater changes (often because of increased pavement or buildings), nutrient-loading, over-fishing, hormones, and climate change.

Case Study-- Freshwater Mussels: In Canada and North America, freshwater Mussels are highly at risk. Present in our streams and lakes, they are one of the most endangered organisms in North America. In Canada, approximately 75% of all species are not given “secure” status: meaning they are at risk of extinction (Environment Canada, 2004). About 70 percent of the nearly 300 species of freshwater mussels native to North America are extinct, endangered or declining. Why? Mussels are very sensitive to change, especially chemical changes. Drugs (pharmaceuticals such as birth control hormones) enter our water systems, disrupt their normal functions and either kill them or stop them from reproducing. (See <http://www.sciencedaily.com/releases/2006/09/060914153812.htm>) Other factors include the introduction of non-natives (check out Zebra Mussels in the Great Lakes) and physical changes (ie. altering the flow of a river).

*There is a really fantastic, colourful and easy to understand set of pages on Canada's water and worldwide water resources called 'Did you know? Freshwater Facts for Canada and the world.' Contains pictures and fast facts on water use and problems. Found at [http://www.ec.gc.ca/water/en/info/facts/e\\_contnt.htm](http://www.ec.gc.ca/water/en/info/facts/e_contnt.htm)*

*The United Nations has declared 2005-2015 the International Decade for Actions, Water for Life and you can find details at <http://www.un.org/waterforlifedecade/index.html>*

## Climate Change

Climate Change is a change in the long term patterns of temperature and weather over the entire Earth. Although climate change has been under debate for decades, recent scientific research by hundreds of scientists and policy-makers has concluded that climate change is occurring at a fast rate (the group is called the Intergovernmental Panel on Climate Change (IPCC) check out [www.ipcc.ch](http://www.ipcc.ch)). Effects on water vary widely over the world but could include: more frequent droughts, more frequent local flooding and storms, loss of water bodies, and temperature changes in lakes and rivers (species that live in water are very sensitive to changes in temperature and many will not survive if water temperature increases by 1°C. This is a very big topic of study, so here are a few key links if you are interested in learning more:

[http://epa.gov/climatechange/kids/water\\_cycle\\_version2.html](http://epa.gov/climatechange/kids/water_cycle_version2.html) Animated kids version from the US Environmental Protection Agency illustrating how climate change affects the water cycle

<http://adaptation.nrcan.gc.ca/> : National Research Council of Canada's Climate Change Website. Includes info and curriculum tools.

[www.ipcc.ch](http://www.ipcc.ch): Intergovernmental Panel on Climate Change: You can find all their documents and summaries here.

<http://www.env.gov.bc.ca/air/climate/>: Canadian Government Page on Climate Change

## Contamination

Water contamination occurs when any chemical or object enters the water system which is not natural to the system. Most of the time contamination is talked about in terms of industrial pollutants, sewage, excess nutrients like nitrogen and phosphorous from fertilizers, and hormones from drugs. Sometimes it is caused naturally from natural disaster (i.e. volcanoes) or from added sediments from a flood. Some of the more serious types of water contamination that you may want to research:

**Heavy Metal Contaminants:** These include metals such as lead, arsenic, mercury and copper and they have a huge affect human health as well as ALL life forms. These contaminants get into water through industrial processes, infrastructure (like lead and copper piping in your home) and sometimes naturally. Canada has recommended amounts for each of these contaminants.

**Hormones:** from drugs & pharmaceuticals of many kinds. They enter the water systems often through sewage systems and have serious effects. For instance, many male fish may gain female characteristics when exposed to hormones, often found in sewage.

**Polychlorinated Biphenyls (PCB's):** A very famous set of chemicals due to their serious environmental effects on animals and humans. They are long lasting chemicals that accumulate in body fat and can have serious consequences to all life forms.

## Cost

How much should water cost? Or is water a human right that should be free for all? How much should industries pay? Can water be owned? These are some fundamental questions behind water resource issues and the distribution of water. Because the access and availability of water is not equal around the world, the buying and selling of water does occur. In Canada, everyone pays some sort of fee for their water, usually measured by a water meter or added on to taxes or rent. This cost allows for the government to treat the water and maintain the dams, pipes and other infrastructure needed for the water to reach your tap. In Canada, this cost is generally pretty low as water is essential to life and we have an abundance of it. However, industry also usually pays the same amount for their water. Because it is so cheap, often industries use it in large quantities. For an example read check out the Alberta Tar Sands or Alberta's Oil Industry:

"Alberta's oil companies use nearly half as much water as the entire city of Calgary, the province's commercial center, which has a population of almost a million." (New York Times, 2002.)

For a fun way of finding out about water cost & water meters in Canada go to: [http://www.toronto.ca/water/kids/story\\_of\\_water/html/costs.htm](http://www.toronto.ca/water/kids/story_of_water/html/costs.htm)

In developing nations, many countries do not have an abundance of water. Sometimes companies own the water reserves and distribute it only to those that can pay. This has some serious consequences in countries where people cannot afford to pay. See Privatization for more.

## Dams

Dams are man-made structures used to stop the flow of water from leaving a waterbody, usually in order to increase the capacity or amount of water stored in a lake or reservoir. By increasing the storage capacity and delaying the flow of the water, it can be used for other purposes such as drinking water or hydroelectricity. They may also be used to stop flooding in an area. Dams are a great benefit to communities and are often seen as a “green” way to produce electricity. However, dams have do have some negative biological and cultural effects. Particularly, large dams (usually greater than 10m in height) are sometimes known to cause serious effects. They stop the flow of nutrients and species (such as fish migrations). They usually change the normal flow of the stream, and change the temperatures and chemistry. Sometimes, large dam projects have forced the relocation of indigenous peoples. Examples include Alcan’s Kemano hydroelectric project in North-Central BC relocating the Cheslatta T’en First Nation in the 1950’s, and China’s Three Gorges Dam which will displace approximately 1.2 million people when completed.

## Drought

Drought is a period of time when there is inadequate rainfall and water to support the needs of the humans and the environment. It is a natural, reoccurring phenomenon in many regions. Drought is a serious problem to almost all countries in some way on a small scale. In BC, parts of Vancouver Island and the Interior are susceptible to drought. However, certain regions such as Sub-Saharan Africa and the Middle East are plagued by reoccurring drought. In developing nations, droughts can lead to food shortages, poor water quality causing disease, wildfires, increasing desert growth (called ‘desertification’), mass migration of people and occasionally war (as is the case in Sudan). Climate experts indicate that the frequencies of droughts may increase as the climate changes. This could cause serious problems for food production and water resources in many regions.

## Disease (Waterborne)

Waterborne disease is a common problem in areas of the world where there is improper treatment of drinking water and improper sanitation methods. 1.8 million people die from waterborne diseases every year (see [www.who.int](http://www.who.int) for more info). Diarrheal diseases, Cholera and Giardia are some of the most common diseases. Other diseases include parasites, nematodes and worms that inhabit water and infect people who drink and bathe there.

## Hydrology

Hydrology is the study of the movement, distribution and quality of water. Hydrologists study how water cycles through the earth (see **Water Cycle**) and look at the way **Watersheds** work. They study how precipitation interacts with the Earth, how it flows through the ground, on the surface and accumulates in lakes and other waterbodies.

## Hygiene

Hygiene, the act of cleaning yourself to maintain proper health, is an important daily routine. Proper hygiene requires water for bathing, washing yourself and your clothes, teeth, and other objects such as dishes and bedding. Without proper hygiene you become more susceptible to catching illnesses and disease. As stated under **Access**, over a million people do not have a safe, reliable source of water. Without adequate water, many people resort to less clean sources in an attempt to maintain hygiene. Often, these unclean sources carry waterborne illnesses and diseases and can lead to serious illness and death. In other cases, people do not practice proper hygiene. Lack of hand-washing for instance, can lead to the spread of disease through person to person contact, or contamination of food or water. In this sense, more vulnerable populations of people also have a higher rate of disease. Porrr sanitation is a third component to the problems of disease and hygiene.

2008 is the [International Year of Sanitation](http://esa.un.org/iys/). See <http://esa.un.org/iys/> for more details.

## Irrigation

Irrigation is the artificial addition of water to lands that would not naturally occur in a region. Irrigation has been used for thousands of years to increase agricultural crop yields. If you water your backyard garden or use a gigantic mechanized sprinkler system on a hundred acres of wheat, you are using a form of irrigation. Irrigation is famous for creating cropland in dry areas such as the mid-western United States where sunshine is plentiful, but rainfall is scarce. Although a huge benefit to society, long-term, large scale irrigation causes some serious problems.

One problem is the depletion of large underground waterbodies called aquifers. Aquifers were created over thousands of years (geological time periods) and have been depleted in tens of years. Another is soil salinization. Salinization is the process of making the soil extremely salty. All water contains some dissolved salt. If you over-irrigate an area, salt builds up in the soil when water evaporates or is used. Eventually the soil is too salty and plants can no longer live. In some cases, over-irrigated lands have become barren wastelands. A good book on the irrigation issue (among other issues) is Marc Reisner’s *Cadillac Desert*.

## Infrastructure

Infrastructure is the piping, holding stations and systems required to move water from its source to its destination. In North America, this mainly means large pipes to take it straight to your tap. Water infrastructure has to be created in a way to allow for the maximum anticipated usage and can be complicated! Learning about how water gets from source to tap can be an interesting project. Sometimes you can even visit your local watershed.

## Nutrient Loading

Nutrient loading is when too many nutrients, usually either nitrogen or phosphorous, enter a water body where they do not regularly occur. Nitrogen and Phosphorous exist in varying amounts in every waterbody, although only in small amounts. In a natural system, these two nutrients limit the amount of growth in a waterbody. Commercial fertilizers are mostly the application of these two nutrients and are used regularly in agriculture to increase crop production. Sometimes these nutrients also come from sewage. When excess fertilizer or sewage reaches waterbodies, usually via runoff, it adds these nutrients to the water and allows for more growth of the organisms in the water. Excessive plant growth can disrupt the natural ecosystem and sometimes cause a severe depletion of oxygen, killing fish and other species that require oxygen to live.

## Overuse

Overuse is a term that generally refers to the using a resource in a way that cannot be sustained over the long term. It is generally considered that the average North American uses more water than necessary and that industries often use far more water due to its availability and low cost. Currently, Canada is one of the of the countries that uses the most water per person. In a document created by the Organization for Economic Co-operation and Development, Canadians use 1,600 cubic metres of water per person per year. This is more than twice as much water as the average person from France, three times as much as the average German, and almost four times as much as the average Swede.

## Politics

There are many political issues surrounding water resources. In countries where there is not an abundance of water, restricting water between regions and countries can be used as a political move. The most famous examples of this are in the Middle East. For instance, Turkey has built a series of hydroelectric dams on the Euphrates River, preventing some of the flow from reaching Syria and Iraq. Many of these issues are well represented in the media which is a good place to start if you want more information.

## Sewage Treatment

Water treatment involves adding chemicals or using some kind of technology to make water safe for drinking. Treatment can include simply adding chlorine or iodine to water to kill the bacteria and microorganisms to complicated multi-process treatments in a water treatment facility. In Canada, larger communities have some type of treatment facility where all drinking water must be sterilized before it reaches the pipes that will take the water to your house. If you live in a rural area, there is a good chance that you may get your drinking water from your own well or nearby water source. In both cases there are guidelines dictating the levels of bacteria and organisms that can be found in the water and still be safe to drink. Form more information on drinking water Guidelines go to Health Canada's website [http://www.hc-sc.gc.ca/ewh-semt/pubs/water-eau/guide-recomm\\_e.html](http://www.hc-sc.gc.ca/ewh-semt/pubs/water-eau/guide-recomm_e.html) .

The most common type of disinfectant is chlorine. When applied correctly, chlorine can kill all harmful microorganisms and has few health concerns (Health Canada). Other types of similar treatments involve the use of ozone, chloramination (chlorine and ammonia), chlorine dioxide or Ultraviolet Radiation (UV rays) to sterilize microorganisms.

Approximately 1.1 billion people do not have access to adequate drinking water supplies. In many of these countries, water may not be treated, or the water may become contaminated by fecal matter before consumption. Many development agencies have studied and use treatment methods. Examples that you may want to explore include:

***boiling water:*** heat action kills organisms

***solar disinfection bottles:*** solar radiation and heat both sterilize and "cook"

***filtration and coagulation:*** (clumping of particles) systems

For an in-depth look at the treatment methods check out the World Health Organizations' website: [http://www.who.int/water\\_sanitation\\_health/dwq/wsh0207/en/index1.html](http://www.who.int/water_sanitation_health/dwq/wsh0207/en/index1.html)

## Women and Water

Women and water are very intricately linked in many nations. Primarily, women are the main suppliers and users of water in a household. Women and girls are often responsible for walking long distances to obtaining water for their family. Women use water in the home for cooking, cleaning, sanitation and in food production. Therefore, improving water availability and quality drastically improves the quality of life for some women. In recent years, this link between women and water has spurred on the need for women to become more politically involved in water resource issues.

The United Nations' (UN) Division for the Advancement of Women have completed a detailed study entitled Women and Water (2005), which discusses this issue in detail: see <http://www.un.org/womenwatch/daw/public/Feb05.pdf>

## Water Cycle

The water cycle is the movement of water through the Earth. Water falls as precipitation, passes through the ground, into streams, rivers, lakes and eventually either back into the atmosphere or into the world's oceans. This cycle of water is much more complex and can involve long delays (called residency) in lakes or in glaciers or sea ice. Hydrologists study how different parts of the water cycle works in different regions.

## Water Resource Types

Almost all Canadians have the ability to turn on a tap and voila! Water comes out! But where does that water come from? In Canada, it can come from a number several sources:

Lake/Reservoir: many places have a large lake or a dammed lake called a reservoir as their source of drinking water. There are many issues surrounding the access to reservoirs: in some communities you can visit, or even swim in them where others only provide restricted access in order to maintain water quality.

Groundwater: Groundwater is water that comes from underground sources. Underground, there is a point in the soil where there is an abundance of water. This is usually called the water table. Water sometimes sits in large pockets called aquifers for a long time. Wells are simply one way in which people have gained access to these groundwater sources. In Canada, almost 30% of the population gains its freshwater from groundwater.

River: Some communities use large rivers as their source of drinking water. The river has to be of significant size that it can meet the needs of the community on a year-round basis. Rivers that have a constant year-round flow are the best. Sometimes the same river used for drinking water is used for sewage as well!

## Watershed

A watershed is a physical boundary from which a water droplet will remain in as it travels through the **Water Cycle**. When a water droplet falls, it will be transported through the vegetation, the ground and on the surface until it either enters the ocean or evaporates or is used by life. Where that drop of water falls determines where it will go. Usually the tops of mountains are used to determine the boundary of a watershed and where water will flow. **Hydrologists** use the watershed to help calculate water balance (the amount of water entering and leaving a watershed). An interactive website that gives you a better idea of a watershed and its functions can be found at <http://www.watersheds.org/kids/index.htm>.