

1.0 Humans depend on water supply and quality.

Living systems need water to survive. Ecosystems depend on it. The land is changed by it. Industry uses large amounts of it. Climate and weather are determined by it.

Our 'blue planet' – as viewed from space - is unique among the planets in our solar system, because 74% of its surface is covered by water.



1.1 The Distribution of Water on Earth

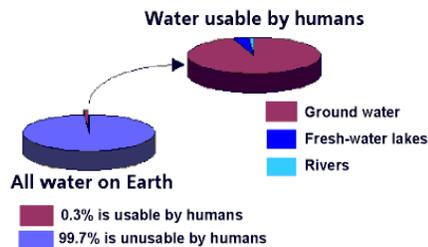
The water on our planet exists in many different forms and is evenly distributed over the entire planet.

Drinking Water For Humans

Drinking water must be fresh water, not salt water. Not all freshwater on the Earth is drinkable. Water that is drinkable (safe to drink) is called **potable** water.

Water On Earth

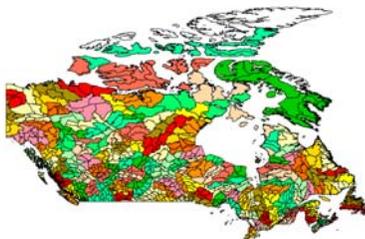
To put this into perspective.



Water source	Model	% of Earth's total water	Potable, or not?
Oceans		97.24%	Saltwater
Icecaps, Glaciers		2.14%	Frozen
Ground water		0.61%	Fresh - but not entirely accessible
Fresh-water lakes		0.009%	Potable
Inland seas		0.008%	Saltwater
Soil moisture		0.005%	Indirect access
Atmosphere		0.001%	Indirect access
Rivers		0.0001%	Potable

A **watershed** (also called a drainage basin) is a region of interconnected rivers and streams.

Watersheds In Canada



Canada has 9% of the world's freshwater.

Watersheds In Alberta



A reservoir is an artificial lake. It is used for storage and management, because many of the larger populated centers in Alberta are far from major river systems.

1.2 Water Quality

Water quality describes how pure (clean) the water is. Water quality can be measured by the types of substances that are found in it; including living organisms, organic material, minerals and other chemicals. Check out the source to tap story that traces the movement of water in the environment: <http://www.ccme.ca/sourcetotap/story.html>

Substances Dissolved In Water

Many different substances can be present in water. Most substances that are found dissolved in water are **salts**. The most common salt is sodium chloride (table salt). The total amount of **all salts** found in water is called **salinity**. Saltwater (found in oceans) has a higher salinity (average of 3.5%) than freshwater.

Hard Water

Water described as "hard" is high in dissolved minerals, specifically calcium and magnesium. Hard water is not a health risk, but a nuisance because of mineral buildup on plumbing fixtures and poor soap and/or detergent performance.

Organisms In Drinking Water

Fresh water contains organisms and organic matter, some of which are harmful and some which are not. **Escherichia coli** (**E coli**) is a type of microscopic bacteria that can cause sickness and even death.

Water Quality Testing

Water that comes from deep below the ground is protected from pollutants. However, most cities and towns get their drinking water from surface water sources (lakes and rivers). The water they use needs to be filtered and treated with chemicals.

Water Testing Criteria

Just looking at water in a glass will not tell you if the water is safe to drink. Smelling it may give you additional information – like it may contain **hydrogen sulphide** (which is harmful to humans) giving it a rotten egg smell. Ocean water is very clear, but cannot be consumed because of its high salinity.

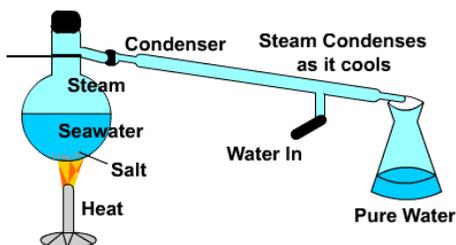
Some of the things to test - to determine water quality - are:

- *Taste and odour*
- *Turbidity (cloudiness) and colour*
- *Toxic substances and other pollutants*
- *Bacteria*
- *Hardness or mineral content*
- *pH (how acidic or basic the water is)*
- *Dissolved oxygen level*
- *Suspended solids (including those floating)*
- *Dissolved solids*

Changing Salt Water to Fresh Water

There are two common processes that can change saltwater into freshwater. These processes are distillation and reverse osmosis.

Distillation - a process in which a liquid or vapour mixture of two or more substances is separated into its parts, by the application and removal of heat.



Reverse Osmosis – forces saltwater through a filter (membrane) allowing water to pass but not salt.

