

**Lesson
Three**

What is the Water Cycle?

Aims

In this lesson we are going to learn:

- how water travels around our world flowing from place to place
- that water may also stay in one place where it is stored
- that humans need water and have to interrupt the water cycle in order to get enough
- that water needs to be cleaned before we can use it and then again before we return it to the water cycle

Context

Water moves from one place to another and is necessary to all living things to allow them to survive.



Oxford Open Learning

The Water Cycle?

Get a glass of water and put it on the table next to you. Now – can you guess how old it is?

The water in your glass may have fallen from the sky as rain just last week, but the water itself has been around pretty much as long as the earth has!

When the first fish crawled out of the ocean onto the land, your glass of water was part of that ocean. When the Brontosaurus walked through lakes feeding on plants, your glass of water was part of those lakes. And you thought your parents were OLD!

The earth has a limited amount of water. That water keeps going around and around and around and around and (well, you get the idea) in what we call the "Water Cycle".

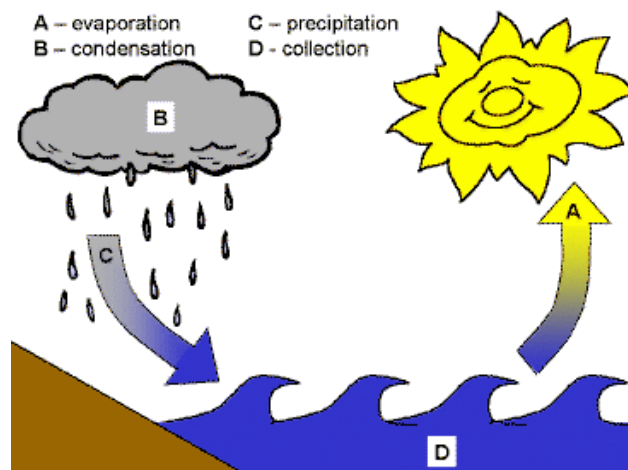


Log on to Twig and look at the film titled **Water Cycle**.

www.ool.co.uk/1161gq

All water on planet Earth is constantly cycled from the atmosphere, into reservoirs, and through plants and animals. The Earth's water has completed this cycle around 8 million times.

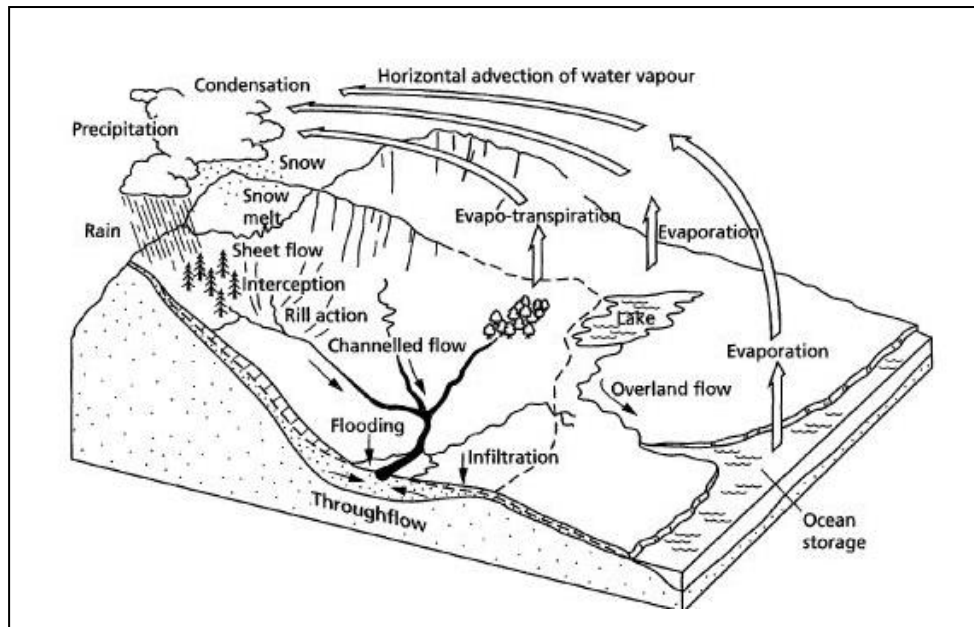
Exploring the water cycle



Stage A

The first stage of the water cycle is when moisture from the sea, soil and plants is lifted into the **atmosphere**. As the sun beats down it warms the oceans, rivers and lakes. This causes the water to rise into the air as **water vapour**. This process is known as **evaporation**. Some moisture is also released from trees and plants, similar to humans sweating.. This is known as **transpiration**.

Stage B



As the water vapour rises in the atmosphere, it cools and **condenses**, forming clouds. This process is known as condensation. It is the same process that makes you see your breath on a cold winter morning.

Stage C

The clouds will then produce rain or snow (known as **precipitation**) which returns to the Earth's surface as water.

Stage D

The final stage is collection. Only about three quarters of the rain that falls back to Earth lands in the oceans. The remaining water makes only a slow return to the oceans. Most is locked up in glaciers and icebergs and can take several thousands of years to complete its cycle.

The remaining water runs slowly overground, seeps into the ground or is taken up by plants as the cycle begins again.

Looking in a bit more detail:

This gives you the basic idea but there are a number of geographical **processes** (actions that change the way things are) we have not mentioned.

Precipitation for example needs a bit more explanation. Rain and snow have already been mentioned. But precipitation is any form of water, such as rain, snow, sleet, or hail, that forms by condensation of water vapour in the atmosphere.

When water has been precipitated in whatever form, a number of things can happen to it. It could become trapped in trees for example (**interception**) it could fall to earth and run down hill (**overland flow**) to a river, and by the river back to the sea (**channel flow**). It can soak into the ground (**infiltration**) and run underground to reappear as a spring (**throughflow**).

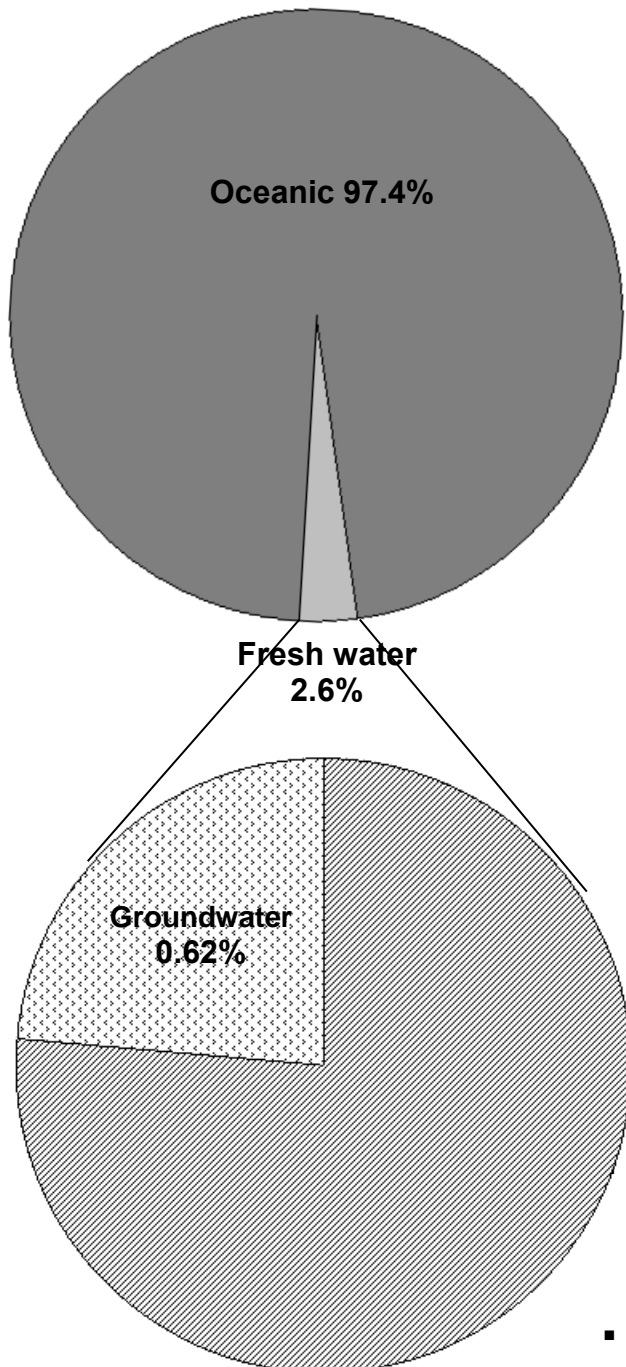
These last four, overland flow, channel flow, infiltration and through flow, you will not be surprised to know are called **flows**.

However, some of the water in the water cycle can be **stored** in glaciers, lakes or even in rocks and can be there for weeks or months or years! But we will talk about this a bit more later.

Activity 1

Get some practice with these new terms. Check out (in the parental guidance for this module) how to play a Zondle game or two!

People and the water cycle



People need fresh water to survive. They need it for drinking, for growing crops and for the animals they rear for meat, milk and eggs and so on.

Globally, with 70% of the planet covered in water, it is hard to imagine that there may be problems with the world's water supply.

But as you can see, the oceans contain over 97% of all the water but this is salty and therefore, in that form, is useless to land living organisms who will be poisoned by too much salt.

Then you see nearly 2% of what remains is locked up in ice, leaving just 0.62% in the ground, in the lakes and rivers. This is the only water we can use and much of that is not really easy to get at. The only way we can get it is by breaking into the water cycle, for example:

We can catch the rain/river water and store it behind a dam in a reservoir

- We can get it from water stored in the rock under the ground via wells and bore holes.

We mentioned earlier that water is stored in various places, and the rocks were one such location. There was also passing mention that water could be stored for some time. As we use up the water stored in rocks faster than it is being replaced, we have to drill deeper boreholes.

The deeper we go, the longer the water we bring up has been in the rocks. The water may have been in the rocks for 100s or even 1000s of years.

We said before that saltwater and land organisms do not get along, but there is a way of obtaining fresh water from salt water which is safe. The process is called **desalination** but it is very expensive as it uses lots of electricity to achieve it.

Activity 2

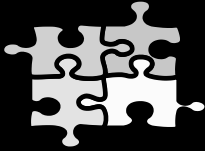
In the UK each person uses an average of 150 litres of water a day. Keep a tally to show how much water you use in one day.



	Number of times	Total litres
Having a bath - 80 litres		
Having a shower - 40 litres		
Brushing teeth - 1 litre with tap running		
A mug of tea or glass of squash - 0.25 or 1/4 litre		
Washing hands - 3 litres		
Toilet - 7 litres		
My share of family water - see below		
Anything else you want to add?		
	Total litres	

Family Water	Number of times	Total litres
Washing up - 12 litres		
Dish washer - 25 litres		
Washing machine - 55 litres		
	Total litres	
÷ number of people in the house - put this number in the highlighted box above		

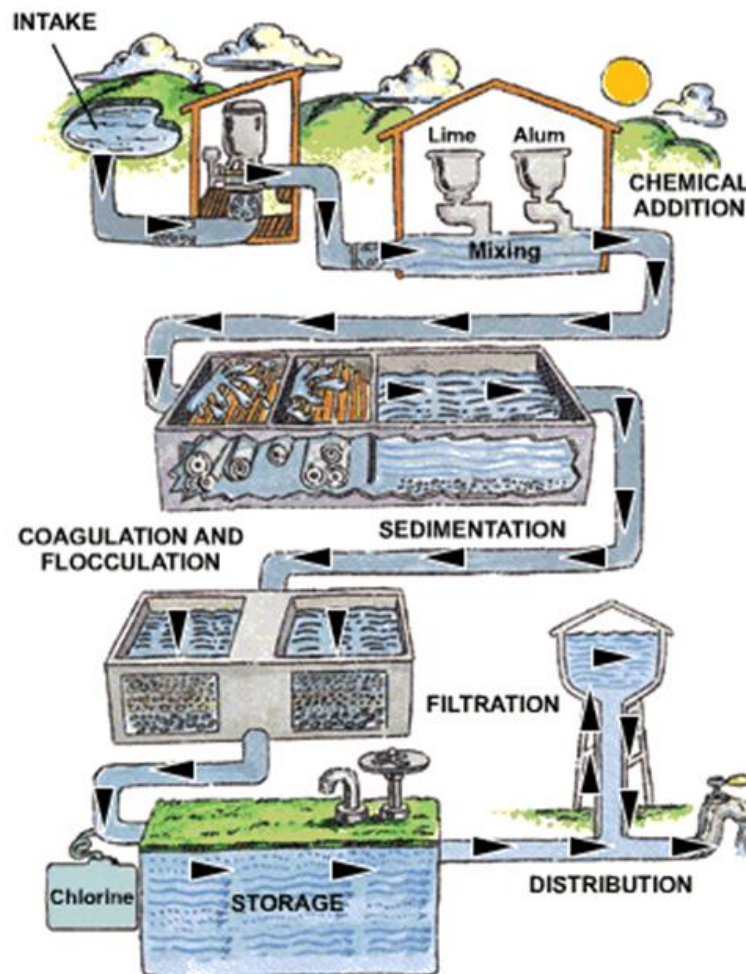
Something to think about



The United Kingdom uses about 25 litres more per person per day than Germany or Belgium. Can you think of ways that you could reduce your family water use?

Safe to drink

Before we can use any water, we need to be sure it is safe to drink. Fresh water sounds safe but is merely means that it is salt-free. The water we use needs to be **potable**, i.e. fit to drink and cook with, without causing harm or transmitting diseases. If animals die in the water or are sick or chemicals are spilt in the water, it is not potable. We need to clean it before we use it.



Water is taken from a reservoir or river. First of all the water passes through a sieve where all the debris such as twigs, leaves and floating rubbish is removed. Then chemicals are added that combine with smaller unwanted particles to form **floc** which sinks to the bottom (**sedimentation**). Next water passes through the **filtration** plant, this is gravel and carbon that removes any remaining small particle together with chemicals such as pesticides. There could still be living germs and it is the **chlorine** that kills them. The water is then stored before it is piped to your homes.

Once we have ‘used’ the water, we have made it dirty. Using it could involve washing clothes, having a bath, washing down a drain after a rainstorm, uses in a factory or being drunk by you before you leave it in a toilet. So it needs to be cleaned in a similar way to methods used to make it potable, before it is returned to a river or the sea, otherwise it might poison the living things.

The Water Cycle and People in other parts of the world

We are fortunate in the United Kingdom. We have taps indoors and potable water indoors whenever we need it. We have toilets that flush away our waste, which is safely taken care of, and does not make us or anyone else ill.

Do you know how many people there are in the world? It reached 7 billion in November 2011 and it is still climbing. Because people are being born and dying all the time, we do not know *exactly*, but there are websites that that keep a running guess.

Try this one: <http://www.worldometers.info/world-population/>

800 million out of that 7 billion (that is 1 person in every 9) does not have access to clean water.

2.5 billion (1 in 3 people) live without adequate sanitation, that is, they do not have any proper toilets.

What does this mean? People have to get water from rivers and lakes where the water has not been checked for germs. If there are no proper toilets, then people have to go to the

toilet outside. This washes into the water and spreads germs and diseases like cholera.

Lots of organisations are trying to help as many people as possible to get clean water and proper toilets. One is Water Aid (<http://www.wateraid.org/uk/>). Practical Action works in this area too (<http://practicalaction.org/water-and-sanitation-14>).

Investigate!



Using either the links to Water Aid or Practical Action or any other source of information, find out what Aid Agencies are doing to help provide clean water and sanitation and where. Here is a world map where you can shade and name the countries you have found out about.



Activity 3

Get some practice with these new terms. Have a go at the Zondle quiz. Go to <http://oxford-homeschool.wikispaces.com/Year+7> , remember to log in with user name OxfordHS and password homeschool and try Lesson 3 Activity 3.

In this lesson you have learnt

- that in the Water Cycle, water has been going around almost since the birth of the Earth and that the total amount does not change.
- that water is not always in the state that people need for life (it may be salty or part of an ice cap or dirty)
- that it is possible to clean water so that it is potable (safe to drink)
- that once we have used the water for any purpose, we need to clean it before we return it to the natural environment.