

THE WATER CYCLE

KEY TERMS

Water cycle:

A continuous loop describing the movement of water from the atmosphere to the earth and back again.

Precipitation:

Gaseous water condensing to form a liquid (such as rain).

Evaporation:

A substance turning from liquid to a vapour (gas).

Evapotranspiration:

The transfer of water from the Earth's surface to the atmosphere through both evaporation from soil and other surfaces and plant transpiration.

Groundwater:

Water that completely fills the spaces between soil and rock particles beneath the ground.

The **water cycle** describes the movement of water from the atmosphere to the earth and back again. Water can exist as clouds, rain, hail, snow or as fog; at the surface as river water, in the ocean, as steam, in living things and underground as groundwater.

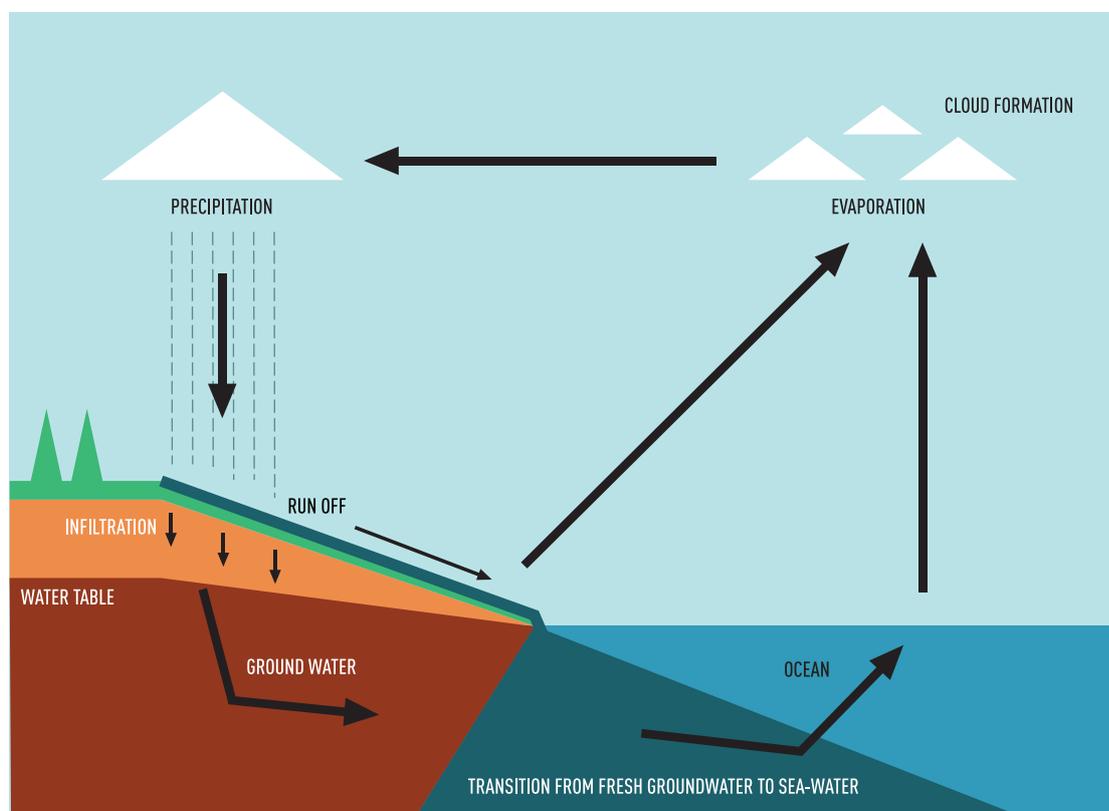
Water in the atmosphere falls to the Earth's surface as **precipitation**. Not all precipitation over land reaches the surface, with some evaporated as it falls and some intercepted by vegetation.

Evaporation occurs when energy from the sun changes the liquid water into a vapour and the vapour rises back into the atmosphere above the earth's surface. Evaporation occurs from rivers, creeks, lakes, dams, ponds and the soil, with the majority occurring in the ocean.

Water that does reach the earth may also be evaporated through the process of **evapotranspiration**. This is the sum of water evaporated from vegetation and soil surfaces and the water taken up by plants and transpired back through the vegetation as part of the growth cycle.

After rain or precipitation falls on the ground, water which does not evaporate or run off into creeks and rivers can infiltrate down into the soil and rocks that are underground. This forms groundwater.

FIGURE 1.1 THE WATER CYCLE



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SURFACE WATER

KEY TERMS

Freshwater:

Fresh water is generally characterized by having low concentrations of dissolved salts and other total dissolved solids. The term specifically excludes seawater and brackish water.

FUN FACT

The deepest point in all the oceans is in the Mariana Trench of the Pacific Ocean. The ocean floor is around 11 km below sea level at this point. That is a lot of water!

What is Surface Water?

When we think about water, most people think of the water they can see at the earth's surface. Most likely, the first image that pops into your head will be that of a tap or shower with running water.

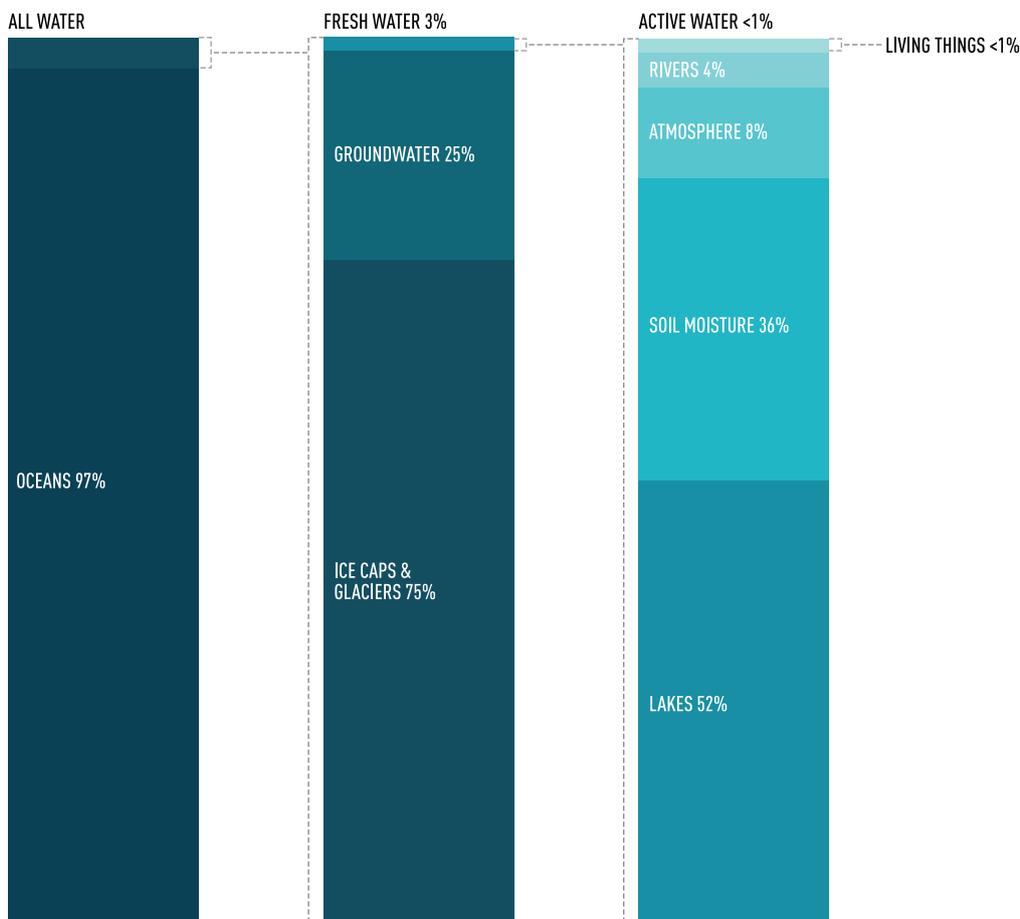
Most Australians are familiar seeing water in the ocean when we stand at the beach and water flowing in rivers and creeks. Most of us are used to some rainfall. In some parts of Australia, there is not a lot of rainfall. When rainfall is low, the dams that hold town and city water supplies also become low. In other parts of Australia there are times of the year when cyclones and large storms bring high rainfall, and many communities have to deal with flooding of the land.

Water is also found at the earth's surface frozen as polar ice caps at the South and North Pole and as glaciers. Glaciers are like a frozen river of ice and flow very slowly.

At the Earth's surface, some water is salty, like the water in the ocean. You certainly wouldn't drink it! Other water sources are fresh, such as that in a river. Perhaps you wouldn't drink that either but wildlife and stock such as cows and sheep drink from rivers, creeks and dams all the time.

Approximately 97% of water on Earth is found within the oceans (Figure 2.1.1). Of the world's **freshwater**, approximately 75% is frozen in ice-caps and glaciers, while approximately 25% is stored as groundwater. Fresh water at the Earth's surface and in the atmosphere is known as active water. Surface water represents less than 1% of the world's fresh water.

FIGURE 1.2 RELATIVE PROPORTIONS OF THE WORLD'S WATER



1 OUR WATER RESOURCES



SURFACE WATER

KEY TERMS

Isohyet:

A line on a map connecting points that have the same amount of rainfall in a given period.

Where is surface water located in Australia?

Australia is the driest inhabited continent on the planet. This may explain why it is also the least populated. All living things on earth require water for life. In Australia water is hard to come by. Freshwater is considered a renewable resource because it continually replenishes itself by way of rainfall.

However, in parts of Australia average rainfall is low and evaporation is high. Surface water is scarce and people have to take measures to carefully plan the use and long term management of freshwater. Its use needs to be sustainable – that is, humans have to use freshwater in such a way that there is enough to meet the needs of the present and enough left over for use in the future.

FIGURE 1.3 MEAN ANNUAL RAINFALL AUSTRALIA(MM)

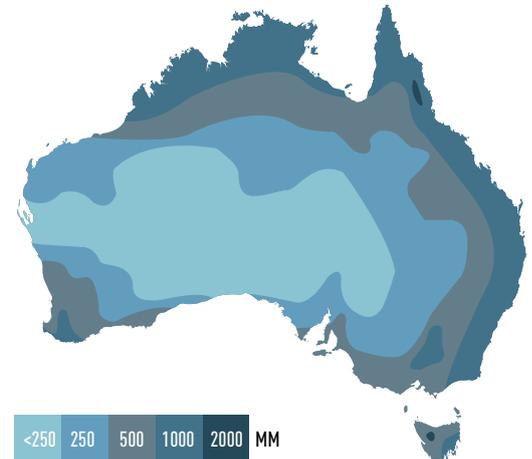


FIGURE 1.4 VARIATION IN RAINFALL FROM THE ANNUAL AVERAGE IN ANY GIVEN YEAR

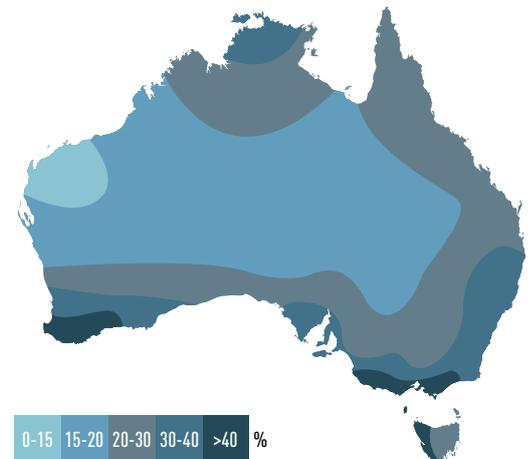
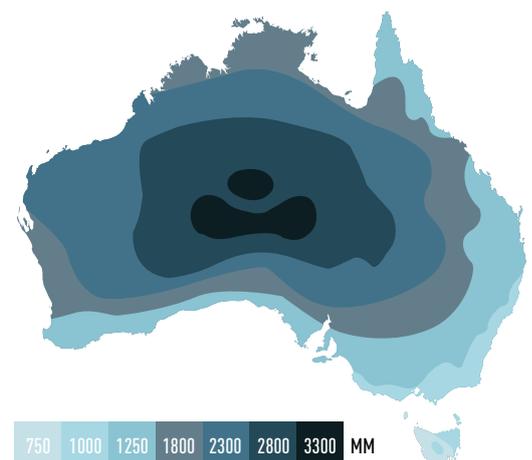


FIGURE 1.5 ANNUAL EVAPORATION IN AUSTRALIA



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GROUNDWATER

KEY TERMS

Groundwater:

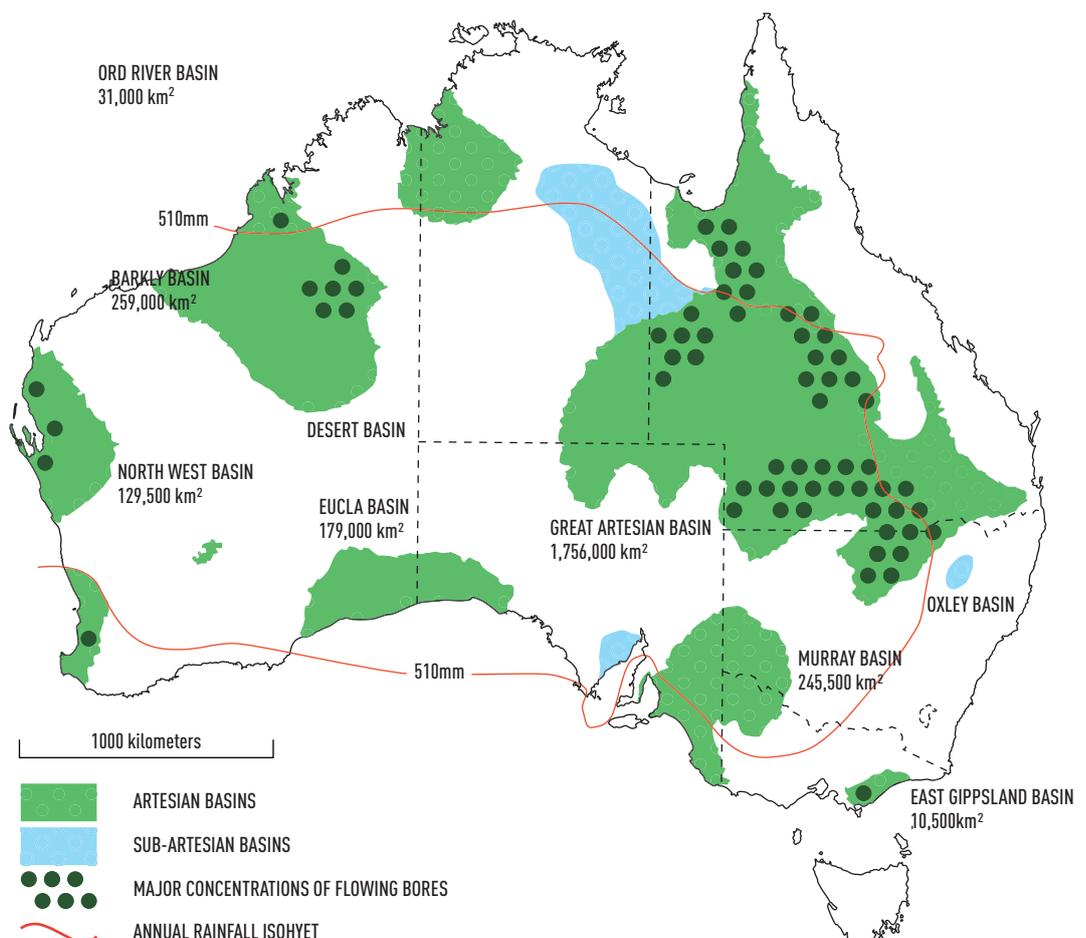
Water that completely fills the spaces between soil and rock particles beneath the ground

A hidden and important resource.

Water that does not run off into creeks and rivers or that is not evaporated infiltrates the ground under the force of gravity. This water, which is now below the ground surface will move through loose soil, sand, gravel (unconsolidated materials) and fractures in hard rocks (consolidated materials). Even in clay and solid rock, water may enter but will move very slowly. This is called **groundwater**. Groundwater is a popular water supply because large storages underground can store water for use during droughts and dry seasons.

Water under the ground can be pumped up to the surface and tapped for use by humans for a variety of purposes. If groundwater is unpolluted, it can be cheap to develop and often groundwater is less affected by catastrophic events. In Australia approximately 15 percent of our drinking water comes from groundwater, serving three million Australians.

FIGURE 1.6 MAJOR GROUNDWATER BASINS IN AUSTRALIA



Note: There are many other smaller groundwater resources in Australia – this is major basins only



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