

10

Water



What

you will learn

Water

Where do we get water?

Water Pollution

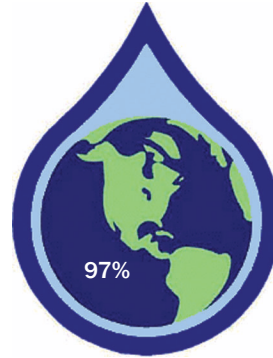
Pure Water

Water

About four-fifths of the Earth's surface is covered with water. More than 97% of the water found on the surface of the earth is in the oceans. The oceans contain salt water. Where do you think we get water?

Before reading any further just think for a while and write down as much as you can write, about water.

Hint: Use your senses to start with.



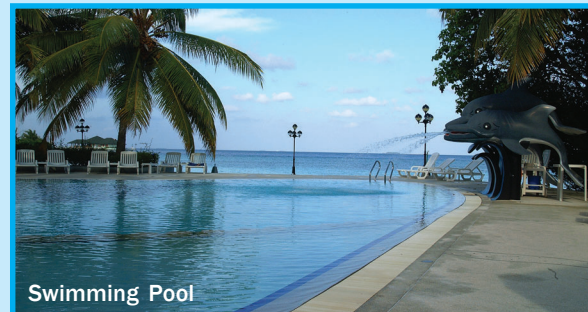
Ice berg



Swamp



Waterfall



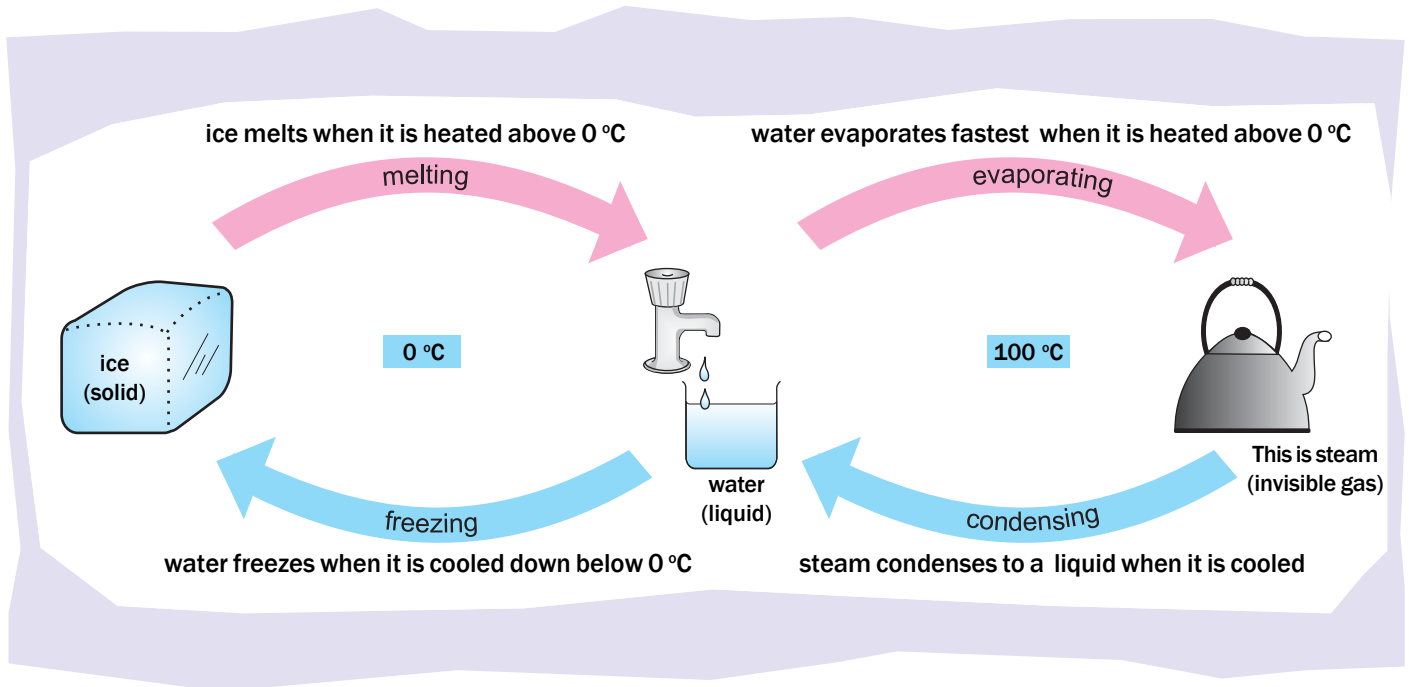
Swimming Pool

Do you Know?

The world's fresh and salt water lakes contain about 180,000km³ of water or 0.01% of the Earth's water resources.

Water

Water is usually found as a liquid, but it can also be found as a solid and a gas. The solid is called ice. Steam and water vapour are names used for the gas.



0°C is called the **melting point** of ice. It is also the **freezing point** of water! 100°C is the **boiling point** of water. Water evaporates quickly when it is boiling at 100°C. It can also evaporate at lower temperatures. But then evaporation is slower.



- 1 Write down the ways water is useful to us.
- 2 How do you get water?
- 3 How can you save water?



Ideas

⇒ Most of the Earth's surface is covered with water.

⇒ Water is found in three states. Solid, liquid and gas.

Where do we get water?

- List down the ways you get water in your house.

Probably the two main sources would be rain and ground water in our country.

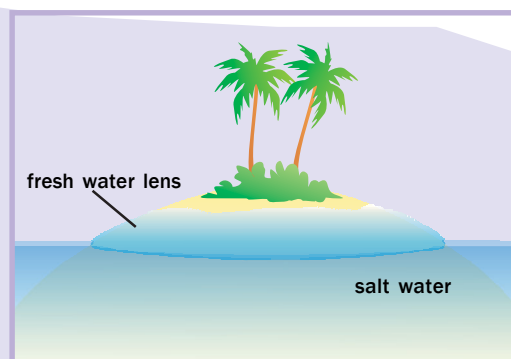


Ground water

Ground water comes from the ground. Since the sea surrounds our islands, the seawater seeps into the ground. When rain falls on the land the fresh water, too, seeps into the ground. It settles on top of the salt water. Fresh water is lighter or less dense than salt water. Therefore the fresh water stays on top of the salt water and forms a **fresh water lens**.

We dig wells to take out fresh water. The water taken from the ground may have some taste due to the minerals dissolved in it.

In Male', people take a lot of water from the ground. The amount of rainfall is not enough to replace the amount of water that is being taken. Therefore the amount of ground water is becoming smaller and smaller. Many people are now forced to use salty water. Desalinated seawater is now being pumped to all the houses in Male'.

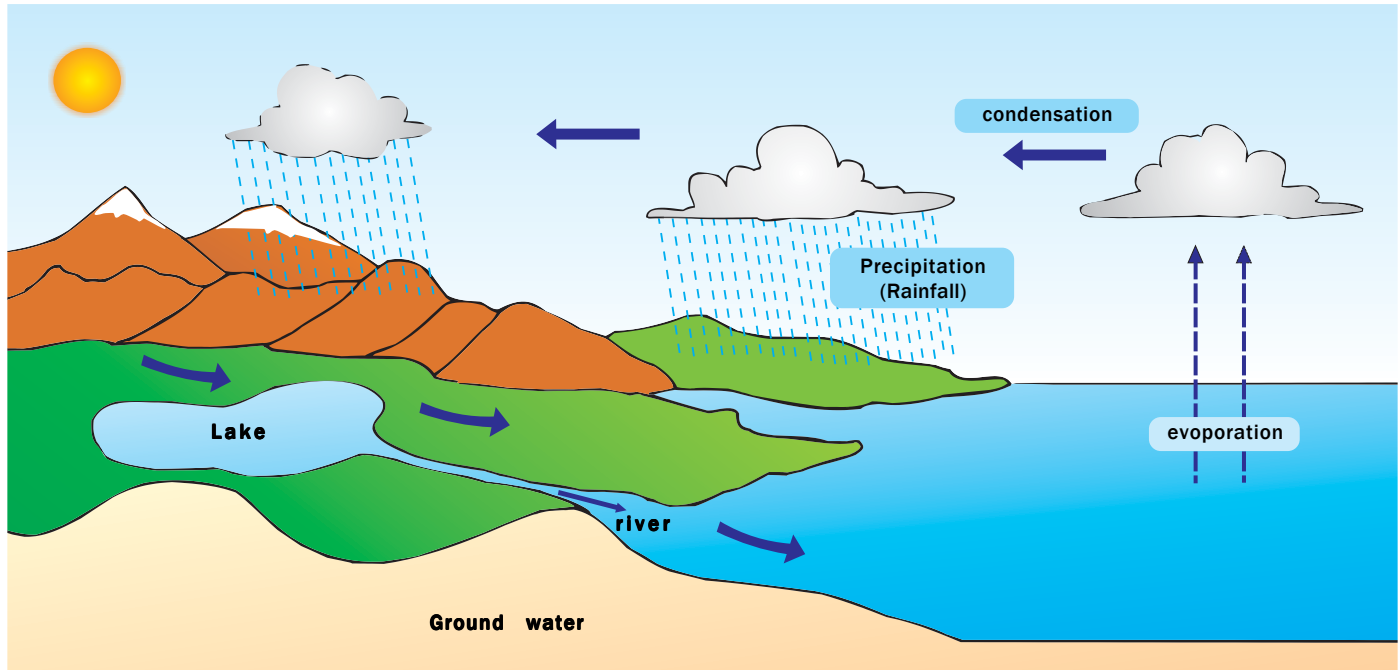


Do you Know?

The shortest river in the world is the North Fork Roe River, located near the Great Falls of Montana, USA – it is only 17.7m long.

It's a cycle!

Have you wondered why the ground water supply does not run out quickly? It is because the used and unused water gets recycled. This happens in a cycle called the **water cycle**. There are three main events in the cycle.



Heat from the sun **evaporates** the water from the seas, oceans and ground. The water vapour rises, cools and **condenses** to form tiny droplets of water. These droplets form clouds.

The wind carries the clouds. When the air cools, the tiny droplets of water join to form larger drops. These fall as rain.

Some rain water seeps into the ground to form ground water. Some flows along the ground to form streams and rivers. These flow back into the sea. The water evaporates again from the seas and rivers. The cycle then repeats.

🔑 Ideas

☞ Rain and ground water are the two main source of water in our country.

☞ In Male'ground water is becoming contaminated with other minerals and water is very salty.

☞ Water cycle is the process by which we get water.



- 1 Discuss and write down the ways how you can improve the ground water.
- 2 Write down in your own words the events or stages of water cycle.

Water Pollution

Water is not always as clean as it should be. Harmful substances called water pollutants are constantly being released into water mainly by human activity. These activities include direct discharge of waste matter into the seas and oceans. In our country although we don't have industrial discharge, a lot of municipal waste is dumped into our seas and oceans.

At present, the signs and consequences of human activity can be found everywhere on the Earth.

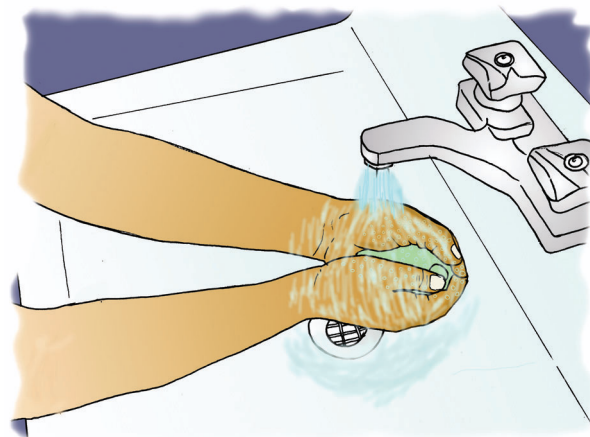


✦ Sources and effects of marine pollution

TYPE	SOURCE	EFFECTS
Nutrients	Excess from forestry, farming and other land use. Also airborne nitrogen oxides from power plants, cars etc.	Increase algae growth. Rotting of algae reduces oxygen, which would kill other marine life.
Sediments	Erosion from mining, forestry, farming, coastal dredging	Slowdown photosynthesis below surface waters, block gills of fish
Pathogens	Sewage, livestock	Contaminate (pollute) coastal swimming areas and seafood, spreading cholera, typhoid and other diseases.
Oil	Cars, heavy machinery, industry, oil tanker operations, shipping, accidents at sea	Kill larvae and cause disease in marine life. Oil slicks kill marine life
Plastics	Fishing nets, cargo, cruise ships, beach litter, wastes from plastic industry	Discarded fishing gear continues to catch fish. Plastic waste trap marine life or is mistaken for food. These may remain as long as 200 to 400 years.
Radioactive substances	Discarded nuclear submarine, military waste, industrial waste	Can enter food chain and cause disease in marine life and people.
Noise	Super tankers, other large vessels and machinery	Can be heard thousands of kilometers away under water. May stress and disrupt marine life.

✦ Hard or soft?

Some of the ground water we get in our islands are hard. It feels no different from a pool of soft water. But you notice the difference when you try to wash your hands with soap. If the water is hard you need a lot of soap to get a lather, and scum forms round the edge of the container you used. If the water is soft you can get a good lather with little soap and no scum forms.



✦ How does water become hard?

Water become hard due to the presence of two minerals - calcium and magnesium. When soap is added to hard water the soap combines with calcium ions to form a greasy scum. The formation of scum wastes soap and makes it more difficult to make things clean.



✦ How can hardness be removed?

Boiling is an inexpensive way of softening water and it does not remove all the hardness.

Find information on another ways of removing hardness of water!

✦ Ideas

- ✦ Pollutants are constantly being released into water mainly by human activity.
- ✦ Water becomes hard due to the presence of calcium and magnesium ions.
- ✦ Some of the ground water we get in our islands are hard.
- ✦ Boiling is one method of softening water.



- 1 Think of ways of reducing marine pollution and present your ideas to the class.
- 2 How can you show that water is hard or not?

Pure water

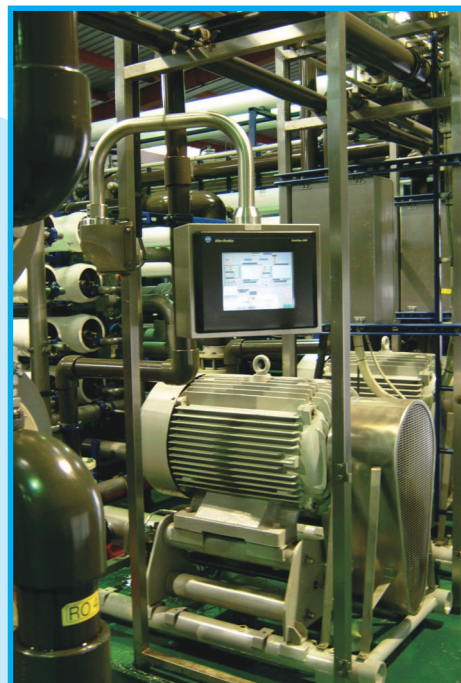
A safe water supply makes a huge contribution to our health.

- Name some water borne diseases.

Typhoid, cholera, dysentery can be spread if untreated sewage contaminates drinking water. According to world Health organization about 80% of all known diseases are related to water. Water can carry tiny living things called germs which cause diseases.

Hard water when used for drinking for long periods can lead to stomach disorders. Especially hard water contains magnesium sulphate which can weaken the stomach permanently.

This is particularly important for people living in the islands other than Male' where some of the sewage goes directly into the ground and people drink well water from a nearby well.



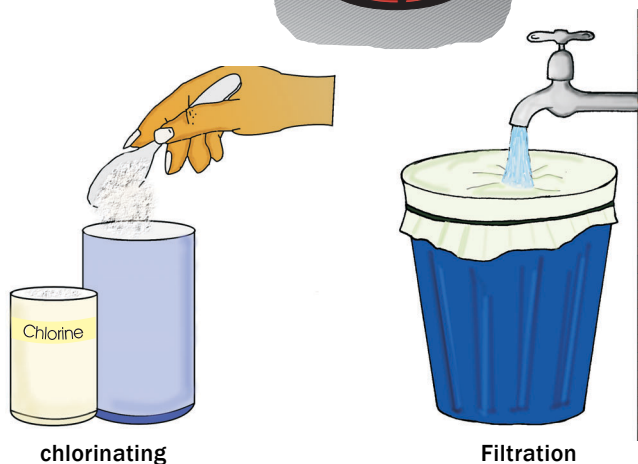
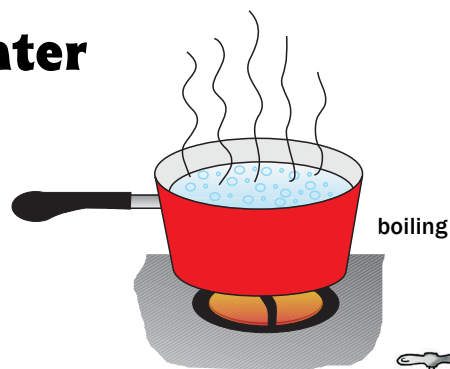
Part of water treatment plant

✦ Removing impurities from water

Impurities are substances which pollute the water making it dirty and unsafe to drink.

We can remove some impurities using some methods we already know:

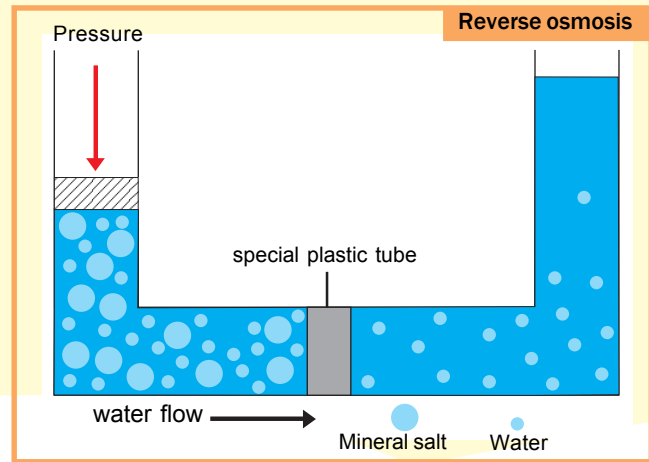
- Filtration – to remove solid substances
- Distillation – to remove dissolved substances
- Boiling – to kill some germs (but not all)
- Adding chemicals like chlorine – to kill most germs.



Desalination of sea water

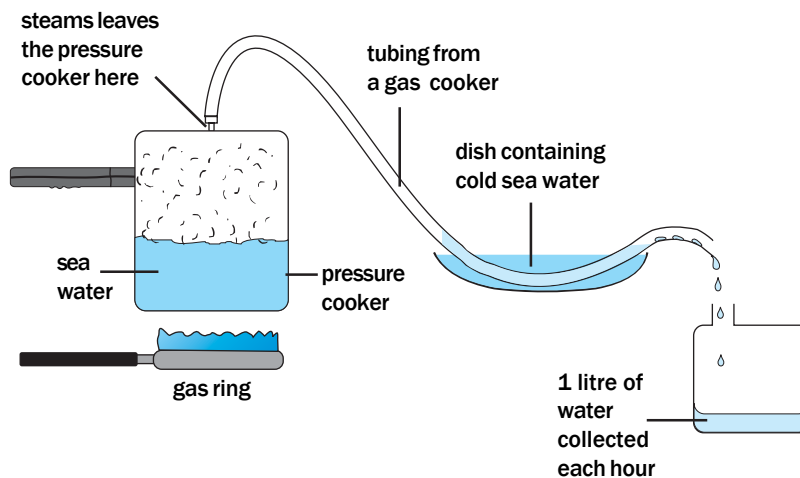
Sea water has mineral salts dissolved in it. Common salt or sodium chloride is the main salt present. Removal of salts from sea water is called desalination.

There are about ten different methods of desalination. In Maldives two methods are being used: simple distillation and reverse osmosis.



Distillation

Distillation process can be used to get fresh water from seawater. In distillation, the water is evaporated and then the steam is condensed. Distillation is not normally used to get drinking water from sea water. It is very expensive because it uses up so much energy. It is only used on a large scale in countries like Saudi Arabia where water is in short supply and energy is cheap.



Key Ideas

- Drinking pure water is necessary to stay healthy.
- Impurities in water can be removed by filtration, distillation, boiling and adding chemicals.
- Desalination is the method used to remove salt from sea water.



- 1 Why does distillation produce pure water from sea water?
- 2 Do you know what method is used in Maldives water supply and Sewerage Company? Try and get information from them.

IBN AL-NAFIS

1213 - 1288 C.E



His name is Allauddin Abul-Hassan Ibn Hazam Al-Qureshi Al-Damashqi Al-Masri. He was born in 607 A.H. of Damascus. He was educated at the Medical College-cum-Hospital founded by Nural Din Zangi. Apart from medicine, Ibn al-Nafis learnt jurisprudence, literature and theology.

After acquiring his expertise in medicine and jurisprudence, he moved to Cairo where he was appointed as the Principal at the famous Nasri Hospital. Here he trained a large number of medical specialists, including Ibn al-Quff al-Masihi, the famous surgeon. He also served at the Mansuriya School at Cairo.

His major contribution lies in medicine. His approach comprised writing detailed commentaries on early works, critically evaluating them and adding his own original contribution. His major original contribution of great significance was his discovery of the blood's circulatory system, which was re-discovered by modern science after a lapse of three centuries. He was the first to correctly describe the constitution of the lungs and gave a description of the bronchi and the interaction between the human body's vessels for air and blood. Also, he elaborated the function of the coronary arteries as feeding the cardiac muscle (heart muscle).

He was devout and it was said, that before his death, some of other physicians said to him, "Why don't you have some alcohol to help you out of this disease? And he said, "No, I can not meet God the Compassionate, with a drop of alcohol in my body". He died in Cairo at the age of 80, in 1288 and gave all his wealth and books and belongings to Mansuriya Hospital.