



# Water treatment

## Resource sheet 1

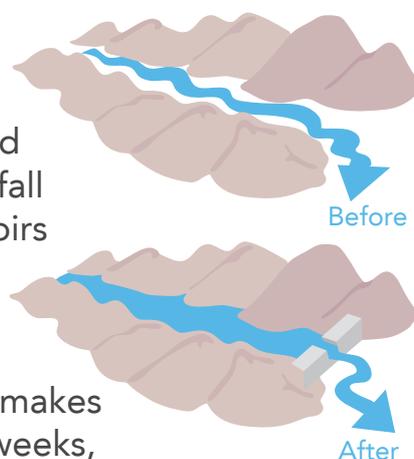
### How is water collected for us to use?

**1** It is easy to turn on the tap to get clean water, but a lot of things have to happen to allow us to do that.

First of all, water has to be taken away from its natural cycle.

Most of the water used today is collected and stored in man-made or natural lochs called reservoirs. Rainfall is highest in hilly areas, so this is where most reservoirs are.

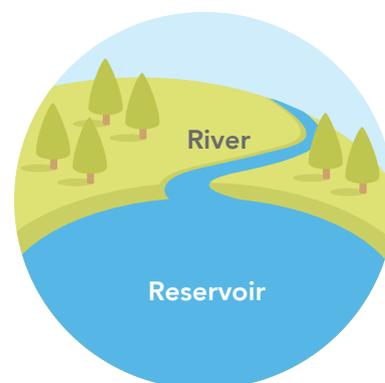
Reservoirs are made by building a dam across the upper part of the river. The water then collects and makes a huge loch. So, even if it does not rain for several weeks, there will still be water available.



**2** The dam has to be made of very strong, thick concrete to hold back the huge amount of water behind it. The amount of water flowing through the dam is controlled by opening and closing valves.

The Scottish Environment Protection Agency (SEPA) set minimum compensation flow rates from the dam to protect the environment such as fish, wildlife and plants downstream.

The water in the reservoir needs to be cleaned before it is ready for us to drink. The river has carried lots of bits of grit and dirt down with the water. Some of this grit and dirt will sink to the bottom of the reservoir as silt. This happens because the water in the reservoir is deep and still. The rest is removed at the water treatment works which makes the water clean and safe to drink.





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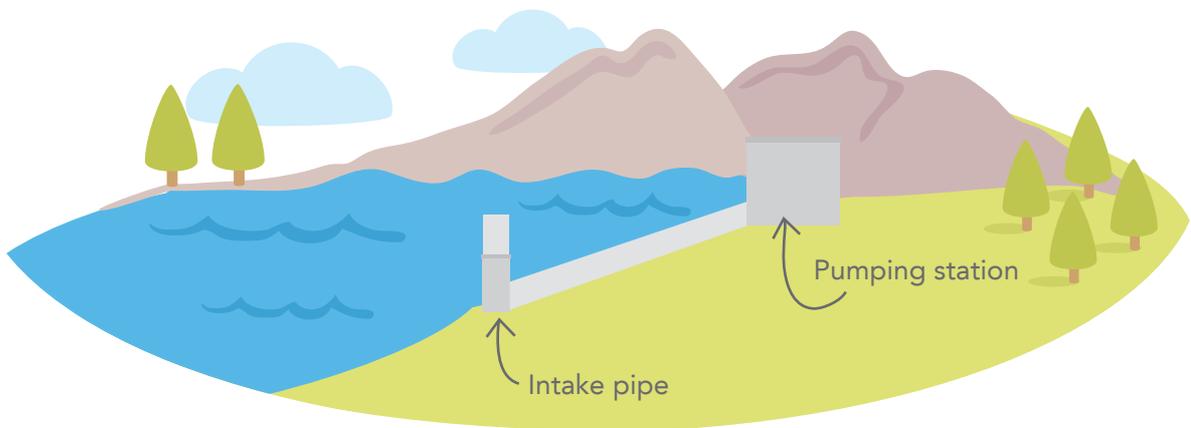
# Water treatment

## Resource sheet 2

### How is water collected for us to use?

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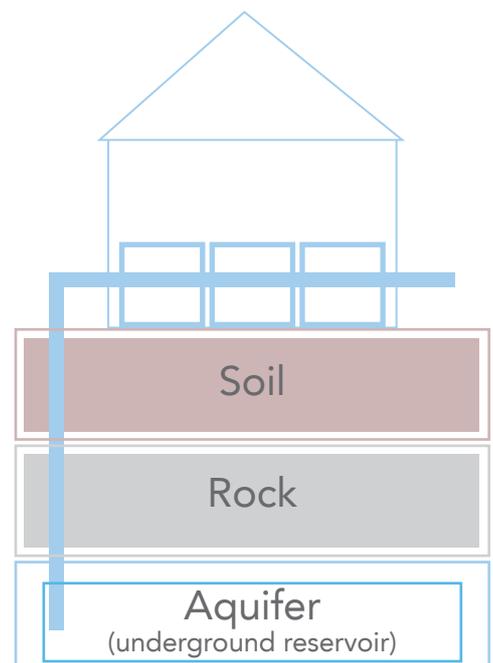
Sometimes we take water from natural lochs like Loch Lomond.



Sometimes a reservoir forms naturally underground. Rainwater soaks into the ground and through the rock below. It happens where there are rocks like chalk and limestone. They soak up a lot of water. They are a bit like underground sponges. The water then collects in a space between layers of rock. We call this an aquifer.

2

We collect water from the aquifer by drilling boreholes in the rock. The water is then pumped out. Wherever we get it from, all water must go to the water treatment works to be made safe and clean before it is piped to our taps. When clean water leaves the water treatment works it travels through large pipes called water mains which are buried underground. There is a water main under the road near your house and the water in your tap comes through a water supply pipe from that water main.





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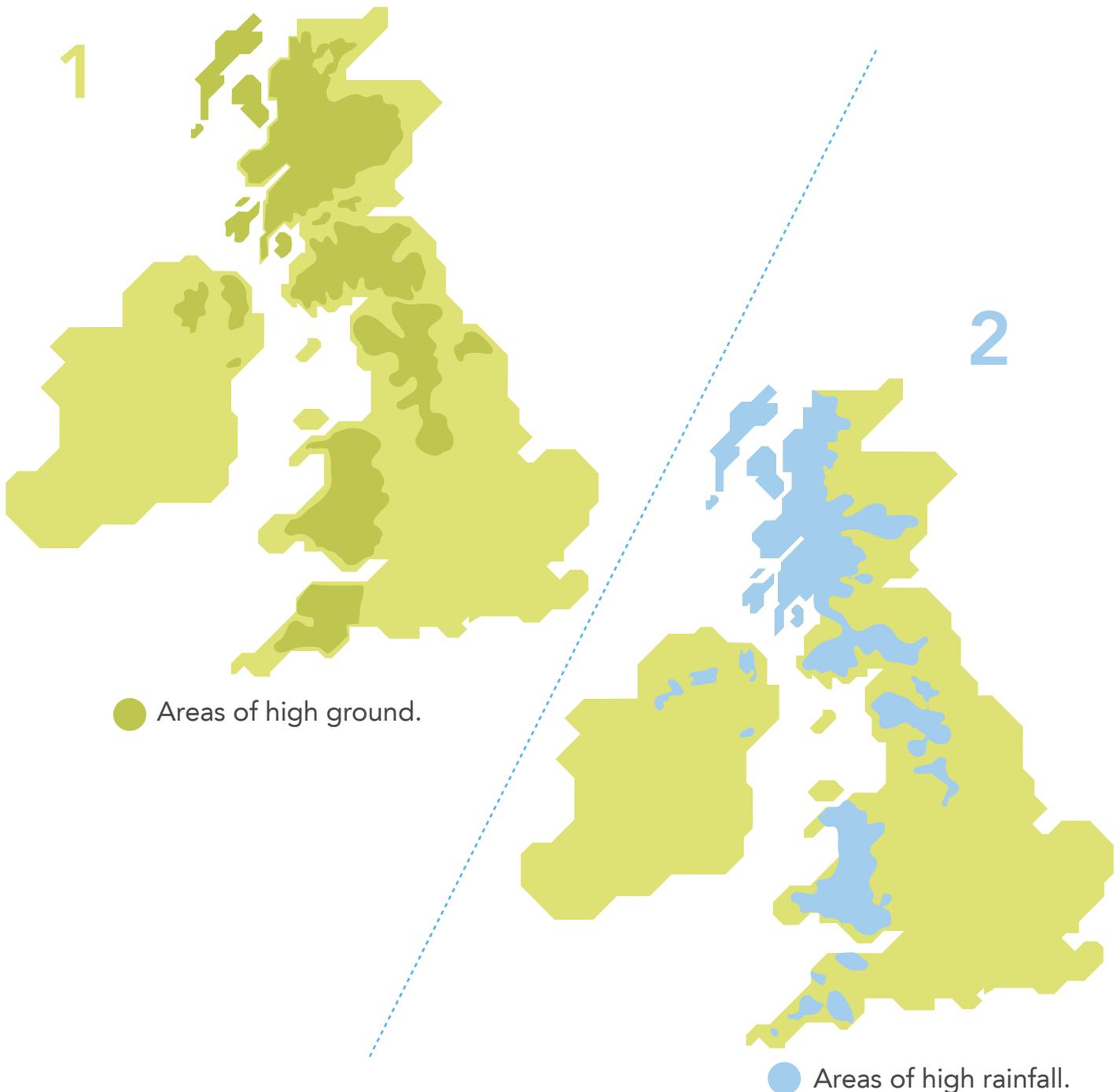
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## Resource sheet 3

### Maps

Look at the maps of Britain below. The first map shows areas of high ground and the second shows annual rainfall. What do you notice about these areas?





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## Resource sheet 4

### Concept cartoon

Read the statements below. What do you think?  
Which do you agree with or disagree with?

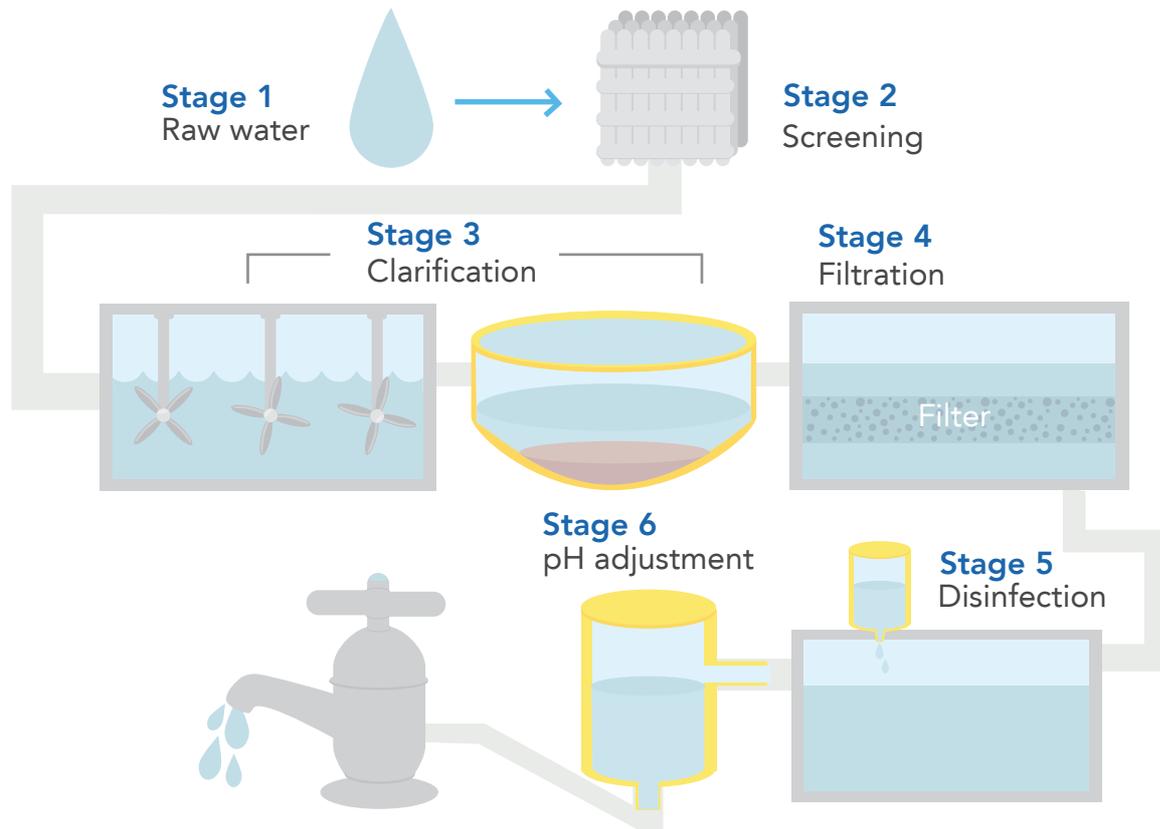




# Water treatment

## Resource sheet 5

### Typical example of the water treatment process



**Stage 1:** Surface water is stored in reservoirs to provide a continuous supply to meet demand throughout the year.

**Stage 2:** Water is passed through mesh screens to remove debris, such as leaves, weeds and sticks.

**Stage 3:** Impurities in the water are removed.

Clarification includes:

- coagulation and flocculation
- sedimentation

**Stage 4:** Any impurities still left from the clarification stage are removed through filtration.

**Stage 5:** Disinfection is vital to ensure that water-borne diseases are eliminated, and that the drinking water that we supply to you meets the water supply regulations.

**Stage 6:** pH is a scientific term used to describe the acidity or alkalinity of a substance. We need to control the pH level of drinking water. If water is too acidic it may corrode metal pipes, and if it is too alkaline it may cause deposits to form inside the pipes.

The water is now safe to drink and use in our homes, schools and businesses.



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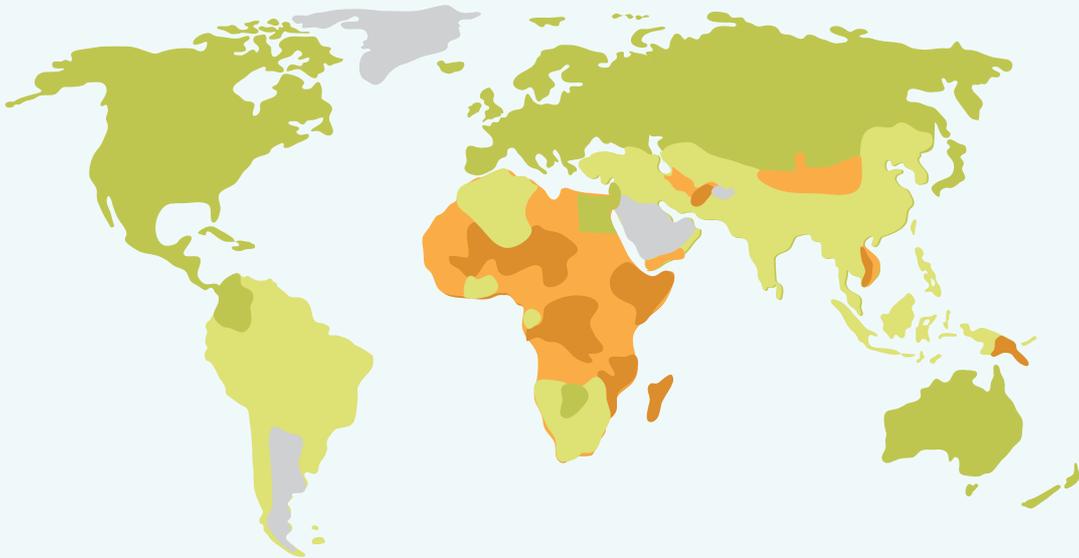
## Resource sheet 6

**One of the biggest causes of disease in the world is drinking dirty water.**

The two maps below show the countries of the world with improved drinking water and the countries with adequate sanitation.

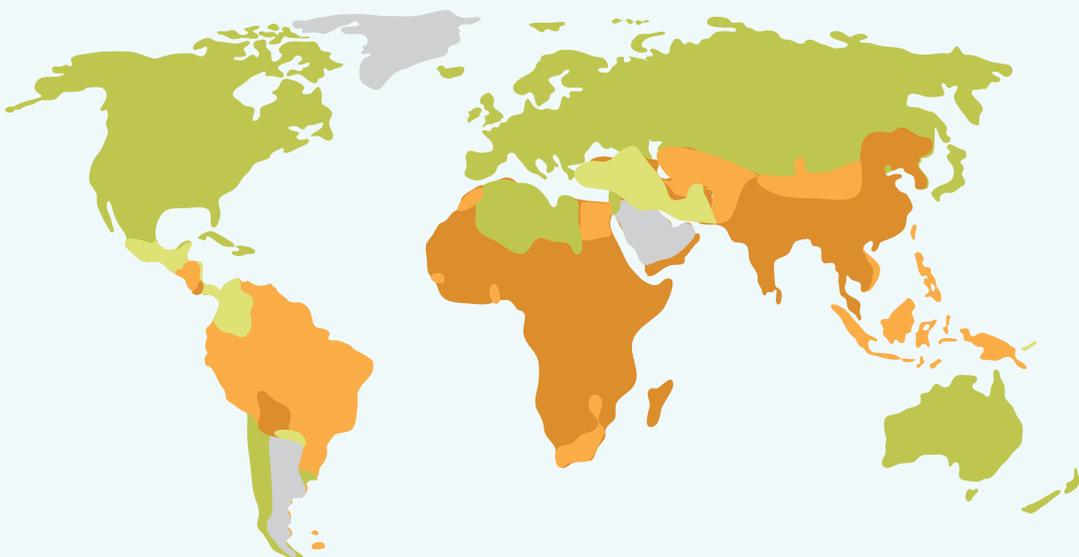
Can you name any of the countries shown on the maps that are most in need of clean water?

Countries with **improved drinking water** (2002)



- Less than 50%
- 50% - 75%
- 75% - 90%
- 91% - 100%
- No Data

Countries with **adequate sanitation** (2002)



- Less than 50%
- 50% - 75%
- 75% - 90%
- 91% - 100%
- No Data



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## Resource sheet 7

### Think about this...

- 1 Have you ever thought about how lucky you are to be able to turn on a tap and have all the water you need?
- 2 In the past people had to collect their water from ponds, streams, rivers or wells.
- 3 In some countries today, people still collect water this way.



● **Uganda's** basic services are still very patchy, leaving millions of desperately poor people without safe water and sanitation.

● Most people in **Papua New Guinea** live in the mountain areas, where less than half the population has water and sanitation.



● Declining rainfall in **Zambia** is making water increasingly scarce, and over half the population has nowhere to go to the toilet.

● On the huge island of **Madagascar** well over half the population has no safe water and only 11% have anywhere to go to the toilet.



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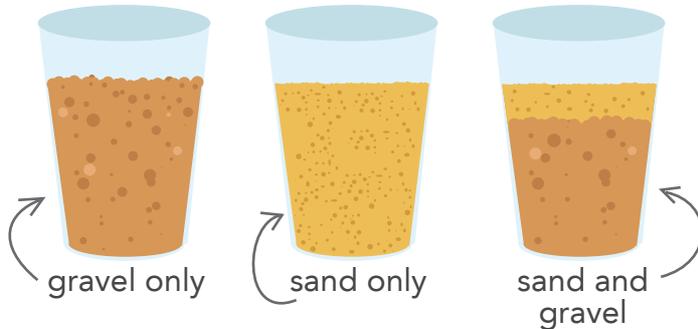
## Resource sheet 8

### Fantastic filters - Can you make a filter to clean dirty water?

#### You will need:

- measuring jug with soil and water mixed up together
- some gravel
- some sand
- three plastic cups
- three empty jars

**1** Fill your plastic cups like this:

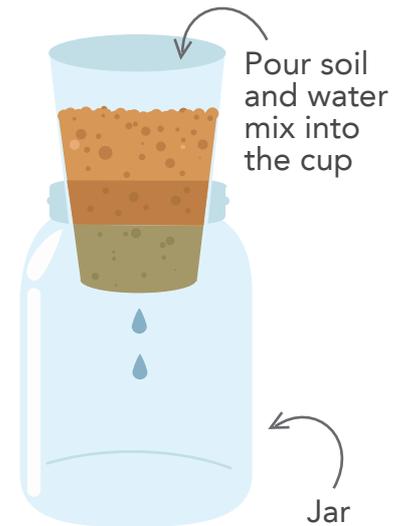


Make some holes in the bottom of the plastic cups to allow the water to drip through.

**2** Sit each cup over an empty jar.

**3** Stir your water and soil mix together and carefully pour equal amounts into each cup.

**4** Compare the water left in each jar.



**Write up your experiment:** What happened to the water poured into each jar?

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#### Try to answer these questions:

1. Which material let the water through the fastest? \_\_\_\_\_
2. How clean was this water? \_\_\_\_\_
3. Which jar has the cleanest water? \_\_\_\_\_
4. What do you think has happened to the dirt in the water? \_\_\_\_\_
5. Which material do you think made the best filter? Why? \_\_\_\_\_

#### What happens at the water treatment works?

When raw water leaves the reservoir it goes to the water treatment works to be cleaned and made safe to drink. One way of cleaning water is to use sand and gravel filters to trap bits of dirt. These are often called slow sand filters. **Can you think why?**



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## Resource sheet 9

### How does clean water get to our homes?

When clean water leaves the **water treatment works** it travels through large **pipes** called **water mains** which are buried underground.

There is a water main under the road near your house and the water in your **tap** comes through a water supply pipe. This pipe is controlled with a **stop cock** which is placed on the **communication pipe**.

A **stop valve** in the house or sometimes in the garage, can be opened or closed to allow you to turn the **supply** from the water main to your house on or off. It's a bit like turning a tap on or off.

**1** Look at the picture below. List the ways you can see water being used.

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**2** Find and label:

- the **water main**
- the **stop valve**

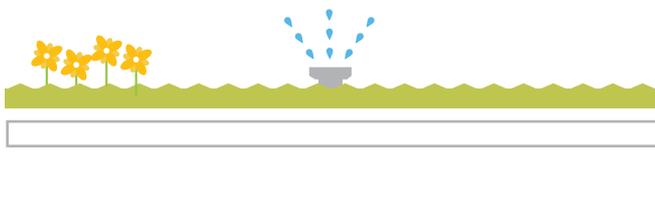
**3** Most of the time the stop valve is open as we are constantly using water at home.

Can you think of any reasons you might want to turn off the water coming into the house?

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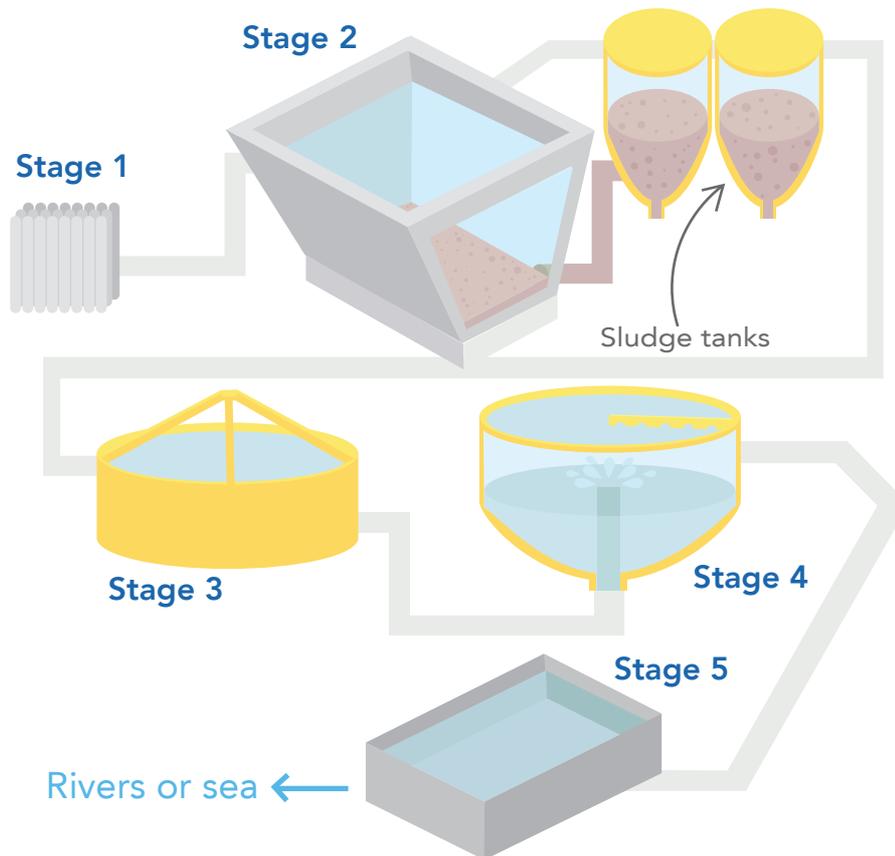




# Water treatment

## Resource sheet 10

### The 5 stages of waste water treatment



**Stage 1:** Screens trap rubbish like rags, bits of wood and plastic.

**Stage 2:** Stones and grit are removed so they don't damage machinery.

**Stage 3:** The waste water rests in these tanks where any solids in the water sink to the bottom. The solids make a slimy mud called sludge. The sludge is pulled out into other tanks to be treated and made harmless. It can be used to make the soil better for growing plants or for burning to make electricity.

**Stage 4:** Good bugs (bacteria) grow in the tanks. They eat up any chemicals and other waste which could harm plants and animals.

**Stage 5:** The waste water is allowed to rest again. Large stirrers gently mix the liquid and the left over bits sink to the bottom of the tank.

Now that the treated waste water is much cleaner, it can be poured back in the river or the sea.