Making water cleaner

The new industrial towns were built along the banks of rivers. Some of the water in the river was used in the steam engines in the factories and for processes in the making of goods, such as dyeing cloth. Some of the water was also used as drinking water by the people living in the towns. However, the river had another important task. It had to carry away all the waste from the town. Thirty million gallons (one gallon is 4.5 litres) of waste was released at Leeds into the River Aire in 1841. It contained water draining from dung hills, solid and liquid waste from water closets (toilets), hospital wastes such as dead leeches and poultices (soft materials for treating sores), unwanted flesh from slaughter houses, pig manure, dyes and other chemicals used in the factories, rotting plants and dead animals.

Similar wastes were released at London into the River Thames. The Thames at London is a tidal river. This means that its water level rises and falls just like the tide on a beach. The wastes were released at low tide, when it was hoped that they would flow out to sea but many of the wastes were carried back up the river when the water level rose again. In 1829 James Simpson, who was the engineer at Chelsea Waterworks invented a way of removing solids from water by filtering dirty water through sand. These sand filters were so successful that they were built at the water works of all other towns.

Make your own sand filter

1. Put a piece of cotton wool in a funnel.

2. Pour dry sand on top of the cotton wool until half the funnel is full of sand.

3. Mix some soil and water in a beaker.

4. Place the funnel over an empty beaker.

5. Pour the dirty water into the sand filter.

6. Compare the filtered water with the dirty water.

Making water cleaner

Age range

- Years 3/4 (SP4/5).
- Years 5/6 (SP6/7).

Resources

Copies of the worksheet. A filter funnel or use scissors to cut off the top of a plastic drinks bottle (you must prepare these before the lesson by cutting off a section of the bottle about seven centimetres below the top of the neck). Two beakers (or just one and you could use the other part of the bottle as a large beaker and invert the top so the neck points down into the bottle), dry sand, soil which has been collected from an area not fouled by dogs (or potting compost), spoon, bucket, measuring jug.

Secondary sources about water works (optional for older students).

Using the worksheet

You may like to use this activity after 7A. The idea that poor water supply was linked with ill health was not widely accepted at the beginning of Victorian times. Instead, they thought disease was carried by the smell of the water. It was John Snow's work that provided the evidence as described in the previous activity.

In this activity the concept of the engineer is introduced. An engineer is a person who uses scientific principles in the design of machines and a range of larger constructions.

While the students may accept the idea of an engineer working with machines they may be unfamiliar with the work of engineers who build bridges, dams, tunnels and water works. This activity provides an opportunity to introduce the concept of the engineer. This is further explored on the web page for page 28 'The railway arrives' in the student book.

Questions (and answers)

Write these questions on the board for the students to try.

1. How do you think the river water would look and smell in Leeds and London? (The water would look dark and have things floating in it and there would be a strong unpleasant smell.)
2. How do you think the sand filters helped to improve health in the towns and cities? (They removed bits of meat from the slaughter house and dead animals and some solids in sewage. These we know today cause disease so people's health would improve.)
3. Use a measuring jug to measure out a gallon of water into a bucket. Now imagine 100 gallons, 1,000 gallons. What area might thirty million gallons cover? (If they imagined 100 and then 1,000 buckets on the school playground they could then multiply it up to see that it would cover a large area in their surroundings.)

Younger students

Some students may need help with holding the funnel over the beaker. You may be able to put the funnel in the top of a large measuring cylinder or plastic drinks bottle to keep it steady.

Outcomes

The students can:

- Imagine conditions in the past.
- Follow instructions.
- Make comparisons.

Older students

The students could consider how long the filtration process takes. From this and from considering the large amount of wastes to be filtered, they could consider what a sand filter looked like. A sand filter covered a large area (about the size of a small field).

They could have a look at secondary sources showing sand filters. Sand filters have been replaced with high pressure filters today and chlorine (or ozone) is also added to the water to kill germs. But the real reason things improved was that the drinking and foul waters were separated.

Outcomes

The students can:

- Imagine conditions in the past.
- Follow instructions.
- Make comparisons.