

Land, water and bees – don't take us for granted: I need a drink

Teacher notes

The issue

Contaminated water can cause serious health problems for people who come into contact with it or drink it. It can carry parasites and potentially fatal diseases. In many parts of the world, water for cooking and washing has to be collected from dirty rivers or wells by women or children.

Introduction

In many parts of the world people living in remote rural areas or overcrowded informal settlements have poor water supplies. Droughts can dry up the supply of water, and wars can make it dangerous to get to whatever supply exists. In times of conflict, sources of clean water can even be deliberately cut off. Growing populations increase the demand for water, putting pressure on the clean water supply. People may have to undertake long journeys to collect water in containers that are very heavy to carry when full. The people who fetch water are often very young, elderly or even unwell. All of these factors can contribute to people having insufficient water for their needs or dirty water that can harm their health.

Learning objectives

- Know that water is a vital resource for both animals and plants.
- Evaluate risks.
- Make and record observations using a range of methods.
- Present observations and data using appropriate methods.

Activities

Aim

Test the effectiveness of various filters in cleaning water in the context of awareness of clean water as a vital resource.

Introductory activities

A 20 litre container full of water weighs 20 kilograms. People in some parts of the world have to fetch water and carry this weight over long distances, otherwise they and their families cannot drink, cook or wash. Ask students to imagine carrying this weight, perhaps over several kilometres, several times every day. Ask them for estimates (not guesses) of how much water their families use. (Water Aid suggests that 50 L is just enough for a day; in the UK most of us use a lot more.) If they had to fetch all this water from a kilometre away, how much time would they spend fetching water every day?

Practical investigation: Filtering a water sample

Safety

Carry out a risk assessment with the students. Ask what hazards they can predict and how to control them.

Remind students that they should never eat or drink in the lab, so should not drink the water.

Wash hands before and after the practical investigation.

In this simple investigation students use a range of filters and open-weave materials to filter a sample of discoloured water. This will be water to which previously sterilised (oven-dried at 160°C for 4 hours) sand, compost, stones etc. have been added so that it is discoloured and clearly not clean. This water represents what might be obtained by a child given the task of water collection in one of the areas of the world where clean piped or well water is not available.

Tell students to observe the filters closely so that they can put them in order starting with the filter they think has the biggest holes (probably muslin or netting) and ending with the finest filter (probably the fine filter paper). If the water is slightly coloured with earth or compost, the colour should be reduced by the finest filter.

Additional activities

A plenary session to discuss the answers to the questions in the Student activity sheet will include a question about invisible contamination (microbes). You could collect some quantities of the final filtrate and boil them, reminding the class that a temperature of 100°C does not kill all microbes immediately, but that even a minute at that temperature greatly reduces the number of potentially harmful organisms in water. (Do not let anybody drink this water, even when boiled.) You could discuss with the class how boiling water to make tea has provided a safe liquid for drinking in many areas of the world. (This fact might also provide a homework research task.)

Answers to questions

1. The colour of the filtered sample gets paler along the line of beakers as the impurities are filtered out.
2. Similarly, more of the fine debris is filtered out.
3. Water from a stream could contain microbes, some of which might be dangerous to health, even after it has been filtered. Students might suggest water purification tablets or boiling the water to make it safe to drink. See the additional activities above for ideas on developing this suggestion.

Further reading

Water Aid: www.wateraid.org/uk/