Rain savers

Use a rainy day to encourage the children to think about the importance of water through a rainwater-harvesting challenge.

> **Links to other activities:** 'Water day' is another activity involving how both we and plants rely on water and 'Changing colours' goes into more detail about pH.

Materials

- Containers of various sizes, such as jars, bottles, tin cans and bowls (which you can ask the children to collect over the summer holidays, ahead of rainy days in the autumn term)
- Permanent markers
- Stones or pebbles (to weigh down lighter containers)
- A water butt
- Measuring jugs
- Potted plants: ericaceous (acid-loving) plants like azaleas, camellia or blueberry plants if possible, as these are likely to give the most observable differences

Activity

Rainwater harvesting was carried out by everyone before we had mains water supply. Today we pay little attention to the amount of water we use every day, and the amount that is wasted. As climate change increasingly affects rainfall patterns, hosepipe bans are frequent in many parts of the UK. That means collecting water during the wetter days and months, and storing it for watering plants on dryer days and in periods of drought, is becoming more and more important.

Harvesting rainwater

Explain that the children are having a rainwater-harvesting challenge. Ask the children to choose a container each, and a spot outside where they think they will collect the most rainwater. Each child can label their container with their name using a permanent marker (on the bottom if possible, as this spot will stay the driest).

Encourage them to try and find a position for their rain harvester where rain is not doing an important job like watering plants or grass (but how feasible this is will be dependent on your outdoor space). Ask children who chose lighter containers like plastic yoghurt pots to weigh these down with stones or similar in the bottom.

Leave the containers to collect rain for a day or two and then collect them and start to measure the amount of water each has collected using a measuring jug. You could create a leader board to keep a record of whose container has collected the most rain.

After each container's water has been measured, transfer it to a water butt with a lid, as it needs to be stored well to stop it going stagnant. After this activity, the water butt can be used to collect water as in an ordinary garden and this can then be used for lots of watering and water-based activities throughout the year.

Watering experiment

Use the collected rainwater for a watering experiment. For this, you need 6–8 potted plants (e.g. azaleas), which can be kept in a glasshouse or on a windowsill. Ask the children to water the plants with a small amount of either rainwater or tap water each day. They should agree on the amount the plants will receive on a daily basis, and use separate labelled measuring jugs for the two types of water to ensure a fair test. (The plants need to be kept indoors or sheltered so that those being watered with tap water don't accidentally get some rainwater too, when it rains).

Hopefully the children will be able to observe some differences in the plants watered with rainwater and those watered with tap water. They might look more healthy and lush, and have more leaves. This is because rainwater is slightly more acidic than tap water and doesn't contain chlorine, fluorine, minerals and coagulants, which are all in treated tap water. These minerals raise the pH of the water and can affect the nutrient availability for plants. This is particularly important for ericaceous (acid-loving) plants. See 'Changing colours' for more about the pH scale.

Further ideas for investigation

You could use litmus paper or some other indicator to test the pH of rainwater vs. tap water. Is there an observable difference or is a more-sensitive test (such as with Universal pH indicator paper) needed?

What else could we use rainwater for, as well as watering plants? Ask the children to come up with ideas for using collected rainwater in their everyday lives to help reduce the water we consume in our homes, schools and gardens (e.g. for painting or art sessions, in the school kitchen for washing vegetables, and for cleaning and mopping).

Ice to see you

This activity helps the children understand how ice behaves, what this means for the ice currently on our planet, and the impact of this as the climate changes. This is perfect for a wintery or snowy day, but can also be carried out at any time of year using ice cubes.

Links to other activities: 'The big freeze' also uses ice and 'Circle of influence' covers discussions about climate change and the environment.

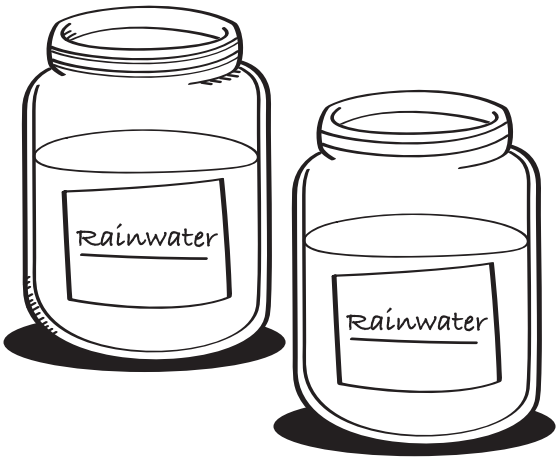
Materials

Required:

- A deep tray or cake tin (without removable bottom), or a plant-free area of soil and an empty compost bag
- Collected rainwater
- Soil, compost or a small container (to use as land in your demonstration)
- Snow or ice cubes
- A twig or ruler

Optional:

- A trowel or small spade
- A marker pen
- Cold water
- Hot or warm water (not boiling)
- Natural food colouring



Activity

Ask the children what they know about ice and snow: how does it feel, what does it look like and where do you find it? Explain that ice is the solid form of water, and snow is like rain but it occurs when the water vapour in the atmosphere falls as ice crystals instead of as water.

Do the children know where the Arctic and Antarctic are, and that penguins are found in the Antarctic and polar bears in the Arctic? Next time they watch a cartoon with a penguin and polar bear duo, they will know that in real life those two would never have met.

What is ice like in water?

Safety note

This activity might be best as a class demonstration because of the materials needed, with individual children volunteering to demonstrate.

Find out what the children think about the icebergs and ice sheets in the Arctic and Antarctic. Does the ice go all the way down into the water? Explain that the ice can be quite deep in some places, but the ice is actually floating on the water.

Fill the deep tray or cake tin with water halfway, or dig a small space in a plant-free area of soil and use an empty compost bag as a liner (almost as if you're making a pond) and fill this halfway up with water. Help the children add a small mound of moistened soil or compost (or a small upturned jar) to represent land at one end.

Dip a ruler or twig into the water to note the level of the water. The children may wish to use a marker pen to mark a line on the twig, or you can use your nails to scratch into it. Ask the children to pop an ice cube or a snowball into the water. What happens to the water level? What happens as the ice melts?

Pop some ice cubes or snow onto the 'land' that the children have created. What does it look like? The snow on the land should look like the snow in the water. In real life, it's sometimes hard to tell if there's land underneath large bodies of ice, but around the world we have lots of ice on land in glaciers and mountain ranges. What do the children think will happen if the ice on land melts?

Leave this set up for the ice to melt on the land too. If it's a particularly cold day, you might want to set this up indoors so the melting will be quicker.

What the children will see

When ice is added to the water, the water level should rise; the water will come up higher than the marked point on the twig or ruler. However, as the ice melts the water level will remain the same. This means that, when the ice in the Arctic or Antarctic that floats on the water begins to melt, the sea levels won't rise. However, as the ice on the 'land' melts, it will drain into the rest of the water and will cause the water levels to rise further up the twig or ruler.

Ask the children what they think rising sea levels will mean, such as what happens to habitats when the ice begins to melt. If there's no ice, what would happen to the animals that live on the ice in the Arctic and Antarctic?

Explain that, as the global temperature rises, the ice melts, but it is the melting of ice on land that will cause sea levels to rise the most. This will lead to flooding and the coasts will start to erode or wear away (with habitable land space shrinking).

Further ideas for investigation

You can demonstrate the temperature change of water to the children by pouring some cold water into a glass and adding some warm water dyed with food colouring gently on the top. The coloured warm water will float on top of the cold water. Ask the children what they understand by this. Why does the warm water float?

Explain that there is another reason why the sea levels can rise as the planet warms up. As the sea water becomes warmer, it will start to expand. In the same way that hot air rises because it has expanded and become less dense, warm water becomes less dense too. Warmer water takes up much more space and will cause sea levels to rise.

What do the children think about climate change and global warming? Encourage a discussion with the children about what it will mean for biodiversity on land and in water as the planet warms. Habitats will be lost and many creatures cannot survive in warmer waters and climates.

Reassure the children that all is not lost. Scientists and governments around the world are working together to help reduce global temperatures by reducing our greenhouse-gas emissions. They are also researching new technologies to help do this, such as electric vehicles, renewable energies like solar and wind power, and ways to capture and store carbon so it doesn't reach the atmosphere.