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STEM Project

Chapter 3: Water

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Help ... I'm Stranded!

We have all heard the stories of people getting stranded on a desert island. If this were to happen to you, your first thoughts might be about finding food and water. It is estimated that humans can survive around three weeks without food, but only three days without water. So, finding water should be your first priority!

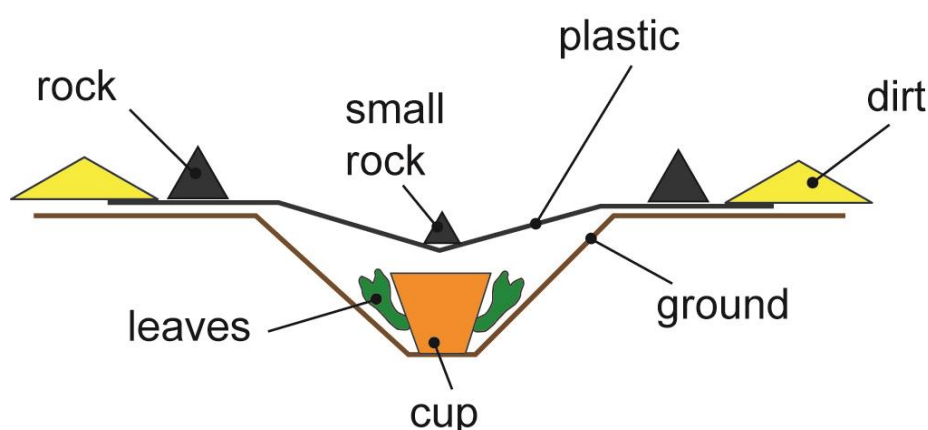
In this task, you are going to prepare for this unlikely event by investigating and comparing different ways of collecting water from the natural surroundings.

Below are two different water-collection experiments designed to collect water from the environment. Break into groups and choose one of these experiments to carry out in your group. Make sure there is the same number of groups in the class doing each one.



Experiment 1 – Solar still

Materials: cup (or similar container), fresh leaves, plastic sheet (cling wrap or garbage bag), several rocks



Method:

- 1 Find an outside location in a sunny area to dig a hole approximately 40 cm wide and 20 cm deep.
- 2 Place the cup in the centre of the hole, making sure the top is below the level of the ground.
- 3 Arrange the leaves around the cup inside the hole.



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- 4 Lay the plastic sheet across the top of the hole. Secure it with rocks at the sides, making a taut 'lid'.
- 5 Add soil around the edge of the plastic sheet to seal it so air cannot get inside the hole.
- 6 Place a small rock in the centre of the plastic sheet so that it sags in the middle, directly above the cup. Make sure that the plastic is not touching the cup.
- 7 Wait 24 hours then collect the cup, making sure not to spill any water inside.

Experiment 2 – Wrapped tree branch tap

Materials: large thick plastic bag, cable tie or string

Method:

- 1 Place the plastic bag over the branch of a tree that has lots of leaves, preferably one that is horizontal or pointing downwards. Make sure your bag does not rip or tear.
- 2 Tie up the bag using the cable tie or string. Make it as tight as possible without damaging the tree.
- 3 Wait 24 hours then collect the bag, making sure not to spill any water from inside your bag.

Data and results

After 24 hours or so, collect the water from your experiment.

Pour the water collected in the cup or plastic bag into a graduated cylinder or beaker and measure its volume in millimetres.

Collect the results from every group in the class and collate the data in the table below. Also find the average volume of water collected for each experiment and add this to your table in the last row.

| Water volumes collected (mm) | Experiment 1 Solar still | Experiment 2 Wrapped tree branch tap |
|------------------------------|-----------------------------|---|
| My group | | |
| Group: | | |
| Group: | | |
| Group: | | |
| Group: | | |
| Group: | | |
| Group: | | |
| Group: | | |
| Group: | | |
| Average volume | | |



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Discussion and reflection

What is happening in Experiment 1 – the solar still? Why is the cup filling with water?

What is happening in Experiment 2 – the wrapped tree branch? Why is the cup filling with water?

Why must there be leaves in the experiments? What is their function? Would the experiments still work if leaves were not present?

How could the weather have affected your experiment?

Will you survive?

Every day we lose water from our bodies through urine, sweat and water vapour in our breath. On average each day we lose:

- 600 mL through urine
- 400 mL through sweat
- 200 mL through breathing.

If you were stranded on a desert island with no water source other than what you can gather using your water-collection experiment, how many sets of contraptions would you need to set up each day to replenish the water lost by your body?



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Extension activity – Stranded at school

You are stranded at school without running water ... will you survive?

Solar still group

- 1 Find the approximate dimensions of your school oval (you can use an online map to help you).
- 2 Estimate the dimensions of your solar still.
- 3 Using this information and the average results of your experiment, investigate how many solar stills could fit on your school oval. Would this provide enough water for you to survive each day?

- 4 How many people could your school oval provide water for in this way?

Wrapped tree branch group

- 1 Estimate the **average** number of tree branches you could wrap up on each tree on your school grounds. Just make an estimate – it does not need to be accurate.
- 2 Count or estimate the number of trees in your school grounds.
- 3 Using this information and the average results of your experiment, investigate how many wrapped tree branches you could set up at school. Would this provide enough water for you to survive each day?

- 4 How many people could the trees at your school provide water for in this way?
