Water filtering challenge

Water derived from healthy peatlands is naturally of high quality with few pollutants and low nutrient levels, requiring straightforward treatment once it reaches a water treatment plant. As water infiltrates through the air spaces between the grains of solid material in peat, it is naturally filtered. Debris, leaves, insects, chemicals and minerals are retained in the soil as water drains through.

This activity suggests hot to replicate a simple peatland or bog that water flows through, demonstrating the excellent filtering properties of peat and how, if left undisturbed, it can help to retain and naturally filter water.

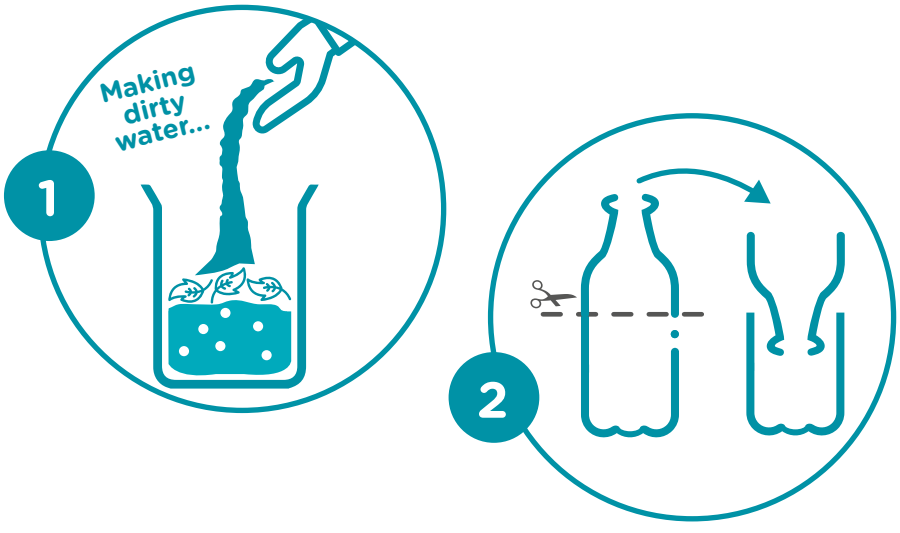
Hypothesis

Before you complete your investigation, write your hypothesis (a prediction or guess).
Of the soil types you have available, which soil type do you think will drain the fastest and why?

Which soil type do you think will filter the water most cleanly? Explain your answer.

Making your water filter

1. Working in groups of 3-4, collect materials to make a sample of dirty water – mix soil, mud, dead leaves and water in a large clear container or bottle.
2. Next, leave your dirty water to one side, cut your plastic bottle in half. The top half of the plastic bottle (take the lid off) will be stood upside down inside the bottom half of the bottle. The funnel-like top half will be the filter, and the bottom half of the bottle will collect the filtered water.



3 With the neck end of the bottle stood upside down, insert a layer of cotton wool in the neck end of the bottle. This needs to be thick enough to prevent the next layer of gravel falling out of the bottle's neck – approximately 2-3 cm in thickness.

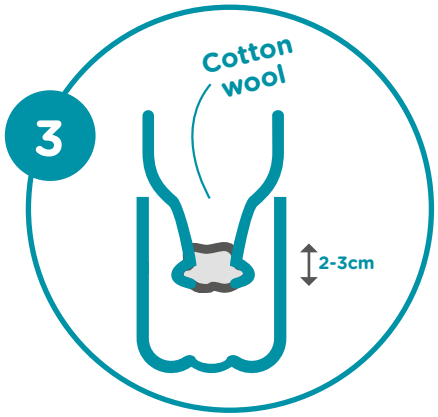
4 Next, carefully pour in a 2–3 cm layer of gravel before adding an equal layer of peat-free compost on top. Do not pack the layers down hard as there is a danger that everything will fall out!

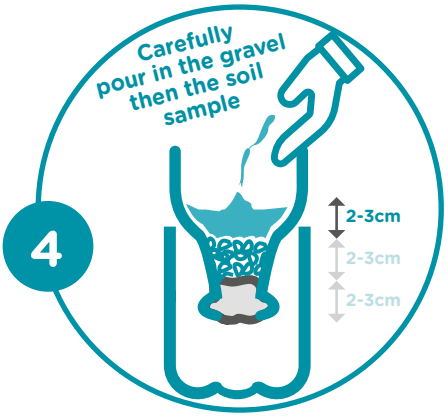
5 Finally, add one more 2-3 cm layer of gravel.

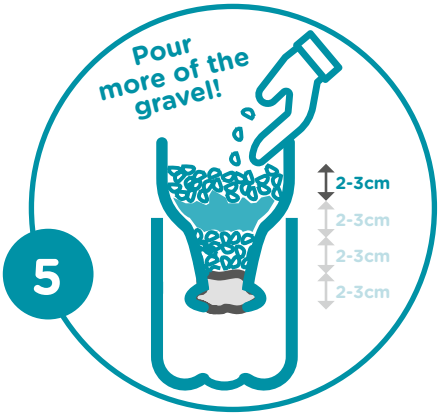
6 Next, measure 200ml of your dirty water into a measuring jug or beaker.

7 Starting your stopwatch, slowly pour the 'dirty water' into the top of your filter and watch carefully as it makes its way through each layer. Does water collect at the bottom of the funnel? Does it run fast or slowly through the soil? As the water passes through the different layers the dirty water should be filtered out with clean water accumulating at the bottom of the plastic bottle.

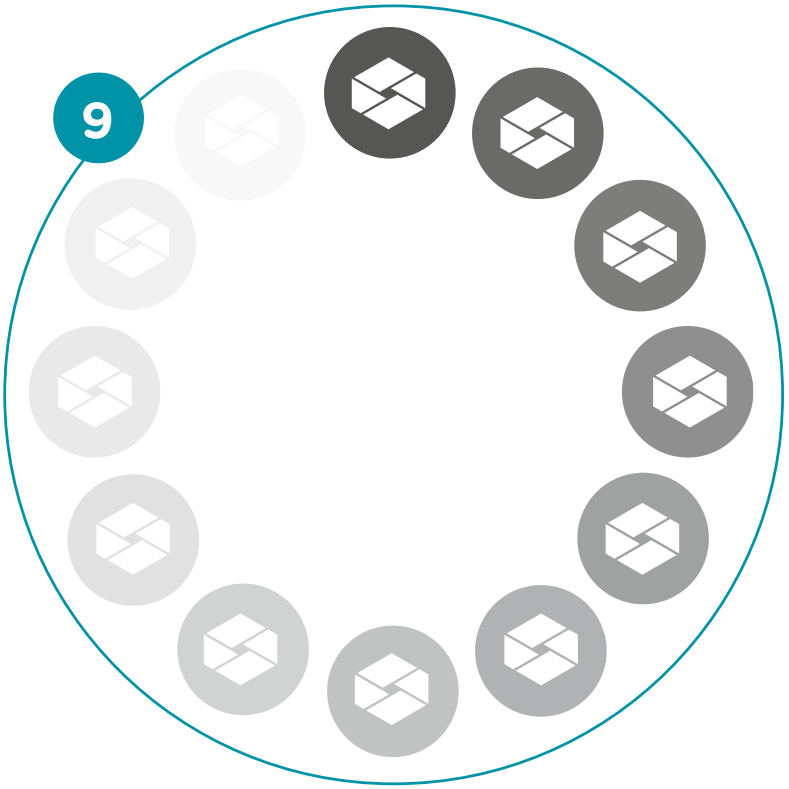
8 Record your findings and observations in the table on the next page.







9 Using our '[Resource card – Measuring the turbidity of water]' measure the turbidity of the filtered water and record your findings in the table below.



Soil type or sample number	Time taken to filter	Observations - Does the water run fast or slowly through this soil?	Volume of filtered water collected	Turbidity of the filtered water
E.g. clay	4.23 minutes	Trickled through very slowly	103 ml	4 NRW logos visible

Congratulations – you have just filtered dirty water!

Please note - This activity is for demonstration purposes only – no one should drink the filtered water.

Questions

1 What was the average filtering time? (add the time taken to filter for each soil sample together and divide by the number of samples tested = average filtering time)

2 Which soil type or sample filtered the most water?

Which soil type filtered the least water?

What does this tell us?

3 Which filtered water sample had the best turbidity level (the clearest)?

What does this tell us?

Hypothesis revisited

Was your hypothesis/prediction correct or incorrect? If your hypothesis was incorrect – why was that so?

If you were to complete this investigation again what would you do differently to improve your results?

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