

Feel the force – water as an energy source

The power created by water falling, flowing or steaming has been harnessed for hundreds of years as energy. Illustrate the idea of water as a source of energy by looking at pictures of watermills and steam engines – and talking, for example, about the devastation caused by tsunamis and floods.

Use these activities to encourage children to understand the value of water as a power source – for good and bad – and at the same time support curriculum subjects such as history, science, geography and maths.

The activities you will find here include:

- Getting steamed up**
- Under pressure**
- Pump perfect**
- Taking turns**



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Getting steamed up

Exploring steam engines for a history topic? How does steam work in real life? A Kelly kettle is a good self-contained system for heating water and producing steam. It is easy to use and simple to take into the school grounds (make sure, however, that you undertake a risk-benefit analysis and reduce the hazards as much as you can). Produce a flow of steam and with a toy windmill see how the steam can turn this effectively. More able pupils could search on the internet for the instructions to make a steam generator. This requires a level of technical expertise but would make an excellent project for a science or technology club.

Under pressure

Why not test out a range of water pistols to see which is the most effective? Explore how different water pistols work – how do you create pressure inside the water pistol and why do you get a powerful stream of water? Then ask the children to develop a range of tests for the different water pistols. These might look at power, accuracy, volume of water produced etc. The children should set up a hypothesis, create an experimental procedure and test out their expectations.

Pump perfect

Create an Archimedes screw using just two bowls, a wooden pole and a length of hosepipe – ideally clear tubing so the children can see what is happening.

- 1 Wind the hosepipe or clear tubing around the pole and fix in place with some heavy-duty tape.
- 2 Fill one bowl with water and place the bottom of the pole in it with the hosepipe or tubing submerged.
- 3 Place the other bowl on a higher surface at the other end of the pole.
- 4 Rotate the stick so the water is scooped up through the pipe.
- 5 Watch the water slowly travel up the pipe as the pole is rotated.

For best results add a bit of food colouring to the water so children can clearly see how the system works by using gravity to slowly move the water up.

Taking turns

From grinding corn and irrigating crop to supplying drinking water and powering textile mills, water wheels have been used through history to harness the energy of water. This activity is ideal for talking about how using water compares to coal or nuclear energy for creating power. You'll need an empty 2 litre plastic drinks bottle, cork, craft blade, metal or wooden skewer, a weight, string (30 cm or longer), jug or something to pour water from... and a little patience!

- 1 Cut the bottle above and below where the label was. You will now have three parts: the mouth or neck, the middle area and the bottom. Cut the middle section into eight equal rectangular sections.
- 2 Make a V-shaped cut-out in the bottom section of the bottle, beginning at the cut edge and moving down, so that the smallest section of the V ends 1 inch or more above the curved base of the bottle.
- 3 Make eight incisions around the circumference of the long side of the cork and insert the plastic strips (rectangular sections from step 1) into the cork about 2-3mm deep. The cork should now start to look like a water wheel or turbine at this point.
- 4 Make a hole through the top centre of the cork turbine with the skewer. Pierce two holes on opposite sides of the plastic bottle bottom with the skewer parallel to the V-shaped cut out.
- 5 Insert the skewer halfway through the plastic bottle bottom, then slide on the turbine before sliding the skewer through the rest of the bottle and out the other side. The plastic blades should slope down towards the V-shaped cut-out.
- 6 Tie one end of the string to the weight and the other to the end of the skewer.
- 7 With the base of the bottle suspended over the edge of a table outdoors drape the string with the weight at the end over the edge of the table. Pour water from a jug or other suitable vessel over the turbine. The weight of the falling water will make the turbine spin and should lift the weight up in the air.

Once your model turbine is working have a think about how this could work in a river. What if a river wasn't going fast enough to make the turbine spin? Would this work in the sea?



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