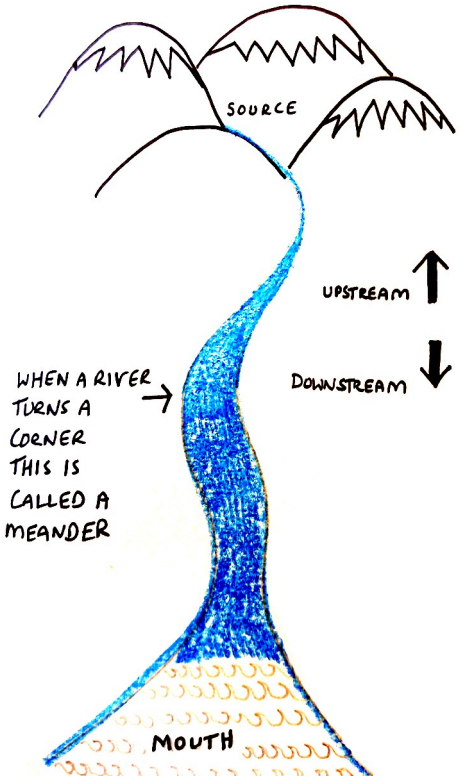
River Flow Experiments

So how do rivers work? We're going to do some fun experiments to find out more about how and why rivers change as they travel from the hills towards the sea. The fancy scientific term for this is *river morphology.*

We're going to look at how rivers change shape over time, why the river depth changes from day to day, and at what makes a river get bigger as it travels downstream. Best of all, we're going to measure the speed of the river using oranges. You can use any river or stream and it might even be interesting to return to the same location weekly or even daily to record your results.

the WATER of LEITH Conservation Trust



Important Words to Learn

The *source* of the Water of Leith is in the Pentland Hills, southwest of Edinburgh. As river travels downhill it picks up speed and gets wider. As it makes its way towards the sea the land gets flatter, so the river spreads out and slows down. It also carries a *lot* more water. In the hills, the Water of Leith is less than two metres wide, but by the time you get to the *mouth* of the river in Leith, it's over 30 metres wide!

When you travel *upstream*, you go in the direction the water's coming from, towards the source. When you travel *downstream*, you go in the direction the water is going to, the mouth.

Keeping Yourself Safe

Always go to with an adult and only when water levels are low.

Chose your location carefully to make sure the river is shallow and does not drop away quickly.

Even in hot weather, do not go into a river barefoot as sharp objects like glass or rusty old bits of metal are often found on the river bed.

Do not go further than the depth of your ankle bones and stay out of fast currents.

Wash your hands before eating

Activity 1: Changing Shape

Rivers change shape all the time. If a tree growing on the bank falls into a river, the water is forced to go around the tree. This increases the flow on the other side of the river and reduces the water downstream of the fallen tree.

You can simulate this by finding a pebbly stream bed and building up stones to create a small dam. See how the water is pushed round the stones and there is less water downstream of the stones. When the water is pushed around the stones, it travels faster and can even *erode* the soil on the far bank.

Activity 2: Run-off

What makes rivers get bigger as they travel downstream? As you walk along a river count little streams, or *tributaries*, joining it. When there's more rainfall, also look out for smaller *run-off* which trickles down hillsides when the ground is *saturated,* full of water. How many run-offs can you see? Take the same walk when it has been dry and sunny and or after a rainy day. How does the run-off change?

Activity 3: River Depth

All you need is a tape measure, a long stick and a pencil and paper to record your findings. Find a place (or a couple of places) along a river/stream where you can safely stand on the bank and estimate the depth. Write down your estimate. Then, insert a stick in the same place. Pull it out and measure the wet length of the stick. How close was your estimate? Return to the same locations for a few days in a row. Does the depth change? If the depth decreases this means that there is less water in the river. That would mean there has been a lot of *evaporation*. How could you make a graph to show this?

Activity Four-River Speed or Velocity

Now you've spent some time exploring the river, you're ready to start some seriously fun velocity experiments. *Velocity* means *speed* and the speed of the river changes every day. The more it rains the more water is in the river, and more water means that the river travels at a faster velocity.

For safety, do this experiment when the river levels are relatively low as a river in *spate* (a sudden flood) is a very dangerous place to be.

What You Need: 3 oranges, 2-3 people, a stop watch, a measuring tape if you have one. If you don't have a measuring tape then measure how long your stride is using a ruler and figure out how many steps you need to make to get to 10 metres.

Find an open stretch of the river and designate a start point and finish line ten metres downstream. One person releases the orange a metre upstream of the start point to allow the orange time to get up to speed.

Another waits downstream to catch the orange and the third person can time and record the speeds.

Record the time it takes for the orange to travel 10 metres, from the start point to the finish line.

1) 2) 3)

To find out the average speed it takes the orange to travel 10 metres, add the three speeds together and divide them by three. Answer: _____

To find out how long it takes the orange to travel one second: distance/time=speed/velocity

10/_____(average speed)= _____metres per second or _____cms per second

If the weather is sunny, dry and warm for the next 4 days will the river speed get faster? _____

Did You Know?

The water we have on the earth is the same water we've always had. Through the water cycle, it just changes from one state to another: solid (ice), liquid (water), and gas (water vapour). That means that the water you drank today could have been drunk by a dinosaur, sweated out by Beyonce, or—yes—peed by a lizard!

97% of the water on Earth is salt water which means that the freshwater which we can drink is only 3% of the world's water. Of this 3%, half of it is frozen as a glacier or iceberg. And we want to keep it frozen. So of all the water in the world, we can only drink 1.5 % of it. With a growing human population on Earth it's really important that we conserve water so there is enough clean water for us all to drink.

Curricular Links to the Curriculum for Excellence

I am learning to assess and manage risk, to protect myself and others, and to reduce the potential for harm when possible (HWB 1-15a/2-15a)

I can share ideas with others to develop ways of estimating the answer to a calculation or problem, work out the actual answer, then check my solution by comparing it with the estimate MNU1-01a

I can carry out practical tasks and investigations involving timed events and can explain which unit of time would be most appropriate to use. MNU 2-10b

I have used a range of ways to collect information and can sort it in a logical, organized and imaginative way using my own and others criteria. MNU 1-20b

I can conduct simple experiments involving chance and communicate my predictions and findings using the vocabulary of probability. MNU 2-22a