Teachers' Notes for the Water Trail

The Water Trail is a structured activity, lead by an adult, for children in Key Stage 1. The activity will take about 20 - 30 minutes to complete.

Aims:

The Water Trail is designed to:

- Help children begin to understand the Water or "Hydrological" Cycle;
- Help children know many of the ways that humans use water;
- Introduce ideas of sustainable development;
- Stimulate discussion back at school;
- Provide a non fiction text for the basis of literacy activities in the classroom.

The activity will make the visit to C.A.T. purposeful and fun!

How the activity works.

The children will be led on a short trail of about 200 metres.

At each of the eight stopping points on the trail the children will be shown a short activity or experience.

One child will make a quick drawing at each stopping point in an appropriate space in the BIG IDEA BOOK to help the children remember the experience back in school. The final six pages of the book can be shared with the children after they have completed the trail or back at school.

Resources:

For each adult and group of children:

A copy of the C.A.T BIG IDEA "Water Trail" Book;

A clipboard;

Some felt tip pens or coloured pencils;

A map of the C.A.T. site.

You might like to take photographs of the activities and insert copies of them in a BIG IDEA BOOK back at school.

The Activity:

Let the children watch and enjoy their journey on the *Cliff Railway.*

Tell the children they are going on an exciting journey called "The Water Trail." Tell them that at the start of the trail they will have to be detectives!

Walk across the site to the smallholding (Map 28).

Stand near the concrete composting building. This is a rodent proof enclosure where much of the C.A.T. organic waste is composted. It sometimes is a bit smelly and you may see the blue lights and hear the zapping noises of the ultra violet lamp trying to keep the number of flies under control.

Ask the children to be detectives and look around and see if they can see a pipe bringing water down the hill.*(There is a grey 20 cm. diameter pipe carrying water across the slate scree down the hillside to the left of the compost building)*

Show the children the opposite page of the BIG IDEA BOOK.
Read the text aloud *(Water comes down the hill inside a pipe).*
Either ask a child to draw a quick picture of the pipe in the frame beneath the text or take a digital photo if a camera is available.

Tell the other children that the grey pipe is buried under the ground and that they are going to follow the trail to some of the places where the water in the pipe goes.

Show the group the picture drawn by the child. Give praise and encouragement and take the group to the HAND PUMP (Map 31).

Gather the children at the base of the Water Pump.
Ask the children to tell you all the ways that water is used back at home.

The list will include:
DRINKING;
WASHING OURSELVES TO KEEP CLEAN IN SHOWERS, SINKS AND BATHS;
WASHING FOOD, CLOTHES AND THE THINGS WE USE FOR COOKING AND EATING;
COOKING SOME FOODS;
TOILETS TO CARRY OUR WASTE AWAY;
WATERING PLANTS IN THE GARDEN;
WASHING CARS, WINDOWS ETC.

Ask the children about how many buckets full of water does each one of us use every day.
(*It's about 30, but the amount has been steadily increasing.)*

Tell the children that:
- it takes a lot of pipes and hard work to collect all the water we use;
- many people can't use as much water because they live in parts of the world where there is not as much to use;
- some people, in other parts of the world, have to pump and carry every bucketful they use. It must be hard work.
- they are going to see how hard it is to pump water from under the ground.

Choose one child to operate the pump and fill the bucket. Encourage the child to do it without stopping (It is hard work for most 5-7 year olds).
Ask the child to explain how he/she feels after the task.

Read aloud the opposite page of the BIG IDEA BOOK. *(The pipe goes past the pump.)*

Choose a child to quickly draw the pump or take a photo.

Show the group the picture drawn by the child. Give praise and encouragement and take the group to the WAVE MACHINE. (Map 30)

Sit the children down on the slate wall opposite the WAVE MACHINE.
Tell the children that you are going to pick two children to "make electricity."

Ask the children to tell you some of the things that use electricity to make them work. The list can be very long so try and make sure that every child suggests something such as:
TELEVISION; COMPUTER; COOKER; WASHING MACHINE; MICROWAVE; DISH WASHER; KETTLE; RADIO; C.D. PLAYER; VIDEO; IRON; VACUUM CLEANER; POWER TOOLS; TUMBLE DRYER; LIGHTS. etc.

Point out the tiny red light in the lighthouse at the end of the wave tank.
Explain the process about how the two children will use their energy to turn the light on.
The children will together push the handle down.
Their push will makes waves that will move along the tank.
The waves will squash the air in the plastic boxes (cuboids) at the end of the tank.
The squashed air will be pushed through a narrow white pipe.
The air, passing through the pipe, will make a generator spin very quickly.
The electricity will light up the light in the light house.

Let the children demonstrate the process. The other children could shout something appropriate ("Eureka!") when they see that the light on the lighthouse is illuminated.

Read the opposite page of the BIG IDEA BOOK. Choose a child to quickly draw THE WAVE MACHINE or take a digital photo.

Let other children, in pairs, operate the machine.
Tell the children that some people, who live near the sea, use electricity that is made by the waves on the sea. There is a picture of the Wave Power Station on a display board near the lighthouse.

Show the group the picture drawn by the child. Give praise and encouragement and take the group to the WATER POWER display (Map 34).

At the display of Water Power stand the children well back so they can all see the main turbine.

Ask the children what they think the turbine is used for. *(It's for "making electricity" although some children may think it is washing clothes!)*

Make sure they understand that when the turbine is spinning:

- it makes electricity that is used to power things such as lights and computers around the C.A.T. site;
- it makes much more electricity than the wave machine;
- that the water to make it spin flows in through the grey pipe that they saw earlier on the hillside;
- that, after it has spun the turbine, the water goes into the lake outside the building.
- that it is attached to a motor and makes electricity

Tell the children that in this turbine the water spins a "Pelton Wheel." Show the children the small working model of a "Pelton Wheel" to the right of the main machine.
Let a child press the button with the palm of a hand to show how the water pushes the cups on the wheel. Tell the children that the wheel was invented in America by a man named Lestor Allen Pelton. Some people believe the inventor got the idea for the shape of the cups on the wheel by looking at a cow's nose!

Read the opposite page of the BIG IDEA BOOK. Choose a child to quickly draw one of the Pelton Wheels or take a digital photo while others take it in turn to press the button.

Show the group the picture drawn by the child. Give praise and encouragement and take the group outside the building. If the main Pelton wheel is working, show the children the stream, made by water from the Pelton Wheel turbine, as it enters the lake.

Now lead the children over the bridge, around the perimeter of the lake. Stop on the small beach opposite the LECTURE ROOM (see map).

On the beach by the lake, opposite the LECTURE ROOM, look out for the large carp fish.
Read the opposite page of the BIG IDEA BOOK. Choose a child to quickly draw one of the fish or take a photo.
Show the group the picture drawn by the child.

Now ask the children to look around and identify the upper station for the cliff railway.
Then, ask the children:

- What makes the cliff railway work? *(The weight of water pushing down.*)
- Where they think the water comes from to make the railway work? *(The water comes from the Lake.)*
- How they think the water gets from the lake to the railway? *(It flows in a stream covered by a wooden walkway.)*

Now walk along the wooden walkway, above the stream, to the small pond outside the upper lift station.

Show the children the metal grill and establish that;

- it is the place where water enters the cliff railway system;
- the metal grill prevents fish and water plants from entering the cliff railway system.

Now take the group into the UPPER STATION (Map 1)

In the Upper Station ensure the children understand the basic principles about how the cliff railway works. i.e.

- A container under the top carriage is filled with just enough water to make it heavier than the bottom carriage.
- The container under the bottom carriage has been emptied of water.
- The carriages are fastened together by a long wire cable.
- The weight of the top carriage rolling down the track pulls the lower carriage up.

Help the children identify the containers under the carriage, the wire cable and the pipes that fill each of the carriages with water.

Read the opposite page of the BIG IDEA BOOK. Choose a child to quickly draw one of the carriages or take a photo.

Show the group the picture drawn by the child and take the children onto the observation platform in the UPPER STATION overlooking the valley, woods and mountains.
On the observation platform watch the trains.

Ask the children to explain what happens to the water in the heavier carriage when it reaches the Lower Station. *(The water is let out of the carriage.)*

Explain that most of the water that comes out of the carriage goes into a stream, then flows through some pipes under the car park and into a river.

Ask the children to try and spot the river through the trees.

Read the opposite page of the BIG IDEA BOOK.

Tell the children that:

- this is the end of the activity;
- there are more pages in the BIG IDEA BOOK;
- they will read the other pages later, or back at school, as appropriate.

The remaining pages of the BIG IDEA BOOK explain the water or hydrological cycle.
The following information could be shared with the children to aid their understanding.

The Local Water Cycle

The water collected and used at CAT eventually is discharged into the River Dulas (pronounced "Dilas"). The river is a tributary of the River Dyfi. The river water meets the sea in the estuary at Aberdyfi, about ten miles from C.A.T.

Aberdyfi is an attractive, sandy seaside resort.

It is energy from the sun that causes the evaporation process.

C.A.T. , being located in the mountains of Southern Snowdonia has high levels of annual rainfall. (Four or five times as much rainfall as many parts of Lowland Britain.)

Before C.A.T. opened the site was used as a slate quarry.
Some of the machinery used to prepare the slate was powered by water. A large reservoir, to store water to power the machinery, was constructed above the site. This was filled by water from the nearby hills.

The reservoir , built for the slate quarry, is still used by C.A.T. today but is not part of the visitor circuit.
It is about 30 metres higher than the lake where the fish feed.
The grey pipe, that the children saw at the beginning of the *Water Trail*, carries water from the reservoir to the Water Powered Turbine.

The water that is used at C.A.T. is slowly going round in a circle or "cycle."

Why is this BIG IDEA so useful?

The BIG IDEA BOOK is designed to promote education for Sustainable Development. It introduces children, in simple terms, to ideas of AIR POLLUTION, RENEWABLE ENERGY and FINITE RESOURCES.

Back in school you could share the BIG IDEA BOOK with the children and discuss the following ideas:

- Using the power of water to both make electricity and to work the Cliff Railway helps the environment.
- Most of the electricity we use at home is made in power stations that burn coal, gas or oil. These power stations produce air pollution which can spoil the environment.
- Most railways and other kinds of transport, also use polluting fuels to make the power that makes them work.
- Coal, gas and oil have to be dug out of the ground before we can use them.
- These fuels took millions of years to make and we are using them up much faster than they can be made. They will eventually run out.
- Water power doesn't cause air pollution.
- As long as it rains there will be water for both the WATER POWER and the CLIFF RAILWAY.

Ideas for completing the BIG IDEA BOOK back at school.

Page 9 The water in the river goes into the sea.
The water used at C.A.T. eventually enters the sea at the Dyfi Estuary.
You could show the children a postcard picture of scenic resort of Aberdyfi.

You could combine your trip to C.A.T. with a visit to part of the Dyfi Estuary.
The sandy beaches at Aberdyfi are a safe playground for Key Stage 1 children.
There are Nature Reserves on the South side of the estuary at Ynys Hir and Ynys Las.
Small groups of well supervised children could be introduced to the diversity of animal, plant and bird species that prosper in an estuary environment.

An appropriate drawing, photo or postcard could be inserted at the foot of page 9.

Page 10 One day the water will leave the sea. It will change into clouds.
You could devise a simple test back at school to help children experience the evaporation process in the water cycle.
For example the children could put the same amount of water in a variety of containers with different surface areas. The containers could include; wide and shallow objects such as dinner plates or lids of buckets; and narrow deeper objects such as yoghurt pots. The containers could be left in the same place for a few days and the children could compare what happens to the water in each case. The water with the largest surface area in contact with the air will probably evaporate quickest.
A diagram of either sea and clouds or a test such as the one above could accompany page 10.

Page 11 Rain comes from the clouds. Some of the rain will fall on the hills near C.A.T.
Many schools visiting C.A.T. are accompanied by rain.
Before you come to C.A.T. you need to encourage children to bring appropriate clothing. Waterproof coats and wellingtons are sensible precautions. Children in tea shirts and trainers often get cold!
Children could produce drawings of appropriately and inappropriately dressed children to accompany this page.

Page 12 Rainwater will trickle into streams.

It's difficult to give key Stage 1 children the authentic experience of mountain streams. Many children, especially from urban locations don't often see or hear, fast flowing clear water.

Below the main car park at C.A.T. there is an over spill car park alongside the beautiful River Dulas.

There are some steep slate steps down to this car park from the main car park. The steps are opposite the Lower Station. At the foot of the steps you'll need to supervise the children across a narrow country lane.

This car park is rarely used by traffic in term times and is a safe place to take children so they can stand, stare and listen close to the river. You could get the children to shut their eyes and listen then collect a set of onomatopoeic words to describe the sounds of the river.

You could use this experience to complete page 12 of the book.

Some onomatopoeic and descriptive words that could be used to describe the experience of watching a mountain river or stream.

Jet ,spurt , spout, splash, rush, gush, waterfall, cascade, force, shower, drip, fountain, spring, rivulet, streamlet, torrent, rapid, race, flood, swash, eddy, whirlpool, wave, billow, surge, swell, roller, spray, running, flowing, meandering, dropping, dribbling, trickling, dripping, oozing, gurgling, spluttering, murmuring, babbling, flowing, draining, pouring , bubbling.

Page 13 The streams will go into a reservoir in the hills above C.A.T.

A photograph of the reservoir that stores rainwater for all the activities on the Water Trail is included in the BIG IDEA BOOK.

When you discuss this page in the classroom you will need to explain that the reservoir is higher up the hills that all the things the children experienced. Visitors to CAT are not taken to see the reservoir because the paths leading to it are not safe or appropriate for large numbers of people to use.

Page 14 The water will come out of the reservoir. Guess where the water will go?

Do ensure that the children understand that the water from the reservoir goes into the grey pipe that was the first stopping point on the Water Trail.

The drawing on page 14 needs to be similar to that on page 1 for the book to make sense.