Exe Estuary

Enquiry 2: Why is the Exe Estuary so important?

Context and Learning Aims

Pupils will be supported in and outside of the classroom to:

• Identify, describe and explain what an estuary is and understand how estuaries are formed;

• Understand both the physical and human features of the Exe Estuary;

• Describe and explain why the Exe Estuary is so important for wildlife;

• Describe with examples human interaction with the Exe Estuary;

• Reflect upon the ways in which human interaction can both benefit and be a disadvantage to the Exe Estuary;

• Create and compile using storyboards a persuasive advertisement designed to encourage people to visit the Exe Estuary in a manner which respects and protects its unique natural environment.
Learning and teaching activities and curriculum progression

Key Question 2.1: What is the Exe Estuary?

Show the children the aerial photograph of the Exe Estuary in Resource 2.1 and then Resource 2.2 which is a satellite image of somewhere else in the world which is a long way away but connected to the Exe Estuary. Where is it and what connects it to the Exe Estuary? The children can look at maps of the world in an Atlas or a large wall map of the world to identify the region. Can they identify the distinctive shape of the land in Resource 2.2 and link it to their maps? Resource 2.2 shows the region of Siberia in northern Russia and the link is the bird in Resource 2.3. Every year thousands of Brent Geese fly from Siberia to spend their winter months on the Exe Estuary (see Resource 2.4). They nest in the summer in Siberia but weather conditions are far too cold in winter so they fly all the way to the Exe Estuary where for them it is much warmer and there is lots of food to eat. This is called migration. What other birds do we know that migrate long distances to spend time with us in Britain? Where do Swallows and House Martins come from in Spring?

Next encourage the pupils to look again at the aerial photograph of the Exe Estuary in Resource 2.1 and orientate it with the Ordnance survey map extract of the Exe estuary in Resource 2.5. Tell them that the photograph was taken at grid reference SX959899 with the camera pointing in a SE direction. Print off a copy of Resource 2.1 for each pupil and have them stick it onto the middle of an A3 piece of plain paper. This will give them room to annotate with the following labels pointing to the correct location on the photograph:

- M5 motorway
- Starcross
- Countess Wear (area of Exeter)
- Dawlish Warren
- Exeter canal
- Exmouth
- Turf Lock
- Confluence of River Clyst with Exe estuary (the point where the River Clyst flows into the Exe estuary)
- Powderham Castle and Deer Park
- Topsham
- An area of exposed mud
- An area of exposed sand

Additional things to discuss:

- Was the photograph taken at high or low tide? How do we know this?
- Check on the OS Water Features key to find how the normal tidal limit is shown i.e. the highest point upstream that the high tide reaches. Now check on the extract in Resource 2.5. How far does it reach? The two points are in grid square SX9390. If one grid square on the map is 1km squared then encourage the pupils to estimate how far inland this is – approximately 11-12km.
Summarise for the pupils that an *estuary* occurs when a river slows and widens to flow into the sea such as with the River Exe. Here incoming salt water from the sea mixes with outgoing fresh water from the river. This creates *brackish* water (somewhat salty but not as much as pure sea water) which is really important for wildlife.

Now children can work in pairs to undertake the following Exe Estuary map work challenge:

The photographs in **Resources 2.6 - 2.12** were all taken from **The Point** in Exmouth at SX993807 but with the camera pointing in different directions. Can the children answer the following questions from the clues provided?

- The photograph in **Resource 2.6** was taken looking WSW. What is the name of the settlement in the photograph and how many different activities can you see happening on the estuary?
- The photograph in **Resource 2.7** shows the First Great Western train from Penzance to London Paddington entering Starcross. In which direction was the camera pointing when this photograph was taken?
- **Resource 2.8** shows the same train passing through Starcross railway station. How is the railway station represented on the map?
- In **Resource 2.9** is a building called Courtlands which was taken from The Point looking NNE. What is the 6 figure grid reference on the map for Courtlands?
- The photograph in **Resource 2.10** was taken looking north to the cliffs at Lympstone. How are these cliffs shown on the map?
- Powderham Castle is shown in **Resource 2.11** looking North West from The Point. How is the deer park which surrounds the castle shown on the map?
- **Resource 2.12** is a photograph of Mamhead House looking west from The Point. Find it on the map. What kind of tree surrounds the house?

The photograph in **Resource 2.13** was taken in Lympstone looking towards Powderham Castle. In which direction was the camera pointing?

The photographs in **Resources 2.14 and 2.15** were both taken in Exton. **Resource 2.14** was taken in a WNW direction and shows Exminster. How is the electricity pylon and cable shown on the map? How do we know that the area beside the river is a nature reserve?

**Resource 2.15** was taken looking NW towards Countess Wear. What is the name of the road that the bridge in the photograph carries over the estuary?

The photographs in **Resources 2.16 and 2.17** were both taken from Turf Lock at SX964861. **Resource 2.16** shows Exton railway station. In which direction was the camera pointing when the photograph was taken?

**Resource 2.17** is looking in ESE direction and shows a training centre. What kind of training centre is this?
The photographs in Resources 2.18 - 2.21 were all taken from Starcross car park at SX977822. Resource 2.18 was taken looking SE towards Exmouth Sailing Club. What is the purpose of the large concrete tower?

Resource 2.19 shows The Point in Exmouth. In which direction was the camera pointing when the photograph was taken?

Resource 2.20 is a photograph of the church with a tower in Exmouth. How is this church shown on the map?

Resource 2.21 was taken in a SSE direction and shows two people at the end of Dawlish Warren spit. Use the scale on the map to work out how far the people are away from the car park in Starcross.

Before moving on it is worth showing the children the photographs 2.7; 2.8; 2.11; 2.12; 2.13 and 2.16 again and asking them what appears in all of them. The railway comes very close to the estuary and walls had to be built to provide foundations. Today, what other function do the walls have? Encourage the children to think about storms and rising water. They also defend the land from flooding by the sea.

Key Question 2.2: Why is Dawlish Warren spit so important to the Exe Estuary?

Provide the children with the aerial photographs in Resource 2.22 and Resource 2.23. Resource 2.22 shows the Dawlish Warren sand spit and Resource 2.23 shows the narrow entrance to the Exe Estuary at Exmouth with the furthest eastern point of the spit in the bottom left hand corner of the photograph. Orientate these two photographs with the map in Resource 2.1. Looking at the map and photographs ask the children how they feel this spit of land benefits the Exe Estuary? Ask them to consider when the weather is very windy and stormy. The main wind direction comes from the SW (direction of prevailing winds) so how does this spit of land help the estuary? It provides a lot of protection to places such as Starcross as well as birds which live on the Dawlish Warren Nature Reserve behind the spit (shown by the reeds and marsh symbols on the map).

Key Question 2.3: How did the Exe estuary form?

Refer the children back to the photographs in Resource 2.1 and 2.23. Do the children think that the Exe Estuary has always looked like this? In fact the estuary is a special geographical feature called a ria. It only formed about 8000 years ago towards the end of the last Ice Age. During the Ice Age sea levels were a lot lower as so much water was stored up in ice sheets and glaciers. What is today the Exe estuary was a river flowing through a valley with wide flood plains. Can the children draw a picture of what it would have looked like? As the climate became warmer and ice sheets and glaciers began to melt, sea levels rose and flooded the low valley of the River Exe to create what it looks like today.
Key Question 2.4: Why is there so much wildlife on the Exe Estuary?

The main factor which explains the incredible range of wildlife on and in the Exe Estuary is the variety of habitats to be found there. In fact there are seven main habitats:

- Mudflats and creeks (Resource 2.24)
- Eel Grass (Resource 2.25)
- Mussel Beds (Resource 2.26)
- Saltmarsh (Resource 2.27)
- Reed beds (Resource 2.28)
- Sand dunes (Resource 2.29)
- Grazing marsh (Resource 2.30)

Divide the pupils into pairs and allocate one of the habitats to each pair. Their task is to research their habitat and then create a five slide maximum PowerPoint presentation which:

- Describes what the habitat is and why it is so important
- Provides four case studies of living things which depend upon it.

Starting points for the pupils are:
http://www.exe-estuary.org/
http://www.bbc.co.uk/nature/habitats/Estuary
http://www.wildlifetrusts.org/wildlife/habitats/estuaries
http://www.rspb.org.uk/reserves/guide/e/exminsterpowderham/
http://www.devonwildlifetrust.org/?gclid=CLb0vqqh07oCFc7JtAodjzUAQg

The Exe Estuary Officer provides a range of support for schools and children visiting the Exe Estuary. This includes accompanying children and supporting them to identify different habitats and understand how creatures adapt to changing water levels. Contact 01392 382236 or email exeestua@devon.gov.uk to find out more. Teachers bringing children to investigate estuarine life will also find the Marine Biological Society’s species identification guide very useful www.mcsuk.org
Key Question 2.5: Why do some people compare the Exe estuary to a motorway service station?

Ask the children what goes on at a motorway service station such as the one in Resource 2.31. When we break our journey at a service station what do we do – exercise; eat and go to the toilet! For many birds the Exe Estuary is very much like the motorway service station is to people. Many birds migrate very long distances from elsewhere in the world to spend time on the estuary where they can fill up on food. The very wide range of habitats that were explored by the children in Key Question 2.4 is a major reason why there is so much food – a menu with lots of things to choose from! An exercise here is to give each child an outline map of the world. They can mark and label the Exe Estuary on it. Then they can use an atlas and world wall map to identify the countries that the following birds travel from to spend time on the Exe Estuary, especially in winter:

- Osprey
- Chiffchaff
- Wheatear
- Sand Martin
- Green Sandpiper
- Avocet
- Lapwing
- Curlew
- Black-tailed Godwit
- Cetti’s Warbler

The children can find the country of origin of each bird on the world map and then produce a flight map from that country to the Exe Estuary on their outline maps. Each line will need to be labelled with the name of the bird and perhaps a photograph also.

Key Question 2.6: How do people benefit from the Exe Estuary?

Project or give out in hard copy the images contained in Resources 2.32 - 2.39. Tell the pupils that these all show ways in which people benefit from the Exe Estuary. Working in pairs, encourage and support the pupils to identify and describe what each image is showing and also to explain how people are benefitting from the Exe Estuary. Encourage discussion and questioning particularly in regard to all the different ways in which people benefit e.g.

- They have jobs directly linked to the Exe Estuary e.g. fishing for shellfish such as mussels; running ferries and boat trips; or working in a hotel with wonderful views of the estuary where tourists and holiday makers come to stay;
- Local people and visitors enjoying relaxation on the Exe Estuary, particularly water sports such as sailing, diving; fishing; water skiing; windsurfing; rowing; canoeing and kayaking;
- Activities around the Exe Estuary such as cycling; running walking or rambling;
- Bird watching from boats on the Exe Estuary or in bird reserves around its edge;
Key Question 2.7: How can we persuade people to visit the wonderful environment of the Exe Estuary?

Explain to the children that Exeter City Council; East Devon District Council and Teignbridge District Council have clubbed together to raise the £59,549 required to air a 30 second advertisement on ITV1 during a commercial break in Coronation Street. They want to persuade more people to come to the estuary but also want them to be green visitors i.e. enjoying and respecting the natural environment at the same time. The key message needs to be that the Exe Estuary is the place to come to be in harmony with nature and to enjoy nature close up – but ensuring that it is not harmed in any way. What the children are going to do is to use a number of storyboard templates to plan and visualize what the advertisement will look and sound like. Filmmakers, animators, web developers and others use storyboard templates to sketch out scenes and to ensure that a story flows with a running sequence of photographs and narrative and makes the very best use of the time available. Storyboards were first used by the Walt Disney film studio in the early 1930s in America. An example of a storyboard for Argos and which models for the children an approach that can be used, can be seen in Resource 2.40 and copies of the blank template for the children to use in their own design is in Resource 2.41. This is not a theoretical exercise for the children to undertake. Seeking sustainable solutions to recreation and tourism demand is a very real objective of councils across Britain. The children could send their storyboard ideas to the Exe Estuary Officer at the Exe Estuary Management Partnership at exeestua@devon.gov.uk

There is a very wide range of ways in which people interact with and benefit from the Exe Estuary as illustrated by the list above and the photographs. Spend some time at the end of this activity discussing with the children how people doing these activities might impact on the wildlife of the estuary. In what ways might the things that they are doing be good or bad for the wildlife?
Sample Resources from Enquiry 2. The complete set of resources supporting learning in this enquiry are available on the accompanying DVD and online at www.licco.eu

Resource 2.3

Credit: Hugh Venables

Resource 2.6

Credit: David Weatherly