Section 4- Shore Study

Teachers' background notes

Organisms which live on the shore have to be able to survive the changes which occur with the rise and fall of the tide. Some shores are sheltered and some are more exposed to the elements. The plants and animals which live in these habitats are specially adapted to the conditions around them. The shore can be divided into areas or zones.

- The splash zone - above the level of where the highest tides reach and is affected by salt spray.
- The upper shore - only becomes covered by water at extremely high tides or spring tides and therefore very few plants and animals can survive its dry conditions.
- The middle shore - is covered and exposed by the tide twice a day. It is here that most of the shore plants and animals live. They have to be able to survive the harsh conditions of being submerged in water when the tide is in and exposed to drier conditions when the tide is out.
- The lower shore - is only exposed during very low spring tides. The species which live here are delicate and cannot survive too much exposure.

Activity 1

Field trip to the shore

Before the visit

Explain to the children what causes the tide to come in and out twice daily.

The children could explore a tide timetable, record tide times and levels for a particular week and use the data to produce graphs/charts. Provide questions on the data or formulate own questions e.g. what was the highest/lowest tide? What information can we glean from the data? Are there any patterns? When would be a good time to plan the shore visit?

Activity 2

P

The tide rises….the tide falls

Ask children to think about the different parts of the shoreline and what conditions are like, at high and low tide. How do they think the tidal changes affect the organisms living there? Discuss with a partner, report back to the class.

- Establish some of the problems living things may have.
- Draw a diagram on the board to illustrate three tidal zones, high tidal zone, middle tidal zone and low tidal zone.

<u>Carry out the following activity</u>

Use a slope in the playground, a staircase or create a sloped area with chairs to represent the sloping seashore.

Position some children at the top (high tidal zone), some children in between, (mid tidal zone) and others at the bottom (low tidal zone). Use string to represent the water level. Discuss how marine animals breathe and feed when covered by water. As water level drops it becomes more difficult for the creatures living there. Children could hold their breath (not for too long!) as the string lowers and breathe when the string rises.

Key questions:

- How do these animals breathe?
- How does their habitat change as the tide goes out?
- How do they adapt to survive?

Discussions could include different kinds of shores, e.g. sheltered bays or shores, which are exposed to the open sea and take a battering from storms especially in the winter. Different threats to the organisms e.g. predators, the sun, changes in temperature of rock pools, rain water diluting the salt content of the pool.

- How do the living things adapt in order to survive?
- How do animals close to waves survive without being washed away?
- How do animals living near high tide survive long periods of time without water?

Although questions are provided here, encourage the children to come up with their own questions to explore once they understand how harsh conditions can be for the species living there.

Activity 3

Planning and preparation

Discuss having a best practice guide for visiting the shore, to have respect for living things, if a rock is moved, move it carefully and put it back where it was originally. Think about why it's important not to take too many shells away from the beach. Brainstorm ideas.

Children create their own best practice guide to behaviour on their visit. They could also be involved in doing their own risk assessment.

List the kinds of living things the children expect to see on their visit to the shore. When they return from the shore re-visit the list and add any other organisms they have seen.

Before the survey pupils could map the area of shore they will be surveying and on completion of the survey, add their results to the map and devise a key to identify them.

Activity 4 a, b & c

Shore study visit

Children work in groups of three or four, each group with a hula hoop. (Explain that a scientist would use a quadrat, a square frame, to survey a sample part of the shore. Several samples would be taken and this would represent the plants and animals found on the whole shore). Groups place their hula hoop somewhere on the shore. There should be a hula hoop placed in each tidal zone. The children then record the number of plants and animals they find inside their hoop using a tally. When they return to the classroom construct graphs to display the information and then devise their own questions. Compare animals and plants found in different tidal zones and some of the threats they face there. For this activity, you can use the identification cards (courtesy of National Trust Scotland, author unknown) to assist in classifying unknown animals and plants.

Activity 5

Surviving the changes

Rock pools on the beach can look very calm, but twice a day there is a huge change - the tide comes in, the tide goes out. When the tide is in, the rock pool can be full of water. When it goes out the pool can lose a lot of water and become warmer. Discuss with the children the kinds of threats to things living in the rock pools when the water level drops? When the waves are crashing in? Pair discussion and report back to class. In groups list three problems that marine creatures have to deal with at low tide. Complete worksheet matching activity.

Activity 6

How am I suited to my environment?

Children can work in pairs or small groups to discuss the questions on the worksheet and how each animal adapts to its environment. Each group could be given a particular animal to discuss and brainstorm their ideas before reporting back to the class.

Extension

Choose a marine animal or plant and write three questions about their physical features, in terms of how well they are adapted to their environment. Other children answer the questions, as main activity.

Additional ideas

- Children design their own imaginary sea creature and its ways of adapting to its environment including how it will protect itself from predators.
- Imagine you are a sea creature living in a cool and shady rock pool. You feel the water slipping away as the tide goes out and the hot sun is shining on you. Seagulls are circling overhead ready to eat you. What will you do to keep safe from the sun and the seagulls?

Activity 7

Beach scavenger hunt

Additional ideas

- Design an animal that could live in a particular habitat, e.g. on the edge of a road, in a wood. The children could make a model of their animal with play dough or plasticene or draw it. They need to describe their animal and say how it best suits its habitat, what challenges it faces and what characteristics help it to survive? What does it eat and who are its predators?
- When exploring the beach think about how the landscape might look at a different time of day. Look at the colours, shapes and patterns in nature. Explore the textures of different objects, pebbles, rocks, shells etc. Create a sketch pad of ideas and observations, individual or whole class. Take photos for the sketchbook. Go on a senses walk, recording what you see, hear, feel, smell, taste. Use this for creating a painting, drawing or a poem. Choose something special or unusual to draw or make a note of something you may never have noticed before.
- Look at the work of Andy Goldsworthy and children create their own work of

art using natural objects, in situ or on return from the trip.

Limpet game

Ideally this activity would follow a visit to the shore or be played whilst at the beach. Children can gently touch a limpet and notice that it tightens its grip on the rock. Discuss with them why it is important for the limpet to be able to grip the rock so tightly; that it protects it from being knocked off the rock by crashing waves and possibly being eaten by predators. Limpets grind a little groove in the rock which it fits onto. When the tide is in the limpet will move around under the water and feed on seaweed. As soon as the tide starts to go out it will find its way back to its own little groove in the rock and attach itself again.

Ask the children to space out well. If done on the shore the children can draw a big circle in the sand around themselves. Alternatively in a large space, hall or playground, children could stand inside a hoop. They are limpets and their circle/hoop is their home on a rock.

When the leader shouts, “The tide is in,” all the limpets come out of their circles and run around looking for seaweed to eat.

When the leader shouts, “The tide is going out,” the children rush back to their homes.

The leader can become a gull and he/she has to get to a circle before the limpet. If the limpet gets back too late it becomes a gull and the circle gets taken away. The gulls can only go to the circles when the tide is out and the limpets are returning.

The game could be extended to other organisms, for example after looking at the flotation bladders on seaweed and discussing what they do for the plant, the children could be seaweed floating on the water when the tide is in. Or they could be sea anemones using their tentacles for feeding and then when the tide is out withdrawing their tentacles.

Activity4a Exploring a rock pool

You are going to work with a partner and explore a rock pool on the shore. You will need a measuring stick and a thermometer.

You will be able to find and identify some animals and plants and discover how they survive in this environment.

Rock pool 1

Choose a shallow rock pool. Draw a circle around which tidal zone your pool is in.

low mid high

Measure the depth of your pool.....

Measure the width of your pool.....

Measure the temperature of your pool.....

Make a list of all the animals and plants you can find in your pool and how many of each you have found. Use the sheet provided to help you identify them. Record your results in the table provided.

Rock pool 2

Now choose another pool to explore. Choose a pool from a different tidal zone.

Draw a circle around which tidal zone your pool is in.

low mid high

Measure the depth of your pool.....

Measure the width of your pool.....

Measure the temperature of your pool.....

Make a list of all the animals and plants you can find in your pool and how many of each you have found. Use the sheet provided to help you identify them.

Activity4b Exploring a rock pool

Animal	Number found in rock pool 1	Number found in rock pool2

Compare the results from the two rock pools. Are these results what you would expect when making comparisons between different tidal zones? Can you explain the reasons for these results?

Activity4c Exploring a rock pool

Choose one animal to draw in the box below and label the parts which help it to survive.

My animal is a .....

What do you think your animal eats?

.....

What do you think your animal does in order to survive living on the shore?

Circle the ways:

Closes its shell tightly.

Crawls under seaweed.

Hides under a rock.

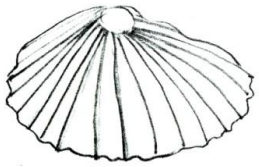
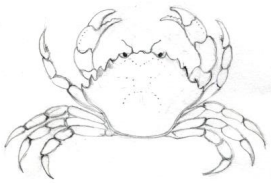
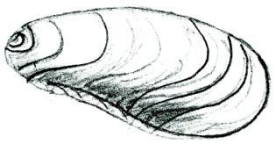
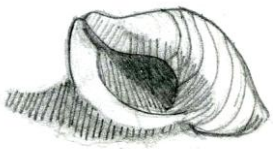
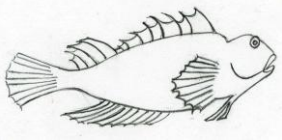
Uses suction to attach itself to a rock.

Lives in cracks to hide from the sun.

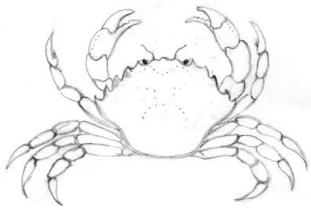
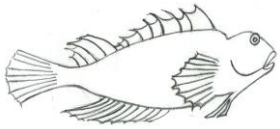
Uses camouflage to hide.

Activity 5 Surviving the changes

Cut out the pictures and phrases below. Match the pictures to the way the plant or animal adapts to its environment in order to survive. The animal or plant can adapt in more than one way.

closes its shell tight	uses fine threads to attach itself to the rocks	 limpet	crab 
uses camouflage	has an exoskeleton to protect itself	mussel 	dog whelk 
hides under a rock	has a hard shell to protect itself	blenny 	bladderwrack 
uses suction to attach itself to a rock	has small air sacks to help it float near the surface to capture sunlight	 barnacle	starfish 

Activity 6 How am I suited to my environment?

star fish 	I have spines on my body, why do you think I might need them? I have tiny tube feet under my arms. What do you think I use them for? The tips of my arms are sensitive to light and if one gets damaged I can grow it back. How could this help me?
seal 	Why do you think I need the fur and blubber I have covering my body? What do you think I use my flippers for? How do you think my long whiskers help me?
crab 	I have sharp pincers. What do you think I use them for? I have a hard outer shell. Why do you think I need this? I also have five pairs of legs. How does this help me?
fish 	I have fins and a streamlined body. How does this help me? What do you think I use my gills for? I can use camouflage to disguise myself under water. How does this protect me?

Activity 7 Beach Scavenger Hunt

You are going to go on a beach scavenger hunt. Find each of the following. You can draw the items which can't be brought back to the classroom.

something spikey 1 point		*three different shells* 3 points	
something bumpy 1 point		*five different stones* 4 points	
bird tracks 5 points		*something shiny* 2 points	
something man-made 2 points		*something made of wood* 2 points	
a feather 3 points		*something made of metal* 3 points	
something with joints 5 points		*something which hangs on the rocks and is difficult to lift off* 4 points	
something which is hiding 4 points		*an animal with more than two legs* 5 points	
two colours of seaweed 3 points		*a shell with growth rings* 3 points	

How many paces wide is the beach? Estimate first.
How many waves crash into the shore in one minute? Estimate first.
Finally find something which is special to you. Why is it special?

END OF SECTION FOUR