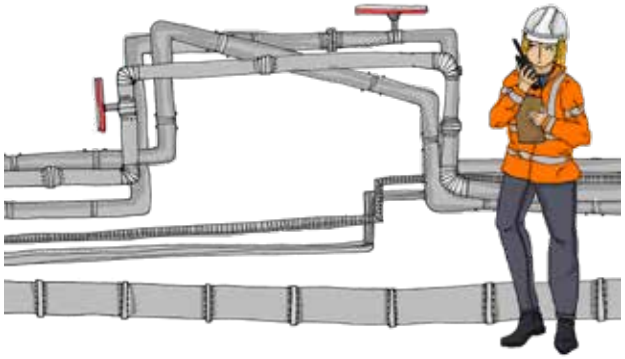
SeaScapes
Tyne to Tees, shores and seas

Going Deep Into the Past

Your story-telling banner kit includes

- 2 banner support stands
- 1 banner rail
- 1 fabric banner with sewn-in magnetic discs
- 22 fabric shapes (characters, objects, places) with sewn-in metal discs (for applying to the banner)



Set up

1. Set the support stands up 2.5 metres apart (NB. this is the full width of the banner)
2. Attach the rail
3. Attach the banner to the rail taking care not to snag the material as you clip it into the hoops
4. Place a table (or tables) close to the banner, without obscuring it
5. Put the applique fabric shapes on the table(s)

The concept

The banner forms a backdrop scene upon which you place illustrated fabric shapes depicting characters and features that together provide a framework for telling a story.

During story telling there is a lot of opportunity for engagement through pointing out features within the scene, asking questions and inviting people to place the shapes on the banner.

YOU'RE NOW READY TO BEGIN!

The story telling process

The main interaction that your audience has (apart from answering questions and discussing points raised) is to find the fabric shapes on the tables and then, on your instruction, place these carefully onto the banner.

The prompt notes below suggest various points at which these fabric shapes are to be found and added AND highlight opportunities for people to identify and point out features within the illustrated banner scene.

Story outline

Our coast and our sea are amazing places.
They hold so many secrets.

We're going to unlock some of these secrets together by looking for clues big and small.

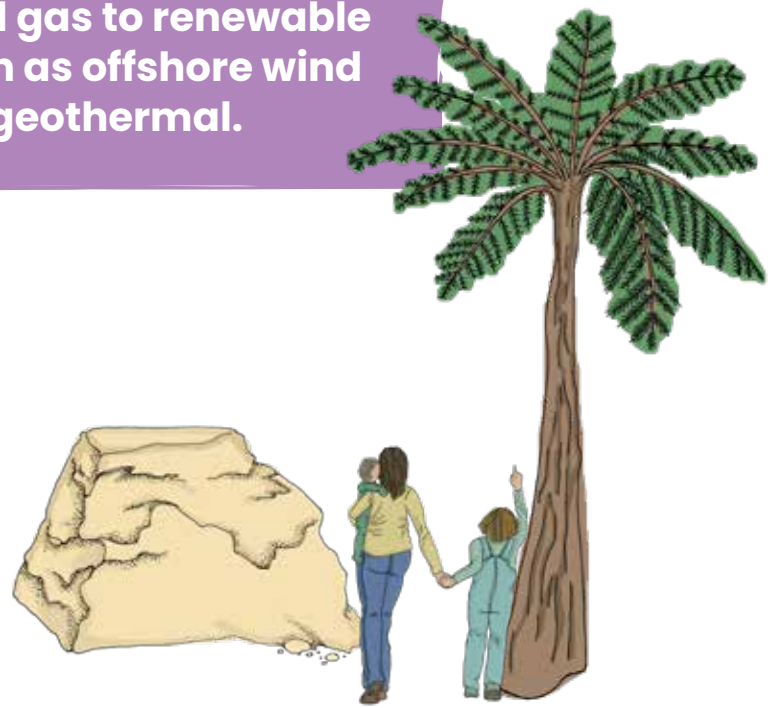
These clues will help us explore and think about the deep distant past – a time long before humans were even around.

And they'll help us think a little about the future too.
A visit to the coast will never be the same again!

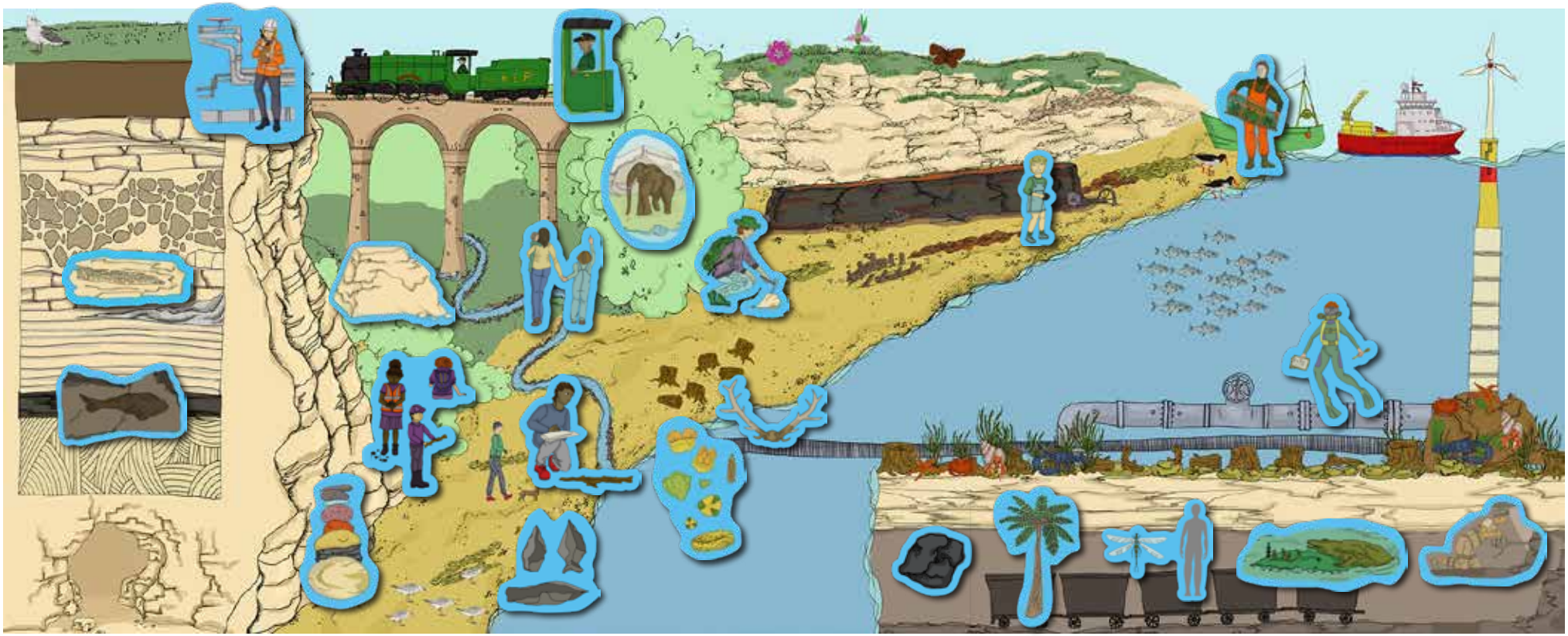
Key headline messages

Our coast has an ancient history as a place of long-lost landscapes and civilisations stretching back into geological time.

Our coast has powered the nation, moving from polluting coal, oil and gas to renewable energy such as offshore wind power and geothermal.



Placement positions for shapes



Chapter 1:
From ancient swamps to a forest of turbines

Q

Have you ever found something when you've been walking on the beach and wondered what it was or where it came from?

ACTION

Invite the children to find the CHILD HOLDING COAL and add it to the banner.

Q&A

Can anyone tell me what this child is holding in their hand?
A lump of coal.

Q&A

Where do you think this coal might have come from?
A coal mine.

Deep underneath the ground along our coast there are bands, layers or 'seams' of coal that stretch out to sea, far below the seabed.

ACTION

Invite the children to find the mine workings on the banner.

Q&A

How do you think the coal was taken out of the mine?
The coal was taken out of the mines in wheeled wagons, called 'tubs' locally.

Originally these tubs were pulled by people and by pit ponies, but in more recent times they were moved by diesel locomotives.

ACTION

Invite the children to find MINER MINING and SHINY BLACK LUMP OF COAL and add these to the banner.

For over 100 years waste rock taken out of the mines was dumped onto our beaches – millions of tonnes of it. Some of it piled high along the bottom of the cliffs and some of it was washed away by the sea. When coal mining stopped along our coast, there was a huge clear up of this mine waste (Turning the Tide). However, occasionally, you will still find bits of coal washing up on the beach. Very occasionally, you might also find old miners' boots and rusty pieces of mine tubs or conveyor belts exposed by a low tide.

Q&A

Can anyone tell me what coal is?

It is a rock. It is formed from the squashed fossilised leaves, stems, branches and trunks of plants that grew millions of years ago.

The coal along this coast dates back to around 310 million years ago - a time we call the Carboniferous. At this time our coast was in a totally different part of the world, and it wasn't a coast it was a giant, hot, steamy, swampy river delta.

It was full of strange plants and animals...

Dragonflies as big as seagulls.

Strange looking amphibians, way bigger than any toad or frog you've ever seen.

Weird knobbly trees that looked nothing like the trees that you'll find growing around here today.

ACTION **Invite the children to find TREE FERN, DRAGONFLY, AMPHIBIAN and add these to the banner.**

When the plants in this ancient Carboniferous swamp died, they formed first into a sort of peaty soil. Then, over millions of years, these layers of peaty soil got buried under other sediments.

As they got squished under the weight of sediment layers above them they heated up in the earth's crust and eventually turned into a hard rock.

The coal and coal waste sometimes reveal plant fossils.

Most fossils are not the remains of plants themselves but the imprint or impression of plants turned to rock. Sometimes, though, a woody tree stump is preserved.

Q&A **Can anyone tell me why people mined for coal?**
Coal was an important form of energy used in industry and transport and as a source of heat in people's homes.

Coal mined along our coast during the 19th and 20th centuries helped to power our nation.

Places such as Seaham, Sunderland and Hartlepool shipped out huge amounts of coal.

Just occasionally the sea reveals clues about past shipping as the remains of an old ship wreck are exposed by a storm or low tide (e.g. Seaton Carew).

Over time the power of waves and currents and the build-up of sand erases all traces of these wrecks.

ACTION **Who can find the shipwreck on the banner scene?**

Later, during the 20th century, coal was sent around the country not in ships but via the railways.

ACTION **Invite the children to find the STEAM ENGINE DRIVER and add him to the banner.**

Q **Who here has seen or heard a steam engine? How did it make you feel?**

Steam power ruled the early years of the railway, with coal being in huge demand to fire the boilers of the locomotives.

These were later replaced by diesel and then electric engines.

During the 1980s and 1990s a lot of coal mines along our coast closed.

One reason for this was the increased availability of North Sea gas. Out in the North Sea there are giant platforms where drills bore deep down below the seabed to find gas. The gas is then piped to Teeside through a maze of pipelines from where it is distributed around the country to power stations, homes and industries.

ACTION **Invite children to spot the gas pipeline in the banner scene.**

ACTION **Invite children to find the DIVER and add it to the banner scene.**

Divers have to inspect the pipelines and other bits of underwater equipment to make sure they're safe and in good condition.

Q **How would you like to dive down to the bottom of the sea?**

Q&A **We talked a bit earlier about fossils but do you know what the phrase 'fossil fuel" means?**
Fossil fuels formed millions of years ago when organisms died, decomposed and were buried deep in the earth, eventually forming carbon-rich deposits. Fossil fuels are non-renewable, meaning that once they have been used up, they cannot be replaced.

Why do you think a lot of coal mines along our coast closed in the 1980s and 1990s? Although coal might be a thing of the past, the mines here on this coast are helping to meet our future energy needs in a different way – geothermal energy! Deep down in the mines the temperature is much higher than at ground level. The heat inside the earth is constant and endlessly renewable, making it a great form of energy for the future.

ACTION **Invite children to find the MINE WATER ENERGY PLANT MANAGER and add her to the banner.**

ACTION **Invite the children to look on the banner and find another way that the people on this coast are helping to power our nation for the future.**

Out at sea a little way from our coast there is one of the biggest offshore windfarms in the world.

Q **Do you think wind power at sea is a good idea? What are some of the benefits and problems of having wind turbines out at sea?**

Our coast has a long history of engineering and ship building. These skills are needed to transport and install wind turbines at sea. Special ships carry the different parts of the wind turbines and the equipment needed to fix the turbines firmly to the seabed.

ACTION **Invite the children to spot the wind turbine service ship on the banner.**

Chapter 2:
A totally tropical past

Stories in the stones

In our first chapter we began with a child finding some coal on the beach.

The rocky, pebbly beaches along our coast have lots of other clues which can help us discover other stories about our distant past.

ACTION **Invite children to find the SCHOOL GROUP who are studying rocks and pebbles and to add it to the banner.**

These school students are studying pebbles on the beach. They are looking for clues about what life along this coast was like around 200 million years ago – a time we call the Permian.

Q&A **Do you know what someone who studies rocks is called?**
A geologist.

Geologists find our coastline really interesting because it has so many clues about events that happened in the deep distant past.

If you fancy becoming a geologist you'll need to learn a whole load of strange names. For example, you'll need to know about something called a stratigraphic column. A stratigraphic column is a way of thinking about the age order of rocks.

ACTION **Find the GEOLOGIST and add him to the banner**

ACTION **Invite the children to spot the stratigraphic column on the banner**

This is a stratigraphic column and it shows different layers of rock which together tell us what happened over a period of several million years. These layers represent the age order of rocks.

Q&A **Can anyone tell me where they think the oldest rocks are on the stratigraphic column?**
The oldest rocks are shown at the bottom; the youngest at the top.

The stratigraphic column is like a story book with each distinctive layer of rock being a different chapter (typically with the oldest rocks found below younger ones). The magnificent limestone cliffs that we see along our coast reveal some of these layers, helping us to understand the changing nature of the environment over millions of years.

Our Permian story starts when our bit of coastline was a hot, tropical sandy desert lying close to the Earth's equator.

Q **What do you think of when you hear the word desert?**

You might think of towering sand dunes blown by the wind. That is exactly what the environment was like.

ACTION **Point out the desert layer on the stratigraphic column.**

Q&A **Q&A What do you notice about the pattern of this layer?**
It has swirly, overlapping patterns. These 'cross cutting beds' were formed from layers of wind blown desert sands.

ACTION **Point out the Marl Slate layer on the stratigraphic column.**

The next chapter in our column is marked by a rock that geologists call Marl slate. This rock reveals a sudden and dramatic change from desert to sea - well, sudden in a geological timescale, which probably means over tens or hundreds of thousands of years! Geologists know this because this layer of rock contains a lot of fish fossils.

ACTION **Invite the children to find the FISH FOSSIL and add this to the banner.**

ACTION **Invite the children to find the CLUSTER OF PEBBLES and add this to the banner. Explain that the pebbles we find on the beach often tell us what kind of rocks we find in the sea cliffs or on the seabed. When they tumble around in the sea, they are smoothed and rounded.**

Q **Which one of these pebbles looks like it came from the Marl Slate layer? (pointing to the CLUSTER OF PEBBLES)**

The next layer on our rock column (limestone) reveals that for a while our bit of the coast was on the edge of a shallow tropical sea.

Q **Who has heard of the Great Barrier Reef?**

This shallow tropical sea was very much like the modern-day Great Barrier Reef.

One of the reasons we know this is because in some places along the coast you'll find limestone cliffs which have pieces of fossil reef in them.

The creatures that made up this Permian reef were different to those you'd find on a reef today though.

ACTION **Point to the stratigraphic column and highlight the thin white layer of salt deposits.**

This little band represents a period of time during the Permian when there was a drop in sea levels and the very shallow salty water was baked dry under a hot sun and evaporated.

ACTION

Point to the stratigraphic column and highlight the layers of limestone above.

The thick layers above are mainly formed of limestone, but with alternating salty layers mixed in. This tells us that there were periods when sea levels rose (when limestone was created) and fell (when salty layers formed) during the Permian.

DID YOU KNOW?

Limestone is a sedimentary rock. The word 'sedimentary' describes rock that forms when small particles (e.g. tiny shell fragments, fish bones, bits of sand) settle as 'sediment' at the bottom of lakes or seas. Eventually these sediments are buried and squished into hard layers.

Q&A

Can anyone tell me where you might see limestone rocks on our coast today?
The main rocks that form the cliffs along our coast are known as Magnesian Limestone.
There is also a great thickness of Magnesian Limestone beneath the seabed off shore.

These limestone layers sit on top of the much older Carboniferous coal that we talked about earlier.

Over millions of years, powerful forces in the Earth moved these rocks from where they were originally laid down to where we find them today in our cliffs. You won't find the salty layers anymore though, because they have been dissolved away by rain and seawater. We know this because of something geologists call 'breccia formations' (sounds like 'brech-ee-ah')!

ACTION

Invite the children to spot the breccia on the stratigraphic column.

Here, in places, the limestone layers have collapsed into a jumbled mess. So what is going on? The salty layer that formed in the Permian period, dissolved away causing the limestone layers above to collapse. Marsden Bay is a good place to see this.

Q

Has anyone played the game Jenga? It's a game where you try to remove little blocks of wood from a tall stack without making it fall down.

If you think of our layers of rock a bit like a Jenga stack, it can help you understand what has happened in places along the coast.

ACTION

Invite the children to find the CANNONBALL LIMESTONE and add it to the banner.

Q

Who can tell me why this is called cannonball limestone?

Chapter 3:
The power of ice and water

Q

Who has seen the film Ice Age? Can you describe what an ice age was like?

ACTION

Point to the GEOLOGIST character already on the banner.

Our geologist is hunting for some clues about what happened to this coast at the end of the last Ice Age about 20,000 to 15,000 years ago.

He's found some little clues and some really really big ones too!

Let's start with a little clue shall we?

ACTION

Refer to the CLUSTER OF PEBBLES shape added previously to the banner. Point out the granite pebble.

Our geologist character has found this pebble on the beach. It is made of a type of rock called granite. Like all pebbles on the beach, it was originally a bigger chunk of rock that over time has been smoothed and rounded by the sea. And like all chunks of rock, it came originally from a much larger rock.

Our geologist is slightly puzzled because he knows that there is no granite anywhere around here. But he does know some other places where there's granite rocks. One of these places is Scotland. The other is Norway.

Q

Who knows where Norway is?

So, what have a little granite pebble, possibly from Scotland and Norway, got to do with the last Ice Age? Before we answer that, let's see what other clues our geologist has found. A big clue this time.

ACTION

Invite the children to point out the dene on the banner.

Our geologist is puzzled by how the denes that cut down through the cliffs at various places along this coast formed.

Q

Who has visited a dene? What was it like to visit?

ACTION

Invite the children to add the FAMILY IN DENE to the banner.

This family is visiting the beautiful woodland nature reserve in one of the denes.

Our geologist has visited the denes too and, whilst he was there, he discovered some limestone boulders as big as houses lying on the valley floor!

Invite the children to find the BOULDER IN DENE and add these to the banner.

Our geologist knows that most valleys form over thousands of years as the rocks are gradually worn away by powerful streams or rivers. But there is only a tiny stream flowing through this dene. Surely it would take a torrent or flood of water to carve out such a large and deep valley, and dislodge great boulders the size of houses!

Our geologist ponders how the clues he's found explain what happened at the end of the last Ice Age. He recalls the misplaced granite pebble on the beach, and now the huge boulders lying in the bottom of a steep-sided dene.

Invite the children to add the WOOLLY MAMMOTH to the banner.

As the climate warmed at the end of the last Ice Age, the huge ice sheets began to melt, creating fast flowing rivers. These carried huge boulders towards the coast, carving out the steep-sided denes.

And so, we return to our stratigraphic column for the last time!

Point to the top layer on the stratigraphic column.

This top layer is called boulder clay (or till). It is the final part of this Ice Age story. Till is a jumbled mess of large stones and crushed up gravel dumped by the ice sheet as it passes over the land and melts. Many of the pebbles that you find on the beaches along our coast come from till.

So, next time you visit the coast you'll know what clues to look out for, and you can impress your family and friends with stories about the amazing power of ice and water!

Chapter 4:
Lost forests beneath the sea

If you look out to sea today it is very difficult to imagine that there was once dry land extending far out from the present day coastline.

How do we know this? Let's find out.

In the past, local fisherman have occasionally found deer antlers caught up in their nets and lobster pots. That's strange, because we all know that deer don't live in the sea, right? Deer live in places where there are trees; they live in woods and forests.

ACTION **Invite the children to find the FISHERMAN WITH LOBSTER POT and place him on the banner.**

ACTION **Invite the children to place the DEER ANTLERS onto the banner.**

There's a place on the coast, near Hartlepool, where an ancient forest is sometimes revealed from beneath the sand. You'd be very lucky to see it, as it has only been seen in the past after a big storm has shifted the sands and when there is an unusually low tide.

ACTION **Invite the children to identify signs of the ancient forest on the banner (both shoreline and seabed).**

Q&A **Can anyone tell me what an archaeologist does?**
Archaeologists learn about the past human lives by studying sites, excavating (or digging), classifying (sorting), recording and preserving objects.

Archaeologists have dated the ancient forest at Seaton Carew, near Hartlepool, to around 7000 years old.

They've been able to work out what kind of trees once grew there! They've even found evidence that people lived and hunted in the forest.

ACTION **Invite the children to find the ARCHAEOLOGIST and to place him on the banner.**

ACTION

Hold up the POLLEN GRAINS and ask the children...

Q&A

Can anyone tell me what these strange looking things are?
(Clue: They can make you sneeze. Bees spend a lot of time collecting them. They are very very small).
Pollen grains.

By examining the muddy sediment from around the tree stumps, archaeologists have collected pollen (as well as nuts and seeds) from which they've been able to work out what kind of trees once grew in the forest.

Willow, birch, hazel, oak, beech and fir trees all grew there.

ACTION

Hold up the KNAPPED FLINT TOOLS and ask the children...

Q&A

Who can tell me what these are?
They are ancient Neolithic flint tools.

Neolithic (or Stone Age) people living in the forest left signs of their hunting activity in the form of small, sharp pieces of flint.

By chipping away at blocks of hard flint (a type of rock) these early people made blades and edges which could be used as knives, arrows and spear heads.

The bones of wild boar, red deer and elk discovered in the peaty sediment of the ancient forest show that there were plenty of big animals around to hunt.

Chapter 5:
Our constantly changing coast

All through our story we've seen how our coast is constantly changing - from swamps and deserts to giant ice sheets and submerged forests.

These changes have happened over thousands and millions of years.

But even in our own life times we can see change.

If you had walked along much of our coast 30 years ago, you wouldn't have recognised it.

Waste from the coal mines and industry spilled over cliffs and covered the beaches, stretching out to sea.

Now, thanks to lots of people cooperating, the coast has been cleaned up and is once again home to wildlife.

ACTION

Invite the children to find the various land and sea creatures which today inhabit our coast.

Bee orchid

Bloody Cranesbill

Durham argus

Lobster

Crab

Starfish

Kelp

Kittiwake

Oystercatcher

Sanderling

It's our job to make sure that we don't spoil our coast and seas so that future generations can enjoy visiting, living and working here.

Q

What do you think are some of the ways that we can help protect our coast and seas?