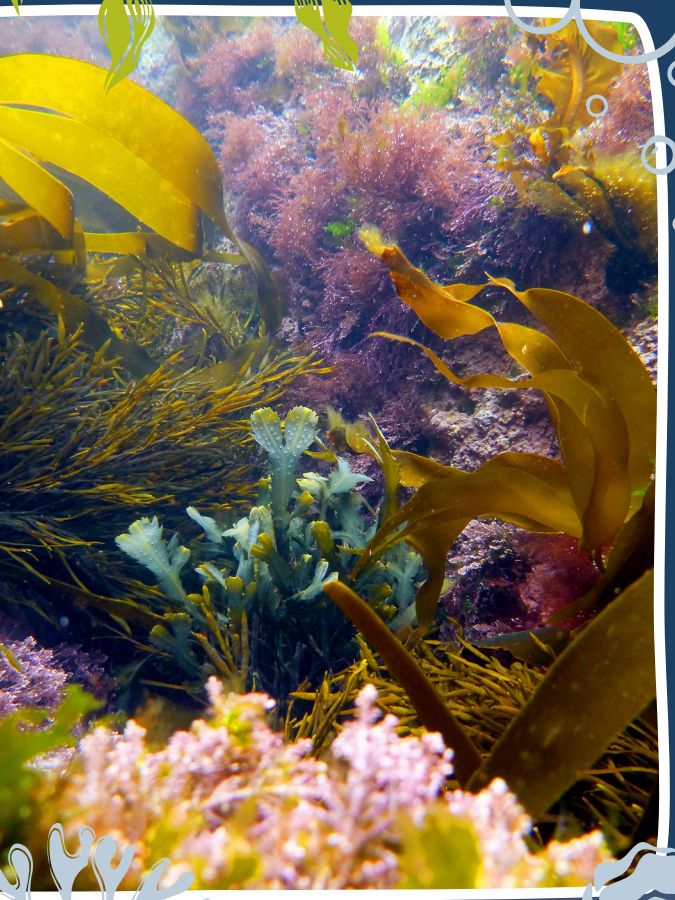
GALLOWAY AND SOUTHERN AYRSHIRE BIOSPHERE

Solway Firth Partnership



BLUE BIOSPHERE: A RESOURCE FOR MARINE AND SUSTAINABILITY EDUCATION

"Our pupils benefitted immensely by taking part in the rich outdoor learning opportunities you provided for all stages. You covered many science learning outcomes. Our pupils especially enjoyed the beach clean and pond dipping activities, which taught them more about their local environment and wildlife. It made them more aware of environmental issues and encouraged them to explore their local area"

Fiona Young
Principal Teacher,
Glenluce Primary School

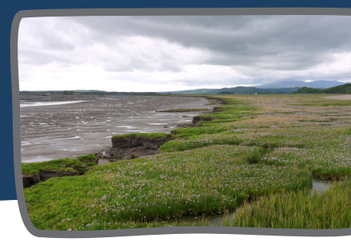
CONTENTS

Solway Firth Partnership works with partners on a wide range of projects to bring marine environment issues to the attention of their local community. We provide schools, colleges and youth organisations with a range of beach cleaning equipment and learning resources that offer topic based cross curricular learning for Sustainable Development Goal 14 Life Below Water.

THE SEVEN PRINCIPLES OF OCEAN LITERACY
(SOURCE: UNESCO)

1. Earth has one big ocean with many features
2. The ocean and life in the ocean shape the features of Earth
3. The ocean is a major influence on weather and climate
4. The ocean makes Earth habitable
5. The ocean supports a great diversity of life and ecosystems
6. The ocean and humans are inextricably interconnected
7. The ocean is largely unexplored

INTRODUCTION



WHAT IS A BIOSPHERE?

The Galloway & Southern Ayrshire UNESCO Biosphere is a region of southwest Scotland that has been recognised as a world class environment for people and nature. The Biosphere designation was awarded by the United Nations Educational, Scientific & Cultural Organisation in 2012 to recognise special landscapes which support many rural communities and a rich biodiversity of plant and animal life. The UNESCO Biosphere designation represents a collective goal of living in harmony with nature: in Galloway and Southern Ayrshire people have a beautiful place to live and work, to connect with the land and the sea, and to celebrate a shared cultural heritage. Biospheres are also 'learning places for sustainable development', as defined by UNESCO's Man and the Biosphere programme, and great places to base Learning for Sustainability. The Scottish Government's Learning for Sustainability Action Plan defines learning for sustainability as: 'a cross-curricular approach which enables learners, educators, learning settings and their wider community to build a socially-just, sustainable and equitable society; and as an effective whole-setting approach which weaves together global citizenship, sustainable development and outdoor learning to create coherent, rewarding and transformative learning experiences.'

It provides a mechanism for promoting and working towards the UN's Sustainable Development Goals which link directly to the Scottish Government's National Outcomes. As one among a global network of more than 700 UNESCO Biospheres, Galloway and Southern Ayrshire is the perfect place to grow consciousness on environmental protection on sea and land, awareness and responsibility, and to expand thinking on sustainable futures.

LEARNING OUTCOMES

CURRICULUM FOR EXCELLENCE LEARNING OUTCOMES & 4 TOPICS.

TOPIC 1: MARINE LIFE

Learning Outcomes:

- Distinguish between the different coastal habitats of the Biosphere: saltmarsh, sandy beaches & rocky shores, seagrass meadows & kelp forests, sea cliffs, and deep marine.
- Identify and classify plants and animals associated with the coastal habitats of the Biosphere.
- Recognise how animals and plants have adapted to their coastal habitat.
- Describe the food chains in different coastal habitats in the Biosphere.
- Discover how marine animals communicate in the ocean.

Experiences & Outcomes:

SCN 0-01a, SCN 1-01a, SCN 2-01a, SCN 1-02a, SCN 2-02a, SCN 2-11a, SOC 1-07a, SOC 2-07a, EXA 1-17a, EXA 2-17a, EXA 1-03a, EXA 2-03a, MNU 2-11b, MNU 2-10c

TOPIC 2: COASTAL COMMUNITIES

Learning Outcomes:

- Recognise the coastal towns and villages of the Biosphere
- Learn how people use the coast for recreation
- Recount coastal heritage sites of the Biosphere
- Discover history, stories and myths associated with the coast; castles, lighthouses, mermaids

Experiences & Outcomes:

SOC 1-03a, SOC 2-03a, SOC 1-04a, SOC 2-04a, SOC 2-10a, ENG 1-31a, ENG 2-31a, LIT 1-01a / LIT 2-01a

TOPIC 3: THE OCEAN AND US

Learning Outcomes:

- Recognise how plastic enters the marine environment and its impact on marine life.
- Discover how everyone can help to prevent plastic pollution in the marine environment.
- Discuss the impacts of climate change on coastal erosion and how marine ecosystems protect the land.

Experiences & Outcomes:

SCN 1-04a, SCN 2-04a, SCN-20a&b, TCH 1-06a, TCH-02a, TCH-04a TCH 2-06a, SOC-08a SOC 1-08a, SOC 2-08a, LIT-06a, LIT-26a

TOPIC 4: ACROSS THE WORLD

Learning Outcomes:

- Discover other Biospheres across the world
- Describe how our Biosphere boundary meets other protected areas in the sea.
- Name different marine animals and habitats around the world
- Learn how climate change is impacting tropical marine ecosystems

Experiences & Outcomes:

SOC 1-12b, SOC 2-12a, SOC 1-13b, SOC 2-14a, SCN 0-20a, SCN 2-20a, SCN 2-01a, SCN 1-02a, SCN 2-02a, ENG 1-31a, ENG 2-31a

TOPIC 1 MARINE LIFE

TOP TIP!

Download our fun Scottish or Not-ish Game from the GSA Biosphere website to guess which marine animals live around our coasts! **www.gsabiosphere.org.uk**

Using photocopies of the Marine Habitats map on page 6/7 for each pupil or group, start to explore – Where are we on the map? Where on the map have pupils visited? And what wildlife did you see there? Ask pupils to draw wildlife where they think it lives on their own copy of the map. Encourage them to think about dolphins (off-shore), sea birds (sea cliffs), crustaceans like crabs, fish, starfish, etc. Use the cut out tokens at the back of this booklet to help explore the topic.

INTERTIDAL-ZONE

The inter-tidal zone is an important habitat for many creatures. From sandy beaches to rocky shores and rock pools, this zone is bursting with life from cephalopods such as octopus, to hermit crabs and mussels.

1. Explore the shoreline by tasking pupils to find as many different items on the beach as they can in 30 minutes. Using circles in the sand, sort items in different ways to suit the group: colour, animal/plant, natural/un-natural. Identify the creatures using ID sheets and sort further – for example molluscs or crustaceans.

   TOP TIP – **Download the iNaturalist app on to your phone to identify your findings!**

2. Shell Identification: Collect a tray full of different types of shells. Use shell identification keys to work out what they are. Create fact cards with a picture on one side and what type of animal it is on the other (mollusc/crustacean), include what it eats & where it lives.

3. Marine Treasure Chest. Find a cardboard box and decorate it as a Marine Treasure Chest. Over a term, as a class, gradually fill it with items found on the beach. Make and decorate luggage labels with the name of the item and a fact about it. When anyone finds something different, bring it in, show it to the class and add it to the Treasure Chest. At the end of the term, return the natural treasure items to the coast (but not the man-made items). Alternative for P1-4: A pre-prepared Marine Treasure Chest 'found' on the beach with items for pupils to investigate.

4. Beach game: Limpets! Limpets are a mollusc that stick themselves to a rock with a kind of natural glue at low tide to protect them from predators like sea birds. When the tide comes in and they are covered by water, they move around, feeding off algae on the rocks. To play the game: Each child finds a spot on the sand and draws a circle which they stand in. Two people are gulls. At 'High tide' limpets venture out to find food (run around), but when the leader shouts 'Tide's Out!' they have to run back to their spot without being caught by a gull. If they are tagged they become a gull.

5. Visit the beach on a falling tide. Put a stick with a brightly coloured ribbon tied to the top in the sand at the point where the water is. Make a note of the time. At the end of the session measure how far the tide has gone out and note the time. Work out the speed of the falling tide.

TOPIC 1

MARINE HABITATS

AYR

CUMNOCK

DALMELLINGTON

GIRVAN

NORTH CHANNEL

THORNHILL

DUMFRIES

NEWTON STEWART

STRANRAER

CASTLE DOUGLAS

KIRKCUDBRIGHT

WHITHORN

COASTAL HABITAT KEY

- Sea cliffs
- Rocky shores
- Shingle
- Sandy beach
- Sandy mud
- Salt marsh
- Sea grass

MAP UPDATED 2024

COASTAL SCAVENGER HUNTS

1. **Find 5! Create a list of five things to find. For example, plant, shell, rock, something that was alive, something non-natural.**
2. **Find 5 different rocks. For example: colour, texture, shape, patterning, size.**
3. **Find 5 different kinds of shells. Identify them using guides.**
4. **Use DIY colour cards to challenge pupils to find things of different colours.**
5. **Litterpick: Complete a litterpick on a stretch of coastline. For further learning - Look at all the litter and consider where it came from, how it got into the sea, what kinds of materials is it made of?**

TAKING A CLASS OUTDOORS

Tips on taking children to the coast:

- Tides can come in fast, check tide times in advance and plan your visit accordingly.
- Check for unsafe items when beachcombing with a class.
- Do not touch jellyfish or dead animals with bare hands.

MUD & MERSE

In Scotland, saltmarsh habitat is known as 'merse'. The Solway Firth's mud, sand and merse is a safe environment from predators for many creatures, and it provides winter food in the form of coastal grasslands, saltmarsh plants, and invertebrates in the sand and mud. The winter is a fantastic time to see thousands of waders, ducks, geese and swans which arrive from the North to overwinter here on the Solway Coast.

1. Marvellous Migration. 'Flyways' are routes that migrating birds use all around the world. Investigate different flyways and the birds that use them, this can be combined with investigating sea currents and global wind patterns to see how they correlate with the flyways to create the basis for an epic global investigation project that will show just how connected our world is!
2. Choose one species of wetland bird found here in southwest Scotland and investigate the different countries and habitats they visit on their migration. Good examples are: ospreys migrating to Africa in September, brent geese migrating to Arctic Canada in August, wigeon migrating to Arctic Russia in March. In spring/autumn, the class can follow a live tracking website of tagged birds as they undertake their migration.
3. Mud dipping. Visit a muddy beach and use buckets and spades to see what creatures you can find in the mud! Return them afterwards for the birds to eat.
4. Put pre-prepared pictures of mallard, little egret, shelduck, redshank and osprey around the room with a fact written underneath. If you have binoculars challenge pupils to some indoor bird spotting, asking them to draw what they see and the fact. Or simply hide the birds around for pupils to find!
5. Use the website **https://xeno-canto.org/** to listen to songs and calls of different coastal birds. For example, curlew, wigeon, heron, pink footed geese, puffin and kittiwake. Use or make musical percussion instruments to imitate coastal birds.
6. Ospreys are large birds of prey that spend the winter in mangroves in West Africa, while in summer they migrate to Scotland to nest, and fish in shallow coastal habitats including harbours! Ospreys make a huge nest using sticks of nearly 2m across! On a beach (or woodland), collect lots of sticks and driftwood and make a huge osprey nest, big enough for everyone to get inside! Feel like going one step bigger? Sea Eagles have started to return to Scotland. Our largest bird of prey, an adult wing span is over 2m. Create a nest big enough for two adult sea eagles and two chicks!
7. Saltmarshes are part water, part land, known as coastal wetlands, which are flooded and drained by the tide. They consist of deep mud and peat, meaning they're very boggy, with low-growing plants and specially adapted organisms. Saltmarshes are home to many different species, including fish, mammals and birds. To see exactly how saltmarshes work, type in 'Secrets of Saltmarshes' on Youtube and click on the video by the Wildfowl & Wetlands Trust. Watch the video and try the quiz:

   In autumn, what is trapped in decaying plants?
   (Carbon)

   In what season do saltmarshes attract lots of wading birds?
   (Winter)

   In spring, saltmarshes become green and vibrant but how do these new plants appear and grow?
   (From seeds swept in from autumn/winter tides)

   What plant provides vibrant colour in summer?
   (Sea Lavender)
8. Saltmarshes are important for both native and migratory birds to raise their young in the high grass and to feed on fish and insects. One migratory bird that you can find on the saltmarshes of the Galloway and Southern Ayrshire Biosphere is the light-bellied brent goose. Brent geese migrate from Arctic Canada via Greenland or Iceland, travelling around 3,000km. Step Challenge! Pretend each step equals 1km. Using a pedometer (even on your phone) can you walk the same distance as brent geese fly?

SEAGRASS MEADOWS & KELP FORESTS

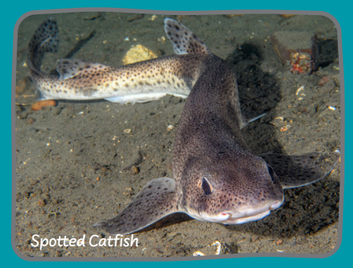
Seagrass meadows are important habitats around the world for wildlife, as well as a locking away carbon from the atmosphere. Seagrass meadows can be found in shallow, sheltered marine areas and are very vulnerable habitats. They can be found right here in the Solway.

The differences between seagrass and seaweed are:

- **Seagrasses are flowering plants, seaweeds are algae.**
- **Seagrasses have roots and leaves. Seaweeds use 'holdfasts' to anchor to objects and have fronds.**
- **Seagrasses produce flowers, seeds and fruit, seaweeds produce spores.**
- **Seagrass gets its nutrients from the seabed, seaweed gets nutrients from the water column.**

Eelgrass (Zostera) is a type of seagrass which is found in the GSA Biosphere. Scotland's coastline is home to 20% Zostera (eelgrass) habitats in NW Europe. Seagrass meadows can absorb carbon dioxide up to 35 times faster than tropical rainforests, and the carbon sink of the sediment lasts longer than trees, meaning they are important habitats for carbon sequestration. When they are destroyed, carbon is released, contributing to the buildup of greenhouse gases in our atmosphere. The roots anchoring seagrass to the seabed stabilise the sediment and prevent coastal erosion by absorbing the impact of storms.

Seagrass meadows hold up to 40 times more biodiversity than sandy seabeds. Creatures living in the seagrass habitat filter and clean water. Shrimps, other creatures and the movement of water itself all pollinate the seagrass flowers. They are nurseries for juvenile animals such as pipefish, flounder, Atlantic cod, and small spotted catshark, and in this way, they also support fisheries.



Twenty per cent of seagrass meadows around the world have disappeared since the late 19th century. In this time the UK has lost over 90% of seagrass meadows and 50% of these losses have been in the last 30 years. They are globally threatened habitats. Threats include industrial pollution (farming and mining), dredging, trawling of the seabed, coastal development, eutrophication from sewage (nutrients encourage growth of algae, reducing the amount of sunlight reaching the seagrass) and invasive species of seaweed which outcompete native species.

There are seagrass restoration projects all round the UK coastline.

1. Can the class create their own seagrass meadow? Colour paper in different shades of green, then cut slits halfway down, to create grass. Investigate and draw creatures that live in seagrass meadows. Eg. Greater pipefish, brent geese, Atlantic cod, sea hare, cuttlefish, small spotted catshark. Slot them into your meadow scene. Write facts about them on the back. Play and move them around the habitat.

2. Alternative: Create a seagrass meadow board. Make the back of the board blue paper, then add cut-up green paper to create seagrass. Pupils can draw and add different animals hiding amongst the seagrass. Write facts about seagrass meadows and climate change and add them to the display.

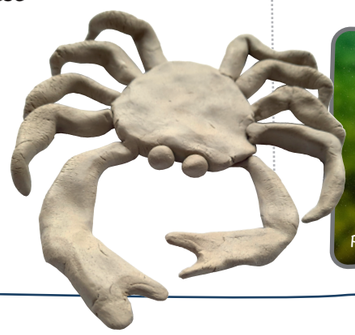
3. Research seagrass and create a poster to tell people about the international importance of seagrass habitats in the GSA Biosphere. Include the differences between seagrass and seaweed, the threats to seagrass meadows and positive stories, the importance of seagrass to climate change and the biodiversity of life in this habitat.

4. Food chain mobiles. Make mobiles of some sea grass food chains and hang them in the classroom. Can you think of any other food chains related to seagrass creatures?

   Sun-seagrass-brent geese

   Sun-seagrass-shrimp-greater pipefish-small spotted catshark

5. One nippy resident of sea grass beds are shore crabs. Make shore crabs from air-drying clay and paint them.



Seaweed is a type of algae which has been around for 23 million years. Fossilised remains have been found to be 1.6 billion years old, meaning they survived severe extinction events. There are 650 different species in the UK and three main types: Brown, red and green.

Kelp is a brown seaweed which lives in cold, rocky, and shallow areas, in colonies resembling a forest. This provides food and protection for a large number of species. There are as many kelp forests around the British coastline as there are forests on the land and they create the same amount of oxygen through photosynthesis. They prevent coastal erosion by absorbing the energy of storms. There are three main threats to kelp forests: Rising sea temperatures; Ocean acidification (where the ocean absorbs carbon dioxide and affects growing conditions); and invasive non-native species which outcompete seaweed.

Become a Citizen Scientist and take part in the Big Seaweed Search project – See **bigseaweedsearch.org**

1. In groups of 6, give out cards with a picture on one side and the name of the creature on the other (Pictures: Sun; kelp seaweed; sea hare; Atlantic cod juveniles; grey seal). Ask pupils to put themselves in order of the kelp forest food chain.

2. Small spotted catsharks are a type of small shark that live in shallow waters. They eat a variety of foods, such as crabs, fish, and sea snails. Game: In a hall/area with a defined boundary. Choose 3 children to be small spotted catsharks while everyone else is prey. Time them for 2 minutes and see how many prey they can tag. Then play the game again, but choose 10 children to be kelp, swaying in the water. When the prey hides in the kelp they can't be eaten by the small spotted catsharks. However they can only stay there for 10 seconds before they have to go out to feed for 5 seconds.
   How many prey can the catsharks catch this time? Notice how important the kelp is as protection from predators.

DEEPER DEPTHS

The ocean is home to 80% of all life on earth – a huge variety of plants and animals. Miniscule plants called phytoplankton which live in the ocean, produce 50% of all the oxygen on earth. Phytoplankton are a very important part of the marine food chain. They are eaten by tiny animals called zooplankton, which are in turn eaten by other creatures in the ocean.

Cetaceans are marine mammals, and around our coastline these include common and grey seals, bottle-nosed dolphins and minke whales. Sharks are fish, and in the GSA Biosphere, species include the basking shark, small spotted catfish, skates and rays.

1. Echolocation game. Dolphins and whales use echolocation to communicate. For this game, pupils stand in a circle. Choose a dolphin and a mackerel, who stand inside the circle. Blindfold the 'dolphin'. To echolocate, the dolphin says out loud 'dolphin' and the mackerel must reply with 'mackerel'. The dolphin has to try and catch (tag) the mackerel using just the sound of the reply while the mackerel must evade capture. After a while the circle closes in closer. An extension is to add more mackerel into the circle.

2. In a large area, such as a beach, use a tape measure to work out the length of different cetaceans. Children then stand in a line with their arms spread out, to see the differences in length. Minke whale (8m), basking shark (7m), bottle-nosed dolphin (4m), porpoise (2m), harbour seal (1.5m).

3. Devote a space indoors to creating an underwater scene. Imagine the surface of the water is the ceiling and hang creatures from above. Include a basking shark, jellyfish, bottle-nosed dolphin. Make creatures from recycled items, or draw them on card, cut out and paint them. Have a space on the floor. Add blue/green cushions and rugs on the floor to lie on and look up and the sea creatures. Play some calming whale and dolphin sounds and relax at the end of the day, or create an Oceanic food chain:

   Phytoplankton, zooplankton, herring, grey seal.

   Phytoplankton, zooplankton, squid, cod, dolphin.

4. Approximately 250 species of fish live in Scottish waters within 12 nautical miles of the coast. Investigate different types of fish living in the ocean. Ask each member of the class to draw a picture of a different types of fish. Hang them all in a display, or stick them on the wall, next to their name.

TOPIC 2 COASTAL COMMUNITIES

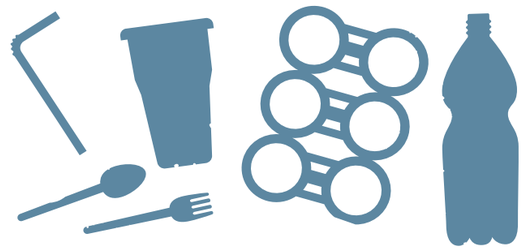
Use the map below to explore your coastal communities

1. Map game: Photocopy and cut out the tokens at the back of this booklet, and a copy of the map for each group. Ask pupils to add the 'tick' token to where they live, a 'star' token to a place they have been before and add a 'question mark' to somewhere they would like to visit and follow on with a discussion – what did you like about the place, why do you want to visit that new place, etc?
2. Can you find out a story or myth about a local coastal area? Sit in a circle and tell the story or act it out. Great examples from the southwest of Scotland are Sawney Bean and the Knockdolian mermaid. Watch out – these stories can be creepy!
3. Investigate the old industries of our coastal area, like past fisheries. Why did these industries decline and what are the current industries?
4. On the beach or in your school grounds, use natural items to create a mermaid, shipwreck or mythical creature. Create a story about your creature and how it came to be on the beach. Tell your story to others or write it down in a short story or poem.
5. Invite an older member of your community to tell the class stories about coastal communities and industries that have declined, for example fishing. Look at old photos of the place and compare them to current photos of the area.
6. Find and sing Scottish sea shanties.
7. The island of Ailsa Craig off the Ayrshire coast is the original place that granite for curling stones was quarried. How about curling for your next school trip? Or, play the 1-21 curling game on our website!

TOPIC 3 THE OCEAN AND US

PLASTIC

Twelve million tonnes of plastic enters the world's ocean each year. Some of the plastic in the ocean comes from the fishing industry, with more than 1 million tonnes lost to the sea every year. This waste plastic is very dangerous to marine animals, such as seals, sharks and sea birds which get caught in it. These 'ghost' fishing nets ensnare and kill 500,000 animals accidentally each year as they drift across the seas.



Do a plastic hunt around the classroom/school, you'll be surprised how much plastic is in our lives. Don't forget items such as: school uniforms, bags & shoes (remember polyester is plastic!), craft items, furniture, technology, lunch packaging etc.

Healthy oceans and seas are essential to our existence. They cover 70% of our planet, and we rely on them for food, energy and water. Yet, we have managed to do tremendous damage to these precious resources. We must protect them by eliminating pollution and overfishing and immediately start to responsibly manage and protect all marine life around the world.

Plastic bottles are one of the most common finds when removing marine debris from beaches in southwest Scotland because they float and are driven by wind and waves onto our shores from many places. It is estimated that 80% of the plastic on our shores has come from the land and a change in the way that people behave will change what is in our seas – plastic drink bottles are a prime example and are very familiar to young people. Plastic breaks down into micro-plastics in the sea which are consumed by sea animals. Plastics also float freely in the sea and wash up on beaches, and entangle animals like sea birds and seals.

1. Explore a shoreline and collect as many different things as you can see. Sort them into natural or artificial, plastic or non-plastic, floating or non-floating…
2. Discussion: Whose litter was this? Some plastics found on the beach can be associated with people, places, jobs or activities. Look at what you have found and use them as inspiration and discussion about who is responsible for plastics on the shore.
3. Choose one item from your haul (either as a group or individual exercise) and tell a story about the journey the plastic object took to arrive on the beach. What happens after it is found on the beach? Use this as a creative writing exercise.
4. Develop a message to raise awareness and change behaviour on plastic waste. Thinking about the target audience – who would you send the message to? What message would you send to your local community? Think about how plastic reaches the sea and think about options for reduce, re-use, recycle and circular economy.
5. A message in a bottle is a metaphor for a 'cry for help', usually asking a stranger to assist in a desperate situation. The concept of message in a bottle is about having limited scope to communicate with the outside world using only a piece of paper / pencil / bottle. Provide a sheet of paper with a bottle drawn on it. Ask pupils to add their message about plastic bottle pollution they would like to send. This can be in words or pictures, but they need to remember space on the sheet is limited.
6. Make a short message about plastic pollution suitable for different social media and launch a plastic campaign on your school socials.

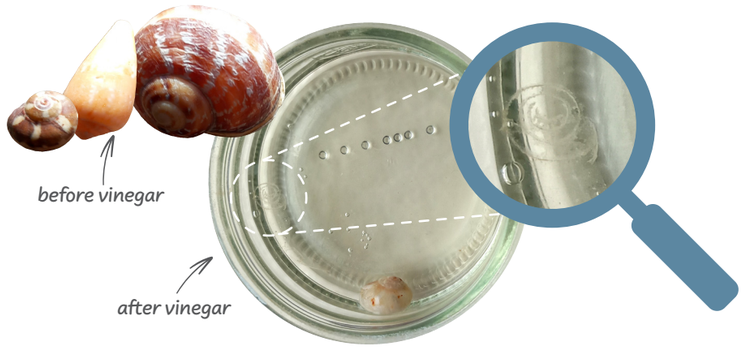
For lots more activities about marine plastic and more, Solway Firth Partnership have education resources available for download from their website.

TOPIC 4 HOME & AWAY

CLIMATE CHANGE

1. The Earthshot Prize celebrates the best sustainability ideas in the world for the future. Climate change and human disturbance is causing a lot of harm to kelp forests, sea grass meadows and salt marshes. In groups, can the class come up with an innovative 'Earthshot' idea to save them? Make a poster, or even create the idea using recycled materials. As a class, discuss all the ideas before voting for a winner!

2. Acidification of the oceans is an urgent issue. Carbon dioxide in the atmosphere is absorbed by the world's oceans, changing its ph level. Humans are producing so much carbon dioxide that the oceans are becoming more acidic. The impacts of this are felt by marine life, particularly vulnerable shell-wearing species. Experiment: Submerge a shell in an acidic liquid such as vinegar. Look at the effects on the shell – it may even dissolve completely!



3. As the earth warms due to the greenhouse effect, glaciers and ice sheets on land are melting and adding to the volume of the sea. This is currently adding 3mm a year to the global sea levels. As the oceans warm, water also expands, (thermal expansion) and this adds a further 1mm a year to global sea levels. Investigate some areas around our coast that are likely to be affected by sea level rise and create a news report on the issue. Eg. The Saltmarshes at Wigtown Bay. Who or what will be affected by the rise in sea level in these areas?

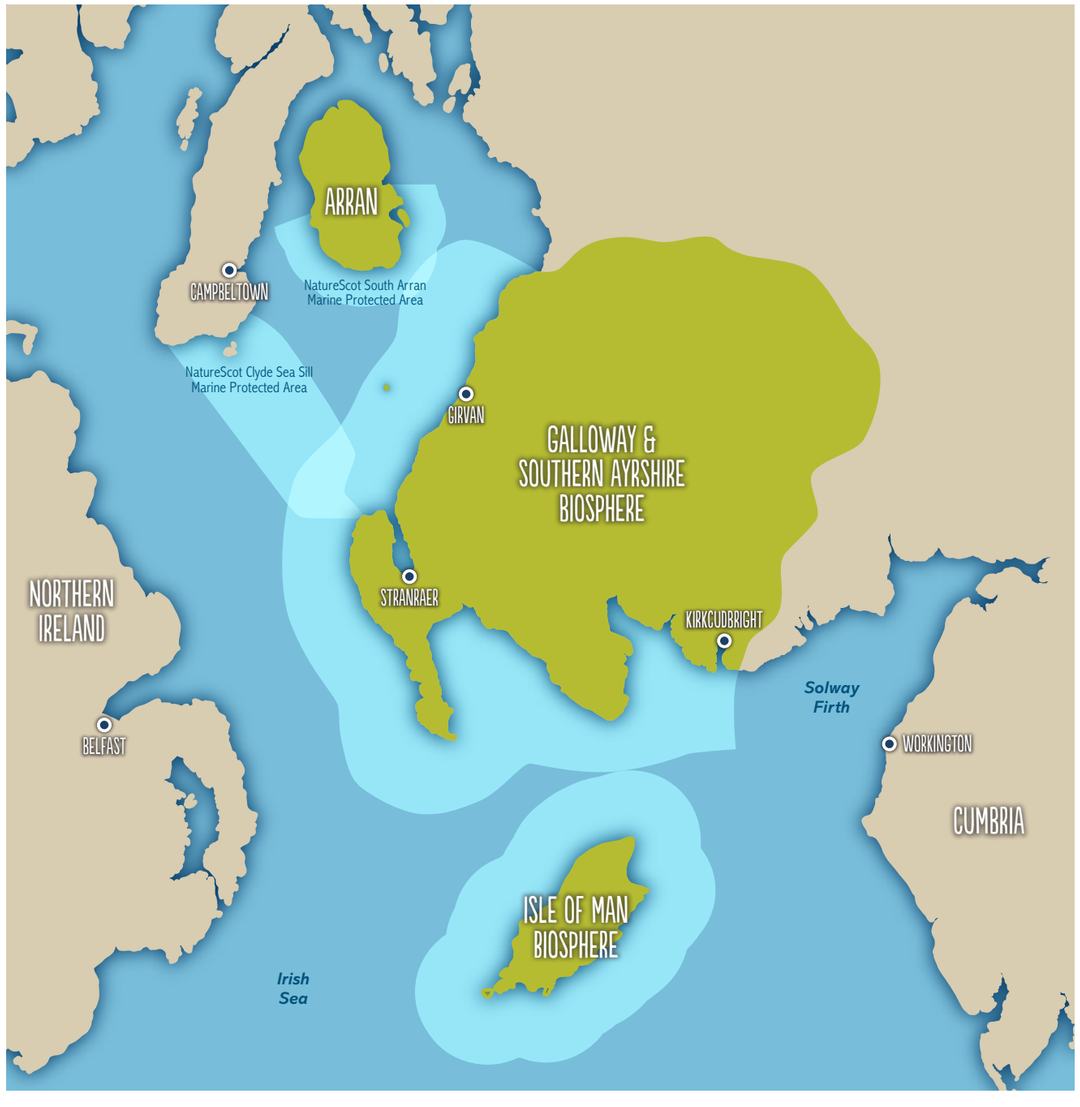
4. One of the effects of climate change is an increase in the amount and intensity of storms. The power of water causes coastal erosion. Some of this energy can be absorbed by coastal habitats such as salt marshes, seagrass meadows and kelp forests which is why it is important to protect, restore and create more of these habitats. Look at weather data to see some of the recent named storms in the UK, and events such as hurricanes and typhoons around the world. Where in the world did they impact and what were the effects on coastal habitats and communities?

5. In order to cut use of fossil fuels such as oil and gas, renewable energy such as wind, solar and tidal energy can be used. Research where the offshore wind farms are around the UK and their names. Find Robin Rigg Windfarm in the Inner Solway Firth. Make wind turbines from paper, a pin and a lollipop stick and add them to a map of the UK.

The Galloway & Southern Ayrshire UNESCO Biosphere includes 4000 square miles of the marine zone around Southwest Scotland. This designation means that it is a special marine area with a unique heritage, such as the wonderful Solway estuary and native oyster beds of Loch Ryan. The GSA Biosphere is one of over 700 Biospheres in the world, and we meet the Isle of Man Biosphere in the sea. We also meet the Marine Protected Area of South Arran. This means that this is a very special area of marine environment, which requires specialised restoration and management to restore its integrity and protect it into the future.

ACTIVITY BOX:

As our neighbouring Biosphere, we invite your class to send the Isle of Man Biosphere the postcard at the back of this resource!

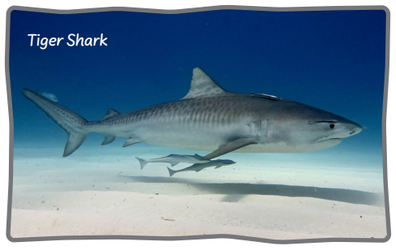


TOPIC 4 HOME & AWAY


Parrotfish

Some UNESCO Biospheres in the world have tropical marine ecosystems with amazing animals.

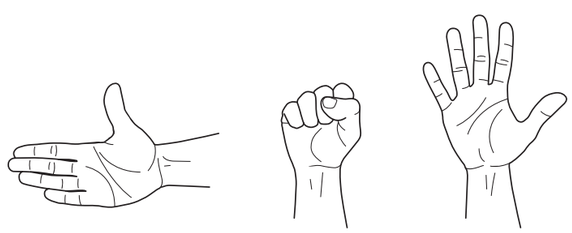
BELIZE BARRIER REEF RESERVE SYSTEM, BELIZE


Tiger Shark

The second largest tropical coral reef on earth, it is home to creatures such as hammerhead sharks, tiger sharks, loggerhead turtles, West Indian manatee, American crocodile, 500 species of fish, as well as many species of sponges, molluscs and crustaceans.

1. Coral reefs are made up of thousands of smaller individual corals which come in loads of different shapes and sizes depending on the species. Coral is also found in Scotland but does not form a reef because it is too cold. Coral reefs are important habitats for around 25% of all sea creatures in the world. To investigate more, search for Smithsonian's Secrets of the Sea interactive site.

2. Parrotfish are colourful, tropical sea creatures that spend most of their time eating damaging algae from coral reefs which helps to keep the reefs clean and allow sunlight in. They also feed on dead coral reefs which allows space for new young coral to settle and grow and build up the reef. To explore how parrotfish, algae and coral are connected, let's play parrotfish, algae, coral – like rock, paper, scissors. Parrotfish beats algae, algae beats coral, and coral beats parrotfish.



3. When the night falls and parrotfish are finished eating they slowly wrap themselves in their own mucus, ready for bed – like pyjamas! They do this to hide their scent while they are asleep so that predators cannot find them, it's like a superpower and their mucus pyjamas are their superhero cape. Draw a parrotfish with pyjamas on and add gadgets and super-secret powers to the pyjamas. Don't forget to colour it in with loads of different colours like a Parrotfish body.

GULF OF MANNAR BIOSPHERE RESERVE, INDIA

Located within the Gulf of Mannar are mangroves. Mangroves are trees or shrubs with tangled roots that grow above the ground. They are found in tropical, coastal waters and are home to a number of different species, as well as playing an important role in protecting shorelines.

1. Can the class create a wordsearch of the species that live among the mangroves? Half the class will create a wordsearch with the following words: starfish, barnacle, crocodile, sea turtle, blue crab and parrotfish, and the other half of the class will create a wordsearch with the following words: alligator, shrimp, oyster, jellyfish, dugong and sponge. The two halves of the class will then swap the wordsearches they have made and try to complete them.

2. Mangroves provide a home for dugongs where they can find a wide variety of seagrasses as well as shelter from predators. Dugong are marine mammals, otherwise known as 'sea cows' due to their diet of seagrass. Dungong look a lot like manatees, meaning people often get them confused. Do some research online to find the differences between dugong and manatees in terms of their appearance, behaviour and habitat.

3. Dugong means 'mermaid' in Malay and could be an origin of mermaid myths. Write a mythical story about a mermaid living in a tropical seagrass meadow.


Dugong

ADDITIONAL RESOURCES

PLACES TO VISIT:

NTS Culzean Castle
RSPB Mull of Galloway
Logan Fish Pond – Port Logan

LOCAL EDUCATION PROVIDERS:

Solway Firth Partnership: **www.solwayfirthpartnership.co.uk**
NTS Culzean Castle: **www.nts.org.uk/visit/places/culzean**
RSPB Mull of Galloway: **www.rspb.org.uk/days-out/reserves/mull-of-galloway**
Crichton Carbon Centre: **www.carboncentre.org**
Dumfries and Galloway Outdoor and Woodland Learning Group: **www.owlscotland.org**
Dumfries & Galloway Council Outdoor Learning: **www.dumgal.gov.uk**
Arran Outdoor Education Centre: **arranoutdoor.com**
Lochranza Centre: **www.lochranzacentre.co.uk**
South Arran Marine Protected Area (MPA): **www.arrancoast.com**
South Ayrshire Ranger Service
East Ayrshire Council Learning Outdoors Support Team
Port Logan

NATIONAL:

The Shark Trust: **www.sharktrust.org**
Marine Conservation Society: **www.mcsuk.org**
ORCA: **orca.org.uk**

GLOBAL AWARENESS DAYS

World Wetlands Day – 2nd February / **World Oceans Day** – 8th June / **National Marine Week** – July

Also look out for national and international awareness days and events including Earth Hour, 30 Days Wild, Plastic Free July, and Unblocktober.

IG GUIDES

www.sharktrust.org
www.buglife.org.uk
www.coastwatch.org

A NOTE OF THANKS

The photographs and video resources incorporated within this marine resource have been generously shared with the GSA Biosphere by Nic Coombey and the Solway Firth Partnership and Coulson & Tennant.

YOUR SCHOOL NAME: .....

CLASS: .....

YOUR MESSAGE: .....

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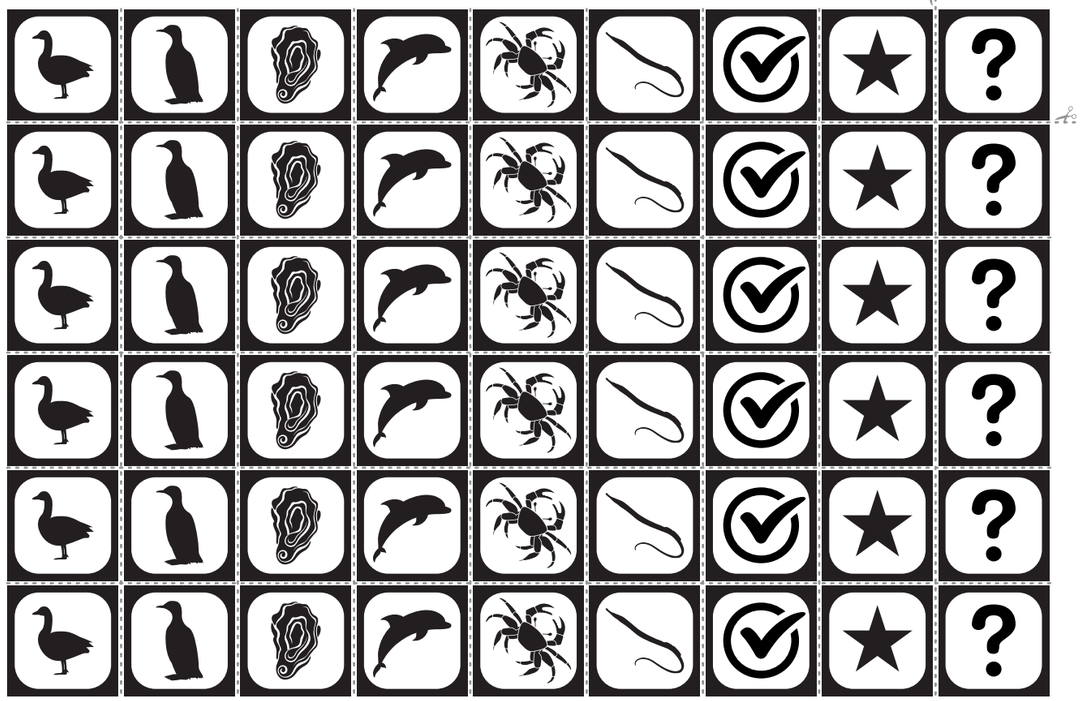
UNESCO BIOSPHERE ISLE OF MAN,
DEPT ENVIRONMENT, FOOD & AG,
THIE SLIEAU WHALLIAN,
STATION ROAD,
ST JOHN'S,
ISLE OF MAN,
IM4 3AS

ICONS FOR MAP ACTIVITIES



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GALLOWAY AND SOUTHERN AYRSHIRE BIOSPHERE

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