

What Lives Around the Turbines Habitats and Adaptation – Teacher Notes

AIM

The aim of this lesson is to introduce the different types of habitat found in and around an offshore wind farm. During the lesson, the class will learn about the plants and animals which live in these habitats and the adaptations which enable them to live there.

LEARNING OBJECTIVES

- What is a habitat?
- What types of habitat occur around an offshore wind farm?
- Why do particular animals live in the different habitats?
- What are adaptations?
- How are marine creatures adapted to live in their particular habitat?

LEARNING OUTCOMES

After the lesson, the class should be able to:

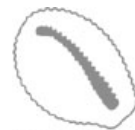
- Identify, use and learn key vocabulary associated with habitats and adaptation.
- Describe different types of marine habitat found in an offshore wind farm.
- Identify different marine organisms (plants and animals).
- Understand how marine organisms are adapted to their environment.
- Give reasons why particular organisms live in particular habitats.
- Understand the challenges faced by life within the intertidal zone.

CURRICULAR LINKS

- Science
 - Sc 1 Scientific enquiry
 - Sc 2 Life processes and living things
 - Unit 2B Plants and animals in their local environment
 - Unit 4B Habitats
 - Unit 6A Interdependence and adaptation
- Geography Unit 23 Investigating coasts

Suggestions for additional cross curricular work

- D/T Unit 4B
 - Create a marine habitat with associated plants and animals.
 - This could be a moving parts book, poster or interactive display.
- ICT
 - Create a graph of how many different organisms live in each habitat.
- Literacy
 - Read beach and sea poetry, compile a class word bank.
 - Create individual/class poems using the vocabulary collected.



- Children write a story about what they imagine the life of one of the animals on or around the turbine to be like.
- Use books, websites and other resources to find information about the animals found on and around the turbines.
- Art
 - Create a classroom mural of life around the wind turbine.
 - Draw a seascape featuring an offshore wind farm.

RESOURCES FOR THIS LESSON

- **COWRIE website pages** (see www.offshorewindfarms.co.uk)
- Background information pages
- Lesson plan
- PowerPoint presentation (available late 2008)
- 'Pin the species on the turbine' backdrop (PowerPoint presentation available late 2008) and printable cards
- Printable worksheet/activity sheets

LESSON PLAN

Introduce the concept of habitats. *What is a habitat?* Explain that a habitat is the place where an organism lives and that provides everything needed for survival. *What requirements are there for survival?* Discuss the children's thoughts and understanding of habitats, and write key vocabulary on the board. *What habitats can you think of?*

Use the introductory powerpoint presentation (available late 2008) to enhance children's understanding of habitats and adaptations. This will introduce the different habitats found in an offshore wind farm and explain about the adaptations needed to survive in each 'zone'. *How are different animals suited to their habitat?* Also have a look at the COWRIE website 'Life around the turbines' which tells you more about the different habitats and species which may be found there.

The children should then be ready for the class activity '**Pin the species on the turbine**'.

Use the PowerPoint 'backdrop' (available late 2008) to provide a virtual monopile and surroundings, showing the different habitat types. Begin by discussing with the class what the different environmental conditions may be in each of the habitats shown and perhaps how plants and animals may need to be adapted to live there.

Share the printed cards (available late 2008) among the class and ask them to pin the species on the turbine! The cards each depict a different species, and have clues as to which habitat it lives in. The children take turns to place a species card in the suitable habitat.

There are several different habitats including open water, in the air/on the water, the seabed around the monopile and several habitats on the structure itself. Some species may live in more than one habitat, while others will only occur in a specific place. Discuss why this is, and talk about *interdependence*. (For example, the common starfish will follow the rising tide to find prey such as mussels, but could also be found feeding at the base of the structure). This leads on to discussion about *food chains and food webs* and can lead on to activities given in the 'Food chains and food webs' teacher resources.

Activity sheets are also available to complete the lesson and for further development. Suggestions for cross curricular work are provided on pages one and two of these teacher notes.

Background Information

A **habitat** is the place where a community of plants and animals live, and which provides them with all the different things they need such as food, water, oxygen and shelter. Some habitats are wet (under the sea) and some are dry (the desert). The conditions in a particular habitat could be mostly stable or very variable. Deep in the oceans the temperature stays the same, so conditions are fairly stable. On the UK shore the tide comes in and out twice every day, so it's only underwater some of the time and the temperature changes, so conditions are very variable.

Animals which are suited to one habitat may not be able to survive in another habitat. For example, fish live underwater and cannot survive on land. The plants and animals living in a particular habitat will be **adapted** for life in the conditions there. **Adaptations** are special features which enable the species to survive.

Several different habitats can be seen in and around an offshore windfarm. Each habitat is home to a different community of animals and plants which are suited to the conditions there. Offshore wind turbines are supported on a 'monopile' which is a long steel tube measuring about four metres in diameter. Many plants and animals need a hard surface to attach to, and the monopiles can be a perfect base for them. As the tide rises and falls, the higher sections of the monopile will be exposed to the air for varying lengths of time. This creates variable conditions and the species living here must be adapted to cope with changes in temperature, drying out (desiccation), and food availability. As a result, the monopile consists of several different zones or habitats, each with a distinct community of animals (and plants in the shallow areas where sunlight can penetrate). In general, exposure, desiccation, light availability, salinity variability and temperature variability increase further up the intertidal zone of the monopile and decrease further down. Feeding time, competition and species diversity decrease further up this zone and increase further down.

Zone 1. A green algal film

This zone is at the very top of the 'littoral zone' (the area that lies between high and low tide) and is called the 'splash zone'. Here, the monopile surface is above the high tide level and only receives splashes of water. Most marine creatures could not live here because they would dry out and it would be hard to find food. Few species are found here, but a thin band of green seaweed which is suited to the harsh conditions and needs sunlight for photosynthesis.

Zone 2. Intertidal barnacles

Plants or animals living in this zone have adaptations to cope with long periods out of the water because the water level will fall as the tide retreats. The barnacle *Elminius modestus* (a non-native species) is perfectly suited to this zone because it is able to close up when the water level falls, to prevent drying out. Animals living in this habitat also need adaptations to hold on tight because of wave action. The common mussel *Mytilus edulis* uses strong threads to attach itself, and barnacles use cement. An advantage of living in a habitat with such challenging conditions is that there may be fewer predators around and less competition for space and other resources.

Zone 3. Dense small mussel band

In this zone the plants and animals will be underwater most of the time and will only need to survive out of the water for a few hours each day. Mussels can close up their shells tightly when exposed to air, and open up to feed when underwater. The common starfish *Asterias rubens* preys on mussels and has many tube feet which allow it to move around without being washed away by the waves.

Zone 4. Barnacles and weed

This zone is underwater for most of the time as it is just above the low tide level, but any plants or animals living here must still be adapted to cope with short periods out of the water.

Zone 5. Dense medium/large mussel band

This habitat is situated at the low tide level and so animals living are likely to need fewer specialist features, but may occasionally be exposed to the air for very short periods. Sunlight is still available at this level, which means that larger seaweeds are able to live.

Zone 6. Barnacles, anemones and other underwater species

This habitat occurs where the monopile is always underwater and the animals living here are adapted for an entirely underwater existence. Conditions here are more stable, but the animals face strong competition for space as life here is abundant and diverse. Animals which live underwater and are sedentary (they don't move) have adapted various different ways to catch food. Some, like sea anemones, extend stinging tentacles to stun and catch prey. Others catch passing food without stinging. Filter feeders, like sea squirts, suck in water and sieve it to take out the food particles contained in it.

Zone 7. Scoured area and seabed

Many of the animals living in this habitat have adaptations which enable them to hide from predators. Some, like the sand goby, use camouflage to blend in with the sand, and others like the plaice, lie still and half buried in the sand. The banded wedge shell has a strong foot which it uses to bury itself deep in the sand.

Zone 8. Anti-scour

The rocks around the bottom of the monopile create a more complex habitat, with hard surfaces, holes and crevices and also soft sediment on the seabed itself. Here we find an array of creatures which again have differing adaptations to their environment. The conger eel has a long, thin body so that it can hide in crevices amongst the rocks. The ballan wrasse feeds mainly on animals with hard shells such as mussels and barnacles, and so has very strong teeth which can crush shells.

The sea surface and the air provide a habitat for many sea birds. Birds have several special features allowing them to live and feed in this habitat: they have wings to fly, most have buoyant bodies to float on the surface, and are specialised divers so that they can catch prey living in the water and on the seabed.

The open water around the windfarm is home to a wide variety of fish, mammals and other sea creatures. Some might live in the area permanently and others will pass through whilst hunting for food or migrating. Animals found here are perfectly suited to this habitat, with many and varied adaptations. Fish have gills to take oxygen from the water so they can remain underwater; whereas mammals such as dolphins need to breathe air just like humans and so they have to surface regularly. Many of the creatures living here, such as the basking shark can grow to very large sizes as their body weight is supported by the water in which they live.

ADDITIONAL USEFUL RESOURCES

Educational games about life in the oceans: <http://www.bbc.co.uk/nature/blueplanet/games.shtml>

MarLIN schools pages: <http://www.marlin.ac.uk/learningzone/schools.php>

A variety of resources from the National Marine Aquarium: <http://www.national-aquarium.co.uk/otherOptions.aspx?m=schools>

A virtual underwater tour of Firestone Bay, Plymouth:
<http://www.marlin.ac.uk/learningzone/interactive/interactiveframe.htm>

Marine Conservation Society 'cool schools' pages: <http://www.mcsuk.org/coolseas/schools>

Shark trust kids activity pages:
<http://www.sharktrust.org/v.asp?level2=6215&depth=2&level3=6215&level2id=6215&rootid=6208&nextlevel=6215>