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Comhairle Contae County Council

Shanganagh Park

Biodiversity Education Programme

An action of Dún Laoghaire-Rathdown Biodiversity Plan 2009-2013

An Chomhairle Oidhreachta
The Heritage Council

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Illustrations: **Naomi Mc Bride**

Content: **Irish Widlife Trust**

Editing: **Dún Laoghaire-Rathdown County Council**

Proofreading: **Therese Carrick**

Foreward

Biodiversity includes all living things from the tiniest micro-organisms to the largest whales in the sea. The relationship between plants and animals and their surroundings create the environment in which we live, and they are an essential component of our daily lives.

With the dazzling technology and busy nature of modern life it is easy to become disconnected from nature and to lose sight of how heavily we rely on our natural environment. We forget that trees and other plants provide us with oxygen, food, fuel, medicines and much, much more! Playing and relaxing in natural surroundings benefits our health and contributes to a greater sense of wellbeing.

Our parks and wild areas provide us with the space to play and have fun. These areas also provide homes and habitats for biodiversity. It is important that we share these places with biodiversity and allow space for wild plants and animals to live and thrive.

The Dún Laoghaire-Rathdown Biodiversity Education Programme is intended to increase children's awareness of the local environment, encouraging them to learn about and experience nature in stimulating and creative ways. It provides children, teachers and youth leaders with the opportunities and the tools to explore their local parks and green spaces as well as fostering a greater appreciation for these areas and the wildlife they support.

I would like to take this opportunity to thank Heritage Council for supporting the development of our Biodiversity Education Programme. I would also like to say a big thank you to everyone who provided advice and support during its preparation including the Irish Wildlife Trust, Blackrock Education Centre and Airfield Trust.

Mary Toomey, Biodiversity Officer
Dún Laoghaire-Rathdown County Council

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Dun Laoghaire Rathdown County Council (DLRCC) commissioned The Irish Wildlife Trust to develop a biodiversity education programme for Shanganagh Park to be used by primary schools and community/youth groups in the area. This is an action of the DLRCC Biodiversity Plan. This programme enables teachers to fulfil practical elements of the school curriculum whilst getting active in the beautiful Shanganagh parkland. The pack comprises a self-guided handbook which links activities to the habitat types of Shanganagh Park.

Aim of the project

The aim of the Shanganagh Park Biodiversity Education Programme is to highlight the value of, and to promote the use and care of biodiversity in the local area through learning exercises and activities taking place in Shanganagh Park. We hope to heighten awareness of the value of green space and wildlife within the DLRCC area. We hope that this handbook will provide a useful resource to teachers and community/youth leaders by fulfilling elements of the curriculum and encouraging regular visits to Shanganagh Park.

How to use the biodiversity pack

This handbook includes a series of teachers' notes and student activity sheets that provide useful information and guidance on investigating wildlife in Shanganagh Park.

The pack begins with a map and nature trail for Shanganagh Park which includes background information about the site and various trail stops. The map is provided to guide you to the different habitats, viewing points and to the coastal access point in Shanganagh Park.

The next section of the pack explains the concept of biodiversity and provides some useful information and facts about it.

The teachers' instructions in section 5 include background information, instructions and a list of materials for all student activities.

Section 6 comprises student activity sheets, which contain exercises and activities designed to encourage students to actively explore and learn about nature.

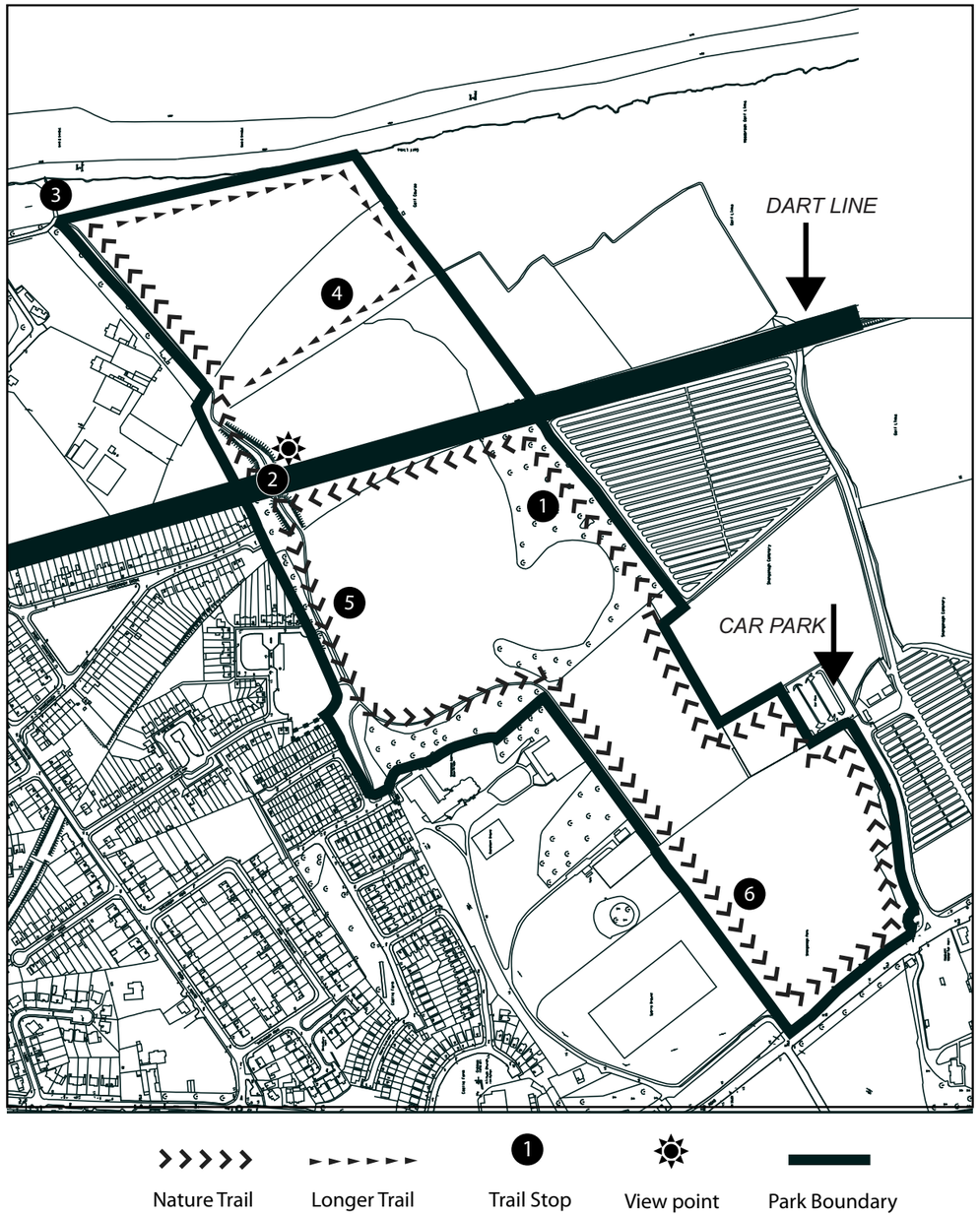
The youth and community activities in section 7 outline fun games and activities for all.

Section 8 lists useful field guides, books and websites that can be used for your field trips to help identify species of plants and animals.

Outdoor safety guidelines are provided in section 9 and should be consulted before each trip to minimise potential risks to programme participants.

The section on tide times provides information about how to look up daily tide times, which will help plan trips more effectively.

Lastly, a checklist is provided which links each activity to relevant topics in the primary school curriculum.



3 Shanganagh Park nature trail

Shanganagh Park is a great area for wildlife and an important amenity for the local community; it is made up of two large green areas separated by the DART line and stretching right down to the coast of the Irish Sea. This nature trail runs through both the west and east section of the park and includes coastal access. It encompasses all the notable habitat types present in this expansive parkland and highlights interesting wildlife features to be found along the way. The trail can be started from either of the two main access points to Shanganagh Park, these being the car park off the Dublin Road, and on foot from the Shankill Dart Station via Corbawn Wood and Quinn's Road. If starting from the Dublin Road car park, then begin the trail at stop 1, if you are entering the park via Quinn's Road you can begin the trail at stop 3.

1. Broadleaf woodland

From the car park, take the footpath through the trees into the park and then turn right along the path with the playing fields to your left. This path will lead you into an area of woodland; this woodland is stop 1 one of our trail.

This is broadleaf woodland! Look around you and see if you can identify some of the trees from their shape, leaves, bark, berries or seeds. You should notice species of tree such as Oak, Beech, Birch and Sycamore. Broadleaf trees have soft delicate, flattish leaves unlike the hard, narrow pines of the coniferous trees. **Can you think of another difference between broadleaf and coniferous trees?** (Pine cones). Coniferous trees produce pine cones within which their seeds are kept, whereas broadleaf trees don't have cones to house their seeds. **Can you think of an example of Irish broadleaf tree seed?** (Acorn, Hazelnut, Beechnut).

Oak

Birch

Horse Chestnut

Sycamore

Ash

Another thing the trees in this broadleaf woodland have in common is that they are all *deciduous,* meaning they lose all their leaves in Winter. Trees use their leaves to make energy from sunlight by the process of *photosynthesis*. In Ireland deciduous trees lose their leaves throughout Autumn because they don't need them in the Winter, as there is not enough sunlight to carry out efficient photosynthesis.

As you move through this broadleaf woodland, look at the spacing of the trees and the width of their trunks. **Do you think this is a young, or an old woodland?** Well, it is a young woodland, and was planted quite recently to improve the biodiversity of this parkland. **Many of the trees planted here are native Irish species; do you know which ones are not?** Both Sycamore and Beech are beautiful trees common in Ireland but they are not native to Ireland. Ireland once had vast areas of *native broadleaf woodland* composed of species like Oak, Ash and Hazel. Today, almost all of this ancient native Irish woodland has been cut down and we have very little broadleaf woodland left. Therefore planting broadleaf woodland like this helps to increase the abundance of a rare Irish habitat, although our original woodland of ancient Oaks can never be replaced!

These trees improve the biodiversity of the park by providing a *habitat* for other plants and animals, such as birds, bats, insects, shrubs and other plants. The tallest trees make up the *canopy layer*. The shrubs that grow beneath the trees make up a woodland habitat called the *understory*. Common understory species in Ireland are Holly, Hazel, Bramble and Bilberry. The understory of a woodland can be as important to its animal residents as to the trees themselves. The understory plants provide shelter for woodland birds with their thick foliage and food for birds and mammals in the form of berries and leaves. As you pass through the woodland, listen for the sound of bird call. If you stop, stand still and face toward the sound you may well see one of our woodland birds in the trees or understory. Some woodland species you can expect to see or hear are the Great Tit, Wren, Blue Tit, Chaffinch and Tree Creeper. Tree Creepers are clever little birds that fly onto a tree and then move down the trunk in a spiral pattern picking off any little insects it finds along the way. It then flies off to the next tree and starts again at the top. You may find flowers and ferns growing beneath the understory. This is known as the *herb layer*. The dead wood and leaves beneath the herbs make up the *ground layer*.

Blue Tit

Tree Creeper

Wren

2. View point

Continue along the footpath out of the woodland as it curves alongside the large open area of grassland on the left. When you reach a right turn in the footpath, leading uphill, follow it. Here our trail leads over the DART line (see map). This side of the park is made up of meadows and hedgerows. From the mound at the far side of the DART crossing, stop and take in the views of this area and the coast beyond (viewpoint marked on map). From here you can see the difference in the way these two sections of the park are managed, the grass in the west section is kept short and neat whereas here it is longer due to a different mowing regime.

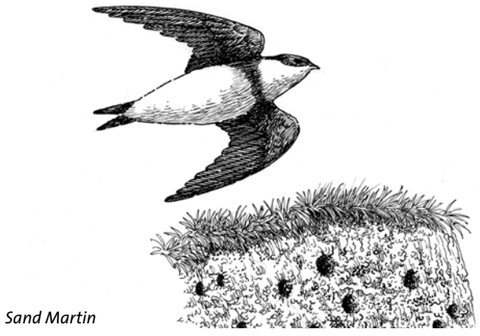
While appreciating the beautiful views, look at the landscape all around you and take note of any local features visible such as mountains, towns and green spaces. Notice how this park itself is part of the patchwork of the local landscape fitting in between buildings, roads, private gardens and other parks. Many species of plant and animals need large areas to provide all their needs including food, shelter and mates. If the green spaces in a landscape are close together and connected to each other, then local populations of animals can move between the different sites using resources from all the sites to increase their chances of survival. Green linear features connecting larger green spaces are often called *wildlife corridors*. A perfect example of a wildlife corridor in Ireland is the hedgerow.

Before having a closer look at the meadow, we shall continue straight ahead to the coast marked as stop 3 on the trail map. Move down from the mound and continue straight ahead on the path keeping left, follow the trail down a straight path with hedgerows on either side. This will bring you to an exit from the park where you can access the beach and stop 3.

3. Coastal access

At the entrance point where Quinn's Road meets the park, you will see steps leading down toward the coast. Follow these steps down to the concrete platforms below, taking care on the steps. You are now standing on the South Dublin Coastline looking over the Irish Sea. Keep an eye out for marine mammals! Seals and porpoises are regularly seen in these waters. If the day is clear, you can see far up and down the coastline. To the right you'll see south, down the Shanganagh Cliffs as far as the town of Bray with Bray Head jutting out into the sea, while to the north lie Killiney Hill and Dalkey Island.

Have you noticed the cliffs running along the coast in both directions? These cliffs are of interest for a number of reasons. They are home to a population of Sand Martins. Sand Martins are a species of migratory bird that look similar to Swallows but are smaller and are greyish brown in colour with a white underside. They live on vertical cliff faces such as this, in narrow tunnels that they excavate horizontally into the cliff, up to a metre deep! These birds migrate to Ireland for the Summer all the way from tropical West Africa. Here they feed on insects, often hunting them by flying low over the water.



Sand Martin

These cliffs also serve as a powerful reminder of the powers of *coastal erosion*. Erosion is the breaking down of materials like rock and soil by the forces of nature such as rivers, wind and the sea. The sea is continuously eroding this coastline. As the sea's powerful waves batter the coast, soil and rock is washed away and falls into the sea leaving these steep cliffs. Coastal erosion can be a slow process; however a large amount of erosion can occur over a short period of time during storms. Two effects of *global climate change* are stormier weather conditions and sea level rise, so as a result of climate change more coastline will be exposed to greater levels of coastal erosion.

The next stop on our nature trail covers the wildflower meadows, so walk up the steps and back into the park through the Quinn's Road entrance. From here you can make your way to stop 4 by two routes, long or short. For a more direct route; retrace your steps along the straight hedgerow path until you reach an opening on your left leading into the middle meadow field; this is stop 4 of the trail. For a longer route, follow the path that leads to the left after entering the park. From your trail map you can see that this path loops along the edge of the meadow fields following a hedgerow to stop 4. Along the way, notice the species of tree and shrub in the hedgerows. **Can you remember any plant species from the broadleaf woodland? Are they the same here?**

4. Wildlower meadows

Here in the wildflower meadows you can observe how different management strategies create different habitats. Look around you and notice how much longer the grass is here than in the other sections of the park. Here the grass has been allowed to develop into a meadow by cutting it only a few times a year, and by not applying any chemicals such as fertiliser or pesticides. A meadow is a seasonal habitat and will appear different depending on which season you visit the park. The grass will be shorter throughout Winter until Spring when it starts to grow again and wildflowers will appear and continue to flower into Summer.

If you were to count the number of different species of grass and wildflower here and on a short cut lawn, you would find far more diversity here. Plants species that can be found here include Creeping Buttercup, Creeping Thistle, Common Knapweed and Yellow Rattle. The number of invertebrate species, such as Moths and Butterflies, that use a habitat like this is greater too. This in turn supports more insect eaters like birds and bats. Long grass also provides nesting sites for birds, such as Skylarks, and small mammals. So changing something simple like the number of times you cut the grass each year can radically change a habitat and its biodiversity value.

Wildflower meadow with buttercups, thistles, knapweed and grasses.

Now move on to stop 5 of the trail where you will see intensively managed grassland and can compare the difference between it and the meadow. Cross back over the dart line by the same path you took earlier and follow the footpath alongside the large open grassland area keeping it on the left hand side.

5. Grassland

While walking down from the railway crossing to the grassland, look in the distance ahead, can you spot a tower standing out on the hills beyond? This is the chimney tower of the old Ballycorus Lead Mines that were opened back in 1805. The tower stands on the slopes of Carrickgolligan Mountain and is made of granite. The chimney tower was part of the refinery at Ballycorus where locally mined lead and silver were smelted along with ores brought there from all over Co. Wicklow. The mines were shut in the 1920s.

Now, walk onto the area of grassland and see how many different species of plant you find, get down on your hands and knees for a closer look if you want! You'll probably find that there are far fewer species than in the meadow. This is because when the lawn is mown regularly, the grass, which grows from its base, can survive, but most wild flowers cannot. But there is still some diversity here; **did you see any Daisies or Dandelions?**

This short grass is of use to some animals. You won't find many birds or mammal using it for a home but they do feed here. Just under the grass there is a very abundant and tasty food - earthworms – and many animals love to munch on them. During the day you will often see birds, like the Song Thrush, Mistle Thrush or Sea Gulls, hopping round on lawns listening for earthworms. Sometimes you can see Sea Gulls doing a strange looking dance on the grass. They stand in one spot and quickly stamp up and down then stop and start again moments later. They are not actually dancing but hunting, stamping on the ground is a trick to attract worms to the surface so they can snap them up. Worms often come to the surface during heavy rains, and the bird is mimicking the sound of the rain on the earth with its stamping – very clever indeed!

Song Thrush pulling on a worm

At night, when the birds have left the worms in peace, the mammals come out to feed. One of Ireland's largest mammals is the Badger and one of the Badger's favourite foods is Earthworms. It is hard to catch a glimpse of Badgers feeding because they are very shy and are *nocturnal*, meaning they only come out after dark, but you can spot the signs of a Badger's midnight feast. Look for patches of grass near the path that have been dug up and over turned with the roots exposed. This is the work of the Badger, using its strong front paws to upturn the grass and roots for tasty worms and any other insects it might find in the soil.

6. Hedgerow

Now moving on from the grassland, we will take a path leading into the wood ahead of us (see map). Walk through this wood enjoying the woodland atmosphere. Keep an eye out for a glimpse of Shanganagh Castle. The back of the castle can be seen from this path through the railings. This path comes out of the woodland at a small play area; take a right here up the straight path leading along the side of the playing fields. As you walk along this path you should notice a hedgerow running all the way along your right hand side; this hedgerow separates the park from the grounds of Shanganagh Castle.

Hedgerows are a vital component of Ireland's biodiversity. They act as wildlife corridors by connecting green spaces to each other, allowing animals that would not normally go out in the open to move between them. For example, many species of butterfly use hedgerows rather than crossing open fields. Ireland has lost the majority of its original woodland through *deforestation*. Most of Ireland's trees are now found not in woodland but in hedgerows. In many cases, the tree dwelling animals of Ireland, such as Squirrels, Pine Martens and many species of birds, must make do with hedgerows instead of woodland. Therefore, we must protect our remaining hedgerows.

The *species composition of a* hedgerow is very important. A hedgerow with a diverse plant community in turn supports a diverse and bustling animal community. Different species of plant produce berries, nuts and leaves at different times of year. So a greater variety of plants in a hedgerow provides food for birds, mammals and insects for a greater portion of the year. Most hedgerows are composed of a mix of low growing trees and shrubs, with occasional tall mature trees rising above and, at the bottom, wildflowers, grasses and ferns. The dense shrub layer of a hedgerow includes species such as Hawthorn, Holly, Blackthorn and Elder. These species all produce fruits that feed our wildlife but they also offer shelter to birds and small mammals. Many birds often build their nests in the dense foliage near the top of these shrubs and low growing trees. Dunnocks, Robins and Wrens use the base of the hedge for shelter while they are foraging for insects. In fact, the shelter of a hedgerow often keeps the ground beneath it free from frost, so these birds can still feed there in Winter while the fields are frozen.

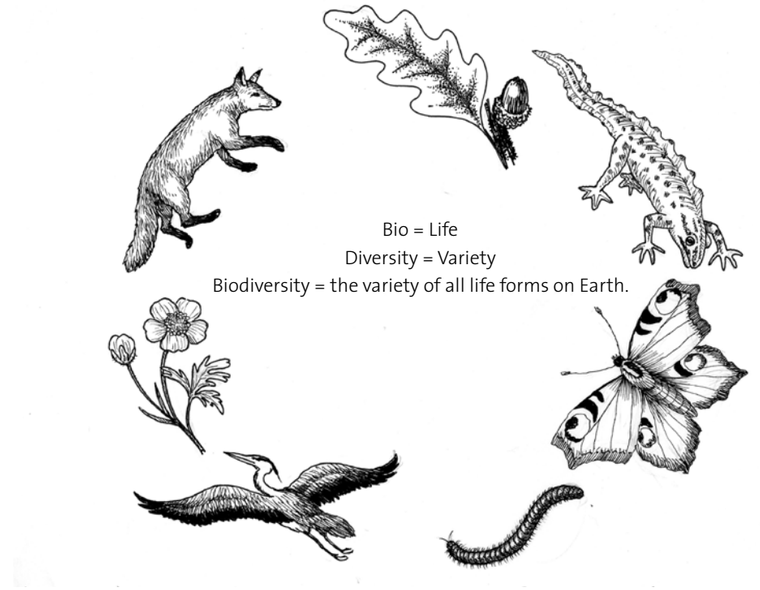
Biodiversity value of a hedge

Larger trees such as Oak and Ash are often found dotted along hedgerows, rising high above the smaller species. These are used by birds as song posts and vantage points to observe the surrounding landscape. Trees provide homes and food for insects and fungi in the dead wood they produce. Look up and down the length of this hedgerow, and just imagine the number of insects that must live in it. You would probably expect to find many hundreds of insects along a single hedgerow and you're not the only one to know this. Bats hunt insects at night using echolocation, and patrol up and down the length of hedgerows plucking insects out of the dark night sky.

Hedgerows really are busy places in the Irish landscape. Owls use hedgerows too, hunting small mammals in the grass and bushes at the hedgerow base. Holes in mature trees are used for nesting by Owls and for roosting by some species of bat such as the Leisler's Bat or the Common Pipistrelle. Other hedgerow dwellers include Badgers; the majority of Badger setts in Ireland are found amongst hedgerows.

This path will encounter another hedgerow on the left hand side that runs perpendicular to this one and separates the two front fields. Take this left back toward the car park and the end of the trail.

WHAT IS BIODIVERSITY?



Our life forms can vary from the tiniest bacteria and bugs to humans up to the biggest whales in the sea.

WHY BIODIVERSITY IS IMPORTANT:

Biodiversity is our **life support system.**
Ecosystems regulate **climatic processes.**
Animals and plants breakdown waste and **recycle nutrients.**
Animals and plants filter and **clean water.**
Natural habitats buffer against **flooding.**
Ecosystem services maintain **soil fertility.**
Biodiversity provides **natural resources.**
Biodiversity provides essential **medicines.**

BIODIVERSITY LOSS:

- Biodiversity is currently being lost at an unprecedented rate globally, and Ireland is no exception.
- Scientists estimate that species extinctions are occurring **100 to 1000 times faster** than without human influence.
- Without a change in our actions, half of the world's species may be lost by 2100.

SOME OF OUR NATIONALLY THREATENED SPECIES:

- Kerry Slug.
- Lesser Horseshoe Bat.
- Natterjack Toad.
- Otter.
- Pearl Mussel.
- Red Squirrel.
- Salmon.

CAUSES OF BIODIVERSITY LOSS:

- Habitat destruction.
- Water pollution.
- Unsustainable consumption.
- Climate change.
- Invasive alien species.

PROTECTING BIODIVERSITY LOCALLY AND GLOBALLY:

- Change consumption patterns,
- Buy local, and seasonal produce where possible.
- Do not buy peat based gardening products.
- Do not use slug pellets, as they not only kill slugs but the birds that eat them too.
- Reduce your energy consumption as climate change and biodiversity concerns are inextricably linked.

5 Teachers' instructions

5.1 Getting started

Step 1: Read the nature trail information on Shanganagh Park as provided in section 3.
Step 2: Prepare for the activities outlined in activity sheets 1-4 in the classroom.
Step 3: During the visit to Shanganagh Park, you can pick and choose which other activities you would like to concentrate on.

The following are teachers' notes for activity sheets 1-4.

These activities are designed to introduce each student to the programme and to Shanganagh Park.

Activity 1. "Making a Nature Diary" will provide a catalogue of what the students have discovered and studied. It can be used as a reference notebook for the different words and skills that are introduced to them. All good ecologists have their notebooks to describe, illustrate and catalogue their findings in the field. The Nature Diary is a good way of keeping all of the students' discoveries in one notebook.

Activity 2. Journey to Shanganagh Park.
Activity 3. Making a map.
Activity 4. Be a Shanganagh Park explorer.

5.2 Discover your woodland

The following are teachers' notes for activity sheets 5 - 7 and are applicable to trail stop 1.

Background information for activity sheets 5 to 7 – Getting to know a tree/ Woodland structure/ Create a food web

This section is designed to introduce school children to a woodland habitat. It aims to encourage children to use important skills like exploring, observing and recording. It will help them discover the plants and trees in a woodland, and the layers in which they are found. They will be shown how to recognise a number of plants, and then will be able to record these in their nature diaries. They will see the importance of light and plants competing for it. Children will expand the use of their senses to experience the sounds, smells and textures of the woodland and by the end of the activities will have discovered how a woodland works.

What to do:
Give a talk to your students about the woodland structure while walking through the trees. Look closely at each layer as described in activity sheet 6. Ask the students to fill in activity sheets 5 - 7.

5.3. View point

It is recommended to read section 2 of the nature trail and use the information for a discussion with students about the area. From here, you can see the difference in the way two sections of the park are managed, the grass in the west section is kept short and neat whereas in the wildflower meadow area it is longer due to a different mowing regime. This could be a good opportunity to draw what you see as you have panoramic views of the park, the Dublin Mountains and the Irish Sea.

5.4 Coastal access

The following are teachers' notes for activity sheets 8 - 11 and are applicable to trail stop 3.

Background information for activity sheet 8 - The water cycle

The aim of this activity is to introduce students to the elements of the water cycle and its importance. Either the teacher or students can read the background information from the activity sheet. During your visit to Shanganagh Park, it is hoped that you can get the students to observe the water cycle first hand by looking at the different features and processes involved in it. It is also important to stress how the earth recycles our water, and hence why we always have the same amount.

On activity sheet 8, ask the students to fill out their observations by answering the questions and make a drawing of the Shanganagh Park water cycle.

Background Information for activity sheet 9 - Wave action

The purpose of this activity sheet is to illustrate the power of the sea and its waves that crash onto land. The aim is to show that the sea is an eroder, e.g. Shanganagh Cliffs and can also build, e.g. beaches. It introduces the students to the terms erosion and deposition. Erosion is the breaking down of materials such as rock and soil by the forces of nature such as rivers, wind and the sea. Deposition is the natural process of laying down material. Ask the students to read activity sheet 9, and to fill in their observations to the questions from looking at the sea from viewing point 3.

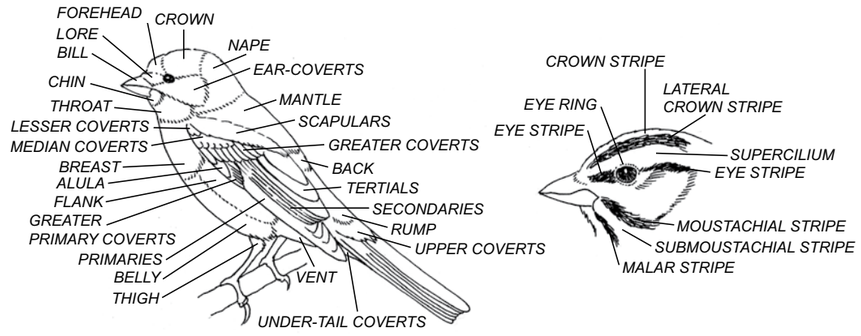
You can also pose extra questions regarding sporting activities that rely on waves and winds of the sea e.g. surfing or kite flying. As Shanganagh Cliffs is an area that was eroded can the students think of somewhere in Ireland or Dublin where the sea has deposited material, e.g. Killiney Beach.

Background information for activity sheet 10 - Become a Shanganagh birder!

Shanganagh Cliffs are a good spot for both resident and migratory birds. Many of them feed on fish and marine invertebrates. The aim of this activity is to get the students to discover the birds that live and visit Shanganagh and to understand the importance of the tides to birds.

You will need:
• Binoculars (if available).
• A Bird Field Guide (find details in section 8).

What to do:
1. At viewing point 3, you can begin to watch from the steps or from the beach below. Please be careful if going down to the beach area as it is very rocky and slippy.
2. Ask the students to record their sighting on their activity sheet.
3. Compare the different findings among the students.
4. Finish the visit to trail point 3 with a discussion on the different birds, what makes them different, for example, size of the beak, size of birds and what they are doing.
5. Back in the classroom, ask each student to draw one of the birds on the recording list and do a seek and discover project to learn more about that bird.



Body parts and feather types of a bird for identification

What to look for - tips for identifying birds

- Size - relative to a common bird (e.g. Sparrow-sized, Starling-sized, Crow-sized etc).
- Colour and patterns, and where they are on the body.
- Size and shape of bill, legs, wings, tail and neck relative to the body size/shape.
- Colour of bill, legs, feet, wings and eyes.
- How the bird flies - (e.g. Kestrel hovering; Swift soaring) and moves on the ground (e.g. waddling duck, running Starling, hopping Thrush or Blackbird).
- General behaviour and characteristic movements (e.g. tail wagging of Wagtails).
- Calls and songs.
- Where you saw the bird - its habitat.
- Date, time, place, weather, distance from you and what the bird was doing.
- Bird bodies - bird watchers and people who study birds (ornithologists) have special names for different parts of a bird's body.

Background information for activity sheet 11 - Bill bits and feathers

Some of the most notable things about birds are their feathers and bill (beak) shapes. Different shaped bills serve different ecological purposes and are good indications of the birds' feeding habits. Short thin bills suit insect eaters, short thick bills suit seed eaters, long thin bills can be for probing flowers for nectar or probing soft mud for worms or shellfish and the strong hooked bills are for tearing meat.

The top and bottom parts of a bird's bill are called mandibles. All birds have their nostrils at the basal end (the end furthest from the tip) of the top mandible. The edges of the bill are especially hard and sharp so that birds can chew their food. They will use their bills to tear chunks off or to crush lumpy items before swallowing them. A bird's bill continues growing throughout the bird's life, this is necessary to replace the wearing that occurs at the tips of their bills. A bird's bill is very sensitive, especially at the tips. Birds like Curlews can open the tips of their bill deep in the mud without getting a mouthful of mud.

Sand Martin - Snapping *Teal - Filtering* *Tree Creeper - Excavating* *Oyster Catcher - Chiselling* *Heron - Stabbing*

Bull Finch - Crushing *Curlew - Probing* *Wren - Picking/Probing* *Kestrel - Snatching*

Feathers are one of the most prominent features of a birds' anatomy and unique to birds.
Feathers perform a number of functions for a bird. Firstly, they provide insulation, this is very important in a warm blooded animal. Secondly, feathers also protect birds from UV light from the sun. Thirdly, feathers allow for flight. Fourthly, feathers determine what a bird looks like. Feathers give birds their colours allowing them to camouflage and hide or attract the females with displays of colour. Feathers grow quickly and are sealed at the base. They have muscles attached at the base of each feather. They do not last forever, and each year birds go through a moulting process replacing their old feathers with new ones. They have different types of feathers on their bodies that perform different jobs. For example, some feathers located on the wings are called the flight feathers which they use to fly. Feathers are made from *keratin*, a protein, which is also used to make hair on different animals and beaks on birds. Birds have good eyesight and colour is important to them. As a general rule, the male birds are more colourful than the female birds.

Bill bits
You will need:

- Tweezers (to illustrate picking or prising beaks), and a strainer (to show filtering birds).

What to do:

1. Explain the background information of the different bird bills. Use the tweezers and the strainer to simulate the actions of the bills of the birds.
2. Ask each student, or group of students, to pick two birds and to study their bills.
3. Ask the students to fill out activity sheet 11.

Birds of a Different Feather
What to do:

1. Explain the background information for the different bird features.
2. Ask each student, or group of students, to pick two birds and to study their plumage.
3. Ask the students to fill out activity sheet 11.

5.5 Grasslands

The following are teachers' notes for activity sheets 12 and 13 are applicable to trail stops 4 and/or 5

Background information for activity sheet 12 - Be a grassland detective

Grasslands are characterised as lands dominated by grasses rather than large shrubs or trees. There are different types of grasslands, some are like garden lawns and mown many times throughout the year but others may be only mown once or twice allowing for a greater number of different plants and animals to live in them. To find out what plants live in the grasslands in Shanganagh Park, you will need to spend some time examining a small area very closely with a quadrat. A quadrat is a square frame that you place on the ground to look at the plants living within the square. It is usually a half metre square. Use a Wildflower Field Guide to help you, available from your local library.

Common grass and herb species that are tolerant of mowing are Annual Meadow Grass, Rye Grass and White Clover. Other species that can be present include Red Fescue, Creeping Bent, Dandelion, Plantain, Daisy and sometimes Shepherd's Purse.

You will need:

- A pencil and notebook.
- A half metre square frame or quadrat.
- A magnifying glass (if available).
- A camera (if available).
- A Wildflower Field Guide.

Limitation: This activity is more suited to Spring and Summer, and early Autumn, and may not be suitable in Winter when it is more difficult to identify species.

What to do:

1. Depending on how many quadrats or frames you may have, divide the students into groups. Choose a nice grassy area at stop 5 where the area looks managed, e.g. the grass is cut short. At stop 4, you could choose an area of meadow where the grass is long.
2. One student must randomly throw the quadrat behind their shoulder so that the site they will study is randomly chosen.
3. Use the Wildflower Field Guide to identify the plants you find in the quadrat. The students can record their findings on activity sheet 12. Make drawings or take pictures of the plants you cannot identify.
4. Throw the quadrat three times, so you get to look at three different areas in the grassland.
5. On the activity sheet, the students are asked questions about the amount of different species of plants found so they can establish which plant species is dominant in the grassland habitat.
6. When the students are back in class, make a checklist of grassland plants. Organise a class discussion on the plants you have discovered, considering the time of year, and the type of area you studied.
7. This activity can be repeated in different types of grassland and a comparison can be made regarding grassland management by Dun Laoghaire Rathdown County Council Staff and their mowing regimes. When grass grows tall, a greater the amount of wildlife can normally be found.

Background information for activity sheet 13 – Identify parts of a plant

This activity familiarises the student with the different plant parts and their functions.

Basic parts of most plants:

Plant parts - roots

The roots help provide support by anchoring the plant and absorbing water and nutrients from the soil which is needed for growth. Plants can have either a taproot system (such as Dandelion) or a fibrous root system (such as Buttercup).

Taproot *Fibrous root*

Plant parts - stem

Stems carry water and nutrients from the roots to the leaves. The food produced by the leaves is then transported to other parts of the plant. The cells that do this work are called the xylem (pronounced zylem) and phloem (pronounced floam) cells. Xylem cells transport water and nutrients absorbed from the soil. Phloem cells transport food made in the leaves to other areas of the plant. Stems also provide support for the plant allowing the leaves to reach the sunlight that they need to produce food.

Plant parts - leaves

Leaves are the food making factories of green plants and use a process called *photosynthesis* to make food. In this process, carbon dioxide and water in the presence of chlorophyll (the green pigment in the plant) and light energy are changed into glucose (a sugar) and oxygen. This energy rich sugar is the food used by most plants. Photosynthesis is unique to green plants and supplies food for the plant and oxygen for other forms of life, like people. A green plant helped create the oxygen you are breathing today.

Leaves have evolved to catch light and have openings to allow the exchange of water and air with the atmosphere. The outer surface of the leaf has a waxy coating called a cuticle, which protects the leaf. Veins within the leaf transport water and nutrients.

Leaves come in many different shapes and sizes. Leaves can be *simple* with a single leaf blade connected by a petiole to the stem, e.g. Oak leaf, or they may be *compound* and made up of separate leaflets attached by a petiole to the stem, e.g. Ash leaf.

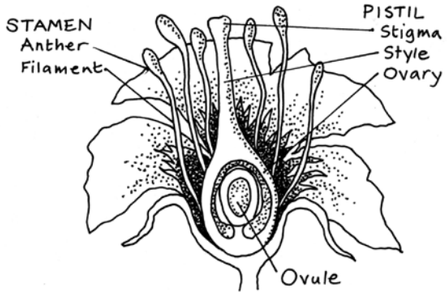
Plant parts - flowers

Flowers are important in making seeds. Flowers produce pollen. Once a flower's ovule has been fertilised (by pollen that is produced by the anther), it becomes the seed, and the ovary of the flower becomes the fruit. This is a very important part of the life cycle of plants. Petals are also important parts of the flower because they help attract pollinators such as bees, butterflies and hoverflies with their colours. You can also see tiny green leaf-like parts called sepals at the base of the flower. They help to protect the developing bud.

Plant parts - fruit

The fruit is the ripened ovary of a plant containing the seeds. After fertilisation, the ovary swells and becomes either fleshy, or hard and dry to protect the developing seeds. Many fruits help seeds spread. Many things that we label as vegetables are really fruits, for example, Tomatoes, Cucumbers and Beans.

Every seed is a tiny plant (embryo) with leaves, stems, and root parts waiting for the right conditions to enable it germinate and grow. Seeds are protected by a coat that can be thin or thick and hard. Thin coats do not protect the embryo very well but thick coats can let the embryo survive tough conditions. The seed also contains a short-term food supply called the *endosperm*, which is formed at fertilisation but is not part of the embryo. It is used by the embryo to help its growth. Seeds allow plants to disperse. They are transferred from one area to another by wind, water or animals.



Drawing of male and female parts of a flower

What to do:

Provide the background information to your students. Then visit Killiney Hill and conduct activity sheet 13. You can use the diagram here to identify the different parts of a plant on activity sheet 13.

Answers to activity 13: Identify parts of a plant

- Leaves.
- Flower.
- Fruit.
- Stem.
- Seeds.
- Roots.

5.6 Hedgerow

The following are teachers' notes for activity sheet 14 and are applicable mainly to trail stop 6.

Background information for activity sheet 14 - Discover hedgerows

This activity is designed to introduce the students to a hedgerow habitat. Hedgerows are man-made structures introduced as field boundaries. Irish hedgerows have only become a familiar feature of our landscape within the past 300 years. Their structure is maintained by the park's team but if left uncut and unmanaged they would grow into tall trees.

Hedgerows are extremely important for wildlife because they act as wildlife corridors allowing animals and plants to move from one habitat to another. Some mammals will not travel in open fields as they would be open to predation and hence they use hedgerows to move under cover. Bats use hedgerows like we use roads, allowing them to move between their roosting sites and their feeding sites. Hedgerows are an important habitat for birds providing them with food, nesting sites and singing posts. Insects and other invertebrates can be found in each layer of a hedgerow. Like woodland, hedgerows are made of 4 layers; ground, herb, shrub and tree layers (woodland layers are described in the nature trail stop 1). Hedgerows are protected under the Irish Wildlife Act, which makes it illegal to destroy vegetation by trimming from the 1st of March to the 31st of August. This is the nesting season for birds, and it is to protect their nests from destruction.

What to do:
Give a talk to your students about the value of hedgerows and ask them to examine the hedgerow and fill in activity sheet 14.

Useful Information:

Types of invertebrates which may live in woodland	
Ants	Grasshoppers
Aphids	Ground Beetles
Butterflies	Hoverflies
Centipedes	Leafhoppers
Cockchafers	Ladybirds
Crickets	Longhorn Beetles
Daddy-Long-Legs	Millipedes
Earwigs	Moths
Woodlice	Spiders
Flies	Weevils

Definitions of the different organisms:
Invertebrate: An animal without a backbone (e.g. Snails, Worms and Insects).
Arthropod: A type of invertebrate which has a segmented body, a hard external skeleton and jointed appendages that are used for feeding, feeling and walking (e.g. Insects, Crabs and Spiders).
Arachnid: A type of arthropod with four pairs of legs, no wings and usually two body parts (e.g. Spiders).
Insect: A type of arthropod that has three body parts (head, thorax and abdomen) and three pairs of legs. Many have wings. Many undergo complete changes of shape during their life cycle (e.g. a Caterpillar transforms into a Butterfly).
Myriapod: A type of arthropod with many pairs of legs (e.g. Centipedes and Millipedes).
Mollusc: A soft-bodied creature with a hard external shell (e.g. Snails, Mussels and Clams).

Background information for activity sheet 15 - Animal tracks and signs

The purpose of this activity is to encourage students to observe and look for evidence of animals in their park. The first part of the activity sheet outlines what tracks and signs animals leave behind them. As many of our animals are nocturnal, you might not see any during the day, but this activity will show the students that animals are there even if they don't see them. You might be lucky and see a Fox or its droppings.

You will need:
- A Guide to Mammal Tracks and Signs (see section 8 for more details).
- A magnifying glass (if possible).
- A white tray (the white background helps show material more clearly).

Dog *Fox* *Badger* *Sika Deer* *Rat*

What to do:
1. Pick a good place to look, possibly beside the hedgerow at trail stop 6 or the woodland at trail stop 1. If there is nothing there, move on to another area.
2. Divide the students into groups and give them one copy per group of the activity sheet. They must work as a team, looking in the park for evidence of animals whether it is their droppings or a burrow or even the trail of a snail that it makes when moving.
3. When the students have finished writing in their findings, ask them to compare it with those of their classmates as they may have seen different things. They can share the experience.
4. Once they have completed this activity congratulate them for becoming Wildlife Trackers.

Note: If you don't know what it is, take a photograph or get the students to draw pictures in their Nature Diaries.

ACTIVITY SHEET 1 - MAKING A NATURE DIARY

A good way to study nature is simply to look and listen! If you write things down that you see and hear, you will remember them afterwards. Make a Nature Diary, and you will soon see how nature changes during the different seasons.

To make your nature diary, you will need:
- A notebook.
- A pencil.
- Colouring pencils/ crayons

What to do:

1. Every time you visit Shanganagh Park, you are visiting a variety of habitats. A habitat is where animals and plants live e.g. woodland, grassland and stonewalls.

Include the following information:
- Date (e.g. Wednesday 21st June 2010).
- Weather (e.g. cloudy).
- Season (e.g. Autumn).
- Habitat (e.g. woodland).

2. Make a list on a different page of all the different types of animals and plants that you see. Each type of animal or plant is called a species. Where do you see the animals? What are they doing?

3. You might see something unusual, such as a rare bird like a Kingfisher. Write about it, draw it or take a photo. Stick your photos into your diary.

4. Sometimes you might see an animal or a bird that you do not recognise. Make a drawing of it in your diary or take a photograph. Then you can identify it with a field guide when you get back to class. Make a note of the different colours and patterns and write about where you saw it and what it was doing.

Happy Nature Watching!

ACTIVITY SHEET 2 - JOURNEY TO SHANGANAGH PARK

Before you begin your journey to Shanganagh Park, try to find a map of the area.

Instructions:

1. Locate your school on the map.

2. What is the distance from your school to Shanganagh Park in kilometres?

   _____

3. Are you travelling by bus, walking, or getting a lift in a car?

   _____

4. How much time did your journey to Shanganagh Park take? Record the direction travelled, e.g. North, South, East or West.

   _____

5. Do you pass by any public buildings such as a library, a court house, or county council offices? If so, what are they called?

   _____

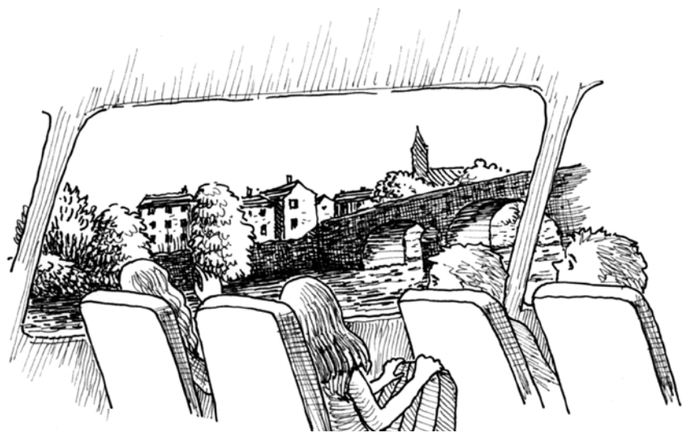
6. Make a list of habitats that you see on your journey in the spaces provided below, e.g. do you pass by a river, a beach, a woodland or a pond?

1. _____

2. _____

3. _____

4. _____



ACTIVITY SHEET 3 - MAKING A MAP

It is important to first get a good idea of your study area by drawing a map of it. Draw a map of your study area in the box provided, and include the different nature features such as the grass, trees and people made features such as a car park, path and monument.

Draw and label any important features, e.g. the location of a wildflower meadow.

ACTIVITY SHEET 4 - BE A SHANGANAGH PARK EXPLORER

Open your Senses - Touch, Listen, Smell.

You will need:
- A pencil and Nature Diary.
- A camera (if available).
- A magnifying glass (if available).

What to do:
Follow the instructions 1 - 10 and write the answers to the questions in your Nature Diary:

1. Using your Nature Diary, write down the name of your area, date of your visit and what the weather is like on that day.
2. Jump up and down on the ground. Is the ground hard or soft?
3. What can you smell in the area? Breathe through your nose!
4. Listen for sounds! What do you hear? Make a list of the different sounds.
5. Listen for bird songs. How many do you hear?
6. Feel a patch of grass or a piece of moss. How does it feel to the touch?
7. Feel a patch of lichen or the bark of a tree. How does it feel to the touch?
8. What colours can you see in the area? Make a list of the different colours.
9. How many shapes can you see? Look at the leaves, flowers and trees.
10. Find nature in action, record what you saw in your nature diary.

For Example:
- A Spider trapping a fly in its web.
- A Caterpillar munching a plant leaf.
- A Bird pulling on a Worm in the soil.

Back in class:
Write about your time spent in Shanganagh Park using the words you learned during the visit.

ACTIVITY SHEET 5 - GETTING TO KNOW A TREE

You will need:
• A pencil.
• A Tree ID Guide (see section 8 for details).
• A bag (paper or plastic) for collecting samples from your tree.

1. Choose a tree to study in your park.

2. Collect a leaf from your tree and if available, some seeds and fruit (late Summer/ Autumn), from the same tree on the ground layer. Place what ever you have collected in your bag.

3. What is the name of your tree?_____

   (Use the Tree Name Trail Guide to identify your tree from the leaves, bark or seeds). Trees are divided into two main groups. A flattened and wide broadleaf tree loses its leaves every Autumn, and is called deciduous, but a conifer is evergreen and keeps its needle like leaves all year round.

4. Is your tree a broadleaf or a conifer? _____

5. Draw and label two things that have found from your tree. (e.g. leaf, fruit, cone, flower)

ACTIVITY SHEET 6 - WOODLAND STRUCTURE

You will need:
•A measuring tape.
•A pencil.

A woodland has four layers that make up its structure. Not all woodlands have every layer. It depends on how much light can reach through to the woodland floor.

1. **Canopy Layer**: You can find older, taller trees such as Oak, Yew, Ash, Birch, Beech, Sycamore and Scots Pine.
2. **Shrub Layer:** You can find younger trees or smaller trees and shrubs such as Hazel, Hawthorn, Honeysuckle, Holly and Elder.
3. **Herb Layer:** You will find ferns and woodland plants in the herb layer. Their presence depends on the amount of light that is able to get through so that they can grow. If the canopy or shrub layer is very thick and dark, there will not be many plants in the herb layer (e.g. Beech woodland).
4. **Ground Layer:** You can find dead leaves, natural debris, rotting logs and mosses.

Student Instructions:
Take a walk through the trees. Mark an area 10 x 10 metres with string or sticks using your measuring tape. Study the woodland structure within this area. In your study area, identify what trees, plants and other vegetation are in your woodland.

List two trees in the canopy layer:

_____ _____

List two shrubs in the shrub layer:

_____ _____

List two plants in the herb layer:

_____ _____

List two things in the ground layer:

_____ _____

Observe your study area. It is very important how much light the trees and plants get from the sun. Some need more light than others, and that is why some trees grow really tall and others don't. Plants and trees use the light from the sun to make their own food as part of a process called photosynthesis. The plants are eaten by animals. Therefore, the sun is an indirect source of food for all living organisms on the planet.

Is your study area dark or bright?

_____

ACTIVITY SHEET 7 - CREATE A FOOD WEB

Draw lines to connect the animals and plants together. Start with the plant, what eats plants? Then connect the smaller animals to other animals that eat them. For example, Snails eat plants, the Badgers eats the Snail. What else do Badgers eat?

Bird

Deer

Wildflower

Oak Tree

Bee

Badger

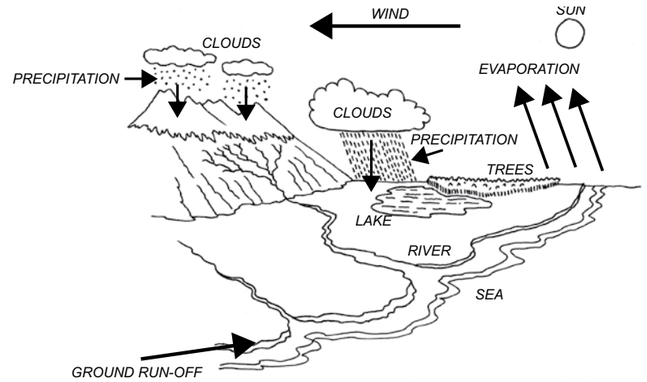
Snail

Caterpillar

ACTIVITY SHEET 8 - WATER CYCLE AT SHANGANAGH

Background information:
The earth continually recycles water – this in known as the *water cycle*. Water is a finite resource, which means the same amount of water is passed between the atmosphere, the oceans and land all year.

Water passes from the atmosphere to the oceans and land by *precipitation* (rain, dew, hail and snow). Firstly, water is evaporated from the rivers, lakes and oceans when heated by the sun, which changes water from a liquid to a gas called vapour. This process is called *evaporation*. Plants also release moisture to the atmosphere. This is known as *transpiration*. Once this vapour rises into the atmosphere, it begins to cool and changes back into tiny water droplets forming clouds. Once the clouds have reached their capacity (full), the water is returned to earth through precipitation. This forms the cycle. Water is collected on land in our rivers, lakes, streams and groundwater (ground water flows through rocks forming a water table under the ground). From the rivers and lakes, freshwater begins its journey to the sea. Freshwater feeding into our bays and estuaries is very important, and there are always lots of plants and animals in the wetlands where freshwater and saltwater meet.



Water cycle activity:
At Shanganagh Park, you can see the Dublin Mountains to the west and the Irish Sea to the east. These elements including the clouds in the sky form components of the water cycle around Shanganagh Park.

What is the weather like? Describe (e.g. sunny, cloudy, rainy, windy).

_____

Having walked around parts of Shanganagh Park, observe the presence of clouds and draw the Shanganagh Water Cycle from what you can see. Draw the water cycle, from the sea to the sky to the land. Can you label the parts of the water cycle process?

ACTIVITY SHEET 9 - WAVE ACTION

The action of the wind and waves on the Irish Sea and the Dublin coastline has created the cliffs at Shanganagh. The sea is both a builder creating new areas, and a taker, as it can erode material creating new features and taking some of the land back to the sea. The power of the sea is driven by the high and low tides, wind and waves. The waves of the sea cut, carry and deposit material and this is how we get such features as beaches, sand dunes, headlands, cliffs, sea stacks, sea arches, sand spits, sand bars, lagoons. Sometimes the sea erodes material from one place and deposits it further along the shore. This is known as long shore drift.

Waves are caused by friction between wind and the surface of the sea. When there are strong winds, we get big waves. When the wind is gentle, we get small, gentle waves.

Answer the following questions, while looking at the sea from Shanganagh trail point 3 (viewing area).

1. What is the weather like on your visit? Describe.

_____

2. What are the waves like along Shanganagh coastline? Describe.

_____

3. Can you identify a feature on the beach that was created by wave power?

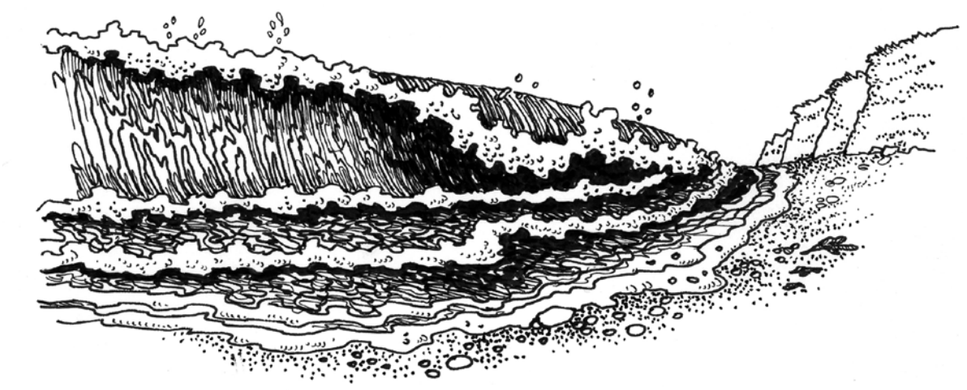
_____

4. Can you name an animal and plant which relies on this feature?

_____

5. The actions of the Irish Sea helped shape the Shanganagh Cliffs; True or False?

_____



ACTIVITY SHEET 10 - LET'S GO BIRD WATCHING!

Discover the different birds around Shanganagh Cliffs. When you see one of the following birds, tick it off on your record sheet below.

Date of Visit: _____ Season: _____

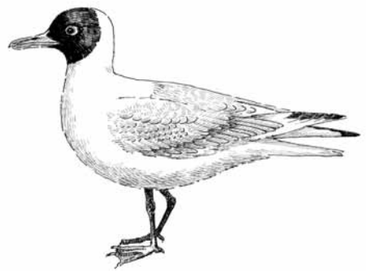
Birds' sighting list: Insert tick

- ☐ Brent Goose
- ☐ Curlew
- ☐ Godwit
- ☐ Gulls (herring, common, black headed)
- ☐ Heron
- ☐ Hooded Crow
- ☐ Kestrel
- ☐ Little Egret
- ☐ Meadow Pipit
- ☐ Oystercatcher
- ☐ Peregrine Falcon
- ☐ Pied Wagtail
- ☐ Plover
- ☐ Redshank
- ☐ Sand Martin
- ☐ Shelduck
- ☐ Skylark
- ☐ Teal

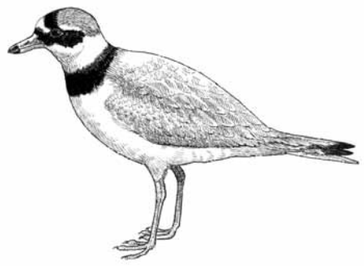
Any new ones?

Curlew

Oystercatcher



Black-headed Gull



Ringed Plover

ACTIVITY SHEET 11 - BILL BITS AND FEATHERS

Bill bits

Different birds have different bills (beaks) that they use for eating different food. Some are long and others are small. Some are used for prising open the shells of molluscs, others are used for bashing open shells and filtering the food from the seawater. The variety of beak shapes allow large numbers of birds to feed in one area, as the different shapes allow them to eat different things, which reduces competition for food.

Sand Martin - Snapping *Teal - Filtering* *Tree Creeper - Excavating* *Oyster Catcher - Chiselling* *Heron - Stabbing*

Bull Finch - Crushing *Curlew - Probing* *Wren - Picking/Probing* *Kestrel - Snatching*

Pick two different birds and look closely at their bills. Make the following record.

Name of bird 1: _____

Describe the bill: _____

_____

What food does the bird eat? _____

Name of bird 2: _____

Describe the bill: _____

_____

What food does the bird eat? _____

Birds of a different feather

Pick two different birds and look closely at their feathers. How are different birds alike, and how are they different?

Name of Bird 1: _____

What does it look like? _____

_____

Name of Bird 2: _____

What does it look like? _____

_____

How are the birds the same? _____

_____

How are they different? _____

_____

ACTIVITY SHEET 12 - BE A GRASSLAND DETECTIVE

Following your teacher's instructions, please record the plants you find in the table below for three throws of the quadrat.

Site 1	Site 2	Site 3

1. What type of plant have you seen the most in each site?

   _____

2. Which plants would you say are **abundant** (lots of them)

   _____

3. Which plants would you say are **scarce** (very few of them).

   _____

4. Observing your surroundings in the grassland, do you see any wildlife such as flying insects e.g. Butterflies, Hoverflies or Grasshoppers. Describe what you see.

   _____

   _____

   _____

5. Observing your surroundings in the grassland, has there been any other activity, for example, has the grass been mown. Describe what you see.

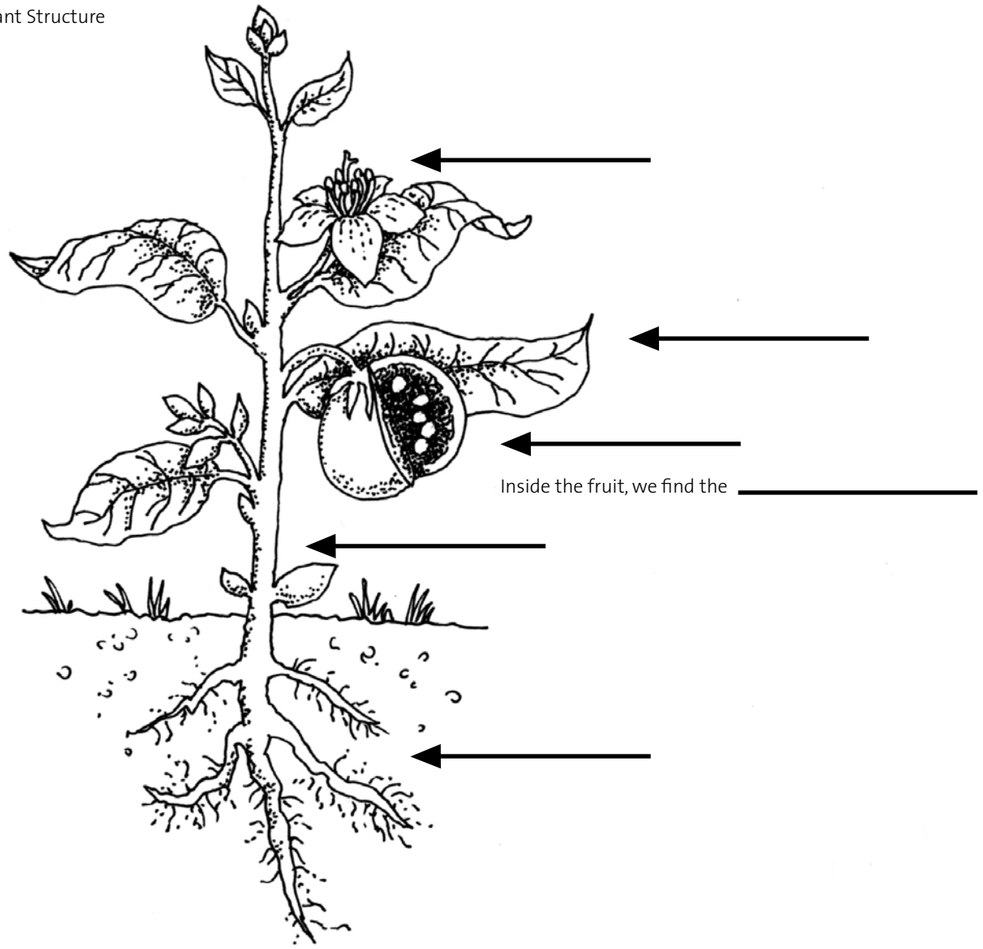
   _____

   _____

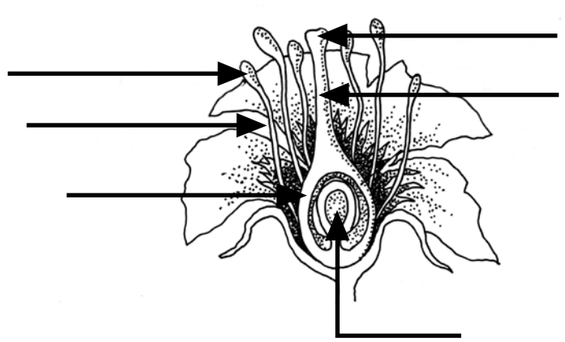
   _____

ACTIVITY SHEET 13 - IDENTIFY PARTS OF A PLANT

Plant Structure



Male and Female parts of plant of a flower



ACTIVITY SHEET 14 - DISCOVER HEDGEROWS

Hedgerows are an important place where wildlife such as Badgers, Fox, Mice, Shrew, Stoats, Birds and Invertebrates live. Spend some time examining a hedgerow. Look at the trees, shrubs and flowers.

Are any birds using the hedge?

Can you find any insects in the hedge? You can put these in a white tray to have a closer look.

Record what you find in box below.

Tree	Shrub	Insect

Spider

Shield Bug

Woodlouse

Aphid

ACTIVITY SHEET 15 - ANIMAL TRACKS AND SIGNS

While visiting your park, there are many clues to look out for that show that animals have been near, even if you have not seen them. They leave evidence behind them.

Footprints: When the ground is soft or muddy, animals often leave their foot impression. You can tell what animal it is by the shape of their footprint.

Dog *Fox* *Badger* *Sika Deer* *Rat*

Droppings: An animal's droppings can tell you which animal it is, what the animal eats and where you find them. A Fox's droppings can be found in many settings and you can see bone and feather remains in it. Look at them with a white background as they will show up better.

Signs of feeding: We can often see where an animal has been eating by feathers or bones that are left behind.

Nests and burrows: These show us where animals live. Most burrows have a muddy path leading to them with footprints at the entrance. Nests can be seen in hedgerows or trees. Never try to touch a nest, as this can harm baby birds or scare the mother away.

Other signs: Many animals leave scratches and other signs behind e.g. fur caught on a fence, feathers that have fallen out of a bird or scratches on the bark of a tree.

Record your findings

Where are you in Shanganagh Park?

_____

Date: _____

What have you found?
Fill in your findings in the boxes below. Compare with your classmates, what did they find?

Droppings				
Footprints				
Signs of Feeding				
Nests or Burrow				
Trails				
Other Signs				

Finding out about animals is about observing and looking for evidence. We can track their movements and find out more about their behaviour.

A. SCAVENGER HUNT

Take this list with you to Killiney Hill. Identify all the things that are listed below.

A leaf.
Something wet.
A berry.
A wind-dispersed seed.
An animal from the bark of a tree.
A feather.
Something with a strong smell.
Three pieces of litter (do not touch the litter).
A fungus.
A smooth stone.
A lichen from the trunk of a tree.
A leaf that's not green.
Something red.
A wildflower.
Something unusual.

Hawthorn Leaf

Feather

Fungus

B. PREDATOR PREY GAME

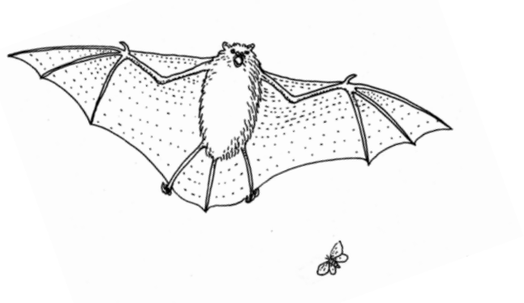
You will need: 2 different coloured balls.

Instructions:
The group needs to stand in a circle. The leader hands out two different balls, which represent a Fox and a Squirrel. Everyone is a tree. The Fox can only be passed to the person standing next to you but the Squirrel is a flying squirrel and can be thrown to anybody in a circle. If you have both Fox and Squirrel in your hands at the same time, you're out!

C. BAT AND MOTHS

You will need: a blind fold and a rolled up newspaper.

Instructions:
Blindfold one person. They will be the "Bat". Give them the rolled up newspaper which will act as the detecting device. Please advise the Bat to use this rolled up newspaper carefully and not hit the Moths too hard. They should swing gently to mimic the Bats' echolocation or sound waves. The others in the group form a circle around them. Two others take the role of the Moths inside the circle, which tries not to get caught by the Bat. Every time the Bat shouts out "Bat", the Moths must shout back "Moth" so they see how bats use echolocation to catch their prey by tipping them with the newspaper.



Echolocation: Bats use echolocation to navigate and forage. Bats echolocate by sending out high frequency calls that bounce off objects and return as an echo. Bats locate small prey by judging the length of time it takes the echo to return.

D. CALLS OF THE WILD

You will need: blindfolds for everyone.

Instructions:
Divide the group into pairs. Each pair must decide on an animal sound for themselves. Blindfold everyone and separate the pairs. Each pair must try and find the other by listening out for the others animal sound.

E. MEET A TREE

You will need: blindfolds for half the group.

Instructions:
Mention how many insect species depend on an Oak tree (350 – the largest amount of any tree) compared to a Sitka Spruce (10 or so). Talk about native trees versus non-natives trees and the importance of native trees for wildlife. Divide the group into pairs and blindfold one of each pair. The other must lead the blind child in a "round-about" way to a tree and "introduce them" to that tree, making them feel the bark, the leaves, the smell, the girth of the trunk, etc. Then they must lead them back (again in a "round about" way to where they started). Taking the blindfold off the child must find the tree they were introduced to.

There are many different books, guides and websites available to help you identify our native species in the field. Here are a few suggestions but feel free to try others.

Your local library is a good place to start, drop in and check out what they have in their natural history section.

IWT: The Irish Wildlife Trust has information packs available on our native animals. Just contact them and ask for "Fact files on Nature".

ENFO: The Centre for Information on the Environment is an online resource with loads of information on Ireland's biodiversity. Look at their poster and leaflets' section for great information on specific habitat types, and the flora and fauna you can expect to find there.

Websites
http://www.iwt.ie - The Irish Wildlife Trust
http://www.enfo.ie - ENFO Website
http://www.iwdg.ie - The Irish Whale and Dolphin Group
http://www.batconservationireland.org - Bat Conservation Ireland
http://www.birdwatchireland.ie - Birdwatch Ireland
http://www.noticenature.ie
http://www.biodiversityireland.ie

Books

Habitats - Fossitt, J. (2000). *"A Guide to Habitats in Ireland"*. The Heritage Council.

General - Mooney, D. & Sterry, P. (2004). *"Complete Irish Wildlife: Photoguide"*. HarperCollins Publisher Ltd.

Tracks and signs - Preben B. & Preben D. (2006). *"Animal Tracks and Signs"*. Oxford University Press.

Birds - Svensson, L., Grant, P.J., Mullarney, J. & Zetterstrom, D. (1999). "*The Most Complete Guide to the Birds of Britain and Europe*". HarperCollins Publisher Ltd.
- Caboy, D. (2004). *"Irish Birds"*. HarperCollins Publisher Ltd.

Plants - Johnson, O. (2006). *"Tree Guide"*. HarperCollins Publisher Ltd.
- Blamey, M., Fitter, R. & Fitter, A. (2003). *"The Wildflowers of Britain and Ireland"*. A & C Black Publishers Ltd.
- Rose, F. & O'Reilly, C. (2006). *"The Wild Flower Key: How to identify wild plants, trees and shrubs in Britain and Ireland"*. Penguin Group.

Invertebrates - Chinery, M. (2004). *"Butterflies"*. HarperCollins Publisher Ltd.
- Chinery, M. (1993). *"Insects of Britain and Northern Europe"* HarperCollins Publisher Ltd.

Field Charts
The Field Studies Council (FSC) is a British organisation that publishes a wide range of well illustrated identification guides. Most of these will be useful for Irish species too, for example;

1. A guide to mammal tracks and signs.
2. Butterflies.
3. British land mammals.
4. Day flying moths.
5. Bugs on bushes.
6. The woodland name trail.
7. Tree name trail.
8. Urban lichens on stone and soil.
9. Urban lichens on trees and wood.
10. A guide to hedgerows.
11. A key to the major groups of freshwater invertebrates.
12. The rocky shore name trail.
13. Common seaweeds.

They can be bought directly from their website at the following address:
http://field-studies-council.org/publications/foldout.aspx

1. Please advise students to wear appropriate footwear, i.e. runners or waterproof footwear. If it has been raining, advise Wellingtons.
2. Ask students to wear clothing that is appropriate i.e. school tracksuit or otherwise just in case they dirty their clothes.
3. Please ask the students to bring their coats or rain gear to school especially as the weather can be unpredictable.
4. Please instruct the students to not run away from the group and to stay in eye sight of their teacher or an instructor and listen to the instructions at all times.
5. Students must stay behind their teacher or instructor at all times on the site visit as they know the way.
6. If the students see something outside of the immediate area, they must seek permission and let it be known where they are going.
7. Bring a first aid kit with you for any cuts or stings.
8. Let them enjoy themselves and learn lots about nature.

TIDE TIMES
The tide comes in and out two times every day, so there are two low tides and two high tides each day. The time of these tides changes each day and varies with location. The daily tide times for Dublin or Dun Laoghaire can be found in the daily newspapers such as on the Bulletin Page of The Irish Times or on the following websites;

http://www.irishtimes.com/weather/tides.html

http://www.dusac.org/node/12

http://www.sailing.ie/inside/default.asp?pageId=309

Curriculum Title	Social, Environmental, Scientific, Education					Arts Education (Visual Arts)	
	Skills and concept Developments	Strands				Skills and concept Developments	Strand
Activity sheet	Geographical investigation skills including questioning, observing, recording and communicating	Natural environments including the local environment	Environmental awareness and care	Living things including plants and animals	Human environment including natural environmental features and people, settlements including homes and other buildings	An awareness of form, texture, pattern and rhythm	Drawing including making a drawing, looking and responding
1	√	√	√	√		√	√
2	√	√			√		
3	√	√	√	√	√	√	√
4	√	√	√	√		√	
5	√	√	√	√		√	√
6	√	√	√	√		√	
7	√	√	√	√			
8	√	√	√	√	√	√	√
9	√	√	√	√	√	√	√
10	√	√	√	√		√	
11	√	√	√	√		√	
12	√	√	√	√		√	
13	√	√	√	√		√	
14	√	√	√	√	√	√	
15	√	√	√	√		√	

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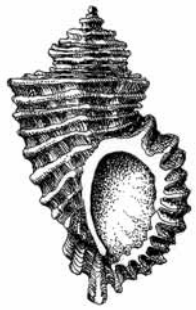


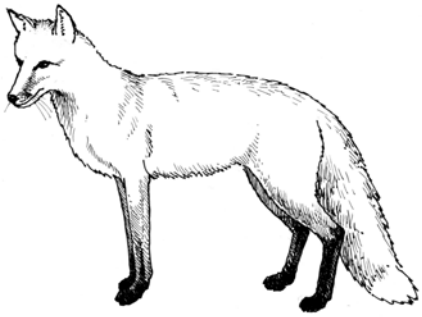


Dún Laoghaire-Rathdown
County Council
County Hall,
Marine Road,
Dún Laoghaire,
County Dublin

Tel: 01 2054700
www.dlrcoco.ie

dlr
Comhairle Contae County Council

An Chomhairle Oidhreachta
The Heritage Council