



Nature in the City a guide to Biodiversity in Cork City

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Nádúr sa Chathair, treoir ar an mBithéagsúlacht i gCathair Chorcaí

An Action of the Cork City Biodiversity Plan 2009-2014

Acknowledgements

This publication was produced by Cork City Council with the financial support from the Heritage Council.

The booklet was researched and written by Mr Rick Mundy, RPS Group, Cork.

Cork City Council would like to express their appreciation to Mr Rick Mundy, Ms Jean Hamilton, Ms Michelle Cronin, Coastal Marine Resource Centre (CMRC), Mr Conor Kelleher, Mr Phil Richardson and Mr Austin Hopkirk who provided images for this publication.

The significant contribution of Mr Dennis MacGarry, late of the Planning Dept, to this booklet, and many other Cork City Council publications over the years, is acknowledged. Dennis' images, particularly those of nature in Cork City, has greatly enhanced the many Heritage publications in which he was involved. Ar dheis Dé go raibh a anam.

Táimád fíor-bhuíoch dóibh san go léir a thug lámh chúnta d'fhon an saothar a thabhairt chun críche.



An Chomhairle Oidhreachta
The Heritage Council



Prepared by Cork City Council with support of the
Heritage Council

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I am delighted to be associated with this interesting booklet "Nature in the City".

I wish to congratulate those members of staff who prepared this document particularly Niamh Twomey, Heritage Officer and acknowledge the support of the Heritage Council.

I hope this booklet will provide useful information to members of the public and specialists alike on the amazing wealth of wildlife and nature that exists in Cork City as well as highlighting the importance of biodiversity in the city.

Councillor Dara Murphy, Lord Mayor

Message from the Manager



Cork City Council is committed to Biodiversity in the City through the implementation of the Cork City Biodiversity Plan (2009-2014). I am delighted to welcome the publication, "Nature in the City" which is a valuable addition to the existing series of interesting and worthwhile Heritage publications produced by the Heritage Officer, Ms Niamh Twomey.

I believe that this publication will highlight natural heritage as a positive element of life in the city and will give the reader an insight into the vast array of wildlife which thrive in Cork City.

Mr Joe Gavin, City Manager

Foreword

As Chairman of the Cork City Heritage Forum I welcome the interesting and informative booklet "Nature in the City" This publication is an action from the Cork City Biodiversity Plan

Biodiversity means the variety of life on earth and encompasses everything from the smallest insect in our gardens to the largest whales in the ocean. It includes all living plants and animals whether rare or common. The term biodiversity is an attempt to represent in a single word the rich tapestry of life on earth.

Cork City supports a wide and varied array of plants and animals. The green spaces of the city such as gardens, parks, and areas such as the ponds and lakes, rivers and Cork harbour provide havens for many species more usually found in rural situations. Indeed many of the urban structures of the city eg the walls and buildings, also provide homes to species which specialise in living in cities.

This booklet helps to raise awareness of the wealth of nature in the city and indicates where and how nature in the city can be seen and enjoyed. This publication also gives practical tips on how to improve biodiversity and where to get further information and advice.

I would like to acknowledge the work of Mr Rick Mundy from RPS Group, Cork who wrote this publication. I would also like to thank Niamh Twomey, Heritage Officer who helped prepare this document and the Heritage Council for their financial support.

**Mr Kevin Terry, Chairman of Cork City Heritage Forum
Director, Planning and Development and City Engineer**

Réamhfocal

Mar Chathaoirleach ar Fhóram Oidhreachta Chathair Chorcaí cuirim fáilte roimh an leabhrán suimiúil agus faisnéiseach "Nature in the City". Is gníomh é an foilseachán seo ó Phlean Bithéagsúlachta Chathair Chorcaí.

Is éard atá i gceist le bithéagsúlacht ná an éagsúlacht bheathra ar domhan agus cuimsíonn sí gach rud ón bhfeithid is lú inár ngairdíní chuig na míolta móra is mó san fharraige. Áiríonn sí gach planda agus ainmhí beo, is cuma cibé tearc nó coitianta. Is éard atá sa téarma bithéagsúlacht ná iarracht chun an taipéis saibhir de bheathra ar domhan a léiriú i bhfocal amháin.

Tugann Cathair Chorcaí tacaíocht do réimse leathan agus éagsúil plandaí agus ainmhithe. Soláthraíonn ceantair ghlasa na cathrach ar nós gairdíní, páirceanna, agus áiteanna ar nós na locháin agus lochanna, aibhneacha agus cuan Chorcaí tearmainn nádúrtha don iomaí speiceas a bhfaightear níos minice i dtimpeallachtaí tuaithe. Gan amhras soláthraíonn go leor de struchtúir uirbeacha na cathrach, m.sh. na ballaí agus foirgnimh, láthair chónaithe do speicis a gcónaíonn go speisialta i gcathracha.

Cabhraíonn an leabhrán seo chun feasacht a mhéadú i leith saibhreas an nádúir sa chathair agus léiríonn sé cá háit agus conas is féidir nádúr sa chathair a fheiceáil agus taitneamh a bhaint as. Sa bhreis ar sin tugann an foilseachán seo leideanna praiticiúla ar conas an bhithéagsúlacht a fheabhsú agus cá háit ar féidir teacht ar bhreis eolais agus chomhairle.

Ba mhaith liom aitheantas a thabhairt don obair a rinne an tUasal Rick Mundy ón nGrúpa RPS, Corcaigh, a scríobh an foilseachán seo. Ba mhaith liom buíochas a ghabháil chomh maith le Niamh Twomey, Oifigeach Oidhreachta, a chabhraigh le hullmhú na cáipéis seo agus leis an gComhairle Oidhreachta as ucht a cuid tacaíochta airgeadais.

**An tUas. Kevin Terry
Cathaoirleach ar Fhóram Oidhreachta Chathair Chorcaí
Stiúrthóir, Pleanáil agus Forbairt agus Innealtóir na Cathrach**

*One touch of nature makes
the whole world kin.*

William Shakespeare



Introduction

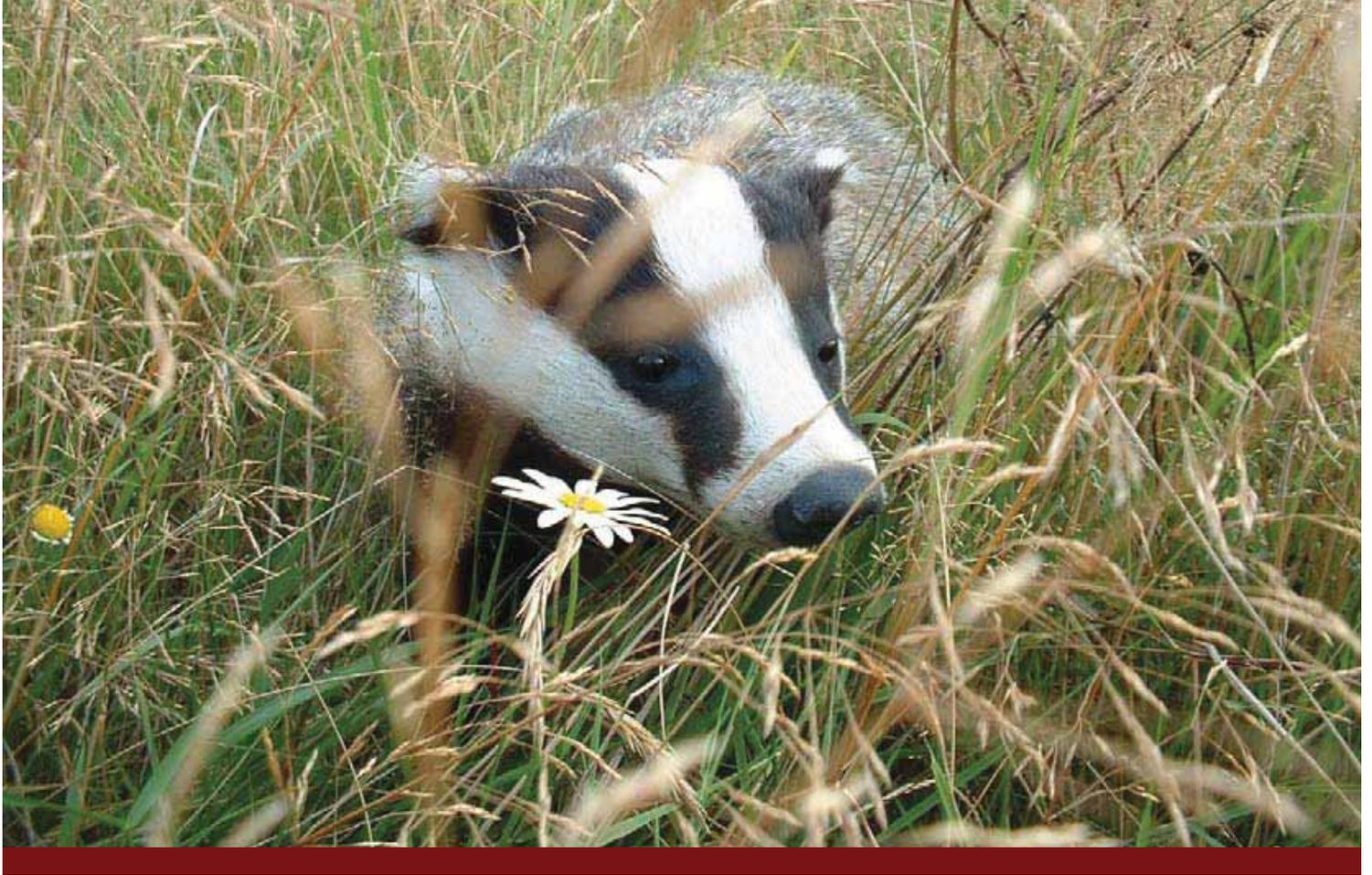
What is biodiversity?

• Biodiversity is short for 'biological diversity'. Biodiversity is the variety of living things on earth, from the smallest insect to the largest mammal and tree. Biodiversity includes the variation between species, the variation between individuals of the same species and the variation between the communities or ecosystems in which these species live. The biological diversity we see today is the result of millions of years of evolution. Biological diversity is constantly changing and evolving as some species adapt to new surroundings, become extinct, and others, over time, evolve into new species. We as human beings are a part of the earth's biodiversity and our activity can influence it in a positive or negative way.

Why is it important that we protect and enhance biodiversity?

Biodiversity is the basis of all life on earth, including human existence; it is our life support system. Ecosystems regulate climatic processes, breakdown waste, recycle nutrients, filter and purify water, buffer against flooding, maintain soil fertility, purify air, and provide natural resources such as wood, textiles, and of course food. All agriculture and marine and freshwater resources depend fundamentally on Biodiversity. To allow continued biodiversity loss means losing the essential 'services' that biodiversity provides, both for us and for future generations.

Ireland is a signatory of the international 'Convention on Biological Diversity' one of the stated aims of which is "to achieve by 2010 a significant reduction of the current rate of biodiversity loss at the global, regional and national level as a contribution to poverty alleviation and to the benefit of all life on Earth."



Biodiversity & Health

The diversity of life provides important checks and balances, keeping populations of disease-causing pests and viruses in check. Biodiversity also keeps air and water clean; essential requirements to human health. Plant extracts and derivatives form the basis of most traditional and many modern medicines. It is estimated that plant-based medicines provide more than 3 billion people with their primary health care. With the loss of global biodiversity, we could be losing important undiscovered plant species that can be used to fight illnesses.

Biodiversity & Agriculture

Biodiversity provides us with a varied food supply, which is needed for balanced human nutrition. Conservation of genetic biodiversity is essential to ensure that domestic plants and animals can be selectively bred in order to adapt to farming in different local conditions in different parts of the world and as climates change. Organic and other non-intensive farming techniques rely on fundamental ecological principles to produce our food. This requires a healthy diversity of organisms to be present within the farmed ecosystem.

Why is biodiversity important in cities?

Whilst many of the essential functions of biodiversity are discussed above, an equally important, if less easily measured function of biodiversity is simply that it enriches our lives. Imagine a world without wild bird song, a spring without Swallows and Swifts appearing in the sky, a summer without wild flowers and butterflies. Most of us live in cities and the plants and animals that share our urban areas with us are therefore the ones that most of us come into contact with most often.



The Biodiversity of Cork City

Plants (Flora) and Animals (Fauna) of Biodiversity Importance in Cork City

Cork supports a wide range of plants and animals. Some are common species, some rare, some legally protected and some are seen as pests. The green spaces of the city provide havens for species more usually found in rural situations whilst the structures of the city, the walls and buildings, provide homes to specialist species which specialise in living in cities. The following section of the booklet provides some information on the plants and animals of Cork City.

Flora

Most species of plant have specific environmental requirements in terms of water, light, soil conditions, the amount of disturbance they can tolerate, the level of competition with other plants that they can tolerate, and so on. For this reason most plants inhabit specific locations with respect to the physical world and to other plants, and many species are 'specialists' found only in a particular habitat where the conditions suit them perfectly such as particular types of woodland or grassland. In Cork, The Douglas Estuary area offers some of these specialist habitats, but elsewhere, the number of different habitat types on offer to plants in Cork's urban environment is quite limited and therefore the number of different plant species present in the city tends to be low and most of the species we do see are 'generalists' rather than 'specialists'. Gardens, parks, allotments and other green spaces will support a range of plant species, but these are mostly species that are much more abundant in rural areas where their preferred habitats are more extensive and are usually of better quality. One scarce woodland plant is however known from the city; Ivy Broomrape grows parasitically on Ivy and can be found, for example, in the Distillery Fields area of the city.

Cities do however offer habitats to some plant species that are rare or absent in rural areas in the form of hard surfaces such as walls, and specialist species of this habitat find a home in the city.

In many ways walls 'mimic' natural cliffs and many plant species that are naturally adapted to life on a cliff will readily make use of man-made walls. Similarly, bare areas of rubble and gravel with little soil cover mimic certain natural habitats such as the scree slopes found beneath cliffs. Because natural rock cliffs and screes are relatively rare habitats in Ireland, the



Think Native! If you plant a native Irish tree such as oak, rowan or birch, it will support more birds, animals and insects than an exotic tree would. For example, a native oak tree growing in Ireland by providing them with food and shelter, can support about 290 different species of animals and other plants.

most important habitat for many of these species are the artificial walls and stony areas of our towns and cities. Furthermore, the lime-based mortar of walls is highly calcareous and provides an attractive habitat to plants that naturally inhabit limestone areas.

Many of the walls of Cork are home to an array of plants. Ferns are well represented and include Maidenhair Spleenwort, Wall Rue, Hart's-tongue Fern and Rustyback Fern. Mosses, lichens, grasses and other flowering plants such as Pellitory-of-the-wall can also be found here. The naturalised (not native to Ireland), but not invasive species Ivy-leaved Toadflax exists in a rare white-flowered form (instead of its usual purple) is also found on some of Cork walls.

Two very rare plant species, both Geraniums, occur in this habitat in Cork: These are Round-leaved Cranesbill and Little Robin. These are listed as nationally 'Vulnerable' in the Irish Red Data Book.

Little Robin is very similar and closely related to the common woodland plant Herb-robert and is considered to be of very high biodiversity value. It is only known from walls and waste ground in Cork City and in Dungarvan Co Waterford. It has not been recorded recently at Dungarvan so its only known remaining sites are probably all within Cork City.

Round-leave Cranes-bill is found in very few sites in Ireland, one of which is waste ground areas around the city, where it has been recorded in greater numbers than at any of its other sites in Dublin and Wexford.

Fauna

Bats

Everybody knows that bats inhabit buildings and caves, which they use as roosting sites during daylight hours, but most people's view of the type of building favoured by bats is of church towers and old abandoned mansions and castles. Whilst bats will use these buildings, most of our commoner species love nothing more than a dry, warm modern house in which to shelter and to raise their young. Cities provide an abundance of such buildings and are therefore very attractive places to bats. Bats eat flying insects so in addition to a roost site, they need to have access to an area rich in flying insects. Such areas are rather limited in the urban environment so bats in cities tend to congregate in places where a food supply does exist, particularly in areas close to water where flying insect numbers are often high.



In Cork, the River Lee and Cork Lough provide such sites rich in insect food and support healthy bat populations.



Smaller numbers of bats can however be found all over the city. The western part of the North Channel of the River Lee, from the Distillery Fields and Fitzgerald Park to the Lee Fields and Lee Road is an excellent area for bats, as is the South Channel where it passes through UCC. The Marina, Atlantic Pond and Blackrock area also supports good bat populations. Cork Lough is probably the easiest place to see bats, and on warm, calm, summer evenings it is a great place to observe them swooping through the swarms of midges and other flying insects over the perimeter path.

Six of Ireland's ten species of bat occur in Cork City: Leisler's bat, common pipistrelle, soprano pipistrelle, brown long-eared bat and Daubenton's bat. Common pipistrelles can be found all over the city, usually associated with areas of trees. Leisler's bats are also widespread and fly higher above trees and garden areas. Brown long-eared bats are also associated with trees and are found in more extensive 'green' areas such as cemeteries parks and large gardens. Daubenton's bat is closely associated with water where they skim the surface for insects. Soprano pipistrelle also tends to be found in wetter areas but is not exclusive to this habitat and is widespread in the city.

Other mammals

Mammals are cautious of humans and are rarely seen, but the city is home to many species. Some we are all too familiar with and are considered pests, these include the brown rat and house mouse, which are found throughout the city.

Other mammals such as the otter are not usually associated with cities but Otters are quite common along the River Lee throughout its course through the city and people have been lucky enough to see them swimming in the river from busy city centre bridges on occasion. The shoreline from Blackrock around Mahon to the Douglas Estuary also provides excellent otter habitat.

The river can throw up other surprises. Both Common and Grey Seals occasionally venture upstream from the harbour in pursuit of Salmon and Mullet; and who can forget the summer of 2001 when the Orcas came to town? Three of these magnificent whales swimming up the South Channel as far as City Hall on a busy Saturday night is not a sight that the inhabitants of many cities can claim to have seen.

Several other mammal species are known from the city. Hedgehogs are present in larger gardens and parks, and can be quite common in suburban areas preferring places with both undergrowth in which to shelter and open areas rich in earthworms, slugs, snails, beetles and other invertebrates on which to feed. Red Foxes occupy similar habitats and are becoming increasingly well adapted to city life, taking advantage of our wasteful ways, scavenging our discarded food.



Red Squirrels are mainly a rural species occupying woodland areas, but probably enter the edges of the city on occasion along tree lines and mature hedgerows. Similarly, Stoats probably occur in areas at the edges of the city on occasion. Pygmy shrew, Ireland's smallest mammal prefers dense ground cover and hedgerows and can be found in areas of the city that provide this habitat.

Birds

Urban habitats have been shown to be of great importance to many bird species. In Britain, the British Trust for Ornithology estimate that gardens and built-up areas support 33% of all Blackbirds in Britain; 54% of Starlings; 38% of Greenfinches and 62% of House Sparrows. In Ireland, where there is a relatively much smaller area of urban habitat these figures are likely to be substantially lower, however they give an indication of just how important towns and cities can be for some of our birds.

In a typical year more than 100 species of bird will be seen in Cork City. Of these approximately 40 breed regularly in the city and a further 10 or 15 may breed occasionally in small numbers. The remainder are mainly passage migrants seen in spring and autumn including the thousands of waders that can be seen on the outskirts of the city at the Douglas Estuary and Lough Mahon and birds such as Sand Martin and Willow Warbler which can occur anywhere; or winter visitors such as the ducks, Pochard and Shoveler and the various species of gull that can be seen at The Douglas Estuary, Lough Mahon, The Lough, along the river and elsewhere. Some of the more unusual and interesting species that can be found in the city are discussed below.

One of the most spectacular birds that nests in Cork City is the Peregrine. This large and magnificent falcon has used a few sites in the city to nest and can be seen regularly in the skies above the city. Peregrines are ferocious hunters, taking other birds such as Pigeons, Jackdaws and Ducks on the wing. The Peregrine population was decimated during the second half of the 20th century as a result of over use of DDT and other pesticides which entered the food chain and caused thinning and breaking of eggshells in Peregrines and other birds of prey. Thankfully these chemicals have been banned and Peregrine numbers have made a remarkable recovery.

The Peregrine's smaller relative the Kestrel also occurs in the city, nesting on old buildings and cliff faces. Kestrels eat mainly small mammals and catch them by hovering. A small bird of prey hovering determinedly, unmoving from the same spot for minutes on end, will invariably be a Kestrel.





The Blue Tit is one of our most familiar garden birds and is one of the first that will be attracted to a bird table or feeder.



Perhaps a more surprising breeding species within the city is the Barn Owl which has bred at one or two traditional sites for many years, surviving on a diet of rats. Both the Barn Owl and the Peregrine are scarce species in Ireland and even the small numbers that occur in Cork City are therefore of some biodiversity importance on a national scale.

The Pied Wagtail is a bird that is very much at home in the city and is seen commonly on rooftops, in car parks and similar open areas where they hunt insects. They nest in crevices in walls often close to rivers or other water. In common with many towns and cities these birds have taken to roosting in the very heart of the city, in Cork's case, in the trees on Grand Parade where hundreds of Pied Wagtails gather in the branches and on nearby ledges of buildings every night during the winter, apparently oblivious to the noisy human traffic below. This apparently strange choice of roost site probably has two advantages for the wagtails. Night time predators such as cats will be deterred precisely because of the human disturbance; and it is probably a tiny but vital degree or two warmer here in the city centre than elsewhere.

Stock Dove is a smaller more elegant cousin of the Woodpigeon. Stock Doves usually nest in holes in large mature trees but unusually, at the distillery on the North Mall; they have taken to nesting in holes in the large retaining wall below Sunday's Well Road. Stock Doves may occur elsewhere in the city where large trees with dead branches occur.

Little Grebe, a diving bird, is the smallest of our waterbirds and looks like a tiny duck or coot (although not closely related to either). They are rare in the city, but can be seen at the Atlantic Pond and at The Lough. During spring and summer the 'song' of the Little Grebe, a loud high-pitched whinnying trill can sometimes be heard at these sites, an indication that they may be nesting or that they may do so in the future. [Photo X]

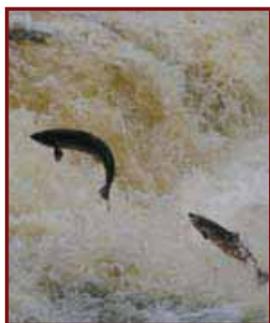
Whilst Kingfishers probably do not breed regularly within the city limits, they can be seen occasionally in autumn and winter along the River Lee. The Distillery Fields section of the North Channel and the Lee fields are particularly favoured areas.

Many people will have noticed one of the most recent additions to Ireland's birdlife the Little Egret. Graceful white birds with black legs and conspicuous yellow feet, members of the heron family, they first bred in Ireland during the 1990's and are becoming quite common around Cork. They can often be seen flying along the Lee and its tributaries and at other locations around the city including the Douglas Estuary, Murphy's Farm, Atlantic Pond and at The Lough where they roost at night during the autumn and winter. [Photo W]



Everybody needs beauty as well as bread, places to play in and pray in, where nature may heal and give strength to body and soul.

John Muir



Fish

A number of fish species can be found in the River Lee within Cork City. Atlantic Salmon, a species protected under the EU Habitats Directive, pass through, adults heading upstream to spawn, juveniles heading downstream to the open sea. From approximately May until September, they can sometimes be seen jumping the weir at the Lee Fields. The best chance of seeing them is following periods of heavy rainfall when a large amount of water is flowing over the weir. Both the North and South Channels of the Lee are well known for Brown Trout. The stretch of the South Channel where it runs alongside Western Road is a good place to see them 'rising' to take flies from the surface. Eels were once common in the Lee but have become less so in recent years.

During warm summers, large shoals of Grey Mullet (also called Thick-lipped Mullet) swimming close to the surface of the water can often be seen from the city's quays and bridges. More rarely seen are the mysterious and peculiar-looking Lampreys. Two species of these very primitive, eel-like, fish occur in the Lee, the brook lamprey and the sea lamprey. Lampreys have complex life cycles. Both Brook Lampreys and Sea Lampreys spawn in gravel beds in fresh water streams and rivers.

Brook lampreys remain in freshwater throughout their lives but sea lampreys when they are 3 to 6 years old migrate to the open sea where they become parasitic, attaching themselves to other fish and sucking their blood. Both species are becoming increasingly rare and like the Atlantic salmon (often a host of the sea lamprey) are protected in law under Annex 1 of the EU Habitats Directive. Flatfish such as Flounder are abundant in the muddy shallows of the Douglas Estuary and Lough Mahon and other marine fish will occur in this area at the edge of the city at high tide.

Invertebrates

The small range of habitat types, low diversity of native plant species and the patchy, isolated distribution of green spaces in cities generally makes them unsuitable as places of biodiversity importance for invertebrate. The semi-natural wetland habitats found at the Douglas Estuary are an exception in Cork and support rich invertebrate communities. (This is discussed in the next section of the booklet). The profusion of flowers in the cities parks and gardens does however attract migrating insects such as butterflies, bees and moths, particularly as large number of garden flowers can be present at times of year when wild flowers in rural areas are few.

Some of our most familiar butterflies such as Red Admirals, Painted Ladies and many of the Small Tortoiseshells that we see are such migrants, arriving in Ireland from the south and remaining here for the summer to breed. A number of moth species and some other insects such as the dragonfly Migrant Hawker, which is being seen in Ireland with increasing regularity, have similar life cycles.

The numbers of these insects that arrive in any given year varies greatly depending upon the weather over a large part of Europe and even beyond. For example, the major arrival of hundreds of thousands of Painted Lady butterflies into Ireland in May and June of 2009 has been traced to a particular wet winter in the Atlas Mountains of Morocco during the previous winter! Such events show that biodiversity issues are truly international in their scale: what happens in one part of the world can have a profound effect on the plants and animals, the biodiversity, elsewhere.

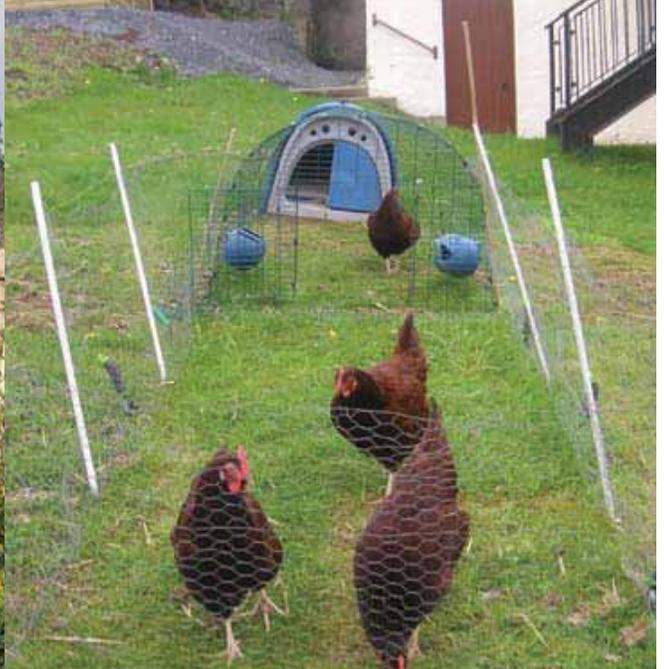
Bumble bees are attracted to garden flowers

People from a planet without flowers would think we must be mad with joy the whole time to have such things about us.

Iris Murdoch



Flowers such as marigolds not only help the gardener as 'companion species' to vegetables they also provide a splash of colour and are valuable to insects as a rich source of nectar and pollen.



Features of Biodiversity Importance in Cork

Gardens

Many residential areas of Cork, including many inner city areas as well as the 'leafy suburbs', have extensive areas of private gardens. Residential gardens, when taken together, make up easily the greatest area of 'green' land within the city.

The biodiversity value of gardens varies greatly from garden to garden. As a general principle, the greater the diversity of plants, the greater the diversity of fauna and the greater the biodiversity value of the garden. Other important factors are the 'structure' of the garden, those with a range of different sized plants including trees, shrubs and ground cover will generally be the most beneficial to wildlife; the presence of native plant species which are of higher diversity value than introduced species or hybrid and cultivar varieties; and the presence of a source of water such as a pond.

Gardens are the most important habitat within the city for many of our bird species. Insects including many attractive groups such as butterflies and bumble bees are found commonly in gardens, attracted to nectar-rich flowers. Larger areas of gardens are important for mammals including hedgehogs and red foxes and even badgers can occur in very large gardens. Gardens with ponds and trees can be important for a wide range of species including frogs and dragonflies.

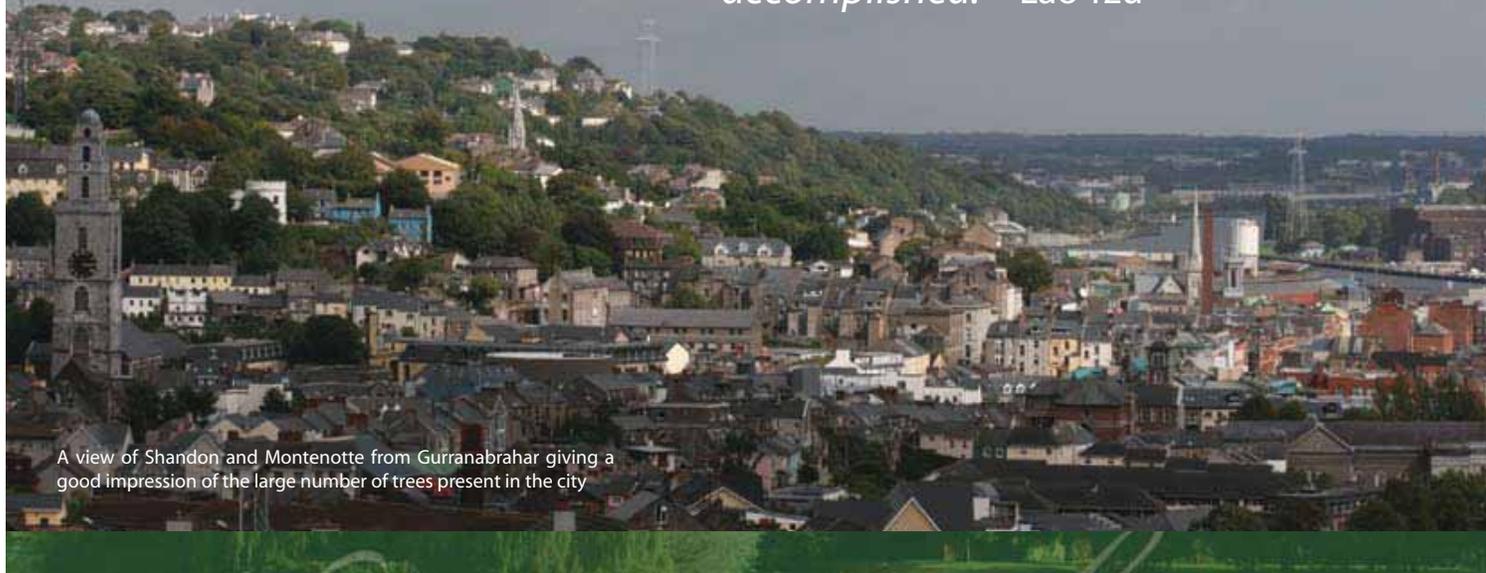
Insects and other invertebrates play an important role within gardens. Some are pests of the crops and plants that we grow, whilst others feed on these pests and so benefit the gardener. They also pollinate most plants and provide food for larger animals like birds, mammals, frogs and lizards. The presence of a healthy population of invertebrates such as beetles, butterflies and hoverflies is a very good sign within a garden, suggesting that it is valuable for biodiversity.

There are many simple things you can do to improve the biodiversity value of gardens. Some are simple and inexpensive, others are more adventurous and require careful planning such as digging pods or planting hedgerows. In the 'Biodiversity in Action' Section of this booklet we have provided some ideas.

Allotments

Cork City Council established two pilot allotment schemes in 2008. Until relatively recently, allotments were a familiar part of the Cork's landscape and all the signs are that the allotment is set to make a comeback. Not only do allotments produce the type of food that ticks all of our 21st century dietary boxes: natural, sustainable, organic, local; they can also provide invaluable refuges for wildlife within the city environment.

Nature does not hurry, yet everything is accomplished. Lao Tzu



A view of Shandon and Montenotte from Gurrabrahar giving a good impression of the large number of trees present in the city

There are many ways in which biodiversity can be enriched on allotments, and we have detailed some in the 'Biodiversity in Action' Section of this booklet. These ideas apply equally to vegetable patches in gardens. Many of these ideas are simple and can be incorporated easily without changing the essential purpose of an allotment or vegetable patch as a plot of land to be cultivated for the production of vegetables, fruit and flowers.

Wetlands

When Cork was first established as a 'hiberno-viking' settlement in the 9th and 10th century the section of the Lee Valley where the city now stands was a landscape of marshes and fens. Indeed the name 'Cork' derives from the Irish corcach or 'marsh'. The process of reclaiming the marshes through containment and drainage began in the thirteenth century and reached a peak of activity in the seventeenth and eighteenth century. The legacy of this marshy history can be observed in the division of the Lee into its North and south Channels as it flows through the city, and in the frequent flooding that still occurs in the city centre.

Fragments of marshland persist at the city's margins, for example along the Lee Road to the west of the city and at Douglas Estuary, where coastal habitats are also found. (this is discussed later in this booklet). The small wooded islands and reedy channels visible upstream of Thomas Davis (Wellington) Bridge give us an idea of the way much of the area must have looked to the city's earliest inhabitants. However surprisingly little wetland habitat now exists within the city other than in small patches along the River Lee itself and its tributaries the Curragheen, Bride, Twopot, Glasheen, Glenamought and Tramore.

Lakes and ponds are also few, the only substantial ones being The Lough and the Atlantic Pond; and other wetland habitat are limited to small areas of wet woodland and wet grassland at Murphy's Farm, the Glen Recreation Area, the Lee Fields and the Distillery Fields. All of these areas are discussed in more detail in the 'sites of Particular Biodiversity Importance in Cork' Section of this booklet.

Trees and Woodlands

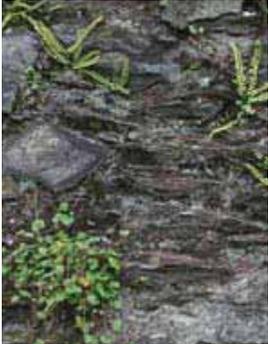
Many mature trees are found in the city's parks and large gardens, and a few areas within the city retain small patches of woodland, for example along the steep slope between the Lower Glanmire Road and Lover's Walk. These trees are vitally important for the city's biodiversity providing food and shelter for invertebrates, nesting places for birds and seclusion for mammals. Fallen leaves and fallen dead wood as well as the living tree itself provide vital resources for a range of species. In general, native Irish trees such as Ash, Oak and Birch are the most valuable trees for biodiversity. Many of our animal species, particularly our invertebrates, have evolved alongside these tree species and over time have adapted their life cycles in such a way that they have become dependent upon one particular tree species. When native trees are replaced with unfamiliar non-native trees most invertebrates are unable to adapt and as a result biodiversity is lost. Oak for example supports many hundreds of invertebrate species; one study in England looked at five groups of insects and found 284 species associated with Oak. Sycamore, one of our most abundant non-native trees, on the other hand supports only about 15 insect species.



A well vegetated wall on Cork's north side

Walls and Buildings

When people think about urban wildlife they often think only in terms of green spaces, parks and gardens. Parks and gardens, trees, rivers and ponds, the little remnants of the countryside that persist in the city. Whilst these features are vitally important for the overall biodiversity of a city, greatly increasing the range of species that are able to survive in the city, they are essentially islands of countryside within the city, and the plants and animals that live on these islands are species of the countryside which manage to survive in small numbers within the city. The real urbanites, the real city species are different. They seek out the city, their habitat is the fabric of the city itself, its walls and its buildings, and Cork is rich in these species. In the case of some birds, they have become so at home in our towns and cities that they now live almost nowhere else. Swift, House Martin, Swallow, Jackdaw, Starling and House Sparrow all nest almost exclusively on buildings or other man-made structures. Swifts in particular are truly urban birds, living only in our larger towns and cities. It is estimated that less than 15,000 pairs of Swift nest in Ireland, and Cork has a healthy population, with colonies at a number of locations in the city centre and elsewhere. The area around Barrack Street and the Saint Fin Barre's Cathedral is a particularly good place to see them on summer evenings.



Maidenhair Spleenwort and Ivy-leaved Toadflax growing on a city wall

Look deep into nature, and then you will understand everything better.

Albert Einstein

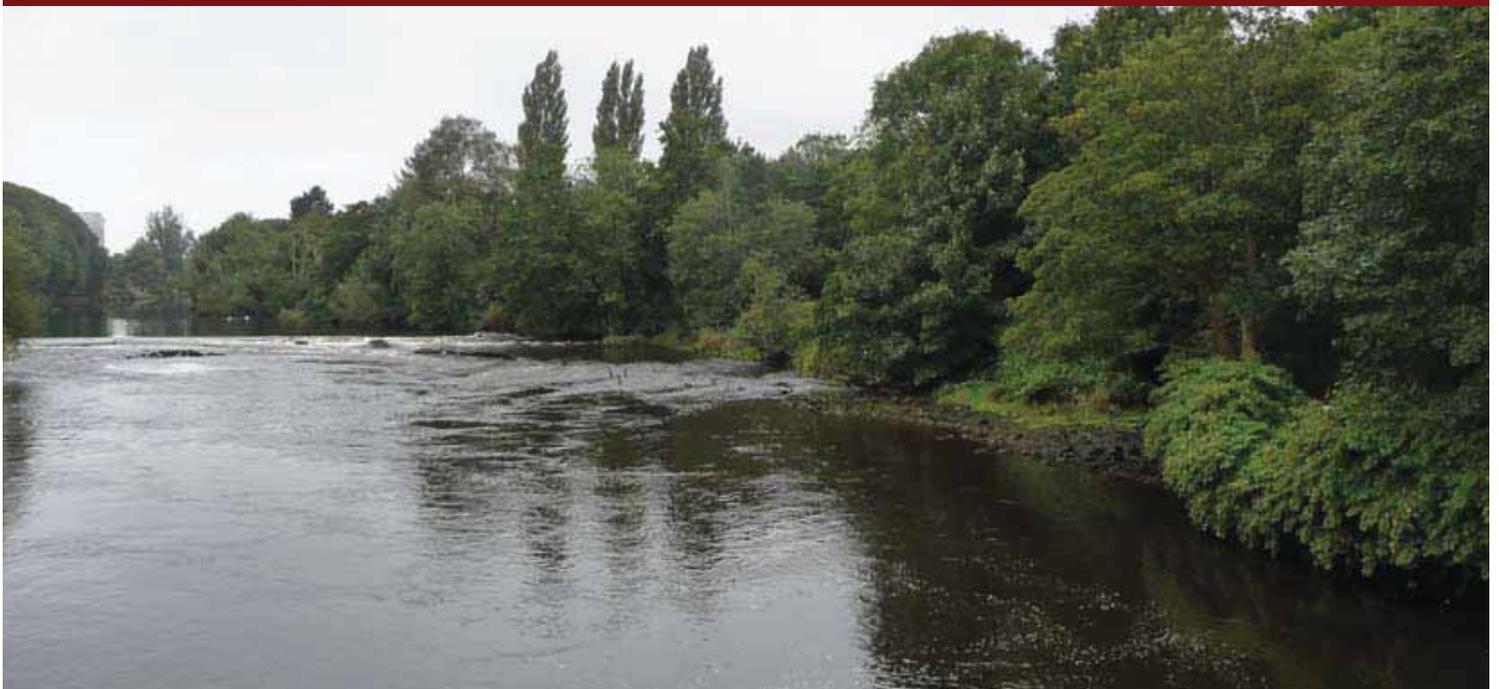
Sites of Particular Biodiversity Importance in Cork City

Lough Mahon and the Douglas Estuary

At Cork City's southeastern edge lies the Douglas Estuary which empties into Lough Mahon to the east of Mahon. This area as far north as the mouth of the River Lee is of importance for birds on a European scale and is recognised as such by its inclusion within Cork Harbour 'Special Protection Area', designated under the EU Birds Directive. The Douglas Estuary is also designated as a Wildlife Sanctuary. The area is important throughout the year. During the spring and autumn migration periods thousands of waders such as Black-tailed Godwits, Golden Plover, Lapwing, Dunlin and Redshank use the area. In winter they are joined by large numbers of ducks including Wigeon and Teal and also an important flock of Great Crested Grebe. During the summer, this is a favourite feeding area for Common Terns which breed elsewhere in Cork Harbour.

In addition to the importance of the area for birds, there are also habitats that are of high biodiversity importance such as salt marsh and reed-beds that are not found elsewhere in the city. The area is also designated as the Douglas River Estuary 'proposed Natural Heritage Area' under the Wildlife Acts to protect these habitats and the fauna communities that they support. The area is very rich in invertebrates and other insects due to the range of different wetland habitat types present. The first Irish record of the moth Twin-spotted Wainscot was from the reed-bed at the head of Douglas Estuary.

All in all the site is the most important area in the city for biodiversity. The site is easily accessible to view the wildlife with paths along the shoreline from Blackrock to Mahon and on to the old railway bridge across to Rochestown. This is a great place to watch an array of different birds at close quarters.



The River Lee looking upstream from the new Mardyke Bridge

The River Lee

The river itself comprises an important habitat for wildlife within the city and also acts as a vital natural 'corridor' along which birds, fish and other animals pass between the important wildlife habitat of Cork Harbour to the east and the Lee Valley to the west. The biodiversity importance of the river within Cork is discussed in various other sections of this booklet.

Cork Lough

The Lough is an oval spring-fed limestone lake of about six hectares lying in a shallow depression. The water is shallow, reaching a maximum depth of only 1.6m, with an additional depth of up to 0.9m of muddy sediment. Importantly for its biodiversity value, the Lough includes a one-hectare island. Until the 1930s, the island consisted of unstable swampy land dominated by Great Reedmace, commonly but inaccurately known as 'bullrush'. Since that time, through the process of natural succession, Grey Willow and other willow species



have gradually become established on the island and now form a dense, low woodland. The island functions as a refuge, roosting and breeding area for the numerous birds that call the Lough home. On autumn and winter nights they are joined by thousands of other birds which come from far and wide to take advantage of the safety of the island as a night time roost site. Mesmerising flocks of Starlings twist and turn over the island before finally deciding it is safe to drop into the trees. Little Egrets on the other hand (joined in the winter of 2007 / 08 by a single Cattle Egret) arrive fast and drop quickly into the willows to avoid the aggressive attentions of the hundreds of Jackdaws and Magpies, which also come to The Lough to roost.

The Lough supports important winter populations of ducks, particularly Shoveler, the numbers of which occasional reach the threshold for a 'Nationally Important' population; and also Tufted Duck, Pochard and Mallard. Large numbers of gulls also use The Lough, attracted by the large amount of bread fed to the ornamental wildfowl and ducks by visiting people.

There is little aquatic vegetation in the Lough due mainly to the introduced population of Carp which are voracious herbivores. Up until the 1950s, hornwort and Water-milfoil, aquatic plant species typical of limestone lakes, and other aquatic plants covered 90% of the Lough's surface, and the water supported large numbers of three-spined sticklebacks and eels, native fish species. The introduction of Carp in 1954 resulted in the disappearance of most of this vegetation within 10 years, and the disappearance of sticklebacks in 1975 / 76. Eels probably still occur in the Lough, but in small numbers. In 1974, an Eel weighing 3.54kg was taken from The Lough, the largest ever caught in Ireland at the time and it held the record for more than 10 years. More recently, in 1988, the thriving Carp population also produced an Irish record fish, weighing in at 29lb 14oz.

Unfortunately, in recent years, The Lough has often experiences episodes of very poor water quality, which can include a growth of toxic microorganisms in the water and on several occasions numbers of birds have been found dead, probably as a result of this. The root causes of the problem are probably two-fold. The loss of aquatic vegetation which would naturally aerate and clean the water is one problem. The other is the large amount of organic matter entering the water, which encourages the growth of algae and bacteria and these in turn further reduce the oxygen levels and can also produce toxins. Feeding the birds at the Lough is a popular and fun activity but the large number of birds present produce a lot of droppings which enter the water, and the large amount of uneaten bread and other foodstuffs adds to the problem. One simple way you can help is to be careful how much you feed to the birds, what you feed them and by not overdoing the feeding. Birds don't like to eat potato peelings or mouldy bread any more than we do. Anything with a lot of sugar, dairy products or meat products are very harmful to the water quality and should not be fed to the birds, and under no circumstances should garden waste or the contents of your kitchen compost bin be thrown into the water.

Like the Douglas Estuary, Cork Lough is designated as a 'proposed Natural Heritage Area' under the Wildlife Acts, which means that the National Parks and Wildlife Service (NPWS) of the Department of the Environment, Heritage and Local Government have special powers and responsibilities to ensure that its biodiversity value is maintained.

Other Places to See Wildlife in Cork

Glen Recreation Area

The Glen Recreation Area is a large green space in the heart of the city's North side. It is located in a deep steep-sided valley and includes a range of habitats that are of biodiversity value. At the heart of the site is one of the city's most diverse wetland areas which includes ponds, wet grassland, wet woodland and swampy areas of emergent vegetation including Common Reedmace, Sweet-grass, Canary Reed-grass and Common Reed, providing a valuable refuge for birds, insects and other wildlife and of high biodiversity value. Many bird species nest in the area including some that are restricted to wetland areas such as Moorhen and Reed Bunting.



The Glen Amenity Area harbours one of the city's most diverse wetland areas

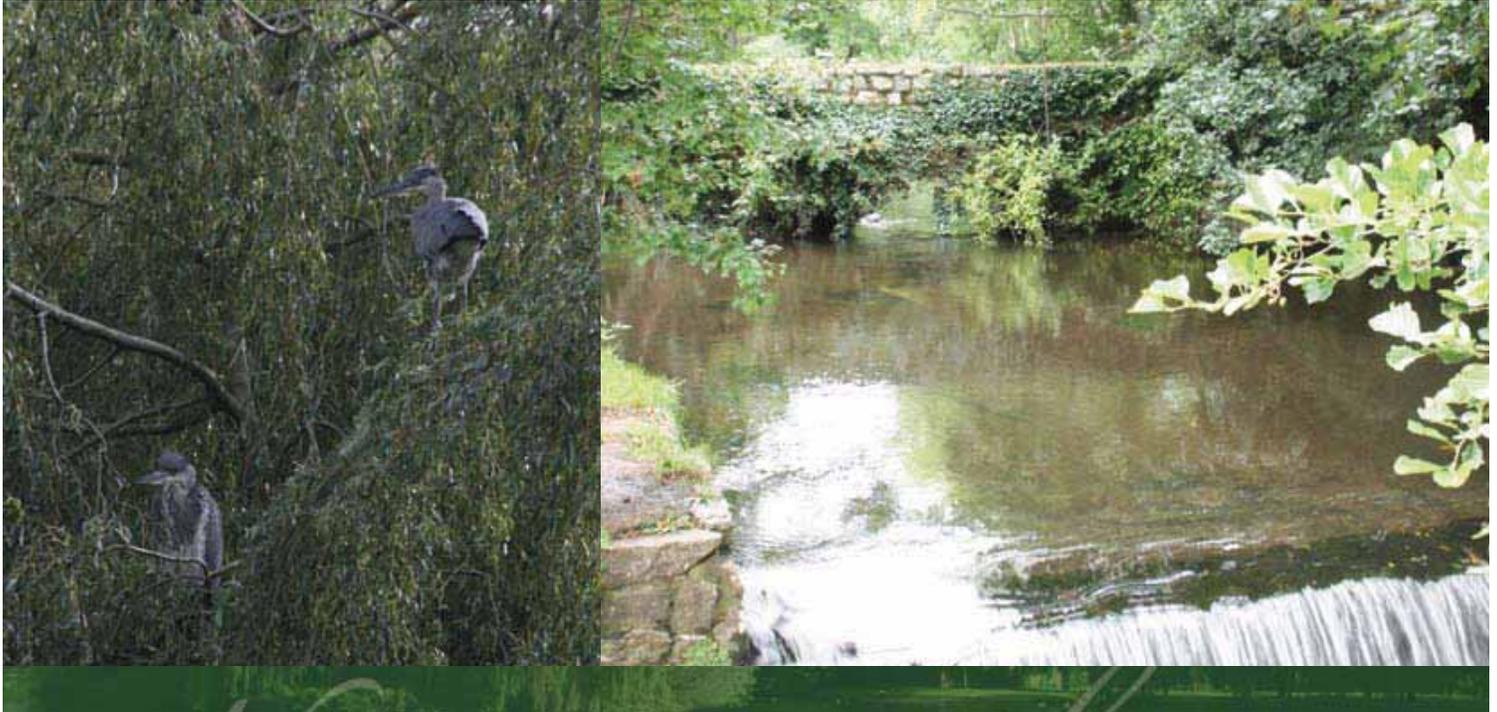
Distillery Fields

This area on the north bank of the North Channel of the River Lee has been made accessible to the public by the opening of the Mardyke Pedestrian Bridge and the associated riverside walkway. This was the last piece of marshland to be reclaimed in the city during the 1850's. The area contains some semi-natural wet woodland of willows and alder, and supports wildlife including Blackcap, Chiffchaff, Pheasant and other breeding birds, mammals such as Stoat and Otter, and relatively rich invertebrate communities that are found in few other parts of the city.

The area also however supports thriving populations of many invasive alien plant species such as Japanese Knotweed, Traveller's-joy, Winter Heliotrope, Himalayan Balsam and others. Various projects are underway in UCC to study this area and to remove these invasive pest species. The problems caused to biodiversity by invasive species are discussed further in the 'Threats to Biodiversity' section of this booklet.

Lee Fields and Lee Road

To the west of the city, above the weir, the Lee becomes a non-tidal freshwater river. Alongside the Lee on the south side of the river lies the Lee fields, a popular recreation area and an excellent place to observe bats in the evening. Otters can also occasionally be seen here. On the north side of the river, between the river and the Lee Road, is a wilder marshy area which probably resembles the marshland that once covered most of the Lee Valley including the area where the city now stands. Birds such as Moorhen, Sedge Warbler and Reed Bunting nest here and during the winter Teal and other ducks can be seen.



Juvenile Grey Herons at Atlantic Pond

The Curraheen River where it flows through Murphy's Farm

The Marina / Blackrock

Other than the River Lee and The Lough, the only substantial area of open water in Cork is the Atlantic Pond. The pond is a breeding site for Grey Herons and these magnificent birds can be viewed easily from the Marina road where it passes the pond. Because these 'urban' herons are so accustomed to people, and because the trees they nest in on the island of the pond are smaller than the trees that herons more usually use, Atlantic Pond provides a truly exceptional opportunity to observe these bird's nests at close quarters. The pond is also home to other waterbirds and Mallard, Little Grebe and Little Egret can usually be seen. In the winter Tufted Duck, Pochard and many species of gull can also be seen.

Murphy's Farm

This tranquil area of semi-natural habitat in Bishopstown lies along the banks of the Curraheen River. The area includes wet willow and alder woodland and wet grassland, habitats that are very rare elsewhere in the city and are of great importance to biodiversity. This is a great place to see a shallow fast-flowing river at close quarters from the riverside path. Unfortunately, in common with much of the city, Murphy's Farm is also home to several invasive alien species and includes a very conspicuous stand of Giant Rhubarb which has infested the edge of the woodland.

Fitzgerald Park

Fitzgerald Park is a well-maintained park lying alongside the North Channel of the Lee and is generally too 'manicured' to suit most species of wildlife. This said, it is a large green space with many mature trees and is home to good populations of many common bird species that favour this 'parkland' habitat such as Mistle Thrush, Chaffinch and Greenfinch. The park includes a lot of mature coniferous trees, which are favoured by Coal Tits and Goldcrests. Moorhens and Mallards can be seen on the small ornamental pond and the park's beautifully maintained flower beds play host to bees, hover flies, butterflies and other insects.

UCC Grounds

Across Western road from Fitzgerald Park, the south Channel of the Lee flows alongside the main campus of UCC which includes a similar area of parkland with mature trees to that found at Fitzgerald Park. The tranquil riverside walk through UCC grounds is an excellent place to see bats in the evening, soprano pipistrelles being particularly abundant here. The river banks host Grey Wagtails and sometimes Little Egrets, and Kingfisher has also been seen here. Away from the river, the parkland habitat supports a similar range of bird species to that found in Fitzgerald Park. Goldcrests are particularly abundant here and their high pitched whistles song can be heard from conifer trees. It is a tiny greenish-coloured bird, Ireland's smallest, with a rarely seen bright yellow crest that it raises in display or aggression to others of its species.

St Joseph's Cemetery

Between 1809 and 1829, this cemetery on Tory Top Road was the location of the short-lived Cork Botanical Gardens. The last remnant of the former gardens was a large tree reported to be a Cedar with was blown down in 1973. Its stump remains today, adjacent to the grave of Father Matthew. St Joseph's cemetery, along with other cemeteries such as St Finnbar's, provides tranquil green spaces of importance to wildlife in the city.



To sit in the shade on a fine day and look upon the verdant green hills is the most perfect refreshment.

Jane Austin

Biodiversity Conservation in Action

Improving Biodiversity in your garden and on your allotment

Here are just a few ideas for ways in which you can increase the biodiversity value of your garden or allotment.

Plant native species

One of the best ways you can improve the biodiversity value of your garden is to include some native Irish species in your planting. Plants native to Ireland are naturally adapted to our climate and will therefore flourish producing flowers, berries and seeds. Many of our insects are adapted to living on specific native plants. And in turn more than 70% of our birds depend on insects.

Plant a tree

Trees create important habitats for many insects, birds and other plants and are important for air purification. As with all plants, a native Irish species is best. Some trees grow very slowly and do not reach great size, so even smaller gardens can usually accommodate one, but be careful to choose a suitably sized species carefully. We give a few ideas in Appendix 1.

Avoid invasive alien species

Before choosing plants for your garden or pond, make sure that they are not invasive alien species. The problem of invasive species is discussed in detail in the 'Threats to Biodiversity' section of this booklet. One of the most frequent ways that these species are introduced is from garden planting.

Avoid excessive use of chemicals

Pesticides and herbicides are designed to kill species that are traditionally considered to be pests. By definition, removing these species from your garden is reducing its biodiversity. Fertilisers benefit a few vigorous plant species at the expense of slower growing species that are less well adapted to taking advantage of the sudden input of nutrients. Again, this will inevitably reduce biodiversity. Think carefully before you use them, do you really need to or is it just a habit? Does it really matter if there is moss and patchiness in your lawn? The moss and the patches of different grasses are a sign of the diversity and many animals will benefit from this. There is some evidence that slug pellets not only kill slugs, but can also kill the birds that feed on the slugs. Again, do you really need to use them?

Create a wildlife area

This is a very valuable way in which you can increase the biodiversity value of your garden or allotment. Let part of your garden 'go wild' and see what plants and animals appear. In larger gardens or on allotments there is usually a small piece of ground somewhere, which for some reason cannot be used. It may be under trees or too wet or too stony to cultivate. Resist the urge to tidy it up! Left on its own it becomes a tangle of grass, thistles, willow herb and nettles and brambles and is a haven for wildlife and a source of food for birds, bats and other creatures. You could consider planting some of the following native species in your wildlife area: grasses such as sweet vernal, meadow foxtail, red fescue and common bent, along with wildflowers such as cowslip, lady's smock, cat's ear, ox-eye daisy, and meadow buttercup. A more extensive list of species is given in Appendix 2 of this booklet. This wild area should be cut once a year in early July and the cuttings removed. A wildlife area such as this will attract butterflies and bumble bees and it will also provide cover for frogs, mammals and other insects.

A log pile left to rot down gives a home to spiders, millipedes, centipedes, beetles and other insects and when it is well rotted will be inhabited by other wood feeding creatures. These in turn provide food for birds, hedgehogs shrews and frogs.

Attract birds

Get a bird box, bird table or hanging feeder for your garden or balcony. Birds are not only important for biodiversity and an attractive addition to a garden; they also eat aphids and other garden pests.

Compost

Buy a compost bin and make your own compost. You will cut down on your waste generation and will create nutrient rich compost to improve soil health and fertilise your garden.

Provide a regular supply of water

A shallow dish with a few pebbles at the bottom (to give varied depths) will attract a variety of creatures. For the more adventurous, a pond will quickly become a valuable resource for local wildlife (see below).

Dig a Pond

Making a pond is one of the most effective things that you can do to improve the biodiversity value of a garden or allotment and the results can be seen in a very short time. Water is essential for wildlife. Ponds not only provide breeding places for frogs, dragonflies and newts, but also provide drinking places for a whole host of other creatures such as, squirrels and birds. Even a small pond will be appreciated and occupied by small creatures which will find it by themselves, especially if there is another pond nearby. Some tips on pond digging are given in Appendix 3.

Caution – ponds, even very shallow ones, should not be accessible to very small children.



In the autumn provide food and shelter for wildlife

Seed heads and foliage that are left on herbaceous perennial plants provide food for birds. Dead sunflowers heads act like a natural bird table attracting a constant stream of finches and tits until the seed is exhausted. A pile of fallen leaves gives shelter to invertebrates, frogs and hedgehogs.

Plant a Hedgerow

A thick hedge around an allotment site is valuable as it can deter unwelcome intruders while providing food for insects, birds, mammals and humans. It is an effective windbreak, a shelter belt and a superb wildlife habitat. A hedge can also act as a green corridor which allows wildlife to move from place to place in relative safety. Some tips on planting a hedge are given in Appendix 3.

Remember

No matter how you manage your garden or allotment, it is a habitat for wildlife and you don't need to have a wilderness to attract wild creatures. You can make a real difference simply by observing what is around you and thinking about the ways in which your usual gardening activities might affect wildlife.



The flowers of Chives are a particular favorite with bumble bees



*Keep your sense of proportion by regularly,
preferably daily, visiting the natural world.*
Catlin Matthews



Local Groups and Non-Government Organisations

There are a number of local groups in Cork with which you can get involved or join. These range from those which actively manage areas to enhance biodiversity, or lobby government and other decision-makers to prioritise biodiversity issues, to those that organise talks and field trips on one or other of the biodiversity features discussed in this booklet such as birds or bats. Many groups are involved in one or more of these activities. In the 'Contacts and Links' section of this booklet we have listed many of these organisations and provided information on how to contact them.

Getting Kids and Schools Involved

Getting children and young people involved in biodiversity issues is not only important for the future of our wildlife it is also easy! Kids love wildlife and with a little pointing in the right direction they will willingly get involved. Something as simple as a bird table in a garden or at school can foster an interest and once the seed is sown it can lead to a life long interest. There is a wide range of resources available to parents and teachers in Cork to get the ball rolling.

A number of NGOs (Non-Government Organisations) including BirdWatch Ireland and the Irish Wildlife Trust have dedicated Education Officers who will happily help to get any initiative going (see the 'Contacts and Links' section for details). The Irish Wildlife Trust organises a 'School Ground Development Project' which provides expertise to help teachers and school managers to develop biodiversity resources in school grounds (see www.iwt.ie for details and click on the 'Education' tab).

Cork Lifetime Lab runs a Schools' Resource Centre offering activity based 'Classroom Workshops' on a daily basis on various environmental topics and would be a good starting point for teachers wishing to get schools involved in biodiversity or other environmental projects.

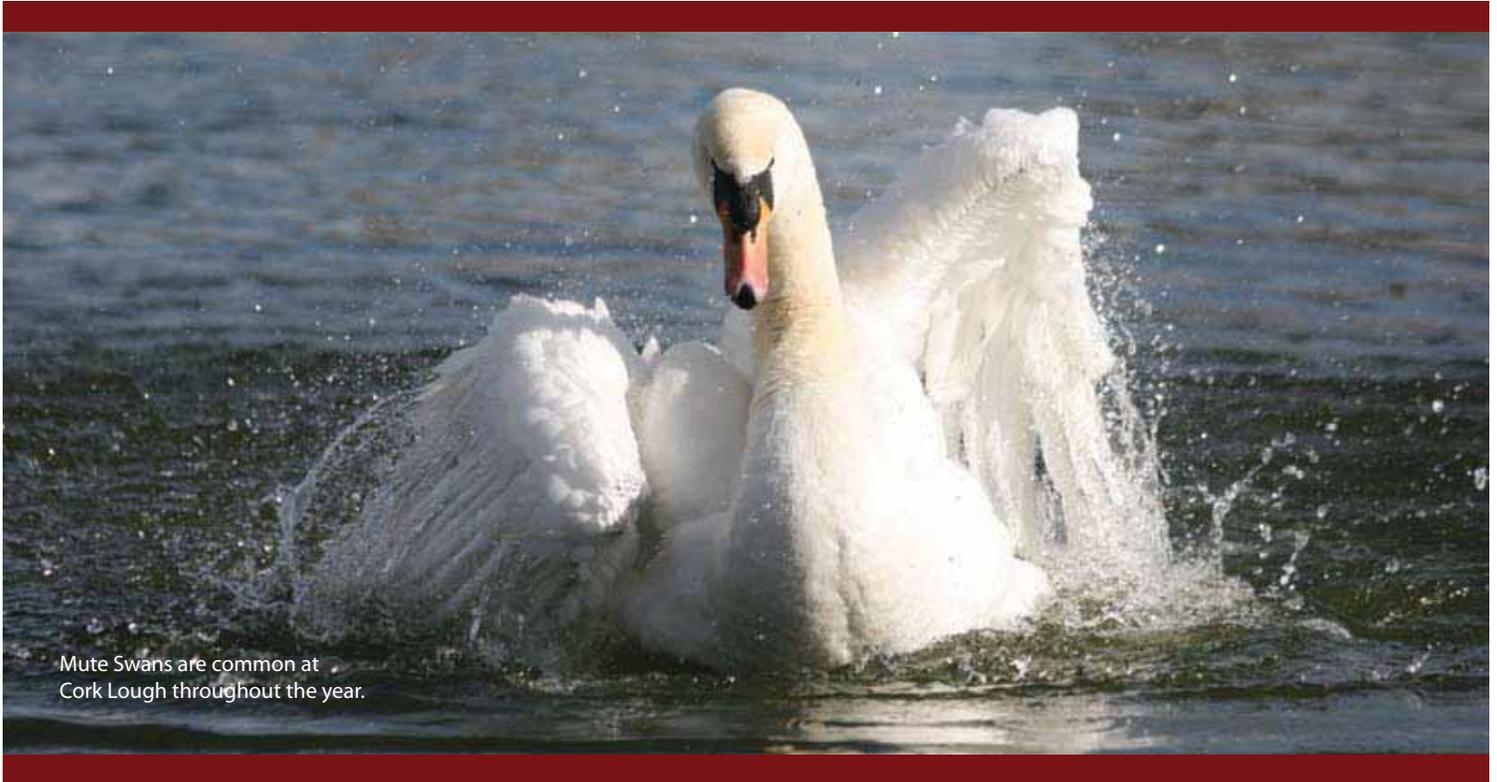
Various on-line resources are available that are specifically designed for youngsters. The Notice Nature Junior Page (http://www.noticenature.ie/kids_area.html) and the BirdWatch Ireland Kids Zone (<http://www.birdwatchireland.ie/KidsZone/tabid/74/Default.aspx>) are examples, and by following 'links' on these pages, a wealth of information and ideas specifically aimed at kids is opened up.

Recording Biodiversity

It is very important that biodiversity is monitored, so we know what species we have, where they are, how many of them there are and how these numbers are changing over time. Without this basic information it is impossible to target resources to the places where they are needed. Much of this information has always been collected by ordinary people with an interest in wildlife and this continues to be the case. At the moment, for example, a major survey is underway to map all of Ireland and Britain's breeding birds. It is being conducted by thousands of amateurs across the two countries. The project is called 'Bird Atlas 2007-11' and volunteers who wish to get involved should contact BirdWatch Ireland (<http://www.birdwatchireland.ie>).

A number of organisations have been established to record various aspects of biodiversity, and until recently the process was rather disjointed and disorganised in Ireland. It is hoped that the establishment of the National Biodiversity Data Centre (<http://www.biodiversityireland.ie>) in 2007 will change all this. The centre, an initiative of the Heritage Council, will become a vital biodiversity resource, and it is hoped it will become a key tool in halting our loss of biodiversity.

If you want to get involved in recording a particular type of flora and fauna a number of schemes exist and the National Biodiversity Data Centre website is a good starting point to find out who to get in touch with. A number of websites and organisation also exist which concentrate on particular groups, for example bees, bats, butterflies, etc. We have provided contact details for many of these in the 'Contacts and Links section of this booklet.



Mute Swans are common at Cork Lough throughout the year.

Threats to biodiversity

Alien species

Invasive non-native plant and animal species are the second greatest threat to biodiversity worldwide after habitat destruction. Invasive alien species are defined as non-native species that, as a result of human activity, have been transported further than they could naturally travel and have subsequently disrupted their newly colonised environments. Alien species can belong to any groups of organisms including birds, mammals, reptiles, amphibians, microorganisms and invertebrates. Invasive alien species negatively impact Irish biodiversity through competition, herbivory, predation, habitat alteration, introduction of parasites or pathogens, and dilution of gene pools.

A cross-border report published in 2006 called 'Invasive Species in Ireland' outlines key actions that need to be taken to reduce the impact of invasive species. The key actions include "The dissemination of information to the public and the engagement of stakeholders, particularly in the commercial sector, should be prioritised by developing online, educational and scientific resources, and by targeted public awareness campaigns."

The community plays a vital role in controlling invasive alien species. Here are some of the ways in which you can help which are detailed further on the Invasive Species Ireland Project website (www.invasivespeciesireland.com).

Learn to identify and report invasive alien species

The Invasive Species Ireland Project includes a 'Field Guide' that will help you to identify some of Ireland's most unwanted alien species. Once you have identified an invasive alien species you can report the location to the 'Alien Watch' part of the Invasive Species Ireland Project website.

Do not grow invasive alien species in your garden

Before choosing plants for your garden or pond, make sure that they are not invasive, non-native species. Ask for advice in your garden centre and request plants from local origin and from certified sources. We have provided a list of invasive alien plant species in Appendix 2 of this booklet.

Dispose of plant material safely

Garden waste can often contain fragments of invasive plant species and if disposed of incorrectly can precipitate the spread of the species. Never dispose of plant material in the countryside. This material can be composted or taken to municipal recycling centres. Contain material in sealed bags or containers prior to removal.

Inappropriate development and thoughtless management

Loss of habitat is considered to be the single greatest threat to biodiversity worldwide, and in cities where valuable habitats are already in short supply, removing or damaging even a small area can have serious effects on biodiversity. Obviously, if an area of habitat is removed, or if the soils or the water supply on which an ecosystem depends are removed the system will not function properly, but there are more subtle ways in which biodiversity can be affected. Often this occurs through a process known as 'fragmentation', whereby large or interconnected patches of habitat are broken up into smaller areas that are isolated from one another. Because of the problems to biodiversity caused by fragmentation, the loss of even a relatively small part of an area of habitat can have disproportionately serious effects on biodiversity. If for example you remove a hedgerow along which bats commute between their roost site in a building and their feeding area in a woodland, it can potentially make the entire area unsuitable for bats even though the building and the woodland remain untouched. Ecosystems are finely tuned and often delicate systems and can have 'threshold' areas below which they cease to function properly resulting in a loss of biodiversity. The actual area will vary greatly depending on the type of system; a small pond of only a few square metres may support a well-functioning ecosystem but with habitats such as grassland and woodland, unless large continuous areas remain intact, a loss in biodiversity will often be seen. Most urban habitats are already fragmented and careless development can not only remove valuable fragments of habitat but can also further isolate remaining ones from one another and have serious indirect impacts on biodiversity.

Climate change

We are all aware of the threat that climate change poses to the world's biodiversity. Predictions about precisely how climate change will affect Ireland vary greatly and are constantly being revised, however it seems that everyone agrees that our climate is likely to change significantly over the coming decades, and plants and animals in general do not adapt well to rapid changes in their environment. Sadly, it seems inevitable that climate change will have a severe impact on biodiversity.

Biodiversity and the Law

There is a large quantity of legislation that is designed to protect biodiversity in Ireland. The most significant acts are the Wildlife Acts of 1976 and 2000 which protect a range of animal species such as badgers, bats and most bird species, and set the legal framework for the establishment of Natural Heritage Areas (see 'Lough Mahon and the Douglas Estuary' and 'Cork Lough' in the 'Sites of Particular Biodiversity Importance in Cork' section). The Flora (Protection) Order of 1999 gives full legal protection to 88 of Ireland's rarest plant species, including mosses, liverworts and ferns as well as flowering plants. The Natural Habitats Regulations of 1997 (including their various amendments) pass the European Union 'Birds Directive' and 'Habitats Directive' into law, both of which are very powerful pieces of legislation designed to protect Europe's biodiversity. One of the most important effects of these Directives is the establishment of the 'Natura 2000' network of protected areas across Europe; known as 'Special Areas of Conservation' (for the protection of threatened or rare habitats and species) and the 'Special Protection Areas' (for the protection of rare species of bird or sites that hold large populations of birds; see 'Lough Mahon and the Douglas Estuary' in the 'Sites of Particular Biodiversity Importance in Cork' section).

Local Groups and Contacts

Cork City Council Heritage Officer	www.corkcity.ie Niamh Twomey Cork City Council, City Hall, Anglesea Street, Cork
Cork County Council Heritage Officer	www.corkcoco.ie Sharon Casey The Heritage Unit, Cork County Council, Millview House, Victoria Cross, Cork. Tel: 021 4818000
Irish Wildlife Trust, Cork Branch. Conserving Ireland's wildlife and habitats.	www.iwt.ie Gill Weyman, Dromavane, Enniskeneane, County Cork.
Cork County Bat Group. Conserving, researching and educating people about Ireland's bats.	www.corkcountybatgroup.ie Conor Kelleher, 'Northants', Spring Lane, Carrigagulla, Ballinagree, Macroom, Co. Cork. Tel: 021 733 9247
Cork County Nature Trust. Promoting awareness of ecological and biodiversity issues.	http://countynaturetrust.tripod.com Dara Fitzpatrick Tel: 087 998 3680
Cork Environmental Forum. To foster promote and implement sustainable development in County Cork with Local Agenda 21.	www.cef.ie Cork Environmental Forum, c/o P.Treacy, Development Officer, Ballyduff, Cloyne, Co. Cork
Lifetime Lab. Providing resources and information on biodiversity and other environmental topics including Energy, Waste and Water.	http://www.lifetimelab.ie Lifetime Lab, Lee Road, Cork. Phone: 021 494 1500
Cork Greenmap. Your Guide to Sustainable Living in Cork.	www.corkgreenmap.org

National State and Semi-state Contacts

National Parks & Wildlife Service (NPWS) Statutory body responsible for nature conservation legislation.	www.npws.ie www.noticenature.ie 7 Ely Place. Dublin 2. Tel: 01 888 2000 or LoCall: 1890 202 021
The Heritage Council	www.heritagecouncil.ie Áras na hOidhreachta, Church Lane, Kilkenny. Tel: 056 777 0777
Coillte, The Irish Forestry Board	www.coillte.ie Coillte, The Irish Forestry Board, Newtownmountkennedy, Co. Wicklow Tel: 01 2011111
Environmental Protection Agency	www.epa.ie EPA Regional Inspectorate Cork. Inniscarra. Co. Cork Tel: 021 4875540

Irish National Organisations

An Taisce	http://www.antaisce.org/
Bat Conservation Ireland	http://www.batconservationireland.org/
Bird Atlas 2007 – 11. Mapping Britain and Ireland's Birds.	http://www.bto.org/birdatlas/
Bird Watch Ireland	http://www.birdwatchireland.ie/
Comhar Sustainable Development Council	http://www.comharsdc.ie/
Dochas Network of Irish Environmental and Development Organisation	http://www.dochas.ie/
Earthwatch (Friends of the Earth Ireland)	http://www.foe.ie/
Environmental Science Association of Ireland	http://www.esaiweb.org/esai_homepage.php
Irish Seed Savers	http://www.irishseedsavers.ie/
Irish Whale and Dolphin Group	http://www.iwdg.ie/
Irish Wildlife Trust	http://www.iwt.ie/
Irish Peatland Conservation Council	http://www.ipcc.ie/
Native Woodland Trust	http://www.nativewoodlandtrust.ie/
Sustainable Water Network (SWAN)	http://www.swanireland.ie/

National State and Semi-state Contacts

Biodiversity and Environmental Change Research	http://www.biochange.ie/
Botanic Gardens Conservation International	http://www.bgci.org/
Botanical Society of the British Isles	http://www.bsbi.org.uk/
British Bryological Society (information on Irish mosses and liverworts)	http://www.britishbryologicalsociety.org.uk/
British Trust for Ornithology Garden Birdwatch	http://www.bto.org/gbw/index.htm
Butterfly Ireland	http://www.butterflyireland.com/
CHANGE - Ireland's Climate Change Awareness Campaign	http://www.change.ie/
COFORD	http://www.coford.ie/
Convention on Biological Diversity	http://www.cbd.int/
CRANN	http://www.crann.ie/
Dragonfly Ireland	http://www.habitas.org.uk/dragonflyireland/
Dublin ZOO	http://www.dublinzoo.ie/
Eco UNESCO	http://www.ecounesco.ie/
ENFO	http://www.enfo.ie/
Golden Eagle Re-Introduction Project	http://www.goldeneagle.ie/
Green Wave	http://www.greenwave.ie/
Grian - Greenhouse Ireland Action Network	http://www.grian.ie/
Groundwork - habitat preservation organisation	http://www.groundwork.ie/
Heritage Ireland	http://www.heritageireland.ie/en/
Heritage Know How - Heritage Council	http://www.heritageknowhow.ie/
Invasive Species Ireland	http://www.invasivespeciesireland.com/
Irish Birding	http://www.irishbirding.com/
Irish National Biodiversity Research Platform	http://www.biodiversityresearch.ie/
Irish Seed Savers	http://www.irishseedsavers.ie/
Irish Timber Growers	http://www.itga.ie/
Irish Wildflowers	http://www.irishwildflowers.ie/
Leave No Trace Ireland	http://www.leavenotraceireland.org/
Lichens of Ireland	http://www.lichens.ie/
National Biodiversity Data Centre	http://www.biodiversityireland.ie
National Botanic Gardens	http://www.botanicgardens.ie/
National Council for Forest Research and Development	http://www.treecouncil.ie/
Native Woodlands Scheme	http://www.woodlandsofireland.com/
Nature Calendar	http://www.biology.ie/
Notice Nature	http://noticenature.ie/
Photographic Guide to Moths in Ireland	http://www.moths.ie/
Sustainable Energy Ireland	http://www.sei.ie
Spring Alive - Bird Survey	http://www.springalive.ie/
The Irish Naturalist's Journal	http://www.habitas.org.uk/inj/index.html
The National Botanic Gardens	http://www.botanicgardens.ie/
The Tree Council of Ireland	http://www.treecouncil.ie/
Wild Flowers of Ireland	http://www.wildflowersofireland.net/

Appendix 1: Recommended Native Irish Plants for Gardens and Allotments

Depending on your size of garden, here are some suggested native Irish ground cover plants, trees and shrubs that are widely available:

Flowers for all gardens

Bluebell (*Hyacinoides non-scripta*), Cowslip (*Primula veris*), Primrose (*Primula vulgaris*), Oxeye daisy (*Leucanthemum vulgare*), Cornflower (*Centaurea cyanus*).

Shrubs for all gardens

Holly (*Ilex aquifolium*), Guelder Rose (*Viburnum opulus*), Honeysuckle (*Lonicera periclymenum*), Dog-Rose (*Rosa canina*), Hawthorn (*Crataegus monogyna*), Blackthorn (*Prunus spinosa*)

Trees for Small Gardens

Silver Birch (*Betula pendula*), Rowan (=Mountain Ash) (*Sorbus aucuparia*), Wild Cherry (*Prunus avium*), Crab Apple (*Malus sylvestris*), Strawberry Tree (*Arbutus unedo*)

Trees for Medium Gardens

Willows (*Salix pentandra*, *S. triandra*, *S. aurita*, *S. purpurea*, *S. cinerea*, *S. Caprea*), Blackthorn (*Prunus spinosa*), Wild Cherry (*Prunus avium*), Downy Birch (*Betula pubescens*), Rowan / Mountain Ash (*Sorbus aucuparia*), Hazel (*Corylus avellana*), Yew (*Taxus baccata*)

Trees for Large Gardens

Oak (*Quercus robur*), Crab Apple (*Malus sylvestris*), Rowan (=Mountain Ash) (*Sorbus aucuparia*), Wild Cherry (*Prunus avium*), Downy Birch (*Betula pubescens*), Ash (*Fraxinus excelsior*), Scots Pine (*Pinus sylvestris*).

Appendix 2: Invasive Alien Species to Avoid Planting in Gardens and Allotments

From 'Invasive species in Ireland'

Invasive Species listed in Appendix 3. Alien plants considered established in natural and semi-natural habitats in Ireland. Many are also established in artificial habitats.

Water Fern	<i>Azolla filiculoides</i>
Japanese Knotweed	<i>Fallopia japonica</i>
Hottentot Fig	<i>Carpobrotus edulis</i>
Common Cord-grass	<i>Spartina anglica</i>
Giant Hogweed	<i>Heracleum mantegazzianum</i>
Sea-buckthorn	<i>Hippophae rhamnoides</i>
Himalayan Balsam	<i>Impatiens glandulifera</i>
Small-leaved Cotoneaster	<i>Cotoneaster integrifolius</i>
(Common) Rhododendron	<i>Rhododendron ponticum</i>

Invasive Species listed in Appendix 4. Alien plants considered established mainly in artificial habitats in Ireland.

Red Valerian	<i>Centranthus ruber</i>
Spotted Hawkweed	<i>Hieracium maculatum</i>
Blue Sow Thistle	<i>Cicerbita macrophylla</i>
Tansy	<i>Tanacetum vulgare</i>
Stinking Tutsan	<i>Hypericum hircinum</i>
Elecampane (Hose-heal)	<i>Inula helenium</i>
Poverty Rush	<i>Juncus tenuis</i>
European Plum	<i>Prunus domestica</i>
Cherry Laurel	<i>Prunus laurocerasus</i>
Jointed Charlock	<i>Raphanus raphanistrum</i> subsp. <i>raphanistrum</i>
Annual Bastard-cabbage	<i>Rapistrum rugosum</i>
White Mignonette	<i>Reseda alba</i>
Japanese Rose	<i>Rosa rugosa</i>

Appendix 3: Practical Tips

Building a Pond

- Site it in a sunny, sheltered spot. It should be in the sun for most of the day, although if it is a very small pond have some border planting to give light shade over part of it for some of the day.
- Avoid over-hanging trees. Leaves rotting in the water will reduce the amount of oxygen in the pond and this may kill some of the inhabitants.
- One side of the pond should be fairly deep to allow aquatic creatures to hide and so survive very hot and very cold spells. The other side should slope up to ground level so that frogs can get out of the pond. Instead of a slope, you can gently step the base to provide different depths for different plants.
- The shallowest step can be separated from the main pond by a water permeable barrier, then filled with soil and planted as a bog garden. Around your pond plant enough vegetation to give cover for the amphibians and escape routes for dragon and damselflies. But make sure you leave enough open areas for timid birds to come down and drink.
- To help deter algae, add oxygenating plants, preferably native plants such as water buttercup or one of the pondweeds. Avoid rampant growers. Planting in pots controls the growth of plants in small ponds.
- Choose a selection of plants; different types will please different creatures. Remember to top up the water levels in dry weather. Rain collected in a water butt is ideal for this as it supports conservation.
- Ornamental fish are not a good idea as they eat a lot of tadpoles and insect larvae. Fish may also make the water rather murky.
- Clean your pond in the autumn to avoid disturbing hibernating creatures and when you remove any vegetation or silt, leave it at the side of the pond for at least a day to allow any trapped pond life to escape back into the water.
- Avoid using fertilizers nearby as run-off could pollute the water.

Planting a Hedgerow

A good hedge should be planted in a double row 15cms wide with 25cms between plants. Hawthorn is a valuable hedging plant as it is known to attract over 200 species of insect which in turn are important food sources for birds, bats and mammals. A mix of hawthorn and blackthorn is ideal. In addition to being of high value to wildlife they are thorny species and so help to make the hedge a real impenetrable barrier. These thorny species can be interspersed with other species such as willows, Dog-rose (also thorny) and Elder to give a variety of flowers and berries over an extended period of the year. Try to use native species as these are much more valuable for wildlife than non-native ones. It takes about four years growth for a hedge to become an effective hedge and it should be pruned back hard in the first two years to ensure that there is a good thick growth at the base. After that different parts of the hedge should be trimmed every other year to encourage flowers and berries and to keep the base of the hedge dense by encouraging further sprouting. Faster growing plants like brambles are likely to find their own way into the hedge, but can be planted to fill gaps if necessary. Other native shrubs and small trees will increase the biodiversity value of the hedge, for example, crab apple, rowan, bird cherry and hazel.