

Biodiversity in Dublin City Urban Parklands

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Abstract

Biodiversity was measured for five regional and fifteen neighbourhood urban parklands in the south-west Dublin city area, including a recently developed municipal golf course. Plant species were inventoried by habitat type in the spring, summer and autumn. Birds, mammals and fish were also recorded for each park with substantial input from environmental groups and members of the local community.

The parklands varied in size, management and origin. Habitat diversity and area were found to be the most important factors affecting biodiversity. Parks that originated as old demesnes or as agricultural land tended to have a relatively higher diversity compared to the open green spaces set aside following urban development. Encouragingly, recently developed parks have been designed to enhance wildlife by maximising the number of habitat types such as the development of water features and the retention of old hedgerows.

The ecological assets of each park were described and specific management recommendations to enhance biodiversity were provided, such as set aside areas of wildflower or hay meadows and the planting of native woodland species. Rare species and areas of conservation interest were highlighted and mapped.

The information has been used by the local authority for management direction and educational purposes. The surveys also provide a baseline data-set which will allow monitoring of future change; this is particularly important for the most recently developed parklands and for the municipal golf course which has signed up to the European Committed to Green programme.

Introduction

South Dublin County Council services 240,000 people in the south-west of Dublin City. The area has over 1,400 hectares of green space with 5 regional parklands, 25 neighbourhood parks and a municipal golf course. South County Dublin's urban parkways are an important amenity resource for the local communities but also provide habitats for many native Irish species of flora and fauna in an otherwise altered landscape. The history of the parks varies enormously, with some developed from old estates or agricultural land and others constructed as green areas between suburban townlands. They also vary in size and management with many areas intensively used for amenity purposes while others are less well managed or abandoned.

This survey was commissioned in 1999 by the South Dublin County Council Parks Department in order to survey and compile a comprehensive inventory of the flora and fauna and a detailed map of the wildlife habitats in selected parks. The aim of this survey was to provide the necessary baseline information for a database on the flora and fauna of the parklands, which would be an important educational resource that could be used to inform people on the biodiversity present within the parks. The information provided in the survey would also aid the long term planning and management of these parklands. Finally it would also provide the knowledge to safeguard against detrimental changes in sensitive ecosystems and individuals or populations of rare species.

Summary of the Aims of the project

- Compile an inventory of the flora, fauna and habitat types for each of the regional parks
- Describe the ecological assets of each of the parks i.e. flora, fauna, rare/protected species and habitats
- Specify management recommendations required to conserve certain species and habitats
- Identify priority areas for nature conservation on a site map for use in site planning.
- Highlight the potential value of the regional parks for environmental education
- Compare and contrast the levels of biodiversity in the parklands

Methods

The parks surveyed are listed in Table 1. The parks were visited during the spring, summer and autumn to account for any potential seasonal variation. Local staff and community groups from each of the parks were consulted about their observations and knowledge of the parks in their care.

Table 1: List of parks surveyed

Name	Park type	Area(ha)	Name	Park type	Area (ha)
Corkagh	Regional	117	Tymon	Regional	130
Leixlip	Regional	32.6	Stewarts	Regional	52.7
Griffeen	Regional	49	Waterstown	Regional	65.7
Dodder	Regional	85	Fettercairn	Neighbourhood	19.4
Jobstown	Neighbourhood	15.4	St. Cuthberts	Neighbourhood	16.2
Killinarden	Neighbourhood	19.4	Elkwood	Neighbourhood	9.3
Collinstown	Neighbourhood	18.8	Glenaulin	Neighbourhood	11.2
Hermitage	Neighbourhood	9.3	Ballymount	Neighbourhood	22.7
Sean Walsh	Neighbourhood	36.4	Rathcoole	Neighbourhood	14.2
Willsbrook	Neighbourhood	6.8	Rathfarnham	Neighbourhood	7.1
Grange Castle	Golf	62.7			

Field Study

The parks were divided into the six broad habitat types listed below, defined by a combination of the dominant plants of the habitat and the local terrain.

- Grassland - Grass species are dominant and the habitat is maintained by regular cutting.
- Woodland – Tree species such as oak, beech, alder, ash or conifers are dominant. Recent plantings in the regional parks consisting of large numbers of willow, birch or poplar were also all classed as woodland for this study.
- Waterside/Riverside – This habitat included all species growing in the immediate vicinity of an aquatic habitat. The aquatic habitat itself, which sometimes contained submerged or floating plants was also included within this broad habitat type.
- Hedgerow – A generally well established artificial habitat consisting of linear arrangements of dominant shrub species with some tree species featuring.

- Scrubland – A more open habitat than woodland where shrubs such as hawthorn, blackthorn and gorse are a significant feature but many grassland species remain in more open areas.
- Ruderal (Waste) - Areas dominated by pioneer plants, many of which are annual species. The habitat is generally open with many bare patches of soil.

Species associated with any unusual feature or area within the parks were classified separately.

Dubious identifications were collected and confirmed with the use of detailed keys and herbarium specimens. These included bryophytes, lichens and fungi, which are difficult to identify in the field.

For the purposes of this study native species are defined as species which are indigenous to Ireland and for which there is no evidence that they arrived as a result of human activity. Alien species are species which are definitely known to have been introduced as a result of human activity, and have become well established in the wild.

Nomenclature for the Vascular plants (Angiosperms and Pteridophytes) follows that used in the Flora of Dublin (1998), nomenclature for bryophytes follows Watson (1981), Lichens follow Dobson (1992) and the Fungi follow Phillips (1981). Birds are named using Heinzel *et al.* (1973), mammals using Corbet & Harris (1991), amphibians using Frazer (1983) and insects using Chinery (1986).

Habitat maps for each site were sketched in the field and compiled on PC computer using ArcView[®].

Assessment of rare and protected species

To assess which species are rare and protected, all species recorded during this survey were cross referenced against the two Irish red data books that have been published to date. These two texts are *The Irish Red Data Book: 1 Vascular Plants* (Curtis & McGough, 1988) and *The Irish Red Data Book: 2 Vertebrates* (Whilde, 1993). No red data books have been published for invertebrates, fungi, or bryophytes, although a list of bryophytes was included in the most recent Flora Protection Order (1999).

Assessment of biodiversity

Biodiversity was calculated for each of the parks by calculating the number of species found in the park divided by the logarithm of the area of the park (the actual area of the park cannot be used as there is not a linear relationship between the size of an area and the number of species that occupy it). All recent data on the parks collected during the field study and also from other studies were used when calculating the total biodiversity for each of the parks.

Comparison of biodiversity

Summary data for each of the parks was calculated and tabulated (Table 2). Summary data included area, biodiversity, habitat number, number of native species, total species number and number of protected species.

Table 2: Summary data for each of the parklands surveyed

	Total sp.	Native sp.	Total biodiv.	Native biodiv.	Habitat no.	Protected sp. no.
Dodder	506	359	262.26	186.07	6	8
Waterstown	438	315	241.00	173.31	5	7
Rathfarnham	181	121	212.63	142.14	4	0
Griffeen	357	243	211.22	143.77	4	3
Stewarts	334	224	194.00	130.10	4	8
Leixlip	268	206	177.00	136.13	3	9
Tymon	373	271	176.45	128.20	5	7
Willsbrook	139	109	166.97	130.93	3	0
Corkagh	415	243	160.04	117.49	5	2
Rathcoole	168	131	145.80	113.69	5	1
Sean Walsh	227	175	145.41	112.10	5	2
Grange						
Castle	234	179	130.20	99.60	5	3
Ballymoun						
t	170	116	125.37	85.54	4	1
Hermitage	111	86	114.61	88.80	3	0
Glenaulin	115	93	109.61	88.64	4	0
Collinstow						
n	136	98	106.74	76.91	4	0
Elkwood	93	64	96.03	66.08	2	0
Killinarde						
n	118	91	91.63	70.66	4	0
St.						
Cuthberts	93	85	76.89	70.28	2	0
Jobstown	78	64	65.68	53.89	3	0
Fettercairn	77	64	59.79	49.70	3	0

Detrended correspondence analysis (DCA) was then carried out to spatially visualise the parks in relation to one another, based on the species composition. DCA is a multivariate analysis technique that measures association (or similarity) between sites, and allow study of spatial patterns in vegetation. The resulting ordination views the distribution of plant species as series of continua along environmental gradients, with frequently-associated species close together, and dissimilar species apart. Thus, similar sites ordinate close together, while dissimilar sites are far apart. The importance of an ordination axis in explaining the total variation within a data set is reflected in the ‘eigenvalue.’

Data matrices were compiled in MS Excel and analyses carried out using PC-ORD for windows (McCune & Mefford, 1997).

Results

Habitat maps for selected representative parks have been chosen to illustrate the range of habitats types and to highlight particular features present in the different parklands.

Editor's Note: Due to space constraints, the maps for most of these sections have been omitted, but all are available from the authors.

Dodder Valley Linear Park

Figure 1: Dodder Valley Linear Park

[map of park here]

The dominant feature of this park is the River Dodder. Along a significant proportion of its length the river is shaded by a narrow section of tree cover as associated pathways that is an important component of the waterside habitat in the park. Almost all of this tree cover appears to be the result of natural colonisation and the vulnerable vascular plant species *Scrophularia umbrosa* occupies a niche within this habitat.

Many of the hedges in the park are found along the borders of the fields either side of the River Dodder. The grassland habitat of most interest is in the area of the ruined site near the designated Natural Heritage Area (NHA). This area contains many habitats including waste areas, grassland and scrub, depending at what stage in the succession the vegetation is at. The fact that a succession of habitats can be viewed in the one area makes this section of the Dodder Valley quite interesting as an educational resource. The final habitat of note is the dry open scrub areas that are found along certain sections of the river and are dominated by Gorse (*Ulex gallii*) and characterised by gravel bank species such as Yellow-wort (*Blackstonia perfoliata*) and Marjoram (*Origanum vulgare*).

The most important area of woodland in the park is the area of wet Alder (*Alnus glutinosa*) and *Salix* dominated woodland within the designated NHA. Several habitat types are present within the NHA, which is mostly a low-lying seasonally flooded area providing a habitat for the Common Frog (*Rana temporaria*) and is the only location in the five parks where the Smooth Newt (*Triturus vulgaris*) has been observed. Willow (*Salix* sp.) and alder (*Alnus glutinosa*) dominate the flooded areas and the ground cover consists of a mixture species tolerant of wet conditions. Extensive gravel banks allow the colonisation of ruderal species during bouts of dry weather and areas of gorse scrub provide nesting sites for small birds.

Tymon Park

Tymon Park has a diverse range of habitats. Large areas of the park are occupied by playing pitches, however between these pitches the hedges have been retained as a remnant of the park's former use as agricultural land. Also the retention of Tymon Lane and the associated hedges adds to the rural landscape of the park. Some fields not used as pitches are managed as wild flower meadows and retain grassland species of interest such as the Pyramidal Orchid (*Anacamptis pyramidalis*). At present a substantial amount of the woodland in the park contains a high percentage of non-native species.

Several water features have been developed along the river Poddle, in particular the Tymon lakes. These provide a breeding ground for a diverse range of water-fowl. These lakes are planted with many non-native species and are maintained as a visual amenity for visitors to the park. The Limekiln lakes were recently developed as flood attenuation for the River Poddle, and have been planted with the Flowering Rush (*Butomus umbellatus*) amongst other species. The Wellington lakes were also developed more recently but have been colonised by native aquatic flowering species providing a habitat for amphibians (e.g. *Rana temporaria*-

the Common Frog) and aquatic waterside insect species (e.g. *Enallagma cyathigerum*- the Common Blue Damselfly).

Griffeen Valley Park

The Griffeen Valley Park runs along the Griffeen River, with some smaller outlying park areas among housing developments to the west. The main area of the park is split by the Lucan By-Pass, with Vesey Park on one side and Griffeen Park on the other. The most important feature of the Griffeen Valley Park is the old woodland in Vesey Park that was retained when the park was formed. This woodland is most extensive along the Griffeen River and contains mature deciduous and coniferous trees. The most important area on the river is the wet woodland containing the most extensive fern and bryophyte growth recorded in the five parks surveyed. The woodland also provides the habitat for the protected species *Hypericum hirsutum*.

Waterstown Park

Waterstown Park is the largest area of park held by South Dublin County Council along the River Liffey. The park entrance is flanked by a diverse ruderal and waste area and an extensive scrub thicket. Several pathways lead around a highly diverse grassland which are fringed with mature hedgerows and also incorporate woodland plantations. A large area is the site of a now vegetated tip head. Further down towards the river lies a wet grassland which is being invaded by willow species. An old woodland borders a disused millrace which runs parallel to the river. This millrace supports a diverse aquatic community with colonies of the rare flowering rush, *Butomus umbellatus*. The park is secluded and is not visited extensively by the locals and there is also evidence of antisocial behaviour.

Grange Castle Municipal Golf Course

Grange Castle golf course was derived from tillage farmland and opened in 1998. The course is a full 18-hole course with the characteristic layout of tees, greens, fairways and rough areas, bordered by planted areas and hedgerows. The partition of grassland results in different levels of diversity that is associated with the intensity of the cutting regime. Artificial features such as sand bunkers, lake systems and tree plantations have been incorporated into the course. Old farmland hedges have been retained around most of the perimeter of the course and remnants of two lane-ways with intact hedge margins occur within the area. Several mature standing trees are scattered throughout the course.

Seán Walsh Park

Seán Walsh Park is a recently developed park in the middle of an urban centre. The dominant features of the park are the developed water features, which support a thriving bird community and have a high aesthetic and amenity value. Patches of woodland have been planted on the western side of the lakes and in parts include are more diverse than the typical birch/poplar plantation. In some areas these patches are diffuse enough to allow the establishment of a ground flora. A sizeable abandoned area has been colonised by a highly diverse ruderal community. This community may be less ephemeral than most ruderal communities due to the underlying rubble which is unlikely to support a more advanced community type. The seed produced by many of the ruderal species is harvested by finch species. A tributary of the Dodder runs along the edge of this area. An untended grassland occupied most of the western end of the park and has been colonised by more ruderal species in open patches. A dense hedge runs down the eastern side of the grassland and this area and the surrounding grassland was considerably damp and uneven.

Jobstown Park

Figure 2: Jobstown Park

[map of park here]

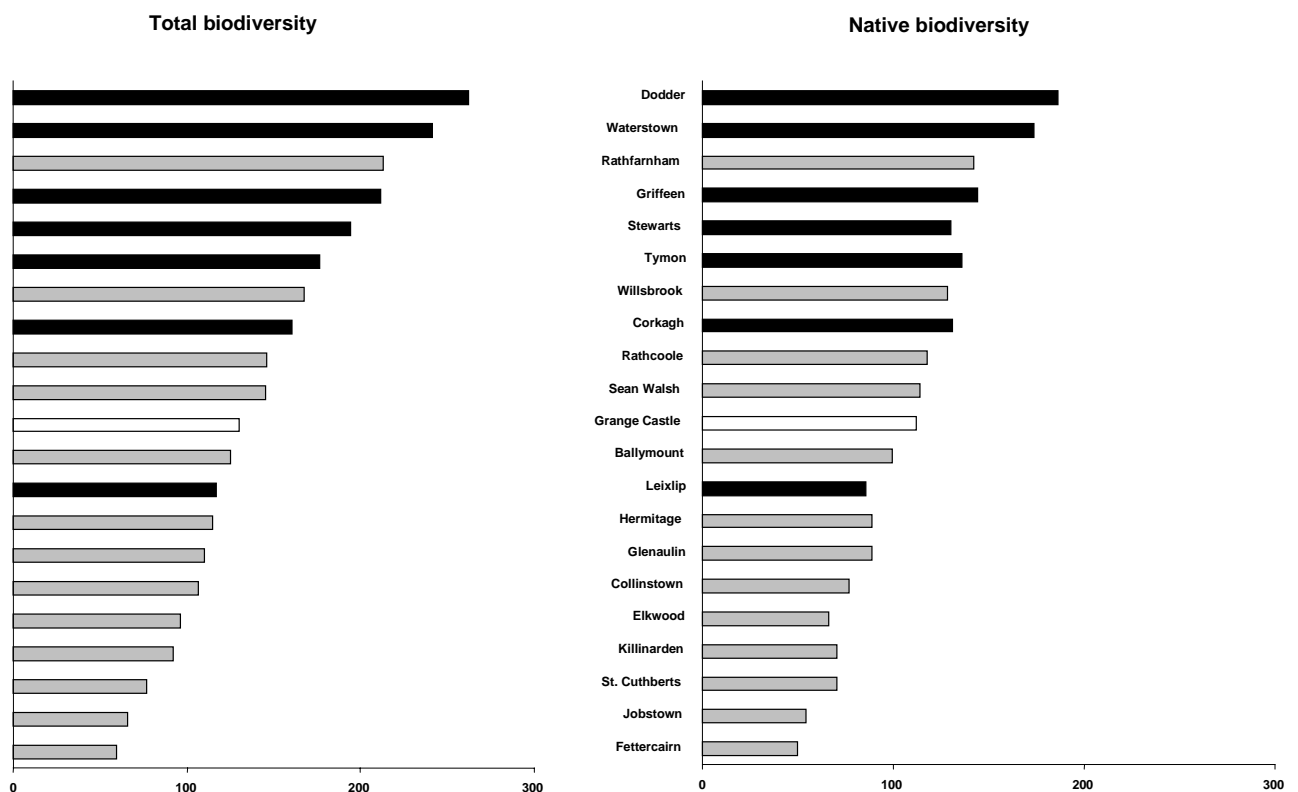
Jobstown Park is dominated by open maintained grassland which support several playing pitches. A pruned hedge divides the park, and a few uprooted and abandoned flower beds were planted around the margins. There are no permanent or artificial water bodies in the park nor is there any habitat to provide suitable shelter for nesting birds or small mammals. It appears that any effort made to improve this park has been thwarted. Planted trees have been snapped, flowerbeds have been uprooted and part of the hedge system burned. The hedges have been pruned probably to reduce that amount of rubbish that has become trapped in the scrubby hawthorn. Evidence of dumping was observed throughout the park and rats were seen foraging through the litter.

Comparisons of biodiversity

Figure 3 shows a graph of the all parks surveyed and their associated biodiversity values. The regional parks largely fall at the top of the graph, with only the neighbourhood parks derived from estate lands falling among them. With the exception of Willsbrook Park all of the upper parks also have lake habitats. The more recently developed neighborhood parks (Seán Walsh, Rathcoole and Ballymount) score relatively highly as all these parks have been developed with artificial water features, and ruderal habitats feature prominently.

Biodiversity increases with increasing habitat number. There is no relationship between the number of protected species and habitat number, with most of the protected species occurring in the regional parks. When all of the species from each of the parks are summarized using DCA (Figure 3), a split between the neighborhood and regional parks is evident along axis 1 of the resulting ordination, which accounts for most of the variation present within the data set. This means that the species assemblages for the regional and neighborhood parks are inherently different. The golf course lies between the two groupings. Spread along the y-axis is mainly between two of the regional parks. A closer look of the species present within these parks revealed a unique suite of aquatic plants in one and damp meadow species in the other.

Figure 3: Total and native biodiversity for each of the parklands surveyed. Black indicates regional parks, grey indicates neighbourhood parks and white indicates the golf course



Discussion

Different levels of biodiversity were evident between the parkland types with regional parks generally higher, however parks developed from older estates also had a relatively high biodiversity index. The level of biodiversity was related to areas where communities have been allowed to establish with less intensive management, however abandoned or ephemeral areas can add considerably to the biodiversity. Rare species tended to be restricted to areas that are in proximity to natural features such as the river systems or mature woodland. Although it is recognised that the primary function of neighbourhood parks is to provide an amenity area for the local community, the parks surveyed displayed a range of levels of diversity that were related to the development of the individual park and the associated management regimes.

While an amenity green space is often considered to require manicured lawns, playing fields and aesthetic plant life there is a growing proportion of the community who appreciate a more natural setting with a rural feel, such as wildflower meadows. Some of the more recently established parks such have been thoughtfully developed so that high amenity and untended wildlife areas can co-exist within the same park. Unfortunately wildlife areas that are set aside tend to be secluded and often considered dangerous.

Management recommendations

General recommended management practice to enhance the biodiversity within the parklands are:

- The sensitive management of hedges and waterways that have been incorporated into the parks from the original landscape
- Grassland areas set aside and managed as traditional meadows, i.e., only cut biannually or annually will contribute greatly to the amount of diversity in the flora and fauna found in the parks.
- Tree planting schemes to increase native biodiversity, and when possible native Irish tree species from local indigenous seed should be used. Increasing the tree cover will also provide shelter and nesting areas for birds and small mammals.
- All lakes and streams should be kept unpolluted and suitable nesting areas for waterfowl secured. Litter bins should be plentiful and emptied on a regular basis.
- For amenity planting, a greater range of species should be included with more educational initiatives such as interesting cultivars or landraces and also species that will attract butterflies and moths.
- Where vandalism or loitering is a problem within the parks resident committees should be encouraged to monitor and protect their local green spaces and also be made aware of the wildlife present within these areas.

Detrimental management practices would include:

- the removal of hedges
- drainage of wet areas
- planting of native or non-native species that will disrupt the natural ecosystem
- inappropriate use of pesticides or herbicides

Education

In addition to conserving the diversity of species and habitats in the parks it is also important that educational material is developed to inform the general public. The Microsoft Access[®] database and detailed maps that have been produced as part of this survey are currently being used for the production of educational material in the form of nature walks, poster boards, leaflets and CD ROM. SDCC will be able to use the database to encourage local schools and interested groups to use the parks as an educational resource and where possible contribute information to the database, for example it is often quite difficult to comprehensively record the more elusive faunal communities during a set period of time, therefore local schools and ecology groups should be encouraged to visit their local parks and catalogue these insect communities at different times of the year.

In addition to the database being made available to the general public it should also be utilised for training programmes within SDCC. One possible training programme would be to make Park Rangers etc. aware of the species and habitats found in the parks and how best to manage them for the future. It is hoped that the simple calculations of biodiversity presented in this report can be used in the future to assess whether there has been any significant changes in overall biological diversity in the parks.

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