
Biodiversity Protection and Promotion in our Public Open Spaces

Take a moment to consider:

- Sixty percent of 3,148 UK species recently assessed have declined over the last fifty years; more than one in ten are threatened with extinction; 72% decrease in butterflies, 28% loss of larger moths; 44 million breeding birds lost since the 1960s; severe mammal declines including red squirrels and hedgehogs. (Source: UK State of Nature Report 2013 from twenty-five wildlife organisations <http://bit.ly/2inF88q>.)
- The British Government has produced an official indicator for the status of 210 priority species (including birds, bats, moths, butterflies, brown hare and hazel dormouse) using records dating back forty years; these have declined on average by 58% since 1970 – and one-in-five of all UK flowering plant species are believed to be threatened with extinction. (Defra <http://jncc.defra.gov.uk/page-4238>.)
- Worldwide, between a quarter and a third of the world's wildlife has been lost since 1970; humans are now wiping out about 1% of all other species every year in what is one of the “great extinction episodes” of the Earth's history; habitat deterioration from pollution/climate change, farming and urban expansion, over-fishing and hunting are major players. (Zoological Society of London <http://bit.ly/2xo9FWj>.)
- Perhaps the most devastating of all habitat-altering agents is climate change – scientists are still coming to grips with the consequences that excessive atmospheric carbon dioxide and Earth's rapid warming are having on ecosystems. However, there is ample evidence indicating that the oceans are bearing the brunt of these changes; the combination of habitat destruction, overfishing, ocean warming, increased acidification and massive nutrient run-off are creating a grand transformation of once complex ocean ecosystems.
(National Geographic <http://bit.ly/Sssa6L>.)

But, you ask, what has all this to do with our local green spaces and the daily lives of most of us? The answer is that we live on a single, ecologically connected planet and “every little counts”. There will always be the die-hard deniers and the uncaring, but if the rest of us all make small changes and start to help the habitats around us to reach their full, biologically diverse potential and to recover from anthropogenic insults and the damage of inappropriate management, we can undo much of the harm before it is too late – a “bottom-up” approach if you like.

Britain, particularly to the south and east, is one of the most populous and over-crowded places on earth, with ever-increasing demands for more housing and the infrastructure that goes with it. The challenges of repairing, maintaining and

enhancing an ecosystem struggling against such an excess of ecological carrying capacity are great indeed, but we can act locally to limit the ecological devastation inherent in our profligacy. One way to do this is to change our attitude to our urban green spaces — our parks, road verges, gardens, streams, ponds, canals and trees. We can also “green” our towns and cities by creating habitats on roofs and walls, something that, bewilderingly, we have been reluctant to do in Britain for reasons I have never been able to fathom and hope will soon change.

With all this in mind, and in the teeth of a storm whipped up by a few who want sterile “chocolate box” landscapes of shorn grass and lollipop trees, ecologists can devise and promoted ecological prescriptions for our green spaces. This can deliver rich ecosystems containing a biological diversity that are more reflective of how our land used to be before the era of post-war habitat destruction.

The Grassy Bits

- If you don't already, learn to love longer grass, moss, daisies, poppies, plantains and buttercups for a biologically rich grassland ecosystem.
- Avoid pesticides, weed-killers & fertilizers.
- For mown areas, set the blades high.
- Think of areas of shorter grass as a rich, green dining table for wildlife that blends into the longer sward.
- A flowery meadow is one of the great wonders of the British Countryside.




Each site is different, of course, but there are some general rules that apply almost universally:

1. Don't be too tidy. This probably causes more opposition from the biodiversity deniers than anything else. Nevertheless, whilst there are elegant underlying rules of physics and biochemistry which all life obeys, nature tends to be a bit messy if the species-richness of a healthy ecosystem is to prevail. Some grassland on a site needs to be left to flower and seeds allowed to fall if it is to support its full complement of species, especially the insects and other invertebrates, and for those birds, mammals, herpetofauna, *etc.* that feed on them. Yes, some parts can be mown and managed to mimic a species-rich grazed sward, but great unbroken extents of close-mown, species-poor rye-grass and bents are anathema to biodiversity. For long grass, even when a hay crop is taken, some tussocky areas and dead stems and seed heads must be left, because many insects hibernate in them as eggs or pupae.

2. No fertilizers or pesticides. Proscribe pesticides of all kinds, unless approved by the Soil Association. These substances are the cause of significant damage and disruption to the health of natural and semi-natural ecosystems and have caused untold harm to wildlife over the past two hundred years – and quite probably to us. This has recently been recognised by the EU which has sensibly banned many of them.
3. Keep the “weeds”. Docks, nettles, thistles, dandelions, brambles and many other wild flowers that colonise readily provide an invaluable resource as food and nectar plants for a host of species of invertebrates and vertebrates. Without nettles, for example, our much-loved small tortoiseshell, peacock, comma and red admiral butterflies would be scarce indeed.

Plants Make Habitats & Animals Live in them

- Insects, reptiles, amphibians, birds & mammals all live in the habitats created by plants.
- British parks and open spaces are home to hundreds of different types of moths, for example.
- Few people know we share our environment with 4,000 species of beetle, 7,000 species of fly or over 17,000 species of fungus.





In the Figure above, the moths, from left to right, are lime hawk-moth *Mimas tiliae* (Linnaeus, 1758), eyed hawk-moth *Smerinthus ocellatus* (Linnaeus, 1758) and canary-shouldered thorn *Ennomos alniaria* (Linnaeus, 1758) all of which have larvae that feed on deciduous trees and shrubs found in parks and open spaces.

Shrubs & Trees

- The woody framework of a site — native species are best.
- Hedges are food, shelter, corridors, hunting ground and nesting sites for wildlife.
- Dead wood, snags, hollows and sap runs are important habitats.



Hard Stuff

- There's a huge variety of "hard" habitats: bricks, rocks and stony materials.
- They provide niches for large range of specialised plants & small animals.
- Many alpine plants that like these habitats are very floriferous — great nectar and pollen sources.
- Don't forget mosses, liverworts, ferns & lichens — usually they will arrive on their own.



4. Reduce sterile surfaces. We can use our buildings, walls and terraces to good effect for wildlife. It is rather sad to learn that 5,900 hectares of front gardens in London have been hard-surfaced in the last few years. Wherever possible, encourage roof gardens or green walls, or just let brick, stone and concrete surfaces accumulate a community of lichens and mosses.

Wet Stuff

- Water is often the single most important feature for wildlife on a site.
- Create as many aquatic habitats as possible.
- Attracts birds, amphibians, fish, dragonflies, mayflies, caddis flies, water beetles.
- Having one pond with fish and one without encourages good piscine and amphibian populations which don't mix well.



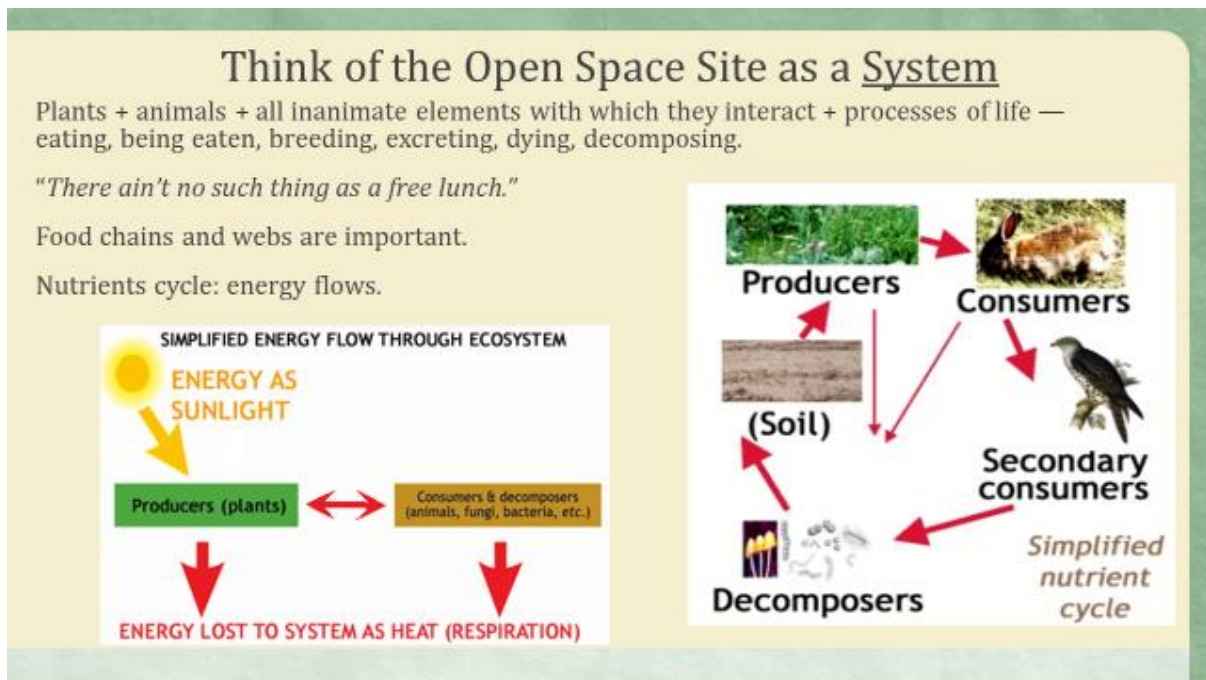
5. Have a pond or stream. Always have open water rather than letting our natural ground waters be consigned to underground pipes and conduits as seems to be current the passion of some design engineers. Ponds (including sustainable drainage attenuation areas) and streams form some of the richest (and most educative) wildlife habitats that exist, and it is simply crackers to cover them over or allow them to be polluted. One has to be sensible about water, especially where there may be young children or the elderly, so common sense needs to prevail. (Supervise children at all times, avoid steep banks and loose slippery boulders, provide safety notices, *etc.*)
6. Inspect, check and keep records. Link up with professionally qualified ecological scientists to check sites regularly, usually at least once in every season. Identify any problems and initiate solutions, make records and take photographs and, if appropriate, produce a report for the site manager. Encourage local people and their families and friends to make records of the wildlife they see and send them in to their local Biological Records centre. In this way a picture of the species using a site over time is built up, helping to measure improvements in biodiversity and spot any undesirable trends early.

Remember – nature is fun, educational and good for you. See this web site: <http://bit.ly/2vZqJlN>.

The Science

There are many definitions of ecology, the author's favourite being that of American ecologist E.P. Odum who succinctly called it "*the study of the structure and function of nature*".

Many people ask about the science behind what biodiversity professionals do. Ecology is a complex, often counter-intuitive subject with many branches, each of which merits study of several lifetimes – but here is our attempt at a (very) simplified introduction.



By an “ecosystem”, we mean the plants and animals plus all the inanimate elements with which they interact, plus the processes of life – eating, preying, being preyed upon, excreting, breeding, dying, decomposing.

"There ain't no such thing as a free lunch". That's a somewhat ungrammatical phrase popularised by free-market economist Milton Friedman (1912-2006) in the 1900s, but well-suited to ecology and incorporated in Barry Commoner's (1917-2012) famous four laws of ecology. In other words, exploitation of nature will inevitably involve the conversion of resources from useful to useless forms.

Commoner's other three laws are:

- *Everything is Connected to Everything Else*. There is one ecosphere for all living organisms and what affects one, affects all.
- *Everything Must Go Somewhere*. There is no “waste” in nature and there is no “away” to which things can be thrown.
- *Nature Knows Best*. Humankind has fashioned technology to improve upon nature, but such change in a natural system is, said Commoner, “likely to be detrimental to that system.”

It is helpful to think of an open space site as a dynamic system because everything interacts with everything else and, indeed, nothing does have a free lunch. You may only be interested in, say, butterflies, but they, like everything else, need sustenance, shelter, the ability to reproduce, and a means of eliminating waste. Any species unable to obtain these will, at best, only be a fleeting visitor; provide its larval food-plant, other flowers with nectar, somewhere to pupate and space for courtship and mating, though, and that butterfly species will be likely to make the site home for generations of its offspring. But it, itself, will also almost certainly become part of a food chain, especially if successful and present in some numbers.

Jonathan Swift in his *Poetry, a Rhapsody* of 1733 has a nice little rhyme about food chains:

*So, naturalists observe, a flea
Has smaller fleas that on him prey;
And these have smaller still to bite 'em;
And so proceed ad infinitum.*

Food chains and food webs are important and fundamental in understanding the ecology of a site. Plants, as the “producers” (because they produce energy from sunlight through photosynthesis) are the basis of most food chains. The “consumers” are the majority of the rest – consuming the plants and often each other. Thus the nutrients cycle around the system, helped by the decomposers – the fungi and various micro-organisms that break down the complex chemicals of life and its wastes into simpler forms that the plants can take up again.

On the other hand, energy flows through the ecosystem and out – from the sun through the biological and physical elements of the planet in various forms and ultimately away as heat – even if it is trapped for too long just now in a gas-bounded greenhouse formed in large part by our extensively burning fossil fuels and intensively farming flatulent livestock! The equation for respiration in ecological energetics is $R=C-P-FU$ or $R=A-P$ where A is assimilation, C is consumption, P is production and FU are the rejecta (faeces+urine). Respiration is the exchange of gases of an organism with its environment to release energy and usually carbon dioxide plus water.

I am over-simplifying, greatly – ecology and ecosystems are bewilderingly complex and commonly counter-intuitive as noted above, and exist at an enormous range of scales in virtually endless variety, from the biome that is the gut of an ant to a whole ocean or planet. And I haven’t even touched on genetics and evolution! I hope, though, that this gives some idea of the relationships between structure and function in nature and why destroying or impoverishing the ecological system, breaking its web of physical and chemical links and the concomitant interdependence of species, if you will, are so harmful. We are part of this system, after all, and we depend upon its health for our survival.

Policy and Statute

It is not surprising, then, that governments around the world have started to become alert to the vital importance of ecology and biodiversity. What is surprising is how long it has taken them to realise how fundamental to human survival this all is, but at last the penny does seem to have dropped, at least for those nations who have politicians who listen to scientists. Sadly, many still do not, but the plethora of adopted policies and statutes now coming into force demonstrates that wiser heads of states are listening and acting. Happily, the EU and the UK, in large part anyway, are amongst them.

Internationally, the Convention for Biological Diversity (CBD) has been signed by many countries, including Britain, and came into force in 1993, following the Earth Summit at Rio de Janeiro in 1992. It has three main aims: conservation of biological diversity; sustainable use of its components; and fair and equitable sharing of benefits arising from genetic resources. The UK Government's response to the CBD was the formation of the UK Biodiversity Action Plan (UK BAP – see below). There are regular updates and conferences on this major Convention and there is increasingly enforced regulatory emphasis on upholding the overriding objective to halt the loss of biodiversity, which feeds down to local statutory duty. Latest information may be found at www.cbd.int/.

Within the EU, there are several important legislative instruments that have been subsumed into British law or formally adopted by Britain. These include, but are not limited to:

- The European Communities Council Directive on the Conservation of Natural Habitats and Wild Fauna and Flora, known as the Habitats Directive. This is presently enforced, and increasingly strictly, in England and Wales by the Conservation of Habitats and Species Regulations 2010. Enforcement in Scotland and Northern Ireland is by instruments applying specifically to those regions. The Habitats Directive confers protection on a large number of habitats and species of community interest. Detailed information may be found at: <http://bit.ly/1Ee1v4R>.
- European Communities Council Directive on the Conservation of Wild Birds, known as the Wild Birds Directive. All birds (excepting a very few derogated pest species or game birds) naturally occurring in the wild in Britain and throughout their natural range in the EU are protected under this legislation which also promotes the creation of Special Protection Areas for particular species under threat. Details at: <http://bit.ly/1nahKR3>.
- The Convention on the Conservation of European Wildlife and Natural Habitats known as the Bern Convention. This is a binding international legal instrument. It has three main aims: to conserve wild flora and fauna and their natural habitats, to promote co-operation between signatory states, and to give particular attention to endangered and vulnerable species including endangered and vulnerable migratory species. Details at: <http://bit.ly/1Bm5vha>.

- The Bonn Convention on the Conservation of Migratory Species of Wild Animals. This came into force and was ratified by Britain in 1985. Its focus is on threatened mobile species that cross national frontiers in migration or dispersal generally, including many birds and several bats. Details at: <http://bit.ly/2vai0w8>.

In Britain, the Wildlife and Countryside Act (1981) was a seminal piece of legislation that now protects hundreds of species and their habitats. It has been updated many times over the decades since it was introduced and is constantly under review, but remains the principal national legislative instrument in criminal law for protected wild plants, animals and sites. Details at: <http://bit.ly/2x8cgEz>.

The UK BAP (see above and below) was written in 1994 and was a step towards meeting the aims of the CBD highlighting the status of the UK's fauna and flora and a way forward in the conservation of our biodiversity. The UK BAP has been succeeded by the Post-2010 Biodiversity Framework which sets out our priorities to meet the challenges of the CBD since the most recent summit in Nagoya in 2010 – this is not a replacement of the BAP but a continuation.

The Countryside and Rights of Way Act and the Natural Environment and Rural Communities Act. The former is a long and complex piece of legislation in five parts – Access, Rights of Way, Nature Conservation and Wildlife Protection, Areas of Outstanding Natural Beauty, and Town and Village Greens. It is supplementary to the Wildlife and Countryside Act (above) which it strengthens and updates – and it has already been updated itself by the Natural Environment and Rural Communities Act. For the first time, the CRoW Act introduced a statutory Duty on English Government Departments and the National Assembly of Wales to have regard to biodiversity conservation in general, and to maintain lists of species and habitats for which conservation steps should be taken or promoted. This places Biodiversity Action Plans (BAPs – see above) within a statutory context and, as noted earlier, is aimed at enforcing the implementation of the principles of the CBD. This legislation has strengthened the statutory protection for wild fauna and flora species in making some offences arrestable, with significantly increased search and seizure powers granted to the police and almost all wildlife offences now have heavier fines and even prison sentences. Details at: <http://bit.ly/1WUGrav> and <http://bit.ly/2wA76Db>.

In terms of adopted planning policy, the National Planning Policy Framework of 2012 places clear responsibility on Local Planning Authorities and those responsible for land-use to aim to conserve and enhance biodiversity and to encourage ecological richness in and around human developments and settlements. The Framework (for detail of which please see the Planning Portal at <http://bit.ly/2wtZuCY>) emphasises that moving from a loss of biodiversity to a gain is a clear requirement of sustainable development and that a core principle for planning is that it should contribute to conserving and enhancing the natural environment and reducing pollution. The legal basis behind this is included the Natural Environment and Rural Communities Act above.

Government Circular 06/2005 (jointly with Defra Circular with 01/2005) *Biological and Geological Conservation – Statutory Obligations and their impact within the planning system*) complements the National Planning Policy Framework (see <http://bit.ly/2wkgZp2>). It places a clear responsibility on Local Authorities to further the conservation of habitats and species of principal importance where a planning proposal may adversely affect them. Furthermore, most local authorities also have supplementary policies which can be found on their web sites.

Last but far from least, British Standard BS42020: 2013 *Biodiversity – Code of Practice for Planning and Development* sets out standards and guidance on biodiversity and ecology in practice, and BS8583: 2015 provides biodiversity guidance for businesses and their Biodiversity Action Plans. These are supplemented by protocols adopted and issued by the relevant professional institutes, particularly the Chartered Institute for Ecology and Environmental Biology.

Please do be aware in all this that biodiversity legislation, whilst increasingly comprehensive and stringently applied, is extremely complex – even the experts find it difficult. You must not take the above as any more than an attempt to offer useful information in good faith. Always consult a specialist lawyer!

Concluding Remarks

Whilst it is not easy to condense the essence of such a large subject into a few lines, I hope the above goes some way towards explaining why caring for biodiversity at a local level is important for all of us, as well as, at a macro-ecological scale, for our planet. It is the “nature on our doorstep” that we see and experience every day. By looking after that in a way which protects and enhances the health of the ecosystem and the vital services it provides to us all, we can help to ensure the future of this green and pleasant world for generations to come. It is nothing less than our patrimonial duty so to do, and it is a rewarding, worthwhile and pleasurable mission.

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Professional service
Sustainable land management
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