

Secrets of the garden

Take to the air over any reasonably large urban area in Britain and look down. Your eye will probably be drawn to a patchwork of green spaces running through the residential zones. Having perhaps first experienced the usual difficulty in locating your own abode, you will probably be surprised at the extent of green, and intrigued at how different each patch is from its neighbours. Most of these patches are, of course, private gardens, each reflecting the occupants' stamp of individuality on what is, for most people, the one piece of land over which they have some control.

Looking at such a scene, it seems inescapable that the form and management of these spaces must profoundly affect not only the quality of life of the human population, but also the closely related issue of biodiversity in urban areas. However, surprisingly little is known about the biodiversity in gardens, what determines its composition and dynamics, and how it can be best enhanced.

With funding from the NERC Urban Regeneration and the Environment (URGENT) thematic programme, we are beginning to answer some of these questions. URGENT aims to stimulate the regeneration of the urban environment through understanding and managing the interaction of natural and human-made processes. The Biodiversity in Urban Gardens in Sheffield (BUGS) project is a collaboration between myself, Ken Thompson and Phil Warren at the University of Sheffield, with Richard Smith as the post doc, several field assistants, advice and support from local and national organisations, and an army of other helpers – of which more anon.

Mapping the green spaces

BUGS has three main objectives. The first is to work out the size of the resource that urban gardens provide and the important biodiversity features they contain. There are surprisingly few data on such issues, presumably because gardens lie outside the immediate control and management requirements of local government and administrative authorities. Domestic gardens cover about 23% of urban Sheffield, more than other forms of green space. This area is, of course, highly subdivided.

Indeed, the large numbers of small gardens contribute most to the overall extent of gardens; the large domestic gardens contribute much less, being comparatively scarce. Across urban Sheffield, we estimate that in gardens alone there may be 25,000 ponds, 45,000 nest boxes, 50,000 compost heaps, and 360,000 trees taller than 2m. Although these may not all be as suitable for biodiversity as one might desire – the architecture and placement

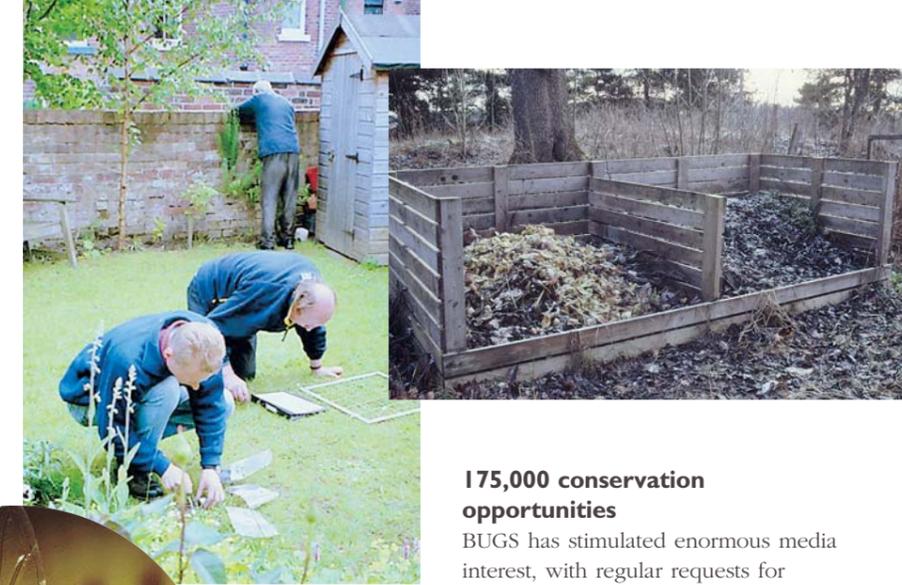
of nest-boxes, for example, don't always suit the needs of their intended occupants – nonetheless, some of these features are occurring at densities greater than in the wider countryside. Together they could exert a significant effect on biodiversity within the city.

Welcoming wildlife

BUGS's second objective is to determine which garden features attract greater levels of biodiversity. To this end, we established a network of 61 gardens across Sheffield. Their owners generously give us access to their grounds, the freedom to decorate them with sampling devices (ground and aerial pitfall traps, Malaise traps, water traps), and the occasional tea and biscuits! This network covers the range of variation of gardens in terms of size, age, management, degree of urbanisation, and proximity to city edge. Some can scarcely be termed gardens, some fit conventional ideas of what a garden should look like, and others are more akin to small patches of natural vegetation. We have mapped all in considerable detail. In sampling these gardens' biodiversity, we have emphasised wildlife that is less obvious to the typical owner, such as lichens, liverworts and mosses, molluscs, beetles, hoverflies and craneflies.

Sorting this material has been a mammoth task. It would have been impossible without the tremendous support of an army of taxonomic specialists, many in Sheffield and already an active part of the city's well-established natural history tradition, and keen to see what role gardens have for their own group of interest. The results are just emerging, but already they highlight nationally rare and threatened species growing in the garden environment and the role of gardens in extending the ranges of some species. Moreover, they show that the occurrence of species, such as lichens, that cannot move about depends hugely on the features of individual gardens, but the occurrence of species that can move, such as flying insects, is more independent of these features.

BUGS's final objective is to test a number of simple means suggested for



improving biodiversity in gardens. Gardening magazines and radio and television programmes are replete with recommendations for

how to turn your garden into a nature reserve. Sourcing the basis for these recommendations is, however, extremely frustrating. Most seem founded on anecdote and force of repetition, rather than empirical demonstrations of their effectiveness. We are therefore experimentally testing, in a design replicated over many gardens, five additions to a garden to increase the breeding populations of wildlife species.

In so doing, we have an eye not simply to whether this increase occurs, but whether it does so before an uninterested average gardener will get bored, and whether they work on the scale accommodated in a typical garden. The five additions are: small artificial ponds, trap-nests for solitary bees and wasps, nesting sites for bumblebees, nettle patches for some butterfly species, and rotting wood for invertebrates specialising in this habitat. We are conducting this experiment over three years. The results to date suggest that some additions are almost totally ineffective and others are very good. So far it seems that the size of nettle patches which people will tolerate in their gardens tend to be too small to attract butterflies.

We are waiting for our final results before making any more pronouncements, and will update you later.

175,000 conservation opportunities

BUGS has stimulated enormous media interest, with regular requests for information on our objectives, progress and conclusions. Yet within ecological science, the study of urban environments has remained something of a minority interest. This highlights a number of important issues.

First, the vast majority of the human population place great importance on urban ecology. It is what most directly influences their lives. This is reflected by the huge number of garden owners in Sheffield who wanted to take part in the BUGS project, and their interest in finding out which species lived in their own patch, why, and what they are doing there. Second, given the contribution to overall green space, and the potential for more and better features, gardens are a tremendous opportunity for improving urban biodiversity. In Sheffield, gardens present us with perhaps 175,000 separate conservation opportunities. Enhancing the biodiversity value of just some of these could improve this urban area's chance to be a viable habitat for some species. Third, and in a related vein, gardens are a great way to teach people about the consequences of how we manage the planet. If we cannot learn the importance of these consequences in our own backyards, we are much less likely to care about what's happening to the rest of the planet.

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For further information on BUGS go to www.sheffield.ac.uk/uni/projects/bugs and on URGENT go to <http://urgent.nerc.ac.uk/>

Sheffield garden owners have been taking part in a study to find out if wildlife can thrive in Britain's gardens, writes Kevin Gaston.



Barrie Watts/OSF

Scott Gammage/OSF