



# What's the buzz?

## The conservation and ecology of urban pollinators

Insects pollinate many of the plants we rely on for food but as our population expands their habitat shrinks – or does it? Jane Memmott explains how the Urban Pollinators Project is finding out what makes an urban *des res* for a pollinator.

**W**e rely on insects like honeybees, bumblebees, butterflies and moths to pollinate many cultivated and wild plants – they play a crucial role in the production of agricultural crops as well as horticultural plants, and are essential for maintaining biodiversity in natural ecosystems.

Pollinating insects are vulnerable to pests, diseases and environmental change – threats that have increased in recent years. The steady decline of these insects could make it increasingly difficult for us to feed our own growing population – a population that is steadily encroaching on the pollinators' natural habitats.

The Insect Pollinators Initiative is made up of several projects aimed at finding out the causes and consequences of threats to insect pollinators, to help develop ways to reverse their decline. The Urban Pollinators Project is one of these, looking specifically at understanding and improving the lot of pollinators in urban environments.

Some ecologists see urbanisation as one of the major causes of insect decline, through its effects on the availability of

things like food and nesting sites. But, surprising though it may seem, flower-rich oases in otherwise uninviting city habitats can provide just the right conditions to support large numbers of pollinators.

For example, half of Germany's bee species were found in the city of Berlin, 35 per cent of British hoverfly species were sampled in a single Leicester garden and it is reported that honeybees produce more honey in urban Birmingham than in the surrounding countryside. And data gathered over the last decade in and around the city of Bristol in the UK, suggest that some urban habitats have at least as many species as nature reserves and farmland – sometimes more.

There has been research in the UK on the biodiversity value of gardens and other types of urban habitats, like roadside verges and roundabouts. But ecologists haven't looked at towns and cities as whole ecosystems, or more generally as systems. A 'systems' or 'network' approach looks at how things are linked together and how change in one part of the network influences other parts.

It also involves understanding the network's 'emergent properties' – the presence of which means that the whole is more than the sum of its parts. For example, consciousness is often considered an emergent property of the brain in that it cannot be predicted simply from looking at the structure of the brain. In the case of pollinators, an emergent property could be how the system responds to the loss of a species – so having a detailed knowledge of an individual pollinator species doesn't mean you can predict whether its loss will cause other species to go extinct – what you need is information about its position in the overall plant-pollinator network.

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Our project will start by asking where pollinators are found in the UK landscape, and will compare pollinator diversity in three habitats: cities, farmland and nature reserves. Rather than just counting species, though, we will study the network of interactions between plants and their pollinators, as these interactions have a profound impact on an insect community's response to species loss, stress and ecological restoration. For example, the removal of just a few species can cause a series of further extinctions, if the first species lost are very well linked to the rest of the community.

The next stage of our research will look in detail at various city habitats in Bristol, Reading, Leeds and Edinburgh. Ecologists know a bit about what makes urban gardens good for pollinators; for example, pollinators prefer single rather than double flowers (so varieties that have not been selected by plant breeders to have extra petals). Practically nothing is known, though, about the pollinator value of industrial estates, school grounds, allotments, graveyards and the many other habitats found in cities. Our preliminary data, from PhD studies run in the city of Bristol, suggest that some of these habitats can be remarkably good for pollinators, at least if they are managed in the right way. Then, still taking a network approach, we'll look at the potential effects of environmental change using an entirely new mathematical tool – one which combines data on the network of interactions that links pollinators to flowers, with data on 'meta-community ecology' – how the whole system of local pollination networks responds to species



extinction and species dispersal.

Finally, and crucially, we'll see what can be done to improve conditions for urban pollinators, running large-scale field experiments in each of our four cities to see if manipulating their food supplies can make the difference. By sowing 'nectar flower mixtures' we'll effectively create an urban version of the planted field margins on farmland, using plant mixes chosen to provide good food for pollinators whilst being low-maintenance and attractive to the human eye. Local conservation biologists will help us create bold experimental planting designs in each city, some of which we hope will become permanent features.

Our research will give conservation biologists the data they need to protect pollinators, and as they'll be collaborators on the project from day one our results can make a difference straight away. But the learning won't stop there. Our city field sites will let us showcase these important

creatures to a large proportion of the general public, and we'll work with local schools in each of the four cities too. And by using our data to understand the value of urban habitats, local authorities will be able to integrate pollinator conservation into the 9 per cent of land that urban areas cover in the UK.

When the project is over we will run a conference to spread the ethos, methods, results and recommendations of our research to the whole conservation community – the very people who can put what we've learned into practice. ■

#### FURTHER INFORMATION

Professor Jane Memmott is based in the School of Biological Sciences at the University of Bristol.

For more information on the Insect Pollinator Initiative and the projects running under it, see [www.bbsrc.ac.uk/pollinators/](http://www.bbsrc.ac.uk/pollinators/)