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The busy life of urban bees: a conservation opportunity

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ABSTRACT

Pollinating insects such as bees and hoverflies provide a vital service for many wild flowers and crops. However, there are growing concerns about their declines. Here I discuss findings from a study in four UK cities that shows which parts of cities are better for pollinators and how urban management can be changed to improve cities.

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Insects such as bees and hoverflies are important pollinators of many wild flowers and crop species. The global value of the services provided by pollinators for crop production is estimated at between US$235 billion and US$577 billion per year. There has been a lot of publicity over the last few years about the threats to pollinators and concerns about their declines. The major threats include climate change, intensification of farming methods, disease and changes in land use, including urbanisation.

There is increasing evidence to suggest that urban areas could be good places for some plants and animals, including pollinators. However urban areas are a complex mosaic of different land uses and habitats and previous studies of urban pollinators have not considered the entirety of different land uses present in towns and cities. In this study we present the first large-scale multi-city study of floral resources and pollinators in 360 sites incorporating all major land uses in four British cities (Bristol, Reading, Leeds and Edinburgh). We aimed to find out which places are good for pollinators in urban areas and to identify ways in which to improve urban areas for pollinator conservation.

We first mapped all land uses in each city and then sampled the following nine land uses for pollinators and flowers: allotments (equivalent to community gardens), residential gardens, cemeteries & churchyards, urban nature reserves, parks, road verges, other urban greenspaces, manmade surfaces, and pavements. We sampled each land use in ten sites in each city, giving 40 replicates per land use and a total of 360 sampling sites. Our surveys

were carried out along 100 m transect walks at each site, along which we sampled insects visiting flowers, and recorded the plant species they visited.

We recorded a total of 5,000 individual insects from nearly 350 different pollinator species visiting flowers from 326 plant species. The main groups of insects recorded were bees, hoverflies and non-syrphid Diptera (all flies except for hoverflies) which comprised 30%, 25% and 30% of flower visitors respectively. Our results suggest that allotments and gardens are good places for pollinators, particularly bees, with numbers of bees significantly higher in allotments and gardens compared to most other land uses. Numbers of hoverflies were similar in allotments, gardens, cemeteries, nature reserves and parks, although higher in allotments and gardens compared to other greenspaces, verges, and pavements. Numbers of other flies were similar across most of the land uses studied.

A key aspect of our analysis was developing a new modelling approach to test how different management strategies might affect the robustness of plant-pollinator communities in cities. Robustness is a measure of how a community responds to species loss; robust communities can withstand some extinction whereas species loss in more fragile communities leads to a cascade of other extinctions. Our model used networks built from the plant-pollinator interaction data collected in the 90 sites in each city and incorporated information on pollinator dispersal and switching between forage plants. We used our model to test the city-scale effect of increasing the area of different land uses and the effect of increasing the numbers of flowers.

We use our findings to make several recommendations that we hope practitioners, policymakers and the public will be able to implement, and which could help improve cities for people as well as pollinators.

Firstly, our robustness models showed that increasing the area of allotments is predicted to have a beneficial effect on the robustness of plant-pollinator communities at a city scale. Allotments are recognised as beneficial for human health and well-being so increasing their area would be a win-win for pollinators and people.

Secondly, while our study demonstrates that gardens are good for pollinators and comprise large areas of cities, we need to ensure that new developments contain gardens and improving the management of existing gardens with pollinators in mind could make this land-use even more important for pollinators.

Finally, parks, road verges and other greenspaces collectively comprise a similar area to that of gardens in cities (approximately a third of urban land area), yet we recorded far fewer pollinator flower visits. Our models predict that increasing the numbers of flowers in these land uses, potentially through reduced mowing (which could also save money), could have a real benefit for plant-pollinator communities in urban areas.

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