

Science for Environment Policy

Decline in bees and wasps linked to land-use changes

The declining number of bee and wasp species in England has been linked to historic changes in land-use in a recent study. Researchers say that policies which promote diverse landscapes offer more opportunities for bees and wasps to nest and forage and are best for conserving these insect pollinators.

Bees and wasps are key pollinators of wild plants and crops, with more than three quarters of the world's most important crops, such as oilseed rape, apples and strawberries, being reliant on animals for pollination. In Europe, as in many other parts of the world, insect pollinators are in serious decline. Reasons for this include [climate change](#), the introduction of invasive species, disease, pesticide use and changes to the landscape, particularly the expansion of intensive agriculture.

This study, which was funded by the UK Government's Insect Pollinator's Initiative¹ and also involved researchers part-funded by two EU projects, [STEP](#)² and [SCALES](#)³, explored whether changing land use was driving pollinator declines in England. It is the first study to use long-term historical data on both land use and pollinating insects, which allowed the researchers to link actual shifts in [land use](#) with the impact of these changes on the species richness and diversity of bees and wasps.

The earliest known land-cover maps of Britain from the 1930s have only been recently digitised. The researchers used these historic maps and the latest land-cover map (from 2007) to identify land-use changes at 14 sites, over two time periods, 1921–1950 and 1983–2012.

These data was compared with records from [the Bees, Wasps & Ants Recording Society \(BWARS\)](#) at each site. The researchers compared land-cover changes within each site, and the surrounding landscape at intervals of 1, 2, 5 and 10 km. They also looked at changes in the composition of bee and wasp communities — that is, changes in the number of different bee and wasp species at each site. The past history of land use may provide an explanation for any changes found in the patterns of these bee and wasp communities.

Eleven of the 14 sites showed a decline in the number of bee and wasp species over the past 80 years. Moreover, it appears changes in land use are driving these losses. The researchers found that the declining number of species and altered patterns of community composition were linked to both land-use changes within the site and in the wider landscape around the sites.

Sites near intensive crop farming expansion showed the greatest losses of bee and wasp species. These sites also showed the greatest changes in the pattern of bee and wasp species over time. This result supports other studies, which show that agricultural intensification, especially growing only one type of crop, has reduced numbers of insect pollinators. By contrast, sites where [urban](#) expansion had occurred showed smaller losses.

Sites which have seen a significant increase in arable expansion in the surrounding area lost more species compared with sites that did not. The researchers suggest these trends occur because bees and wasps only have a limited opportunity to forage in flowering crops, before the flowers are finished or the crop is harvested. Urban areas, with their numerous parks, gardens and churchyards, can supply bees and wasps with a diverse range of food and offer nesting habitats over a longer time period.

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1. Insect Pollinator Initiative (IPI) jointly funded by BBSRC, DEFRA, NERC, Scottish Government, Wellcome Trust and LWEC. Further information available at <https://wiki.ceh.ac.uk/display/ukipi/Home>

2. Status and Trends of European Pollinators (STEP) supported by the European Commission under the 7th Framework Programme.

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(continued)

The study also found that a mixed landscape, including woodland, heathland and grassland, offers bees more diverse foraging and nesting opportunities. This helps to increase numbers of bee and wasp species.

The researchers say their findings can help planners design land-management policies that encourage joined-up, landscape-scale schemes which will provide a diversity of habitats for these vital insect pollinators.



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3. *Securing the Conservation of biodiversity across Administrative Levels and spatial, temporal, and Ecological Scales (SCALES)* supported by the European Commission under the 7th Framework Programme.

