



The British bees: are wild bees disappearing across the UK?

The insects that pollinate the apples, which make the cider that gets sold to sustain a multi-million-pound business, are a kind of ecological glue. Take them away, and several bits of a system can start to fall apart. For example, flowering plants either stop producing seed and fruit, make much less of it, or change the quality of what they do produce.

When it comes to conserving the natural environment, this is important to understand. It is arguably even more so in relation to food (and drink) security. About two-thirds of the world's crop plant species rely on animal pollination, and to that extent bees, butterflies, beetles and all the other species that help plants to complete their life cycles ensure that we continue to eat.

The loss of pollinators has already emerged as a major challenge for farming.

While most species of flowering plant rely on animals (mostly insects) to move their pollen between flowers, some use the wind, including the grain-producing wheat, barley and maize that occupy much of our farmland. Even so, animal-pollinated crops, such as oilseed rape, apples, pears and strawberries, comprise about a fifth of the UK's total cropped area. Many pasture plants, such as clover, also rely on bees to reproduce, so there's some dependence on animal pollinators for livestock, too.

Since 1980 most British landscapes have seen a reduction in wild bee diversity. In line with the progressive homogenisation of our environment, those species that are specialists and dependent on particular kinds of habitat and/or food plants have fared worst. Many other insect pollinators are also known to be in decline, among them hoverflies and butterflies.

Behind all this has been the loss of habitats rich in wild flowers. Wild flowers are primarily found in semi-natural grasslands, mountains, moors and heathlands, woodlands and coastal margins, and in urban habitats such as parks, gardens and roadside verges. In all cases, there has been a decline in the quality of these ecosystems.

This is a problem for farming because the pool of pollinators supported by the plants in these places spills out into agricultural areas. Flower-rich wildlife habitats are not, therefore, only nice to look at and of ecological interest and value for their own sake: they are also an essential part of the 'green infrastructure', in this case underpinning national food security.



While pondering the dependence of many insects on wild flowers, it is important to remember that these wild flowers also depend on the insects. A high proportion of wild-flower species studied are pollination-limited.

This means that when there are no pollinators there are no seeds, over time fewer flowers, and then fewer pollinators.



In line with the reduction in bee diversity, animal-pollinated plants have declined in the UK more than self- or wind-pollinated species. For example, some 76% of the plant species favoured by bumblebees for gathering the nectar and pollen they need have decreased in frequency. Decline in particular kinds of plant that have lost their pollinators can also lead to the decline of species dependent on their leaves, seeds and fruits for food. Changes in plant communities can then cause knock-on impacts on soil health, water quality and pest regulation, with disruption to pollinators leading to a spiral of decline in an entire system

Behind all this has been the loss of habitats rich in wild flowers. Wild flowers are primarily found in semi-natural grasslands, Jeff Ollerton of the University of Northampton is an expert in pollination and its role in ecosystems. "About 75% of our native plants require insects as pollinators," he says. "If we didn't have the insects to pollinate them, then our populations of native wild flowers would eventually die out." And it's not just little plants that have this dependency: about 60% of our trees are insect-pollinated.

The loss of semi-natural habitats across the UK since the mid-20th century has been an important factor behind pollinator loss. Ploughing of meadows, clearance of woodlands, drainage of wetlands and removal of hedgerows are among the changes that have caused it. Most of these losses are down to changed farming practices, backed over decades with tens of billions of pounds-worth of tax-funded subsidies



Ollerton says a number of pollinators are already lost. “Twenty-three species of bees and flower-visiting wasps have gone extinct in Britain since about 1850. This maps very closely against the large-scale changes in agriculture.” The distribution of many other species has changed markedly. “We’ve got about 250 species of bee that are native. A significant proportion of those have declined in relation to distribution. We’ve got some bumblebees, for example, that were once widespread, which are now being pushed up into the Scottish highlands and islands and out towards Wales.”

This decline in diversity leaves farming more vulnerable. “If all of our pollination is reliant upon just a small number of species and something happens to those species, then there’s nothing to fill that gap. That’s one of the values of diverse insect populations – a sort of insurance policy.”

The changes in farming practices have been profound, he adds. “In the 19th century, set-aside was very common: farmers would leave a field to go fallow, or maybe sow a crop of something like red clover and then dig it in to build up the fertility of the soil. By the 20th century, when inorganic nitrogen fertilisers started to be produced, suddenly there was no need to have those fallow periods or to use clovers – and so farmers could intensify production and use fields all year around. Therefore that fallow field, that habitat, that resource to be used by pollinators has disappeared. That was a massive landscape-level change.”

In the wake of the virtual disappearance of semi-natural grasslands, the extinction of wild honeybees, decline in bumblebees, beetles, butterflies and others, some assume that domesticated honeybees will fill the gap. Here, too, there is cause for concern. For a start, there are far fewer hives. The high point was in 1949, when in England there were 87,000 beekeepers and 465,000 colonies. The post-war popularity of beekeeping was less to do with pollination and more about sugar rationing. When rationing was lifted in 1953, beekeeping for honey became less necessary and by 1970 the number of beekeepers in England and Wales had dropped to about 32,000, running about 158,000 colonies between them.

Beekeeping has since become more popular again, in part because of growing awareness about the loss of wild pollinators. It is estimated that during 2009 there were 40,000 beekeepers and 200,000 colonies, including approximately 300 commercial beekeepers managing between them 40,000 colonies.

The recent rise in beekeeping has, however, been accompanied by a rise in bee colony collapse, a process leading to the death of a hive. Some cases are linked to the parasitic Varroa mite that infests hives and increases the bees' susceptibility to harmful diseases.



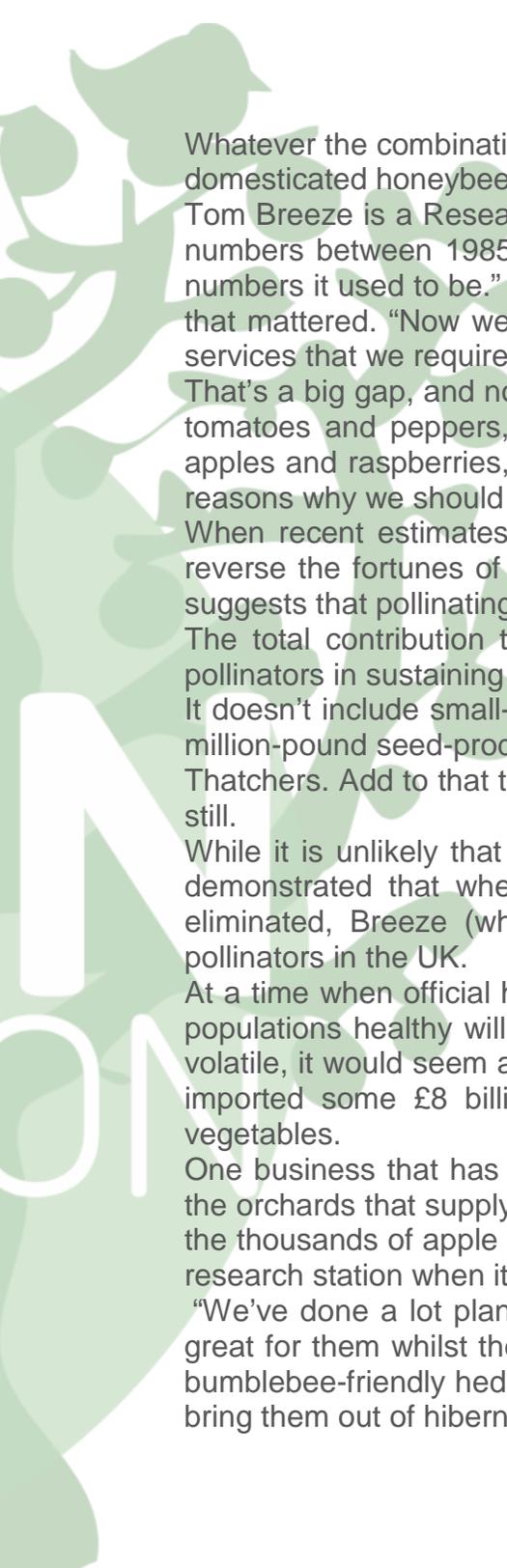
On top of this are the effects of pesticides. Around 31,000 tonnes of chemicals are used in farming in the UK each year to kill weeds and insects and other pests that attack crops. There is surprisingly little control over how these chemicals are used (in the non-organic sector at least) or in what quantities and combinations. These chemicals affect both wild and domesticated pollinators and include consequences that range from death to changed behaviour and increased susceptibility to disease. In recent years there has been controversy over the role in both wild and domesticated bee decline of a class of pesticides called neonicotinoids. Designed to affect the central nervous system of insects, these substances cause behaviour change, paralysis and death.

In experiments that exposed bumblebees to a widely used neonicotinoid substance called imidacloprid at a level the insects would experience in visiting a field of treated oilseed rape plants, the insects were found to forage less effectively, colony size shrank by about 10% and, most worrying, they lost almost all their ability to produce queens. Queens are the only bumblebee colony members to live over winter, and without them new groups can't be founded in the spring.

Evidence like this led the European Commission in 2013 to propose temporary bans on three neonicotinoid products. While most European member states backed the move, the UK, backed by pesticide companies, including Syngenta and Bayer CropScience, waged a ferocious campaign to keep them in circulation. Sales of neonicotinoid pesticides earn millions of pounds for the companies that make them and in so doing generate tax receipts, and it seems that for reasons of economy the British government saw taking risks with ecology as more desirable than a temporary restriction on one part of one business sector.

Despite the best efforts of the companies and the UK government, the European Commission's proposals prevailed, and some neonicotinoid chemicals were temporarily taken out of use. It will be fascinating to see what happens to bee populations, although with a suspension of just two years it might be difficult to detect effects.

On top of habitat loss and the effects of chemicals are overlaid the consequences of climate change. This could, for example, lead to wetter conditions over extended periods (as was the case in the summer of 2012), in turn hampering the ability of honeybees to forage and causing dampness in hives, thereby increasing the risk of fungal infections. Wild species will be affected too, with some bumblebee decline in the UK already attributed to climatic shifts.



Whatever the combination of reasons for wild pollinator decline and the collapse of honeybee colonies, there's no doubt that domesticated honeybees play a considerably smaller role in providing pollination services than wild species.

Tom Breeze is a Research Fellow at the University of Reading. "In the case of honeybees there was a 54% drop in colony numbers between 1985 and 2008," he says. "Although beekeeping has enjoyed a resurgence, it's still nowhere near the numbers it used to be." It used to be assumed that whilst other species could pollinate crops, honeybees were the only ones that mattered. "Now we know that even under the most generous assumptions they provide only a third of the pollination services that we require. Other species are definitely filling the gap."

That's a big gap, and no matter how many honeybee hives are established to fill it, for certain crops, including strawberries, tomatoes and peppers, it won't help, because bumblebees are their main pollinators. For others, including field beans, apples and raspberries, honeybees are not as effective pollinators as wild insects. There are, therefore, plenty of practical reasons why we should be concerned about the ongoing decline of natural pollinators.

When recent estimates of the economic contribution made by pollinators are taken into account, the case for action to reverse the fortunes of the wild ones becomes even more compelling. One figure, based on UK crop production in 2007, suggests that pollinating insects provided services that underpinned crops with a market value of about £430 million.

The total contribution to the economy is even bigger, however. That figure doesn't, for example, include the value of pollinators in sustaining forage crops, such as the clovers that support livestock and thus much of the meat and dairy sector. It doesn't include small-scale food growing, as in allotments and gardens, ornamental flower production, or the UK's multi-million-pound seed-producing business. It also doesn't include the value added to the wider supply chains of companies like Thatchers. Add to that the contribution that wild flowers and insect-pollinated trees make to our quality of life, and it's bigger still.

While it is unlikely that we'll imminently see a total collapse in the services provided by pollinators, several studies have demonstrated that when they become locally depleted, reduced crop yield and quality can result. Should they all be eliminated, Breeze (who calculated that £430 million figure) says it would cost around £1.8 billion to replace insect pollinators in the UK.

At a time when official health advice recommends a higher proportion of fruit and vegetables in our diet, keeping pollinator populations healthy will need to be part of the same policy. And when food price fluctuation is expected to become more volatile, it would seem an intelligent choice to maintain our capacity to grow as much of our own as we can. Yet in 2012 we imported some £8 billion-worth of fruit and vegetables, producing only 12% of our own fruit and just over half our vegetables.

One business that has understood the commercial relationship between pollinators and profit is Thatchers Cider. I visited the orchards that supply the company, with Martin Thatcher, William Thatcher's great-grandson. We walked among some of the thousands of apple trees, including an orchard with 458 varieties of apple salvaged from the government's Long Ashton research station when its funding was axed. "A living library", he calls it.

"We've done a lot planting of wild-flower seeds – says Thatcher - because the thing about bumblebees is that whilst it's great for them whilst the blossom is out, they need a sustained food source throughout the year." Another step is planting bumblebee-friendly hedges. "They like the north side of hedges because on a hot day in spring if they're facing south it can bring them out of hibernation too early."

The philosophy that underpins this pollinator-friendly approach is entirely practical. “We’re keen to work Nature into the equation and give it every chance to succeed,” Martin says. “If you use too many chemicals it just doesn’t make sense, either environmentally or financially. You’re just creating a problem for the future. What we’re trying to do is to keep Nature on our side.”

This is an edited extract from his new book *What Nature Does for Britain*, published by Profile Books. Tony Juniper is a former director of Friends of the Earth and is a Resurgence Trustee

