
Bee conservation: A call for coherence, cohesion and co-operation

Conservation actions for different groups of bees would be improved if a more coherent, scale-aware approach is taken amongst organisations concerned with bees.

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A pollination crisis? From awareness to action

The media regularly report scare stories about large-scale declines in bee populations, commentaries on the causes of these declines (generally reduced to pesticides, diseases and habitat loss) and the consequences for our food security; as well as a few encouraging articles on how people can help by planting wild flowers in their gardens. There have been several recent TV shows on bees, most recently the BBC 2 series 'Bees, Butterflies and Blooms' which explored a variety of issues around declining populations of insect pollinators like bees and butterflies, and encouraged local communities to change their gardening habits and manage village landscapes to better support these species. The RSBP and other wildlife organisations have broadened their remit to include insect pollinators, for example by selling 'minibug houses' and providing advice for gardeners on insect habitats. The UK government has provided £10m over 5 years to set up the Insect Pollinator Initiative¹, a series of research projects into many aspects of insect pollinator populations. There has been a huge upsurge in membership of beekeeping organisations, and growing interest in bee-specific conservation organisations like the Bumblebee Conservation Trust.

Insect pollinator population decline is a complex subject – there are many factors involved, ranging from impacts of new pests and diseases, through changes in land use and agricultural policy, all the way to international trade in vegetables and fruit, via issues of pesticides, public awareness and ecosystem service provision.

The current energy and enthusiasm for supporting, researching and conserving the many species of bee in the UK should be harnessed into a more coherent approach to bee conservation, which would allow the numerous and diverse groups involved with bees to act together, sharing resources and expertise. Each species or group of bee pollinators should be both considered separately and collectively, as representatives of a rich pollinator community, rather than being considered in isolation as often happens now. What affects one species will affect many others in the same way, but the degree of impact will vary depending on the type of bee and the scale at which threats or problems are being considered. Whilst honeybees and bumblebees often dominate discussions of the so-called pollination crisis², this may overshadow the

plight of the many other species of bee pollinator, often of solitary habit, which are arguably a much greater cause for conservation concern for both their high sensitivity to environmental change and their importance as pollinators.

The value of bee pollinators

Around 70% of the world's crops are in some way reliant on the action of insect pollinators³, which represents around 35% of global production in terms of yield.⁴ In the UK, insect-pollinated crops take up around 20% of arable land, which represents 19% of total farm-gate crop value.⁵ The value of honey bee pollination in the UK alone is valued at around £200m annually⁶, although current estimates of honeybee populations suggest that these insects are only capable of ensuring pollination services to 34.1% of the UK's flowering crops.⁵ Furthermore, in some agro-ecosystems such as apple orchards, honeybees may not be the most effective bee pollinator in terms of single visit pollen contributions⁷ and so, the importance of other bee taxa such as bumblebees and solitary bees, as well as insects from



Female *Bombus lapidarius*
on a *Phacelia* flower



A female *Andrena haemorrhoa*
on apple blossom

other orders e.g. Syrphid flies, must be considered in discussions of insect pollinator conservation and ecosystem service delivery. However, having said this, whilst honey bees may not be as efficient as other pollinating insects when compared per visit, the absolute number of foragers can readily compensate for any inefficiency.⁸

Yet, no one species or taxonomic group is universally the best pollinator and a multitude of studies from agro-ecosystems across the globe have highlighted how diverse pollinator communities (including managed species) may provide more effective pollination services that are more robust to the consequences of local extinction and environmental stochasticity than species-poor assemblages.⁹

Issues: the importance of scale

Possibly the most important issue affecting all insect pollinators is habitat loss, specifically changes in the spatial configuration of resources like forage and nesting sites in both managed and unmanaged ecosystems. All bees require access to pollen and nectar from flowers to raise young and sustain adults, and the abundance and diversity of both solitary bees¹⁰ and bumblebees¹¹ is strongly determined by nest resource availability, although this is not applicable to honey bees.

Changes in the spatial distribution of these resources, through changes in land use and management practise have differential effects on the various guilds of bee pollinator (Table 1). Solitary bees tend to be more sensitive to even small changes in resource availability, due to their often limited foraging range (in terms of both distance and feeding niche).¹² Eusocial and pseudo-social bees tend to respond

Bee Group	Behaviour	Lack of Nesting Resources		Lack of Forage	
		Local	Landscape	Local	Landscape
Honeybees	Eusocial	—	—	→	↘
Bumblebees	Pseudo-social	→	↓	→	↓
Solitary bees	Asocial*	↓	↓	↓	↓

*some solitary bees live in nest aggregations

to land use change at larger scales and are seemingly less affected by small scale changes in resource availability.¹³

The crop protection industry has been cited as one of the major causes of insect pollinator declines. Recently focus has been on the negative effects of honey bee exposure to the neonicotinoid group of pesticides, such as imidacloprid, commonly used in oil seed rape and sunflower crops. The different bee taxa vary in their susceptibility to agrochemicals: solitary bees are the most vulnerable to the effects of agrochemicals, honey bees are less sensitive due to their more effective detoxifying adaptations¹⁴ and life history traits¹⁵ and bumblebees, having a greater body mass than solitary bees, benefit from an increased ability to tolerate lesser exposures.¹⁶

A call for coherence in bee conservation

There are a huge number of stakeholders involved with bees. The motivations of these stakeholders vary: some are interested in the current availability of funding for conservation activities related to bees and other insect pollinators, others are dedicated to particular species or groups of bees, yet more are motivated by a desire to broaden their attractiveness as organisations. Just within the world of beekeeping, which focuses on one species, there are dozens of specialist groups (e.g. focussing on bee improvement, ‘natural’ beekeeping, beekeeper education) all of whom are fundamentally working towards supporting honey bee populations, but from many different, occasionally incompatible directions.

Bee conservation needs greater coherence at both landscape and local scales, especially when management measures are being discussed (Table 2). Whilst most landscape-scale measures implemented to assist insect pollinators are likely to benefit all species to an extent, increasing the density of honey bees indefinitely can be problematic, especially in terms of disease transmission and competition for resources. Likewise, local-scale, intensive management efforts for solitary bees to

improve their access to forage and nesting resources, whilst likely to also benefit bumblebees to an extent, are different to the requirements for intensive management of honey bees which generally involves disease and pest management. However, each

Bee Group	Management policy	
	Intensive	Extensive
Honeybees	↑	↓
Bumblebees	→	↑
Solitary bees	↑	↑

management measure adopted does depend on other activities also aimed at protecting or assisting insect pollinators – there is little point in creating solitary bee nesting habitat if the surrounding habitat is regularly sprayed with agrochemicals. Ensuring that effort expended to conserve bees in one way is not undermined through lack of communication or poor planning is vital if conservationists are to have a significant impact in the battle to reverse the declines witnessed across taxa and entire regions.¹⁷

Thus, the major challenge for bee conservation is for effective coordination amongst all the various stakeholders. The recently formed Healthy Bees Plan¹⁸ brings together the commercial and parts of the hobby beekeeping communities with the government bodies responsible for honey bees (the National Bee Unit and FERA). Although the HBP looks at one species, its success in creating a place for creative and constructive discussion between very different stakeholder groups about the future of honey bees in the UK suggests that there might be appetite within the wider insect pollinator stakeholder pool for something similar.

In order to conserve the diverse array of bees and other insect pollinators, and the ecosystem services they provide, we need a reciprocal diversity in academic research effort, government policy and funding, and enthusiasm of specialist groups, with a willingness to engage with each other.



Honey bee (*Apis mellifera*) drinking spilt nectar outside a hive

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