Insect Pollinators and Policy

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Approximately 75% of the world's crops need to be pollinated by insects and insect pollinated crops are thought to be worth £690 million per year in the UK [1, 5]. However, pollinator numbers are in decline. Pollination is the process of pollen being transferred to the female reproductive organs of a plant and fertilisation taking place. The term pollinator means an animal which moves the male pollen from the male anther of one flower to the female stigma of another flower. Insect pollinators include bees, wasps and ants, and both wild and domesticated insects such as honeybees make vital contributions to pollination. The decline of both threatens food security [6]. Insects pollinate plants for a reward, usually for nectar (a sugary solution), or the pollen itself can be used as a food reward. For many crops, cross-pollination by insects is vital for fruit set. Thus, the preservation of pollinators in the UK is of key importance. This piece will examine the policy in place to protect pollinators and the evidence collected by scientists to determine whether pollinator policy has been effective. Although government commitment to biodiversity is strong in the UK, patchy legislation means that this commitment may not translate into protection for pollinators.

There are many drivers of pollinator decline, however one of the main drivers is agriculture and intensification of land use. For example, 97% of wildflower meadows in the UK have been lost since the 1930s [4]. Agrochemical use is also a key issue. Evidence is building that neonicotinoids, water-soluble pesticides which are put on the coats of seeds, are contributing to pollinator decline [8]. Furthermore intensified growth of insect-pollinated crops means intensification of pollinator numbers are necessary. This has led to managed pollinators being moved around, which means pollinator disease is also being moved around. Yet maintaining pollinator health is a key policy issue and of economic value to countries worldwide. An example of loss of insect pollinators having a detrimental effect on a local community is evidenced by the 'apple valley' in South West China. Pesticide spraying (eight times per season for four decades) and habitat loss led to a loss of the insects required to cross-pollinate apples. Humans had to do the job of pollination instead, and one human could only pollinate 5-10 trees per day. By 2001 all of the apples in the valley were hand pollinated. Many farmers had to turn to self pollinating varieties such as plums instead; this is a problem for apple orchards worldwide. Therefore pollinator decline is a very real threat to food security both in the UK and worldwide.

The UK is legally committed to protecting biodiversity and pollination. The government's commitment to pollinators is exemplified in 'The National Pollinator Strategy: for bees and other pollinators in England' (November, 2014) [9]. Public support in the UK for pollinators has helped influence the government to put legislation into place. Public UK charities such as The Bumblebee Conservation Trust (BBCT), were established because of serious concerns about the plight of the bumblebee. The BBCT organises pollinator initiatives, and collects citizen science data

to help inform policy such as that by Dicks et al. [3]. Another UK charity, 'Buglife', is the only organisation in Europe which is devoted to the conservation of all invertebrates. It also produces policy and legislation summaries, and is helping to implement the National Pollinator Initiative (2014) [9]. 'B-lines' are a series of insect corridors across England, Scotland and Wales. These are being executed by liaising with land owners, conservation partners, businesses and local authorities to help fill mapped areas with restored and new wildflower rich habitat. Monitoring of initiatives such as 'B-lines' are important to determine their efficacy, and citizen science can be a very useful part of this. The inclusion of 'monitoring pollinator numbers' on the POSTnote (summaries of topical policy issues produced by the Parliamentary Office of Science and Technology (POST) for parliamentary use) longlist which lists topics of upcoming importance to parliament shows that the government is still serious about maintaining pollinator numbers. There are signs that policy to restore habitats (planting of flowering hedgerows, meadows or flower strips under agri-environment schemes) is having a positive effect. Carvell et al. showed that bumble bee family lineage survival is enhanced by 'high quality landscapes' [2]. This could be considered the first study to conclusively show that policy encouraging farmers to leave strips of land for pollinators is beneficial, and can further inform future policy decisions.

Despite the strong public and political support for pollinators in the UK, there are criticisms that legal protection for pollinators in the UK is patchy and incomplete. The Wildlife and Countryside Act (1981), currently protects 25 butterflies and 8 moths, but no wasp, bee or hoverfly species. As a requirement of the 2006 NERC Act, other pollinators were put on the list, but it is debatable whether this provides adequate legal protection. For instance in England the Act only requires public bodies to have regard for conservation of the species on the list, but does not require any action to be taken. Membership of the EU has had positive effects for invertebrates with the Habitats Directive, EU Red List and Water Framework Directive. Yet the UK government has not always complied with EU legislation, and has been taken to the courts multiple times for failing to implement environmental protection measures. How 'Brexit' will affect pollinators remains to be seen. Given it is unclear the relationship the UK will have with the EU after 'Brexit', the impacts on pollinators cannot be currently determined. However with continued public support, it is hoped that the UK can lead a positive example in how to protect pollinators.

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Whilst there are guidelines to protect pollinators, legislation is not uniformly implemented across the globe. Internationally, the UK is a signatory of the legally binding convention on biodiversity, first signed in Rio de Janeiro 1992, and re-pledged in Japan in 2010 when the 'Aichi targets' were formed. However is the UK meeting these targets? As of 2013, 30% UK ecosystem services (which include pollination), were failing. Often guidelines are set, for example the International Code of Conduct on Pesticide Management (ICCPM) and not adhered to [7]. The good news is that there are strong political commitments to support pollinators from the United States, United Kingdom and France. The first Intergovernmental Science-Policy platform on Biodiversity and Ecosystem services (IPBES) assessed knowledge on pollinators and pollination. It found evidence

of large-scale wild pollinator declines in northwest Europe and North America, with a bias for data collection in these areas. There is therefore a lack of data from other areas of the world [7]. The publication by researchers of 'Ten policies for pollinators', outlines ten ways we can implement this change. These recommendations include raising pesticide regulatory standards, regulating movement of managed pollinators and developing long-term monitoring of pollinators and pollination [3]. Continuing funding research on pollinator behaviour and plant pollinator interactions to allow us to fully understand drivers of pollinator decline is integral to stemming pollinator decline.

To conclude, with continued public support, and government commitments we can hope that stronger policies will be implemented to both protect pollinators and fund long-term scientific research into pollinator behaviour and monitoring of pollinator numbers to determine whether policies designed to protect pollinators are having a positive effect. To quote Dave Goulson 'Bees and other wild pollinators are fascinating, beautiful, and vital to our food production. They have pollinated our crops for millennia; now it's time for us to return the favour' (Dave Goulson, 2014) [9].

References

[1] Breeze et al., 2010. Pollination services in the UK: How important are honey bees? Agriculture, Ecosystems and Environment. 142(3), 137–143.

[2] Carvel et al. 2017. Bumblebee family lineage survival is enhanced in high quality landscapes. Nature. 543, 547–549.

[3] Dicks et al. 2015. How much flower-rich habitat is enough for wild pollinators? Answering a key policy question with incomplete knowledge. Ecological Entomology.

[4] Fuller, 1978.The extent and conservation interest of lowland grasslands in England and Wales: a review of grassland surveys 1930–1984. Biological conservation. 40, 281–300.

[5] Klein et al., 2007. Importance of pollinators in changing landscapes for world crops. Proceedings. Biological sciences / The Royal Society, 274(1608), pp.303–13.

[6] Potts et al., 2010. Global pollinator declines: trends, impacts and drivers. Trends in Ecology and Evolution. 25 (6), 345–353.

[7] Policies for pollinators. 2015. The Need for Government Leadership in backing England's bees. The Bee Coalition.

[8] Rundlo et al., 2015. Seed coating with a neonicotinoid insecticide negatively affects wild bees. Nature. 521,77–80.

[9] The National Pollinator Strategy: for bees and other pollinators in England. DEFRA policy paper, November 2014.

About the Author

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