

THE EXTINCTION OF BEES THREATENING FOOD SECURITY HOW CAN CITIES CONTRIBUTE?

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WHY IS IT IMPORTANT?

There are around 20 000 described species of bees across 7 recognised families. They have an essential role of pollination of a wide range of flowering plant species, alongside other pollinators – butterflies and moths comprise over 140 000 species, for instance – even though bees represent the most efficient group of pollinators.

Through their pollination activities, bees help in sustaining ecosystems. Wild and managed bees help pollinating wild plants in natural and managed ecosystems that provide a wide range of services – water cycle regulation, carbon sequestration and essential food and crop production... Bee-pollinated plants provide food for wildlife as well as for people - **35% of the world's food production relies on pollinators insects and upon the 100 vegetal species that provide 90% of the food worldwide, 71 rely on bees for their pollination.** They also provide resources for people, like timber, by ensuring thriving forests. Bees' decline has an impact on the strenght and sustainability of ecosystems as well as on the livelihoods of the communities relying on these ecosystems.

Cities can help in protecting habitat loss and slow down the extinction of bees by conserving habitats and by creating pesticide free areas.

Today, managed honeybees and wild bees' populations are declining in Europe and North America, and likely elsewhere. Nevertheless, we are lacking data regarding the conservation status of bees. Only 483 bee species have been assessed by the IUCN, most of which were data deficient. Also, the European Red List assessment of 1 965 species of European bees found that 9.2% were threatened, whilst insufficient data were available to assess the conservation status of nearly 57% of European species, many of these might also be threatened.



RESTORATION OF HABITATS FOR BEES: GOOD PRACTICES IN URBAN SETTINGS

Bees are widely threatened by habitat loss due to deforestation, agricultural expansion and intensification (pesticides), industrialisation and urbanization. As of 2022, the literature on the topic tends to conclude that deforestation and agricultural intensification are the main drivers of insects' decline, including bees.

Habitat loss can be addressed by cities with protected areas, or again, urban redesign, to incorporate safe places for bees to thrive.

PROTECTED AREAS IN CITIES: THE EXAMPLES OF GERMANY, SPAIN AND PORTUGAL

Approximately 50% of the metropolitan area of Freiburg (Germany) is protected and subject to strict land use management. In Spain, the green belt of Vitoria-Gasteiz, managed by the city's administration, integrates the Salburua Wetlands, a site that is part of the Natura 2000 network. 1/3 of the municipal area of Cascais' (Portugal) is part of the Sintra Natural Park, which is part of the Natura 2000 network as well. This protection is coupled with awareness-raising activities, like hikes and/or visits to local beekeepers, organized by the municipality.

SEEDS FOR NECTAR DENSITY PLANT SEEDS: BARCELONA'S INITIATIVE

In 2016, the municipality of Barcelona initiated a project that led to the restoration of the hives surrounding 1,460 urban trees. Mix of high-nectar-density plant seeds have been planted, which provided additional food and habitat for pollinators.

BEES AS AIR QUALITY SENSORS, THE EXAMPLE OF GPC IN GUADELOUPE

The Guadeloupe Port Caraibes (Guadeloupe, France), is using bees as an air and environment quality sensor. Bees are indeed a good indicator of the quality of the environment - their foraging activity puts them in contact with a large number of pollutants within a radius that generally varies from 1.5 km to 3 km around the hive. 4 hives have been set up. This collaboration between human communities and bees leads to a win-win situation where bees see their habitat increased while it is benefiting human populations.

As agriculture intensification is one of the main drivers of bees' decline, they are largely affected by pesticide/insecticide use, whether they are lethal or not - bees can be stressed, disoriented, immunocompromised by nonlethal insecticide exposure.

"In Belgium, the United Kingdom, Germany, and the Netherlands, 40-70% of their respective land areas are used for agriculture — and as such, chances for drift of pesticides into preserves and adjacent lands and waters are greatly heightened." [1]

In cities, it can be efficiently addressed by strict regulations on urban agriculture and urban green areas.

PESTICIDES REGULATIONS IN STRASBOURG, FRANCE

Strasbourg (France) is an important promoter of urban agriculture as well as a pioneer of the Pesticides Free Towns network. The city has implemented the **Zero Pesticides Initiative** in 2008, banning the use of pesticides in public areas (parks, gardens, sport fields...). The city now relies on alternatives that vary depending on the plants. These new practices can include the use of boiling water to kill certain plant species, the use of natural pesticides or manual and selective weeding. This has been coupled with awareness campaigns to provide citizens with pollinator-friendly techniques in their own gardens. The city also collaborates with gardening centres that are committed to switch from harmful pesticides to organic products.

Pollinators can also suffer from the proliferation of parasites and invasive species - especially on islands where invasive species can disrupt or even overrun whole communities.

"(...) exotic plants can diminish insect herbivore loads by more than 90%, which, in turn, negatively affects birds and other insectivore" [2]

In Europe, bees are particularly affected by the Asian Hornet. The city of Vitoria-Gasteiz in Spain provides an example of what can be done by municipalities to prevent the expansion of this invasive species.

IN SPAIN, THE CONTROL OF INVASIVE INSECTS SPECIES

In Vitoria-Gasteiz, the municipality has implemented an action based on two steps:

- The identification and capture of hibernating queens in early spring with the use of bait (financed by the regional government),
- And the removal of nests once the queen has settled and produced a colony (financed by the municipality). This is done by local firefighters (responsible for 90% of nest removal) with some support from local citizens - citizens that spot (and correctly identify) a nest of Asian Hornet are expected to warn firefighters who will then proceed to eliminate.

The process remains admittedly costly, complementary measures need to be found

Bees struggle with the lack of availability and diversity of forage as well as, overall, changes in land use.

Overall, the changes implied by industrialization have led to less nature-friendly conditions for insects in general. Cities can have a role in providing such areas/spaces to insects, including bees which play an important role in ecosystems and food safety.





RESOURCES:

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LAND USE OPTIMIZATION IN SCOTLAND AND IN BELGIUM

In Edinburgh, the city is using meadows in which native and non-native plants co-exist to increase the attractiveness of the ecosystem. Therefore, the landscape is improved for citizens and offers a good source of food and shelter for a variety of pollinating species.

In Genk, Heempark has been created jointly by the local authority and local community groups. The idea emerged from a consultation about turning unused agricultural land into a public park, the site became a community-driven nature and sustainability park with a strong focus on pollinators.

Globally, bees are also threatened by climate change - temperature, variable weather patterns, extreme weather patterns, water stress and droughts... on which municipalities can have an impact by implementing climate mitigation measures.

All the stressors mentioned above have complex interactions between them.

Also, there is a broad literature on the interactions between native wild bees and introduced domesticated bees there is evidence of competition for forage and nesting resources, disruption of native plant-pollinator networks, and potential for viral disease transmission between species'. This has to be taken into account while thinking initiatives to protect pollinators.

Overall, there is an increased awareness of public towards the conservation of bees and pollinators more broadly which provides opportunities for conservation and support pro-pollinator initiatives in land management, notably urban greening. Education and research are fundamental in protecting pollinators, including bees.

BROWNFIELD RESEARCH AND DATA BASES IN THE UK

In the UK, a partnership between BugLife and Natural England is working on the development of an inventory of high quality brownfields for urban planners. These unused urban spaces often suffer from soil contamination, but when possible they can efficiently be converted into meadows. This database is an essential tool for urban planners, and globally, to easily integrate pollinators protection into urban settings.

The situation has become urgent to protect pollinators in order to preserve ecosystems, crops and ensure food security.

[1]. Wagner, D. 2020, 'Insect Declines in the Anthropocene', *Annual Review of Entomology*, Vol.65, pp.457-480. <https://doi.org/10.1146/annurev-ento-011019-025151>. P.465

[2]. *Ibid*, p.467