

Save the Bees: How Internationally Synced Conservation Initiatives Within the European Union Can Help Ensure a Sustainable Trajectory for the Future of the Biosphere



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Executive Summary

Bees act as the spine for not just the planetary biosphere – but for ensuring food security globally through their invaluable ecosystem services. However, in recent years there has been a continuous and rapid decline in colony numbers worldwide, largely due to various anthropogenic activities such as fertilizer use and biodiversity loss. Bees have been found to contribute towards 15 of the 17 SDGs, and a minimum of 30 targets, reinforcing how paramount conservation of this species is in achieving sustainable development. Current EU legislation addresses the urgent need for pollinator protection laws, however due to a lack of international synchronicity, funding and proper reinforcement of laws, bee numbers are still continuing to decline. Immediate action must be taken in order to stabilise bee colony numbers to ensure a sustainable trajectory for the future of our biosphere, starting with a complete ban on all neonicotinoid use within the EU. Not only will this reduce CCD within bee communities but allow for increased biodiversity and the chance for bees to repopulate. In addition to this, reallocation of CAP funding into ecological farming accompanied with education for farmers regarding sustainable farming alternatives play a crucial role in reforming the currently destructive agricultural industry in attempt to help stabilise bee colony numbers for the future.

Foundational Science:

Discussion and Analysis

Honeybees – wild and domestic - perform approximately 80% of all pollination worldwide, with a single bee colony able to pollinate 300 million flowers each day¹. The role of bees in global crop production is currently valued at \$577 billion, however in the past 15 years regions globally have been seeing a continuous decline in bee colonies with losses as high as 90%² referred to as “colony collapse disorder” (CCD)³. As a keystone species, bees play an invaluable role in our biosphere, whilst simultaneously providing us with a range of ecosystem services that contribute to the wellbeing of people and help maintain the planets life support systems⁴. Recent research suggests that bees contribute towards 15 of the 17 SDGs, and a minimum of 30 SDG targets⁵, reinforcing the need for a collectively clearer understanding of bee contributions in the path to sustainable development. See Table 1, where 30 targets have been identified through a range of direct and indirect connections between bees, people, and the planet.

The main drivers in bee decline include but are not restricted to - land use changes, habitat fragmentation, climate change, use of fertilizers and biodiversity loss⁶. Additionally, with industrialisation constantly on the rise, areas of natural habitat are increasingly being converted into roads and developments, limiting bees’ access to forage resources. The nature of the problem makes it complex, but not impenetrable. Anthropogenic activities such as pesticides and land use change are arguably the 2 most prominent players in the decline of bees, with biologists finding more than 150 different chemical residues in

¹ Greenpeace, “Save the Bees,” Greenpeace USA, 2015, <https://www.greenpeace.org/usa/sustainable-agriculture/save-the-bees/>.

² Earth Day Network, “EARTH DAY NETWORK ® 42 Protect Our Species Primer and Action Toolkit” (n.d.), <https://www.earthday.org/wp-content/uploads/species/bees.pdf>.

³ US EPA, OCSPP OPP 2018

⁴ Vidushi Patel et al., “Why Bees Are Critical for Achieving Sustainable Development,” *Ambio*, April 20, 2020, <https://doi.org/10.1007/s13280-020-01333-9>, Gill et al. 2016; Matias et al. 2017

⁵ Vidushi Patel et al., “Why Bees Are Critical for Achieving Sustainable Development,” *Ambio*, April 20, 2020, <https://doi.org/10.1007/s13280-020-01333-9>.

⁶ Earth Day Network, “EARTH DAY NETWORK ® 42 Protect Our Species Primer and Action Toolkit” (n.d.), <https://www.earthday.org/wp-content/uploads/species/bees.pdf>.

bee pollen⁷, indicating the extent of disruptive human activity on the natural biosphere.

IPBES also recently reported agriculture as a major driver of wild pollinator decline⁸.

In January 2013, the European Food Safety Authority reported that three neonicotinoid class insecticides weakened the bees' immune system. The bees pick up the chemicals through dust and residue on nectar and pollen, before bringing the poison back to the hive (see figure 1). Repeated exposure to many of these pesticides also severely weakens the health of the bee colony, making them more susceptible to parasites⁹. The chemicals include clothianidin, imidacloprid and thiamethoxam¹⁰. This class of insecticides was banned in Europe entirely in 2018¹¹ yet continues to be used in other countries around the world today. The termination of the use of these pesticides in agriculture is essential in stabilising the bee community.



Figure 1: A bee in the process of collecting pollen.

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⁷ Greenpeace, "Save the Bees," Greenpeace USA, 2015, <https://www.greenpeace.org/usa/sustainable-agriculture/save-the-bees/>. Eric Mussen Uni of California

⁸ IUCN, "Pollinators in Europe," IUCN, January 31, 2020, <https://www.iucn.org/regions/europe/our-work/biodiversity-conservation/pollinators-europe>.

⁹ Earth Day Network, "EARTH DAY NETWORK @ 42 Protect Our Species Primer and Action Toolkit" (, n.d.), <https://www.earthday.org/wp-content/uploads/species/bees.pdf>.

Full Bio Follow LinkedIn Kimberly Amadeo is an expert on U.S et al., "How Much Does Colony Collapse Disorder Increase Food Prices?," The Balance, accessed May 10, 2021, <https://www.thebalance.com/bee-colony-collapse-disorder-facts-and-economic-impact-3305815#citation-17>.

¹¹ The Well Essentials, "Why Are Bees Dying and How You Can Help Save the Bees," The Well Essentials, accessed May 10, 2021, <https://www.thewellessentials.com/blog/why-bees-are-dying-how-to-save-the-bees>.

The evidence clearly shows the health of our natural ecosystems is fundamentally linked to the health of our bees. Pollination is “critical for the conservation and sustainability of the worlds flora and fauna”¹² and without the services provided by honeybees, the planetary boundary of biosphere integrity is put at risk of surpassing its threshold. Therefore, it is indispensable that we alter our behaviours through the reinforcement of effective and synced policies in order to restore the stable trajectory of our future biosphere, whilst maintaining sufficient agricultural productivity.

Sustainable development goal (SDG) ^a	Contributions from bees to SDG targets	Examples of supporting literature ^b	Details on the contributions that bees may provide towards achieving the SDG targets
1. No Poverty	1.1 1.4 1.5	Bradbear, 2009 ; Amulen et al. 2019 ; Pocol and McDonough 2015	Keeping bees offers economic diversity as an income source (1.1) helping build resilient livelihoods for poor and vulnerable peoples (1.5), whilst potentially providing equal access to economic and natural resources for both men and women (1.4)
2. Zero hunger	2.2 2.3	Klein et al. 2007 ; Kleijn et al. 2015 ; Potts et al. 2016a ; Stein et al. 2017 ; Klein et al. 2018	Bee pollination increases crop yield (2.3) and enhances the nutritional value of fruits, vegetables, and seeds (2.2)
3. Good health and well-being	3.4 3.8 3.9	Bradbear, 2009 ; Brockerhoff et al. 2017 ; Pasupuleti et al. 2017 ; Sforzin et al. 2017 ; Kocot et al. 2018 ; Easton-Calabria et al. 2019 ;	Bee products provide safe and affordable medicinal sources (3.8) used in traditional and modern medicine to treat non-communicable diseases such as cancer through strong bioactive compounds (3.4). Bee pollination potentially contributes to the growth and diversity of plants that are important for improved air quality (3.9)
4. Quality education	4.3 4.4 4.5	Pocol and McDonough 2015 ; Mburu et al. 2017 ; Ekele et al. 2019	Vocational training for keeping bees can enhance equal opportunities for employment, training and entrepreneurship amongst men, women and indigenous people (with traditional knowledge) (4.3, 4.4 and 4.5).
5. Gender equality	5.5 5.a	Pocol and McDonough 2015 ; Mburu et al. 2017	Keeping bees as a hobby or being involved in beekeeping can enhance opportunities for women's involvement in economic, social and political decision-making processes even in communities that deprive women of property rights (5.5, 5.a)
6. Clean water and sanitation	6.6	Brockerhoff et al. 2017 ; Creed and van Noorwijk 2018	Bee pollination may contribute to growth and diversity in water-related ecosystems, such as mountains and forest. Appropriate afforestation efforts may provide new resources for commercial bee operations whilst potentially contributing to regional water supply (6.6)
7. Affordable and clean energy	7.2	Romero and Quezada-Euán 2013 ; Halinski et al. 2018 ; Perrot et al. 2018	Bee pollination improves production for oilseed crops used as biofuel such as sunflower, canola and rapeseed (7.2)
8. Decent work and economic growth	8.1 8.6 8.9	Arih and Korošec 2015 ; Mazorodze 2015 ; Pocol and McDonough 2015 ; Stein et al. 2017 ; Quezada-Euán 2018 ; Vinci et al. 2018	Improved agricultural production from bee pollination may contribute to the gross domestic product (GDP) of nations (8.1). Beekeeping can diversify livelihood opportunities for men and women in rural areas (8.6) and support nature-based tourism initiatives (8.9).
9. Industry innovation and infrastructure	9.b	Xing and Gao 2014 ; Zhang et al. 2015 ; Sahlabadi and Hutapea 2018	Bees are an element of nature that inspires human innovations (e.g., airplane design and computer algorithm development) and new honey-related products (9.b)
10. Reduced inequality	10.1 10.2	Carroll and Kinsella 2013 ; Tomaselli et al. 2014 ; Mburu et al. 2017	Improved livelihoods from beekeeping and the contribution of bee pollination towards GDP can support sustainable income growth for lower income groups (10.1) which can potentially contribute to promoting inclusive social, economic and institutional development (10.2)
11. Sustainable cities and communities	11.6 11.7	Lowenstein et al. 2015 ; Van der Steen et al. 2015 ; Hausmann et al. 2016 ; Stange et al. 2018 ; Zhou et al. 2018	Bees can be useful in monitoring air quality in urban areas, as pollination of urban flora can support improved local air quality (11.6). Bees can enhance pollination and self-sustainability of urban gardens and public open spaces (11.7)
12. Responsible consumption and production	12.3 12.b	Klatt et al. 2014 ; Lemelin 2019	Bee pollination can contribute to reducing food waste by improving visual aesthetics of food (shape, size and colour) and increase shelf life (12.3). Beekeeping can be marketed as sustainable tourism for regional development (12.b)
13. Climate actions	13.3	Van der Steen et al. 2015 ; Smith et al. 2019	Use of bees and bee products for environmental monitoring can improve understanding of climate impacts on the environment (13.3)
14. Life below water	14.4	Amjad Khan et al. 2017	Bees can potentially contribute to improved production of plant-based sources of compounds commonly found in fish. Overharvesting of fish can be managed by promoting production and consumption of alternative plant-based nutrient sources (14.4)
15. Life on land	15.1 15.5 15.9	Senapathi et al. 2015 ; Minja and Nkumilwa 2016 ; Chanthayod et al. 2017 ; Klein et al. 2018 ; Mudzengi et al. 2019	Bees contribute to biodiversity by pollinating flowering trees and plants (15.5) and beekeeping can contribute to forest conservation (15.1). Incorporating beekeeping in local planning processes may support reforestation activities which can result in poverty reduction and sustainable regional development (15.9).

^aSDG16 (peace, justice and strong institutions) and SDG17 (partnership for the goals) were excluded from this analysis given their focus on governance and policy

^bSupporting literature includes a mix of direct and indirect evidence. The details on bees' potential contribution to SDGs have been provided using the language used in SDG targets, which may differ from the language used in the supporting literature

Table 1⁶

¹² Peter et al (2003), Flora and Fauna

Assessment of Existing Governance

Currently, there are at least 6 national or regional strategies or action plans addressing wild pollinator conservation in EU member states, with others still in the pipeline¹³. The IUCN and the Institute for European Environmental Policy (IEEP) also co-lead a consortium of five partners to implement the EU Pollinators Initiative, through EU funding to enable Member States to tackle the urgent conservation issue¹⁴. However, to date, there has been no single, coordinated EU action to address the decline of pollinators through an integrated approach involving different sectors and policies¹⁵. The EU and its member states need to cooperate holistically in order to solve the problem.

The EU agreed on a ban on all outdoor uses of the neonicotinoid insecticides clothianidin, imidacloprid and thiamethoxam on 27th April 2018¹⁶, in an attempt to protect bees after sufficient evidence was released against their use in agriculture. However, there have been numerous issues surrounding this ban, most notably the successful use of loopholes to bypass it. In the past 2 years since the ban was agreed, EU countries have issued at least 205¹⁷ different ‘emergency authorisations’ for outdoor use of the chemicals. Furthermore, in at least 14 cases, the holder of the ‘emergency authorisation’ was the major pesticide manufacturer Bayer, making it one of the EUs three biggest holders of emergency neonic authorisations¹⁸. This puts into question the effectiveness of bans on use of controlled

¹³ IUCN, “Pollinators in Europe,” IUCN, January 31, 2020, <https://www.iucn.org/regions/europe/our-work/biodiversity-conservation/pollinators-europe>.

¹⁴ IUCN, “Pollinators in Europe,” IUCN, January 31, 2020, <https://www.iucn.org/regions/europe/our-work/biodiversity-conservation/pollinators-europe>.

¹⁵ European Commission, “EN EN” (, 2018), <https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:52018DC0395&from=EN>.

¹⁶ Crispin Dowler and Joe Sandler Clarke, “Loophole Keeps Bee-Killing Pesticides in Widespread Use, Two Years after EU Ban,” Unearthed, July 8, 2020, <https://unearthed.greenpeace.org/2020/07/08/bees-neonicotinoids-bayer-syngenta-eu-ban-loophole/>.

¹⁷ European Commission, “Search for Emergency Authorisations,” ec.europa.eu, 2019, <https://ec.europa.eu/food/plant/pesticides/eu-pesticides-database/ppp/pppeas/screen/home>.

¹⁸ Crispin Dowler and Joe Sandler Clarke, “Loophole Keeps Bee-Killing Pesticides in Widespread Use, Two Years after EU Ban,” Unearthed, July 8, 2020, <https://unearthed.greenpeace.org/2020/07/08/bees-neonicotinoids-bayer-syngenta-eu-ban-loophole/>.

substances and stressing the importance of transparency in successful policy implementation.

A recent example of a successful initiative is the All-Ireland Pollinator Plan (AIPP), initiated by a multi-stakeholder steering group and published by the National Biodiversity Data Centre (NBDC). The Pollinator Plan identifies 81 actions under 5 main objectives as seen in Figure 2:

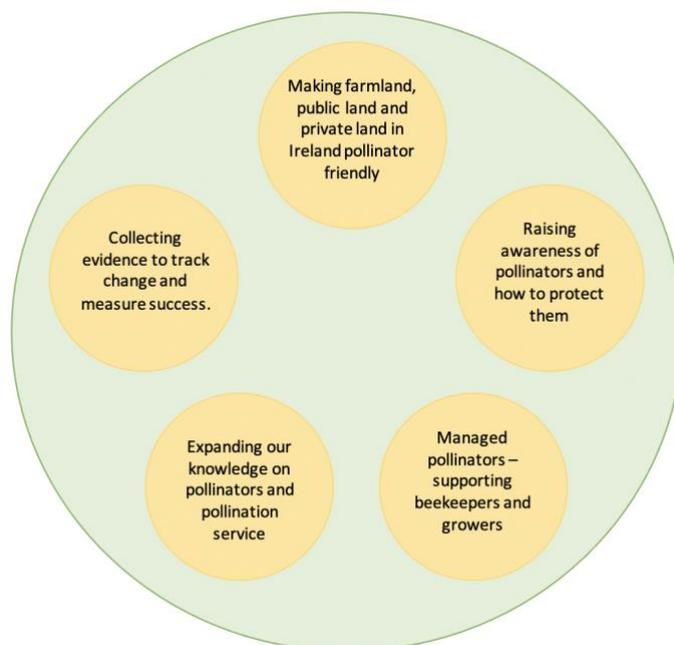


Figure 2:
The 5 main objectives of the AIPP

Due to its success, the plan has been used as a model for national pollinator plan development in Norway and the Netherlands¹⁹. However, due to lack of funding, the AIPP is unable to take full advantage of the momentum generated by the plan,²⁰ as well as lacking the ability to spread awareness to farmers who are essential players in ensuring the stability of pollinator numbers. A focus on farmer education is crucial in the steps towards successful pollination policy. Despite this, the successful implementation of this plan to both Norway and the Netherlands shows how national policies within the EU can be successfully synced internationally.

¹⁹ National Biodiversity Data Centre, “AIPP Plan,” Biodiversity Ireland, 2016, http://www.biodiversityireland.ie/wordpress/wp-content/uploads/All-Ireland-Pollinator-Plan_progress-report-year-1_Dec-2016.pdf.

²⁰ Personal communication with Dr Jane Stout, 19/10/17, Trinity College Dublin, Deputy Chair of the Pollinator Plan Steering Group

In line with the most recent strategy “Healthy Bees 2030”, the commission said it wants to cut the use of chemical pesticides by 50% and reduce fertiliser use by 20% by 2030²¹. Formulated by Defra, the Healthy Bees plan aims to enhance the skills and opportunities for farmers using sound science and effective biosecurity. Progress has yet to be monitored.

²¹ Marine Strauss, “EU Has Failed to Halt Decline of Bees and Butterflies, Auditors Say,” *Reuters*, July 9, 2020, <https://www.reuters.com/article/us-climate-change-eu-pollinators-idUSKBN24A188>.

Overall Analysis of Existing Governance

Current governance measures can be seen to cover all key problem areas; however, data shows from 2018-2019, bee colony numbers have continued to decline throughout the EU, with losses as high as 32.0% in Slovenia²². The lack of success may be attributed to lack of transparency and funding, as well as ineffective reinforcement of regulations.

A recent report from the European Court of Auditors stated that the key EU policies intended to halt the decline of pollinators has been largely inefficient due to the lack of specific funds and legal framework²³. The association Beelife also stated that the billions spent on Common Agriculture Policy (CAP) is a major barrier to conserving pollinators²⁴ as it's counterproductive to invest in both intensive agricultural practices and pollinator conservation.

²² Alison Gray et al., "Honey Bee Colony Winter Loss Rates for 35 Countries Participating in the COLOSS Survey for Winter 2018–2019, and the Effects of a New Queen on the Risk of Colony Winter Loss," *Journal of Apicultural Research* 59, no. 5 (August 11, 2020): 744–51, <https://doi.org/10.1080/00218839.2020.1797272>.

²³ European Court of Auditors, "Protection of Wild Pollinators in the EU — Commission Initiatives Have Not Borne Fruit," European Court of Auditors, 2020, https://www.eca.europa.eu/Lists/ECADocuments/SR20_15/SR_Pollinators_EN.pdf.

²⁴ ELENA SÁNCHEZ NICOLÁS, "EU 'Failed to Protect Bees and Pollinators', Report Finds," EUobserver, 2020, <https://euobserver.com/environment/148900>.

Governance

Recommendations

All recommendations are to be applied throughout the whole of the EU to allow for a synced and consistent response – something that not yet been achieved.

1) Reallocation of Common Agriculture Policy (CAP) Funding into Ecological Farming

Currently agriculture plays a large role in bee colony decline, with many environmental leaders blaming allocation of CAP funding in enabling the continuation of bee colony collapse. “On the one hand, millions of euros are spent to support farmers in planting flower strips or replant hedges along their fields to help restore biodiversity; on the other, billions are spent in the CAP to support intensive agriculture - which is the main cause of the massive decline in bee populations”²⁵.

By reallocating CAP funding into ecological farming practices instead of current intensive agriculture, there will be a stabilization in food production, wild habitats will be preserved, and it will protect the bees. Bhutan has already led the world in adopting a 100% organic farming policy, and Mexico has banned genetically modified corn to protect the native varieties²⁶. Ecological farming restores soil nutrients with natural composting systems and avoids pesticides and chemical fertilizers. The United Nations Food and Agriculture Organisation (FAO) identified encouraging pollinators – especially bees – as one of the best ways to boost food security and support sustainable farming. By investing in ecological farming, you are therefore investing in bees and subsequently future food security. Transparency however is critical to ensure fair allocation of funding.

²⁵ ELENA SÁNCHEZ NICOLÁS, “EU ‘Failed to Protect Bees and Pollinators’, Report Finds,” EUobserver, 2020, <https://euobserver.com/environment/148900>.

²⁶ Greenpeace, “Save the Bees,” Greenpeace USA, 2015, <https://www.greenpeace.org/usa/sustainable-agriculture/save-the-bees/>.

2) Extend to a Complete Ban on Neonicotinoids Throughout the EU

Current EU law states that all outdoor use of the neonicotinoids clothianidin, imidacloprid and thiamethoxam is banned, and only the use of them in permanent greenhouses remains possible²⁷. This should be extended to a complete ban of use in order to eliminate possible exploitation of loopholes by third parties and also in light of evidence of contamination to wildflowers and exposure to other wildlife²⁸. By irradiating the demand for neonicotinoids in the EU altogether, there will simultaneously be a significant halt in production. Both farms and pharmaceutical companies such as Bayer should be monitored closely in relation to the use and production of the chemicals, and any violations in policy should be met with the appropriate sanctions such as loss of licenses.

Bees will positively impact from the ban through a reduction in pesticide related deaths throughout the EU. The crops grown will also have had no exposure to neonicotinoids, leading to healthier bee colonies and a positive multiplier effect for other pollinators and the subsequent food chains.

²⁷ "Neonicotinoids," European Commission, November 30, 2017, https://ec.europa.eu/food/plant/pesticides/approval_active_substances/approval_renewal/neonicotinoids_en.

²⁸ Thomas James Wood and Dave Goulson, "The Environmental Risks of Neonicotinoid Pesticides: A Review of the Evidence Post 2013," *Environmental Science and Pollution Research* 24, no. 21 (June 7, 2017): 17285–325, <https://doi.org/10.1007/s11356-017-9240-x>.

3) Ensure Education of Farmers and Subsidise Pesticide Alternatives

Farmers arguably play one of the largest roles in preserving colony numbers as their actions have direct impacts on the bee population. Education should be provided to them from the EU, encouraging them to use holistic practices. Farmers who are informed about the importance of pollination and pollinators to fruit quality are more likely to take up measures to benefit pollinator populations and reduce pesticide impacts. For example, apple fruit quality and economic value is enhanced by insect pollination²⁹ and fruit set is highly dependent on wild pollinators³⁰ as well as honeybees. A reduction in the number of farmers using unsustainable practices can have exponential positive impacts on bee colony numbers within the EU. This education should also be accompanied by EU subsidised pesticide alternatives in order allow for cost to have no bearing on the farmers choice. Subsidy should come from the CAP funding allowance.

A holistic view of ecosystems including wild and managed bees and humans is necessary to address sustainability challenges³¹. By employing an internationally synced approach, throughout the EU, we can better understand and address the interconnections between our human and environmental systems.

²⁹ Garratt, M. & Truslove, Louise & Coston, Duncan & Evans, Rebecca & Moss, Ellen Dorothea & Dodson, Cassie & Jenner, Nigel & Biesmeijer, Jacobus & Potts, Simon. (2013). Pollinator deficits in UK apple orchards. *Journal of Pollination Ecology*. 12.

³⁰ Földesi et al, 2016; Rachel E. Mallinger and Claudio Gratton, "Species Richness of Wild Bees, but Not the Use of Managed Honeybees, Increases Fruit Set of a Pollinator-Dependent Crop," ed. Tim Diekötter, *Journal of Applied Ecology* 52, no. 2 (December 18, 2014): 323–30, <https://doi.org/10.1111/1365-2664.12377>.

³¹ Kleijn et al. 2018; Saunders et al. 2018 Vidushi Patel et al., "Why Bees Are Critical for Achieving Sustainable Development," *Ambio*, April 20, 2020, <https://doi.org/10.1007/s13280-020-01333-9>.

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- U.S, Full Bio Follow Linkedin Kimberly Amadeo is an expert on, World Economies, investing, With Over 20 Years of Experience in Economic Analysis, and business strategy She is the President of the economic website World Money Watch Read The Balance's editorial policies Kimberly Amadeo. "How Much Does Colony Collapse Disorder Increase Food Prices?" *The Balance*. Accessed May 10, 2021. <https://www.thebalance.com/bee-colony-collapse-disorder-facts-and-economic-impact-3305815#citation-17>.
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