What's the Buzz on Pollinators?

Almost 90 percent of wild flowering plants depend on pollinators; these creatures are far more than just buzzy pests.[1] Some, like the monarch butterfly, are iconic symbols of nature's beauty, while others go largely unnoticed. But the growing threats posed by Big Ag and Big Oil to pollinators big and small are a grim reminder of the urgency to act now. Our food security is intrinsically tied to the lives of hundreds of thousands of insects and animals.

Pollinator Varieties

The term "pollinators" encompasses 200,000 species across the world, ranging from traditional bees and butterflies to 1,000 different vertebrate species.[2] For plants that do not self-pollinate, these animals facilitate reproduction.[3] This mutualistic relationship benefits both sides, allowing many pollinators to feed on plant nectar or pollen. Some, like bees, intentionally collect pollen. Others, like butterflies, birds, and bats, do so accidentally, with the pollen sticking to their bodies while they feast.[4]

Bees are the world's primary pollinators with over 20,000 species globally; their collective hives produce an estimated 1.76 million tons of honey annually.[5] Eighty percent of pollination can be attributed to the activities of just 2 percent of wild bee species.[6] However, other unsung insect heroes include flies, beetles, moths and butterflies — these species are equally if not more important for certain crops.[7] Birds and bats also play an essential role, with birds pollinating around 5 percent of the plants in any given region, and bats visiting over 500 plant species worldwide.[8]

Importance of Birds and Bees

Our food system depends on the wellbeing of pollinators — in fact, one out of every three bites on your plate exists because of pollinators.[9] Their efforts support over 1,200 food crops,[10] including more than three-quarters of top global food crops.[11] A variety of everyday staple categories like fruits, vegetables, seeds, nuts and oil crops rely on pollinators for reproduction. In the human diet, pollinated crops account for 40 percent of the global nutrient supply, including 90 percent of vitamin C and 70 percent of vitamin A.[12]

We also need diverse pollinators for the stability of crop systems. A combination of wild and managed pollinators is essential for productive crops and to ensure that different plants are visited.[13] Studies have shown positive correlations between pollinator and plant diversity, making biodiversity a necessity for our crop system.[14]

An estimated 5 to 8 percent of current global crop production can be directly attributed to pollination, a market value of up to $577 billion.[15] In the United States alone, the leading pollinators, honeybees, contributed to over $19 billion in crop production in 2010, while other insect pollinators contributed nearly $10 billion.[16]

These estimates do not even account for the host of human or ecosystem services that pollinators provide. For us, they provide essential medicines, clothing fibers, and construction materials, and they act as cultural symbols and inspirations in many cultures. For the planet, pollinators stabilize the soil, clean the air, supply oxygen and support ecosystems.[17] Around a quarter of the diets of all bird species and many herbivore species depend on pollinators for survival.[18]

Status and Ongoing Threats

As important as they are, more than 40 percent of insect pollinators and 16 percent of vertebrate pollinators globally are highly threatened.[19] The United Nations found that wild pollinators have declined in occurrence and diversity at all scales in northwest Europe and North America.[20] Globally, insect declines are greater than those of bird or plant species, setting up a scenario for cascading effects across ecosystems.[21] Bee populations have some of the most well-documented declines, with the United States losing at least 30 percent of its bee colonies annually since 2006.[22] In North America, we are 50 percent less likely to see a bumble bee than we were prior to 1974.[23]

The crisis is evident. Its causes are just as clear. The largest threat posed to pollinators is land-use change and the growth of intensive agriculture.[24] Since the 1960s, agricultural lands have expanded at the expense of forests and grasslands; a further 10 percent increase in agricultural land is projected by 2030.[25] In the United States, this land is increasingly owned by large financial institutions rather than by small and mid-sized farmers.[26] Intensification of land resources leads to habitat loss and fragmentation, loss of nesting sites and destruction of foraging areas.[27] These changes have drastically reduced the number and diversity of wildflowers and weeds, turning them into poisoned monocultures.[28]

With this intensification comes insecticides — particularly the most common class called neonicotinoids — and herbicides.[29] Although overall usage has declined, the remainder have become more potent and harmful to invertebrate species, particularly bees.[30] For instance, imidacloprid (a type of neonicotinoid) is 7,000 times more toxic than DDT to honeybees.[31] If it does not kill bees immediately, it may cause significant sublethal effects, including shortened lifespans, compromised immune systems, impaired navigation and senses, and reduction of their famous waggle dance.[32]

Neonicotinoids are persistent in soil and water and remain in the environment for a long time. These long exposures will continue to take their toll.[33] Meanwhile, although herbicides and fungicides are not applied for insect control, their chemicals still disrupt molecular processes inside pollinators.[34] Chronic toxicity from fungicides has been found in honeybees.[35] For example, the world's most popular herbicide, Roundup, has extreme negative impacts on bees, with one of the products having up to 96 percent mortality rates just 24 hours after exposure.[36]

Climate change poses yet another threat to pollinators. It is already altering the range, abundance and seasonal behavior of wild pollinator species like bumble bees and butterflies.[37] Climate change is also shifting growing seasons, potentially weakening the plant populations that these species rely on.[38] Stressful conditions, such as extreme weather events, can reduce the quantity and quality of plant production. In one experiment, simulated temperatures that were increased to mimic climate change caused nectar production to drop by 90 percent.[39]

Effects on Us and Our Food System

It is easy to dismiss these hazards as distant threats happening to distant creatures, but the harms that they will have on people, communities and ecosystems are not so easy to dismiss. Food security will be thrown into disarray with further decimation of pollinator species. Global reliance on pollinator-dependent crops has increased 300 percent over the last five decades, but these crops have experienced lower growth and stability than their pollinator-independent counterparts.[40]

With crop declines comes increased risk for malnutrition. A limited study found that up to 56 percent of several countries' populations would be newly at risk of nutritional deficiencies if pollinators were lost. Vitamin A deficiencies are particularly dangerous, already causing premature death in 800,000 women and children and pediatric blindness in another 250,000 children annually.[41] Continuing this trend of pollinator loss is likely to destabilize regional food production and to impact international trade.[42]

Plant productivity and biodiversity are also negatively impacted by pollinator loss. One study looking at vertebrate pollination found that, in plants pollinated by vertebrates in addition to insects, fruit and seed production drops 63 percent when the animals cannot access plants.[43] In addition to lower productivity, some plant species may be unable to adapt to survive without their designated pollinators, putting them at risk of extinction. Populations of South African orchids, for example, have already nosedived with the disappearance of their bee populations.[44] A third of flowering plant species would be unable to produce seeds with total pollinator loss.[45]

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510.922.0720 (CA)
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In this scenario, the balance of plant species is likely to shift, causing self-pollinating weeds to dominate ecosystems and destroy competition.[46] This will only cause further declines in pollinator populations, as they are unable to feed off many of the species that would become dominant.[47] Animal and bird populations within these ecosystems would also suffer, as the loss of seeds or plants for food threaten their survival.[48]

What We Can Do

These effects will continue to unfold over the next several decades, but we must act now to secure the future of our pollinators and our food security. Most urgently, we need to shift away from the intensive, profit-motivated and pesticide-driven agricultural practices that Big Ag has pushed upon us for decades. Our reliance on chemicals and monocultures serves corporate interests, not farmers or ecosystems.

Food & Water Watch recommends:

- Reestablish supply management for commodity crops, to stop the overproduction of corn and soybeans on monocultures and end the glut of cheap grain that props up factory farms.[49]
- Realign our farm safety net so that it encourages the adoption of regenerative practices that return biodiversity to the farm.[50] Diverse, integrated crop-and-livestock operations will eliminate the need for pesticides while providing vital habitat for pollinators and other wildlife.
- Pass federal legislation to protect pollinators. Models include the Saving America's Pollinators Act, which would immediately revoke registration of lethal neonicotinoid pesticides and direct the U.S. Environmental Protection Agency to create a Pollination Protection Board. The Board would monitor pollinator populations and conduct independent reviews of pesticides to protect pollinators and their habitats.[51]

Endnotes

[1] Potts, Simon G. et al. Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services (IPBES). [Summary for policymakers]. "The Assessment Report on Pollinators, Pollination and Food Production." 2016 at 8.
[2] Marks, Raissa. Wildlife Habitat Council. "Native Pollinators." No. 34. May 2005 at 1.
[3] Potts et al. (2016) at 14.
[4] U.S. Department of the Interior. National Parks Service (NPS). "What is a pollinator?" Updated June 18, 2018. Available at https://www.nps.gov/subjects/pollinators/what-is-a-pollinator.htm.
[5] Kopec, Kelsey and Lori Ann Burd. Center for Biological Diversity. "Pollinators in Peril." February 2017 at 2; Potts et al. (2016) at 18.
[6] Potts et al. (2016) at 21.
[7] Rader, Romina et al. "Non-bee insects are important contributors to global crop pollination." *PNAS*. Vol. 113, No. 1. January 2016 at 147.
[8] Mize, Alison. "Lizards, mice, bats and other vertebrates are important pollinators too." *Ecological Society of America*. April 4, 2018.
[9] Department of the Interior NPS. (2018).
[10] *Ibid*.
[11] Potts et al. (2016) at 8.
[12] Department of the Interior NPS. (2018); van der Sluijs, Jeroen P. and Nora S. Vaage. "Pollinators and global food security: The need for holistic global stewardship." *Food Ethics.* Vol. 1. April 2016 at 77 to 78.
[13] Potts et al. (2016) at 21; Rader et al. (2016) at 147.
[14] Marks (2005) at 2.
[15] Potts et al. (2016) at 8.
[16] Department of the Interior NPS. (2018).
[17] *Ibid*.; Potts et al. (2016) at 8.
[18] Marks (2005) at 1; van der Sluijs and Vaage (2016) at 78.
[19] Kopec and Burd (2017) at 2; IPBES. [Press release]. "Pollinators vital to our food supply under threat." February 26, 2016.
[20] Potts et al. (2016) at 9.
[21] Sanchez-Bayo, Francisco and Kris A. G. Wyckhuys. "Worldwide decline of the entomofauna: A review of its drivers." *Biological Conservation*. Vol. 232. January 2019 at 9.
[22] Penn State College of Agricultural Sciences. Department of Entomology. "Disappearing pollinators." Available at https://ento.psu.edu/research/centers/pollinators/resources-and-outreach/disappearing-pollinators. Accessed June 2022.
[23] Main, Douglas. "Bumblebees are going extinct in a time of 'climate chaos'." *National Geographic*. February 6, 2020.
[24] Potts et al. (2016) at 10; Sanchez-Bayo and Wyckhuys (2019) at abstract.
[25] Kovacs-Hostyanszki, Aniko et al. "Ecological intensification to mitigate impacts of conventional intensive land use on pollinators and pollination." *Ecology Letters*. Vol. 20. 2017 at 674.
[26] Keiffer, Katy. "Who really owns American farmland?" *The Counter*. July 31, 2017.
[27] Kovacs-Hostyanszki et al. (2017) at 674.
[28] van der Sluijs and Vaage (2016) at 81.
[29] Sanchez-Bayo and Wyckhuys (2019) at abstract; van der Sluijs and Vaage (2016) at 82.
[30] Heidt, Amanda. "U.S. pesticide use is down, but damage to pollinators is rising." *The Scientist*. April 5, 2021.
[31] van der Sluijs and Vaage (2016) at 82.
[32] Riaz, Jaweria et al. "Pollution and pollinators: A review." *Pure and Applied Biology*. Vol. 9, Iss. 3. September 2020 at 2052; Holt, Holly. Penn State College of Agricultural Sciences. Department of Entomology. "Pesticides." Available at https://ento.psu.edu/research/centers/pollinators/resources-and-outreach/disappearing-pollinators/pesticides. Accessed June 2022.
[33] van der Sluijs and Vaage (2016) at 82 to 83.
[34] Holt. "Pesticides."
[35] Riaz et al. (2020) at 2052.
[36] Straw, Edward A. et al. "Roundup causes high levels of mortality following contact exposure in bumble bees." *Journal of Applied Ecology.* Vol. 58, Iss. 6. April 2021 at abstract.
[37] Potts et al. (2016) at 11.

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[38] Department of the Interior NPS. (2018).
[39] Holt, Holly. Penn State College of Agricultural Sciences. Department of Entomology. "Global warming." Available at https://ento.psu.edu/research/centers/pollinators/resources-and-outreach/disappearing-pollinators/global-warming. Accessed June 2022.
[40] Potts et al. (2016) at 9.
[41] IPBES (2016) at 8; World Health Organization. "Vitamin A deficiency." Available at https://www.who.int/data/nutrition/nlis/info/vitamin-a-deficiency. Accessed June 2022.
[42] Dicks, Lynn V. et al. "A global-scale expert assessment of drivers and risks associated with pollinator decline." *Nature Ecology & Evolution*. Vol. 5. August 2021 at 4.
[43] Mize (2018).
[44] Rodger, James. "Biodiversity depends on pollinators: A first estimate of how many plants rely on animals." *The Conversation*. October 14, 2021.
[45] *Ibid*.
[46] *Ibid*.
[47] *Ibid*.
[48] *Ibid.*; van der Sluijs and Vaage (2016) at 78.
[49] Food & Water Watch (FWW). [Issue brief]. "Fair Farming: A New Deal Approach to Food Supply Management." June 2021.
[50] FWW. [Report]. "Well-Fed: A Roadmap to a Sustainable Food System That Works for All." April 2021.
[51] H.R. 4079. 117th Cong. (2021).