

Pollinators: First global risk index for species declines and effects on humanity

August 16 2021



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Disappearing habitats and use of pesticides are driving the loss of pollinator species around the world, posing a threat to "ecosystem services" that provide food and wellbeing to many millions—particularly

in the Global South—as well as billions of dollars in crop productivity.

This is according to an international panel of experts, led by the University of Cambridge, who used available evidence to create the first planetary risk index of the causes and effects of dramatic pollinator declines in six global regions.

The bees, butterflies, wasps, beetles, bats, flies and hummingbirds that distribute pollen, vital for the reproduction of over 75% of [food crops](#) and flowering plants—including coffee, rapeseed and most fruits—are visibly diminishing the world over, yet little is known of the consequences for [human populations](#).

"What happens to pollinators could have huge knock-on effects for humanity," said Dr. Lynn Dicks from Cambridge's Department of Zoology. "These small creatures play central roles in the world's ecosystems, including many that humans and other animals rely on for nutrition. If they go, we may be in serious trouble."

Dicks assembled a 20-strong team of scientists and indigenous representatives to attempt an initial evaluation of the drivers and risks for pollinator declines worldwide. The research is published today in *Nature Ecology & Evolution*.

The top three global causes of pollinator loss are habitat destruction, followed by land management—primarily the grazing, fertilizers and crop monoculture of farming—and then widespread pesticide use, according to the study. The effect of climate change comes in at number four, although data are limited.

Perhaps the biggest direct risk to humans across all regions is "crop pollination deficit": falls in quantity and quality of food and biofuel crops. Experts ranked the risk of crop yield "instability" as serious or

high across two-thirds of the planet—from Africa to Latin America—where many rely directly on pollinated crops through small-holder farming.

"Crops dependent on pollinators fluctuate more in yield than, for example, cereals," said Dicks. "Increasingly unusual climatic phenomena, such as extreme rainfall and temperature, are already affecting crops. Pollinator loss adds further instability—it's the last thing people need."

A major [2016 report](#) to which Lynn Dicks contributed suggested there has been up to a 300% increase in pollinator-dependent food production over the past half century, with an annual market value that may be as much as US\$577 billion.

Reduced species diversity was seen as a high-ranking global risk to humans, which not only risks food security but a loss of "aesthetic and cultural value". These species have been emblems of nature for millennia, argue the experts, and too little consideration is given to how their declines affect human wellbeing.

"Pollinators have been sources of inspiration for art, music, literature and technology since the dawn of human history," said Dicks. "All the major world religions have sacred passages about bees. When tragedy struck Manchester in 2017, people reached for bees as a symbol of community strength."

"Pollinators are often the most immediate representatives of the natural world in our daily lives. These are the creatures that captivate us early in life. We notice and feel their loss. Where are the clouds of butterflies in the late summer garden, or the myriad moths fluttering in through open windows at night?"

"We are in the midst of a species extinction crisis, but for many people that is intangible. Perhaps pollinators are the bellwether of mass extinction," said Dicks.

Loss of access to "managed pollinators" such as industrial beehives was ranked as a high risk to North American society, where they boost crops including apples and almonds, and have suffered serious declines from disease and 'colony collapse disorder'.

The impact of pollinator decline on wild plants and fruits was viewed a serious risk in Africa, Asia-Pacific and Latin America—regions with many low-income countries where rural populations rely on wild-growing foods.

In fact, Latin America was viewed as the region with most to lose. Insect-pollinated crops such as cashew, soybean, coffee and cocoa are essential to regional food supply and international trade right across the continent. It is also home to large indigenous populations reliant on pollinated plants, with pollinator species such as hummingbirds embedded in oral culture and history.

Asia Pacific was another global region where pollinator decline was perceived to pose serious risks to human well-being. China and India are increasingly reliant on fruit and vegetable crops that need pollinators, some of which now require people to pollinate by hand.

The researchers caution that not enough is known about the state of pollinator populations in the Global South, as evidence of decline is still primarily from wealthy regions such as Europe (where at least 37% of bee and 31% of butterfly species are in decline). Pollination deficits and biodiversity loss were seen as the biggest risks to Europeans, with potential to affect [crops](#) ranging from strawberries to oilseed rape.

Dr. Tom Breeze, co-author and Ecological Economics Research Fellow at the University of Reading, said: "This study highlights just how much we still don't know about pollinator decline and the impacts this has on human societies, particularly in parts of the developing world.

"While we have data on how pollinators are doing in regions like Europe, there are significant knowledge gaps in many others. More research is needed on a global level so we can really understand the problems we face, and how we might address them."

More information: A global-scale expert assessment of drivers and risks associated with pollinator decline, *Nature Ecology & Evolution* (2021). DOI: [10.1038/s41559-021-01534-9](https://doi.org/10.1038/s41559-021-01534-9) , www.nature.com/articles/s41559-021-01534-9

Provided by University of Cambridge

Citation: Pollinators: First global risk index for species declines and effects on humanity (2021, August 16) retrieved 8 May 2024 from <https://phys.org/news/2021-08-pollinators-global-index-species-declines.html>

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