



## **The small empires that sustain life on Earth are burning**

**Banka Kanda Kishore Reddy, K. Madhuri, G. Sasikala, B. Chandana and Malleswari Sadhineni**

Krishi Vigyan Kendra, Reddipalle, ANGRAU

<sup>1</sup>Krishi Vigyan Kendra, Kalikiri, ANGRAU

<https://doi.org/10.5281/zenodo.7753566>

Recently a cadre of scientists took on the near-Sisyphean task of estimating the number of ants in the world. They came up with 20 quadrillion – a 20 with 15 zeros after it. For each human on earth, there are at least 2.5 million ants. That widely reported number reinforced common assumptions about insects: that they are ubiquitous to the point of annoyance and worse – not merely disrupting our picnics but also stinging us, befouling our food, and spreading disease. They are a blight we could do without. The reality is starkly different. Insects from beetles to blowflies keep our environment ticking. They nourish soils, they break down feces and human and animal remains, and they are food themselves for birds, amphibians, and mammals. Globally, some three-quarters of human food crops depend to some degree on pollination by insects. And the problem with insects is not abundance, but worrisome signs of scarcity. Insects around the world are in steep decline, in what may be the most consequential loss of life on earth since the wipe-out of the dinosaurs. The tiny empires that prop up terrestrial life are on fire, yet we can barely comprehend the flames licking at our feet.

In just the past five years, an avalanche of under-reported research has sketched the contours of an emerging disaster. The biomass of flying insects caught in traps in German nature reserves has slumped by three-quarters, on average, since 1989. In Britain, large moths have declined by a third over the past 50 years. In the apparently pristine rainforest of Puerto Rico, 98% of ground-dwelling insects, by weight, have disappeared since the 1970s. And entomologists now realise that around a quarter of all the world's known bee species haven't been sighted and recorded since before the 1990s. The evidence is literally in front of us: Even the quantity of bugs splattered on car windshields seems to have dropped precipitously in recent years.



Insect populations can fluctuate wildly from year to year, and much of the planet – including the tropics, where the largest trove of insect life is found – has yet to be properly surveyed for arthropod biodiversity. But from what we do know, researchers estimate that around 40% of insect species are declining, with overall populations around the world falling by 1-2% a year. This is the sort of decline that points to eventual oblivion. “It is indeed a period of crisis for all insects,” laments Francisco Sánchez-Bayo, an ecologist at the University of Sydney who undertook this broad analysis. The insect decline has inspired a nascent conservation movement, limited mostly to charismatic and obviously useful species – especially honeybees. “Of the 100 crop species that provide 90% of the world’s food, over 70 are pollinated by bees,” note the authors of a study in Proceedings of the Royal Society B.

Loss of pollination is just one thread in a tapestry of biological and ecological consequences, however. In France and Germany, plummeting populations of warblers, swallows, and bluebirds have been blamed on insect declines. A full-on collapse of insect populations would mean no wildflowers, vastly fewer birds, and a land etched with human and animal death and hunger. “Your environment would look completely different and smell quite bad as well,” says Erica McAlister, senior curator at the Natural History Museum, London. “I describe it as swimming along in a quagmire of feces with dead Uncle Jeremy floating past you.” For all our technological prowess, we humans cannot replace the dung beetles that cycle nutrients through soils around the world, or the tiny midges that the chocolate industry depends on to propagate cacao trees. We have strafed the land and oceans with deadly chemicals and other pollutants. The worst of these chemicals is a class of insecticide called neonicotinoids, which are, by one measure, 7,000 times more toxic to bees than DDT, the chemical reviled for its environmental impact in Rachel Carson’s *Silent Spring* and banned in the United States since 1972. Also known as neonics, these pervasive biological weapons have wiped out bees, butterflies, beetles, and most other creatures they touch, leaving its residue in everything from baby food to onions to our drinking water. The poison continues to mount, layer by applied layer. Farms, housing, and other types of infrastructure have chewed up the habitat of insects and other animals as we replace forests and meadows with monocultural croplands and highways and Starbucks. We’ve compounded this folly by replicating the sins of industrialised farming, in miniature, around our own homes. The largest irrigated crop in America is not corn or soy but lawns, which require huge volumes of water and pesticides in order to maintain their lush yet close-cropped and lifeless aesthetic. Insects have nowhere to hide in these wastelands, removed of leaves or logs or sprouting weeds. Some yards are refuges for insects, but many simply extend the torment of farmland. “It’s like if the only food available was chips. Chips for everybody, even if you don’t eat chips,” the agricultural ecologist Barbara Smith explained.



We not only have subjected insects to homelessness, starvation, and chemical warfare but have also, through the unceasing burning of fossil fuels, pushed the world toward temperatures not seen in the span of human civilisation. Should we exceed 3°C in global warming by the end of this century, compared with preindustrial times, half of all insect species will lose more than half of their current habitable range, research has found. Bumblebees, sewn into their winter coats and facing long journeys to forage for food, face mass thermal doom. Even the onset of spring, a vital crucible for the emergence of plants and insects, has been scrambled by climate change. A review of data spanning 20 years shows that, in the UK, moths and butterflies are emerging from their cocoons 3 days earlier per decade on average. The potential dangers of widespread insect loss are alarming. And yet, while money, effort, and attention have been poured into saving the celebrated beasts of our time – the orangutans, the rhinos, the elephants – our attempts to arrest the loss of insects have barely begun. Many people also don't yet realise how far the problem goes beyond honeybees. What's required isn't an army of urban beekeepers, but rather a fundamental rethink of our relationship with nature.

Neonicotinoid insecticides must be banned in the India, as they mostly are already in the European Union. We need stronger regulations to prevent habitat loss and to curb greenhouse gas emissions. But in other respects, we actually need to do less. Do we all need featureless, manicured lawns? Do we need to hack away wildflowers or weeds from roadsides or around parks? Do all fringing plants around the edges of fields of corn or soy need to be ruthlessly exterminated if they can't be turned into cash? Could we imagine surroundings that aren't drained of vibrancy but instead invite the buzzing and thrumming riot of insect life?

We are not only threatening our own life-support systems by snuffing out insects but also pushing aside great beauty. In our focus on “creepy crawlies,” we are missing the aesthetic as well as ecological beauty all around us. Bulbous compound eyes, translucent wings, and shocks of insect color all developed over an incredible 400-million-year span on earth, both predating and outliving the dinosaurs. On the eve of the COVID-19 pandemic, in a bid to witness this beauty, I mounted a horse and ascended the mountains of central Mexico to see the overwintering monarch butterfly horde draped in vast orange and black clumps on the bows of the oyamel fir trees there. Millions of butterflies were there, although this great migration from the India is vastly reduced from what it once was and is further threatened by climate change.