



Insect populations suffering death by 1,000 cuts, say scientists

Damion Carrington | January 11, 2021

Insect populations are suffering “death by a thousand cuts”, with many falling at “frightening” rates that are “tearing apart the tapestry of life”, according to scientists behind a new volume of studies.

The insects face multiple, overlapping threats including the destruction of wild habitats for farming, urbanisation, pesticides and light pollution. Population collapses have been recorded in places where human activities dominate, such as in Germany, but there is little data from outside Europe and North America and in particular from wild, tropical regions where most insects live.

The scientists are especially concerned that the climate crisis may be causing serious damage in the tropics. But even though much more data is needed, the researchers say enough is already known for urgent action to be taken.

Insects are by far the most varied and abundant animals on Earth, with millions of species and outweighing humans by 17 times. They are essential to the ecosystems that humanity depends upon, pollinating plants, providing food for other creatures and recycling nature’s waste. The studies show the situation is complex, with some insect populations increasing, such as those whose range is expanding as global heating curbs cold winter temperatures and others recovering from a low level as pollution in water bodies is reduced.

The good news is that the raised profile of insect declines in the past two years has prompted government action in some places, the scientists said, while a “phenomenal” number of citizen scientists are helping with the huge challenge of studying these tiny creatures.

The 12 new studies are published in the journal Proceedings of the National Academy of Sciences. “Nature is under siege [and] most biologists agree that the world has entered its sixth mass extinction event,” concludes the lead analysis in the package. “Insects are suffering from ‘death by a thousand cuts’ [and] severe insect declines can potentially have global ecological and economic consequences.”

Prof David Wagner of the University of Connecticut in the US, the lead author of the analysis, said the abundance of many insect populations was falling by 1-2% a year, a rate that should not be seen as small: “You’re losing 10-20% of your animals over a single decade and that is just absolutely frightening. You’re tearing apart the tapestry of life.”

Wagner said most of the causes of insect declines were well known. “But there’s one really big unknown and that’s climate change – that’s the one that really scares me the most.” He said increased climate variability could be “driving [insect] extinctions at a rate that we haven’t seen before”.

“Insects are really susceptible to drought because they’re all surface area and no volume,” Wagner said. “Things like dragonflies and damselflies can desiccate to death in an hour with really low humidity.”

One of the studies identifies an increasingly erratic climate as the overarching reason for region-wide losses of moths and other insects in the forests of north-western Costa Rica since 1978. This could be a “harbinger of the broader fate of Earth’s tropical forests”, said Wagner.

However, another study contradicts a 2018 report of a 98% collapse in insects in a Puerto Rican forest. The new paper says “abundances are not generally declining” and that changes in populations are driven by the impacts of hurricanes and not climate change. Brad Lister, who led the 2018 study, said he was unconvinced by the work but would conduct his own analysis of the data used and submit the conclusion to the PNAS editors.

Wagner said increased public attention had spurred some action, such as an EU initiative to protect pollinators, a pledge of €118m (£106m) for insect conservation in Germany and \$25m in Sweden.

Another of the papers sets out actions that can protect insects. Individuals can rewild their gardens, cut pesticide use and limit outdoor lighting, it said, while countries must reduce the impacts of farming. All groups can help change attitudes towards insects by conveying that they are crucial components of the living world.

The biggest systematic assessment of global insect abundances to date, published in April 2020, showed a drop of almost 25% in the last 30 years, with accelerating declines in Europe. It indicated terrestrial insects were declining at close to 1% a year. The previous largest assessment, based on 73 studies, led the researchers to warn of “catastrophic consequences for the survival of mankind” if insect losses were not halted. It estimated the rate of decline at 2.5% a year.

Other PNAS papers found both declines and rises. Butterfly numbers have fallen by 50% since 1976 in the UK and by 50% since 1990 in the Netherlands, according to one. It also showed the ranges of butterflies began shrinking long ago, dropping by 80% between 1890 and 1940.

However, a study of moths showed zero or only modest long-term decreases over the past two decades in Ecuador and Arizona, US.

“The most important thing we learn [from these new studies] is the complexity behind insect declines. No single quick fix is going to solve this problem,” said Roel van Klink of the German Centre for Integrative Biodiversity Research. “There are certainly places where insect abundances are dropping strongly, but not everywhere. This is a reason for hope, because it can help us understand what we can do to help them. They can bounce back really fast when the conditions improve.”

Wagner said: “We know nature is under siege and we know we are responsible – we don’t really need to have a lot more data to start changing what we do. It’s unconscionable what could happen if we don’t start paying attention and change our way of consumption.”

Another paper in the series, co-authored by Wagner, concluded: “To mitigate the effects of the sixth mass extinction event that we have caused, the following will be necessary: a stable (and almost certainly lower) human population, sustainable levels of consumption, and social justice, that empowers the less wealthy people and nations of the world, where the vast majority of us live.”