Apocalypse now?

A new study strengthens the evidence base for declining trends in insect abundance, but also adds some much-needed nuance to the apocalyptic narrative.

'Insect Armageddon', or just 'Insectageddon', is a term that has entered the public consciousness in recent years, due to some widely reported scientific studies but also some questionable anecdotal evidence such as a perceived reduction in the number of insects on car windscreens. While this may help to move environmental issues up the political agenda, care is needed to avoid overclaiming or oversimplifying, with a resultant loss of public trust.

One of the most widely cited studies on the topic reported a 76% decline in insect biomass over 27 years in protected areas across Germany[1]. Other studies have suggested loss of grid-cell occupation by pollinators in the United Kingdom over 33 years[2], shown that arthropod biomass in Puerto Rico's Luquillo rainforest was lower in the 2010s than the 1970s[3], and shown declines in insect biomass, abundance and species number at nearly 300 grassland and forest sites across Germany between 2008 and 2017[4]. These are all important data sets and highlight some very worrying trends. However, it is also important to note what they don't tell us: they are not sufficient to identify global trends, they examine only a subset of ecosystem types, not all of them are continuous data sets, none of them go back before the 1970s, and it is still difficult to reliably identify drivers of the declines. A study published in this issue improves on some but not all of these deficiencies, and adds further nuance to the decline narrative.

The Rothamsted Insect Survey provides continuously monitored daily data on moth species abundance from 34 light traps located in woodland, grassland, arable and urban UK sites between 1967 and 2017. Of the 80 traps currently in operation, 34 have at least 30 years of data from each individual site. Amongst the complex and varied trends identified by the authors (and discussed in an accompanying News & Views) is the fact that while moth biomass has declined gradually since 1982, it increased much more sharply before that date, with the overall result that it is currently higher than in 1967. This indicates that studies focusing only on trends since the 1980s may be missing an important part of the story, but also highlights the fact that we really don't know what happened during the century or so of intensive agriculture and urban expansion that preceded this new study. The authors also found that while moth biomass is lower in urban and arable areas, it is woodland and grassland areas that have experienced the sharpest declines. This may be because urban and arable areas had already lost their most sensitive species before the study began, emphasizing again the importance of when you start looking.

The important point is that all these studies are contributions to the overall picture, and that these conclusions depend critically on the baseline to which they are being compared. However, no single study should be taken out of context. As the number of studies grows, so does the possibility of using an evidence synthesis approach to identify broader conclusions. But even that needs to be done with care: the methodology in one recent review on the topic[5] has been criticized for, amongst other things, having search terms that were biased towards studies that report declines[6,7].

As with all biodiversity declines, insect declines need to be taken very seriously. We have enough evidence already, from insect studies and other parts of the biodiversity literature, to support land-use policies that seek to reduce negative impacts on insects. However, to make claims about the global magnitude and extent of insect declines, we still need more data, with longer, denser and more widespread sampling. As in all areas of science, if we overclaim on the basis of any single study, we risk a scenario in which perfectly valid studies showing no effect, or a modest effect, undermine public confidence in equally valid studies that show large effects. ❐

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References

1. Hallmann, C. A. et al. *PLOS ONE* **12**, e0185809 (2017).
2. Powney, G. D. et al. *Nat. Commun.* **10**, 1018 (2019).
3. Lister, B. C. & Garcia, A. *Proc. Natl Acad. Sci. USA* **115**, E10397–E10406 (2018).
4. Seibold, S. et al. *Nature* **574**, 671–674 (2019).
5. Sánchez-Bayo, F. & Wyckhuys, K. A. G. *Biol. Conserv.* **232**, 8–27 (2019).
6. Simmons, B. I. et al. *Ecol. Evol.* **9**, 3678–3680 (2019).
7. Thomas, C. D., Jones, T. H. & Hartley, S. E. *Glob. Change Biol.* **25**, 1891–1892 (2019).