



Policy Brief

Freshwater insects are recovering, while terrestrial insects show widespread declines

Overview

Insects affect people in a variety of positive and negative ways. While pest species threaten crop yields and human health, many other insect species provide critical ecosystem services. For example, pollination directly contributes to the production of food and other economically important products such as cotton or medicinal and hygiene products, generating an estimated yearly economic revenue of more than 14 billion euros in the EU¹.

Since the publication of several local studies showing dramatic declines in insect biomass or abundances, the issue has received considerable public and political attention resulting in remarkable public engagement (e.g., Volksbegehren Artenvielfalt

in Bavaria, Germany) and political action (e.g., EU Pollinators Initiative). However, despite the growing number of case studies, it remains unclear if such declines occur everywhere and how bad the situation really is.

A new study analysing long-term studies at almost 1,700 sites globally reveals an average decline in the abundance of terrestrial insects and spiders of about 9 per cent per decade, but at the same time found an increase of some 11 per cent per decade in freshwater insects. But neither of these trends were universal and there was considerable variation, even among adjacent sites. While the observed declines give reason for concern, the study also suggests that habitat protection and restoration, particularly for freshwater insects have been effective to support them.

¹ Gallai et al. (2009): Economic valuation of the vulnerability of world agriculture confronted with pollinator decline. *Ecological Economics*, Vol. 68



iDiv

German Centre for Integrative
Biodiversity Research (iDiv)
Halle-Jena-Leipzig

Key messages

- ▶ Fresh water insect abundance has increased by about 11 per cent per decade, globally, probably mostly because of effective water protection and restoration measures.
- ▶ Terrestrial insect abundance has declined by about 9 per cent per decade, on average. This decline is of concern despite being weaker than the declines observed in recent prominent case studies.
- ▶ In Europe, abundance declines in terrestrial insects have worsened over time, and are steepest since 2005. At the same time, abundance of fresh water insects has improved.
- ▶ Abundance declines of terrestrial insects were related to levels of urbanisation. Among the potential reasons for those declines are associated processes such as habitat destruction, light pollution and chemical pollution.
- ▶ There was no consistent effect of climate change.
- ▶ Large data gaps exist around the world, but primarily in low- and middle-income countries, which is worrisome considering the large environmental changes that are occurring and are projected to increase in these countries.

Effects of land-use and conservation measures

Declines in terrestrial insect abundances were weaker in protected areas compared to non-protected areas. While this may indicate that conservation measures such as habitat protection and restoration can be effective strategies for mitigating changes in insect assemblages, the still negative trends inside protected areas highlight that protected area management is insufficient to prevent declines.

The effects of changes in agriculturally used sites could neither be confirmed nor refuted. This was probably due to a lack of detailed information about management practices in the respective sites.

Policy implications

- ▶ Water protection policies have been beneficial for freshwater insects and could be strengthened to further improve the status of these species. Possible actions include better implementation of existing policies such as the EU Water Framework Directive, the explicit formulation of water protection targets in the implementation of the European Green Deal and the targets in policies targeting other sectors such as agriculture, transport or energy.
- ▶ Management effectiveness of protected areas on land should be improved.
- ▶ Urban spatial planning should consider habitat requirements of insects and other wildlife, e.g., by preserving open spaces and natural vegetation, and promoting connectivity between habitat patches.²
- ▶ Science and science-based agencies should support policy with evidence through coordinated long-term monitoring programmes.
- ▶ Robust citizen-science programmes can contribute to monitoring efforts and new statistical analysis methods can exploit already existing, non-standardised data to uncover trends in insect assemblages.^{3,4}

2 New (2018): Promoting and developing insect conservation in Australia's urban environments. *Austral Entomology*, vol. 57

3 Saunders et al. (2020): Moving on from the Insect Apocalypse Narrative: Engaging with Evidence-Based Insect Conservation. *BioScience*, vol. 70

4 <https://www.idiv.de/smon>

Study details

The presented results are based on the analysis of data from 166 studies with 1,676 sampling locations in 41 countries.

Insect numbers in the included studies were either reported as abundance or biomass.

The study only provides estimates for regions where at least five independent datasets or data from at least 20 sampling locations were available.

The included datasets contained sampling time-series of 9 to 80 years (median sampling period 19 years).

Original study

R. van Klink, D. E. Bowler, K. B. Gongalsky, A. B. Swengel, A. Gentile, J. M. Chase (2020): Meta-analysis reveals declines in terrestrial but increases in freshwater insect abundances, *Science* 368(6489)

Contact



Dr Roel van Klink

sDiv – Synthesis Centre of iDiv

German Centre for Integrative
Biodiversity Research (iDiv)
Halle-Jena-Leipzig

Phone: +49 341 9733135

Email: roel.klink@idiv.de

[www.idiv.de/groups_and_people/
employees/details/788](http://www.idiv.de/groups_and_people/employees/details/788)



Dr Andrea Perino

Science-Policy Coordinator

German Centre for Integrative
Biodiversity Research (iDiv)
Halle-Jena-Leipzig

Phone: +49 341 9733261

Email: andrea.perino@idiv.de

[www.idiv.de/groups_and_people/
employees/details/172](http://www.idiv.de/groups_and_people/employees/details/172)



iDiv

German Centre for Integrative
Biodiversity Research (iDiv)
Halle-Jena-Leipzig

Deutscher Platz 5e
04103 Leipzig, Germany

Phone: +49 341 9733105

Fax: +49 341 9739350

info@idiv.de

www.idiv.de

Layout: Stefan Bernhardt / iDiv

Cover photo: Pascaline Kromicheff /
pixabay.com

As of April 2020

iDiv is a central facility of Leipzig University within the meaning of Section 92 (1) of the Act on Academic Freedom in Higher Education in Saxony ("Sächsisches Hochschulfreiheitsgesetz, SächsHSFG"). It is run together with the Martin Luther University Halle-Wittenberg and the Friedrich Schiller University Jena, as well as in cooperation with the Helmholtz Centre for Environmental Research – UFZ. The following non-university research institutions are involved as cooperation partners:

the Helmholtz Centre for Environmental Research (UFZ), the Max Planck Institute for Biogeochemistry (MPI BGC), the Max Planck Institute for Chemical Ecology (MPI CE), the Max Planck Institute for Evolutionary Anthropology (MPI EVA), the Leibniz Institute DSMZ – German Collection of Microorganisms and Cell Cultures, the Leibniz Institute of Plant Biochemistry (IPB), the Leibniz Institute of Plant Genetics and Crop Plant Research (IPK) and the Leibniz Institute Senckenberg Museum of Natural History Görlitz (SMNG).