

Science for Environment Policy

Flying insects in west German nature reserves suffer decline of more than 76% (1973–2000)

Insect numbers in west German nature reserves have fallen by more than 76% in just 27 years, according to a new study. The fall was even higher in the summer months, with 82% on average fewer insects being recorded. The reasons for this dramatic fall are unclear. The researchers ruled out changes in weather, plant cover and local landscape playing a significant role in the observed decline, but suggest that intensive agriculture and pesticides in fields near to the reserves could be responsible. Whatever the cause, the catastrophic fall in insect numbers will inevitably lead to knock-on effects on ecosystems in the long term, particularly due to their essential role as pollinators and their position in the food web. The researchers say that preserving and protecting insects should now be a priority for conservation policies.

Insects play a vital role in ecosystems. They recycle nutrients by helping to decompose plant litter and dung. They also provide a food source for birds, mammals and amphibians. Eighty per cent of wild plants are estimated to depend on insects for pollination, whilst 60% of birds rely on insects as a food source.

The EU are working to address the threats facing Europe's insects in several ways. The EU's [biodiversity strategy](#) aims to halt the loss of biodiversity and ecosystem services by 2020. [EU nature legislation](#), such as the [Habitats Directive](#)¹, has established guidelines to conserve threatened animal and plant species. On 1 June 2018, the European Commission adopted the [EU Pollinators Initiative](#) to address the decline of insect pollinators. While it does not encompass all insects, it can be expected that the initiative will also greatly benefit non-pollinating insects.

Many studies have suggested certain populations of insects are on the decline — between 1990 and 2015, grassland butterflies declined by 33% in 15 EU Member States². Studies on bees³ and moths⁴ suggest the same trend. [The European Red List](#), a review of the status of European species shows that 9.2% and 9.1% of bee species are considered threatened at the European and EU 27 levels, respectively. For more than half of the species in Europe, however, there was not enough data to evaluate their risk of extinction, due to the general lack of monitoring activities for insects. Therefore, while climate change and habitat loss have often been blamed for insect decline, no long-term studies have looked at their effect on insect numbers.

This study is based on standardised observations conducted between 1989 and 2016, using malaise traps — large, tent-like structures — to capture flying insects in 63 lowland wildlife and biodiversity protection areas in Germany. They measured the total weight, or biomass, of the insects and found an alarming decline of 76% in just 27 years.

The scientists looked at a number of possible causes for the decline. They measured local weather and climate conditions, studied changes in the landscape surrounding the traps, and examined changes to the habitats themselves, including the richness of plants, shrubs and trees found nearby. None of these factors, however, could explain the dramatic plunge in insect numbers. Although nutrient-rich habitats, such as grasslands and wasteland, contained 43% more insects than nutrient-poor areas, such as heathland, the annual rate of decline was similar, suggesting that insects were suffering across all habitat types and landscape configurations.

Continued on next page.



19 July 2018

Issue 511

[Subscribe](#) to free
weekly News Alert

Source: Hallmann, C.A., Sorg, M., Jongejans, E., *et al.* (2017). More than 75 percent decline over 27 years in total flying insect biomass in protected areas. *PLoS ONE* 12(10): e0185809. doi:10.1371/journal.pone.0185809

Contact:

c.hallmann@science.ru.nl;
h.dekroon@science.ru.nl

Read more about:

[Agriculture](#),
[Biodiversity](#),
[Emerging risks](#),
[Natural capital](#)

1. <https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX:31992L0043>

2. e.g. Van Swaay, C., Van Strien, Aghababayan, K., *et al.* (2016). [The European Butterfly Indicator for Grassland species: 1990-2015](#). Technical Report

3. e.g. Woodcock, B.A., Isaac, N.J., Bullock, J.M., *et al.* (2016). [Impacts of neonicotinoid use on long-term population changes in wild bees in England](#). *Nature Communications*, 7:12459.

4. e.g. Fox, R., Oliver, T.H., Harrower, C., *et al.* [Long-term changes to the frequency of occurrence of British moths are consistent with opposing and synergistic effects of climate and land use changes](#). (2014). *Journal of Applied Ecology*; 51(4): 949–957.

Science for Environment Policy

Flying insects in west German nature reserves suffer decline of more than 76% (1973–2000) *(continued)*

19 July 2018

Issue 511

[Subscribe](#) to free
weekly News Alert

Source: Hallmann, C.A., Sorg, M., Jongejans, E., *et al.* (2017). More than 75 percent decline over 27 years in total flying insect biomass in protected areas. *PLoS ONE* 12(10): e0185809.
doi:10.1371/journal.pone.0185809

Contact:

c.hallmann@science.ru.nl;
h.dekroon@science.ru.nl

Read more about:

[Agriculture](#),
[Biodiversity](#),
[Emerging risks](#),
[Natural capital](#)

The contents and views included in Science for Environment Policy are based on independent, peer-reviewed research and do not necessarily reflect the position of the European Commission. Please note that this article is a summary of only one study. Other studies may come to other conclusions.

To cite this

article/service: "[Science for Environment Policy](#)":
European Commission DG
Environment News Alert
Service, edited by
SCU, The University of
West of England, Bristol.

This finding is significant, because it shows for the first time that it is not just vulnerable species such as bees, butterflies and moths that are at risk: all flying insects have been affected. The researchers have not identified the cause of this decline but they suggest that agricultural intensification might be responsible. Almost all the reserves in which the traps were placed are enclosed by agricultural fields. Increased pesticide and fertiliser use in these fields, as well as year-round tillage and the disappearance of field margins, could explain the fall in insect numbers, although this factor was not tested in the study due to unavailability of relevant data.

The researchers did not look at the entire range of climatic variables that could impact on insect biomass, and say that prolonged droughts or lack of sunshine, especially in low temperatures, might have had an effect on insect biomass. They suggest that there is a need for further research on the causes of the decline in insect numbers, its geographical extent, and how it might impact on ecosystems.

