Peer-reviewed scientific literature over the past decade supports the conclusion that **many diverse insect groups have declined substantially worldwide.** Trends vary by habitat, taxon, region, and metric, and the biggest scientific uncertainty concerns the tropics, where most insect diversity occurs but long-term monitoring is difficult.[1][2]

What the evidence shows

The field was transformed by the 2017 German study, which reported a 76% seasonal decline in flying-insect biomass across 27 years in protected areas. That finding stimulated hundreds of subsequent studies and made insect decline a major research agenda.[2] A major 2020 meta-analysis of 166 arthropod time series found an average decline of about 0.9% per year in terrestrial insect abundance, while freshwater insect abundance increased by about 1.1% per year. This is the central reason scientists distinguish terrestrial from freshwater trends rather than speaking of a single global trajectory.[3] Later reports generally estimate losses of roughly 9% per decade, though the magnitude is contested and trends differ substantially among taxa and habitats. The strongest, most consistent evidence comes from North America and temperate Europe; evidence from tropical regions remains sparse.[1]

Causes are multiple and interacting

A 2025 synthesis of 175 reviews, meta-analyses, and perspectives published since 2017 mapped 597 proposed causes across 108 drivers. It found that insect decline is best understood as the result of interacting pressures rather than one universal cause.[2]

Cause	Main mechanisms
Agricultural intensification	Habitat conversion, monocultures, pesticide exposure, simplified landscapes, and effects mediated through managed-bee pathogens [2]

Habitat loss and degradation	Destruction, fragmentation, and homogenization of natural habitats; these are central pathways linking land-use change to insect outcomes [2]
Pesticides and pollution	Insecticides, especially neonicotinoids, plus light pollution, nutrient loading, and other contaminants; insecticides are among the most frequently proposed direct stressors [2][1]
Climate change	Temperature stress, phenological mismatch, range shifts, and interactions with chemicals and habitat degradation [2][1]
Urbanization	Habitat loss and fragmentation, altered microclimates, light pollution, and other urban pressures [2][4]

Agricultural intensification is the most frequently identified upstream or “root” driver, while habitat loss and habitat degradation are especially central because they connect many other pressures to insect outcomes. The three most frequently proposed specific direct stressors are insecticides, loss of critical plant resources, and habitat loss.[2]

Important qualifications

The literature rejects the claim that every insect population is collapsing everywhere. Some taxa and freshwater systems have increased or remained stable, and responses depend on species traits such as thermal tolerance, diet specialization, dispersal ability, and habitat requirements.[5] [1] Trends are also highly heterogeneous: butterflies, moths, bees, and ground beetles are relatively well studied, whereas flies, true bugs, grasshoppers, and many other orders receive little attention. Nearly half of taxon-specific hypotheses in the 2025 synthesis concerned just two bee genera, *Apis* and *Bombus*, despite their tiny share of hymenopteran diversity.[2] There is also

a geographic monitoring gap. Standardized long-term datasets are concentrated in temperate Europe and North America, while the tropics—home to most insect species—are poorly represented. The limited tropical time series that exist tend to report decline rather than stability, but they are too sparse to support a precise global estimate.[1]

Ecosystem consequences

Insects underpin pollination, decomposition, nutrient cycling, pest regulation, and food webs for birds, fish, reptiles, and other animals. The literature therefore treats sustained insect loss as a structural threat to ecosystem functioning, not merely a biodiversity-count issue.[2] Declines are expected to affect agriculture and food security as well, particularly through pollination and natural pest control, although the size of those effects varies by crop, region, and the insect species involved.[5]

The Bottom Line: the last decade's peer-reviewed work establishes widespread, often severe terrestrial insect declines in monitored regions; identifies agriculture, habitat loss, pesticides, climate change, and pollution as interacting causes.

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