



CLIMATE CHANGE IS ALTERING PLANT AND POLLINATOR RELATIONSHIPS

A GLOBAL OVERVIEW

The rhythms of life, shaped by millions of years of evolution, are being altered by our rapidly changing climate. The relationship between plants and their pollinators is particularly vulnerable, and the survival of nearly all terrestrial ecosystems hangs in the balance. Our planet's future will be defined by how well we understand and safeguard these vital connections.

In February 2025, scientists from Mexico, Costa Rica and the United States published a report that compiles the research from 340 scientific articles on how climate change is disrupting plant reproduction and pollinators. This overview provides a brief summary of the report's findings.

THE GLOBAL SOUTH AND MANY SPECIES REMAIN UNDERSTUDIED

Research on climate change's impact on plants and pollinators is topically and geographically imbalanced. The vast majority of studies have focused on temperate (49%) and alpine (17%) ecosystems, with far fewer examining tropical (13%), Arctic (8%), Mediterranean (9%), and desert habitats (4%). Geographically, North America (41%) and Europe (36%) dominate the research landscape, while Central and South America (8%), Asia (8%), Oceania (3%), multi-continent studies (3%), and Africa (1%) lag far behind. Many plant and pollinator groups remain undersampled, including woody plants, nectar-feeding vertebrates, moths, and other insect pollinators. Even for the most well-studied ecosystems, information on most plant and animal species is limited.

Long horned bee
on aster



PLANT-POLLINATOR RELATIONSHIPS ARE BEING DISRUPTED

Climate changes are reshaping how plants and animals interact. Disruptions in these relationships may occur when plants and pollinators no longer co-exist in space or time, or when floral shapes and rewards no longer match the needs and behaviors of their animal pollinators. For example, rising temperatures are causing earlier blooming periods in most world regions, although later flowering or lack of change is also common in some communities. Similarly, the activity times of many temperate pollinators are shifting earlier, but there is variation among pollinator groups and regions. Overall, climate change is increasing the risk of mismatches between plants and pollinators.

Small-flowered agrimony



PLANT REPRODUCTION AND POLLINATOR SURVIVAL ARE AT RISK

Climate change is altering the traits that help flowers attract and reward pollinators, such as flower size, color, scent, and nectar or pollen production. Warmer temperatures and drought conditions generally reduce nectar rewards, while flower shape may change in different ways. Meanwhile, floral scents often become stronger or chemically change, which could attract different pollinators.

Climate change is altering different plant and pollinator life cycle traits, such as fertility and survival. The effects on flower production, reproductive success, and pollinator abundance vary depending on temperature and water availability. However, most pollinators experience negative impacts on their health and life cycles due to rising temperatures. Extreme weather and the destruction of natural habitats further worsen these effects, making it harder for both plants and pollinators to thrive.



Bumble bee on coneflower

URGENT NEED FOR FURTHER RESEARCH

Global warming impacts plant reproduction, but the effects aren't always negative. Though few mismatches between plants and pollinators have been confirmed, shifts in blooming times and floral attractants suggest mismatches will likely become more common. The report underscores the need for broader global research, especially in tropical, arid, and icy regions and in underrepresented plant and pollinator species worldwide.

WHAT CAN YOU DO?

- Support actions that help fight climate change
- Get involved in community science projects that track pollinator populations and flowering patterns
- Support pollinators by planting early- and late-season blooms
- Support water conservation strategies to reduce the impact of droughts on plants and pollinators
- Advocate for sustainable agricultural practices that minimize land use changes and habitat destruction
- Reduce your carbon footprint

Reference

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Photos provided by USGS and Pollinator Partnership.

pollinator.org

Find more information on pollinators and climate change at pollinator.org.

This resource was created by the NAPPC Climate Change and Pollinators Task Force.



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