Bugs thrive in urban Los Angeles—volunteers' traps reveal biodiversity hot spots for city insects and spiders

July 22 2024, by Laura Melissa Guzman, Charles Lehnen and Teagan Baiotto

This snakefly, from the genus Agulla, was one of the 400 bug species discovered in Los Angeles backyards and byways. Credit: Lisa Gonzales, courtesy of Natural History Museums of Los Angeles County, CC BY-SA

The most significant predictors of bug biodiversity in Los Angeles are proximity to the mountains and temperature stability throughout the year, according to a study weco-authored with Brian V. Brown of the Los Angeles Natural History Museum and colleagues at the University of Southern California and California State University.

The project used data from the museum's BioSCAN project, where volunteers across Los Angeles allowed insect traps to be installed on their property between 2014 and 2018.

The analysis showed some surprising results. For instance, land values had little impact on the overall diversity of arthropods, specifically spiders and insects. This finding challenges the "luxury hypothesis," the notion that wealthier neighborhoods, which tend to have more trees, always have greater biodiversity—an assumption that generally holds true for birds and mammals, including bats.

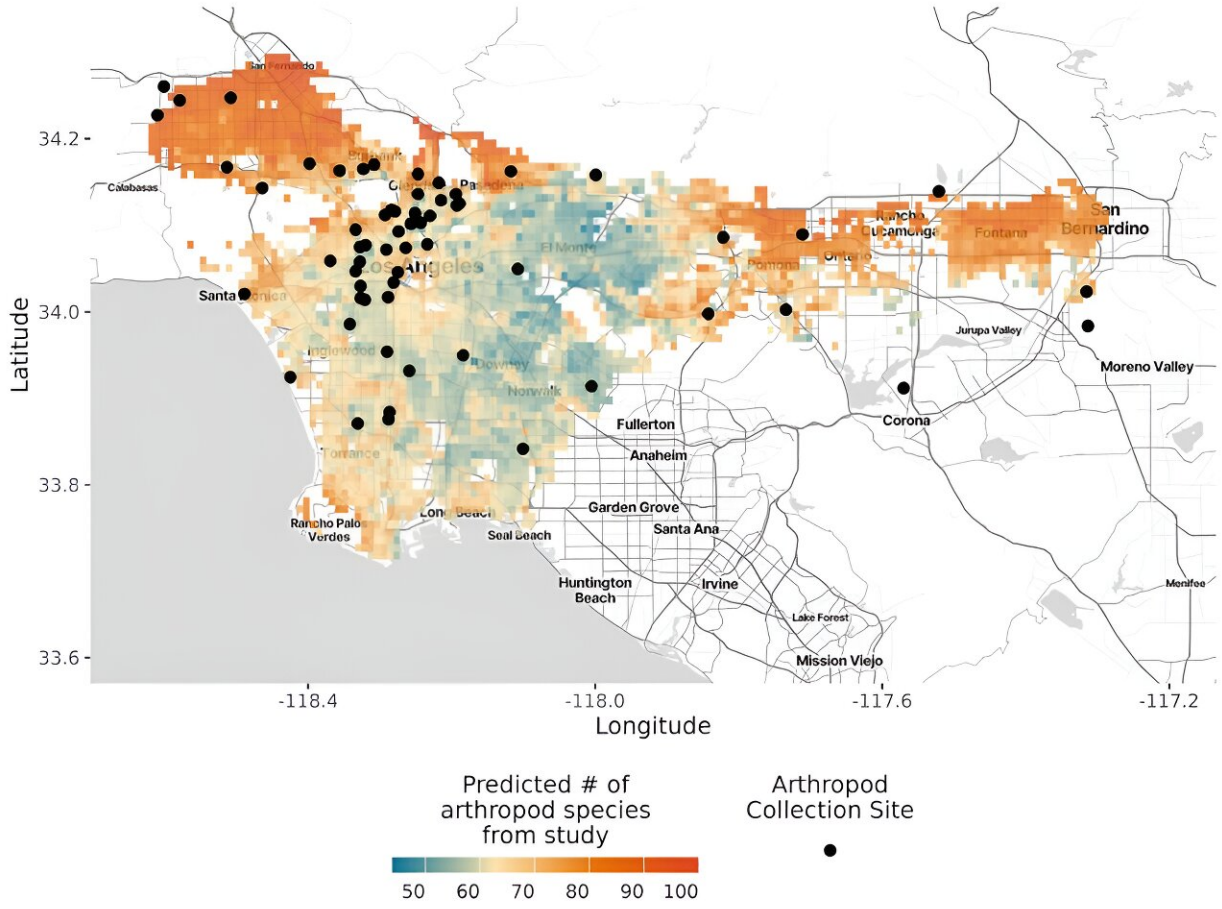
The BioSCAN study identified over 400 different species of bugs across Greater Los Angeles, many surviving despite pavement and habitat loss.

In fact, urban environments can be attractive to some invasive arthropod species. Often called urban opportunists, such species frequently come in waves that replace or restrict current species. For instance, about 20 years ago, Los Angeles' native black widow spiders (Latrodectus hesperus) began to be replaced by brown widow spiders (Latrodectus geometricus). Recent evidence shows these interlopers are now being replaced by noble false widow spiders (Steatoda nobilis).

Why it matters

Bug populations are essential for people, who rely on them to provide pollination, decompose plant and animal material and control pest insects. These services are as important in cities as they are in rural environments—and are provided by insects for free.

Imagine a city where organic waste like dead animals or plant matter didn't decompose. A city without insects would also mean an environment without birds and most other types of wildlife, many of which rely on insects for food. Such a place would also have no flowers, fruits or vegetables growing. In fact, a world without insects would be a world without humans.



Arthropod species richness in Los Angeles. Black dots show locations where the BioSCAN project collected bugs between 2014-2018. The color scale shows the predicted number of species, with blue being the least rich and orange being the most rich. Credit: Map tiles by Stamen Design, CC BY-SA

Low arthropod diversity can lead to ecosystem imbalance. A 2022 study found that pests, like sap-feeding aphids, can get out of control in highly urban areas because there are not enough predators like beetles and spiders to keep them in check.

Most biodiversity studies are conducted in natural or even protected areas, but more and more, scientists are recognizing that urban areas can harbor many species. Understanding biodiversity in urban areas is important because cities are expected to continue spreading—with the United Nations predicting urban populations to grow by 2.5 billion by 2050.

What still isn't known

Although we now know which factors most strongly influence arthropod diversity in Los Angeles, we don't fully understand how this diversity translates to healthy urban ecosystems.

Scientists know more species lead to healthier urban ecosystems, but not all species contribute equally. For example, planting pollinator-friendly plants are a relatively easy intervention in urban environments, but it will not benefit all insect species.

What's next

As part of the BioSCAN project, volunteers also allowed bioacoustic monitors to be installed on their properties, so future studies can include bats, which are also crucial for pollination and pest control in cities.

Additionally, researchers at the University of Southern California are continuing to study the same data set to understand seasonality in urban arthropod communities. In a warming climate, this knowledge could help predict future bug population shifts.

Overall, insights from these studies may help inform urban planning and development to support bug biodiversity, particularly as cities expand through urban sprawl.

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