

Urban agriculture can promote bee communities in tropical megacities

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Large solitary cavity-nesting bees such as Carpenter bees (*Xylocopa* spp.) can benefit from urbanization provided they find enough flower resources. Credit: Vikas S Rao

Urbanization is a primary threat to biodiversity. However, scientists

know little about how urbanization affects biodiversity and ecosystem services in tropical regions of the Global South. An international research team led by the Universities of Göttingen and Hohenheim in Germany, in collaboration with the University of Agricultural Sciences of Bangalore in India, investigated the effects of urbanization on bee communities in smallholder farms in and around Bangalore—a South Indian city with more than 13 million inhabitants. They found that social bees, such as wild honey bees, suffered more than large solitary bees or those that nest in cavities, which contrasts with results from temperate regions. Native flowering plants adjacent to farmland and crop diversification can help to maintain bee communities. The findings were published in the journal *Ecological Applications*.

In an extensive field survey of bees on vegetable farms spread from rural to [urban environments](#), the researchers recorded more than 26,000 individual bees belonging to 40 species. Combining the data with remote sensing by satellite allowed the scientists to identify how the proportion of sealed surfaces and buildings in [metropolitan areas](#) affected bee communities. They also analyzed how bee species responded to the environments, comparing bees that use different nesting sites and differ in sociality and mobility.

"We demonstrated that the way bees responded to urbanization were specific to certain traits. For example, bees nesting in cavities actually benefited from urbanization as they can nest in small cracks and cavities on buildings," says first author Gabriel Marcacci, Ph.D. student in the Functional Agrobiodiversity group at the University of Göttingen. He continues, "Moreover, we found that ground-nesting bees, which are usually considered the losers in urbanization, find ample nesting opportunities in tropical megacities because enough bare ground is still available, mostly in the less developed neighborhoods."



Urban expansion increasingly encroaches smallholder farms in tropical megacities. Credit: Gabriel Marcacci

Professor Ingo Grass, Department of Ecology of Tropical Agricultural Systems University of Hohenheim, explains that their "results differ in part from what is often found in cities in [temperate regions](#), which shows that we cannot generalize from field studies carried out in Germany or other countries of the Global North." Another contrasting result is the strong decline of social bees with urbanization. "This result is particularly worrying because in the tropics, [social bees](#)—such as wild honeybees and [stingless bees](#)—form large colonies and are essential for crop pollination," explains Professor Teja Tscharntke.

The study also revealed the positive effects on bee communities of farm management practices such as crop diversification, or the presence of wild native plants growing within and around vegetable fields. Professor Catrin Westphal, head of Göttingen University's Functional Agrobiodiversity group, concludes that their "results suggest that [urban agriculture](#) can promote bee communities if managed in a sustainable manner and could combine to support wild bee conservation and food production in and around cities."

More information: Gabriel Marcacci et al, Functional diversity of farmland bees across rural–urban landscapes in a tropical megacity, *Ecological Applications* (2022). [DOI: 10.1002/eap.2699](https://doi.org/10.1002/eap.2699)

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