

Earth & Space

Bee aware! Signs of a global decline in wild bee diversity

by **Eduardo E. Zattara**¹ | Adjunct Researcher

¹: INIBIOMA, Universidad Nacional del Comahue, CONICET, Bariloche, Argentina

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ABSTRACT

There is more to bees than honey: wild bees ensure efficient pollination of most flowering plants and food crops. Yet a recent study counting the number of species recorded worldwide every year from 1946 to 2015 suggests a bleak picture, finding a steep reduction in the number of species in recent years. Although changes in how we record bees could overstate these results, such strong decline in bee diversity should trigger some alarms.



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Everyone likes bees; they are fuzzy, love flowers and do many great things – but they might not be around for much longer.

Although most of us are familiar with the European honeybee, this is but one of over 20 thousand species of wild bees, and one of only a handful of species we have domesticated. In fact, honey-making is probably the least important service wild bees provide: without bees, hundreds of thousands of flowering plant species wouldn't be able to reproduce, including about 85% of crops. So, if you like apples, almonds, berries, pumpkins, or any other of many fruits and veggies, then the possible disappearance of bees should be a matter of concern to you.

For almost two decades now, studies from various regions around the world have raised the alarm that abundance and species numbers of insects in general, and bees in particular, are going down. These are coming at a time when the ecosystem services – a measure of the role a species plays in sustaining healthy natural and agricultural environments – provided by insects were being increasingly recognized. However, there was disagreement over whether this was a global phenomenon. A major problem was the lack of historical data: it is very difficult to measure how the abundance and diversity of bees is changing if we do not know how it was in the past.

Unfortunately, we do not have a time machine to go back to the past and measure the diversity back then. However, there is a treasure-trove of valuable data about the past within specimen collections and records from museums, academic institutions and public and private collectors. An increasing number of these records is being gathered into a single, publicly available database by the Global Biodiversity Information Facility (GBIF), an international network funded by governments worldwide. Along with my colleague and friend Marcelo Aizen, we set out to test if we could use this database to begin answering the important question of whether bee biodiversity was declining on a global scale.

Now, accurately evaluating changes in abundance and diversity of bees – or any other group in fact – requires repeatedly visiting each location and observing or collecting specimens in the same way over several years or decades. Unfortunately, this is not how most insects are observed or collected. Furthermore, data records found on GBIF come from a mishmash of sources and were collected for diverse purposes. Thus, we knew “accuracy” was off the table; instead of aiming for precise estimates, we went for a rougher estimate of overall trends, expecting that the large size of the dataset would smooth out the bumps caused by the diverse original recording criteria.

The logic we used was that if the population of any given bee species is stable over time, then the chance of at least one specimen of a certain wild bee species being collected anywhere in the world in any given year would be the same. This means that if bee species are not thriving nor declining, then the total number of species found and reported yearly should stay around the same average value. But when we counted the number of bee species from worldwide GBIF records starting from 1946 up to 2015, we

found a steep decline in the average number of species being reported since the 1990s. In particular, we found that the number of species recorded in the last ten years was 25% smaller than that recorded during the 1970s.

It is certainly possible that this decline could be partially explained due to changes in collection efforts (moving away from traveling far to find rare species and towards collecting more common species closer to home), the loss of the expertise necessary to tell species apart, or shifts in research funding priorities for collections and data sharing. On the other hand, the number of records has been growing exponentially, mainly thanks to community science efforts, suggesting we should be finding more, not fewer species in more recent years - unless bee populations are really suffering. Widespread replacement of diverse natural habitats for agricultural and urban lands, increased use of pesticides, introduction of invasive species and climate change are some of the many factors hammering not only wild bees but also many other groups, causing population declines and local or even global extinction.

While highlighting the many uncertainties resulting from the variety of data we used, our study also raises a very timely and needed word of alarm and has prompted further studies addressing the status of wild bee populations worldwide, along with a call for action to prevent their further decline. Everyone can help wild bees with individual actions – like making gardens and parks more bee-friendly, and learning and teaching about wild bees – and political pressure – supporting conservation initiatives and voting for representatives pushing environmental agendas. The world as we know it needs healthy wild bees.