

Why do birds make so many different sounds? A study gets at the underlying factors

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Birds make sounds to communicate, whether to find a potential mate, ward off predators, or just sing for pleasure.

But the conditions that contribute to the immense diversity of the sounds they make are not well understood. Researchers at the University of Wisconsin–Madison have conducted the first-ever global study of the factors that influence bird sounds, using more than 100,000 [audio recordings](#) from around the world. The new study, recently [published](#) in the journal *Proceedings of the Royal Society B*, revealed insightful patterns for why birds make certain noises and at what frequency.

Hypotheses about the role of habitat, geography, [body size](#) and beak shape in forming bird sounds have been tested on small scales before. But H.S. Sathya Chandra Sagar, a UW–Madison doctoral student who works with Professor Zuzana Buřivalová in the Department of Forest and Wildlife Ecology and the Nelson Institute for Environmental Studies, wanted to see if they held up on a global scale.

Sagar analyzed audio recordings of bird sounds taken by people around the world and submitted to a bird-watching repository called xeno-canto. The analyzed recordings represented 77% of known [bird species](#).

The study's major takeaways included:

- The habitats of bird species influence the frequency of the sounds they may make in unexpected ways. For example, in ecosystems with a lot of rushing water there is a constant level of white noise occurring at a lower frequency. In such cases, researchers found that birds tend to make sounds of higher frequency, likely so they wouldn't be drowned out by the water.
- Bird species living at the same latitudes make similar sounds. Observing this pattern on a global scale is an important piece of the puzzle in the evolutionary story of bird sounds. It could inspire further research into the aspects of geographic location that influence bird sounds.

- A bird's beak shape and body mass are important. Generally, smaller birds create higher frequency sounds while larger birds create lower frequency sounds. The global analysis not only proved this hypothesis correct, but it also added new information about the nature of the relationship between beak shape, body mass and sound.
- Smaller bird species tend to have a wider range of frequencies at which they can make sound as a protection mechanism. Smaller, more vulnerable birds can benefit from being able to make a range of sounds. Higher frequencies can help them communicate with fellow birds of the same species, while lower frequencies can serve as camouflage, tricking potential threats into thinking they are larger and less vulnerable than they actually are.

The research also contributed to the broader understanding of soundscapes—all of the sounds heard in any particular landscape. Soundscapes are often used as part of conservation studies, but Sagar realized "there's very little that we know about the forces that govern soundscapes."

He hopes this foundational work will provide a platform for future studies to improve [conservation efforts](#) by developing ways to monitor the health of an ecosystem through soundscapes.

"In the tropics and all over the world, larger birds tend to be hunted for meat," he says as an example. "Larger birds [tend] to call at a low frequency, and if we don't find any sound in the lower [frequency](#), we could [conclude] there may be more hunting in this landscape."

Next, Sagar hopes to use 24-hour soundscape recordings to understand whether some birds modify the timing of their song in addition to their frequencies to communicate with their peers in a landscape crowded

with noise. He notes the important role that birdwatchers and citizen scientists play in discovering new insights about our natural world.

More information: H. S. Sathya Chandra Sagar et al, Global analysis of acoustic frequency characteristics in birds, *Proceedings of the Royal Society B: Biological Sciences* (2024). [DOI: 10.1098/rspb.2024.1908](https://doi.org/10.1098/rspb.2024.1908)

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