

What we know and don't know about Earth's missing biodiversity

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Most of the world's species are still unknown to science although many researchers grappled to address the question of how many species there are on Earth over the recent decades. Estimates of non-microbial diversity on Earth provided by researchers range from 2 million to over 50 million species, with great uncertainties in numbers of insects, fungi, nematodes, and deep-sea organisms.

Some groups of species, such as plants and [birds](#), are well-known, with scientists discovering relatively few new ones each year. For [insects](#) and [fungi](#), however, it is almost impossible to guess how many [unknown species](#) there are.

These findings were revealed in a first-ever study by researchers from the National University of Singapore (NUS), James Cook University in Australia, Microsoft Research in the United Kingdom and Duke University in the United States, and was first published in [Trends in Ecology & Evolution](#) on 10 July 2012.

The researchers emphasise the importance of technology such as DNA barcoding, new databases and crowd-sourcing, that could greatly accelerate the rate of species discovery.

Unknown Biodiversity: Estimates

In their study, Scheffers and his colleagues collated information from

numerous studies that attempt to estimate numbers and characteristics of unknown biodiversity. What may seem like straight forward questions about the Earth's biodiversity are "deceptively complex", warned the researchers.

"What we do know," said lead researcher Brett R. Scheffers, who is from the Department of Biological Sciences at NUS, "is that these unknown species are likely living in places where they are in danger of extinction, and that we could lose many before we realise how valuable they are."

"The problem is how one protects an animal that has never been seen," he added. "What we want to know is how many species there are, what they look like and where do they live."

The report suggests that many of these species are important for medicine, water purification and provide numerous other services for humanity. For instance, a group of marine snails - the cone snail - is important for drug development ranging from pain killers to treatment of neurological diseases. Many species of these snails are newly discovered, and there is likely many more still waiting to be discovered.

"We simply cannot afford to lose these species because of neglect and short-sided economic gains," explained co-author Professor William Laurance of James Cook University in Cairns, Australia.

Major Challenges

The researchers pointed out major challenges that complicate biodiversity inventory. These include accidentally assigning two different species the same name, and animals that look nearly identical and can therefore only be identified by genetic analyses.

Co-author Dr. Lucas Joppa from Microsoft Research in Cambridge, United Kingdom said, "Missing species will likely be hard to find, such as deep-sea organisms, high mountain species or those species that live beneath the ground. Missing biodiversity will be small - both in body size and the amount of area that they live in. This is a concern as both of these factors relate to a species vulnerability to environmental disturbances."

Advances in Technology

Although these challenges present real struggles for future records, Scheffers and his colleagues stress that progress is being made. Novel techniques, such as DNA barcoding, new databases and crowd-sourcing, could greatly accelerate the rate of species discovery.

"New technologies such as environmental DNA analyses now exist and can detect a species' presence from mere water samples without ever visually observing it," said Scheffers. "Data sharing technologies over the Internet about [species](#) locations and discoveries are also expediting and expanding the catalogue of life."

Provided by National University of Singapore

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