

The sound of restored soil: Measuring soil biodiversity with eco-acoustics

April 10 2023



Credit: Pixabay

U.K. and Australian ecologists have used audio technology to record different types of sounds in the soils of a degraded and restored forest to indicate the health of ecosystems.

Non-invasive acoustic monitoring has great potential for scientists to gather long-term information on species and their abundance, says Flinders University researcher Dr. Jake Robinson, who conducted the study while at the University of Sheffield in England.

"Eco-acoustics can measure the health of landscapes affected by farming, mining and deforestation but can also monitor their recovery following revegetation," he says.

"From earthworms and plant roots to shifting soils and other underground activity, these subtle sounds were stronger and more diverse in healthy soils—once background noise was blocked out."

The subterranean study used special microphones to collect almost 200 sound samples, each about three minutes long, from [soil samples](#) collected in restored and cleared forests in South Yorkshire, England.

"Like underwater and above-ground acoustic monitoring, below-ground biodiversity monitoring using eco-acoustics has great potential," says Flinders University co-author, Associate Professor Martin Breed.

Since joining Flinders University, Dr. Robinson has released his first book, entitled "Invisible Friends," which covers his core research into "how microbes in the environment shape our lives and the world around us."

Now, a researcher in restoration genomics at the College of Science and Engineering at Flinders University, the new book examines the powerful role invisible microbes play in ecology, immunology, psychology, forensics and even architecture.

"Instead of considering microbes the bane of our life, as we have done during the global pandemic, we should appreciate the many benefits they

bring in keeping plants animals, and ourselves, alive."

In another new article, published in *Education Sciences*, Dr. Robinson and colleagues call for a return to "nature play" for children to expose their developing immune systems to a diverse array of microbes at a young age for better long-term health outcomes.

"Early childhood settings should optimize both outdoor and indoor environments for enhanced exposure to diverse microbiomes for social, cognitive and physiological health," the researchers say.

"It's important to remember that healthy soils feed the air with these diverse microbes," Dr. Robinson adds.

The article, "The sound of restored [soil](#): Measuring soil [biodiversity](#) in a forest restoration chronosequence with ecoacoustics" (2023) by Jake M Robinson, Martin F Breed and Carlos Abrahams (Nottingham Trent University) can be viewed on the pre-print server for biology, *bioRxiv* ahead of review for final publication.

More information: Jake M. Robinson et al, The sound of restored soil: Measuring soil biodiversity in a forest restoration chronosequence with ecoacoustics (2023). [DOI: 10.1101/2023.01.23.525240](https://doi.org/10.1101/2023.01.23.525240)

Jake M. Robinson et al, Optimising Early Childhood Educational Settings for Health Using Nature-Based Solutions: The Microbiome Aspect, *Education Sciences* (2023). [DOI: 10.3390/educsci13020211](https://doi.org/10.3390/educsci13020211)

Jake Robinson, Invisible Friends (2022). [DOI: 10.53061/NZYJ2969](https://doi.org/10.53061/NZYJ2969)

Provided by Flinders University

Citation: The sound of restored soil: Measuring soil biodiversity with eco-acoustics (2023, April 10) retrieved 16 August 2024 from <https://phys.org/news/2023-04-soil-biodiversity-eco-acoustics.html>

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