

eDNA provides researchers with 'more than meets the eye'

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Curtin PhD Candidate Ms Mieke van der Heyde collecting samples for eDNA analysis. Credit: Curtin University

Researchers from Curtin University have used next generation DNA sequencing to learn more about the different species of plants, insects and animals present in the Pilbara and Perth regions of Western Australia.

Lead researcher Curtin Ph.D. candidate Mieke van der Heyde, from the

ARC Centre for Mine Site Restoration said that DNA metabarcoding is a growing field in the biological monitoring space, with the potential to provide fast, accurate, and cost effective assessments of biodiversity.

"Traditionally, biomonitoring has relied on scientists setting traps and visually monitoring a certain area, counting the number of species, and then extrapolating that data to come up with regional analysis," Ms van der Heyde said.

"Understandably, that method of data collecting is expensive, time consuming and challenging, especially when looking into remote areas of Australia, which often present a harsh climate.

"As animals and organisms interact with their environment, they leave behind traces of their DNA through things like droppings, skin cells, saliva, and pollen. When this DNA is found in the environment, it's known as environmental DNA, or eDNA.

"Our research looked in to the feasibility of using this eDNA as an additional tool for biomonitoring. Not only to see if this type of analysis could potentially make things a bit easier for biologists out in the field, but as well as providing researchers with more accurate field information than what they can visually identify."

The study analysed samples of soil, animal droppings, plant and insect material, collectively known as 'substrates,' taken from two different areas of Western Australia: The Pilbara, a hot desert climate, and the Swan Coastal Plain, a hot Mediterranean-type climate.

"We tested common environmental substrates including soil, bulk scat, bulk plant material, and bulk arthropods from pitfall traps and vane traps, using four eDNA barcoding assessments to detect a wide range of plants, vertebrates and arthropods," Ms van der Heyde said

"This study was the first of its kind to systematically test terrestrial substrates for eDNA, and it also was the first time that some of these particular substrates were analysed.

"Results show that bulk arthropods and animal droppings detected the most biodiversity, with at least a third of the biodiversity detected in only one [substrate](#). Soil samples detected the least, and fewer samples had usable DNA, especially in the Pilbara. We believe this is most likely due to the hot climate, which potentially degraded the eDNA.

"Biomonitoring is necessary for effective ecosystem management. Our study shows that eDNA can detect biodiversity in an area, and collecting more substrates will increase the breadth of biodiversity detected.

"However, surveys must be carefully considered, as DNA may come from organisms outside the study area," Ms van der Heyde said.

The [research paper](#), "Testing multiple substrates for terrestrial [biodiversity](#) monitoring using environmental DNA (eDNA) metabarcoding," is published in *Molecular Ecology Resources*.

More information: Mieke Heyde et al. Testing multiple substrates for terrestrial biodiversity monitoring using environmental DNA metabarcoding, *Molecular Ecology Resources* (2020). [DOI: 10.1111/1755-0998.13148](#)

Provided by Curtin University

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