

By using new methods such as drones, biodiversity can be measured faster, more precisely and cheaper.

New ways to measure biodiversity better

Scientists, farmers and policy makers are striving for more biodiversity by applying nature-inclusive agriculture and other initiatives. Do new forms of agriculture such as food forests have the desired effect? This research project identifies the best methods for measuring biodiversity. ►

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Problem: there is insufficient understanding of the impact of ecological measures such as food forests and flower strips on biodiversity. This obstructs effective implementation and adaptation of these initiatives.

T02 Solution: a set of new methods, enabling biodiversity to be measured faster, more precisely, cheaper and on a larger scale. This will help to determine which measures will or will not work properly in nature-inclusive agriculture, for example.

Impact: if biodiversity is measured better, the initiatives to increase biodiversity can be applied more effectively.

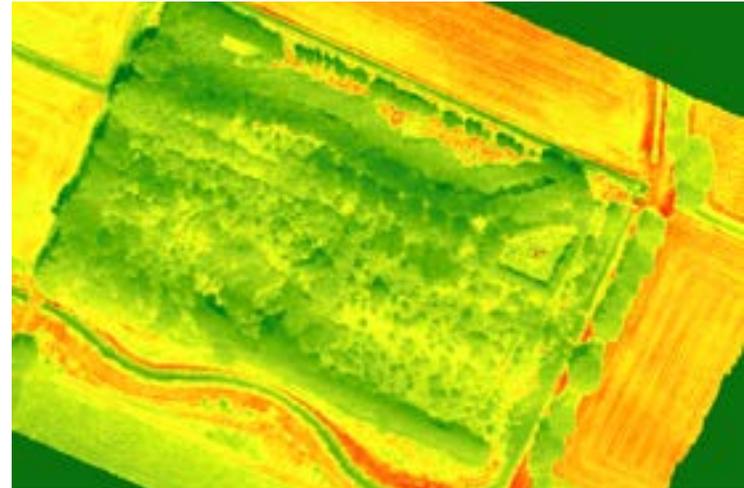
Promoting biodiversity is high on the agenda. “Many species are not doing well”, explains Arjen de Groot, animal ecologist at Wageningen University & Research. He refers to the entire ecosystem of plants, animals, fungi and bacteria. As an animal ecologist, he predominantly focuses on animals. “Their numbers are decreasing or are even threatened with extinction, while these species are essential.”

Pest controllers

Bees, for example. “If fewer flowers are pollinated, there will be deformed fruit or no fruit at all. This could cause considerable damage to the cultivation sector.” Insects such as spiders, earwigs and hoverflies, also have useful functions for humans. “We can use them as pests controllers rather than chemical pesticides, but there must be enough insects. In the Netherlands we have been trying to work together more often with nature in recent years,” says De Groot. Examples include green roofs in urban areas or flower strips to attract more insects. Nature-inclusive agricultural systems are also emerging. The new food forests, for example, in which the Dutch Ministry of Agriculture, Fisheries, Food Security and Nature (LVVN) is investing heavily. “But if we are to stem the tide, we must apply these new initiatives as effectively as possible”, says the researcher. “And that is why we are investigating whether this type of new agriculture actually contributes to increasing biodiversity.”

Drone photography

Measuring biodiversity is not a new phenomenon. Biodiversity has long been measured by birdwatchers with binoculars or listening ears, or by scientists who capture insects and identify them in the laboratory. De Groot: “Meticulous, specialised and time-consuming work.” Researchers are therefore experimenting with new monitoring methods. They do so in Ketelbroek, the oldest food forest in the Netherlands. Drone photography, for example, clearly shows how healthy the plants are by using colours. “We are also investigating whether we can use the same light signals to recognise the species.” By way of sound monitoring via small cabinets hanging in a tree, researchers are able to measure the



In drone photography colours clearly shows how healthy the plants are.



This equipment enables you to perform DNA analysis on hairs and animal skin cells present.

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“Every technique has advantages and disadvantages, so it is important to combine the various methods.”

- ▶ sounds of birds and bats. Other mammals are photographed when they pass a camera. By way of automatic image capture and sound recognition, a list is generated that shows the observed species. This makes it possible to collect information quickly and efficiently on the presence and identity of various animals or plants in a given area.

DNA via the air

Another state-of-the-art method is an analysis of DNA floating in the air. “This was first tested at the zoo in Copenhagen a few years ago”, says De Groot. There was a device on the roof of the reception area that sucked up air. Its purpose was to perform a DNA analysis after a week of the hairs and skin cells present. The DNA of almost all the animals in the zoo was found to be present. “In Ketelbroek, we also saw how efficient and remarkably meticulous this is, which is quite an eye-opener.” For example, this method appeared to identify almost all species that were found by both a bird watcher and the sound monitoring, plus a large number of extras. De Groot expects this technique to take off in a big way in the coming years. Research shows that these new measuring methods can measure biodiversity faster, more reliably, cheaper and on a larger scale. “Every technique has advantages and disadvantages, so it is important to combine the various methods. For each species and for each type of research question, we have to look at what works best,” explains De Groot. WUR’s Wageningen Data Competence Center helps to summarise and visualise all that data in graphs so that other scientists, farmers and policy makers can make use of it. The insights gained, help them to take the right measures, thereby increasing biodiversity. ■

Who: Wageningen University & Research.

Duration: January 2023 until the end of 2024.

Follow-up: in a follow-up process, researchers want to measure the impact of the new set of monitoring methods in practice.



[View the video here](#)



By way of sound monitoring via small cabinets hanging in a tree, researchers are able to measure the sounds of birds and bats.