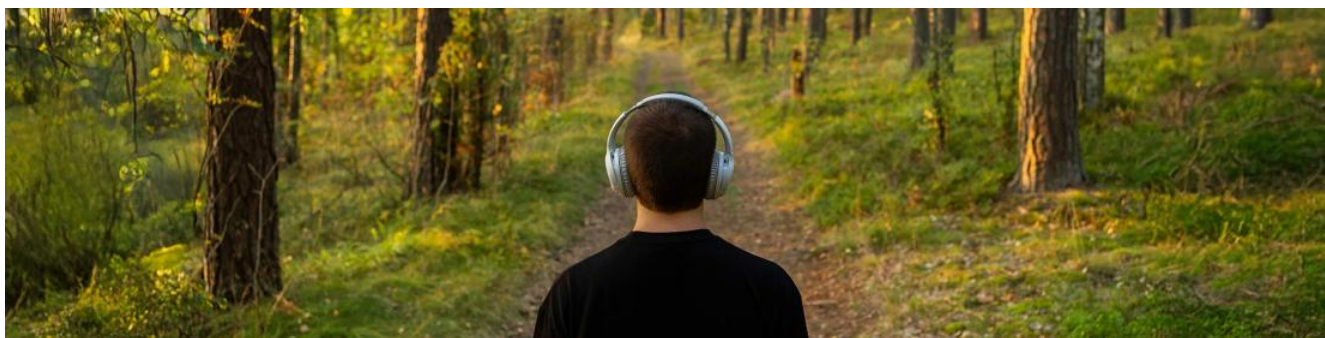




AI listens in to help protect wildlife

AI systems are learning to listen to and decode the sounds of nature, helping scientists to track species and spot ecosystem changes much faster than traditional field surveys.

04 June 2026 - By MICHAEL ALLEN

Strolling through a forest, you may notice that the air is filled with sound. Birds sing, insects and small mammals rustle through the undergrowth, and at dusk bats squeak as they communicate with each other.

These soundscapes contain a wealth of information about which animals are present, how many there are and how healthy an ecosystem may be. But analysing all that audio is a huge challenge.

Scientists can now collect enormous quantities of recordings using small autonomous devices placed in forests, wetlands and urban areas. The problem is no longer gathering data, but making sense of it quickly enough to be useful.

Professor Dan Stowell from the Naturalis Biodiversity Centre in Leiden, the Netherlands, is one of the leading researchers in the emerging field of computational bioacoustics that uses AI to analyse wildlife sounds and environmental recordings.

“We now have so many ways to record animal sounds and soundscapes,” said Stowell. “But the scale of the data is absolutely overwhelming.”

His research focuses on developing AI systems that can help scientists monitor biodiversity more efficiently and at much larger scale than traditional field methods allow.

Cutting through the noise

Naturalis, the Dutch national centre for biodiversity research, has joined forces with researchers from across Europe and the UK in a four-year EU-funded research effort called BioacAI. The team, led by Stowell, is working to bridge the gap between the massive acoustic data collected and our ability to make sense of it.

The initiative, which ends in 2027, is developing new AI tools capable of automatically identifying species from sound recordings. The research team believes this could reshape how scientists monitor biodiversity across Europe and beyond.

“We don’t want to replace experts,” said Stowell. “But we want to be able to take all that valuable information you can hear whenever you’re in a forest, or even an urban environment, and turn it into useful information about animals and biodiversity.”

The research collaboration is also responding to a skills crisis in the field. No existing training programme currently produces researchers with expertise spanning acoustics, AI, zoology and ecology.

BioacAI’s doctoral network is designed to fill that gap, training a new generation of professionals with what Stowell calls “full stack” bioacoustic AI skills.

Tracking biodiversity in decline

Biodiversity loss is accelerating globally. Among the species most at risk are birds and insects, whose declining populations could trigger knock-on effects across ecosystems and agriculture, and ultimately human wellbeing. To respond effectively, scientists need reliable large-scale data on the status of different species.

Traditional wildlife surveys – where scientists walk set routes recording what they see and hear – are labour-intensive, costly and limited in scope.

One increasingly popular approach is passive acoustic monitoring, in which small recording devices are left in the field to capture everything they hear. These recordings can provide a detailed picture of what is happening in an environment over long periods of time.

The BioacAI team is collaborating with specialist European bioacoustics companies to develop a new generation of smarter recording devices. These are able to run recognition algorithms directly on the device and synchronise between multiple units to locate calling animals.

Alongside improving monitoring methods, the aim is to reduce power demands and lower the environmental footprint of large-scale monitoring deployments.

But there is a catch. These devices can generate hundreds of gigabytes of data within weeks. Multiply that across a national monitoring scheme and the volume quickly becomes unmanageable.

Making sense of bat calls

Dr Lia Gilmour, research manager at the UK’s Bat Conservation Trust, a partner in the BioacAI consortium, is all too familiar with this problem.

“Our projects generate hundreds of terabytes of data a year, which would take 20 to 30 years of human input to get through,” she said.

Because of their elusive nature and nocturnal activity, bats are difficult to study, making passive acoustic monitoring particularly important. “We need to record them to be able to understand their population trends and behaviour,” Gilmour said.

At night, bats use ultrasound – emitting high-frequency pulses and listening for the echoes – to navigate and detect prey. Different species often call at different frequencies, but they also adapt their echolocation sounds to their surroundings. This makes distinguishing between closely related species difficult, even for experts.

Researchers are therefore exploring whether bat social calls might provide a better way to identify species. These chirps, sometimes audible to humans, tend to be more species-specific than hunting or navigation sounds.

Although bats make these communication calls less frequently, classifying them could help AI systems identify species that currently challenge acoustic monitoring.

And it could dramatically reduce the data backlog.

“Without these classifiers and this system, we would be looking at decades of manual work,” Gilmour said.

From data overload to discovery

The AI tools being developed through BioacAI learn to recognise the distinctive acoustic signatures of different species, operating at a speed and scale no human could match.

Apps such as Merlin Bird ID, which allows birdwatchers to identify species using a smartphone microphone, have already shown what is possible for common, well-documented birds. But the BioacAI researchers are trying to go further by identifying species for which relatively little data exists.

To tackle this, the team is using an AI technique known as deep embeddings that places animal sounds within a spatial map so that acoustically similar sounds cluster together. As well as suggesting which known species unfamiliar sounds may resemble, the technique can also flag unusual or previously unclassified sounds for further investigation.

“We have masses of uncurated data,” Stowell said. “If we can identify the sounds or locations where a little bit of investigation is needed, this would be fantastic.”

This is where human expertise remains essential.

Soundscapes from around the world could eventually be analysed using networks of acoustic sensors, research teams and citizen scientists. This will give researchers and policymakers a much clearer picture of how ecosystems are changing.

Such work could reveal previously unidentified species, new habitats for known animals or emerging biodiversity hotspots. It could also support the EU’s Biodiversity Strategy for 2030 by improving how ecosystems and species are monitored across Europe.

“We have huge power to really detect the drivers of change in populations, to study these populations at large scale and gather datasets we simply couldn’t access before,” Gilmour said.

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More info

- [BioacAI \(CORDIS\)](#)
- [BioacAI project website](#)
- [Biodiversity Strategy for 2030](#)