Will AI inadvertently push a natural history renaissance?

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Abstract

As AI automates coding and statistical modelling, quantitative ecologists face an existential crisis. But automated analysis is only as good as the data it is fed, shifting the scarce resource from analysis to expert observation. Naturalists and field ecologists, increasingly 'endangered' species in the modern era, may experience a resurgence, if institutions act.

Main text

When large language models first appeared, many scientists dismissed them as a curiosity, or as fodder for memes about hallucinations and robotic stupidity. A few years on, many scholarly disciplines are in the midst of an existential crisis, echoing science-fiction scenarios in which science becomes an entirely synthetic endeavour (Chiang, 2000). Mathematicians are confronting generative AI systems that contribute to problems that resisted humans for decades (Howarth, 2026). Programming, once a scarce human skill, is being rapidly automated: an estimated 29% of Python functions committed by US developers to open-source projects were AI-generated by the end of 2024 (Daniotti et al., 2026), and this share can only keep growing. Most scientific fields may soon need to be reimagined (Evans & Duede, 2025), and ecology and evolutionary biology, especially their data-intensive and model-heavy subfields, are unlikely to be spared (Han et al., 2023).

Indeed, ecological and evolutionary analysis is becoming cheaper. As coding (Daniotti et al., 2026), literature synthesis (Berger-Tal et al., 2024), and modelling (Branco et al., 2023) can increasingly be automated, the technical skills that once defined quantitative ecologists are coming to resemble ancient languages – valuable,

yes, but no longer a differentiator. Yet this shift may have an unexpected beneficiary: traditional natural history.

Earlier work defined technology as the engine of a ‘next-generation natural history’ (Tosa et al., 2021); here I propose an opposite mechanism: when analysis and technological innovation becomes a commodity, naturalistic observation turns into the scarce resource. Expert, first-hand observation of organisms in the wild is scarce because it requires skill, knowledge, dedication, and time. This increases its value, particularly as AI tools become routinely used to tackle the global biodiversity crisis (Reynolds et al., 2025). Moreover, automated outputs per se require validation and anomaly detection, which depends on people who know their systems: naturalists may become a key layer of defence against plausible but wrong AI output.

It is true that automated collection methods (e.g. camera traps, acoustic recorders, eDNA, remote sensing, AI-assisted species-ID tools) are evolving fast and may partly replace classic naturalistic observation (Tosa et al., 2021; Besson et al., 2022), but these systems scale well only for predefined measurements and taxa. They also perform poorly at detecting unexpected behaviours, interactions, and phenologies, which require trained observers. For example, vocal mimics such as the Northern Mockingbird (*Mimus polyglottos*) accounted for about a third of the false positives in one acoustic survey using Merlin Bird ID, as spotting them relied on knowing how the species behaves (e.g. that it repeats each imitated phrase several times) (Kalta & Gregory, 2024). Automated sensing and embodied AI may eventually close similar gaps (Besson et al., 2022), but this has yet to be demonstrated and achieved at scale. Citizen-science platforms (e.g. iNaturalist, eBird) can help further, but their data still require expert validation and curation before they can underpin high-quality biodiversity assessments and conservation decisions (Fraisl et al., 2022).

Worryingly, however, the expertise needed to generate high-quality naturalistic observations and validation has been eroding. Natural history has long been described as a discipline in crisis (Tewksbury et al., 2014), taxonomic expertise has been in decline since at least the 1990s (Buyck, 1999), and ecologists are spending less time in the field (Soga & Gaston, 2025). If this trend continues, and is compensated by automated monitoring for just a few taxa that sensors can easily track, over time the AI models used to monitor and conserve biodiversity will be fed a

shrinking, increasingly skewed observational base, and their outputs will inherit these biases.

In conclusion, naturalists and field ecologists may well become unintended beneficiaries of generative AI, and a natural history renaissance may follow, but ‘endangered species’ are rarely saved by accident. Universities can restore field and taxonomic training, funders can sustain long-term field site monitoring and natural history collections, and hiring and promotion panels, increasingly flooded with big-data proposals, can recognise field-based observation as research in its own right. If analysis is cheap, those who can still go out, look, and notice something unexpected will supply the data – or even new testable hypotheses – on which every model, human or artificial, depends.

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