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PERSPECTIVE

A vision for the future conservation evidence landscape

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Abstract

1. Evidence-based conservation has made some major steps forward in the last two decades. However, the 'landscape' in which evidence is generated, funded and disseminated still has some elements that will need to be further developed if the UK's conservation sector is to achieve its collective nature recovery goals.
2. This paper articulates a shared vision of the conservation evidence landscape in 2035. It was developed by representatives of 27 organisations involved in conservation and nature recovery across the UK.
3. *Solution*: the authors identified a range of issues that will need to be addressed to allow the evidence base to support and guide nature recovery efforts. These will require action in four key areas: (1) evidence creation, (2) access to evidence, (3) evidence culture, and (4) enabling evidence-based conservation.

KEYWORDS
access to evidence, co-design, evidence creation, evidence culture, evidence-based conservation, vision

1 | INTRODUCTION

At the start of the 21st century, there was considerable optimism in the nature conservation sector, that the systematic evaluation of evidence by practitioners and policy makers would result in an 'effectiveness revolution' (Pullin & Knight, 2001; Sutherland, 2000). In the same way that such evaluations had improved clinical practice within the field of medicine, it was hoped that 'Evidence-based Conservation' would deliver improved decision making in the conservation sector (Sutherland et al., 2004). The underlying logic was simple: in the context of the growing number, magnitude and extent of nature conservation challenges, and given that all decisions have a level of accompanying uncertainty, conservation actions will be most effective when decisions are informed by collating and assessing the available evidence.

Some 20 years later, after considerable efforts by a range of individuals and organisations, the use of evidence in conservation has fundamentally progressed. For example, there has been improved clarity on the nature of conservation evidence, and increased knowledge of the circumstances in which the use of different evidence

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types (quantitative, qualitative, experiential, indigenous, etc.) is considered most relevant and impactful (Adams & Sandbrook, 2013; Salafsky et al., 2019). There is also a range of freely available online summaries and synopses of conservation-relevant publications. These include evaluations of the effectiveness of conservation actions, as well as practical guides to facilitate improved decision making (Sutherland, 2022). The *Conservation Evidence* programme (https://www.conservationevidence.com/) has been at the forefront of this type of initiative, and has focused on developing resources designed to: "overcome barriers to evidence use, and ensure more effective decision making in conservation practice" (Smith et al., 2023).

A number of tools to increase the impetus towards an evidence-based sector have also been published. Examples include: Konno et al. (2020) who produced the CEEDER open-access database to aid transparency and reliability in using evidence reviews, and Salafsky et al. (2019), who produced a typology of conservation evidence types, and an associated decision tree to facilitate practitioners' use of evidence. Smith et al. (2023), produced an 'Evidence Toolkit', co-designed between researchers and practitioners over a number of years, based on five supporting strategies for delivering change: (1) make synthesised assessments of effectiveness of conservation actions accessible, (2) encourage further and improved testing of actions, (3) strengthen societal expectations of evidence use, (4) facilitate use of evidence in decision making, and (5) build capacity for evidence use and generation. Importantly, in addition to supporting practitioners in assessing the quality of evidence from a range of potential sources, they also allow organisations to achieve greater transparency in their decision-making processes and outputs (Christie et al., 2022).

These initiatives provide tools, resources, and guidance to support evidence-based conservation, generally through increased access to evidence. However, there has also been some progress in the real-world application of evidence-led approaches across a range of habitats and taxa. A good example of this can be seen in the UK's bird conservation sector. Here, action is regularly based on the results of several decades of research evidence produced and disseminated by organisations such as the Royal Society for the Protection of Birds (RSPB), the Wildfowl and Wetlands Trust (WWT), the British Trust for Ornithology (BTO) and statutory conservation agencies (Eaton et al., 2024; Gibbons et al., 2011). There has also been a move towards embracing the beneficial impacts of applied research initiatives co-created by researchers, practitioners and other stakeholders (Maxwell et al., 2020). Although some of the prerequisites for effective co-creation have been identified (Kurle et al., 2022), cultural differences between practitioners and researchers and associated practical difficulties (real or perceived), have often reduced the effectiveness of co-creation efforts. It has been recognised within the sector that such approaches take time, effort and a genuine willingness from all participants to set the interests of a shared venture above the views, needs and priorities of individual contributors, and to integrate their various valid contributions effectively. This has proved to be hard to achieve, particularly in situations where projects needed to be assembled quickly to meet funding application or other business-related deadlines, when language and terminology used differs between stakeholders and when researchers, funders and practitioners are working on different timeframes, and in different institutions.

Despite the developments in this area, it has been difficult to move towards a position where embedding evidence into practice is, culturally, a standard practice across the sector (Cvitanovic et al., 2014; Sutherland & Wordley, 2017, 2018). Walsh et al. (2019) attempted to characterise a range of factors that have hindered the desired shift in evidence culture. They found that organisational ethos, capacity, structure, and internal decision-making processes were often key barriers to evidence use; this was a particular issue for organisations where nature conservation is one of several thematic objectives. They also showed that long-term professional associations between researchers and practitioners, substantially strengthened the science-practice interface. This was echoed by Smith et al. (2023), who demonstrated the importance of integrating the needs of practitioners in shaping the design of evidence gathering. This may be especially effectively achieved when scientists and practitioners are co-located either within single institutions or collaborative centres (Gregory et al., 2024), and allow challenging tests of conservation practice to be achieved at scale (e.g. Bolton et al., 2007).

Continuing financial constraints within the conservation sector have also contributed to inertia in the creation and uptake of evidence to address the biodiversity crisis (Waldron et al., 2013). Funding shortfalls have impacted both primary evidence creation and the degree to which practitioners have used the evidence base within externally funded conservation projects and partnerships (Parks et al., 2022; Tinsley-Marshall et al., 2022). When resources are scarce, the evidential underpinnings of an organisation's work will often lose out on resource allocation. In other words, there is pressure to do more built on weaker knowledge foundations, rather than do less on stronger ones. This can particularly be the case in the non-governmental organisation (NGO) sector, where visible action on the ground can be more appealing to membership and funders, and fund-raising teams may lack experience and confidence in building the case for science resources into funding propositions. There is also a lack of understanding in some areas of conservation practice of the time needed, and necessary steps involved, to maximise conservation impact, and an accompanying drive to find short-cuts to achieve short-term aims. But beyond merely highlighting the impacts of funding shortfalls, there has been a recognition of the need for improved reporting of the costs of interventions (White, Petrovan, Booth, et al., 2022; White, Petrovan, Christie, et al., 2022), and doing this in a standardised way (Iacona et al., 2018). The costs reported in published studies should also allow interpretation and use across a range of different actions (Cook et al., 2017), and have clarity in relation to the units, scale and contexts of the costed intervention (Armsworth, 2014). Such cost-oriented reporting approaches will

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be of particular importance for those lower-middle-income countries (LMIC) where conservation capacity is still currently being developed and enhanced (Albuquerque et al., 2015; O'Connell et al., 2019).

Organisationally, engaging with the evidence base can also be viewed as a luxury i.e. drawing resource away from 'doing' (Mikołajczak et al., 2023), or worse, regarded as potentially causing 'paralysis by analysis' (Bunnell, 1998). A widespread tendency for resource-poor, action-focused NGOs to collect and analyse data when resources allow, rather than as an integral part of ongoing conservation delivery, can undermine the usefulness of the evidence generated, and may add to the sense that investment in data collection is not cost effective. Another tendency is to rely on overly broad objectives for habitat conservation not based on adequate field assessments of the specific problems facing an ecosystem. This means that the desired outcomes may be ill-defined, prior questions may not be formulated precisely enough, and evidence gathering may therefore lack focus. Such 'scattergun' approaches to data collection (with such data collected also often left unused) reinforce the perception of it as unsustainably resource intensive.

As environmental pressures continue to grow, the urgency of the nature crisis will undoubtedly make it harder for conservation groups and responsible agencies to balance competing approaches and allocation of resources. However, whilst obstinate gaps in funding continue at all scales (Coad et al., 2019), it has been recognised that solutions to the resource constraints on conservation are not solely about relevant institutions simply providing more money (UNDP, 2018). This is because a range of structural and political factors are responsible for reducing the efficiency of conservation expenditure. Meyers et al. (2020) suggested that these factors: "… limit the effectiveness and impact of spending, lead to increased costs, and/or fail to create an enabling environment and adequate incentives for conservation – some even serve to discourage or undermine conservation objectives."

The case for a transformative shift towards the goal of achieving evidence-based conservation has been robustly made (see overview by Sutherland, 2022). However, Sutherland described the slow rate of change as an 'inefficiency paradox' in which conservation could be more effective and successful (and money saved) but has so far been slow to make the change. He also highlighted the need for: (1) a strategic shift to ensure evidence is available and decision makers have the skills and tools to use it, and (2) a cultural shift whereby it becomes unacceptable to funders and donors, the public, partners and stakeholders to make decisions that do not include available evidence. An additional cultural shift also needs to be made in terms of ensuring that the evidence needs of practitioners and the ways in which evidence generation is integrated into their working practices are key drivers of conservation science. A growing proportion of the evidence base for nature conservation is being built by non-academic institutions, or through partnerships between NGOs and universities. But the historical structural frameworks for knowledge generation have often meant that many areas of available evidence are outputs from academic research. A major issue maintaining this *status quo*, is that professional constraints on academic practices (e.g. journal rankings, between-university rankings, such as the UK's Research Excellence Framework, small grants for applied research), can lead to thematic biases in the outputs, and reduced relevance for practitioners (O'Connell & White, 2017).

Importantly, it has been recognised (as with case of nature conservation funding) that achieving a transformative sectoral shift towards evidence-based conservation, will require changes across a broad 'enabling' environment (Cisneros-Montemayor et al., 2021; Davila et al., 2021). The many elements described above, form a wider 'evidence landscape' in which the changes being called for must ultimately be integrated and enabled. Given the slow pace of change since the start of the 'effectiveness revolution', it is timely to articulate a 'vision' of the future evidence landscape that organisations and responsible agencies will need to create in the coming decade (i.e. to 2035). Given the ongoing acceleration of threats to biodiversity at all scales, the urgency for achieving evidence-based conservation, constraints on resources, and the need to engage with organisations outside the conservation sector, the need for collective clarity on the future evidence landscape required, has never been greater (see also the Kunming-Montreal Agreement: https://www.cbd.int/gbf/introduction).

In 2023, twenty-four leading conservation organisations and statutory agencies were hosted at the *Cambridge Conservation Initiative* (CCI, Cambridge, UK), for a workshop supported by the British Ecological Society (BES). The meeting was convened to discuss two key issues. First, to outline a shared vision for how we wish the conservation evidence landscape to look by 2035. Second, to identify the need and potential architecture of a tool to support practitioner-led and national-level reviews of conservation evidence needs. As a corollary to the substantial work on using existing evidence (outlined above), the discussions focussed on the development of a tool to identify evidence 'needs' that have yet to be the subject of research. The latter development will be reported in a future edition of *Ecological Solutions and Evidence*. In this paper, we set out our vision for the future conservation evidence landscape covering four broad areas: (i) evidence creation, (ii) access to evidence, (iii) evidence culture and (vi) enabling environments.

2 | A VISION FOR THE 2035 EVIDENCE LANDSCAPE

Gawande (2010) advocated the use of 'checklists' as a tool to allow organisations to measure and monitor the outputs and outcomes of their activities, thereby supporting continuous quality improvement through evaluative feedback. In response to this, Sutherland (2022), produced a series of checklists for different groups within the conservation sector, aimed at improving the processes of using evidence and making decisions. In this section, we articulate a vision for the wider conservation, research and societal contexts that would provide an 'enabling environment' in which these checklists could form the basis of successful evidence-based conservation.

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Vision Statement: By 2035, across society, organisations and individuals taking decisions for nature and the environment are empowered, informed enabled and feel a responsibility to seek and use relevant evidence to advise these decisions. To support this, relevant evidence will be collated, synthesised and made accessible to support the delivery of evidence-based conservation. Furthermore, stakeholders will work collaboratively to define and fill evidence gaps and understand effective practice delivered across a range of scales.

In addition to this statement, we believe the following areas of the evidence landscape (creation, access, culture and enabling), will be central to support the realisation of the vision:

2.1 | Evidence creation

New evidence must be created:

- In response to the individual priorities and evidence needs of practitioner organisations, supported and informed by an oversight of collective evidence needs at the UK level (e.g. through a national review of conservation evidence needs).
- That allows organisations to quantify the potential direct and indirect costs, benefits and risks of interventions, and assess their organisational feasibility, relative taxonomic value and economic viability.
- Through knowledge sharing, co-design and development between conservation practitioners, researchers, policy makers and funders.
- Through more routine use of practitioner-led experiments, and the use of landscape-scale interventions as 'real world' experiments (including training and support from the research community).
- From the outputs of further testing and enhancement of existing evidence on impactful conservation actions.
- As a consequence of capacity building in relation to evidence generation. In particular, training on how to ask the 'right' question, and how to design experimental interventions whose evaluation guides future improvement of the intervention (i.e. adaptive management approaches).
- Increasingly including well designed and adequately resourced citizen science and biological recording activities.
- Incorporating, where appropriate, all available ecological knowledge (local, traditional and indigenous).
- Including the routine reporting of negative conservation outcomes and action failures, as well as successes.
- As a result of implementing learning focused on changing culture to enable and empower people to take an evidence-based approach.

2.2 | Access to evidence

Evidence can be accessed:

- From online platforms that provide collations of assessed and synthesised evidence, especially from the peer-reviewed scientific literature. Examples are: (i) *Conservation Evidence* (https://www.conservationevidence.com/) and (ii) *Collaboration for Environmental Evidence* (https://environmentalevidence.org/).
- From online platforms that provide conservation-related grey literature, reports and best-practice resources. An example is Applied Ecology Resources (https://www.britishecologicalsociety.org/applied-ecology-resources/about-aer/).
- Without the need for conservation NGOs to overcome journal paywalls when accessing published papers, or incurring *Open Access* costs when submitting manuscripts to journals.
- As a result of increased levels of 'discoverability' so that information is findable by humans and machines and is accessible, interoperable and reusable as a result of clear and consistent labelling of evidence metadata and consistent use of keywords (the FAIR principle. See: Scheffler et al., 2022; Wilkinson et al., 2016).
- From facilitated and funded peer-to-peer learning.

2.3 | Evidence culture

A conservation evidence culture will be required in which the following *principles* are realised:

- The evidence 'needs' of practitioners are a key driver of conservation science.
- It becomes unacceptable to make decisions that do not reflect on the available evidence in response to elevated societal and NGO membership expectations of evidence use.
- Research institutions have long-term and funded professional partnerships with conservation practitioner organisations, including co-location where resources allow.
- Conservation work is judged by its outcomes rather by the intensity of crisis or urgency-driven activity.
- Organisations that test actions always share positive and negative results in a timely and effective way.
- Knowledge gaps impeding effective conservation action are prioritised.

A conservation evidence culture will be required in which the following *actions* happen:

- Conservation evidence partnerships (i.e. those involving researchers, practitioners, policy makers, statutory agencies, communities, or funders), take account of the perspectives, contexts and constraints on the working practices and needs of their partners.
- Organisational culture, structure and internal decision-making processes embrace the use of evidence in implementing conservation work, including budget setting and embedding evidence reviews in the regular revision of site management plans.

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- Conservation practitioners communicate the evidence and reasoning on which their decisions are based and explain their strengths and limitations, and ways in which the available evidence might beneficially be strengthened.
- Communications about evidence are framed in a way that resonates with specific audiences and promotes behavioural change. This needs to be balanced against over-simplification that might generate perverse outcomes.
- Evidence horizon scanning occurs regularly using cross-sectoral inputs and approaches not solely in response to policy.
- Funders support the testing and analysis of conservation actions within projects.

2.4 | Enabling evidence-based conservation

An enabling environment where there is:

- Training and capacity building available in relation to all aspects of evidence-based conservation. This includes individual resources for practitioners, agencies, researchers and funders, and across all professional levels within organisations (CEOs to entry-level positions). Resources cover the following broad areas:
  - The nature of evidence.
  - The importance and impact of using evidence.
  - How to conduct an organisational review of evidence needs.
  - The identification and assessment of evidence: toolkits and frameworks.
  - The conversion of evidence into action and policy.
  - Using evidence platforms (section 2 above) to identify evidence gaps and how to ask the 'right' question to generate evidence.
  - Undertaking and supporting practitioner-led experiments and tests.
- Support for universities to overcome current barriers to undertaking 'applied' research (e.g. national formal mechanisms for assessing research impact, journal impact factors, research grants), and to exploit opportunities for transdisciplinary co-design approaches.
- Increased leverage of funding for evidence generation (including accessing funding opportunities outside the traditional conservation sector).
- An integration of identified grassroots (practitioner-led) evidence needs in funding priorities.
- The incorporation of the characteristics, generation and use of evidence within undergraduate and post-graduate programmes.
- Further action from the UK's major research funding bodies (e.g. Research Councils and DEFRA) to employ practitioner-led approaches in the development of grant calls, and to include practitioners in stakeholder panels (e.g. as with the NERC Treescapes programme).
- Action from the UK's academic research institutions on ensuring that co-design with practitioners is seen as the norm where research could influence decisions and practice.

3 | CONCLUSION

Our vision for the evidence landscape in 2035, is an articulation of the end-points for a transformative shift within conservation practice and research. This shift is needed to produce a sector where evidence use is routinely practiced as part of decision making, and where evidence is generated in a prioritised fashion that engenders collaboration and co-design. A shared multi-organisational vision on future needs is, therefore, a critical first step towards transformative change. Any visioning exercise will of course require further thought and agreement to develop ideas on how we might achieve our vision (a *Road Mapping* exercise), and the areas that will need to be addressed in order to successfully implement the road map (a *Theory of Change* exercise) (Salafsky et al., 2019). Crucially, the transformative change needed within the conservation sector will also require a shift towards increased levels of dialogue and collaboration with the land management sector (e.g. farming, forestry, local authorities). In the UK, it is largely this sector that will actually deliver the actions required for nature recovery. It is, therefore, only by articulating a shared and cross-sectoral vision for the future (and clearly demonstrating consistent use of evidence through co-design) that those who will be instrumental in nature recovery can hope to resolve the current biodiversity challenges. Lastly, whilst we have articulated a vision for the future, we also recognise that the selection and evaluation of conservation actions by rational means (evidence-based conservation), must ultimately also account for the twin issues of cost and feasibility. These are critical for most action-oriented practitioner organisations, as they can significantly impact the development of best practice, the setting of conservation priorities, and allocation of resources. The balance to be struck here will be difficult for many organisations i.e. how to ensure that they fully embrace an evidence-driven culture, whilst at the same time implement actions within the constraints of their own cost/feasibility framework (further influenced by similar considerations in the wider stakeholder community). In achieving such a balance, it will therefore be vital that pragmatic considerations of what it is possible to achieve (cost/feasibility), do not provide a pretext for 'business as usual' within the sector.

AUTHOR CONTRIBUTIONS

Mark J. O'Connell and Rachel L. White developed and coordinated the original partnership discussions on the need for a vision (and proposed a subsequent national review of conservation evidence needs), at a workshop in 2023 at the Cambridge Conservation Initiative (supported by the British Ecological Society). They drafted the initial version of the manuscript which then received substantial input and contributions from all authors. Other than Mark J. O'Connell and Rachel L. White, all other authors are listed alphabetically by their affiliation organisation.

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Mark J. O'Connell and Rachel L. White are Associate Editors of *Ecological Solutions and Evidence*, but took no part in the peer review and decision-making processes for this paper. Philip Dooner and Minhyuk Seo are employees of the British Ecological Society, but took no part in the peer review and decision-making processes for this paper.

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