

PERSPECTIVE

On the evidence for evidence-based conservation

Nigel G. Taylor¹  | William H. Morgan¹  | William J. Sutherland¹  | Alec P. Christie² 

¹Department of Zoology, University of Cambridge, Cambridge, UK

²Centre for Environmental Policy, Imperial College London, London, UK

Correspondence

Nigel G. Taylor
Email: nt461@cam.ac.uk; ngltaylor@yahoo.com

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Abstract

1. It is over 20 years since seminal papers argued that conservation effectiveness could be revolutionised by using the best available evidence. Ironically, in this time there has been little work critically evaluating the evidence for evidence-based conservation (EBC) itself. Does it really improve conservation outcomes and provide a return on investment? In this perspective, we explore three interpretations of this question.
2. First, we consider evidence for the overall EBC paradigm. Case studies and research, largely from disciplines other than conservation, support the intuitive conclusion that evidence-based practice can improve outcomes. But issues such as deficiencies in the underlying evidence and biases in those assessing it mean this will not always hold true, even where all principles of evidence-based practice are followed.
3. Next, we consider the question of how much to invest in EBC. Generating and using evidence takes time and money; this investment will not be worthwhile in all situations. Understanding the cost-effectiveness of EBC in different contexts is an important direction for future work.
4. Finally, to address the question of how to carry out EBC to maximise its benefits, we present a theory of change that describes the key stages in the EBC process. Each step is a potential barrier to EBC, but also provides insights into enabling actions. The theory of change identifies key assumptions that can be tested with a range of research methods, both to inform the application of EBC and generate mechanistic evidence on its effectiveness.
5. *Practical implication:* Over the next 20 years, we encourage further investment in generating evidence on EBC, especially on contextual questions such as *when* it is effective and worth the investment and *how* it should be carried out. We must also strengthen the underpinning evidence base so it *can* inform decisions where appropriate.

KEYWORDS

conservation decision making, conservation policy, conservation practice, evidence-based practice, evidence-informed conservation, evidence-led conservation, research-implementation space, value of information

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1 | INTRODUCTION

The field of evidence-based conservation (EBC) developed in the early 2000s, following seminal writings (Pullin & Knight, 2001; Sutherland, 2000; Sutherland et al., 2004) and the establishment of dedicated evidence synthesis organisations (e.g. Centre for Evidence-Based Conservation and Conservation Evidence). Concern that conservation practice was not delivering as effectively as it could, being too reliant on 'anecdote and myth' (Sutherland et al., 2004), prompted calls to adopt evidence-based practices that were already transforming other fields of research (Pullin & Knight, 2001). Subsequent years saw advances in the generation of primary evidence on conservation impacts (e.g. Ferraro & Pattanayak, 2006), synthesis of existing studies (e.g. Pullin & Stewart, 2006; Sutherland et al., 2019) and co-design of tools for embedding evidence in decision-making (e.g. Smith et al., 2023). By the 2020s, evidence had become central to global efforts for halting and reversing biodiversity loss, forming a key part of the Kunming-Montreal Global Biodiversity Framework.

With origins in medicine (Sackett et al., 1996; Sallam, 2010), evidence-based practice has been adopted across diverse fields that include international development, policing, education and social policy. It represents a systematic process whereby decisions are made and actions implemented after making 'conscientious, explicit, and judicious use' of the best available evidence (e.g. on status, threats, effects of interventions and costs), alongside considerations of context, feasibility, available resources and values, guided by the wisdom and experience of the decision maker (Dawes et al., 2005; Sackett et al., 1996). Consequently, practice is based on more than tradition, authority and dogma (Pullin & Knight, 2001; Sutherland et al., 2004). Note that not all practice that uses evidence is evidence-based practice: it requires more than a superficial search of the literature to find a handful of studies supporting a decision. Evidence-based practice is closely related to adaptive management (Gillson et al., 2019). Both approaches can clearly feed into each other: we see the former as a broader process (used, for example, to identify possible management options for a particular context) and the latter as a way to generate spatially and temporally specific evidence to tailor management to the local context (and, ideally, feed back into the broader corpus).

Over the last 20 years, the conservation community has broadened its collective understanding of what counts as evidence. Early work focussed primarily on scientific evidence (Pullin et al., 2004; Sutherland et al., 2004); exploring the use of evidence from the natural and social sciences remains an important focus in conservation research (Walsh et al., 2019). Yet the value of other forms of knowledge, including expert opinion and local and Indigenous knowledge, is now widely recognised (Adams & Sandbrook, 2013; Kadykalo et al., 2021; Walsh et al., 2019). In light of this, we consider evidence broadly as any relevant data (raw observations), information (studies), knowledge (syntheses and decision support systems) and wisdom (theory and principles) used to assess an assumption

(Salafsky et al., 2019, 2022). Since different types of evidence have varying reliability and relevance in different contexts, it is crucial that the evidence sources used to inform any decision are transparently documented.

Despite these conceptual advances, there exists a somewhat ironic paucity of direct and critical reflection on the evidence for whether EBC delivers on its goals. This is important because, as proponents of (and stakeholders in) evidence-based practice, we should be held to the same standards that we promote. In this paper, we identify and discuss three key questions pertaining to the delivery of EBC. First, we ask '*Why should we be doing EBC?*' and consider evidence on the effectiveness of the overall paradigm of evidence-based practice. Second, we ask '*How much should we invest in EBC?*', which explores when to invest in evidence-based practice within conservation and what the optimal investment might be. Third, we ask '*How should we implement the EBC process?*', where we consider how best to achieve the steps in the theory of change for EBC, such that we deliver on our goals. Any assessment of evidence for EBC, or evidence-based practice more generally, should make explicit which of these questions it addresses. We finish with some suggestions for how to generate new evidence on EBC.

2 | WHY SHOULD WE BE DOING EBC?

It is important to reflect upon whether the overall EBC paradigm leads to better conservation outcomes than conservation that does not adhere to evidence-based principles. In this analysis, we are essentially assessing the effectiveness of EBC as a conservation action in itself, albeit a complex one comprising many individual activities.

Intuitively, applying the paradigm of evidence-based practice to conservation will lead to better outcomes for species, ecosystems and other focal values. For example, there is evidence that actions vary in effectiveness (Sutherland, Dicks, et al., 2021), so logically an assessment of this evidence will lead to improved practice by doing more of what works and less of what does not. Bias is reduced by systematic collation of evidence and can be accounted for in synthesis methods (Woodcock et al., 2014). Less relevant or reliable studies can be downweighted or ignored completely (Christie et al., 2023). As the underlying evidence base grows, each decision is based on a greater cumulative understanding, meaning accuracy and certainty of these decisions should increase.

There is some research evidence for the potential for evidence-based practice to deliver better outcomes. In a study of Spanish hospitals, patients in a ward using evidence-based practices had a clinically significantly lower risk of death and a shorter length of stay than patients in a ward using standard practices (Emparanza et al., 2015). Policing focused on crime 'hot spots', as opposed to traditional policing focused on individuals or wider communities, is supported by theory and empirical evidence and generates 'small but noteworthy' reductions in crime (Braga et al., 2014). In a

conservation context, Kodikara et al. (2017) reported higher survival of planted mangroves in projects that used technical guidance (46%) than in projects that did not (0%). In Nepal, regulation of the veterinary drug diclofenac, based on evidence-based diagnosis of its implication in vulture *Gyps* spp. population declines, was associated with a partial recovery of vulture populations (Esmail et al., 2022; Galligan et al., 2020). However, whether the benefits of evidence-based practice seen in other disciplines such as medicine transfer broadly to conservation is arguably unclear given that conservationists are typically working in complex social-ecological systems (Adams & Sandbrook, 2013) with an evidence base that is both smaller (e.g. due to limited funding and incentives to monitor and report outcomes, which often materialise over long timescales; Caruana, Muir, et al., 2024) and that comprises studies with inevitably weaker statistical study designs, on average, and more diverse outcomes.

There are also several case studies where failure to consider existing evidence has led to poor outcomes. For example, the evidence-based practice of prescribing clot-busting drugs to treat acute heart attack was recommended only in 1986, although the benefits of the therapy would have been clear in 1975 had available research been systematically reviewed and meta-analysed (Antman, 1992). 'Scared Straight' and similar programmes, in which young people are exposed to prison life and adult inmates to deter future offending, continued to be popular through the 1990s and 2010s despite accumulating evidence that they actually increase delinquency (Petrosino et al., 2013). Failure of a recent eradication effort to eradicate red swamp crayfish *Procambarus clarkii* in Malta was, in part, due to ignorance of evidence on crayfish burrowing behaviour alongside the local context of refugia provided by rubble walls (Caruana, Camilleri, et al., 2024).

However, we also recognise the potential that EBC might not improve conservation outcomes, having no meaningful effect or even making them worse. In medicine, hormone replacement therapy (HRT) was promoted in the USA in the 1990s on the basis of the best available evidence (observational studies and randomised trials recording non-clinical outcomes) suggesting it prevented cardiovascular disease. Later randomised trials that explicitly monitored clinical outcomes indicated that HRT did not prevent, and may even increase, cardiovascular disease (Alkhenizan, 2004). Thus, many deaths may have been caused by a change in practice based on the best available evidence at the time. In conservation, excavation of deep pools for natterjack toads *Bufo calamita* was informed by evidence of desiccation in shallow pools, but in practice facilitated high predator abundance and complete predation of tadpoles (Banks & Beebee, 1988).

Some instances where evidence-based practice fails to improve outcomes could be related to misapplication of its principles. For example, gaps and biases in the assessed evidence corpus can materialise if evidence is not collated systematically or appraised fairly, due to lack of time, lack of skills (e.g. in literature searching, assessing study validity and critical thinking, but also in communication by those producing the original evidence;

Walsh et al., 2019), cognitive and directional biases (e.g. framing effects and confirmation bias; Druckman & McGrath, 2019) or deliberate misrepresentation (Pielke Jr., 2007). Selective use of evidence can lead to ineffective or harmful practice (Sutherland & Wordley, 2017). Furthermore, attempts to secure the best possible evidence, rather than the best *available* evidence, could delay action if decision makers have to wait for that better evidence (Salafsky et al., 2019).

In other instances, evidence-based practice may fail to improve outcomes even when its principles are correctly followed. Critically, evidence-based practice relies on an underlying evidence base of sufficient quantity, reliability and relevance to the question at hand (Christie et al., 2023). Inherent biases or deficiencies in this evidence base mean it may not sufficiently reduce uncertainty and can even lead to incorrect conclusions (Christie et al., 2021; Goldacre, 2014; Woodcock et al., 2014). Primary studies may be out of date relative to the current decision context and can lead to the 'wrong' answer by chance alone (Ioannidis, 2005). Evidence-informed expert assessments can generate incorrect insights (Burgman, 2015). Recommendations based on evidence might not align with the real practical question being answered (John, *in press*). However, evidence-based practice can rapidly self-correct in a way that tradition- or authority-based practice cannot. Evidence-based practice explicitly encourages refinement of knowledge, wisdom and ultimately practice as new evidence accumulates (Sackett et al., 1996; Sutherland, 2019). Of course, this assumes any new evidence is reliable. In the near future, artificial intelligence (AI) has the potential to massively weaken the evidence base, for example through inserting 'hallucinations' or facilitating rapid production of poor-quality papers to support various nefarious agendas (Reynolds et al., 2025). This poses an existential threat to evidence-based practice, to be weighed against the potential benefits of AI in evidence synthesis (e.g. to dramatically speed up systematic literature screening and data extraction; Reynolds et al., 2025).

Further challenges to evidence-based practice arise from human psychology. Ultimately, humans make decisions based on the evidence corpus, but they are prone to decision biases that may lead to ineffective or inefficient practice (Druckman & McGrath, 2019; Filewod et al., 2023). It has been suggested that feeding more information into a decision-making process can lead to information overload and decision paralysis (Salafsky & Margoluis, 2021). Accordingly, Zheng et al. (2020) demonstrated that providing causal information can lead to incorrect decisions, especially for individuals with prior knowledge or experience. Syntheses and decision support systems can mitigate some of these issues (Dicks et al., 2014; Smith et al., 2023), but decision makers need to be able to access such systems and know how to use them.

Thus, EBC is intuitively effective and should generally lead to improved conservation outcomes. However, there remain open questions around the circumstances in which EBC improves outcomes and the magnitude of those benefits.

3 | HOW MUCH SHOULD WE INVEST IN EBC?

In a crisis discipline such as biodiversity conservation, resources must be used efficiently. This also applies to decisions about investments in EBC for different problems and decision contexts. There are costs to investing in all stages of evidence-based practice, from evidence production to access and appraisal, and the associated human and technological enabling conditions. The cost of this investment is less justifiable for decisions that are self-evident, of low consequence if wrong, or for which evidence-based practice will be disproportionately difficult or expensive (Figure 1; Papworth, 2017; Rushing et al., 2020; Sutherland, Downey, et al., 2021). In these cases, investing in EBC might invoke trade-offs that reduce the overall cost-effectiveness of conservation. Thus, triaging the use of EBC is essential.

Certain conservation decisions are acutely time-critical, for example if a rare species or geographically restricted population is at imminent risk of extinction. In such a situation, there is a high risk that delaying action, or taking no action at all, would lead to catastrophic consequences and so it may be justifiable to invest minimally in EBC. Experiments to generate new evidence, time-consuming structured decision-making processes and intensive evidence synthesis could be replaced by a rapid assessment of existing, readily available evidence (ideally already synthesised in a review or database). Equally, there may also be scenarios for which delaying action might lead to suboptimal consequences or missed opportunities—for example, because public opinion shifts, local community receptiveness changes or environmental changes occur, rendering certain interventions unfeasible or unviable and forcing the use of less (cost-)effective ones.

Theoretically, the relationship between investment in EBC and conservation 'success' should follow an asymptotic curve

representing diminishing returns (i.e. greater investments lead to progressively smaller marginal benefits). Grantham et al. (2008) demonstrated this relationship in silico, where investments beyond US\$100,000 in surveying South African proteas generated little additional increase in the effectiveness of conservation prioritisations. Salafsky and Margoluis (2021) have proposed that the probability of success may even decline with very high investment in EBC, for example due to confusion and overcomplication as more and more analyses are carried out. Excessive investment in evidence gathering and assessment could also lead to decision paralysis if it generates an overwhelming amount of evidence. Fundamental unanswered questions exist relating to how these relationships vary across decision contexts and with different components of EBC (e.g. investments in training or tool development) as the predictor variable.

The state of the literature on the return on investment (ROI) of EBC is currently being reviewed but evidence is assumed to be scarce (Christie et al., 2025). Future research will need to deconstruct the problem into several tangible questions or layers. First, additional costs involved at each stage of evidence gathering and assessment could be quantified, for example comparing a quick scan of evidence to hand, to commissioning an evidence review, to commissioning new research to generate evidence. Second, the impacts of evidence on decisions could be quantified (as per Walsh et al., 2015) for different investment strategies and decision-making scenarios. Third, the impact of these different decisions on conservation outcomes could be quantified. Attributing changes in conservation outcomes to different decisions will require carefully planned impact evaluation using rigorous counterfactual methods (O'Garra et al., 2025). From these data, a cost-effectiveness analysis could then compare the costs of EBC for a given desired outcome (e.g. if more time is spent reviewing evidence in a project, would a different

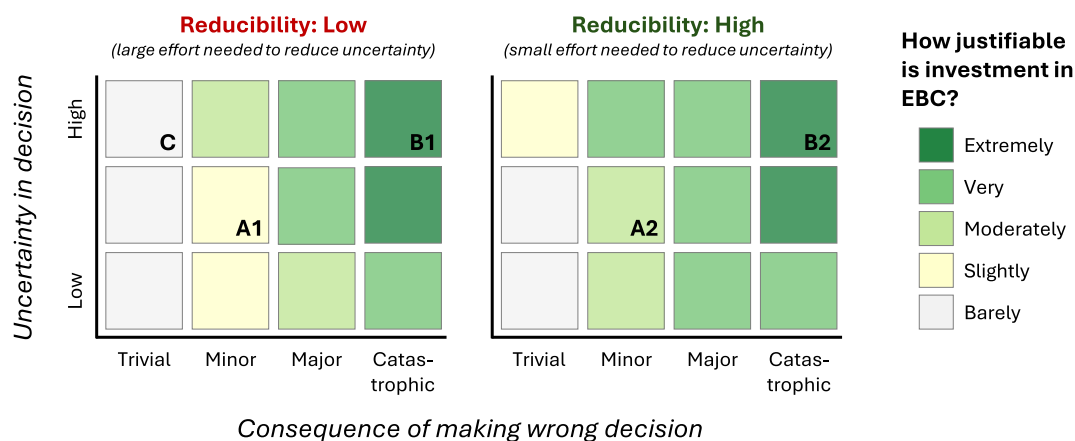


FIGURE 1 Investment in evidence-based conservation (EBC) is most justified when a decision has significant consequences, high uncertainty and/or high reducibility (i.e. minimal effort and cost needed to sufficiently reduce uncertainty). Although presented as discrete categories and panels for ease of visualisation, in reality all of these variables are continuous. The figure illustrates, for example, that: Generally, for a given combination of consequence and uncertainty, EBC is more justifiable when reducibility is higher (A1 vs. A2); but for decisions with potentially catastrophic consequences, investment in EBC might be justified regardless of reducibility (B1 vs. B2); and that trivial decisions will command little investment in EBC, especially when reducibility is low (C). While primarily framed in terms of individual decisions, this schematic could also apply to investment in EBC infrastructure for an organisation or discipline based on the types of decisions it makes. Adapted from Rushing et al. (2020) and Sutherland, Downey, et al. (2021).

decision be taken and would that increase species abundance relative to the counterfactual?). A more in-depth cost-benefit analysis might also be possible to incorporate all relevant costs and benefits, even those with different outcome measures (HM Treasury, 2020). Context-specific learnings will support decision-making on EBC investment in related projects, whilst cumulative learnings will benefit the wider conservation community.

4 | HOW SHOULD WE IMPLEMENT THE PROCESS OF EBC?

EBC is a process involving several steps to achieve its intended outcomes and ultimate impact. These can be mapped out as a theory of change (Figure 2). A theory of change offers a structured approach for building the evidence base for complex actions and strategies, such as EBC, and makes explicit the underlying assumptions, thereby allowing each decision-relevant assumption to be tested by synthesising available evidence (Cooke et al., 2023; Salafsky et al., 2022).

Evidence on the assumptions within the theory of change is critical to understanding whether and how EBC works in different contexts, and how practice can be adjusted to increase effectiveness and ROI. We provide some illustrative evidence from conservation in Table 1. The process of EBC could break down at any of the steps, leading to suboptimal (or even harmful) action, wasted resources and missed opportunities. For example, evidence may not exist or be inaccessible (e.g. behind paywalls). Decision makers might not have the skills or time to adequately synthesise or interpret evidence (Sutherland et al., 2019; Walsh et al., 2019). At the same time, assumptions in the theory of change can direct insights into enabling interventions, for example ensuring effects of conservation actions are recorded and published in accessible sources or training conservation staff in evidence use (Walsh et al., 2019). As a parallel to conservation, the field of nursing recognises a seven-step approach to evidence-based practice (Chays-Amania et al., 2024). Completing each step to a high standard requires having the relevant skills, knowledge and expertise and timely access to the necessary resources (e.g. sources of evidence, decision support tools).

Furthermore, analysing the effectiveness of steps in the theory of change can also build a mechanistic case for (or against) the overall effects of EBC. If each step is shown to be effective, one can assume that a signal can propagate along the entire theory of change to produce the desired response (Christie et al., 2023; Grace, 2024).

Early proponents of EBC (e.g. Pullin et al., 2004; Sutherland et al., 2004) focused on the special value of scientific evidence (derived from social or natural science research methods; Walsh et al., 2019). This is echoed in more recent arguments over 'evidence complacency' (Sutherland & Wordley, 2017). It also aligns with the concept of evidence-based practice in other disciplines (e.g. Ratnani et al., 2023; Sherman, 1998). There is some evidence that scientific literature can provide more complete and timely insights than other types of evidence (e.g. Antman, 1992). Well-conducted scientific studies are robust, for example through their design to account

for biases and the process of peer review, but they are typically costly to produce, not immune to bias, and can generate spurious results (Ioannidis, 2005). Further, local observations may be more useful than peer-reviewed studies for testing certain assumptions, for example that deer herbivory was responsible for failed tree planting at a specific site (Salafsky et al., 2019). Discourse around calls to broaden the concept of evidence in conservation (Salafsky et al., 2019, 2022) should thus be supported by discipline-specific evidence on the value of different types of evidence.

5 | GENERATING EVIDENCE ON EBC

Mixed methods will be needed to generate evidence on the effectiveness and ROI of EBC. These can be applied to both the overall paradigm and constituent assumptions, but methods should be tailored to the specific question being tested and insight sought.

Experimental and quasi-experimental approaches, familiar to conservationists from disciplines such as natural sciences with an epistemological foundation of objective empirical observation (Moon & Blackman, 2014), can in principle be used to test the effects and ROI of EBC (e.g. Emparanza et al., 2015; Kodikara et al., 2017; Walsh et al., 2019). Rigorous study designs, using counterfactual methods, will be critical to generate causal insights (Jones & Shreedhar, 2024; O'Garra et al., 2025). For example, BACI designs, synthetic controls, interrupted time series and statistically matched designs should be employed where possible, as they generate far more reliable results than simple Before-After or Control-Impact designs (Christie et al., 2019; O'Garra et al., 2025).

However, there are challenges associated with using experimental and counterfactual approaches to evaluate EBC. For example, given the assumption that EBC improves outcomes, it may be unethical to designate control groups where decisions are not made under the EBC paradigm (e.g. when attempting to save a Critically Endangered species). It may also be difficult to achieve sufficient replication and statistical power when working with rare species that are often the targets of conservation. Focusing experiments on EBC for managing common species or habitats, or removing threats such as invasive species, would be a way around this. Low replication within individual studies can be addressed by synthesis methods (see below), as long as individual studies are otherwise well-designed. Finally, EBC does not exist in a void. Any control groups are likely to be influenced by existing knowledge informed (consciously or not) by evidence, or knowledge spilling over from evidence-based groups in any experiment (Jones & Shreedhar, 2024). These effects would need to be accounted for, for example through statistical matching of individuals in groups by their prior level of evidence use.

Qualitative attribution approaches allow exploration of the mechanisms, causal processes and sequences leading to outcomes (Sharkey et al., 2025; Stern, 2015). More specifically, theory-based approaches rely on tracing causal processes or chains, such as our overall theory of change for EBC (Figure 2), or more fine-scale theories of change for the constituent processes. Case-based approaches

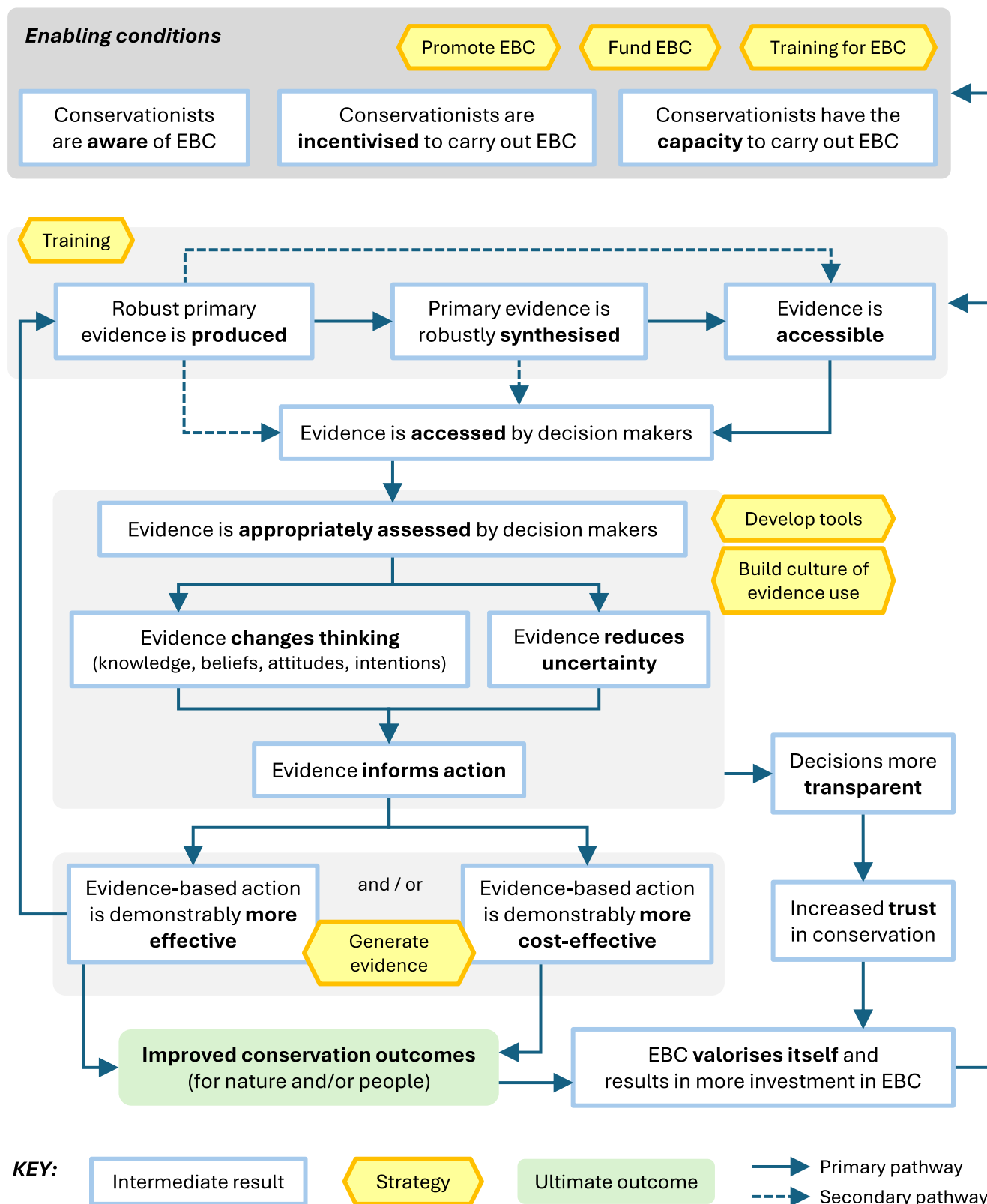


FIGURE 2 Theory of change for how evidence-based conservation (EBC) can improve conservation practice, adapted from Salafsky et al. (2019). Testable analytical questions can be generated from intermediate results, strategies (limited examples shown) and their component activities (not shown), for example: Do conservationists change their actions after assessing evidence? Does EBC increase investment in conservation? Do conference talks promoting EBC increase awareness and implementation of EBC?

TABLE 1 Illustrative evidence for some of the assumptions in our theory of change for evidence-based conservation (EBC; see also Figure 2). These examples are not comprehensive or based on a systematic search. Thus the summaries of findings relate to individual studies and do not reflect the overall state of evidence for any assumption.

Assumption	References	Summary of relevant findings
Robust primary evidence is produced	Christie et al. (2020)	Limited support for assumption: Only 17%–20% of studies testing conservation actions for amphibians and birds used reliable designs. There are also large geographical gaps in evidence coverage, with most from the Global North.
	Williams et al. (2020)	Limited support for assumption: Conservation research remains heavily focussed on describing the state of conservation targets. Greater attention is needed on understanding the sources and drivers of threatening mechanisms, and on testing the effectiveness of conservation responses.
Evidence is accessible	Gossa et al. (2015); Veríssimo et al. (2020)	Limited support for assumption: Conservation science journals largely fail to meet fair open-access standards. Conservation practitioners in developing countries identified paywalls as a barrier to accessing scientific literature.
	Kadykalo et al. (2021)	Refutes assumption: Conservation decision makers in British Columbia, Canada, indicated that Indigenous communities can be hesitant to share their knowledge, despite it being highly valued by decision makers.
Evidence is accessed by decision makers	Kadykalo et al. (2021)	Supports assumption: 98% of interviewees in British Columbia, Canada use western scientific knowledge in conservation decision-making. Less frequent contributions are made by local (59%) and Indigenous (51%) knowledge.
	Stevens and Norris (2022)	Limited support for assumption: 74% of claims in Nature Conservancy of Canada conservation plans did not reference any evidence source. Some sections of plans were particularly poorly referenced, with <1% of claims being referenced. Surveys revealed capacity limitations and gaps in expertise as barriers to effective evidence use.
Evidence is appropriately assessed by decision makers	Frick et al. (2022)	Supports assumption: Ingleby Farms systematically evaluates various forms of evidence, in light of local values, to make informed decisions about farm management.
	Gossa et al. (2015)	Limited support for assumption: Conservation practitioners in developing countries rely on a limited subset of research evidence, mainly in open-access journals. However, journal Impact Factor does not strongly influence evidence selection.
Evidence changes thinking	McConnachie and Cowling (2013)	Supports assumption: All interviewed 'Working for Water' managers whose estimates differed from the evidence-based findings were willing to change their beliefs.
	Walsh et al. (2015)	Supports assumption: Surveyed conservation practitioners changed their likelihood of using 46% of interventions after reading a synopsis of scientific evidence.
Evidence informs action	Galligan et al. (2020); Esmail et al. (2022)	Supports assumption: Various lines of evidence diagnosing diclofenac as a major cause of vulture mortality on the Indian subcontinent convinced governments to ban its veterinary use in India, Pakistan and Nepal.

(Continues)

TABLE 1 (Continued)

Assumption	References	Summary of relevant findings
	Batáry et al. (2015); Sutherland and Wordley (2017)	Refutes assumption: An accumulation of scientific evidence over time did not lead to any improvement in the benefits of European agri-environment schemes on species richness, likely because the evidence was ignored by decision makers.
Evidence-based action is more effective	Walsh et al. (2015)	Supports assumption: When surveyed conservation practitioners changed their likelihood of using interventions after reading a synopsis of scientific evidence, they were more likely to implement effective actions and avoid ineffective ones.
	Kodikara et al. (2017)	Supports assumption: The survival rate of planted mangroves was higher in projects that used technical guidance than in projects that did not.
Evidence-based action is more cost-effective	Santangeli and Sutherland (2017)	Supports assumption: A conservation programme solely carrying out demonstrably effective measures would save about €78,854 (or 22% of the considered budget) annually.
EBC valorises itself and results in more investment in EBC	Al-Fulaij et al. (2025)	Supports assumption: A group of 18 conservation funders looks favourably upon projects that adhere to an evidence-based paradigm, by using or generating evidence.

Note: Bold text highlights key word(s) in each assumption. Coloured text reflects categorical assessment of support (e.g. green = Supports assumption, red = Refutes assumption).

draw lessons by detailed comparison of cases with different combinations of causal factors. Participatory approaches allow participants (e.g. conservation practitioners) to validate that their actions and effects are caused by a particular intervention. Qualitative approaches will be particularly useful for generating evidence on EBC (e.g. Gossa et al., 2015; Kadykalo et al., 2021), given that it occurs in a complex social and ecological environment. These approaches can blend empirical evidence with other forms of evidence such as tacit knowledge and expert opinion (Gillson et al., 2019). They can also explore how EBC is experienced and understood by different stakeholders, incorporating diverse perspectives and narratives to generate a rich, nuanced and timely understanding of outcomes and impacts in different contexts (HM Treasury, 2020; Sharkey et al., 2025). As such, they can move us beyond understanding *what* the change was to understanding *how* and *why* it did or did not occur. Attributing causality on the complex social-ecological systems around EBC will require careful application of these methods by trained researchers (Adams & Sandbrook, 2013).

Finally, synthesis approaches combine findings from primary (or sometimes other secondary) studies to provide evidence based on the accumulation or aggregation of knowledge (HM Treasury, 2020; Stern, 2015). Specific approaches include narrative reviews, rapid reviews, subject-wide evidence synthesis, systematic reviews and meta-analyses (Stern, 2015; Sutherland et al., 2019). Broad syntheses of evidence related to the effectiveness and ROI of EBC are conceptually challenging, given the diversity of outcomes in conservation: across different species, metrics, levels of biological organisation and even extending to human attitudes and behaviour (Christie et al., 2021). The limited quantity and quality of primary studies in

conservation also restricts the scope for synthesis (Christie et al. 2019, 2020). Moreover, conservation studies generally do not make it clear whether and how they adhere to the principles of evidence-based practice (in the way medical studies do; Connor et al., 2023), limiting the potential for synthesis exploring the effects of adopting the paradigm.

6 | CONCLUSIONS: THE NEXT 20 YEARS

Over the past 20 years, there have been repeated calls for increased adoption of evidence-based practice in conservation but, somewhat ironically, we still lack a rigorous evidence base to support the claim that outcomes are improved by the additional investment in EBC.

As a working position, it seems reasonable to assume that the EBC paradigm generally leads to better conservation outcomes, based on theory and empirical evidence largely from other disciplines. There is a need for further evidence on whether this assumption holds within conservation specifically, but we suggest research attention is best focused on more nuanced questions around the application of EBC. It would be particularly useful to test the assumptions along the theory of change for EBC, to guide effective implementation. A combination of experimental, qualitative and synthesis approaches will be necessary, ideally working across disciplines: the basic steps apply to evidence-based practice generally and could benefit from insights from fields such as education, sociology, psychology, economics, computing and operations research.

Furthermore, we believe that further research is required to determine the cost-effectiveness and cost-benefit of EBC, to inform

decisions around when and how much we invest in it. We need a better understanding of the contexts in which EBC is (or is not) worth the investment, and what is the optimal balance between rapid action and detailed evidence assessment to achieve the best possible conservation outcomes.

Systematic analysis of the existing evidence around EBC will help to prioritise future research by identifying knowledge gaps (likely many) and clusters (likely few). Meanwhile, we must continue to enhance the diversity and quality of the underlying evidence base, and ensure it is augmented rather than diminished by AI.

AUTHOR CONTRIBUTIONS

All authors contributed to conceptualisation, investigation, writing—review and editing. Nigel G. Taylor also contributed to writing—original draft, visualisation, project administration. William H. Morgan also contributed to writing—original draft. Alec P. Christie also contributed to writing—original draft.

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DATA AVAILABILITY STATEMENT

All data supporting the conclusions of this manuscript are available within the article.

ORCID

Nigel G. Taylor  <https://orcid.org/0000-0002-8643-826X>

William H. Morgan  <https://orcid.org/0000-0002-7594-6453>

William J. Sutherland  <https://orcid.org/0000-0002-6498-0437>

Alec P. Christie  <https://orcid.org/0000-0002-8465-8410>

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