The Evidence Synthesis Toolkit: Perspectives from Philosophy and Biology

Bielefeld, 7th & 8th October 2024

Abstracts

Federica Bocchi
Title: Two Notions of "Evidence" in Evidence-Based Conservation.

Abstract: The rise of "evidence-based approaches" has profoundly reshaped both science and decision-making, prioritizing the use of empirical evidence to assess the effectiveness of policy interventions. This trend extends into evidence-based conservation (EBC), where proponents advocate that environmental actions should be grounded in empirical data rather than untested ecological hypotheses. Despite the momentum behind this movement, philosopher Nancy Cartwright (2013) persuasively argues that evidence-based approaches still lack a philosophically rigorous yet actionable account of evidence. In this talk, I will explore the conceptual landscape of "evidence" as it is used in conservation, focusing on two case studies: the Conservation Evidence Project and the GeoBon Biodiversity Project. These projects reveal two distinct meanings of "evidence" within the EBC framework. The first, akin to evidence-based medicine, emphasizes synthesizing existing studies to provide a comprehensive assessment of conservation action effectiveness. The second emerges from big data projects, which seek to amass more data to validate foundational ecological knowledge, such as the habitat fragmentation hypothesis.
I will argue that these two notions of "evidence" in EBC should be re-examined through the lens of established philosophical frameworks, particularly feminist and social epistemology of science. These frameworks offer critical tools for developing a philosophically sound and potentially more practical understanding of evidence within the evidence-based paradigm.
Evidence is a central concern for philosophers interested in both epistemology and the methodology of science. In this presentation, I investigate the various notions of evidence at play in biodiversity conservation, contributing to ongoing discussions around evidence synthesis, data, and the knowledge-implementation gap.

Antica Čulina
Title: Risk of bias assessment for evidence synthesis

Abstract: Systematic review and meta-analysis are often used to provide an overview and quantitative synthesis of the existing evidence for a research question. However, the reliability of the evidence synthesis depends on the reliability of the individual studies included. Thus, a detailed assessment of the risk of bias (RoB) in contributing studies is essential to identify the most credible estimates for synthesis and to highlight evidence gaps in the literature. Despite this, the risk of bias assessment is still rare in ecology and evolution. In this talk, I will introduce the risk of bias assessment, available RoB tools, and will discuss some reasons for the low application of RoB in ecology and evolutionary biology. I will also list some RoB bias items that those conducting evidence synthesis might consider using.

Matt Grainger
Title: Rage against the machine (Or old man shouts at AI)

Abstract: The overwhelming volume of literature and limited resources have driven the search for robust shortcuts in evidence synthesis since at least 2010. The recent surge in access to large language models and AI tools has sparked a rapid increase in their use for streamlining evidence synthesis. Whilst these technologies promise efficiency and scalability in processing vast amounts of data, they come at the cost of environmental impact, as well as a loss of transparency, openness, and reproducibility in the synthesis process.

Saana Jukola
Title: From evidence to advice? The challenge of nutrition policy

Abstract: The aim of this talk is to discuss some of the main challenges related to synthesizing evidence that arise when nutritional policies are issues. As a case that helps to illustrate this topic, I introduce the controversy surrounding the health effects of meat eating. Many recent dietary guidelines have recommended reducing meat consumption for both health and environmental reasons. According to some critics, these recommendations are not based on sound evidence. I show how disagreements concerning standards of evidence and different understandings of evidential relevance influence these debates. Moreover, I argue that even if evidence that appears to be reliable was available to the decision-makers, issuing nutritional policies was not straightforward. This is because in nutrition policymaking, science converges with economic and political concerns and cultural habits.

Julia Koricheva
Title: Temporal instability of evidence base in ecology: causes and consequences

Abstract: Outcomes of meta-analyses are increasingly used to inform evidence-based decision making in various research fields. However, policy-relevant recommendations derived from these reviews may quickly go out of date if the magnitude and statistical significance of the reported effects changes over time, as has been shown in a number of recent studies across different research fields. Such evidence reversals may be due to a lack of statistical power in early studies, heterogeneity, methodological changes over time, or true changes in biological effects under study. I will present the results of assessment of the extent and patterns of temporal trends in magnitude and statistical significance of the cumulative effects in meta-analyses in applied ecology and conservation. 93% of examined meta-analyses showed a temporal trend in cumulative effect magnitude or significance with 27% of the datasets exhibiting temporal trends in both. Analysis of potential causes of these temporal patterns showed that they are unlikely to be caused by the small sample size of early studies and changes persisted after effects of moderators have been accounted for in the analysis. These results show that temporal changes in magnitude and statistical significance in applied ecology are widespread and represent a serious potential threat to use of meta-analyses for decision-making in conservation and environmental management.

Rose O'Dea
Title: Transparency is insufficient for reliability

Abstract: In good news for proponents of systematic reviews and meta-analyses, the open science movement has made research more transparent. It is easier to find primary results to synthesise, and it is easier for readers to determine whether a review was conducted systematically. The bad news, at least in ecology and evolution, is that we weren't making the most of the information we already had available; methods for critical appraisal emphasise transparency and internal validity, while neglecting construct and external validities. With reference to what has and hasn't changed following the open science movement, this talk will speculate on sticking points when it comes to synthesising reliable evidence.

Rose Trappes
Title: Data Synthesis in Ecology

Abstract: Ecologists are increasingly engaging in *data synthesis*: producing and using large datasets compiled from heterogenous sources. In many cases, the resulting datasets are published as open data, providing a resource for other ecologists to use in future studies. In this presentation I identify and discuss a trade-off inherent in this practice, the *data synthesis trade-off*. When producing synthetic, reusable datasets, researchers can make synthetic datasets easy to use by homogenising and processing the data, but they thereby limit the possible research questions the dataset can be used to answer. On the other hand, they can enable data reuse for many different purposes by retaining heterogeneity in the data, but such datasets are very difficult to use. I illustrate the data synthesis trade-off using the examples of data synthesis studies in movement ecology and big citizen science projects in ornithology. These examples also help to identify strategies researchers can use to navigate the trade-off, such as flexible datasets, open code, and data exploration and analysis tools.