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GUEST EDITORIAL

Evidence Synthesis for Environmental Decision Making: Why "Summary" Is Not The Same As "Synthesis"

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NOT ALL EVIDENCE THAT LOOKS RIGOROUS ACTUALLY IS

Environmental science has never been more productive. Every month we see new studies on forests, fisheries, pollution, climate hazards, restoration, protected areas, and community-based management. In Indonesia and across Southeast Asia, where environmental decisions often must be made quickly amid rapid development pressure and climate risk, the idea of "evidence-informed decision making" is widely supported.

But what kind of evidence are we actually using to inform these decisions?

Many evidence sources look similar. They cite research. They summarise findings. They offer recommendations, sometimes with authoritative branding or publication in high-impact journals. They do not, however, all do the same job, and if we treat them as interchangeable we risk overconfidence, selective learning, and weak foundations for policy and practice.

Poor-quality reviews do not only mislead decisions. They can also distort the research agenda itself because funding and research priorities are often influenced by what decision-makers believe the evidence says. When a persuasive "summary" fails in practice, policymakers rarely blame the summary, they blame "the science". Over time, this can erode trust in research institutions and in the idea of "evidence-based" decision making.

The key point of this editorial is simple: the difference between summarising evidence and systematically synthesising it is not a technical detail. It is structural, and it can affect the quality of recommendations. A growing body of work in environmental management shows that "evidence-based" practice succeeds only when evidence is gathered, assessed, and used in ways that are realistic for decision contexts and transparent about limitations (Cooke et al., 2023).

SUMMARY VERSUS SYNTHESIS: TWO DIFFERENT TOOLS

An evidence summary helps people orient themselves by scanning a topic, highlighting themes, and translating findings into accessible language, which can be very useful when time is short.

Evidence synthesis is different. It is a scientific method and in systematic reviews and systematic maps, authors do not only "describe studies". They use a transparent and repeatable process to search for evidence, select studies using clear criteria, and then assess how trustworthy the studies are. Evidence synthesis asks not only what do studies say, but how confident should we be in those findings? (Collaboration for Environmental Evidence, 2022).

This distinction matters because these products answer different questions:

- A summary often answers: What are people saying about this topic? What are the main ideas?
- A synthesis answers: What does the total relevant evidence show, how consistent is it, why might results differ, and how confident can we be?

When summaries and syntheses are treated as the same, we can mistake visibility for weight. A well-written overview can feel decisive, whereas a systematic review may feel slower and more cautious. But caution is sometimes the honest result of weak or mixed evidence, especially in complex environmental systems.

This problem is common. Environmental researchers have highlighted recurring weaknesses in literature reviews that look scholarly but are vulnerable to bias, along with practical ways to fix them (clear questions, transparent searching, explicit inclusion criteria, and critical appraisal) (Haddaway et al., 2020).

WHAT MAKES EVIDENCE SYNTHESIS DISTINCTIVE: CRITICAL APPRAISAL

The most crucial difference between "summary" and "synthesis" is often critical appraisal (sometimes called risk of bias assessment).

Environmental studies vary in reliability. Some have strong designs and clear reporting. Others have weaknesses: no control sites, strong confounding, short timescales, selective outcomes, or unclear methods. If we treat all studies as equally trustworthy, we can easily be misled, especially when results are complex or politically important.

Evidence synthesis therefore includes structured ways to appraise study validity. In environmental science, this has historically been less standardised than in health research, but that is changing. The Collaboration for Environmental Evidence (CEE), for example, has developed a Critical

Appraisal Tool for environmental intervention and exposure studies, designed to help reviewers judge internal validity and risk of bias consistently (Konno et al., 2021).

Critical appraisal is not a bureaucratic exercise. It protects against predictable bias, especially when evidence is used to justify expensive projects or high-impact policy decisions, and it helps us avoid building confident conclusions on weak foundations.

WHY RIGOUR MATTERS: IT IS ABOUT RISK, NOT PERFECTION

We often justify evidence synthesis by saying it reduces bias and prevents cherry-picking. That is true. But the deeper issue is risk. Environmental and climate decisions can commit major resources and shape landscapes and livelihoods for many years.

Not every decision context allows time for a full "gold-standard" systematic review. In fast-moving situations, more proportionate approaches may be necessary. What matters is being clear about what is gained, and what is exposed, when rigour is trimmed.

When shortcuts are taken, the headline conclusion may stay the same, but confidence changes. For example:

- Without full searching, contradictory or "no effect" evidence can be missed.
- Without critical appraisal, weak studies can inflate apparent effectiveness.
- Without structured comparison, important context differences can disappear, and interventions look more transferable than they are.
- Without transparent methods, uncertainty is underplayed.

The result is rarely one dramatic error; more often it leads to overconfident policy, scaled-up interventions that underperform, and opportunity costs, because time, money and attention are committed to approaches that work only in narrow conditions. In environmental and climate decision-making, opportunity cost is cumulative: five years invested in the wrong direction is not trivial.

WHY ENVIRONMENTAL DECISIONS PARTICULARLY NEED SYNTHESIS

In environmental management, decisions rarely resemble controlled laboratory conditions. Outcomes can take years. Systems are influenced by governance, incentives, enforcement, social context, ecology, and climate variability. Monitoring may be uneven. Many interventions are implemented without strong evaluation design.

Two common failures are especially relevant in environmental management:

- The single-study trap. One exciting study (from one place, one time) becomes "proof" of what works, and an intervention is scaled up without understanding uncertainty and context.
- The evidence overload trap. There are too many papers to interpret, so people stop trying to integrate evidence systematically. Decisions drift toward habit, authority, or the most accessible narrative.

Evidence synthesis offers a disciplined alternative. It helps us learn cumulatively, identify what is robust, and recognise where evidence is weak or mixed. It also supports a wider "evidence culture": asking clearer questions, measuring meaningful outcomes, and being honest about uncertainty (Cooke et al., 2023).

FIT FOR PURPOSE: NOT EVERY QUESTION NEEDS THE SAME APPROACH

Different decisions need different evidence approaches:

- Systematic maps help when a topic is broad and we need to understand what evidence exists and where gaps remain. They are especially valuable for research planning and priority-setting.
- Systematic reviews help when there is a focused question about an intervention or exposure and enough comparable evidence exists.
- Rapid reviews can support urgent decisions, but shortcuts must be clear and conclusions cautious.
- Narrative reviews and evidence summaries still have a place, especially for early orientation, but they should not be presented as equivalent to systematic synthesis (Collaboration for Environmental Evidence, 2022).

A simple "reader's test" helps: if a review does not clearly describe how studies were searched for, selected, and appraised, it is a summary (or narrative review), not a systematic synthesis. This is one of the most practical "fixes" recommended in the environmental review methods literature (Haddaway et al., 2020).

A PRACTICAL TOOL: A QUICK CHECKLIST FOR RECOGNISING "SYSTEMATIC" WORK

Across many journals internationally, papers are sometimes labelled "systematic reviews" even when key steps are missing. To address this, Pullin and Macura (2025) published a short checklist to help editors and peer reviewers verify whether a paper really meets systematic review expectations, but it is equally useful for authors and students as a self-check before submission.

If you are writing (or reading) a review, ask:

- Was there a protocol (written before the review, even if not registered)?
- Are the searches fully reported (databases, keywords / search strings, dates)?
- Are inclusion/exclusion criteria explicit and replicable?
- Was study validity critically appraised (risk of bias)?
- Are extracted data presented clearly (tables that allow checking)?
- Is the synthesis method appropriate and explained (not just a narrative summary of selected findings)?
- Are limitations stated clearly (limits of the review and limits of the evidence base)?

A simple test of transparency is this: could another researcher replicate your review using only your written methods? If several of the checklist items are missing, the work

might still be a useful overview, but it should not claim the authority of a systematic synthesis.

A common mistake is to treat a systematic search strategy as the main definition of rigour. Authors may provide excellent search details, yet the analysis remains non-systematic: study quality is not appraised, outcomes are not extracted consistently, and findings are summarised in a selective or unstructured way. In these cases, the search is systematic, but the review is not. A useful rule of thumb is: a systematic review is systematic in both its searching and its reasoning, from inclusion criteria and critical appraisal through to how conclusions are drawn.

TWO SOUTHEAST ASIA EXAMPLES: WHY CONTEXT AND CONFIDENCE MATTER

To keep this grounded, consider two decision areas in Southeast Asia where evidence is plentiful but easy to misinterpret without synthesis.

Example 1: Mangrove restoration for coastal risk reduction. Mangroves are widely promoted for coastal protection, biodiversity, and livelihoods. Many studies report positive effects such as wave attenuation or erosion reduction. Yet effectiveness depends strongly on context: hydrodynamic setting, sediment supply, geomorphology, species choice, planting methods, maintenance, and governance (including land tenure and long-term protection). A synthesis approach helps separate what is consistent across settings from what depends on conditions, and it identifies where evidence is weak or based on short-term proxy outcomes. This matters because agencies must decide not only whether to invest, but where, how, and with what realistic expectations.

Example 2: Peatland fire and haze prevention. Peatland fires and transboundary haze are shaped by hydrology, land management, incentives, and enforcement. Interventions include rewetting and canal blocking, fire prevention programmes, livelihood options, and early warning systems. Individual studies often examine one intervention in one locality. Evidence synthesis can help decision-makers understand which approaches (or combinations) have stronger evidence, what outcomes are being measured, what conditions are critical for success, and where evidence gaps remain, especially regarding long-term maintenance, governance, and unintended consequences.

In both examples, the goal is not one universal answer. The goal is better judgement under uncertainty, the kind of judgement that adaptive management needs.

A NOTE ON SCALE: GLOBAL SYNTHESES AND LOCAL DECISIONS

One practical challenge is that decision-makers may feel that "global" evidence syntheses are too broad for their specific context. This is understandable. Context matters in environmental management. But high-quality, fully bespoke syntheses for every local decision are difficult and resource intensive.

This is one reason why it is valuable for more early-career researchers to become skilled in evidence synthesis methods: smaller, decision-focused syntheses and maps, done transparently, can be just as impactful as large global ones.

FROM "CAUSALITY" TO "CONTRIBUTION"

Environmental managers often want a clear causal answer: "Did this intervention cause this outcome?" But in open, complex systems, strict causality is often difficult to demonstrate, with outcomes usually reflecting multiple interacting drivers.

For many decisions, what is needed is credible evidence of contribution: does an action tend to improve outcomes compared with alternatives, and under what conditions? Evidence synthesis supports this by building a transparent picture across studies, appraising confidence, and clarifying where results are robust versus fragile. It helps avoid false certainty while still supporting action.

WHAT INDONESIAN STUDENTS AND RESEARCHERS CAN DO NOW

Evidence synthesis may still be unfamiliar in many Indonesian environmental fields. But individuals can begin building more rigorous habits immediately. Here are some practical steps:

1. Label your product honestly. If you are writing a narrative review or evidence summary, say so. Do not call it "systematic" unless you used systematic methods.
2. Make your methods transparent (even in a narrative review). Report which databases you searched, which keywords you used, and the date range.
3. Be explicit about what you include and what you exclude. "Inclusion/exclusion criteria" simply means: what types of studies count for your question (topic, location, study type, outcomes) and what does not.
4. Start thinking about study quality. Ask basic questions: Was there a comparator? Were outcomes measured consistently? Were methods reported clearly? What biases might be present?
5. Use a checklist as a training aid. Try applying the checklist above to any published "systematic review" in your topic area. This is a fast way to build evidence literacy.
6. Try a small "training synthesis". A good starting point is a narrow question, a transparent search, and a simple map of what evidence exists (even before estimating effects). The aim is to practise method, not to solve everything at once.

CEE provides author resources and standards here: https://environmentalevidence.org/information-for-authors/

One lesson from fields such as medicine is that evidence cultures can take decades to build. Systematic review methods, explicit appraisal of bias, and transparency about uncertainty did not emerge overnight, and environmental science is still strengthening this culture.

LOOKING AHEAD: INFRASTRUCTURE AND AI, BUT METHOD STILL MATTERS

Globally, evidence synthesis is increasingly seen as part of decision-support infrastructure, not just an academic activity. New collaborations and investments aim to make evidence easier to find, assess, and use, especially in policy contexts where time is limited.

At the same time, AI tools are beginning to speed up parts of the evidence process (for example, searching and screening). We now also see AI tools that can generate an "instant literature review" or a set of "key findings and recommendations" from a short prompt, often with citations that look authoritative. These developments are exciting, but they also raise an urgent issue: if AI systems learn from weak, biased, or non-transparent summaries, they can scale a "garbage in, garbage out" problem very quickly. In other words, faster tools make it even more important to label evidence products correctly and assess them appropriately, otherwise the "evidence overload trap" becomes worse, not better (Cooke et al., 2023).

CONCLUSION

Evidence summaries are useful for quick orientation, but evidence synthesis helps societies learn reliably. If we want learning to be real rather than rhetorical, the difference between summarising evidence and systematically synthesising it is not a technical detail. It is structural.

My hope is that this editorial encourages InJAST readers, especially students and early-career researchers, to become curious about evidence synthesis, to understand the science–policy challenges around evidence-informed decision making, and to build more rigorous habits over time. Those habits are not only about publishing papers; they are about producing knowledge that genuinely supports better outcomes for people and nature.

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