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PERSPECTIVE ESSAY

Twelve strategies for realizing the promise of ecopracticology

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Abstract
Ecopracticology—the study of socio-ecological practice and the ensuing body of knowledge—is increasingly being embraced as a useful paradigm for understanding and solving social and environmental problems. Ecopracticology has historical roots but in recent years has been touted for its role in generating solutions that are effective and durable. Using a diverse team of scholars, practitioners, and scholar-practitioners from around the globe working in various roles in the ecopracticology space, we identified twelve strategies for putting ecopracticology into practice drawing on their experiences and anchored in the literature. The twelve strategies are: (1) Embed co-design principles at all levels of socio-ecological practice; (2) Build a diverse team through embracing inclusivity; (3) Consider the human dimension; (4) Cross disciplinary boundaries with courage and purpose; (5) Set practice-based problems as a starting point for research; (6) Establish trust with practitioners and partners; (7) Weave old and new ideas and knowledges; (8) Consider the interplay of scales in the application of socio-ecological practices; (9) Study and learn from actions in recognition that knowledge is imperfect; (10) Synthesize research into evidence-based practice guidelines; (11) Embrace nature-based solutions; (12) Embrace ecophronesis as a fundamental value and prism of reflection and action. The strategies shared here are not intended to be prescriptive but rather to provide guidance to those embarking on or reflecting upon their journeys in this space recognizing that not all strategies will work or are necessary for every context. Moreover, these strategies will likely need to be adapted to specific social, political and cultural contexts within which socio-ecological practice takes place. Nevertheless, what is clear is that to address the polycrisis facing humanity and the planet there is urgency in leveraging the collective knowledge of all relevant actors with a particular focus on ensuring that socio-ecological practitioners—the front-line workers—are involved, supported, and celebrated. Doing so is a manifestation of ecopracticology and serves as a template for putting ecopracticology into widespread practice.

Keywords Ecopracticology · Environmental problems · Twelve strategies · Ecophronesis · Sustainable development goals

1 Introducing ecopracticology

Ecopracticology is the study of socio-ecological practice. It involves pragmatic ways of knowing, creating a body of pertinent knowledge and identifying workable solutions to socio-ecological challenges (Xiang 2019). In more simple terms it is about addressing socio-ecological problems and challenges with solutions that work. Ecopracticology inherently recognizes that there are many forms and types of knowledge and evidence that can be used to support such activities. In particular, it centres the role of those individuals, organizations, or cultures that hold, generate and apply practical knowledge (from scholars to practitioners to community members) obtained through short term and long term (even intergenerational) learning. Ecopracticology spans the entirety of the knowledge-application spectrum—working to improve socio-ecological outcomes through more effective interactions between knowledge (and evidence) and application. Ecopracticology also involves studying the processes behind the practice (e.g., the interface between knowledge generation and application) to ensure effective or sustainable impact.

The principles of ecopracticology have been applied for a long time, yet the term itself was only recently coined (Xiang 2019, p.7), and efforts continue to fully define and codify the concept. We argue that although the definition of "ecopracticology" included implicit recognition of integration with practice, the reality is that doing so is challenging (Memmott

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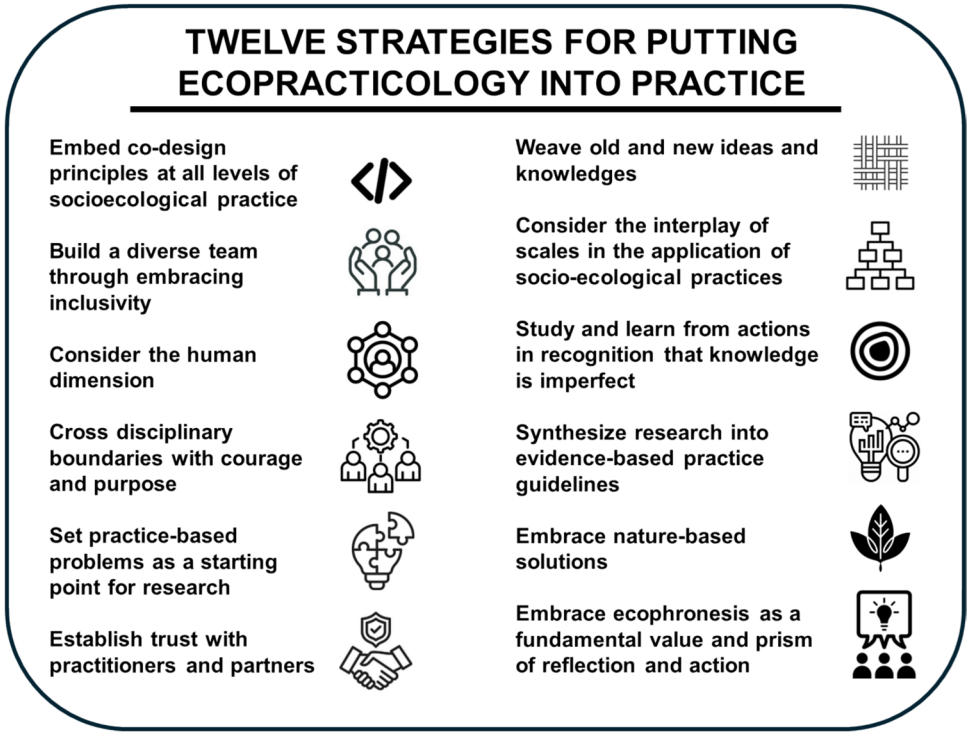

Fig. 1 Visual summary of the twelve strategies for putting ecopracticology into practice. Although these are presented as discrete numbered strategies we acknowledge that there is inherent overlap among them and that they should be viewed as being integrated and overlapping

et al. 2010; Lawrence 2015) and there is need for guidance for those working in such spaces or considering work in such spaces. That is the premise for this paper. Here we identify twelve strategies for putting ecopracticology into practice embracing the notion that it is a valuable paradigm to achieve environmental solutions that are effective and have sustainable impact. Given the current state of environmental affairs (think climate change, the biodiversity crisis, natural disasters, human suffering as a result of warfare and environmental pollution, urban strife) on the planet and an increasing threat matrix, there is a sense of urgency to identify and implement solutions. The strategies are meant to provide guidance to those embarking on or reflecting upon their journeys in this space, rather than prescriptions. After presenting the twelve strategies we briefly reflect on how they collectively advance environmental solutions that benefit nature and people.

2 Approach

We assembled a diverse team of scholars, practitioners, and scholar-practitioners from around the globe (many of whom attended the SEPR Conference in Weihai, China in October 2024; see Cooke et al. 2025) working in various roles in the ecopracticology spectrum. The SEPR Conference is unique in focus in that it is largely framed around ecopracticology and more broadly on research related to socio-ecological practice. We asked co-authors to reflect on their experiences to help identify what we share here as the preferred twelve strategies (not presented in prioritized manner given that will depend on a given context; See Fig. 1) for putting ecopracticology into practice. There is inherent overlap and interconnections among the strategies presented such that they are not mutually distinct as may be implied in our attempt to present them as a numbered list. We encourage readers to think carefully about the interconnections of the strategies while also recognizing that the strategies are undoubtedly incomplete. Indeed, we acknowledge that a different team may generate other strategies than those shared here. Nonetheless, given that multiple team members identified each strategy and given consensus within the group that these were worthy of sharing with our community, we are confident that these ideas have merit and will be relevant to those interested in putting ecopracticology into practice. Moreover, understanding ecopracticology and facilitating its implementation will ultimately feedback into the research community and help ecopracticology research become more prevalent and impactful.

3 Twelve strategies for putting ecopracticology into practice

3.1 Embed co-design principles at all levels of socio-ecological practice

Co-design (and other related manifestations including co-creation, co-production, co-evolution and co-assessment)

broadly defined involves working collaboratively with a broad range of stakeholders to design and implement research projects and/or plans (e.g., environmental initiatives, service layout in a community; Steen 2013; Brandsen and Honingh 2018; Chapman and Schott 2020). Therefore, we consider co-design as one of the most important principles for putting ecopracticology into practice (see Djenontin and Meadow 2008 for guidance on how to do such work). There are worldwide initiatives and efforts that continue to fully delineate and classify this concept. In socio-ecological practice research, studies highlight the role of local people (local knowledge bearers) in the integration of local and scientific knowledge systems in research (for example, Reed et al. 2007 in sub-Saharan Africa region; Velempini and Perkins 2008 in Botswana; Velempini et al. 2016 in Tanzania). Socio-ecological practice research needs to be developed in partnership with local people who should be at the forefront of driving the research process (proposal and implementation). This includes, for example, establishing the research priorities and questions, co-designing the participant information sheets/consent forms, discussing ethical, practical, and safeguarding issues, as well as interpreting the findings and being actively involved in impact and knowledge exchange activities. To achieve this, local knowledge bearers should be equipped with capacity building skills and empowerment (e.g., project management skills, office and clerical procedures) for executing community research projects (O'Connell et al. 2019). This approach places emphasis on valuing local and traditional ecological knowledge (TEK; including Indigenous ways of knowing), ensuring representation from diverse groups, and fostering co-creation in decision-making. Therefore, co-design (and related approaches) ensures that solutions align with the lived realities of local communities, enabling widespread adoption of sustainable and resilient practices (See 3.6 below for guidance on developing trusting and meaningful relationships).

3.2 Build a diverse team through embracing inclusivity

Inclusivity is one of the core principles that can put ecopracticology into effective practice. Ecopracticology continues to contribute to initiatives that aim at achieving the targets of UN Sustainable Development Goals (SDGs) for 2030. Some of the SDGs state as follows: "By 2030, eliminate gender disparities in education and ensure equal access to all levels of education and vocational training for the vulnerable, including persons with disabilities, indigenous peoples and children in vulnerable situations", "By 2030, substantially increase the number of youth and adults who have relevant skills, including technical and vocational skills, for employment, decent jobs and entrepreneurship", and "Promote peaceful and inclusive societies for sustainable development, provide access to justice for all and build effective, accountable and inclusive institutions at all levels". The above SDGs emphasize the importance of inclusivity for all people in all pathways of social and economic practices, including socio-ecological research which includes practical wisdom. In experience, most of the time field work activities in rural and remote areas rarely include people who have some special needs in life such as people living with disabilities. Therefore, in upscaling ecopracticology, it is critical that there is evidence of gender equity; participation of all people living with disabilities, multi-sensory, severe communication and interaction challenges; and all ethnic groups (Kganetso 2024) for successful lifeways. This can contribute to closing the gap of a lack of provision for effective curricula for learners with Special Educational Needs, which is a worldwide concern, and many countries (including sub-Saharan African countries) are experiencing an increase in the number of children who are identified as in need for special provision (Florian and McLaughlin 2008; Kuyini and Mangope 2011, p.20). The consideration of inclusivity in ecopracticology suggests a rethinking, rewriting, and reapplication of practices to make good quality life accessible and equitable to all people. As a result, people can overcome their fears, hesitation and enjoy experiential and outdoor learning, and increase their interaction levels with both society and nature.

3.3 Consider the human dimension

The centrality of human values, perspectives, and behaviours to environmental problems (and problem solving) is well established (Bennett et al. 2017; Manfredo et al. 2009), and evident in terms and/or concepts like 'socio-ecological system,' 'anthropogenic stressor,' and 'Anthropocene.' Relatively simple problems of the past (e.g., maximizing agricultural production) were solved with conventional, nature-focused scientific methods, which have failed to solve modern environmental problems (e.g., biodiversity conservation amidst industrial agriculture) stemming from conventional science (Funtowicz and Ravetz 1993, p.739). Human dimensions research focuses on the values, perspectives, and behaviours of people, and is a major component of modern efforts to manage modern environmental problems. Human cognition and societal values, for example, have direct effects on natural resource use (Jacobs et al. 2018), but were not explicitly considered in natural resource management until relatively recently. 'Forgetting' such information can undermine management strategies that assume resource users (e.g., commercial fishers) will behave predictably (e.g., comply with fishing regulations; Hilborn 2007, p.285). Understanding the "winners" and "losers" related

to a given development activity or environmental decision is essential to ensure that actions are not unduly benefitting or harming particular segments of a given population (Baskin 1998). Other human dimensions research focuses on governance and can reveal 'bottlenecks' to sustainability in management systems (e.g., science-policy interactions, corruption; Howarth et al. 2023; Nguyen et al. 2017; Robbins 2000), as opposed to natural scientific understanding. Many attempts to solve modern environmental problems like hurricanes or indiscriminate waste disposal misattribute persistent problems to deficiencies in science while overlooking core issues (e.g., differing stakeholder values and preferences; Balint et al. 2011). In such cases, the most urgent part of a problem—which relates to human values—may be ignored altogether. Practitioners of ecopracticology must consider the contribution(s) of human values, perspectives, and behaviours to an environmental problem, and the possibility that one or more of these is at the problem's core. Practitioners who know what parts of a problem need solving stand a better chance of finding 'solutions that work.'

3.4 Cross disciplinary boundaries with courage and purpose

Inherent with the concept of ecopracticology is a recognition that most environmental problems and solutions require critical thinking across disciplinary boundaries (MacLeod and Nagatsu 2018). Doing work that crosses boundaries is not an academic exercise or quest but rather an activity that is done out of necessity (Dick et al. 2016) and with the recognition that it involves many challenges (Cooke et al. 2020). It is easy and convenient to focus solely on one's expertise and put disciplinary guard rails up around a given issue. However, research in health care, education, and the environment all reveal that doing so leads to myopic thinking and a constrained solution set. The reality is that environmental problems are complex for many reasons including the ever-pervasive human dimension (Dick et al. 2016). Crossing disciplinary boundaries for the sake of boundary crossing is not a good strategy; rather, when boundary crossing is necessary one should do so with courage and purpose (Cooke and Arlinghaus 2024, p.665). Courage requires a willingness to be challenged (and learn) along with a good dose of humility. Purpose means being clear about the "why" of boundary crossing and doing so with an open mind willing and ready to consider alternative viewpoints. Purposeful also means assessing interdisciplinary activities and expanding or contracting them as necessary to ensure that those efforts are aligned with practice (Datta 2017, p.22). We submit that to put ecopracticology into practice, embracing interdisciplinary thinking with a willingness to cross boundaries is fundamental to success. Doing so will certainly yield some bruises, but it will also open the door for identifying and implementing solutions that work (Datta 2017; Dick et al. 2016) in the midst of a polycrisis.

3.5 Set practice-based problems as a starting point for research

Practice constitutes the foundational element of ecopracticology (Xiang 2019), encompassing not only the dissemination of research outcomes but also the research process, particularly the research design. The formulation of a well-articulated statement of practice-based problems as a starting point for research endeavors can serve as a pivotal strategy to ensure the relevance of research to practical applications. For instance, the "Future-Proofing Conservation" project in Colombia emerged from dissatisfaction and reflection on existing technical approaches to climate adaptation. So, it applied a problem-driven perspective to embed research in the decision-making context (van Kerkhoff et al. 2018). Similarly, the Ecology-oriented Sand Nourishment research program started with dynamic preservation so that the following research and ecological knowledge were deemed indispensable to the practice of dynamic preservation (van der Molen et al. 2018). The process of establishing practice-based problems as the primary catalyst for research constitutes a manifestation of user-inspired research (Kates 2011, p.19449) and practice-based research (West et al. 2019). In such a circumstance, knowledge and research are defined as artifacts of practice (Cook and Wagenaar 2012), which are distinct from the application of knowledge to practice. Setting practice-based problems as a starting point for research can assist in narrowing down and articulating the research questions and research methods among the numerous research potentials. Most importantly, doing so crafts shared understanding between research and practice so that the relevance of research can be embedded in research design (Wang et al. 2023, p.509).

3.6 Establish trust with practitioners and partners

Socio-ecological practices may involve multiple actors (or stakeholders and rightsholders) from different social domains, such as governments (including Indigenous governments), industries, investors, academia, civil society, non-governmental organizations, and other communities. In most cases, acting practitioners have asymmetrical relationships in power, knowledge, information, and socioeconomic status. Therefore, it is a priority to reduce such "socio-ecological" asymmetry among practitioners. The Research Institute for Humanity and Nature (RIHN) is an international center for socio-ecological practice research, mainly focusing on Asia and Africa (Kondo et al. 2022; Yasunari et al. 2023). Participatory observation of ongoing projects (Kondo et al. 2019, 2021) and semi-structured interviews with RIHN's former

project leaders (Kondo et al. 2022) revealed that trust and rapport were the most important driving forces for better socio-ecological practice research. It has been our experience that trust is established among acting practitioners by creating ethical space for engagement and making the research process more transparent. Membership in socio-ecological practices must always be inclusive and dynamic. Therefore, it is necessary to focus on empowering marginalized actors whose voices are often ignored. It is also vital to ensure the transparency of the research process by sharing it widely and inclusively. Since socio-ecological practice is a form of action-based research, it is therefore important to maintain traceability, allowing for ongoing evaluation and course correction when needed. Open dialog and a willingness to move beyond individual perspectives can also help build trust among multiple actors in a project. Ideally relationships become long-term and allow for co-design and co-creation of projects that are of mutual interest (see 3.1 above).

3.7 Weave old and new ideas and knowledges

There have been countless innovations and technological developments through history (Genta and Riberi 2019). Some of those innovations have themselves been responsible for catastrophic environmental destruction (e.g., the nuclear bomb, coal extraction and combustion; Steffen et al. 2015, p.81) yet there have also been many innovations that have revolutionized human civilization for the betterment of people and without ill effects on the environment (Groenewegen and Vergragt 1991; Huber 2004). Consider advances in the tertiary treatment of wastewater, scrubbers atop smokestacks, or green roofs alongside tools used by ecopracticologists such as geographic information systems to plan cities and sophisticated models to design stormwater systems. Modern technological developments underpinned by computers and increasing artificial intelligence will continue to evolve in the service of ecopracticology (Nishant et al. 2020). Yet, when embracing new innovations, it is equally important to reflect and revisit the innovations from yesteryear. It is useful to consider ecological wisdom that has evolved and been shared across generations (Wang et al. 2016, p.100). Ecological wisdom can take many forms (Liao and Chan 2016; Yang et al. 2019)—from learning shared by early scholars and innovators—to learnings from local and Indigenous peoples and early civilizations. Wisdom can also be accrued over one's life as is common for ecopracticologists who learn by doing if they are scholar practitioners (and in some cases, failing; Yang et al. 2019). Too often ecological wisdom is forgotten, ignored, or dismissed as being irrelevant or dated (Kakoty 2018) yet is essential especially when working with unfamiliar cultures or environments. There is need for more formal processes for merging historical wisdom with holistic decision-making in modern society and for weaving different knowledge systems. Of particular importance is ensuring that Indigenous knowledge is treated ethically and respectfully (see papers on weaving, bridging, and braiding knowledges (Johnson et al. 2016) or on embracing a two-eyed seeing approach Reid et al. 2021). We submit that the ecopracticologists of today and tomorrow can only achieve great success by embracing ecological wisdom and building upon the work done by others, sometimes centuries ago.

3.8 Consider the interplay of scales in the application of socio-ecological practices

As Xiang (2019 and 2020) points out, socio-ecological practitioners operate within a dual framework of relationships: the human-nature (ecological) relationship and the human–human (socio-economic, political, cultural, etc.) relationship. This dual approach requires a deep understanding of the natural environment—both human and non-human—to make informed decisions that translate into effective socio-ecological practices. These practices are inherently spatial (Grose et al. 2019; Steiner 2022), manifesting through tangible interventions in various geographical and temporal contexts. According to Xiang (2019), socio-ecological practices encompass six distinct but closely interrelated categories of human actions and social processes: planning, design, construction, restoration, conservation, and management. In all these contexts, the consideration of scale becomes paramount. A keen awareness of the interaction of scales in socio-ecological practices is essential to avoid mismatches between beneficial actions and the spatio-temporal frameworks in which they occur (Cumming et al. 2006; Schultz et al. 2019). Neglecting this interplay risks creating oases in the desert, where localized successes fail to address systemic challenges or, conversely, where broad-scale initiatives overlook critical nuances at the micro-level. Practitioners must therefore consider that a holistic approach based on an in-depth analysis of the territory and its socio-ecological fabric is essential which is salient to understanding "winners" and "losers" in a given context. They must engage in meaningful dialog with a diverse array of stakeholders, both active and peripheral, to ensure that socio-ecological practices are not only inclusive but also contextually responsive. By doing so, these efforts can harmonize the multiplicity of scales, fostering coherence between localized actions and broader systemic imperatives, ultimately driving sustainable and resilient outcomes.

3.9 Study and learn from actions in recognition that knowledge is imperfect

Ecopracticology recognizes that no solution is perfect from the outset, and knowledge is often incomplete or evolving.

This necessitates an adaptive approach to socio-ecological solutions, prioritizing learning from actions and adjusting based on outcomes (e.g., Bourne et al. 2016; Steinitz et al. 2023). Embedding implementation science—the study of processes to promote the systematic use of evidence-based practices—ensures that practice and evidence are linked to drive continuous improvement (Cooke et al. 2024, p.475). Adaptive management, a cornerstone of ecopracticology, emphasizes flexibility and responsiveness, treating every action as an opportunity to learn and refine strategies as new information emerges (Folke et al. 2005; Levin et al. 2013; Steinitz et al. 2023). Adaptive management has been applied to many environmental projects and is now a tenet of environmental management in some regions (Williams 2011). Dynamic monitoring and evaluation systems further support this by tracking how well strategies work overtime and allowing for adjustments to address changing conditions or challenges. For instance, habitat restoration might involve regular surveys of plant and animal populations, alongside community feedback to align with local needs. Similarly, urban air quality initiatives could use real-time pollution sensors and health data to refine approaches. By considering ecological, social, and cultural aspects together, these systems help maximize positive outcomes and ensure strategies remain relevant and effective. Importantly, effective ecopracticology requires contextual sensitivity. Each case has unique ecological, social, and cultural conditions. Success lies in combining broad frameworks and guidelines with tailored approaches that adapt to local realities, enabling scalable application without losing effectiveness. By embracing imperfection and embedding learning mechanisms, ecopracticology practitioners can develop durable solutions to complex socio-ecological challenges.

3.10 Synthesize research into evidence-based practice guidelines.

Evidence synthesis is the process of identifying, collating and synthesizing available evidence on a question of concern (CEE 2022). There are many forms of syntheses, ranging from quick (often biased) literature summaries to more robust syntheses, such as systematic reviews, that use rigorous, repeatable and transparent methodologies to minimize biases. Robust evidence syntheses can contribute to the study of socio-ecological practice and evidence-based guidelines by bringing together all knowledge on a topic, providing a better understanding of the question of interest than would be possible from a single source (Pullin and Knight 2009, p.931). This assists decision-makers in determining what has worked in the past and what did not, and to use this information to make evidence-informed decisions. The most robust syntheses look critically at existing evidence and ensure that both theoretical and empirical (real-world) learning is used to inform results. They also highlight existing biases in research (e.g., poor experimental design, small sample sizes) that may influence interpretation, and help to minimize unnecessary research duplication (Pullin et al. 2020, p.114). Critically assessing and synthesizing available evidence requires humility, as syntheses may reveal that commonly held socio-ecological beliefs are not supported, or commonly applied practices are not effective (e.g., bat gantries; Altringham et al. 2020). By acquiring insight from the wider knowledge base, evidence syntheses can support evidence-based guidelines for socio-ecological practice that are based on the best available evidence. Syntheses can contribute to any of the six classes of human action and social process that are part of socio-ecological practice (planning, design, construction, restoration, conservation and management; Xiang 2019) by providing robust and defensible evidence that can be used to support decision-making in complex socio-ecological systems.

3.11 Embrace nature-based solutions

An effective environmental strategy should prioritize solutions that not only tackle immediate challenges but also foster long-term resilience. Nature-based solutions (NbS) provide such strategies by harnessing natural systems to tackle issues like climate change, urban resilience, and biodiversity loss. These solutions—such as the restoration of wetlands, the implementation of green infrastructure, and the conservation of forests—offer numerous co-benefits, including carbon sequestration, flood mitigation, climate regulation, and improved water quality. NbS are particularly appealing because they emphasize low-impact, low-maintenance interventions, making them cost-effective and adaptable in the long run (Seddon et al. 2020). By working with natural processes, NbS can safeguard critical ecosystem services, such as water and air purification, while enhancing biodiversity and climate resilience (Manes et al. 2022). However, their success depends on context-specific approaches and proper integration into urban planning and policy (Goodwin et al. 2023). For example, urban areas benefit significantly from NbS such as green roofs and bioswales, which effectively mitigate the urban heat island effect and enhance stormwater management. Still, NbS must be carefully monitored to ensure their sustainability and effectiveness over time (Cohen-Shacham et al. 2016). Moreover, despite many advantages, NbS are not widely implemented for various reasons, including lack of the evidence of their cost effectiveness among policy makers, the complexity of their design, and the difficulty of integration in planning instruments at different administrative levels (La Rosa et al. 2021). Similarly, there is need to ensure that NbS are durable and effective over the long-term given that many projects have limited windows and support for ongoing maintenance and

monitoring (Frantzeskaki 2019). More research, demonstration projects and full-scale implementations are required to bolster the evidence base on the effectiveness of NbS in contemporary socio-ecological systems (Seddon 2022).

3.12 Embrace ecophronesis as a fundamental value and prism of reflection and action

Ecophronesis is a much-needed skill in the Anthropocene, the current era in the Earth's history characterized by severe ecological uncertainties and increasingly strained societal relationships. Xiang (2016) describes ecophronesis as "the master skill par excellence of moral improvisation to make, and act well upon, right choices in any given circumstance of ecological practice; motivated by human beings' enlightened self-interest, it is developed through reflective ecological practice." The term ecophronesis can also be used in terms of establishing an epistemological framework to guide actions. Ecopracticologists study and embrace ecophronesis as a fundamental value in planning, design, construction, and management because it emphasizes the ethical importance of good decision-making. It is a significant ability, putting the interest of other beings ahead of one's own, an ability that develops through cycles of action and reflection, one gained through deep experience addressing complex socio-ecological challenges (Cuerden-Conboy 2024, p.34). Ecopracticology seeks examples of ecophronesis in action and reflects on the multidimensional knowledge found. Ecophronesis is a prism of reflection and action. Conceptually, it mediates between theory and practice and practically it depends upon action and reflection itself. Theoretically, it fosters a deep understanding of interdependencies and encourages forward-looking approaches to ensure that today's actions safeguard the well-being of future generations. Practically (in scholarship), it acts as a new epistemological framework for socio-ecological ethics, providing tools to design context-sensitive solutions that minimize destructive compromises and maximize collective benefits (Xiang 2023, p.1). This is notable for key disciplines like urban planning and design concerned with pressing challenges such as urban growth and social segregation, where responses need to link social and environmental processes (Steiner 2018). Therefore, ecophronesis constitutes an essential consideration for socio-ecological practice and its scholarship by offering an ethical, reflexive and pragmatic framework (Steiner 2022, p.417) to guide action.

4 Synthesis and conclusion

The twelve strategies shared here (See Fig. 1) are not intended to be prescriptive but rather to provide guidance to those starting out in ecopracticology or reflecting upon their explorations in this space. There is much need to connect scholarly research and diverse knowledges to action (practice). We acknowledge that it is probable that a different group of co-authors would have generated a somewhat different suite of strategies. Yet, it is worth noting that during the idea generation phase of this paper, most of the strategies that made their way into the paper were identified by multiple co-authors from across regions and domains suggesting that these are themes that are broadly relevant. Some of the strategies are more process oriented while others are about mindset or application. We also acknowledge that not all strategies will work or are necessary for every context. Moreover, these strategies will likely need to be adapted to specific social, political and cultural contexts within which socio-ecological practice takes place. However, we are confident that these strategies are broadly relevant to scholars, scholar-practitioners and practitioners working on different problems (e.g., the restoration of degraded ecosystems, the design of green infrastructure, sustainable food production) and from different disciplines (e.g., applied ecology, landscape architecture, human wellness).

Our collective group of co-authors acknowledges that to address the many environmental crises and challenges facing humanity and the planet, there is urgency in leveraging the collective knowledge of all relevant actors with a particular focus on ensuring that socio-ecological practitioners—the front-line workers—are involved, supported, and celebrated. Doing so is a manifestation of ecopracticology and serves as a template for putting ecopracticology into widespread practice. Ecopracticology is inherently about bridging the theory–practice gap which is pervasive. Getting scholars to consider what they could do to generate actionable research and to help bridge the gap is critical, yet there is also need for practitioners to consider what they could do to create pathways for new knowledge (and "old" wisdom) to inform their actions. If the strategies here were considered and embraced by individuals on either side of the gap (as well as by scholar-practitioners who work between), we are optimistic that there could be rapid and meaningful progress in overcoming numerous environmental challenges, particularly those that can be addressed locally/regionally. Ecopracticology is well-positioned as a concept to do just that and the strategies presented here are intended to help those working in (or aspiring to do so) this space to be more effective.

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References

Altringham JD, Berthinussen A, Wordley CFR (2020) Generating, collating and using evidence for conservation. In: Vickery JA, Ockendon N, Pettorelli N, Brotherton PNM, Sutherland WJ, Davies ZG (eds) Conservation Research. Cambridge University Press, Policy and Practice, pp 48–62. https://doi.org/10.1017/9781108638210.004

Balint PJ, Stewart RE, Desai A, Walters LC (2011) Managing wicked environmental problems. In: Balint PJ, Stewart RE, Desai A, Walters LC (eds) wicked environmental problems. Island Press/Center for Resource Economics, Washington, DC, pp 207–217. https://doi.org/10.5822/978-1-61091-047-7_10

Baskin Y (1998) Winners and losers in a changing world. Bioscience 48(10):788–792

Bennett NJ, Roth R, Klain SC, Chan KM, Clark DA, Cullman G, Epstein G, Nelson MP, Stedman R, Teel TL, Thomas RE (2017) Mainstreaming the social sciences in conservation. Conserv Biol 31(1):56–66. https://doi.org/10.1111/cobi.12788

Bourne A, Holness S, Holden P, Scorgie S, Donatti CI, Midgley G (2016) A socio-ecological approach for identifying and contextualising spatial ecosystem-based adaptation priorities at the sub-national level. PLoS ONE 11(5):e0155235. https://doi.org/10.1371/journal.pone.0155235

Brandsen T, Honingh M (2018) Definitions of co-production and co-creation. In: Brandsen T, Steen T, Verschuere B (eds) Co-Production and Co-Creation: Engaging Citizens in Public Services. Routledge, New York, pp 9–17. https://doi.org/10.4324/9781315204956-2

Chapman JM, Schott S (2020) Knowledge coevolution: Generating new understanding through bridging and strengthening distinct knowledge systems and empowering local knowledge holders. Sustainability Sci 15(3):931–943

Cohen-Shacham E, Walters G, Janzen C, Maginnis S (2016) Nature-based solutions to address global societal challenges. IUCN, Gland, Switzerland. https://doi.org/10.2305/IUCN.CH.2016.13.en

Collaboration for Environmental Evidence. (2022). Guidelines and Standards for Evidence Synthesis in Environmental Management. Version 5.1. https://environmentalevidence.org/information-for-authors/

Cook SDN, Wagenaar H (2012) Navigating the eternally unfolding present: toward an epistemology of practice. Am Rev Public Adm 42(1):3–38. https://doi.org/10.1177/0275074011407

Cooke SJ, Arlinghaus R (2024) Learning, thinking, sharing, and working across boundaries in fisheries science. ICES J Mar Sci 81(4):665–675. https://doi.org/10.1093/icesjms/fsae026

Cooke SJ, Nguyen VM, Anastakis D, Scott SD, Turetsky MR, Amirfazli A, Hearn A, Milton CE, Loewen L, Smith EE, Norris DR et al (2020) Diverse perspectives on interdisciplinarity from Members of the College of the Royal Society of Canada. Facets 5(1):138–165. https://doi.org/10.1139/facets-2019-0044

Cooke SJ, Young N, Alexander S, Kadykalo AN, Danylchuk AJ, Muir AM, Hinderer JLM, Cvitanovic C, Nguyen VM (2024) Embracing implementation science to enhance fisheries and aquatic management and conservation. Fisheries 49:475–485. https://doi.org/10.1002/fsh.11112

Cooke SJ, Heavers NM, La Rosa D, Xiang W-N (2025) Observations and reflections on the SEPR 2024 Conference—the 2nd International Conference on Socio-Ecological Practice Research. Socio Ecol Pract Res 7(1):1–16. https://doi.org/10.1007/s42532-024-00212-x

Cuerden-Conboy E (2024) Ecophronesis: environmental consideration in the quest for virtue. Ipso Facto: the Carleton J Interdiscip Human 3:34–48

Cumming GS, Cumming DHM, Redman CL (2006) Scale mismatches in social-ecological systems: causes, consequences, and solutions. Ecol Soc 11(1):14

Datta RK (2017) Practice-based interdisciplinary approach and environmental research. Environments 4(1):22. https://doi.org/10.3390/environments4010022

Dick M, Rous AM, Nguyen VM, Cooke SJ (2016) Necessary but challenging: multiple disciplinary approaches to solving conservation problems. Facets 1(1):67–82. https://doi.org/10.1139/facets-2016-0003

Djenontin INS, Meadow AM (2018) The art of co-production of knowledge in environmental sciences and management: lessons from international practice. Environ Manage 61(6):885–903. https://doi.org/10.1007/s00267-018-1028-3ss

Florian L, McLaughlin MJ (2008) Disability classification in Education. Corwin Press, USA

Folke C, Hahn T, Olsson P, Norberg J (2005) Adaptive governance of social-ecological systems. Annu Rev Environ Resour 30(1):441–473

Frantzeskaki N (2019) Seven lessons for planning nature-based solutions in cities. Environ Sci & Policy 93:101–111

Funtowicz SO, Ravetz JR (1993) Science for the post-normal age. Futures 25(7):739–755. https://doi.org/10.1016/0016-3287(93)90022-l

Genta G, Riberi P (2019) Technology and the Growth of Civilization. Springer, Switzerland. https://doi.org/10.1007/978-3-030-25583-1

Goodwin S, Olazabal M, Castro AJ, Pascual U (2023) Global mapping of urban nature-based solutions for climate change adaptation. Nat Sustain 6(4):458–469

Groenewegen P, Vergragt P (1991) Environmental issues as threats and opportunities for technological innovation. Technol Anal Strateg 3(1):43–55. https://doi.org/10.1080/09537329108524031

Grose MJ, Wang Y, Cheng Y, Yan W, Forester J, Steiner F (2019) Ecological practical wisdom: common stances across design and planning. J Urban Ecol 5(1):juz004. https://doi.org/10.1093/jue/juz004

Hilborn R (2007) Managing fisheries is managing people: What has been learned? Fish Fish 8(4):285–296. https://doi.org/10.1111/j.1467-2979.2007.00263_2.x

Howarth A, Nguyen VM, Cooke SJ (2023) Managing Canadian freshwater fisheries: persistent challenges and emerging opportunities. Can J of Fish Aquat Sci 80(9):1436–1455. https://doi.org/10.1139/cjfas-2023-0011

Huber J (2004) New technologies and environmental innovation. Edward Elgar Publishing, UK

Jacobs MH, Vaske JJ, Teel TL, Manfredo MJ (2018) Human dimensions of wildlife. In: Steg L, De Groot JI (eds) Environmental Psychology: An Introduction, 2nd edn. Wiley, New York, pp 85–94

Johnson JT, Howitt R, Cajete G, Berkes F, Louis RP, Kliskey A (2016) Weaving Indigenous and sustainability sciences to diversify our methods. Sustain Sci 11:1–11

Kakoty S (2018) Ecology, sustainability and traditional wisdom. J Clean Prod 172:3215–3224. https://doi.org/10.1016/j.jclepro.2017.11.036

Kates RW (2011) What kind of a science is sustainability science? Proc Natl Acad Sci USA 108(49):19449–19450. https://doi.org/10.1073/pnas.1116097108

Kganetso K (2024) Examination of safety and environmental education for special needs learners (visually impaired) in public schools: a case study in Mochudi village of Botswana (Thesis). Master of Education in Environmental Education, University of Botswana, Gaborone, Botswana

Kondo Y, Miyata A, Ikeuchi U, Nakahara S, Nakashima K, Ōnishi H, Osawa T, Ota K, Sato K, Ushijima K, Vienni Baptista B, Kumazawa T, Hayashi K, Murayama Y, Okuda N, Nakanishi H (2019) Interlinking open science and community-based participatory research for socio-environmental issues. Curr Opin Env Sustain 39:54–61. https://doi.org/10.1016/j.cosust.2019.07.001

Kondo Y, Fujisawa E, Ishikawa K, Nakahara S, Matsushita M, Asano S, Kamatani K, Suetsugu S, Kano K, Kumazawa T, Sato K, Okuda N (2021) Community capability building for environmental conservation in Lake Biwa (Japan) through an adaptive and abductive approach. Socio Ecol Pract Res 3(2):167–183. https://doi.org/10.1007/s42532-021-00078-3

Kondo Y, Kumazawa T, Kikuchi N, Kamatani K, Nakahara S, Yasutomi N, Uchiyama Y, Hayashi K, Hashimoto S, Miyata A, Muramatsu S (2022) Research Institute for Humanity and Nature: A Japanese center for inter- and trans-disciplinary consilience of socio-cultural dimensions of environmental sustainability. In: Vienni Baptista B, Thompson Klein J (eds) Institutionalizing Interdisciplinarity and Transdisciplinarity: Collaboration across Cultures and Communities. Routledge, New York, pp 168–184

Kuyini AB, Mangope B (2011) Student teachers' attitudes and concerns about inclusive education in Ghana and Botswana. Int J Whole Sch 7(1):20–37

La Rosa D, Pauleit S, Xiang WN (2021) Unearthing time-honored examples of nature-based solutions. Socio Ecol Pract Res 3(4):329–335. https://doi.org/10.1007/s42532-021-00099-y

Lawrence RJ (2015) Mind the gap: bridging the divide between knowledge, policy and practice. In: Lawrence RJ (ed) The Routledge handbook of planning for health and well-being. Routledge, NY, pp 74–84

Levin S, Xepapadeas T, Crépin AS, Norberg J, De Zeeuw A, Folke C, Hughes T, Arrow K, Barrett S, Daily G, Ehrlich P (2013) Social-ecological systems as complex adaptive systems: modeling and policy implications. Environ Dev Econ 18(2):111–132. https://doi.org/10.1017/S1355770X12000460

Liao KH, Chan JKH (2016) What is ecological wisdom and how does it relate to ecological knowledge? Landsc Urban Plan 155:111–113. https://doi.org/10.1016/j.landurbplan.2016.07.006

MacLeod M, Nagatsu M (2018) What does interdisciplinarity look like in practice: mapping interdisciplinarity and its limits in the environmental sciences. Stud Hist Philos Sci A 67:74–84. https://doi.org/10.1016/j.shpsa.2018.01.001

Manes S, Vale MM, Malecha A, Pires AP (2022) Nature-based solutions promote climate change adaptation safeguarding ecosystem services. Ecosyst Serv 55:101439. https://doi.org/10.1016/j.ecoser.2022.101439

Manfredo MJ, Vaske JJ, Brown PJ, Decker DJ, Duke EA (2009) Wildlife and society: the science of human dimensions. Island Press, Washington

Memmott J, Cadotte M, Hulme PE, Kerby G, Milner-Gulland EJ, Whittingham MJ (2010) Putting applied ecology into practice. J Appl Ecol 47(1):1–4

Nguyen VM, Young N, Cooke SJ (2017) A roadmap for knowledge exchange and mobilization research in conservation and natural resource management. Conserv Biol 31(4):789–798. https://doi.org/10.1111/cobi12857

Nishant R, Kennedy M, Corbett J (2020) Artificial intelligence for sustainability: challenges, opportunities, and a research agenda. Int J Inf Manag 53:102104. https://doi.org/10.1016/j.ijinfomgt.2020.102104

O'Connell MJ, Nasirwa O, Carter M, Farmer KH, Appleton M, Arinaitwe J, Bhanderi P, Chimwaza G, Copsey J, Dodoo J, Duthie A (2019) Capacity building for conservation: problems and potential solutions for sub-Saharan Africa. Oryx 53(2):273–283. https://doi.org/10.1017/S0030605317000291

Pullin AS, Knight TM (2009) Doing more good than harm—building an evidence-base for conservation and environmental management. Biol Conserv 142(5):931–934. https://doi.org/10.1016/j.biocon.2009.01.010

Pullin AS, Cheng SH, Cooke SJ, Haddaway NR, Macura B, Mckinnon MC, Taylor JJ (2020) Informing conservation decisions through evidence synthesis and communication. In: Vickery JA, Ockendon N, Pettorelli N, Brotherton PNM, Sutherland WJ, Davies ZG (eds) Conservation Research, Policy and Practice. Cambridge University Press, Cambridge, pp 114–128

Reed MS, Dougill AJ, Taylor MJ (2007) Integrating local and scientific knowledge for adaptation to land degradation: Kalahari rangeland management options. Land Degrad Dev 18(3):249–268. https://doi.org/10.1002/ldr.777

Reid AJ, Eckert LE, Lane JF, Young N, Hinch SG, Darimont CT, Cooke SJ, Ban NC, Marshall A (2021) "Two-Eyed Seeing": an Indigenous framework to transform fisheries research and management. Fish Fish 22(2):243–261. https://doi.org/10.1111/faf.12516

Robbins P (2000) The rotten institution: corruption in natural resource management. Polit Geogr 19(4):423–443. https://doi.org/10.1016/S0962-6298(99)00087-6

Schultz CA, Timberlake TJ, Wurtzebach Z, McIntyre KB, Moseley C, Huber-Stearns HR (2019) Policy tools to address scale mismatches: insights from U.S. forest governance. Ecol Soc 24(1):21. https://doi.org/10.5751/ES-10703-240121

Seddon N (2022) Harnessing the potential of nature-based solutions for mitigating and adapting to climate change. Science 376(6600):1410–1416. https://doi.org/10.1126/science.abn9668

Seddon N, Chausson A, Berry P, Girardin CA, Smith A, Turner B (2020) Understanding the value and limits of nature-based solutions to climate change and other global challenges. Philos Trans R Soc B 375(1794):20190120. https://doi.org/10.1098/rstb.2019.0120

Steen M (2013) Co-design as a process of joint inquiry and imagination. Des Issues 29(2):16–28

Steffen W, Broadgate W, Deutsch L, Gaffney O, Ludwig C (2015) The trajectory of the Anthropocene: the great acceleration. Anthr Rev 2(1):81–98. https://doi.org/10.1177/2053019614564478

Steiner F (2018) The ecological wisdom of plan-making. J Urban Manag 7(3):124–130. https://doi.org/10.1016/j.jum.2018.04.004

Steiner FR (2022) Reflective socio-ecological practice. Socio Ecol Pract Res 4(4):417–429. https://doi.org/10.1007/s42532-022-00130-w

Steinitz C, Orland B, Fisher T, Campagna M (2023) Geodesign to address global change. In: Droege P (ed) Intelligent Environment. North Holland, Elvisier, pp 192–242
van der Molen F, Swart JAA, van der Windt HJ (2018) Trade-offs and synergies in joint knowledge creation for coastal management: Insights from ecology-oriented sand nourishment in the Netherlands. J Environ Policy Plan 20(5):564–577. https://doi.org/10.1080/1523908X.2018.1461082
van Kerkhoff L, Munera C, Dudley N, Guevara O, Wyborn C, Figueroa C, Dunlop M, Hoyos MA, Castiblanco J, Becerra L (2018) Towards future-oriented conservation: managing protected areas in an era of climate change. Ambio 48(7):699–713
Velempini K, Perkins JS (2008) Integrating indigenous technical knowledge and modern scientific knowledge for biodiversity conservation and human livelihoods in the southern Kalahari. Botswana Notes Records 39:75–88
Velempini K, Smucker TA, Clem KR (2016) Community-based adaptation to climate variability and change: mapping and assessment of water resource management challenges in the North Pare highlands, Tanzania. Afr Geogr Rev 37(1):30–48. https://doi.org/10.1080/19376812.2016.1229203
Wang X, Palazzo D, Carper M (2016) Ecological wisdom as an emerging field of scholarly inquiry in urban planning and design. Landsc Urban Plan 155:100–107. https://doi.org/10.1016/j.landurbplan.2016.05.019
Wang Z, Jian Y, Huang Z, Qureshi S, Cheng K, Bai Z, Zhang Q (2023) Transforming research on recreational ecosystem services into applications and governance. Land 12(2):509. https://doi.org/10.3390/land12020509
West S, van Kerkhoff L, Wagenaar H (2019) Beyond "linking knowledge and action": towards a practice-based approach to transdisciplinary sustainability interventions. Policy Stud 40(5):534–555. https://doi.org/10.1080/01442872.2019.1618810
Williams BK (2011) Adaptive management of natural resources—framework and issues. J Env Manage 92(5):1346–1353
Xiang WN (2016) Ecophronesis: the ecological practical wisdom for and from ecological practice. Landsc Urban Plan 155:53–60. https://doi.org/10.1016/j.landurbplan.2016.07.005
Xiang WN (2019) Ecopracticology: the study of socio-ecological practice. Socio Ecol Pract Res 1(1):7–14. https://doi.org/10.1007/s42532-019-00006-6
Xiang WN (2020) Envisioning alternative futures of socio-ecological practice: navigating an uncertain world with a compass of scenarios. Socio Ecol Pract Res 2(4):297–299. https://doi.org/10.1007/s42532-020-00063-2
Xiang WN (2023) When the process socio-ecological practice meets the virtue ecophronesis, the SEPR community receives benefits. Socio Ecol Pract Res 5(1):1–10. https://doi.org/10.1007/s42532-023-00144-y
Yang B, Li S, Xiang WN, Bishop I, Liao KH, Liu J (2019) Where Does Ecological Wisdom Come from? Historical and Contemporary Perspectives. In: Yang B, Young R (eds) Ecological Wisdom. EcoWISE, Springer, Singapore, pp 33–56
Yasunari T, Kondo Y, Lambino R, Mallee H, Onishi Y, Taniguchi M, Tayasu I (2023) Transdisciplinarity at the Research Institute for Humanity and Nature, Kyoto, Japan. In: Lawrence RJ (ed) Handbook of Transdisciplinarity: Global Perspectives. Edward Elgar, UK, pp 419–4354. https://doi.org/10.4337/9781802207835.00036

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