



Minerva Access is the Institutional Repository of The University of Melbourne

Author/s:

Toumbourou, T;Winarno, B;Yuwati, TW;Lestari, S;Rachmanadi, D;Budiningsih, K;Sakuntaladewi, N;Idrus, NI;Grover, S;Treby, S;Rawluk, A

Title:

Collaboration for social-ecological restoration: Reflections from literature and practice

Date:

2024-12-03

Citation:

Toumbourou, T., Winarno, B., Yuwati, T. W., Lestari, S., Rachmanadi, D., Budiningsih, K., Sakuntaladewi, N., Idrus, N. I., Grover, S., Treby, S. & Rawluk, A. (2024). Collaboration for social-ecological restoration: Reflections from literature and practice. *Restoration Ecology*, 33 (3), <https://doi.org/10.1111/rec.14355>.

Persistent Link:



<https://hdl.handle.net/11343/354512>

License:

[CC BY](#)

RE-NEW OPINION ARTICLE

Collaboration for social-ecological restoration: reflections from literature and practice

Tessa D. Toumbourou^{1,2} , Bondan Winarno³, Tri W. Yuwati³, Sri Lestari^{3,4}, Dony Rachmanadi³, Kushartati Budiningsih⁵, Niken Sakuntaladewi³, Nafila I. Idrus⁶, Samantha P. P. Grover⁷, Sarah Treby⁷ , Andrea Rawluk¹

Collaboration is critical for engaging stakeholders and integrating diverse knowledges in social-ecological restoration. Yet, despite the recognized benefits, ecosystem restoration has often not been collaborative across social and ecological disciplines or across different stakeholder scales. Drawing on relevant literature and practice-based knowledge derived from our respective experiences working on the restoration of Indonesia's tropical peatlands, we emphasize the need for equitable task distribution; mutually beneficial, trust-based relationships; inclusive and safe collaborative environments; scrutinizing and redressing power inequalities; establishing a shared understanding of, and vision for, social-ecological contexts targeted for restoration; meeting on-site and engaging with place-based knowledge; and centering Indigenous and local knowledge. Putting in place these interconnected elements can contribute to a more integrated, equitable, adapted, sustained, and impactful collaboration for social-ecological restoration.

Key words: collaborative partnerships, interdisciplinary research, participation, shared vision, social-ecological restoration, stakeholder engagement, tropical peatland restoration

Implications for Practice

- We propose key elements for building collaboration focused on planning and enacting social-ecological restoration.
- These elements offer guidance for ways of working together to set in place a robust, equitable, and respectful collaboration that is better able to make sense of and integrate the complexity of a social-ecological system, including Indigenous and local knowledge, aspirations, and expectations.
- We provide tangible examples from our practices to demonstrate the application of these elements, though these are not exhaustive.
- The elements offer ways of working together that are challenging and time-consuming, but that promote more integrative, locally supported social-ecological restoration with lasting, broad-reaching impacts.

Collaboration to Plan and Enact Social-Ecological Restoration

Collaboration is crucial for engaging stakeholders and integrating diverse knowledges in social-ecological restoration, leading to more holistic outcomes that efficiently address complex, interconnected issues within growing budgetary constraints (McIntyre & Schultz 2020). The International Principles and Standards for the Practice of Ecological Restoration emphasize the importance of collaboration with local communities, Indigenous groups, nonprofits, and citizen scientists to achieve

equitable and sustained restoration outcomes and to enhance community engagement and investment in restoration (Gann et al. 2019). Despite these recognized benefits, ecological restoration has often lacked collaboration (Jellinek et al. 2019). Although research on collaborative governance of natural resources and social-ecological systems (SES) is expanding (Carr Kelman et al. 2023), studies outlining the key elements of collaboration to plan and enact social-ecological restoration

Author contributions: TDT conceived the article, drafted the manuscript, and developed the elements in collaboration with BW, TWY, SL, DR, KB, NS, NII, SG, ST, AR; all co-authors contributed to writing, revising, and improving the draft.

¹School of Agriculture, Food and Ecosystem Sciences, Faculty of Science, University of Melbourne, Melbourne, Victoria, Australia

²Address correspondence to T. D. Toumbourou, email tessa.toumbourou@unimelb.edu.au

³Research Centre for Ecology and Ethnobiology, National Research and Innovation Agency (BRIN), Cibinong, Bogor, West Java, Indonesia

⁴Crawford School of Public Policy, The Australian National University, Canberra, Australian Capital Territory, Australia

⁵Research Centre for Behavioral and Circular Economics, BRIN, Jakarta Selatan, Indonesia

⁶Department of Earth and Environmental Sciences, University of Leuven, Leuven, Belgium

⁷Applied Chemistry and Environmental Science, STEM College, RMIT University, Melbourne, Victoria, Australia

© 2024 The Author(s). Restoration Ecology published by Wiley Periodicals LLC on behalf of Society for Ecological Restoration.

This is an open access article under the terms of the [Creative Commons Attribution License](#), which permits use, distribution and reproduction in any medium, provided the original work is properly cited.

doi: 10.1111/rec.14355

Supporting information at:

<http://onlinelibrary.wiley.com/doi/10.1111/rec.14355/supinfo>

are limited. Addressing this gap supports restoration in complex social-ecological contexts.

Adopting a SES perspective is increasingly valued for informing social-ecological restoration planning, processes, and outcomes (Krievins et al. 2018; Fischer et al. 2021). An SES perspective identifies the interconnected parts of a system targeted for restoration, and the multiple forms of knowledge to be integrated to plan and enact restoration, requiring transdisciplinary collaboration (Nkhata et al. 2008). This requires acknowledging and integrating contributions from diverse disciplines and stakeholders to enhance understanding of the complex dynamics in a SES, and centering local livelihoods and cultural values to achieve holistic outcomes (Cockburn et al. 2020; Fischer et al. 2021; Elias et al. 2022).

This opinion paper explores building collaboration in social-ecological restoration, with a particular focus on planning for restoration, as getting this right sets a crucial foundation for the action and outcomes that follow. We draw on our experience in an interdisciplinary group of Indonesian and Australian researchers and practitioners from across the ecological and social sciences who have been working on a large peatland restoration project in Indonesia. We observe a need for more transparent and critical discussion around collaboration specific to social-ecological restoration, given the limited existing scholarship. We ask: *What are key elements of collaboration to plan and enact social-ecological restoration?*

We worked together to develop a shared vision and principles for peatland restoration in Central Kalimantan, Indonesia, through an iterative, phased process (Toumbourou et al. 2024a, 2024b). The seven elements of collaboration we propose in this opinion article (see Fig. 1) integrate insights from our practice-based knowledge (Weber et al. 2014), supplemented by a critical synthesis of SES, restoration, and collaboration literature for this new context of collaboration in restoration.

As represented in Figure 1, four collaboration elements focus both inwardly on the makeup, structure, practices, and ways of working with each other (foundational elements) and three focus outwardly on a collaboration's process to achieve outcomes (process elements). While foundational elements are crucial early on, all elements are cyclical—not strictly sequential. All elements lead toward the development of a shared vision, the basis of comprehensive and integrated restoration action plans.

Foundation Elements

Balance Structure, Equity, and Adaptability

Effective collaboration requires balancing openness to new ideas with establishing structure to guide progress and ensure equitable divisions of labor. Collaboration initiators must make early decisions, starting with selecting initial collaborators who share a common agenda and provide a structure (or focus) for discussions—as starting with a completely blank canvas can be inefficient (e.g. Box 1). Initiators must remain attuned to group needs and dynamics and take a flexible, inclusive approach that actively engages all collaborators (and stakeholders) in planning—integrating their ideas and ensuring they have a stake in the outcomes (Cundill et al. 2019; Gunasekara

2020; Carr Kelman et al. 2023). Knowledge gaps must be addressed, such as by bringing in new collaborators or expertise—scientific, Indigenous, local, or other—to deepen understanding (Carr Kelman et al. 2023). Clear communication about expectations, time commitments, data sharing, knowledge, and resources fosters trust and fairness. Equitable distribution of labor and funding is crucial (Cundill et al. 2019), and all contributions should be acknowledged, such as through authorship order in publications. Institutional support, including funding and time allocation, is crucial to enable participants to contribute meaningfully over the extended periods required in collaboration for social-ecological restoration.

Foster Trust and Inclusivity Through Safe Spaces for Interaction

Trust is essential for collaboration, requiring spending extended time together and intensive, ongoing communication (virtual and in-person) and safe spaces to share ideas and build relationships (McIntyre & Schultz 2020; Diver et al. 2024). Online collaboration can supplement face-to-face interactions (see Box 2). Crucial to establishing trust is coming with mutual respect, working together in a good relationship, and valuing the knowledge and contributions of all collaborators (Kanngieser et al. 2024). This demands humility, openness to diverse worldviews, and a willingness to consider and incorporate collaborators' ideas even when they challenge our own (Haefner et al. 2022; Kanngieser et al. 2024). These relationships and environments allow collaborators to clarify disciplinary assumptions and hear and properly understand each other's perspectives—even where ideas are articulated differently (Gunasekara 2020). Building iterative stages for reflexivity and adaption—through safe spaces that allow thinking to change, adapt, and grow—is crucial for new knowledge to build (Iwanaga et al. 2021). Regular reflection on what is and what is not working within the collaboration and the restoration approach—including balancing the multidimensional trade-offs between various ecosystem services and ensuring the well-being of the most marginalized social groups (Cavender-Bares et al. 2015; Lu et al. 2021).

Co-created ground rules and principles are essential to codify shared values, principles, and mechanisms or means of interaction and problem resolution, and fostering “systems-based trust” (Stern & Coleman 2019). These should cover safe and inclusive dialogue, dispute resolution, and managing changes like staff turnover. Engaging an independent facilitator to co-develop these rules of engagement could help resolve power imbalances (Cundill et al. 2019). These principles establish a foundation for equitable, adaptive, and trust-filled collaboration.

Scrutinize and Redress Power Inequalities

Explicitly recognizing and addressing the breadth of inequalities that are present in a collaboration is a critical step to creating an inclusive, equitable space. Within any group of collaborators, uneven power structures and dynamics will exist. Power shapes interdisciplinary collaborations in various ways, from problem framing and collaborator selection to the roles assigned,

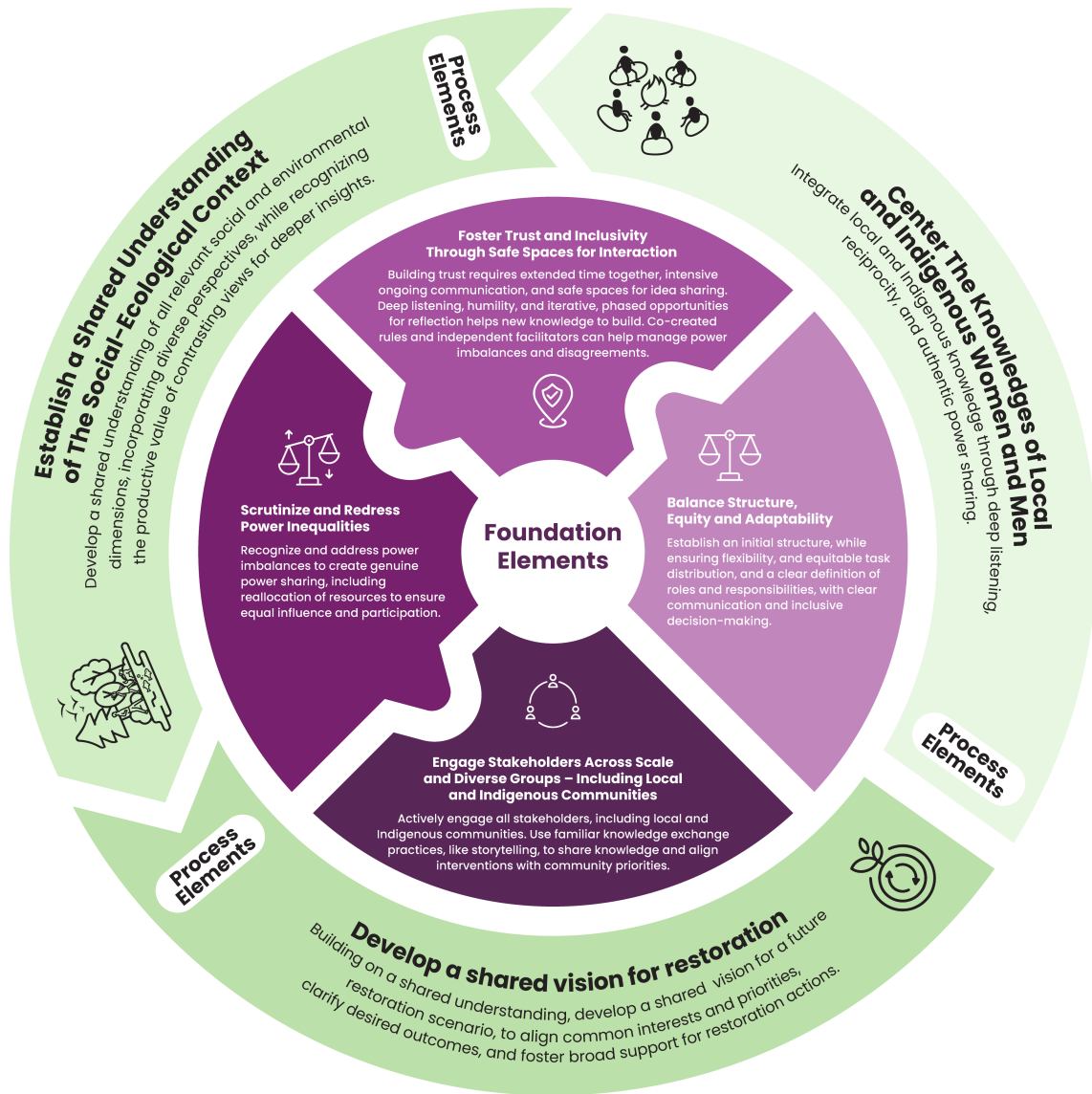


Figure 1. Elements of collaboration to support social-ecological restoration.

proposed solutions, the pace of the work, and who receives recognition for the outcomes (Gunasekara 2020). Open calls for collaborators, rather than relying on already familiar or established networks, may facilitate more equitable access to participation in collaborations.

Redressing power inequalities requires recognition of power disparities—understanding who holds power, how it is exercised, and when it needs to be confronted—and establishing authentic power sharing to ensure all participants have equal influence over discussions, decisions, and outcomes (Wall et al. 2022). Redressing power in collaboration may involve redistributing resources (such as the example we offer in Box 3), like making information available in local languages and culturally appropriate formats beyond the narrow limits (and paywalls) of academic journals. Non-traditional information distribution methods, such as local radio or social media, may be more appropriate to reach diverse local communities.

Engage Stakeholders Across Scale and Diverse Groups— Including Indigenous and Local Communities

To ensure restoration’s long-term success, it is crucial to partner with a diverse array of stakeholders to support efforts across various scales. Drawing on the work of Gray (1989) and more recent work on collaboration protocols (Kangieser et al. 2024), we define collaborators as those actively engaged in reciprocal exchanges of knowledge, ideas, and resources to work toward shared future scenarios for context-appropriate restoration. Collaborators differ from stakeholders who operate at various levels, ranging from national policymakers to Indigenous and local communities dependent on landscapes identified for restoration (Mansourian 2021). Collaborators must foster meaningful partnerships with interested or impacted stakeholder groups to ensure restoration is locally appropriate and provides mutual benefit in ways that align with diverse Indigenous and local people’s preferences and priorities—crucial

Box 1 Example: balancing initial structure with collaborative flexibility.

In our collaboration, the collaboration initiators (authors 1 and 11) proposed a methodology (combining the Delphi method with focus group discussions) for eliciting opinion from geographically dispersed researchers and other stakeholders to develop a shared vision for restoration of degraded tropical peatlands in Central Kalimantan, Indonesia. We conducted discussions and training to explain the methodology, ensuring our collaborators fully understood it to allow their active involvement and informed feedback for improvement. We found that some early guidance—such as by proposing a broad initial approach, alongside a detailed explanation—was essential for ensuring all participants understood and could adapt or challenge concepts. Without an initial structure, collaborations risk stagnating and losing momentum or missing opportunities to draw on the expertise of collaborators in ways most generative.

Box 2 Example: augmenting meetings with asynchronous tools for collaboration.

Face-to-face settings using roundtable formats that give everyone the opportunity to contribute help ensure all voices are heard and build familiarity, mutual trust, and respect—and thus are crucial for strong collaborations. However, where collaborators are geographically dispersed, face-to-face meetings can be costly and carbon-intensive. These could be augmented with regular online meetings and the use of asynchronous tools, such as shared Google Docs for text generation, Miroboard to create visual representations and brainstorming, and polling tools (such as Mentimeter or [Slido.com](https://www.slido.com)) to quickly capture reactions, questions, or specific input on ideas shared to support thinking and new knowledge generation. Allowing some respondent anonymity may also help mitigate power dynamics and better capture marginalized perspectives (Fletcher & Marchildon 2014).

Asynchronous tools also help to build in iteration and reflexivity, giving collaborators time to grapple with new ideas and to reflexively interrogate and transcend their own disciplines and assumptions (Iwanaga et al. 2021). Additionally, they may help prevent collaboration from stalling where conflicting views arise, as can occur during real-time discussions. However, online tools may not always be suitable. To better accommodate the diverse socio-cultural contexts of collaborators, hybrid approaches that combine in-person and online participation could be adopted (see Sheedy 2022 for suggestions).

Box 3 Example: challenging assumptions about who holds expertise and where it should flow.

One way our research-for-development project sought to shift power imbalances was by reallocating funding to bring Indonesian scholars to Australia for in-person discussion and to attend conferences and training. This revised the initial project design and budget allocation, where only Australian scholars were to visit Indonesia—challenging the notion of expertise flowing only one way from the global north to the south. Author two noted this experience deepened his understanding of diverse disciplinary approaches to problem-solving that could then be applied in practice.

to support restoration implementation and success in the longer term. In Box 4 we outline a way that collaborations can meaningfully engage local communities throughout the process of designing and implementing restoration.

Identifying local stakeholders involves understanding land and resource tenure arrangements and different social groups' land use patterns (Elias et al. 2022). To ensure lasting impact, it is crucial to integrate restoration goals into government policies and plans. Civil society organizations can help identify and engage reform-minded local, regional, and national government actors to embed restoration outcomes into policy for broader, long-term impact (Poli et al. 2024).

Process Elements**Center the Knowledges of Local and Indigenous Women and Men**

Integrating Indigenous and local knowledge (ILK) is crucial for effective social-ecological restoration and landscape management. ILK can inform site and species selection, historical ecosystems and management insight, and invasive species management and support post-restoration monitoring and landscape management (Uprety et al. 2012; Reyes-García et al. 2019). While situated in specific time and contexts, ILK changes, as do communities and landscapes (Berkes 2012), and varies across gender, age, and wealth (Elias 2018). Actively involving Indigenous and local women and men across generations ensures diverse knowledges and priorities are included and build long-term restoration support.

Successful collaborative restoration in cross-cultural contexts has employed a “two-ways” approach, combining western science with Indigenous land management knowledge and practices (Dickson-Hoyle et al. 2022). Doing so requires deep listening, reciprocity, and respect for Indigenous rights and livelihoods, and authentic power sharing (Robinson et al. 2021; Diver et al. 2024). Structures for engagement with ILK could involve respected local traditional forums, community councils, or tribal meetings. Rather than top-down knowledge exchange, collaboration should embrace familiar ILK-sharing practices

Box 4 Example: form a community advisory group to bridge between collaborators and communities.

Community advisory groups (CAGs)—also called citizen advisory groups—can function as a crucial liaison between collaborators and a community impacted (directly or indirectly) by restoration. CAGs often comprise a core group of interested community members intended to represent various diverse social groups, who meet regularly to advise restoration action (Laurian 2005). Building CAGs into collaborations for restoration helps provide a mechanism for seeking guidance and input to shape the direction and outcomes of a collaboration. A CAG can help to shape a collaboration's research design and questions to ensure that a collaboration's focus is prioritizing the vision, priorities, and aspirations of different local people within a community (Hacker 2013).

like storytelling or informal discussions. On-site discussions (see Box 5), foster a shared understanding through place-based approaches that center on ILK.

Establish a Shared Understanding of the Social-Ecological Context

To fully understand all parts of a common problem—a social-ecological context targeted for restoration—collaborations must develop a shared understanding of all

Box 5 Example: develop a shared understanding on-site.

Developing a shared understanding of a site targeted for restoration, as well as key concepts, principles, and approaches for restoration, is most effectively achieved through on-site discussions. This real-world context provides a platform for collaborative decision-making and can facilitate a place-based approach that centers Indigenous and local knowledge (Urgenson et al. 2017; Diver et al. 2024). Being physically present on site reveals differing interpretations and priorities, promoting constructive dialogue and relationship-building. On-site discussions, including observing, engaging with, and attending to all elements of a landscape, are also a useful strategy for establishing a shared understanding of key terminology, concepts, and principles. Grappling with the realities of a degraded ecosystem can be a challenging experience and can elicit a strong negative emotional response. Experiencing this together in person can strengthen bonds and solidify a shared commitment to overcome the many challenges inherent to social-ecological restoration.

social and environmental dimensions (Rawluk et al. 2022). This ensures that restoration approaches and plans are tailored to local conditions, enhancing restoration planning and budgeting (Toumbourou et al. 2024a). Creating this requires that all collaborators comprehend a system's nested, interrelated dynamics and interactions and that the right people—representing a diversity of disciplinary backgrounds and knowledges—are involved (Preiser et al. 2018; Reyes-García et al. 2019). A shared understanding of key terms and concepts is also essential to ensure all collaborators can engage with, integrate, or interrogate them (Gunasekara 2020; Cundill et al. 2019). We caution against consensus as a universal goal for a shared understanding, as it may oversimplify complex differences and silence diverse perspectives (Yates-Doerr 2019). Rather, contrasts and tensions can lead to deeper insights and the creation of new knowledge. For example, using a boundary object—like a visual and textual representation—can elicit diverse, nuanced perspectives that enrich shared understandings of the social-ecological context (see Box 6).

Understanding historical disturbances and social-political drivers of ecosystem changes can help to support a shared understanding of a social-ecological system, including how differently positioned people have adapted their livelihoods in response (Choi 2007). This supports the development of realistic, resilience-oriented future scenarios that account for social and ecological realities (Choi 2007; Osborne et al. 2021).

Develop a Shared Vision for Restoration

A shared vision can help a collaboration identify their common interests, priorities, and alignments, and clarify the desired future scenario they are working toward (van der Helm 2009).

Box 6 Example: use a boundary object to transfer knowledge.

Using a “boundary object” (Star & Griesemer 1989) is a useful strategy to create a common reference point to foster and facilitate discussion between collaborators from different disciplines, policymakers, and practitioners (van Rooij et al. 2021). A boundary object should be plastic enough to accommodate local needs and different conceptual perspectives, yet robust enough to facilitate meaningful dialogue and convey coherent perspectives across diverse disciplines and scales, in pursuit of a common purpose (Star 2010). We used the coded responses from a first round of the Delphi survey to create a visual representation of a restored peatland. This shared vision (Supplement S1) served as a boundary object during interviews with diverse stakeholders involved in peatland restoration in Central Kalimantan, allowing for its refinement and adaption and the development of principles to achieve it.

Box 7 Example: an iterative process to develop a shared vision for restoration.

To develop a vision for tropical peatland restoration in Central Kalimantan, Indonesia, we used a three-phase process: a two-round Delphi survey combined with focus group discussions (Toumbourou et al. 2024b). This produced a graphical and textual vision, which we used in expert interviews to develop more refined region-specific restoration principles (Toumbourou et al. 2024a). While the visual and textual representation prompted more critique, it also enabled deeper engagement and refinement. For community visioning, an interactive, iterative process using both visual and textual or other elements, conducted on-site, is essential. Rather than fixed and static, a vision should remain adaptive and reflexive.

It offers a robust foundation from which to develop an integrated and holistic plan for action to achieve the shared vision, even among participants who might have previously experienced conflict (Toman et al. 2019). To ensure strong and broad support for a vision's desired outcomes, it must be developed with the active involvement of stakeholders who are positioned to support and pursue restoration action (van der Helm 2009; Ryan & Urgenson 2019). Box 7 describes the process we followed to achieve a shared understanding for restoration.

Conclusion

We were drawn to the topic of collaboration for social-ecological restoration because it is so often an implicit process that is not critically and transparently engaged with. Collaboration is a skill that requires ongoing practice and significant investment of time and resources, especially in large-scale initiatives—and is not a panacea for all problems (Cockburn et al. 2020). While challenging, there are multiple benefits to collaborative approaches to restoration, from ensuring the social and ecological suitability for local contexts and increasing the success of restoration efforts. Effective collaboration requires balancing structure with adaptability, fostering inclusive spaces, and addressing power imbalances through intentional power sharing and transparency. Centering the knowledge and aspirations of Indigenous and local communities to develop a shared understanding of social-ecological contexts can better ensure restoration efforts are more holistic, generate deeper insights, and achieve wider-reaching outcomes. Rather than separate steps or phases of collaboration, each of these elements is strongly interconnected and reinforces one another. For example, establishing equitable funding distribution and acknowledging all collaborators' contributions and labor in research outcomes fosters trust, inclusivity, redresses some power inequalities, and enhances equitable (and enthusiastic) participation. Similarly, incorporating ILKs through place-based approaches necessitates authentic power sharing and on-site

discussions that also support diverse collaborators to reach a shared understanding.

Acknowledgement

We thank the community members, practitioners, researchers, and government staff from various agencies who generously shared their experience and knowledge with us, enriching the insights presented in this article.

Funding Information

This study was conducted as part of Australian Centre for International Agricultural Research (ACIAR) funded project FST/2016/144 "Improving community fire management and peatland restoration in Indonesia." Funding was AUD \$301,593.

LITERATURE CITED

- Berkes F (2012) Sacred ecology. Routledge, New York. <https://doi.org/10.4324/9780203123843>
- Carr Kelman C, Brady U, Raschke BA, Schoon ML (2023) A systematic review of key factors of effective collaborative governance of social-ecological systems. *Society & Natural Resources* 36:1452–1470. <https://doi.org/10.1080/08941920.2023.2228234>
- Cavender-Bares J, Polasky S, King E, Balvanera P (2015) A sustainability framework for assessing trade-offs in ecosystem services. *Ecology and Society* 20:17. <https://doi.org/10.5751/ES-06917-200117>
- Choi YD (2007) Restoration ecology to the future: a call for new paradigm. *Restoration Ecology* 15:351–353. <https://doi.org/10.1111/j.1526-100X.2007.00224.x>
- Cockburn J, Schoon M, Cundill G, Robinson C, Aburto J, Alexander S, et al. (2020) Understanding the context of multifaceted collaborations for social-ecological sustainability: a methodology for cross-case analysis. *Ecology and Society* 25:7. <https://doi.org/10.5751/ES-11527-250307>
- Cundill G, Harvey B, Tebboth M, Cochrane L, Currie-Alder B, Vincent K, et al. (2019) Large-scale transdisciplinary collaboration for adaptation research: challenges and insights. *Global Challenges* 3:1700132. <https://doi.org/10.1002/gch2.201700132>
- Dickson-Hoyle S, Ignace RE, Ignace MB, Hagerman SM, Daniels LD, Copes-Gerbitz K (2022) Walking on two legs: a pathway of indigenous restoration and reconciliation in fire-adapted landscapes. *Restoration Ecology* 30:e13566. <https://doi.org/10.1111/rec.13566>
- Diver S, Vaughan MB, Baker-Medard M (2024) Collaborative care in environmental governance: restoring reciprocal relations and community self-determination. *Ecology and Society* 29:7. <https://doi.org/10.5751/ES-14488-290107>
- Elias M (2018) Mobilizing indigenous and local knowledge for successful restoration. Lessons for gender-responsive landscape restoration, GLF Brief 4. *Global Landscapes Forum*. <https://www.globallandscapesforum.org/publication/mobilizing-indigenous-and-local-knowledge-for-successful-restoration/> (accessed 5 May 2024)
- Elias M, Kandel M, Mansourian S, Meinzen-Dick R, Crossland M, Joshi D, et al. (2022) Ten people-centered rules for socially sustainable ecosystem restoration. *Restoration Ecology* 30:e13574. <https://doi.org/10.1111/rec.13574>
- Fischer J, Riechers M, Loos J, Martin-Lopez B, Temperton VM (2021) Making the UN decade on ecosystem restoration a social-ecological endeavour. *Trends in Ecology & Evolution* 36:20–28. <https://doi.org/10.1016/j.tree.2020.08.018>
- Fletcher AJ, Marchildon GP (2014) Using the Delphi method for qualitative, participatory action research in health leadership. *International Journal of Qualitative Methods* 13:1–18. <https://doi.org/10.1177/160940691401300101>

- Gann GD, McDonald T, Walder B, Aronson J, Nelson CR, Jonson J, et al. (2019) International principles and standards for the practice of ecological restoration. Second edition. *Restoration Ecology* 27:S1–S46. <https://doi.org/10.1111/rec.13035>
- Gray B (1989) *Collaborating: finding common ground for multiparty problems*. Jossey-Bass, San Francisco, California
- Gunasekara V (2020) (Un)packing baggage: a reflection on the “battle over ideas” and labour hierarchies in collaborative north–south research. *The European Journal of Development Research* 32:503–513. <https://doi.org/10.1057/s41287-020-00275-y>
- Hacker K (2013) *Community-based participatory research*. SAGE Publications, Inc, London. <https://doi.org/10.4135/9781452244181>
- Haefner M, Hames F, Barbour MM, Reeves JM, Platell G, Grover S (2022) Expanding collaborative autoethnography into the world of natural science for transdisciplinary teams. *One Earth* 5:157–167. <https://doi.org/10.1016/j.oneear.2022.01.002>
- Iwanaga T, Wang H-H, Koralewski TE, Grant WE, Jakeman AJ, Little JC (2021) Toward a complete interdisciplinary treatment of scale: reflexive lessons from socioenvironmental systems modeling. *Elementa: Science of the Anthropocene* 9:182. <https://doi.org/10.1525/elementa.2020.00182>
- Jellinek S, Wilson KA, Hagger V, Mumaw L, Cooke B, Guerrero AM, Erickson TE, Zamin T, Waryszak P, Standish RJ (2019) Integrating diverse social and ecological motivations to achieve landscape restoration. *Journal of Applied Ecology* 56:246–252. <https://doi.org/10.1111/1365-2664.13248>
- Kanngieser AM, Soares F, Rubis J, Sullivan CT, Graham M, Williams M, et al. (2024) Listening to place, practising relationality: embodying six emergent protocols for collaborative relational geographies. *Emotion, Space and Society* 50:101000. <https://doi.org/10.1016/j.emospa.2024.101000>
- Krievins K, Plummer R, Baird J (2018) Building resilience in ecological restoration processes: a social-ecological perspective. *Ecological Restoration* 36: 195–207. <https://doi.org/10.3368/er.36.3.195>
- Laurian L (2005) Public input in toxic site cleanup decisions: the strengths and limitations of community advisory boards. *Environment and Planning B: Planning and Design* 32:445–467. <https://doi.org/10.1068/b31046>
- Lu N, Liu L, Yu D, Fu B (2021) Navigating trade-offs in the social-ecological systems. *Current Opinion in Environmental Sustainability* 48:77–84. <https://doi.org/10.1016/j.cosust.2020.10.014>
- Mansourian S (2021) Disciplines, sectors, motivations and power relations in forest landscape restoration. *Ecological Restoration* 39:16–26. <https://doi.org/10.3368/er.39.1-2.16>
- McIntyre KB, Schultz CA (2020) Facilitating collaboration in forest management: assessing the benefits of collaborative policy innovations. *Land Use Policy* 96:104683. <https://doi.org/10.1016/j.landusepol.2020.104683>
- Nkhata AB, Breen CM, Freimund WA (2008) Resilient social relationships and collaboration in the management of social–ecological systems. *Ecology and Society* 13:2. <https://doi.org/10.5751/ES-02164-130102>
- Osborne T, Brock S, Chazdon R, Chomba S, Garen E, Gutierrez V, Lave R, Lefevre M, Sundberg J (2021) The political ecology playbook for ecosystem restoration: principles for effective, equitable, and transformative landscapes. *Global Environmental Change* 70:102320. <https://doi.org/10.1016/j.gloenvcha.2021.102320>
- Poli M, Cloutier M, Garoni S, Teixeira SV (2024) The power of effective coalitions and collective action in building trust and achieving sustainable development. *World Bank Blogs*. <https://blogs.worldbank.org/en/governance/the-power-of-effective-coalitions-and-collective-action-in-build> (accessed 30 June 2024)
- Preiser R, Biggs R, De Vos A, Folke C (2018) Social-ecological systems as complex adaptive systems: organizing principles for advancing research methods and approaches. *Ecology and Society* 23:46. <https://doi.org/10.5751/ES-10558-230446>
- Rawluk A, Sanders A, Yuwati TW, Rachmanadi D, Izazaya N, Yulianti N, et al. (2022) Finding common ground: developing a shared understanding of tropical peat swamp forest restoration and fires across culture, language, and discipline. *International Forestry Review* 24:426–441. <https://doi.org/10.1505/146554822835941922>
- Reyes-García V, Fernández-Llamazares Á, McElwee P, Molnár Z, Öllerer K, Wilson SJ, Brondizio ES (2019) The contributions of indigenous peoples and local communities to ecological restoration. *Restoration Ecology* 27: 3–8. <https://doi.org/10.1111/rec.12894>
- Robinson JM, Gellie N, MacCarthy D, Mills JG, O'Donnell K, Redvers N (2021) Traditional ecological knowledge in restoration ecology: a call to listen deeply, to engage with, and respect indigenous voices. *Restoration Ecology* 29:e13381. <https://doi.org/10.1111/rec.13381>
- Ryan CM, Urgenson LS (2019) Creating and sustaining collaborative capacity for forest landscape restoration. In: Butler WH, Schultz CA (eds) *A new era for collaborative forest management*. Routledge, London, United Kingdom. <https://doi.org/10.4324/9781351033381-5>
- Sheedy A (2022) *Virtual community engagement guide: a toolkit for hosting online community engagement and meetings in rural, remote, and indigenous communities*. Nature United. <https://www.indigenousguardianstoolkit.ca/sites/default/files/2022-01/Virtual%20Community%20Engagement%20Guide.pdf> (accessed 30 June 2024)
- Star SL (2010) This is not a boundary object: reflections on the origin of a concept. *Science, Technology, & Human Values* 35:601–617. <https://doi.org/10.1177/0162243910377624>
- Star SL, Griesemer JR (1989) Institutional ecology, ‘translations’ and boundary objects: amateurs and professionals in Berkeley’s Museum of Vertebrate Zoology, 1907–39. *Social Studies of Science* 19:387–420. <https://doi.org/10.1177/030631289019003001>
- Stern MJ, Coleman KJ (2019) Trust ecology and collaborative natural resource management. In: *A new era for collaborative forest management*. Routledge, London. <https://doi.org/10.4324/9781351033381-3>
- Toman E, Walpole EH, Heeren A (2019) From conflict to shared visions: science, learning, and developing common ground. In: *A new era for collaborative forest management*. Routledge, London. <https://doi.org/10.4324/9781351033381-7>
- Toumbourou TD, Grover S, Arifanti VB, Budiningsih K, Idrus NI, Lestari S, et al. (2024b) Identifying a shared vision for peatland restoration: adapting the Delphi method to enhance collaboration. *Mires and Peat* 30:24. <https://doi.org/10.1111/rec.14221>
- Toumbourou TD, Lestari S, Yuwati TW, Treby S, Winarno B, Rachmanadi D, et al. (2024a) Principles for equitable and resilient tropical peatland restoration in Central Kalimantan, Indonesia. *Restoration Ecology* 32:e14221. <https://doi.org/10.1111/rec.14221>
- Upreti Y, Asselin H, Bergeron Y, Doyon F, Boucher J-F (2012) Contribution of traditional knowledge to ecological restoration: practices and applications. *Écoscience* 19:225–237. <https://doi.org/10.2980/19-3-3530>
- Urgenson LS, Ryan CM, Halpern CB, Bakker JD, Belote RT, Franklin JF, Haugo RD, Nelson CR, Waltz AEM (2017) Visions of restoration in fire-adapted forest landscapes: lessons from the collaborative forest landscape restoration program. *Environmental Management* 59:338–353. <https://doi.org/10.1007/s00267-016-0791-2>
- van der Helm R (2009) The Vision Phenomenon: Towards a Theoretical Underpinning of Visions of the Future and the Process of Envisioning. *Futures* 41:96–104. <https://doi.org/10.1016/j.futures.2008.07.036>
- van Rooij S, Timmermans W, Roosenschoon O, Keesstra S, Sterk M, Pedrol B (2021) Landscape-based visions as powerful boundary objects in spatial planning: lessons from three Dutch projects. *Land* 10:16. <https://doi.org/10.3390/land10010016>
- Wall S, Donovan T, Radford K, Allan W, Daylight G, Finlay E (2022) Reflections on working and walking gently together in collaboration and partnership in Aboriginal ageing research. *Australian Journal of Rural Health* 30: 795–800. <https://doi.org/10.1111/ajr.12917>

- Weber EP, Belsky JM, Lach D, Cheng AS (2014) The value of practice-based knowledge. *Society & Natural Resources* 27:1074–1088. <https://doi.org/10.1080/08941920.2014.919168>
- Yates-Doerr E (2019) Whose global, which health? Unsettling collaboration with careful equivocation. *American Anthropologist* 121:297–310. <https://doi.org/10.1111/aman.13259>

Coordinating Editor: Stephen Murphy

Supporting Information

The following information may be found in the online version of this article:

Supplement S1. A vision for a just, inclusive and sustainable restored peatland in Central Kalimantan, Indonesia.

Received: 10 October, 2024; First decision: 18 November, 2024; Revised: 19 November, 2024; Accepted: 22 November, 2024