


UN DECADE ON ECOSYSTEM RESTORATION

OPINION ARTICLE

# Ten people-centered rules for socially sustainable ecosystem restoration

Marlène Elias<sup>1,2</sup> , Matt Kandel<sup>3</sup> , Stephanie Mansourian<sup>4</sup> , Ruth Meinzen-Dick<sup>5</sup> , Mary Crossland<sup>6</sup> , Deepa Joshi<sup>7</sup> , Juliet Kariuki<sup>8</sup>, Lynn C. Lee<sup>9</sup> , Pamela McElwee<sup>10</sup> , Amrita Sen<sup>11,12</sup> , Emily Sigman<sup>13</sup> , Ruchika Singh<sup>14</sup>, Emily M. Adamczyk<sup>15</sup> , Thomas Addoah<sup>16</sup>, Genevieve Agaba<sup>3</sup> , Rahinatu S. Alare<sup>17</sup> , Will Anderson<sup>18</sup>, Indika Arulingam<sup>7</sup>, SGiids Kung Vanessa Bellis<sup>19</sup>, Regina Birner<sup>8</sup>, Sanjiv De Silva<sup>7</sup>, Mark Dubois<sup>20</sup> , Marie Duraisami<sup>14</sup>, Mike Featherstone<sup>21</sup>, Bryce Gallant<sup>7,22</sup>, Arunima Hakhu<sup>7,22</sup>, Robyn Irvine<sup>9</sup> , Esther Kiura<sup>6</sup>, Christine Magaju<sup>6</sup> , Cynthia McDougall<sup>23</sup> , Gwiisihlgaa Daniel McNeill<sup>19</sup>, Harini Nagendra<sup>24</sup> , Tran Huu Nghi<sup>25</sup>, Daniel K. Okamoto<sup>26</sup>, Ana Maria Paez Valencia<sup>6</sup>, Tim Pagella<sup>27</sup> , Ondine Pontier<sup>28</sup> , Miranda Post<sup>9</sup>, Gary W. Saunders<sup>29</sup> , Kate Schreckenber<sup>30</sup> , Karishma Shelar<sup>31</sup>, Fergus Sinclair<sup>6,27</sup> , Rajendra S. Gautam<sup>32</sup>, Nathan B. Spindel<sup>26</sup> , Hita Unnikrishnan<sup>12,33</sup> , Gulxa taa'a gaagii ng.aang Nadine Wilson<sup>9</sup>, Leigh Winowiecki<sup>6</sup> 

As the UN Decade on Ecosystem Restoration begins, there remains insufficient emphasis on the human and social dimensions of restoration. The potential that restoration holds for achieving both ecological and social goals can only be met through a shift toward people-centered restoration strategies. Toward this end, this paper synthesizes critical insights from a special issue on “Restoration for whom, by whom” to propose actionable ways to center humans and social dimensions in ecosystem restoration, with the aim of generating fair and sustainable initiatives. These rules respond to a relative silence on socio-political issues in di Sacco et al.’s “Ten golden rules for reforestation to optimize carbon sequestration, biodiversity recovery and livelihood benefits” on socio-political issues and offer complementary guidance to their piece. Arranged roughly in order from pre-intervention, design/initiation, implementation, through the monitoring, evaluation and learning phases, the 10 people-centered rules are: (1) Recognize diversity and interrelations among stakeholders and rightsholders; (2) Actively engage communities as agents of change; (3) Address socio-historical contexts; (4) Unpack and strengthen resource tenure for marginalized groups; (5) Advance equity across its multiple dimensions and scales; (6) Generate multiple benefits; (7) Promote an equitable distribution of costs, risks, and benefits; (8) Draw on different types of evidence and knowledge; (9) Question dominant discourses; and (10) Practice inclusive and holistic monitoring, evaluation, and learning. We contend that restoration initiatives are only tenable when the issues raised in these rules are respectfully addressed.

**Key words:** equity, rightsholders, social inclusion, stakeholders, tenure, UN Decade on Ecosystem Restoration

## Implications for Practice

- The potential that restoration holds for enhancing livelihoods and achieving the Sustainable Development Goals can only be met through a shift toward people-centered restoration strategies.
- A people-centered approach to restoration must recognize: rightsholders and diverse stakeholders and their interrelations; political-economic histories; tenure; communities as agents of change; equity; multiple restoration benefits; distributional issues; diverse evidence and knowledges; contextualized narratives; and holistic monitoring, evaluation, and learning.

Author contributions: all authors conceived the paper and drafted “rules” as inputs; ME, MK, SM, RMD analyzed and grouped inputs and wrote the manuscript; all authors reviewed and edited the manuscript.

- <sup>1</sup>Multifunctional Landscapes, Alliance of Bioversity International and CIAT, Via di San Domenico, 1, 00153 Rome, Italy  
<sup>2</sup>Address correspondence to M. Elias, email [marlene.elias@cgiar.org](mailto:marlene.elias@cgiar.org)  
<sup>3</sup>School of Geography and Environmental Sciences, University of Southampton, Building 44, University Road, Southampton SO17 1BJ, U.K.  
<sup>4</sup>Mansourian.org, University of Geneva, 24 Rue du Général-Dufour, 1211 Genève 4, Switzerland  
<sup>5</sup>Environment and Production Technology Division, International Food Policy Research Institute (IFPRI), 1201 I Street NW, Washington, DC 20005, U.S.A.  
<sup>6</sup>World Agroforestry (ICRAF), United Nations Avenue, Gigiri, PO Box 30677, Nairobi 00100, Kenya  
<sup>7</sup>International Water Management Institute (IWMI), 127 Sunil Mawatha, Battaramulla 10120, Sri Lanka  
<sup>8</sup>Social and Institutional Change in Agricultural Development, University of Hohenheim, Institut 490c, 70599 Stuttgart, Germany

## Introduction

As the UN Decade on Ecosystem Restoration begins, a problem confronts us: top-down restoration approaches are often prescriptive, ecologically focused, and fail to recognize the importance of humans in nature—starting with the ways they use maps devoid of social dimensions to prioritize areas to be restored (Erbaugh et al. 2020). Calls to “engage stakeholders” are too generalizing and fail to acknowledge the webs of power, political-economic motivations, inequalities, and tensions to be addressed to reconcile diverse interests, priorities, and worldviews through restoration. Even the SER “Social Benefits Wheel” insufficiently considers the complex power relations, negotiations, contestations, and value judgments that restoration entails (see Gann et al. 2019). Too often, social issues get relegated to the local level rather than considering the human dimensions required for successful restoration, including issues of voice and legitimacy, in shaping global agendas and activities at multiple scales (Elias et al. 2021; Joshi et al. 2021).

In light of these shortcomings, we propose 10 people-centered rules to support socially sustainable ecosystem restoration—that which sustains the restored landscapes, socio-political arrangements (i.e. institutions) and resource management processes that underpin them. These rules respond to a relative silence in di Sacco et al.’s (2021) “Ten golden rules for reforestation” with respect to socio-political issues, although we welcome their inclusion of community engagement and economic benefits in their otherwise biophysically focused recommendations. To adopt di Sacco et al.’s terminology, we refer to “rules” that are actionable and practical, rather than high-level principles. These rules complement the multitude of largely eco-centric principles developed for restoration (e.g. Besseau et al. 2018; Gann et al. 2019) as well as the “Principles for Ecosystem Restoration to Guide the United Nations Decade 2021–2030” (FAO et al. 2021). In particular, our rules unpack and expand upon Principle 2, which emphasizes “inclusive and participatory governance, social fairness and equity from the start and throughout the process and outcomes.”

Our rules build on efforts to shift restoration discourse and practice from an ecologically centered to a “pluralistic socio-centric” mindset that “offers opportunities for win–win (and sometimes triple-win) scenarios that can achieve ecological restoration while simultaneously delivering food security, poverty alleviation, and broader socioeconomic development goals” (Djenontin et al. 2018; see also Mansourian 2017). The rules are meant to support a contextual, evolving, and sustainable restoration practice informed by critical reflection of complex social equity considerations. We suggest that restoration outcomes are only tenable when the overarching issues raised in these rules are respectfully addressed.

## The 10 Rules

Developed for practitioners, policymakers, and researchers, among others, our rules follow from a special issue in *Ecological Restoration* (Elias et al. 2021). They apply to reforestation, like di Sacco et al.’s (2021), but equally to restoration of marine ecosystems (Lee et al. 2021), lakes (Sen et al. 2021), wetlands (Joshi

et al. 2021), and other ecosystems. Unlike another recent call for socially just restoration that focuses on actions at different scales (Osborne et al. 2021), our rules apply across scales and follow the life cycle of restoration interventions to show intervention points for explicit consideration of social dimensions (Fig. 1).

### 1. Recognize Diversity and Interrelations Among Restoration Stakeholders and Rightsholders

“Engaging stakeholders” is the first principle of forest landscape restoration (Besseau et al. 2018) and of the SER’s “International Principles and Standards for the Practice of Ecological Restoration” (Gann et al. 2019), and the second “golden rule” from di Sacco et al. (2021). Yet, in practice, stakeholder identification

<sup>9</sup>Gwaii Haanas National Park Reserve, National Marine Conservation Area Reserve, and Haida Heritage Site, Skidegate, British Columbia V0T 1S1, Canada

<sup>10</sup>Department of Human Ecology, Rutgers, The State University of New Jersey, 55 Dudley Road, New Brunswick, NJ 08901-8520, U.S.A.

<sup>11</sup>Department of Humanities and Social Sciences, Indian Institute of Technology Kharagpur, IIT Kharagpur, Kharagpur, India

<sup>12</sup>Azim Premji University, Bangalore, India

<sup>13</sup>Jackson Institute for Global Affairs, Yale University, 55 Hillhouse Avenue, New Haven, CT 06520, U.S.A.

<sup>14</sup>World Resources Institute India, LGF, AADI, 2 Balbir Saxena Marg, Hauz Khas, New Delhi 110016, India

<sup>15</sup>Department of Zoology and Biodiversity Research Centre, University of British Columbia, 4200-6270 University Boulevard, Vancouver, British Columbia V6T 1Z4, Canada

<sup>16</sup>Department of Humanities, Political and Social Sciences, ETH Zurich, Haldeneggsteig 4, 8006 Zürich, Switzerland

<sup>17</sup>Department of Environmental Science, C.K. Tadam University of Technology and Applied Sciences, PO Box 24, Navrongo, Ghana

<sup>18</sup>Global Restoration Initiative, World Resources Institute, 10 G Street NE, Suite 800, Washington, DC 20002, U.S.A.

<sup>19</sup>Haida Fisheries Program, 133 Front Street, Queen Charlotte, British Columbia V0T 1S1, Canada

<sup>20</sup>Resilient Small Scale Fisheries Program, CGIAR Research Program on Fish Agri-Food Systems (FISH), WorldFish, West Gyogone, Bayint Naung Road, Insein Township, Yangon 11181, Myanmar

<sup>21</sup>Pacific Urchin Harvesters Association, 12740 Trites Road, Richmond, British Columbia V7E 3R8, Canada

<sup>22</sup>Water, Land and Ecosystems, IWMI-Tata Water Policy Program, “Jal Tarang”, Near Smrutii Apartment, Behind IRMA Gate, Mangalpara, Anand 388001, Gujarat, India

<sup>23</sup>Gender Research Theme, CGIAR Research Program on Fish Agri-Food Systems (FISH), WorldFish, Jalan Batu Maung, Batu Maung, 11960 Bayan Lepas, Pulau Pinang, Malaysia

<sup>24</sup>School of Development, Azim Premji University, Survey No 66, Burugunte Village, Bikkanaahalli Main Road, Sarjapura, Bangalore, India

<sup>25</sup>Tropenbos Việt Nam, 149 Tran Phu Street, Phuoc Vinh, Hue, 49000 Thua Thien Hue, Vietnam

<sup>26</sup>Department of Biological Science, Florida State University, 319 Stadium Dr, Tallahassee, FL 32304, U.S.A.

<sup>27</sup>School of Natural Sciences, Bangor University, Bangor, Gwynedd LL57 2DG, U.K.

<sup>28</sup>Nearshore Science, Hakai Institute, 303-1100 Island Hwy, Campbell River, British Columbia, Canada

<sup>29</sup>Centre for Environmental and Molecular Algal Research, Department of Biology, University of New Brunswick, PO Box 4400, Fredericton, New Brunswick E3B 5A3, Canada

<sup>30</sup>Geography Department, King’s College London, 40 Bush House (North East Wing), Aldwych, London WC2B 4BG, U.K.

<sup>31</sup>Center for Policy Design, Ashoka Trust for Research in Ecology and the Environment, Royal Enclave, Srirampura, Jakkur Post, Bangalore 560 064, Karnataka, India

<sup>32</sup>Institute of Livelihood Research and Training, 3rd Floor, Surabhi Arcade, Troop Bazar, Bank Street, Koti, Hyderabad, Telangana 500001, India

<sup>33</sup>Urban Institute, The University of Sheffield, 219 Portobello, Sheffield S1 4DP, U.K.

© 2021 The Authors. *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-NonCommercial-NoDerivs License](https://creativecommons.org/licenses/by-nc/4.0/), which permits use and distribution in any medium, provided the original work is properly cited, the use is non-commercial and no modifications or adaptations are made.  
doi: 10.1111/rec.13574



Figure 1. Ten people-centered rules for sustainable ecosystem restoration.

is complex, and their engagement can be fraught with power inequalities (Robinson et al. 2021). Stakeholders in restoration operate at multiple levels: from multinational corporations financing carbon offsets to local communities relying on natural resources for food and livelihoods (Mansourian 2021). Recognizing their

diverse rights, motivations, aspirations, constraints, opportunities, and embedded networks and power relations is critical for effective engagement, in relevant ways, at the right times.

Representatives in restoration initiatives may not have the perceived legitimacy of the group they are meant to represent.

For example, community leaders may not represent the best interests of their entire community (Kandel et al. 2021), and diverse groups of local men and women may have different perspectives on restoration (Crossland et al. 2021; Kariuki & Birmer 2021; Singh et al. 2021). Intersectional identities mediate access and rights, knowledge, priorities, and the abilities of different actors to engage, decide, and benefit in/from restoration.

To understand the intricacies of social relations and equitably engage diverse rightsholders and stakeholders, restoration teams may require capacity-strengthening and partners who are well connected and trusted by key groups (Gornish et al. 2021). Building trust with and among rightsholders and stakeholders takes time and calls for deliberate effort and investment (Lee et al. 2021).

## 2. Actively Engage Communities as Agents of Change

At the core, restoration initiatives should center on communities as agents of change, and on their values, priorities, aspirations, and capacities (Sen et al. 2021; Sigman & Elias 2021; Singh et al. 2021). Communities have the power and capacity to enact and sustain local change much more effectively than top-down programs. By supporting the collective agency of local actors in deciding whether, what and how restoration projects should happen within their community/territory, setting priorities, plans, implementing, and monitoring through collective action, initiatives can build on local knowledge and motivations.

Communities may not always have all the capacities that restoration initiatives call for, particularly where meetings, land-use plans or monitoring processes use unfamiliar language or formal “scientific” criteria (Evans et al. 2018). Trusted organizational brokers can help build community capacity in organizing, technical planning, or leadership on monitoring processes. Where there are trusted leaders, social solidarity, and relatively strong local institutions, including well-functioning resource user groups, approaches such as payments for environmental services may create incentives for collective action; but they can also raise challenges where rules are imposed without consultation or are poorly understood (Kerr et al. 2014).

Instead of seeing communities as passive “beneficiaries” or focusing on what they lack to engage in restoration initiatives as externally defined, programs and projects can recognize what communities have, and adapt their rules and modalities to emphasize those assets and reduce power asymmetries (Di Gregorio et al. 2008; Lee et al. 2021). For example, meetings can be held in communities on a rotating basis in local languages rather than at administrative quarters in official languages. Appreciative inquiry (Whitney & Trosten-Bloom 2010) and adaptive collaborative management (Armitage et al. 2009) are approaches that can build on local capacities to support self-determined change.

## 3. Address Socio-Historical Contexts

Although restoration initiatives generally consider ecological histories (Gann et al. 2019), they often overlook socio-historical trajectories, and how drivers of ecosystem degradation are

embedded in multi-scalar social and political processes (Elias et al. 2021). Market-based approaches that inadequately grapple with perceptions of historical inequities and injustices may lead to elite capture (McElwee & Nghi 2021). Competing resource tenure claims are often rooted in legal pluralism and centuries-old, complex processes like state formation, migration and settlement, and capitalist expansion (Meinzen-Dick & Pradhan 2002; Peluso & Lund 2011; Sikor et al. 2017).

Assessing whether restoration sites are imbued with active or latent natural resource-related tensions (e.g. between farmers and pastoralists) can avoid triggering or exacerbating conflict and jeopardizing project legitimacy (Kandel et al. 2021). Collaboratively unpacking socio-historical trajectories with rights-holders and stakeholders may reveal important nuances in perceptions and inform engagement strategies (Reed et al. 2020; Mansourian 2021; Sen et al. 2021). Risk assessments and risk mitigation planning should consider the potential impact of historical grievances, and the need to adopt conflict-sensitive restoration approaches (Lange 2004).

## 4. Unpack and Strengthen Resource Tenure for Marginalized Groups

Tenure fundamentally shapes who has authority and incentives to participate in restoration. Secure tenure provides assurance that investing in the land will reap benefits, instead of losing land rights as restored lands become more valuable to others (Lawry et al. 2017; Kandel et al. 2021). Since many restoration initiatives involve informal land or resource owners, focusing only on formal ownership is inadequate and can exacerbate inequalities.

Landscape-level restoration covers complex mosaics of land uses and tenure, including private household use (e.g. agricultural lands), shared community resources, or commons, and protected areas, with overlapping bundles of rights to particular resources (e.g. land, trees, carbon) held by different individuals or entities. The degree of formal recognition and tenure security vary across different types of rights. Women or youth within households can be excluded from processes—and benefits—that only involve formalized land or resource owners, such as (typically male) household heads (Sijapati Basnett et al. 2017; Kariuki & Birmer 2021). Where community rights over commons like village grazing lands, forests, or water bodies are recognized, local government or user groups may be formally involved in restoration planning. In other areas, local rights over the commons are commonly overlooked. The situation is often worse for transhumant pastoralists and forest-dependent communities, including Indigenous peoples, in areas that the state claims as protected. Restoration efforts that fail to understand complex tenure arrangements and claims can further marginalize and exclude groups that lack formal rights, in some cases leading to their dispossession through “green grabs” (Fairhead et al. 2012).

Restoration can strengthen the tenure security of marginalized groups and their decision-making power through formal recognition of their resource rights (Cronkleton et al. 2017). Land titling is not without risks, however: in Vietnam, for example, using land tenure certificates as motivation for tree planting projects incentivized land grabbing (McElwee & Nghi 2021).

Projects should conduct comprehensive tenure assessments to identify the range of rightsholders' and of stakeholders' resource claims (McLain et al. 2018).

### 5. Advance Equity Across Its Multiple Dimensions and Scales

Rarely is equity explicitly addressed in restoration initiatives (Wells et al. 2021). Commonly used equity frameworks (e.g. Fraser 2009; McDermott et al. 2013) draw attention to four interrelated dimensions. The first concerns *recognition* of the legitimacy of different stakeholders (Rule 1), and their rights, knowledge systems, values, and priorities in restoration initiatives. The *procedural* dimension refers to representation and meaningful participation, voice and influence of different actors in restoration; which helps shape the *distribution* of the costs, benefits, and risks of restoration (Rule 7). *Contextual* equity refers to factors such as historical relations, patterns of resource access, and power dynamics that embed the other three dimensions and mediate the equity outcomes of restoration initiatives. Although all dimensions are critical, interventions often limit their attention to distributional aspects that are more easily observed and quantified (Friedman et al. 2018).

Equity issues are common across scales. For instance, project locations and objectives may be determined by state agencies, large private sector actors, or NGOs, leading to an inequitable spatial distribution of restoration resources and disproportionate weight given to these stakeholders' priorities. Sigman and Elias (2021) question the fairness of such processes, and of shifting the burden of restoration from richer nations that disproportionately cause degradation to poorer nations.

Equity issues at a given scale can arise among different groups, such as across gender (Crossland et al. 2021), age, ethnic, or socio-economic groups (Kariuki & Birner 2021), between governments and Indigenous or local communities (Lee et al. 2021), and spatially among actors located closer to or farther away from restoration sites (Kandel et al. 2021). Inter-generational equity issues arise as current land uses affect future ones, and the distribution of costs and benefits is shared (or not) across generations. The understanding of equity may differ or be contested and should be explored among and between rightsholders and stakeholder groups. Indicators and tools customized to specific contexts can help identify and measure gender and inter-generational (in)equities, including distributional issues (Grabowski et al. 2020).

### 6. Generate Multiple Benefits, Including Social Benefits

Improvements in quality of life should result alongside those in ecology from restoration (Erbaugh & Oldekop 2018). Simple measures of wellbeing are often monetary. For example, payments for ecosystem services schemes reduce ecological values to services that can be monetized (Kariuki & Birner 2021). Yet, equally and sometimes more valuable are numerous other cultural and social benefits, which are more difficult to quantify, monetize and trade. Restored ecosystems can play a socially irreplaceable role in providing a sense of belonging, preserving or revitalizing socio-cultural identity and spiritual or cultural

values (Reyes-Garcia et al. 2019; Lee et al. 2021; Sen et al. 2021). These outcomes hold importance for current and future generations, who may lose out from present-day transactions with long term, unfavorable consequences for the environment they inherit. Monitoring and evaluation frameworks should capture these multiple benefits, with attention to how to meaningfully assess social outcomes (Rule 10).

To be sustainable, forward-looking restoration must account for local aspirations. Ultimately, the question remains about who determines which social values from ecosystems are to be restored or protected (Elias et al. 2021). Stakeholder convenings to map and decide such priorities cannot be fully representative; therefore, care must be taken to avoid these being dominated by political elites, who might then capture many of the benefits from interventions (McElwee & Nghi 2021).

### 7. Promote an Equitable Distribution of Costs, Risks, and Benefits

Restoration initiatives may generate different environmental (e.g. carbon sequestration, enhanced biodiversity) and human wellbeing (e.g. employment, rights) benefits, alongside costs—monetary, opportunity (e.g. of foregone land use or income), or labor-related (e.g. terracing, planting trees). Risks include social tensions as initiatives may change power dynamics, and displace or dispossess local land users as land use and values change. Distinct groups, such as local women and men, often identify and prioritize different costs, risks, and benefits (Pham et al. 2016).

Rarely are benefits and costs equitably distributed, and risks, which can be particularly acute for marginalized groups, are often overlooked and poorly mitigated (Covelli Metcalf et al. 2015). For instance, women may provide labor and skills for restoration without receiving an equitable share of benefits, particularly when these are linked to formal land ownership (Kariuki & Birner 2021). Distribution may differ temporally, as processes like planting native species involve long-term investments or opportunity costs with delayed returns. Rightsholders and stakeholders are better positioned to receive benefits and share costs when they have a voice and influence over restoration processes and decisions, thereby incentivizing support for restoration (Verdone 2015).

Restoration initiatives should comprise strategies and approaches at various levels and work with multiple rightsholders and stakeholders to define the aims, scope, and kinds of benefits they value, the costs and risks they may face, and measures to share them equitably. This requires understanding what equity means to them and how it can be transparently assessed. Cost–benefit analyses ought to consider the broad range of benefits restoration can generate as well as their distribution from the onset (see Rule 5), including immaterial and social benefits (Sen et al. 2021), opportunity costs (e.g. time and labor), and trade-offs for different groups, with fair compensation provided at appropriate timescales (e.g. medium-term subsidies until ecosystem services are restored) to affected groups (McElwee & Nghi 2021). Impartial grievance redress mechanisms must ensure that initiatives are accountable

to affected actors, particularly marginalized groups (Sijapati Bassett et al. 2017).

### 8. Draw on Different Types of Evidence and Knowledge

Recognizing different types of evidence and knowledge means asking “who determines what qualifies as evidence” and “whose knowledge counts”? Co-production is often reduced to the integration of rightsholders’ (i.e. rightsholders’) and stakeholders’ (i.e. stakeholders’) views and knowledge into externally defined projects and research agendas (Latulippe & Klenk 2020). Yet, genuine co-production means engaging these groups right from the start, and truly learning from diverse knowledge systems (Lee et al. 2021; Robinson et al. 2021). Evidence can be stronger when derived from different methodological traditions and epistemologies, including local and traditional knowledge (LTK), citizen/community science, and qualitative and quantitative approaches. LTK provides contextualized, historical, dynamic, and perceptual information that often cannot be instrumentally collected (McElwee et al. 2020). While integrating LTK with scientific methods may be useful in field experiments (di Sacco et al. 2021), tensions may arise as LTK is generally place-based and rooted in tacit, experiential learning in contrast to more reductionist Western scientific methods (Goldman et al. 2018). People who are comfortable with these multiple ways of knowing the world are uniquely positioned to consider these knowledge systems together (Bartlett et al. 2012).

Integration and consensus often serve as guiding principles for co-production, yet a pragmatic approach recognizes probable tensions and contestations and seeks constructive dialog among and between rightsholders and stakeholders (Turnhout et al. 2020). This requires robust project communication and learning strategies, which can be embedded within monitoring and evaluation frameworks that also recognize that restoration is a long-term process (Reed et al. 2020). Iterative approaches to sustainability (legacy) planning should include different types of evidence and knowledge, from the planning phase to the development of indicators for tracking progress (Dale et al. 2019).

### 9. Question Dominant Discourses

The need to move beyond simple narratives of tree planting and carbon sequestration has recently received welcome attention. However, questioning dominant discourses also requires examining the politics of popular narratives and framings that shape restoration practice and policy (Joshi et al. 2021). For instance, ecosystem degradation is often blamed on “unsustainable” land-use practices such as overgrazing. Yet, such attributions reveal little about the structures and contextual factors driving these processes, including policies and actors operating across multiple scales (Lind et al. 2020), and interconnections among drivers and their causal chain, which are best understood from a political economy/ecology perspective.

The power to frame problems is salient in global environmental governance (Sikor et al. 2017), wherein international and state actors define what should be restored, how, and why, often to the exclusion of local rightsholders and stakeholders. Embracing

different types of evidence and knowledge (Rule 8) and interdisciplinary collaborations can help ensure that popular misconceptions do not drive restoration initiatives and impede alternative restoration visions and pathways (Kandel et al. 2021).

### 10. Practice Inclusive and Holistic Monitoring, Evaluation and Learning (MEL)

Effective MEL includes feedback loops that incorporate timely sharing, feedback, and reflections on data among decision-makers, including rightsholders and stakeholders, to support equitable, sustainable, and “successful” restoration initiatives. Definitions of “success” vary, but commonly include dimensions of ecological sustainability, social wellbeing, and economic efficiency (Pagdee et al. 2006), and cultural and spiritual values (Evans et al. 2018; Lee et al. 2021). Tracking progress toward these outcomes is important as what is measured typically commands attention and investment. Nuanced assessments drawing on mixed methods are important for internal learning, and to build credibility and accountability upward (toward funders and actors commissioning initiatives) and downward (toward local communities).

Restoration initiatives should assess quality not just quantity (e.g. numbers of hectares restored) across multiple objectives (Kariuki & Birner 2021; McElwee & Nghi 2021). They should consider intended and unintended ecosystem (e.g. rise in invasive species), social (e.g. accentuation of inequality), and economic (e.g. loss of income-generating opportunities) consequences in the short and longer terms and at different scales, as ecological and social dynamics will change over time and space (Lee et al. 2021; McElwee & Nghi 2021). Monitoring ought to engage and respond to diverse priorities and values of rightsholders and stakeholders (Bloomfield et al. 2019).

Participatory monitoring, which enables local people to decide what, how, and when to measure, who does the measuring, and to collect and analyze data that respond to local concerns, can support social learning and improve decision-making, knowledge sharing, stakeholder capacities, and empowerment (Evans et al. 2018). Privileging the voices of marginalized groups in the assessment process can validate their knowledge, shift power into their hands, and lead to locally demanded actionable change (Holland & Ruedin 2012). Participatory monitoring also supports attitudinal and perceptual shifts among community members, and fosters collaboration and improved natural resource governance (Cundill & Fabricius 2010).

### Conclusion

The UN Decade on Ecosystem Restoration provides unique opportunities for simultaneously improving environmental outcomes and human wellbeing. Yet, there are also serious risks. Ignoring the social dimensions of environmental initiatives has led not only to failure in achieving ecological objectives, but also to disposessions, land grabs, conflict, and further marginalization of vulnerable groups. Our 10 people-centered rules can help improve the tenability of restoration, and contribute to greater inclusion, poverty reduction, and other SDGs.

Still, more can be done. For example, the rules need to engage the United Nations Declaration on the Rights of Indigenous Peoples, and to address issues related to rightsholders—particularly Indigenous peoples within their traditional territories—and governance more fully than could be explored here. Our rules are intended to complement ecological guidance to further unpack, expand, and operationalize established principles, and to shift focus from eco-centric toward people-centered restoration. Restoration requires an inter- and trans-disciplinary approach that valorizes natural and social dimensions as well as plural knowledge and value systems, centers on communities, and fosters collaboration on more equal footing.

## Acknowledgments

The authors gratefully acknowledge H. Zaremba for her assistance with copyediting and referencing, J. Falik for our infographic, and S. Murphy for his support and advice. The authors want to thank the anonymous reviewers who provided valuable comments on an earlier version of this manuscript, as well as CGIAR Research Programs on Forests, Trees and Agroforestry; Policies, Institutions and Markets; Water, Land and Ecosystems; and the CGIAR Trust Fund Donors.

## LITERATURE CITED

- Armitage DR, Plummer R, Berkes F, Arthur RI, Charles AT, Davidson-Hunt I-J, et al. (2009) Adaptive co-management for social-ecological complexity. *Frontiers in Ecology and the Environment* 7:95–102
- Bartlett C, Marshall M, Marshall A (2012) Two-eyed seeing and other lessons learned within a co-learning journey of bringing together indigenous and mainstream knowledges and ways of knowing. *Journal of Environmental Studies and Sciences* 2:331–340
- Besseau P, Graham S, Christophersen T (2018) Restoring forests and landscapes: the key to a sustainable future. *Global Partnership on Forest and Landscape Restoration*. International Union of Forest Research Organizations (IUFRO), Vienna, Austria
- Bloomfield G, Meli P, Brancalion PH, Terris E, Guariguata MR, Garen E (2019) Strategic insights for capacity development on forest landscape restoration: implications for addressing global commitments. *Tropical Conservation Science* 12 (November):194008291988758
- Covelli Metcalf E, Mohr JJ, Yung L, Metcalf P, Craig D (2015) The role of trust in restoration success: public engagement and temporal and spatial scale in a complex social-ecological system. *Restoration Ecology* 23:315–324
- Cronkleton P, Artati Y, Baral H, Paudyal K, Banjane MR, Liu JL, Tu TY, Putzel L, Birhane E, Kassa H (2017) How do property rights reforms provide incentives for forest landscape restoration? Comparing evidence from Nepal, China and Ethiopia. *International Forestry Review* 19:8–23
- Crossland M, Paez Valencia AM, Pagella T, Magaju C, Kiura E, Winowiecki L, Sinclair F (2021) Onto the farm, into the home: how intrahousehold gender dynamics shape land restoration in Eastern Kenya. *Ecological Restoration* 39:90–107
- Cundill G, Fabricius C (2010) Monitoring the governance dimension of natural resource co-management. *Ecology and Society* 15:15
- Dale VH, Kline KL, Parish ES, Eichler SE (2019) Engaging stakeholders to assess landscape sustainability. *Landscape Ecology* 34:1199–1218
- Di Gregorio M, Hagedorn K, Kirk M, Korf B, McCarthy N, Meinzen-Dick RS, et al. (2008) Property rights, collective action, and poverty: the role of institutions for poverty reduction. CAPRI Working Paper 81. International Food Policy Research Institute (IFPRI), Washington, D.C.
- di Sacco A, Hardwick KA, Blakesley D, Brancalion PH, Breman E, Cecilio Rebola L, et al. (2021) Ten golden rules for forest reforestation to optimize carbon sequestration, biodiversity recovery and livelihood benefits. *Global Change Biology* 27:1328–1348
- Djenontin IN, Foli S, Zulu LC (2018) Revisiting the factors shaping outcomes for forest and landscape restoration in sub-saharan africa: a way forward for policy, practice and research. *Sustainability* 10:906
- Elias M, Joshi D, Meinzen-Dick R (2021) Restoration for whom, by whom? A feminist political ecology of restoration. *Ecological Restoration* 39:3–15
- Erbaugh JT, Oldekop JA (2018) Forest landscape restoration for livelihoods and well-being. *Current Opinion in Environmental Sustainability* 32: 76–83
- Erbaugh JT, Pradhan N, Adams J, Oldekop JA, Agrawal A, Brockington D, et al. (2020) Global forest restoration and the importance of prioritizing local communities. *Nature Ecology and Evolution* 4:1472–1476
- Evans K, Guariguata MR, Brancalion PH (2018) Participatory monitoring to connect local and global priorities for forest restoration. *Conservation Biology* 32:525–534
- FAO, IUCN CEM & SER (2021) Principles for ecosystem restoration to guide the United Nations Decade 2021–2030. Rome: FAO.
- Fairhead J, Leach M, Scoones I (2012) Green grabbing: a new appropriation of nature? *The Journal of Peasant Studies* 39:237–261
- Fraser N (2009) Scales of justice: reimagining political space in a globalizing world. Columbia University Press, New York, NY
- Friedman RS, Law EA, Bennett NJ, Ives CD, Thorn JPR, Wilson KA (2018) How just and just how? A systematic review of social equity in conservation research. *Environmental Research Letters* 13:1–13
- 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. *Restoration Ecology* 27:S1–S46
- Goldman MJ, Turner MD, Daly M (2018) A critical political ecology of human dimensions of climate change: epistemology, ontology, and ethics. *Wiley Interdisciplinary Reviews: Climate Change* 9:e526
- Gornish ES, McCormick M, Begay M, Nsikani MM (2021) Sharing knowledge to improve ecological restoration outcomes. *Restoration Ecology* 3: e1701345
- Grabowski PP, Djenontin I, Zulu L, Kamoto J, Kampanje-Phiri J, Darkwah A, Egyir I, Fischer G (2020) Gender-and youth-sensitive data collection tools to support decision making for inclusive sustainable agricultural intensification. *International Journal of Agricultural Sustainability* 12:1–7
- Holland J, Ruedin L (2012) Monitoring and evaluating empowerment processes. Swiss Agency for Development and Cooperation, Stockholm, Sweden
- Joshi D, Gallant B, Hakhu A, De Silva S, McDougall C, Dubois M, et al. (2021) Ramsar Convention and the wise use of wetlands: rethinking inclusion. *Ecological Restoration* 39:36–44
- Kandel M, Agaba G, Alare RS, Addoah T, Schreckenber K (2021) Assessing social equity of farmer-managed natural regeneration (FMNR) interventions: findings from Ghana. *Ecological Restoration* 39:64–76
- Kariuki J, Birner R (2021) A conceptual framework for exploring equity in ecological restoration: the case of a market-based programme in Kenya. *Ecological Restoration* 39:77–89
- Kerr JM, Vardhan M, Jindal R (2014) Incentives, conditionality and collective action in payment for environmental services. *International Journal of the Commons* 8:595–616
- Lange M (2004) Building institutional capacity for conflict sensitive development and humanitarian practise. International Alert, London, United Kingdom
- Latulippe N, Klenk N (2020) Making room and moving over: knowledge co-production, Indigenous knowledge sovereignty and the politics of global environmental change decision-making. *Current Opinion in Environmental Sustainability* 42:7–14
- Lawry S, Samii C, Hall R, Leopold A, Hornby D, Mtero F (2017) The impact of land property rights interventions on investment and agricultural productivity in developing countries: a systematic review. *Journal of Development Effectiveness* 9:61–81

- Lee LC, McNeill GD, Ridings P, Featherstone M, Okamoto DK, Spindel NB, et al. (2021) Chiixuu Tli iinasdli: indigenous ethics and values lead to ecological restoration for people and place in Gwaii Haanas. *Ecological Restoration* 39:45–51
- Lind J, Sabates-Wheeler R, Caravani M, Kuol LB, Nightingale DM (2020) Newly evolving pastoral and post-pastoral rangelands of Eastern Africa. *Pastoralism* 10:1–4
- Mansourian S (2017) Governance and forest landscape restoration: a framework to support decision-making. *Journal for Nature Conservation* 37:21–30
- Mansourian S (2021) Disciplines, sectors, motivations and power relations in Forest Landscape Restoration. *Ecological Restoration* 39:16–26
- McDermott M, Mahanty S, Schreckenberg K (2013) Examining equity: a multi-dimensional framework for assessing equity in payments for ecosystem services. *Environmental Science and Policy* 33:416–427
- McElwee P, Nghi TH (2021) Assessing the social benefits of tree planting by smallholders in Vietnam: lessons for large-scale reforestation programs. *Ecological Restoration* 39:52–63
- McElwee PD, Fernández-Llamazares A, Aumeeruddy-Thomas Y, Babai D, Bates P, Galvin K, et al. (2020) Integrating indigenous and local knowledge (ILK) into large-scale ecological assessments: The experience of the IPBES global assessment. *Journal of Applied Ecology* 57:1666–1676
- McLain R, Lawry S, Guariguata MR, Reed J (2018) Toward a tenure-responsive approach to forest landscape restoration: a proposed tenure diagnostic for assessing restoration opportunities. *Land Use Policy* 104:103748
- Meinzen-Dick RS, Pradhan R (2002) Legal pluralism and dynamic property rights. CAPRI Working Paper No. 22. International Food Policy Research Institute (IFPRI), Washington, D.C.
- 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
- Pagdee A, Kim Y, Daugherty PJ (2006) What makes community forest management successful: a meta-study from community forests throughout the world. *Society and Natural Resources* 19:33–52
- Peluso NL, Lund C (2011) New frontiers of land control: introduction. *Journal of Peasant Studies* 38:667–681
- Pham TT, Mai YH, Moeliono M, Brockhaus M (2016) Women's participation in REDD+ national decision-making in Vietnam. *International Forestry Review* 18:334–344
- Reed J, Ros-Tonen MAF, Sunderland TC (2020) Operationalizing integrated landscape approaches in the tropics. Center for International Forestry Research (CIFOR), Bogor, Indonesia
- Reyes-García V, Fernández-Llamazares A, McElwee PD, Wilson SJ, Molnar Z, Ollerer K (2019) Indigenous peoples and local communities' contributions to ecological restoration activities. *Restoration Ecology* 27(1):3–8
- 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
- Sen A, Unnikrishnan H, Nagendra H (2021) Restoration of urban water commons: navigating social-ecological fault lines and inequities. *Ecological Restoration* 39:120–129
- Sigman E, Elias M (2021) Three approaches to restoration and their implications for social inclusion. *Ecological Restoration* 39:27–35
- Sijapati Basnett B, Elias M, Ihalainen M, Paez Valencia AM (2017) Gender matters in Forest Landscape Restoration: A framework for design and evaluation. Center for International Forestry Research (CIFOR), Bogor, Indonesia
- Sikor T, He J, Lestrelin G (2017) Property rights regimes and natural resources: a conceptual analysis revisited. *World Development* 93:337–349
- Singh R, Shelar K, Duraisami M, Anderson W, Gautam RS (2021) Equitable and inclusive landscape restoration planning: learning from a restoration opportunity assessment in India. *Ecological Restoration* 39:108–119
- Turnhout E, Metzger T, Wyborn C, Klenk N, Louder E (2020) The politics of co-production: participation, power, and transformation. *Current Opinion in Environmental Sustainability* 42:15–21
- Verdone M (2015) A cost-benefit framework for analyzing forest landscape restoration decisions. International Union for Conservation of Nature (IUCN), Gland, Switzerland
- Wells HBM, Kirobi EH, Chen CL, Winowiecki LA, Vågen T-G, Ahmad MN, et al. (2021) Equity in ecosystem restoration. *Restoration Ecology* 29:e13385
- Whitney D, Trosten-Bloom A (2010) *The power of appreciative inquiry*. 2nd ed. Berrett-Koehler, San Francisco, CA

Coordinating Editor: Stephen Murphy

Received: 22 June, 2021; First decision: 1 September, 2021; Revised: 2 October, 2021; Accepted: 3 October, 2021