

OPINION ARTICLE

Cross-scale interdependencies require attention in forest restoration

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A governance perspective that connects actors at multiple levels in forest restoration is largely missing and much needed to expedite the translation of national restoration targets into long-lasting outcomes. An explicit focus on the interactions across governance levels, and how these influence ecological processes at different spatial levels, can overcome the general tendency to focus on forest restoration either from the top-down or bottom-up and help improve the quality of forest restoration.

Key words: cross-level alignment, cross-scale fit, governance arrangements, governance strategies

Implications for Practice

- Forest restoration efforts can address cross-scale and cross-level interdependencies and interactions when they successfully engage actors at different governance levels who have unique and complementary mandates, skills, and knowledge.
- Depending on the specific context, forest restoration efforts can draw on a variety of “scale-sensitive” governance arrangements to enhance responsiveness to local ecological and livelihood specificities, and local realities, while learning from past efforts.

To reverse the negative impacts of land degradation, forest conservation and restoration have gained prominence in the climate (IPCC 2019, 2022), biodiversity (IPBES 2018), water (UN Water 2018) and development (UNDP 2020) agendas. Various global initiatives have generated unparalleled political commitment and optimism among national governments to jointly restore hundreds of millions of hectares of the world’s degraded and deforested lands (Di Sacco et al. 2021). Yet despite political ambitions, there appears to be limited progress in translating national forest restoration targets into local action (Cooke et al. 2019; Chazdon et al. 2020) and many countries lack a detailed and viable plan (Mansourian & Parrotta 2019; Fagan et al. 2020; Wiegant et al. 2020).

Although much attention has gone to mapping global forest restoration potentials and priorities to stimulate action (Bastin et al. 2019; Brancalion et al. 2019; Strassburg et al. 2020), these often ignore local socioeconomic, governance, and political contexts (Erbaugh & Oldekop 2018; Wyborn & Evans 2021; Fleischman et al. 2022). This hampers the development of contextually relevant solutions that build on the skills, knowledge,

experience, and aspirations of local actors. Conversely, forest restoration plans and programs that are solely focused on the local level may cause adverse external effects elsewhere. Such plans and programs run the risk of disregarding governance challenges that go beyond the sphere of influence of local decision-making (Arts et al. 2017). The effectiveness of forest restoration efforts could be compromised if decision-making processes are not aligned across different governance levels, or when the spatial and temporal dimensions of governance processes mismatch those of ecological processes (Evans et al. 2022; Wiegant et al. 2022b). To this end, a perspective that examines the decision-making processes that occur across governance levels, and the challenges associated with these can improve the quality of forest restoration design and implementation (Stephenson 2013; McLain et al. 2017; Djenontin et al. 2018).

Adopting a multilevel governance perspective (Table 1; Hooghe & Marks 2003; Stephenson 2013) that focuses on cross-level and cross-scale interdependencies (Table 1) and interactions encompasses understanding the restoration-relevant mandates, skills and knowledge that exist at multiple levels of governance, and how these influence actors at other levels. When decision-making processes at multiple levels of governance are given due attention, the tendency to address forest restoration either from the top-down (e.g. exclusively through a national policy framework) or the bottom-up (e.g. exclusively

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Table 1. Glossary.

Multi-level governance refers to the decision-making processes that occur within and across different politico-administrative levels where centers of authority are located, from the supra-national level down to national and subnational levels (Hooghe & Marks 2003; Stephenson 2013). They include a national government, a municipal government as well as the leadership within a rural community.

Cross-level and cross-scale interdependencies refer to situations where a decision or event at one level of governance has effects on processes at other governance levels (cross-level) or on ecological processes (cross-scale) (Görg 2007; Termeer & Dewulf 2014). For example, a new policy at the national level can influence the possibilities for local governments or rural communities to sustain restoration processes in the long term.

Cross-level misalignment refers to cases where no effective arrangements or strategies exist to align the interests, needs and capacities of actors at different levels of governance to achieve a specific objective (Cash et al. 2006; Pistorius & Freiberg 2014).

Cross-scale mismatch refers to governance processes that do not fit the spatial or temporal dimensions of the ecological processes they are trying to influence (Cumming et al. 2006; Mansourian & Parrotta 2019).

Governance arrangements are the formal and informal rules, processes, and instruments that structure interactions between relevant public and/or non-state actors to achieve specific objectives (Termeer et al. 2011; Wiegant et al. 2022c).

Governance strategies are applied in specific circumstances to implement objectives or to address challenges that arise when objectives are implemented (Olsson et al. 2006). They form part of continuous and iterative governance processes and are ideally based on a thorough understanding of human-environment system dynamics and learning from past experiences (Folke et al. 2005; Pahl-Wostl et al. 2007)

through a locally developed plan) is overcome (Cash et al. 2006).

Previous natural science studies have addressed cross-level interdependencies by stressing the impact of forest restoration on long-distance water transportation (Hoek van Dijke et al. 2022) and assessing how forest restoration in one location may displace agricultural activities and induce deforestation elsewhere (Latawiec et al. 2015). At present, however, published guidance on the human and social dimensions of forest restoration seems to not sufficiently address cross-level and cross-scale interactions and interdependencies. It has been recently acknowledged that relevant restoration actors are located at multiple scale levels and that their engagement is required (Di Sacco et al. 2021; Elias et al. 2022; Mansourian et al. 2022; Marshall et al. 2022). Yet, there is not enough explicit consideration for the governance arrangements (Table 1) that can facilitate them to work together in the design, implementation, and sustenance of forest restoration (Evans et al. 2022). In the restoration governance literature, numerous examples of governance arrangements that offer possibilities to overcome cross-level misalignment and cross-scale mismatch (Table 1) can be found, but these seem scattered and not presented as solutions to create alignment and fit (Wiegant et al. 2022c).

That said, enhanced attention for cross-level dependencies is warranted, since key actors with unique mandates, skills, knowledge, and aspirations needed to address the many dimensions of forest restoration are located across different levels of governance (Cumming et al. 2013; Wiegant et al. 2022c). High-level actors can exploit economies of scale, internalize policy externalities through regulation, and facilitate effective redistribution, while local actors are better able to generate place-specific responses (Hooghe & Marks 2003). Assessing the multilevel governance context to unravel existing cross-level and cross-scale challenges may point to which “scale-sensitive” governance arrangements and strategies are best suited to overcome cross-level misalignment (e.g. initiatives that are responsive to local livelihood specificities, and incorporate local realities and capacities of implementing actors) and cross-scale mismatch (e.g. initiatives that are responsive to the temporal and spatial dimensions of ecological processes; Fig. 1).

Cross-level alignment can be achieved through multilevel collaboration and learning. For example, when local governments and rural communities detail their respective responsibilities for restoring forests in negotiated management plans (Harada et al. 2015; Chowdhury et al. 2020). Multilevel learning can incentivize the exchange of data and knowledge between different levels of governance and societal groups, and create shared standards of practice (Eicken et al. 2021; Danielsen et al. 2022; Ladouceur et al. 2022). Bridging organizations (such as civil society organizations that are well connected to actors at different governance levels) can help leverage both top-down, government-led as well as bottom-up, community-led information on degradation drivers and restoration progress. In this way, monitoring efforts and knowledge-sharing systems at different levels can be integrated and harmonized with public forest restoration policies and instruments (Evans et al. 2022). Meanwhile, *cross-scale fit* can be achieved when governance arrangements position tasks and responsibilities at the most appropriate ecological scale level. For example, by creating task-specific organizations, like biosphere reserve agencies (Holder 2016), ecoregion agencies (Mansourian et al. 2019), or water funds (Bremer et al. 2016; Wiegant et al. 2022a). Such arrangements can provide financial and institutional frameworks that are compatible with the spatial and temporal dimensions of forest restoration. Decentralizing restoration responsibilities from national to local governments or to community-level forest groups (Atela et al. 2016; Gregorio et al. 2020) is another way to restore forests at an appropriate governance level.

The wide spatial scope of national forest restoration targets and the interdisciplinary nature of restoration challenges, can make actors confused about where and how to start restoring. This can cause them to deploy “simple” solutions that focus only on one single level of governance or take one particular perspective, overestimating their ability to solve the problem (Termeer et al. 2019). An example is addressing land degradation through short-term tree planting campaigns without looking at the wider spatial, temporal, and governance context. To detect cross-level

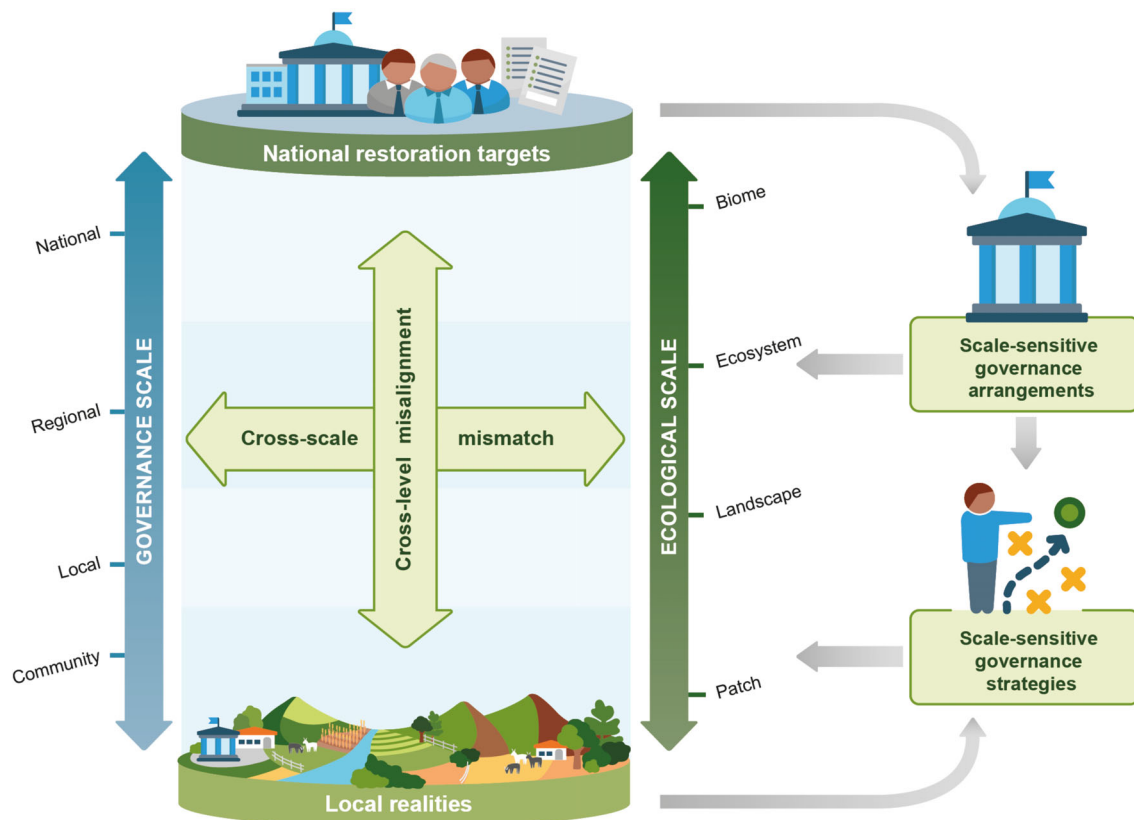


Figure 1. Scale-sensitive governance in forest restoration. The local implementation of national forest restoration targets and policies can give rise to cross-level misalignment when decision-making processes at different levels are not aligned; and to cross-scale mismatch when the temporal or spatial dimensions of governance processes and ecological processes do not fit. To overcome misalignment and mismatch, governance arrangements and strategies should be scale-sensitive, meaning that they facilitate observing and addressing interactions between governance and ecological scales and scale levels.

and cross-scale governance bottlenecks in forest restoration, it is important to conduct an assessment of how forest restoration governance arrangements at different levels have performed in the past, and how they link to restoration-relevant decisions at other levels. This can inform current and future restoration governance processes to become more “scale-sensitive”, by strengthening effective governance arrangements and strategies and adjusting those that hamper cross-level alignment and cross-scale fit (Larson et al. 2021). A thorough understanding of cross-level and cross-scale interdependencies can make actors go beyond confusion and overestimation by helping them identify governance arrangements that work best in specific landscape contexts and at different phases of the restoration process.

Understanding and addressing cross-level and cross-scale interdependencies will also require developing human capacities to detect cross-scale and cross-level bottlenecks that constrain the effectiveness of restoration efforts (Termeer & Dewulf 2014; Mansourian et al. 2022; Wiegant et al. 2022a). To this end, multidimensional training of restoration professionals is warranted to enable actors at different levels of governance to bring high-level objectives, technical knowledge, sensitivity to local conditions, and diverse objectives together (Meli et al. 2019; Stanturf et al. 2019). The urgent need to restore degraded forest ecosystems globally cannot overlook the fact

that high-level restoration objectives may not succeed if not effectively connected to the skills, knowledge, capacities, and aspirations that exist at different levels of governance.

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