

OPINION ARTICLE

Cross-scale interdependencies require attention in forest restoration

Daniel Wiegant^{1,2} , Manuel R. Guariguata³ 

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

Author contributions: DW, MRG conceptualized the manuscript; DW led the writing process; MRG co-wrote and edited the manuscript.

¹Public Administration & Policy group, Wageningen University, Hollandseweg 1, Wageningen, The Netherlands

²Address correspondence to D. Wiegant, email dawiegant@gmail.com

³Center for International Forestry Research and World Agroforestry, Av. La Molina 1895, Lima, Peru

© 2023 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 License](https://creativecommons.org/licenses/by/4.0/), which permits use, distribution and reproduction in any medium, provided the original work is properly cited.

doi: 10.1111/rec.13980

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

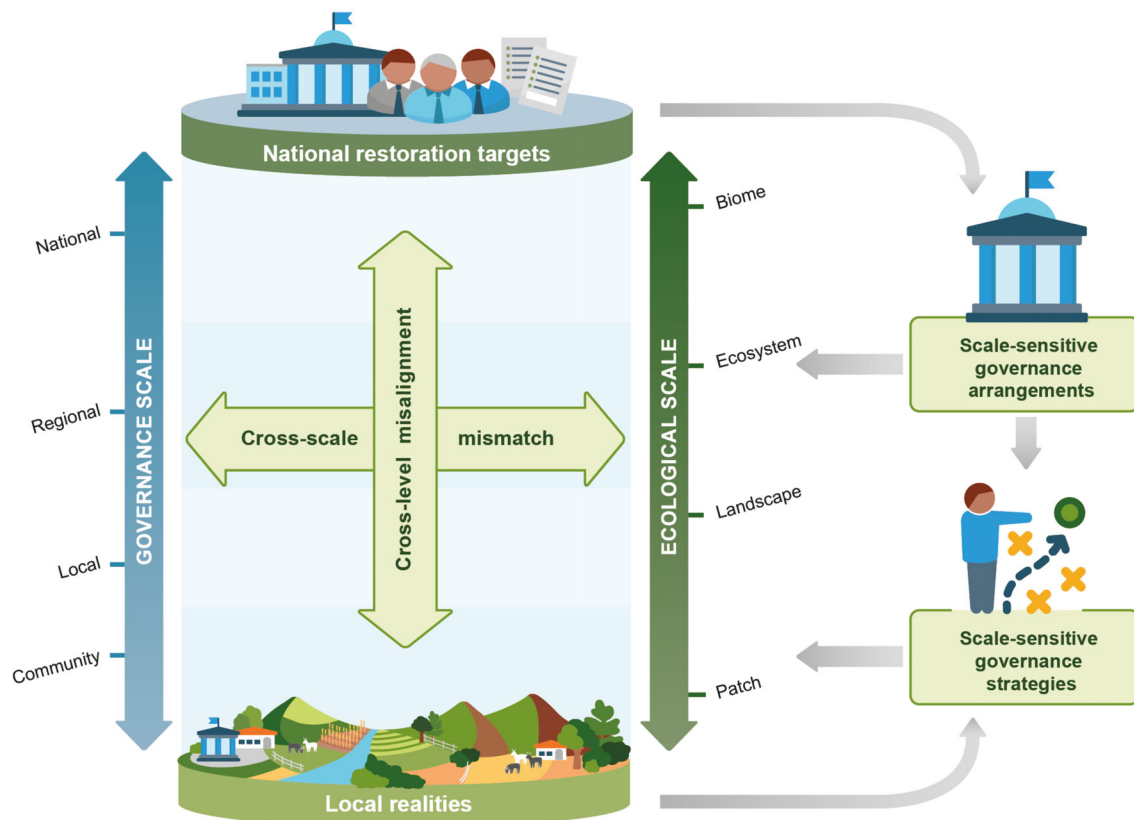


Figure 1. Scale-sensitive governance in forest restoration. The local implementation of national forest restoration targets and policies can give rise to cross-level misalignment when decision-making processes at different levels are not aligned; and to cross-scale mismatch when the temporal or spatial 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.

LITERATURE CITED

- Arts B, Buizer M, Horlings L, Ingram V, Van Oosten C, Opdam P (2017) Landscape approaches: a state-of-the-art review. *Annual Review of Environment and Resources* 42:439–463. <https://doi.org/10.1146/annurev-environ-102016-060932>
- Atela JO, Quinn CH, Minang PA, Duguma LA, Houdet JA (2016) Implementing REDD+ at the national level: stakeholder engagement and policy coherences between REDD+ rules and Kenya’s sectoral policies. *Forest Policy and Economics* 65:37–46. <https://doi.org/10.1016/j.forpol.2016.01.003>
- Bastin J-F, Finegold Y, Garcia C, Mollicone D, Rezende M, Routh D, Zohner CM, Crowther TW (2019) The global tree restoration potential. *Science* 365:76–79. <https://doi.org/10.1126/science.aax0848>
- Brançalion PHS, Niamir A, Broadbent E, Cruzeilles R, Barros FSM, Almeyda Zambrano AM, et al. (2019) Global restoration opportunities in tropical rainforest landscapes. *Science Advances* 5:eaav3223. <https://doi.org/10.1126/sciadv.aav3223>
- Bremer LL, Auerbach DA, Goldstein JH, Vogl AL, Shemie D, Kroeger T, et al. (2016) One size does not fit all: natural infrastructure investments within the Latin American Water Funds Partnership. *Ecosystem Services* 17: 217–236. <https://doi.org/10.1016/j.ecoser.2015.12.006>

- Cash DW, Adger WN, Berkes F, Garden P, Lebel L, Olsson P, Pritchard L, Young O (2006) Scale and cross-scale dynamics: governance and information in a multilevel world. *Ecology and Society* 11:8. <https://doi.org/10.5751/ES-01759-110208>
- Chazdon RL, Wilson SJ, Brondizio E, Guariguata MR, Herbohn J (2020) Key challenges for governing forest and landscape restoration across different contexts. *Land Use Policy* 104:104854. <https://doi.org/10.1016/j.landusepol.2020.104854>
- Chowdhury FI, Islam K, Feroque MA, Islam KN, Rahman MF, Arif MTA, Nath TK, Jashimuddin M (2020) Assessing the impacts of co-management on protected area landscape under socio-imagery lens: evidence from Bangladesh. *Journal of Sustainable Forestry* 41:553–572. <https://doi.org/10.1080/10549811.2020.1747497>
- Cooke SJ, Bennett JR, Jones HP (2019) We have a long way to go if we want to realize the promise of the “Decade on Ecosystem Restoration”. *Conservation Science and Practice* 1:e129. <https://doi.org/10.1111/csp2.129>
- Cumming GS, Cumming DHM, Redman CL (2006) Scale mismatches in social-ecological systems: causes, consequences, and solutions. *Ecology and Society* 11(1):14. <https://doi.org/10.5751/ES-01569-110114>
- Cumming GS, Olsson P, Chapin FS, Holling CS (2013) Resilience, experimentation, and scale mismatches in social-ecological landscapes. *Landscape Ecology* 28:1139–1150. <https://doi.org/10.1007/s10980-012-9725-4>
- Danielsen F, Eicken H, Funder M, Johnson N, Lee O, Theilade I, Argyriou D, Burgess ND (2022) Community monitoring of natural resource systems and the environment. *Annual Review of Environment and Resources* 47: 637–670. <https://doi.org/10.1146/annurev-environ-012220-022325>
- Di Sacco A, Hardwick KA, Blakesley D, Brancalion PHS, Breman E, Cecilio Rebola L, et al. (2021) Ten golden rules for reforestation to optimize carbon sequestration, biodiversity recovery and livelihood benefits. *Global Change Biology* 27:1328–1348. <https://doi.org/10.1111/gcb.15498>
- Djenontin INS, Foli S, Zulu L (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. <https://doi.org/10.3390/su10040906>
- Eicken H, Danielsen F, Sam J, Fidel M, Johnson N, Michael K, et al. (2021) Connecting top-down and bottom-up approaches in environmental observing. *BioScience* 71:467–483. <https://doi.org/10.1093/biosci/biab018>
- 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* 30:1–8. <https://doi.org/10.1111/rec.13574>
- Erbaugh JT, Oldekop JA (2018) Forest landscape restoration for livelihoods and well-being. *Current Opinion in Environmental Sustainability* 32:76–83. <https://doi.org/10.1016/j.cosust.2018.05.007>
- Evans K, Meli P, Zamora-cristales R, Schweizer D, Méndez-toribio M, Pilar AG, Guariguata MR (2022) Drivers of success in collaborative monitoring in forest landscape restoration: an indicative assessment from Latin America. *Restoration Ecology* 20:1–9. <https://doi.org/10.1111/rec.13803>
- Fagan ME, Reid JL, Holland MB, Drew JG, Zahawi RA (2020) How feasible are global forest restoration commitments? *Conservation Letters*. 13:e12700. <https://doi.org/10.1111/conl.12700>
- Fleischman F, Coleman E, Fischer H, Kashwan P, Pfeifer M, Ramprasad V, Rodriguez Solorzano C, Veldman JW (2022) Restoration prioritization must be informed by marginalized people. *Nature* 607:E5–E6. <https://doi.org/10.1038/s41586-022-04733-x>
- Folke C, Hahn T, Olsson P, Norberg J (2005) Adaptive governance of social-ecological systems. *Annual Review of Environment and Resources* 30: 441–473. <https://doi.org/10.1146/annurev.energy.30.050504.144511>
- Görg C (2007) Landscape governance. The “politics of scale” and the “natural” conditions of places. *Geoforum* 38:954–966. <https://doi.org/10.1016/j.geoforum.2007.01.004>
- Gregorio N, Herbohn J, Tripoli R, Pasa A (2020) A local initiative to achieve global forest and landscape restoration challenge: lessons learned from a community-based forest restoration project in Biliran province, Philippines. *Forests* 11:475. <https://doi.org/10.3390/f11040475>
- Harada K, Prabowo D, Aliadi A, Ichihara J, Ma H-O (2015) How can social safeguards of REDD+ function effectively conserve forests and improve local livelihoods? A case from Meru Betiri National Park, East Java, Indonesia. *Land* 4:119–139. <https://doi.org/10.3390/land4010119>
- Hoek van Dijke AJ, Herold M, Mallick K, Benedict I, Machwitz M, Schlerf M, Pranindita A, Theeuwes JJE, Bastin J-F, Teuling AJ (2022) Shifts in regional water availability due to global tree restoration. *Nature Geoscience* 15:363–368. <https://doi.org/10.1038/s41561-022-00935-0>
- Holder CD (2016) Multiscale forest governance structures within a transboundary biosphere reserve in Central America. *World Development Perspectives* 3:22–24. <https://doi.org/10.1016/j.wdp.2016.11.005>
- Hooghe L, Marks G (2003) Unraveling the central state, but how? Types of multi-level governance. *American Political Science Review* 97:233–243. <https://doi.org/10.1017/S0003055403000649>
- IPBES (2018) Summary for policymakers of the assessment report on land degradation and restoration of the Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services. IPBES secretariat, Bonn, Germany
- IPCC (2019) Summary for policymakers. In: *Climate change and land: an IPCC special report on climate change, desertification, land degradation, sustainable land management, food security, and greenhouse gas fluxes in terrestrial ecosystems*. Intergovernmental Panel on Climate Change, Geneva, Switzerland.
- IPCC (2022) Summary for policymakers. In: *Climate change 2022: mitigation of climate change*. Contribution of Working Group III to the Sixth Assessment Report of the Intergovernmental Panel on Climate Change. Cambridge University Press, Cambridge, UK and New York, USA. <https://doi.org/10.1017/9781009157940.001>
- Ladouceur E, Shackelford N, Bouazza K, Brudvig L, Bucharova A, Conradi T, et al. (2022) Knowledge sharing for shared success in the decade on ecosystem restoration. *Ecological Solutions and Evidence* 3:1–9. <https://doi.org/10.1002/2688-8319.12117>
- Larson AM, Mausch K, Bourne M, Luttrell C, Schoneveld G, Cronkleton P, et al. (2021) Hot topics in governance for forests and trees: towards a (just) transformative research agenda. *Forest Policy and Economics* 131:102567. <https://doi.org/10.1016/j.forpol.2021.102567>
- Latawiec AE, Strassburg BBN, Brancalion PHS, Rodrigues R, Gardner T (2015) Creating space for large-scale restoration in tropical agricultural landscapes. *Frontiers in Ecology and the Environment* 13:211–218. <https://doi.org/10.1890/140052>
- Mansourian S, Kleymann H, Passardi V, Winter S, Derkyi MAA, Diederichsen A, Gabay M, Pacheco P, Vallauri D, Kull CA (2022) Governments commit to forest restoration, but what does it take to restore forests? *Environmental Conservation* 49:1–9. <https://doi.org/10.1017/S037689222000340>
- Mansourian S, Parrotta J (2019) From addressing symptoms to tackling the illness: reversing forest loss and degradation. *Environmental Science & Policy* 101:262–265. <https://doi.org/10.1016/j.envsci.2019.08.007>
- Mansourian S, Walters G, Gonzales E (2019) Identifying governance problems and solutions for forest landscape restoration in protected area landscapes. *Parks* 25:83–96. <https://doi.org/10.2305/IUCN.CH.2019.PARKS-25-ISM.en>
- Marshall AR, Waite CE, Pfeifer M, Banin LF, Rakotonarivo S, Chomba S, Herbohn J, Gilmour DA, Brown M, Chazdon RL (2022) Fifteen essential science advances needed for effective restoration of the world’s forest landscapes. *Philosophical Transactions of the Royal Society: Biological Sciences* B 378:20210065. <https://doi.org/10.1098/rstb.2021.0065>
- McLain R, Guariguata M, Lawry S (2017) Implementing forest landscape restoration initiatives: tenure, governance, and equity considerations. *Forests* 8: 1–8.
- Meli P, Schweizer D, Brancalion PHS, Murcia C, Guariguata MR (2019) Multi-dimensional training among Latin America’s restoration professionals. *Restoration Ecology* 27:477–484. <https://doi.org/10.1111/rec.12933>
- Olsson P, Gunderson LH, Carpenter SR, Ryan P, Lebel L, Folke C, Holling CS (2006) Shooting the rapids: navigating transitions to adaptive governance of social-ecological systems. *Ecology and Society* 11:18. <https://doi.org/10.5751/ES-01595-110118>

- Pahl-Wostl C, Craps M, Dewulf A, Mostert E, Tabara D, Taillieu T (2007) Social learning and water resources management. *Current Opinion in Environmental Sustainability* 12:5
- Pistorius T, Freiberg H (2014) From target to implementation: perspectives for the international governance of forest landscape restoration. *Forests* 5: 482–497. <https://doi.org/10.3390/f5030482>
- Stanturf JA, Kleine M, Mansourian S, Parrotta J, Madsen P, Kant P, Burns J, Bolte A (2019) Implementing forest landscape restoration under the Bonn challenge: a systematic approach. *Annals of Forest Science* 76:50. <https://doi.org/10.1007/s13595-019-0833-z>
- Stephenson P (2013) Twenty years of multi-level governance: “Where does it come from? What is it? Where is it going?”. *Journal of European Public Policy* 20:817–837. <https://doi.org/10.1080/13501763.2013.781818>
- Strassburg BBN, Iribarrem A, Beyer HL, Cordeiro CL, Crouzeilles R, Jakovac CC, et al. (2020) Global priority areas for ecosystem restoration. *Nature* 586:724–729. <https://doi.org/10.1038/s41586-020-2784-9>
- Termeer C, Dewulf A, Van Rijswick H, Van Buuren A, Huitema D, Meijerink S, Rayner T, Wiering M (2011) The regional governance of climate adaptation: a framework for developing legitimate, effective, and resilient governance arrangements. *Climate Law* 2:159–179. <https://doi.org/10.1163/CL-2011-032>
- Termeer CJAM, Dewulf A (2014) Scale-sensitivity as a governance capability: observing, acting and enabling. Pages 344. In: Padt F, Opdam PFM, Termeer CJAM, Polman N (eds) *Scale-sensitive governance of the environment*. Wiley, Chichester, West Sussex, UK.
- Termeer CJAM, Dewulf A, Biesbroek R (2019) A critical assessment of the wicked problem concept: relevance and usefulness for policy science and practice. *Policy and Society* 38:167–179. <https://doi.org/10.1080/14494035.2019.1617971>
- UN Water (2018) *The United Nations world water development report 2018: nature-based solutions for water*. UNESCO, Paris
- UNDP (2020) *Human development report 2020: the next frontier*. In: *Human development and the Anthropocene*. United Nations Development Programme, New York, USA.
- Wiegant D, Bakx J, Flohr N, Van OP, Dewulf A (2022a) Ecuadorian water funds’ use of scale-sensitive strategies to stay on course in forest and landscape restoration governance. *Journal of Environmental Management* 311: 114850. <https://doi.org/10.1016/j.jenvman.2022.114850>
- Wiegant D, Eshetu GZ, Muluken AM, van Oel P, Dewulf A (2022b) Unravelling cross-scale and cross-level challenges in Ethiopian forest and landscape restoration governance. *Ecology and Society* 27(3):30. <https://doi.org/10.5751/ES-13478-270330>
- Wiegant D, Peralvo M, van Oel P, Dewulf A (2020) Five scale challenges in Ecuadorian forest and landscape restoration governance. *Land Use Policy* 96:104686. <https://doi.org/10.1016/j.landusepol.2020.104686>
- Wiegant D, van Oel P, Dewulf A (2022c) Scale-sensitive governance in forest and landscape restoration: a systematic review. *Regional Environmental Change* 22:25. <https://doi.org/10.1007/s10113-022-01889-0>
- Wyborn C, Evans MC (2021) Conservation needs to break free from global priority mapping. *Nature Ecology and Evolution* 5:1322–1324. <https://doi.org/10.1038/s41559-021-01540-x>

Coordinating Editor: Matthias Gross

Received: 26 April, 2023; First decision: 30 May, 2023; Revised: 26 June, 2023; Accepted: 26 June, 2023