SHERPA TRACK
Environment and Climate Sustainability Work Group (ECSWG)

Best Practice and Lessons Learned from Large-Scale Restoration Projects

A review of published literature

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[1] *This paper is a Technical Paper commissioned by the South African Department of Forestry, Fisheries, and the Environment (DFFE) to enrich and inform the discussion and deliberations of the 2025 G20 Environment and Climate Sustainability Working Group (ECSWG) during South Africa's G20 Presidency. Although the paper was subjected to various reviews by G20 Members, invited Guest Countries, and International Partners, the views, opinions, findings, and conclusions or recommendations expressed in these papers are those of the author(s) and do not necessarily reflect those of the G20 or the DFFE.*

EXECUTIVE SUMMARY

This paper synthesizes good practices and key lessons from large-scale land restoration initiatives worldwide, recognizing both the growing urgency of restoration and the complexity of scaling up from local successes. Large restoration projects offer outsized ecological and socio-economic benefits, including enhanced biodiversity, resilience, and support for multiple land uses. However, they also face significant challenges in governance, funding, technical capacity, and stakeholder coordination.

Key success factors include robust governance structures, sustained community engagement, and tailored restoration strategies that incorporate both ecological science and traditional knowledge. The paper stresses that community involvement enhances ownership of the project, conflict resolution, and long-term sustainability. It also critiques the overemphasis on tree planting, advocating for more context-specific approaches such as natural regeneration and adaptive management.

A major obstacle to success is the chronic underestimation of long-term funding needs, especially for monitoring, governance, and project maintenance. There is a need for diversified financing models, including private sector engagement and results-based funding. Lastly, the paper highlights the need for improved monitoring, particularly of socio-economic outcomes, and for greater knowledge sharing to accelerate learning across projects. Successful large-scale restoration requires strategic planning, inclusive participation, and long-term commitment.

1 INTRODUCTION

A great deal of successful restoration happens at a very local scale. However, the extent of degraded land, and the urgency with which we need to address on-going decline makes it imperative that restoration moves from the local to the landscape scale. Scaling-up not only increases the area of land being restored, but the benefits of restoration increase non-linearly with size. For this reason, large restoration projects (individually ≥ 100 hectares or collectively ≥ 10,000 hectares) have become an increasing priority.

Nevertheless, although the benefits of land restoration increase rapidly as projects get bigger, so do the challenges. Large-scale land restoration demands coordinated land use and management across broad areas, typically involving multiple stakeholders and partners. It will often be the case that these people have very different needs and aspirations for restoration of their land, along with different capacities for participation. Large-scale restoration also embraces a range of different habitats and levels and history of land degradation, each requiring its own diagnosis and treatment. This multi-layered mosaic creates new technical, financial, and institutional challenges for land managers.

Scaling-up restoration projects has, in practice, often proved complex and expensive and there is a great deal to learn from the experiences of large projects that have begun in the last two decades. Frustratingly, thorough analyses of large project successes and failures are few and far between and much of the literature is not available to practitioners and policy-makers. The aim of this review is to summarise some of those experiences, as they have been documented in the scientific literature, and distil from them important policy implications.

2 CURRENT MULTILATERAL DELIBERATIONS

At its eleventh meeting held in Hyderabad, India, in 2012, the Conference of the Parties (COP) to the Convention on Biological Diversity adopted a decision inviting relevant organizations to support the compilation and dissemination of case studies, best practices, lessons learned, and information related to the socio-economic aspects and evaluation methods of restoration projects (UNEP, 2012). This decision is a clear commitment to an evidence-based approach to restoration. By analysing past experiences, new projects can avoid repeating mistakes and adopt proven approaches more quickly. The vision is that well-documented successes and challenges inform policy frameworks, enabling supportive legislation, funding, and institutional backing.

The G20 Global Land Initiative (GLI) supports this approach. At their September 2020 meeting, the G20 Environment Ministers committed to strengthening the evidence base to guide collective action and policy development in tackling the global challenge of land degradation. The Global Initiative on Reducing Land Degradation and Enhancing Conservation of Terrestrial Habitats was launched by G20 Leaders in November 2020, during the G20 Saudi Presidency, at the Riyadh Heads of State Summit. Its aim is to support existing efforts to prevent, halt, and reverse land degradation and habitat loss and promote land restoration globally. The initiative seeks to support the G20 Leaders ambition to reduce land degradation by 50 percent by 2040 through the sharing of knowledge and best practices, capacity building, and coordination among G20 and other countries. It focuses on documenting and disseminating successful practices, fostering collaboration, and supporting sustainable land management to ensure food security, biodiversity conservation, and climate resilience.

The G20 GLI, in collaboration with its partners, is developing user-friendly and comprehensive web portals on ecosystem restoration including a Global Restoration Information Hub (https://grih.info/). This hub aims to improve access to and dissemination of documents, case studies, and capacity-building tools.

This review, supported by the G20 GLI, has been compiled in support of the mission to disseminate good practice and lessons learned from large restoration projects.

3 THE VALUE OF LARGE-SCALE RESTORATION

There are enormous social and ecological benefits of scaling up restoration projects. Large areas may better protect rare species, restricted habitats, and key ecological processes, and they will often provide sufficient space to support multiple land-uses and their associated ecosystem services.

Rare species typically inhabit a landscape as a metapopulation, or several spatially separated subpopulations that interact through migration and dispersal. If a subpopulation goes extinct, its habitat patch may be recolonized by dispersal from other patches. Larger areas contain more and larger habitat patches and this is likely to increase the number of subpopulations, which enhances the overall metapopulation stability. As a result, large, restored areas provide significantly greater resilience for the species that inhabit them.

Natural disturbances such as fires, floods, storms, or predation, play a crucial role in shaping ecosystems. They help maintain nutrient cycles, regulate species competition, and create habitat heterogeneity that supports biodiversity. In small or fragmented areas, disturbances can quickly affect the entire project or come into conflict with nearby land uses (e.g., agriculture or infrastructure). Key ecological processes, particularly disturbance processes, often require a minimum viable area to permit them to operate at their normal magnitude and frequency. After a disturbance, recovery often depends on recolonization from nearby undisturbed patches. In large areas, these source populations are more likely to be present, allowing natural regeneration and ecological succession to occur without the need for human restoration.

An iconic example of the need for large, restored areas, is the experimental re-establishment of tallgrass prairie in an abandoned field, begun in 1936 at the UW–Madison Arboretum. The experiment was one of the first to study the factors influencing the recovery of degraded land and how deliberate interventions could accelerate recovery. One of its most important conclusions was the great value in attempting restoration over large areas. It demonstrated the importance of occasional bison grazing in balancing the competition between forbs and the dominant grasses (Edwards, 1976) and the need for a large enough area to support an itinerant herd of bison.

High levels of genetic diversity within populations are generally desirable, as they help ensure long-term genetic sustainability. Since adaptability is closely linked to genetic diversity, maintaining and re-establishing this diversity should be a key focus of restoration efforts, especially in the face of environmental change (Allendorf *et al.*, 2022). Because genetic diversity tends to increase with population size, restoration strategies should aim to protect, nurture, and reconnect as many existing natural populations as possible to re-establish large, diverse, adaptable populations.

Scale enables diversity, not just ecologically, but in stakeholder objectives. If managed strategically. large restoration projects can encompass sufficient spatial heterogeneity to

support multiple land uses and ecosystem services simultaneously. This approach helps minimize conflicts among stakeholders with different priorities. It can enable different land-uses such as conservation, agriculture, tourism, or forestry to be accommodated by zoning, integrating, or sequencing uses, based on ecological suitability and stakeholder needs.

Integrated landscape management (ILM) approaches involve stakeholder collaboration to coordinate multiple land uses across a landscape in a way that supports both ecological integrity and human development. ILM assists the multiple stakeholders that use a particular landscape to understand the interconnections between their various uses of the land, identify opportunities for business development and manage potential conflicts. The rapid transformation of rangelands in Ethiopia (Aman *et al.*, 2024) showcases what can be achieved by combining innovative techniques, collaborative effort and community engagement.

4 GOVERNANCE

Good project governance is essential for all projects and becomes even more critical as their scale and complexity grow. It is essential for ensuring accountability and hence the on-going support of project sponsors. One of the main challenges in large restoration projects is sustaining funder confidence and support over the long timelines required for successful implementation.

Successful projects have well-defined decision-making structures in which roles, responsibilities, and authority levels are clearly articulated. It can take a lot of time, prior to the start of a project, to understand and build on existing governance structures, and project timescale rarely permit this to be done thoroughly (Chazdon *et al.*, 2021). In a survey of 27 large projects in the UK, Adams *et al.* (2016), found that partnerships took significant time to create and those that were successful, required resilience in the face of different organizational practices, staff turnover, and short-term funding. Experience suggests that local institutions may lack the mandate or experience to manage large restoration projects, necessitating new governance structures or partnerships. Progress with implementing the ambitious vision of the African Union's Great Green Wall Initiative varies significantly between countries, largely due to differences in governance, capacity, and institutional frameworks (UNCCD, 2020). Countries like Ethiopia and Senegal, which, at the start of the initiative, established clear national GGW agencies and action plans, saw greater implementation success. An obvious lesson-learned is the importance of creating or empowering local governance institutions that have the mandate and capacity to manage a complex project and are properly accountable for doing so.

Large projects are complex because they frequently involve multiple stakeholders, often several land-owners and sometimes several administrative jurisdictions and therefore require the reconciling of different aspirations and the agreeing of trade-offs over objectives (Holl and Brancalion, 2020). Stakeholders may have contrasting views on what constitutes

successful restoration (e.g., economic benefit versus biodiversity). Achieving consensus or cooperative action among stakeholders with different cultural, or economic backgrounds requires extensive negotiation and trust-building, which is time-consuming and resource-intensive.

Large projects may span multiple administrative boundaries, requiring coordination across municipalities, states, or even countries (i.e., Trans Frontier Conservation Areas TFCAs). This can result in differences in the legislative and policy context and variation in funding or other incentives available (Rusinga and Mapira, 2012). Approaches to resolving such difficulties will often be jurisdiction specific, but it is important to be aware of this common pitfall.

Despite the importance of good governance to restoration project success, its quality is rarely assessed as part of project monitoring and assessment (Chazdon *et al.*, 2021). An important lesson learned is that regular reviews of the effectiveness of project governance should be a standard part of project monitoring.

5 GAPS IN TECHNICAL EXPERTISE

Gastauer *et al.* (2020) examined barriers to large-scale forest restoration in the Amazon and highlighted significant knowledge gaps as being a key hurdle to scaling-up restoration. A similar barrier has been identified as constraining restoration projects in Europe (Ockendon *et al.*, 2018) and the African Union's Great Green Wall Initiative (Chevallier and Chesterman, 2022). Detailed ecological knowledge, of species' habitat requirements and barriers to their re-establishment, is invaluable in developing robust management prescriptions.

Global knowledge banks, like the GLI Global Restoration Information Hub (G20 Global Land Initiative, 2024), and libraries of good practice, such as the China–WBG Global Center for Ecological Systems and Transitions (World Bank Group, 2025), are vital for scaling land restoration. They consolidate data, case studies, and technical guidance, enabling evidence-based planning and monitoring. By sharing proven approaches, financing models, and policy frameworks, they accelerate learning across regions and reduce costly trial-and-error. These platforms foster international collaboration, align restoration efforts with global goals, and empower governments, NGOs, and communities to design context-specific, effective, and sustainable solutions for restoring degraded ecosystems at scale.

An important lesson that many technical experts have been slow to learn, is that, although not based on scientific research, many indigenous soil and water management and conservation strategies are highly effective. For example, smallholder farmers in semi-arid Kenya adopt remarkably diverse practices, explained by their naturally diverse and difficult environment and varying resource endowments of land, labour, livestock, and capital. Decades of accumulated experience and experimentation, including tried-and-tested strategies to cope with rare extreme events, demonstrate that there is considerable scope for building on indigenous resource management practices to attain sustainable livelihoods, food security, and land restoration (Tengberg and Stocking, 2019). Nevertheless, in a survey

of 75 restoration projects in Mexico, Méndez-Toribio *et al.* (2021) found that only 38% of the projects relied on collective learning from traditional management as a source of knowledge to generate techniques.

At a landscape scale, ecosystems become more heterogeneous, spanning multiple habitats, land uses, and ecological processes. Different parts of the landscape may require different restoration techniques and goals depending on the type of habitat, the level and history of degradation, and stakeholder objectives. The choice of a suitable restoration strategy requires expert ecological knowledge, and social insight (Ambrose-Oji *et al.*, 2025). A skilled project team will make the right decisions and these and can have a profound impact on the costs of the projects and its likelihood of success.

Skilled project officers play a critical role in the successful implementation of landscape-scale restoration initiatives. They can provide specialised ecological knowledge that may not be readily available to generalist land management advisors, thereby supporting more effective interventions. They can develop long-term, collaborative relationships with landowners, contractors, volunteers, partner organisations, and local communities. The trust that they can build is crucial to project success (Metcalf *et al.*, 2015). Additionally, by delivering training to, contractors, volunteers and local stakeholders and fostering local ecological knowledge, project officers significantly improve the potential for long-term restoration outcomes that extend beyond the duration of the initial project. Despite their pivotal role, experience indicates that securing funding for project officers to support scheme uptake remains considerably more challenging than obtaining resources for direct habitat management.

6 COMMUNITY ENGAGEMENT IS CRITICAL TO SUSTAINABILITY

Most restoration project failures result not from technical breakdowns, but from a lack of community involvement, appropriate governance structures, and proper negotiation of restoration objectives with local stakeholders (Ellison et al., 2020). When local communities are meaningfully involved, they are more likely to take ownership of restoration efforts. This ownership encourages long-term care and protection of restored landscapes, even after external funding or project staff leave. Communities hold rich, place-based knowledge about land use, ecology, and traditional practices that can help ensure restoration strategies are locally appropriate, culturally sensitive, and practical.

Land restoration can provide important socio-economic benefits through the creation of jobs or improving livelihoods. Engaged communities are more likely to see and share in the benefits, which strengthens support and continuation. A detailed review of 97 recent restoration projects in in Latin America and the Caribbean by Coppus *et al.* (2019) found that many land restoration projects follow a top-down approach, often overlooking the interests of local communities. Few projects, except for some of those funded by international donors, focussed on creating local jobs or improving livelihoods. Community members were

rarely involved in the planning stages and were typically engaged only during implementation.

Community engagement can help avert conflict and may enhance social cohesion. Restoration may involve changes in land use, access, or livelihood systems. If not managed inclusively, these changes can lead to conflict over resources. Engagement builds trust, transparency, and consensus, reducing the risk of disputes. Aman *et al.* (2024) described the key lessons learned from the successful Mansa Participatory Rangeland Management Cooperative project in Ethiopia. The project showed that interventions designed around community needs, coupled with active participation and representation, resulted in lasting impact. Resolving land-resource based conflicts through co-management approaches not only promoted environmental rehabilitation but also fostered peace and socio-economic wellbeing.

7 SUSTAINABLE FUNDING

One of the biggest weaknesses in large restoration projects globally, has been the underestimation of the true cost of sustaining a project over timescales sufficient to achieve success. Many projects have focussed on their establishment costs, particularly those of tree planting, and failed to make plans for long-term care and maintenance (Van Winkle *et al.*, 2025). There is often under-investment in the infrastructure and institutions that are necessary to support a major project, including the important preliminary work that must be done to build a consensus on restoration objectives. Scaling-up requires a substantial increase in financial investment, human resources and technical capacity, and these demands can be on-going after the establishment phase of the project. In a major review of forest restoration projects in Latin America, Cole *et al.* (2024) failed to find clear evidence of efficiencies of scale, and practitioners reported that substantial additional investment was needed to maintain projects over a ten-year period. Nearly all projects indicated that significant labour was involved in site preparation and maintenance.

Lack of long-term funding is one of the main reasons why so few large projects have sustained adequate monitoring and evaluation, and consequently, why there are relatively few thorough accounts of lessons learned.

Coppus et al (2019), in an analysis of 97 restoration projects in Latin American and the Caribbean, found that the funding for most large projects came from international donors. These donors typically have demanding accounting and reporting requirements and a number of major projects have lost support because they have been unable to meet these standards. The main challenge in the implementation of the Great Green Wall at the required scale and pace has been accessing funding, especially for financing projects on the ground, but also for the institutional framework required to support the GGW as well the initiatives that improve the effectiveness of finance use and allocation (UNCCD, 2020). Implementation has been constrained by fragmented financing and reliance on short-term,

project-based funding. Long-term investment and results-based finance are recommended for scale-up.

An expansion of projects on the scale necessary to meet global restoration targets will, almost certainly, far out-strip available donor funding. Scaling up of this magnitude will therefore require inputs from the private sector and is most likely to include payments for ecosystem services such as carbon sequestration, biodiversity gain and other ecosystem services (Van Winkle *et al.*, 2025). Companies increasingly understand that land degradation, biodiversity loss, and climate change pose direct risks to supply chains, especially in agriculture, forestry, and infrastructure. Restoring land is now seen not just as a moral imperative, but as a strategic investment to protect long-term business interests. The private sector, if appropriately regulated, can bring innovation, efficiency, and the ability to scale through technology, business models, and global networks. These features will be essential for implementing restoration at the speed and scale required.

8 RESTORATION STRATEGIES

A common response to the call-to-arms of the Bonn Challenge (IUCN, 2014) among governments and international non-profit organisations, has been to announce ever more ambitious tree planting targets e.g. the WEF One Trillion Trees campaign (World Economic Forum, 2020). Martin *et al.* (2021) found that the number of organizations dedicated to tree-planting has increased by 288% in the past 30 years, especially for-profit organizations. Trees are often perceived to be a panacea to land degradation problems, but not all land is suitable for trees (Holl and Brancalion, 2020, Xu, 2011, Cao *et al.*, 2011), and planting trees in naturally treeless environments can harm ecosystems by excluding native species, depleting water resources, making wildfires worse, and even exacerbating global warming (Parr *et al.*, 2024, Hasler *et al.*, 2024).

Whilst well-planned and carefully designed tree planting campaigns could play an important role in land restoration, a one-size-fits-all approach does not work in heterogeneous ecological and socio-economic contexts. Restoring land is not simply a matter of planting trees. It is a long-term process of rebuilding self-sustaining ecosystems, strengthening landscape and community resilience, and creating sustainable livelihoods.

Adaptive management of restoration projects is a very successful approach in this context (Ellison *et al.*, 2020). Management actions are treated as experiments, and outcomes are monitored to learn about the system. Plans are adjusted over time based on new knowledge or changing conditions. Long-term environmental trends, like those linked to climate change, and short-term events, such as hurricanes, can significantly affect the outcome of restoration efforts. As environmental conditions now show greater variability than in the recent past, restoration methods that once worked may no longer be reliable (Greening et al., 2023). In a highly unpredictable world, adaptive management is essential to facilitate nimble responses to change.

Adaptive management may require close monitoring of restoration success, experimental testing of novel practices, but also the implementation of knowledge gained from similar projects elsewhere. In this way, the Great Green Wall Initiative has evolved from an ecologically and socially problematic wall of trees toward a mosaic of landscapes that provide multiple benefits. Use of locally adapted and diverse restoration strategies has encouraged a more integrative development approach that aims to transform the lives of those living in the Sahel by creating a mosaic of green and productive landscapes.

Adaptive management is more challenging where for-profit restoration businesses are contracted to carry out work (Mohr and Metcalf, 2018). Businesses will usually prefer to meet contractual requirements rather than to work flexibly with unpredictable outcomes.

In addition to the dangerous hegemony of trees in restoration projects, there has been an unhelpful obsession with planting. Planting is popular because it is a very visible management action that can be easily quantified, for funding, and reported as a measure of success. Furthermore, it is easy to link the funding paid to contractors, and the incentives offered to local people, to the number of trees that they plant.

However, it is evident that planting is an expensive method of restoration, and the outcomes can be very variable. In an analysis of planting success at 176 sites across Asia, Bain *et al*. (2023) found mean mortality of planted trees was 18% one year after planting, increasing to 44% after five years. Site conditions had a big effect on survival. Mean mortality rates were 20% higher in open, degraded land than in forest sites. Relatively few restoration projects record or report long-term survival data.

Planting has often led to the creation of large, genetically uniform populations. The most commonly planted trees in a pantropical survey of 174 tree planting organizations by Martin *et al*. (2021) were a small number of commercially useful species. Many large projects struggle to source sufficient planting material (Merritt and Dixon, 2011) and utilise large quantities of genetically uniform planting stock.

Natural regeneration can, in certain environments, be more effective at achieving restoration objectives. Degraded land can retain many relics of former vegetation, including cut stumps, roots, seed banks and important soil micro-organisms, that can kick-start the restoration process. Natural regeneration is typically the most cost-effective intervention for large-scale restoration (Chazdon and Guariguata, 2016). For example, in Niger widespread use has been made of Farmer Managed Natural Regeneration (FMNR), the deliberate nurturing of trees and shrubs from tree stumps and roots. This technique has helped restore over 5 million hectares of land in Niger at low cost. Several international sponsors of large restoration projects are now alert to the value of low or minimal intervention restoration strategies and there has been a shift towards identifying the most effective strategies for each element in a landscape mosaic. One of the main discoveries from the Sow-A-Seed project in Sabah, Malaysia, (Axelsson *et al.*, 2024) is that the choice of restoration techniques and the need to plant depends on the level of degradation. Where the biological legacy of former vegetation is

poor, natural regeneration may require limited augmentation. Choi *et al.* (2024) found that the presence of invasive exotic species in a degraded US prairie caused spontaneous natural regeneration to stall, due to a potentially strong inhibitory priority effect of invasive plants.

The selection of restoration strategies should also take account of their acceptability to different landowners. In a survey of around 100 land managers in the UK, Ambrose-Oji *et al.* (2025) found that they assess risks and opportunities related to resilience, carbon sequestration, biodiversity, and land restoration differently, which influences their acceptance of various restoration approaches. Most land managers favour a hybrid strategy which combines active planting with some natural colonisation because it reduces risks and provides more predictable outcomes. It is essential to understand farmers' goals and the constraints they face in production. Subsidies and other incentives offered by restoration projects may encourage adoption of certain technologies, but if these technologies do not align with farmers' needs and priorities, their use is unlikely to be sustained.

9 MONITORING AND EVALUATION

There are two key reasons why monitoring and evaluation should be a necessary part of all large restoration projects. First, monitoring enables restoration progress to be measured against specific criteria. This is an essential component of an adaptive management system, enabling strategies to be tweaked and experiments evaluated. It is also critical to a process of collective learning; lessons can only be learned if clear records are made of successes and failures. Second, monitoring and evaluation is a vital part of providing funders with reassurance that the project is well-managed and good value for money. As the private sector becomes increasingly involved in large projects, it will be important to establish key performance indicators to ensure that restoration actions have been carried out appropriately.

The criteria of restoration success should be agreed by all stakeholders at the outset of a project. That agreement must include who is responsible for data collection, over what period and how collection is to be resourced. Larger projects often need more time to produce observable results, complicating monitoring and adaptive management. The lack of adequate undisturbed natural baselines is often given as a significant problem facing those who wish to measure restoration progress. This is only a genuine problem where the success criterion is the recreation of a near-natural community.

New technologies are transforming the monitoring and evaluation of landscape-scale restoration projects by enabling faster, more accurate, and scalable data collection and analysis (de Almeida *et al.*, 2020). These innovations, including remote sensing from drones and satellites, allow restoration efforts to be assessed over vast areas and long timeframes, overcoming many limitations of traditional field-based methods. Drones equipped with lidar, and hyperspectral sensors can capture detailed data on vegetation structure and land surface changes. This is particularly valuable for linking field data with broader satellite

observations. Machine learning has enabled the integration of large datasets, allowing predictive modelling of ecosystem services and restoration outcomes.

These technologies provide restoration practitioners with powerful tools to track progress, evaluate effectiveness, and adaptively manage large-scale restoration initiatives. However, they require expert operation, can be fragile in hostile field conditions, and the data can be expensive to collect and analyse. Monitoring programs that depend on advanced technology are vulnerable to failing funding. Consistent collection over long time periods, of data that are simple and cheap to record will often be of greater value in understanding change, than elaborate schemes that are swiftly dropped when found to be too expensive or demanding. There is a greater chance that project teams will collect long-term datasets if they have ownership of the process and feel that there is value in the analysis (Van Winkle *et al.*, 2025). It is important not to over-burden local communities with complex reporting requirements. In this regard, it will be critical that governments, civil society, and supporting organizations provide technical, financial, and institutional support to ensure that any monitoring and evaluation processes are appropriate, accessible, and equitable.

Socio-economic results of land restoration require different approaches, typically involving ground-based data collection, participatory methods, and sometimes integrated modelling with biophysical data. Whilst there are several well-established and widely used biophysical measures of recovery, there is still strong debate about what variables should be monitored to demonstrate improvements in livelihoods, wellbeing, and economic development. There would be considerable value in agreeing a standard set of socio-economic metrics that could be used by large restoration projects, to increase the comparability of data and to facilitate learning.

A systematic review of restoration monitoring (Wortley *et al.*, 2013) found that published research is still heavily skewed toward United States and Australia and that there was a dearth of papers that included any measure of socio-economic change. They found that 94% of the articles reported on ecological recovery, whilst only 3.5% reviewed socio-economic factors. Similarly, in a review of 75 Mexican restoration projects, Méndez-Toribio *et al.* (2021) found only 2% recorded data on social change. This is a critical omission, because it is important to understand if a project has been successful in addressing the drivers of degradation.

10 G20 CONSIDERATIONS AND RECOMMENDATIONS

10.1 Key Issues Identified

- **Governance gaps**: Many countries lack institutions with the mandate and capacity to manage large-scale, multi-stakeholder restoration.
- **Underestimated long-term costs**: Most projects underfund post-implementation phases, including monitoring and maintenance.

- **Over-reliance on afforestation**: Tree planting is often applied inappropriately in ecosystems where it may harm biodiversity and hydrology.
- **Inadequate community engagement**: Many projects are still top-down, limiting long-term success and local support.
- **Fragmented and short-term financing**: Restoration requires long-term investment, but funding remains sporadic and donor dependent.

10.2 Recommendations

10.2.1 Strengthen Governance and Institutional Capacity

Insight: Empower subnational institutions to lead, with technical support from central authorities.

Potential Policy Options:

- Create or enhance national restoration agencies.
- Support regional restoration planning platforms.
- Facilitate cross-border governance for Transboundary Conservation Areas.

10.2.2 Diversify Restoration Finance

Insight: Long-term funding is more critical than initial capital injections.

Potential Policy Options:

- Explore payments for ecosystem services (PES).
- Leverage green bonds and results-based finance.
- Foster public-private partnerships with restoration-linked incentives.

10.2.3 Embed Community-Centred Approaches

Insight: Community buy-in improves sustainability, reduces conflict, and unlocks local innovation.

Potential Policy Options:

- Require participatory planning frameworks.
- Fund capacity-building for community governance bodies.
- Recognize customary land rights in restoration agreements.

10.2.4 Reform Restoration Metrics

Insight: Too great a focus on tree counts; too little on biodiversity, livelihoods, or resilience.

Potential Policy Options:

- Develop a toolbox of restoration metrics that draws on international best practices while remaining adaptable to national and local contexts. This toolbox would include a range of biophysical and socio-economic indicators that countries can select and tailor according to their specific ecological, social, and economic circumstances.
- Promote long-term monitoring and evaluation protocols that are appropriate, accessible, sustainable and equitable.
- Co-invest in open-access data systems (e.g., GRIH).

10.2.5 Promote Innovation and Knowledge Exchange

Insight: Existing knowledge is underutilized; new technology can help but needs grounding in local contexts.

Potential Policy Options:

- Co-fund regional knowledge hubs on restoration.
- Support restoration "twinnings" among G20 and partner nations.
- Incentivize integration of indigenous and scientific knowledge in restoration curricula.

10.2.6 Encourage Context-Specific Restoration Strategies

Insight: No single approach suits all ecologies or social systems.

Potential Policy Options:

- Encourage adaptive management as a best practice.
- Promote farmer-managed natural regeneration (FMNR) where appropriate.
- Discourage "plant and abandon" tree planting models.

11 ACKNOWLEDGMENTS

The author received financial support from the G20 Global Land Initiative that allowed this review to be completed.

Reviewers from Germany, European Union, Italy, Mexico, Brazil, United Kingdom, Kingdom of Saudi Arabia and the World Bank are thanked for providing valuable feedback on an earlier draft.

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