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# Creating value through restoration

Literature review

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## Executive Summary

There is renewed global interest in restoration in response to growing land scarcity, imperatives to tackle environmental challenges and the resulting new business and investment opportunities arising. This literature review formed part of a thematic study to explore approaches to restoration, the evidence on the effectiveness of different restoration approaches from the literature and an assessment of selected P4F restoration initiatives, to identify potential success factors and recommendations to inform the P4F programme and wider community of practice. This thematic study relates to the Partnerships for Forests (P4F) strategic intervention area on restoration. P4F provides catalytic finance for sustainable business.

The literature review shows that globally, as a result of the accelerating global interest in the potential and need for Forest-Landscape Restoration (FLR), new business models are emerging. These include both landscape-based approaches as well as individual smallholder engagement, for example in timber contract production or contingent credit access in return for the adoption of sustainable land management practices. The latter generally avoid transferring land rights from communities to companies, but they are support implementation at scale. Privately held concessions for the restoration of degraded landscapes, involve the facilitation of multiple, high value, low intensity products involving smallholder and community suppliers. Available evidence suggests that restoration can be effective, potentially delivering multiple environmental and social benefits to smallholders, land managers, companies and governments. Despite major national and global commitments, decision-makers still tend not to fully appreciate the multiple economic values which can be derived from avoided land degradation and restoration initiatives, which calls for more communication, education and trade-off analyses.

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# 1 Key insights emerging from the Review

This section summarises the key insights arising from the literature review.

*There is need to enhance policy-maker recognition of the economic value of multi-functional landscapes and of the root causes of deforestation and land degradation as well as strengthening of restoration planning capacity*

Governments have often lacked enough appreciation of the land degradation that results from economic development processes and the associated socio-economic costs involved. Further, the root causes of land degradation and resource over-exploitation are not that well understood; whilst extreme poverty can contribute to these, when there is also a context of resource scarcity and inequality in access to resources, this is in fact rarely the main cause. Root causes tend to include, amongst others: land right disputes, inadequate market access, weak access to financial credit, inadequate research and development investment, single sector development plans which ignore other sectors and weak governance institutions. Local practices which degrade the land and responses should be understood in the context of the national policies and integration into regional and global markets.

*Global interest in forest and land restoration is intensifying because of growing land scarcity, rising global demand for food and fuel, and the need to tackle environmental challenges and reduce pressures on remaining standing forests. This enhances business opportunities in restoration enterprise.*

Because of growing land scarcity and environmental challenges, there are new business investment opportunities, leading to renewed global interest in restoration. Governments are providing incentives for restoration in many countries worldwide, companies are identifying new business opportunities and investors are seeing new investment opportunities. The potential for private-sector led approaches for improving forest outcomes and delivering multiple socio-economic benefits is firmly on the global agenda. Despite important global and country-level commitments, there is also lack of consensus on definition which is hampering efforts to assess progress on implementation.

## Box 1: Global interest in and commitments

Global commitments on restoration are now significant, because of the imperative of responding to sustainability mega-challenges, and of meeting the Sustainable Development Goals, especially SDG 15 'Protect, restore and promote sustainable use of terrestrial ecosystems, sustainably manage forests, combat desertification, and halt and reverse land degradation and halt biodiversity loss'.

Significant global commitments made on restoration are grounded in international treaties and agreements. Aichi Target 15 is the most relevant to restoration: 'By 2020, ecosystem resilience and the contribution of biodiversity to carbon stocks has been enhanced, through conservation and restoration, including restoration of at least 15 per cent of degraded ecosystems, thereby contributing to climate change mitigation and adaptation and to combating desertification'. Targets for 'hectares restored' have been agreed in the Bonn Challenge (2011) and the New York Declaration on Forests, plus the Africa focused AFR100, and the Latin America 20x20 (Stanturf et al, 2017). Aichi Target 15 does not, however, define what is meant by restoration and appropriate approaches and criteria (Chazdon et al (2015) citing Lamb, 2014; Stanturf et al, 2014; Rappaport et al, 2015). Many initiatives lack a clear reference against which progress can be measured (Wortley et al 2013).

*A shift of focus has occurred from returning ecosystems to original ecological states to the achievement of multiple social and environmental interests and goals*

The focus has generally shifted amongst many practitioners and governments from restoration viewed as returning ecosystems to their original ecological states, to those that seek the enhancement of ecological integrity, combined with social goals. Forest-Landscape Restoration approaches especially, seek to balance

multiple and competing interests in different land uses, and pragmatically seek to balance ecological restoration goals with social policy objectives.

*There are key challenges in Forest-Landscape Restoration relating to collective action, the availability of long-term financing and sustained political commitment. The accommodation of plural cultural values may also be challenging in market-oriented approaches.*

Mobilizing effective collective action amongst stakeholders is one of the key challenges within Forest-Landscape Restoration initiatives, given the behaviour changes required across diverse actors in the landscape system and the institutional and organisational capacity strengthening required. Adequate social networks for collective action at the local requires substantial support from public, private and civic actors, due to land insecurity, poverty, low education levels and limits on empowerment. The slew of landscape approaches underway provides fertile ground for learning about what combinations of interventions may have more success in delivering sustainable land use management and forest protection under what conditions. Comparisons with non-market-based approaches, or those that rely primarily upon community-owned trade which tend to lack investment and can be difficult to scale up are also needed. Other key challenges include the need for sustained political commitment to ensure that government policy levers are sufficiently supportive. There is a continuing lack of stable, long-term finance to support such transitions. In some quarters, the extent to which market-oriented approaches can accommodate the different ways local communities and indigenous groups value the forest is being questioned and merits attention. Additional challenges include the following: weak consensus on the criteria for assessing and selecting priority locations, inadequate measurement of environmental and economic outcomes of different approaches (e.g. natural regeneration compared to tree planting and a lack of quantification of multiple benefits at landscape scale represent additional challenges; capacity weaknesses in spatial prioritization of restoration approaches and outcomes for different landholders.

*Restoration approaches are not monolithic; there are distinct approaches to restoration with differing theories of change, influenced by variation in contexts and the initial status of degradation.*

Restoration approaches differ in terms of immediate objectives and scale of operation (farm or landscape level) and the value chain relations anticipated. There is a spectrum of activities which may be promoted, especially at the landscape scale, from passive restoration, i.e. actions are not taken except for ending agricultural and grazing stressors to allow natural forest regeneration to active regeneration, i.e. measures such as tree seed or seedling planting, as well as sustainable land management practices, such as soil and crop management, soil erosion control, water harvesting techniques and climate smart agriculture. The scale and context of restoration is important: widescale restoration may be selected where there are large areas for forest restoration and often in low population regions, b) areas with a mosaic of different land uses, in which tree density can be increased on farms, and agroforestry systems established, as well as introduction of improved fallow systems, creation of ecological corridors, creation of discrete areas of forests and woodlands. Thirdly, there are measures for protective land and buffers for mangrove restoration, watershed protection and erosion control.

*There is evidence of restoration activities creating benefits that outweigh the costs and generating social and livelihood benefits as well as inter-connected environmental benefits. However, there are also trade-offs between social and environmental benefits: restoring ecosystem qualities will take time during which social returns are low or in-existent, which requires specific financial systems innovations to overcome a transition period.*

The economic benefits of sustainable land management practices and / or restoration actions have been shown to exceed their costs in many places, but levels of effectiveness are context-dependent. Benefits for local farmers include livelihood improvements, ecosystem services, enhanced food, energy and water security. Companies can benefit from offsetting and compensating environmental impacts, achieving compliance with legal or certification requirements, reputational benefits, more secure and profitable product supply and avoidance of land conflicts. Governments can benefit from more functional and productive degraded lands. Costs include opportunity costs, transaction costs, and implementation costs. The land being restored will likely be unproductive for some time as investments are being made and this requires specific financial systems innovations. Available research suggests positive social outcomes can be achieved, especially where rural households are dependent upon forests for their livelihoods, including farm level benefits, such as enhanced shade or provision of fodder, wider benefits for communities from restored forests, such as an enhanced supply of timber and game, increased jobs in tree nurseries, increased social cohesion from stakeholder engagement processes, and global public goods such as biodiversity conservation, climate protection and improved water and food security etc.



Overall, Sustainable Land Management (SLM) practices, such as grazing pressure management, agroecology, conservation agriculture, and sustainable intensification, have been shown to avoid or reduce the degradation of crop- and grazing lands. Effectiveness depends upon the nature, extent and severity of existing degradation drivers and processes and the biophysical, social, economic and political contexts in question. Evidence shows that local and indigenous knowledge and community-based natural resource management systems have been effective in many regions of the world. Many SLMs generate net climate benefits, but there are risks as well: Poor implementation, such as monoculture plantation establishment in non-forest habitats or net displacement of crop production into forest areas due to rising competition for land between food and bioenergy crops, can amplify the risks of land degradation and biodiversity loss risks.

*There are remaining gaps of knowledge on restoration approaches, e.g. the effectiveness of passive and active restoration, and the irreversibility of land degradation.*

Evidence from the wider literature on ecological outcomes is fragmented, with geographical biases (e.g. limited study of African restoration initiatives, despite the forest losses experience in the region). Further, many restoration studies only cover two of the three key ecological attributes (ecosystem composition, structure and function), with just a few indicators per attribute included. Standardized measures across projects are needed to allow for an assessment of how far management activities contribute to restoration of ecological complexity and integrity in forest ecosystems and the contribution to global conservation goals. Ecological evidence comparing active restoration, such as tree planting, versus passive restoration, such as natural restoration, is inconclusive and some authors question whether the former, i.e. tree planting, which tends to be the default approach, should necessarily be chosen over and above the latter, i.e. natural restoration. The capacity of ecosystems to self-restore declines as functionality is progressively impaired and becomes increasingly expensive, ultimately passing a point at which degradation is irreversible. Hence avoiding land degradation in the first place is preferable and cheaper, but the availability of adequate incentives for producers and land / tree tenure security both require attention. Social indicators are particularly under-served in restoration assessments: more data is collected on process indicators, e.g. resource inputs, extent of community participation, but less so on differentiated socio-economic outcomes. More attention to the gendered nature of land use trade-offs and restoration initiatives will be important.

*New business models, involving landscape approaches, scaling of smallholder contract timber production or technology-enabled provision of credit to smallholders for uptake of Sustainable Land Management (SLM) measures, have yet to demonstrate their effectiveness in the delivery of multiple benefits. Trade-offs and timescales are an issue for smallholder producers in relation to restored productive services, and there are associated risks of over and early-harvesting.*

Sustainable Land Management efforts appear to have positive effects, but there are risks that poorly implemented restoration initiatives could lead to an exacerbation of degradation rather than the reverse. For example, there is considerable variation in the ecological services provided by trees. A Eucalyptus plantation may lead to greater carbon stocks, but also impoverishment of soils and reduced water infiltration to aquifers. Teak can lead to greater erosion. Pine can lead to soil acidification. In certain cases, reforestation of moorlands, can lead to the release of soil carbon and increased run-off and flooding. An increase in tree cover in a landscape will lead to a reduction in water yield for human use at least in the short-term. Single species plantations, especially if based on exotic species such as oil palm or rubber, will likely have no biodiversity benefits and possibly contribute to the loss of biodiversity. The provision of productive services requires action to ensure short-term as well as longer term benefits for sustainability, particularly for resource-poor smallholders. There are risks that smallholders perceive more incentive in cutting trees early for example in timber contract production schemes, thus undermining intended ecological objectives. Bridging finance mechanisms for smallholders with limited resources may be needed. It is essential to firstly define the services that should be restored, and then to select/design the trees species and management systems to deliver them. Practical guidance on restoration design and implementation and trade-off decision tools are emerging which could support new initiatives and projects to reveal trade-offs and support discussion on decision-making. In Forest-Landscape approaches strict conditions need to be instituted to ensure that restoration activities do not simultaneously undermine forest protection and the adoption of sustainable land management, including in neighbouring and more distant localities (leakage). Government policy-makers, especially the need to attend to the risks of leakage, as restoration in one locality can merely displace forest clearances for agriculture and other purposes to other regions, which undermines the overall achievement of global forestry goals, with closer alignment of policy levers necessary.

*Given the potential trade-offs between social, economic and environmental benefits and the importance of contextual conditions, restoration initiatives should include robust systems of monitoring to generate data and lessons for strategic decision-making and identify/mitigate risks.*

MEL should thus be integrated into project cycles, from the design phase, including testing key assumptions, such as the assumption that short-term benefits for smallholders are of adequate magnitude and tree tenure security is also strong enough such that farmers plant trees and invest in their farms. Another key assumption in Forest-Landscape Restoration initiatives, is that governance systems are sufficiently effective in landscape approaches. Measures to increase agricultural productivity can reduce pressure on remaining areas of native vegetation, but *only if* strict conditions are met, including adoption of SLM practices by farmers and protection of areas of native vegetation to prevent further expansion of agricultural lands occurring (IPBES, 2018). Tracking community participation and empowerment is also vitally important. More attention is needed as to how such systems can be established for real time monitoring of ecological indicators as well as social ones, and how they can be funded over time on a sustainable basis.

*New business models are emerging which could potentially facilitate scaling of Sustainable Land Management (SLM) measures, but there are also risks of over- or too early harvesting and disregard of gender issues.*

New forest business models are emerging which are seen as a growing investment opportunity for the private sector. They aim to overcome smallholder constraints on adoption, which have been so challenging in sub-Saharan Africa, leading to low adoption levels and scaling up issues. Crucially, these models aim to change behaviour and deliver benefits to smallholders *at scale*. The new business models are not all new, range in scale and have diverse target markets from middle class consumers to large financial institutions. Many use technologies to facilitate restoration, reducing costs and improving efficiency. A proportion sell products based on the origin restoration 'story' to consumers. Beyond traditional commercial forestry involving plantation establishment, a new model being promoted is distributed plantations, in which companies aggregate supply through trees grown by smallholders on farmer's land, as well as other models such as bamboo plantations and mixed species plantations. The extent to which the new approaches will be effective in changing smallholder behaviour and achieving social and environmental outcomes requires attention in design, as well as monitoring and evaluation, because there are potential risks include early cutting of planted trees, as well as potential gender risks, where project designs insufficiently address prevailing gender inequalities, e.g. in household gender division of labour, and access to resources and control of income, particularly where commercialisation processes are occurring in agricultural production.

*Potential success factors for Forest-Landscape restoration have been identified from emerging experience, including a set of enabling environment conditions and programme design and implementation features. It is highly relevant to consider restoration initiatives as part of a landscape approach, integrated with Produce-Protect initiatives as well as EC measures, to make the enabling context more conducive, although we note that P4F initiatives are also viewed by the programme as a way of demonstrating success and using this to build political support over time for wider changes in enabling conditions.*

Probable success factors which can be distilled from the literature relate to enabling conditions and specific design features, of which the following is a summary - more details are provided in Tables 2A and 2B below, and guidance documentation in Table 3.

- Enabling conditions: supportive policies; clear and secure tenure rights, effective laws and law enforcement; empowered local and indigenous communities; sustained political commitment.
- Design and implementation features: flexibility to cope with changing conditions; working at the landscape scale; long-term strategies, short-term benefits focus and exit strategies; facilitation of high-quality stakeholder participation, strengthening of local governance structures, enhanced efforts to accommodate plural cultural values and strengthening of the capacity of all landscape actors (civic, government, private sector); selection of socially and ecologically appropriate restoration opportunities, techniques and infrastructure; use of appropriate tree seeds and species; recognition of the complementarity of restoration and protection approaches in the landscape; creating effective incentive systems.

Some landscape initiatives seek to improve the enabling conditions as part of the Forest-Landscape Restoration initiative, this includes many of the P4F projects on restoration in landscapes. However, questions remain about how effective interventions are, and in some cases, there are gaps, with respect to issues such as tenure rights and law enforcement. Landscape level forest restoration initiatives are relatively new, and more evidence will be needed on their ecological effectiveness and the extent to which they can deliver equitable outcomes. They involve a complex balancing of diverse land uses in a mosaic arrangement.



It is worth emphasising the complementarity of restoration and Produce-Protect approaches in landscape initiatives. Avoiding the further reduction of natural forest cover should be a goal in FLR, by addressing the on-going loss and conversion of primary and secondary natural forest and ensuring that newly reforested areas and farms will also be sustained. There is a clear linkage here to Produce-Protect approaches, as well as more traditional public and community-based forest protection approaches. Evidence of effectiveness of Produce-Protect mechanisms is limited and there are risks of exacerbating degradation as a result of increased agricultural intensification.

**Table 2A: Supportive Enabling Environment Features for Forest-Landscape Restoration (FLR) initiatives**

Enabling environment	
Supportive Policies	Coordinated use of diverse policy instruments and responses at different levels. Communication of the ‘restoration case’ and successes at all levels to levels to build support, but also transparent sharing of under-achievements and failures. Coordination between sectors and ministries with responsibility for land and natural resources, including integration of agriculture and environmental policies, and bridge building (e.g. between government functions and stakeholder group). Regional policies also need to be aligned to avoid displacement of land uses where environmental enforcement is weaker.
Clear and secure tenure rights	Land tenure arrangements strongly influence stakeholder incentives for restoration. Recognize the full diversity of stakeholders that may exist in a single landscape and identify divergences in interests and values. Insecure land / tree rights undermine farmers’ willingness to invest in restoration, as they cannot be sure they will capture the benefits. FLR under common property regimes is more challenging than in private land title and corporate concession contexts. Restoration initiatives should seek to enhance and regulate community land rights, without changing prevailing customary tenure systems or transferring rights away from communities to companies. The process of strengthening community land rights can also enhance community engagement in FLR.
Effective laws and law enforcement	Effective law enforcement is needed to ensure that areas under restoration are protected. Identify potential avenues for strengthening law enforcement systems.
Local and indigenous communities are empowered	Local and indigenous communities need to be sufficiently organised and empowered to benefit from restoration activities e.g. they have bargaining power to achieve fair value chains with corporate partners, and they can participate and have voice in landscape decision-making, which may require governance innovations and special measures to facilitate representation of the values of indigenous communities, particularly for the most marginal social groups.
Sustained political commitment and champions	Champions are required to inspire politicians and other decision-makers to support restoration approaches. Political commitment must be sustained over the long-term to protect newly restoring and restored forests.

**Table 2B: Design & Implementation Features**

<p>Flexibility to respond to changing conditions</p>	<p>Tailor restoration initiatives to local conditions, including ecological, socio-economic, cultural and political context, as conditions change over time. Flexibility in governance arrangements is needed, because climate change many render long-established land management / restoration practices unviable. New land uses, landscape status, restoration needs, and social actors may also emerge over time. Adopt an adaptive management approach: Enabling learning from high quality monitoring and research to identify / implement adjustments as environmental conditions, human knowledge and societal values change. MEL systems require sustainable, adequate financing to enable surveillance (identifying undesirable changes so they can be stopped), checking management implementation follows agreed plans and contracts, effectiveness of management implementation in achieving desired goals and social and ecological benefits, trade-offs and unintended consequences. Tree planting initiatives should be monitored, not only for hectares planted and seedling survival rates, but also genetic diversity levels. Remote sensing, mobile applications, open access data and decision-support platforms exist. Decision-support tools tend to focus on biophysical aspects, but more integrated tools are being developed combining socio- ecological dimensions. Baselines are needed to establish progress. Community participation is essential in monitoring, including in knowledge creation/sharing. MEL is also necessary for companies making claims about land investments<sup>1</sup>.</p>
<p>Working at the landscape scale with a landscape vision</p>	<p>Consider and restore entire landscapes, not just individual sites, which often entails balancing a mosaic of inter-dependent land uses. Smaller-scale interventions should be coherent with landscape-scale objectives. Landscape vision is an important leading indicator of mindset shifts (part of the capacity changes needed for successful restoration). However, this landscape vision and capabilities also need to be made concrete, for example by including in restoration actor contracts and agreements.</p>
<p>Understand and address key trade-offs. Adopt long-term strategies, but consider short-term benefits and have an exit strategy</p>	<p>Forest-Landscape restoration is inherently a long-term process, requiring long-term commitments and strategies, underpinned by appropriate, long-term financing mechanisms. Successive phases of landscape initiatives can be funded and implemented, building up an initiative into a comprehensive programme. Lead organisations need to ensure short-term benefits to change landscape actor behaviours (smallholders and larger land owners, companies, governments) and longer-term sustainability, including building-in proper exit strategies. Use decision-support tools to identify key trades and to prioritize the key ecosystem services to be restored. This analysis should ensure a clear focus on delivering short term benefits for producers or bridging finance mechanisms and keep in view multiple cultural valuations of forest resources.</p>
<p>Facilitation of high-quality stakeholder participation, strengthening of local governance structures, enhanced efforts to accommodate plural cultural values, and capacity strengthening of all landscape actors</p>	<p>FLR success is predicated upon multi-stakeholder participation in identifying restoration goals and implementation. Local governance systems require strengthening so more stakeholders can participate in decision-making to balance competing interests and values. Capacity strengthening is needed amongst all landscape actors (governmental, civic and private sector). National level decision-makers need a better appreciation of the economic value of multi-functional landscapes. Landscape participatory planning / coordination is needed, but beyond individual and organisational capacity strengthening, new institutional spaces are required for decision-making. Formal multi-stakeholder dialogues and platforms have tended to take centre-stage, but broader trust and social capital building is also important. The extent to which stakeholder</p>

<sup>1</sup> Possible ecological indicators for FLR monitoring are: Extent of forest cover; Compositional and structural diversity; Carbon storage in various above ground and below ground components; Surface water yield and quality; Groundwater recharge and quality; Groundwater recharge and quality; Biodiversity (flora and fauna); Key flora and fauna habitats; Recreational opportunities; Non-timber forest products; Jobs; Household income; Food security. Ecological indicators are grouped under functional diversity, composition and structural diversity. (ROMA tool, ref).

**Table 2B: Design & Implementation Features**

processes in landscape initiatives can facilitate dialogue, shared understanding, collaboration and trust, rather than adversarial negotiation and elite capture of benefits in contexts of power asymmetries remains to be seen. Land users, land owners and downstream communities all have a role in landscape governance processes. Customary leaders and local authorities should be fully engaged, but ownership is not always clear and support for *within* community dialogues and bargaining and community legal empowerment may be advisable. Affirmative measures can help ensure the active participation and influence of more marginal actors in FLR processes: Local and indigenous knowledge can be sidelined in negotiation processes by scientific and technical expertise, constraining local land user agency. Such processes can struggle to accommodate the spiritual and cultural importance of forests to local communities, and this requires greater attention in FLR approaches. FLR social outcomes should be explored and evaluated from a development perspective, not only from an instrumental corporate perspective. Freedom of choice and action is relevant in this regard.

Selection of socially and ecologically appropriate restoration opportunities, techniques and infrastructure in design processes.

There is a raft of new, practical guidance available to guide restoration initiatives from guidance for national planning processes and the identification of appropriate, specific restoration landscape opportunities and the development of detailed project designs. FLR initiatives should fit ecological conditions, but also local preferences and consideration of the cost- effectiveness for local land users. In the design process, a wide range of eligible technical strategies for restoring trees in the landscape should be considered, ranging from natural regeneration to tree planting. They should also include education on the negative effects of resource depletion and ecosystem degradation, as well as positive incentive measures for local land users (e.g. to support tree planting and SLM measures), as well as Produce-Protect measures. New decision-tools, such as the SI Toolkit could be helpful<sup>2</sup>, as well as dedicated manuals and guidance on FLR: See table 3 below.

Use of appropriate tree seeds and species and effective restoration advisory and extension services

Planting of unsuitable tree seeds or seedlings has undone many previous restoration efforts. Species and seed sources must be suited to local site conditions and sufficiently genetically diverse to be self-sustaining, even as environmental conditions change. As well as the right combination of native species, it is important that well-adapted, diverse seeds sources *within species* are found, i.e. adequate in-species diversity. This requires collecting seed from enough trees per population of each species and measures to avoid loss of diversity in nursery practices, such as retaining slower growing or smaller seedlings. Delivery systems for such diverse, adapted and high-quality tree seeds and planting material are weak and require long-term planning and support for scaling. Key steps for ecological success in restoration initiatives are: a) Defining objectives, identifying planting locations and sources of planting material. For the latter, it is necessary to determine seed collection zones for target species based on ecological classification or field trial results to ensure planting material can be matched to planting sites; b) Collection of seeds from large, healthy, diverse populations of target species must be planned and carried out with ample time to collect when seed production is high and to grow seedlings in local nurseries; c) Setting up tree nurseries (new local nurseries may be needed to produce enough volume of native tree seedlings); d) Managing planting stock, planting, and monitoring. Local specialists generating knowledge on how to restore lands effectively, tailored to local context, are important, as are effective advisory and extension services which can support effective restoration. The latter need to be adequately gender-sensitive. Access to strong land tenure is vital for smallholders in encouraging them to invest in sustainable land management practices, including natural regeneration as well as tree planting.

<sup>2</sup> <https://sitoolkit.com/how-to-use-the-assessment-framework>

**Table 2B: Design & Implementation Features**

<p>Creating effective governance systems and incentive and disincentive systems</p>	<p>Changing behaviour requires, <i>inter alia</i>, appropriate and effective incentives and disincentives for restoration appropriate to different stakeholder groups and outweighing negative incentives. <u>Market-based approaches</u> include credit lines, insurance policies, and future contracts that reward adoption of more sustainable land management practices, payments for ecosystem services and conservation tenders, biodiversity offsets, and farm subsidies. One model sees forest-product value chains motivating restoration and protecting remaining pockets of standing forest, but this requires a sufficiently strong business case both for companies and for smallholders and harvesters (benefits/fair value chain relations). Institutional capacity and context-specific governance mechanisms are needed for these to be successful. Eliminating perverse incentives (e.g. subsidies for unsustainable land use and production) and establishing positive incentives for sustainable land management is very important (e.g. strengthening regulations to internalize the costs of unsustainable land use and production in prices). Policies may be needed that legally oblige landholders to initiate and track restoration on private lands. <u>Non-market-based approaches</u> include joint mitigation and adaptation mechanisms, justice-based initiatives, and ecosystem-based adaptation and integrated water co-management schemes. Effective governance systems will be needed in Forest-Landscape Restoration approaches – see the Produce-Protect Thematic Study for more details. Fair value chain relations are important to ensure that new business models are not exploitative, leading to adverse terms of smallholder and community incorporation into global value chains. New innovations using blockchain for transparent, smart contracts between ethical buyers, forestry companies and producers could be considered.</p>
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**Table 3: Emerging Forest Landscape Restoration Guidance**

FLR Guidance	Description	Target Audience
Restoration Opportunity Assessment Methodology (ROAM) <sup>3</sup>	Primarily to support broad national planning processes, including building a shared understanding of restoration and the value of multi-functional landscapes amongst decision-makers and land managers, and rapid identification of restoration opportunities at national and sub-national levels.	Government policy makers, planners and land managers.
Forest Landscape Assessment Tool (FLAT) <sup>4</sup>	Primarily focused on ecological assessment of baseline conditions and the identification of potential threats to forest ecosystems and restoration needs.	Planners and managers
Implementing Forest Landscape Restoration: A Practitioner's Guide	Practical guidance on how to deal with the complex realities, account for uncertainties and unexpected changes in the project environment and to develop a consistent strategy for implementation at different scales (From global restoration goal setting, to national level priorities and landscape opportunities and detailed project planning – the latter being the most critical scale for assessing baseline conditions, holding stakeholder consultations on specific objectives, developing operational planning, monitoring progress and adjusting for subsequent project interventions.	Practitioners & facilitators working in a local context to restore a specific landscape. Policymakers / practitioners considering FLR commitments to gain an understanding of the complexities of actual implementation
World Resources Institute analytical framework and landscape restoration diagnostic	Based on a review of historical experience, the WRI have designed a stand-alone tool, as a component of the ROAM methodology. There are 3 key steps in which users define the scope or geographic boundary, conduct an assessment to identify if key success factors are in place. Users identify which policies, incentives, and practices would address the missing factors.	For use by mid-level managers, and analysts supporting such managers. Relevant government agencies are a key user group. NGOs, landowners and companies can use the tool as well. Companies with responsibilities for restoration in post-extraction contexts can use this as a diagnostic tool.

<sup>3</sup> <http://www.bonncallenge.org/content/restoration-opportunities-assessment-methodology-roam> (IUCN/WRI 2014).

<sup>4</sup> <https://www.treesearch.fs.fed.us/pubs/53245>



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# Bibliography

Besseau, P., S. Graham, T. Christophersen (eds. 2018) *'Restoring forests and landscapes: the key to a sustainable future'*. Global Partnership on Forest and Landscape Restoration, Vienna, Austria. ISBN No: 978-3-902762-97-9

Biodiversity International (2015) *'Safeguarding investments in forest ecosystem restoration: Policy Brief'*. [https://www.biodiversityinternational.org/fileadmin/user\\_upload/Policy\\_Brief\\_Restoration\\_Safeguarding\\_investments\\_2017.pdf](https://www.biodiversityinternational.org/fileadmin/user_upload/Policy_Brief_Restoration_Safeguarding_investments_2017.pdf)

Chazdon and Uriarte (2016) *'Incorporating natural regeneration in forest landscape restoration in tropical regions: synthesis and key research gaps.'* *Biotropica* 48 (6); 915-924.

Chazdon, R. L., P. H.S. Brancalion, D. Lamb, L. Laestadius, M. Calmon, C. Kumar (2015) *'A Policy-Driven Knowledge Agenda for Global Forest and Landscape Restoration'* *Conservation Letters*, 10, 125-132.

Cheyns, e., P.M. Aubert and L. Castanada-Silva (2019) *'Missing the forest for the data? Conflicting valuations of the forest and cultivable lands.'* *Land Use Policy*. 10.1016/j.landusepol.2018.08.042

Ciecko, L., D. Kimmett, J. Saunders, R. Katz; K.L. Wolf; O. Bazinet; J. Richardson; W. Brinkley; D.J. Blahna (2016) *'Forest Landscape Assessment Tool or FLAT'*. <https://www.treeseearch.fs.fed.us/pubs/53245>.

Crouzeilles, R., M. S. Ferreira, R. L. Chazdon, D. B. Lindenmayer, J. B.B. Sansevero, L. Monteiro, A. Iribarrem, A. E. Latawiec, B. B.N. Strassburg (2017) *'Ecological restoration success is higher for natural regeneration than for active restoration in tropical forests.'* *Applied Ecology, Sci. Adv.* 2017;3: e1701345

De Graaf et al, (2018) *'Factors influencing adoption and continued use of long-term soil and water conservation measures in five developing countries.'* J. de Graaff, A. Amsalu, F. Bodna, A. Kessler, H. Posthumus, A. Tenge. *Applied Geography* 28 (2008) 271 – 280.

Ding, H., S. Faruqi, A. Wu, J.C. Altamirano, A. Anchondo Ortega, M. Verdone, R. Zamora Cristales, R. Chazdon and W. Vergara (x) *'Roots of Prosperity. The economics and finance of restoring land'*. World Resources Institute.

Djenontin, I.A., S. Foli, L. Zulu (2018) *'Revising the Factors Shaping Outcomes for Forest and Landscape Restoration in Sub-Saharan Africa: A Way Forward for Policy, Practice and Research'*. *Sustainability*. 10 (4): 906.

FAO and UNCCD (2015) *'Sustainable financing for forest landscape restoration: Opportunities, Challenges and the Way Forward'*.

Farugi, S. and F. Landsberg (2017) *'Attracting private investment to landscape restoration: A roadmap'*. WRI 2017.

Farugi, S., A. Wu, E. Brolis, A. Anchondo Ortega, A. Batista (2018) *'The Business of Planting Trees: A Growing Investment Opportunity'*. World Resources Institute and the Nature Conservancy.

FSC's Contribution to Forest Restoration (2017).

Gatica-Saveedra P, C. Echeverria, C. R. Nelson *et al*, (2017) *'Ecological indicators for assessing ecological success of forest restoration: A world review'*. Vol. 25, No. 6, pp. 850–857

Hanson, C. K. Buckingham, S. Dewitt, L. Laestadius (2015) *'The restoration diagnostic: A method for developing forest-landscape restoration strategies by rapidly assessing the status of key success factors.'* IUCN. World Resources Institute.

Hutto, R.L. and R. T. Belote (2013) 'Distinguishing four types of monitoring based on the questions they address'.

Intergovernmental Science-Policy Platform on Biodiversity and Ecosystems Services (IPBES) (2018) *'Summary for policymakers of the thematic assessment report on land degradation and restoration'*.

IUCN/WRI (2014) 'Restoration Opportunity Assessment Methodology or ROAM'. Available at: <http://www.bonnchallenge.org/content/restoration-opportunities-assessment-methodology-roam>

IUCN/WRI (2014) 'Restoration Opportunity Assessment Methodology' (ROAM) <http://www.bonnchallenge.org/content/restoration-opportunities-assessment-methodology-roam>

Mansourian, S. and N. Dudley (2017) *'Challenges for Forest Landscape Restoration Based on WWF's experience to date'*.

Mansourian, S., A. Razafimahatratra, D. Vallauri (2018) 'Experiences in Forest Landscape Restoration: Lessons learnt from 13 years in restoration of a moist tropical forest: The Fandriana-Marolambo Landscape in Madagascar'. WWF.

McLain, R., M. R. Guariguata, S. Lawry (2017) 'Implementing Forest Landscape Restoration Initiatives: Tenure, Governance and Equity Considerations'.

Morrison, E.B., and C.A. Lindell (2010) 'Active or Passive Forest Restoration? Assessing Restoration Alternatives with Avian Foraging Behavior'.

Newton, A.C., R.F. del Castillo, C. Echeverria, D. Geneletti, M. Gonzalez-Espinosa, L.R. Malizia, A.C. Premoli, J.M. Rey Benayas, C. Smith-Ramirez, and G. Williams-Linera (2012) 'Forest Landscape Restoration in the drylands of Latin America' (2012) *Ecology and Society* 17 (1): 21. <http://dx.doi.org/10.5751/ES-04572-170121>

Reid, J.L., M.E. Fagan, R.A. Zahawi, (2018) *'Positive site selection bias in meta-analyses comparing natural regeneration to active forest restoration'*. Applied Ecology. Scientific Adv. 2018: 4.

Reji, C. and R. Winterbottom (2015) 'Scaling Up Regreening: Six Steps to Success: A Practical Approach to Forest and Landscape'.

Restoration Ecology. Vol. 21, No. 5, pp. 537-543.

Stanturf, J., S. Mansourian, M. Kleine, eds. (2017) 'Implementing Forest Landscape Restoration, A Practitioner's Guide'. International Union of Forest Research Organizations, Special Programme for Development of Capacities (IUFRO-SPDC). Vienna, Austria. 128 p

Stickler, C., A. Duchelle, J. P. Ardila, D. Nepstad, O. David, C. Chan, J. G. Rojas, R. Vargas, T. Bezerra, L. Pritchard, J. Simmons, J. Durbin, G. Simonet, S. Peteru, M. Komalasari, M. DiGiana, M. Warren (2018) 'The state of jurisdictional sustainability: Synthesis for practitioners and policy-makers'.

Vergara, W., L. Gallardo Lomeli, A. R. Rios, P. Isbell, S. Prager, R. De Camino (2016) 'The Economic Case for Landscape Restoration in Latin America'. World Resources Institute.

Wortley, L., J.M. Hero and M. Howes (2013) 'Evaluating Ecological Restoration Success: A Review of the Literature'.

