# A Companion to the Short-Term Action Plan on Ecosystem Restoration

## RESOURCES, CASES STUDIES, AND BIODIVERSITY CONSIDERATIONS IN THE CONTEXT OF RESTORATION SCIENCE AND PRACTICE

Convention on Biological Diversity

FERI

SER SOCIETY FOR ECOLOGICAL RESTORATION

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## Contributors

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The STAPER Companion is a collaborative effort between **The Forest Ecosystem Restoration Initiative (FERI) and the Society for Ecological Restoration (SER)**. The content of the resources sections received contributions from members of the Collaborative Partnership on Forests (CPF) and the Global Partnership on Forest and Landscape Restoration (GPFLR). Thousands of other organisations work globally in the fields of ecosystem restoration, ecological restoration, Forest and Landscape Restoration and related fields. The resources they provide can be submitted for inclusion to the online version of the STAPER companion at this link:
www.ser-rrc.org/resource-database/submit-a-resource

The FERI is supported by the Korea Forest Service of the Republic of Korea and implemented by the Secretariat of the Convention on Biological Diversity (CBD). It supports developing country Parties as they develop and operationalize national targets and plans for ecosystem conservation and restoration within the framework of the Strategic Plan for Biodiversity 2011-2020 and its Aichi Biodiversity Targets, especially Targets 5, 14 and 15. The FERI funds restoration projects in 13 countries around the world, some of which are featured in this document. It also organizes regional capacity-building workshops and generates knowledge products on ecosystem restoration. The Secretariat of the CBD is a member of the GPFLR.

SER is the leading international organization working on the science, practice, and policy of ecological restoration, with members in 70 countries. SER advances ecological restoration to sustain biodiversity, improve resilience in a changing climate, and re-establish an ecologically healthy relationship between nature and culture. Via its members, publications, conferences, policy work, and outreach, SER defines and delivers excellence in the fields of ecological restoration science and practice. SER is also a member of the GPFLR.

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***Cover Photo Credit:*** *Community-led restoration activities in the old-growth oak forests of Bhutan, implemented by UWICER with funding from the Forest Ecosystem Restoration Initiative - Credit: Tshewang Norbu.*

***Back-Cover Photo Credit:*** *Antanamboa Gavo bridge, buffer zone of the Rainforests of Atsinanana national park, a UNESCO World Heritage Site where Madagascar National Parks is assessing options for the restoration of degraded areas with funding from the FERI. Credits: Association Vahatra.*



*Community consultation on restoration af old-growth oak forests of Bhutan, implemented by UWICER with funding from the Forest Ecosystem Restoration Initiative - Credit: Tshewang Norbu.*

## Introduction

Unsustainable production and consumption patterns in human societies have led to widespread degradation of natural ecosystems. This degradation reduces habitat suitability for many species and is the leading cause of biodiversity loss. Furthermore, degradation of ecosystems also leads to a loss or decline in the services they provide, which has significant impacts on human societies.

The important role of ecosystem restoration in achieving positive economic, ecological, and social outcomes is inscribed into many international agreements and global objectives, including, but not limited to the Strategic Plan for Biodiversity 2011-2020, Aichi Biodiversity Targets (specifically Target 15), ambitious policy platforms such as the Bonn Challenge and the New York Declaration on Forests, and the United Nations 2030 Sustainable Development Goal 15 ‘Life on land’. Most recently, the United Nations General Assembly declared 2021

*Community-led restoration activities in the old-growth oak forests of Bhutan, implemented by UWICER with funding from the Forest Ecosystem Restoration Initiative - Credit: Tshewang Norbu.*

## The Short-term Action Plan on Ecosystem Restoration

Recognizing the extraordinary opportunity that ecosystem restoration creates for addressing ecological, economic, and social issues, the United Nations Convention on Biological Diversity (CBD) adopted at its 13th Conference of the Parties (COP13) in 2016 in Cancun, Mexico, a Short-Term Action Plan on Ecosystem Restoration (STAPER).

The STAPER is implemented on a voluntary basis and provides step-by-step guidance to support governments in the development and implementation of their national restoration strategies.
The STAPER is based on four main groups of activities and 24 steps. The activities listed in the Plan operate as "a menu of options, and can be implemented by countries and governmental bodies, in collaboration with international, national and local organizations, and in accordance with national legislation, circumstances and priorities". The four main groups of activities are:

**A** **Assessment of opportunities for ecosystem restoration**

**B** **Improving the institutional enabling environment for ecosystem restoration**

**C** **Planning and implementation of ecosystem restoration activities**

**D** **Monitoring, evaluation, feedback and disseminating results**

The purpose of the **STAPER** is to promote restoration as "a contribution to reversing the loss of biodiversity, recovering connectivity, improving ecosystem resilience […] and improving human well-being while reducing environmental risks and scarcities." Restoration is therefore understood as an opportunity not just to mitigate and reverse human impacts on the environment, but also one that, when applied at scale, can create net economic and social benefits.

## A tool to unpack the STAPER and support its implementation

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The present document is intended as an introduction and guide to the broader collection of resources available on the online portal: **www.feri-biodiversity.org/staper**.

In addition to the original text from the STAPER, for each of the four groups of activities, the portal provide access to:

- A synthesis of relevant considerations from restoration science and practice, developed from a literature search in conjunction with expert opinion and knowledge from the Society for Ecological Restoration (SER)
- A selection of resources and tools provided by member organizations of the Collaborative Partnership on Forests (CPF), the Global Partnership on Forest and Landscape Restoration (GPFLR), and others.
- Links to SER's Restoration Resource Center, where further resources and tools can be consulted, as well as restoration projects relevant under the various activities of the Plan.

# Restoration terminology helper – a review of key concepts and their relationship with the objectives of the with the objectives of the CBD

The term "restoration" can mean different things in different contexts. This glossary considers these nuances by introducing several key concepts related to restoration and explaining how they intersect and differ.

**Restoration** – The Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services has defined restoration as "any intentional activity that initiates or accelerates the recovery of an ecosystem from a degraded state." This definition covers all forms and intensities of the degradation state and in this sense, is inclusive of the definition adopted by the Society for Ecological Restoration (below).

The term restoration itself does not have a widely agreed upon definition and can be used to mean wide variety of activities, not necessarily compatible with each other.

**Ecological restoration** is defined by the Society for Ecological Restoration (SER) as "the process of assisting the recovery of an ecosystem that has been degraded, damaged or destroyed". Ecological restoration uses the concept of a "native reference ecosystem" as a model for setting and evaluating restoration objectives. This reference model, derived from multiple sources of information, aims to characterize the condition of the ecosystem as it would be had it not been degraded, adjusted as necessary to accommodate changed or predicted change in biotic or environmental conditions, such as increases in temperature or variation in precipitation patterns caused by climate change. The reference model includes information on the community of organisms (flora and fauna) and abiotic components (non-living chemical and physical components of the environment) as well as ecosystem structure, functions, and relationships with the surrounding landscape. Ecological restoration is a process aimed at recovering ecosystem integrity and resilience, while delivering ecosystem services and insuring human well-being. The conservation and restoration of biological diversity is usually a primary goal.

**Ecosystem restoration** is a term often used interchangeably with ecological restoration, but ecological restoration always addresses biodiversity conservation, while some approaches to ecosystem restoration may focus solely on the delivery of ecosystem services. The STAPER includes the following guiding principles for ecosystem restoration: (1) ecosystem restoration is a complement to conservation activities, and provides multiple benefits both inside and outside of protected areas; (2) ecosystem restoration activities should be consistent with the provisions of the Convention; and, (3) ecosystem restoration activities should be planned at various scales and implemented using the best available science and traditional knowledge.

**Forest (and) Landscape Restoration (FLR)** – This concept emerged in 2000 and has since gained policy relevance, reflected by the adoption of the Bonn Challenge. The Global Partnership on Forest and Landscape Restoration (GPFLR) defines FLR as "a process that aims to regain ecological functionality and enhance human well-being in deforested or degraded landscapes. FLR is not an end in itself, but a means of regaining, improving, and maintaining vital ecological and social functions, in the long-term leading to more resilient and sustainable landscapes."

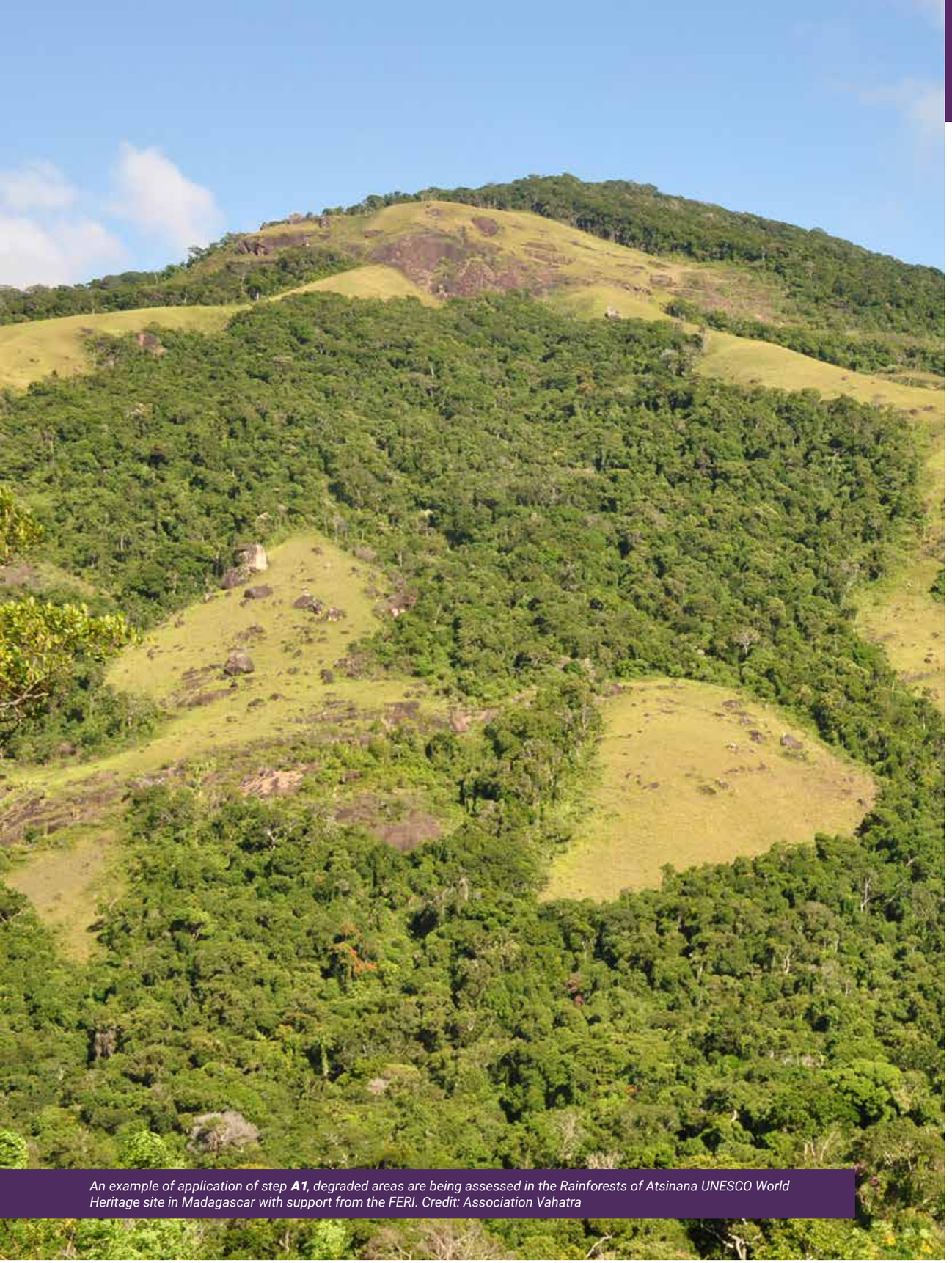
Ecological restoration is one of many interventions used to implement FLR, which aims to improve ecological and social conditions across a mosaic of land uses. FLR programs comprise a range of activities, the selection of which should be aligned with stakeholder-defined objectives, and often include an emphasis on ecosystem services and sustainability. As such, FLR emphasizes sustainable use of components of biodiversity rather than their conservation per se. Interventions that support biodiversity conservation may be included with other FLR actions to support multiple objectives within the landscape.

**Restoration ecology** is the scientific discipline that includes the scholarly study of the practice of ecological and ecosystem restoration as well as related fields that are allied with ecological restoration, for example, ecosystem rehabilitation and reclamation. Restoration ecology is a relatively recent, applied, sub-discipline of ecology – it is highly dynamic, with new research resulting in continual re-assessments and innovative approaches to ecological restoration practice on the ground.

**Land degradation neutrality** (LDN) is defined by the Parties to the UNCCD as "a state whereby the amount and quality of land resources, necessary to support ecosystem functions and services and enhance food security, remains stable or increases within specified temporal and spatial scales and ecosystems." Given the continuing rates of degradation around the world, achieving the LDN objective will require an acceleration of restoration actions across terrestrial ecosystems to counterbalance the expected loss of productive land with the recovery of degraded areas.

**Enhancement of forest carbon stocks** is one of five activities contemplated under the REDD+ mechanism. Increase in forest cover is a key objective under the UN Strategic Plan on Forests 2017-2030. Restoration of forest ecosystems can achieve both objectives, however, other actions (e.g., forest plantations) may also enhance carbon stocks or increase forest cover without providing the additional benefits of restoration, especially biodiversity. Increasing forest cover with a sole focus on acreage and/or enhancing forest carbon stocks has the potential to cause negative consequences to ecological conditions and biodiversity.

*Clearing of invasives prior to planting as part of the FERI-funded project in Brackenhurst Botanical Gardens, Kenya*
*Credit: Mark Nicholson*



*An example of application of step **A1**, degraded areas are being assessed in the Rainforests of Atsinana UNESCO World Heritage site in Madagascar with support from the FERI. Credit: Association Vahatra*

# A Group of activities A: Assessment of opportunities for ecosystem restoration

Ecosystem restoration: short-term action plan. The next spread presents a sample of relevant considerations from restoration science and practice and of resources and tools available for the implementation of this groupf of activities. Further considerations and resources can be found at: **www.feri-biodiversity.org/staper-a**

*To ensure that restoration activities are implemented in areas requiring restoration and that are high priority taking into account ecological, economic, social and institutional realities, it is useful to implement broad-scale ecosystem assessments, including mapping, or to make use of existing assessments. These assessments can be undertaken at various levels according to national circumstances and adjusted in the light of more detailed assessments that result from the site-level activities in step C. The following actions may be considered, and, as appropriate, taken:*

1. **Assess the extent, type, degree and location of degraded ecosystems** *at regional, national, and local scales as well as the drivers of ecosystem degradation. Take into account current restoration activities and initiatives, and how these integrate biodiversity considerations.*

2. **Identify and prioritize geographical areas where restoration would contribute most significantly to achieving national level targets** *contributing to the Aichi Biodiversity Targets (such as priority areas for the conservation of biodiversity, areas that provide essential ecosystem services, and areas that would enhance the integrity of protected areas and their integration into wider land- and seascapes).*

3. **Involve indigenous peoples and local communities and relevant stakeholders.** *Identify and obtain the prior and informed consent and full and effective participation of indigenous peoples and local communities and involve relevant stakeholders in the process, including consideration for gender balance, in the identification of priority areas for restoration.*

4. **Assess the potential costs and multiple benefits of ecosystem restoration at relevant scales.** *Benefits may include those linked to biodiversity and ecosystem services, and socioeconomic benefits, such as water and food security, carbon capture and sequestration, jobs and livelihoods, health benefits, and disaster risk reduction (e.g., fire and erosion control, and coastal protection). Identify opportunities for maximizing co-benefits and for reducing or eliminating conflicts among co-benefits. Costs of inaction may also be significant. Capitalize on lessons learned from previous restoration activities and the potential for ecosystem restoration to provide ecosystem services using nature-based solutions and developing green infrastructure.*

5. **Assess the relevant institutional, policy, and legal frameworks and identify financial and technical resources,** *as well as gaps, for implementing ecosystem restoration. Analyse opportunities for innovative approaches to restoration, including financial ones.*
6. **Identify options to reduce or elimi-nate the drivers of the loss of biodiversity and the degradation of ecosystems at various scales.** *Utilize pre-degradation baselines where appropriate and consult with experts and stakeholders, including indigenous peoples and local communities to determine baselines and other requirements, such as: resources; behavioural changes; incentive mechanisms; addressing perverse incentives; adopting sustainable land, water, forest, fisheries and agriculture management practices; diversifying land tenure; and recognizing resource rights. Assess areas where the implementation of sustainable productive practices could contribute to ecosystem restoration and to prevent land degradation.*

# Considerations in the context of restoration science and practice

The assessment phase of restoration planning offers an opportunity to consider and prioritize degraded lands for restoration action, to engage indigenous peoples and local communities to consider gender balance and to assess the potential of restoration as a tool for addressing a wide variety of ecological and social issues.

An effective approach to initial planning can help prevent potential challenges at later stages of implementation while simultaneously enhancing restoration opportunities. The following considerations can be useful (relevance to specific steps of the Plan is indicated in brackets):

- **Avoid damage to natural ecosystems [A2]**
- **Account for all potential ecosystem benefits of restoration [A4]**
- **Consider the optimal location of restoration on the landscape [A2, A6]**
- **Establish baselines [A6]**

Below is a sample for one of the considerations - To consult detailed guidance on the other considerations listed above please refer to **www.feri-biodiversity.org/staper-a**

## Avoid damage to natural ecosystems [A2]

Damage to ecosystems, whether unintentional or through conversion to another ecosystem type, should be avoided to prevent negative effects on biodiversity. This consideration is reflected in the Annex to the STAPER[i], and in other policy frameworks relevant for restoration such as REDD+[ii], the International Standards for the Practice of Ecological Restoration[1], and the Principles of Forest and Landscape Restoration[iii].

Damage may occur when projects use afforestation, that is, the planting of trees in non-forest native ecosystems, such as grasslands, even if those non-forested ecosystems are in a degraded state. These often-overlooked native ecosystems typically contain significant biodiversity[2].

Global maps of restoration opportunities based largely on potential forest vegetation could inadvertently lead to the afforestation of biodiverse grasslands, savannas, and open canopy woodlands. In most cases, these maps were only intended to provide a general idea of where restoration might be considered. Assessments of restoration opportunities should always be scaled down appropriately to national or local level, drawing on expert knowledge. ROAM and other assessment frameworks (e.g., Chapter 8.2.2 of IPBES 2018[3]) can be helpful in this process.

*An example of application of step A3, local communities are being consulted on the choice area to be restored in the buffer zone of the Cordilllera Azul National Park, Peru, as part of a project implemented by CIMA with support from the FERI. Credit: Jorge Watanabe.*

[i] See the 'Guidance for integrating biodiversity considerations' section in appendix I of Decision CBD COP XIII/5

[ii] Seven safeguards were adopted in Decision UNFCCC 1 / CP.16 with the aim of avoiding risks from REDD+ implementation. One safeguard states that in the execution of REDD+ activities (which may include the enhancement of carbon stocks through forest restoration), the conversion of natural forests should be avoided.

[iii] The Global Partnership on Forest and Landscape Restoration has developed principles to establish a common understanding on forest and landscape restoration and guide the efforts of its members.one principle states that "FLR does not lead to the conversion or destruction of natural forests or other ecosystems." ; see Besseau, P., Graham, S. and Christophersen, T. (eds.). (2018) Restoring forests and landscapes: the key to a sustainable future. Global Partnership on Forest and Landscape Restoration, Vienna, Austria.
**http://www.forestlandscaperestoration.org/sites/forestlandscaperestoration.org/files/resources/GPFLR_FINAL%2027Aug.pdf**



# Resources and tools

A wealth of resources is available to assist with identifying and prioritizing areas for restoration that will contribute to achieving national level biodiversity targets. A small selection of those tools is presented below. To search further resources and tools relevant under Group of activities A "Assessment of opportunities for ecosystem restoration" please visit **www.feri-biodiversity.org/staper-a**

## Restoration Opportunities Assessment Methodology

The Restoration Opportunities Assessment Methodology (ROAM) provides a flexible and affordable framework for countries to rapidly identify and analyse forest landscape restoration (FLR) potential and locate specific areas of opportunity at a nationa l or sub-national level. A ROAM application is generally undertaken by a small core assessment team through collaborative engagement with other experts and stakeholders. A national-level assessment typically requires 15-30 days of work by the assessment team spread over a two-to-three months period. A ROAM application can deliver six main products:

• A shortlist of the most relevant and feasible restoration intervention types across the assessment area
• Identified priority areas for restoration
• Quantified costs and benefits of each intervention type
• Estimated values of additional carbon sequestered by these intervention types
• A diagnostic of the presence of key success factors and identification ofstrategies to address major policy, legal and institutional bottlenecks
• Analysis of the finance and resourcing options for restoration in the assessment area

One important component of the application of the ROAM is the mapping of areas of potential for restoration. This is typically done through GIS analysis of relevant datasets, including datasets on levels of degradation (in accordance with activity **A1**). Drawing on further map datasets and expert knowledge, opportunity areas can then be categorized, for instance, by general type of restoration (widescale, mosaic, protective) or by priority (high, medium, low), in accordance with activity **A2**. It also describes some of the concepts and basic steps required for the modelling of costs and benefits of restoration (**A4**) The methodology also describes how to engage stakeholders throughout the assessment process, in line with activity **A3** and provides examples of criteria and indicators for the assessment of the legal, institutional, policy context, in line with activity **A5**. In 2018, IUCN released the Biodiversity Guidelines for Restoration Opportunities Assessments, which provide more context, more resources, and fresh perspectives relevant to the ongoing global interaction between forest landscape restoration and national biodiversity targets, making it particularly relevant in the implementation of activity **A2**. While most relevant for group of activities A, the methodology can also assist in the implementation of further steps such as the development of plans for resources mobilization (**B9**) and the identification of appropriate measures for ecosystem restoration (**C1**).

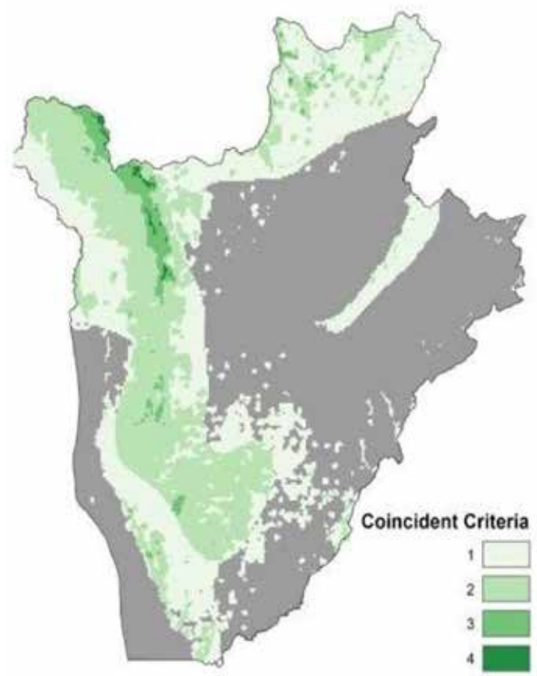



*Illustration: biodiversity components of a multi-criteria analysis during a ROAM assessment for the government of Burundi. Areas of darker green indicate a higher frequency of overlap of input data layers, of which there are six. These data are used to tailor landscape restoration programmes to support areas where biodiversity is important to conserve and restore. Source: IUCN*

*Local community training on the value of old-growth oak forests and the importance of their restoration, and example of application of step **B3** 'promotion of informal education systems' as part of a project implemented by UWICER in Bhutan with support from the FERI. Credit: Tshewang Norbu.*

# B Group of activities B: Improving the institutional enabling environment for ecosystem restoration

The text on this page is extracted from Annex I of CBD COP Decision XIII/5: Ecosystem restoration: short-term action plan. The next spread presents a sample of relevant considerations from restoration science and practice and of resources and tools available for the implementation of this groupf of activities. Further considerations and resources can be found at: **www.feri-biodiversity.org/staper-b**

*In order to facilitate the implementation of ecosystem restoration actions, the further development of the enabling institutional framework for ecosystem restoration should be considered. This includes providing legal, economic and social incentives, and appropriate planning mechanisms, and fostering cross-sectoral collaboration, to promote restoration and for reducing ecosystem degradation. This work may be informed by the assessments undertaken in step A, and, especially A5, and could be undertaken in parallel with the planning and implementation activities undertaken in step C. The following actions may be considered, and undertaken as appropriate:*

1. **Review, improve or establish legal, policy and financial frameworks for the restoration of ecosystems.** *This may include, as appropriate, laws, regulations, policies and other requirements for protecting and restoring habitats, as well as improving ecosystem functions. It may require a certain proportion of land, coast or sea to be maintained in its natural state.*
2. **Review, improve or establish a legal and policy framework for land tenure,** *and for recognizing the rights of indigenous peoples and local communities.*
3. **Promote and strengthen formal and informal education systems** *at all levels by including content related to ecosystem restoration, and raise awareness about the benefits of ecosystem restoration for the economy and the well-being of society, including through the dissemination of scientifically sound information.*
4. **Review, improve or establish terrestrial and marine spatial planning processes** *and zoning activities in the framework of integrated man-agement.*
5. **Consider the need for safeguard measures** *to reduce risks of displacing habitat loss and degradation as well as other risks to biodiversity and indigenous peoples and local communities.*
6. **Review, improve or establish targets, policies and strategies for ecosystem restoration.** *These activities would normally be reflected in national biodiversity strategies and action plans, and/ or national plans for sustainable development, climate change mitigation and adaptation and land management. Setting targets can demonstrate political commitment and help to increase public awareness, support and engagement. Existing targets established under other relevant processes may also be taken into account.*
7. **Develop accounting processes** *that take into account the values of natural land, semi-natural, ecosystems, and of the functions and services they deliver.*
8. **Promote economic and financial incentives** *and eliminate, phase out or reform incentives harmful to biodiversity in order to reduce the drivers of ecosystem loss and degradation, and to foster ecosystem restoration, including through sustainable productive activities.*
9. **Develop plans for resource mobilization** *Create a framework for mobilizing resources to support ecosystem restoration, from national, bilateral and multilateral sources, such as the Global Environment Facility, leveraging national budgets, donors and partners, including the pri-vate sector, indigenous peoples and local communities and non-governmental organiza-tions, to implement the action plans and to fill gaps identified through assessments in step A. Public funds and instruments can be used to leverage private funding through such methods as, inter alia, risk guarantees, payment for eco-system services, green bonds, and other inno-vative financial approaches.*
10. **Promote and support capacity-building and training and technology transfer** *for the plan-ning, implementation and monitoring of ecosys-tem restoration so as to improve the effective-ness of restoration programmes.*

## Considerations in the context of restoration science and practice

The analysis of successful scaling-up of restoration efforts in certain contexts shows the importance of developing robust institutional frameworks, including through the establishment of a clear and stable legal basis for restoration. In addition, policies are needed that promote the inclusion of biodiversity in restoration design and not just as an outcome of restoration.

- **Provide a clear and stable legal basis for restoration [B1, B2]**

Funding required to meet the goals of the Bonn Challenge and the New York Declaration on Forests is estimated at USD 360 and 830 billion, respectively[1]. A wide range of funding and other resources will be needed, including markets to leverage investment in ecosystem restoration[1-4]. Governance for restoration is critical, and without inscribing restoration actions within a clear governance framework, short-term restoration efforts are less likely to succeed. Because successful restoration may take years or decades, accountable institutions should oversee projects for the period of time required to achieve success[5,6]. Institutional goals and approaches to restoration range from active interventions to more passive approaches such as natural regeneration[7,8]. Legal frameworks that mandate biodiversity offsets, payments for ecosystem services, and agricultural-environmental schemes are all enabling policy mechanisms for restoration.

Legal frameworks at the international (e.g., the European Union) and national levels can take advantage of existing and emerging law to facilitate ecosystem restoration[9]. Incorporation of terms important to biodiversity conservation, (e.g., extinction debt) into legal language is important so that lawyers and policy makers understand the underlying ecological concepts[10]. Addressing land-tenure issues and securing land tenure, especially for local stakeholders, is seen as key to obtaining investments in Forest Landscape Restoration[5,11]. Legal instruments to promote and implement both voluntary and mandatory restoration exist in many countries (e.g., Brazil, China, Japan, South Africa, United States)[12], and in some cases laws have been refined based on experience to improve both project assessments and outputs (e.g., São Paulo State, Brazil)[13,14].

- **Make biodiversity and climate benefits an explicit objective of restoration projects [B6**

Explicit incorporation of biodiversity into restoration projects is low. A review of published studies on restoration from 1990-2015 found that biodiversity was considered less than 10% of the time, and that the increase of consideration of biodiversity over that time was slight[15]. Most studies considered biodiversity as a response to restoration rather than incorporating it in the restoration design. Thus, policies are needed that promote the inclusion of biodiversity in restoration design, enhance the survival of restored organisms, and maximize the ecosystem functions and services they provide.

Moreover, public policies should recognize the role that ecosystem restoration and conservation can play to attain ecosystem-based adaptation to climate change, as well as in increasing the resilience of local society to future climate change scenarios. In Brazil for example, the protection and restoration of native Atlantic forests is an explicit part of the government's objective to reduce society's vulnerability to climate change[16].

*A community consultation on access to forest resources in the buffer zone of the Atsinana National Park, Madagascar, an example of application of step B2 'review of land tenure' as part of a project implemented by Madagascar National Parks with support from the FERI. Credit: Association Vaharatra.*



## Resources and Tools

Many resources can be consulted to further assist in the development of institutional framworks for restoration, a sample of which are presented below. To search further resources and tools relevant under Group of activities B "Improving the institutional enabling environment for ecosystem restoration" please visit **www.feri-biodiversity.org/staper-b**

### Linkages between Forest Landscape Restoration and the Aichi Biodiversity Targets

Two reports prepared by IUCN explore the linkages between Forest and Landscape Restoration (FLR) and the Aichi Targets and can assist in the review and improvement of restoration targets: Restoration of forest ecosystems and landscapes as contribution to the Aichi Biodiversity Targets and Accelerating biodiversity commitments through Forest Landscape Restoration. Specific country examples are presented that illustrate the link between planned or implemented FLR activities and national biodiversity targets that have been adopted in NBSAPs, and demonstrate the connection made by Parties to the Convention between FLR and ecosystem-based approaches to landscape restoration.In reviewing the linkages between FLR strategies and national biodiversity targets, these reports are of particular relevance to activity B6 and can facilitate the integration of FLR-related objectives and targets in NBSAPs as well as national reports to the CBD.

### Sustainable financing for forest and landscape restoration report and infographic

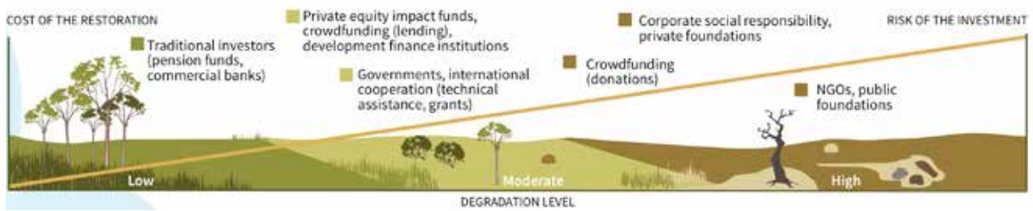



*Illustration: Risks and barriers for FLR investment. The more degraded the landscape, the higher the cost of restoration and the higher the risk of the investment. Different investors are willing to accept different levels of risk. Source: FAO*

In developing plans for resource mobilization, public policy makers from developed and developing countries, at all levels (national, regional, local), have the opportunity to take leadership as FLR financing champions. Even without controlling private capital, they can support resource mobilization in a number of ways. Sustainable financing for forest and landscape restoration - The role of public policy makers is a publication by FAO's Forest Landscape Restoration Mechanism that shares the experiences of initiatives from around the world, from which public policy makers can learn and adapt. It provides recommendations to help them improve their support to FLR financing by (i) mainstreaming FLR in State budgets, (ii) setting up appropriate financing mechanisms, (iii) engaging the private sector, and (iv) building alliances and partnerships. The main findings are also available as an infographic.

This publication and its recommendations can help develop a framework for resource mobilization and the setting up of financing instruments for restoration, in line with activity **B9.**

*Community members at work clearing ferns from a degraded area to assist the natural regeneration of native forest, an example of application of step* **C5** *'implementation of the measures outline in the ecosystem restoration plan' in the buffer zone of Cordillera Azul National Park, Peru, as part of a project implemented by CIMA with support from FERI. Credit: Jorge: Watanabe*



# C Group of activities C: Planning and implementation of ecosystem restoration activities

The text on this page is extracted from Annex I of CBD COP Decision XIII/5: Ecosystem restoration: short-term action plan. The next spread presents a sample of relevant considerations from restoration science and practice and of resources and tools available for the implementation of this group of activities. Further considerations and resources can be found at:
**www.feri-biodiversity.org/staper-c**

*Restoration activities should be planned on the basis of priorities identified in Step A and im-plementation facilitated by actions in step B. Actions would benefit from consultation with stakeholders and experts from various disci-plines to assist with all phases of project work (assessment, planning, implementation, moni-toring and reporting). Capacity-building for stakeholders, including legal and legislative support for the rights of women and indigenous peoples and local communities, may be required. The following actions may be considered, and undertaken as appropriate:*

**1. Identify the most appropriate measures for conducting ecosystem restoration**, *based on the best available evidence and taking into account ecological appropriateness, the use of native species, scale of measures linked to the processes to be restored cost-effectiveness, and support to indigenous peoples' and community conserved territories and areas, and respect for their traditional customary knowledge and practices. Emphasis should be given to restoration approaches and activities that allow people to maintain and/or establish sustainable livelihoods.*

**2. Consider how ecosystem restoration activities can support the ecological and economic sustainability of agriculture and other production activities**, *as well as climate change mitigation and adaptation, and disaster risk reduction, and enhance ecosystem services, including for urban ar-eas. Restoration may be mainstreamed into land- and seascape planning. The expected effects of restoration activities on the eco-logical function of adjacent lands and waters should be considered, for example through environmental impact assessments and stra-tegic environmental assessments. Potential future environmental changes, such as those resulting from climate change, should be taken into account.*

**3. Develop ecosystem restoration plans with clear and measurable objectives and goals** *for expected environmental, economic and social outcomes. In addition to goals and objectives, plans could include the extent and lifetime of the project, the feasibility of mitigating degrading forces, budget and staff requirements, and a coherent plan for monitoring project implementation and effi-cacy. Project goals may include the desired future condition of the areas being restored, and the expected ecological and socioeco-nomic attributes of the reference ecosys-tem(s). In addition, project goals could ex-plicitly specify ecological and socioeconomic targets (e.g., biomass of vegetation, jobs), and for each target an action (e.g., reduce, increase, maintain), quantity (e.g., 50 per cent), and timeframe (e.g., five years). Ob-jectives could then be developed with an appropriate monitoring programme to detail the specific steps required to fulfil the goals.*

**4. Develop explicit implementation tasks, schedules, and budgets.** *Anticipated details of implementation, including site preparation, installation, or follow-up activities, may be considered. In addition, performance standards could be explicitly stated, along with a preliminary and adaptable list of ques-tions to be addressed through monitoring and the proposed protocols that will be used to examine project success at specified in-tervals during restoration. Monitoring and evaluation may benefit from the establish-ment of standards for data collection, man-agement and retention, analyses, and sharing of lessons learned.*

**5. Implement the measures** *outlined in the ecosystem restoration plan to conserve, manage sustainably, and, restore degraded ecosystems and landscape units in the most effective and coordinated manner possible, making use of existing science and technology and traditional knowledge.*

# Considerations in the context of restoration science and practice

The following practices can be usefully considered in applying activities under Group C – Planning and implementation of ecosystem restoration activities:

- **Use of standards and guidelines [C1, C3, C4]**
- **Use of a reference ecosystem or model [C1, C3, C4]**
- **Consideration of appropriate and cost-effective restoration approaches [C1, C2]**
- **Consideration of species interactions [C5]**
- **Accounting for genetic diversity, and supply of plants and other essential materials [C5]**

To consult detailed guidance on the rest of the biodiversity considerations for group of activities C, please refer to **https://www.feri-biodiversity.org/staper-c**

## Consideration of appropriate and cost-effective restoration approaches [C1, C2]

Many approaches can be taken to restore native ecosystems and biodiversity, and an even greater number of approaches can be used that mix ecosystem restoration with other activities, such as agroforestry. These approaches are often used in combination or mosaics across landscapes, and many approaches utilize natural successional processes and ongoing adaptive management to help drive ecosystem recovery.

Natural regeneration, which focuses on removing sources of degradation (e.g., deforestation, inappropriate grazing, over-fishing, restriction of water flows, and inappropriate fire regimes), has enormous potential to contribute to ecosystem restoration[1-3]. However, natural regeneration alone may not be sufficient and other more active restoration approaches may be needed. Planted forests with a high diversity of native tree species, for instance, can be used to overcome low resilience, reduced forest cover, and high fragmentation, and create biologically rich and viable forests[4]. Diverse plantings of native species also contribute to the restoration of soils and improve ecosystem resilience[5]. Agro-successional restoration is defined as the incorporation of a range of agroecology and agroforestry techniques as a transition phase early in forest restoration. This approach could be used more widely to overcome socioeconomic and ecological obstacles to restoration on former agricultural lands[6].

Planting mixed stands of native trees and commercial species, or allowing natural inclusion of native species in commercial plantations, can lower costs and increase biodiversity in forest restoration. However, co-benefits of mixed plantations may come with some environmental costs over native forests, such as lower water availability[7].

*Illustration: photo of enrichment planting with Eucalyptus trees. Economically or commercially important species can enhance the value of naturally regenerating forests by providing revenue and offsetting opportunity costs. In Brazil's Atlantic Forest, harvesting fast-growing Eucalyptus trees interplanted with native tree species after 4-5 years can significantly offset these costs. Credits: Nino Amazonas.*



# Resources and tools

Many resources can be consulted to further assist in the planning and implementation of ecosystem restoration activities, a sample of which are presented below. To search further resources and tools relevant under Group of activities C "Planning and implementation of ecosystem restoration activities" please visit **www.feri-biodiversity.staper-c**

## Genetic considerations in ecosystem restoration using native tree species

In collaboration with FAO, Bioversity International published the book **Genetic Considerations in Ecosystem Restoration Using Native Tree Species**, which reviews the evidence that genetic diversity plays a critical role in seedling survival and adaptation of forests to environmental change and discusses the advantage of using native tree species over exotic species for meeting conservation and sustainable development goals.

The report provides fundamental information for the achievement of knowledge-based ecosystem restoration using native tree species. It draws attention to the importance of embedding genetic considerations in restoration activities, an aspect which is often overlooked both by restoration scientists and practitioners.

This resource is particularly relevant for the implementation of Activity **C1**, under which appropropriate measures for conducting ecosystem restoration should be identified taking into account ecological appropriateness and the use of native species.

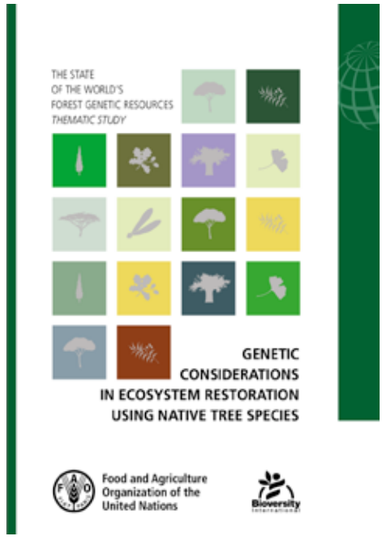



*Illustration: cover of the report – source: Bioversity International*

## Restoration evidence portal

**Restoration Evidence** is a free resource developed by the Endangered Landscapes Programme that aims to make ecological restoration more effective by providing evidence about the effectiveness of specific restoration actions. The searchable website contains summaries of scientific research on the effects of actions to restore habitats, in order to support decision making. Actions are categorized by the target habitat or species. Summaries of evidence are available for the ecological restoration of forests, peatland vegetation, shrublands and heathlands, and farmland, and for restoration actions aimed at enhancing populations of birds, amphibians, bees, bats and primates.

This resource is particularly relevant for Activity C1 in that it helps assess the ecological appropriateness of different restoration measures for different ecosystems or particular taxonomic groups. Its grounding in scientific research also makes us of existing science, in line with Activity **C5**.


*Illustration: Categories of evidence by theme on the Restoration Evidence website – Source: http://www.restorationevidence.org/*

# D Group of activities D: Monitoring, evaluation, feedback, and disseminating results

The text on this page is extracted from Annex I of CBD COP Decision XIII/5: Ecosystem restoration: short-term action plan. The next spread presents a sample of relevant considerations from restoration science and practice and of resources and tools available for the implementation of this groupf of activities. Further considerations and resources can be found at:
**www.feri-biodiversity.org/staper-d**

*Monitoring activities should begin during the earliest phases of project development to enable ecosystem conditions and socio-economic effects to be measured against a reference model. Effective monitoring may include extensive planning prior to initiation of restoration activities, including establishing baselines, using biological indicators, and setting clear and measurable restoration objectives based on these indicators. Remote sensing may also be a cost-effective monitoring technique in some ecosystems that can easily be repeated. Monitoring results and the lessons learned on the outcomes of activities in steps B and C may be documented, analysed and used to support adaptive management. The following actions may be considered, and undertaken as appropriate:*

1. **Assess the efficacy and effects of implementing the ecosystem restoration plan,** *including the success of ecosystem restoration activities and the environmental and socioeconomic costs and benefits. This may be done in close collaboration with relevant stakeholders including indigenous peoples and local communities and be based on the questions and analysis set out in the monitoring section of the restoration plans in step C4.2*
2. **Adjust plans, expectations, procedures, and monitoring through adaptive management** *based on monitoring results and lessons learned and promote continuity beyond the project end.*
3. **Share lessons learned from planning, financing, implementing and monitoring ecosystem restoration plans** *in collaboration with stakeholders to demonstrate the practices and areas that provide multiple benefits of ecosystem restoration, identify unintended consequences, and improve outcomes of future restoration efforts, using this through national clearing-house mechanisms and the global clearing-house mechanism, among others, for exchanging information.*

*Observation of a multi-storey forest structure and high plant diversity in a 12-years old area of ecologically restored forest in Brackhenhurst Botanical Gardens, Kenya, which receives support from the FERI. Forest structure and plant diversity are examples of indicators that can be used in the monitoring phase of ecosystem restoration. Credit: Mark Nicholson.*

*A frog from the species Boophis luteus in the National Park of Atsinanana, which receives support from the FERI. Fauna inventories can be used to monitor the success of restoration activities. Credit: Association Vaharatra.*

## Considerations in the context of restoration science and practice

Monitoring of restoration allows evaluation of implementation and effectiveness of interventions in meeting desired goals. The latter is of particular importance because it allows course corrections during the life of a project through adaptive management. When combined, monitoring data from many projects can shed light on best practices, inform planning decisions at larger scales, and contribute to scientific knowledge.

The incorporation of monitoring into restoration projects is not universal due to many factors, including costs, lack of technical expertise, and insufficient support. For example, during the 1990s in the United States, only 10% of >37,000 river restoration projects had any form of project monitoring and little information was available to assess the ecological effectiveness of restoration activities[1]. Building support and providing funding for monitoring is key to both the future success of ecosystem restoration, and communicating success to stakeholders. The following concepts and considerations may be relevant in the implementation of monitoring activities:

- **Participatory and innovative techniques for monitoring**
- **Monitoring protocols**
- **Recovery debt and restoration timescales**
- **The importance of meta-analyses and reviews of monitoring outputs**

To consult detailed guidance on the rest of the biodiversity considerations for group of activities D, please refer to **www.feri-biodiversity.org/staper-d**

### Participatory and innovative techniques for monitoring

One challenge is to design monitoring so that it is efficient and engages stakeholders in local communities.Participatory monitoring can provide an important way to connect local and global priorities for forest restoration[2,3].

Collaborating with stakeholders generally increases effectiveness and lowers costs of project monitoring.

Restoration monitoring must be adapted to available resources and to specific needs. Not all monitoring requires sophisticated scientific procedures, and simple monitoring methods, such as establishing photo points and taking time-series photography can yield significant information[4]. Modern technology, such as drones[5,6] and remote sensing[7], are increasingly important in restoration monitoring and may help reduce monitoring costs over time.

*Illustration: Drone launch for conservation purposes. Image courtesy of conservationdrones.org*



## Resources and tools

Many resources can be consulted to further assist in the monitoring, evaluation, feedback, and disseminating results, a sample of which are presented below. To search further resources and tools relevant under Group of activities D please visit **http://www.feri-biodiversity.org/staper-d**

### International principles and standards for the practice of Ecological Restoration

In addition to providing significant guidance for activities in Group C, **SER's restoration standards** contain guidance for the monitoring of restoration projects. This guidance includes a tiered system from 1 to 5 stars to evaluate progress of a restoration project (D1) along a trajectory toward a reference model by assessing six key ecological attributes: species composition, structural diversity, ecosystem function, external exchanges, absence of threats, and physical conditions.

An 'ecological recovery wheel', available online and as an **Android app** provides a framework to communicate this restoration progress (D3). The SER Standards also provide an example 'Social Benefits Wheel' to help assess and communicate the delivery of ecosystem services by restoration projects, in line with activities D1 and D3.

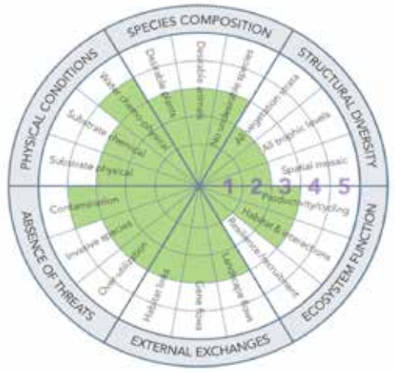


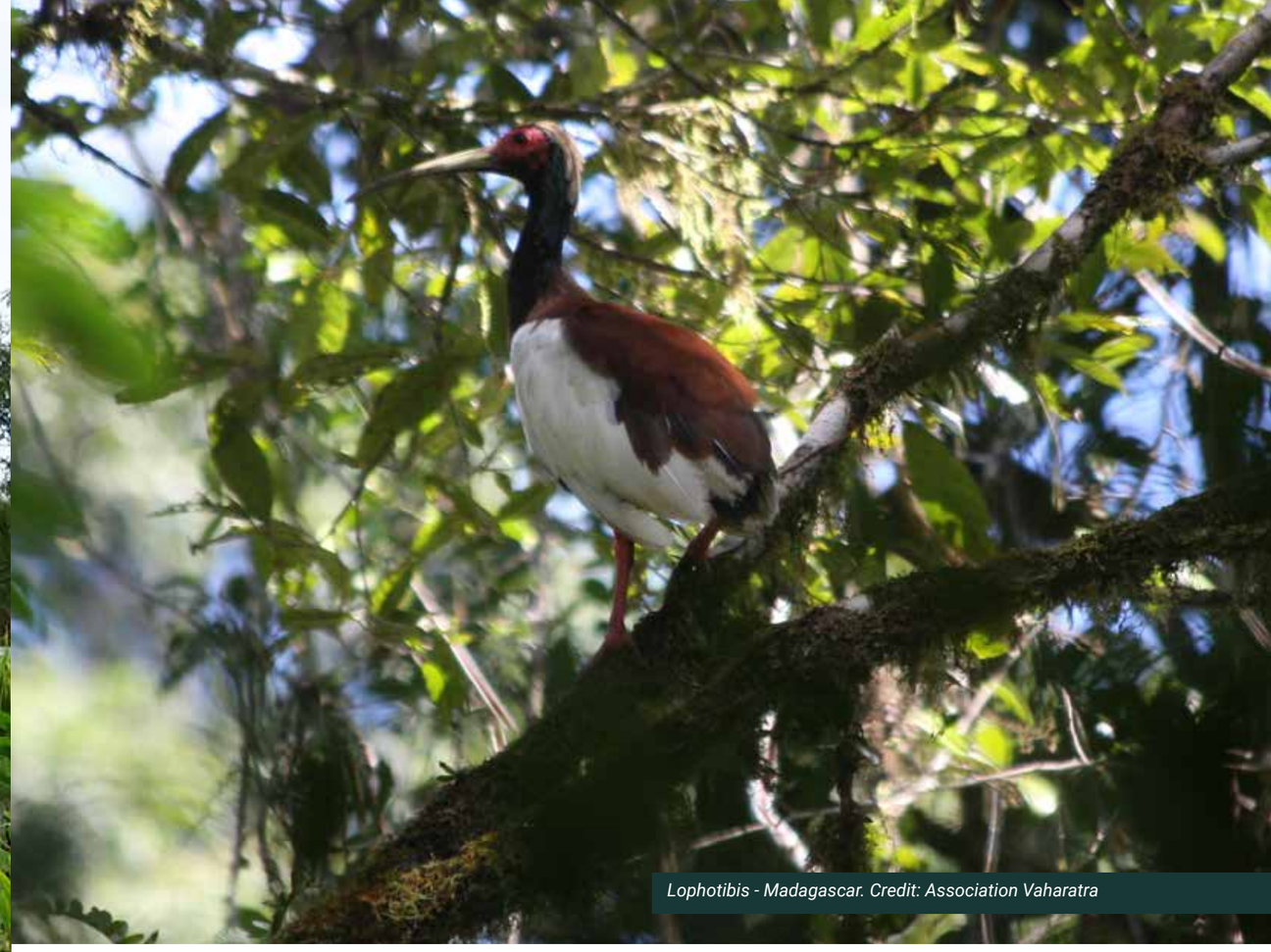

*Illustration: SER's ecological recovery wheel monitoring framework. Source: SER*

### Bonn Challenge Barometer

The Bonn Challenge Barometer is a progress tracking protocol for the Bonn Challenge, a global effort to bring 150 million hectares of degraded and deforested land into restoration by 2020 and 350 million by 2030. It aims to provide a flexible framework for the development of indicators by jurisdictions who pledged to the Bonn Challenge and to report on progress on various dimensions of Forest and Landscape Restoration (FLR). A Spotlight Report, published in 2017, describes the process for the development of the Bonn Challenge Barometer and the underlying concepts and initiatives. It also offers five case studies of progress on FLR in Brazil, El Salvador, Mexico, Rwanda and the United States, which illustrate the types of information the Barometer reports will present. By providing a common platform for countries to report on the outcomes of their FLR strategies along standard criteria, the Bonn Challenge Barometer allows for the sharing of lessons learned and exchange of information, in line with Activity **D3**.


*Illustration: Dashboard of the Bonn Challenge Barometer for Brazil – Source: https://infoflr.org/bonn-challenge-barometer*

*Community restoration activities in the Rainforests of Atsinana UNESCO World Heritage site in Madagascar with support from the FERI. Credit: Association Vaharatra*



*Lophotibis - Madagascar. Credit: Association Vaharatra*

## Conclusion

Scaling up ecosystem restoration to meet global needs is a difficult task, but a wealth of knowledge and capacity is available to assist countries in implementing ecosystem restoration across the landscape. This Companion to the STAPER and its associated online resources introduce several examples, but these are just a few highlights from the many other examples and resources currently available. Additionally, it is critically important that global and regional guidance be placed into the local context and augmented by local knowledge and expertise. Because ecosystem restoration is an emerging discipline, best practice also dictates that new techniques should be trialed and evaluated prior to widespread implementation. This should not be viewed as a burden, but rather due diligence resulting in lower risk, higher efficiency, and increased levels of success in the future.

Opportunities to achieve multiple benefits from ecosystem restoration, including biodiversity gains, are widespread, though not universally implemented. As we know, the achievement of sustainability goals and the future of human society depends upon obtaining multiple objectives simultaneously. The more we can design and implement ecosystem restoration to do that, the closer we will come to achieving these goals.

We now know that biodiversity serves many functions, including increasing ecosystem stability, resilience, and productivity. We hope that this Companion to the STAPER both demonstrates that co-benefits can be achieved, and provides the examples, tools, and knowledge to assist countries and other stakeholders in turning that vision into a reality on the ground.

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*A community-based tree nursery an example of application of step **C5** 'implementation of the measures outline in the ecosystem restoration plan' in the buffer zone of Cordillera Azul National Park, Peru, as part of a project implemented by CIMA with support from FERI. Credit: Jorge: Watanabe*


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