55. Forest restoration

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Chapter 55: Forest Restoration – Download PDF

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Intended learning level: Advanced

Purpose of the chapter:
The chapter gives an introduction into the current state of forest restoration.

NOTE: this text is a complete draft, which will be further revised

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55.1 Introduction and definition

Forest landscapes, characterised by forest with other embedded land uses, are under pressure with the loss of forest area by conversion to other land uses and degradation of existing forests, and reduced biodiversity (Bolte et al., 2023). An estimated 10 million hectares of forest area have been lost worldwide between 2015-2020 (FAO & UNEP, 2020) and an even larger amount is estimated to be degraded. Ongoing environmental and climate change is rapidly altering the growing conditions for forest ecosystems, as well

as their ecosystem services, with strong impacts on 3.2 billion people, in particular the most vulnerable (IPBES, 2018).

Reversing degradation by restoring vegetation cover to degraded land has a long history, although the terminology of restoration is a relatively new development. In 2000, a group of 30 social and natural scientists came together to define Forest Landscape Restoration (FLR) as 'a planned process that aims to regain ecological integrity and enhance human wellbeing in deforested or degraded landscapes'. This definition, together with associated research work and guidance, was to be the cornerstone of both WWF and IUCN's work on forest restoration in the next decades. Several years later, the Global Partnership on FLR (GPFLR) was established by WWF, IUCN and the UK Forestry Commission, which today regroups over 30 NGOs and private and public institutions (Stanturf & Mansourian, 2020). From 2011 on, with the Bonn Challenge and New York Declaration, a political commitment with restoration of 150 million ha of landscapes by 2020 and 350 million ha by 2030, respectively was set. Since then, pledges to date totalling 210 Mio. ha for restoration were given (https://www.bonnchallenge.org/progress). Responding to the Bonn Challenge also contributes to meeting national obligations under the several Rio Conventions. For example, the CBD Aichi Target 15, UNFCCC REDD+ goals and the Rio+20 UNCCD land degradation neutrality targets are all intended to lead to carbon richer landscapes that are biodiverse, economically more productive, provide a sustained flow of a broad range of ecosystem services and are resilient to climatic variability. FLR can contribute to several Sustainable Development Goals (SDG). The current UN Decade on Ecosystem Restoration 2021 to 2030 is the next chronological step in elevating the wider practice of ecosystem restoration to the forefront of international policy discourses (Chazdon & Laestadius, 2016).

In spite of the attention focused on FLR, consensus on what constitutes FLR and what differentiates it from functional or ecological restoration is elusive. In line with better defining what counts as FLR, the GPFLR in 2018 proposed a series of six principles for FLR (Stanturf & Mansourian, 2020):

1. focus on landscapes;
2. engage stakeholders and support participatory governance;
3. restore multiple functions for multiple benefits;
4. maintain and enhance natural ecosystems within landscapes;
5. tailor to the local context using a variety of approaches; and
6. manage adaptively for long-term resilience.

Meeting all of these principles is ambitious, and in practice, many projects that have been carried out are being labelled as FLR while in practice, they do not qualify according to the definition of FLR (either because of their scale or because they do not meet the dual ecological and social dimensions of FLR) or according to these principles.

Forest Landscape Restoration is closely linked with the question of Adaptive Forest Management (AFM) (Figure 55-1) in order to enhance the functionality of both forests and forest landscapes under multiple

pressures of global change (Spathelf et al., 2018; Mansourian et al., 2017).

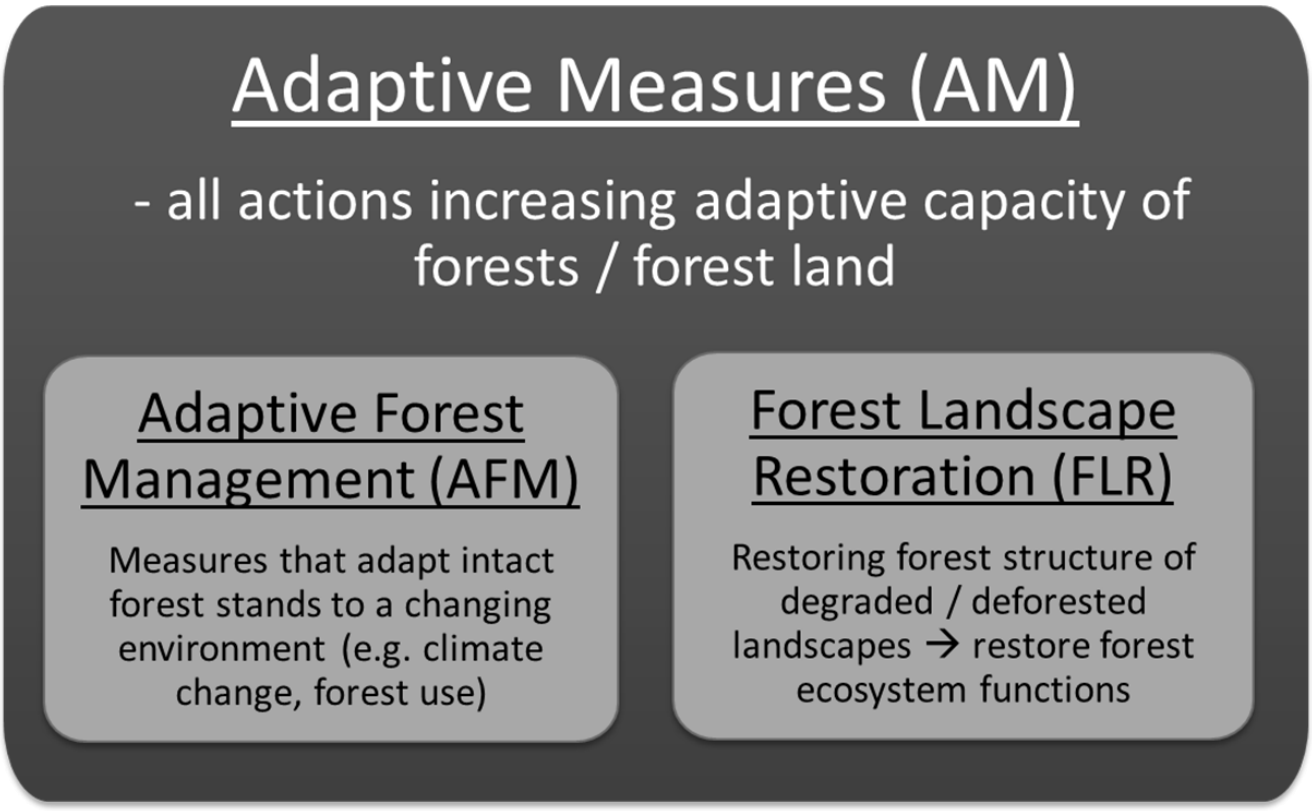

Figure 55-1**:** Integrative Adaptive Measures (AM) concept combining Adaptive Forest Management (AFM) and Forest Landscape Restoration (FLR) (from Spathelf et al., 2018).

Forest adaptation is forward looking, restoration backward. FLR has the potential to reconcile local adaptation with the landscape approach. This approach seeks to balance different values/functions at the landscape scale such as water regulation, wildlife habitat, and biodiversity or carbon storage (Spathelf et al., 2018).

55.2 Concept and design of FLR

FLR is about returning some trees to a landscape so that they can enhance the overall benefits provided by forests in that landscape to both nature and people. This process takes place over a long period of time, large spatial scales and seeks to achieve multiple (social and ecological) objectives. Theoretically, a team of experts can design an ideal FLR scenario. This design may contain maps showing where different restoration activities might take place, it may contain an overall goal for the state of the future landscape and its management once restored, and it may contain a number of objectives for restoration at the level of individual sites. Questions that arise from this first stage are: Who develops this design? Who is involved in the design? Who leads and finances the design? Who is consulted in this design? How realistic is the design? Is there the knowledge and capacity in place to apply this design? What are competing designs?

Implementation can take place once the FLR plan has been developed, in a stepwise approach (with some

feedback loops) over a given period of time. Questions that arise from this stage are: Is the timeframe for these actions realistic? Who coordinates them? With what authority? Who funds them? How long is the funding available? Is funding sufficient? How practical are these activities? For instance, when projects are funded by external donors, the project timeframe may be unrealistically short (with donors typically funding projects for 3–5 years) leading to small-scale interventions or often, to a lack of consultation simply to 'save time' (Stanturf & Mansourian, 2020).

Maps can identify where best to implement specific restoration activities. These may be derived from an 'ideal' optimal definition based on social and ecological conditions and indicators. Questions that arise are: what was there on those sites before restoration? Why has land use changed? What are underlying drivers of the change? Who owns the land? Who owns the rights to access, use or manage the land? Are there conflicts over land use? For example, while an optimal allocation of trees within the landscape may be defined to yield both social and ecological benefits, it is challenging to determine whose social (and economic) benefits (e.g. which community or local versus national stakeholders), and which ecological benefits should be prioritized (e.g. climate mitigation versus biodiversity conservation). Trade-offs are inevitable in practice and indeed, one positive aspect of FLR is that it is easier to make trade-offs involving contrasting activities/alternatives at a landscape scale than at an individual landholding.

55.3 Planning and implementation of FLR

In practice, there have been many challenges associated with implementing FLR programmes, not least reconciling the human and ecological dimensions and achieving the scale required. Several tools have been developed over the years to address some of these challenges.

Vallauri et al. (2005) identified five steps in a successful restoration implementation:

- Step 1: Initiating an FLR programme—the purpose of this first step is to identify the problem(s) and agree on possible solutions and targets for restoration. In this step, stakeholders are engaged and consulted, and both social and ecological problems of deforestation and forest degradation are considered in order to identify ways of reversing them. The authors acknowledge that this first step could last several years.
- Step 2: Defining restoration needs and linking restoration to a large-scale conservation vision—in this step, an emphasis is on the biodiversity dimension of restoration with an explicit link being made to a wider 'conservation vision' for the area. Potential benefits—social, ecological and economic—of restoration are assessed. This step leads to a definition of target sites for restoration within the landscape that are linked to the objectives identified.

- Step 3: Defining restoration strategies and tactics—this step looks at different trajectories or scenarios for achieving the objectives identified above. It acknowledges that trade-offs may be necessary and that reaching wider agreement among landscape stakeholders may take time and may require a phased approach. An important output anticipated at this stage is potential land use scenarios (including maps) and a fully costed restoration plan.
- Step 4: Implementing restoration—in this stage, the authors recommend starting small scale through pilot projects, emphasizing the need to 'learn by doing'.
- Step 5: Piloting systems towards fully restored ecosystems—this step advocates the need for long-term monitoring and adaptive management. It acknowledges that the plan identified earlier may need to be adapted based on feedback from the system, particularly given the complexity of working within a social–ecological landscape.

In practice, this guidance has been used for relatively small-scale projects. For example, in New Caledonia's dry forest, 10 partners have been collaborating to restore this remnant ecosystem since the early 2000s. Using guidance such as that of Vallauri et al. (2005), the implementing partners mapped out priority restoration sites in a first phase of the project (2001–2006). Other planning frameworks have since been developed.

The techniques and measure for FLR implementation are not necessarily new, they comprise a wide range of well-established options (approaches, systems or silvicultural measures), such as (according to Sabogal et al., 2015):

- Planted forests and woodlots
- Planting of trees on formerly forested land. Native or introduced species planted for various purposes, fuelwood, timber, building, poles, fruit production, etc.
- Natural regeneration
- Natural regeneration of formerly forested land. The site may be highly degraded and no longer able to fulfil its past function, e.g., agriculture. If the site is heavily degraded and no longer has native seeds, some planting will probably be required.

- Silvicultural tending
- Enhancement of existing forests and woodlands and stocking, e.g., by reducing fire and grazing and by liberation thinning, enrichment planting, etc.
- Agroforestry
- Establishment and management of trees on active agricultural land, either through planting or favouring natural regeneration, to improve crop productivity, provide dry season fodder, increase soil fertility, enhance water retention, etc.
- Improved fallow
- Establishment and management of trees on fallow agricultural lands to improve productivity, e.g., through fire control, extending the fallow period, etc., with the intention that eventually this land will revert back to active agriculture.
- Mangrove restoration
- Establishment or restoration of mangroves along coastal areas in estuaries.
- Watershed protection and erosion control
- Establishment and restoration of forests on very steep sloping land, along water courses, in areas that naturally flood and around critical water bodies.

'Real' FLR incorporates all the six foundational traits (see above). A planned process implies a long-term vision and active intervention in well-defined, bounded areas. The natural human tendency to plan in stages and phases, however, is often shattered by the reality of having to 'muddle' through. On the one hand, the scale implied in FLR and the complexity intrinsic in dealing with a social–ecological system requires planning, yet flexibility is necessary; regular reappraisals and modifications are more realistic than strict adherence to the original plan. On the other hand, 'laissez faire' approaches that then retrofit the label FLR may be preferred to 'interventionist' approaches that seek to 'direct' the effort without considering context where it is not always welcome and sometimes backfires. Laissez

faire approaches, however, may lack accountability and risk long-term persistence. While a middle approach may be preferable, the multiple crises we are facing may not allow the time simply to muddle through (Stanturf & Mansourian, 2020; Stanturf et al., 2019).

Landscape approaches are advanced as superior to sectoral approaches that often result in conflicting and multiple demands for the same land resources. Landscapes are large and complex, providing different

habitats where diverse uses can be accommodated. Despite calls for restoring ecological complexity, landscapes are socio-ecological systems that present particularly difficult conditions of dynamism and change. Experience from engineering suggests that all successful efforts at designing complex systems have started with small successful efforts, i.e. pilot or proof of-concept projects. Experience with scaling up research to large-scale implementation seems to validate approaching FLR carefully and establishing an experience base.

Seeking to meet both social and ecological objectives is a strength of the FLR process but also a challenge. Different disciplines and expertise are required for each dimension and the complexity of operating within a social–ecological system signifies that often the focus tends to be on either the social (or economic) or the ecological system rather than balancing both. Explicit as well as implicit biases towards the social or ecological dimensions of FLR potentially can be avoided by multi-disciplinary teams working together at all phases, from visioning to sustaining.

The barriers to realizing the potential of FLR are substantial; Fagan et al. (2020) analyzed commitments of Bonn Challenge countries on multiple indicators in three categories of feasibility of meeting the commitments, likelihood that restoration outcomes would persist and the effectiveness of governance.

They concluded that if commitments were to be realized, significant land use changes would be required, substantially affecting the agricultural economy. Others have examined the likely persistence of restoration interventions based on attributes of stakeholders, environmental context and governance structure. Not surprisingly, the attitudes of local stakeholders are important; without recognized, long-term benefits to local stakeholders, restoration is likely to be short-lived, especially if the main benefits are short term and disappear once donor support is removed. The ability of local stakeholders to control land use is another factor related to governance and tenure security; not to be overlooked is that restored land may become a new asset at risk of exploitation by elite capture.

Many areas targeted for restoration are available because they are degraded and probably pose challenges such as low fertility, draughtiness, etc. Therefore, the speed of recovery may be slow and areas under restoration may appear unused and at risk for encroachment (Stanturf & Mansourian, 2020).

55.4 Failure and success factors for FLR

Nevertheless, setting ambitious area targets is insufficient for making real change towards more sustainable land use and functioning ecosystems. The FLR process provides a long-term, multiobjective and large-scale means to implement international targets into on-the-ground interventions. However, in practice, there are limited data on details of Bonn Challenge commitments or on progress towards accomplishments. Furthermore, significant large-scale restoration activity is undertaken outside of the Bonn Challenge, notably by the private sector. There are opportunities to learn from these large-scale initiatives but also to enhance alignment with the FLR approach. Nevertheless, implementing restoration is difficult due to ecological and socio-economic complexities in many of the regions where Bonn Challenge commitments have been made and the time that will be required for change to become evident. Höhl et al. (2020) undertake a significant effort to identify and describe factors of success and failure for practical FLR implementation on the ground. Without meeting the long-term needs of local stakeholders, restoration is

likely to be short-lived, especially if the main benefits are short term and disappear once donor support is removed. Thus, projects and initiatives like this likely fail. Failed projects and disappointed stakeholders, as well as discouraged funders and policy-makers will attenuate global forest restoration ambitions. Despite these challenges and the initial results thus far achieved, it is important to maintain the Bonn Challenge and New York Declaration on Forests as global restoration initiatives but increase their effectiveness by implementing enhanced pledging criteria and a more comprehensive and specific monitoring system (Höhl et al., 2020).

55.5 Future perspectives of FLR (Stanturf & Mansourian, 2020)

Protecting and restoring forests is essential to meeting the Paris climate goals, conserving biodiversity and addressing food security and livelihood needs. The FLR approach as it was designed initially, and as it was strengthened in 2018, through the agreement of six principles, provides an avenue to reach both ecological and social objectives. However, in practice, initiatives are still in their infancy when it comes to fully adhering to the objectives of this approach, and many initiatives that are labelled FLR would not qualify under its definition or principles. Forest landscapes have moved up in the political agenda; the Bonn Challenge and New York Declaration on Forests have set goals of bringing into restoration 350 million ha by 2030, fully supporting the UN Decade on Ecosystem Restoration (2021–2030).
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