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In the eye of the beholder: Reconciling interpretations of forest landscape restoration

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Abstract

Although forest restoration is not a new concept, it has recently gained in popularity. Forest landscape restoration (FLR) in particular may be said to have acted as an ambassador for the wider restoration cause. Yet how different communities and disciplines interpret this complex term has implications for their implementation decisions. Although the term FLR is used widely, it signifies different things to different people. Ambiguity may prove to be both an asset and a liability. The objective of this article is to understand how different disciplines interpret FLR. I first review the diversity of terms and definitions related to the broad concept of restoration and then identify the interpretations different groups make of the term 'forest landscape restoration'. Five constructs are proposed based on these interpretations. The ultimate aim is to facilitate FLR implementation by raising awareness among practitioners and policymakers of the variety of interpretations of FLR, associated with different disciplines and communities of practice, and to facilitate the identification of common ground so that implementation can proceed. I conclude that there are significant divergences on the objectives of the term FLR and propose opportunities for collaboration, including through the sustainable development goals, to scale up restoration in the face of such divergences.

KEYWORDS

Bonn Challenge, FLR, forest landscape restoration, governance, SDGs

1 | INTRODUCTION

In the last few years, forest landscape restoration (FLR) has been advocated at many international fora as a solution to climate change, biodiversity loss, land degradation, poverty, wood supply, and food insecurity, among others. Governments from around the world are adhering to FLR via the Bonn Challenge, the New York Declaration on Forests, the Africa 100, or the Latin America 20 × 20—major political pledges to restore millions of hectares of land. FLR is presented as a means of achieving several international commitments, including the UN sustainable development goals (SDGs; Aronson & Alexander, 2013; AFR100, ny).

Restoration per se is not new (e.g., Higgs, 1997; Hobbs & Norton, 1996); the Society for Ecological Restoration (SER) was established in 1988. Although ecological restoration has a narrow definition (Clewell, Aronson, & Winterhalder, 2004), recent voices among restoration ecologists have sought to expand the ecological restoration approach to better respond to rapid global change (e.g., Hobbs, 2007; Suding et al., 2015) not without their critics (e.g., Murcia et al., 2014; Woodworth, 2017). In parallel, the umbrella term 'restoration' (in the context of forests) or, to use a term by Aronson, Blignaut, and Aronson (2017), the 'family of restorative activities,' cover diverse actions and processes, span many objectives, relate to various motivations, and aim for multiple end states (Burton & Macdonald, 2011; Hobbs & Norton, 1996). A wealth of associated terms such as reclamation, reforestation, afforestation, rehabilitation, and rewilding reflect this diversity (Table 2). Yet these terms ~~reflect~~, slightly different objectives (e.g., Woodworth, 2017), and individual

terms are preferred by different scientific and professional disciplines. Similarly, differing understandings of the term FLR exist, and these can hamper progress towards implementation (Chazdon & Laestadius, 2016).

The term FLR was coined in 2000 based on the perception that existing approaches to restoration were too narrow. Originally defined as 'a planned process that aims to regain ecological integrity and enhance human well-being in deforested or degraded landscapes' (WWF & IUCN, 2000), this gave rise to much ambiguity, not least because of the many terms in the definition that are unclear. For example, there is no single agreed definition on forests (Chazdon et al., 2016). As a result, ~~17~~ years later, it appears that different communities (from conservation NGOs to UN agencies and different governments) have interpreted the term 'forest landscape restoration' to suit their objectives (see, e.g., Pistorius & Kiff, 2017; Sabogal, Besacier, & McGuire, 2015). Depending on the user, it has become synonymous with different terms presented in Table 2. Ultimately, it can be argued that this same ambiguity has led to its widespread adoption and adaptation.

The contribution of this article is to disentangle the uses and interpretations of the term 'forest landscape restoration' by relating them back to their proponents' disciplinary backgrounds. I start by exploring the main disciplines and communities using the term FLR based on a review of publications and observations at several international meetings and workshops on FLR. I also identify related terms falling under the broad umbrella of forest restoration. Matching the disciplines and communities with the terms leads to the definition of five 'constructs' for FLR, which range from ecocentric to anthropocentric. The aim is to understand how different stakeholder groups and disciplines interpret, promote, and apply FLR, so that policymakers and practitioners can better appreciate the diversity of interpretations and ultimately, to seek common ground to facilitate FLR implementation. I associate FLR implementation with the SDGs to promote the integrative value of FLR to target policymakers in addition to practitioners.

2 | DISCIPLINES AND TERMS ASSOCIATED WITH FLR

Disciplines are defined as having common values, personal acquaintances, and applying similar problem-solving techniques (Stichweh, 1992). Within disciplines, separate communities of practice (groups that share a common concern or approach, and that further develop knowledge as defined by Wenger, 1998) can be identified. Different disciplines may use the same term in different ways, leading to confusion (Petrie, 1976). For example, the concept of forests can refer to land use or a legal designation or simply 'home' (Chazdon et al., 2016). Searching scientific publications is revealing because they reflect the cohesiveness of a discipline and also help to shape scientific disciplines (Stichweh, 1992). A search for the term 'forest landscape restoration' in either the title or the topic field in the online database ISI Web of Science reveals that out of a total of 65 journal articles on FLR since 2008, 23 were in forestry journals, with the remainder being classified as general environmental journals (22) and biodiversity conservation and ecology journals (25). The third category are in geography, economics, planning, and agriculture journals (12). The remainder are outliers such as two articles classified under 'meteorology and atmospheric sciences' journals (note that ISI classifies articles under more than one category, which is why the total is higher than 65). Clustering these articles reveals that three broad disciplines are interested in FLR: foresters, ecologists, and rural development specialists (see Figure 2 central Venn diagram and Table 1). Within these, subcategories can also be identified, such as conservation biologists, restoration ecologists, or landscape ecologists under the 'ecology' discipline. A similar search in the online database Scopus confirms the proportional balance between the disciplines.

Recent conferences and workshops on FLR have been convened by a relatively small number of institutions (some examples are illustrated in Table 1) also aligned with these three broad disciplines.

Three caveats are necessary to highlight: (a) although forestry, ecology, and rural development are the main disciplines identified,

TABLE 1 Example of disciplines and communities interested in forest landscape restoration (FLR)

Discipline	Forestry	Ecology	Rural development
Community of practice	Foresters National forest services Research bodies	Ecologists Non-governmental organisations (NGOs) Research bodies	Extension officers Agronomists Economists Development agencies
Examples of organisations	Center for International Forestry Research (CIFOR) International Tropical Timber Organization (ITTO) International Union of Forest Research Organizations (IUFRO)	International Union for ~~4~~ Conservation of Nature (IUCN) World Resources Institute (WRI) Worldwide Fund for Nature (WWF)	Food and Agriculture Organization of the United Nations (FAO) Overseas Development ~~institute~~ (ODI) United Nations Convention to Combat Desertification (UNCCD)
Examples of meetings	*Knowledge sharing workshop on FLR in Rwanda—2016 (IUFRO) *Accelerating Restoration of Degraded Forest Landscapes in Bonn—2017 (CIFOR-GIZ)	*Contribution of FLR to nationally determined contributions (NDCs) in Bonn—2017 (IUCN) *International Expert Meeting on FLR—February 2002 in Costa Rica (WWF/IUCN).	*Private investments in FLR in Rome—2015 (FAO/UNCCD) *Financing mechanisms for local investment in forest and landscape restoration—2017 in Rome (FAO)
Examples of journals	Journal of Forestry Forests Forest Ecology and Management	Biotropica Restoration Ecology Conservation Biology	Society and Natural Resources Journal of Rural Studies Agroecology and Sustainable Food Systems

they are not the only ones using the term and over time, it is likely that more disciplines will adopt this term, moulding it to suit their needs; (b) overlap exists between disciplines with, for example, a rural development economist being interested potentially in both the forestry management dimension and the broader ecosystem goods and services provided by forested landscapes; (c) although disciplines and communities of practice can be described, these are not perfectly homogeneous groups. For example, ecologists in Brazil prioritise restoration differently than ecologists in Scotland because of their specific social, cultural, economic, and environmental contexts.

3 | CONSTRUCTS IN FLR

Examining the definitions of the different terms associated with forest restoration (Table 2 for a nonexhaustive list) helps to better differentiate them by identifying the actions involved and the ultimate objectives. An analysis of the 24 terms in Table 2 reveals that they cover 24 different actions—for example, managing, establishing, modifying, and diversifying. They also cover 33 different objectives, such as improving structure or composition or productivity, although seven terms (e.g., prestoration and reforestation) do not have an explicit objective. Analysing the objectives indicates that they cover a range from species-focused to utilitarian (Figure 1) and are associated with the ecocentric versus anthropocentric view. At the ecocentric end, specific objectives relate to returning 'wild species,' 'vegetation,' and 'biodiversity' with terms such as 'habitat reconstruction,' 'rewilding,' and 'ecological restoration.' At the anthropocentric end, specific objectives focus on 'controlling erosion' or 'restoring productivity' associated with terms such as 'functional restoration' or 'rehabilitation' (see column 4 in Table 2).

This analysis reveals the diversity of objectives and actions falling under the umbrella of restoration. Often, multiple goals apply (Perring et al., 2015) and FLR was defined specifically with the idea of meeting multiple objectives, both ecocentric and anthropocentric. Re-grouping objectives, and associating them with the three broad disciplines, yields five possible 'constructs' for FLR (Figure 2). Constructs are used here to imply more than objectives; it is the way in which different stakeholders interpret the term rather than the specific objectives to which they relate it.

3.1 | Construct 1: FLR is about safeguarding biodiversity and regaining ecological integrity

For the conservation community (including conservation NGOs and ecologists), FLR is a complement to protected areas (Aldrich et al., 2004). A recognition among conservation biologists that there is a need to move beyond just protecting natural areas in order to scale up conservation efforts leads to the inclusion of sustainable management and restoration in their toolbox (Adams, 2016). The emphasis remains however, on biodiversity, with a focus on restoring habitat for endangered species (CBD, 2016; Howell, Harrington, & Glass, 2012), creating linkages between protected areas (Bennett, 1999), or improving existing protected areas (Keenleyside, Dudley, Cairns, Hall, & Stolton, 2012). Ecologists tend to focus on the biodiversity and authenticity dimensions of restoration, using terms such as 'ecosystem restoration,' 'ecological restoration,' and 'natural regeneration,' which emphasise what was believed to be there before an event that led to degradation or deforestation (McDonald, Gann, Jonson, & Dixon, 2016; Suding et al., 2015).

Ecological integrity is in the definition of FLR, and it remains a core principle of restoration ecology although its specifics remain elusive (e.g., Suding et al., 2015). For the SER, ecological integrity is defined in terms of biodiversity (particularly species composition and ecosystem structure; Aronson & Van Andel, 2006). Until recently, restoration ecologists had not been as receptive to FLR, fearing possibly that the human dimension might dilute the ecological priorities, or concerned with the vagueness of the term and its related complexity, or with its association with ecosystem services and related neo-liberal implications. The analysis of the ISI Web of Science reveals that only five articles with FLR in the topic field or title are in restoration journals. However, a scan of the abstracts at the 2017 conference of the SER reveals that there were at least 20 sessions related to FLR, a dramatic increase from the previous conference, and a growing acknowledgement by restoration ecologists of the need to consider FLR.

3.2 | Construct 2: FLR can reduce land degradation and enhance food security

Reversing land degradation is promoted by soil and agricultural scientists, and the broader rural development community, particularly at the international level by the UNCCD and FAO. Rural development specialists perceive the role of restoration to be improving agricultural productivity and reducing land degradation (Blaikie & Brookfield, 2015). Their focus is on improving environmental conditions for rural people, using terms such as 'rehabilitation,' 'reforestation,' 'revegetation,' or 'landscape restoration.' The concept of 'land degradation neutrality' was launched in 2012 within the 'World we Want' initiative of the UN and necessitates restoration. It takes an anthropocentric approach, emphasising notably, ecosystem services, productivity, food security, and resilience of people (Akhtar-Schuster et al., 2017; Orr et al., 2017). The UNCCD bolstered the concept of restoration as a solution to land degradation further to the acknowledgement that it was not able to halt land degradation without offering a solution such as restoration (Chasek, Safriel, Shikongo, & Fuhrman, 2015) and its executive secretary called for 'a global landscape restoration revolution' (UNCCD website). For the UNCCD, 'landscape restoration' can help small farmers dependent on agriculture for their livelihoods (UNCCD website). Indeed, food production systems require many of the services provided by forests and trees in the landscape (MEA, 2005). FLR presents an opportunity to link agriculture with the services provided by forests in the context of productive landscapes (Latawiec, Strassburg, Brancalion, Rodrigues, & Gardner, 2015). Specific approaches promoted under FLR include agroforestry, fuelwood lots, or intercropping, which seek to achieve multiple objectives that reconcile ecological improvement with sustaining rural livelihoods and empowering communities (e.g., Charnley & Poe, 2007). For example, the establishment of community-run fuelwood plantations has attempted to reduce removals from natural forests, while empowering

TABLE 2 Terms Associated with Forest Restoration

Term	Key elements	Definition	Objective	Action
Afforestation	Returning trees to a site that was not previously considered forest	*"Establishment of forest through planting and/or deliberate seeding on land that, until then, was not classified as forest." (FAO, 2012).*	*Forest*	*Establishing* *Planting* *Seeding*
Ecological restoration	Assisting damaged ecosystems to recover to a previous state before degradation	*"the process of assisting the recovery of an ecosystem that has been degraded, damaged or destroyed." (Clewell et al. 2004*; Keenleyside et al. *2012*; McDonald et al. *2016.* *"It is the practice of restoring ecosystems as performed by practitioners at specific project sites" (Clewell et al. 2004)* *"an attempt to recover a natural range of ecosystem composition, structure, and dynamics" (Palmer et al. 2006).*	*Composition* *Structure* *Dynamics*	*Recovering* *Assisting*
Ecosystem repair	Helping an ecosystem to recover	*"to aid the recovery of an ecosystem" (Clewell et al. 2004*; Grenfell, Ellery, Garden, Dini, & Van der Valk, *2007)*		*Recovering*
Ecosystem restoration	Framing ecological restoration in the context of biodiversity and resilience	*"the process of managing or assisting the recovery of an ecosystem that has been degraded, damaged or destroyed as a means of sustaining ecosystem resilience and conserving biodiversity." (CBD, 2016).*	*Resilience* *Conserving biodiversity*	*Managing* *Assisting* *Recovering*
Forestation	Generic term for returning trees to land (forest or other)	*Refers to "reforestation, afforestation and tree planting" which is "the artificial establishment of trees outside forests" (Wiersum, 1984)*		*Establishing*
Forest landscape restoration	Improving forest quantity and quality within a landscape for both humans and biodiversity	*"a planned process that aims to regain ecological integrity and enhance human wellbeing in deforested or degraded landscapes" (WWF & IUCN, 2000)* *"an active process that brings people together to identify, negotiate and implement practices that restore an agreed optimal balance of the ecological, social and economic benefits of forests and trees within a broader pattern of land uses" (Sabogal et al, 2015)*	*Ecological integrity* *Human wellbeing* *A balance of ecological, social and economic benefits of forests and trees*	*Regaining* *Enhancing* *Identifying* *Negotiating* *Implementing*
Functional restoration	Focus of restoring functions and structure of an ecosystem	*"the manipulation of interactions among process, structure, and composition in a degraded ecosystem. Functional restoration aims to restore functions and improve structures with a long-term goal of restoring interactions between function and structure" (Stanturf, Palik, & Dumroese, 2014).*	*Functions* *Structure* *Process* *Composition* *Interactions between functions and structure*	*Manipulating*
Habitat restoration	Returning conditions to a site for the needs of a given species (or group of species)	*"Ecological restoration with respect to the living conditions for a particular species" (Howell et al. 2012).*	*Species*	
Landscape restoration	Inclusion of landscape processes in restoration	*Ecological restoration that "incorporate[s] specific large-scale, landscape-level processes" (Holl, Crone, & Schultz, 2003).* *"aims to restore the essential ecosystem functions which nature provides, which people fundamentally rely upon and which make concrete contributions to solving global challenges, from food and poverty to living within planetary boundaries." (UNFCCC website).*	*Processes* *Functions*	
Natural regeneration	Passive (natural) process whereby trees and plant species regenerate and re-establish in an area	*"a gradual process of recovery of the structure, function, and composition of the pre-disturbance ecosystem" (Chazdon & Guariguata, 2016).*	*Structure* *Function* *Composition*	*Recovering*

(Continues)

TABLE 2 (Continued)

Term	Key elements	Definition	Objective	Action
Prestoration	Restoration that looks to both the past and future in anticipation of climate change	*"utilizing species in restoration for which a site represents suitable habitat now and into the future." (Butterfield et al., 2017)*		*Utilizing*
Rainforestation	Type of agroforestry where farming is done under native forest cover	*"closed canopy and high diversity tree-based farming system" (Göltenboth, 2011).*	*Closed canopy* *High diversity farming system*	
Reallocation	Converting an ecosystem to a different form	*"the conversion of an ecosystem to a different kind of ecosystem or land use primarily for purposes other than the conservation management of local native ecosystems" (McDonald et al. 2016)*	*Non-conservation purpose*	*Converting*
Reclamation	Returning a mined or industrial site (or other heavily degraded site) to vegetation	*"The main objectives of reclamation include the stabilization of the terrain, assurance of public safety, aesthetic improvement, and usually a return of the land to what, within the regional context, is considered to be a useful purpose" (Clewell et al. 2004).* *"the making of land fit for cultivation." (Bradshaw, 1996).* *"applies to severely degraded land generally devoid of vegetation, often the result of belowground resource extraction, such as mining (..) or work pads associated with oil and gas drilling. On such sites, more intensive management techniques are usually necessary to revegetate the site" (Stanturf, Palik, Williams, Dumroese, & Madsen, 2014)*	*Stabilization of the terrain* *Public safety* *Aesthetics* *Useful purpose* *Land for cultivation*	*Managing intensively*
Reconciliation ecology	Modifying human-dominated spaces to accommodate plant and animal species	*"how to modify and diversify anthropogenic habitats so that they harbor a wide variety of wild species". (Rosenzweig, 2003).* *"attempts to encourage biodiversity in human-dominated landscapes" (Corlett, 2016).*	*Wild species* *Biodiversity*	*Modifying* *Diversifying* *Encouraging*
Reconstruction / Habitat reconstruction	Returning native species to a site that has been used for other purposes	*"restoring native plant communities on land recently in other resource uses, such as crop production or pasture" (Stanturf et al. 2014b)*	*Native plants*	
Reforestation	Returning trees to a site that is classified as forest	*"Re-establishment of forest through planting and/or deliberate seeding on land classified as forest." (FAO, 2012).*		*Re-establishing* *Planting* *Seeding*
Rehabilitation	Returning degraded land to some more ecologically diverse state	*"emphasizes the reparation of ecosystem processes, productivity and services," (Clewell et al. 2004)* *"restoring desired species composition, structure, or processes to an existing, but degraded ecosystem." (Stanturf et al. 2014b)*	*Processes* *Productivity* *Services* *Species composition* *Structure*	*Repairing*
Reintroduction	Bringing back a species in an area where it used to be found	*"the release of an organism into an area that was once part of its range but from which it has been extirpated" (Seddon, 2010)*		*Releasing*
Remediation	Improving land cover after serious damage	*"reversing effects of contamination or pollution, e.g., after oil spill" (Burton, 2014).*		*Reversing*
Replacement	Using non-indigenous species to return tree cover to a site	*"replacement of species (or their locally-adapted genotypes) being displaced by climate change with new species (or new genotypes of that species) that have been historically absent from the site" (Stanturf et al 2014b)*	*New species* *New genotypes*	*Replacing*

(Continues)

TABLE 2 (Continued)

Term	Key elements	Definition	Objective	Action
Restocking	Replanting similar trees in a managed forest	*"the release of individuals into an existing population of conspecifics" (Seddon, 2010)*		*Releasing*
Revegetation	Similar to restocking but not necessarily with the same species	*Returning vegetation cover "primarily aimed at restoring productive functions or avoiding further soil erosion." (Stanturf et al. 2014a)*	*Vegetation cover* *Productive functions* *Avoiding erosion*	*Returning*
Rewilding	Bringing back animal species to a site and allowing nature to take its course	*"the scientific argument for restoring big wilderness based on the regulatory roles of large predators" (Soulé & Noss, 1998).*	*Regulatory role* *Large predators*	

local communities, reducing their vulnerability, and supporting their food production. The amount and quality of trees promoted by those interested in sustainable agriculture differ to those promoted by the ecological restoration community. 'Landscape restoration' and 'rehabilitation' are often interchanged with FLR under this construct.

3.3 | Construct 3: FLR helps to build natural capital

Re-establishing forest cover is perceived here purely in financial terms. This is the construct of rural development economists although it is also being used by all three disciplines highlighted in Figure 2. Given the estimated vast sums of money needed for restoration (up to USD 49 billion per year according to FAO and UNCCD (2015)), it is seen as useful—if not essential—to put an economic value on the services that restoration can provide. The commodification of nature has been spurred on by neo-liberal influences spilling over into the conservation world (Adams, Hodge, & Sandbrook, 2014). Terms such as 'natural capital,' 'natural assets,' and 'ecosystem marketplace' have become widespread. Measuring and quantifying the values of forest (both lost and restored) maintain the argument that FLR is a worthwhile investment. The concept of services provided by ecosystems, including forests, has been promoted through global assessments such as the Millennium Ecosystem Assessment (MEA, 2005) or The Economics of Ecosystems and Biodiversity (TEEB, 2008), and the ostensibly quantifiable, comparable, and tradeable values of such services constitute a cornerstone of these recent developments (Costanza et al., 2014). Recent recognition and assessment of these valuable ecosystem services provided by natural resources have rekindled interest in the financial aspects of restoration.

Ecosystem services have also become a proxy for the delivery of 'human well-being' in conservation and restoration projects (Adams et al., 2004; Daw, Brown, Rosendo, & Pomeroy, 2011) although critics highlight the difficulty in quantifying the values of ecosystems, particularly cultural, spiritual, or aesthetic values (Telesetsky, 2012). Markets for carbon have exemplified this approach and generated interest in different forms of tree planting, although they have raised challenges concerning possible incompatibility of objectives (Bullock, Aronson, Newton, Pywell, & Rey-Benayas, 2011), inadequate payment mechanisms (Lamb, Erskine, & Parrotta, 2005), or inequity in the distribution of these payments (Adams et al., 2014; Phelps, Webb, & Agrawal, 2010). Terms used include 'reallocation,' 'forestation,' or 'afforestation.'

3.4 | Construct 4: FLR supports sustainable timber production

Under this construct, the role of forest and of restoring forest cover is limited to the supply of timber. In the context of 'restoration,' foresters have tended to focus on returning productivity and increasing biomass, using terms such as 'rehabilitation' or 'restocking.' 'Functional restoration' is also used by the forestry sector as it emphasises the utility value of forests (Stanturf et al., 2014; Stanturf et al., 2014). Much criticism has been levelled at foresters for their blanket

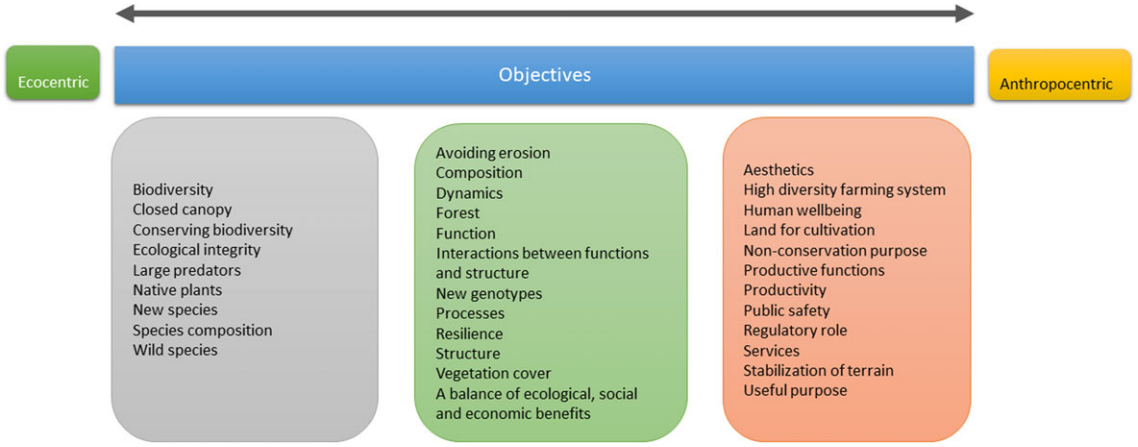

FIGURE 1 Objectives of different restoration terms on an ecocentric-anthropocentric continuum [Colour figure can be viewed at wileyonlinelibrary.com]

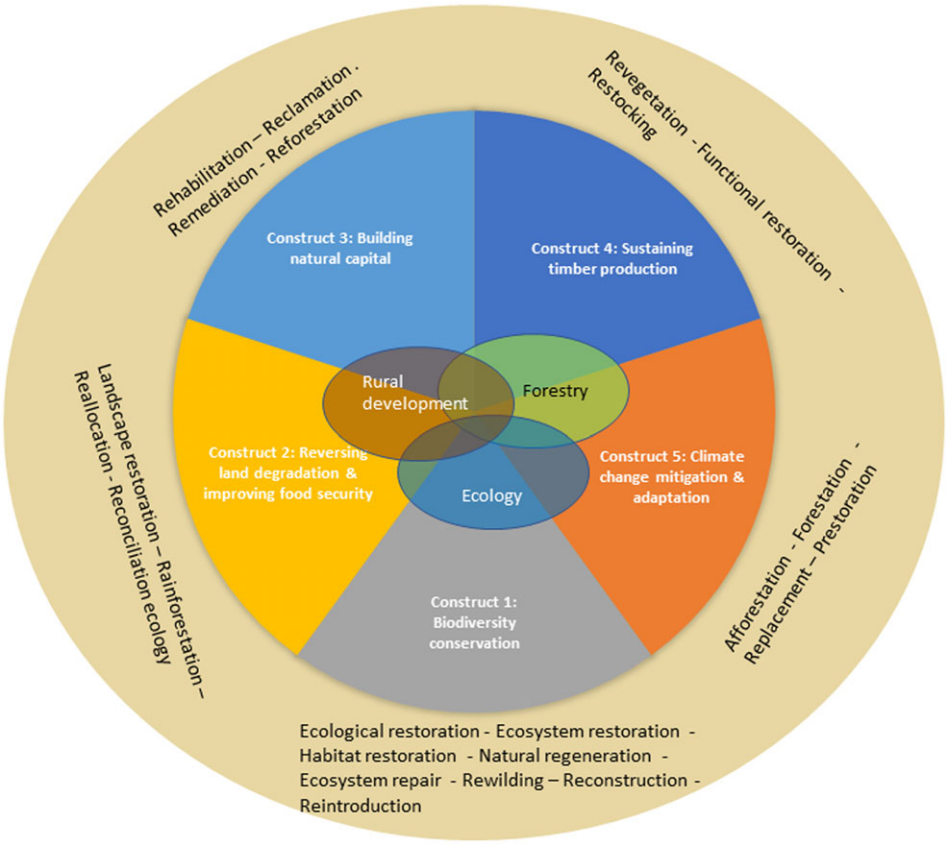

FIGURE 2 Different disciplines have different understandings of forest landscape restoration (FLR) [Colour figure can be viewed at wileyonlinelibrary.com]

approach to "restoration" whereby they have promoted the use of a small number of species whose reproduction and management they master, leading to simplified, artificial landscapes (Lamb et al., 2005; Sayer, Chokkalingam, & Poulsen, 2004), providing only a narrow set of benefits (Boedhihartono & Sayer, 2012; Ciccarese, Mattsson, & Pettenella, 2012). Today, although primarily concerned with forest management to sustain yields, foresters, in many parts of the world, also increasingly recognise multiple objectives in forestry (Gillis, 1990; Kuchli & Blaser, 2005; Wiersum, 1995). For many foresters, FLR applies to their efforts at larger scales to marry timber production with multiple objectives.

3.5 | Construct 5: FLR contributes to climate change mitigation and adaptation

Growing understanding and quantification of the role of trees in both carbon sequestration and social and ecological adaptation to climate change have provided another role for FLR. This construct

FIGURE 3 Links between sustainable development goals (SDGs) and forest landscape restoration constructs. Five SDGs (on the left) are "enabling" [Colour figure can be viewed at wileyonlinelibrary.com]

is shared more widely, to a large extent by all three core disciplines examined here. Climate change impacts have risen on the agenda of world leaders in the last decade; in part (Stern, 2007), TEEB (2008), and the MEA (2005). Additional voices from the private sector echo concern about the business impact of climate change (SwissRe, 2016). Forests were brought on the climate change agenda very prominently in 2007 at the UNFCCC COP 13 where the intergovernmental forum the 'International Coalition of Rainforest Nations' brought restoration to the fore among decision-makers alongside protection and sustainable management of forests through REDD+.[1] Rather than tackle emissions by targeting businesses, forests were seen as an 'easy solution' to mitigate climate change and to offset emissions from industry. Forest restoration took on more importance for governments and the private sector in the context of climate change mitigation and adaptation, particularly further to the Paris Agreement signed in 2015. The role of FLR in climate change mitigation and adaptation is manifold: It can serve to increase the productivity of landscapes, to enhance the resilience of forest ecosystems and to reduce the vulnerability of forest-dependent human communities (Stanturf et al., 2015). Terms used under this construct include 'replacement,' 'reforestation,' and 'afforestation.'

[1]Reducing Emissions from Deforestation and forest Degradation and the role of conservation, sustainable management of forests, and enhancement of forest carbon stocks.

4 | WHAT ARE THE IMPLICATIONS?

All of the above constructs are equally important. They each reflect very real objectives that humanity needs from forested landscapes. Although they present a picture of dissonance, with clearly different understandings as shaped by subjective perceptions (Hajer & Versteeg, 2005), they also demonstrate that FLR can contribute to several objectives for humankind, as exemplified by the SDGs (see Figure 3). Different objectives may be more or less important to different groups at different times. Terms and their use evolve over time; however, what is significant with FLR is the concurrent interpretations of the term that have recently emerged and are being used in parallel. An understanding of the multiple interpretations of FLR promoted by different communities can lead to better integration across disciplines and to more cost-effective and sustainable implementation.

In many ways, FLR has helped to expand the reach of restoration as an umbrella concept, raising awareness among a much wider international group of decision-makers about the value and importance of forest restoration. As restoration shifts from an emphasis on 'restoration for restoration's sake' to one that seeks to emphasise the ultimate objectives of restoration, the perception and interpretation of different communities can clash. Although FLR fails to have an 'institutional home' having outgrown its initial abode in the conservation community, it has been adopted and adapted by many different communities. In doing so, FLR has been moulded and reshaped to suit

diverse needs and expectations as exemplified by the five constructs introduced here.

Positive and negative outcomes result from this discordance. On a more pessimistic note, the lack of common understanding of the term and highly divergent interpretations of its intent may lead to implementation paralysis, significant sums of money being spent by groups for different objectives, and priorities that do not aggregate into something meaningful (Mansourian, Stanturf, Derkyi, & Engel, 2017; Woodworth, 2017). Vagueness may lead to poor implementation and to success being claimed more easily regardless of outcomes.

Striking an optimistic tone, the numerous interpretations and constructs of FLR have led to its widespread adoption, to expanding the concept of 'restoration' making it more widely acceptable and relevant to local needs. It has also led to increased funding, increased involvement and commitments from numerous partners and stakeholders, and generated momentum for a number of alliances and partnerships.

As the world is adopting the SDG framework to tackle global challenges, there is an opportunity for FLR to integrate within numerous goals. The constructs presented provide a means to align FLR with SDGs, to speak the language of different communities and disciplines while acknowledging the diversity of interpretations. It also sets the stage for improved interdisciplinarity in FLR implementation.

Moving forward, it is important to recognise the following:

1. There are highly divergent interpretations of the term FLR. A clear statement upfront of stakeholders' goals and motivations in a given FLR project or programme can contribute to improving mutual understanding and reducing potential conflicts.
2. At times, these interpretations may not be compatible (e.g., increasing carbon stocks through fast growing exotic species and biodiversity conservation through restoration of native habitat around protected areas).
3. Where they can be compatible, it may be useful to devise landscape-scale plans, establish multi-stakeholder negotiation platforms and design scenarios that can acknowledge and embrace multiple objectives under one common landscape vision.
4. The SDG framework and current efforts towards its implementation provide a useful inroad for FLR implementation recognising the contribution of the FLR constructs identified here and their links to the SDGs. For example, restoring riparian forests can contribute to SDG 15 on terrestrial ecosystems, but equally to SDG 6 on water and SDG 13 on climate change.

Collaboration, negotiation and trade-offs can help to better align differing constructs and determine their contribution, limits and parameters within the landscape, particularly as these evolve over time. These building blocks could start to bring order in the current chaos of FLR enthusiasm.

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