Land Use Policy 96 (2020) 104686

Contents lists available at ScienceDirect

Land Use Policy

journal homepage: www.elsevier.com/locate/landusepol

Five scale challenges in Ecuadorian forest and landscape restoration governance

Daniel Wiegant[a,*], Manuel Peralvo[b], Pieter van Oel[c], Art Dewulf[a]

[a] Public Administration & Policy Group, Wageningen University. Hollandseweg 1, 6706 KN, Wageningen, the Netherlands
[b] Consorcio Para El Desarrollo Sostenible De La Ecorregión Andina (Condesan). Calle Germán Alemán E12-123 y Carlos Arroyo Del Río, Quito, Ecuador
[c] Water Resources Management Group, Wageningen University. Droevendaalsesteeg 3a, 6708 PB, Wageningen, the Netherlands

ARTICLE INFO

Keywords:
Forest and landscape restoration governance
Scale challenges
Policy

ABSTRACT

The forest and landscape restoration (FLR) targets set as part of the Bonn Challenge draw attention to the governance arrangements required to translate national FLR targets into local action. To achieve the targets, actors at multiple levels of the governance scale aim to influence relevant processes on the ecological scale. In this article, we focus on the scale challenges relating to the implementation of Ecuador's restoration targets, by analysing the implementation of the 2014–2017 National Forest Restoration Plan in the montane *Chocó Andino* and *Bosque Seco* landscapes. From 54 semi-structured interviews, a document review, and geographical data analysis, we identified two temporal (i, ii) and three spatial scale challenges (iii, iv, v): i) Political cycles mismatch with FLR timelines; ii) Planning horizons mismatch with FLR timelines; iii) National restoration objectives mismatch with decentralised land use planning realities; iv) The governance level of existing FLR efforts mismatches with the level receiving restoration funds; and v) Tensions exist between the spatial dimensions of biodiversity and water-related restoration efforts. The findings highlight that more attention must be given to scale-sensitive governance to make the process in which national FLR targets are translated into local action more effective.

1. Introduction

A continued, long-term increase in the extent and intensity of anthropogenic land use has led to the loss or diminished regulation capacity of ecosystems (Dawson et al., 2017; Foley et al., 2005). The loss or reduction of an ecosystem's capacity to sustain biological or economic productivity – generally termed land degradation – results in decreased yields, income, and food security and a weakening of vital ecosystem functions (Barbut and Alexander, 2015). Currently, land degradation processes are systemic phenomena that negatively impact the well-being of at least 3.2 billion people and push the planet towards a sixth mass extinction of species (IPBES, 2018). The restoration of degraded lands has therefore become an urgent priority to ensure human well-being and protect biodiversity and ecosystem functions (IPBES, 2018; IPCC, 2019).

Over two billion hectares of deforested and degraded lands worldwide currently offer opportunities for restoration (Pistorius and Freiberg, 2014). In recognition of these significant opportunities and an urgency to act, unparalleled political will has been demonstrated at international level to achieve ambitious restoration targets (Chazdon et al., 2017; Suding et al., 2015). Significant commitments have been made as part of the 2010 Aichi Convention on Biological Diversity to restore at least 15 % of degraded ecosystems globally and as part of the 2011 Bonn Challenge, which aims to inspire national and sub-national governments to restore 150 million hectares of deforested and degraded forest by 2020. The 2014 New York Declaration on Forests extended the Bonn Challenge target to restore a combined 350 million hectares of forest landscapes by 2030 (Suding et al., 2015). In the wake of the Bonn Challenge, several government-led regional efforts have been formed, such as the Initiative 20 × 20 in Latin America (Murcia et al., 2017). Fifty national governments and six sub-national governments have made restoration pledges to restore a specific number of hectares within their territory (bonnchallenge.org).

The pledges made as part of the Bonn Challenge follow the forest and landscape restoration (FLR) approach (Chazdon et al., 2017). This approach has been defined as a "planned process that aims to regain ecological integrity and enhance human well-being in deforested and degraded landscapes" (Mansourian, 2017, p. 21). In the FLR process, both forest and non-forest ecosystems, as well as other land uses, are accommodated in a landscape to achieve sustainable food production,

* Corresponding author.
E-mail address: daniel.wiegant@wur.nl (D. Wiegant).

https://doi.org/10.1016/j.landusepol.2020.104686
Received 5 October 2019; Received in revised form 6 March 2020; Accepted 9 April 2020

the provision of ecosystem functions, and biodiversity conservation (Chazdon et al., 2017). As a way to reconcile socio-economic and ecological priorities within multifunctional landscapes, the area-based or landscape approaches to environmental governance have received increased recognition (Reed et al., 2017). FLR comprises three dimensions (Mansourian, 2016; Mansourian and Parrotta, 2019). First, the governance objective is to regain ecological integrity in a way that ensures ecosystem functioning and provides social benefits; second, the landscape is the spatial dimension to achieve this objective; and third, there is an implicit temporal dimension as restoration is a long-term process.

Montane landscapes are of particular importance to protect biodiversity and ensure human well-being (Mathez-Stiefel et al., 2017; Price and Egan, 2014). With mountains generating higher precipitation levels than their surrounding low-lying areas, montane ecosystems play a crucial role in the regulation of water flows on which local and downstream agricultural systems and urban areas depend (Putzel et al., 2017). In addition, functioning montane ecosystems host high levels of biodiversity, reduce the occurrence and intensity of soil erosion, landslides, and flood events, and sequester atmospheric carbon. Because of their steep gradients however, montane landscapes are particularly vulnerable to disturbances triggered by the interplay between climate change and land use changes (Putzel et al., 2017), making them an important target of restoration initiatives.

National FLR plans, strategies, and policies have been and continue to be developed by many countries (Chazdon et al., 2017). With numerous authors highlighting the importance of governance to achieve successful FLR (Adams et al., 2016; Chazdon et al., 2017; Dawson et al., 2017; Guariguata and Brancalion, 2014; Mansourian, 2016; Opdam et al., 2015), particular attention is drawn to the governance arrangements required to translate the Bonn Challenge pledges into local action. Despite FLR's prominence in policy frameworks, it remains unclear how governments at different levels align governance arrangements with relevant ecological processes to create multifunctional landscapes (Mathez-Stiefel et al., 2017). It also remains largely uncharted how FLR plans and policies are achieved locally (Mansourian and Parrotta, 2019) and influenced by landscape context specificities. In spite of these knowledge gaps, governments at multiple levels are increasingly required to play their part in fulfilling national restoration targets, either by shaping enabling conditions to meet national targets locally or by actually finding the space in their jurisdiction to reconcile ecological and social priorities.

Our central question is: what are the scale challenges encountered in forest and landscape restoration governance? In the theoretical framework, we elaborate on the theory of scales and levels to explain the emergence of scale challenges. Subsequently, we clarify the policy and case study contexts, followed by an explanation of the data collection and analysis. In the results, we elaborate on the scale challenges encountered in FLR policy implementation, as well as on the governance arrangements that are shaped by landscape and policy level actors to navigate future scale challenges.

2. Theoretical framework

Restoration efforts often fail to meet their targets because they are not sufficiently comprehensive and they address degradation drivers in isolation (IPBES, 2018). No single actor has the knowledge or the resources to single-handedly solve complex problems such as land degradation. As a result of the diffusion of state power towards international actors (upward), decentralised governments and communities (downward), and civil society and non-state actors (outward) (Termeer and Dewulf, 2014), the involvement of actors that operate at different scales and levels is required (Ansell and Torfing, 2015; van Lieshout et al., 2011). In such a system, there is no single preferred level at which a phenomenon can best be studied; a multilevel perspective is required (Gibson et al., 2000). The scale concept offers a useful lens through which to analyse the challenges that emerge in such governance processes (Padt and Arts, 2014).

2.1. Scales and levels

Scale is understood as a dimension – or measuring rod – that facilitates the study of biophysical and social phenomena (Padt and Arts, 2014). We distinguish the ecological and the governance scale. The ecological scale comprises the various levels at which an ecological phenomenon plays out. It has a spatial and a temporal dimension (Gibson et al., 2000). Whereas the spatial dimension refers to the geographical extent and detail of a phenomenon like land degradation, the temporal dimension deals with the relevant timeframe and periods concerned. The governance scale comprises the various levels at which formal and informal governance arrangements are positioned in relation to a particular issue or sector (Termeer and Dewulf, 2014). Useful governance scale elements identified by Cash et al. (2006) include the jurisdictional scale, referring to nested public authority units, and the institutional scale, which consists of the rules that shape decision making. The governance scale also has a spatial and a temporal dimension (Termeer and Dewulf, 2014).

Different levels can be distinguished on each scale and most frequently refer to specific positions along the scale dimension. A level is not a quantitative unit but rather a qualitative order of measurement (Padt and Arts, 2014). Relevant ecological levels on the spatial dimension are the field, landscape, and ecosystem, and the short, medium, and long term on the temporal dimension. Relevant governance levels on the spatial dimension include national, provincial, and municipal government. Different levels on the institutional scale have varying temporal implications. Whereas a constitution usually has long-term validity, policies may change every four to five years, and operating rules can change in an even shorter term.

2.2. Scale challenges

FLR processes take place within the ecological system. However, FLR is a governance process that generates both social and ecological system impacts. If it is to meet social and ecological priorities in the millions of hectares that are now pledged, FLR needs to be integrated into the land use mosaic through an effort that spans multiple generations (Mansourian and Parrotta, 2019). When actors do not consider spatial and temporal dimensions on the ecological scale, or do not make meaningful attempts to align spatial and temporal dimensions on the governance scale, scale challenges emerge (Gibson et al., 2000). Cash et al. (2006) distinguished three types of scale challenges, and Termeer and Dewulf (2014) elaborated the scale-sensitive observing notion to deal with these. Both the three scale challenge types identified by Cash et al. (2006) and the scale-sensitive observing implications are discussed in the following:

A) *Failure to recognise important cross-scale and cross-level interactions*: The implementation of policies may be suboptimal if attention focuses on just one single level or scale (Cash et al., 2006). A restoration policy may target one jurisdictional level to provide short-term support without sufficiently considering possible constraints that exist at that level. A policy might also be blind to pre-existing, local restoration dynamics that could increase policy success. When cross-level or cross-scale interactions are not examined, restoration efforts may turn out to be ineffective or unsustainable. Cross-scale issues may relate to agricultural practices in groundwater recharge areas that unintentionally lead to the drying of springs on which the same farmers depend. Cross-level governance issues could relate to conflicts between policies and rules that are made at different governance scale levels. To address potential blind spots, interactions and interdependencies between ecological and governance scales must be understood, and an analysis is required of how

interdependent governance actors collaborate or not (Termeer and Dewulf, 2014).

B) *Persistence of mismatches between scales and levels*: This may happen when governance arrangements cannot find the appropriate spatial and temporal fit between the demand on an ecosystem and the ecosystem's ability to meet that demand (Cash et al., 2006). Spatial mismatches occur when the spatial reach of governance arrangements does not align with the ecological processes that are being restored. Temporal mismatches occur when the temporal reach of governance processes is not aligned with the temporal characteristics of ecological processes. In addition, scale mismatches can persist when policies lack local specificity and support (Cumming et al., 2013) – for example, land users whose land use practices need to be altered as part of the FLR process. To prevent this scale challenge from occurring, cross-scale and cross-level institutional fit needs to be explored to align governance levels with relevant ecological processes (Termeer and Dewulf, 2014). Creating a better fit may involve changes in the scaling of governance arrangements. This could be upwards to higher levels (more actors, longer-term planning horizons, larger jurisdictions) or downward to lower levels (fewer actors, shorter planning horizons, smaller jurisdictions) (Ansell and Torfing, 2015).

C) *Failure to recognise heterogeneity in the way that scales are perceived and valued*: Specific actors may define an issue in such a way that certain scales or levels become dominant, whereas others are given less significance. This could then place them at the centre of authority to offer the solution. Van Lieshout et al. (2011) call this process scale framing –the process of framing an issue by using a certain scale and/or level. When it comes to FLR, it could be that high-level institutions highlight its carbon sequestration benefits or ecological connectivity, whereas rural communities are mainly concerned with protecting their water sources. A bias towards certain interests, perceptions, and values at one level may result in ineffective and inequitable decisions for another level. There is no single best characterisation for a problem or solution that applies to the entire system or all actors involved (Cash et al., 2006). To recognise heterogeneity in the way issues are perceived and valued, observers need to be aware of the different scale frames that actors at levels enact to push their interests (van Lieshout et al., 2011).

3. Methods

3.1. General approach

Focusing the research on two montane landscapes in Ecuador, we adopted a qualitative multiple case study design (Yin, 2014) to understand the context in which we could analyse how challenges play out across scales and levels. Data were collected through a preliminary document review and in-depth semi-structured interviews. Interview references are placed between brackets ([…]) in the text and acronyms of the interviewed organisations are listed in Fig. 1. By transcribing the interviews in detail, we created a thick description (Geertz, 1973) of FLR governance processes as perceived by actors within Ecuador's community of practice.

To analyse the scale challenges in FLR policy implementation, we used grounded theory-informed exploratory methods to systematically and inductively analyse the qualitative data. These methods were complemented by deductive sensitising concepts – the scale and level notions and their temporal and spatial dimensions – that were used as a point of departure to analyse the interviews (Charmaz, 1996). It is not our intention to test a hypothesis, but rather to contribute to building theory about the scale challenges typically encountered in FLR governance.

3.2. National policy context

Cut through by the Andes mountains, Ecuador is a country in South America that pledged to restore 500,000 ha of degraded and deforested lands as part of the Bonn Challenge. Schweizer et al. (2018) listed Ecuador as a country with a large diversity of restoration policy frameworks, implementation mechanisms, and cross-sector initiatives. It is also one of four countries in Latin America that created a specific national restoration strategy (Méndez-Toribio et al., 2017). Ecuador hence offers a relevant case to study and analyse how national FLR policies are implemented locally and the challenges that emerge in the process.

Ninety-one ecosystem types are found in continental Ecuador, covering over 15.3 million hectares or 59.8 % of the country (MAE, 2016a). Of these, forest ecosystems covered almost 12.8 million hectares in 2014 after the loss of 2.2 million hectares of forest between 1990 and 2014. An estimated 47 % of Ecuador's territory suffers from land degradation as a result of ecosystem conversion for cattle raising and agriculture, deforestation in upper catchments, excessive soil tillage, and agriculture on steep slopes (MAE, 2016b).

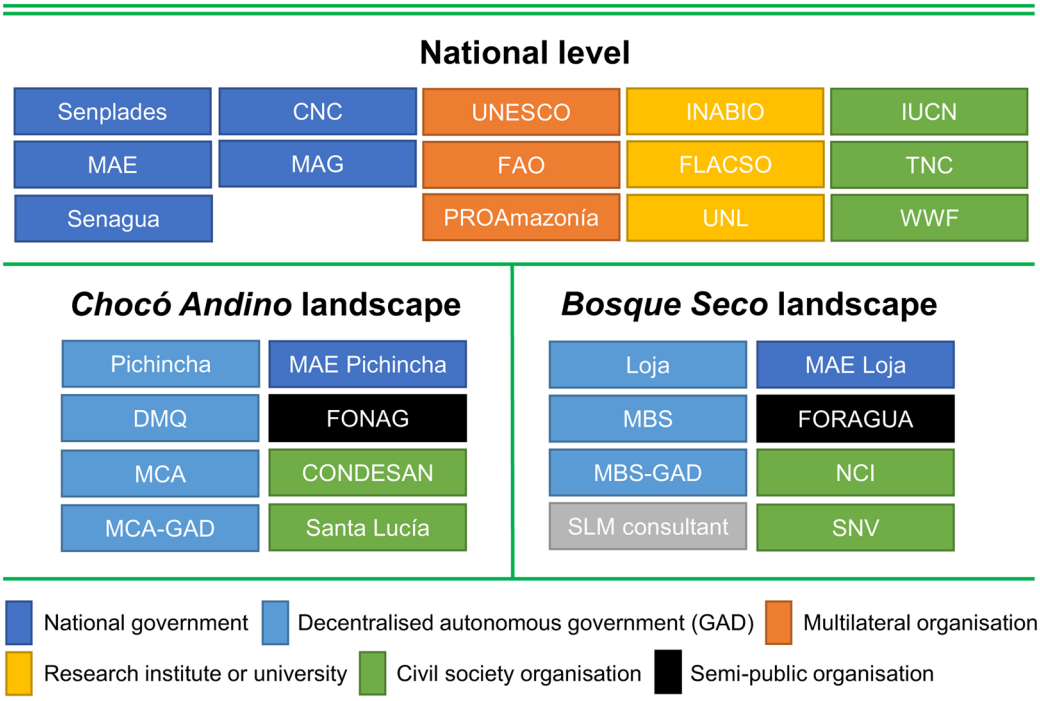
Restoration gained particular prominence in Ecuador's policy landscape with the adoption of the new constitution in 2008. The constitution contains 13 references to ecosystem restoration, including the right of society to live in a healthy and ecologically balanced environment (Art. 14) and the right of nature to be restored (Art. 72) (Asamblea Constituyente, 2008). This prominence has triggered the integration of restoration targets in multiple plans and strategies, ranging from national development plans (Senplades, 2017, 2013) to sector-specific strategies that relate to forests (MAE, 2018, 2016a, 2014, 2013), agriculture (MAE, 2013), biodiversity (MAE, 2016b), climate (MAE, 2012), and water (República del Ecuador, 2014). Building on decades of reforestation policy, several policies have been created since 2008 to restore various types of native vegetation, either by reforestation or natural regeneration. The Ministry of Environment (MAE) has been mainly responsible for implementing restoration policies, and the former National Planning and Development Secretariat (Senplades) has been instrumental in determining local implementation as part of a wider decentralisation process.

In 2013, momentum for landscape restoration in Ecuador received another significant stimulus when the World Resources Institute requested the President's Office to become part of Initiative 20 × 20 and make a pledge to restore degraded and deforested land [INABIO]. Instigated by the President's ambition to join the initiative and to fulfil restoration objectives set in the 2013–2017 National Development Plan (Senplades, 2013), the National Forest Restoration Plan was created by MAE. This plan envisioned the restoration of 500,000 ha between 2014 and 2017 (MAE, 2016a) to achieve a net zero deforestation balance, based on predicted deforestation rates between 2008 and 2017 (MAE, 2014).

The National Forest Restoration Plan became the first restoration policy to be implemented through the Decentralised Autonomous Governments (GAD), which in Ecuador consist of the provincial, municipal, and parish governments. The roles and responsibilities of these local governments were determined as part of a decentralisation process that was started in 2008, and, to obtain funding from Senplades to fulfil these roles, local governments are required to revise their Territorial Land Use and Development Plans after each local election. To pool resources and better implement their roles and responsibilities, two or more local governments also have the possibility to form a local government association – *mancomunidad* in Spanish (República del Ecuador, 2010).

3.3. Landscape restoration cases

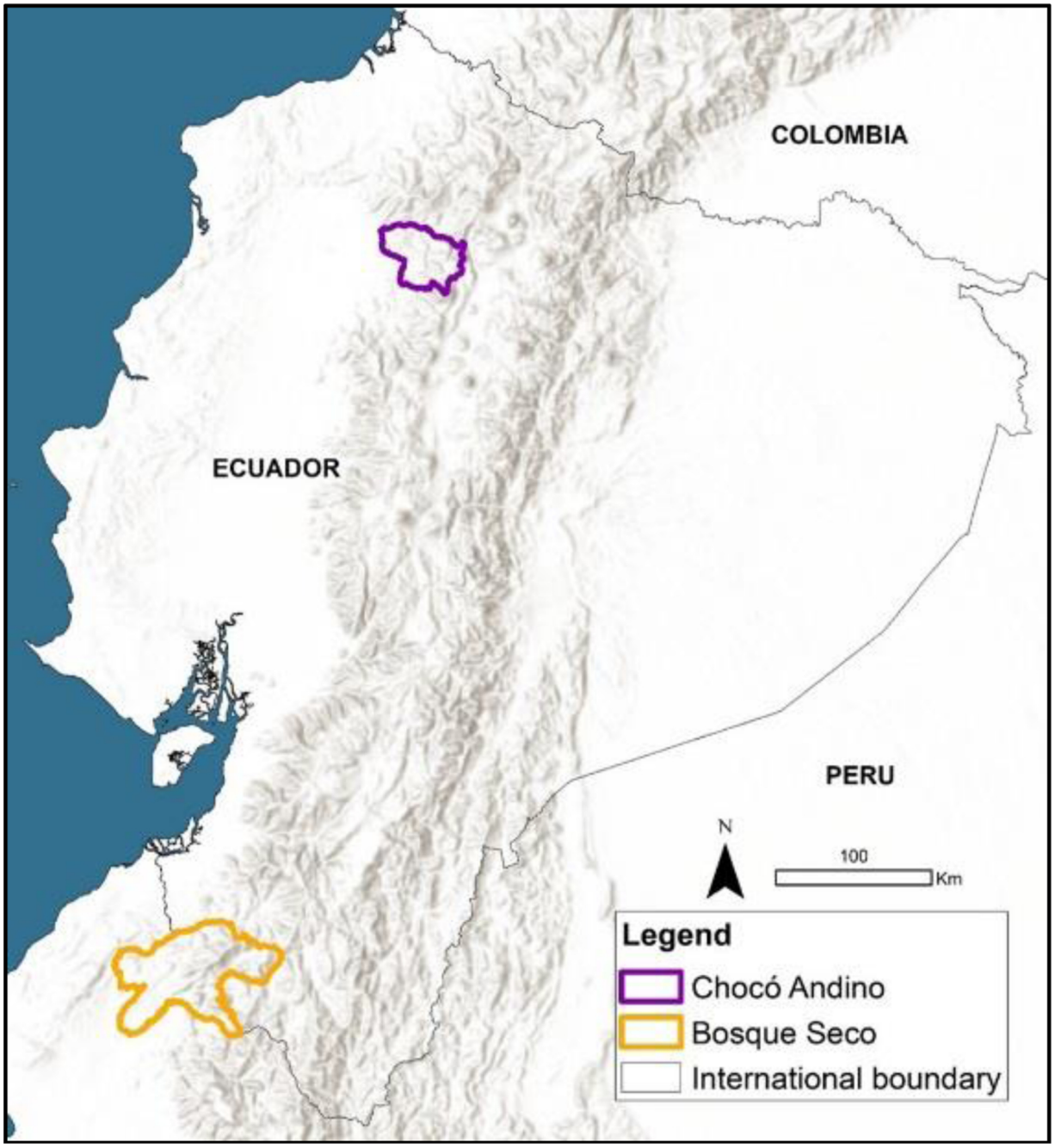
We focus on the governance context of two montane forest landscapes: the *Chocó Andino* and the *Bosque Seco*. These landscapes are examples of places where civil society and local governments initiated



CONDESAN	Consortium for the Sustainable Development of the Andean Ecoregion
CNC	National Council of Competencies
DMQ	Quito Metropolitan District municipal government
FAO	Food and Agriculture Organisation of the United Nations
FLACSO	Latin American Social Sciences Institute
FONAG	Water Protection Fund
FORAGUA	Regional Water Fund
INABIO	National Biodiversity Institute
IUCN	International Union for the Conservation of Nature
Loja	Loja Province government
MAE	Ministry of Environment
MAE Loja	Ministry of Environment Loja Province branch
MAE Pichincha	Ministry of Environment Pichincha Province branch
MAG	Ministry of Agriculture
MBS	Association of Municipalities of the Southwest of Loja Province
MBS-GAD	Municipal governments belonging to the MBS: Celica, Macará, Paltas, Puyango, Zapotillo
MCA	Association of Rural Parishes of the Chocó Andino Bioregion
MCA-GAD	Parish governments belonging to the MCA: Calacalí, Gualea, Mindo, Nanegal, Nanegalito, Nono, Pacto
NCI	Nature and Culture International
Pichincha	Pichincha Province government
PROAmazonía	Integrated Programme for the Amazon for Forest Conservation and Sustainable Production
Santa Lucía	Santa Lucía Cooperative
Senagua	National Water Secretariat
Senplades	National Secretary of Planning and Development
SNV	Netherlands Development Organisation
TNC	The Nature Conservancy
UNESCO	United Nations Educational, Scientific and Cultural Organisation
UNL	National University of Loja
WWF	World Wildlife Fund

Fig. 1. Interviewed actors, their position in the case study, characteristics, and abbreviations.

FLR-relevant efforts well before implementation of the National Forest Restoration Plan. Local FLR-relevant initiatives included the creation of a *mancomunidad* in each landscape to improve natural resource management in the affiliated local governments. The local government associations of the *Chocó Andino* and the *Bosque Seco* ranked first and second, respectively, for the 2017 Green Prize of Ecuador's



Map 1. Map of Ecuador with the location of the *Chocó Andino* (purple) and *Bosque Seco* (yellow) landscapes.

Development Bank, which aims to support local governments' sustainable environmental initiatives. Thus, both landscapes contain local sustainable land management initiatives that are recognised at national level. The two landscapes enable us to study the implementation of the National Forest Restoration Plan in places where FLR-relevant governance arrangements already existed, whether and how the policy made use of local FLR-relevant governance arrangements, and the kind of scale challenges that emerged in the process. We have taken the territories of the relevant local government associations to delineate the two landscapes.

1) *Chocó Andino*: Situated next to the national capital Quito, the *Chocó Andino* has witnessed a high density of conservation and restoration efforts in the past few decades. Particularly since the start of the decentralisation process, conservation efforts have gained importance. The Quito Metropolitan District government, civil society organisations such as Condesan and Imaymana Foundation, and the local government association have been the most prominent restoration actors. The Association of Rural Parishes of the Chocó Andino Bioregion (MCA) occupies ± 151,000 ha and was created in 2014 to promote environmental protection and sustainable land management [MCA1]. Located between 400 and 4,600 m above sea level, the *Chocó Andino* is at the crossroads of the Túmbes-Chocó and Tropical Andes biodiversity hotspots and hosts high levels of biodiversity and endemism. In 2010, vegetation cover in MCA consisted of moist forest (45.6 %), secondary forest (6 %), highland grasslands (0.9 %), shrubland (16.3 %), agriculture (30.1 %), and other (1.1 %) (Bosques Andinos, 2018). Agriculture and cattle raising constitute an important livelihood, with over 80 % of MCA's productive land use being dedicated to extensive cattle raising. The gross

deforestation rate has been decreasing over the past decades and currently stands at about 200 ha a year (Bosques Andinos, 2018).

2) *Bosque Seco*: Situated in the southwest near the Peruvian border, the *Bosque Seco* has a lower density of conservation and restoration efforts. Nevertheless, conservation and restoration efforts have gained considerable importance over the past decades, with the civil society organisation Nature and Culture International (NCI), the regional water fund (FORAGUA), and the local government association playing critical roles in restoring parts of the dry forest – *Bosque Seco* in Spanish. The Association of Municipalities of the Southwest of Loja Province "Dry Forest" (MBS) covers ± 433,300 ha and unites six municipalities. MBS was established in 2014 to strengthen water resource conservation and promote sustainable economic development [MBS1]. Two ecosystems can be distinguished in the *Bosque Seco* landscape (MBS, 2012): 1) the moist forest remnants between 1,000 and 2,300 m above mean sea level, which have suffered from increasing land use conversion pressures resulting from the expansion of extensive cattle raising and corn production, and 2) the dry forest Túmbes biodiversity hotspot in the low-lying parts, between 90 and 1,000 m above sea level. The dry forests found in the southwest are among the most extensive and best preserved in Ecuador and Peru (Ordóñez Delgado et al., 2013).

3.4. Data collection

We reviewed documents, analysed geographical data, and conducted interviews. Firstly, a preliminary screening was made of policy documents (Asamblea Constituyente, 2008; MAE, 2018, 2016a, 2016b, 2014, 2013, 2012; República del Ecuador, 2017, 2014, 2010; Senplades, 2017, 2013), as well as reports that focus on restoration in the *Chocó Andino* (e.g. Bosques Andinos, 2018; Torres, 2015) and the *Bosque Seco* landscape (e.g. MBS, 2012; Ordóñez Delgado et al., 2013). To obtain an idea of the regulations and strategies used to guide local restoration action, the documents were reviewed regarding their restoration and rehabilitation notions. Several landscape-level reports were read in their entirety to understand the landscape context and inform the semi-structured interview checklists. The National Forest Restoration Plan document (MAE, 2014) formed the basis for analysing forest restoration policy implementation.

Secondly, restoration-related geographic data were obtained to create two geographic maps (Maps 1 and 2) that visualise conservation and restoration-relevant areas in the two landscapes. Thirdly, 54 semi-structured interviews were held between November 2018 and March 2019. For the interviews, we used a purposive sampling strategy to identify all relevant actors in these cases. The decision to interview a person was based on that person's perceived centrality in either national FLR policy or local restoration efforts. Fig. 1 indicates all actors interviewed.

Scales, levels, and the scale challenges described by Cash et al. (2006) were used as sensitising concepts to integrate various cross-scale and cross-level topics in the interview checklists for national and landscape actors. Interview topics included motivations to restore, restoration-related policy implementation mechanisms, cross-level and cross-sector collaboration, governance arrangements, land use planning, and reconciliation of restoration with rural livelihoods. The checklists' semi-structured nature ensured sufficient width of topics covered and enough openness to discuss other cross-scale and cross-level issues that were considered important by the interviewed restoration actors. A person was asked questions only when the interviewer considered the questions to be appropriate, and specific questions were added to clarify actor-specific restoration issues. The semi-structured interview checklists are available in Spanish as supplementary material.

The interviews were recorded and fully transcribed. To ensure confidentiality, we used abbreviations to link viewpoints to organisations rather than to individuals. In the cases where one person from an organisation was interviewed, only that organisation's abbreviation is used, whereas in the cases where multiple persons from the same organisation were interviewed, a specific number is added to the abbreviation. MCA2 refers to the second interview with a technical team member of the *Mancomunidad del Chocó Andino* and MAE4 refers to the fourth interview with a staff member of the *Ministerio del Ambiente*. In a few cases, a former employee was interviewed on events that occurred while the person worked at a pertinent organisation. In those cases, the organisational code of the former employer was used.

3.5. Data analysis

We simultaneously engaged in data collection and analysis phases, in line with the principles of grounded theory (Charmaz, 1996). We followed the path of analytic progression (Miles and Huberman, 1994) in which we first tried to understand the nature of the FLR governance context in Ecuador, and then analyse the elements and dimensions of scale challenges and shape a framework on how elements and dimensions are connected. In this way, data were condensed, clustered, sorted, and linked over time (Miles and Huberman, 1994), and different leads in the data were followed. In Results, we provide an analysis of generic FLR scale challenges derived from data that can be further refined and updated by other researchers (Charmaz, 1996). Multiple actors experienced the identified scale issues as challenges.

4. Results

We took the temporal and spatial dimensions of the ecological and governance scales as a lens through which to detect scale challenges (Cash et al., 2006) in Ecuador's FLR governance context. We identified five temporal or spatial scale challenges linked to the implementation of the National Forest Restoration Plan in the *Chocó Andino* and the *Bosque Seco*. Following a brief overview of the challenges in Table 1, we discuss them more elaborately with evidence from the interviews at national and landscape level.

4.1. Political cycles mismatch with restoration timelines

As part of the National Forest Restoration Plan's implementation, a discrepancy became clear between the short-term logic of election cycles and the inherently long-term timelines linked to the restoration of native vegetation. When the Ecuadorian President's Office set the ambition to restore 500,000 ha of degraded lands, it was important for the high-level politicians involved that this policy would show the national government's success and leverage political support [INABIO]. The temporal mismatch between the governance and ecological scales that resulted from the drive to achieve this ambition in a four-year timespan was not, however, corrected by MAE or by the President's Office [MAE3]. "They did not understand that nature was not going to run at the pace of political campaigns. The main mistake was to transform the National Forest Restoration Plan into a generator of political achievements" [INABIO].

Furthermore, an interest in showing tangible results in the short term also biased politicians towards highly visible planting of fast-growing tree species instead of natural regeneration, or towards investments in other sectors. As tree planting makes it easy for politicians to show their constituencies that they are actively implementing a project, in many cases FLR was reduced to the number of trees or the area planted [MAE4]. "The government did not bother about how the seedlings had been planted, but rather that they had been planted" [UNL2]. It proved hard to convince politicians about the biodiversity benefits of natural regeneration [MAE3], even though it does more justice to the diversity of species found in most ecosystems while also being a better starting point in harsh, dry environments like the *Bosque Seco*.

A similar drive by politicians in the *Chocó Andino* and the *Bosque*

Table 1
Five scale challenges identified in the case study landscapes.

No.	Scale challenge	Description	Challenge type (Cash et al., 2006)
i	Political cycles mismatch with restoration timelines	Short-term-oriented political cycles created a mismatch with the long-term character of restoration. The desire to meet political interests at the governance scale resulted in ineffective decisions for the ecological scale.	B) Temporal mismatch between the governance scale and the ecological scale
ii	Planning horizons mismatch with restoration timelines	By working with a four-year compensation scheme for landowners to restore native vegetation cover on their land, the National Forest Restoration Plan did not align with longer-term restoration timelines.	B) Temporal mismatch between the governance scale and the ecological scale
iii	National restoration objectives mismatch with decentralised land use planning realities	Local governments had neither the capacity nor the experience to integrate the National Forest Restoration Plan's landscape-level objectives in their land use planning. The national government failed to anticipate local land use planning realities by creating technical guidelines, providing proper assistance, or pushing for land use planning norms.	A) Failure to recognise important dependencies between different governance levels resulting in spatial planning challenges
iv	The governance level of existing restoration efforts mismatches with the level receiving restoration funds	The National Forest Restoration Plan barely channelled any restoration funding to pre-existing restoration efforts and actors, whereas the parish government level received most funds, despite being new to the theme.	B) Spatial mismatch between governance levels
v	Tensions exist between the spatial dimensions of biodiversity and water-related restoration efforts	Heterogeneity existed in the spatial dimensions on the ecological scale that are linked to different restoration efforts and used to enable and determine restoration success. Notable tensions exist between spatial dimensions used by biodiversity and water-related restoration efforts.	C) Failure to recognise and support the heterogeneity in the spatial dimensions on the ecological scale to engage in restoration

Seco to show short-term results before their political cycle ended caused them to favour other projects over FLR [MCA-GAD5]. "They do not see environment issues as something that generates votes. They rather focus on infrastructure and health" [MBS2]. Arguing that their constituencies will judge them on how they performed in office, politicians are inclined to focus on the construction of pipelines to bring water from source to tap, while neglecting water source protection [MAE3; Senagua; NCI1; NCI2]. The latter is seen as cumbersome because it creates competing land use claims. On multiple occasions, a desire to meet short-term political interests has thus resulted in decisions that are ineffective in fostering long-term restoration processes.

4.2. Planning horizons mismatch with restoration timelines

A similar mismatch is seen between the long-term nature of FLR and the short-term planning horizons in the National Forest Restoration Plan. The plan was based on a four-year financial compensation for those landowners who decided to reforest or regenerate parts of their property. A yearly compensation was paid by local governments to landowners, depending on the progress in native vegetation growth during the four to five years that the plan lasted. However, the plan did not consider sufficiently the sustainability of the restoration results after the project period [MAE Loja]. In the *Bosque Seco*, it was observed that "closing the area is not necessarily sustainable because, when it has regenerated after five or ten years, the agreement ends and the landowner can decide to put his livestock in again. It has then served nothing" [MBS-GAD3].

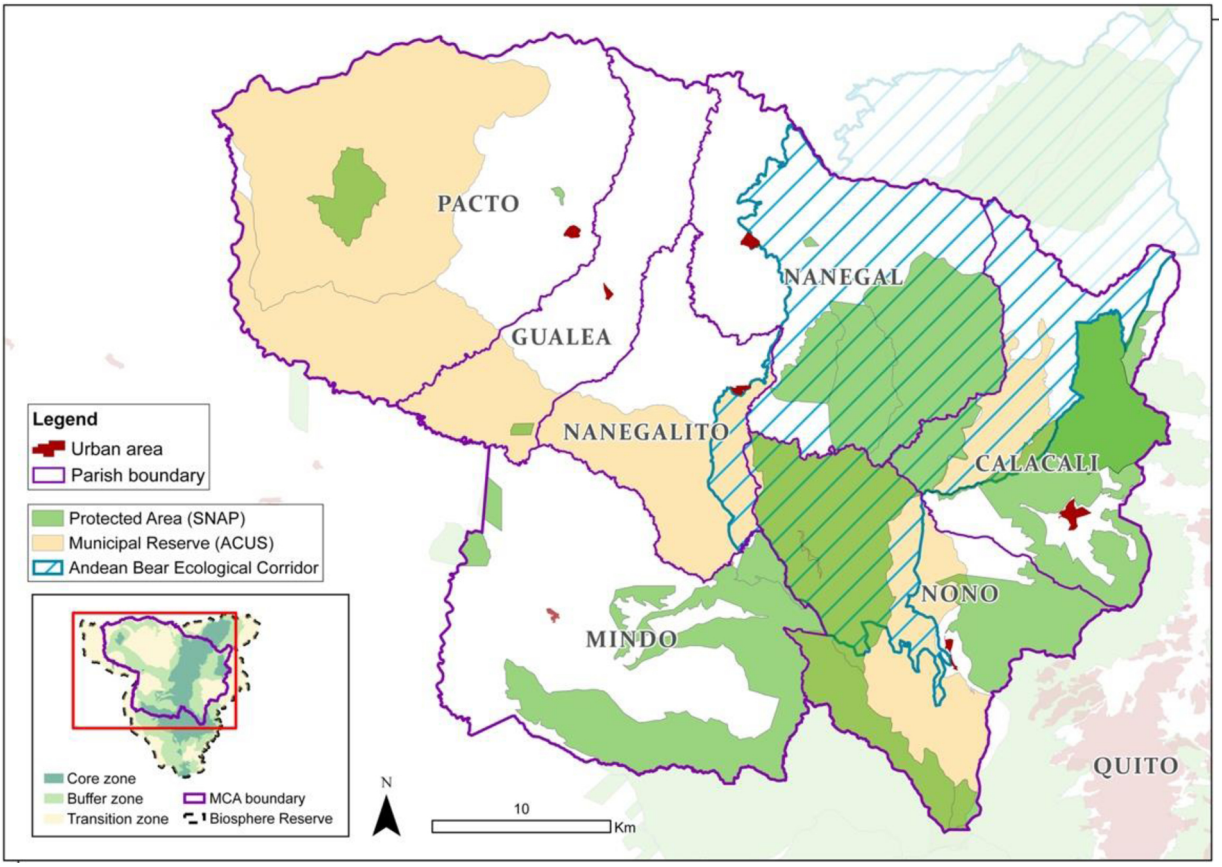
In the *Chocó Andino*, MCA's technical team highlighted the challenge of providing a proposition to landowners that does not affect their income negatively. This could be achieved by combining improved farm practices with the restoration of those parts of their property that are not suitable for agriculture or cattle ranching, like riparian areas or steep slopes [MCA1; MCA2]. However, MAE declined requests by MCA to invest in restoration-oriented farm practices because its funds were earmarked for either tree planting or natural regeneration, not for livelihood improvement [MCA1]. The short-term planning horizon of the National Forest Restoration Plan raised similar concerns in the *Bosque Seco*. "The challenge is that the plan missed one crucial step. Firstly, it is key to create preparedness among the people through economic activities. From there, one can start talking about restoration. If you talk about restoration without anything in return, they are not willing to participate" [MBS2].

Local actors in the *Chocó Andino* and the *Bosque Seco* came to realise that it is better to focus restoration funds on making rural livelihoods more nature-inclusive in the long term than to compensate landowners for the project period only. With cattle raising and agriculture being key economic and cultural activities in the *Chocó Andino* and the *Bosque Seco*, it would have been particularly relevant to see how these could be made more nature-inclusive in the long run [Santa Lucía]. "It is important to build cattle raisers' capacity, so that on fewer hectares they can do more" [MCA-GAD4]. However, MAE failed to recognise that meaningful restoration could not be achieved during the plan's four-year timespan [MBS2].

4.3. National restoration objectives mismatch with decentralised land use planning realities

The National Forest Restoration Plan was designed to restore 500,000 ha of native vegetation cover through five elements: restoration in hydrological protection zones, landslide protection zones, natural area buffer zones, biological corridors, and other biodiversity conservation areas (MAE, 2014). However, these objectives were not accompanied by land use planning norms that determined how local governments could integrate explicit restoration and conservation goals in their Territorial Land Use and Development Plans. Nor did local governments have the capacity or the experience to use their land use plans to fulfil biodiversity and water objectives by delineating restoration sites in their jurisdiction for this purpose. Most land use plans were created merely to meet funding requirements of the former National Planning and Development Secretariat, rather than to actively use them as a planning tool [Senplades2]. Thus, no connection could be made between the funds becoming available to local governments for restoration and their land use planning process.

Despite the local challenges that could have been foreseen, the National Forest Restoration Plan was not accompanied by technical guidelines to indicate how local governments could select restoration



Map 2. Existing conservation and restoration efforts in the *Chocó Andino* landscape. There is a mismatch between the parish government level that received most restoration funds – indicated by the purple boundaries – and the level of existing and planned FLR efforts. These are the areas that fall within the National System of Protected Areas in green, the municipal reserves in yellow, an Ecological Corridor in stripped blue, the local government association that comprises the seven depicted parish governments, and the Biosphere Reserve shown in the map on the bottom left (source: elaborated by the authors, with geographical data from Condesan and MAE).

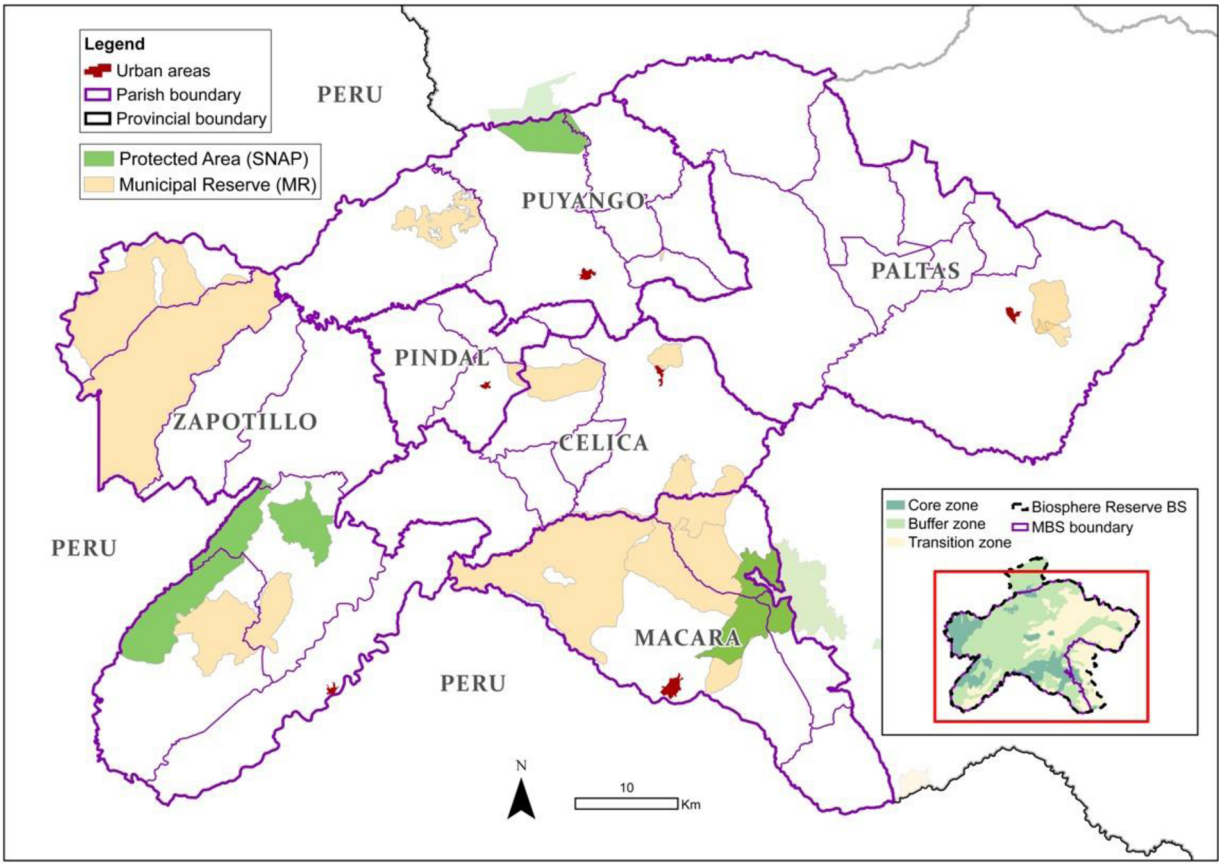
sites [MAE4]. In addition, MAE experts who assisted local governments to implement the plan did not have the required land use planning knowledge or experience. They focused merely on the standard procedures relating to tree planting and checking tree survival, rather than giving land use planning guidance to local governments [INABIO; UNL2]. As a consequence, restoration occurred in places where it was easy for local governments to work, instead of in places that were most suitable from a landscape perspective [MAE2].

The absence of guidelines and guidance capacity was a result of the speed with which the National Forest Restoration Plan had to be implemented. Agreements had to be signed with local governments for 100,000 ha during the plan's first year alone to be on track to meet the 500,000-hectare target [MAE3]. With MAE simply looking for more land to fulfil its hectare targets, the plan hence accepted a high number of restoration hectares from individual parishes without having a clear understanding of whether the parishes could give substance to the restoration objectives identified by the plan [MAE3; INABIO]. "One of the main causes of failure has been that it was a very high goal that had to be reached, which meant that the quality of restoration was not guaranteed. It was simply looking for hectares at local level. Whoever wanted to restore was accepted in the National Plan" [MAE4].

4.4. The governance level of existing restoration efforts mismatches with the level receiving restoration funds

Another mismatch was observed between the governance level at which pre-existing FLR efforts had taken place and the level that predominantly received funds from the National Forest Restoration Plan. Whereas the inexperienced parish governments were on the receiving end of the plan's predefined implementation scheme, MAE did not consider FLR efforts with explicit biodiversity and water-relevant objectives that already existed in the *Chocó Andino* (Map 2) and the *Bosque Seco* (Map 3) and that could have benefited greatly from the National Forest Restoration Plan.

Chocó Andino: In the *Chocó Andino*, the focus over the past decade has been on the creation of rules and governance arrangements to strengthen environmental protection and sustainable production [MCA-GAD3; MCA-GAD7]. Most of the landscape's conservation areas are the result of municipal policies of Quito's metropolitan district government. These include an Ecological Corridor for the Andean Bear (the spectacled bear) that covers 60,000 ha of protected forest and 97,000 ha of municipal reserves where natural resources are co-managed sustainably with landowners [DMQ]. Another catalyst in the landscape's conservation was the establishment of MCA. The association was born from the parishes' recognition that political unity is crucial to resist the national government's strategies to promote mining and agricultural commodities [MCA1; DMQ; MCA-GAD7]. In an effort to strengthen the *Chocó Andino*'s conservation and sustainable development, the parish governments pushed for a municipal ordinance in 2016 that imposes restrictions on construction and agriculture in riparian zones and water sources, and curbs land fragmentation, uncontrolled agricultural expansion, and mining within MCA territory [DMQ; MCA1]. The success of the various municipal policies and the establishment of MCA have attracted much attention to the landscape and resulted in the declaration of a Biosphere Reserve in Pichincha Province's *Chocó Andino* in 2018 [MCA2].



Map 3. Existing conservation and restoration efforts in the *Bosque Seco* landscape. There is a spatial mismatch between the parish government level that received most restoration funds – indicated by the purple boundaries – and the level of existing and planned FLR efforts. These are the areas that are part of the National System of Protected Areas in green, the municipal reserves in yellow, the local government association of six municipalities – whose names are mentioned in the map – and the Biosphere Reserve shown in the map on the bottom right (source: elaborated by the authors, with geographical data from NCI, MBS, FORAGUA, and MAE).

Many local FLR-relevant policy dynamics were ongoing in the Chocó Andino landscape when the National Forest Restoration Plan was implemented. Still, neither the municipal reserves, the Ecological Corridor, nor MCA's technical team received support from MAE, and the plan disbursed funding to a governance level that was new to the restoration field. The funds were also much larger than the budget that parish governments would normally handle [MAE1]. An MCA parish would normally manage US$ 140,000 annually, but the plan increased this to US$ 550,000 [MCA1], hence generating capacity problems for the parishes in the process.

Bosque Seco: FLR efforts in the *Bosque Seco* have focused mainly on improving water flows in its montane areas and on biodiversity conservation in the low-lying parts. Restoration efforts started in the 1990s with a micro-catchment management project that promoted area enclosures and natural regeneration. The project united the municipalities that would later establish MBS in 2011 and that would continue along the same line [SNV]. With water scarcity being a recurrent challenge in the dry forest, NCI also started assisting municipalities to specifically promote the restoration of water sources to ensure water availability while safeguarding biodiversity [NCI1]. NCI did so by stimulating municipalities to adopt ordinances that declare municipal reserves in the water source areas and to raise an environmental tax to enable land purchase to restore the water sources. In the wake of these efforts, NCI established FORAGUA in 2009 to further assist municipalities in the protection and restoration of water sources. In Loja Province where the *Bosque Seco* landscape is located, the National Forest Restoration Plan signed a total of 37 agreements, of which 35 were with parish governments [MAE Loja]. However, it had not been the parishes that had undertaken earlier restoration efforts, but rather NCI, FORAGUA, and the various municipalities united in MBS. Another indication of the pre-existing conservation and restoration dynamics in the landscape is the declaration of the *Bosque Seco* Biosphere Reserve, which MBS and NCI got accepted in 2014 [MBS1]. Finally, MBS did become directly involved in the National Forest Restoration Plan, with 2,600 ha, after MBS's technical team successfully lobbied MAE to include municipalities and their associations on the list of beneficiaries.

With MBS being a notable exception, National Forest Restoration Plan funds predominantly flowed to a governance level that was not best positioned to restore ecological connectivity or improve water regulation at landscape level in the *Bosque Seco*. The fact that the plan did not align its funds better with pre-existing FLR efforts in both landscapes was a missed opportunity, because it could have built more on local visions, local concerns, and local pride.

4.5. Tensions exist between the spatial dimensions of biodiversity and water-related restoration efforts

A last scale challenge concerns heterogeneity in the spatial dimensions on the ecological scale that are used at national and landscape level, with notable tensions emerging between the spatial dimensions that are used by biodiversity and water-related restoration efforts. At national level, restoration success was determined by the number of hectares with restored native vegetation, although the exact location of these hectares *de facto* received little attention [MAE4]. For MAE, what was basically important was to find the 500,000 ha in time within Ecuador's national territory. At landscape level on the contrary, existing FLR efforts had paid more attention to the underlying ecological connectivity and water regulation objectives of restoration, making the

exact location of such efforts matter much more. Water scarcity is a concern that worries people in particularly the montane areas of the *Chocó Andino* and the *Bosque Seco*, making water source restoration an important strategy to solve locally felt challenges [NCI2; Pichincha]. "We used to have a lot of water sources, but slowly these have been degrading. Now there is practically no water in summer. What we want to do is recover the streams that used to provide water to the town" [MBS-GAD2]. Indeed, most of the municipal reserves that were established in the *Bosque Seco* have great hydrological importance [MBS2] and were considerably degraded and deforested at the time of their purchase. In the *Chocó Andino* too, the importance of water availability is reflected in MCA's strategic planning to better protect areas that currently do not have a formal conservation status as a municipal reserve, but that are nevertheless crucial from a water regulation perspective [MCA2].

Despite the importance of restoration to improve water regulation at landscape level, it has taken a long time to create a dedicated level on the governance scale that matches the spatial specificities of water regulation. As part of the National System of Protected Areas, a historical bias can still be observed towards biodiversity conservation. Private or municipal reserves can receive protected area support from MAE only when there is sufficient evidence of exceptional biodiversity in those areas. Areas that are too small or too degraded are not eligible to be declared protected. As a result, the water regulation functions that can be provided by currently degraded areas once they are restored was not recognised. However, the fact that areas of exceptional importance for water regulation exist, such as highland grasslands (*páramos*), made the National Water Secretariat (Senagua) declare Ecuador's first hydrological protection area in 2018 [Senagua]. This new model breaks with the conventional biodiversity conservation scheme with which MAE has worked and does more justice to current levels of landscape fragmentation where remaining ecosystem patches are often small and degraded. "What was difficult about the biodiversity framework was that you had to provide evidence of exceptional biodiversity to be eligible for protection. Many areas, however, are exceptionally important as a water source, but so degraded that there is no longer exceptional biodiversity, like endemic species. With this new legal framework, there can still be protection" [FONAG].

Ecuador's forest restoration policies have continued to evolve. Learning from the lessons drawn from the National Forest Restoration Plan's 2014–2017 phase, MAE has designed a new implementation model to run between 2019 and 2030. The model starts from the realisation that parish governments alone do not have the capacity to implement FLR efforts [MAE Loja]. Territorial roundtables have therefore been envisioned to enable collaboration between FLR actors at different levels and spheres operating in a given territory [MAE4]. Depending on local circumstances, roundtables can consist of provincial, municipal, and parish governments, as well as technical partners like research institutes, civil society organisations, private actors, and water funds to facilitate local governments' capacity building (MAE, 2018). The roundtable model explicitly intends to favour restoration quality over quantity, by prioritising restoration where it has a function rather than just looking for more hectares. The roundtables are envisioned to function as platforms for local actors to draw attention to local interests and to set FLR targets that are based on an understanding of landscape-specific water and biodiversity concerns [MAE1]. With actors jointly shaping priorities, the model aims to ensure that restoration action addresses locally felt challenges in the future and integrates these priorities in Territorial Land Use and Development Plans [MAE4].

5. Discussion

The question central to this article is: what are the scale challenges encountered in forest and landscape restoration governance? Elucidating the cross-scale and cross-level challenges that are specific to FLR is highly valuable because the prominence of this multi-actor endeavour will continue to grow as restoration pledges are being implemented.

The results show that the National Forest Restoration Plan was established to serve short-term political interests and was implemented through a pre-determined scheme that looked neither at local realities nor at what local implementing actors needed; nor did it show the flexibility needed to take pre-existing FLR efforts into account. To reconcile multiple levels within a landscape context, Guariguata and Brancalion (2014) highlighted that the main challenge is to find the right mix between command and control and governance that includes non-state actors and regulatory flexibility. Too much focus on strict fulfilment of restoration targets leaves little space to negotiate visions that link to local realities and priorities. Indeed, the Bonn Challenge has already been critiqued for its focus on a specific number of restored hectares of degraded and deforested lands, without giving sufficient consideration to the effectiveness of restoration projects (Mansourian et al., 2017). Stanturf et al. (2019) conclude that the chances of achieving restoration targets are enhanced when linked to accepted local goals and aspirations. Building on existing governance arrangements and conservation efforts allows FLR to be taken up as part of a broader process that addresses local interests and concerns. The two case studies show that there is no shortage of governance arrangements that are grounded in local realities and that develop FLR-relevant visions, as the examples of the local government associations, the water fund, and the Biosphere Reserves testify.

With regard to the relevance of the findings for FLR governance in other areas, it must be stated that both the *Chocó Andino* and the *Bosque Seco* landscape are well-known at national level for their local conservation and restoration efforts. What this study's results show is that scale challenges can even be found in places where many restoration efforts exist and where one would expect more capacity for scale-sensitive governance. The results and conclusions are hence relevant for other areas where FLR efforts have materialised as well as for places where no FLR efforts currently exist (Romijn et al., 2019), so that future scale challenges can be avoided and the need for scale-sensitive observation in landscape restoration governance can be understood.

The process of detecting restoration mismatches and finding better fixes is an ongoing one. Continuous adaptation is required to reach the adequate level at which FLR needs to be negotiated. Creating a better fit does not mean having the best fit between levels on the ecological and the governance scale. Termeer and Dewulf (2014) consider it impossible to find fixed and lasting fits between levels on these scales, implying that scale challenges can be realistically addressed only by organising governance at multiple levels. For example, MCA covers an area that ranges from 400 to 4,600 m above sea level. From a biodiversity restoration perspective, it is crucial to cover the wide range of ecological zones that fall within this altitude range. From a human perspective however, the livelihood and priorities of a cattle farmer in the high-altitude parish of Calacalí are different from those of a sugar cane farmer in the low-lying parish of Pacto. An institution like the local government association needs to give space to the heterogeneity in a landscape to accommodate differing and overlapping conservation and restoration priorities. Effective integration across spatial dimensions requires flexible governance arrangements (Mansourian and Parrotta, 2019).

The idea that continuous adaptation is required to reach the level at which restoration is best negotiated raises questions about the specific roles, responsibilities, and capacities needed by governments at different levels to shift scales or to manage across or at multiple levels (Ansell and Torfing, 2015). With governments being increasingly required to play their part in fulfilling national FLR targets, more research is needed on the strategies applied at multiple levels to overcome scale challenges and organise decision space to reconcile national FLR targets with local realities. Collaborative monitoring approaches that integrate restoration actors across governance levels could assist in cross-level

coordination, information sharing, and learning, and encourage adaptive management in forest and landscape restoration (Guariguata and Evans, 2019).

In terms of limitations, it is important to note that the scale challenges identified in Ecuador do not exist in isolation from a plethora of other challenges that do not directly have cross-scale or cross-level origins. Scale challenges are intertwined with more common challenges related to corruption, political orientations, lack of financial resources, land tenure insecurity, and inter-agency coordination. All challenges together make up the complex FLR governance picture in which each deserves attention. In fact, it is often another challenge, such as a lack of capacity at a particular governance level or the lack of cross-sector collaboration at the same level, that may lead to the emergence of a scale challenge. Scale challenges themselves are also intertwined. Lastly, we acknowledge that the methods chosen are not the only way to study FLR governance. We have chosen to build on the lived experience of Ecuador's FLR community of practice to highlight context and nuance when describing the various temporal and spatial scale challenges linked to the local implementation of national FLR targets.

6. Conclusion

This article focused on the scale challenges faced in FLR governance in the montane *Chocó Andino* and *Bosque Seco* landscapes. We identified five scale challenges in both landscapes. Two temporal challenges emerged because neither (i) political cycles nor (ii) short-term planning horizons were aligned with long-term restoration timelines. Spatial scale challenges arose from the fact that (iii) the national restoration objectives mismatched with decentralised land use planning realities, (iv) the governance level of existing restoration efforts mismatched with the level predominantly receiving restoration funds, and (v) tensions existed between the spatial dimensions of biodiversity and water-related restoration efforts.

Cross-scale and cross-level challenges that emerge in the implementation of FLR policies need to be observed with more sensitivity. This requires more attention on the temporal and spatial set-up of governance arrangements and how these link to the temporal needs of FLR and the spatial character of existing FLR efforts. Preliminary results relating to the territorial roundtables show that more attention is already being paid in Ecuador to address FLR at the right governance level and to better integrate FLR in territorial land use planning.

Acknowledgements

The authors would like to thank Condesan, FORAGUA, MBS, and NCI for sharing shape files of conservation areas in the *Chocó Andino* and the *Bosque Seco*. Special thanks go to Christian Suarez for his help in elaborating the maps for this study and to Sylvia Karlsson-Vinkhuyzen for providing detailed feedback on an early draft. We also thank two anonymous reviewers for their constructive feedback and suggestions.

Appendix A. Supplementary data

Supplementary material related to this article can be found, in the online version, at doi:https://doi.org/10.1016/j.landusepol.2020.104686.

References

Adams, C., Rodrigues, S.T., Calmon, M., Kumar, C., 2016. Impacts of large-scale forest restoration on socioeconomic status and local livelihoods: what we know and do not know. Biotropica 48, 731–744. https://doi.org/10.1111/btp.12385.

Ansell, C., Torfing, J., 2015. How does collaborative governance scale? Policy Polit. 43, 315–329. https://doi.org/10.1332/030557315X14353344872935.

Asamblea Constituyente, 2008. Constitución de la República del Ecuador.

Barbut, M., Alexander, S., 2015. Land degradation as a security threat amplifier: the new global frontline. Land Restoration. https://doi.org/10.1016/B978-0-12-801231-4.00001-X.

Bosques Andinos, 2018. El Programa de Bosques Andinos en el Sitio de Aprendizaje Pichincha.

Cash, D.W., Adger, W.N., Berkes, F., Garden, P., Lebel, L., Olsson, P., Pritchard, L., Young, O., 2006. Scale and cross-scale dynamics: governance and information in a multilevel world. Ecol. Soc. 11, 8. https://doi.org/10.5751/ES-01759-110208.

Charmaz, K., 1996. Grounded theory. In: Smith, J.A., Harré, R., Van Langenhove, L. (Eds.), Rethinking Methods in Psychology. SAGE Publications.

Chazdon, R.L., Brancalion, P.H.S., Lamb, D., Laestadius, L., Calmon, M., Kumar, C., 2017. A policy-driven knowledge agenda for global forest and landscape restoration. Conserv. Lett. 10, 125–132. https://doi.org/10.1111/conl.12220.

Cumming, G.S., Olsson, P., Chapin, F.S., Holling, C.S., 2013. Resilience, experimentation, and scale mismatches in social-ecological landscapes. Landsc. Ecol. 28, 1139–1150. https://doi.org/10.1007/s10980-012-9725-4.

Dawson, L., Elbakidze, M., Angelstam, P., Gordon, J., 2017. Governance and management dynamics of landscape restoration at multiple scales: learning from successful environmental managers in Sweden. J. Environ. Manage. 197, 24–40. https://doi.org/10.1016/j.jenvman.2017.03.019.

Foley, J.A., DeFries, R., Asner, G.P., Barford, C., Bonan, G., Carpenter, S.R., Chapin, F.S., Coe, M.T., Daily, G.C., Gibbs, H.K., Helkowski, J.H., Holloway, T., Howard, E.A., Kucharik, C.J., Monfreda, C., Patz, J.A., Prentice, I.C., Ramankutty, N., Snyder, P.K., 2005. Global consequences of land use. Science 309 (80), 570–574. https://doi.org/10.1126/science.1111772.

Geertz, C., 1973. Thick description: toward an interpretive theory of culture. The Interpretation of Cultures. Basic Books, pp. 3–30.

Gibson, C.C., Ostrom, E., Ahn, T.K., 2000. The concept of scale and the human dimensions of global change: a survey. Ecol. Econ. 32, 217–239.

Guariguata, M., Brancalion, P.H.S., 2014. Current challenges and perspectives for governing forest restoration. Forests 5, 3022–3030. https://doi.org/10.3390/f5123022.

Guariguata, M.R., Evans, K., 2019. A diagnostic for collaborative monitoring in forest landscape restoration. Restor. Ecol. https://doi.org/10.1111/rec.13076.

IPBES, 2018. Assessment Report on Land Degradation and Restoration; Summary for Policymakers.

IPCC, 2019. Climate change and land; an IPCC special report on climate change, desertification, land degradation, sustainable land management, food security, and greenhouse gas fluxes in terrestrial ecosystems. Summary for Policymakers.

MAE, 2012. Estrategia Nacional De Cambio Climático Del Ecuador 2012–2025. Ministerio del Ambiente, Quito, Ecuador.

MAE, 2013. Plan Nacional de Forestación y Reforestación. Ministerio del Ambiente, Quito, Ecuador.

MAE, 2014. Plan Nacional de Restauración Forestal 2014–2017. Ministerio del Ambiente, Quito, Ecuador.

MAE, 2016a. Bosques para el Buen Vivir; Plan de Acción REDD+ Ecuador 2016–2025. Quito, Ecuador. .

MAE, 2016b. Estrategia Nacional de Biodiversidad 2015–2030. Ministerio del Ambiente, Quito, Ecuador.

MAE, 2018. Propuesta del Modelo de Gestión del Programa Nacional de Restauración Forestal 2018–2030. Programa Nacional de Reforestación con Fines de Conservación Ambiental, Protección de Cuencas Hidrográficas y Benficios Alternos. Ministerio del Ambiente, Quito, Ecuador.

Mansourian, S., 2016. Understanding the relationship between governance and forest landscape restoration. Conserv. Biol. 14, 267–278. https://doi.org/10.4103/0972-4923.186830.

Mansourian, S., 2017. Governance and forest landscape restoration: a framework to support decision-making. J. Nat. Conserv. 37, 21–30. https://doi.org/10.1016/j.jnc.2017.02.010.

Mansourian, S., Parrotta, J., 2019. From addressing symptoms to tackling the illness: reversing forest loss and degradation. Environ. Sci. Policy 101, 262–265. https://doi.org/10.1016/j.envsci.2019.08.007.

Mansourian, S., Stanturf, J.A., Derkyi, M.A.A., Engel, V.L., 2017. Forest landscape restoration: increasing the positive impacts of forest restoration or simply the area under tree cover? Restor. Ecol. 25, 178–183. https://doi.org/10.1111/rec.12489.

Mathez-Stiefel, S.-L., Peralvo, M., Báez, S., Rist, S., Buytaert, W., Cuesta, F., Fadrique, B., Feeley, K.J., Groth, A.A.P., Homeier, J., Llambí, L.D., Locatelli, B., Sandoval, M.F.L., Malizia, A., Young, K.R., 2017. Research priorities for the conservation and sustainable governance of Andean forest landscapes. Res. Dev. 37, 323–339. https://doi.org/10.1659/MRD-JOURNAL-D-16-00093.1.

MBS, 2012. Diagnóstico del Territorio Mancomunado de la Mancomunidad "Bosque Seco.".

Méndez-Toribio, M., Martínez-Garza, C., Ceccon, E., Guariguata, M.R., 2017. Planes actuales de restauración ecológica en Latinoamérica: Avances y omisiones. Rev. Ciencias Ambient. 51, 1. https://doi.org/10.15359/rca.51-2.1.

Miles, M.B., Huberman, A.M., 1994. Qualitative Data Analysis; An Expanded Sourcebook, second edi. SAGE Publications Inc.

Murcia, C., Guariguata, M.R., Peralvo, M., Gálmez, V., 2017. La restauración de bosques andinos tropicales: Avances, desafíos y perspectivas del futuro. Documentos Ocasionales 170. CIFOR, Bogor, Indonesia. https://doi.org/10.17528/cifor/006524.

Opdam, P., Coninx, I., Dewulf, A., Steingröver, E., Vos, C., van der Wal, M., 2015. Framing ecosystem services: affecting behaviour of actors in collaborative landscape planning? Land Use Policy 46, 223–231. https://doi.org/10.1016/j.landusepol.2015.02.008.

Ordóñez Delgado, L., Serrano, F., Paladines, B., Solórzano, V., 2013. Reserva de Biosfera del Bosque Seco; Formulario de Propuesta para la Declaratoria de Reserve de la Biosfera dirigida a la UNESCO.

Padt, Frans, Arts, B., 2014. Concepts of scale. In: Padt, F., Opdam, P.F.M., Termeer,

C.J.A.M., Polman, N. (Eds.), Scale-Sensitive Governance of the Environment. Wiley. https://doi.org/10.1002/9781118567135. p. 344.
Pistorius, T., Freiberg, H., 2014. From target to implementation: perspectives for the international governance of forest landscape restoration. Forests 5, 482–497. https://doi.org/10.3390/f5030482.
Price, M.F., Egan, P.A., 2014. Our Global Water Towers: Ensuring Ecosystem Services from Mountains Under Climate Change. UNESCO-IHP.
Putzel, L., Baral, H., Zhang, K., Artati, Y., Cronkleton, P., 2017. Studies on forest landscape restoration in hilly and mountainous regions of Asia and Africa – an introduction to the special issue, international forestry review. Dongcheng Dist.
Reed, J., van Vianen, J., Barlow, J., Sunderland, T., 2017. Have integrated landscape approaches reconciled societal and environmental issues in the tropics? Land Use Policy 63, 481–492. https://doi.org/10.1016/j.landusepol.2017.02.021.
República del Ecuador, 2010. Código Orgánico de Organización Territorial. Autonomía y Descentralización.
República del Ecuador, 2014. Ley Orgánica De Recursos Hídricos, Usos Y Aprovechamiento Del Agua. https://doi.org/SAN-2014-1178. .
República del Ecuador, 2017. Código Orgánico del Ambiente.
Romijn, E., Coppus, R., De Sy, V., Herold, M., Roman-Cuesta, R.M., Verchot, L., 2019. Land restoration in Latin America and the Caribbean: an overview of recent, ongoing and planned restoration initiatives and their potential for climate change mitigation. Forests 10. https://doi.org/10.3390/f10060510.
Schweizer, D., Meli, P., Brancalion, P.H.S., Guariguata, M.R., 2018. Oportunidades y desafíos para la gobernanza de la restauración del paisaje forestal en América Latina. Documentos Ocasionales, vol. 182 CIFOR, Bogor, Indonesia.
Senplades, 2013. Plan Nacional Buen Vivir 2013–2017 “Todo El Mundo Mejor.”.
Senplades, 2017. Plan Nacional de Desarrollo 2017–2021 “Toda una Vida.”.
Stanturf, J.A., Kleine, M., Mansourian, S., Parrotta, J., Madsen, P., Kant, P., Burns, J., Bolte, A., 2019. Implementing forest landscape restoration under the Bonn challenge: a systematic approach. Ann. For. Sci. 76.
Suding, K., Higgs, E., Palmer, M., Callicott, J.B., Anderson, C.B., Baker, M., Gutrich, J.J., Hondula, K.L., LaFevor, M.C., Larson, B.M.H., Randall, A., Ruhl, J.B., Schwartz, K.Z.S., 2015. Committing to ecological restoration. Science 348 (80-), 638–640. https://doi.org/10.1126/science.aaa4216.
Termeer, C.J.A.M., Dewulf, A., 2014. Scale-sensitivity as a governance capability: observing, acting and enabling. In: Padt, F., Opdam, P.F.M., Termeer, C.J.A.M., Polman, N. (Eds.), Scale-Sensitive Governance of the Environment. Wiley. https://doi.org/10.1002/9781118567135. p. 344.
Torres, R.P., 2015. Plan de Gestión Territorial Sustentable; Mancomunidad de la Bioregión del Chocó Andino.
van Lieshout, M., Dewulf, A., Aarts, N., Termeer, C., 2011. Do scale frames matter? Scale frame mismatches in the decision making process of a “mega farm” in a small Dutch village. Ecol. Soc. 16.
Yin, R.K., 2014. Case Study Research: Design and Methods, 5th ed. SAGE Publications, Thousand Oaks, CA.