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Narratives Across Scales on Barriers and Strategies for Upscaling Forest Restoration: A Brazilian Case Study

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Abstract: Several countries worldwide have committed to forest and landscape restoration (FLR) through ambitious pledges in numbers of hectares to be restored. As the implementation of these commitments happens within countries, different actors from global to local scales must negotiate the "what, where and how" of specific forest restoration projects. We interviewed actors at national, state and local scales to gather their narratives regarding barriers and strategies for upscaling forest restoration and compared the narratives among them and with those that prevail in the global literature on FLR. We based the local scale in four Atlantic Forest landscapes. We classified the narratives gathered according to three discourses commonly used in environmental policy arenas: (1) ecological modernization, advocating market solutions; (2) green governmentality, with its emphasis on technocratic solutions; and (3) civic environmentalism promoting governance. Brazilian legislation with its mandate of forest restoration in private lands appeared as the main restoration driver in the interviews. However, when political will for enforcement weakens, other strategies are needed. An ecological modernization narrative, around increasing funding, incentives, market and investments, prevailed in the narratives on barriers and strategies for all actors from the global to the local scales. Similarities nevertheless diminished from the global to the local scale. The narratives of national actors resembled those found in the global literature, which emphasize strategies based on increased capacity building, within a green governmentality narrative, and governance arrangements, a civic environmentalist narrative. These narratives appeared less at state scales, and were almost absent at local scales where forest restoration was perceived mostly as a costly legal mandate. Similar narratives across all actors and scales indicate that a focus on improving the economics of restoration can aid in upscaling forest restoration in Brazilian Atlantic Forest landscapes. However, discrepant narratives also show that inclusive governance spaces where the negotiation of FLR interventions can take place is key to increase trust and aid implementation.

Keywords: forest landscape restoration; discourse analysis; governance; perceptions; Brazil; Atlantic Forest

1. Introduction

Recent global commitments on land restoration, including the Bonn Challenge and the New York Declaration on Forests, have placed forest restoration high on national agendas as a means to attain

several sustainable development goals. The ambitious goal to restore 350 million hectares of degraded lands by 2030 requires, in previous forested areas, the implementation of forest restoration at landscape scales. World Wildlife Fund (WWF) and the International Union for the Conservation of Nature (IUCN) coined the term Forest Landscape Restoration (FLR) as "a planned process that aims to regain ecological integrity and enhance human well-being in deforested or degraded landscapes" [1]. This definition implies that FLR programs should incorporate ecological, social, and economic dimensions among their implementation strategies [2–4]. Global commitments on FLR began with the launch of the Bonn Challenge in 2011. However, upscaling from current activities remains challenging and implementation rates still leave 2030 goals unattainable [5]. A recent review conducted by Brower [6] shows that countries in Latin America have implemented around 20% of what they committed to for the Bonn Challenge.

Well-intentioned global agreements are traditionally driven by negotiators with little on-the-ground expertise [7], which leads to the emergence of two contrasting narratives in inter-governmental conservation initiatives. One is a global and poorly detailed aspirational narrative on goals, and the other is a local, pragmatic narrative building on contextualized experience [8]. The global narrative tends to dictate top-down solutions that can be challenging to implement in local realities. For example, the mechanism for "Reducing Emissions from Deforestation and Forest Degradation" (REDD+) aims to achieve climate change mitigation via global, transnational funding mechanisms [9], yet it has been criticized for excluding local people from decision-making processes [10–13]. FLR widens the vision of REDD+ by promoting a series of environmental and productive restorative activities, such as agroforestry and silvopasture systems [14], aimed at meeting environmental and social wellbeing goals [15,16]. Nevertheless, it is important to acknowledge different perceptions on FLR may exist at different scales, from the global to the local scale where project implementation happens. Such recognition and the negotiation of restoration objectives prior to implementation may minimize social and environmental trade-offs [17].

In this context, we view actors involved in forest restoration as nested across scales (Figure 1) and we aimed to assess similarities and differences in the narratives across scales regarding barriers and strategies for upscaling forest restoration. Here, we provide a summary of barriers and strategies highlighted in recent global FLR literature. We then present our findings from semistructured interviews conducted at national, state and local scales in Brazil. We based our local scale interviews in four, rural, Brazilian Atlantic Forest landscapes. Since 1934, the Brazilian government legally mandates rural landowners to restore riparian forests in their properties and, subject to farm size, an additional area called the "Legal Reserve". This legal mandate is key to protect the estimated 53% of Brazilian biodiversity that remains in private lands countrywide. This value increases to 90% in the most populated Atlantic Forest Biome [18]. A revision of the law in 2012 improved the mechanisms for compliance and enforcement but also granted controversial amnesties to landowners who did not comply with their restoration requirements and reduced the areas that require restoration [19]. In the revised legislation, the Brazilian government requires landowners to declare areas on the property in need of restoration or else they would not be eligible for rural bank financing. After declaring, the landowners can enroll in a program to restore on or off their lands. In the latter option, the landowner can lease or purchase land with native vegetation from another owner in the same Biome, which gives flexibility to landowners in highly productive areas, but also risks that key watersheds remain unprotected [19]. In addition to the restoration mandate, the presence of a large constituency of actors that endorse forest restoration [20] makes Brazil an interesting case study with respect to its ability to meet Bonn Challenge commitments.

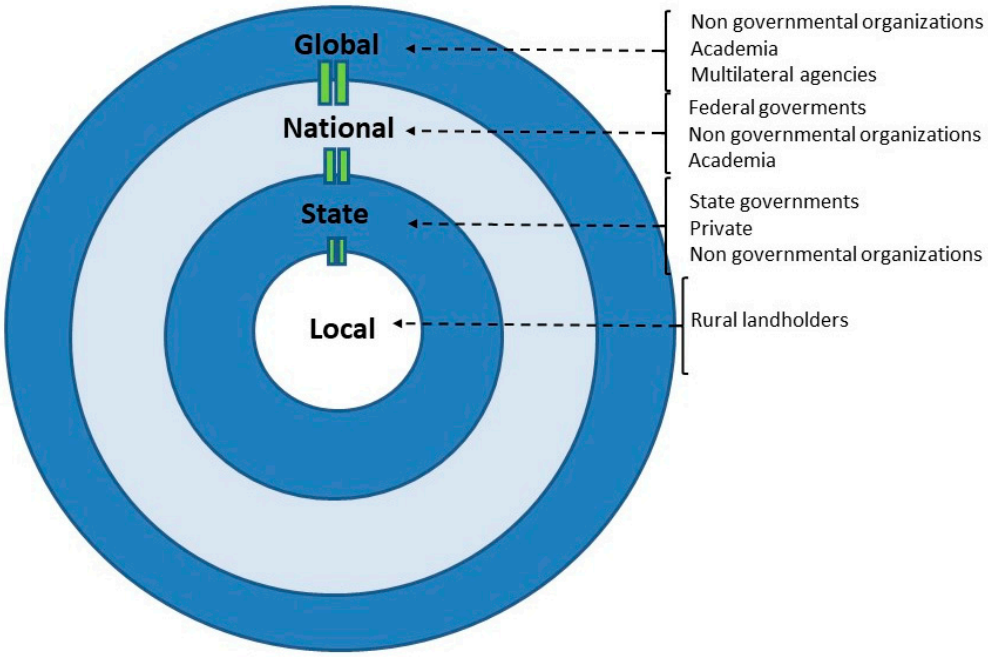

Figure 1. Nested scales where actors are involved in FLR planning and implementation work. The size of the equal sign denotes our hypothesis regarding diminishing similarity in the narratives when one moves from the global to the local scale. We gathered global narratives from peer reviewed and gray literature, whereas national, state and local narratives were gathered using semi-structured interviews. Private actors include sugar, pulp and restoration practitioners. This figure depicts the case of Brazil as scales and actor types may change in other parts of the world, where, for example, private property may not be the main form of land tenure.

We expected narratives on barriers and strategies for increasing the scale of forest restoration activities to increasingly differ from the national to the local scales, with national actors mirroring global narratives in FLR found in the literature (Figure 1). However, we also expected similarities that might inform a multi-scalar, multi-stakeholder FLR strategy.

We classified the narratives as belonging to one of three common narratives found in global, environmental policy arenas, namely, *ecological modernization, green governmentality,* and *civic environmentalism* [21]. *Ecological modernization* is rooted in liberal economy and claims that economic growth and environmental protection can be harmonized. Carbon trading for climate mitigation is an example of this narrative. *Green governmentality* uses scientific data and technology to legitimize specific top-down administrative measures via, for example, the modelling of carbon sinks and sources to legitimize administrative measures around carbon offset measures. Finally, *civic environmentalism* relates to governance claims that all relevant actors who have a stake in an environmental issue should be heard and be involved in finding a solution. Previous research has documented narratives among FLR proponents at the global scale [22], yet a need exists to document national, state and local narratives since FLR projects are being implemented locally within countries.

2. Global Narratives on Barriers and Strategies for FLR Implementation

Various barriers and strategies to implement FLR have been cited in the international peer-reviewed and gray literature. In Table 1 we classified them according to the three environmental policy discourses: *ecological modernization*, *green governmentality* and *civic environmentalism* as explained in the introduction [21]. Several articles and reports mention a variety of financial barriers and, therefore, strategies for FLR implementation in ways that resonate with an ecological modernization narrative. Authors mention few or short-term funding initiatives, high cost, perverse incentives, limited returns, lack of a value chain, lack of access to credit and high investment risks [6,15,22–41]. To overcome these barriers, authors propose a better design of funding and incentive strategies, restoration on marginal lands, and win-win restorative interventions that can achieve environmental and productive goals, such as agroforests, and public private partnerships, among others (Table 1).

Other aspects cited as barriers in the literature are poor communication and capacity weaknesses, the latter fitting clearly within a green governmentality narrative. Authors state that the creation of pilot restoration models and clarity in defining FLR can improve communication barriers [8,15,24,26,27,32,37,39,40,42]. To overcome capacity barriers, authors cite better planning, improved capacity building programs and rural extension support to small holders [6,15,22–24,31,32,35–37,40,41,43–47]. Governance claims within a civic environmentalist discourse are also commonly found in the literature. Top-down approaches that lack coordination at local levels and irregular land tenure hamper FLR interventions. On the other hand, multistakeholder arrangements and participatory planning are mentioned as strategies for success [8,15,16,22–26,31,32,35,36,40,41,44,48–51]. Finally, conflicting and uncertain legislation added to weak political will are barriers mentioned that may fit either an ecological modernization or a green governmentality discourse. Authors claim an enabling political environment and long-term political support to investments in forest restoration can aid in FLR implementation.

Table 1. Summary on barriers and strategies to Forest and Landscape Restoration (FLR) implementation mentioned in the global literature.

Narrative	Theme	Barrier	Strategy	Sources
Ecological modernization	**Financial**	Lack of long-term funding for projects High restoration and opportunity costs Unattractive /perverse incentives Limited and long returns from investment Lack of value chain High investment risk Lack of access to credit Volatile markets	Design adequate funding Restore on marginal lands Government supported incentive programs, dialogue with privates, and project bundling Win-win interventions Restoration linked with local economies Public-private partnerships Institutional change Innovative economic considerations	[6,15,22–41,49]
Green governmentality	**Communication**	Poor communication of restoration benefits	Increase pilot models and knowledge sharing Improve communication of restoration benefits, clarify FLR definition	[8,15,24,26,27,32,37,39,40,42,49]
	Capacity	Poor technical and planning capacities, limited extension services, scale of FLR implementation	Knowledge brokers, capacity building, and rural extension support, improved multi-disciplinary planning, based on solid ecological and social understanding, improved methodologies	[6,15,22–24,31,32,35–37,40,41,43–47]
Civic Environmentalism	**Governance**	Top-down approaches Lack of coordination and engagement across scales and actors Irregular land tenure	Improve governance arrangements, participatory planning Resolve irregular land tenure	[8,15,16,22–26,31,32,35,36,40,41,44,48–51]
Ecol. Modern. & Green governmentality	**Legislation and politics**	Conflictive and uncertain legislations Weak political will and ethics	Enabling political environment Long term political support	[6,8,15,22,24,25,32,37,46,49]

3. Methods

3.1. Semi-Structured Interviews

We interviewed actors at the national scale between the months of January and July 2018. We interviewed people from government, non-governmental organizations (NGOs) and academia. We employed Skype, EVAER® to interview actors remotely. We employed semi-structured interviews to allow two-way communication between the interviewers and the interviewee and the possibility for interviewees to elaborate on their responses [52]. We obtained informed consent from the interviewees before conducting the interviews and our project has been approved by the ETH's Ethics Commission under project code "2019-N-47".

We selected actors at the national scale using snowball sampling from an initial list of contacts two of the authors compiled for a previous study [53]. We gathered data for the state and local scales in four Atlantic Forest landscapes, two in Sao Paulo State (Paraibuna and Batatais) and two in Espirito Santo State (Domingo Martins and Sooretama) (Figure 2). We selected these areas as they represent Atlantic Forest landscapes where forest fragments appear in a matrix mostly of monoculture plantations and extensive cattle. Two of the landscapes are composed mainly of small-scale agriculture, with properties between 18 and 80 hectares (Paraibuna and Domingo Martins), and the other two of small- and medium-sized farms, with properties up to 300 hectares, on flatter terrains that allow mechanized sugar cane (Batatais) or coffee (Sooretama) agriculture (Table 2). During June, August and October 2018, we visited these landscapes to conduct interviews with state government staff, local NGO staff, rural extension agents, private actors (sugarcane mill, pulp companies and restoration practitioners) and rural landowners. To ease access to the rural landowners, we received support from the rural extension agencies of Paraibuna and Domingo Martins, from the Secretary of the Environment in Sooretama and from Sugar Mill staff in Batatais. We tried to randomly select the rural landowners, yet the final interviewee list consists of those landowners that were available during fieldwork dates and were willing to participate in the research. The interview (Table 3) contained a series of questions that provided us with some contextual information about forest restoration and leading questions on barriers and strategies to increase the scale of forest restoration. Additional context information provided by the local landowners is presented in Table S1.

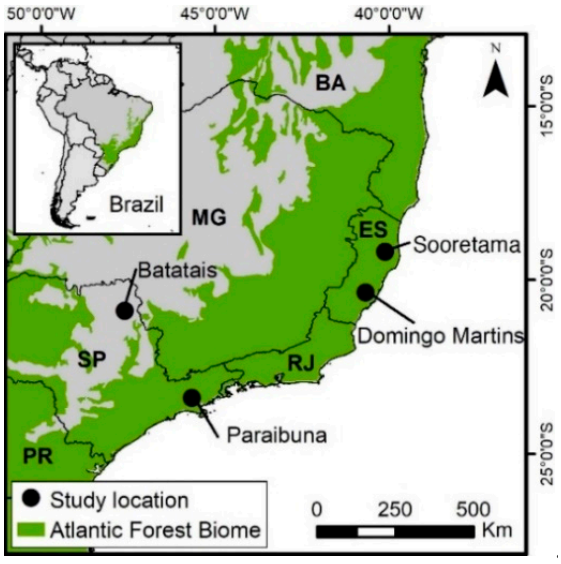

Figure 2. Map of Brazilian Atlantic Forest showing the four case study municipalities: Batatais and Paraibuna in the state of Sao Paulo, and Domingo Martins and Sooretama in the state of Espírito Santo.

Table 2. Characteristics of the four landscapes where interviews with state and local actors were conducted. Current forest cover includes remnants, secondary and restored forest.

State	Municipality	Rural Population (2010)	Area (km^2)	Average Property Sizes (ha)	Current Forest Cover (%)	Main Commercial Activity	Source
Espírito Santo	Domingo Martins	24,106	1225	18–72	43	Coffee	[54]
	Sooretama	6970	587	20–300	38	Coffee	[55]
Sao Paulo	Paraibuna	12,144	811.7	20–80	30.3	Milk, fruits	[56]
	Batatais	2827	850.7	20–200	9.7	Sugar cane	Sugar mill staff (pers. comm.)

Table 3. Semi-structured interview leading questions.

	National and State Scales	Local Scale
Themes	**Questions to Governments, Rural Extension, NGOs, Academia, and Privates**	**Questions to Rural Landowners**
Contextual	At what scales have you conducted previous forest restoration projects?	What is the main land use in your property?
	What were the main objectives of your previous projects?	Have you conducted forest restoration in parts of your property? Why yes/why not?
	Was your organization working alone or in collaboration? If in collaboration, with whom?	What were the restoration objectives?
Barriers for upscaling forest restoration	What barriers do you perceive for upscaling forest restoration to the landscape scale?	What barriers exist that hamper an increase in forest cover in your property? What barriers exist to increase forest cover in areas surrounding your property?
Strategies for upscaling forest restoration	What do you see as strategies for overcoming barriers to implement forest restoration at landscape scale?	In your opinion, what do people need to conduct forest restoration in their properties?

3.2. Data Analysis

We employed the software Maxqda analytics, version 12, (VERBI, 2018) [57] to transcribe the interviews. After the transcription, we applied a qualitative data analysis methodology [58,59] based on coding segments of the transcribed interviews using key words mentioned by the interviewees to later organize interview segments by common themes. We found the key words using word clouds and Maxqda MaxDictio word frequency function. We later used the key words and ran lexical searches to code the interview text the coded segments were grouped into themes and subthemes related either to the restoration context of the interviewee or to global narratives (Table 4).

Grouping allowed a quantitative comparison across actor types and scales based on comparing the percent in which each subtheme was mentioned at different scales or by different actor types. We classified the themes as *contextual* if they refer to general descriptions of the restoration context such as: (1) actor type in charge of implementation, (2) methods for restoration and (3) drivers of restoration. *Key themes* were those themes we intersected with parts of the interview where the interviewee was talking about either barriers or strategies for restoration. The legislation theme was coded as a driver for restoration and as a key theme as it is relevant for both the context but also to analyse if legislation is perceived as a barrier or as a strategy for upscaling forest restoration. We ran chi-square tests, with a 0.05 significance level, across actors and scales to assess differences in the percent of coded segments that denoted different emphasis of specific themes.

Table 4. Coding structure by themes and subthemes. The table also contains the key words for the lexical search. Key themes were employed for grouping barriers and strategies for increasing the scale of forest restoration mentioned.

	Theme	Subthemes	Key Words
Restoration context	**Actor type**	Government	government *, municipality, organization *, institution *,
		Rural Landowner	landowner, landholder, farmer, producer
		Private companies	compan *, agribusiness, business, Nestlé, Vale, Coca Cola, sugar mill, private
		Non Govermental Organization	NGO [2], TNC [3], WWF [4], WRI [5], other
		Academia	research *, profess *
	Restoration Method	Agroforestry	agrofore *, cacao, coffee
		Active restoration	seed *, plant *
		Passive restoration	fenc *, regeneration, succession
	Drivers	Legislation [1]	polic *, public, legal, law, forest code, permanent protected area, APP [1], RL [1], legal reserve
		International commitment	commitment, international, 20 × 20, Bonn Challenge, New York Declaration
		Water	water, spring, river
		Climate	climate, carbon
		Biodiversity	*divers *
Key themes		Financial	financ *, expens *, cost *, fund *, market, invest *, resource *, econom *, money, PES [6]
		Legislation [1]	polic *, public, legal, law, forest code, permanent protected area, APP [1], RL [1], legal reserve
		Capacity	capa *, extension, courses, classes, empower, educ *
		Communication	sensibilization, campaign, communication, inform
		Governance	multi *, governance, engage *

[1] Legislation was coded both as a driver and as a key theme. APP and RL refer to "permanent protected area" and "legal reserve" which are the two areas private rural landowners should maintain with forest cover according to the Brazilian Native Vegetation Law. [2] Non governmental organization; [3] The Nature Conservancy; [4] World Wildlife Fund; [5] World Resources Institute; [6] Payment for Environmental Services. * denotes a search based on the root of the word was conducted so all declinations and plural forms would be included.

4. Results

4.1. Contextual Themes: Actor Type, Restoration Method and Restoration Drivers

We conducted 105 interviews across the different actors and scales (Table 5).

Interviewees mentioned rural landowners and the government as the main actors in charge of forest restoration implementation (Figure 3A). The following quote illustrates this:

> "We cannot generalize as every region is different, but generally speaking the main axis of the restoration chain is the rural landowner" (National NGO).

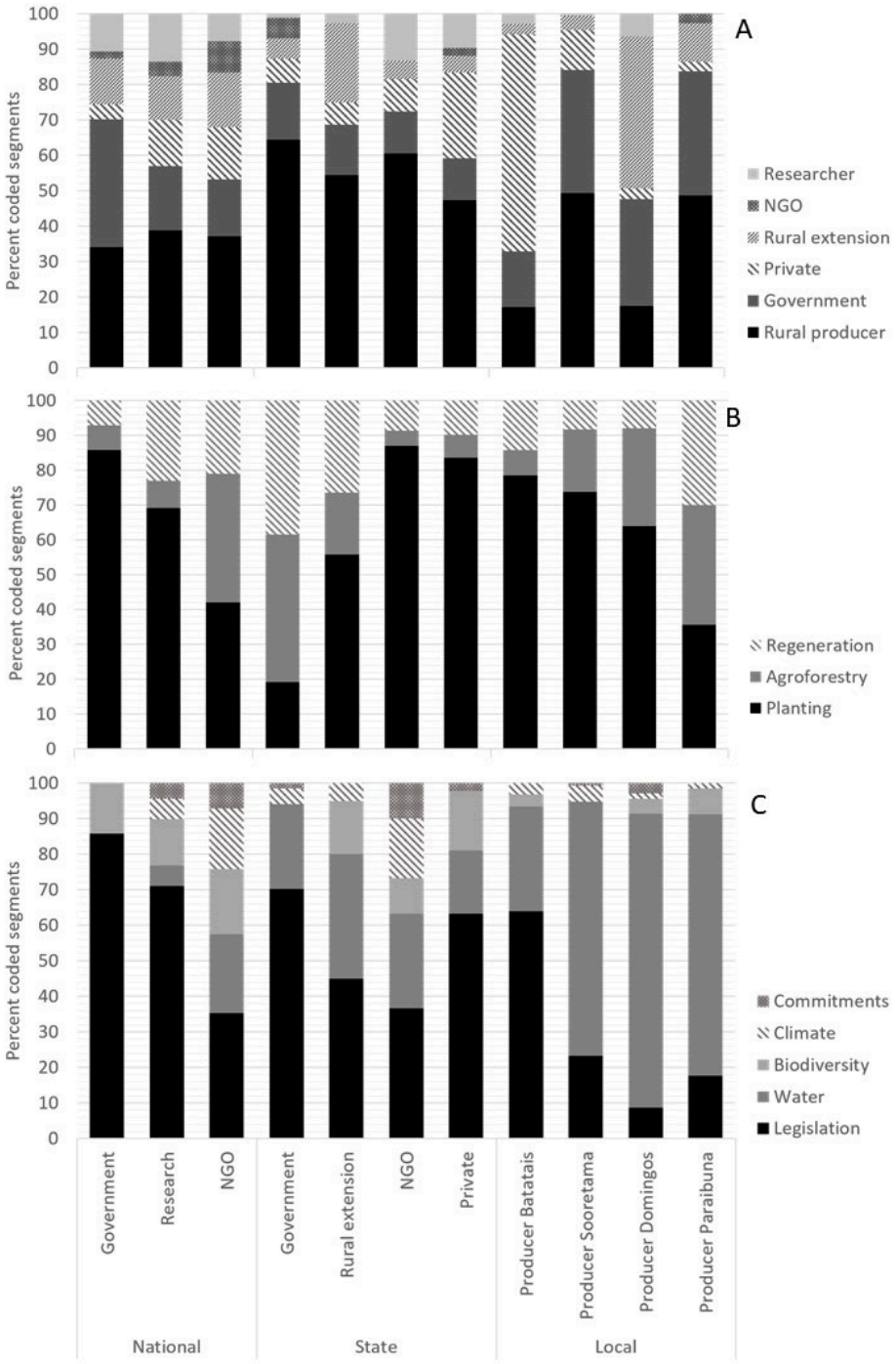

Figure 3. Percent coded segments for the different contextual themes. (**A**) actor type; (**B**) restoration method; (**C**) restoration drivers.

Table 5. Breakdown by actor and scales of the interviews conducted.

Actor	Scales			
	National	State	Local	TOTAL
Government	2	3		5
Academia	4			4
Rural Extension		4		4
NGO	5	3		8
Private (practitioners, companies)		7		7
Rural landowner Sooretama, ES			23	23
Rural landowner Domingo Martins, ES			20	20
Rural landowner Paraibuna, SP			18	18
Rural landowner Batatais, SP			16	16
TOTAL	11	17	77	105

However, interviewees at different scales differed in the percent of times (defined as the number of times interviewees mentioned a specific actor divided by the total number of interviewees) they mentioned specific actors ($X^2 = 98.4$, $df = 10$, $p < 0.0001$). Rural landowners across all four landscapes mentioned academic and NGO actors less compared to interviewees at other scales. Rural landowners from Paraibuna and Domingo Martins, municipalities with significant presence of rural extension, often mentioned the role of rural extension agents in helping them manage their properties and restore legally mandated areas. Rural landowners from Batatais mentioned private actors significantly more than other landowners given the support they receive from the Sugar Mill to restore riparian forests in their properties. The motivation of the Sugar Mill to support the landowners not only came as a means to comply with the legislation but also due to market pressure:

> " ... restoring forests is also a competitive advantage to the sugar mill: the landowner can rent to us or rent to another, and the landowner rents to us because we are going to environmentally adequate the property. We also feel pressure from the market .... companies like Nestle, Pepsi, Coca Cola do not want their image linked to environmental destruction" (Private).

The restoration method most commonly mentioned, regardless of actor type or scale ($X^2 = 8.88$, $df = 4$, $p = 0.06$), was tree planting (Figure 3B) driven by the legislation mandate (Figure 3C).

Water conservation as a driver for forest restoration was mentioned more often at the state, and particularly at the local scale than at other scales ($X^2 = 202.03$, $df = 8$, $p < 0.00001$). Other drivers such as biodiversity conservation or climate ranked very low at the state and local scales, being more salient only at the national scale (Figure 3C).

4.2. Narratives on Barriers and Strategies to Increase the Scale of Forest Restoration

We found similarities and differences across actor types and scales regarding barriers and strategies for increasing the scale of forest restoration in Brazil. We grouped these according to the key themes that appear in Table 4.

4.2.1. Barriers for Upscaling Forest Restoration

An *ecological modernization* narrative centered on financial aspects prevailed in the barriers mentioned by all actors across all scales. High cost of restoration actions, few incentives or funding and no or slow economic return were commonly mentioned by all interviewees (Figure 4). Landowners, mainly from the mountainous areas of Paraibuna and Domingo Martins, found agroforestry interesting as some already plant fruit trees and grow shade-grown coffee, but they did not consider this activity as forest restoration. Landowners interviewed in all landscapes did not consider forest restoration as a potentially productive use of their land, as this quote from a rural landowner from Paraibuna exemplifies:

"I do not think there are opportunities in my land to do more forest restoration. I already have that forest remnant. If I were to do more, I would not have enough productive land" (Rural landowner, Paraibuna).

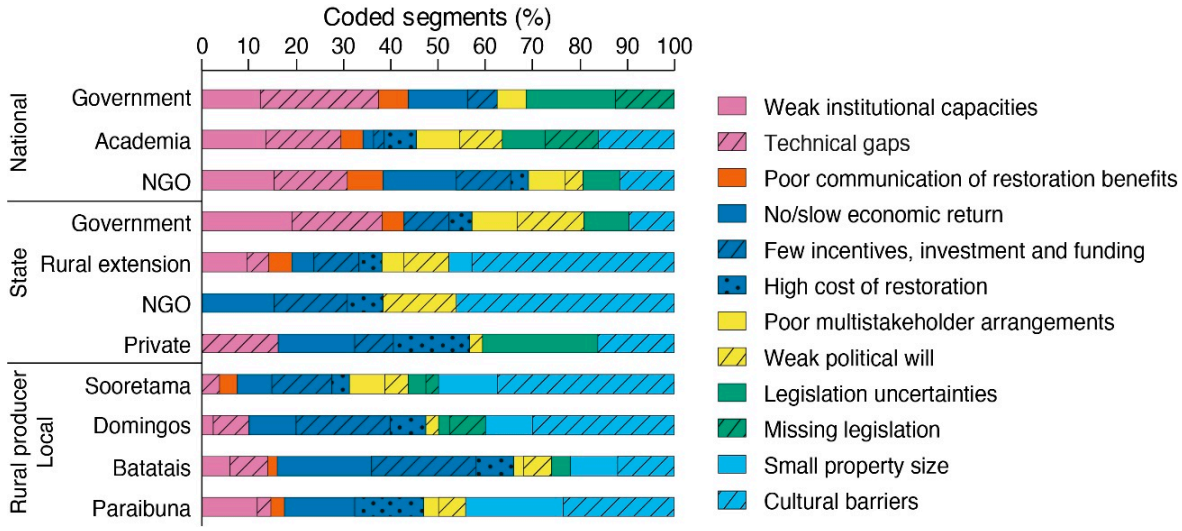

Figure 4. Code intersection on barriers for upscaling forest restoration as perceived by the different actors at different scales. Colour codes correspond to themes and patterns to subthemes from Table 4: pink = capacity issues, red = communication, dark blue = financial, yellow = governance, light blue = social.

Most actors, including local actors, mentioned weak engagement of the rural landowner in forest restoration in ways that fit within a *civic environmentalist* narrative. Interviewers mentioned several cultural barriers that limit engagement of the landowner, among them a lack of awareness about the benefits of forest restoration and a remaining tradition to deforest.

Despite above-mentioned similarities in the narratives of all actors, across all scales, we also found significant differences in their perceptions ($X^2 = 82.39$, $df = 26$, $p < 0.0001$). Actors at the state and local scales cited cultural barriers more often than actors at national scale. Interviewees from the state government and even rural landowners themselves mentioned how landowners sometimes take the seedlings donated by public or private programs, but subsequently afford them little care, and might even put cattle back into restoration areas, for example:

"Landowners receive the seedlings but do not plant them; they think the government has to come and plant for them, irrigate for them. Not only the government fails but we fail" (Rural landowner, Sooretama).

At national scales, a *green governmentality* narrative that emphasized capacity barriers was used more often than at other scales. The following quote illustrates this point:

"We lack, within the research institutions, professionals that think about ecological restoration from a research and technical stand-point that would take information to restoration practitioners and landowners on how to do forest restoration in their properties and fulfil the legislation mandate" (Academia).

Small property size as a barrier that limits upscaling forest restoration was mentioned only by the rural extension agents and by the rural landowners. The quote below captures this aspect:

"But the main barrier in our region is small property size. A person who has 5 hectares is not going to reforest because he will not be able to survive from the remaining portion of the land" (Rural Landowner, Sooretama).

4.2.2. Strategies for Upscaling Forest Restoration

Strategies mentioned were similar for all actors across all scales. An *ecological modernization* narrative around increasing funding, incentives, market and investments appeared throughout.

In addition, interviewees commonly mentioned education campaigns and dissemination of information on productive restoration as strategies for upscaling (Figure 5). Along a *civic environmentalist* narrative, most actors mentioned governance arrangements. For example, actors at the national scale often mentioned the 'Commission for the Recovery of Native Vegetation (CONAVEG)' as a key platform for upscaling forest restoration:

> "Today exists the Conaveg, linked to the legislation for the recovery of native vegetation. This is a council where we have representatives from the Ministry of Finance, of Agriculture, of Environment, of Science and Culture, of Technology and Communication, representatives of the Brazilian States, and from NGOs" (National NGO).

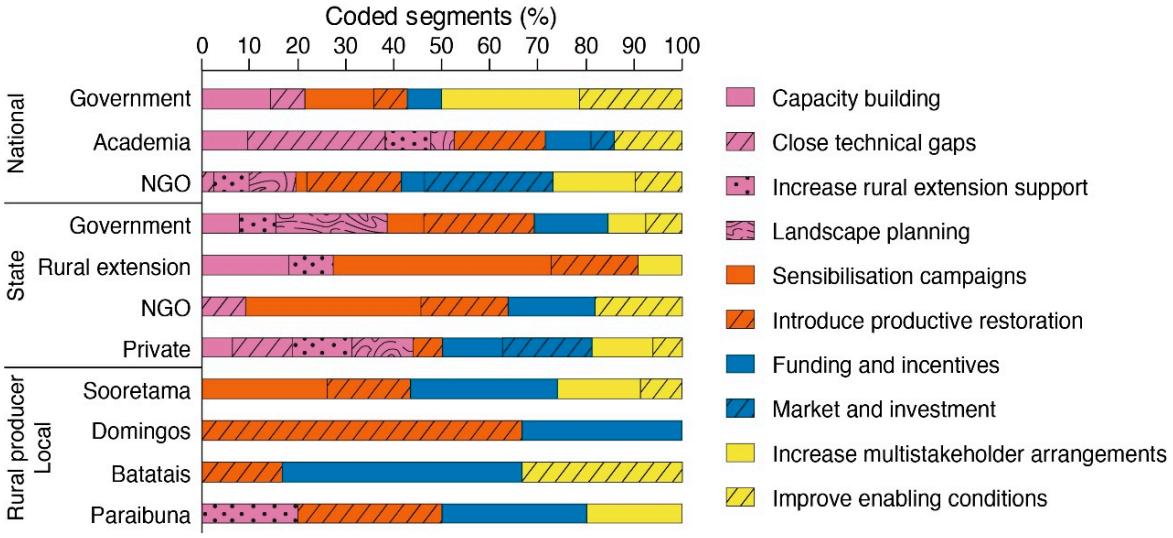

Figure 5. Code intersection on strategies for upscaling forest restoration as perceived by different actors at different scales. Colour codes correspond to themes and pattern to subthemes from Table 4: pink = capacity issues, red = communication, dark blue = financial, yellow = governance, light blue = social.

Despite several similarities, narratives across actors were marginally different ($X^2 = 113.04$, $df = 90$, $p = 0.05$) and the difference increased when comparing actors across scales ($X^2 = 45.05$, $df = 18$, $p = 0.0004$). The difference was mainly due to a *green governmentality* narrative based on capacity building, extension support and planning that was prevalent at national and state scales but mostly absent at local scales.

5. Discussion

As expected, the narratives of national actors mirrored those found in the global literature regarding barriers and strategies to increase the scale of forest restoration. State actors hold narratives that resemble the national scale but also that reflect the needs and expectations of the local, rural landowners. Despite this decreasing similarity from the global to the local scales, we found a prevailing *ecological modernization* narrative at all scales, which signals that improving the economics of forest restoration, via, for example, productive forest restorative interventions [14], or improved payment for ecosystem services, can find local support. A target area for productive restoration often mentioned by national and state actors were the Legal Reserves areas where legislation allows productive interventions that increase forest cover. However, interviewees mentioned the need to improve communication of

this possibility since the rural landowner does not consider productive restorative actions as forest restoration and to draw attention to biodiversity versus productivity trade-offs [60].

5.1. Contextual Themes

Actors across all scales consider the rural landowners as fundamental for upscaling forest restoration. These results reflect the Brazilian legislation and, more specifically, the Atlantic Forest context where private property prevails. We observed, however, slight differences across the four landscapes. Domingo Martins has a strong rural extension presence, and thus landowners in this area mentioned rural extension support more often. On the other hand, landowners from Batatais talked about the key role of the private for viabilizing forest restoration given that the Sugar Cane Mill helps them fulfill the mandate of restoring their riparian areas.

The restoration method more commonly mentioned across all actors and scales was seedling planting. This result once again likely reflects the legal mandate for forest restoration. This mandate has led to the development of a market for nurseries and restoration practitioners who implement active restoration. Planting is perceived as a method that allows meeting legislation requirements in shorter time than with passive restoration [61], although research has shown that this perception may not be true in all cases [62]. The prevalence of active restoration as the preferred method, however, maintains the perception that restoration is a costly activity, when research suggests that most areas in need of recovery could be restored through natural regeneration, which is a cheaper option [19].

Interestingly, aside from legislation, we found water as a driver mentioned by the rural landowners in all four landscapes. This signals a degree of environmental awareness probably driven by years of legislation on riparian forest restoration but also by recent drought events. On the other hand, climate, one of the main drivers for forest restoration globally [22], was almost absent from the narratives of local actors. This signals a rupture in the narratives on FLR as it moves from the global to the local. Traditionally, local actors care more about their everyday actions than about global environmental issues like climate change or biodiversity loss [51].

5.2. Barriers and Strategies to Increase the Scale of Forest Restoration

An *ecological modernization* narrative dominated the barriers and strategies for increasing the scale of forest restoration mentioned by actors at all scales. The main themes mentioned were the high cost and slow results of forest restoration and the need to increase long-term funding and investment opportunities. Rural landowners highlighted that government incentive programs exist, yet they are still not enough to conduct forest restoration. They see forest restoration mostly as a legally mandated environmental action important for water conservation. As such, rural landowners differed from global, national, and state actors by not perceiving productive restoration as a forest restorative action. This may be a legacy from the recent past where environmental restoration of riparian areas was the only restorative action promoted and enforced by the government [63].

Legislation now allows productive forest restoration interventions, with up to 50% exotic species, in the portion of the property designed for sustainable forest use, called the "Legal Reserve" [19]. Rural landowners interviewed were, however, not fully aware or distrustful of this possibility. Landowners were the only actors, aside from rural extension agents, that thought an increase in forest restoration was unfeasible due to the small size of their properties and the inability to set aside more land for environmental restoration. Only one landowner from Batatais considered the possibility of leasing or purchasing land, a new mechanism established in the Native Vegetation Law, as an option to pay his environmental debt. This option can lower the opportunity cost of restoration in certain areas. It is, however, controversial [19], and may only work for medium or large landowners in highly productive areas. We acknowledge this farm size limitation may not be the case for all of Brazil, but it is nonetheless important to consider for many NGO and government programs that tend to target small landholders.

National scale interviewees mentioned the mobilization of private investment through native species or mixed species silviculture as a key strategy for upscaling forest restoration [see also 30,33]. However, interviewees highlighted that high financial risks still limit investments. To reduce perceived high investment risks, interviewees from transnational NGOs, like the World Resources Institute (WRI), are providing business cases of native silviculture and agroforestry to investors in Brazil [64]. Aside from agroforestry and silviculture, other strategies were mentioned by interviewees, including the partnership between the Sugar Mill and the rural landowners, as well as technical innovations and economies of scale to lower the costs of forest restoration. These options need to be considered by proponents of FLR.

Green governmentality appeared as another narrative shared by national, state and global actors. Actors highlighted weak institutional capacities, and the need for further research on restoration techniques as barriers and increased rural extension support as a strategy for upscaling forest restoration. Interviewees mentioned that rural extension agents are close to the rural landowners, have long-term presence in the local communities and already advise landowners on how to manage their lands sustainably. Most local actors had a positive perception of rural extension agents (and of private companies in the case of the Sugar Mill) in supporting them with the restoration and management of their properties. Therefore, rural extension can play a critical role in providing farmers with important technical support to increase forest cover. However, further training of extension agents on the multiple ecological, social and economic dimensions within the current FLR vision for upscaling may be needed [65]. Despite the presence of extension support in the landscapes assessed, national actors mentioned weak extension support in many other regions of Brazil. Interviewees mostly at national and state scales voiced concerns about prevailing legislation uncertainties, weak political will and the ensuing lack of legislation enforcement as barriers to the implementation of what they considered good legislation mechanisms. Interviewees at national and state scales considered the Native Vegetation legal framework as a good opportunity for implementing FLR. However, drafting legislation is only a first step that will not advance without enforcement and the presence of an enabling environment for investments. These themes are likely to become important barriers in the current government administration for whom the environmental agenda ranks very low in its priorities [66].

Under a scenario of weak political will, governance arrangements become a key strategy for implementation that also prevails in the global literature. National actors often mentioned the creation of multistakeholder platforms, such as the National Commission for Native Vegetation Recovery (CONAVEG), as relevant spaces for the negotiation of strategies for upscaling forest restoration. Actors perceived the CONAVEG as a space where dialogue across traditionally separate sectors, such as agriculture and environment, can take place but highlight that state level or local actors are not yet involved. Local actors seldom mentioned multistakeholder arrangements as a strategy. Previous research found that, even in participatory forest restoration projects, landowner participation is traditionally limited to workshops designed to present them with "options" they did not help design [48]. Our results indicate that proponents of upscaling forest restoration in Brazil need to place strong emphasis on the development of inclusive governance arrangements at local scales where interventions to scale up forest restoration can be negotiated even under current weak political will.

6. Conclusions

Our results signal that a strategy for upscaling forest restoration of Brazilian Atlantic Forests can be based on shared *ecological modernization* narratives around improving the economics of forest restoration. However, FLR planning must consider both productive and environmental restorative actions, in a way that enhances landscape multifunctionality and restores native biodiversity. The main barrier currently facing proponents of FLR in Brazil is the low rank of the environmental agenda in the priorities of the current government. Weak political will for restoration increases distrust of rural landowners that governments will allow them to conduct productive actions, such as agroforestry, in Legal Reserve areas. In addition, low political will make enforcement of the legal mandate for forest

restoration highly uncertain. Under this scenario, strategies based on the creation of local governance spaces, where trust among actors can improve and restorative actions negotiated, become fundamental for upscaling forest restoration to meet Bonn Challenge commitments.

Supplementary Materials: The following are available online at http://www.mdpi.com/1999-4907/10/7/530/s1, Table S1: Background on the local scale.

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