Forests **2014**, *5*, 599-619; doi:10.3390/f5040599

OPEN ACCESS

forests

ISSN 1999-4907

www.mdpi.com/journal/forests

Article

Multi-Scalar Governance for Restoring the Brazilian Atlantic Forest: A Case Study on Small Landholdings in Protected Areas of Sustainable Development

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Received: 7 February 2014; in revised form: 14 March 2014 / Accepted: 20 March 2014 / Published: 3 April 2014

Abstract: Implementation of forest restoration projects requires cross-scale and hybrid forms of governance involving the state, the market, civil society, individuals, communities, and other actors. Using a case study from the Atlantic Forest Hotspot, we examine the governance of a large-scale forest restoration project implemented by an international non-governmental organization (NGO) on family farmer landholdings located within protected areas of sustainable development. In addition to forest restoration, the project aims to provide an economic benefit to participating farmers by including native species with market potential (fruits, timber) in restoration models and by contracting farmers in the planting phase. We employed qualitative methods such as structured interviews and participant observation to assess the effect of environmental policy and multi-scalar governance on implementation and acceptability of the project by farmers. We demonstrate that NGO and farmer expectations for the project were initially misaligned, hampering farmer participation. Furthermore, current policy complicated implementation and still poses barriers to project success, and projects must remain adaptable to changing legal landscapes. We recommend increased incorporation of social science methods in

earlier stages of projects, as well as throughout the course of implementation, in order to better assess the needs and perspectives of participants, as well as to minimize trade-offs.

Keywords: smallholders; good governance; civil society; environmental policy; project implementation; incentives; participation; trade-offs; *Euterpe edulis*

1. Introduction

Tropical forest regions, as sites of both high biodiversity and high rates of ecosystem transformation and degradation, are a focus of conservation and forest restoration initiatives worldwide [1]. To effectively achieve multiple objectives of biodiversity conservation, forest restoration, and sustainable development throughout these regions, multi-scalar governance systems that engage state and non-state actors across levels of governance are required [2]. As large-scale environmental issues faced by all mankind, such as climate change and biodiversity loss, increase in complexity, so too do our understandings of the range of solutions and partnerships necessary to address these problems. With this understanding comes a recognition that no one sphere offers the best approach, but that strategies require the cooperation, interaction, and interdependence of different sectors. When effective, these interdependencies comprise systems of "good governance".

In recent decades, "good governance" has gained popularity in environment and development as a mechanism with which to improve management of economic, social, and environmental resources [3–5]. Like other concepts employed in development, such as "participation" and "community-based natural resource management (CBNRM)," "good governance" has become 'institutionalized' and normative in theory and practice of socially just development, despite broad interpretation of its meaning [4,5]. Indeed, good governance is considered essential for fair and multi-level resource management and should employ the following principles: openness, participation, accountability, effectiveness, coherence, and civic peace [6,7]. As with other development concepts, practice of good governance is closely linked with ideals of democracy and with market mechanisms (both private and state-driven) for addressing rural poverty [8–10], but as a model remains necessarily undefined in order to be applicable to diverse local and institutional contexts [4].

An emerging and promising field of governance studies and theory, environmental governance is a concept encompassing all forms of action, organization, and formal and informal rule-making directed at addressing matters of the environment, especially environmental problems. Lemos and Agrawal [11] describe "environmental governance" as "the set of regulatory processes, mechanisms and organizations through which political actors influence environmental actions and outcomes" and place emphasis on the effectiveness of "hybrid" *versus* "pure" modes of governance, such as state-only or market-only solutions. Instead, cross-scale and co-governance partnerships between state, market, civil society, individual, community, and other actors offer increased opportunity for information exchange, adaptive management, and access to knowledge, benefits and authority [11,12]. Adaptive governance, as described by Folke *et al.* [13], allows the partnerships and management systems crucial to environmental governance to respond to changing social, economic, and ecological conditions, enhancing the resilience [14] of systems being governed.

Civil society [15,16] can play crucial roles in addressing environmental problems and improving democratic participation, enhancing good governance of resources. Non-governmental organizations (NGOs), labor unions, and local associations and cooperatives may improve smallholder access to benefits such as credit, technology, information, and markets, advancing their ability to participate in governance of production systems and, in this case, of forest restoration. Indeed, NGOs are often able to more directly address the needs of rural populations due to their greater flexibility or by acting as intermediaries between households, governments, funders, and the private sector [17]. However, the presence of such organizations is not a guarantee of success, and a correlation between NGO intervention and expanded "political spaces" for the poor cannot be assumed [18]. Like all institutions [19,20], those of civil society are subject to the effects of conflicting interests and management challenges, particularly relevant in the multi- and trans-disciplinary field of forest restoration. Furthermore, civil society organizations often work at the "community" level, resulting in problematic homogenization of diverse local conditions [21,22], and seek "win-win" solutions rather than addressing realistic trade-offs [23].

As defined today, forest restoration engages ecological and social systems to modify landscapes, ecosystem processes, and people, dependent upon the interests, interactions, and capabilities of multiple actors [24]. Actors can include forest restoration specialists with training as ecologists, biologists, foresters, and technicians; federal, state, and local government agencies; financial institutions (both public and private); civil society (NGOs, local associations and cooperatives); private businesses and industrial sectors seeking to establish themselves as progressive and "green"; and rural communities. Because all actors operate across multiple spheres of authority and knowledge, forest restoration projects necessarily involve cross-scale formal and informal arrangements of governance, as well as systems to be governed [25]. Transcendence of territorially bounded conceptions of governance permits engagement with "new political spaces" in a non-hierarchical manner, with important implications for political asymmetry and power sharing among actors [2]. As mentioned, civil society can play crucial roles in negotiating this asymmetry.

As opposed to purely conservationist approaches, forest restoration has since its early stages recognized the importance of social systems in the forest restoration process [26]. However, early conservationist perspectives that considered local populations as destroyers of the environment and excluded them from management strategies have bred conflicts that continue to pose challenges to implementation of forest restoration projects [27]. As a result, conservation, and sometimes forest restoration, projects have often resulted in failures and been considered as "neocolonialist" [27,28]. More recently, socially minded ecological restoration has been described as restoration of natural capital (RNC). RNC is a concept that considers the interface between ecology and economics, and between people and the natural environment, drawing on various disciplines including social sciences, economics, and policy. It suggests the necessity to develop a more holistic approach and accentuate the consideration of historical, political, economic and cultural factors for forest restoration projects to succeed [29–32]. Forest restoration is now a truly multidisciplinary field of action.

RNC was built on the idea that forest restoration should operate beyond purely technical and scientific knowledge and engage people in the forest restoration process, and that compromised natural capital is a limiting factor for human well-being and economic sustainability [33]. Traditional populations, family farmers and small landowners have an invaluable experiential knowledge about

their environment and often contribute to the sustainable management of natural resources, thus it is increasingly suggested that they should take part in the design of conservation and forest restoration projects [34]. The hypothesis that traditional populations may contribute to conservation effectiveness was considered in the work of Porter-Bolland *et al.* [35], which suggested that community managed forests distributed across the tropics showed lower deforestation rates than strictly protected areas. Such studies imply that when engaging traditional and family farmers, forest restoration practitioners could incorporate local environmental knowledge and local management techniques into project design, potentially increasing project success.

Due to the cross-disciplinary nature of forest restoration, careful observations about the operation of governance of forest restoration projects are necessary to improve the design, implementation, and success of forest restoration. Using a case study from São Paulo State, southeastern Brazil, we address institutional project management by public, private, and civil society bodies; public policy; and multi-scalar implementation in a large-scale forest restoration initiative. The studied project is being currently implemented by an international NGO on small landholdings located in protected areas of sustainable development of the Atlantic Forest Hotspot [36].

Working from a framework of trade-offs rather than win-wins, we set reasonable expectations for project successes as well as gain a realistic picture of social, ecological, and political realities. To map these realities and assess the governance systems of our case study, we ask,

- How did the governance of this forest restoration case study by a large NGO and the current legal context affect the project's implementation and acceptability by farmers?
- What are the relationships between local "community" and institutional-level governance, and how do they affect project success?

Previous studies have described the multi-scalar nature of sustainable development [10,25], both promoted and critiqued the concepts of CBNRM and co-management between the state and communities [37], and addressed development trade-offs [23]. However, the relationships among actors, across scales, and between policy and implementation of forest restoration projects remain understudied. Furthermore, mechanisms of actor relationships in the context of social-ecological relationships are not well understood, problematizing recommendations for increased resilience in systems of environmental governance [12]. We seek to provide a clearer picture of these relationships by examining a forest restoration project as an "object" of governance, with the intention of offering insight into improved implementation of forest restoration initiatives involving smallholders.

2. Experimental Section

2.1. Study Sites and Project History

This study was carried out in the Atlantic Forest of Brazil, a global biodiversity Hotspot and, more specifically, in the Serra do Mar biogeographical sub-region, the best-preserved center of endemism of this biome [38]. For achieving the goals of this research, we chose as a case study a forest restoration project implemented in the municipality of Barra do Turvo, Vale do Ribeira region (Figure 1; Detailed ecological, socioeconomic and land use information can be found in Table 1). Funded by the Brazilian Development Bank (BNDES, *Banco Nacional do Desenvolvimento*) as part of its Atlantic

Forest Initiative, the project also seeks to provide an economic incentive for farmers to participate in the forest restoration process. The Atlantic Forest Initiative allocates funding for the implementation of forest restoration projects across the biome, and the NGO responsible for the implementation of the studied project received approval from the Bank to include the economic component in the project design. Forest restoration is being conducted on farmer property located within Sustainable Development Reserves (RDS, *Reserva de Desenvolvimento Sustentável*), a category of protected area that permits management, and native species with potential for farmers to exploit economically via fruits and timber are favored.

Figure 1. Localization of the Mosaic of Jacupiranga (MOJAC) and of the study sites in Barra do Turvo, southeastern Brazil, where governance issues were assessed for a forest restoration program carried out on small landholdings in Protected Areas of Sustainable Development. Modified from "Map of the Mosaic of Jacupiranga," Instituto Socioambiental, 2008; [39].

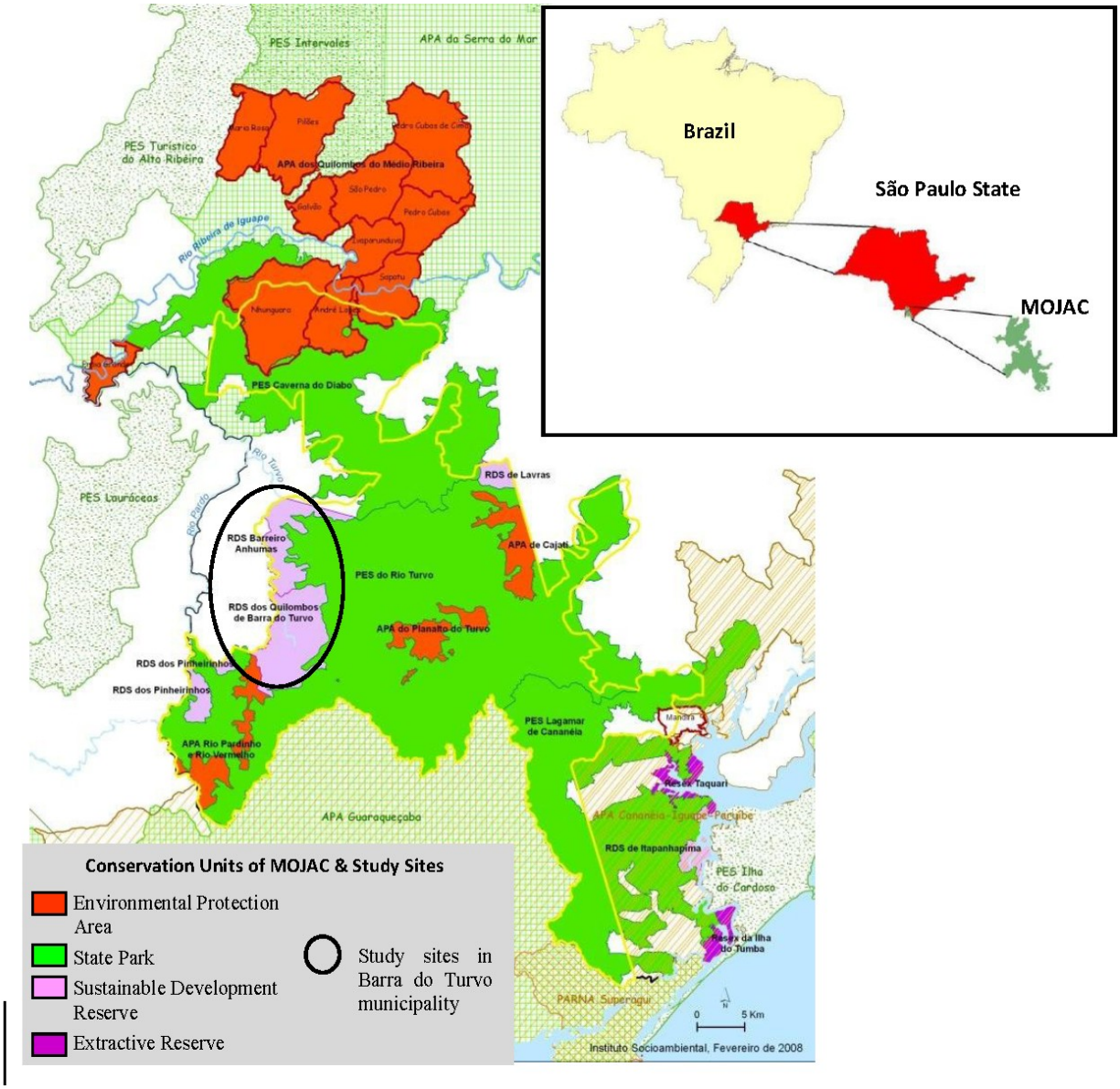

Table 1. Ecological and socioeconomic descriptions of the study sites, considering different scales, where governance issues were assessed for a forest restoration program carried out on small landholdings in Protected Areas of Sustainable Development in Barra do Turvo, southeastern Brazil.

	Biome-scale	**Regional-scale**	**State-scale**	**Local-scale**
The study site	Atlantic Forest	Serra do Mar	Vale do Ribeira	Barra do Turvo
Ecological	A global biodiversity Hotspot that once covered 1.5 million ha, but is now reduced to 12% of its original cover. Human-modified landscapes predominate.	This biogeographical sub-region is one of the centers of endemism of the Atlantic Forest, retaining 36.5% of its original vegetation. It contains the three largest remnants of continuous forest of the biome and accounts for 63% of the total remaining Atlantic Forest under protection.	Contains 2 million ha of forested areas (21% of the total Atlantic Forest), which shelter great biological richness and potential for sustainable management, such as through agroforestry or ecotourism. One of the most threatened plant species of this region, and also one of the most economically exploited for palm heart, is *Euterpe edulis*.	48% of the municipality's total surface is covered by some of the largest remnants of native forest (dense ombrophylus rainforest). But, in recent decades, farmers have witnessed soil fertility and water quality decrease, and degradation and erosion escalate, due to intensified grazing and use of fire as fewer areas are available to exploit.
Socioeconomic	This biome harbors more than 60% of Brazil's population within its boundaries, where *ca*. 70% of the national GDP is generated.	Several prosperous, big cities are located in this region, with many industries and services. However, small, poor cities predominate in the most forested regions, where agriculture is the main source of income of the population.	The region is remote and poorly linked to the state's main cities. With the lowest Human Development Index in the state and a very low population density, it is the poorest region of São Paulo State.	The commercialization of small farmers' products is still uncertain, and the intensification of agriculture limited by the hilly relief. Farmers mainly rely on bananas and peach palm (*Bactris gasipaes*) to generate income, as well as on cattle, which acts as a "security capital" used in times of necessity. Their situation has improved with the creation of cooperatives and the establishment of governmental "Food Acquisition Programs".
Land use	Mostly urbanization, extensive pastures and intensive agriculture (sugarcane, eucalyptus, orange).	Principal land uses include reserves (protected areas cover 25.2% of the region) and extensive pasturelands with very low productivity. Remaining forests are highly explored by the population.	Intensive and small-scale banana production as well as subsistence agriculture. Cattle ranching is also a major land use, particularly on steep slopes. Forest management is also very common.	The production systems are varied: Agroforestry, native fruits, cattle and buffalo breeding, crops, vegetables and beans. Pastures are a major component of the landscape. With the exception of bananas, peach palm, and milk, production is mainly for household consumption.

Most farmers of Barra do Turvo are from traditional groups such as the *Caiçaras* and the *Quilombolas* [40] or are considered "family farmers" and live from a combination of subsistence agriculture, banana production, and the extraction of natural resources of the forest, such as the emblematic *palmito juçara* (*Euterpe edulis*) and its "heart of palm," which is threatened with extinction due to overexploitation [41]. It is for these reasons and others outlined in Table 1 that the NGO targeted this region for a project designed to bring environmental, economic and social benefits.

In search of alternatives, conscious of the forest's values, and with the need to adapt to environmental laws and rules of the Mosaic of Jacupiranga (*Mosaico do Jacupiranga*, MOJAC) [42], farmers have incorporated forest restoration and agroforestry as new activities (Table 1). Overall, the farmers of the municipality are eager to experiment with new production systems, thus they initially welcomed the NGO. There are two RDS in Barra do Turvo: The RDS Quilombos de Barra do Turvo, constituted by four Quilombos, or traditional communities, with a total of 136 families; and the RDS Barreiro-Anhemas, constituted by two neighborhoods with a total of 176 families of family farmers. Considering that the NGO designed the project to be conducted on 21 hectares in this municipality, a total of sixteen farmers from various communities of both RDS joined the project.

To realize the project within the RDS, the NGO partnered closely with the Forest Foundation (FF, *Fundação Florestal*), a government body of the Secretariat of the Environment of São Paulo that is responsible for the management of state protected areas. Local FF RDS managers, along with an NGO technician later hired for local project management, were responsible for the presentation and coordination of the project with communities. However, allocation of funds was delayed until 2012, two years after initial discussion with farmers and the FF, and many farmers lost faith in or forgot about the project during this time. After implementation was reinitiated in early 2013, the NGO contracted a forest restoration consulting company and the biggest nursery of native species in the state, and the University of São Paulo's (USP) Laboratory of Ecology and Forest Restoration (LERF, *Laboratório de Ecologia e Restauração Florestal*) and Laboratory of Tropical Forestry (LASTROP, *Laboratório de Silvicultura Tropical*) to design forest restoration models in conjunction with communities for the chosen areas.

After initial design of forest restoration models at USP, a participatory workshop was held at an RDS headquarters at which the NGO, consulting company, and LERF/LASTROP presented to farmers a model of "sequential planting," in which pioneer species are planted first, followed by later successional species in subsequent years. Native species to be planted were determined jointly with farmers, and *E. edulis* was agreed upon as the species with greatest future economic benefit through the use of its fruits to produce a pulp similar to that of *açaí*, *Euterpe oleracea.* Additionally, a daily rate will be paid to farmers who assist in the planting phase, though the NGO was not able to provide the amount of this rate at the time of the workshop. The NGO will provide technical assistance to farmers for maintenance of the forest restoration sites for a period of two years.

2.2. Methods

The study was realized at the time of the implementation phase of the project, between May and August 2013. The researchers were part of the field team collaborating with the NGO, in charge of prospecting 21 hectares to be restored in Barra do Turvo, and used this opportunity to familiarize

themselves with the study sites and the different actors involved in the project. Five fieldtrips (approximately twelve days total) were organized to Barra do Turvo to meet the RDS manager and interested farmers, explain the project and realize the environmental diagnosis of the areas. These trips also enabled the researchers to conduct short preliminary interviews with the farmers. The NGO's technician in charge of the project in São Paulo accompanied the team in the field each time it was possible. Additional data was collected through participant observation during a one-day workshop organized in August gathering all stakeholders and through review of project documents provided by the NGO. We also investigated the legal instruments and regulations affecting the realization of the project since its beginning.

Eighteen separate structured interviews with farmers of fourteen distinct households (from both RDS) were conducted exclusively for the study without the presence of the NGO during a seven-day fieldtrip in July 2013. Thirteen of the interviewees are participating in the project and the five others had declined the NGO's offer. The objective of the interviews was first to realize a brief agrarian system diagnosis of the region and of each household, which improved understanding of the farmers' practices, their involvement in the community, the difficulties encountered, the role of each production system and the cash flow. This step, which had not been realized by the NGO, was essential to better appreciate farmers' enthusiasm or reluctance towards the project. Indeed, the history of interventions conducted for agricultural development reveals that the actions taken cannot be effective without knowing beforehand the dynamics of the agrarian system and the diversity of production systems of the region [43]. Interview questions addressed tenure, daily on-farm activities and major crops, labor and materials available, changes in focal activities over time, and other income sources apart from farming.

Then we investigated the evolution of the relationship between the farmers and the forest over time, the activities linked to it and the idea and opinion the farmers have of reforestation. Interview questions focused on the role the forest and trees play on farmer property and in production systems, observed environmental changes over time, and understanding of forest restoration and of the current project. Engagement with local farmer associations and cooperatives was also assessed, as were opinions and perceptions of the current project, including how and why the farmer became involved. All this information gave insight into the values the farmers associate with this ecosystem and their expectations about the project.

Finally, additional interviews with the NGO's former Project Manager and current Program Manager completed our effort to better understand the project's history, the governance system and the barriers encountered, as well as the NGO's own vision and expectations about the farmers and the project. In these interviews, we asked about the NGO's relationship with BNDES and how the project was revised to include an economic benefit to farmers, choice of areas to be restored and relationship with the FF, how the NGO perceives its relationship with the farmers, and how it perceives farmer understanding of the project, and difficulties in implementation.

The analysis of the data collected during field surveys, interviews and participant observation is entirely qualitative. The information was coded and sorted according to our research questions into thematic groups.

3. Results and Discussion

3.1. Institutional Project Management

3.1.1. Policy Context and Constraints

The legal and tenure conditions in which the project takes place are complex, placing constraints on project implementation and success at later stages. Major legislation affecting the project include the recently revised and heavily debated Brazilian Forest Code, the Atlantic Forest Law, the National System of Units of Conservation (SNUC, *Sistema Nacional de Unidades de Conservação*), and legislation regulating the management and commercialization of native, endangered species (Table 2).

In all areas of the project, sites are carved into micro-divisions, each with associated legal and prohibited activities. For conservation, the Forest Code defines two types of areas: The Areas of Permanent Preservation (APP, *Áreas de Preservação Permanente*) and the Legal Reserve (RL, *Reserva Legal*). The APPs are riparian areas and steep slopes that cannot be exploited for economic activities, and the size of an APP varies according to the width of the river and the size of the landholding considered. Law mandates compulsory forest restoration of APPs when they are in a degraded state, however, with the new Forest Code of 2012, the size of APPs to be restored has been greatly decreased, with just the region closest to water bodies now obligatory to recuperate (the rest is called "consolidated" and can be managed by the property holder). Changes in the new Code underscore a key difficulty of planning such a project: The necessity to design the best schema in accordance with current legislation while anticipating future changes in legislation that will directly affect how the project will operate. It must work within the current legal framework while hoping for changes conducive to success, such as policy favorable to management of secondary forest and of *E. edulis* fruits. Because of the uncertainty of this scenario, projects and local managers must maintain flexibility in implementation over time, especially when the forest restoration project is focused on the exploitation of long-lived native species.

Several other policies affect the management regimes of the project. The SNUC is a governmental instrument created in 2000 to work towards the protection of the environment and guarantee the right of traditional populations to access resources necessary for their subsistence. SNUC defines two groups of Units of Conservation with specific characteristics and objectives, as presented in Table 2. The primary objective of an RDS (group of Sustainable Use) is sustainable management of the reserve in order to preserve both biodiversity and the local communities' knowledge and traditions, as well as to increase their quality of life. Like all of São Paulo State's protected areas, the RDS is a public domain administrated by the Forest Foundation. By allowing sustainable management in RDS, SNUC makes the economic component of the studied project possible.

Table 2. Legal instruments and implications for the development of a forest restoration program carried out on small landholdings in Protected Areas of Sustainable Development in Barra do Turvo, southeastern Brazil.

NAME		TARGET	OBJECTIVES	IMPLICATIONS FOR PROJECT DEVELOPMENT
Brazilian Forest Code	Federal Law 12.651/2012	Forest protection and restoration	→ Regulates land-use: - APP: protected areas (riparian areas, slopes >45°, hilltops, any areas >1800 m), divided in obligatory (must remain vegetated) and consolidated (ability to manage). - RL: sustainable exploitation allowed but requirement to maintain or restore the forest (80% of the property in Amazon Forest; 35% in Savannas; 20% in Atlantic Forest).	→ Defining areas to be restored. → Management dependent upon government authorization and licensing. → Right to manage agroforestry systems in RL and consolidated APP by "traditional" or "small family farmer": Raises the issue of being recognized as such; imposes limits to farmers and to the technical nature of the project (practices, species or resources targeted).
Atlantic Forest Law	Federal Law 11.428/2006	Atlantic Forest remnants	→ Regulates vegetation removal based on the stage of regeneration (strongly restricted in secondary forests)	→ Defining areas to be restored → Management dependent upon government authorization and traditional status.
National System of Units of Conservation (SNUC)	Federal Law 9.985/2000	Environment and traditional populations' rights	→ Protects the environment and guarantees access to lands and natural resources for traditional peoples: - Group of Full Protection: Conservation, research, education -Group of Sustainable Use: Conservation, sustainable management.	→ Defining traditional status and management activities → Land tenure regulated by the Conservation Unit's management plan, raising the issue of written title *versus* customary tenure. → Regulating exploitation of native species.
MMA/IBAMA	Federal Law 6/2008	Species threatened with extinction	→ Protection and improvement of native flora and fauna (restrictions on extraction, conservation *ex-situ)*.	→ Regulating exploitation of native species.
SMA	State Law48/2004	Species threatened with extinction in São Paulo State	→ Protection and improvement of native flora and fauna	→ Regulating exploitation of native species.
National System of Seeds and Seedlings	Federal Law 10.711/2003	Seeds and seedlings	→ Organizes production, trade, import and export system; assurance of identity and quality	→ Regulating production of native species

Finally, another difficulty for a forest restoration project such as this one - as it also aims to provide economic benefits - is to obtain the right to work with protected or threatened species. *Euterpe edulis* is an endangered species increasingly favored in projects, as it is crucial in the ecology of the forest and can provide income for farmers via seeds or processing of fruit pulp [41]. Other uses such as the extraction of its heart of palm are forbidden, even if the palm tree was originally planted by a farmer, as the process leads to the death of the palm [44]. This problem is encountered for numerous native species, and a whole project faces failure if it cannot guarantee the farmers authorizations to manage and use the resources, and consequently reduces their willingness to plant native tree species in agricultural lands.

Farmer uncertainty regarding future ability to benefit economically from native species was not only a function of difficulty on the part of the NGO in explaining the economic component of the project, but also a reflection of the reality of policy complexity surrounding native species. Farmers are fully aware of restrictions on commercializing, or even cutting for personal use, native timbers, and future changes in these restrictions are uncertain. In an encouraging development, São Paulo State recently adopted a resolution regulating management of *E. edulis* fruits (SMA 105/2013), but while most participants in the project are hopeful about pulp commercialization, they realize that this represents a long-term benefit from which they cannot immediately profit (the *E. edulis* palm typically begins producing fruit only eight years after planting). If legislation does not facilitate other native species management in the future, or even the cultivation of crops in the initial phases of the project through agro-successional models of forest restoration [45], these restrictions could in fact prevent farmer access to manage trees they have planted for this project.

Presently, the law permits developing agroforestry or agro-successional systems to be managed by traditional or small family farmers in the consolidated APP and RL. Management may also be permitted in young secondary forests provided it is for subsistence use. But undoubtedly, the project is embedded in a complex legal landscape where it is hard to know which law prevails, and how future legislation will support or hinder project objectives.

Management rights are also complicated by the location of farmer properties within protected areas of sustainable use. As government property, RDS land is subject to regulations defined in the reserves' management plans and by the FF. Furthermore, before transfer of the land to the government, the majority of farmers held only *posse* (possession through long-term inhabitance) rather than written title, further weakening their property claims. Especially for the Quilombo communities concerned in this study, title remains a point of contention between communities and the FF. All farmers' right to remain living and producing within the RDS is contingent upon their identity as "small" or "traditional," defined by size of property and on-farm methods.

3.1.2. Incentives and Project Acceptability

The prospect of future economic gains from planted species may have offered additional incentive for farmers to participate [46] but was not found to be the principal reason for acceptance of the project. Rather, farmers were more likely to participate if they simply had marginal lands not currently in use and perceived no detrimental effect of allowing forest restoration on their property. Farmers with cattle or buffalo, whose forest restoration areas will require construction of fences, were enthusiastic about receiving new fencing through the project, and farmers whom the project will

employ for area preparation, planting, and maintenance agreed to participate because of the income provided by these activities. Yet, even when farmers displayed interest in experimenting with a new species or management technique, they were not always willing or able to invest time or money in this experimentation.

Furthermore, interviews indicated that farmers do not currently hold a vision of the forest as a source of economic benefit, as Brazilian environmental law has largely rendered it off-limits to management. While some farmers rely on forest products for traditional use, income is primarily dependent on non-forest production systems. Thus, the majority of interviewees do not believe that any economic benefit from the project will significantly increase their income. Prior experience with or exposure to forest restoration had not involved any potential for smallholders involved in this study to economically exploit species planted in the future, so conceptually this was a very difficult idea to convey when explaining the project to farmers. Interviews made evident the fact that, although the NGO had previously introduced the concept of the project to them during the first visits in 2010 and 2011, nearly all respondents were totally unclear about the idea that the forest restoration model adopted was meant to provide a future economic benefit for them.

From the start, NGO and farmer understandings of the project were not in alignment. Before and during the area diagnostic and mapping phase, the project faced many setbacks as participants dropped out, unsure of the intended benefits of the project to them and distrustful of the NGO's intentions after a long delay in implementation with no communication with participants during the period of the delay. Property visits by field staff and the workshops held by the NGO and the FF greatly contributed to farmer understanding of the NGO's vision, and participants were enthusiastic about the future potential for *E. edulis* pulp. Before the workshops, half of our informants described reforestation as "planting trees on an area you can't use anymore afterward" and as something that is "using up space" and a "loss of agricultural lands." These statements underline the smallholder perception of reforestation on their land as a loss of usable space, either for cattle or crops, and of a use, rather than conservationist, relationship with the landscape.

Despite this use-based relationship, during workshops and interviews, farmers cited many ecosystem service values, such as the provisioning and regulating services of recovery and maintenance of soil fertility, fresh water, and air quality, the cultural service of inherent beauty, and the supporting service of animal habitat [TEEB service categories; 1]. Articulation of ecosystem service values of the forest by farmers demonstrates a shared value with NGOs, funders, and environmental policy and serves as a point of mutual understanding of the benefits of a forest restoration project. By becoming more familiar with the association between ecosystem services and forest restoration, and by witnessing increased economic potential for native species, farmer goals will become progressively more aligned with those of forest restoration [33]. Furthermore, projects should place greater emphasis from the start on arriving at mutually understandable definitions of key concepts, such as the definition of forest restoration itself, in order to ensure successful implementation and avoid later confusion between stakeholders [47].

3.2. Multi-Scalar Implementation

3.2.1. Participatory Nature of the Project

The implementation of a large-scale forest restoration project funded by BNDES, designed by a multi-national and hierarchical NGO, and ostensibly intended to benefit farmers on whose land forest restoration will occur, is unquestionably complex (Table 3). To complicate implementation, the project is also reliant on local government, even local officials' personal interest and faith in the project, to be successful. A shift from a project management approach to a good governance approach is required.

Table 3. Map of stakeholders involved with a forest restoration program carried out on small landholdings in Protected Areas of Sustainable Development in Barra do Turvo, southeastern Brazil.

Stakeholder	Role	Scale of Action
Farmers	Providing areas on property for forest restoration; planting and maintenance of trees.	Local
NGO	Project concept, design and coordination; technical assistance.	International
São Paulo State Forest Foundation (FF)	Providing access to RDS and to farmers; project coordination.	State
BNDES (Brazilian Development Bank)	Providing project funding.	National
Forest restoration consulting company and the University of São Paulo	Project design and site assessments.	National; Atlantic Forest Biome
Local unions and farmer associations	Communication with farmers and responsibility for administrative concerns.	Regional

The NGO placed emphasis on conducting "participatory" workshops to design and implement forest restoration models with farmers. Counter intuitively, the degree of participation actually achieved through workshops and field visits may be more important to the NGO than to farmers, the majority of whom were not explicitly concerned with the project's long-term benefit to them when they agreed to participate in it. The NGO will rely on the representation of a participatory process, and of the project's "success," through reports and presentations to secure future funding from institutions that value participation, and the NGO has ultimate control over the "interpretation of events" [48].

In addressing trends in development project design and implementation, Mosse [48] describes the "mobilizing metaphors" of policy discourse, including "participation," "partnership," "governance," and "social capital." Because they can be interpreted broadly, these concepts feature centrally in project representation and in multi-stakeholder planning by serving to "conceal ideological differences, to allow compromise…and to multiply criteria of success within project systems" [48]. By adding a participatory component, not originally required by the forest restoration funded by BNDES, the NGO has rendered the project significantly more complex and must draw on existing development language and techniques for incorporating farmers into planning and implementation. In the present case, farmer participation was essentially limited to (1) choice to participate in a project that may bring future

economic benefit, and some choice about where forest restoration will occur on their properties, and (2) choice of native species to plant. However, the forest restoration models themselves were designed apart from farmers, highlighting the fact that the entire structure and primary objectives of the project are necessarily non-participatory, requiring specialized technical knowledge. Farmers are invited to participate in very specific phases of the project, and although the design of the forest restoration models is meant to benefit smallholders, the primary objective is forest restoration.

This form of participatory engagement might be characterized by Mosse as a "commodity" of a project [48], holding an important symbolic position but effectively changing little in a project's central goals or technologies. Participants may come to appropriate these goals as their own in a process of "mirroring," whereby the "institutional needs of the project" become "built into community perspectives, making the project decisions appear perfectly participatory" [48]. In the present case, as the benefits of forest restoration and potential future benefits of economic native species are explained to farmers, farmers make decisions in line with the goals of the project. At the same time, details of project operation are modified to accommodate farmer ideas and needs, such as suggesting that they intercrop bananas and other annuals in initial stages of tree planting.

As discussed above, the project initially demonstrated low accountability [12] towards farmers by failing to adequately explain the purpose and intended outcomes of forest restoration on their lands, though this was significantly altered through subsequent field visits and workshops. The process of conducting workshops to better explain the project, to choose species in a participatory manner with farmers, and to provide training in area preparation and planting likely improved the trust between participants and the NGO. Through this process, the NGO both increased trust in the project [12] and its "downward accountability" towards a marginalized population, cited as a neglected component of multi-stakeholder implementation [49]. Not only must farmers demonstrate to NGOs and other authorities that they are capable of putting into practice project components, but these organizations must also show farmers that they are reliable and accessible.

Local civil society, such as farmer associations and cooperatives, can play a role in negotiating asymmetries between smallholders and more powerful actors, assuring just engagement of farmers by NGOs and improving farmer access to benefits brought by NGOs and government. NGOs themselves remain powerful actors in this asymmetry even as they may try to minimize it, at times unaware of how use of mobilizing metaphors such as participation in fact diminishes power sharing by setting the terms of smallholder engagement. In our case study, leaders of farmer associations were vocal in meetings and workshops in insisting that the NGO clarify intended benefits for farmers, and associations assumed responsibility for transferring money earned through the project from the NGO to farmers. Some of these leaders are individuals who share conservationist values and already have an interest in agroecology, and thus played key roles in influencing other farmers' perceptions of the project.

3.2.2. Problem of "community"

The concept of "community" acts as another kind of mobilizing metaphor, providing a site of intervention for projects. "Community-based natural resource management" requires a community, rather than individuals, to achieve equitable and sustainable resource management, though a discreet

community upon which development can act may not always be present [21,22]. It is within the realm of community that the "environmental subject" emerges [50]; it is the unit upon which NGOs can act and for which they can most effectively attract funding. Communities, in turn, can reinforce this conceptualization as a space of intervention as a means to attract projects and attention from NGOs.

These environmental subjects, as "participants" in systems of environmental governance, come to perceive the environment as an object of governance by responding to incentives that necessitate sustainable management of natural resources [11,50]. In our example, smallholder farmers who have previous experience with conservation projects and exposure to conservation rhetoric are able to articulate perceptions of the environment using conservationist language and in some cases have altered their own perspectives on the environment and conservation as a result of this engagement. Here, project "success" is actually dependent on subject making [50], as the project will only accompany the farmers for the first few years and requires that farmers maintain interest in ensuring the success of tree growth and in pursuing avenues for commercialization of products derived from native species. Forest restoration success will also depend on farmers' increased valuation of environmentalist values of the landscape and decreased valuation of profits gained through cattle ranching or 'unproductive' farming.

Interviews at the household level demonstrated the diversity of opinion about the project, about conservation, and of production systems within each community. This variety reveals that in approaching members of the same "community," the NGO is basing its methodology on a simplified reality, seeing a homogenous community with common interests when it is in fact engaging individuals with different knowledge, experience, and opinions. Because they share similar production systems and cultural histories, Quilombola households seem to cohere as communities (as Quilombos) more neatly than family farmers in the other RDS, but conflict and diversity of opinion are still present within Quilombos. Intra-community conflict in all RDS include tension between those producing organically and those still using agrochemicals, and between ranchers who use fire to clear lands and their neighbors. Income disparity and conflict highlight the need to assure access by and opportunities for less powerful actors within communities when possible during the life of the project.

3.2.3. Trade-offs

As the political, social, and economic realities of this case study have demonstrated, the movement across scales in multilevel, multi-stakeholder development is a process of negotiating trade-offs. Development projects act as a social phenomenon that involves and affects various social actors or groups of actors, also called "strategic groups" [51], that interact and compete to capture the resources of a project. Thus, while projects involving diverse stakeholders should address the needs and priorities of every strategic group, strategies and outcomes fully satisfactory to each group cannot be expected. Rather, project management should focus on trade-offs acceptable to the parties. Trade-offs of this project include:

- Inability of every smallholder involved in the project to attend every meeting and workshop hosted by the NGO, due to lack of transportation or time. Thus, not all perspectives were taken into account, as the project in Barra do Turvo operated at the household rather than the community level.

- Design of forest restoration models on a university campus *versus* with farmer participants. However, the models were presented to participants in workshops, during which farmers were able to make recommendations for alterations. Species choices in the models were also primarily based on farmer suggestions.
- From the perspective of some farmers, losing productive space to forest restoration; from the perspective of the NGO, accepting less space per farmer property than preferred. These compromises were in some cases negotiated in the field during the prospecting phase, as farmers and project team members discussed current and potential future uses of pieces of land.
- Substitution of species more suitable to forest restoration for species with greater economic potential.
- Uncertainty of future legal situation conducive to commercialization of native species, but enough potential to design a project around the possibility.

Rather than "failures" or the less desirable alternatives to a win-win scenario, these trade-offs reflect realities of project implementation and of projects with conservation and development objectives. With improved project planning, such as better communication with farmers in initial stages, minimization of some trade-offs may be possible.

4. Conclusions

Large-scale forest restoration projects in protected areas, which involve small landholders and strive for both conservation and socio-economic development, are embedded in multi-scalar and complex social, legal and tenure contexts. Here, we have examined these contexts, including incentives for farmer participation, participatory project design and implementation, and questions of community and trade-offs. Studying the governance regime and relationships between the actors allows us to highlight the obstacles faced by the different stakeholders when designing and implementing a forest restoration project, as well as demonstrate the interdependence of the involved sectors.

Major barriers discussed include policy complexity and components of policy not necessarily aligned with the project objectives, and the uncertain evolution of legislation; administrative processes; the working unit (individual/household *versus* community) approached by the NGO which, if not properly defined, will lead to inappropriate proposals or inapplicable methodologies; and the lack of communication between parties.

We offer several recommendations that can improve the implementation of forest restoration initiatives involving smallholders, based in "good governance" that promotes "multilevel, nonhierarchical, information-rich, loose networks of institutions and actors" [11,52]. Good governance of forest restoration and conservation involving smallholders requires inclusion of and dialogue with farmers in all phases of the forest restoration process, as well as the need to adapt current legal instruments and incentives to this end. Recognition by institutional-scale governance bodies of the important role of local-level governance, and more serious incorporation of social science-based analyses prior to project implementation, will support the achievement of multiple goals, enhance power sharing, and reduce political asymmetry.

Increased attention to social analyses before and during project implementation aids in identifying relevant local, regional and even global policies [53]. Surveys and social evaluations at the outset of

projects, and thorough investigations of historical, cultural and economic backgrounds, also significantly contribute to better understandings of the strategies of the participants, allow projects to appropriately adapt, and increase the acceptability of projects by smallholders. Pre-implementation social analysis also improve institutions' (NGO, government, university) understanding of local farmers' relationship with their landscape, and how their sense of place is formed by daily interactions with it. Improving participatory techniques, working from local relationships with landscape, and establishing a relationship of trust through frequent contact can minimize trade-offs and ensure participation throughout the project. Civil society can play a role in negotiating this trust, in improving smallholder access, and in promoting openness and accountability.

Finally, we stressed the "flexibility" and interdependence of the concerned institutions. Because institutions must deal with uncertainty in environmental projects [6,12], they should be ready to adapt and adjust to the reality of the field, to small farmers' needs, and to environmental and legal variability. Forest restoration projects must be concerned with both conservation and livelihoods, as recognized by RNC, and can provide alternatives to conventional forest restoration that not only increase the ecological complexity of the system to be restored, but also transform the socioeconomic landscape. Forest restoration projects must compensate the loss of arable lands and offer economic incentives, such as contracting farmers for planting and including crops and exotic species in agro-successional models that will evolve into production areas of timber and non-timber forest products that can be sustainably managed. In the Atlantic Forest, management of economically interesting species such as *E. edulis* can address both forest restoration and development goals, with the objective of avoiding little success in either, or significantly more success in one realm than the other.

Acknowledgments

The authors wish to thank the Laboratory of Tropical Silviculture (LASTROP) and the Laboratory of Ecology and Forest Restoration (LERF) of the Escola Superior de Agricultura "Luiz de Queiroz" for logistical support, the Yale MacMillan Center Fox International Fellowship, and the described NGO for the opportunity to accompany the project described here. We are grateful to our colleagues in the field for their insights and enthusiasm, to the farmers of Barra do Turvo for participating in this research, and to James Aronson and two anonymous reviewers for their valuable feedback on drafts of the article.

Author Contributions

Alaine Ball and Alice Gouzerh carried out the fieldwork described in the article, with both authors present during NGO-organized trips. A. Gouzerh conducted separate, structured interviews with farmers without the presence of the NGO. Pedro Brancalion advised the research of both Alice Gouzerh and Alaine Ball. All authors contributed to the writing of the article and the analysis presented here.

Conflicts of Interest

The authors declare no conflict of interest.

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