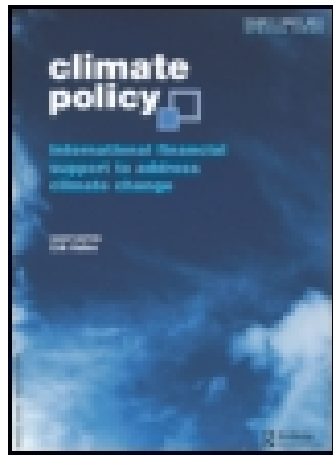


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Publisher: Taylor & Francis

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Climate Policy

Publication details, including instructions for authors and subscription information:

<http://www.tandfonline.com/loi/tcpo20>

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Published online: 24 Jun 2015.



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To cite this article: Thales A. P. West (2015): Indigenous community benefits from a de-centralized approach to REDD+ in Brazil, *Climate Policy*, DOI: [10.1080/14693062.2015.1058238](https://doi.org/10.1080/14693062.2015.1058238)

To link to this article: <http://dx.doi.org/10.1080/14693062.2015.1058238>

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■ research article

Indigenous community benefits from a de-centralized approach to REDD + in Brazil

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Successful efforts of indigenous groups to reduce emissions from deforestation and forest degradation in developing countries (REDD +) will likely vary with how the initiatives are designed and implemented. Whether REDD + initiatives are carried out by national governments or decentralized to sub-national or project-level institutions with a nested approach could be of great consequence. I describe the Suruí Forest Carbon Project in Amazonian Brazil, one of the first REDD + pilot projects implemented with indigenous people in the world. I emphasize (1) how enfranchisement of community members in the policy-planning process, fund management, and carbon baseline establishment increased project reliability and equity, and (2) how the project's quality would have likely been diminished if implemented under a centralized REDD + scheme.

Policy relevance

This article explores a decentralized REDD + intervention established in an indigenous land in Brazil. It expands the theoretical discussions on REDD + governance and highlights how centralized REDD + programmes are likely to be less effective than project-level interventions assisted by NGOs in terms of social benefits and community engagement. Additionally, the case study described can serve as reference for the design of critical social and technical components of REDD +.

Keywords: climate policy framework; community participation; decentralized governance; equity; NGOs; REDD

1. Introduction

Recognition of the reputed cost-effectiveness of using tropical forests as sinks for GHGs provides motivation for conservation efforts funded by monetary transfers from developed to developing countries (Tolba & Rummel-Bulska, 1998, p. 174). REDD + (Reducing Emissions from Deforestation and Forest Degradation, with recognition of the roles of conservation, sustainable management, and enhancement of carbon stocks in developing countries) is a policy intervention designed to organize these fund transfers in ways that recognize the interplay between biodiversity conservation, development, and climate change mitigation (UN-REDD, 2008). Although national REDD + readiness activities are still under way, a large number of project-based initiatives are already operational and have provided substantial insights into implementation issues (Caplow, Jagger, Lawlor, & Sills, 2011; Cerbu, Swallow, & Thompson, 2011; Duchelle et al., 2014; Garibay, 2012; Sunderlin et al., 2014). Still, little light has been shed on how on-the-ground interventions should address the components of REDD + that relate to local communities. This study describes the design of the Suruí

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Forest Carbon Project (SFCP), the first REDD + project implemented with an indigenous group in Amazonian Brazil. Lessons learnt from this project seem relevant to efforts to implement REDD + programmes in a fair and equitable manner for forest stakeholders, particularly indigenous communities. Given the presence of indigenous people in many forests considered for REDD + , insights about ways to address the needs and desires of these people are of broad relevance (Sikor et al., 2010).

The REDD + literature still lacks assessments of how operations should be managed in interventions that involve indigenous groups (Bellfield, Sabogal, Goodman, & Leggett, 2015; Caplow et al., 2011; Hayes & Persha, 2010; Krause & Nielsen, 2014). To help fill this gap, the genesis and structure of the SFCP in Brazil was analysed. Key approaches adopted by this project-based activity and their outcomes were identified and scrutinized to determine (1) how strengthened governance led to greater community participation in decision-making processes and commitment to REDD + objectives; (2) how community participation enhanced engagement and confidence in the expected carbon emission reduction from curbing deforestation; (3) how a fund management mechanism was structured to guarantee fair and equitable usage of carbon revenues; and, finally, (4) the fundamental role played by NGOs in promoting REDD + with the indigenous group in a fair and democratic manner.

The SFCP seems like an appropriate case study because of its goals and its mode of implementation. The project was certified (i.e. validated) in 2012 by a third-party certification body under two standards of the voluntary carbon market, including the *Climate, Community, and Biodiversity Alliance*, which is focused on social and biodiversity safeguards. The project was audited again 18 months later to check for performance conformance (i.e. verified) and to issue carbon credits.

1.1. REDD + governance and indigenous groups

Studies on environmental governance related to common pool resources generally emphasize stakeholder issues such as rights, responsibilities, enforcement, participation, and decision-making processes (Dietz, Ostrom, & Stern, 2003; Sandbrook, Nelson, Adams, & Agrawal, 2010). These issues are of great relevance to REDD + projects implemented with local people, where success often hinges on the processes through which decisions are made and resources are managed (Pettenella & Brotto, 2012; Thompson, Baruah, & Carr, 2011; Vatn & Vedeld, 2013). A growing body of literature supports decentralization and local empowerment as the foundation for effective REDD + governance (Hayes & Persha, 2010; Sandbrook et al., 2010; Sikor et al., 2010; Toni, 2011). Ribot, Agrawal, and Larson (2006) define decentralization as 'any political act in which a central government formally cedes powers to actors and institutions at lower levels in a political-administrative and territorial hierarchy'. Accordingly, decentralized REDD + activities (i.e. project-level interventions) should engage communities and other local actors in decision-making processes (e.g. Garibay, 2012).

For the framework of this article, decentralized REDD + interventions are defined as local activities implemented independent of governmental regulations (i.e. under voluntary carbon market schemes; Pettenella & Brotto, 2012). They contrast with centralized REDD + programmes, designed as top-down approaches by federal governments, which are likely to disregard the traditions and priorities of local agents (White, 2014). While there is support for project-level interventions under REDD + , there is also the threat of recentralization of control over forests to capture the financial benefits from carbon markets (Kanowski, McDermott, & Cashore, 2011; Phelps, Webb, & Agrawal, 2010; Toni, 2011). This

scenario, described by Sandbrook et al. (2010) as the ‘REDD paradox’, could compromise the effectiveness of conservation interventions and the benefits to forest-dependent local communities.

Although a strict bifurcation between centralized and decentralized REDD + schemes does not reflect reality (Wunder, 2010), concerns about centralized REDD + governance have been raised by the International Forum of Indigenous Peoples on Climate Change (Pedroni, Dutschke, Streck, & Porrúa, 2009). One major worry was that national programmes could facilitate contraventions of indigenous rights to land and forest resources. Still, even project-based initiatives involving indigenous groups and operating independently of any policy regulation are susceptible to adverse consequences. Some project developers earned the pejorative title ‘carbon cowboys’ for designing profit-oriented REDD + activities without promoting community well-being or respecting social safeguards (Toni, Ferreira, & Ferreira, 2011). Independent of the approach to governance adopted by REDD + interventions, they should not weaken community organization, threaten ancestral practices, and cause internal conflicts over boundaries and resources (Shankland & Hasenclever, 2011). Moreover, where the rule of law is weak and there are low levels of public accountability, REDD + payments are likely to increase corruption by participating organizations and benefit-capture by elites (Sandbrook et al., 2010). Corruption can be the major barrier to effective REDD + initiatives (García, 2011) and can occur at all levels of administration during both design and implementation phases.

According to the ‘United Nations Declaration on the Rights of Indigenous Peoples’ (UN, 2007) ‘... [i]ndigenous peoples have the right to the lands, territories and resources which they have traditionally owned, occupied or otherwise used or acquired.’ The document goes on to reinforce the need for the free, prior, and informed consent of indigenous peoples on decisions that affect their communities. Contrary to these recommendations, timber and other natural resources on the lands of indigenous people are often detrimentally exploited by outsiders (Hayes & Persha, 2010). This pattern in part reflects the issue that about 80% of the indigenous people in Latin America still live below the poverty line (Garibay, 2012). Even well-intended outsiders who try to implement community-based conservation initiatives often lack in-depth knowledge of indigenous cultures and fail to engage in participatory decision-making processes, which renders their efforts unlikely to be effective (Stearman, 2006). The same failures are suffered by the weak governmental institutions responsible for supporting local communities (Vitel et al., 2013). It is widely agreed that the achievement of REDD + goals will be enhanced by unconstrained community participation, especially if those goals align with those of the community and if the concerns and needs of affected communities’ members are respected (Phelps et al., 2010; Shankland & Hasenclever, 2011; Thompson et al., 2011).

In response to the concerns raised over the rights of local stakeholders, social safeguards for REDD + were developed, such as the ‘Cancun Safeguards’ (UNFCCC Decision 1/CP.16, 2010), the ‘Safeguard Information System’ (UNFCCC Decision 12/CP.17, 2011), and the ‘Social and Environmental Principles and Criteria’ (UN-REDD, 2012). Furthermore, numerous analysts recommend that national REDD + programmes nest bottom-up decentralized activities within broader national frameworks (Pedroni et al., 2009; Sikor et al., 2010). This strategy is supported by the UN-REDD programme (see García, 2011; Garibay, 2012). With the nested approach, project-level initiatives established with the participation of local people conform to national REDD + frameworks to allow their inclusion in national accounting and management systems. It is argued that mitigation results can thereby be achieved faster, more effectively, and efficiently, with the participation and representation of all

sectors of society (Fearnside, 2012; Kanowski et al., 2011; Pedroni et al., 2009; Phelps et al., 2010; Streck, 2010).

1.2. REDD + framework in Brazil

Historically, due to its recent economic development, Brazil was never obliged to reduce GHG emissions under international climate agreements (UNFCCC, 1998). However, during the 13th annual Conference of the Parties (COP 13) of the United Nations Framework Convention on Climate Change (UNFCCC) in 2007, the country made a voluntary commitment to mitigate its emissions (Law 6,263/2007), which was later translated into the Brazilian 'National Policy on Climate Change' (Law 12,187/2009).

The Brazilian climate policy was set by the 'National Climate Change Plan' (Brasil, 2008), in which the country aims to reduce 36.1–38.9% of its projected emissions under a business-as-usual scenario by 2020. Given that about 75% of the domestic GHG emissions result from land-use and land-cover change (IEA, 2012), one of the main objectives in the plan is to reach zero net deforestation by 2015. To achieve its goal, the plan relies on strengthened forest monitoring and enforcement, as well as reforestation. Part of the strategy is to create financial mechanisms to support climate change mitigation actions, including the development of a national carbon market to trade certified GHG emission reductions.

In the draft update of the national plan (Brasil, 2013), REDD + is acknowledged as an official mitigation strategy. Participatory dialogues were held by the Ministry of Environment in 2010 to formulate a national REDD + policy. To proceed with this task, a working group composed of representatives from the Civil House and seven ministries was established in 2011. This group suggested a strategy for the national policy based on (1) enhancement of regulations to mitigate GHG from the forest sector through effective and efficient monitoring, enforcement, and information systems, and (2) the management of international funds that are aligned with future emission reduction targets. According to the draft, Brazil's REDD + policy will probably have its sub-national levels for resource allocation and its main directions established until 2020. Another intention of the policy is to secure the adoption of social safeguards.

Despite the strategy developed by the governmental REDD + working group, Brazil's REDD + framework is still under debate (Shankland & Hasenclever, 2011). It seems certain, however, that the national REDD + policy will support decentralized activities and recognize the rights of indigenous groups and their autonomy to negotiate carbon-related agreements (Loft et al., 2015). This scheme arguably resembles the nested governance approach proposed for national REDD + programmes. Still, there is no unified indigenous group position on REDD +. Shankland and Hasenclever (2011) highlighted that no Brazilian indigenous organizations signed the 'Belém Declaration' or the 'Cochabamba Peoples' Agreement', which reject market-based mechanisms for conservation, but successful engagement of these groups in REDD + is likely to rely on case-specific negotiations. Toni et al. (2011) described two contrasting example of these negotiations with two distinct groups and outcomes.

Brazil has substantially benefited from bilateral REDD + agreements, such as the US\$1 billion agreement with Norway (among other donors) destined for the Amazon Fund (Angelsen, 2013). There has also been a strong attempt from Amazonian states to establish a common and market-based policy

position on REDD + (e.g. the ‘Palmas Declaration’ and the ‘Macapá Declaration’; May, Calixto, & Gebara, 2011). Multiple sub-national initiatives incorporating REDD + concepts have emerged in Brazil over the last decade in response to state interests and private investments, some associated with sub-national governments and others completely independent (Fearnside, 2012). Examples of these initiatives include the REDD Offset Working Group (ROW), established between the state governors of California, Chiapas, and Acre in 2010 (<http://greentechleadership.org/programs/redd-offset-working-group/>), state policies addressing climate change concerns, such as those passed in Amazonas (Law 3,135/2007), Acre (Law 2,308/2010), and Mato Grosso (Law 9,878/2013) states, the ‘REDD certification bill’ (5,586/2009) introduced in Congress (Shankland & Hasenclever, 2011), and, more recently, a proposal on revenues distribution from REDD +, prepared by the Amazonian states (Loft et al., 2015), as well as dozens of private initiatives oriented towards voluntary carbon markets (e.g. <http://www.climate-standards.org/category/projects/>). Although no national REDD + framework has yet been approved, REDD + pilot activities, implemented either under the umbrella of sub-national policies or in conformance with international voluntary carbon market standards, can shed light on crucial implementation issues related to local stakeholders, such as community engagement, strengthened governance, equitable revenues distribution, and technical assistance.

1.3. The Suruí Forest Carbon Project

The SFCP was initiated in June 2009. The 31,994 ha project area is in the indigenous territory Sete de Setembro, Rondonia, Brazil, homeland of the *Paiter Suruí* indigenous people (hereafter referenced as the ‘Suruís’). The approximately 1300 members of the community live in 26 villages in their government-recognized territory of 247,845 ha (Vitel et al., 2013). Although the project cannot technically be considered ‘nested’, as Brazil still lacks a national accounting system for REDD +, representatives of governmental institutions were involved in the project design to assure that it conforms to future national regulations (IDESAM, 2011).

After first contact by colonists in 1969, the Suruí population was reduced by half, primarily as a result of exposure to what were for them new diseases. Invasion of their land by colonists was related to the national territorial occupation strategy promoted by Brazil’s military dictatorship (1964–1985), which encouraged colonists to settle in the Eastern Amazon region. The Suruí territory was demarcated in 1976, but only ratified in 1983. Since then, government institutions responsible for the protection of indigenous community rights and the provision of basic public services (i.e. the National Indian Foundation (FUNAI), the National Institute of Colonization and Agrarian Reform (INCRA), and the Public Ministry of Brazil) have mostly failed at both (Mondini et al., 2007; Orellana, Basta, Santos, & Coimbra, 2007).

The colonial towns established near the Suruí territory greatly influenced the behaviour of the community. Suruí livelihoods and diets were substantially altered, resulting in widespread health-related problems (Lourenço, Santos, Orellana, & Coimbra, 2008; Tavares, Coimbra, & Cardoso, 2013). At the same time, illegal logging in their reserve by outsiders became an important source of income to some indigenous group members. It was estimated that almost US\$2 million worth of timber was taken from the land (Vitel et al., 2013). The income generated was used to purchase manufactured products and services available from outside their territory. Decades of unmanaged timber exploitation depleted stocks to the extent that revenues to the Suruí declined. Logging was followed by widespread

deforestation for crops (mainly coffee) and cattle ranching, mostly implemented under 'rental agreements' with non-Suruí farmers. The destruction was particularly unconstrained because, although Brazilian forestry regulations apply to indigenous territories, indigenous communities have usufruct rights (Law 6,001/1973) and non-compliance with environmental regulations is also widespread.

In 1989, with assistance from a local NGO (the Kanindé Association of Ethno-environmental Defence, hereafter referenced as the 'Kanindé'), the Suruís established the Metareilá Association of the Suruí Indigenous People (hereafter referenced as the 'Metareilá') to 'defend and preserve the cultural and territorial patrimony of indigenous groups and promote biological conservation and indigenous leadership to support their autonomy' (Toni et al., 2011). Greatly influenced by their Head Chief (*Labiway Esaga*), Almir Narayamoga Suruí, the community, through its Metareilá association, worked with Kanindé to improve its governance structure and to develop a sustainable 50-year management plan for the indigenous group's land. The plan emphasizes forest protection, sustainable food production, and institutional enhancement. Deforestation and illegal logging are prohibited, while reforestation is encouraged (IDESAM, 2011; Metareilá et al., 2009, 2010; Vitel et al., 2013).

In late 2007, the Suruís contacted Forest Trends, an NGO based in Washington, DC, specializing in environmental markets and financial mechanisms for conservation, to seek funds for reforestation. In response to this request, Forest Trends assessed the potential for a reforestation-based carbon project on the Suruí land. It was recommended that the best strategy for the Suruís was to implement a REDD + project (Olander, Borges, & Suruí, 2010). To help develop the initiative, additional NGOs with the required expertise were recruited:

1. *Metareilá*
2. *Kanindé*, with *Metareilá*, represented the local interface between the Suruí community and other partner NGOs. They co-designed and implemented the reforestation activities and the social-economic survey in the villages for the REDD + intervention. Both NGOs were also involved in the development of the project budget and provided support for data collection.
3. *The Brazilian Office of the Amazon Conservation Team* (ACT-Brazil; international home office in Arlington, VA) led the participative planning and the free, prior, and informed consent (Metareilá et al., 2010). ACT-Brazil also provided juridical assistance with the memorandum-of-understanding between the Suruís and their partners.
4. *Forest Trends* coordinated the REDD + project and was responsible for juridical assessments over rights to the carbon credits, identification of buyers, and clarification of the project to the Suruís.
5. The *Institute for Conservation and Sustainable Development of Amazonas* (IDESAM, Manaus) was responsible for the forest carbon inventory and baseline deforestation modelling.
6. The *Brazilian Biodiversity Fund* (FUNBIO, Rio de Janeiro), helped design the mechanism to ensure the long-term financial sustainability of the initiative. It manages the fund and established contracts for the sale of carbon credits.
7. The SFCP was designed in a three-phase methodology of free, prior, and informed consent (Metareilá et al., 2010), with multiple rounds of meetings, discussions, and clarification. It was estimated that the project would need around US\$3 million to implement the proposed actions in the Suruí land management plan (Metareilá et al., 2009; Olander et al., 2010).

The effects of the REDD + project on the community are monitored using indicators established by Richards and Panfil (2010) in collaboration with the Suruí people (IDESAM, 2011). The indicators, which address issues related to health, education, food security, sanitation, housing, cultural maintenance and revival, institutional strengthening, and professional training, are assessed through participatory workshops and field verifications conducted by NGO staff and third-party auditors, as required by the standards of the voluntary carbon market.

The REDD + project received its validation certificate from the Rainforest Alliance in March 2012 under the *Climate, Community & Biodiversity Standard* (CCBS, 2008) and the *Verified Carbon Standard* (VCS, 2013). In July 2013, the project went through its first verification under VCS (i.e. when measured carbon stocks were compared to those predicted from the business-as-usual deforestation scenario for the 2009–2012 period, and emission reduction credits were issued). The result of this verification was that 251,530 tradable carbon credits unities (each unit proportional to an avoided emission of 1 MgCO₂) were generated in the 31,994 ha project area (Rainforest Alliance, 2012, 2013). Two months later, 120,000 of these credits were purchased for R\$10.00/credit (approximately US\$4.30/credit) by *Natura* (<http://www.natura.com.br/>), a Brazilian company that emphasizes social and environmental responsibility.

2. Methods

The SFCP was first assessed to certify that the REDD + intervention was supported by community members and that their concerns and expectations were addressed during project implementation. The second step was to identify the key implementation components responsible for the perceived success of the intervention, namely (1) community engagement and strengthened governance, (2) community participation in project activities, (3) equitable management of REDD + revenues, and (4) the role to be played by the partner NGOs in project design and implementation.

Two field visits were conducted with representatives of the Suruí community to evaluate their perceptions about the project. Visits took place during third-party audits in November 2012, when the project was under validation, and in May 2013, when the project was first verified. To respect Suruí cultural preferences, group interviews were held instead of individual ones. During the first field visit, three large meetings were held with representatives from multiple villages. The first meeting was held in Nabekodalaquibá Village and was attended by around 50 community members. The other two meetings took place in Joaquim Village and Lapetanha Village, and were attended by over 100 and 150 Suruís, respectively. For the second field visit, Nabekodalaquibá and Lapetanha Villages were revisited, and Pinpaeter and Amaral Villages were visited for the first time. The numbers of community members interviewed in each village were 6, 15, 20, and 7, respectively. All interviews were voluntary, and any Suruí was welcome to join the conversation at any time. The questions were elaborated in a semi-structured approach, intended to address three main points: Suruís' understanding and willingness to engage in REDD + ; changes in livelihood strategies due to the intervention; and participation in project implementation. The interviews also aimed to understand Suruí perceptions of the project's performance by comparing the benefits from REDD + to the continuation of their previous land-use practices, but, perhaps because the project had just started, this point was unable to be properly clarified.

In addition to the community members interviewed, key actors involved in the REDD + project were also consulted. These actors were represented by the current Suruí Head Chief, representatives from the partner organizations Kanindé, IDESAM, and ACT-Brazil, and representatives from the Brazilian government (FUNAI). Avoided deforestation effects were assessed by comparing deforestation after the beginning of the REDD + activities to those expected under the project's business-as-usual baseline scenario, in accordance with standard monitoring procedures for REDD + (Parker, Mitchell, Trivedi, Mardas, & Sosis, 2009).

3. Results

The vast majority (95%) of Suruí interviewed during both field visits supported the REDD + project. There was widespread consensus that the REDD + strategy would support the community financially and help preserve its forest and culture. Based on responses during group interviews, the community was found to be mostly engaged with the project's goals and strategies. The 5% of community members who did not support the REDD + projects were mainly from one village that still profited from illegal logging. These individuals also refused to participate in the interviews conducted with the community. Confidence in the benefits from REDD + increased between the first and second visits, at which time fewer Suruí expressed doubts about the concept of 'carbon payments'. These results apparently relate to the positive result of the project validation, which signalled to the community that their efforts towards REDD + were on the right track, and the feeling that after a long period of project development, rewards would soon be forthcoming (with the first verification auditing). However, the concept of 'carbon payments' remained abstract to the community members, e.g. 'how to commercialize something that cannot be seen, touched, or known?' (Metareilá et al., 2010). It is clear that the role played by partner NGOs was fundamental for the design and engagement of the indigenous group. Still, overlap between SFCP and Suruí goals was key to community engagement.

In respect to the new livelihood strategies developed with the community, the group interviewed reported to have curbed unsustainable timber exploitation as well as other activities that lead to deforestation and degradation. In response to Suruí vigilance and the consequent decline in profits to outsiders, the Head Chief and other leaders were reportedly threatened with physical harm on several occasions. Interviewees also reported that a transition to more sustainable practices is under way on their land. Better crops were identified, and extension partnerships were established with a local governmental agency, resulting in the establishment of 'improved agricultural areas'. Such areas, previously degraded, were chosen to support new agricultural techniques to enhance food productivity. Improved agriculture was indicated to be an effective strategy to minimize pressure on the surrounding forests once food security is guaranteed. It was also reported that the community is in the process of developing business plans for Brazil nuts (a popular non-timber forest product in the Amazon), handcrafts, and ecotourism. These activities seek to ensure the protection of traditional knowledge and cultural heritage while enhancing economic and social well-being. Additionally, initial income from the project supported reforestation and the establishment of agroforestry systems in 12 villages. The following results sections cover the identified key components from the REDD + intervention associated with its apparent success.

3.1. Community engagement and strengthened governance

Like many indigenous communities in the Amazon, instead of a centralized social organization, the traditional Suruí governance structure is a plural with patrilineal exogamic groups. Power among the Suruís was traditionally held by clan chiefs, who restricted popular participation in decision making. Understanding their organization was an important prerequisite for the assurance of social participation and equity. In 2010, a new governance system was built in multiple public meetings with effective participation of the community and assistance from the NGO Kanindé. This process allowed the development of a governance structure that was perceived to be more participatory and democratic.

The over 25 villages in the Suruí territory were grouped into geographic zones, each with two elected representatives who meet regularly to discuss issues of concern in the parliament (*Labiway-Ey*). Also created was a Clans Advisory Council (*Pamatot-Ey*), constituted by three representatives from each of the four clans that participated in the discussions. This board selects the Head Chief (*Labiway Esaga*). Additionally, representatives from organizations created by the community, such as the Suruí Women's Group and the Young Suruí Group, as well as from local NGOs, were also incorporated into the new governance structure adopted by the Suruí (Kanindé et al., 2011). This structure facilitated representative decision making and discussions that, for the first time, included the participation of young people and women.

The strengthened governance system allowed for participatory implementation of the SFCP's free, prior, and informed consent (Metareilá et al., 2010). The activity was realized in three stages: (1) internal discussions held by the community members about the development and implementation of a REDD + project; (2) meetings among Suruí representatives and representatives from partner NGOs and the government (i.e. FUNAI); and (3) village meetings and visits. The objective of the exercise was to ensure that the indigenous group was in a position to make an informed decision whether or not to move forward with the SFCP, considering its risks and benefits to the community. The new governance system and the free, prior, and informed consent were, at least partially, responsible for the high level of community engagement in the SFCP.

3.2. Community participation in project activities

Avoided deforestation projects require estimates of how carbon emissions would probably have been in the absence of the intervention (i.e. baseline; Parker et al., 2009, p. 21). The SFCP's baseline was estimated with a site-specific model, *SimSuruí*. This is a system-dynamic model coupled with cellular automata that allocates the projected deforestation rates in the landscape. The model was specifically developed to capture the community's behaviour in projections of future deforestation and was the first of its kind used for a REDD + project. A full description of *SimSuruí* is provided by Vitel et al. (2013). Here, the focus is on how community participation helped with model construction and validation, which increased the reliability of land-use change projections and with technical issues related to the REDD + intervention itself.

The Suruís provided detailed information about the deforestation processes and drivers, which allowed modellers to create a conceptual model tailored to the local socio-economic context. The answers provided by community members through an extensive survey (62% of Suruí households were sampled) were used to identify and quantify additional model parameters beyond the estimates

gathered from standard remote sensing and spatial analysis (e.g. demographics, labour, production systems). Participative validation of the conceptual model was achieved with critical feedback from the community. As a result, the proposed model captures changes in the indigenous socio-economic dynamics that drive land-use change, so *SimSuruí's* predictions are more reliable than those based solely on linear projections of historical deforestation rates (Geist & Lambin, 2002). The *SimSuruí* model predicted that in the absence of the SFCP, 13,575 ha of their territory would be deforested between 2009 and 2038, which would result in emissions of 7,423,806 MgCO₂ (IDESAM, 2011).

As well as the contribution of the Suruís to development and validation of the SFCP baseline, community members were also involved in other project activities, such as biomass inventories. They also play a strategic role in monitoring illegal activities related to deforestation and forest degradation within their area. The engagement of community members in REDD + activities was reported to have increased the sense of responsibility and ownership of the SFCP and is likely to have contributed positively to the outcomes of the intervention.

3.3. Equitable management of REDD + revenues: the Suruí Fund

Potentially the greatest achievement of the SFCP was the successful development of a financial mechanism to secure equitable REDD + revenue allocation: the Suruí Fund. The fund design prioritizes community autonomy and defines procedures for the use of generated financial resources. Rules for fund governance were developed with the community simultaneously in Portuguese and the indigenous language (i.e. *Tupi-mondé*) to increase participation. According to FUNBIO (2012), the fund's mission is to benefit the indigenous land by organizing, centralizing, and ensuring management transparency of financial resources, in alignment with the Suruí governance system and their land-use management plan.

The fund was initially designed in 2011 with inputs from Suruí leaders and partner NGOs, and was approved by the community during public meetings in 2012. The fund was officially launched at COP 16 in Mexico and presented again at COP 17 in South Africa. It aims to secure financial resources for the protection and monitoring of the Suruí forests, and to promote sustainable food production and local capacity building. In that respect, it is similar to other indigenous funds administered by FUNBIO, such as the Kayapó Fund (Pinheiro, Ceotto, Michelotti, Mariano, & Cardoso, 2012). However, the Suruí Fund differs from others insofar as it was the first developed to manage revenues from the commercialization of carbon credits, as well as national and international donations, other payments for environmental services, and private investments. The fund is also intended to manage revenues from sustainable businesses conducted on the indigenous land.

The benefit-sharing mechanism of the fund was developed in accordance with the Suruís' 50-year management plan. Instead of adopting an equitable but unsustainable revenue-sharing approach among community members, it seeks to benefit the group collectively and guarantee continuation of the fund in perpetuity. The fund employs an adaptive management approach, which allows for periodic review and adjustments of its tools and procedures to increase its efficiency in achieving community goals. As part of its perpetuity strategy, it seeks to create reserves to sustain activities when donations become scarce. More importantly, transactions and decisions are transparent and subject to audits, which reduces corruption risks and brings credibility to the initiative. The Suruí Fund is structured in four tiers (FUNBIO, 2012):

1. *Deliberative tier*. This is composed of the Suruí Head Chief (*Labiway Esaga*); the *Deliberative Council*, with representatives from the Suruí parliament (*Labiway-Ey*); and the *Conflict Resolution Chamber*, with elders from the Clans' council (*Pamatot-Ey*). This tier was structured to guarantee community empowerment in the decision-making process related to the allocation of financial resources. It decides who participates in the management tier, deliberates over strategic plans, and evaluates the projects to be implemented with fund resources.
2. *Management tier*. This is composed of a *Facilitator Institution* and the *Financial Manager*, who are responsible for the development of strategic plans, calling for and analysing project proposals from *Implementation Institutions* to meet community needs, financial monitoring, establishing technical commissions, and informing representatives from the Deliberative tier. The current *Facilitator Institution* selected by the Suruí is Kanindé. The overall goal of the fund is to promote capacity building among the Suruí so they can manage the fund in the future (10 years).
3. *Monitoring and counselling tier*. This is composed of *Technical Commissions*, created as needed to ensure proper functionality of the fund and its objectives; the *Monitoring Commission*, with representatives from partner NGOs and government; and the *Donor's Committee*. This tier is also responsible for securing the participation of external actors and maximizing fundraising initiatives.
4. *Implementation tier*. This is composed of *Implementation Institutions*. These are the institutions responsible for implementation of projects selected by the Deliberative and Management tiers and sponsored by the fund.

The fund is scheduled to go through three management periods: (1) three years of 'incubation' under the Metareilá association, when the fund will operate with pilot initiatives and governance adjustments will be made; (2) three years of 'transition', when, among other activities, the leaders to take over fund management will be identified among the Suruí; and (3) four years of 'consolidation', when the fund will be emancipated from the Metareilá association as an independent institution and long-term strategies will be planned, among other institution strengthening actions. All phases are intended to promote capacity building to guarantee the sustainability of the fund after its autonomy.

In September 2013, before the receipt of revenues from carbon credit sales on the voluntary market, the Suruí Fund functioned with donations from corporation social funds (e.g. the Vale Fund; <http://www.fundovale.org/>). These funds allowed the project to begin and to check the effectiveness of revenue-handling protocols.

4. Discussion

It is well recognized that where governance and decision-making structures are established without strong stakeholder involvement, successful outcomes are unlikely (Hayes & Persha, 2010; Lambin et al., 2014; Lyster, 2011; Pettenella & Brotto, 2012; Sikor et al., 2010; Thompson et al., 2011). Most importantly, well-designed governance structures can assure that benefits are effectively delivered to recipients at the appropriate level (Garibay, 2012). The NGOs played a fundamental role in strengthening local governance, linked to community planning and engagement in conservation. The case of the SFCP is an example of how local governance systems can be

modified in the short run and elaborated with substantial participation and rule-making autonomy of forest stakeholders.

Governmental agencies from developing countries are unlikely to provide equivalent assistance to indigenous groups. Vitel et al. (2013) described how FUNAI agents suggested the Suruís continue with illegal logging, given the government's lack of resources to provide an alternative way to satisfy community needs. At the same time, when REDD + projects are designed by 'carbon cowboy' consultancy companies, the lack of attention to community needs and equity can cause more harm than good (Toni et al., 2011). These shortfalls cannot be ignored – effective REDD + programmes should be designed to encourage the participation of NGOs committed to development and conservation goals. Without these institutions, the success of REDD + interventions will probably be jeopardized.

REDD + interventions need to cope with corruption, secure commitments from local actors expected to forgo their current uses of forest resources, gain the confidence of potential investors, and ensure long-term sustainability and financing (García, 2011; UN-REDD, 2012). These goals were considered during the participative design of the Suruí Fund. As a result, this framework can serve as reference for future REDD + interventions and addresses often-mentioned concerns about how to and who should design benefit-sharing strategies. Given the entrenched corruption in many private and government institutions involved with natural resource management (Rands et al., 2010), REDD + initiatives need to be designed to mitigate risks. Initiatives focused at the project-level that include indigenous groups or rural communities are not immune to fraud, but for the SFCP these threats were diminished by the fund management mechanism. This mechanism is designed to avoid corruption and to guarantee equitable distribution of REDD + revenues through transparent decision-making processes, external audits, and direct involvement of community and partner organizations.

A criticism of REDD + interventions is that payments are based on unrealistic scenarios (baselines) driven by historical patterns that serve as poor predictors of the future. In particular, deforestation projections based solely on retrospective rates can be unreliable, such as when the carbon benefits of an intervention that has done little to mitigate climate change are overestimated (Griscom, Shoch, Stanley, Cortez, & Virgilio, 2009). This criticism can be properly addressed with baselines constructed with consideration of household behaviours and social-economic factors (e.g. demographics, commodity prices, and other underlying drivers of emissions prone to change over time). The *SimSuruí* model captures decisions made in response to shifts in natural and social environments by means of process-based understanding of the community's land-use preferences. It is the first and only real example in the REDD + literature of how baselines can be improved through the use of more nuanced models. It can also enhance community participation and engagement in REDD + activities, as observed in previous studies (Bellfield et al., 2015). Without this sort of approach it is difficult to capture complexity in multiple dimensions and at multiple scales or to otherwise represent the interactions between natural and human systems (An, 2012).

5. Conclusion

This study explored the Suruí Forest Carbon Project (SFCP), one of the first project-based REDD + activities implemented on the lands of indigenous people. It is argued that the initial success of the

intervention was mainly a function of heavy NGO participation. Given the initial success of the initiative and the challenges that were overcome, it is argued that national REDD + programmes should promote and facilitate the involvement of NGOs as key on-the-ground implementation actors. Although this case study can shed light on REDD + interventions it is important to be aware of the social context in which the Suruí initiative was inserted. In particular, REDD + goals were aligned with the community's management plan for its territory, and decisions were made democratically by community members and not imposed by outsiders. Hence, generalization about the results should be made with care. Still, the project components identified in this study seem critical to any REDD + intervention involving local forest stakeholders. What warrants exploration now is how decentralized REDD + projects like the SFCP can be effectively accommodated in the future Brazilian REDD + framework and how the project will continue to affect the community.

Central to the success of the SFCP was the successful engagement of the Suruí people in REDD + activities through an institutional framework that allowed for participatory decision making and transparent management of revenues oriented to the greater good of the community. The multi-stakeholder mechanism involving community members that was created by the project, the Suruí Fund, was designed to avoid issues of corruption and internal disputes, promote fair and equitable benefit sharing, institutional strengthening, and local empowerment. The project's credibility was increased by the development of a community-specific land-use model to estimate baseline deforestation in the absence of the REDD + intervention. Parameterization of this model required substantial data collected through community participation, which enhanced project engagement.

Efficient and otherwise successful REDD + programmes that involve indigenous groups will ultimately depend on national frameworks that foster benefit capture by engaged communities. It is therefore critical that national REDD + architectures benefit from and incorporate project-based initiatives such as the SFCP. If designed correctly, projects developed and run with local stakeholder participation should nest comfortably into national frameworks and at the same time benefit from the technical resources often only available from NGOs. Moreover, the observed good performance of the SFCP to date was substantially influenced by the fact that the REDD + funds are being used to promote alternative activities to deforestation that go beyond climate change mitigation and do not require deleterious cultural changes for the purposes of selling carbon.

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