

WORKING PAPER 204

Who will bear the cost of REDD+?

Evidence from subnational REDD+ initiatives

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Working Paper 204

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Working Paper 204

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DOI: 10.17528/cifor/006169

Luttrell C, Sills E, Aryani R, Ekaputri AD and Evníke MF. 2016. *Who will bear the cost of REDD+? Evidence from subnational REDD+ initiatives*. Working Paper 204. Bogor, Indonesia: CIFOR.

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We would like to thank all funding partners who supported this research through their contributions to the CGIAR Fund. For a full list of the 'CGIAR Fund' funding partners please see: <http://www.cgiar.org/who-we-are/cgiar-fund/fund-donors-2/>

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Acknowledgments

This research is part of CIFOR's (Center for International Forestry Research) Global Comparative Study on REDD+ (GCS) (<http://www.forestsclimatechange.org/global-comparative-study-on-redd.html>) and CIFOR's project on "Opportunities and challenges for implementing REDD+ benefit sharing mechanisms in developing countries" (<http://www.cifor.org/redd-benefit-sharing/>). The authors of this paper are grateful for the research efforts of the many other people involved in the development of the GCS research methods and the collection of the particular data on which we have drawn. These include William Sunderlin, Amy Duchelle, Marina Cromberg, Maria Fe Gebara, Raissa Guerra (Brazil); Abdon Awono and Akombi Andrea Tambe (Cameroon); Cut Augusta Mindry Anandi, Pangestuti Astri, Stibniati Atmadja, Yayan Indriatmoko, Dian Intarini, Ida Aju Pradnja Resosudarmo (Indonesia); Galia Selaya, Valerie Garrish and Dawn Rodriguez (Peru); Demetrius Kweka (Tanzania), among others. We are also grateful to Jennifer Arnold and Shintia Arwidia for helpful comments, to Hannah Watson and Judith Shaw for editorial assistance, to Debby Rahmi for help with references and data, and to Eko Prianto for his work on the graphics. Funding was provided by the Norwegian Agency for Development Cooperation (Norad), the Australian Department of Foreign Affairs and Trade (DFAT), the European Commission, the UK Government, the International Climate Initiative (IKI) and the CGIAR Forest, Trees and Agroforestry Program (<http://foreststreesagroforestry.org>), as well as the CGIAR Fund.

1 Introduction

REDD+ (Reducing Emissions from Deforestation and Forest Degradation) is intended to be a system of incentives for the reduction of deforestation and forest degradation, with countries and sectors that are historically responsible for carbon emissions paying for the costs of avoiding future emissions from forest loss (Karsenty and Ongolo 2012). A key attraction of REDD+ is the claim that reducing emissions due to deforestation is less expensive than reducing emissions from other sectors, and the resulting proposition that the costs of REDD+ will be fully paid by those other sectors (Stern 2006). The development of benefit-distribution systems for anticipated carbon payments has become a key facet of policy discussions and efforts to prepare countries to participate in REDD+.

In order to plan how carbon revenues are to be shared, it is critical to determine who bears the costs, and to define which costs should be compensated. For example, a key issue in the discussions around payments for emission reductions emerging from the discussions at the Paris Convention on Climate Change (COP 21) is how to set the carbon price. The consensus is that more information on costs is needed in order to set fair prices (Wong et al. 2016). One persistent concern is whether costs will be fully covered by carbon payments, or also borne by actors in REDD+ countries. This encompasses two issues: The first is that disadvantaged groups, including smallholders and those without de jure claims to forest land, will not be fully compensated for the opportunity costs they bear. The second is that the costs of establishing REDD+ (including transaction and implementation costs) are much higher than generally recognized, and are falling on REDD+ country institutions that do not receive compensation.

We examined the evidence for these concerns in a sample of 22 subnational REDD+ initiatives (SNIs) across five countries (Brazil, Peru, Indonesia, Tanzania and Cameroon). This sample allowed us to look for empirical regularities and patterns across the range of landscapes eligible for REDD+. At the time of data collection, the 22 SNIs were all in their start-up phase, having defined their intervention areas but not yet begun implementation on the ground. Thus, we characterized them based on their stated primary objective, their primary source of start-up funding, the role of forest management in their implementation plans and their intention to sell carbon offsets in the voluntary market, supplemented with information on their survival and progress toward sales of carbon credits as of 2015.

Based on interviews with key informants in the organizations implementing and supporting these SNIs, we identified all stakeholder groups bearing either opportunity or implementation costs, and looked for patterns across different types of initiatives and across different countries. Next we considered whether it is likely that these costs will be compensated, by examining (i) which institutions bearing implementation costs are being compensated through the REDD+ initiative budget, and (ii) the stakeholder groups (and their legal status) expected to bear the greatest opportunity costs, defined in terms of both total financial cost and total number of people affected.

2 Background: Fears that failure to cost will bring failure to compensate

While REDD+ has increasingly been accepted in United Nations Framework Convention on Climate Change (UNFCCC) negotiations and regional and voluntary markets for carbon offsets, there is a vocal and highly visible opposition operating under taglines such as “No REDD” or “REDD Alert” (Cabello and Gilbertson 2010). One of the key concerns of opponents is that insufficient funds will flow from the Global North to the Global South to compensate local people who protect forests. Instead, the costs will be shifted onto underfunded institutions and vulnerable stakeholder groups in developing countries (e.g. Gilbertson 2011).

2.1 Opportunity costs

Much of the literature on REDD+ suggests that opportunity costs are likely to be “the single most important category of costs” (White et al. 2011). These costs determine the compensation required, or the amount of income that alternative activities would need to provide, to induce land users to voluntarily forego deforestation (Caravani and Graham 2011). Critics have argued that the focus on opportunity costs privileges a neo-liberal discourse that emphasizes financial incentives over regulatory measures (Fosci 2013) and that ignores other motivations for deforestation, such as private rent-seeking or gaining electoral support from certain interest groups (Karsenty and Ongolo 2012; Ogonowski and Enright 2013; Delacote et al. 2014). Nonetheless, quantifying opportunity costs remains a key step in the design of REDD+ interventions. It helps to identify and ascribe monetary value to the drivers of deforestation (Pagiola and Bosquet 2009; LTS International and UNIQUE 2012), supporting efforts to prioritize the most efficient interventions (Pirard 2008a; Pagiola and Bosquet 2009). Furthermore, the distribution of opportunity costs is fundamental to the design of benefit-distribution systems (White et al. 2011; Delacote et al. 2014) and helps identify the groups most likely to resist implementation of REDD+ (Pagiola and Bosquet 2009; Caravani and Graham 2011; White et al. 2011).

We use the term ‘opportunity cost’ to mean the foregone value of alternative uses of land, that is, the value of production per hectare that would have been feasible under regulatory and socioeconomic conditions without REDD+. These costs can be estimated using a range of approaches (Pirard 2008a; Wertz-Kanounnikoff 2008; Fosci 2013), which make different assumptions about behavioral and market responses. One common approach is to use information on farm budgets and profits (e.g. Moulton and Richards 1990; Richards et al. 1993; Chomitz et al. 2005). As typically implemented, this approach tends to lead to low estimates of the opportunity costs for forest that is converted to subsistence farming, and high estimates for forest that is converted to commercial farming (Pirard 2008b). Estimates are also affected by whether analysts consider only current land users, or other agents who could achieve higher returns; whether they include subsistence production and, if so, how that is valued; whether they consider non-market benefits from forests and alternative land uses; what they assume about whether REDD+ will restrict access to forest products; and whether, and how, they include illegal activities.

While opportunity cost is typically calculated and discussed as a single number per hectare, the cost of foregoing forest conversion clearly varies across stakeholder groups (Adams et al. 2010; Delacote et al. 2014). Different methods may be appropriate for calculating opportunity cost to different groups. For example, in a small sample survey of smallholder farmers in Cambodia, Caravani and Graham (2011) demonstrate the use of non-market valuation methods to obtain more complete estimates of the opportunity cost of foregoing conversion of forest to agricultural land. As Karky and Skutch (2010) point out, standard opportunity cost calculations often do not consider the value of standing forests, such as production of timber, fuelwood, fodder and other non-timber forest products, which are likely to be important for some stakeholder groups and negligible for others. Depending on the rules about forest use, these forest benefits may represent additional opportunity costs or co-benefits of REDD+ (Ogonowski and Enright 2013; Caravani and Graham 2011).

There are concerns about using standard estimates of opportunity costs to design REDD+. These include the ethical concern that the distribution of opportunity costs reflects the current distribution of income, with the implication that “the poor need to be compensated a lot less because they are, well, poor” (Gregersen et al. 2010, p. 3). There is also the practical challenge of overlapping rights and multiple users (with different opportunity costs) on the same area of land (Feder and Feeny 1991; Mwangi and Markelova 2009; Unruh 2008). Many opportunity cost calculations (see, for example, Delacote et al. 2014) assume secure land tenure with clearly defined and enforced property rights over the right to benefit from forest use. This assumption can lead to misunderstanding of the true opportunity costs of local people engaged in traditional activities not formally recognized in the law (White et al. 2011). Thus, many of the concerns relate to which stakeholder groups are considered in estimation of opportunity costs.

2.2 Implementation costs

Much of the early policy dialog about REDD+ implicitly assumed that implementation costs were unlikely to be significant in comparison to opportunity costs (Borner and Wunder 2008; Olsen and Bishop 2009). Implementation costs tended to be either ignored or oversimplified in policy discussions (Fosci 2013), partly due to a lack of information and partly due to uncertainty regarding the future design of REDD+ (Borner and Wunder 2008; Robledo and Blaser 2008; Olsen and Bishop 2009). For example, the Eliasch Review (Eliasch 2008) omits administrative costs and is said to underestimate transaction costs when compared to empirical data from subnational sites (Viana et al. 2009); The United Nations Environment Programme (UNEP 2011) only includes implementation costs of reforestation and no transaction costs; and McKinsey and Company (2009) omit many important implementation costs (Ekins et al. 2011). However, there is increasing recognition of the importance of these costs (Fisher et al. 2011; White et al. 2011; Fosci 2013; McCann 2013), especially in the start-up phase (Wertz-Kanounnikoff 2008; Phan et al. 2014) and in small-scale projects (Mooney et al. 2004; Galik et al. 2009).

In this paper, we use the term ‘implementation costs’ to refer to start-up and running costs of administration, institutional arrangements, actions to reduce deforestation or forest degradation, MRV (measurement, reporting and verification), FPIC (free prior informed consent), and any direct payments or PES (payments for environmental services). These are all activities generally recognized as part of REDD+, although the first three are not always included in the official budgets of SNIs. Most are additional to opportunity costs, except for direct payments, which are typically designed as compensation for opportunity costs. Some analyses make a distinction between implementation and transactions costs, with the latter being required for participation in the carbon market but not directly reducing deforestation (Dyer and Counsell 2010). Other studies use the term ‘institutional costs’ for reforms and capacity building needed to establish REDD+ (Merger et al. 2012). However, these differences are particularly difficult to distinguish in the start-up phase, and thus we group them into one category labeled ‘implementation costs’.

While REDD+ was conceived as an international system to finance the cost of reducing forest emissions, critics fear that institutions in REDD+ countries will actually bear many of the implementation costs. For example, Alston and Andersson (2011) discuss the ‘hidden costs’ of REDD+ that fall heavily on central governments. They suggest that the institutional design of REDD+ is flawed because it depends on host governments to monitor contracts and compliance. Alston and Andersson argue that failure to take these costs into account is linked to the poor performance of many policies to reduce deforestation. Potvin et al. (2008) provide an example of these costs in Panama, and suggest that the significant costs borne by governments make it difficult to incentivize their involvement. Thompson et al. (2011) argue that, in many countries, the host governments do not have sufficient legitimacy to enforce rights and regulations, and Ring et al. (2010) note that host governments will have little incentive to support the implementation of REDD+ if they are not compensated for lost income (e.g. taxes, fees and shared revenue). Concerns have also been raised about the degree to which non-governmental organizations (NGOs) and the private sector are subsidizing REDD+ in the short term, potentially creating challenges for long-term commitment (O’Sullivan et al. 2010; Climate Investment Fund 2013).

3 Methods

Data were collected on 22 SNIs (six in Indonesia, six in Tanzania, five in Brazil, three in Cameroon and two in Peru) included in the CIFOR-GCS (Global Comparative Study on REDD+) sample (Table 1).¹ As described in Sunderlin et al. (2016), baseline data for CIFOR-GCS were collected between 2010 and 2012, before interventions began, and follow-up data were collected in 2013 and 2014. As part of the baseline data collection, CIFOR researchers interviewed representatives of the lead implementing organizations of the SNIs (the ‘Proponent Appraisal’), conducted a desk review of documentation on each SNI and interviewed other key informants from the lead implementing organizations and other stakeholder institutions (the ‘Survey of Project Implementation’).² In this paper, we draw primarily on (i) lists of implementing institutions bearing significant costs and (ii) identification of stakeholder groups bearing the greatest opportunity costs.

Table 1. Characteristics of the 22 subnational initiatives in our sample.

SNI	Land Area	Primary proponent type	Primary objective	Primary funding source	Approach to forest use	Carbon credits: intention and sales
Acre	>20000	Government	Co-benefits (conservation, biodiversity and SFM)	Government	SFM activities planned or minor	Certified
Cotriguaçu	1000-20000	Private non-profit-government	Reduce carbon emissions in order to obtain carbon funding or sell carbon credits	Government	SFM activities planned or minor	Opposed to credit sale
Jari/Amapá	<1000	Private for-profit	Reduce carbon emissions in order to obtain carbon funding or sell carbon credits	NGO	SFM & certified products a central objective	Selling credit
SFX	>20000	Private non-profit-government	Demonstrate viability of REDD+ by reducing carbon emissions	Government	SFM important part of strategy	Opposed to credit sale
Transamazon	<1000	Private non-profit	Demonstrate viability of REDD+ by reducing carbon emissions	Government	Aim to stop illegal logging only	Opposed to credit sale
Mt. Cameroon	<1000	Government	Demonstrate viability of REDD+ by reducing carbon emissions	Private	Aim to stop illegal logging only	Not yet certifying
SE Cameroon (East)	<1000	Private non-profit	Co-benefits (conservation, biodiversity and SFM)	International/national donor	Aim to stop illegal logging only	Certified

Continued on next page

1 The SNIs selected for the CIFOR-GCS sample are described in Sills et al. (2014). Due to incomplete stakeholder information, we discarded two SNIs from our sample (one in Brazil and one in Vietnam). As we chose to differentiate between distinct sites with different groups of stakeholders, we split one SNI in Cameroon and one SNI in Tanzania into two separate intervention areas. Finally, we were unable to obtain data on the stakeholders expected to bear the greatest opportunity costs at one site in Indonesia, where the focus was on peatland restoration, reducing our sample size to 21 for the discussion of opportunity costs.

2 These two surveys are described in Sunderlin et al. (2010) and the survey instruments are available at: <http://www.cifor.org/library/3286/technical-guidelines-for-research-on-redd-project-sites-with-survey-instruments-and-code-book/>

Table 1. Continued

SNI	Land Area	Primary proponent type	Primary objective	Primary funding source	Approach to forest use	Carbon credits: intention and sales
SE Cameroon (South)	<1000	Private non-profit	Co-benefits (conservation, biodiversity and SFM)	International/national donor	Aim to stop illegal logging only	Certified
Katingan	1000-20000	Private for-profit	Reduce carbon emissions in order to obtain carbon funding or sell carbon credits	Private	SFM important part of strategy	Certification in progress
KCCP	<1000	Private non-profit	Co-benefits (conservation, biodiversity and SFM)	NGO	SFM activities planned or minor	Certification in progress
KFCP	1000-20000	Government	Demonstrate viability of REDD+ by reducing carbon emissions	International/national donor	SFM important part of strategy	Expired/on hold
Rimba Raya	<1000	Private for-profit	Co-benefits (conservation, biodiversity and SFM)	Private	Aim to stop illegal logging only	Selling credits
TNC within BFCP	>20000	Private non-profit	Reduce carbon emissions in order to obtain carbon funding or sell carbon credits	International/national donor	SFM & certified products a central objective	Not yet certifying
Ulu Masen	1000-20000	Government	Co-benefits (Poverty reduction and community development)	Private	SFM activities planned or minor	Expired/on hold
Madre de Dios	1000-20000	Private for-profit	Co-benefits (conservation, biodiversity and SFM)	NGO	SFM & certified products a central objective	Selling credits
Ucayali	1000-20000	Private non-profit	Reduce carbon emissions in order to obtain carbon funding or sell carbon credits	International/national donor	SFM important part of strategy	Certified
Kigoma	<1000	Private non-profit	Reduce carbon emissions in order to obtain carbon funding or sell carbon credits	International/national donor	SFM important part of strategy	Expired/on hold
Kilosa	1000-20000	Private non-profit	Demonstrate viability of REDD+ by reducing carbon emissions	International/national donor	SFM activities planned or minor	Not yet certifying
Lindi	<1000	Private non-profit	Demonstrate viability of REDD+ by reducing carbon emissions	International/national donor	SFM activities planned or minor	Certification in progress
Mpingo	1000-20000	Private non-profit	Reduce carbon emissions in order to obtain carbon funding or sell carbon credits	International/national donor	SFM important part of strategy	Certification in progress
Shinyanga	<1000	Private non-profit	Reduce carbon emissions in order to obtain carbon funding or sell carbon credits	International/national donor	SFM important part of strategy	Certification in progress
Zanzibar	<1000	Private non-profit	Demonstrate viability of REDD+ by reducing carbon emissions	International/national donor	SFM & certified products a central objective	Expired/on hold

The aim of CIFOR-GCS is to identify the challenges and enabling conditions for REDD+ to be efficient, effective and equitable and fulfill co-benefits. SNIs were selected by GCS based on five criteria: (i) they conform to an operational definition of the term ‘REDD+’ as actions whose primary aim is to reduce emissions from deforestation and forest degradation and/or to increase removals through conservation, sustainable management and enhancement of the carbon stocks of existing forest in developing countries; (ii) they intended to monitor, report and/or transact reductions in carbon emissions or increases in removals (in a quantified manner); (iii) they had defined site boundaries and intervention villages before the baseline GCS survey; (iv) they did not plan to offer REDD+ incentives until after the baseline GCS survey; and (v) the REDD+ incentives had a reasonable chance of being implemented and maintained in the subsequent 1.5 years (through the end of 2011) (Sunderlin et al. 2010).

To identify the stakeholder groups expected to bear the greatest opportunity costs, the lead CIFOR researcher for each SNI first listed all of the land and forest uses expected to be foregone as a result of the REDD+ interventions, resulting in opportunity costs for associated stakeholder groups. These included both current land and forest uses that would be stopped, and planned land and forest uses that would be prevented. Key informants were asked to identify the stakeholder group that they considered to be the ‘most significant’ according to two criteria: (i) foregoing the greatest financial profit (OC\$), and (ii) negatively affecting the largest number of people (OCP). These ‘most significant’ stakeholder groups also classified according to scale: ‘small-scale/subsistence’ for those stakeholders using land at a subsistence or family-economy scale, and ‘medium/large scale’ for those using land at a commercial level.

Researchers assessed whether ‘opportunity cost stakeholders’ were operating in a ‘legal’, ‘illegal’, ‘ambiguous’ or ‘mixed’ manner. Following Gregersen et al. (2010), we define ‘legal land use’ as a land use carried out under a right which falls within the formal statutory framework and which is embodied in local, national or international law; ‘illegal land use’ as a land use clearly carried out by an actor who does not have the statutory right to do so; ‘legally ambiguous land use’ as a land use carried out under rights which are unclear; and ‘mixed legality land use’ as land use that occurs under multiple types of legality (e.g. in different forms, locations or seasons) at the same site. For example, logging may be ‘legal’ if official permits have been obtained but ‘illegal’ if not. Logging by smallholders may be legally ambiguous if it is considered legal by one level/agency of government, but illegal by another level/agency, or if its legality status has never been defined. Logging that is legal when implemented following specific practices, in specific seasons or in specific locations, but otherwise illegal, would be considered a ‘mixed legality land use’.

To collate information on implementation costs, the researchers generated lists of all institutions that had incurred significant costs in the start-up phase of each SNI, including for design, planning, preparation or oversight. ‘Significant’ was defined as having spent, or having control over, (a) at least 5% of the total SNI budget to date, (b) at least 1 month of person-days in the start-up phase, or (c) at least 5 person-days per month in continuing or recurrent costs or equivalent financial outlay. The lists were created based on researcher knowledge and then triangulated with two key informants, who in many cases were from organizations implementing the SNI. With input from these informants, the institutions were categorized into three groups:

1. those that have all of their REDD+ related costs covered by the official SNI budget, including some institutions earning a surplus from REDD+ (for example, using MRV resources to monitor biodiversity in the wider region in which the SNI is located)³;
2. those that are burden sharing – incurring more costs for the SNI than their portion of the official budget, i.e. providing significant financial, labor or other in-kind contributions;
3. those that are cost-sharing through some roles and modes of input and that have all costs covered through other roles and modes of input.

3 We initially distinguished institutions that had all of their REDD+ related costs covered by the official SNI budget, i.e. the type of transaction initially envisioned by REDD+ whereby institutions in REDD+ countries are paid by the international community, from institutions earning a REDD+ surplus, i.e. receiving more financial support than they are incurring costs for the SNI. However, very few institutions were characterized as benefiting from REDD+ (receiving more benefits than they incur costs): 5% of government, 2% of civil society, 1% of research and none of the 19 private (for profit) institutions. This may be because key informants were reluctant to characterize institutions as receiving more than the costs they incurred, as this could be perceived as an accusation that they are diverting or misusing funds, rather than an acknowledgement of co-benefits from REDD+ funding.

4 Characterizing the sample of SNIs

Our analysis spans 22 SNIs, which are being developed across a wide range of national and subnational contexts for REDD+. In both Brazil and Indonesia, REDD+ is characterized by competing interests between national and subnational governments regarding land use (Jagger et al. 2014). Brazil has a decentralized system of licensing and enforcement, coupled with strong federal incentives for forest conservation. As a result, many states have chosen to promote forest conservation (Jagger et al. 2014), which has led to advanced policy reforms (Brockhaus and Di Gregorio 2014). Brazil and Peru are also characterized by a relatively high capacity for REDD+ MRV (Sunderlin et al. 2014). In Indonesia, forest management is more centralized, and REDD+ has been shaped by significant involvement of national level actors (Korhonen-Kurki et al. 2014) with much contestation (Brockhaus et al. 2016). One source of contestation is the considerable gap between formal and customary rights, which, to some degree, is also the case in Cameroon and Peru (Larson et al. 2013; Brockhaus et al. 2014). In Tanzania, the decentralization of forest management rights is more advanced on paper, although analysts question how well this is implemented in practice (Jagger et al. 2014). There is significant donor involvement in REDD+ in all sample countries, but in Cameroon this has resulted in particularly weak national ownership (Brockhaus et al. 2014). In most of these countries (with the possible exception of Brazil), there is a disjoint between national level dialog on REDD+ and the implementation of SNIs (see, for example, Kweka et al. 2014). In particular, this is manifested in a lack of clarity on how REDD+ benefit sharing will be structured at the national level, meaning that most SNIs are operating within an insecure legal framework (Luttrell et al. 2013).

The 22 SNIs listed in Table 1 are of very different sizes and institutional arrangements. Acre in Brazil covers by far the largest area (157,490 km²), followed by three other Brazilian SNIs (Cotriguaçu, SFX and TNC Berau). All of the other sites are much smaller: 11 cover less than 10 km², and 8 cover 10 – 200 km². Thirteen SNIs are managed by NGOs (private, non-profit), four by companies (private, for profit), three by government organizations, and two by both private non-profit and government organizations. In addition to these lead proponents, many other institutions – often from different sectors – have been involved in the start-up phase of these SNIs, as discussed below.

We categorized the SNIs according to their strategies for implementing and funding REDD+, focusing on four key dimensions (Table 1):

1. the SNI's stated primary objective;
2. their approach to forest use and management;
3. their primary source of start-up funding; and
4. their intentions regarding the sale of carbon credits, and the realization of these sales.

We focus on these dimensions because they vary substantially across SNIs and could affect how their costs are distributed.

We first considered the main goal (objective) of each SNI, as identified by its lead proponent. We categorized the SNIs into those whose proponents are *primarily* seeking to:

1. reduce carbon emissions in order sell offset credits (i.e. implement REDD+) (eight SNIs);
2. reduce carbon emissions in order to demonstrate the viability of REDD+ (seven SNIs); and
3. generate non-carbon benefits (e.g. conservation, biodiversity, sustainable forest management, or poverty reduction) (seven SNIs).

Regardless of the proponents' primary objectives, they all intended to reduce forest clearing for crops and/or livestock. However, the SNIs differ in the degree to which sustainable forest management (SFM) of timber and non-timber products is incorporated into their strategies, as well as the ways in which SFM is included. The proponents of four SNIs (in Brazil, Indonesia, Peru and Tanzania) consider SFM certification to be central to their strategies, based on the assumption that certified forests are more valuable standing and therefore less susceptible to deforestation. Five of the SNIs seek to prevent illegal logging, but do not otherwise promote SFM. The other SNIs fall in between these two groups. We identify four categories:

1. Type I aims to prevent illegal logging, but does not otherwise promote SFM (five SNIs).
2. Type II includes SFM as a minor or planned future activity (six SNIs).
3. Type III includes SFM as an important, but not core, aspect of their strategy (seven SNIs).
4. Type IV considers SFM certification to be one of their core REDD+ strategies (four SNIs).

The eight SNIs primarily seeking to reduce carbon emissions in order to sell offset credits were categorized as SFM Types III and IV (i.e. certification is a core strategy for three of these SNIs, and an important part of the strategy for five). Among SNIs primarily seeking to demonstrate the viability of REDD+ or to generate non-carbon benefits, SFM is a less likely to be an important objective (Table 1).

Half (11) of the SNIs in our sample were initially funded primarily⁴ by donor sources, while the remaining SNIs were primarily funded by NGOs (three SNIs), private companies (four SNIs), or national governments (four SNIs, all in Brazil) (Table 1). This distribution reflects the 'aidification' of REDD+, with most funding coming from public sources, including Official Development Assistance (ODA) and government donors (Streck and Parker 2012; Seymour and Angelsen 2012; Angelsen 2013). Two out of four government-funded SNIs, but only four out of 11 donor-funded SNIs, stated that demonstrating the viability of REDD+ was their primary objective.

The SNIs in our sample vary widely in terms of their intention to sell carbon credits, and their progress toward the sale of voluntary carbon offsets. Figure 1 shows that most SNIs are interested in selling credits, although they have made variable progress, falling into the following categories at the beginning of 2015:

1. SNIs that had sold credits in a voluntary or subnational market (three SNIs);
2. SNIs that had been certified to sell voluntary carbon offsets (e.g. by the Climate Community and Biodiversity Alliance, CCBA or by Plan Vivo) but had not yet made any sales (four SNIs);
3. SNIs that had completed at least one step toward certification (e.g. developing and submitting a methodology), but had not yet achieved certification or sold credits (four SNIs);
4. SNIs that had not made any progress toward selling credits, although they remain interested in supplying carbon offsets (four SNIs);
5. SNIs that had decided (either initially or at a later stage) that they are philosophically or strategically opposed to selling credits in voluntary or subnational markets (three SNIs);
6. SNIs that had expired or been put 'on hold' (four SNIs).

The second and third categories are clearly related to, but not the same as, interest in selling carbon credits. All of the SNIs with non-carbon benefits as their primary objective have been certified, or are making progress toward certification (e.g. they have a project development document (PDD)). Proponents might seek certification in order to establish their legitimacy and bolster their case for external support from any source – not just the carbon market. The last three

4 Some SNIs stated two or more sources as their primary source of funding. In those cases, we categorized that SNI under the least frequently occurring type of funding source across the sample. This undercounts the number of SNIs funded primarily by donor sources.

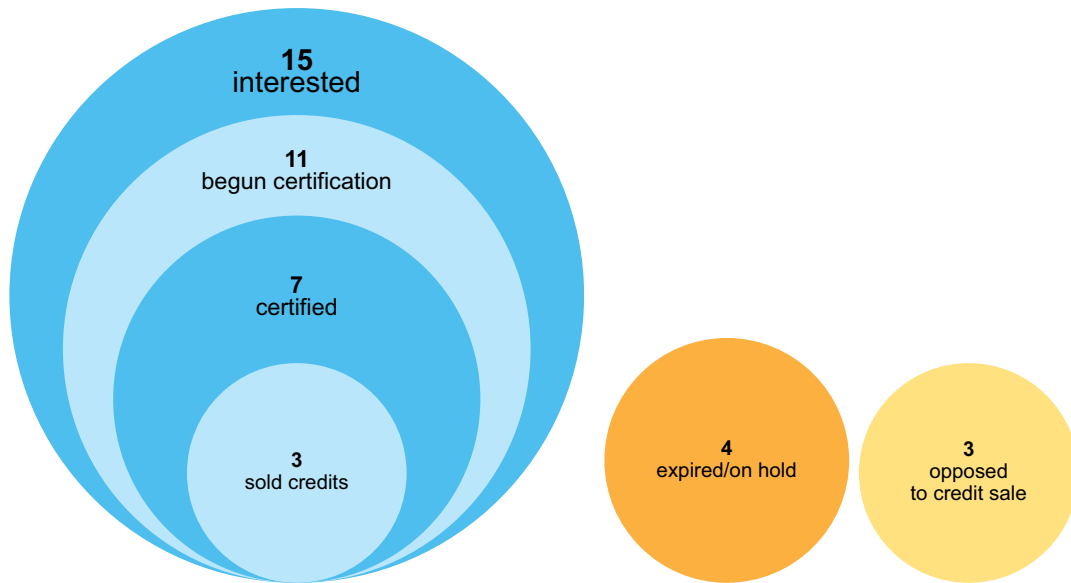


Figure 1. The relationship to the market of the 22 SNIs.

categories, which include 11 out of 22 SNIs, are the least successful according to Reynolds' (2012) definition of a successful REDD+ project as one that: (i) does not collapse during the study period; and (ii) sells carbon offsets. However, we distinguish between SNIs that are opposed to selling carbon credits (category 5) and therefore cannot be judged as less successful because of this, and those that are interested but have not made progress toward sales (category 4).

5 Results: Incidence of costs

The cost of REDD+ implementation is shaped by the types of land uses and users within the intervention area, as well as the administrative and transaction costs of launching and implementing the intervention(s). We draw on local understanding to identify stakeholder groups bearing the costs of each SNI. We then examine whether the incidence of costs is consistent with the concerns about REDD+ outlined above and whether it varies systematically with the characteristics of the SNIs.

5.1 Who bears the greatest opportunity costs?

The stakeholder group judged to be the most affected by REDD+ varies both by site and by whether ‘most affected’ is defined in terms of profit (OC\$) or count of people (OCP). At each of the SNI sites in our sample, forests are being replaced by agricultural systems, ranging from small-scale shifting cultivation to large-scale commercial plantations. Of the 42 stakeholder groups judged most affected across the 21 sites (i.e., listed under either OC\$ or OCP), 24 use deforested land for agricultural crops. The 18 remaining stakeholder groups range from households that harvest forest products to large cattle-ranching enterprises.

The differences between OC\$ and OCP are summarized in Table 2. Both are most commonly associated with crops (commercial or subsistence) and harvest of timber and other forest products. In five of the sites (including four out of five sites in Brazil), agricultural and ranching land uses generate the largest opportunity cost in terms of both financial return and people. While forest uses are either the most profitable *or* affect the most people at a substantial number of sites, they are only associated with *both* the largest monetary value *and* the greatest number of people bearing the opportunity costs of REDD+ at one site (Madre de Dios). In most sites where OC\$ or OCP are associated with forest use, SFM is an important part of the SNI strategy. However, SFM is less common in SNIs where restrictions on forest use would affect a large number of people, but agriculture has the highest financial value (OC\$).

Table 2. Land use, scale and legality associated with greatest opportunity cost by two criteria for each SNI.

Abbreviated Name	Greatest opportunity cost identified by total profits foregone	Greatest opportunity cost identified by number of people affected
Acre	Cattle ranching	Agriculture
	Medium/large commercial	Small-scale/subsistence
	Legal and illegal	Legal and illegal
Cotriguaçu	Cattle ranching	Agriculture
	Medium/large commercial	Small-scale/subsistence
	Legal and illegal	Legal and illegal
Jari/Amapá	Agriculture	Agriculture
	Small-scale/subsistence	Small-scale/subsistence
	Illegal	Illegal
SFX	Cattle ranching	Timber and wood
	Medium/large private	Small-scale/subsistence
	Illegal	Illegal
Transamazon	Timber and wood	Agriculture
	Medium/large commercial	Small-scale/subsistence
	Legal and illegal	Illegal

Continued on next page

Table 2. Continued

Abbreviated Name	Greatest opportunity cost identified by total profits foregone	Greatest opportunity cost identified by number of people affected
Mt. Cameroon	Agriculture	Agriculture
	Small-scale/subsistence	Small-scale/subsistence
	Legal and illegal	Legal and illegal
SE Cameroon (East)	Timber and wood	Agriculture
	Small-scale/subsistence	Small-scale/subsistence
	Illegal	Legal
SE Cameroon (South)	Timber and wood	Agriculture
	Small-scale/subsistence	Small-scale/subsistence
	Legal	Legally ambiguous
Katingan	Agriculture	Agriculture
	Medium/large commercial	Small-scale/subsistence
	Legal	Legal
KCCP	Agriculture	Agriculture
	Medium/large commercial	Small-scale/subsistence
	Legal	Legally ambiguous
Rimba Raya	Agriculture	Non-wood forest product
	Government	Small-scale/subsistence
	Legal	Illegal
TNC with BFCP	Timber and wood	Agriculture
	Medium/large commercial	Small-scale/subsistence
	Legal	Legally ambiguous
Ulu Masen	Timber and wood	Agriculture
	Medium/large commercial	Small-scale/subsistence
	Legal	Illegal
Madre De Dios	Timber and wood	Timber and wood
	Small-scale/subsistence	Small-scale/subsistence
	Illegal	Legal
Ucayali	Other (oil exploration)	Agriculture
	Medium/large commercial	Small-scale/subsistence
	Legal, legally ambiguous	Legal
Kigoma	Agriculture	Timber and wood
	Small-scale/subsistence	Small-scale/subsistence
	Legally ambiguous	Legally ambiguous
Kilosa	Agriculture	Timber and wood
	Small-scale/subsistence	Small-scale/subsistence
	Legal	Legally ambiguous
Lindi	Agriculture	Timber and wood
	Small-scale/subsistence	Small-scale/subsistence
	Legal	Legal
Mpingo	Agriculture	Agriculture
	Small-scale/subsistence	Small-scale/subsistence
	Legally ambiguous	Legally ambiguous
Shinyanga	Agriculture	Timber and wood
	Small-scale/subsistence	Small-scale/subsistence
	Legal	Legal
Zanzibar	Agriculture	Timber and wood
	Small-scale/subsistence	Small-scale/subsistence
	Legally ambiguous	Illegal

Scale and legality of stakeholders

The scale and legality of the groups identified as bearing the greatest opportunity cost both reinforce and contradict concerns expressed in the literature. Unsurprisingly, the land uses that involve the most people are small scale (Figure 2). The land uses with the highest financial value are often associated with medium- and large-scale enterprises, perhaps reflecting their ability to invest more capital. However, in 11 out of 21 of the sites, the land use with the greatest financial value is predominantly carried out by small-scale stakeholders. Nine of these 11 SNIs are in Tanzania or Cameroon, consistent with previous literature that finds smallholders are a much more significant agent of deforestation in Africa than in South America or Southeast Asia (Fisher 2010).

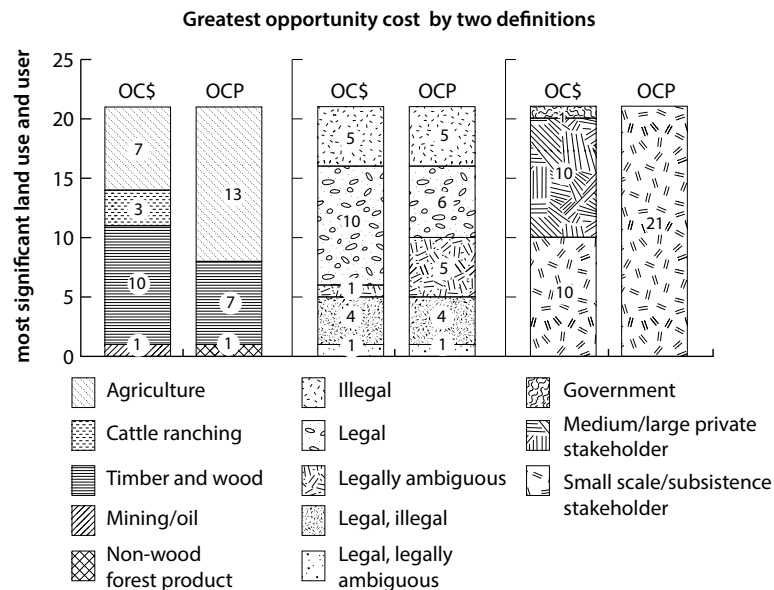


Figure 2. A comparison between different opportunity cost definitions in terms of the most significant land use, land-use legality and level of main land user across 22 SNIs.

Across the sites, land uses with an ambiguous or mixed legal basis are common. In fewer than half of the sites (10 out of 21), the land use identified as generating the highest financial opportunity costs was characterized as clearly legal (Figure 2). Where illegal land uses present the largest financial opportunity costs, they tend to be carried out by small-scale stakeholders (three out of four sites). Cattle ranching is the exception, as this activity usually involves medium- or large-scale stakeholders, and always occurs under mixed legality. This may partly reflect a country effect, as illegal and mixed legality land uses are predominant across all sites in Brazil.

Land uses that, if foregone, would impose opportunity costs on the greatest number of people, are clearly legal in only six out of 21 sites (Figure 2). In all of the Brazilian sites, and four out of the five Indonesian sites, the land uses that support the most people (OCP) are either clearly illegal or based on mixed or legally ambiguous rights. Agricultural land uses (which are the most frequently occurring in this category) have particularly unclear tenure (legally ambiguous) (Table 2).

5.2 Implementing stakeholder institutions

Our data show significant variation in the number of institutions that were involved in the start-up phase of the different SNIs. The Brazilian and Indonesian SNIs that cover entire jurisdictions involve many institutions, but there are also a large number involved in a donor-funded demonstration project in Indonesia (the Kalimantan Forests and Climate Partnership or KFCP).

As shown in Figure 3, civil society organizations were involved in the start-up phase of all SNIs except one, while 14 SNIs involved government agencies, and 11 involved private (for profit) sector organizations. Using this figure, we can identify four major categories of SNIs according to the institutions involved in their start-up phase, i.e. those implemented by:

1. civil society and government (eight SNIs),
2. civil society and private sector (five SNIs),
3. only civil society (two SNIs) and
4. all three sectors (five SNIs).

We also categorize institutions by the level at which they operate. As shown in Figure 3, international institutions were significantly involved in the implementation of all but five of the SNIs, and national institutions and subnational⁵ institutions were involved in all but four. In contrast, no village (or local) level institutions participated in the start-up phase of more than half (13 out of 22) of the SNIs.

Country	Name of SNI	Stakeholders who incur significant implementation costs*							
		By Sector				By Level			
		Civil society	Govt	Private	Donor or Research	Internatl.	National	Sub-national	Local
Brazil	Acre								
	Cotriguaçu								
	Jari/Amapá								
	SFX								
	Transamazon								
Peru	Madre de Dios								
	Ucayali								
	KCCP								
Indonesia	Katingan								
	KFCP								
	Rimba Raya								
	TNC Berau								
	Ulu Masen								
Cameroon	Mt Cameroon								
	SE Cameroon (East)								
	SE Cameroon (South)								
Tanzania	Kigoma								
	Kilosa								
	Lindi								
	Mpingo								
	Shinyanga								
	Zanzibar								
		1	4	11	10	5	4	3	1 3

* Significant costs are at least 5% of total project budget, or at least one month of person-days in start-up phase, or at least 5 person-days per month ongoing

Figure 3. The level and type of stakeholder institutions occurring across 22 SNIs.

5.2.1 Institutions involved in SNI start-up by sector

The 139 institutions involved in the start-up phase of the 22 SNIs in our sample provide a picture of who is involved in the implementation of REDD+ on the ground. Of the 139, the smallest number are from the private sector, with only 19 for-profit institutions participating across all 22 SNIs (Figure 4). These include private investors, firms providing management or technical services, such as carbon accounting, financing and forestry expertise, and companies operating in the carbon offset market. All of these occur in SNIs that received most of their start-up funding from government sources. On the other hand, civil society institutions occur the most frequently (60/139), and government institutions are the second most frequently occurring (43/139) (Figure 4).

5 'Subnational' institutions operate below the national level but above the village level (e.g. state and provincial).

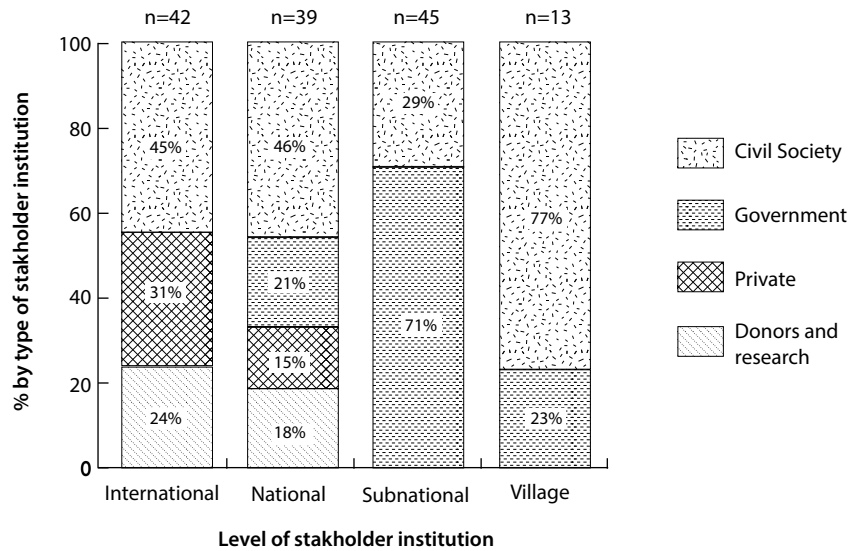


Figure 4. Percentages of stakeholder institutions by role of SFM in 22 SNIs from different sectors by importance of SFM in initiative, across 22 SNIs

Although the number of SNIs is too small to conduct statistical tests to determine whether, or how, their characteristics relate to the types of stakeholder institutions involved in their implementation, we note an apparent negative relationship between the importance of forest management in SNI strategy and the involvement of civil society institutions. Specifically, the larger the percentage of civil society institutions involved in an SNI, the smaller the focus on SFM (Figure 5). Across all SNIs of SFM Type 1 (that aim to prevent illegal logging, but do not otherwise promote SFM), 64% are civil society institutions, compared to 35% in SNIs of SFM Type IV (that consider certification to be a central objective). Sites where the greatest REDD+ opportunity costs (in terms of both financial value and number of people affected) were associated with agriculture involved the highest percentage of civil society institutions (i.e. 71% of institutions involved in those SNIs were civil society institutions). In contrast, the percentage of private sector institutions involved increased with the SNI's degree of attention to SFM (from 11% in SFM Type I to 27% in SFM Type IV).

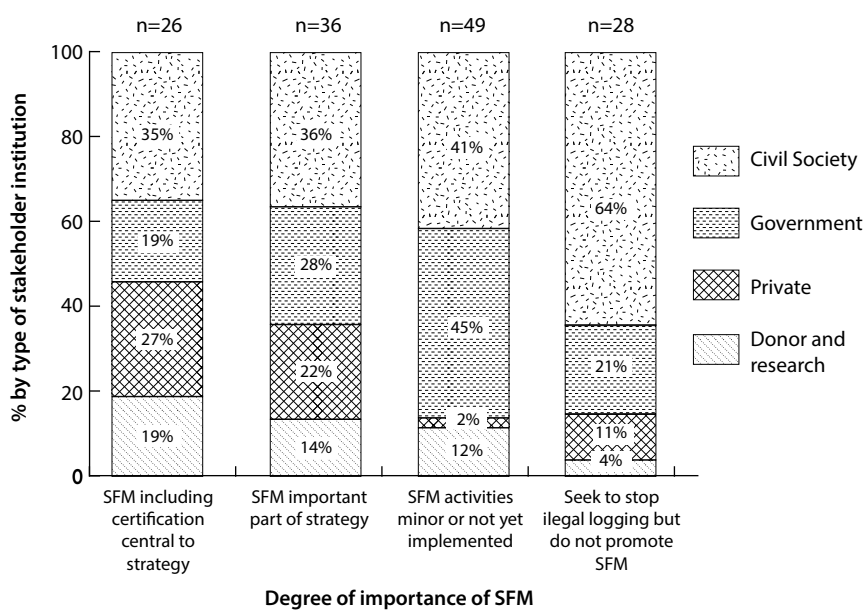


Figure 5. The percentage of stakeholders from different sectors by importance of SFM in initiative, across 22 SNIs

There may also be a relationship between an SNI's approach to the carbon credit market and the involvement of private sector institutions in its implementation. Across SNIs that have sold carbon credits, more than a third (37%) of the implementing institutions are from the private, for-profit sector, and no government institutions were involved. In contrast, SNIs opposed to credit sales had no private sector involvement. Across the four SNIs that had expired by 2015, a third of implementing institutions were government institutions, and only a fifth (21%) were from the private sector.

5.2.2 Stakeholder institutions involved in SNI start-up by level

The largest numbers of institutions involved in the start-up phase of SNIs operate at the subnational (45 out of 139) and international (42) levels (Figure 4). When we compare the level and sector of these institutions, we find that most subnational institutions (71%) are government agencies, whereas most of the international institutions are from civil society. Private sector institutions are either national or international. The few village level institutions (N = 13 across all SNIs) are mostly from civil society (77%). Subnational institutions are most prevalent (50%) among SNIs funded primarily by the government, and national institutions are most prevalent among SNIs funded primarily by NGOs. Three of the four SNIs that lacked national level institutions have expired. It is also interesting to note that SNIs funded primarily by government sources involve more subnational institutions and more private sector institutions. Thus, government funding is associated with broader participation in our sample of SNIs.

5.2.3 Patterns of burden and benefit sharing across the different types and levels of stakeholder institutions

To assess the concern that the costs of REDD+ will fall on institutions in REDD+ countries, we examined which types and levels of stakeholder institutions (i) have their costs fully covered (or possibly more than fully covered) by the SNI budget, or (ii) share the financial burden of implementing the SNI. A high percentage of village and subnational level institutions are burden sharing (62% and 40%, respectively), while 60% and 67% (respectively) of international and national institutions cover their costs from the budget for the SNI (Figure 6).⁶ Comparing across sectors and levels, we find that burden sharing is most common among government (24 out of 43) and village (8 out of 13) institutions (Figure 7). Thus, our sample offers some basis for concerns that REDD+ country institutions will end up shouldering part of the cost of REDD+, at least in the start-up phase. One caveat is that we do not know the extent of the burden sharing, which could range from token contributions to the majority of the SNI budget.

SNIs funded primarily by governments in their start-up phase involved a much higher percentage of burden-sharing institutions (56%) compared to SNIs funded primarily by NGOs (16%). A total of 34% of institutions involved in donor-funded SNIs and 46% of institutions involved in private sector funded projects are burden-sharing (Figure 7). Thus, in our sample, donor and NGO funded SNIs are most likely to budget for the costs incurred by all implementing institutions from the beginning of the initiative, whereas the government-funded SNIs are more likely to call on institutions that do not fully recover their costs, at least during the start-up phase. However, all government-funded SNIs in this sample are in Brazil and three out of four of these SNIs are opposed to credit sales (Table 1). SNIs with lead proponents opposed to the sale of carbon credits have the highest percentage (50%) of institutions that are burden sharing. Thus, opposition to credit sales and willingness to share the costs of REDD+ are associated, as might be expected. Another pattern is that SNIs with a stronger focus on SFM have a higher percentage of institutions that have their costs fully covered, i.e. 73% of institutions involved in SNIs that focus on forest certification (SFM Type IV) cover their costs (Figure 8).

⁶ Some stakeholder institutions were described as both 'burden sharing' and as 'benefitting more than the costs incurred', and a judgment could not be made as to which of these was dominant. We do not include these institutions in any of the figures reported for either 'burden sharing' or 'covering costs'.

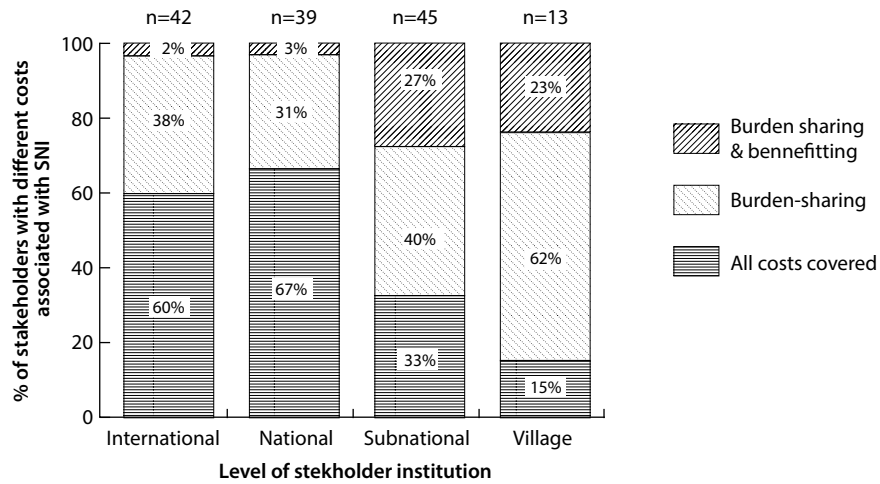


Figure 6. The percentage of each level of stakeholder institution that is burden sharing versus covering their costs across 139 institutions in 22 SNIs.

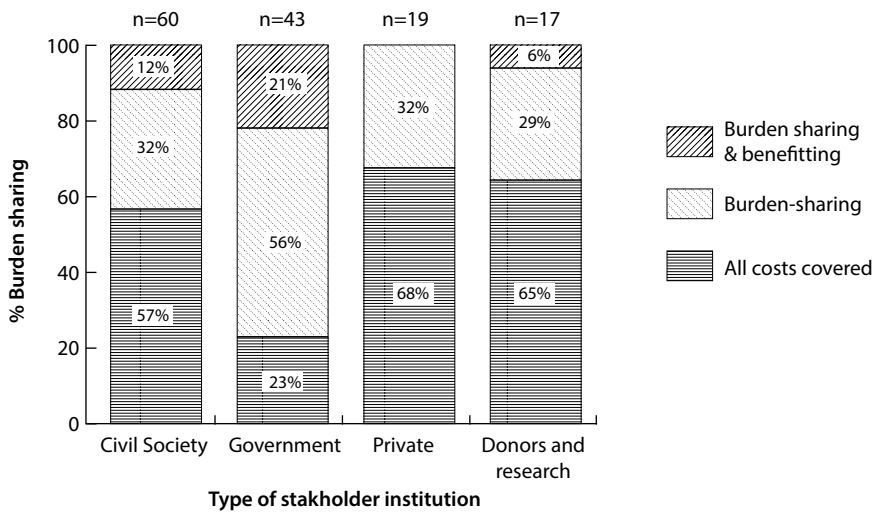


Figure 7. The percentage of stakeholder institutions that are burden sharing versus those that are covering their costs by importance of SFM in 22 SNIs.

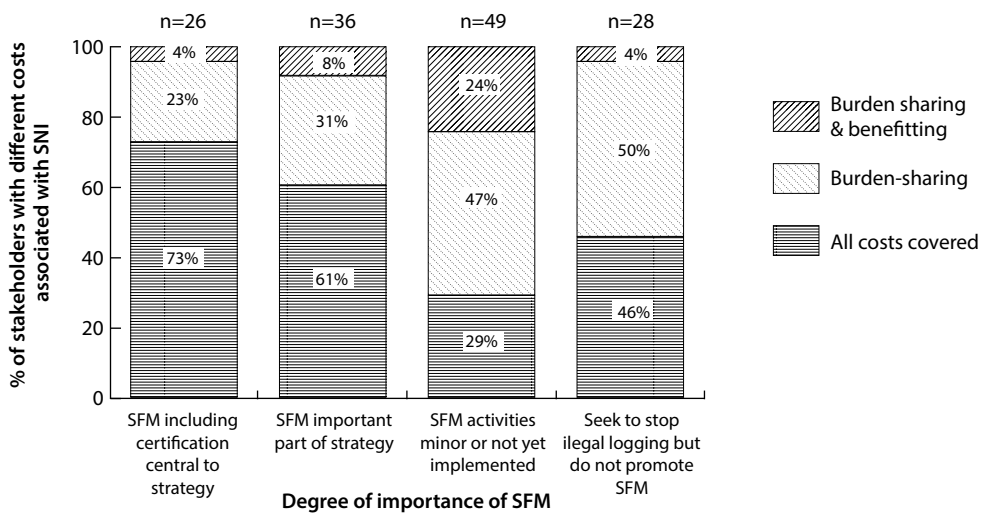


Figure 8. The percentage of each type of stakeholder institution that is burden sharing or covering their costs across 139 institutions in 22 SNIs.

6 Discussion

In this section, we discuss the degree to which common concerns regarding the distribution of REDD+ costs are manifested in our sample of 22 REDD+ SNIs. In so doing, we explore some of the motivations that institutions might have for involvement in REDD+ SNIs, as these have implications for safeguards and benefit sharing.

6.1 A large number of implementing stakeholder institutions are involved in REDD+: what does this mean for costs?

Many institutions are involved in the establishment of REDD+ across the 22 SNIs in our sample. Based on a review of carbon forestry projects, Milne (1999) suggests that involving a large number of parties in project implementation increases implementation costs. However, this is not necessarily the case if the parties share the burden or cost. In our data, there is a weak, but positive, correlation between the number of implementing stakeholder institutions, and the proportion of those institutions that are burden sharing (i.e. cross-subsidizing the SNI). That is, the more institutions involved, the greater the likelihood of burden sharing. Additional institutions can help reduce total costs if they have complementary expertise (e.g. staff with different backgrounds and training). Furthermore, they may be able to capture additional resources available only to certain types or levels of institutions. Agrawal et al. (2011) suggest that efforts to promote complementarity of interests and capacities among different actors “may help achieve multiple objectives that REDD+ efforts have come to symbolize for different stakeholders”.

6.2 REDD+ SNIs have required a significant amount of government subsidization

Our results suggest that the establishment of REDD+ on the ground often involves support (burden sharing) by government stakeholder institutions. In particular, government entities may bear non-monetary transactions costs, such as staff time, which have also been identified as important hidden costs in community forestry (Schreckenber and Luttrell 2009). Government subsidization is more apparent in Brazilian SNIs and less common among Indonesian SNIs. This may be related to the fact that many of the Brazilian SNIs in our sample have a considerable number of government institutions involved in implementation, in contrast to the more mixed composition of the implementing institutions in Indonesia. The willingness of both national and subnational governments to bear some of the costs of establishing SNIs suggests that their goals go beyond immediate cost recovery. For example, governments may seek to use the early SNIs to build readiness and support for REDD+, or to generate non-carbon co-benefits. An important area for further research is whether these public investments in REDD+ are ‘crowding out’ or ‘crowding in’ investments by the private sector and civil society (cf. Andreoni and Payne 2003; Albers et al. 2008).

6.3 Challenging the notion of REDD+ as a centralizing force: subnational stakeholder institutions play a significant role

Phelps et al. (2010) warn that REDD+ could encourage recentralization of forest management across the tropics, due the requirements of performance-based financing. However, our data suggest that even if *policy* discussions are dominated by national-level institutions, institutions at the subnational level are highly involved in implementation. Indeed, four of the SNIs in our sample (in Tanzania and Brazil) received no significant input from national institutions. Instead, a diverse range of stakeholder institutions, across all governance levels, were involved in the start-up phases of most of the SNIs

studied. Subnational and international institutions are particularly numerous. The burden on subnational institutions was predicted by Nepstad (2007), who highlights the costs that federal and state governments in Brazil are likely to incur to reduce emissions. Brazilian SNIs are supported by a particularly large number of subnational institutions; all but one Brazilian SNI in our sample has more subnational than national or international stakeholder institutions. This is related to on-going decentralization of environmental governance in Brazil, including efforts to hold local governments responsible for slowing deforestation, e.g. through a 'blacklist' or 'embargo' of municipalities that deforest the most (Assuncao and Rocha 2014; Cisneros et al. 2015). Our data also reveal a large number of subnational actors involved in Indonesian SNIs, contradicting arguments that this level has been excluded from REDD+ policy discussions in Indonesia (Gallemore et al. 2015).

The variety of levels and types of implementing institutions in our sample is consistent with a polycentric system (Ostrom 2010, 2012). Ideal polycentric systems benefit from the complementary strengths of multiple institutions (Andersson and Ostrom 2008; Nagendra and Ostrom 2010; Agrawal et al. 2011). Alston and Andersson (2011) suggest that REDD+ requires a multilevel response, and that costs can be reduced by encouraging a variety of organizations to take on tasks related to REDD+. Reynolds (2012) examines variation in local, subnational and national level institutions, and finds that working across levels can make carbon forestry projects more likely to succeed. This is echoed in our finding that the SNIs that have expired were less likely to have implementing institutions at all levels and from all sectors, with gaps especially in national-level and private-sector representation. On the other hand, strong polycentricity can generate increased transaction costs due to the frequent interaction required between levels. Gallemore et al. (2015), in their work on REDD+ policy in Kalimantan, Indonesia, conclude that the transaction costs of REDD+ inhibit equitable multilevel systems. They suggest that more powerful actors tend to interact across levels, as they are able to reduce transaction costs by letting others come to them, and by shaping the overall structure of the policy arena. Indeed, work by Poteete et al. (2012) suggests that multilevel interaction is characterized by poor alignment of institutions, coordination problems and blurred accountability. Sunderlin et al. (2015) point out that a polycentric system cannot compensate for insufficient international finance for REDD+.

6.4 Limited involvement of local level institutions

While the SNIs in our sample involved institutions from a variety of sectors and levels, there is one notable gap: in many (13 out of 22) SNIs, particularly in Brazil, Peru and Indonesia, there were no village (or local) institutions involved in the start-up phase. The positive implication is that village institutions are not being burdened with costs. The negative implication is that they are also not being included in governance of the SNIs. In other words, the core of the polycentric governance system is hollow. The exception was Tanzania, where, in most SNIs, village level institutions were the most frequently occurring institution. This may reflect the way in which Norwegian funding for REDD+ in Tanzania specifically targeted local capacity building, in order to move forward while national institutions and rules for REDD+ were still being developed (Rantala et al. 2015). In the short run, the hollow core does not appear to have been a major stumbling block for SNIs: there were no village institutions and a lower percentage of subnational institutions in SNIs that were certified and that sold credits (one definition of 'success').

6.5 Institutions are prepared to share the cost-burden

Cost compensation is a prominent part of the discourse on REDD+ benefit sharing (Luttrell et al. 2013). A commonly held view is that international funding for REDD+ should cover the costs of the implementing institutions, thus matching benefits to the costs incurred. Failure to cover costs could lead to a motivation deficit, and thus a sustainability problem. However, we find that not all institutions

behave according to this ‘cost compensation’ logic in the start-up phase of SNIs. For example, many (40%) subnational institutions supporting implementation of SNIs are bearing the costs themselves (Figure 6). This presents a stark contrast to predictions that funding for REDD+ would be diverted to support conservation efforts and other national and local priorities (Pagiola and Bosquet 2009; Harvey et al. 2010; Phelps et al. 2011). We find little evidence that institutions involved in SNIs, from either the public sector or civil society, are siphoning off REDD+ funds to support related activities, and substantial evidence that they are sharing the costs of implementation.

The willingness to share the burden perhaps reflects a strategy of getting REDD+ up and running, with the hope that it will eventually generate a surplus. Another possible explanation for this pattern is that government (and local organizations) have the greatest interest in securing non-carbon co-benefits from REDD+ and are thus willing to invest in its establishment. Specifically, governments may be willing to use public funds to reduce emissions, with the hope that their investment will leverage other investment or REDD+ funds that can be shared as benefits (e.g. for forest stewards or the poorest). Another interpretation is that host governments have viewed investment in REDD+ as part of voluntary national contributions to climate change mitigations (i.e. Nationally Appropriate Mitigation Actions (NAMAs) and Nationally Determined Contributions (NDCs); Boos et al. 2015; Fridahl et al. 2015). Some government institutions may be willing to share the costs because it means that they have more influence and control over implementation, thereby avoiding the paternalistic relationships associated with financing (Sanginga et al. 2007). Finally, some institutions may be investing in REDD+ for its non-carbon co-benefits, such as locally valuable ecosystem services. Two of the four SNIs funded primarily by private sources indicated that non-carbon benefits were their primary objective. The proponent of one of these (Ulu Masen) stated that its primary objective was poverty reduction, and the proponent of Rimba Raya stated that its primary objectives were conservation, biodiversity and SFM (Table 1). Both of these SNIs aimed to sell carbon offsets and thus may have been interested in generating co-benefits partly to secure access to the voluntary carbon market. Dixon and Challies (2015) find a range of motivations among private sector investors in REDD+ in Indonesia. They suggest that those who seemed to be willing to derive little or no immediate financial return were the most active in REDD+, while those who prioritized financial profit had typically suspended or slowed their activities or spread their risk across other investments.

6.6 Methods for defining opportunity costs risk overlooking costs to smallholders

An important theme among critics of REDD+ is that vulnerable groups such as smallholders will not be properly compensated for losses they incur by foregoing forest conversion (e.g. Kashwan 2015). Our data suggest that this could come true if compensation systems focus on stakeholders who bear the greatest opportunity cost in dollar terms, since those are different from the stakeholder groups including the most people bearing opportunity costs. Focusing on financial value foregone typically results in a focus on medium- and large-scale land users. On the other hand, focusing on the number of people affected by a foregone activity inevitably shifts the focus to small-scale land users.

Another concern is that REDD+ will only recognize and compensate the opportunity costs of agricultural conversion or deforestation, and not forest use that leads to degradation. However, in our sample, the collection of timber and other forest products was frequently listed as a land use that would be affected by REDD+ interventions (Table 2) and identified as generating the greatest financial opportunity costs (see Figure 2). Thus, we confirm that restricting forest use could impose opportunity costs, but we find that these costs *are* recognized by people involved in implementation of SNIs, making it *unlikely* that they would be overlooked in local planning, even if they are not recognized by researchers and analysts operating at the national level (Karky and Skutsch 2010).

6.7 Denying benefits to those without legal rights will disproportionately affect certain groups

There is a strong discourse within the benefit-sharing debate suggesting that only those with legal rights should be compensated for costs incurred (see Luttrell et al. 2013 for discussion). However, in most of our sites we find a high level of uncertainty over tenure and the legality of land use, particularly for land uses associated with OCP (Figure 2). Across our sites, higher value land uses are more likely to have legal tenure. Those sites with illegal or legally ambiguous higher value land uses tend to be dominated by smallholders, in contrast to sites with legal land uses that tend to be dominated by medium/large stakeholders. The land uses that affect the largest number of people tend to be illegal. Overall, in sites where the most significant land use involves smaller stakeholders, the legal status of that land is more likely to be unclear. However, in fewer than half (10 out of 21) of the SNIs are the land uses generating the highest financial return exclusively legal. In an additional five sites, the land uses generating the highest financial return are found in both legal and non-legal (mixed legality) scenarios, which would present problems for benefit sharing based on land use. None of the land uses generating the highest financial return in Brazilian SNIs were classified as legal.

The considerable level of illegal, legally ambiguous or mixed legality of the most important land uses identified under either definition raises questions about how to design benefit sharing systems. Martin et al. (2014) point out that if an activity is illegal, then any ‘opportunities’ related to it are also illegal. This suggests that agents who forego illegal activities should not be entitled to share benefits, which in turn would call into question the ability of REDD+ to influence groups without legal recognition (and other categories that are practically difficult to compensate). Although it can be argued that compensating for illegal opportunity costs condones, and perhaps even encourages, illegal activity, to withhold compensation risks further reducing opportunities and viable strategies for the poor, particularly in the case of small-scale subsistence use. Furthermore, if illegal opportunity costs are not compensated, actors may continue to practice illegal activities on lands where other users receive payments for compliance. This reinforces the difficulty of implementing REDD+ without fundamental reforms, such as tenure clarification (Sunderlin et al. 2014).

7 Conclusions: Implications for the design of REDD+

Our findings, based on the experiences of 22 subnational REDD+ SNIs during their start-up phase, suggest that concerns regarding who will bear the costs of REDD+ are well founded from the perspective of people involved in implementation of SNIs. It is widely recognized that opportunity costs are only part of the full costs of REDD+, and there have been many calls to more explicitly account for the full transaction and implementation costs. We demonstrate that a considerable number of stakeholders are involved in the implementation of REDD+ and, furthermore, are sharing the costs of REDD+. Subnational actors play a far larger role than is often assumed, and these actors have been willing to subsidize REDD+ in the absence of a vibrant carbon market. We suggest that these intermediaries require greater attention, in terms of understanding their motivations and the incentives necessary to maintain their interest. In most of the literature on REDD+, implementation costs are discussed in terms of maximizing efficiency. In this paper, we have explored issues of equity related to implementation costs, including the degree to which particular types of actors are more likely to share the burden of implementation costs, and the reasons why they may be motivated to do so. Recognizing these issues is the first step toward addressing concerns about distribution that have been a barrier to progress for REDD+.

Identifying who bears opportunity costs appears to be a simpler task. These are the individual resource and land users who are required to forego clearing or forest uses that result in degradation. However, observers may use different criteria to decide where to focus their attention when designing benefit-sharing systems. This, in turn, can lead to different conclusions about the incidence of costs.

Based on the experience of 22 subnational REDD+ initiatives, we suggest a need to use multiple approaches to identify priority stakeholder groups and to be explicit about the inherent biases of the approaches used. For example, the greatest opportunity costs can be defined in terms of the number of people affected, as well as the number of dollars foregone, and implementation costs can include many forms of cost-sharing not recorded in the official budgets for REDD+ initiatives. Different methods for measuring and recognizing costs can produce very different assessments of who will bear the greatest costs of REDD+. There may also be advantages to moving away from an analytical separation of implementation and opportunity cost for stakeholders. For example, it may be that reducing net opportunity costs to stakeholders by providing viable livelihood alternatives will ultimately reduce costs of implementation, such as law enforcement.

The first step toward mitigating concerns over costs is to make the distribution of costs transparent, in order to identify the full set of stakeholders that should be considered in future research, consulted regarding benefit-sharing systems and included in negotiations. There is a range of discourses about which stakeholder groups have a legitimate claim on REDD+ revenues (Luttrell et al. 2013). Some see 'benefits' as the surplus payment over and above the cost of reducing emissions, while other discourses consider all carbon revenues as benefits to be distributed. Claims on these benefits may be based on merit, needs, egalitarian beliefs or legal rights. Aside from these 'rights' based approaches, some discourses are also related to the pragmatic question of what motivates involvement in REDD+. Motivations for getting involved in REDD+ are not always about ensuring costs are compensated or financial profit. Our analysis suggests that SNIs reflect a shift away from the original idea of REDD+ as compensation for costs, toward a transformational development model, with diverse motivations for involvement (cf. Fishbein and Lee 2015).

Overall, our contribution is to make costs more transparent by characterizing the stakeholders who bear the costs of different types of subnational REDD+ initiatives. This empirical evidence provides a useful complement to, and a reality check on, common discourses in the benefit-sharing literature about which stakeholder groups have a legitimate claim on revenues from REDD+. Our approach, which demonstrates different ways to characterize target groups for benefit-distribution systems, also has value for other programs and processes *beyond* REDD+.

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DOI: dx.doi.org/10.17528/cifor/006169

CIFOR Working Papers contain preliminary or advance research results on tropical forest issues that need to be published in a timely manner to inform and promote discussion. This content has been internally reviewed but has not undergone external peer review.

REDD+ is based on the premise that actors with an interest in reducing emissions will pay for the costs of reducing deforestation. However, concerns have been raised about whether stakeholders in REDD+ host countries will end up bearing at least some of the costs. Drawing on a pan-tropical dataset covering 22 subnational REDD+ initiatives in five countries, we examine the degree to which these concerns about REDD+ are played out.

We find that many institutions in REDD+ host countries, particularly subnational governments, are bearing implementation costs not covered by the budgets of subnational REDD+ initiatives.

Opportunity costs are typically evaluated in terms of the value of production foregone, but can also be assessed in terms of the number of people affected. We show that expectations about which stakeholder groups will bear the greatest opportunity costs depend on whether the metric is total value or total number of people. The stakeholder groups with the greatest number of people affected are likely to be small-scale actors engaged in legally ambiguous land uses, which is a potential barrier to recognition and compensation of their costs.

Our study clarifies the distribution of implementation and opportunity costs by characterizing the institutions and stakeholders that bear the costs of different types of subnational REDD+ initiatives. Thus, it complements common discourses in the benefit-sharing literature about which stakeholder groups have legitimate claims on revenues from REDD+ and should therefore be considered in the design of benefit-sharing systems.



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This research was carried out by CIFOR as part of the CGIAR Research Program on Forests, Trees and Agroforestry (CRP-FTA). This collaborative program aims to enhance the management and use of forests, agroforestry and tree genetic resources across the landscape from forests to farms. CIFOR leads CRP-FTA in partnership with Bioversity International, CATIE, CIRAD, the International Center for Tropical Agriculture and the World Agroforestry Centre.



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