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Working Paper No. 94–15

Are Community Forestry Institutions Appropriate for Implementing REDD+? Lessons from Nepal

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Published by the South Asian Network for Development and Environmental Economics (SANDEE)
PO Box 8975, EPC 1056, Kathmandu, Nepal.
Tel: 977-1-5003222 Fax: 977-1-5003299

National Library of Nepal Catalogue Service:

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(SANDEE Working Papers, ISSN 1893-1891; WP 94–15)

ISBN: 978-9937-596-25-1

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April 2015

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PO Box 8975, EPC 1056, Kathmandu, Nepal

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Abstract

This paper examines the role of national and sub-national institutions in managing carbon sequestration and trade in Nepal. It first asks whether it is feasible and advantageous to implement REDD+ in Nepal's community managed forests. Then, using a pilot experimental program, it assesses whether community institutions can serve both existing needs and meet international demand for carbon. The review of secondary evidence suggests that community forestry can effectively and equitably manage REDD+ activity. However, there may be higher carbons returns to converting forests currently directly managed by the government to more efficient regimes. At the sub-national level, available evidence suggests that REDD+ activities can be successfully implemented, if, in addition to rent, communities receive technical mentoring that contributes to institutional strengthening.

Are Community Forestry Institutions Appropriate for Implementing REDD+? Lessons from Nepal

1. Introduction

Globally, there is growing interest in the carbon mitigation instrument 'Reducing Emissions from Deforestation and Degradation (REDD)' and 'REDD+', which includes forest carbon enhancement through sustainable forest management and conservation (FAO, 2011; UNFCCC, 2011). This has spawned a number of experimental projects to assess REDD+'s impacts and implications for social and environmental safeguards (Angelsen et al., 2012; Wertz-Kanounnikoff and Kongphan-apirak, 2009). In this context, our paper focuses on the institutional framework required to implement REDD+ in one country, Nepal, and examines its implications for existing forest management institutions.

REDD+ seeks to solve a fundamental collective action problem by creating markets to sequester and store carbon in forests (Angelsen et al., 2012). Through this mechanism, high carbon emitting countries are expected pay forest conserving developing countries to enhance carbon stocks in forests. If successful, REDD+ has the potential to reduce around 12 to 20 percent of global greenhouse gas emissions (Corbera and Schroeder, 2011; FAO/UNDP/UNEP, 2008; Springate-Baginski and Wollenberg, 2010; Visseren-Hamakers et al., 2012; World Bank, 2009). It can also produce co-benefits by conserving bio-diversity and ecosystem services and improving forest governance and the welfare of forest dependent communities (den Besten et al., 2014; Sunderlin et al., 2010). Furthermore, REDD+ is believed to be a cheap and quick instrument for mitigating carbon. This is because the returns to most alternate forest uses are relatively low and REDD+ activities will require few technological innovations (Angelsen, 2008a).

While these ideas are compelling, REDD+ implementation faces many challenges related to monitoring, reporting and verification (MRV), co-benefits and safeguards, and inter-agency coordination (Angelsen, 2008a; Visseren-Hamakers et al., 2012; World Bank, 2010). As Angelsen and Brockhaus (2009) discuss, the economic viability of REDD+ projects may depend on meeting important criteria such as effectiveness, efficiency, equity and co-benefits (3E+). Effectiveness requires that net carbon emission reductions from REDD+ implementation are positive and significant. In addition, the stored carbon would need to be 'additional' to any mitigation that may occur in a business-as-usual scenario. Efficiency implies that REDD+ emission reductions are less costly relative to other options. Thirdly, benefits would need to be greater than the costs borne by different stakeholders to make this instrument incentive-compatible (Luttrell et al., 2013). The co-benefits ensure bio-diversity, livelihood and other socio-economic outcomes.

Fundamental to REDD+ success is the nature of that institutions that facilitate the trade between sellers and buyers of forest carbon (Bushley and Khatri, 2011; Corbera and Schroeder, 2011; Lederer, 2012). While an international architecture is slowly emerging for forest carbon trade, of equal importance are the national and local institutions that currently undertake forest management. The question is how well these nested institutions can facilitate trade in carbon and how they may need to be modified in order to deliver this service (Hayes and Persha, 2010).

In this paper, we seek to examine the role of national and local institutions in carbon sequestration and trade by focusing on community forestry in Nepal. We first examine the potential for REDD+ to be implemented nationally through community forestry institutions using the 3E+ criteria. To understand if there is a better alternative to community forestry, we also examine implementation possibilities in government managed forests. We then use a pilot program to understand how effectively community institutions can serve existing needs and meet international carbon demand. We draw lessons for REDD+ implementation in Nepal based on these analyses.

2. REDD+ Readiness in Nepal

Nepal emits only 0.1 metric tons of CO2 per capita relative to a global average of 4.7 (World Bank, 2013). However, its forest carbon density is comparable to large carbon rich countries such as Indonesia and Brazil (FAO, 2011). Forty percent of Nepal's land area is classified as 'national' forests (29 percent forests and 11 percent shrub land) (MOF/GON, 2014) (see Table 1). Nepal is also home to seven climatic zones ranging from the tropical to the arctic, 112 forest ecosystems (MFSC/GON, 2014a) and more than 125 ethnic communities (CBS, 2012). Besides, in recent decades, it has seen extensive forest clearing in some regions and large scale re-growth in others (Nagendra, 2007). These features make Nepal interesting for examining the viability of REDD+ in diverse settings.

Nepal's unique landscape and the dependence of its people on forest resources may have contributed to it being one of the first countries to receive international financial support for REDD+ preparedness from the Forest Carbon Partnership Facility (FCPF) of the World Bank. Accordingly, the Government of Nepal now has a three-tiered structure for REDD+ readiness – an 'Apex' inter-ministerial body for multi-sectoral coordination, a REDD Working Group responsible for technical support and strategy, and a REDD Implementation Centre (formerly, the REDD Cell). In addition, many civil society institutions have emerged, which seek to ensure that REDD+ implementation follows an inclusive process.[1]

Government and non-government institutions in Nepal are currently grappling with several REDD+ related policy uncertainties. One concern is whether REDD+'s focus on MRV will lead to a reversal in Nepal's policy of decentralized forest management achieved through decades of effort and legislation (Bushley and Khatri, 2011; Phelps et al., 2010). Second, there is anxiety about carbon services dominating livelihood and bio-diversity services and potential restrictions on forest resource use (Adhikari, 2009). Third, there is debate over criteria for REDD+ payments and distribution (DANAR, 2012). There are also many discussions about what types of forests and what management regimes are more amenable to carbon sequestration. These complex issues have begun to heighten social and political tensions, making it essential to follow an incremental learning-by-doing approach.

3. Conserving Carbon through Community and Government Managed Forests

National forests in Nepal are sub-divided into multiple management regimes – government managed, community managed, leasehold, religious and private forests, and protected areas, conservation areas and protected watersheds (MFSC/HMGN, 2000). REDD+ implementation is expected to focus on government managed forests and community managed forests (MFSC/GON, 2013a).

Community forests cover some 30 percent of Nepal's national forests (see Table 1). They are managed by some 18,324 community forestry user groups (CFUGs) or approximately 40 percent of the households in the country (CBS, 2011; MOF/GON, 2014). Protected areas (national parks, wildlife reserves, conservation areas and buffer zones), cover around 59 percent of national forests (MFSC/GON, 2014b). Protected areas are generally not included under REDD+ activities since, *de jure*, they do not offer possibilities for 'additional' carbon. However, the Government of Nepal is considering implementing REDD+ in these areas[2] as these forests can, *de facto*, be highly degraded. Government managed forests, which are under *de jure* government ownership, cover the remaining 10 percent of forest area in Nepal. In the rest of the paper, we restrict our discussions to community and government managed forests.

In forestry circles, Nepal is best known for implementing a community forestry program in its middle-hill areas (Bushley and Khatri, 2011; Dev et al., 2003; DOF/GON, 2008; Nagendra, 2007; Nagendra et al., 2008; Shyamsundar and Ghate, 2014). In these areas, forestry is undertaken through elected committees of community forestry user groups (CFUGs), which make decisions regarding forest use, penalties for rule violation and

[1] These include the 'Multi-stakeholder forum,' made up of the private sector, media, government, local and international NGOs, donors and research organizations, which serves as an outreach and communication platform, and, the 'Civil Society and Indigenous People's Organizations Alliance' that undertakes dialogue on the behalf of local peoples (MFSC/GON, 2013b).

[2] Informal discussion with the REDD Implementation Centre Officials.

disbursement of fines and funds.[3,4] Incorporated into this framework is a poverty reduction program that requires CFUGs to provide very poor households with some additional forest related benefits.

Government managed forests cover some of the most valuable and carbon rich forests in the Southern Terai and the Siwalik hills of Nepal. These forests are directly managed by the forestry department through district, sectors and area (*Ilaka*) offices. However, government managed forests have degraded over time, with an estimated 0.4 percent annual loss in forest cover during the 1991-2010 (FRA/DFRS, 2014). Limited institutional capacity has contributed to this degradation and deforestation (MFSC/HMGN, 2000).

3.1 Experimental carbon payments

In order to demonstrate the viability of REDD+, several large non-government organizations joined hands in 2009 to implement a pilot REDD+ payments program in community forests.[5] NORAD's Climate and Forest initiative funded the Forest Carbon Trust Fund (FCTF) to make payments to CFUGs for conserving carbon in three watersheds – Charnawati watershed in Dolkha district (mountains), Ludikhola watershed in Gorkha district (hills) and in Kayarkhola watershed in Chitwan district (plains) (see Figure 1). All the CFUGs in each watershed were invited to join and 105 CFUGs participated in the REDD+ pilot program in 2011.[6]

In order to create an incentive system for carbon sequestration, the project distributed a total sum of US $95,000 each year for three consecutive years (2011-13) to participating CFUGs. Payments were provided to management committees along with guidelines for fund allocation. Further, instead of a pure market type, the carbon payment was designed to be a function of carbon and social safeguard indicators with differing weights: i) carbon stock (24 percent), (ii) carbon increment (16 percent), (iii) indigenous group household (10 percent), (iv) Dalit household (15 percent), (v) poor households (20 percent), and (vi) gender ratio (15 percent) (Shrestha et al., 2014).

The CFUGs disbursed the carbon funds to their members for a variety of pre-identified activities that reduced deforestation, conserved and enhanced forest carbon, and reduced poverty and improved livelihoods.[7] They also used the funds to raise awareness on REDD+ and build community capacity in carbon monitoring.

4. Methods and Data

In order to examine REDD+'s viability in Nepal, we first examine the potential for national-level REDD+ implementation through community forestry institutions relative to government managed forests. Second, we examine the REDD+ pilot program to understand how well community-level organizations may fare in practice.

While there are a number of country-specific challenges in REDD+ implementation, carbon effectiveness, cost efficiency and equitable distribution of benefits, including co-benefits, repeatedly emerge in the literature as important criteria (Corbera and Schroeder, 2011; Costenbader, 2011; Murdiyarso et al., 2012; Sunderlin et al., 2010). Thus, we use the three 3E+ criteria plus the possibility of 'additionality' of carbon sequestration to assess the potential for REDD+ in Nepal.

Table 2 lays out an analytical framework for gauging prospects for REDD+. In order to assess effectiveness, we look at practical mechanisms such as fire control, provision of alternatives to fuel wood, grazing management etc. and institutional arrangements that would reduce deforestation and degradation as suggested by MFSC/GON (2013b) and Tachibana and Adhikari (2009). We also ask how much potential there is to create 'additional' carbon sequestration relative to a business-as-usual scenario. To evaluate cost effectiveness, we examine differences in

[3] The executive committee is expected to be made up of women and representatives from poor, Dalit, indigenous and other disadvantaged groups (including location disadvantaged).
[4] The CFUGs, themselves, are organized under a national umbrella organization called the Federation of Community Forest Users Nepal (FECOFUN).
[5] The partners in the project entitled "Design and setting up of a governance and payment system for community forest management under REDD+" were the International Centre for Integrated Mountain Development (ICIMOD), the Federation of Community Forest User's Nepal (FECOFUN) and Asia Network for Sustainable Agriculture and Bio-resources (ANSAB).
[6] These watersheds covered a total area of over 10,000 ha of community managed forest involving more than 18,000 households.
[7] Pre-identified actions included activities related to: a) reducing deforestation b) alternative energy promotion for reducing degradation (c) forest carbon stock conservation (d) sustainable management and biodiversity conservation (e) forest carbon stock enhancement (f) poverty reduction/livelihood improvement (g) forest carbon monitoring (h) REDD+ awareness/capacity building (i) auditing funds and data verification (CFRPN, 2011)

implementation, transactions and opportunity costs. Finally, we scrutinize equity in benefit sharing by focusing on factors such as the population and area covered, downward accountability to communities and capacity to produce co-benefits (Kanel and Kandel, 2004; Luttrell et al., 2013). For the national level analyses, we rely on secondary literature and data.

Our sub-national analysis is based on the REDD+ pilot program in community forests. We compare CFUGs that received REDD+ seed grants with other similar non-REDD+ (control) groups using the same 3E+ criteria (see Table 3). Our understanding is that carbon can be sequestered if the sub-national institutions that manage forests are effective. Thus, we identify indicators of institutional and management effectiveness such as frequency of meetings, forest fires averted, avoided conflicts and updated community records (Maraseni et al. 2014; Springate-Baginski et al., 2003). To assess cost efficiency, we examine the aggregate transaction and implementation costs. We also estimate REDD+ rents to the community by deducting transaction and implementation costs from payments received. Equity issues focus on representation of marginalized groups and women in forest management and the use of pro-poor criteria in livelihood programs.

Data for the sub-national analyses comes from 9 REDD+ CFUGs in the three watersheds covered by the REDD+ pilot program and 9 control CFUGs in nearby areas. The control and treatment CFUGs were matched using Propensity Score Matching techniques as part of a larger study on carbon impacts (see Sharma et al. 2015). The selection of a subset of CFUGs for the institutional analyses was based on similarity in forest management indicators through discussions with the FECOFUN's District Executive Committee that monitored activities in both REDD+ and non-REDD+ CFUGs. We consider 2011 as the reference year and 2012 as the end-line year.

Sub-national data were collected through a focus group discussions (FGDs) participated by executive committee members, CFUG members , local key informants such as social workers and teachers in each of the sampled communities. During the FGDs, structured and semi-structured questions were used to obtain in-depth and perception related information. Required data also came from CFUG meeting minutes and other documents (from 2010/2011 and 2011/2012). Additional information such as amount of carbon payments made to each of the sampled communities was collected from the central project office.

5. Differing Implications for REDD+ in Community and Government Managed Forests

In this section, we discuss how REDD+ can be implemented in Nepal's community and government managed forests.

5.1 Carbon effectiveness

While there is no large scale evidence to suggest that one type of forest management is better than the other in enhancing carbon stocks, a number of studies identify community forestry as an effective, even superior, management strategy relative to state forestry in the Himalayan region of Nepal and India (Baland et al. 2010; Kanel, 2008; Nagendra, 2007; Nagendra et al., 2005; Shyamsundar and Ghate 2014). Edmonds (2002), for instance, shows that fire wood extraction is lower in community forests relative to state managed forests in Nepal. This result is supported by research that suggests that strengthened management rules and tenure in community forests help reduce forest product extraction and improve forest health (Nagendra, 2007; Tachibana and Adhikari, 2009). These findings from Nepal are reinforced by studies in the Indian Himalayas. In contrast, there is evidence that suggests that some 100 thousand hectares of forest land, mostly government managed forests in the Terai and Siwalik region of Nepal, were encroached during the last 25 years (MFSC/GON, 2014d).

Community forestry in Nepal has an extensive network of experienced local forest management institutions (Acharya et al., 2009). Communities are effective in reducing degradation because they identify clear rules for forest use, monitor and enforce rules, introduce technologies that enhance efficiency in forest use and are able to respond to signals of forest change more rapidly (Kanel, 2008; Nagendra, 2007; Pokharel, 2012).[8] Practices such as stall feeding of cattle are often found in community forest areas, while open grazing is still quite prevalent in

[8] Kanel (2008) estimates that fines and punishments for different rule violations contributed about 0.6 percent of total CF annual income.

government managed forests (Nagendra, 2007). Also, many CFUGs have introduced improved cooking stoves and bio-gas plants to reduce bio-fuel dependence and taken advantage of sapling distribution programs to promote planting trees in private lands for household needs (MFSC/GON, 2009). Furthermore, CFUGs seem to be able to better respond to forest fires, while control of forest fires in government managed forests can be slower since it is mainly the responsibility of forest guards (Nagendra, 2007; Tachibana and Adhikari, 2009). Thus, the presence of robust institutions contributes to better management of community forests relative to government managed forests, which get little actual protection through Forest Offices (Poudel and Karki, 2013).

While carbon is more likely to be sequestered in community forests, reference carbon emission levels will likely be lower in government managed forests because of higher rates of deforestation and degradation. This would make it possible to store more 'additional' carbon, particularly in the Terai government managed forests, if these forests could be better governed (Dahal and Banskota, 2009).

5.2 Cost efficiency

In the context of REDD+, the cost of sequestering carbon can be categorized into implementation, transactions and opportunity costs (Lutrell et al., 2013). Implementation costs refer to administrative and technical costs incurred in the course of measurement, monitoring, verification, reporting and organization of payments for carbon. Transaction costs emerge from establishing and maintaining property rights over the forests and the carbon stock increment.[9] The opportunity cost is the benefit from the most profitable alternative use of forests and forested land, such as conversion into commercial plantations, monoculture forestry or agriculture.

While there are no empirical studies in Nepal that compare the cost effectiveness of different forest management regimes, Somanathan et al. (2009), who examined similar Himalayan forests in India, show that state management is seven times more expensive relative to community management of forests for similar levels of conservation. This is because community institutions are not dependent on a costly bureaucracy and decisions are quickly taken.[10] On the other hand, management of government managed forests is centralized and implementation from districts to *Ilakas*, the lowest administrative units, can be stymied by many hurdles. Government implementation costs (infrastructure, administrative expenses, forest fire control management etc.) can be significant.[11]

Community institutions may be able to economize on transaction costs related to meetings, training and regular monitoring activities because of ownership, proximity and local knowledge. However, MRV of carbon from community forests may impose a significant burden because of the multiple small forest areas that need to be managed. Thus, at least one report prepared by the Government of Nepal envisions an MRV design that would cluster community forests into areas of a minimum of 10,000 hectares (MFSC/GON, 2014c). In this context, nation-wide REDD+ programs may be easier and cost effective to implement in government managed forests because of economies of scale.

Opportunity costs are expected to vary by location, but may not differ for government and community forests found in the same bio-physical locations. Currently, a large portion of government managed forests are in the Terai and Siwalik hill region, which is home to high-priced Sal and other hardwood trees (ICIMOD/MOEST/GON, 2007). Here, the opportunity costs of conserving government managed forests for carbon will be high, i.e. carbon benefits will need to be weighed against revenues from managing forests for high-value timber. In terms of community forests, CFUGs may bear additional costs if extractive products currently obtained from community areas are reduced when forests are managed for carbon. These costs will also be borne if illegal extraction from government managed forests is reduced.

5.3 Equity and co-benefits

In order to assess how government managed forests fare relative to community forests in terms of generation of co-benefits as well as equitable distribution of benefits, we ask which institutional regime is more down-ward

[9] There are differing definitions of transaction costs and MRV and related costs are also considered as part of the set of transaction costs.
[10] Community forest management is based on an operational plan drawn up with government approval. Households do incur production costs in terms of thinning and pruning, floor clearing, and fire protection and so on, which need to be considered a part of REDD+.
[11] The MFSC budget in fiscal year 2011/12 was NRs. 485 million (approximately 1.6 percent of the Government budget). Around 30 percent of the total forestry budget goes to community forestry (DOF/GON, 2012).

accountable, i.e. is able to engage communities in decision making and better able to generate co-benefits that are valued by poorer people.

Government managed forests are guided by conservation and revenue goals and are not intended to benefit local communities, except through broader ecosystem services. Resource extraction by households is generally illegal, except with seasonal permission in the case of products such as thatching grass. There is no institutional mechanism for direct interaction with the community and government decrees are implemented through district forest offices. The exceptions are national parks, where benefit sharing arrangements offer local communities for engagement in conservation activities in the national parks and buffer zones.[12]

Community forests are widely distributed serving some forty-four percent of Nepal's households (CBS, 2011). In such areas, decision-making over resource extraction is decentralized with different interest groups within the communities influencing final distributional rules. Furthermore, communities are expected to spend at least 35 percent of their annual community income for poor and marginalized households (MFSC/GON; 2009). Several studies, in fact, show that CFUGs have organized themselves to benefit the poor and marginalized (Kanel, 2008; Springate-Baginski et al., 2003). CFUGs also build social capital and reduce conflicts as they support a range of community development activities (Pokharel, 2008; Springate-Baginski et al., 2003). Thus, relative to the government managed forest offices, community forestry groups are popular institutions that offer greater co-benefits.

In summary, because community forests are backed by robust local institutions, they are likely to be better at delivering carbon and co-benefits relative to government managed forests. However, the potential for storing carbon is higher in government managed forests because these forests are more degraded. The cost-related trade-offs are unclear – MRV costs may be lower in government managed forests due to economies of scale, but, timber-related opportunity costs are likely to be higher.

Overall, Nepal has two options in terms of REDD+ implementation. The Government can convert existing government managed forests into community forests or into alternate more effective regimes. Another option would be to seek REDD+ payments to CFUGs using different strategies. First, carbon stocks in community forests can be further enhanced through better and more scientific management of the forests (Kanel, 2008). Payments to communities can also be negotiated by arguing for a 'no-lose system' or a 'differentiated system', in which very low emission reductions are also rewarded (Angelsen, 2008b).[13] Alternatively, REDD+ payments can be made to communities just for measuring and monitoring carbon stock (Skutsch et al. 2011).

6. Can REDD+ be Effective and Deliver Co-Benefits at the Sub-National Level?

Given that REDD+ implementation has not yet started at the national level, any discussion on countrywide options is hypothetical. However, at the sub-national level, we have experimental evidence on carbon financing for enhancing carbon stocks in community forests.

Prior to the REDD+ pilot, the 9 REDD+ and 9 non-REDD+ CFUGs analyzed in this paper started out as quite similar when the time invariant variable data collected for a different purpose were examined[14]. Table 4 shows that on average, both have the same density of households per unit area of forests, have equal access to public facilities such as high school, health post, police station and bank and have been managing their forests for approximately the same number of years. The REDD+ CFUGs appear to have a higher percentage of indigenous and Dalit peoples users, but these differences were statistically in-significant.

An examination of carbon stock increment in the REDD+ CFUGs over a one year period (Table 5) suggests that carbon stock increased by approximately 3 tons per hectare in the nine REDD+CFUGs in the three districts during 2010-11. This is equivalent to around 11 metric tons of CO_2 (1 ton of Carbon =3.67 tons of CO_2; Pearson et al,

[12] In such cases, up to 50 percent of the revenue of the parks is provided to local communities for local infrastructure and development activities. But this provision does not apply for general government managed forests.

[13] In a 'no-lose' system, carbon baselines are set at such as a level to ensure that there is no loss in carbon credit and in a 'differentiated system' higher payments are made for small incremental reductions in deforestation (Angelsen, 2008b).

[14] These data were obtained from Sharma et al. (2015) collected from records and FGDs with the CFUG executive committee members for a propensity score matching for a different purpose in 2011.

2007, cited in ICIMOD/ANSAB/FECOFUN, 2012). Thus, the question is: Whether the CFUG institutions were influenced by REDD+ program activities, which then affected carbon sequestration? Also, how were community institutions modified by the REDD+ payments?

6.1 Management effectiveness

In order to understand if the REDD+ investments in the CFUGs contributed to carbon sequestration, we first examine five management effectiveness indicators. The first two indicators on meetings in Table 6 identify community participation in undertaking routine or crisis management. The other indicators reflect operational outcomes from such participation. The third indicator also has an impact on equitable benefit sharing. Because changes reflect institutional responses to REDD+, the indicators in Table 6 also provide some evidence on how REDD+ incentives may change existing institutions.

Table 6 shows that REDD+ CFUGs did significantly better in terms of EC meeting per year, but there was no clear difference in terms of holding general assemblies. This suggests that REDD+ CFUGs were motivated to more actively manage their forests. Updating of ethnicity profiles were not regularly done in non-REDD+ CFUGs, but was an essential part of the REDD+ CFUG activity because they received guidelines on this. FGDs also suggested that most non-REDD+ CFUGs had limited resources (particularly in Dolkha and Gorkha) and did not spend these on maintaining records.

The REDD+ seed grant was a strong motivation for forest fire surveillance. As noted by one committee member of a REDD+ CFUG committee member, Shikhar CFUG, Gorkha, "*A single forest fire can destroy forest protected through years of efforts. After REDD+ was introduced, we are very concerned about the value of protecting the trees and have made effective provision of surveillance employing CFUG members during the four risk months. The carbon payment will more than cover this surveillance cost*." Some non-REDD+ CFUGs also had such a system in place.

There were no differences among the CFUGs in terms of effectiveness in resolving conflicts. There were also few differences in monitoring and penalties imposed. There were minor cases of default, such as animal grazing in CFUGs, which received verbal reprimands but no fines.

We also analyzed how effectively CFUG institutions undertook the various activities identified in the community forestry guidelines of the Department of Forests. As Figure 2 shows, REDD+ CFUGs fared relatively better than non-REDD+ CFUGs in terms of forest conservation, development and utilization activities. Only REDD+ CFUGs were able to undertake income generating and training activities. The REDD + CFUGs were also more effective in undertaking community development activities.

6.2 Cost efficiency

To assess cost efficiency, we examine implementation and transaction costs incurred by REDD+ CFUGs in Table 5. Implementation costs were labour cost of surveillance to prevent forest fire and costs of labor and non-labour inputs in plantation and carbon measurement activities. Transaction costs were calculated as time costs of members in REDD+ related meetings and other management activities. Transaction costs are limited to community costs and do not include the costs incurred by multi-level national and local institutions that will eventually have to implement REDD+. REDD+ rent refers to payments received over and above costs. We do not estimate opportunity costs to the CFUGs as CFUGs do not possess the rights of making land use change.

Table 5 shows that the average carbon payment received by the communities in USD was 3.8 per ton of carbon. The mean transaction and implementation costs to the community were USD 2.6 per ton. These costs are expected to be high during the initial years due to inception costs and are likely to fall overtime. The mean REDD+ rent per ton of additional carbon sequestered were around USD 1.3. Transaction and implementation costs were about two thirds of the REDD+ receipt per ton. Thus, REDD+ rents are positive but low though they were essentially zero in case of Gorkha.

Table 5 also shows that there considerable variation in the carbon payment receipt, costs and rents per ton of carbon stored. Chitwan had the lowest carbon increment, yet highest receipt per ton due to social safeguards provisions making it highest per ton rent recipient. On the other hand, Gorkha, with highest carbon increment

per hectare but with relatively high costs due to high intensity forest fire surveillance cost earned zero rent.[15] But during personal communication, it was told that the high surveillance cost was in Gorkha was a part of the social safeguard as it was spent to pay to community members for the surveillance against forest fire. REDD+ rents thus depends upon carbon effectiveness and cost efficiency at the local level.

6.3 Equity and co-benefits

We assess equity and co-benefits emerging from the REDD+ efforts by examining gender and ethnic group representation in the executive committees and identifying differences in the distribution of benefits. Effective participation in Nepal's CFUGs reflects interactions at the hamlet and sub-settlement (*Tole*) level (Springate-Baginski et al., 2003). Thus, Table 7 examines how participation at executive committee and *Tole* levels changed during the years 2011-12 during which REDD+ payments were made.

As Table 7 shows the membership of women in Executive Committees increased by 7 percent in REDD+ CFs, while there was a decrease by 4 percent in the non-REDD+ CFs. These numbers were reinforced in conversations with local community members. As discussed by one member of the Devidhunga CFUG, "*It is mostly women who participate in the REDD+ meetings now a days. They are concerned about efficient way of forest management so that extraction is not restricted but forest degrading practices such as open grazing and cutting green stems are discouraged.... Now we have planted plants that provide fodder to our livestock and twigs that can be a substitute for firewood.*" Focus Group participants indicated a high level of women involvement in community activity was characteristic of Devidhunga and REDD+ further strengthened this.

The actual proportion of indigenous population in REDD+ and non-REDD+ communities was 73 and 53 percent respectively. These figures for the Dalits were 9 and 10 percent respectively. In both REDD+ and non-REDD+ CFUGs, indigenous members in the executive committees were under-represented relative to their percentage in the community, but REDD+ CFUGs performed relatively better.[16] Further, in both sets of CFUGs, there was a further small reduction in their participation in the ECs. Dalit member's percentage also declined in both groups, but this decline was towards normalization because they were previously slightly over-represented. Our perception is that these small changes reflected on going social and political dynamics rather than REDD+ payments. The *Tole* level meetings took place only in the REDD+ CFUGs, which consulted poor and marginalized households in distant hamlets. In the non-REDD+ groups, since they had very few pro-poor programs, *Tole* level meetings were not undertaken.

In order to further probe into equity issues, we examine how the REDD+ programs distributed their funds to different beneficiaries. We focus only on the REDD+ CFUGs, since such programs did not exist in most non-REDD+ areas. As Table 8 shows, REDD+ capacity development programs' benefits were weighted more heavily towards underserved groups-the Dalits and the indigenous groups. The distribution of the poverty and the livelihood improvement funds, which included provision of micro-credit, was also targeted to low and middle income households and utilized in a greater proportion by Dalit members. The REDD+ program also seems to have helped in changing perceptions regarding micro-credit to the poor and their ability to repay loans. One community member in the Tharlange CF, Dolkha said to us "*We thought that it is worthless giving loans to the poor. They cannot utilize it productively and cannot repay back. But now we feel that it is not a good idea. This REDD+ thing has taught me that these people should receive benefit if the REDD+ program is to continue...*"

Carbon monitoring, which requires some literacy to be hired for employment, was less beneficial to the mostly-illiterate Dalit households. The alternative fuel program was also more skewed towards the middle income group as it needed assets such as cattle and permanent toilets since the Government of Nepal subsidizes households that connect toilets to biogas plants. Yet, in this case, Dalits benefited because cook stoves and biogas plant distribution were targeted to them. Overall, as Table 8 shows, Dalits, who are considered the most deprived community in Nepal, benefitted relatively more from REDD+ funds.

Institutional development, forest quality and bio-diversity, poverty reduction and local livelihood, and community development are the most desired co-benefits of REDD+ (Brown et al., 2008). In order to further identify the most

[15] The carbon increments received a 16 percent weight by design.

[16] Though there were 73 percent indigenous households in the community, the representation fell from 67 to 65 percent in REDD+ CFs. With 53 percent household in non-REDD+, it fell from 49 to 43 percent.

significant co-benefits of the REDD+ pilot as perceived by community members, we discussed these issues in the FGDs conducted in each of the sampled 9 REDD+ CFUGs. Figure 3 shows their perceptions on five aspects, as recorded on a Likert scale ranging from 1 to 5 (very low to very high). Villagers perceived that institutional development was the strongest contribution of the REDD+ pilot. The villagers saw improvements in forest quality as the next best co-benefit from the program.

7. Discussions

Our experience from the field and evidence from other studies suggest that REDD+ may have helped revitalize local institutions and improve forest management (Maraseni et al., 2014; Shrestha et al., 2014). As a result of the pilot, communities became motivated to protect growing forest stocks, undertake more intensive surveillance to prevent forest fires and better manage rotational grazing or stall feeding.

In the pilot sites, community forests sequestered around 3 tons of carbon per hectare, for which communities received payments that ranged from USD 2-6 per ton of carbon. The mid altitude areas yielded the highest carbon increments compared to higher and lower altitudes (also see Pandey et al. 2014). Communities appear to be willing to accept low rents for carbon because regular benefits from forests did not possibly decline and they received additional support for strengthening institutional capacity.

The pilot provides initial evidence that MRV of carbon can be undertaken at the local level. Yet, it is important to note that the very poor were not employed in MRV activities because they did not possess the literacy required for technical work. In general, however, communities were able to forge equitable solutions. In addition to direct poverty reduction activities, REDD+ CFUGs updated membership profiles, enabling the marginalized to make claims on resources. *Tole* level meetings also reduced the possibility of "*elite capture*" within CFUGs.

8. Conclusions

There is a great deal of discussion in Nepal's policy circles about where and how REDD+ can be implemented. Our review of secondary evidence suggests that REDD+ can be effectively implemented in community forests relative to government managed forests. While, degraded government managed forests offer the possibility of higher carbon sequestration and higher REDD+ receipts, these forests will need much better management before they can be used for storing carbon.[17]

The costs associated with REDD+ implementation will vary by forest type and management regime. The MRV costs may be higher in community managed forests, while the opportunity costs associated with carbon storage may be higher in government managed high-value timber forests in the Terai landscape. These costs will need to be carefully scrutinized before identifying areas for REDD+ implementation.

The sub-national pilot program shows that REDD+ activities can be implemented in community forests if communities receive both rents and technical guidance that contributes to institutional strengthening. The pilot demonstrates that communities can participate in the MRV of carbon. It also suggests that a well-designed program can contribute to social and institutional co-benefits. Thus, implementation of REDD+ through community forestry is a viable option.

Since, deforestation and degradation is already low in community forests, a REDD+ system that makes payments for no further losses in carbon or higher payments for additional carbon storage may need to be negotiated. It is also possible that 'production' forestry within the context of community management could enhance timber and carbon returns. Recently, the Government of Nepal started scientific forest management (SFM) as a forest management strategy. SFM is expected to cover at least 50 percent of the forest area in the Terai and result in revenues of more than USD 15 million by enhancing biomass productivity. Introducing SFM in community forests of Nepal may be a new mechanism to ensure additional carbon storage.

[17] The number of community managed forest user groups and area under CFUGs are growing annually at a rate of 5 and 8 percent (MOF, 2010; MOF, 2014). Thus, more government managed forests may come under community management in the future.

Acknowledgements

This study was conducted with financial and technical support from the South Asian Network for Development and Environmental Economics (SANDEE) and International Centre for Integrated Mountain Development (ICIMOD). It also benefited from NORAD's support and the support from Norwegian Ministry of Foreign Affairs to the REDD+ pilot program in Nepal. We thank all the community members, government and NGO representatives who participated in focus group discussions, interviews and took the time to provide us with detailed information. Our thanks are also due to Erin Sills, Professor, North Carolina State University for her detailed comments on this paper.

References

Acharya, KP; Dangi, RB; Tripathi, DM; Bushley, BR; Bhandary, RR (eds) (2009) Ready for REDD? *Taking Stock of Experience, Opportunities and Challenges in Nepal*. Nepal Foresters' Association: Kathmandu, Nepal

Adhikari, B (2009) Reduced emissions from deforestation and degradation: Some issues and considerations. *Journal of Forest and Livelihood*, 8(1), 14-24

Angelsen, A (ed) (2008a) *Moving ahead with REDD: Issues, options and implications*. CIFOR, Bogor, Indonesia.

Angelsen, A (2008b) 'How do we set the reference levels for REDD payments?' in *Moving ahead with REDD: Issues, options and implications*. CIFOR, Bogor, Indonesia

Angelsen, A, & Brockhaus, M (Eds) (2009) *Realising REDD+: National strategy and policy options*. CIFOR.

Angelsen, A; Brockhaus, M; Sunderlin, WD; Verchot, LV (2012) (eds) *Analysing REDD+: Challenges and choices*. CIFOR, Bogor, Indonesia.

Baland, JM; Bardhan,P; Mookherjee, D (2010) 'Forests to the People: Decentralization and Forest Degradation in the Indian Himalayas' *World Development* 38 (11),1642–1656

Brown, D; Seymour, F; Peskett, L (2008) 'How do we achieve REDD co-benefits and avoid doing harm?' in Angelsen, A (2008a) (ed.) *Moving ahead with REDD: Issues, options and implications*. CIFOR, Bogor, Indonesia.

Bushley, BR; Khatri, DB (2011). *REDD+: Reversing, Reinforcing or Reconfiguring Decentralized Forest Governance in Nepal*? Discussion Paper 11:3. Forest Action Nepal

CBS (2011) *Nepal Living Standard Survey (2010/11)*. Central Bureau of Statistics. National Planning commission Secretariat, GON.

CBS (2012) *National Population and Housing Census 2011 (National Report)*. Central Bureau of Statistics. National Planning Commission Secretariat, Government of Nepal.

CFRPN (2011) *Operational Guidelines of Forest Carbon Trust Fund 2011*. Community Forestry REDD+ Project Nepal.

Corbera, E; Schroeder, H (2011) 'Governing and implementing REDD+'. *Environmental Science & Policy*, 14 (2), 89-99

Costenbader, J (2011) *REDD+ benefit sharing: A comparative assessment of three national policy approaches*. Forest Carbon Partnership/UN-REDD Programme

Dahal, N; Banskota, K (2009) 'Cultivating REDD in Nepal's Community Forestry: Discourse for Capitalizing Potential?' *Journal of Forest and Livelihood*, 8(1),41-50

DANAR-Nepal (2012) *Report on Assessing Dalits' involvement in REDD+ initiatives in Nepal: A case study from NORAD REDD Project (Gorkha, Chitwan and Dolakha)*. Dalit Alliance for Natural Resources (DANAR), Nepal

den Besten, JW; Arts, B; Verkooijen, P (2014) 'The evolution of REDD+: An analysis of discursive-institutional dynamics'. *Environmental Science & Policy* 35, 40-48.

Dev, OP; Yadav, NP; Springate-Baginski, O; Soussan, J (2003) 'Impacts of Community Forestry on Livelihoods in the Middle Hills of Nepal'. *Journal of Forest and Livelihood* 3(1), 64-77

DOF/GON (2012) Annual Program of the Community Forestry Development Program. http://dof.gov.np/image/data/Yearly_Programme/Community_2068_69.pdf. (accessed October 21, 2014)

Edmonds, EV (2002) 'Government-initiated community resource management and local resource extraction from Nepal's forests' *Journal of Development Economics* 68, 89-115

FAO (2011) *State of the World's Forests 2011*. Food and Agriculture Organization of the United Nations Rome

FAO/UNDP/UNEP (2008) *UN Collaborative Programme on Reducing Emissions from Deforestation and Forest Degradation in Developing Countries* (UN-REDD) FAO, UNDP, UNEP Framework Document 20 June, 2008

FRA/DFRS (2014) *Terai Forests of Nepal (2010 – 2012)*. Forest Resource Assessment Nepal Project/Department of Forest Research and Survey Babarmahal, Kathmandu

FTEM; BNEF (2013) *Maneuvering the Mosaic: State of the Voluntary Carbon Markets 2013*. Forest Trend's Ecosystem Marketplace and Bloomberg New Energy Finance

Hayes, T; Persha, L (2010) 'Nesting local forestry initiatives: Revisiting community forest management in a REDD+ world'. *Forest Policy and Economics* 12(8), 545-553. http://www.forest-trends.org/documents/files/doc_3898.pdf. Assessed 8/28/2014

ICIMOD/ANSAB/FECOFUN (2012) *A Monitoring Report on Forest Carbon Stocks Changes in REDD+ Project Sites (Ludikhola, Kayarkhola and Charnawati)*

ICIMOD/MOEST/GON (2007) *Nepal Biodiversity Resource Book: Protected Areas, Ramsar Sites, and World Heritage Sites*, International Centre for Integrated Mountain Development /Ministry of Environment, Science and Technology / Government of Nepal (GoN)

Jagger, P; Lawlor, K; Brockhaus, M; Gebara MF; Sonwa, DJ; Resosudarmo, IAP (2012) 'REDD+ safeguards in national policy discourse and pilot projects' in *Analysing REDD+ Challenges and choices*. Angelsen, A; Brockhaus, M; Sunderlin, WD; Verchot, LV (eds) CIFOR, Bogor, Indonesia

Kanel, KR (2008) 'So far so good: Next steps in community forestry' in Ghate, R; Jodha, N; Mukhopadhyay, P (2008). *Promise, Trust and Evolution: Managing the Commons of South Asia*. Oxford University Press

Kanel, KR; Kandel, BR (2004) 'Community Forests in Nepal: Achievements and Challenges'. *Journal of forestry and Livelihood* 4(1), 55-63

Lederer, M (2012) *REDD+ governance*. WIREs Climate Change 3(2), 107-113

Lin, W; Pattanayak, SK; Sills, EO; Sunderlin, WD (2012) 'Site selection for forest carbon projects' in Angelsen, A;Brockhaus, M; Sunderlin, WD; Verchot, LV (eds). *Analysing REDD+: Challenges and choices*. CIFOR, Bogor, Indonesia

Luttrell, C; Loft, L; Gebara, MF; Kweka, D; Brockhaus, M; Angelsen, A; Sunderlin, WD (2013) 'Who should benefit from REDD+? Rationales and realities'. *Ecology and Society* 18(4), 52.

Maraseni, TN; Neupane, PR; Lopez-Casero, F; Cadman, T (2014) 'An assessment of the impacts of the REDD+ pilot project on community forests user groups (CFUGs) and their community forests in Nepal'. *Journal of environmental management* 136, 37-46

MFSC/GON (2009) *Community Forestry Programme Guideline*. Community Forestry Division, Ministry of Forest and Soil Conservation/Government of Nepal

MFSC/GON (2013a) *Mid Term Report on World Bank FCPF Grant on REDD Readiness*. Government of Nepal, Ministry of Forests and Soil Conservation REDD+ Forestry and Climate Change Cell, Babarmahal, Kathmandu

MFSC/GON (2013b) Drivers of Deforestation and Degradation in the High Mountain Regions of Nepal: Policy Brief, REDD-Forestry and Climate Change Cell, Ministry of Forest and Soil Conservation (MFSC)

MFSC/GON (2014a) *Nepal Fifth National Report to Convention on Biological Diversity*. Government of Nepal, Ministry of Forests and Soil Conservation

MFSC/GON (2014b) O*fficial website of the Department of National Parks and Wildlife Conservation of the Ministry of Forests and Soil Conservations* http://www.dnpwc.gov.np/ (assessed on November 18, 2014)

MFSC/GON (2014c) *Development of a Measurement, Reporting and Verification (MRV) System for Emissions and Removals Contract No.: FCPF/REDD/S/QCBS-7*. Ministry of Forest and Soil Conservation/Government of Nepal

MFSC/GON (2014d) *Forest Policy (2014-2033: Draft circulated for comments*) Ministry of Forest and Soil Conservation/ Government of Nepal MFSC/GON

MFSC/GON (2014e) Forest Department: an Introduction (in Nepalese). Ministry of Forest and Soil Conservation/ Government of Nepal

MFSC/HMGN (2000) *Forestry Sector Policy 2000*. Ministry of Forest and Soil Conservation/His Majesty's Government of Nepal

MOF/GON (2010) *Economic Survey: Fiscal year 2009/10*. Ministry of Finance/ Government of Nepal

MOF/GON (2014) *Economic Survey: Fiscal year 2013/14.* Ministry of Finance/ Government of Nepal

Murdiyarso, D; Brockhaus, M; Sunderlin, WD; Verchot, L. (2012) Some lessons learned from the first generation of REDD+ activities. *Current Opinion in Environmental Sustainability*, 4(6), 678-685

Nagendra, H (2007) *Drivers of reforestation in human-dominated forests*. PNAS.104 (39): 15218–15223

Nagendra, H; Karmacharya, M; Karna, B (2005) 'Evaluating forest management in Nepal: views across space and time', *Ecology and Society* 10(1): 24

Nagendra, H; Pareeth, S; Sharma, B; Schweik, CM; Adhikari, KR (2008). 'Forest fragmentation and regrowth in an institutional mosaic of community, government and private ownership in Nepal'. *Landscape Ecology*, 23(1), 41-54.

Pandey, S. S., Cockfield, G., & Maraseni, T. N. (2014) 'Dynamics of carbon and biodiversity under REDD+ regime: A case from Nepal'. *Environmental Science & Policy*, 38, 272-281

Paudel, G; Karki, R (2013). 'REDD+ Governance, Benefit Sharing and the Community: Understanding REDD+ from Stakeholders' Perspective in Nepal'. *Journal of Forest and Livelihood*, 11(2), 55-64

Phelps J; Webb, EL; Agrawal, A (2010) 'Does REDD+ Threaten to Recentralize Forest Governance'. *Science* 328:312-13

Pistorius, T (2012) 'From RED to REDD+: the evolution of a forest-based mitigation approach for developing countries'. *Current Opinion in Environmental Sustainability*, 4(6), 638-645

Pokharel, RK (2008). Nepal's Community Forestry Funds: Do They Benefit the Poor? SANDEE Working Paper No. 31-08, South Asian Network for Development and Environmental Economics

Pokharel, RK (2012) 'Factors influencing the management regime of Nepal's community forestry'. *Forest Policy and Economics* 17 (2012) 13–17

Sharma, BP; Nepal, M; Karky, BS; Pattanayak, SK; Shyamsundar, P (2015) *Baseline Considerations in Designing REDD+ Pilot Projects: Evidences from Nepal*. SANDEE Working Paper

Shrestha, S; Karky, BS; Karki, S (2014) 'Case Study Report: REDD+ Pilot Project in Community Forests in Three Watersheds of Nepal'. *Forests*, 5: 2425-2439

Shyamsundar, P.; Ghate, R. (2014) Rights, rewards, and resources: lessons from community forestry in South Asia. *Review of Environmental Economics and Policy*, ret022

Simonet, G; Karsenty, A; de Perthuis C; Newton, P; Schaap, B (2014) REDD+ projects in 2014: an overview based on a new database and typology, Climate Economics Chair

Skutsch, M; Vickers, B; Georgiadou, Y; McCall, M (2011) 'Alternative models for carbon payments to communities under REDD+: A comparison using the Polis model of actor inducements'. *Environmental Science & Policy*,14(2), 140-151

Somanathan, E; Prabhakar, R; Mehta, BS (2009) 'Decentralization for cost-effective conservation', *PNAS*. 106 (11), 4143–4147

Springate-Baginski, O; Wollenberg, E (eds.) (2010) REDD, forest governance and rural livelihoods: the emerging agenda. CIFOR, Bogor, Indonesia.

Springate-Baginski, O; Yadav, N; Dev, OP; Soussan, J (2003) 'Institutional Development of Forest User Groups in Nepal: Processes and Indicators'. *Journal of Forest and Livelihood* 3(1)

Sunderlin, WD; Ekaputri, AD; Sills, EO; Duchelle, AE; Kweka, D; Diprose, R; Doggart, N; Ball, S; Lima, R; Enright, A; Torres J; Hartanto H; Toniolo, A (2014) *The challenge of establishing REDD+ on the ground: Insights from23 subnational initiatives in six countries*. Occasional Paper 104. Bogor, Indonesia CIFOR

Sunderlin, WD; Larson, AM; Duchelle, A; Sills, EO; Luttrell, C; Jagger, P; Pattanayak, S; Cronkleton, P; Ekaputri, AD (2010) *Technical guidelines for research on REDD+ project sites*. CIFOR, Bogor, Indonesia

Tachibana, T; Adhikari, S (2009) 'Does Community-Based Management Improve Natural Resource Condition? Evidence from the Forests in Nepal'. *Land Economics*, 85 (1): 107–131

UNFCCC (2011) Report of the Conference of the Parties on its sixteenth session, held in Cancun from 29 November to 10 December 2010. In FCCC/CP/2010/Add1

Visseren-Hamakers, IJ; Gupta, A; Herolds, M; Pen˜a-Claros, M; Vijge, MJ (2012) *Will REDD+ work? The need for interdisciplinary research to address key challenges*. Current Opinion in Environmental Sustainability 4:590–596

Wertz-Kanounnikoff, S; Angelsen, A (2009) Global and national REDD+ architecture Linking institutions and actions in Angelsen, A with Brockhaus, M; Kanninen, M; Sills, E; Sunderlin, WD; Wertz-Kanounnikoff, S (eds) *Realising REDD+: National strategy and policy options*. CIFOR, Bogor, Indonesia

Wertz-Kanounnikoff, S; Kongphan-apirak, M (2009) *Emerging REDD+: A preliminary survey of demonstration and readiness activities*. CIFOR Working Paper 46 CIFOR, Bogor Indonesia

World Bank (2009) Roots for Good Forest Outcomes: An Analytical Framework for Governance Reforms Report No. 49572-GLB

World Bank (2010) *World Development Report*. The World Bank. New York

World Bank (2013) *World Development Indicators*. The World Bank. New York

Tables

Table 1: **Forest distribution in Nepal**

Area category	Area (hectares)	Percent of country area	Percent of forest area
Nepal	14718100	100.00	-
Forest	4268800	29.00	-
Shrubs	1559200	10.59	-
Forest total	5828000	39.60	100.00
PA and Conservation area (MFSC, 2014b)	3418600	23.23	58.66
Community forestry(MOF, 2014)	1717763	11.67	29.47
Leasehold forestry (MOF, 2014)	27407	0.19	0.47
Collaborative forestry (MOF, 2014)	55812	0.38	0.96
Religious forests (approx.; MFSC, 2014e)	2,056	0.014	0.04
Private forest (MFSC, 2014e)	2,360	0.016	0.04
Government managed forest (approximate)	-		10.36

Note: PA stands for protected area; Government managed forest area is calculated as residual forest area based on definition of National Forests in Nepal's in Forest Sector Policy 2000 (MFSC, 2000).

Table 2: **Analytical framework at the national level**

Forest Management	Criteria for meeting REDD+ goals	Indicators
Government managed forests and Community managed forests	Carbon Effectiveness (positive net carbon sequestration and additionality)	Improved forest management
		Forest fire control
		More efficient fuel use (cook stoves, biogas and LPG)
		Livestock management (herd size and stall feeding)
		Private forestry for household firewood and forage needs
	Cost Efficiency (low cost of carbon sequestration compared to alternative emission reduction options)	Cost of guarding, thinning and clearing the forest floor and forest fire prevention and control;
		Salaries, infrastructure, transportation costs for forest management;
		Opportunity costs associated with forest conversion to plantations, silviculture, agriculture etc. and forest product extraction compared to the business-as-usual scenario
	Equity and co-benefits (benefits distributed proportionately to costs borne)	Geographical coverage
		Proportion of disadvantaged people covered
		Downward accountability to community members
		Potential of producing ecological and livelihood co-benefits

Table 3: **Analysis of REDD+ at the sub-national level**

Criteria for meeting REDD+ goals	Indicators
Institutional Effectiveness	Number of regular 'management' meetings per year
	Regularity of general assembly meetings
	Forest fires avoided
	Border conflicts resolved
	Updating of ethnicity and wealth profiles
Cost Efficiency	Transaction costs for REDD+ related meetings, awareness campaigns, delegations to the District Forest Office etc.
	Implementation cost of REDD+ activities in the community
Equity and other co-benefits	Relative representation of Dalit and indigenous groups in Executive committees
	Representation of females in executive committees
	Number of CFs with pro-poor livelihood programs
	CFs with objective priority criteria in favour of poor in benefit sharing
	Actual allocation of REDD+ seed grant benefits to marginalized households
Co-benefits	Perceived co-benefits such as institutional development, forest quality improvement, livelihood improvement of the poor and the marginal, livelihood of general households, community development activities

Table 4: **Characteristics of treatment and control CFUGs (2011)**

CFUG characteristics	REDD		Non-REDD	
	Mean	Std. Error	Mean	Std. Error
Years of CFUG handover	11.11	2.03	8.22	1.69
Households per hectare CF	1.95	0.41	2.26	0.48
CF Income per hectare ('000)	4.26	1.91	2.98	0.99
Percentage of indigenous and Dalit population.	82.33	3.50	63.67	11.90
Average time taken to reach public facility	98.33	17.39	97.92	17.33

Note: t-tests of variables suggested no statistical difference between REDD+ and non-REDD.
Source: Field data based on FGDs, 2012

Table 5: **Carbon increment and REDD+ rent (2011)**

Districts	Tons per hectare	USD per ton*		
	Average carbon increment (2010-11)	Revenue (seed grant receipt)	Costs (transaction and Implementation costs)	REDD+ Rent (Revenue-Cost)
Chitwan	1.25	6.28	3.83	2.45
Dolkha	2.39	2.84	1.51	1.33
Gorkha	5.30	2.37	2.36	0.00
All district (average)	2.98	3.83	2.57	1.26

*The amount is calculated as the total payments received by the sample CFUGs divided by the increment in carbon in the associated CFs during 2010-11.
Source: ICIMOD/ANSAB/FECOFUN, 2012 and field data

Table 6: **Indicators of management effectiveness (2012)**

Criteria	Indicators	REDD+ CFUG	Non-REDD+ CFUG	Difference t-statistics	Inference
Effectiveness	EC meetings per year	15	9	2.587**	Better
	General assembly meetings (percent)	100.0	77.8	1.51	No difference
	Updated ethnicity and wealth profiles (percent)	100.0	33.3	4.00***	Better
	Forest fire surveillance system during risk months (percent)	100.0	55.6	2.52**	Better
	CFUG border conflicts resolution attained (percent)	22.2	0.0	1.51	No difference

Source: Field observations and FGD data, 2012

Table 7: **Impact of REDD+ on participation in decision making (2012)**

Criteria	Indicators*	REDD+ CF	Non-REDD+ CF	Inference**
Equity and Co-benefit	Female members in EC (2011-2012) (percent)	38→45	46→42	Better
	Indigenous members in EC (2011-2012) (percent)	67 → 65 (73)	49→43 (53)	Relatively better
	Dalits in EC (2011-2012) (percent)	9.7→9.6 (9)	12.6→12.0 (10)	Similar
	Tole level interactions on CF benefit sharing (percent of sample CFUGs)	0→33	0.0→0.0	Better

*Population percentage share in brackets** Inference based on changes in arithmetic mean figures. Source: Field observations and FGD data 2012

Table 8: **Beneficiaries of project in REDD+ CFUGs (2011)**

Main programmes	Percentage share of beneficiaries							
	Income terciles			Ethnicity			Gender	
	Low	Med-ium	High	Dalit (9%)*	Ind. Group (73%)*	Brah./ Chhe. (18%)*	Wom-en	Men
Capacity development training and workshops	40	31	29	22	60	18	68	32
Poverty reduction and livelihood improvement	48	40	13	32	53	15	-	-
Carbon measurement and monitoring	12	35	53	6	54	41	52	48
Alternative fuel	27	44	29	23	58	19	-	-

* Actual percentage of population in community. Source: Field observations and FGD data (2012).

Figure 1: **REDD+ Pilot Sites in Nepal**

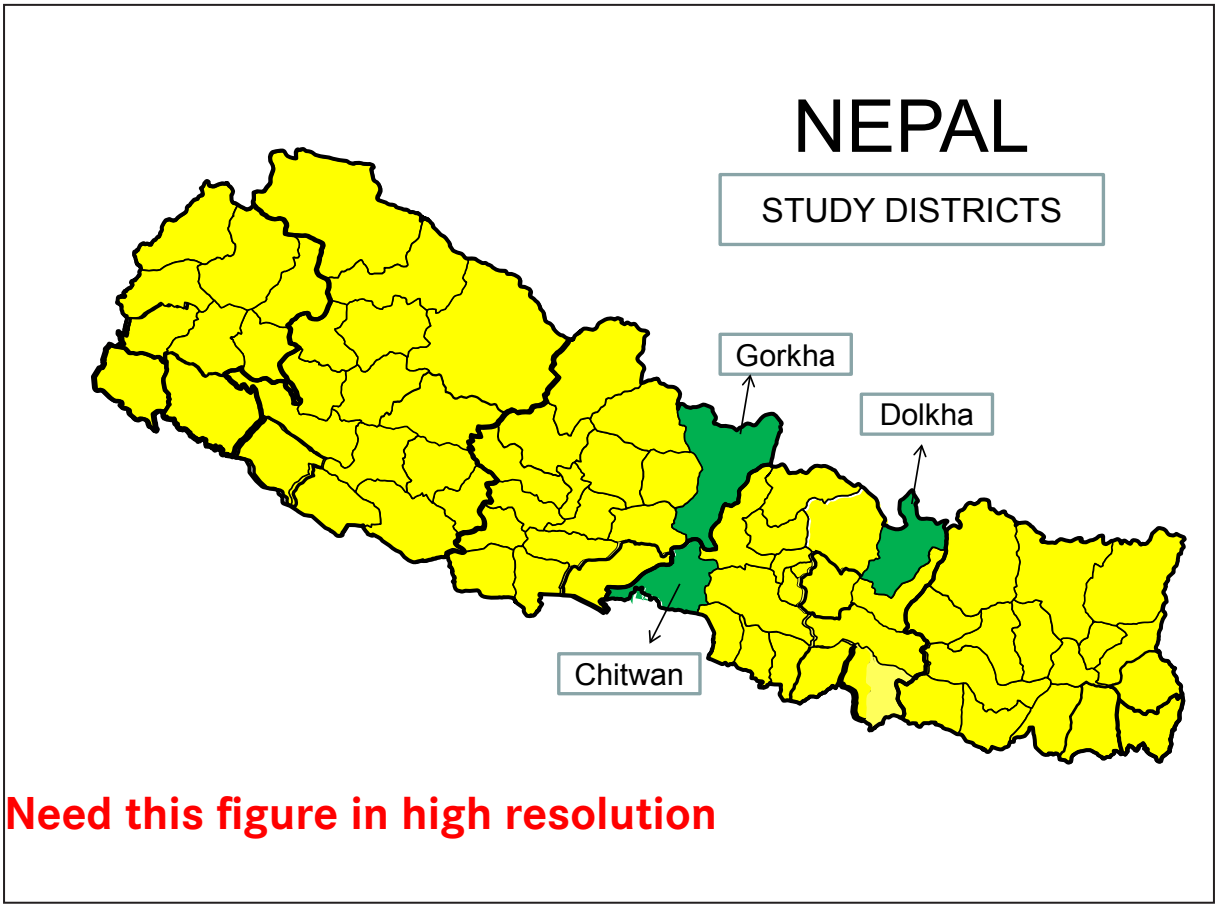
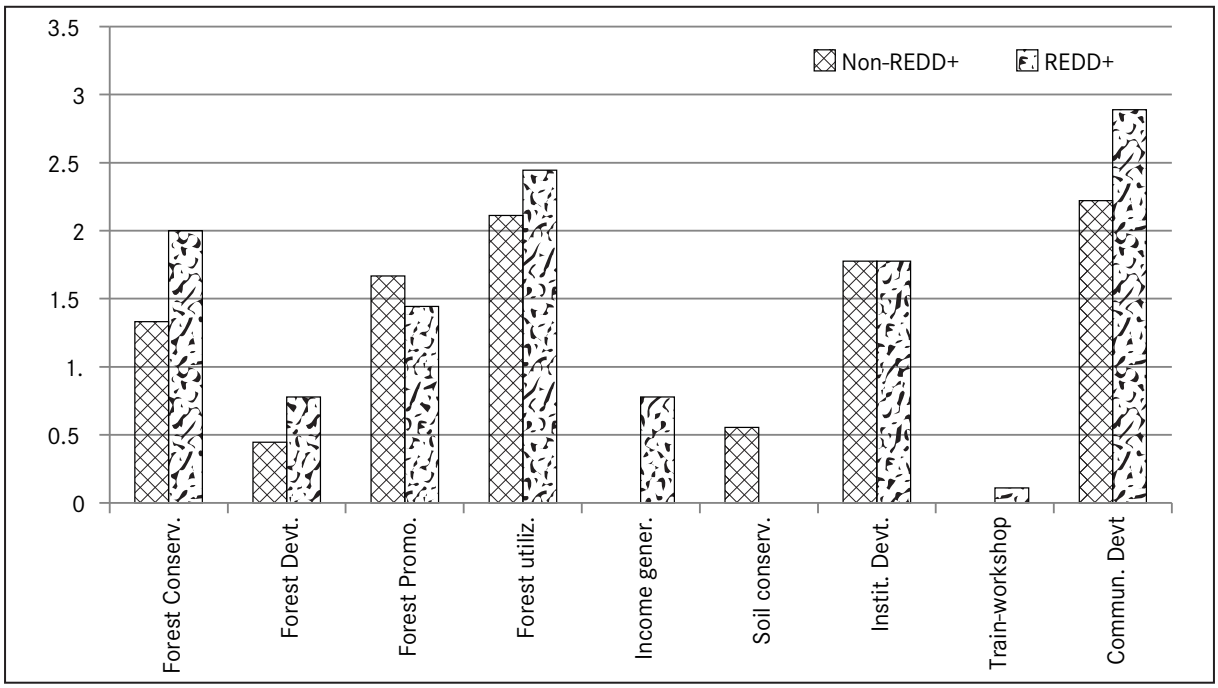
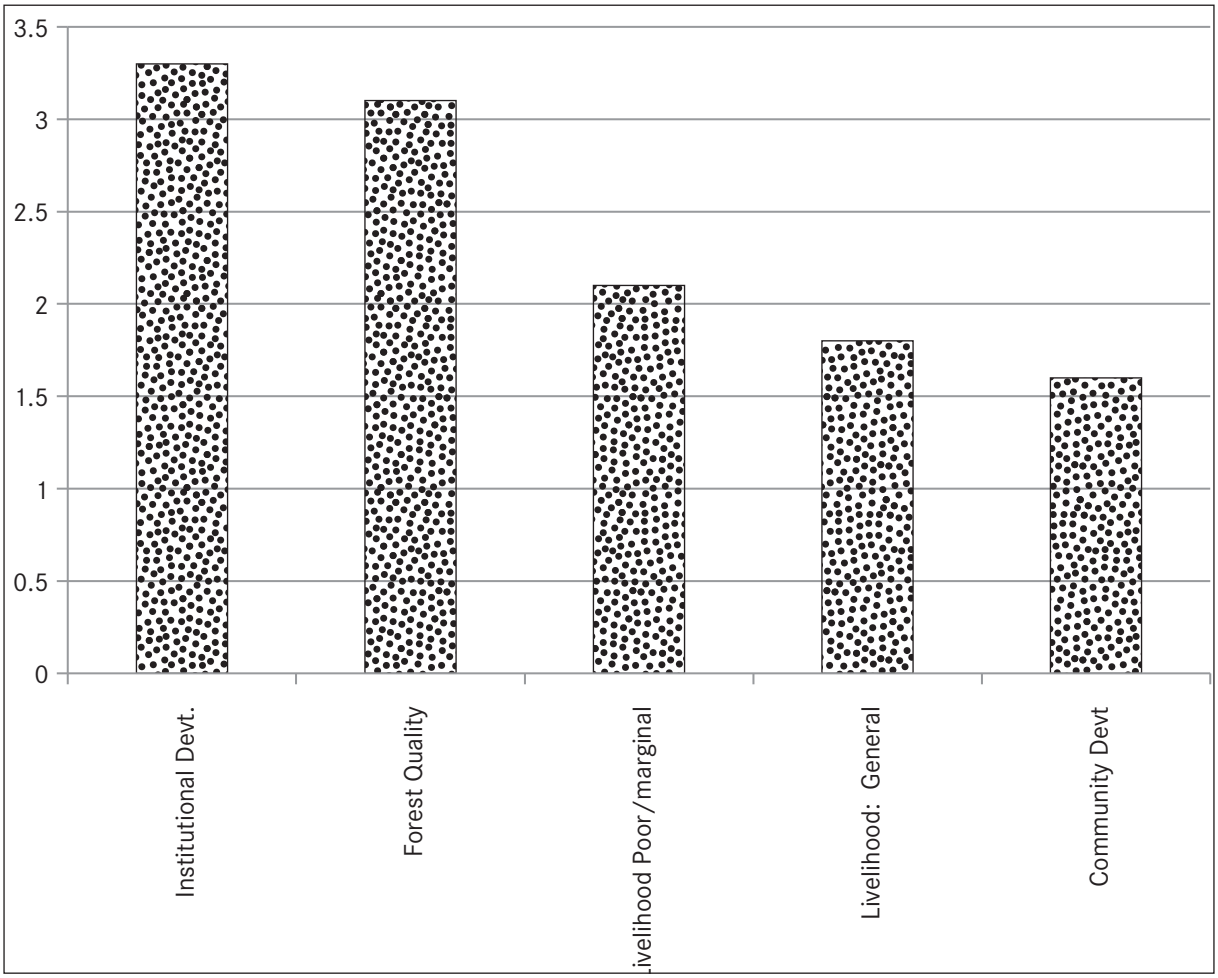


Figure 2: **Differences in programmatic activities between REDD+ and non-REDD CFUGs**



Source: Field Observations, 2012 Survey

Figure 3: **Perceived influence of the REDD+ pilot programs on different co-benefits**



Source: Field data from FGDs, 2012

Annex 1 – **Designing and implementing REDD+ - Some background on International developments**

REDD+'s history can be traced to various voluntary efforts to sequester carbon in standing forests through payment mechanisms. However, it's formal geneses happened at the thirteenth session of its Conference of the Parties (COP-13, December 2007), when the United Nations Framework Convention on Climate Change (UNFCCC) formally mandated that parties develop a forest-based incentive mechanism to reduce climate change (FAO/UNDP/UNEP, 2008). In Copenhagen (2009), REDD+ was launched by adding biodiversity conservation, sustainable forest management and enhancement of carbon stocks to the previous concept of REDD (Visseren-Hamakers et al. 2012; Wertz-Kanounnikoff and Angelsen, 2009).[1] The UNFCCC protocol allows carbon trade to move beyond independent efforts, gives nations the responsibility to regulate carbon trade and supports national capacity development for implementing REDD+.[2]

REDD+'s emerging international architecture consists of the UNFCCC at the apex, with the Forest Carbon Partnership Facility of the World Bank, the REDD Partnership and UN-REDD (UN Collaborative Programme on REDD in developing countries) financing and aiding strategy and implementation. National governments formulating REDD+ policies constitute a layer beneath, while projects testing various sub-national approaches constitute the bottom layer (Pistorius et al., 2011; Visseren-Hamakers et al., 2012). The private sector is also involved in trading carbon.[3]

Even as the international architecture for REDD+ takes shape, some 200 REDD+ global projects offer lessons on how REDD+ may work (Lin et al. 2012).[4] They suggests that considerations such as costs, location, potential environmental and social co-benefits and ease in monitoring and enforcement drive REDD+ related investments (Lin et al., 2012).[5] Institutions that take on REDD+ are motivated by goals such as avoided deforestation and degradation, afforestation and local co-benefits. This broader approach minimizes risks emerging from the incomplete international carbon payment architecture and the wide range of deforestation pressures (UNFCCC, 2011; Jagger et al., 2012; Sunderlin et al., 2014).

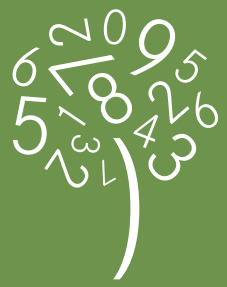
[1] Prior to this, the UN Collaborative Programme on Reducing Emissions from Deforestation and forest Degradation in developing countries (UN-REDD) helped countries access to financial and technical assistance (FAO/UNDP/UNEP, 2008).

[2] The UNFCC protocol encourages countries to develop national policies for REDD+, identify action plans and build capacity, prioritizing technology development and transfer and demonstration activities (UNFCCC, 2011).

[3] In 2011-12, voluntary carbon markets saw a four percent increment in the volume of carbon transacted even though carbon prices fell by 11 percent (FTEM and BNEF, 2013).

[4] There are some 325 projects globally that cover REDD+, integrated forest management (IFM) and afforestation, reforestation and re-vegetation (ARR) projects (Simonet et al. 2014).

[5] A large number of REDD+ projects are in Brazil and Indonesia (Cerbu et. al., 2011: cited in Lin et al., 2012).



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