What is REDD+ Additionality in Community Managed Forest for Nepal?

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Abstract: Reducing Emissions from Deforestation and Forest Degradation (REDD+) is a policy currently under consideration by the United Nations Framework Convention on Climate Change (UNFCCC). This study carries out a Nepal-specific research to understand REDD+ policy's potential role in carbon sequestration, by identifying the economic and preferential rationales that drive deforestation and degradation in community managed forests. The study explores four different land use options, making use of both community based survey and field data used to generate net present value (NPV). Both techniques give consistent results that, in the current economic situation, farmers prefer using land for livelihood purposes rather than solely for community forest management. This has a very strong implication for policymakers. First, the results imply that conversion and degradation are inevitable, thus placing community forest in imminent threat and making this risk reduction additionality in REDD+ terms. Furthermore, it shows that, to combat the drivers of deforestation and forest degradation, policies such as REDD+ need to provide enough financial incentives that will incur the opportunity costs and direct farmers towards the efficient use of community managed forest.

Keywords: REDD+, additionality, land use options, opportunity cost, community forest

INTRODUCTION

Reducing Emissions from Deforestation and Forest Degradation (REDD+), recognized as the most effective and efficient way to combat climate change, is a policy currently under consideration by the United Nations Framework Convention on Climate Change (UNFCCC). Approval of this policy will ensure carbon credit eligibility for carbon abatement through reduction in deforestation and forest degradation. The Hindu-Kush Himalayan region is witnessing regeneration of forest in vastly deforested land, making collaborative forest management a valuable carbon pool (Banskota *et al.* 2007). Thus, implementation of REDD+ policies in this region will provide the communities involved in forest management with strong incentives to participate in the global carbon market. Participation, however, will depend highly on the costs and benefits to the communities. To understand such economic rationales and preferences, pilot projects are underway in three different watersheds in Nepal, one of which is the basis of the study presented in this paper.

LITERATURE REVIEW

The economic rationale and preferences behind an individual's land use options introduce a basic economic concept of opportunity cost. The concept of opportunity cost looks at the cost of foregone benefits (White and Minang 2010). In this context, it is the benefits from deforestation and forest degradation that are being lost by implementing forest conservation practices such as those undertaken by the community managed forests of Nepal. For a REDD+ project, the opportunity cost is 'the single most important category of costs a country would incur', making it highly valuable in determining the carbon payment compensation (White and Minang 2010). In order to provide enough incentives to farmers, the compensation has to incur the opportunity cost.

To understand the economic rationale and farmers' preferences, it is important to recognize the different land use options. Forest land usage can be divided into two categories: those that offer either a market value or a non-market value (Barbier *et al.* 1991). Market value is generated from timber, non-timber forest products such as fruits and nuts, land for agricultural purposes or cattle grazing and infrastructural use such as hydro dam, road or building construction. On the other hand, non-market value is achieved through watershed protection, microclimatic regulation and indirectly through recreation and tourism (Barbier *et al.* 1991). Evidently, market value can only be achieved through deforestation, while non-market value requires the forest to be in its conserved state. Thus, in terms of opportunity cost, forest conservation would imply giving up the current income that could be generated from the deforested state for long-term benefits that are not guaranteed.

Among the mentioned market values, deforestation for agricultural purposes is the most common problem in developing countries, expansion of the agricultural frontier being one of them. As Schneider (1994) argues, 'the returns to sustainable farming on existing frontier land ... rarely compare favorable with the returns from unsustainable farming' (as cited in Barbier 1997). Low income rural households are primarily found where land productivity is poor. Thus, these households find it more profitable to gain short-term rent by fully exploiting the land they are already in and to abandon it once yields decline. If a farmer were to invest money in making their existing land more sustainable in the long term, then they would have to incur the cost of land improvement and immediate income. Where land is abundant and expansion is relatively cheap, this is not seen as the most efficient strategy (Barbier 1997).

Most of the options that are available make deforestation highly favourable to low income households. Due to this, the provision of strong incentives is required to encourage them to take on forest conservation practices. These incentives can be given a value by calculating its opportunity cost. Several prior case studies have been carried out that specifically look at the opportunity cost of forest preservation. Once such study took place in the Brazilian Amazon, the largest rainforest in the world, covering 3.3 million km^2 of land and preserving 47 billion tons of carbon (excluding soil carbon) (Nepstad 2007). Using spatially explicit models, the study calculates an opportunity cost of US$5.5/$tCO_2$, which has a total value of US$257 billion for the entire area. Another case study was carried out in Cameroon, which is one of the six countries that form the Congo basin, the second largest rainforest after the Brazilian Amazon (Bellassen and Gitz 2008). Exploring the idea of *Compensated Reduction* (creating financial incentives through the allocation of monetary value to the stored carbon), the study calculates the opportunity cost specifically in terms of shifting cultivation. The study computes the breakeven price of carbon, which is the point where compensated reduction and shifting cultivation yield equivalent revenue. The analysis shows that avoided deforestation has an opportunity cost of US$2.85/t CO_2, a value much lower than that of the Brazilian Amazon. This implies that a compensation of US$2.85 for every ton of CO_2 stored will be enough to make up for the loss they would face from ceasing shifting cultivation. Comparing these opportunity costs with the European price for carbon of US$20/tCO2e (in 2008), it is observed that forest preservation practices are highly profitable.

Looking specifically at Nepal, a research undertaken in three different areas indicates how the cost of REDD+ implementation varies mainly due to the differences in the opportunity cost in different locations. The study shows that the cost for REDD+ implementation by individual community forest user group (CFUG) can vary from US$0.55 to US$3.7 per tCO_2 (Karky and Skutsch 2010).

The cost for avoiding deforestation and forest degradation in developing countries is near the opportunity cost of the business as usual activity. Estimating the opportunity cost is strategic for REDD+ to work, as it will influence the role of forests in developing countries and will serve as a basis for setting the level of financial incentive (Pirard 2008). This clearly indicates that the opportunity cost for forest conservation differs significantly. Thus, the REDD+ policy needs to take this into consideration to ensure meaningful conservation and sustainable management of forest.

STUDY AREA BACKGROUND

This study is conducted in one of the watershed sites of the REDD+ project in Nepal. The study area is confined to Pragati Community Forest (CF), Shaktikhor Village Development Committee (VDC)-6, Chitwan that lies within the Kayarkhola Watershed (Centre coordinates: 27.71700°N, 84.623074°E).

Kayarkhola watershed is located in Chitwan district, which is a part of the Central Development Region of Nepal. Its total area is 8,002 hectares (ha) and it consists of tropical to sub-tropical forests, covering an altitudinal range of 245m–1,944m. It covers five Village Development Committees (VDCs) in Chitwan district, out of which, only three fall under CF. These three VDCs further consist of 15 CFUGs, covering 2,381.96 ha of CF area: Shiddi (5 CFUGs), Shaktikhor (9 CFUGs) and Chainpur (1 CFUG). Land use of Kayarkhola watershed is categorized as shown in Table 1.

Table 1: Land cover types within the Kayarkhola watershed

Land Use/Land Cover	Area (ha)	Land Cover %
Close broadleaved forest	4,119	51.48
Open broadleaved forest	1,702	21.27
Agriculture areas/Built-up Areas	2,038	25.47
Bare soil	30	0.38
Natural water bodies	31	0.39
Clouds	81	1.02
Total watershed area	8,002	100
Total forest within watershed	5,821	72.74
Total other Forest (National, Religious, Leasehold Forest) within watershed	3,439.04	42.98
Total Community Forest Area within Watershed	2,381.96	29.77

Source: MENRIS 2010

In the watershed, CFUGs were first formed in the year 1999 (2056 B.S.); formally, the Pragati CF was registered at District Forest Office. A total of 124 ha of CF are being managed by 153 households. The CF managers are from Shaktikhor VDC, ward no. 6; especially from Naya Tandi, Koshrangdi Tandi and Hishe Tandi. The dominant forest type in the area is Sal (*Shorea robusta*), with presence of other species like Saaz (*Terminalia* alata), Karma (*Adina cordifolia*), Bhalayo (*Semecarpus anacardium*), Amala (*Emblica officinalis*), Harro (*Terminalia chebula*), Barro (*Terminalia bellirica*), Chiuri (*Aesandra butyracea*) and fauna like deer, rabbit, wild boar; reptilian species like snakes, lizard, gohoro, etc. The field survey indicates that the demand for fuel-wood and fodder is sufficient for the CFUGs, whereas the demand for timber is somewhat insufficient. Recognizing these features, the Pragati Community Forest Operational Plan (2003) mentions that the CF needs to be managed further by timber wood and other species that grow fast in bare land despite the forest having a good regenerating capacity; focus is needed to ensure that the forest does not get mono-cultured tree species; the CF needs to aim at sustainable management of the forest, which will fulfill demand for forest product.

RESEARCH OBJECTIVE

The objective of the research is to identify and understand potential economic and preferential rationale that drives deforestation and forest degradation of community-managed forests. Economic rationale, in this case, refers to the economic benefits and costs involved in potential alternative land use options. Preferential rationale refers to the preferences of respective farmers in terms of different land use options.

There are two reasons for understanding the potential economic and preferential rationale that drive deforestation and forest degradation. The first is to be able to identify the level of payment required by REDD+ to promote performance-based forest management by linking economic incentive with conservation and sustainable management of forest in community-managed forest. Second, REDD+ requires the additionality of certified emission reduction (CER) than business as usual scenario. The advent of CF dates back to more than three decades, but it was not initiated in terms of REDD+. However, there is imminent threat of loss of forest biomass in the future from land use conversions. This study attempts to understand the drivers of change so that such threats can be reduced, which may be regarded as meeting the additional criteria of REDD+.

METHODOLOGY

In order to achieve the research objectives described above, several steps were taken. Two focus group discussions (FGDs) were conducted in Pragati CF, Shaktikhor VDC-6, Chitwan. Furthermore, Key informant Interviews (KII) was conducted with District Forest Officers (DFOs).

During the FGDs, the farmers identified different possible land use options and their preferences with respect to the listed options were recorded. Additionally, data on the costs and benefits of implementing these different land use options were calculated. Using the data gathered on the costs and benefits of CF (for 2007–10), projections of future costs and benefits were made (until 2030). These data were used to calculate net present values (NPVs) of different land use options. This approach is similar to that of Purushothaman (2005).

All data used in this paper except those in the 'study area background' and 'livelihood and land use linkages' area were collected by the authors through field research in 2010. The data on 'study area background' and 'livelihood and land use linkages' were taken from MENRIS (2010) and ICIMOD *et al.* (2010) respectively. Note that project database surveys a sample of 365 households.

Each of the possible land use options identified by the farmers is described below:

Option 1: There is no additional intervention or activity in the CF.

Option 2: A small part of the CF is converted into grazing land.

Option 3: A small part of the CF is used for agriculture.

Option 4: A small part of the CF is used to build a resort.

LIVELIHOOD AND LAND USE LINKAGES

In this section, a brief background of livelihood and land use linkages in Kayarkhola watershed, where the study area, Pragati CF lies, is provided. As can be seen in Table 2, Janajati[1] (indigenous people) households form the majority and approximately half the total population in Kayarkhola watershed. Brahmin/Chhetri[2] follows with 129 households (approximately 35 percent). *Dalit*[3] households are a minority, accounting for 56 households (approximately 15 percent).

Table 2: Caste/ethnicity distribution in Kayarkhola watershed

Caste/Ethnic Group	No. of households
Janajati	180
Brahmin/Chhetri	129
Dalits	56

Source: ICIMOD *et al.* 2013

From Table 3, we see how the livelihoods of different caste/ethnic groups depend on different sources of income, including land-based ones like farms and forests.

Table 3: Income source and distribution in Kayarkhola watershed

	Sources of Income								
	On-farm			Off-farm					
				Forest-Based			Others		
	B/C	J	D	B/C	J	D	B/C	J	D
>0 and < 20000	37	84	21	0	7	0	8	36	7
20,000-40,000	33	19	1	0	0	0	14	26	5
40,000-80,000	16	7	1	0	0	0	22	13	13
80,000 +	7	1	0	0	0	0	62	51	24
Total	93	111	23	0	7	0	106	126	49

Source: ICIMOD *et al.* 2010
- B/C refers to Brahmin/Chhetri, J refers to Janajati, and D refers to Dalit.
- On-farm income includes income received from sale of cereal crops, vegetables, cash crops, and milk and meat products.
- Off-farm (forest-based) income includes income received from sale of timber and non-timber products and products based on other forest resources. Off-farm (non-forest-based) income includes income received from wage labour, job/services, pension, business and remittances

1 Janajati or indigenous people: people who have been residing in a place for a very long time; have cultural authenticity; hold spiritual ties with their land and possess very limited ability to participate in, and are most often marginalized by the development process.

2 Brahmin/Chhetri: In general terms Brahmin and Chhetri are the natives of the hills of the Nepal Himalayas and the dominant population with almost 30% of the total population. The mother tongue of this community is Nepali, which is spoken throughout the country.

3 Dalit: Literally meaning 'downtrodden', this is a category of caste system where they are considered 'untouchables' in society that puts them at the heart of an insidious form of discrimination and social unacceptability.

The data shows that a large number of households coming from different caste/ethnic groups depend on farm income. However, income from farm activities for most households is minimal, i.e. on-farm income for most households is less than NRs 4,000 per year. Moreover, an even larger number of households depend on off-farm (non-forest-based) income. Income from such activities for most households is greater than NRs 4,000 per year. It should be noted that farmers use forest resources mainly for subsistence and not income-generating purposes. Thus, as shown by the data, farmers barely depend on forest resources for income, even though the forests support rural livelihoods in a substantial way.

As we can see from Table 4, individual CFs are unable to meet the demand for forest products in the Kayarkhola watershed region. This is true across all products. The problem is especially severe in the cases of fuel wood, grass and fodder. Consequently, farmers are forced to rely on other sources, e.g. private forests and government forests, among others.

Table 4: Household demand and supply of forest products in Kayarkhola watershed

		Supply by sources						
Products	**Demand**	**CF**	**Other CFs**	**GF**	**PF**	**LF**	**Purchase**	**Total**
Timber (cubic feet)	268	208	0	0	60	0	60	328
Fuel wood (Bharis)	30,568	16,385	528	240	10,738	1,256	2,386	31,533
Grass (Bharis)	36,891	3,918	30	0	26,407	2,757	45	33,157
Fodder (Bharis)	46,498	18,196	600	0	23,317	4,171	50	46,334
Leaf Litters (Bharis)	11,688	5,269	121	0	5,391	1,111	30	11,922
Others (kg)	210	120	0	0	70	20	60	270

Source: ICIMOD *et al.* 2010

- One *Bhari* equals 30kg
- CF, GF, PF and LF stand for community forest, government-managed forest, private forest, and leasehold forest respectively.

IDENTIFICATION OF POTENTIAL LAND USE OPTIONS

To examine the economic rationale for (or against) CF management and farmers' preferences on this matter, farmers were asked to identify four potential land use options, including that of a community-managed forest, and discuss their attributes, benefits and costs. In this section, each option for the use of 137 ha of land is described. In addition, the respective benefits and costs of each option to farmers are discussed.

Option one is 'community-managed forest', where communities manage the forest sustainably. This option benefits the farmers as it allows them to have access to fuelwood, fodder, timber and water supply. Meanwhile, the cost is the expenditure incurred in forest management: mobilizing members for sustainable management, implementing conservation measures and maintaining administrative procedures.

Option two is 'community-managed forest with 20 ha (approximately 14.59 percent) of forest land converted to grazing land', leaving 117 ha of community-managed forest. The additional benefit provided by this option to farmers is the increase in livestock products and increased income from tree-felling (for the first year). The additional cost to farmers is the cost of livestock rearing and reduction in forest resources such as fuelwood, timber and so forth. in the subsequent years.

Option three is 'community-managed forest with 10 ha (approximately 7.29 percent) of forest land converted for mixed agriculture', leaving 127 ha of community-managed forest. The additional benefit provided by this option to farmers is that they can now plant perennial and seasonal crops, which yield higher returns. The additional cost to farmers, apart from reduction of forest resources, is the expenditure involved in preparing land, cash crop plantation, weeding and growing, and mixed agricultural systems.

Option four is 'community-managed forest with 5 ha (approximately 3.64 percent) of forest land being used for resort construction', leaving 132 ha of community-managed forest. This resort would oversee the valley and would provide a trekking trail to *Gadi,* i.e. the top of the hill. The additional benefit of this option is the revenue generated by the resort for the community. The additional cost is the expenditure incurred in the construction, management and maintenance of the resort.

ECONOMIC RATIONALE OF LAND USE OPTIONS

After identifying the potential land use options of Pragati CF, a cost–benefit analysis was carried out for each, including that of a community-managed forest. For each option, data on costs incurred under that particular option were collected for the period between 2007 and 2010. Using this data, future costs for years between 2011 and 2030 were projected. Finally, using the collected and projected data, the NPV for each option for the period between 2007 and 2030 was calculated. The base year was taken to be 2011. The formula used to calculate the NPV is:

$$NPV = \sum PV = \sum_t R_t/(1+i)^t$$

Where *t* is the time of the cash flow, R_t is the gross margin at time and is the discount rate.

In Table 5, we see the calculated NPV for each of the options described in the previous section for Pragati CF. Clearly, the NPV of community-managed forest is significantly lower when compared to the NPVs of all other options. The NPV of a community-managed forest with grazing land is the highest, valued at NRs 85,260,484, while the NPV of community-managed forest with mixed agriculture is the second highest, valued at NRs 46,761,468. Community-managed forest has the lowest NPV value of 3,696,917, which shows that there exists an economic rationale for farmers to be lax in their stance to prevent deforestation and forest degradation under the current option.

Table 5: NPV and farmers' preference on land use options for Pragati CF

Land use options	Net Present Value (NRs)	Farmers' preference (%)
Community-managed forest	3,696,917	11.3
Community-managed forest with grazing land	85,260,484	30.2
Community-managed forest with mixed agriculture	46,761,468	26.4
Community-managed forest with built environment	24,254,984	32.1

Source: Calculations based on field survey, 2010

FARMERS' PREFERENCE ON LAND USE OPTIONS

During the FGDs, farmers were also given the opportunity to pick one or more land use options that they preferred most among the four. In Table 5, we can also see that farmers' preference for community-managed forests as a land use option, was significantly low compared to all other land use options. Farmers' preferences for all other land use options were relatively the same. Comparing this to the NPV, this indicates that farmers' preference on land use options are fairly consistent with the economic rationale of land use options discussed above.

DISCUSSION

As can be seen in Figure 1, the NPV of option 1, community-managed forest, is significantly lower compared to other options. Similarly, farmers' preference for community-managed forests as a land use option is significantly low compared to all other land use options. This indicates that there is both an economic incentive and desire of farmers to move away from community-managed forests. From a legal point of view, CF area cannot be converted to other land uses. However, the threat is the loss of biomass from community-managed forest area. Even though CF will always remain a forested area, there can be significant loss of woody biomass. Hence, unless community-managed forests are able to provide more benefits to farmers, the risks of their management in a sustainable manner and succumbing to deforestation and forest degradation are very high. Therefore, it can be said that CF is in imminent threat from loss of woody biomass as a result of different market forces. This calls for intervention to compensate or provide incentive for conservation and/or sustainable management of forest if this risk is to be reduced in the future. Reducing the risk of deforestation and forest degradation may be the additionality of REDD+ in such community-managed forest.

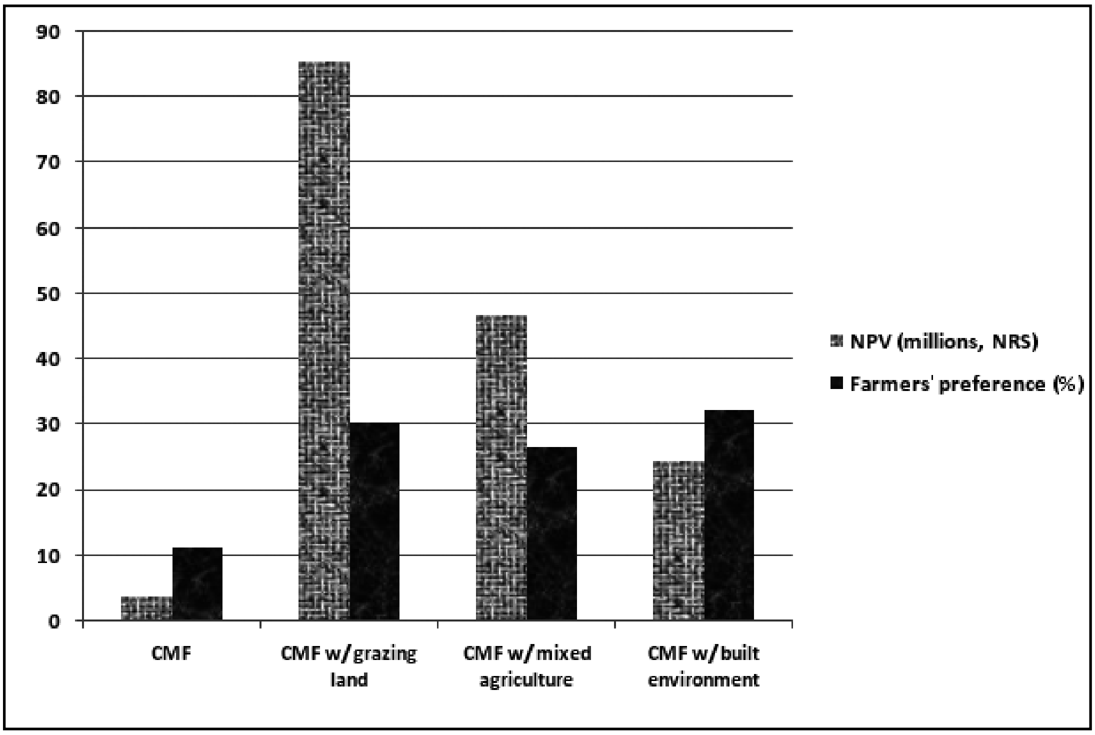

Figure 1: Economic rationale and farmers' preference

Source: Calculations based on field survey, 2010

CONCLUSION

The research indicates that there is both an economic incentive and desire for farmers to move away from community-managed forests under business as usual scenario. Hence, it is very important to come up with ways in which REDD+ financing instruments are able to provide more benefits to farmers so that community-managed forests are not converted to other land uses.

The research has two main implications. First, it can be said that there is ample ground for believing that REDD+ payment may be regarded as an important financial source that could add value to standing forests, consequently reducing biomass loss and land use conversion in community-managed forest. For this to happen, REDD+ payment needs to account for the opportunity cost. Second, addressing the drivers of deforestation and forest degradation by understanding the opportunity cost of different land use options will reduce imminent threat of loss of carbon pool from community-managed forest. Reducing this risk in the long run could be argued as the additionality factor for REDD+ in community-managed forests. This opportunity cost study needs to be further extended by computing the REDD+ cost at national level in order to develop a meaningful incentive for forest conservation and sustainable management.

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