Journal of Sustainable Forestry
Publication details, including instructions for authors and subscription information:
http://www.tandfonline.com/loi/wjsf20

Cost-Benefit Analysis of a Community Forest in Nepal

Anup K C[a], Indra Koirala[b] & Naveen Adhikari[b]
[a] Department of Environmental Science, Tribhuvan University, Amrit Campus, Kathmandu, Nepal
[b] Central Department of Economics, Tribhuvan University, Kathmandu, Nepal
Accepted author version posted online: 21 Jan 2015.

To cite this article: Anup K C, Indra Koirala & Naveen Adhikari (2015) Cost-Benefit Analysis of a Community Forest in Nepal, Journal of Sustainable Forestry, 34:3, 199-213, DOI: 10.1080/10549811.2014.1003074

To link to this article: http://dx.doi.org/10.1080/10549811.2014.1003074

Journal of Sustainable Forestry, 34:199–213, 2015

ISSN: 1054-9811 print/1540-756X online
DOI: 10.1080/10549811.2014.1003074

Taylor & Francis
Taylor & Francis Group

Cost-Benefit Analysis of a Community Forest in Nepal

ANUP K C[1], INDRA KOIRALA[2], and NAVEEN ADHIKARI[2]
[1]*Department of Environmental Science, Tribhuvan University, Amrit Campus, Kathmandu, Nepal*
[2]*Central Department of Economics, Tribhuvan University, Kathmandu, Nepal*

Community forestry is an approach for mitigating deforestation and forest degradation by managing the forest resources for benefitting neighboring communities. Monetary benefits and costs are associated in a community forest during conservation and management of a forest. For sustainable forest management, the benefit should be more than cost which is a contesting issue of research. So, this study was conducted in a community forest of the central part of Nepal with the help of 80 household surveys and a focus group discussion. The firsthand information collected at the site is complimented by forest product harvest and cost-related secondary information. It was observed that the total annual harvest of timber was 60 cubic feet, pole was 8 cubic feet, firewood was 1,110 Bhari,[1] fodder was 4,388 Bhari, and leaf litter was 590 Bhari. To manage a forest, people were involved in fencing, thinning, and meetings. Management cost was six times higher than administration cost. The benefit from firewood and fodder was more due to the dependency of people in a forest for enhancing their livelihood. The higher value of benefit cost ratio indicates that the Community Forest User Group benefited from community forest management.

KEYWORDS community forest, forest product usage, forest management, benefit cost analysis

Address correspondence to Anup K C, Department of Environmental Science, Tribhuvan University, Amrit Campus, P.O. Box 23883, Kathmandu 0977, Nepal. E-mail: kcanup04@gmail.com

Color versions of one or more of the figures in the article can be found online at www.tandfonline.com/wjsf.

INTRODUCTION

Forestry is the manipulation of forests for achieving a specific objective that introduces it into different types. But managing forests for the express intent of benefitting neighboring communities is community forestry (Brendler & Carey, 1998). In community forestry, forest user groups (FUG) control and manage the local forests, harvest and set price of forest products with the help of an executive committee elected in the FUG assembly (Gilmour & Fisher, 1998). These policies emerged as a response to institutional failure which led to progressive degradation of hill forests (Ojha, Persha, & Chhatre, 2009). Community forestry was legally implemented with the 1993 Forest Act and the 1995 Forest Rules based on the operational co-operation of Forest Department officers and forest user groups in Nepal (Pokharal, 2001). In 1975, the Department of Forest (DoF) National Conference concluded that there was a pressing need to involve local people in forest management (Hobley, 1996). After two amendments to the Forest Act in 1977 and 1978, the handover of forests to the community started on a gradual basis (Ojha, 2008).

Community-based forest management is an approach to mitigate deforestation and forest degradation by addressing their negative impacts on rural livelihoods through protective measures (Karky & Banskota, 2007). It became widespread as a collective forest in China, a community-based forest in Philippines, and a community forest in Nepal (Karky, 2005). Nepal is one of the pioneering countries with successful implementation of a community forest (Aryal, Bhattarai, & Devkota, 2013; K C., Joshi, & Aryal, 2014; Pandit, Albano, & Kumar, 2009; Paudyal, Neil, & Allison, 2006). From the 1970s, community forest management had been the good example of common property resource management (Agrawal & Angelsen, 2009; Rana, 2008). In this approach, local users develop operation plans, set harvesting rules and prices for forest resources (United Nations Conference on Sustainable Development [UNCSD], 2012). A total of 1,665,419 ha of forest is handed over to 17,810 community forest user groups (DoF, 2013).

To make any forest sustainable, harvesting methods should not reduce future harvests, regenerating populations of all native species should be maintained at the landscape level, and forestry practices should be economically sustainable for the human population (Nesheim & Halvorsen, 2011). There is a great challenge in modern forestry to manage a forest for multiple goals including biodiversity conservation (Trotter & Whitham, 2011). But, Nepal's community forest was already taken as a successful example of a green economy (Sukhdev, Stone, & Nuttall, 2010), as it encourages active participation of local people in managing forest products (Muthoo, 2002). It has the cobenefits of reducing poverty, addressing social exclusion, and creating rural employment (Moss, 2012; Kanel, Shah, Poudel, & Regmi, 2009; Patel et al., 2013) and carbon sequestration (Gautam & Watanabe, 2009).

Various studies have demonstrated that there is a significant increase in forest condition under a community forest showing that it is a proven model for controlling deforestation and forest degradation (Karky & Banskota, 2007).

The availability of forest products such as firewood, timber, fodder, agricultural implements, leaf litter, and grasses have a positive impact on the life support system in the hills of Nepal (Kanel & Niraula, 2004). The community forest in the Terai region of Nepal is also generating many times more revenues from forest products than the government managed forest (Pandey, 2009). This analysis clearly indicates that with little public investment, communities are several times more efficient in forest management (Pandey, 2009). Adhikari (2003) tried to examine the contribution of community forestry to household-level income with particular emphasis on group heterogeneity and equity in benefit distribution. The household-level benefits suggest that poorer households are currently benefiting less from community forestry. Econometric analysis suggests that income from community forests is related to socioeconomic attributes and private resource endowments of households. Households with land and livestock assets and upper caste gain more from the forest, while better educated households depend less on forest resources. Female-headed households benefit less from community forests, further aggravating the inequity in distribution of benefits (Adhikari, 2003).

Various monetary benefits and costs are associated with community forests (K C, 2012; K C et al., 2014; Katoomba Group, 2007). Monetary benefits come from membership and renewal, identity card, forest thinning, sale of forest products, punishment fees, and bank interest; while costs are incurred as salary of guards, office and forest management costs, construction of physical infrastructure for forest conservation and training and education (K C, 2012; Koirala, 2013). Nonmonetary benefits are also associated with forests which include ecological services as provisioning (food and water), regulating (ability of ecosystems to regulate floods, diseases, and land degradation), supporting (soil formation and nutrient cycling), and cultural (recreational and religious) services (Chaudhary, 2009). Therefore, having benefits more than cost for sustainable forest management is a contesting issue. There is a need of study to assess whether the benefit for user groups is more than the cost in the community forest of Nepal. In this context, (a) what is the status of forest use and management strategies applied? and (b) what is the benefit cost ratio of community forest management? are some pivotal questions that demand empirical answers.

METHODOLOGY

The study was conducted in Dhamala Paripakha Community Forest (DPCF) in Bageswari Village Development Committee Ward No. 4 of Nuwakot District in the central part of Nepal as shown in Figure 1, which lies some 50 km north of the capital city Kathmandu. The rationale for selecting this

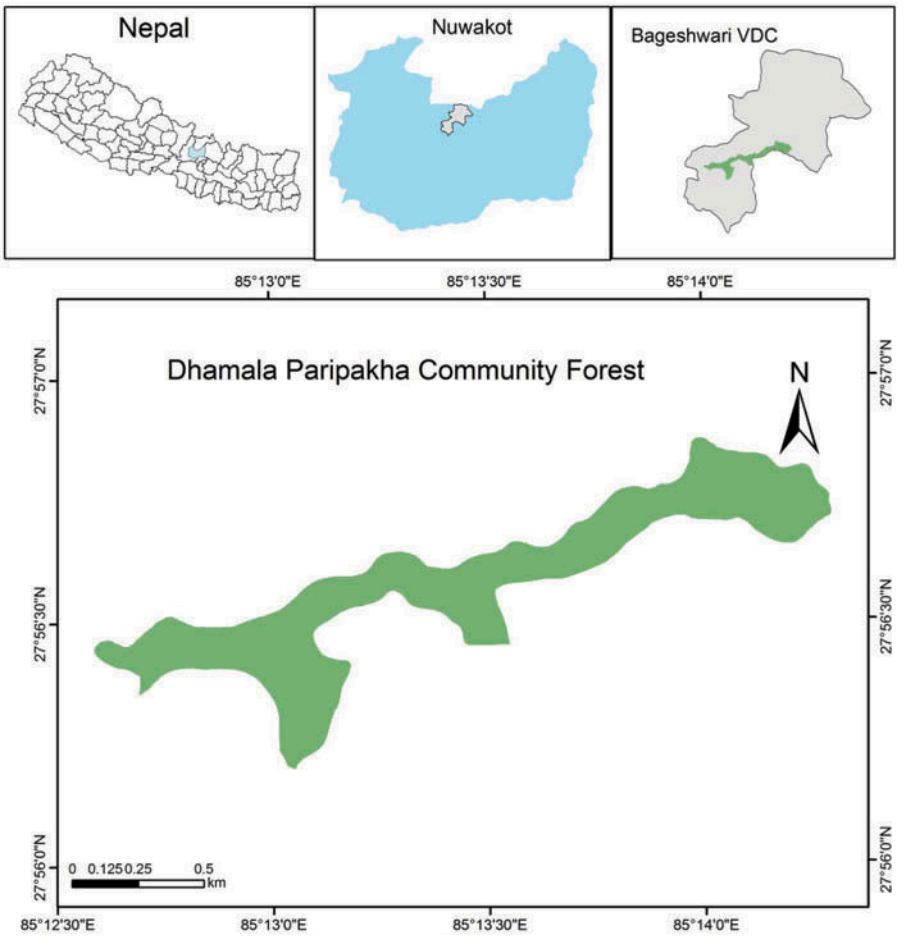

FIGURE 1 Map showing the study area.

particular community forest was due to the availability of information on forest products removal and their associated costs. The forest with an area of 56.23 ha was handed over to a community forest user group (CFUG) with 158 members in 1996. The forest ranges from 800–900 m above mean average sea level consisting of *Shorea robusta, Pinus wallichiana, Castanopsis indica*, and *Schima wallichi* as the major tree species. A subtropical climate and vegetation dominates the whole area of the forest. The major herb and shrub species found in the forest are *Cynoden dectylon, Trifolium repens, Drymeria diandra, Bidens pilosa*, and *Artemisia indica*. The forest is divided into seven blocks—Dhunge Ban, Bishmure Tallo Pakha Ban, Bishmure Makhlo Pakha Ban, Dhamala Pari Pakha Ban, Makure Khola Ban, Aagetari Ban, and Thulo Pakha Ban—according to the settlement of the CFUG (District Forest Office [DFO], 2011; Koirala, 2013).

A preliminary field visit was done in January 2013 and a meeting was held with executive members to know the basic characteristics of the study area. The household and forest harvest-related secondary information in the study area was collected from the Community Forest Operational Plan (CFOP; DFO, 2011) to take a sample of households for the survey during this visit. The fieldwork was conducted in August 2013. The household survey and focus group discussion was carried out during a field visit. For the household survey, the list of households obtained from CFOP (DFO, 2011) was selected randomly. More than 50% of the sample (80 out of 158) was selected by lottery method and questioned with the semi-structured questionnaire similar to Griscom, Connelly, Ashton, Wishnie, and Deago (2011). The major focus of the household survey was to collect information about forest product collection and household contribution to forest management. According to the preliminary information on forest product harvest, questions on amounts of forest products such as timber, pole, firewood, fodder and leaf litter harvested were asked of the respondents. The primary information on the forest product harvest of 2012 was compared with secondary information of CFOP (DFO, 2011). Also, questions related to time involved in thinning, fencing, and meetings by each household were asked of the respondents to get the management cost of the forest. A focus group discussion with community forest user committee members was carried out to get information on benefits distribution and management strategies with the help of a semi-structured checklist. Also, the role of community forest user committee and user group in forest management was discussed. The local market price of forest products, labor wages, and verification of household information was done during focus group discussion.

The economic valuation of the community forest was made on the basis of benefit-cost ratio (BCR; Campbell & Brown, 2003). Cost-benefit analysis, also called benefit-cost analysis, is a systematic process for calculating and comparing benefits and costs of a project, decision, or government policy. It is an economic decision tool to organize the information about project costs and benefits, and to determine the cost efficiency of investment for enhancing private and public welfare (Koirala, 2013). It is the process of ranking policy options from an economic point of view by taking account of benefits and costs from a small investment project to a broader fiscal policy change (Boadway, 2006). And BCR is the ratio of total benefit to the total cost. BCR without discounting was calculated as the direct ratio of total benefit (B) and total cost (C) as BCR = B/C. Discounting reflects the balance between present and future well-being (Philbert, 1999) and the opportunity cost of capital (Groom & Palmer, 2012). The present value (PV) is calculated using the method of compound interest and using the discount rate (Civil Aviation Safety Authority [CASA], 2007). The PV estimates of income are based on market and discount rates (Groom & Palmer, 2012). The BCR with discounting was calculated by following CASA (2007) and K C (2012):

The calculation for benefit and cost from 2008–2012 for administration and management cost and benefit from forest products was done by following Equations 1 and 2:

$$\text{Present Value Benefits} = \sum_{n=0}^{N} \text{Bn}(1 + \text{r})\text{n}, \tag{1}$$

$$\text{Present Value Costs} = \sum_{n=0}^{N} \text{Cn}(1 + \text{r})\text{n}. \tag{2}$$

The calculation of benefit and cost from 2013–2017 was done by following Equations 3 and 4:

$$\text{Present Value Benefits} = \sum_{n=0}^{N} \frac{\text{Bn}}{(1 + \text{r})\text{n}}, \tag{3}$$

$$\text{Present Value Costs} = \sum_{n=0}^{N} \frac{\text{Cn}}{(1 + \text{r})\,\text{n}}, \tag{4}$$

where,
B = total benefit in year "n" expressed in constant dollars; n = evaluation period in years;
C = total cost in year "n" expressed in constant dollars; N = total number of years (10 years);
r = real discount rate (12%) as taken by Rana (2008) and K C (2012) for the similar study in other community forests of Nepal making similar to financial interest rate of Nepal followed from Loomis and Helfand (2003).

The only tangible benefit as the benefit of forest products was measured due to the lack of information and trading mechanism of intangible benefits as that of Meshack, Adhikari, Doggart, and Lovett (2006). The benefit of forest products which was directly received by the user group (Meshack et al., 2006) was estimated by the direct market pricing method—Delphi Method (Karpagam, 2007). The direct market pricing method was applied as the local market price of the forest goods. The entire forest products were easily sellable in the local market and the price was obtained by means of full group discussion (FGD) as follows in Table 1.

The total cost includes forest management and administration cost. Management cost includes time and cost involved in thinning, meetings,

TABLE 1 The Exchange Rate and Market Price of Forest Products

The exchange rate taken is US$1 = N Rs. 100 at the time of field work in August 2013.
1 cubic foot timber costs US$10 (N Rs. 1,000).
1 pole costs US$5 (N Rs. 500).
1 Bhari (load carried at back) firewood (45 kg) costs US$2 (N Rs. 200).
1 Bhari fodder (30 kg) costs US$0.50 (N Rs. 50)
1 Bhari leaf litter (15 kg) costs US$0.10 (N Rs. 10).

and other management cost (Meshack et al., 2006). The time spends by households in thinning and meetings was taken during the household survey. As the local level rule, 8 hours were calculated as 1 day for wages. The daily wage of men was US$3 (N Rs. 300) and a woman was US$2 (N Rs. 200), determined from focus group discussions. While administration cost includes salary of guards, office management cost, cost of physical infrastructure, training, education, and other administrative cost.

RESULTS AND DISCUSSIONS

Information about socioeconomic status of the CFUGs was gathered by asking questions on family number, gender, occupation, ethnicity, economic status, and livestock holding status to the respondents. The total population of the CFUG was 1,031 with 53.44% female as shown in Table 2. Involvement of females in forest conservation and management in the Dhamala Paripakha Community Forest was found high. Most of the adult males were out of their village in search of education and employment opportunities in larger cities of Nepal which was similar to the status of the whole country (Central Bureau of Statistics [CBS], 2012). Households of small size from 5–8 people had the lowest forest product collection rate (Adhikari, Williams, & Lovett, 2007). Brahmin, Chettri, Magar, and Kami are the major castes in the group dominated by higher caste (107), minority groups (36), and lower caste (15). The major occupation of the household was agriculture (Meshack et al., 2006). Agriculture alone could not sustain the annual food demand of the people. So, people rely on other economic activities like wage labor, service, and other small business in the locality. Most of the households were of poor economic standards that were unable to provide basic needs properly. The economic status of the household had affected resource use patterns (Mahanty, Suich, & Tacconi, 2013). The major livestock reared by CFUG were buffalo, ox, cow, goat and hen.

Information on status of community forest, governance, management status, and involvement of CFUG in conservation and management, type and quantity of forest product harvested was gathered by asking questions to the respondents. Similar to other parts of Nepal, this CFUG also includes a selected subgroup of households from the village having similar interests

TABLE 2 Socioeconomic Status of Households

Population	Number	%	Category of household	Number	Major occupation	Major livestock
Male	480	46.56	Higher caste	107	Agriculture	Buffalo
Female	551	53.44	Minority caste	36	Wage labor	Ox
Total	1,031	100.00	Lower caste	15	Service	Cow

and benefits. The state retained ownership of forests but communities hold the rights to use the forests and make management decisions (Ojha, 2002). The 1993 Forest Act provided CFUGs the authority to undertake management decisions regarding forest resources (Acharya, 2002). So, governance arrangements for CFUG were defined by the constitution and the forest management operational plan, both registered and approved by the District Forest Office (DFO). Forest rangers are the government employees in the range posts of the forest department from DFO who assess the quality and quantity of forest products at regular intervals. The DFO looks after the forest management and conservation of district forests. This CFUG was preparing its own constitution, defining the social arrangements, responsibilities, and rights of the group. The operational plan specifies how the forest is managed and utilized and also serves as an agreement between the Forest Department of Nepal and the CFUG. The CFUG elects a specified number of members to an executive committee for a term of 2 years. The executive committee carries out the day-to-day decisions about forest management on behalf of the entire CFUG (Kanel & Kandel, 2004). The members control and manage the local forests after the establishment of a forest user group (FUG). Harvesting and pricing of all forest products and forest management is governed by an executive committee. With the formation of a CFUG, local forest users gain membership that encourages them to practice sustainable management and observe institutional regulations. The members receive a cash subsidy as an incentive for plantation, development, and protection. Surplus income from the user group's forests is used for infrastructure development purposes other than forestry development (Gilmour & Fisher, 1998). The community forest provides an invaluable opportunity for society and resource managers to engage the knowledge of those living closest to the land in developing a sustainable relationship with forests (Brendler & Carey, 1998).

People were harvesting timber, firewood, fodder, and litter from the forest. The total annual harvest of timber was 60 cubic feet, pole was 8 cubic feet, firewood was 1,110 Bhari, fodder was 4,388 Bhari, and leaf litter was 590 Bhari as shown in Table 3.

TABLE 3 Use and Management of Forest Products

Annual use of forest resources			Annual involvement in forest management by each household		
Categories	Amount	Unit	Categories	Number	Unit
Timber	60	Cubic feet	Thinning	10	Days
Pole	8	Number	Meeting	3	Days
Firewood	1,110	Bhari	Fencing	5	Days
Fodder	4,388	Bhari	Total	18	
Leaf Litter	590	Bhari			

Timber was allowed to the household for construction of a new building while firewood was harvested annually during the thinning of forest in the winter season. After the thinning of forest, about 30 Bhari of firewood was provided to each user group from the dead trees, old trees, and branches. People were also allowed to take fodder after paying an entry fee from July to September. Each household was taking 2 Bhari of fodder in a day. Similarly, dry leaf litter was allowed during the winter season. Both males and females go to the forest for harvest of forest products and thinning of forest by using handmade tools (Salverson et al., 2011).

People were involved in fencing, thinning, and meetings for management of the forest. They contributed 5 days in fencing, 10 days in thinning, and 3 days in meetings as shown in Table 3. Also, they were involved in the plantation of forest in barren land nearby the forest area. CFUG members were voluntarily involved in such conservation and management-related activities. Males contributed in the fencing for conservation of the forest. It was compulsory for the CFUG to attend during thinning and fencing.

Most of the administrative cost was spend in the salary of forest guards (82%) as shown in Table 4. The annual total forest administration cost in this study was more than that calculated by Baral, Sekot, and Vacik (2008) in Kalobhir Community Forest, Dolakha District (US$91). Administrative cost was less, as the CFUG members used to spend less money in meetings and other managerial work. They spend money to send their members to trainings organized at the district level and to construct physical infrastructure for forest protection. About 92% of total cost (US$1,338) was spent in thinning of forest by CFUG members.

In the cost category, management cost was 86.84% while administration cost was only 13.16% of the total cost (US$1,679) as shown in Table 5. The management cost was more as CFUGs were voluntarily devoting more time

TABLE 4 Cost and Benefit Associated With Community Forest (Per Annum)

Administration cost			Management cost			Benefit from forest products		
Categories	US$	%	Categories	US$	%	Categories	US$	%
Salary of guards	180	81.45	Cost of thinning	1,338	91.77	Timber	600	11.73
Office management cost	9	4.07	Cost of meetings	78	5.35	Pole	40	0.78
Physical infrastructure	11	4.98	Others	42	2.88	Firewood	2,220	43.42
Training and education	12	5.43	Total	1,458	100.00	Fodder	2,194	42.91
Others	9	4.07				Leaf litter	59	1.15
Total	221	100.00				Total	5,113	100.00

TABLE 5 Cost, Benefit, Net Benefit, and Benefit-Cost Ratio of Community Forest

Annual cost and benefit	Categories	US$	%
Cost associated with CFM	Administration cost	221	13.16
	Management cost	1,458	86.84
	Total cost	1,679	100.00
Benefit associated with CFM	Benefit from forest products	5,113	100.00
	Net benefit	4,015	
Benefit-cost ratio	Without discounting	3.04	
	With discounting	3.06	

Note. CFM = community forest management.

in managing and conserving forest by involving themselves in meetings, thinning, fencing, and plantations. The annual total forest management cost in this study was more than that calculated by Baral et al. (2008), but less than that calculated by Gryze and Durschinger (2009) in the Dolakha District of central Nepal. Every year CFUG members devote more than 10 days in thinning of the forest to extract firewood and forest management. Stakeholder input was currently possible through public hearings (Lal et al., 2011) and meetings of the CFUG members. Most of the costs were effort and time spent in lengthy discussions at the meetings and assemblies (Adhikari & Lovett, 2006).

The benefit from firewood and fodder was about 43% each of the total benefit of forest products (US$5,113) as shown in Table 4. It shows that most of the households depend on wood for fuel and fodder for domestic animals (Rana, Lal, & Samant, 2011). Leaf litter was extracted in the dry season by CFUG for shelter and compost manure. The benefit from forest products was more as the livelihood was totally dependent on extracting forest products such as firewood, fodder, timber, and pole. Net monetary gain per household was US$25.41 which was less than that calculated by Karky (2008) in the community forest of Ilam District, Nepal (US$46).

The BCR of 2012 without discounting was 3.04 and with discounting was 3.06. The BCR ratio without using the discount rate was higher in this study than that calculated by Dangi, (2006) in Makwanpur district; Rana, (2008) in Dhading district and K C et al. (2014) in Syangja district, Nepal. The BCR using discount rate was higher than that calculated by Dangi (2006) and lower than that calculated by Rana (2008) and K C et al. (2014). The higher value of BCR indicates that CFUGs benefited from community forest management. Community forest management was not only conserving the forest but also helping to generate money to enhance the livelihood of the people.

The community forest management strategy is successful and sustainable in this community forest as local people are actively participating in managing the forest, harvest and distribution of forest products, setting rules and regulations, and fulfilling their demand of forest products

for sustaining and enhancing their livelihood as explained in UNCSD (2012). It was also addressing social exclusion, creating rural employment, and helping in carbon sequestration as explained by K C et al. (2014), which further increases the forest cover by controlling deforestation and forest degradation.

CONCLUSION

Firewood and fodder was harvested more than timber and leaf litter in the community forest. People were involved in fencing, thinning, and meetings for management of the forest. The management cost was much higher than the administration cost. The benefit from firewood and fodder was more due to the dependency of people in the forest for enhancing their livelihood. The higher value of BCR indicates that CFUGs benefited from the community forest. CFUGs are already benefiting from the current status of management practices, incentives and funding from national and international agencies for conserving forests would increase economic and social benefit of the CFUGs. As this study focused on cost-benefit analysis of one community forest of central Nepal, similar studies are recommended in other community forests of different regions of the country to assess the feasibility.

NOTE

1. 1 Bhari firewood = 45 kg; 1 Bhari fodder = 30 kg; 1 Bhari leaf litter = 15 kg.

ACKNOWLEDGMENTS

We would like to thank Mr. Binod Pyakurel of Tribhuvan University, Central Department of Environmental Science for helping in preparing a map.

ORCID

Anup K C http://orcid.org/0000-0003-1470-4511

REFERENCES

Acharya, K. P. (2002). Twenty-four years of community forestry in Nepal. *International Forestry Review*, *4*, 149–156.

Adhikari, B. (2003, June). *Property rights and natural resources: Socio-economic heterogeneity and distributional implications of common property resource management* (SANDEE Working Paper No. 1-03). Kathmandu, Nepal: South Asian Network for Development and Environmental Economics.

Adhikari, B., & Lovett, J. C. (2006). Transaction costs and community-based natural resource management in Nepal. *Journal of Environmental Management*, *78*(1), 5–15.

Adhikari, B., Williams, F., & Lovett, J. C. (2007). Local benefits from community forests in the middle hills of Nepal. *Forest Policy and Economics*, *9*(5), 464–478.

Agrawal, A., & Angelsen, A. (2009). *Using community forest management to achieve REDD+ goals*. Retrieved from https://cgspace.cgiar.org/handle/10568/20289

Aryal, S., Bhattarai, D. R., & Devkota, R. P. (2013). Comparison of carbon stocks between mixed and pine-dominated forest stands within the Gwalinidaha Community Forest in Lalitpur District, Nepal. *Small Scale Forestry*, *12*(4), 659–666. doi:10.1007/s11842-013-9236-4

Baral, S., Sekot, W., & Vacik, H. (2008). *Significance of community forestry for rural households: An economic analysis of community forest user groups in Nepal*. Vienna, Austria: University of Natural Resources and Applied Life Sciences.

Boadway, R. (2006). Principles of cost-benefit analysis. *Public Policy Review*, *2*(1), 1–44.

Brendler, T., & Carey, H. (1998). Community forestry, defined. *Journal of Forestry*, *96*(3), 21–23.

Campbell, H., & Brown, R. (2003). *Benefit cost analysis*. Cambridge, United Kingdom: Cambridge University Press.

Central Bureau of Statistics. (2012). *National population and housing census 2011* (Vol. 01). Kathmandu, Nepal: Author.

Chaudhary, M. (2009). *Assessing the protection of forest based environmental services in the Greater Mekong subregion: Asia-Pacific forestry sector outlook study II* (Working Paper No. APFSOS II/WP/2009/13). Bangkok, Thailand: Food and Agriculture Organization of the United Nation.

Civil Aviation Safety Authority. (2007). *Cost benefit analysis methodology procedures manual*. Canberra, Australia: Australian Government, Civil Aviation Safety Authority.

Dangi, R. (2006). *Benefit cost analysis of community forest from Makwanpur District, Nepal*. (Master's thesis). Purwanchal University, New Baneswar, Kathmandu, Nepal.

District Forest Office. (2011). *Community forest operational plan of Dhamala Paripakha community forest*. Nuwakot, Nepal: Author.

Department of Forest. (2013). *Community forest management programme*. Kathmandu, Nepal: Department of Forest, Ministry of Forest and Soil Conservation.

Gautam, C. M., & Watanabe, T. (2009). *Assessment of role of community forests (CFs) in CO_2 sequestration, biodiversity and land use change: Final report submitted to APN*. Kathmandu, Nepal: Nepal Development Research Institute.

Gilmour, D. A., & Fisher, R. J. (1998). *Evolution in community forestry: Contesting forest resources*. Bangkok, Thailand: The Center for People and Forests (RECOFTC).

Griscom, H. P., Connelly, A. B., Ashton, M. S., Wishnie, M. H., & Deago, J. (2011). The structure and composition of a tropical dry forest landscape after land clearance; Azuero Peninsula, Panama. *Journal of Sustainable Forestry*, *30*(8), 756–774. doi:10.1080/10549811.2011.571589

Groom, B., & Palmer, C. (2012). REDD+ and rural livelihoods *Biological Conservation*, *154*, 42–52.

Gryze, S. D., & Durschinger, L. (2009, May). *Payment for ecosystem services: Developing forest carbon projects in Nepal*. Retrieved from http://www.enterpriseworks.org/pubs/Forest_Carbon_Projects_in_Nepal.pdf

Hobley, M. (1996). *Participatory forestry: The process of change in India and Nepal*. London, United Kingdom: Rural Development Forestry Network, Overseas Development Institute.

K C, A. (2012). *Feasibility analysis of REDD+: A case study in Ghwangkhola Sapaude Babiyabhir community forest of Syangja, Nepal* (Master's thesis). Tribhuvan University, Kathmandu, Nepal.

K C, A., Joshi, G. R., & Aryal, S. (2014). Opportunity cost, willingness to pay and cost benefit analysis of a community forest of Nepal. *International Journal of Environment*, *3*(2), 108–124.

Kanel, K. R., & Kandel, B. R. (2004). Community forestry in Nepal: Achievements and challenges. *Journal of Forest and Livelihood*, *4*, 55–63.

Kanel, K. R., & Niraula, D. R. (2004). Can rural livelihood be improved in Nepal through community forestry? *Banko Jankari*, *14*(1), 19–26.

Kanel, K. R., Shah, S. B., Poudel, K., & Regmi, N. P. (2009). *Quick assessment of land use, forest policy and governance*. Kathmandu, Nepal: Ministry of Forest and Soil Conservation.

Karky, B. S. (2005). *Who will grow the forest, bring benefit, and save the earth?* (Vol. XII). Kathmandu, Nepal: Resources Himalaya Foundation.

Karky, B. S. (2008). *The economics of reducing emissions from community managed forests in Nepal Himalaya* (Doctoral dissertation). University of Twente, Enschede, The Netherlands.

Karky, B. S., & Banskota, K. (2007). The Kyoto Protocol and community-managed forests. In K. Banskota, B. S. Karky, & M. Skutch (Eds.), *Reducing carbon emissions through community-managed forests in the Himalayas* (pp. 23–37). Kathmandu, Nepal: International Centre For Integrated Mountain Development (ICIMOD).

Karpagam, M. (2007). *Environmental economics: A textbook* (6th ed.). Chennai, India: Sterling.

Katoomba Group. (2007). *Conservation economy backgrounder ecosystem marketplace 2007*. Retrieved from http://www.katoombagroup.org/documents/publications/ConservationEconomyBackgrounder.pdf

Koirala, I. (2013). *Cost benefit analysis of Dhamala Paripakha community forest of Nuwakot, Nepal* (Master's thesis). Tribhuvan University, Kirtipur, Kathmandu.

Lal, P., Alavalapati, J. R. R., Marinescu, M., Rao, J. M., Dwivedi, P., & Susaeta, A. (2011). Developing sustainability indicators for woody biomass harvesting in the United States. *Journal of Sustainable Forestry*, *30*(8), 736–755. doi:10.1080/10549811.2011.571581

Loomis, J., & Helfand, G. (2003). *Environmental policy analysis for decision making* (Vol. 1). Dordrecht, The Netherlands: Springer.

Mahanty, S., Suich, H., & Tacconi, L. (2013). Access and benefits in payments for environmental services and implications for REDD+: Lessons from seven PES schemes. *Land Use Policy*, *31*, 38–47.

Meshack, C. K., Adhikari, B., Doggart, N., & Lovett, J. C. (2006). Transaction costs of community-based forest management: Empirical evidence from Tanzania. *African Journal of Ecololgy*, *44*, 468–477. doi:10.1111/j.1365-2028.2006.00659.x

Moss, C. (2012, June 20). Nepalese community forestry expert: 'With green forests comes a green economy' [Web log post]. Retrieved from http://blog.cifor.org/9807/nepalese-community-forestry-expert-with-green-forests-comes-a-green-economy/#.UDJ6-KllSAp

Muthoo, M. (2002). Global Forest Fund to combat tropical deforestation and rural poverty. *European Tropical Forest Research Network*, *35*(02), 12–14.

Nesheim, I., & Halvorsen, R. (2011). Selective logging and regeneration of timber species in the Maya Biosphere Reserve in Guatemala. *Journal of Sustainable Forestry*, *30*(8), 850–865. doi:10.1080/10549811.2011.577402

Ojha, H. (2002). *A critical assessment of scientific and political aspects of the issue of community forest inventory in Nepal*. Kathmandu, Nepal: Forest Action.

Ojha, H. (2008). *Reframing governance: Understanding deliberative politics in Nepal's Terai forestry*. New Delhi, India: Adroit.

Ojha, H., Persha, L., & Chhatre, A. (2009, November). *Community forestry in Nepal: A policy innovation for local livelihoods* (IFPRI Discussion Paper 00913). Retrieved from http://www.ifpri.org/sites/default/files/publications/ifpridp00913.pdf

Pandey, G. S. (2009). *Community inclusion and expanding community space in forest management in Nepal: A community perspective*. Paper presented at the Community Forestry International Workshop, Pokhara, Nepal.

Pandit, B., Albano, A., & Kumar, C. (2009). Community-based forest enterprises in Nepal: An analysis of their role in increasing income benefits to the poor. *Small-Scale Forestry*, *8*(4), 447–462.

Patel, T., Dhiaulhaq, A., Gritten, D., Yasmi, Y., Bruyn, T. D., Paudel, N. S., . . . Suzuki, R. (2013). Predicting future conflict under REDD+ implementation. *Forests*, *4*(2), 343–363 doi:10.3390/f4020343

Paudyal, B., Neil, P., & Allison, G. (2006). Experiences and challenges of promoting pro-poor and social inclusion initiatives in user group forestry. *Journal for Livelihood*, *5*(1), 34–45.

Philbert, C. (1999). The economics of climate change and the theory of discounting. *Energy Policy*, *27*, 913–929.

Pokharal, B. K. (2001). *Livelihoods, economic opportunities and equity: Community forestry and people's livelihoods*. Retrieved from http://www.forestaction.org/app/webroot/js/tinymce/editor/plugins/filemanager/files/6.%20Bharat.pdf

Rana, E. (2008). *An option for carbon finance and its impacts on livelihoods of forest users in Nepal, a case study from a community forest in Dhading, Nepal* (Master's thesis). Technische Universität München, Munich, Germany.

Rana, M. S., Lal, M., & Samant, S. S. (2011). Status and regeneration of Himalayan maple in the Himachal Pradesh: Honing Red List of plants. *Journal of Sustainable Forestry*, *30*(8), 775–789. doi:10.1080/10549811.2011.571618

Salverson, W. G., Walker, R. F., Fecko, R. M., Frederick, W. B., Johnson, D. W., & Miller, W. W. (2011). Influences of mechanized thinning and prescribed fire on understory vegetation in an uneven-aged Jeffrey pine stand. *Journal of Sustainable Forestry*, *30*(8), 823–849. doi:10.1080/10549811.2011.577401

Sukhdev, P., Stone, S., & Nuttall, N. (2010). *Green economy: Developing countries success stories*. Geneva, Switzerland: United Nation Environment Programme (UNEP).

Trotter, R. T., III., & Whitham, T. G. (2011). The roles of climate variability and habitat heterogeneity in structuring a forested system: An integrated accumulation function of species richness. *Journal of Sustainable Forestry*, *30*(8), 721–735. doi:10.1080/10549811.2011.567963

United Nations Conference on Sustainable Development. (2012). *Community forestry*. Retrieved from http://www.uncsd2012.org/index.php?page=view&nr=44&type=99&menu=20