Inequality and forest dependence on community forest resources in Kaski, Nepal

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This paper examines the importance of community forest income, and how such income affects the overall income inequality in the community. Analyses are based on a household survey of 176 respondents in five selected forest user groups in Kaski District, Nepal. Overall, community forest income contributed an average of 7.4% of the total household income, which covers 56% of the total forest income of the user households. The main sources of community forest income were fuelwood, fodder, ground grass, timber and leafliter. The poor households derived as much as 17.7% of their total household income from community forests, compared to only 3.9% for the rich households. The community forest income had some equalizing effect on local income distribution: 100% increase in community forest income, other things being equal, would decrease 6.4% in overall income inequality. The high importance of community forest for the poor underscores the importance of securing their access into the resources.

Key words: *Community forests, dependence, household, income inequality, Nepal*

INTRODUCTION

Forests are assessed to contribute to the livelihoods of a vast number of rural households in developing countries (World Bank, 2004). Since the mid-1980s and 1990s decentralised Community Based Forest Management (CBFM) has been officially promoted through policies and legislation as a means to improve rural livelihoods, conserve forest resources and promote good governance (Agrawal and Ostrom, 2001; Colchester, 2006) in many of the developing countries across the globe. Today, at least one-quarter of the forested land in developing countries is under some form of community control (Sunderlin *et al.*, 2008), and that proportion is likely to increase. Evidence of ecologically sustainable decentralised CBFM is emerging (Ostrom and Nagendra, 2006) and this sustainability is documented to be positively associated with active local level forest law enforcement, particularly in the monitoring and sanctioning aspects (Gibson *et al*., 2005; Pagdee *et al*., 2006; Chhatre and Agrawal, 2008). It remains unknown; however, to what degree forest product extraction from locally managed forest resource contribute to total household income and the extent to which it affects the local community level income inequality in the decentralized CBFM.

In Nepal, like in other developing countries, community forestry, a popular model of CBFM is increasingly viewed as an important resource in sustaining the livelihood (e.g. Varughese and Ostrom 2001). The program was formally launched in 1978 (Timsina *et al* 2004), that emphasises participatory approach through a group of traditional users as the basic principle in forest management (Graner 1999). Within the revised frameworks for community forestry legislation in Nepal, the amount of forest officially managed by local user groups is growing rapidly (Kanel and Kandel 2004). Community forests now covers 25% of the Nepalese forest area (1.1 million ha) and includes 35% of all Nepalese households (1.5 million households) in about 14,000 Community Forest User Groups (CFUGs) (Blaikie and Springate-Baginski, 2007). Forest areas are handed over to users organised in a CFUG by the District Forest Officer according to rules specified in the Forest Act (HMG, 1993) and Forest Regulations (HMG, 1995). The implementing body of the CFUG is the Users' Committee elected at the annual General Assembly. The main thrust of handing over the national forest to the community is to sustain the local forest users to fulfil their daily forest needs (Malla 2000).

Specially, in the rural context of Nepal, inequalities in private endowments (such as land, livestock's, saving assets etc.), occupation and other household's characteristics and settlements together create socio-economic stratifications which often apparent in society distinguishing households into rich and poor (Adhikari and Loveit 2006). Estimation based on different household surveys also revels that income inequality has grown in recent decades (CBS, 2004) and that the increment is larger in rural areas than in urban. The community forestry program, though considered a success in terms of both forest conservation and socio-economic contribution (Kanel and Dahal, 2008; Tachibana and Adhikari, 2009), the real significance and potential role of community forest resources to household economy and its effect in local income distribution remains unclear. First, at national level, value of forest resource to the household's economy, though not completely ignored, is often merged with the agricultural income so that little is known about their value in

terms of overall rural household's welfare, nor about how their use and value might vary across household types. Second, scholars who have estimated the value of forest resource to the households' economy mainly conducted their research only in community forests, ignoring the income derived from other types of forest resource, implying that our knowledge often rests on segmented data and snap-shots which do not allow us to say the actual potential of community forest resource in contributing the total forest needs of the households. Several of the studies voiced the concerns with elite capture and marginalisation of poor (e.g. Graner 1999; Malla 2000; Gilmour, 2003).Studies carried out by Adhikari *et al*. (2004), in 309 households covering the eight CFUGs; provide good points of reference for knowing the income potentials of community forests and their patterns in household's economy. He claimed that the benefits derived from community forests are biased in favour of those who own land and livestock. Unfortunately, his study, however, analyses the total income of the households without reporting income generated by the households from other types of forests (private and national) separately. From his study, we can not say how much of the forest need of the rural household is fulfilled by community forests. By explicitly incorporating the income of the households from all sources, this paper assess the importance of income from community forest resources to the people in the mid-hills of Nepal, and how such income affects the local income inequality among the forest user households.

MATERIALS AND METHODS

Study sites, sampling procedure and data collection

The study was carried out in Kaski district, one of the mid-mountain regions of Nepal where community forestry has been practiced for more than 30 years. The district has a semitropical climate with relatively high humidity. Some parts of the district receive the highest rainfall in Nepal, with more than 5000 mm per annum. The mean maximum temperature is 33^0C in April and May, which declines during the monsoon period and falls to a minimum of 5-6^0C during December and January (DDC 2002). About 65% of the total area of the district is relatively intact natural area, of which 45% is forest and 20 % shrub land. Agricultural land covers 24% while 11% of the area is under human settlements (CBS 2003). The major tree species found in community forests are *Castonopsis indica, Schima wallichii* and *Shorea robusta.* According to the District Forest Office (DFO) Kaski, (December 2004), there are 401 community forests handed over to the local communities, covering 14.43% (13,962 ha) of potential community forest area, and 34,113 households are involved in community forestry activities.

A field study was carried out in October and November 2004. From the list of all community forests, prepared by DFO Kaski, only forests which were handed over at least five years ago were considered. To capture the variation in socio-economic variables, caste/ethnicity, accessibility, age and size of the CFUGs, resource status, and distance to urban centres, five CFUGs were purposively selected. Within each of the five selected CFUGs, the list of all user households was used to select respondents by random sampling. In all, there were a total of 766 member households in the five forest user groups, while the total number of sample

households comprised 176, ranging from a minimum of 17 in the smallest CFUG to a maximum of 77 in the largest one.

In the study area, the members of CFUGs are the households who have since long been managing and utilizing the forest resources. The questionnaire survey was conducted in selected five CFUGs of different size (Table 1). Fuelwood is the only cooking material for the poor households whereas some of the *Brahmin, Chhetri* and *Newar* communities use kerosene and also biogas plants in combination with fuelwood. Agriculture is the main occupation of the community. Paddy, wheat, maize and millet are grown in order of economic importance. Communities keep cows, buffaloes and goats for protein like milk and meet, draft power, and manure for soil fertility maintenance.

Table 1: Information about the selected CFUGs for the study[1]

SN	Name of CFUG	VDC/Municipality	Year handed over*	Community forest area (ha.)	Forest condition
1	Pachabhaiya**	Lekhnath	1995 (2001)	235.2	Degraded
2	Kapase	Lekhanath	1997 (2003)	25.0	Good
3	Lewade	Dhikurpokhari	1992 (2001)	18.5	Good
4	Bastolaparipakha	Hemja	1994 (2001)	13.8	Degraded
5	Thotnekhola	Sarangkot	1993 (1999)	83.0	Good

* Renewal date in parentheses

** The community forest was seized by DFO in 1998 because of the illegal harvesting

Table 1 presents the name of village development committee (VDC)/municipality to which different CFUGs are affiliated, year of handed over of national forest to the community, area of the community forest patch and the forest condition. Selected community forests are diverse in terms of the area covered and the forest condition. The location-wise study area in the district is shown in Figure 1.

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[1] Data were from the official record of District Forest Office, Kaski, 2004

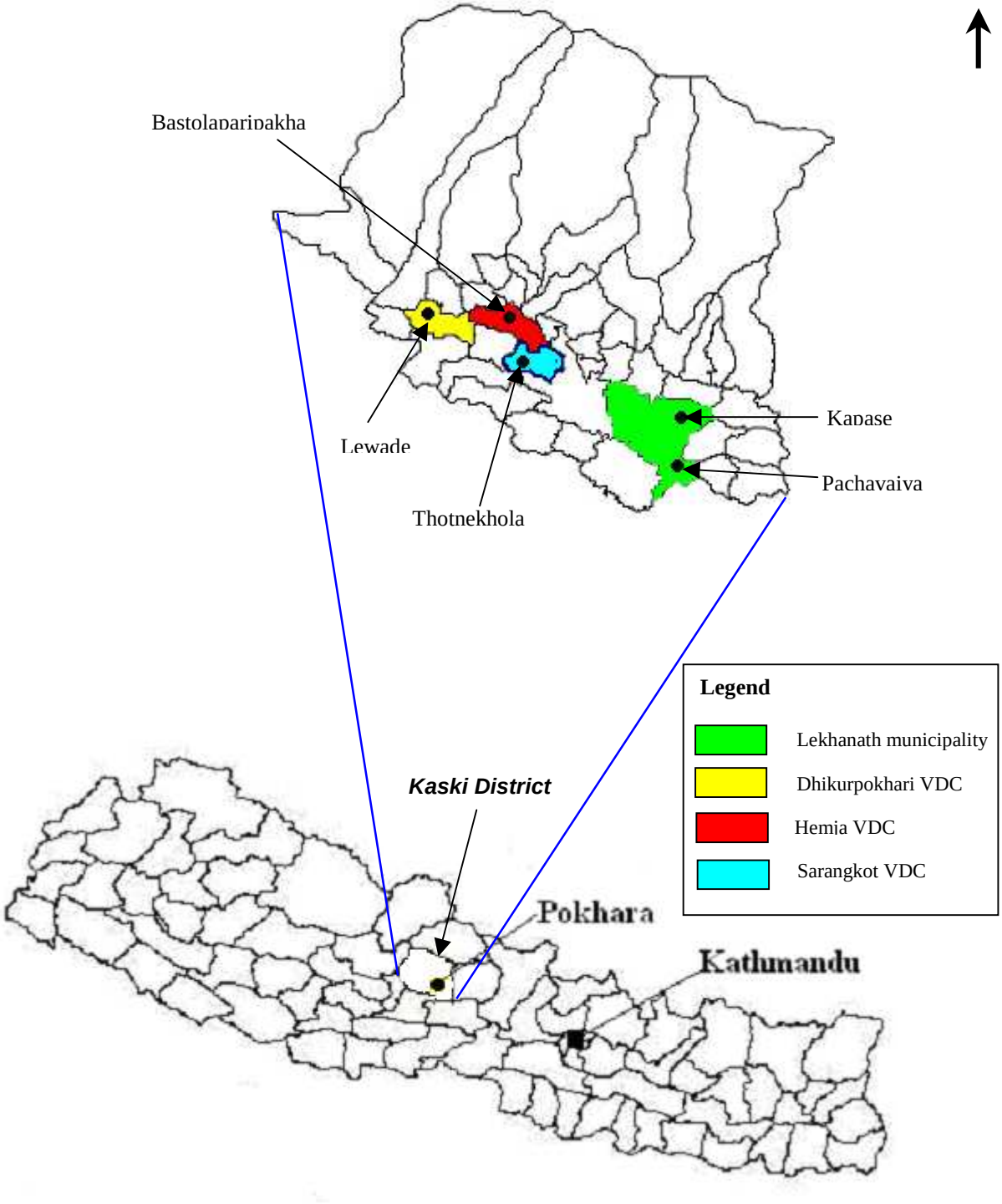

Figure 1: Map of Nepal showing the study sites in Kaski District

A self-administered questionnaire was used to elicit information from the respondents. Pre-testing of the questionnaire was undertaken in one non-sample CFUG. Questions were asked to obtain information on demographic characteristics, land and livestock ownership and direct transfer income as well as subsistence production from different sources including forest products community and other (private and national) forests.

Household income definition and valuation

Fairly comprehensive concept of income is used in this study following the approach used by Cavendish (2002) where household income is measured in net total income obtained by deducting the input costs from the gross value. While the cost of hired labour was included, family labour is not in the cost calculation. Household income sources are summarized under transfer income, agricultural income, community forest income and other forest income. *Transfer income* of a household includes the income from small scale cash generated from the own business activities, government and private sector employment, pension, remittances, gifs, rents, daily wages. Total *community forest income* includes the net earning from raw and proceeds products harvested from the community forest by a household minus the attached cost. Consumption of timber and poles, fuelwood, fodder grass, leaflitter and other smaller NTFPs like bedding materials are the sources of community forest income captured under this heading. *Other forest income* includes similar types of forest products collected from national forest, private forest and from other source outside community forests. Soils and stones are also included in this category. *Agriculture and livestock income* includes the net earning from all agricultural crop production, both annual and perennial crops including agro-forestry, horticulture and income from the crop by-products and net income generated from the imputed value of livestock products and services as well as the home-consumed livestock.

Households were found to use a large number of products both for the subsistence and commercial purposes. As most of the products are traded inside the village market, households own reported farm gate price (Gunatilake, 1998; Adhikari, 2005) were primarily used in estimating the value of each of the products, as these estimates are expected produced aggregate unit values with acceptable properties. Prices of some products which are not traded in general such as leaf litter, fodder, ground grasses etc were obtained from respondents own estimation. In some cases respondents were asked to value the product based upon the exchange (substitution) pricing method (Godoy *et al*., 1993), where value of the marketed goods is used to valuate the value of non-marketed goods. All products were measured in local units and later were converted into standard units.

Income decomposition and inequality measure

As the basis for further data analysis, the 176 households were divided into quartile groups based on total income per capita. Scheffe's means test was used to compare the means of the various income sources among the income quintile groups. All income figures are presented into Nepalese Rupees.

The equality of the income distribution was assessed by calculation of the Gini coefficient. Gini decomposition approach developed by Lerman and Yitzaki (1985) is used to examine not only to identify the importance of the particular income source for the poor but also to see marginal effect of each of the source income inequality on overall income inequality. The technique enables us to compute the Gini coefficient for each income sources and identify which income source is more responsible for increasing and or decreasing inequality to total income inequality. The aggregate Gini

coefficient, G, for the total income inequality, where income is derived from k different income sources, is given by:

$$G = \sum_{k} S_k G_k R_k \qquad (1)$$

Where S_k is the share of income source k in total income, G_k denotes the disaggregated Gini coefficient for income source k and R_k measures the Gini correlation between income source k and the cumulative distribution of total income. In addition to the importance of the share of each income source (S_k), using equation (1), we assessed how equally or unequally the income source K is distributed among the sampled households and the extent to which the income source K is correlated with the total income.

The effect of change in income source k on inequality holding income from all other sources constant is computed. The percentage change in inequality resulting in a small percentage change in income from source k equals the initial share of the income source in inequality minus the initial share in total income and is given by,

$$\frac{\partial G / \partial e_k}{G} = \frac{S_k G_k R_k}{G} - S_k \qquad (2)$$

Finally, the relative concentration coefficient (g_k) is computed using,

$$\text{Relative concentration coefficient}(g_k) = \frac{R_k G_k}{G_k} \qquad (3)$$

and follows that k^{th} income source has an increasing or decreasing effect on inequality according to whether g_k is greater than or less than unity. Data were analysed using the Statistical Software-STATA version 11.0.

RESULTS AND DISCUSSION

First, average household asset endowment particularly the land and livestocks' is presented. Second, average household income per capita is presented by source and quartile, with and decomposition of community forest income by product. Last, data on income inequalities (Gini coefficients) are presented.

Household characteristics

The major castes/ethnic groups in the study area were *Brahmin, Chhetri, Newars, Gurungs, Damai, Kami and Sarki.* The household size varied from one to 14 members, with an average of 5.26, which is slightly less than the country's average of 5.4 members per household (CBS 2003). Among the sample respondents 35% were illiterate.

The number of households, food sufficiency, and the average land and livestock holdings by household income status is presented in Table 2.

The average land per household in the sample was 11.1 ropani (0.55 ha.), which is almost equal to the average land holding of 11.4 ropani (0.57 ha.) per household in the district (DDC 2002). Almost all households owned livestock regardless of their land ownership. The average number of livestock units per household was 2.1. Households belonging to middle or rich income groups were better endowed than others in terms of land and livestock ownership. The average food sufficiency from their own production was 7.4 months, which shows that the majority of the households were not able to produce enough food from their own agricultural activities.

Table 2**:** Number of households, food sufficiency from own farm production, average land and livestock holdings by household categories (N = 176).

Household categories	Number of households	Food sufficiency from own farm production, months per year	Land holding, ropani*	Livestock units**
Poor	44	6.5	7.1	1.5
Second	44	7.2	11.6	1.9
Third	44	7.5	12.6	2.4
Rich	44	8.2	13.2	2.5
All households	176	7.3	11.1	2.1

*20 ropani = 1 hectare

** All the livestock is converted into livestock units (LSU) using, 1 LSU = 1 buffalo = 1.2 cow = 4 goats = 5 sheep = 2 calves (cf. Thapa and Poudel, 2000).

Income decomposition and the importance of income from community forest

The mean total annual household per capita income in the study area is 21,105 rupees. On average, the most important income source is transfer income (Table 3). All absolute means except the other forest income increase with increasing total income but the relative means of all income sources, except transfer income, decrease with increasing income. In absolute term community forests income showed no significant difference among the income quartile groups. Almost similar is the case for agricultural and livestock and other forest incomes, where only the poorest quartile group in the former case and the richest quartile group in the later generate significantly less and more amount from the sources respectively compared to the other groups. The big differences in absolute figures are mainly observed on transfer among the income quartile groups. Table 3 shows that community forest income is fairly modest at 7.4% of total income, which is far less than transfer and agricultural income, and only slightly more than other forest income.These data show that the income generating options available to the poorest are mainly agriculture whereas all other groups are able to derive largest share of their household income from activities like governmental and non-governmental services in and outside the country. All households in the study area engage in crop and livestock production but the figures challenge the perception of rural Nepal as primarily dependent on farm-based incomes. In line with Rigg (2006) the income data describe a situation where agricultural development may not be the best way to improve rural livelihoods. In a situation where pensions and remittances, primarily from household members migrated abroad, constitute a larger income source for the wealthiest household than

agriculture; the importance of skills improvement is likely to be crucial. Acquirement of skills requires a capital investment, of course, which is why Barrett *et al.* (2001) talk about barriers to benefits from new opportunities.

In Nepal, forest access may be subject to restrictions where community forests have been handed over to local user groups that need not include all village members. Almost all of the FUGs under study have introduced controlled and limited extraction of forest products and charge for extraction rights for some of the products, on which the poor people were depending. As a consequence, access of poor traditional users in community forests seems to be reduced. The lower value of the community forest income for the poorer household than the relatively rich households (Table 3) contradicts with the finding of Richards *et al* (2003) who reported that the middle income households have the highest community forest use levels.

The percentage of community forest income in the total household income for the poor households was 17.7%, which is much greater, compared to the 4.1% of rich households (Table 3). It clearly indicates that, though the contribution of community forest income to the total household income seems small (5.9%), it appears utmost important to the poor families. Other studies (e.g. Escobal and Aldana 2003; Reddy and Chakravarty 1999) also confirm that poor households derive a relatively large share of their income from forests compared to the better-off households in the same community.

Table 3: Annual per capita income of the sampled households (n=176) according to the income source (in rupees[2]) and income quartile*

Income Class	Agricultural and livestock	Community forest	Other forest	Transfer	Total
Poor	[a]2960 (40.3)	[a]1298 (17.7)	[a]800 (10.9)	[a]2280 (31.1)	7338
Second	[ab]4328 (32.7)	[a]1578 (11.9)	[a]1225 (9.2)	[ab]6123 (46.2)	13254
Third	[ab]4428 (22.1)	[a]1625 (8.1)	[a]1126 (5.6)	[b]12859 (64.2)	20038
Rich	[b]7581(17.3)	[a]1707 (3.9)	[b]1809 (4.1)	[c]32694 (74.7)	43790
All households	4824 (22.9)	1552 (7.4)	1240 (5.9)	[d]13489 (63.9)	21105

Scheffe's means test (in column) followed by a common superscripted imply the mean difference is not significant at 5% level.

*Number in the brackets gives the percentage income from the source in the group.

The figures concerning total forest income support the finding from other studies (e.g. Cavendish, 2000; Fisher, 2004; Vedeld *et al*., 2007; Kamanga *et al.,* 2009) that poor households are relatively more dependent on forest income while richer households derive more forest income in absolute terms; this conclusion is not shared by Adhikari (2005) presenting data from Nepal, however, who finds that richer households also derive more forest income in relative terms.

The average of all forest income of 13.1% (ranging from 8.0-28.6%) indicate that previously published studies on income and livelihoods in the region that ignore the

[2] One US$ =75 rupees.

income from other ftypes of forest (e.g., Bohle and Adhikari, 1998; Blakie *et al.*, 2002, Rijal, 2006) should be read with caution; the same as for studies using the Nepal Living Standard Surveys (e.g., Maltsoglou and Taniguchi, 2004) that do not include forest incomes. A study by Adhikari (2005) reports lower forest incomes (4-8%) but excludes incomes only from other forests forests, deducts labour costs, and includes incomes from community forests; the study is therefore not directly comparable with the present one. Comparable studies from the Nepalese middle hills report slightly lower income ranges of 6-22% (Aryal and Angelsen, 2007) possibly because because these types of incomesare highly contexted and meaning that dependency vary based upon the geographical location.

Compared with studies internationally, the relative total forest incomes of households in the areas are comparable with the ranges normally reported: 9-19% in Sri Lanka (Illukpitiya and Yanagida, 2008), 23-35% in Ethiopia (Babulo *et al.*, 2009), 21-41% in Malawi (Fisher, 2004); 29-40% in Zimbabwe (Cavendish, 2000), and 17-45% in Bolivia and Honduras (Godoy *et al.*, 2002). Comparisons need to take into account that these studies vary somewhat regarding definitions and methods. The result from the present study contributes to the existing knowledge base on forest incomes, and further accentuates the importance of including these in total household account estimates.

Within community forest income the value derived from fuelwood, ground grass, fodder grass, timber and leaflitter are the major source of income. Apart from these, some households also reported the harvesting of green and dry bending materials, and some fruits, herbs and nuts. Community forest income by source and income class is presented in Table 4. Harvesting and distribution of green fuelwood in the entire user groups were carried out collectively in equality basis and the households were required to pay nominal annual fees for the green fuelwood allocated to them by the FUG. Harvesting of some other forest products vary from households to household as per their need and based on the permission allowed by the FUG committee.

Table 4: Household annual per capita income from the products from community forest by income quartile (n=176)

Forest products	poor	second	Third	fourth	All households
Fuelwood	350	493	387	424	414
Ground grasses	466	373	519	484	460
Fodder grasses	46	32	65	78	56
Timber	239	407	331	379	339
Litter and other NTFPs	196	272	323	341	283

Inequality measures

Contribution of per capita income components to total per capita income and income inequality is presented in table 5. The column (1) labelled S_k presents the share of each income source in the per capita total income in the sample. The transfer income has the highest share in the total household income and the other forest income has the lowest. The second column, labelled G_k presents the Gini coefficient for each income source. Inequalities in the income distribution of each income sources are

relatively high; G_k for the community forest income is 0.51 and that for the transfer income is 0.59. In our case, larger Gini for transfer income indicates that the richer households receive larger share of transfer income compared to the poorer households. This result is also supported from the result presented in table 3. The results presented indicate that the income gap between the richest and the poorest in the study area was relatively high. The high Gini in the incomes sources is not only due to the high variation in income that the households generate but also by the fact that some of the households in the sample do not generate or only generate very small amount from these sources. Though, agricultural and livestock income accounts the significant share in total income, it is the lowest unequally distributed income reflected by Gini of 0.50 shown in column (2). This could be because in the study areas, all household irrespective of their income status, participate to generate income agriculture and livestock sources. High or low income source Gini does not necessarily imply that an income source has not an equalizing effect on total income distribution. In our case, all income sources except the transfer income showed some equalizing effect in total income distribution.

Table 5: Gini decomposition by income source

Income source	S_k (1)	G_k (2)	R_k (3)	Share[a] (4)	Marginal Change[b] (%) (5)	$g_k = R_k * G_k/G$ (6)
Agricultural and livestock	0.2286	0.4963	0.4062	0.1190	-0.1095	0.520788
Community forests	0.0735	0.5138	0.0943	0.0092	-0.0643	0.125165
Other forests	0.0588	0.5256	0.3095	0.0247	-0.0341	0.420236
Transfer	0.6391	0.5665	0.9055	0.8471	0.2079	1.32515
Total		0.3871				

[a] It is the share of the income source to overall income inequality computed as:
Column 5= [Column 1 * Column 2 * column 3]/ G, where, G= 0.3871

[b] It measures the iimpact of 1% change in respective income source on overall income inequality

Table 5 column (4) shows the percentage contribution of each of the income sources to total income inequality. The percentage contribution of community forest income to total income inequality is 0.9% which is smaller than its contribution to total income (7.4%) indicating that community forest income has an equalizing effect on total income distribution. Further, looking on the relative effect of a marginal increase of each income source (column 5), we observe that 100% increase in community forest income, other things being equal, would decrease more than 6.4% in overall income inequality. The Gini-coefficient for the total household income was 0.38, but increased to 0.42 when the community forest income was excluded from the calculation. All these results support the argument that community forest income has an equalizing effect on total income distribution in the rural household's economy. Further more, Further more, the relative concentration coefficient (g_k) presented in column (6) shows that only the transfer income (which is greater than unity) is the inequality-increasing income and all other are the inequality-decreasing sources of income. The Gini coefficient, relative marginal effect of forest-environmental income presented here has the strong policy implication that this particular source deals with equity in local income distribution and due attention has to be paid in forestry sector development in the area in reducing poverty.The Gini coefficients, relative marginal effects and the relative concentration coefficient of agricultural and livestock,

community forest and other forest incomes presented here showed the strong policy implication that these particular sources deals with equity in local income distribution and due attention has to be paid in forestry-livestock based agriculture sector development in the area in reducing the local income inequality.

CONCLUSIONS

This research has shown that though the overall income from communal forests in the study area is much less than income from transfer earning and earning from agriculture and livestock, and only slightly higher than income from other forests, the communal forest income is particularly important for poor households who in general are the marginalized and underprivileged groups of the society. Further, the research has also shown that community forests have some equalizing effect on income distribution. Also, it has been shown that the level of forest income as well as the dependence on such income increases with decreasing access to other income sources. From a policy point of view, these findings underscore the importance of securing access to community forests for poor, marginalized and underprivileged households of the CFUGs.

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