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# Economic Contribution of Community Based Forest Protection and Management in Kavrepalanchok District, Nepal

Yogesh Ranjit[1]

**Abstract**

*This paper deals with economic contributions of community participation in forest protection and management program in the rural area of mid-hills district of Nepal. The economic benefits are the use of timber, various types of non-timber forest products and employment generation. Forests also become one of the important sources for income and employment generation to the people living in and around the forests. It contribution's to GDP is very nominal. The major goal of the program is to achieve sustainable management of forests and forest resources by converting accessible national forests into community forests. In Nepal, there were various types of informal traditional forest protection and management activities undertaken by the various indigenous local committees even without any formal forest management policies of the government. But since mid of 1970's, government started a formal program of community participation in forest protection and management and still continue to date. A multiple log linear regression model is used along with t-test, F-test and D-W test. The study reached to the conclusion that forest condition (quality and quantity) of most community forests in the study area is improved after handing over forests to local users. As people are highly dependent upon forests and forest products for income and employment generation, all household members of selected FUGs are generating income and employment from the community forests.*

**Kew Words:** Forests, forest products, community forests, people participation, income and employment generation,

## Introduction

Forest resources play a significant role in the rural household economy. The use of forests has crucial economic benefits through timber and poles for construction of buildings and agricultural tools, bamboo and thatching for roofing, fuel wood for energy, fodder, grass and leaf litter for livestock rearing and preparation of compost fertilizer, medicinal plants for pesticides, and other non-timber forest products (NTFPs). Forests are also being highly used for livestock grazing. The next economic benefits of forestry are the conversion of forestland to farmland and settlement areas but it has not been put under priority of any nation. Basically, forest becomes one of the important sources for income and employment generation to the people living in and around the forests. Similarly, it also provides raw

1 Dr. Ranjit is an Associate Professor at Central Department of Economics, TU, Kirtipur.

materials for forest based industries like timber, paper, plywood, furniture, match, and *Bidi* (cigarette made of leaf) industry, resin tapping, rearing silk warms, rope making, oil extraction, making bowls and plates of broad leaf, netting mates and baskets of bamboo etc. It provides various timber forest products (TFPs) and non-timber forest products (NTFPs) to livelihood for the people living in and around the forests. Therefore, a proper use of forest products, forest protection and sustainable management could contribute to well livelihood of local people. However, it is not a much substantial to the GDP.

It is also estimated that about 61 % of total forests of Nepal is potential for community forests which could be handed over to the local communities for protection, better management and sustainable utilization of forests and forest resources (Tamrakar & Nelson, 1990). By the end of 2014, 35 percent (24,61,549 households) of the population of Nepal is involved in community based forest protection and management (CBFPM) programme through 19,361 Community Forestry User Groups (CFUGs) out of which 1072 are fully women committee members. A total of 18,13,478 hectares of National forest have been handed over as community forests. (DoF, 2014). Forestry sector of Nepal accounts for 15 % of the national GDP (Parajuli, 1997) providing an annual employment to 17.8 % of the economically active population (HMG/N, 1988).

Since the late 20th century, there was a dramatic transformation in forest protection, utilization, and management system of global forest resources. The *'Jakarta Declaration'* of the *'Eighth World Forestry Congress'* in 1978 projected serious forest product supply gaps and warned that these could be averted only by ensuring the economic benefits from better forest utilization, protection and management (Chiong & Javier, 2001). The global forestry priority also dramatically shifted from maximum forest utilization to sustainable utilization and simple management to sustainable management through CBFPM (Houghton, 1990). The strategy of CBFPM is handing over accessible forest areas as community forests to the Forest User Groups for better management and sustainable utilization of forest resources.

In Nepal, there were various types of informal traditional forest protection and management activities undertaken by the various indigenous autonomous local committees in view of quantity, quality, socio-economic, religious, cultural and environmental importance of forests even without any formal forest management policies of the government due to small size of population and sufficient availability of forest resources. On the contrary, the government policy was to encourage people to convert the forestland to agriculture land in order to increase the land-tax revenue of the government. However, people's participation has formally and legally been recognized by the government of Nepal only since mid of 1970's by formulating various forest plans, policies, acts, regulation and guidelines.

However, the major aim of people's participation is to make a continuous availability of the basic forest products by improving the quality, quantity, and density of forests. The major affecting factors of people's participation are physical and environmental conditions of forests, household requirement of forest products, distance between residence and forests, forest laws and bylaws, conciseness and awareness of importance of forests. Besides, government, NGO and INGO are also directly and significantly involving in the development of CBFPM Programmes as a facilitator by providing financial, technical and material supports.



## Review of Literature

Community based forest management system has brought fundamental changes in resource management, utilization and income generation in the rural Nepal. It has contributed in promoting resource governance, enhancing, income generation, and empowering local users to initiate community development activities. Therefore, it can help to bring significant contribution to economic transformation in the changing context of Nepal. (Kanel et. al., 2008). The century-old centralized and controlled forest management system shifted to decentralization in the form of people's participation. The probable reasons of the change will be the fiscal crisis, structural adjustment, economic liberalization policies, pressure from donor agencies for greater accountability and transparency, the recognition of the failure of past approaches by state agencies, and the demonstration effect of successful pilot efforts by NGOs etc. (Thompson.1995). The system is taken as protection and management of forest resources by rural communities that become an integral part of their farming systems (Gilmour & Fisher, 1991). The Community Forest Act - 1993 and Forest Regulation – 1995 provide local people significant control in the management and harvest of forest resources (Ranjit, 2013). Because of this progressive act, community forest hand over process has speeded up rapidly during the last twenty years period. Forestry plays an important role in the livelihoods of rural people and they could get employment generation and earn cash income through the sale of NTFPs which may account for as much as 16 % of total income of households in India (Mallik, 2000).

CBFPM is very progressive and also well known for rural communities in the better utilization and management of forest resources through participatory approach (Kanel et. al., 2008). There is an expectation that CBFPM can bring substantial economic contributions to livelihood improvement and poverty reduction of forest user group. Nepal has made a significant progress in development of forest resources through the CBFPM in late 1970's due to its nature of operation and procedures (Joshi, 2004). CBFPM in Nepal is successful in increasing the greenery of degraded sites, biodiversity and environmental situation forming, local level institutions for revenue management and improving the supply of forest products to farmers in the Hills of Nepal (Acharya, 2003).

A study in the early 1990's reported that NTFP's accounted for 20 % of household income in West Bengal, (Ford Foundation, 1998). Community forestry is clearly contributing to rural people's livelihood (Allison et. al., 2004). Forest products are the major source of income of forest user groups (FUGs) which constitutes about 82 % of their total income and community forest is probably contributing about NRs. 2 billion of Nepal's GDP through forest product alone. In many parts of Nepal, up to a quarter of the total household income is derived from the sale of NTFPs (Malla, 2000). Rural Community still consumes 69 % energy from fuel-wood from community forestry and this percentage has not decreased (Shrestha & Sharma, 2004). The forest use and management would be integrated with strategies of resources use and economic development through the active cooperation and participation of the local people (Nadkarni, 1989). The integration of forest use and management with strategies of economic development is possible only through the active cooperation and participation of the local people (Kandel and Subedi, 2004).

## Objectives of the Study

The main objective of the study is to analyze the economic contribution of forest protection and management through participation of local people living in and around the

forests. So, the paper deals with the economic contributions of CBFPM that are determined by various factors of people participation.

**Research Methodology**

In this section, a brief introduction of the study area, research design, nature and sources of data, population, sample and sampling procedure, tools of data collection, data organization and processing, specification of the variables and model, tools and method of data analysis, and hypothesis testing are presented.

**Study Area**

Kavre Palanchok district is the study area which is purposively selected based on its status as pioneer district in CBFPM in the form of community forestry in Nepal. The district lies in the mid-hills region of Nepal and the center of the district is Dhulikhel that lies about 30 km. of eastern part of Kathmandu city. The district covers a geographical area of 1446 $km^2$ which is surrounded by Ramechhap district in the east, Lalitpur and Bhaktapur in the west, Sindhu Palchowk in the north and Makwanpur district in the south respectively (CBS, 2001). It has sub-tropical and temperate climate. The total households of the district is 80,720 with total population of 3,81,937 out of which 41.90% males and 52.10% females. The average size of household is 4.73 with the population density is 264 per sq. km. (CBS, 2012).

In the past, forests area had been degraded in the district both in quantity and quantity due to several regions like open grazing, unsustainable forest harvesting, ineffective management, lack of property right regime over forest management, ignorance of importance of forests and its sustainable management etc. At this situation, CBFPM programme started by the government initially as piloting project under the community forestry programme with Forest Policy – 1988, Forest Law -1992 and Forest Regulation – 1994. As per the official record of FECOFUN - 2015, Kavrepalanchok, total forest area of the district is 39,565 hector out of which 28,195 (71%) hector becomes community forests area. By mid of 2014, there are 564 FUGs involving 63,155 household members that benefited to 3,20,841 size of population.

**Research Design:-** The study used deductive method applying both descriptive and analytical techniques of data analysis in nature in other to fulfill the given objectives of the study. The descriptive technique is used to explain several economic factors. The analytical technique is used to analyze various factors that determine level of people's participation and thereby enhance economic contribution of forest protection and management by using regression analysis. For economic benefits, it covers only the gross household income (GHY) of forest products.

**Nature and Sources of Data:-** The study is fully based on the primary data and information of CBFPM programme for economic benefits to the local people living in and around the forests. The secondary data and information were also used for introduction of the subject matter and other additional information from various published literatures.

**Population, Sample and Sampling Procedure:-** The population of the study is total household members (63,155) of the total FUGs (564) of the study area by the mid of 2014. Hence, in the beginning, 8 FUGs of the study area were randomly selected namely Dhaneshshwor Baikiwa FUG (Panauti Municipality), Rachma FUG (Thulo Parsel VDC), Kajiko Dhaireni FUG (Panchakhal VDC), Phagarkhola VDC (Chaubas VDC), Hile Jaljale FUG (Tukucha Nala VDC), Bhagaban Thumki FUG (Ugratara VDC), Dharapani Hile FUG and Lakure Rukh Bhulbhule FUG (Bhumlu VDC). The 160 household members were selected (20 household members from each selected FUGs) as sample households by applying lottery method under the assumption of similar characteristics that properly represent for the rest of other household members and FUGs of the study area that are not selected.



**Tools of Collecting Primary Data:-** The primary data and information were collected in the study area through four specific tools like the **'Household Survey'** with a pre-tested structured questionnaire, formal **'Focus Group Discussion'** among the sampled FUGs, forest administrators and other local facilitators, **'Informal Consultation'** with local representatives as key informants in other to develop a better understanding of existing forest protection, utilization and management systems and practices, and **'Participatory Observation'** of the researcher in order to verify the collected data and information with the ground reality of forest protection, utilization and management activities in the study area. The field survey (visit) was carried out by the researcher himself visiting door to door of the selected sampled households during the mid of 2014 with the help of two local representatives who are involving in community forestry work since a long time in the study area.

**Data Organization and Processing:-** After completed field survey, the collected data and information were organized and processed as per the given objectives and hypothesis of the study through the simple calculation.

**Specification of the Variables and Model:-** The study used a multiple log-linear regression of gross household income (GHY) as a dependent variable which is the sum of monetary valuation of direct tangible benefits of timber, small timber, pole, firewood, fodder, grass, leaf litter, medicinal plants, herbs, fruits, and nuts received from community forests. So, as the collection of the volume of those forest products increases, the GHY of the households also increases. However, GHY depends upon seven independent variables like people's participation index (PPI), size of land holding (SLH), number of livestock keeping (NLSK), number of household members (NHM), distance between residence and community forests (DRCF), distance between residence and government forests (DRGF), and distance between residence and main market (DRMM). Hence, the general multiple log-linear regression equation is given as -

$$\ln Y = \square + \square_1 \ln X_1 + \square_2 \ln X_2 + \ldots\ldots + \square_n \ln X_n + e_n. \qquad \text{(Gujarati, 2006)}$$

Where, $Y$ = GHY as dependent variable

$X_i$ = Several independent variables (where, i = 1, 2, 3, 4.....n)

$\square$ = Constant term

$\square_i$ = Parameters on independent variables (where, i = 1, 2, 3, 4.....n)

$e_n$ = Error term.

**Tools of Data Analysis:-** Different types of statistical and econometric tools were used for data analysis and interpretation like coefficient of multiple correlation, multiple log linear regression, coefficient of determinants, adjusted coefficient of determinants, stander error of the parameters, t-test, F-test, and auto-correlation. The statistical computer package of 'Microsoft Excel' and *'SPSS'* were used for data analysis.

**Hypothesis:-** The study pre-assumed that there is a significant positive relationship between GHY and PPI along with other selected independent variables as mentioned above. The hypothesis is tested by using t-test for the regression coefficients and F-test for the linearity of the fitted equation (model) at 0.05% level of significance as per the respective degrees of freedom.

**Data Presentation and Analysis**

In the study area, community forests have directly or indirectly provided income and employment opportunities to the household members of FUGs in making closures of forests, plantation, silvicultural (like thinning, pruning and weeding), local infrastructure development activities, livestock keeping, cottage industry, and forest guard etc. Besides, the sample households are generally collecting the forest products like timber, fuel wood, fodder, grasses, and life litter. Hence, it shows that community forestry is providing income generation and employment opportunities to the household members of FUGs. It means the household's economic activity is the function of the use of forest resources, forest protection and management. In this study, however, the income generation in terms of basic forest products and forest management through people's participation are taken as the gross household income (GHY) from community forests. However, the degree of people's participation in forest protection and management is determined by area under forests, its density and geographical features and some other factors.

So, the GHY is taken as the dependent (response) variable and some social, economic and physical factors are taken as independent (explanatory) variables like the people's participation index (PPI), size of land holding (SLD), number of livestock keeping (NLSK), total household members (THM), distance between the residence and community forests (DRCF), distance between the residence and government forests (DRGF), and distance between the residence and main market (DRMM). But other variables that may significantly affect to the process of GHY are not included in the model due to some constraints of the study. Therefore, a multiple log-linear regression model is drawn in order to observe the degree of change in GHY with any change in the given explanatory variables as given below.

**Results of Regression Analysis for Economic Contribution (GHY)**

The multiple log-linear regression equation of the study is given as -
$\ln GHY = \square + \square_1 \ln X_1 + \square_2 \ln X_2 + \ldots\ldots + \square_n \ln X_n + e_n$.

| Coefficients | Expected Sign | Values | Standard Error | t-value | P – value |
|---|---|---|---|---|---|
| Constant ($\beta_0$) | | 1.923 | 1.417 | 1.357 | 0.8035 |
| PPI ($\beta_1$) | + | 0.608 | 0.355 | 2.008 ** | 0.0021 |
| SLD ($\beta_2$) | + | 0.502 | 0.141 | 3.568 | 0.0301 |
| NLSK ($\beta_3$) | + | 0.038 | 0.188 | 2.200 ** | 0.0032 |
| THM ($\beta_4$) | + | - 0.282 | 0.296 | -0.953 | 0.6051 |
| DRCF ($\beta_5$) | - | - 0.060 | 0.189 | -2.317 ** | 0.0306 |
| DRGF ($\beta_6$) | + | 0.282 | 0.310 | 2.912 ** | 0.0037 |
| DRMM ($\beta_7$) | + | 0.236 | 0.148 | 1.660 | 0.0243 |
| Summary Statistics | Multiple r = 0.840, $R^2$ = 0.652, Adj.$R^2$ = 0.571, F-value 2.633, P-value = 0.00013, D - W value = 2.669, N = 160 | | | | |

Source: Author's Calculation, Level of significant = 0.05%.



The table shows that the expected sign of all predictors in the model (except THM) became as the expected sign of coefficients which show that a 100 percent increase in any of predictor with positive sign leads to increase in the response (dependent) variable by the respective percentage of each predictor with remain constant other variables. If the people's participation index increases by 100 percent, GHY will increase only by 60 percent and so on other predictors.

But the expected sign of THM became negative sign in the model as it shows 100 percent increase in THM that leads to reduce the GHY by 28.2 percent. But the sigh of the result is unexpected and also theoretically opposite. Such result of unexpected sign of coefficient may be due to the existence of multicollinearity problem among the given explanatory variables.

Similarly in the table, 84 percent multiple correlation coefficients reveals that the given all variables are highly correlated. Again, the value of coefficient of determinants shows that 65.2 percent of the total variation in the response (dependent) variable (GHY) is explained by the variation in the given explanatory (independent) variables. Moreover, 57.1% of the total variation in the response (dependent) variable (GHICF) is explained by the fitted regression equation.

Similarly, if the p-value is less than α percent level of significant (p-value < α), reject the null hypothesis by accepting alternative hypothesis and concluded that the regression coefficient is statistically significant that means there is considerable relationship between the given independent and dependent variable. The table revels that the p-values of all given coefficients (except THM) are less than α percent level of significant so that the null hypothesis is rejected by concluding statistically considerable relationship between the given independent and dependent variables. But, the p-value of coefficients of THM in the model is higher than α percent level of significant so that null hypothesis is accepted by concluding statistically insignificant of the regression coefficient on GHY. It may be due to existence of either inappropriate number of household members in forest harvesting or carelessness of number of participation in forest harvesting or using incorrect method of forest harvesting or incorrect and insufficient available data.

Similarly, the p-value for overall goodness of fit in the model is less than α percent level of significance so that the null hypothesis is rejected by concluding statistically significant of the regression equation. Again, the calculated D-W value of the model is greater than its tabulated value at upper level ($D\text{-}W > d_U$) at 5% level of significance. Hence, it concludes that the error terms in the model is said to be no positively auto-correlated.

**Conclusion**

Before the introduction of CBFPM programs, all users living in and around forests were able to collect most forest products free of cost at any time. But it degraded forest condition, supply of forest products, bio-diversity, environment, and ecological balance. So, CBFPM programmes restricted free access to collect forest products in order to improve the forest condition in the study area. Consequently, forest condition both in quality and quantity of most community forests in the study area is improved after handing over forests to local users. As people are highly dependent upon forests and forest products for income and employment generation, all household members of selected FUGs are generating income and employment from the community forests. But the amount of GHY differs among the FUGs. Basically, FUGs generate income from external sources by selling various forest products like timber, round poles, dry and green fuel wood, leaf litter, fodder, and tree seeds etc.

Similarly, most of FUGs of the study area receive income from internal sources like membership fees, fines and penalties levied on members who break the rules and regulation of forest protection and management. Most FUGs spend their income on different activities such as salaries for school teachers and forest guards (watchers), construction and improvement of rural road, foot trail, electricity systems, drinking water, irrigation canal, community building, temple, soil conservation works, nursery and plantation, and temples etc. However, the major challenges of CBFPM in the study area at present are how to make much meaningful involvement of local people for better forest protection and management so that they will get sustainable economic benefits and employment generation. Hence, it is to be concluded that CBFPM programs have played an important role in improving quality, quantity, and density of forest and thereby enhance income and employment generation for household members of FUGs living in and around the forests.

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