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Integating Economic Benefits with Participatory Forest Management in Kaski District, Nepal

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Abstract

Forests provide direct and indirect economic benefits to the people at household level. The paper investigates and tries to determine the role of participatory forest management on household income of people living in and around the forests in the study area. Basically, forests provide basic products of timber, poles, fuel wood, twigs, fodder, grass, leaf litter, and non-timber forest products (NTFPs) for various uses. So, the paper deals integrating economic benefits of the local people living in and around the forests with their participation in forest management activities. The main objective of the study is to examine and analyse the economic benefits from people's participation as major determinants in the study area. The multiple regression model has been used to estimate the economic benefits in terms of gross household income as dependent variable and people participation index along with other socio-economic factors are used as independent vaiables. Besides, simple correlation, multiple correlation, coefficient of determinants, adjusted coefficient of determinants, t-test, F-test and D-W test are also used. The study found that as local people significantly participate in forestry programme, they could receive more income and employment generation and the gross household income is highly and significantly determined by people participation index.

Key Words: Forests, Forest products, Non-timber forest products, Economic benefits, Forest user groups, Participatory forest management.

Introduction

Forests are the significant renewable natural resources of Nepalese economy. Government of Nepal has a policy to maintain at least 40 percent of total geographical area of the nation with forests. Forests cover 40.36 percent (42,688 km^2) and shrub area covers 4.38 percent (15,592 km^2) of the total geographical area of the nation (MoF, 2016).Forestry is an extensive land use system in Nepal that provides a vast array of goods and services to human being. Forests provide both direct and indirect benefits to income of local people at household level and national economy for economic growth and development of Nepal. The common economic benefits of forest products are timber and poles for the construction of building, agricultural tools, and shed for livestocks; livestock grazing; fodder, grass and leaf litter for livestock rearing, log and fuel wood for energy, preparation of compost fertilizer,

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bamboo and thatching for roofing, medicinal plants for pesticides, and other non-timber forest products (NTFPs) for income and employment generation basically to the people living in and around the forests. Similarly, it provides raw 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.

Similarly, forests are also home and natural habitat of various types of flora (bio-diversity of plants) and fauna (birds, wildlife animals, mammals, reptiles, and insects etc). Besides, a proper use and management of forests also provide important services of ecological functions like development of eco-tourism, biodiversity conservation, environmental protection, erosion control, ecological balance of the nation, and carbon dioxide consumption, etc. Therefore, a proper use of forests, forest products, and its effective management contribute to income, output and employment generation at household and national level that also helps in reduction of poverty level of the nation.

Nepalese people have a common practice of properly using forests, forest products, forest protection and management activities since very long time. Traditionally, there were various types of informal forest management activities undertaken by the various indigenous and autonomous local forests management committees. The results were better in view of physical, socio-economic, religious, cultural and environmental importance. At that time, there were no any formal forest policies of the government of Nepal and formal forest management practices due to a large size of forest resources availability with a small size of population. However, it has formally and legally been made only since mid 1970's by formulating various government forest plans, policies, acts, regulation, and guidelines. It is also estimated that about 61 percent of total forest in Nepal is the potential community forests which could be handed over to the local communities for protection, management and sustainable utilization (Tamrakar and Nelson, 1990).

Basically, people participate in forest management activities for regularly availability of the basic forest products for livelihood of the people living in and around the forests, socio-economic development of the forest users, and to improve in overall quality, quantity, and density of forests. It also helps to stop conversing forestland to farmland and settlement areas. In this regard, government and I/NGOs can also play a significant role as facilitators by providing financial, technical and logistic supports to the forest users.

Review of Literature

Forestry sector of Nepal accounts for 15 percent of the national GDP (Parajuli, 1997) providing an annual employment to 17.8 percent of the economically active population. It has been estimated that forestry sector has a contribution of 4.4% to the total GDP of Nepal during the period of 1990 to 2000 (FAO, 2004). Forestry sector contributed 15 percent to the agriculture gross domestic product (AGDP) of Nepal. However, it is not a substantial to the national GDP in comparison to the contribution from the agricultural sector. It has estimated that in 2015 agriculture together with forestry sector has contribution of 31.2 percent to the Gross Domestic Product (GDP) of Nepal (MoF, 2016).

Forestry sector has become an important part of livelihood of rural people that helps for income and employment generation throughout the year (Sunderl in et. al., 2003). Participation of rural people in forest management is clearly contributing rural people's livelihood (Allison et. al., 2004).Rural people could earn cash income through the sale of

NTFPs which may account for as much as 16 percent of total income of households in India (Mallik, 2000). In most of the forest user communities, women are primary users and collectors of forest resources like fuel-wood, fodder, grass, fallen leaves and NTFPs for domestic as well as commercial purpose. For rural women, income from NTFPs is particularly important. A study in the early 1990's reported that NTFP's accounted for 20 % of household income in West Bengal (Ford Foundation, 1998).

Nepal has made a significant progress in development and utilization of forest resources through the actively participation of local people in forest management activities (Joshi, 2004). 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). As people are highly dependent on forests and forest products, most of the forest user communities are generating income and employment from community forests (Ranjit, 2014). Although the contributions of community based forest management carry significany economic values there is a growing concerned that these contributions are not well accounted and reflected in GDP of Nepal (Kanel et. al., 2010).

Forest products are the major source of income of forest user groups (FUGs) of Nepal. It 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 and 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). People's participation in forest management has become most effective vehicle for income and employment generation in Kavre Palanchwok district of Nepal (Ranjit, 2011). But forest products have not been equally distribution due to less involvement of poor, women, and landless and disadvantaged group in decision-making (Shrestha & Sharma, 2004). The participation of women and DAGs in forest protection, management and decision-making is still low but gradually increasing over time period. Increased resources availed due to community forestry will result in a situation in which the household members of FUG are achieving incomes above the poverty line (Sharma and Dangi, 2013).

Objective of the Study

The main objective of the study is to investigate and analyze the integrating participatory forest management with income of people living in and around the forests at household level in the study area as forests provide direct and indirect economic benefits to them. So, the paper deals with the economic analysis of income through forests and other factors including participation of people in forest management activities and that helps in household income and employment generation of local people living in and around the forests.

Research Methodology

Site Selection

This study is mainly based on the field experiences of the author in Kaski District (Fig. 1) that falls under the Western Development Region of Nepal (Fig. 2). The site selection of Kaski District was done in consultation with forestry personnel and District Forest Office, Kaski, Pokhara. Potential sites in the district were explored to match the research objective. After careful study on all potential sites, five FUGs of Kaski District were purposively selected for the study namely Bamdibhir, Pragatishil, Phurketari, Sundarban Batika and Situm Kasyari FUGs.

Figure – 1: Map of Kaski District

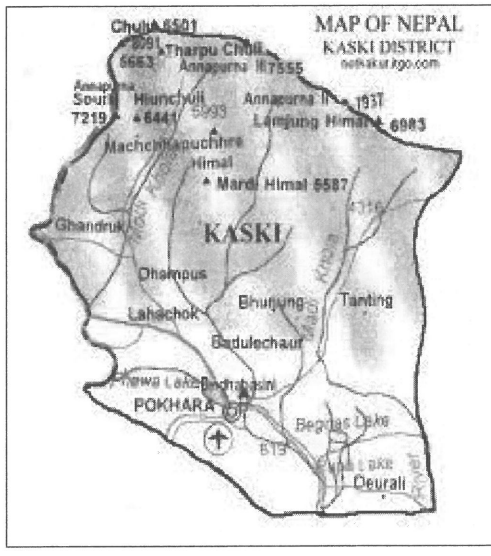
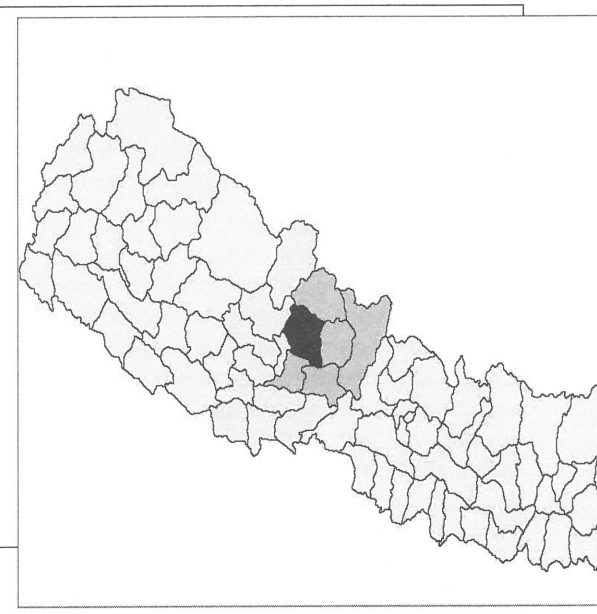


Figure -2: Map of Nepal



Introduction of the Study Area

The Kaski District (fig.1) covers an area of 2017 km^2 which is 1.37 percent of the national geographical area. The district spreads between $28^0.6^1$ to $28^0.36^1$ north latitude and $80^0.40^1$ to $84^0.12^1$ east longitude. Altitude (elevation) of the district varies across the district from 450 m in the south to8091 m in the north. Due to variations in the geographic and climatic zone in the district, there is variation in availability of vegetation too i.e., sub-tropical broad-leafed forest, temperate forest, sub-alpine forest, and alpine forest. It has sub-tropical and temperate climate. The district is surrounded by Lamjung district in the east, Myagdi in the west, Manang in the north, Syangja and Parbat in the south, and Tanahun in the east-south respectively (CBS, 2012). The center of the district is Pokhara which is located at 200 km. west from Kathmandu, capital city of the nation.

Kaski district covers 93649 ha, of forests out of which 31 percent is under the jurisdiction of district forest office and 69 percent is under Annapurna Conservation Area Project (ACAP). Overall, 68.22 percent (19,495 ha) of the total potential community forestry area has been handed over to 46,692 households of 508 FUGs by 2015(DFO, 2016). According to the population census 2011, the total population of the district is 492,098 out of which 48.04 percent is male and 51.96 percent is female with 92.44sex ratio and population growth rate of 2.57 percent per annum. The total household is 125,673 with 3.92size of average household (CBS, 2012).

Research Design

The study is designed in accordance with the given objective of the study. So, it is fully based on primary data related to participation of people in forest management work and various forest products for economic benefits of the local people in the study area. It is an explorative type of study using deductive method. The study followed both of descriptive as well as analytical methods of data analysis. In descriptive method, several socio-economic factors were used in presenting various tabular forms. In the case of model analysis, it used gross household income through forest products (GHY) as dependent variable and few socio-economic factors as independent variables.

Population, Sample and Sampling Procedure

The size of population of the study is all household members of 508 FUGs as that were formed in Kaski district by the end of 2015(DFO, 2016). The size of sample of the study is 125 households that were randomly selected through two stages of sampling procedures. In the first stage, 5 FUGs were purposively selected with variation in caste, ethnicity, income and expenditure that could represent the whole study area. In the second stage, 25 households from each selected FUGs were randomly selected by applying lottery method without replacement assuming that the selected households would properly represent for the socio-economic diversities of the rest of other households. A Brief characteristic of sampled FUGs are made as shown in given table 1.

Table 1: Major Characteristics of Sampled FUGs in the Study Area

Names of FUGs Particulars	Bamdibhir FUG	Pragatishil FUG	Phurketari FUG	Sundarban Batika FUG	Situm Kasyari FUG
Date of Registration	1993	1992	1991	1992	1991
Forest area covered	49 ha.	58 ha.	16 ha.	19 ha	162 ha.
Total HH members	139	341	48	114	181
Major tree and fodder species availability	Chilauni, Mauwa, Katus, Nallto	Chilauni, Sal, Sioss, Khair	Utish, Paiun, Katus, Mauwa	Utish, Paiun Ipilipi, Paiun	Sal, Katus Chilauni, katus
Major animal and bird species availability	Tiger, Leopard, Deer, Dove,	Monkey, Dove Fox, Nightingale	Deer, LeopardDove, Nightingale	Fox, Deer, Dove Long-tailed bird,	Tiger, Nightingale Deer, Leopard
Major NTFPs and medicinal plant available	Bamboo, Nigalo, Amliso	Kamaro, Gurjo Amala, Kamaro	Amiro, Aisenlu Titepati	No major Specific	Bamboo, Nigalo, Amiro Jayan
Exe.Com. members	11	13	11	11	11
Chairperson through	Selection	Selection	Election	Election	Selection
Given period of E.C.	2 Years	2 Years	2 Years	2 Years	2 Years
Meeting of E. Comt.	Once a month	Once a month	Once a Month	Once a Month	Once a Month
Meeting of Gen. Body	Once a Year	Once a Year	Once a Year	Once a Year	Once a Year

Source: FUG Offices ofKaski, 2016

Tools and Methods of Data Collection

The study is fully based on primary data. The required primary data and information were collected by using four instruments. The first instrument is the 'Household Survey' in the study area through a pre-tested structured questionnaire. The field survey was carried out by

the researcher himself visiting door to door to the sampled households with the help of local representatives. The second instrument is the 'Informal Discussion' on various issues related to their participation in forest management for income - employment generation that washeldat the common place of the study area. The third instrument is the semi-formal key informants discussion among local representatives from various sectors like teachers, social workers, senior citizens, FUG committee members, political leaders, district and range-post level forest officials, and other knowledgeable persons of the study area in other to better understand about existing people's participation in forest management work and forest products through a set of guidelines. The fourth instrument is the 'Participatory Observation' of researcher himself in order to verify the collected information with the ground reality like forest management practices, forest products, agricultural product, livestock keeping practices, forest condition in quantity, quality, and density in the study area.

Data Organization and Processing

After conducting field survey, the collected data and information were systematically organized along with five steps of data processing like data editing, coding, classification, tabulation and calculation in accordance with the nature of the study, and availability of data and information in order to achieve the answer of the given research questions and fulfilled desired objective.

Tools and Method of Data Analysis

Simple mathematical, statistical and econometric tools were used for data analysis and interpretation like table, percentage, ratio, average, coefficient of multiple correlation, multiple regression, coefficient of determinants, adjusted coefficient of determinants, stander error of the parameters, t-test, F-test, and auto-correlation through the statistical shoftweare of 'Microsoft Excel' and *'SPSS 16'* for data analysis etc.

Specification of the Model and Variables

The study used a multiple log-linear regression in which gross household income (GHY)is used as dependent variable. It is the sum of gross monetary income received by households from direct tangible benefits of collecting and harvesting timber, small timber, pole, firewood, fodder, grass, leaf litter, medicinal plants, herbs, fruits, and nuts etc. So, as the collection of the volume of those forest products increases, the GHY also increases and vice versa. The GHY generation directly depends upon several independent factors like people's participatory index (PPI) which is the index of households participation in forest protection, management and harvesting activities and it is the core independent variable of the model. Besides, there are also few counter independent variables related to the household income like size of land holding (SLH), number of livestock keeping (LSK), number of household members (HHM), distance between residence and community forest (DRCF), and distance between residence and main market (DRMM), Hence, the general log-linear regression equation is given as

$$\ln Y = \alpha + \beta_1 \ln X_1 + \beta_2 \ln X_2 + \ldots\ldots\ldots + \beta_n \ln X_n + e_n \text{.(Gujarati, 2006)}$$

Where,

Y = Dependent variable

X_i= Several independent variables (where, i = 1, 2, ……..n)

α = Constant term

β_i = coefficient of independent variables (where, i = 1, 2, ...n)

en. = Error term.

Relating the general equation into the study, it becomes like -

$$\ln GHY = \alpha + \beta_1 \ln PPI + \beta_2 \ln SLH + \beta_3 \ln LSK + \beta_4 \ln HHM + \beta_5 \ln DRCF + \beta_6 \ln DRMM + e_n.$$

Hypotheses of the Study and its Testing

The study shows that the availability and use of forest products have a significant relationship with the given independent factors. Especially, the GHY is positively and significantly affected by the PPI, SLH, LSK, and HHM. But it is negatively and significantly affected by distance between residence and community forests (DRCF) and distance between residence and main market (DRMM) as people depend less on the forest products. These hypotheses were tested by using t-test for the regression coefficients and F-test for the fitted model (equation) at 0.01, 0.05 and 0.10 percent levels of significance as per the respective degrees of freedom.

Results and Discussion

In the study area, the sample households are generally collect the forest products like timber, fuel wood, fodder, grasses, life litter and other NTFPs. People participation in forest protection and management directly or indirectly provide income and employment opportunities to the people living in and around the forests in making closures of forests, plantation, silvicultural (like thinning, pruning and weeding), local infrastructure development activities, livestock keeping, cottage industry, and forest guard etc. Hence, it shows that people's participation in forestry protection and management is providing income and employment generation to the household members of FUGs. It means that the household economic activity is the function of the use of forest resources and forest management. Similarly, some factors related to physical environment like the distance between the residence of FUGs to community forests, and community forests to main market etc. In this study, however, the income generation in terms of basic forest products through participation in forest management is taken as the GHY from forestry programme.

Correlation Analysis

The study shows that there is a highly correlation between the GHY with PPI, SLH and LSK. Similarly, there is only some relationship between GHY with DRCF and DRMM. But, there is weak relationship between GHY and HHM as shown in given table - 2.

Table 2: Correlation Coefficients between Dependent and Independent Variables

Variables	GHY	PPI	SLH	SLK	HHM	DRCF	DRMM
GHY	1	0.9845	0.9334	0.9523	0.4254	-0.6235	0. 6721

Source: Author's own calculation.

Regression Analysis

The regression analysis shows the role of independent varials to the given dependent variable. In the study, the GHY is taken as the dependent (response) variable and

otherselected 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 (LSK), total household members (HHM), distance between the residence and community forests (DRCF), and distance between residence and main market (DRMM). Therefore, a log-linear multiple regression models is drawn in order to examine the percentage change in given independent (explanatory) variables to dependent Variable (GHY) as given below.

Table 3: Results of Regression Analysis

Coefficients	Expected Sign	Values	Standard Error	t-value	Summary Statistics
Constant (β_0)		1.923	1.417	1.357	r = 0.840
PPI (β_1)	+	0.758	0.355	2.008 *	R^2 = 0.706
SLD (β_2)	+	0.482	0.141	3.568*	Adj.R^2 = 0.641
LSK (β_3)	+	0.638	0.188	2.200 **	F-value = 2.633 **
HHM (β_4)	+	- 0.363	0.296	- 0.953	D-W value = 2.669
DRCF (β_5)	-	- 0.460	0.189	-2.317 **	N = 125
DRMM (β_6)	+	0.236	0.148	1.660***	

Note: Single asterisk denotes * significant at 1%; double asterisk denote ** significant at 5%; and triple asterisk denote *** significant at 10%.

Source: Author's own calculation.

The table-3 reveals that all predictors in the model have become as the expected sign of coefficients but not the HHM. The positive sign shows the positive role of independent variable to dependent variable where as the negative sign shows an inverse role of independent variable to dependent variable.

The table further reveals that there is a strong and positive correlation among the given dependent and independent variables with the value of multiple correlation 84 percent. The value of coefficient of determinants shows that 70.6 percent of the total variation in the dependent (response) variable (GHY) is explained by the variation in the given independent (explanatory) variables. Rest of 29.4 percent variation in the GHY is explained by some other variables. Similarly, 64.1 percent of the total variation in the dependent (response) variable (GHY) is explained by the fitted regression equation.

The coefficient of β_1 shows that 10 percent increase in PPI leads to increase in GHY by 7.58 percent. The coefficient of β_2 shows that 10 percent increase in SLH leads to increase in GHY by 4.82 percent in which alternative hypothesis is accepted even at 1 percent level of significant. Similarly, the coefficient of β_3 shows that 10 percent increase in LSK leads to increase in GHY by 6.38 percent. Again, the coefficient of β_4 shows that 10 percent increase in HHM leads to decrease in GHY by 3.63 percent. Similarly, the coefficient of β_5 shows that 10 percent decrease in DRCF lead to increase in GHY by 4.60 percent. Finally, the coefficient of β_6 shows that 10 percent increase in DRMM leads to increase in GHY by 2.36 percent. Among the given independent variables in the model, the coefficient of PPI became highest as there is a strong and significant role of participatory forest management on GHY.

Similarly, as the calculate t-value of independent variables of PPI, SLH, LSK, DRCF and DRMM in the model is greater than its tabulated value ($t_{cal}>t_{tab}$) at different level of significance. The coefficients of $\beta_1$and$\beta_2$arestatistically significant even at 1 percent level of

significance, the coefficients of $\beta_3$and$\beta_5$arestatistically significant at 5 percent level of significance, and the coefficient of $\beta_6$is statically significant only at 10 percent level of significance by rejecting null hypotheses. But the calculate t-value of HHM is less than its tabulated value ($t_{cal} < t_{tab}$) so that the coefficient of $\beta_4$isstatically insignificant even at 10 percent level of significance. It concludes that the variable is not significantly affecting on GHY. It may be due to meaningless participation of HHM in forest management work, orcarelessness participation in forest harvesting, or using incorrect method of forest harvesting, or incorrect and insufficient available data.

Again the calculated F-value for overall goodness of fit in the model is greater than its tabulated value ($F_{cal} > F_{tab}$) at 5% level of significance. Hence, it could be concluded that the regression equation is statistically significant by rejecting null hypothesis of the study. Similarly, 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

The study shows that there is highly correlation between the GHY and PPI than other independent variables. The people participation has become the most effective vehicle for forest protection, management, and sustainable development. As local people more participate in forestry programme, they could receive more forests and forest products for income and employment generation. The GHY is highly and significantly determined by PPI and thereby LSK and SLH. However, the distance between residence and community forests (DRCF) and distance between resident and main market (DRMM) weak determinants. Moreover, the number of household member does not seem effective in the study area. Therefore, for effective people's participation in forestry programme, the government, I/NGOs and other stakeholders should play the advisory role as a partner, facilitator and technical supporter. However, the current major challenges are how to make meaningful involvement of local people in better forest protection, management and sustainable development they could get more and sustainable income and employment generation, poverty reduction, and ecological promotion.

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