Rhetoric and Reality of Biodiversity Conservation in Community Forests of Nepal

Submitted by

Sujata Shrestha, PhD Candidate

University of Massachusetts Boston

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Executive Summary

Although community forestry of Nepal is regarded as a successful natural resource management program, its role in maintaining or enhancing forest cover and biodiversity conservation is largely unknown. Nor do we know much about the economic contribution of community forests (CFs) on household economy of forest user groups. This study uses tools of geospatial, natural and social sciences to quantify the role of CFs in forest cover change and to measure the economic contribution of CFs on household economy of Community Forest User Groups (CFUGs). We also analyze the participation of CFUGs on CFs' conservation, management and utilization activities. Overall we found that the increase in forest cover in areas where forest management is under local forest user groups, however, very nominal contribution of community forests income in household economy. We also found that the gender differentiation in perception of direct benefits of community forests. The male perceive more diverse and direct benefits of community forests on rural livelihoods than female do nevertheless, female members of the households visit forests more frequently than male do to collect forest products.

1. Introduction

Rural households in developing countries mostly use forests for their subsistence use such as timber, fuelwood, fodder and medicine (World Bank 2004, Sunderlin et al. 2005). To benefit the local populations in rural areas, with combine environmental conservation and economic development, the management of forests was transferred from centralized government management to the local user groups, most visibly in developing countries (Agrawal 2001).

The community forestry program in Nepal, initiated three decades ago, has now become one of the major forestry programs in Nepal. Under this program local communities manage and protect forests and receive ecosystem services- mainly provisional services from the forests. With increasing importance of carbon sequestration services of forests in the age of climate change, community-managed forests of Nepal are considered as one of the potential forested areas to implement REDD+ (reducing emissions from deforestation and forest degradation) program. REDD+ pilot project was performed in CFs of Nepal from 2009-2013. The REDD+ program that initially focused only on carbon stock enhancement, later insisted on multiple forest functions including biodiversity conservation (Dickson and Kapos 2012).

Visual observations and anecdotes suggest that CFs have increased forest cover and improved forest conditions (Banskota 2000). Even though community forestry program was initiated three decades ago, a quantitative measurement of the program's contribution to forest cover change is lacking. The national forest cover data in Nepal has not been updated since 1999 (FAO 2009). The available information based on local level studies is fragmented. Generally, visual observation is the only means to evaluate the role of CFs on forest cover change. Therefore, this study intends to quantify the forest cover change as a result of community forestry program at a regional level. The study will also review the existing forest policies/programs and will help to formulation of new policies, as community forestry in Nepal is headed towards a new paradigm of forest utilization after 30 years of forest conservation (Kanel and Acharya 2008). This study will evaluate access, manage and use of CFs to CFUGs based on diverse socio-economic factors of the users.

2. Project Objectives

1. To quantify the forest cover change in the community forests of Ludikhola watershed in Gorkha district.
2. To carry out the ecological survey in five community forests of Ludikhola watershed in Gorkha district.
3. To find out the socio-economic contribution of community forests on household economy of community forest user groups (CFUGs).
4. To document the CFUGs forest management activities and silvicultural practices.

3. Study Area

The study was conducted in Ludikhola watershed of Gorkha district of Nepal. Gorkha district is located in western developmental zone of Nepal. The district head quarter of Gorkha district, which is about 150 km West from Kathmandu—a capital city of Nepal. It has 449 CFUGs of 49,901 households that manage 21,376 ha (19% of total forest areas of Gorkha District) of forest areas (DoF 2013). Ludikhola watershed with an area 1,888 ha, is situated in southeastern part of district head quarter of Gorkha district (Figure 1). It is one of the REDD+ pilot project areas.

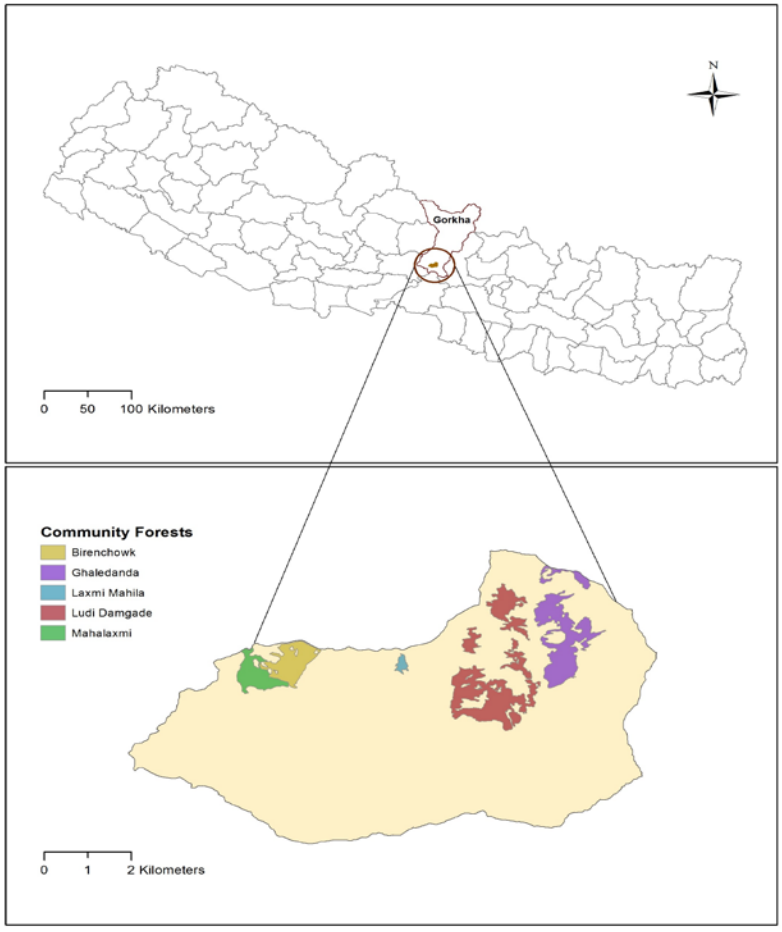

Figure 1. Map showing the study area.

4. Data Collection

The field study was carried out in two scales—forest change monitoring at a regional scale and socio-economic surveys at a local scale.

Land use land cover change: The quantification of the land use land cover change in three different periods (1989, 1999, 2014) was carried out in Ludikhola watershed of Gorkha district. The forest cover map was produced by using freely available Landsat imagery using ArcGIS 10.3 software. We used supervised classification to classify the Landsat image of the study area. Map of Ludikhola watershed was developed using topographic and political maps of the study area. Community forests' boundary was obtained from International Centre for Integrated Mountain Development (ICIMOD). To find out the land use land cover change in inside and outside CFs we selected 31 CFs from Ludikhola watershed. We divided the land use of the study area into four major land use land cover classes such as agriculture, bushes and barren areas, forest and settlement (table 1).

Table 1. Definitions of land cover classes

S.N.	Land cover classes	Description
1	Agriculture	Agriculture lands are currently cultivated lands
2	Bushes and barren areas	Areas with the herbs/shrubs and with no vegetation cover
3	Forest	Land covered with the trees
4	Settlement	Land covered by the humans for the settlement

Socio-economic analysis: Five CFUGs were selected from Ludikhola watershed of Gorkha district by using well defined criteria of accessibility, comparative physiography, vegetation composition, management history (≥15 years), and forest size (≥20 ha). One CFUG that has forest size (<20ha) was also selected to include female managed CFUGs. The names of the five CFUGs are Birenchowk, Ghaledanda, Laxmi mahila, Ludidamgade, Mahalaxmi (table 2). These CFUGs comprise 1409 users' households and 8232 dependent population that manage 584 ha forest areas. For the household survey in our study area, I selected about 20% of the households from each CFUGs which comprises less than 500 households and 10% of the households from each CFUGs which comprises greater than 500 households. The total of 176 households were randomly selected for the interview. Moreover, CFUGs operational plans and meeting minutes were also reviewed.

Table 2. List of the five CFUGs.

Community Forestry User Groups	Area (Ha)	Number of Users' Household	Dependent Population	Number of interviewed households
Birenchowk	83	198	1082	30
Ghaledanda Ranakhola	194.18	513	3173	51
Laxmi Mahila	8.1	95	598	20
Ludi Damgade	241.15	522	2892	46
Mahalaxmi	58	81	487	29

5. Result and Discussion

5.1. Land use land cover change in Ludikhola watershed of Gorkha district

We classified land use land cover of the study area for three different time periods (1989, 1999, 2014) and calculate the change in inside and outside CFs of Ludikhola watershed. The area covered by different land use land cover type is given in table 3. Our result shows that agricultural lands, bushes and human settlement was increased inside the 31 CFs from the year 1989 to 1999, whereas forest land was declined. Similarly the areas of agricultural land and forest lands were increased whereas bushes and barren areas and human settlement areas was decreased in last 15 years (1999-2014). The increase in forest areas and decrease in bushes and barren areas may be due to the growing of planted trees by CFUGs during community forest management practices in last 15 years period. In the whole Ludikhola watershed, the agricultural lands and human settlement areas were increased and bushes and barren areas and forest areas were decreased from the year 1989 to 1999. Similarly, bushes and barren areas, forest areas and human settlement areas were decreased and only agricultural areas were increased from 1999 to 2014 in the watershed. The maps are presented in figure 2.

Table 3. Land use land cover change 1989-2014.

Land cover classes	Area (ha)			
	1989-1999		1999-2014	
	Ludikhola watershed	Inside 31 CFs	Ludikhola watershed	Inside 31 CFs
Agriculture	69120	4734	91467	24669
Bushes and barren areas	-23805	2700	-22005	-22986
Forest	-62973	-8181	-52326	1169
Settlement	17658	1935	-17136	-1800

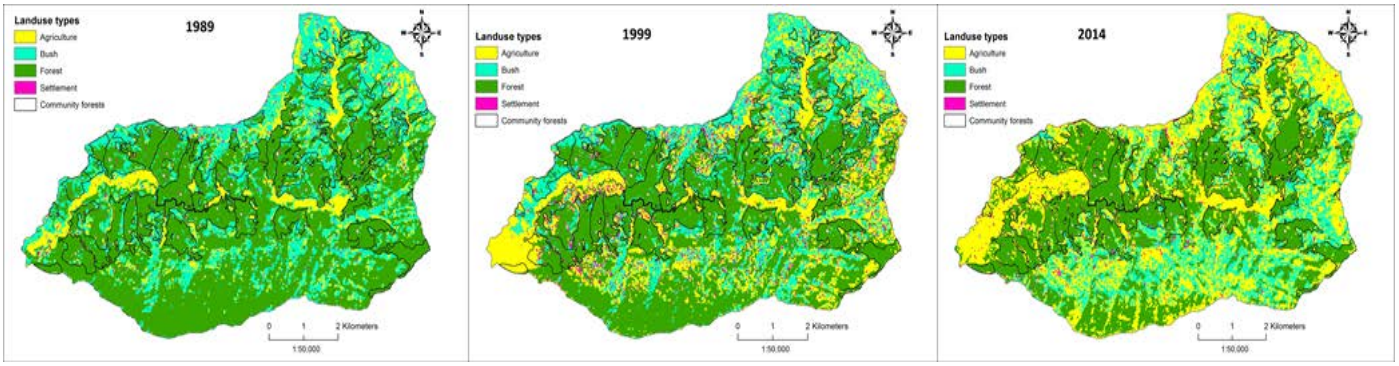

Fig. 2. Land use land cover map of Ludikhola watershed in the year 1989, 1999 and 2014.

5.2. Household characteristics

The questionnaire surveys were carried out in five CFUGs that include 176 users' households. The socioeconomic characteristics of five CFUGs are given in the table 4. Among the five CFUGs, household size is comparatively the lowest in Birenchowk CF and the highest in Mahalaxmi CF. Similarly households' private land holding is the highest in Ghaledada CFUGs and the lowest in Laxmi Mahila CFUGs. Distant to CF from home is the shortest in Laxmi Mahila and longer in Ludidamgade. Similarly, distant to the city is the shortest in Laxmi Mahila and the longest in Ghaledanda.

Table 4. Socio-economic characteristics of five CFUGs of Gorkha district.

Socio-economic characteristics	Birenchowk (N=30) Mean (SD)	Ghaledada (N=51) Mean (SD)	Laxmi Mahila (N=20) Mean (SD)	Ludidamgade (N=46) Mean (SD)	Mahalaxmi (N=29) Mean (SD)
Household size	5.37 (1.29)	6.53 (2.4)	5.4 (1.98)	6.11 (2.4)	6.9 (2.73)
Household land size	12.48 (10.23)	19.51 (13.5)	10.5 (13.40)	17.2 (17.58)	13.67 (11.28)
Distance to CF from home (Km)	1.01 (0.95)	1.54 (1.03)	0.46 (0.39)	1.75 (1.56)	1.72 (0.54)
Distance to City from home (Km)	0.39 (0.34)	7.16 (2.4)	0.12 (0.20)	1.7 (2.1)	1.57 (1.47)

5.3. Income Sources

CFUGs are dependent on farm income, off farm income, remittances and forest income. The income sources of five CFUGs are given in table 5. Farm income includes agriculture income and livestock income. Off-farm income includes service, pension and wages from casual labor works. Remittance includes the income received from the family members who reside outside the village and home country. Forest income includes community forest income and private forest. CFUGs are not allowed to sell the forest resources extracted from the community forests. Thus, forest income includes the forest resources collected from in and outside the community forests for their subsistence use.

Table 5. Income sources of five CFUGs of Gorkha district.

Income sources (NRs*)	Birenchowk (N=30) Mean (SD)	Ghaledada (N=51) Mean (SD)	Laxmi Mahila (N=20) Mean (SD)	Ludidamgade (N=46) Mean (SD)	Mahalaxmi (N=29) Mean (SD)
Agriculture income	20375 (19152)	47187 (32401)	27880 (56577)	27861 (25830)	28291 (18150)
Livestock income	105770 (158696)	86458 (49946)	112140 (329582)	65739 (63008)	130224 (129338)
Off farm income	154866 (111655)	155082(130623)	253800 (261661)	166969 (184705)	99310 (144992)
Remittances	68666 (158608)	32254 (88135)	84000 (273503)	25521 (80331)	48379 (149412)
Community forest income	9933 (8331)	3286 (5363)	5202 (22786)	3703 (5421)	7793 (11003)
Private forest income	7055 (16817)	3850 (7191)	38.25 (171)	9767 (11132)	11360 (17969)
Total income	366666 (224163)	328119 (173173)	483060 (523480)	299563 (226478)	325359 (230912)

*1US$=NRs 86

5.4. Economic contribution of different sources of income on total household income

The percentage of economic contribution of off-farm income in the total household income is higher in four CFUGs except Mahalaxmi CFUGs in which it is the highest in livestock income. The economic contribution of community forests income in total household income is very small in compared to the other sources of income that is Birenchowk CFUGs is 2.7%, Ghaledanda CFUGs is 1%, Laxmi Mahila is 1%, Ludamgade is 1.2% and Mahalaxmi is 2.3%. In some CFs private forest income is higher than the community forest income. In the sake of conservation CFUGs use their own private lands to collect forest products.

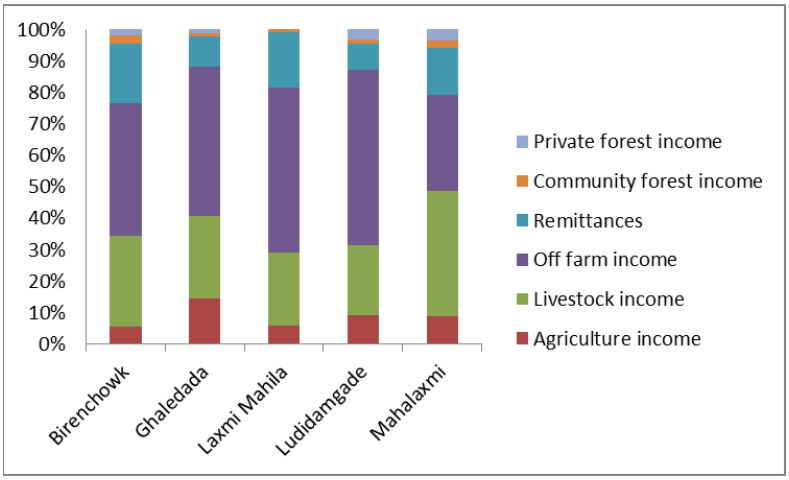

Fig. 3. Economic contribution of different income sources on total household income.

5.5. Direct and indirect ecosystem services provided by community forests

Community forest user groups (CFUGs) conserve community forests to receive direct benefits such as timber, fuelwood, fodder, and leaf litter from it. Only 69% of the respondent receive direct benefits from the community forests. Among them 27% of the male and 20% of female respondents perceive that timber is the important goods from community forests. Similarly 12% male and 9% female perceive that fuelwood and fodder are important goods from community forests. The result shows that male perceive more diverse types of benefits of the community forests on rural livelihood than female do. Similar results was found by Sunderland et al. 2014. However, female members of the households visit forests more frequently than male do to collect forest products.

Moreover, CFUGs perceive the importance of community forests for indirect benefits such as soil nutrition enrichment, carbon sequestration, watershed conservation, greenery, wildlife conservation, climate regulation, and flood control. More than 97% of the respondents know that they are benefitting indirectly from ecosystem services provided by community forests. Only 18% respondents know that forests serve as a carbon sink. Among them 61% are male and 39% are female.

5.6. Knowledge about climate change and biodiversity

We further analyzed the knowledge of CFUGs on key issues related with global climate change phenomenon. There are many CFUGs (74%) who had knowledge about climate change, however, very few of them (30%) knew about the concept of "biodiversity". It is presented in fig. 4. The source of information they had is mostly from the radios and television. In addition to this some of them knew from personal communication with each-other and also from the community forest executive committee members who participated in trainings/workshops. However, large numbers of CFUGs were unaware of the concept of biodiversity and the benefits of its conservation. Therefore, enhancement of community knowledge on biodiversity conservation may require to include biodiversity issues in community forest management. Thus awareness programs such as trainings and workshops for CFUGs are required to provide the knowledge about the importance of biodiversity in terms of conservation and livelihood benefits.

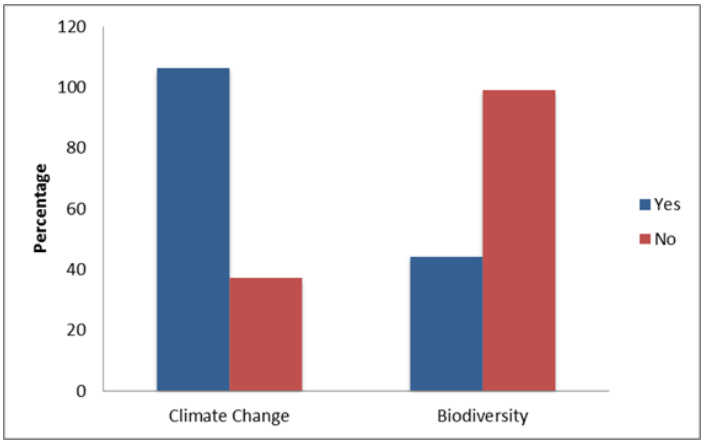

Fig. 4. Perception of CFUGs on global climate change phenomenon.

5.7. Participation of CFUGs in community forest related activities

The household survey also includes the questions related to the household participation in community forest related activities. These include participation in community forest conservation, utilization of forest resources extracted from community forests, participation in community forest related policy making, participation in community services and participation in community forestry related seminar/workshops. We categorized these activities based on their participation frequency: high, medium, low and no participation. Our result shows that the participation of 93% of responds is high, 5% is medium, 1% is low and 1% is no in community forest conservation activities. In terms of community forest resource utilization, only 7% use high, 30% use medium, 37% use low and 26% do not use forest resources from community forest. Similarly 45% of respondents participate highly in community forest related policy making, 26% medium, 21% low and 6% do not participate during policy making. In total 53% participate highly in community services, 32% medium, 6% low and 7% do not participate in community services. Similarly, only 13% of respondents participate highly in seminar/workshops related to community forestry, 14% medium, 17% low and 56% never participated in seminar/workshops. The result is shown in fig 5.

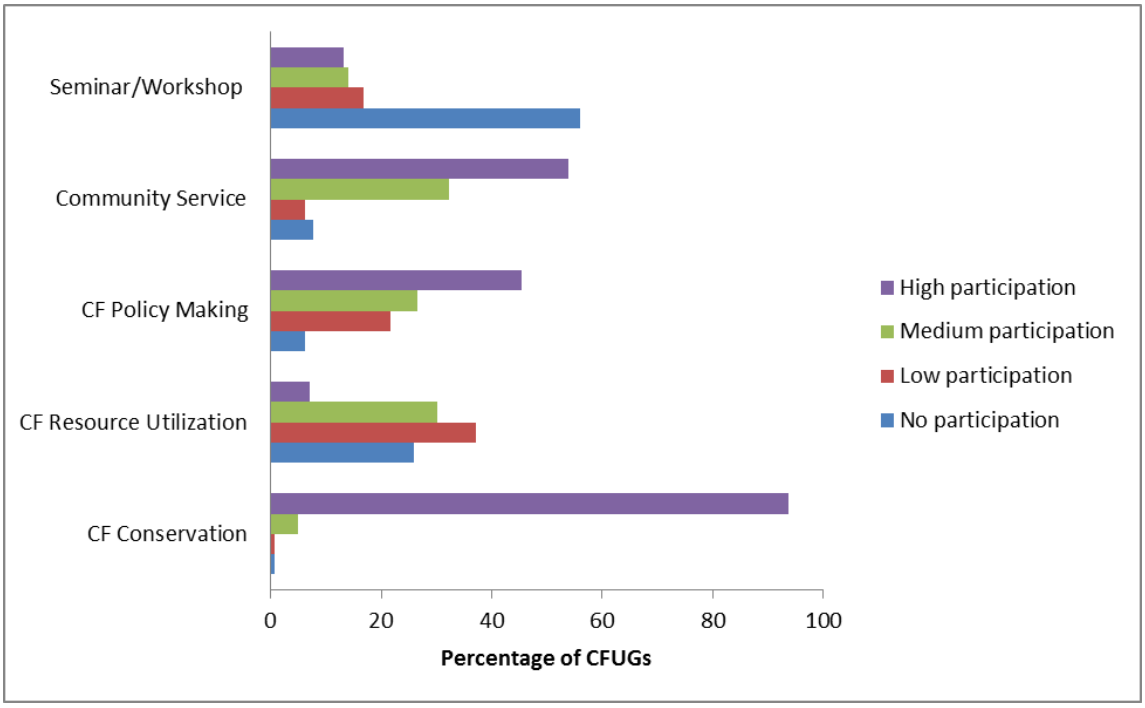

Fig. 5. Participation of CFUGs on community forest related activities.

6. Future plan

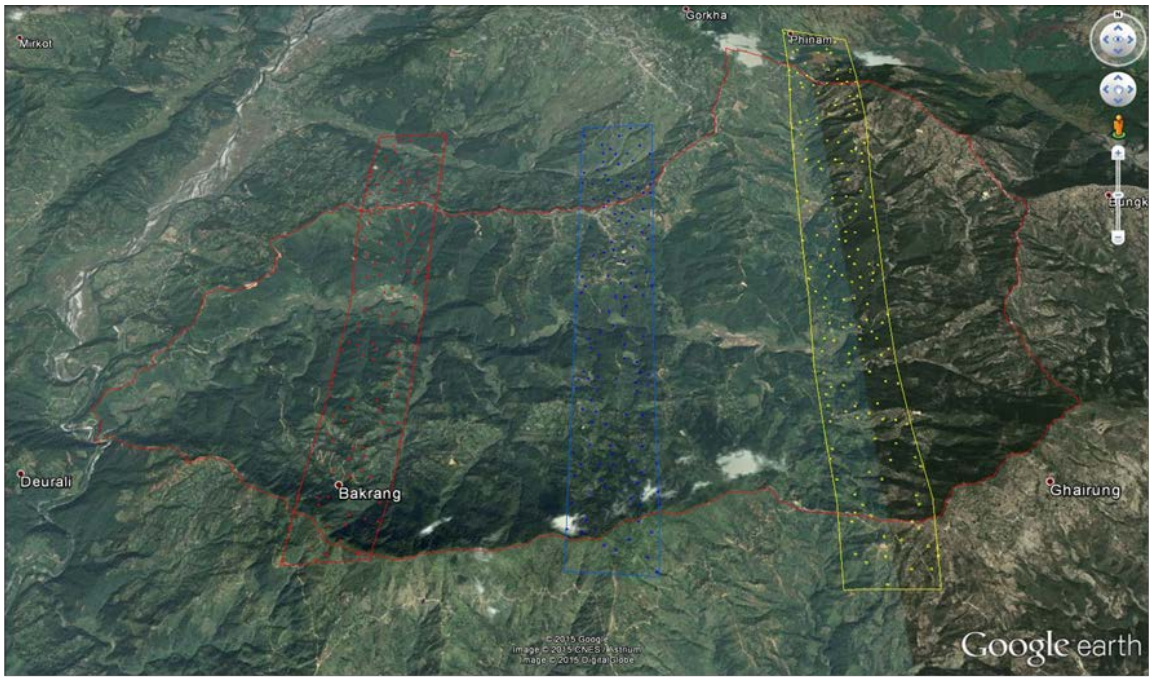

Plate 1. Three transects with random sampling plots throughout Ludikhola watershed

The second objective of this project is partially achieved. In addition to that I have developed a future plan to continue this research. Ecological study will be carried out in the same study area.

Vegetation samples will be collected from the study area by using 20X20m sample plots. The sampling design is already developed by using a Google earth. A boundary of Ludikhola watershed was overlaid in Google earth. Three transects with equal width and equal distances from each other were drawn inside Ludikhola watershed. In each transect random sampling points were generated. Each point represents the area where vegetation sampling method will be applied to collect vegetation data in future.

Plate 2. Ludidamgade community forest.

Plate 3. Questionnaire survey with forest users.

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