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Determining the impact of fodder program under IFLDP on livelihoods and forests of Uttarakhand Himalayas

Final Report-2010

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EXECUTIVE SUMMARY

There is acute shortage of fodder in the mountainous state of Uttarakhand. At present state is in deficit of about 43.13% of dry and green fodder. With the aim to fulfill the fodder requirement, promote rural livelihoods and enhance incomes of rural people in Uttarakhand, Himmotthan Society has initiated an environmentally sustainable, integrated livestock management programme entitled "Integrated Fodder-Livestock Development Project (IFLDP)" in 2008-09. The project is being implemented in 83 villages in 15 project areas, spread over six hill districts of Uttarakhand in collaboration with different organizations already working in the sector. Over 8,000 households (covering a population of about 44,000) of the project villages are directly or indirectly involved with the project.

- The initial focus of this programme appears to have been to eradicate between fodder requirement and fodder availability, the success in this measurable has been mixed due to the lower than expected productivity of fodder grasses.

- In terms of increasing soil moisture, enhancing spring recharge and increasing growth rates of tree saplings in protected areas becomes better understood, more communities are getting interested in this activity and also putting under fodder less marginal and more productive lands.

- The success of the dairy federations promoted under this project has been an achievement of this program. Linking the programme with MGNREGS has helped push its spread.

- Not measured or valued are the tremendous ecological benefits in terms of soil conservation and forest protection. This along with slightly reduced dependence (4.4%) on lopping and free grazing (44.9%) is helping aid forest recovery and regrowth and enhancing the ecosystem services flowing from these areas.

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ACRONYMS AND ABBREVIATIONS

ANOVA	Analysis of variance
Avg.	Average
CD	Critical Difference
CEDAR	Centre for Ecology Development and Research
ha	Hectare
IFLDP	Integrated Fodder and Livestock Development Programme
INR	Indian National Rupees
LPGs	Livestock Producer Groups
LSD	Least Significance Difference
Lts	Liter
MGNREGA	Mahatma Gandhi National Rural Employment Guarantee Act
Mt	Metric Tonnes
NGO	Non Governmental Organization
PRA	Participatry Rural Appraisal
SHGs	Self Help Groups
SPSS	Statistical Packages for Social Sciences
SRTT	Sir Ratan Tata Trust
t ha^{-1}	Tonnes per hectare
t/yr	Tonnes per year
ULDB	Uttarakhand Livestock Development Board

1. BACKGROUND

Over the past few decades there has been a great deal of concern about ecological degradation, deforestation, climatic change and human drudgery in the Himalaya. The delicate and perhaps the most significant mountainous regions of the world are important not only because of its rich biodiversity, water resources and climate but also for communities and cultural diversity. The scale and nature of present environmental problems in the Himalayan Regions are large, human populations continue to grow while many basic resources are depleted, polluted or mismanaged (Singh and Singh, 1991).

The people of Indian Himalayan region, resembling other mountain ecosystems, are greatly reliant for livelihood on their immediate natural resources and production from most important sectors i.e., agriculture, forestry and livestock, etc. The dependency of the ever increasing population on limited resources is getting higher. Lack of modern technology to reduce mountain specificities and enhanced production to meet the burden are exhausting the resources in conjunction with marginality of farmers, in the end advancing poverty (Samal *et al.*, 2003). Despite its rich biological resources the region is underdeveloped. Trends of environmental wellbeing indicate that existing interventions are unsustainable. Economic indicators also do not show the desired effects on monetary upliftment, moreover, the natural delicateness of the mountains as the vulnerability of the Himalaya to human induced environmental impacts make people live in the gloom of uncertainties of natural calamities. Number of studies suggests that the unscientific exploitation of natural resources is the main

cause behind environmental degradation in the region. Reduction in dense forest cover before the ban on green felling, hastened soil erosion and siltation of water bodies (Valdiya, 1985), drying up of springs (Negi and Joshi, 2002), replacement and loss of species (Singh *et al*., 1984) and increased ratio of energy spent in fodder, fuel collection, and agricultural bustle that enhance labor of the women folk (Pandey *et al*., 1983) are some of the revealing indicators of the environmental ill-health.

The widespread environmental degradation which has been the consequence of faulty and insensitive economic policies and poor management of resources is a normal feature of the region. The social conditions have not been dealt within an imaginative manner with the result that the productive potential of mountain communities has not been realized (Dhar, 1996).

The population of the state chiefly relies on agriculture for day to day living; about 70% of the population is engaged in agriculture. Out of total reported area, only 14.02% is under cultivation. More than 55.0% of the cultivated land in the State is rainfed. The cropping intensity is 160.6%. The landholdings are small and scattered. The average land holding is around 0.68 ha in the hills (ULDB, 2009) Because of the extraction of natural resources by the inhabitants for subsistence living far beyond their capacity to regenerate; many areas of the state are facing degradation of natural resources. For example, against the requirement of 18 ha of forests land including 5-12 ha of well-stocked forests, per ha of cultivated land, the ratio of forest to agriculture is only 1.33:1 and the ratio of well-stocked forests to agricultural land is only 0.84:1. Grazing intensity is high; each ha supports about 7.99 units of livestock against the appropriate 2 livestock units. The green fodder requirement has been estimated as 259 lakh MT per annum, but present production is only 52 lakh MT both from the forests and agriculture.

The State supports about 4.75 million livestock population out of which about 11.00 lakh are buffaloes, 21.3 lakh are cattle, 10.97 lakh are goats and 3.60 lakh are sheep. Approximately 36.5% of the population of the state lives below poverty line. Three hill districts, i.e., Chamoli, Tehri Garhwal and Uttarkashi have more than 45% of their population below poverty line while the other districts have around 30-40% of population below the poverty line.

1.1 Fodder Scenario of the state

According to the 2003 livestock census, the fodder requirement (green and dry) fodder for the livestock is about 197.40 lakh MT (green) and 54.31 lakh MT (dry) respectively. Hence, approximately 251.71 lakh MT of fodder is required per annum for the entire state. While annual availability of fodder in the state is about 105.12 lakh MT (green) and 38.02 lakh MT (dry). According to the above estimates the state has a shortage about 108.57 lakh MT of fodder per annum (Singh and Singh, 2009) (Table 1.1.1.). However, it has been estimated that due to flawed method of feeding of dry fodder to the livestock (without chopping), considerable percentage (roughly 30-40%) of the dry fodder go waste with fecal matter trampling of animals. Hence real scarcity of fodder in the state is larger than the above estimates.

Due to scarcity of irrigation facilities the production of green fodder is not uniform throughout the year. The availability of green fodder is only for 4 months (monsoon). Remaining months of the year (winter and summer) green fodder is not available resulting in low production of milk other animal related products.

Table 1.1.1 Status of Fodder Requirement and Production in Different Districts of Uttarakhand

Haridwar	**421813**	**32.85**	**19.17**	**-13.68**	**41.64**
Dehradun	**401012**	**18.61**	**9.23**	**-9.38**	**50.4**
Pauri	**609673**	**28.21**	**12.66**	**-15.55**	**55.12**
Teri	**356445**	**18.67**	**9.41**	**-9.26**	**49.59**
Uttarkashi	**343867**	**10.96**	**9.00**	**-1.96**	**17.88**
Rudraprayag	**195481**	**9.81**	**4.71**	**-5.10**	**51.98**
Chamoli	**368667**	**16.86**	**10.97**	**-5.89**	**34.93**
Nainital	**359802**	**22.04**	**10.86**	**-11.18**	**50.72**
Udham Singh Nagar	**347854**	**24.05**	**21.62**	**-2.43**	**10.1**
Almora	**525009**	**25.17**	**13.47**	**-11.70**	**46.48**
Bageshwar	**264781**	**11.57**	**6.53**	**-5.04**	**43.56**
Pithoragarh	**506645**	**23.22**	**10.34**	**-12.88**	**55.47**
Champawat	**186790**	**9.69**	**5.17**	**-4.52**	**46.64**
Total	**4887839**	**251.71**	**143.14**	**(-)108.57**	**43.13**

Source: (Singh and Singh. 2009)

Due to small landholding and poor irrigation facilities the village population has to largely depend upon the adjoining forests for their fodder requirements besides agricultural residues are also used. Increase in livestock population and poor forest management has led to a decline in the available resources leading to degradation in most forest areas of Uttarakhand Himalayas. The state as a whole is facing more than 50% scarcity of green fodder and is more acute (up to 75%) in mountainous districts. Out of total fodder produced in the state 70% of fodder comes from forest (42% grasses and 28% tree leaves) which directly shows dependency of fodder on forest (Anon, 2009).

1.2 Integrated Fodder-Livestock Development Program (IFLDP)

With the above backdrop, Himmotthan Society, a Dehradun based organization, initiated (2008-09) a project entitled "Integrated Fodder-Livestock Development Project (IFLDP)", with the aim to promote rural livelihoods and enhance incomes through an environmentally sustainable, integrated livestock management programme to grow a variety of fodder grass, many of which stay evergreen and others which provide sufficient nutritious dry fodder to last the winter have been piloted over the past several decades. The project is being implemented in 88 villages in 15 project areas, spread over six hill districts of Uttarakhand in collaboration with different organizations already working in the sector. Over 8,000 households (covering a population of about 44,000) of the project villages are directly or indirectly involved with the project. The project is being implemented in partnership with different government departments and NGOs. Fodder cultivation related activities are being implemented with the dovetailing of funds from the Mahatma Gandhi National Rural Employment Guarantee Act (MGNREGA), while the Sir Ratan Tata Trust (SRTT) is supporting activities such as fodder preservation, better feeding practices, capacity building and community mobilization. The cattle breed improvement component of the IFLDP is being implemented in collaboration with Uttarakhand Livestock Development Board (ULDB). One of the major objectives of the program is to provide quality of fodder for cattle and decrease the dependence on tree leaf supply.

In the year 2010, Centre for Ecology Development and Research (CEDAR) was given the task of assisting Himmotthan Society to determine the impact of IFLDP on both the lives of local people and on ecosystem recovery. This exercise is based largely on surveys to monitor the grass production and milk production, and forest sampling to determine growth rates of trees in forests

subject to chronic disturbances. While this is a mid-term assessment it should yield valuable information on ways and means to enhance the IFLDP programme in the years to come.

The following objectives were undertaken:

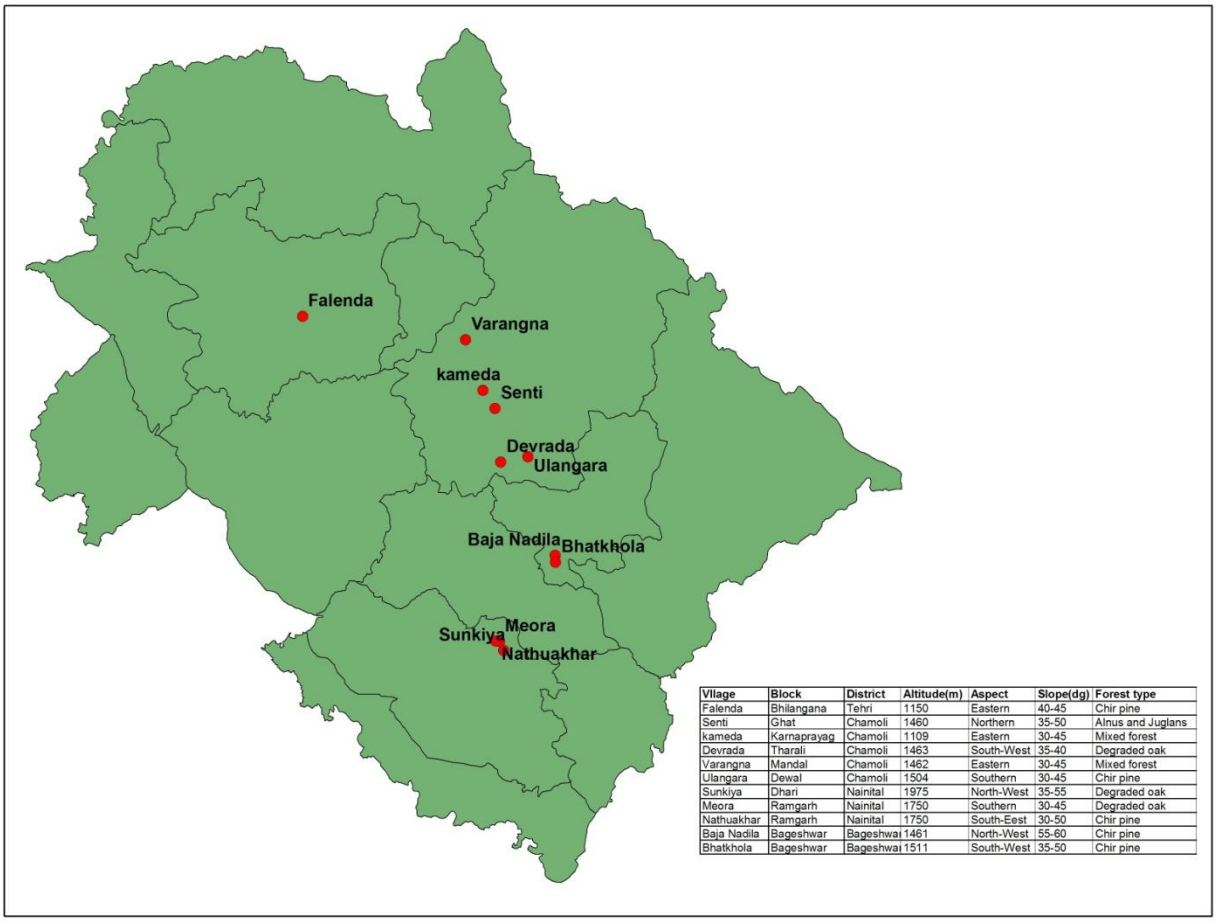
Objectives

1. To assess the fodder requirements of local communities and potential of existing program to fulfill the same. To recommend interventions to meet the fodder deficiency.
2. Calculate existing productivity of fodder grasses under different land holdings and agro climatic conditions and standardize the methodology for fodder yield data collection on program implemented villages.
3. To study the impact of fodder program on soil water conservation
4. To study the impact of IFLDP on livestock health, milk production, income generation and women drudgery.

The present investigation was carried out in 11 randomly selected villages in both Garhwal and Kumaun region of Uttarakhand state. The criteria of selection of the villages was based on the physiographic region, fodder species planted, size of the village, jurisdiction on the fodder plots (common, private or Van Panchayat) and number of beneficiaries. Out of 11 villages 6 were in Garhwal region and 5 were in Kumaun region (Figure 2.1.1.) (Table 2.1.1.). Most villages undertaken in the study were in the subtropical region as most villages undertaken under the IFLDP lie in this region. However, to understand the production and performance of fodder grasses in the temperate region three villages were undertaken to study the same.

Table 2.1.1. Description of Villages undertaken for the study

S.No	Name of Village	Block	District	Altitude (m)	Coordinates	Aspect	Slope Gradient (^{0})	Adjoining Forest type
1	**Falenda**	**Bhilangna**	**Tehri**	**1150**	**N30^0 25.395' E78^0 39.174'**	**Eastern**	**40^0-45^0**	**Chir Pine**
2	**Senti**	**Ghat**	**Chamoli**	**1460**	**N' 30^0 14.163' E 79^0 26.690'**	**Northern**	**35^0-50^0**	**Alnus & Juglans**
3	**Kamera**	**Karanprayag**		**1109**	**N' 30^0 17.320' E 79^0 23.178'**	**Eastern**	**30^0-45^0**	**Mix forest**
4	**Devrada**	**Tharali**		**1463**	**N' 30^0 03.831' E 79^0 30.150'**	**South-West**	**40^0-55^0**	**Degraded Oak**
5	**Bairangna**	**Mandal**		**1462**	**N' 30^0 26.687' E 79^0 17.140'**	**Eastern**	**35^0-40^0**	**Mix forest**
6	**Ulangra**	**Dewal**		**1504**	**N' 30^{0}05.798' E 79^0 36.127'**	**Northern**	**30^0-45^0**	**Chir Pine**
7	**Sunkiya**	**Dhari**	**Nainital**	**1975**	**N' 29^{0}26.645' E 79^0 38.269'**	**North-West**	**35^0-55^0**	**Degraded Oak**
8	**Meora**	**Ramgarh**		**1823**	**N' 29^0 28.321' E 79^0 36.998'**	**Southern**	**30^0-45^0**	**Degraded Oak**
9	**Nathuakhan**	**Ramgarh**		**1781**	**N' 29^0 28.240' E 79^0 36.149'**	**South-East**	**45^0-50^0**	**Chir-Oak Scrub**
10	**Baja Nadila**	**Bageshwar**	**Bageshwar**	**1461**	**N' 29^0 47.212' E 79^0 46.176'**	**South-West**	**55^0-60^0**	**Chir Pine**
11	**Bhatkhola**	**Bageshwar**		**1511**	**N' 29^0 45.915' E 79^0 46.557'**	**South-West**	**35^0-50^0**	**Chir Pine**



Village	Block	District	Altitude(m)	Aspect	Slope(dg)	Forest type
Falenda	Bhilangana	Tehri	1150	Eastern	40-45	Chir pine
Senti	Ghat	Chamoli	1460	Northern	35-50	Alnus and Juglans
kameda	Karnaprayag	Chamoli	1109	Eastern	30-45	Mixed forest
Devrada	Tharali	Chamoli	1463	South-West	35-40	Degraded oak
Varangna	Mandal	Chamoli	1462	Eastern	30-45	Mixed forest
Ulangara	Dewal	Chamoli	1504	Southern	30-45	Chir pine
Sunkiya	Dhari	Nainital	1975	North-West	35-55	Degraded oak
Meora	Ramgarh	Nainital	1750	Southern	30-45	Degraded oak
Nathuakhar	Ramgarh	Nainital	1750	South-Eest	30-50	Chir pine
Baja Nadila	Bageshwar	Bageshwai	1461	North-West	55-60	Chir pine
Bhatkhola	Bageshwar	Bageshwai	1511	South-West	35-50	Chir pine

Figure 2.1.1. Map of Uttarakhand showing different fodder plot locations

To capture the overall impact of the IFLDP program 22 villages were considered keeping in mind that all components/activities of the project has taken place in the village, the villages were adopted from the commencement of the project and all the project clusters /districts and all the partners were represented, to stratify the sampling we used a simple method of selecting 2 villages under each partner organisation (Table 2.2.2.).

Table 2.2.2. Villages undertaken to study the overall impact of the IFLDP project

Sr. No.	District	Block	Village	Name of the Partner Organization
1	**Chamoli**	**Ghat**	**Lakhee**	**SBMA**
2	**Chamoli**	**Ghat**	**Banjbagar**	**SBMA**
3	**Chamoli**	**Deval**	**Ulangra**	**SIMAR**
4	**Chamoli**	**Deval**	**Faldiagaon**	**SIMAR**
5	**Chamoli**	**Dasholi**	**Siroli**	**JSS**
6	**Chamoli**	**Dasholi**	**Bandawara**	**JSS**
7	**Chamoli**	**Karanprayag**	**Kamera**	**JNUS**
8	**Chamoli**	**Joshimath**	**Pakhi**	**AAGAAS**
9	**Chamoli**	**Dasholi**	**Gadora**	**AAGAAS**
10	**Bageshwar**	**Bageshwar**	**Kabhra**	**CHIRAG**
11	**Nainital**	**Ramgarh**	**Myora**	**CHIRAG**
12	**Nainital**	**Ramgarh**	**Nathuwakhan**	**CHIRAG**
13	**Bageshwar**	**Bageshwar**	**Baja Nadila**	**CHIRAG**
14	**Bageshwar**	**Bageshwar**	**Borgaanv**	**CHIRAG**
15	**Nainital**	**Ramgarh**	**Deena**	**CHIRAG**
16	**Nainital**	**Ramgarh**	**Bhadune**	**CHIRAG**
18	**Pithoragarh**	**Kanalichina**	**Pali**	**HSS**
19	**Pithoragarh**	**Kanalichina**	**Dungari**	**HSS**
20	**Tehri**	**Bhilangana**	**Pakh**	**MVDA**
21	**Tehri**	**Jaunpur**	**Tator**	**GVK**
22	**Tehri**	**Jaunpur**	**Mason**	**GVK**

After an initial survey of the recommended villages by the Himmotthan team, existing baseline information was collected and analyzed. The following methodology has been applied to fulfill the objectives of the study:

3.1.1 Participatory Rural Appraisal (PRA)

PRA tools have been applied in the selected villages. The questionnaire format (*Annexure I*) distributed among 10 randomly selected households in each village to assess impact of IFLDP intervention on the livelihood and forests. The following indicators were used to assess the impact of the IFLDP program on the livelihoods and forests:

1. Increase/ Decrease in free grazing
2. Increase/Decrease in number of cattle
3. Induction of improved livestock
4. Household involved in Dairy
5. Number of Self Help Groups 's
6. Households involved in Fodder intervention
7. Income generation through fodder activity (MGNERGA program)

The extent of forest resources being used and intensity of use was also surveyed through field visits to estimate forest degradation in the adjoining areas. The information collected during the survey was analyzed using standard statistical technique.

3.1.2 Estimation of Productivity

Five randomly selected trenches of high and low fodder production were subjected for estimation of fodder production (*Annexure II*). The **fodder production for planted grass** was estimated using following formula:

$$\text{Fodder Production (t/ha)} = \frac{\text{Avg. area of Selected Trenches X Avg. Fodder Production form Selected Trenches X Total No. of Trenches/ ha}}{1000}$$

The estimation of natural grass production in the fodder plots (protected area) were estimated using quadrat method (Mishra, 1968). Five random quadrats of 1x1 m were laid down in the fodder plots and the production of natural grasses was estimated. Following equation was used to estimate the **total fodder production in the fodder plots**:

$$\text{Fodder Production (t/ha)} = \frac{\text{Total Area of Fodder Plot - Area Covered by Fodder Grasses}}{1000}$$

Similarly, the production of natural grass in adjoining natural forest (unprotected area) was estimated using the quadrat method given by Mishra, 1968. Five random quadrats of 1x1 m were laid down in the nearby forest area and the production of natural grasses was estimated.

3.1.2.1 Fodder requirement and potential of existing program to fulfill the requirement

To estimate the fodder requirement of the village following formula was used

Total fodder requirement= total animal units in the village x 2.35 MT

(2.35 MT is a standard fodder requirement per unit of animal per year) (Singh and Singh 2009; Himmotthan, 2009).

The potential of existing program to fulfill the fodder requirement is calculated by using following formula

Fodder requirement– Total Planted fodder production in protected plots

3.1.3 Soil Moisture

For estimation of moisture content, five replicate soil samples at the depth of 0-30 cm were collected from the fodder plots and adjoining areas. These soil samples were brought in air tight moisture boxes and then analyzed for their moisture content through electronic moisture analyzer (Sartorius MA-50).

3.1.4 Statistical Analysis

The data related to soil moisture and fodder production were analyzed by using the SPSS programme for Windows version 15.0. Multiple comparison and two way analysis of variance (ANOVA) procedures are used to compare the differences between the samples. LSD test are performed to determine the significance of the samples mean at $P< 0.05$. Each experiment has 5 replicates; the significant differences would be statistically analyzed by ANOVA. CD (Critical Difference) was calculated using Scheffe's method (Scheffe, 1959).

4.1. Planted Grass Production

Napier grass production was studied at all the selected sites, once in the monsoon (June –July) and the second post monsoon late September to early October. The data collected on was subjected to statistical analyses using the statistical package- ***SPSS*** The findings of the analyses are given below.

The analysis of variance (ANOVA) exhibits that the variation in fodder production between the sites were observed to be highly significant ($P<0.001$) (Table 4.1.1). In the first observation (monsoon period) maximum Napier production was observed in Bhatkhola 16.42±0.82 tha^{-1} whereas minimum was observed in Ulangra 9.82±0.59 tha^{-1}. However in the second observation (post-monsoon) maximum Napier production was observed in Baja Nadila 16.79±0.68 and minimum was again observed for Ulangra 9.00±0.65 (Table 4.1.1). The time of the observation was decided in view with the local project partners and the villagers under the IFLDP program. As per our discussions with the villagers and partner NGO's different fodder plots can be harvested 3-4 times a year. Since the study was limited to a period of 6 months we could only observe 2 cuts in the interim. To calculate the fodder production per year we took average value of the previous two cuts, we calculated the fodder production taking a conservative approach of assuming that the grass can be harvested

only three times a year. Total fodder production in the subtropical region per year was highest in Baja Nadila 48.61±1.53 $tha^{-1}yr^{-1}$ followed by Bhatkhola 47.02±2.15 tha-$1yr^{-1}$ while minimum Napier grass production was observed in Ulangra 28.23±0.78 $tha^{-1}yr^{-1}$ (Figure 4.1.1). Fodder production in the temperate region was higher in Nathuakhan 27.25±1.30 $tha^{-1}yr^{-1}$ as compared to Sunkiya, where it was found to be lowest 24.99±0.53 $tha^{-1}yr^{-1}$. The average total fodder production in the subtropical region was found to be higher (48.32±0.31 $tha^{-1}yr^{-1}$) as compared to temperate region where the average total fodder production was estimated to be 26.35±0.02 $tha^{-1}yr^{-1}$) (Figure 4.1.2).

Table 4.1.1. Fodder production per cut in selected sites

	Subtropical	
14.97±0.92	**16.09±2.02**	**15.53±3.23**
16.24±1.60	**15.07±1.54**	**15.65±0.87**
15.39±1.32	**12.60±0.37**	**14.00±0.76**
13.49±0.62	**14.76±1.50**	**14.12±0.74**
13.99±1.01	**10.10±0.33**	**12.05±0.56**
9.82±0.59	**9.00±0.65**	**9.41±0.26**
15.61±0.64	**16.79±0.68**	**16.20±0.51**
16.42±0.82	**14.93±0.67**	**15.67±0.72**
14.49±0.76	**13.67±1.00**	**14.08±0.82**
	Temperate	
9.33±0.26	**7.33±0.14**	**8.33±0.18**
9.90±0.23	**7.98±0.18**	**8.94±0.20**
10.00±0.39	**8.17±0.49**	**9.08±0.43**
9.74±0.20	**7.83±0.25**	**8.78±0.23**
*******	*******	*******
23.81	**16.38**	**30.62**

*****Significant at *P*<0.001** *Values are mean of five replicates ± standard error*

 # Average of first and second production

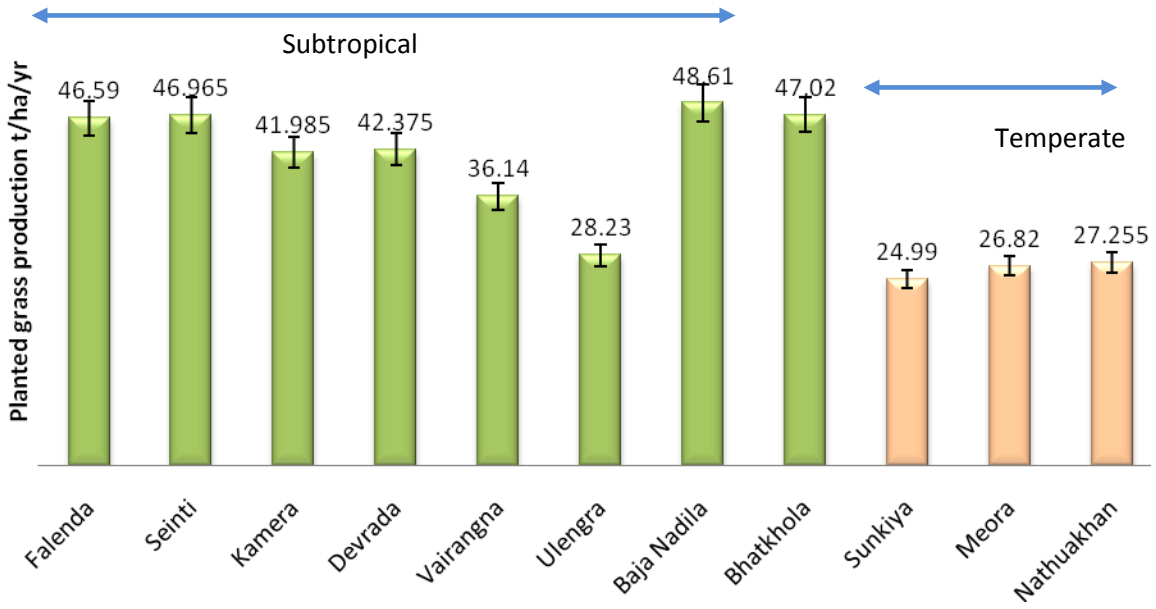


Figure 4.1.1. Total planted fodder production at different selected sites

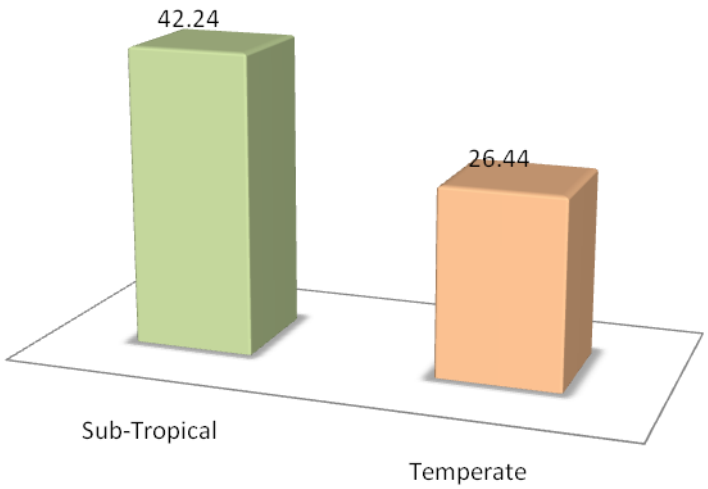


Figure 4.1.2. Average total planted fodder production at different regions

4.2 Natural Grass production

The production of natural grasses was also estimated two times, once in the monsoon (June–July) and the second post monsoon late September to early October. There was a significant variation in production of natural grasses protected the fodder plots from one site to another at $P<0.001$. Natural grass production in protected area (fodder plot) was found to be higher in Bairangna 24.12±0.39 tha^{-1} while minimum in Ulangra fodder plot 7.85±0.59 tha^{-1}. As regards to natural grass production in adjoining natural forest, Sunkiya exhibited the higher production of natural grass (15.98±0.55 tha^{-1}) as compared to Ulangra 6.00±0.10 tha^{-1} (Fig 4.2.1).

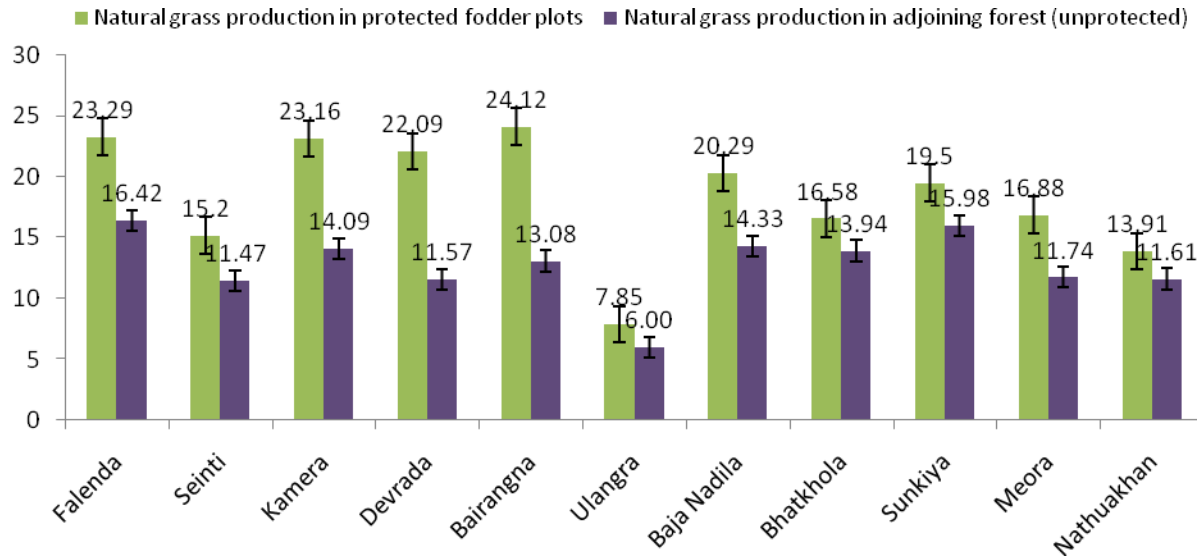


Figure 4.2.1. Total natural grass production protected and unprotected fodder plots

4.3 Total fodder production from fodder (Protected) plots

The grass production in protected fodder plots was significantly higher than the grass production in unprotected plots. The results of the findings suggests that 1 ha of fodder plot in the subtropical region yields 61.31±3.53 tha-1yr-1 grass per year of which 51.34% is constituted by Napier grass and the remaining 48.66% by natural grasses. In subtropical region, the production of natural grasses in unprotected areas is 79.43% less in comparison the total grass (planted + natural) production in protected fodder plots (Fig 4.3.1).

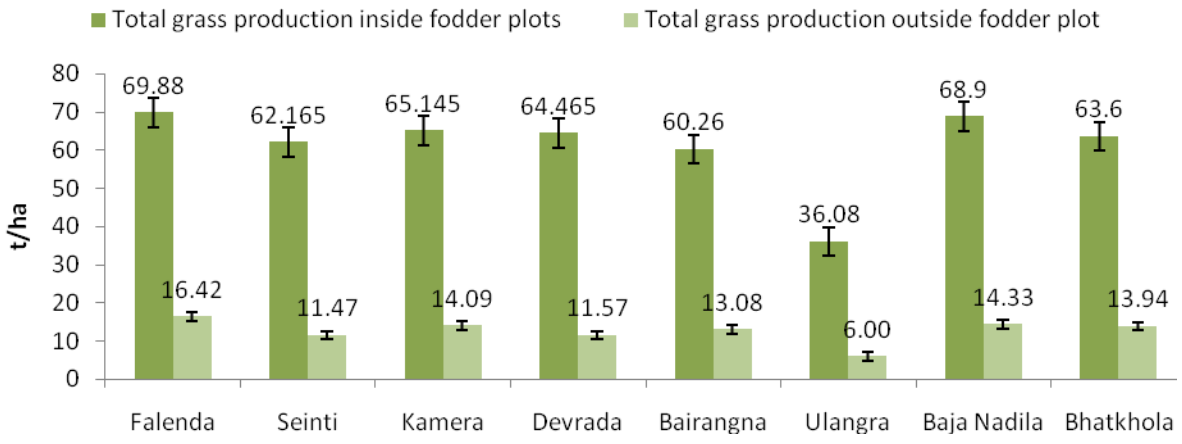


Figure 4.3.1. Natural and planted fodder production in protected and unprotected sites in subtropical region

In the temperate region average fodder production in protected fodder plots was 43.11±1.00 tha^{-1} and average grass production in unprotected fodder plots was 13.11±1.43 tha^{-1}, approximately 3 times lesser than the grass production protected fodder plots (Figure 4.3.2).

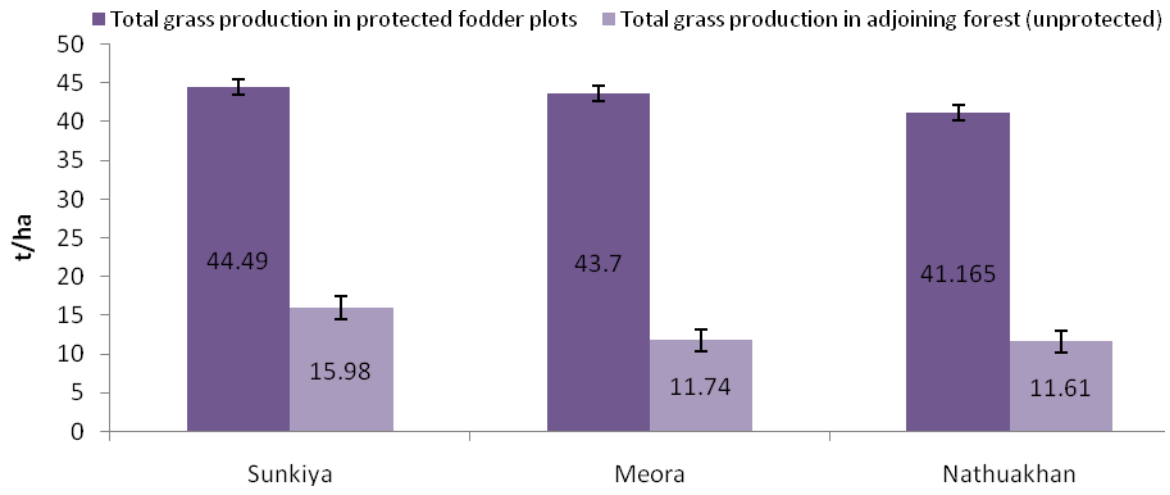


Figure 4.3.2 Natural and planted fodder production in protected and unprotected sites in temperate region.

4.4 Fodder Production in the Private lands

Random quadrats were laid to assess the fodder production in private lands. Due to a scarcity of fodder, most households preferred to grow fodder grasses on field bunds as the main part of the field was needed to grow food staples required for day to day living.

Maximum fodder production occurred in Bairangna while minimum in Ulangra. Fodder Production from private lands depends upon the availability of land and number of families involved in the activity and number of cuts available to be harvested (Figure 4.4.1).

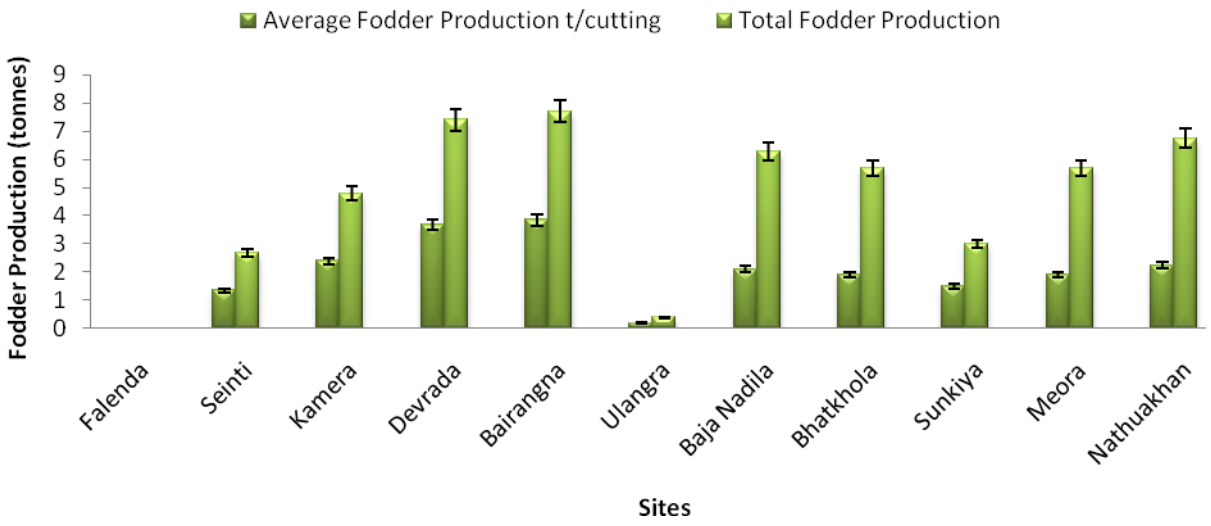


Figure 4.4.1. Average and total fodder production from private plots per year

4.5 Fodder requirement and potential of existing programme to fulfill the same

The fodder requirement was calculated according to the number of households and the livestock population in the village. Figure 4.5.1 illustrated that maximum fodder requirement was observed in Sunkiya (644.50 t/yr) while minimum fodder requirement was observed in Devrada (264.3 t/yr). On the basis of fodder requirement, the potential of IFLDP intervention to fulfill the fodder requirement was also calculated. Minimum percentage of fodder requirement met from the planted fodder plots was observed in Nathuakhan (17.77%) while in Falenda the planted fodder plots fulfill the maximum fodder requirement which was observed about 94.51% (Figure 4.5.2).

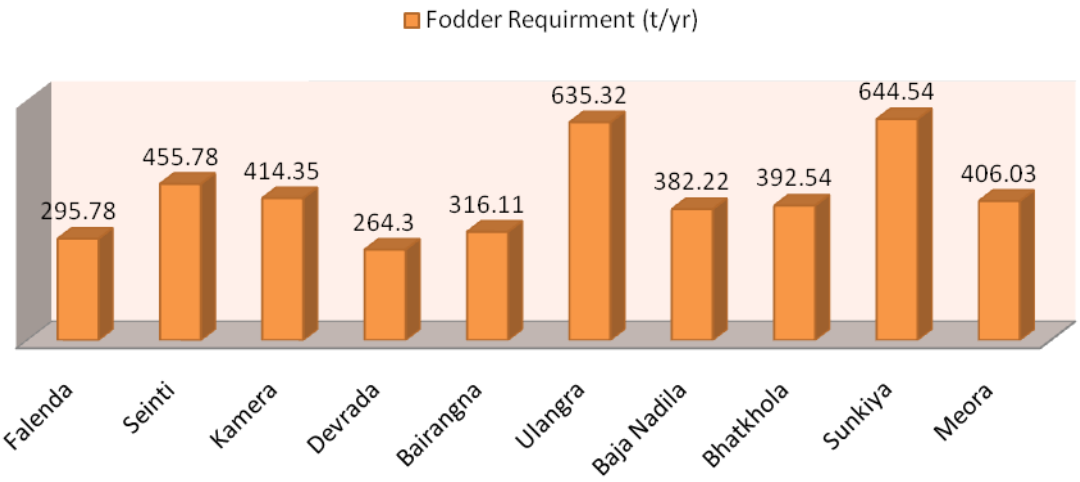


Figure 4.5.1. Fodder requirement in the selected villages

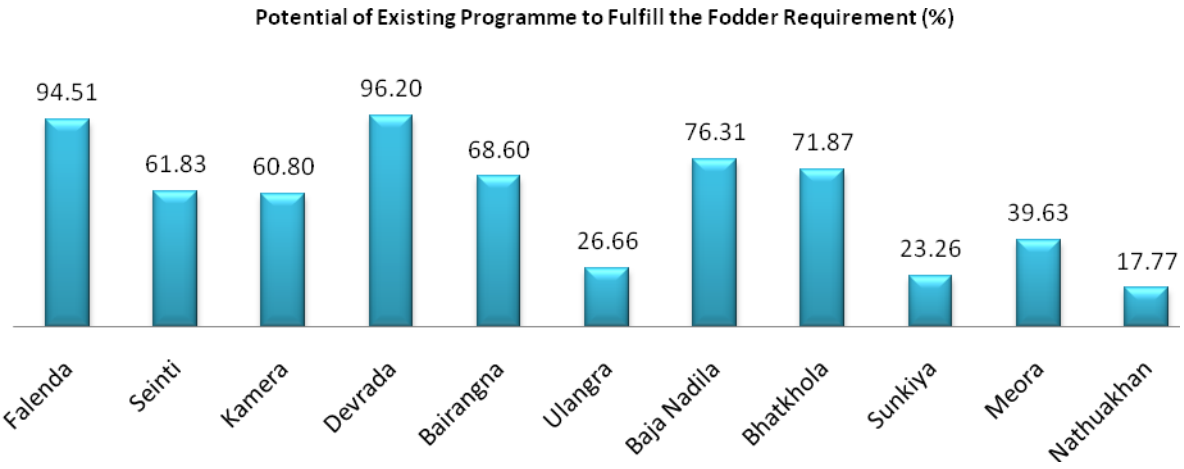


Figure 4.5.2. Percentage Fodder requirement met from fodder plots in the selected villages

4.6. Soil Moisture Conservation

Soil moisture was studied at all the selected sites in the month of June and October. Soil moisture showed highly significant variation between the sites at $P<0.001$ (Table 4.6.1). It was observed that the high soil moisture percent was in the month of June for each site due to influence of heavy rains, however the soil moisture significantly declines in the month of

October. High soil moisture was observed in Seinti fodder plot. Soil moisture percent was higher in the fodder trenches and lowest in the adjoining forest area (Table 4.6.1). The area outside trenches within the fodder plots also showed high soil moisture percent in comparison to the adjoining forest area.

Table 4.6.1 Comparison of soil moisture percent at different studied sites

Falenda	**June**	**20.75±0.62**	**14.53±0.39**	**8.55±0.75**
	October	**9.73±0.0.47**	**6.39±0.40**	**5.38±0.39**
Seinti	**June**	**36.33±1.80**	**27.12±0.78**	**5.97±0.77**
	October	**-**	**-**	**-**
Kamera	**June**	**20.75±0.83**	**11.59±0.72**	**7.55±0.71**
	October	**-**	**-**	**-**
Devrada	**June**	**26.49±1.14**	**15.18±0.95**	**11.25±1.37**
	October	**15.79±0.50**	**11.19±0.45**	**8.50±0.34**
Bairangna	**June**	**25.65±1.07**	**15.11±0.92**	**9.37±0.76**
	October	**-**	**-**	**-**
Ulangra	**June**	**18.79±0.86**	**9.47±0.59**	**2.47±0.26**
	October	**10.23±0.41**	**7.89±0.63**	**2.89±0.43**
Baja Nadila	**June**	**-**	**-**	**-**
	October	**6.86±0.33**	**4.96±0.46**	**3.49±0.21**
Bhatkhola	**June**	**-**	**-**	**-**
	October	**9.73±0.27**	**6.02±0.47**	**3.86±0.15**
Sunkiya	**June**	**29.56±0.69**	**21.33±0.72**	**13.09±0.35**
	October	**-**	**-**	**-**
Meora	**June**	**21.20±0.27**	**14.53±0.74**	**8.34±0.82**
	October	**-**	**-**	**-**
Nathuakhan	**June**	**19.50±0.60**	**11.63±0.61**	**7.45±0.89**
	October	**-**	**-**	**-**
Average June		**24.34±1.92**	**15.61±1.81**	**8.22±1.01**
Average October		**10.47±1.47**	**11.25±3.50**	**4.82±1.00**
Significance	***	***	***	***
		392.97	**158.43**	**40.90**

Significant at *P*<0.001 *Values are mean of five replicates ± standard error* -Data not collected***

4.7 Other activities

On the basis of questionnaire and base line data obtained from various partner organizations and Himmotthan team, we quantitatively analyzed reduction in dependence of forests, Institutional Strengthening and promotion of economic/livelihood activities in relation to the IFLDP program.

4.7.1 Impact on forest dependence

Since the commencement of the project the number of households dependent on tree leaf fodder has declined from 1677 households to 1602 households. (Figure 4.7.1.1). The households dependent on tree leaf fodder declined by 4.48% after the intervention. Similarly, the number of households involved in free grazing decreased from 1358 to 648, which exhibits a decline of about 44.91% (Figure 4.7.1.2).

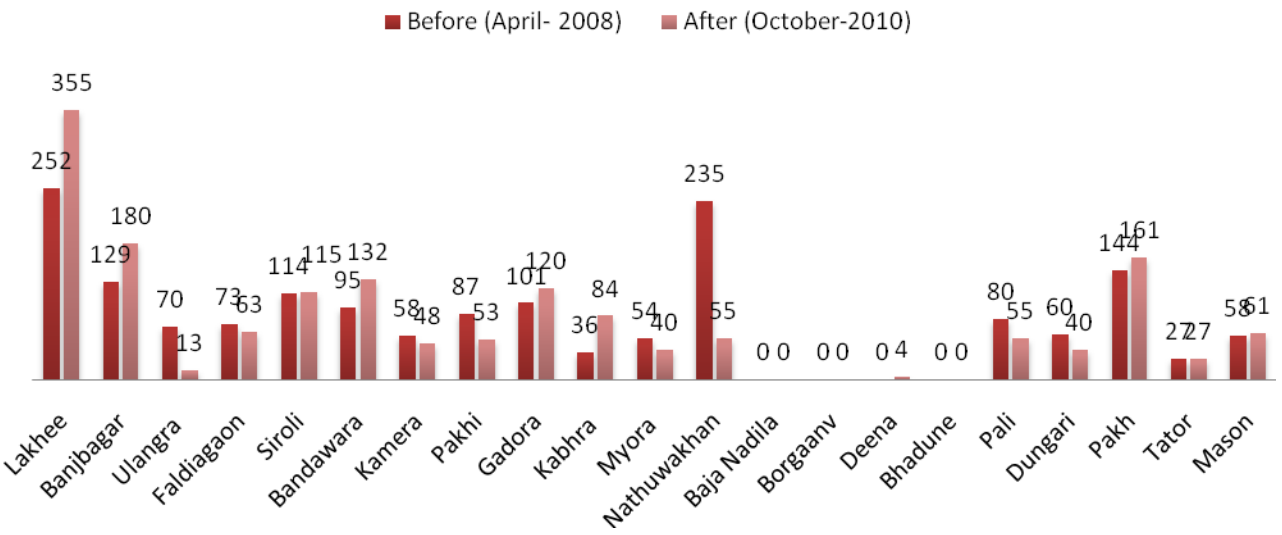


Figure 4.7.1.1. Households dependent on tree leaf fodder before and after project intervention

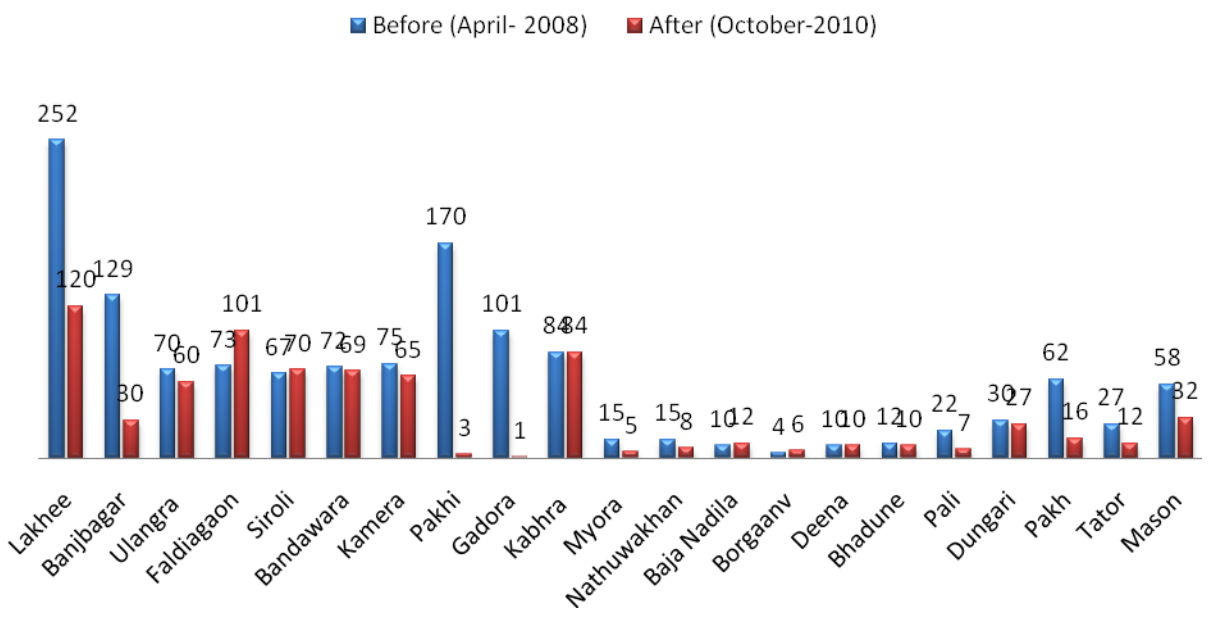


Figure 4.7.1.2. Number of households involved in free grazing before and after project intervention

4.7.2 Impact on better feeding practices and improved cattle breed

The number of households involved in better feeding practices have increased from 42 to 228. It shows that after the intervention about 81.57% of households adopted the better feeding practices (Figure 4.7.2.1), while the households involved in stall feeding has increased from 604 to 1084 (44.28%) since the commencement of the IFLDP program (Figure 4.7.2.2). Similarly the overall number of livestocks has increased by 13.72% from 1616 to 1873. Households with improved cows have

gone up by 53.20% from 95 to 203 and improved buffalo has increased by 82.69% from 18 to 104.

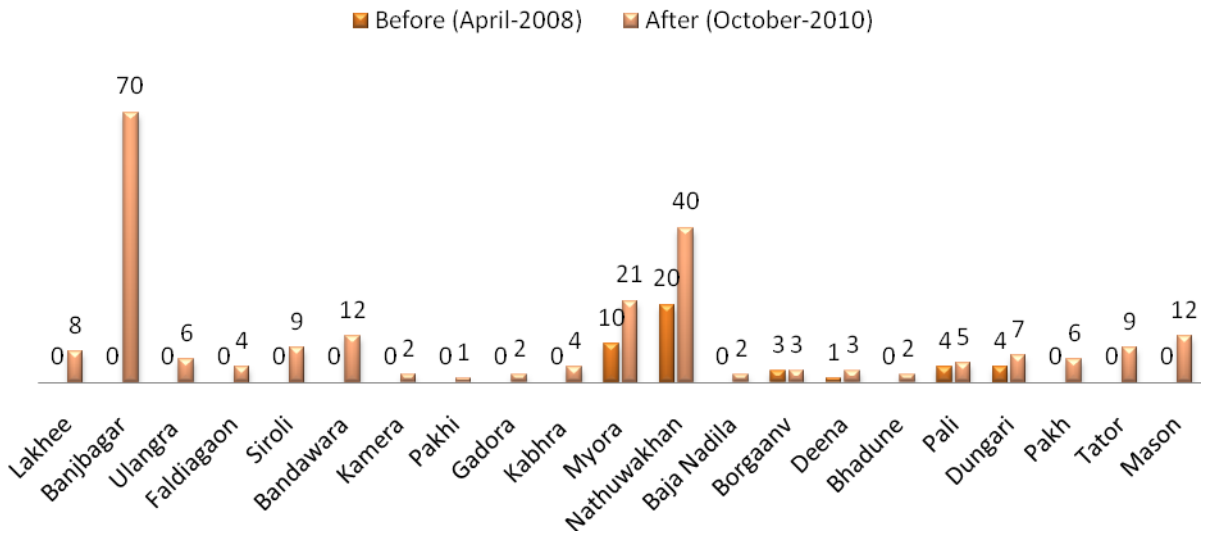


Figure 4.7.2.1. Households adopted better feeding practices due to project interventions

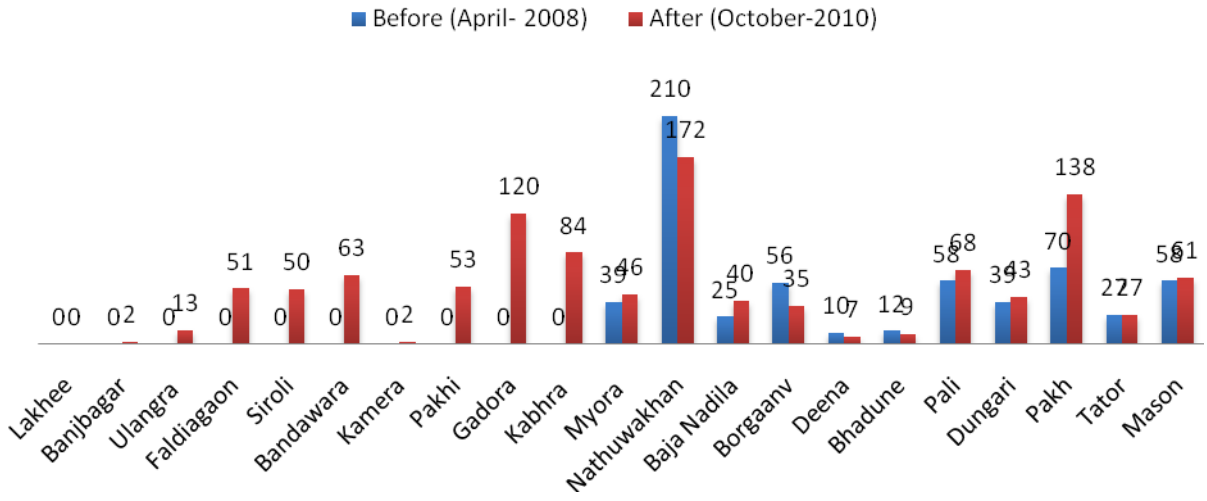


Figure 4.7.2.2. Households engaged in stall feeding

4.7.3 Impact on institutional strengthening

The number of federations linked with live stock based enterprises has increased by 58.33 from 5 to 12 after the intervention in the studied villages while an increase of 75% were recorded in the numbers of federations which has increased from 3 to 12. Similarly number of Self Help Groups/Livestock Producer Groups (SHGs/LPGs) have increased by 14.94% from 74 to 87, number of SHGs with bank linkages has increased by 17.74% from 51 to 62 and number of SHGs/LPGs involved in dairy has increased about 72.97% which was about 20 before the intervention in Aprail-2008 and about 74 after the intervention in June-2010 (Figure 4.7.3).

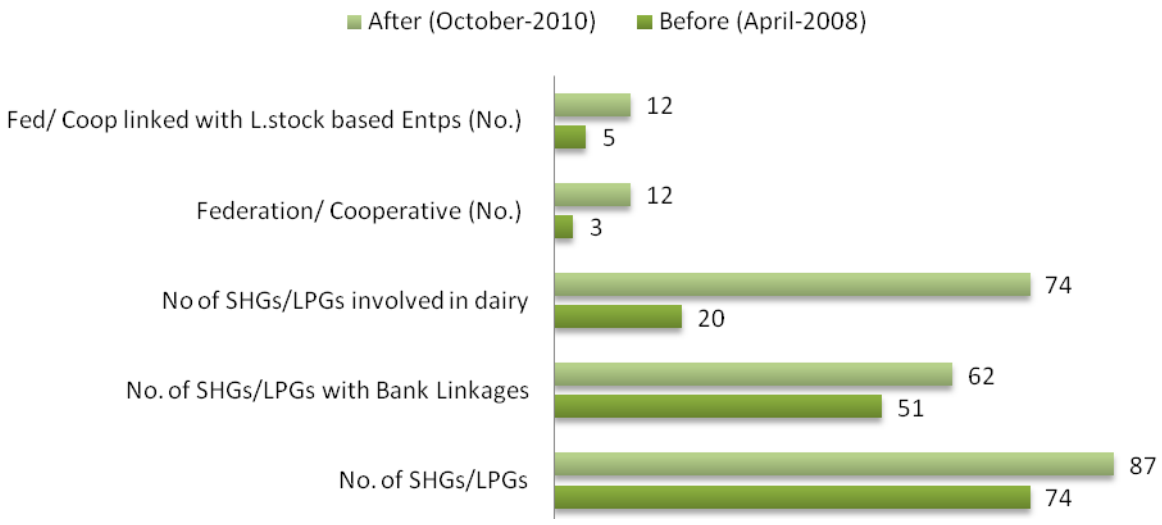


Figure 4.7.3. Impact on institutional strengthening before and after project intervention

The IFLDP intervention played a vital role in establishing and strengthening several federations. A good example of such federation is Umang Bhilangna Valley Milk Production and Marketing Federation, Ghansali, Tehri, which is mainly led by the local women. Since the commencement of the federation in October-2009 about 43377.95 liters of milk has been collected and about 40091.20 liters of milk has been sold in the local market (Figure 4.7.3.1). The rest 3286.75 liters of milk was used to prepare various milk products such as butter, paneer, cream and dahi etc. The federation generated rupees 87,562 by selling of these milk products (Figure 4.7.3.2). The total income of the federation in the year 2009-10 was estimated to be rupees 1074515.62 out of which approximately 776903 rupees were paid to about 1240 families who sold the milk to the federation and about 273527rupees were spent as the operational cost for transportation, rent, collection charge etc. The net benefit of the federation after the payment of milk to the villagers and the operational costs the net benefit was estimated about 24085.62 rupees (Figure 4.7.3.3) which is a quite good amount for such a federation running by the local inhabitants without having any prior experience of marketing and other such activities.

Figure 4.7.3.1. Total Milk Collection and Sale by Umang Bhilangna Valley Federation in 2009-10

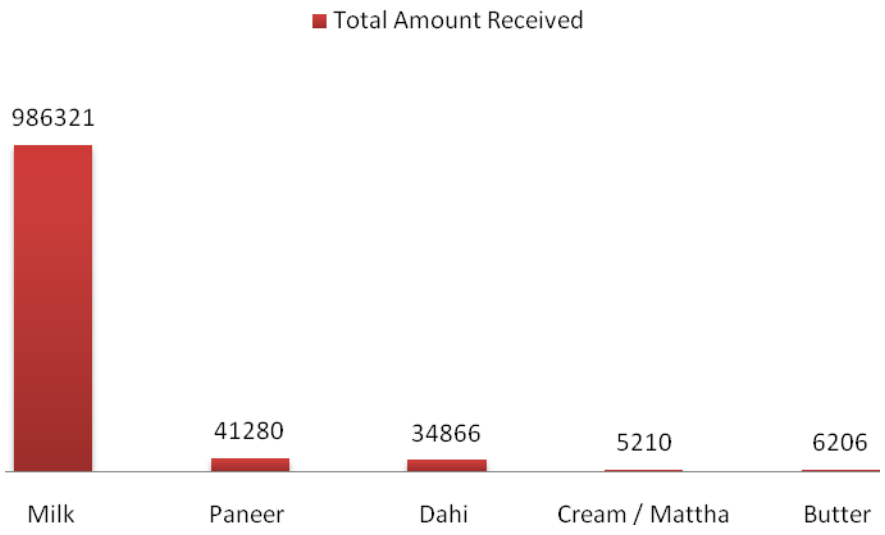


Figure 4.7.3.2. Total annual income of Umang Bhilangna Valley Federation through sale of milk and other milk products in 2009-10

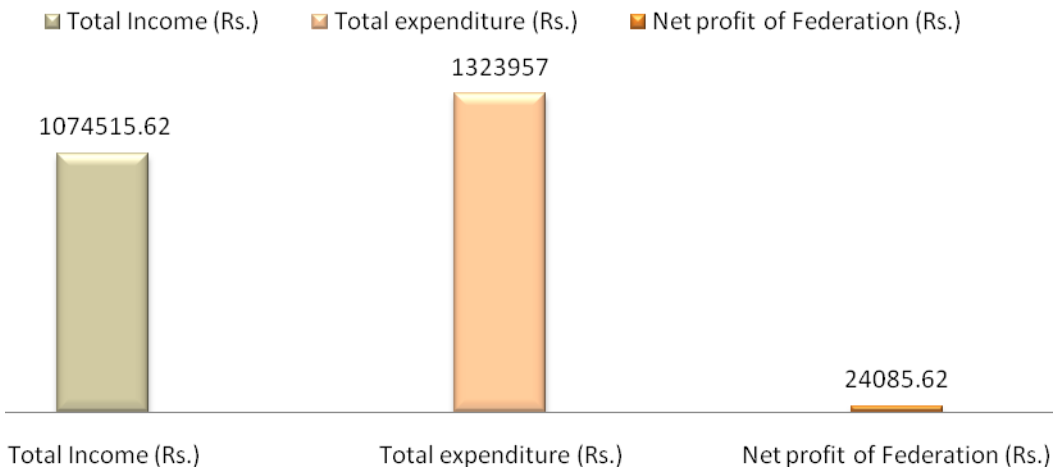


Figure 4.7.3.3. Total income, expenditure and net profit of Umang Bhilangna Valley Federation in 2009-10

4.7.4. Impact on economic activities

Households involved in sale of cattle has increased by 87.50% from 3 to 24 after the intervention, while households involved in milk sale has increased from 402 to 509. The increase was recorded about 21.02%. The household involved in ghee sale has declined since the commencement of the project by 8.85% from 429 to 391, because most of the households were involved in selling of milk due to market access initiated by women federations. There is an average increase of 6 rupees in the selling price of milk since the commencement of the project; however this increase would have been there due to inflation and initiation ked by marketing intervention under the project during last three years (Figure 4.7.4).

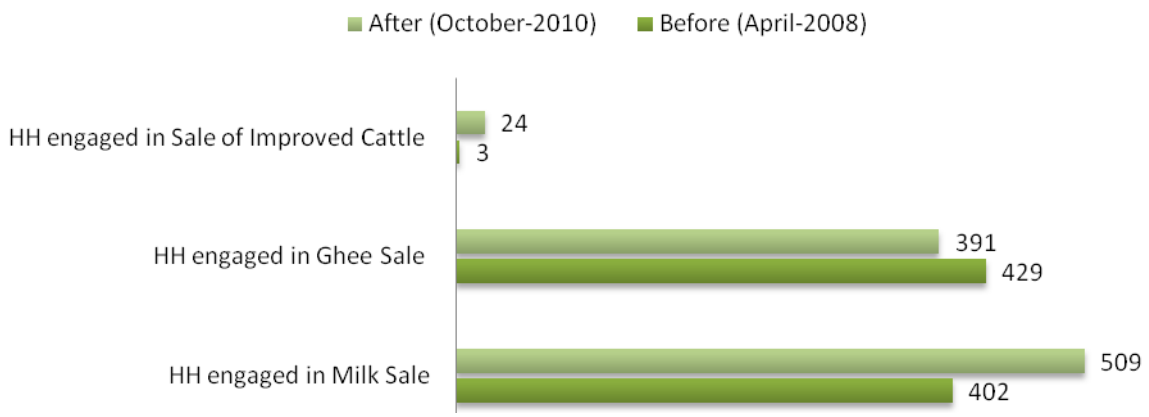


Figure 4.7.4. Impact on economic activities before and after project intervention

5. DISCUSSION AND KEY RECOMMENDATIONS

Livestock are valuable assets of the rural poor and are critical in supporting their livelihoods particularly during unfavorable times. Mixed (crop-livestock) farming systems provide poor farmers with flexible asset regime and reduce risk and vulnerability. Fodder production is important not only for augmenting feed availability but for maintaining the natural resource base through soil stabilization, preventing soil erosion, and contributing to soil fertility through microbial nitrogen fixation and organic matter addition.

The IFLDP programme identified fodder shortage as a serious constraint in the mountainous villages of Uttarakhand. Under the IFLDP program the importance of fodder development locally has been recognized. The severity of the fodder scarcity is such that villagers are feeding Banj oak leaves which are an inferior quality fodder to keep their animals alive. Collection of tree leaf fodder also involves intense human labour, time consumption, women drudgery and occasional loss of life. Due to inferior quality of fodder the production of milk cannot reach its potential, besides resulting in value of cattle crash to the lowest levels. IFLDP program is a holistic approach to not only to address the problem of fodder scarcity but also to strengthen the various components necessary to create an integrated and profitable livestock venture.

Several initiatives have been undertaken by the project to increase the availability of nutritious fodder. Four species of temperate grasses (Tall fescue, Cocks foot, Perennial Rye and Brome grass), three species of sub-tropical grasses (Hybrid Napier, *Kadh* and *Ouns*) and fodder shrub/ tree species are being raised in these nurseries. In the present study our focus was on the most extensively planted Napier grass (*Pennisetum purpureum*) indigenous to tropical Africa. The popularity of Napier grass is due to its high production, reasonably good fodder quality, drought tolerance and its persistence to frequent harvesting. The advantage of withstanding repeated cutting, and four to six cuts in a year can produce 50-150 tonnes fresh herbage per ha (Purseglove 1972) in the African region. In the present study we examined that Napier grass can produce 28.23 ± 0.78 $tha^{-1}yr^{-1}$ to 48.61±1.53 $tha^{-1}yr^{-1}$ if harvested thrice a year. The productivity values obtained in the study seems low when we compare it with productivity of Napier in tropical regions, the value ranges between 10 and 40 t ha^{-1} per cut (Schreuder *et al*., 1993). Nevertheless, the rates are high considering that only 3-4 cuts can be obtained in subtropical and temperate regions, as most the grass goes under a dormant phase under severe winter conditions of the Himalayas, the productivity starts declining from November to early December and reaches a phase of zero productivity from January to early March. Productivity is highest with the commencement of rainfall in the monsoon. It is worthwhile to consider that grass is planted on common lands and steep hill slopes with little or no soil cover. Best results are obtained when it is planted in deep, fertile soils. However, cultural operations i.e. hoeing, mulching, composting, weeding, irrigation (wherever possible), gap filling and repairing of physical structures (contour, walls, plantation pit, gully plugs, check dams, compost pits) protected the fodder plots have considerably minimized this effect.

Natural grass production in the fodder plots was found higher than the adjoining forest. The natural grass production in the protected plots varied from 7.85± 0.59 $tha^{-1}yr^{-1}$ to 24.12± 0.39 $tha^{-1}yr^{-1}$, whereas the natural grass production in adjoining sites was ranged between 6.00± 0.10 $tha^{-1}yr^{-1}$ to 15.98± 0.55 $tha^{-1}yr^{-1}$. The protection measures and cultural operations done by the partner organizations in the fodder plots may be resulted in the higher production of natural grasses in the fodder plots as compare to adjoining forest.

Though the average fodder requirement in the selected villages met from the fodder plots was estimated about 57.9%, the deficiency of fodder in winter months remains a bottleneck, it is evident from the minimal reduction shown in the dependency of households on tree leaf fodder, only 4.48% of households have shown no dependency on tree leaf fodder, however free grazing has declined by 44.91%, such reduction in free grazing can be attributed to the awareness generated by the IFLDP program on stall feeding which has increased from 604 to 1084 and better feeding practices from 42 to 228 (Figure 4.7.2.1). However, due to increase in the livestock units from 1616 to 1873 (Figure 4.7.5) since the project intervention and lack of options for green fodder in the winter season the reliance on the forest has only declined by 4.48%. It is therefore

essential to extensively plant grass, shrub and tree species depending upon the climatic and topographical conditions that can provide green fodder throughout the year. Some species have already been identified and planted along with Napier protected the fodder plots. However, Napier being fast growing species would consume most of the resources and suppress other species occurring in the area which would be useful in a long run. Stronger conservation efforts are required to protect these species. Due to better management practices and conservation efforts put by the partner organizations some fodder plots have demonstrated excellent growth of such species planted with the Napier grass, as much 17 different fodder species occurred protected a 5 ha fodder plot in Bhatkhola which also a Van Panchayat.

There are anecdotal accounts from the studied villages that the milk production has increased after feeding treated hay, while no statutory evidence to support this is available with the households or the partner organizations.

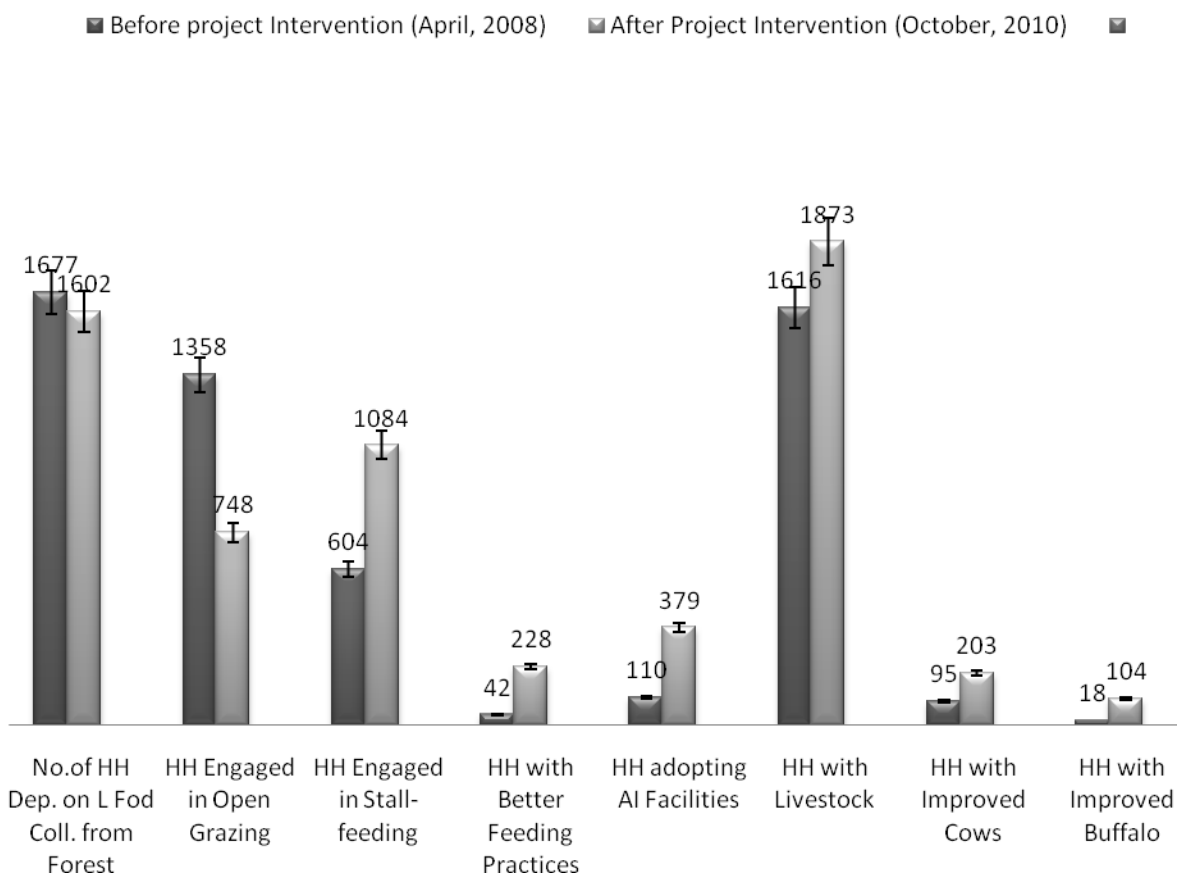


Figure 4.7.5. Impact of project intervention on various activities under the project

It is interesting to observe that the maximum production occurred in the fodder plots (Baja Nadila and Bhatkhola) that fell under the jurisdiction of Van Panchayat and on the floor of Chir Pine (*Pinus roxburghii)* forest which supports very few species. In view of the results it is suggested that extensive fodder plantations should be set up under the canopy of Chir pine under van Panchayat or in collaboration of community with the forest department in future. This will not only solve the problem of scarcity of land available for grass fodder in hills but also reduce the risk of forest fires which is often set deliberately to promote fresh flush of grass for livestock to graze.

Minimum fodder requirement met from fodder plots was observed in Ulangra village, where Napier grass had shown minimum production and higher requirement. Low productivity in Ulangra can be attributed to the higher altitude (1504 m) of the plot combined with aspect (Northern) as compared to other studied plots. Napier grass grows best in the altitudinal range of 800-1500m and prefers drier conditions. While Baja Nadila (1461m) and Bhatkhola (1511m) also lie in same altitudinal range but the aspect of the sites were south facing with ensured drier conditions and minimized damage due to frost injury. Napier is highly prone to damage due to frost. Similarly future plantations should be concentrated to slopes that receive maximum sunlight to ensure better survival rates and maximum productivity.

High soil moisture can be attributed to the moisture conservation activities undertaken by the local NGO's protected the fodder plots in collaboration with MGNREGA and IFLDP i.e. contour terracing, earthen ponds and vermi-compost pits. A recent study conducted by Singh, 2009 (unpublished) suggests that the average soil moisture % of an undisturbed banj oak forest is 19%,

banj oak is considered to be a moisture retaining species, in the present study we have observed that the average soil moisture % of the fodder plots was 17% which is close to the undisturbed banj oak forest. Considering that the protection in the banj oak forest has been for several areas the moisture % obtained from the fodder plots is promising.

The design of the contour trenches plays a major role in soil and moisture conservation. Each contour is dug against the slope of the hill the size and the distance of pits from each other were decided depending upon the degree of the slope. To increase infiltration of water and retain soil moisture in the selected sites, roughly 2 percolation pits (Khals) have been dug in plantation plots, apart from this roughly 4 gully plugs/check dams have been constructed to retain moisture and avoid erosion of top soil.

There has been an overall improvement in all the activities undertaken in the IFLDP program from 5 to 12 in the studied villages while the numbers of federations have increased from 3 to 12. Similarly number of Self Help Group' (SHGs)/Livestock Producer Groups (LPGs) have increased from 74 to 87, number of SHGs/LPGs with bank linkages has increased from 51 to 62 and number of SHGs/LPGs involved in dairy has increased from 20 to 74. It is encouraging to notice that women are playing an active role in fodder plantations, selection of new fodder plots, protection, maintenance of plots and distribution fodder grasses from planted plots. Moreover, where Federation managed micro-dairies are in functional, women's are actively involved in operation and management of these dairies. Although the formation of SGP's/ LPGs in the project villages has considerably increased, there is a need to involve more households under the SGPs /LPGs so that a significant volume of milk production could be generated. This will not only ensure economic viability but also long term sustainability of the federations. The Federations are promising as key competitor in the local market. Federations are successfully

operating the micro-dairy business venture and are also playing a major role in the enhancement of the incomes of their members through the sale of milk and milk products. The good thing about Umang Bhilangna Valley and other such federations is that these kinds of organizations are not only supplying good quality of milk and other milk products but also improving the livelihoods of the local people by providing them market in the nearby area and paying them significantly higher amount for selling milk. However, capacity building programmes are required on a regular basis to the Federation members and project staff so that they can manage the dairy ventures in a systematic manner and become self reliant. Some of the key areas identified are account keeping, processing and value addition of milk, lawful issues related to business enterprise etc. It is also necessary to provide some compensation to the members of the federation for long term sustainability.

Key recommendations:

1. The fodder production from the fodder plots have yielded satisfactory results, however to bridge the gap between requirement and availability the program needs to be up scaled substantially.

2. The deficiency of fodder in winter months remains a bottleneck; it is evident from the minimal reduction shown in the dependency of households on tree leaf fodder, only

4.48%. It is therefore essential to identify and extensively plant grass, shrub and tree species depending upon the climatic and topographical conditions that can provide green fodder throughout the year.

3. It is also essential to expand the fodder preservation practices for the lean period, some households are already involved in hay treatment with Urea molasses and EM concentrates with satisfactory results, however this technique of fodder preservation should be widely advertised under the program and training sessions with community members organized.

4. As per the present study plantations in the pine forests and under the jurisdiction of Van Panchayats have yielded excellent results. As there is scarcity of common lands in certain areas, plantations under pine forests should be encouraged in collaboration with State Forest Department or Van Panchayat.

5. It was observed in that some study sites Napier grass had shown high productivity under the canopy of leguminous tree species. The capability of leguminous species to fix atmospheric nitrogen may be the region of high productivity, thus the fodder species can be cultivated under the canopy of leguminous tree species such as *Alnus nepalensis* or in combination with other leguminous shrubs and grasses.

6. It is also important to consider the topographical variations before undertaking plantation activities i.e. south facing and gentle slopes has shown higher productivity of Napier grasses when compared to North facing and steep slopes.

7. Villagers with Livestock should be encouraged to promote animal hygiene and construct their animal shelters with better feeding, watering systems and proper ventilation.

8. Capacity building programmes are required on a regular basis to the Federation members and project staff so that they can manage the dairy ventures in a systematic manner and become self reliant.

9. It is also necessary to provide some compensation to the members of the federation for long term sustainability.

In a nutshell, the IFLDP program indicates that improvement of livelihoods of the rural population of Uttarakhand can be improved following the IFLDP model. The program has rightly taken a more holistic advance to address the issue as the specificities of the Himalayan Mountains and strong interlinkages livelihoods with livestock and economic upliftment any sectoral approach would have been unviable. However to make a substantial difference the program needs to be up scaled not only in terms of villages adopted under the program but also the extent of program in each village, each activity under the program should be strengthened and more households involved in the program.

References

Anon, 2009. Baif-Naip Intigrated livestock development program Uttarakhand, 2009 Annual report.

Dhar, T.N.S. 1996. Himalayas the Social economic Configuration. NewDelhi, In: *Experiences and observations*, ULDB Dehradun

Himmotthan, 2009. A handbook for Fodder Production in common lands under National Rural Employment Guarantee Act. 16-18 pp.

Misra, R. 1968. *Ecology Workbook.* Oxford and IBH publishing Co. Calcutta, 224 p.

Negi, G.C.S. and Joshi, V. 2002. Drinking water issues and development of spring sanctuaries in a mountain watershed in Indian Himalaya. *Mt. Res. Dev.*, **22:** 29–31.

Pandey, A.N., Pathak, P.C. and Singh, J.S. 1983. Water, sediment and nutrient movement in certain forested and non-forested sites in Kumaun Himalaya. *Forest Ecol. Mgmt.*, **7:** 19–29.

Purseglove, J. W. 1972. Tropical crops Monocotyledons (Harlow, UK: ELBS/Longman).

Samal, P.K., Palni, L.M.S. and Agrawal, D.K. 2003. Ecology, ecological poverty and sustainable development in Central Himalaya region of India. *Int. J. Sustain. Dev. World Ecol*., **10:** 157–168.

Scheffe, H. 1959. *Analysis of variance,* John Wiley and Sons, New York.

Schreuder, R., Nijders, P.J.M., Steg, A. and Kariuki, J.N. 1993. Variation in OM digestibility, CP, yield and ash content on napier grass (*Pennisetum purpureum*) and their prediction from chemical and environment factor. *Research Report,* National Animal Husbandry Research Station, Naivasha, Kenya. pp.62.

Shah, G. 2009. *Uttarakhand A Blue Print for Development.* Cosmo Publications, New Delhi. 33-37 pp.

Singh, J.S. and Singh, S.P. 1992. *Forests of Himalaya, Structure, Functioning and Impact of Man*. Gyanodaya Prakashan, Nainital, India.

Singh, J.S., Pandey, U. and Tiwari, A.K. 1984. Man and forests: A central Himalayan case study. Ambio, 13(2): 80-87.

Singh, V. 2009. Biomass stocks and carbon sequestration rates in banj oak (*Quercus leucotrichophora, A. Camus*) forests under different disturbance regimes in Central Himalaya. *PhD Thesis,* Kumaun University, Nainital, Uttarakhand (India).

Singh, K. and Singh, H.S. 2009. Forage resource development in Uttarakhand: Experience and observations (http://www.uldb.org/pdf/Forage%20Resources_FDP_.pdf).

Singh, S.P. and Singh, J.S. 1991. Analytical and conceptual plan of reforest central Himalaya for sustainable development. *Environmental Management*, **15:** 369-379.

UFLDP. 2009. Uttarakhand Fodder and Live stock development Board. *Annual Report.*

Valdiya, K.S. 1985. Accelerated erosion and landslide-prone areas in the Himalayan region. *In*: Singh, J.S. (*Ed.*) *Environmental Regeneration in the Himalaya: Strategies and Concepts*. Gyanodaya Prakashan, Nainital. pp. 12-38.

Annexure-I

Household Fodder Development Plan Survey Format

Proforma No.

Block: **Gram Panchayat:**

Village: **District:**

A	**Basic Information**					
1	Household Head	Name (if Male)		Name (if Female)		
2	No. of family members	Male	Female	Children	Total	
B	**Livestock Information**					
3	No. of Cattles (local & Improved)	Cow	Buffalo	Oxen/Sheep/Goat/Others	Total	
C	**Milk Production and Consumption**					
4	What is the daily milk production of your cattle (Kg)					
	0.5-1 kg	1-2 kg	2-3 kg	3-5 kg	More than 5 kg	
5	Whether the available milk is adequate for your family			Yes	No	
6	Do you also sell the milk in the local market (If yes at What Price)					
7	Out of total milk production what	10-20%	20-30%	30-40%	50-60%	More than that

	percentage of milk you sell out					
C	**Source of Fodder and Fodder Collection**					
8	Forest/Community Forest	Private Lands	All	Others (if any)		
9	Distance between house and Fodder source point in meters					
	100-200m	200-500m	500-100m	>1000m		
10	If Fodder is collected from forest what amount is harvested every time (kg)					
	5-10kg	10-15 kg	15-20 kg	More than 20 kg		
11	Weather Fodder is available round the year in Forest	Yes	No			
12	If No How do you fulfil your fodder requirement during fodder scarcity in forest	From private land	From Market	Others (if any)		
13	In which season there is maximum fodder scarcity in forest	Winter	Summer	Autumn	Spring	
14	How much time does it takes to fetch Fodder for Livestock from forest	0-30 minutes	30 min-1 hr	More than 1 hr		

15	Frequency of Fodder Collection				
	Once a Week	2-3 times in a Week			Daily
16	Whether the available Fodder is adequate	Yes		No	
17	If the fodder is not adequate how do you fulfil the fodder requirement (Answer in Brief)				
18	Who carry fodder normally in your house	Male	Female	Childerns	
				Girls	Boys
19	Major species harvested for fodder	Oak (Banj) Leaves	Grewia (Bheemal)	Cilitis (Khadik)	Others
D	**Impact of IFLDP Programme**				
20	Dependency on forest after the fodder intervention	Increases	Decreases	Still the same	
21	Milk Production after the fodder programme	Increases	Decreases	No Change	
22	If milk production increases what amount of milk production increases (in g)				
	100-200g	200-500g	500-1000-g	>1000g	
E	**Cattle Health**				
23	What is the average daily feed of your cattle (in kg)	5-10 kg	10-15 kg	More than 15 kg	

24	Is there an increase in the daily feed of your cattle		Yes	No	
25	Is there any improvement in your cattle health after the intervention		Yes	No	Can't Say
2	What is your opinion about the IFLDP Programme				
	It is a good initiative	Its good but needs to be improve		Don't Know about it	

Annexure-II

Fodder production format

Village: Area Under plantation (ha)/nail: Year of plantation:

Ownership: Van panchayat/civil/ private

Altitude: Aspect: Slope:

No of contour trenches/ha:

Average length of contour Trenches (m): _____ _____ _____ _____ _____

Average width of contour Trenches (m): _____ _____ _____ _____ _____

Species planted:

Tree species planted:

Distance from Village:

Time taken: colleague

Adjoining forest type:

Month of fodder harvesting: Season:

No of households benefitted:

No of Compost pits dug: No of cuttings/year:

Trench No	Species	Grass production (Kg)
1		
2		
3		
4		
5		
Average		

Remarks

Integrated Fodder Livestock Development Project (IFLDP)

Village Level Impact Assessment Survey Format

Name of Organisation:_____Name of Surveyor:_____

District:_____ Block:_____ Village:_____

1. Demographic Profile of the Village

SN	Particulars	Number
1	Total Households	
2	Total Population	
3	Male Population	
4	Female Population	
5	SC Households	
6	SC Population	
7	ST Households	
8	ST Population	
9	No. of BPL Households	

2. Livestock Population in the Village

SN	Particulars	Number
A	**Cow**	
1	Improved	
2	Local	
B	**Buffaloes**	
1	Improved	
2	Local	
C	**Calf (Cow + Buffalo)**	
1	Improved	
2	Local	
D	**Bull**	
E	**Goats**	
	Total	

3. Status of Village Institutions

SN	Particulars	Description
1	No. of Existing SHGs/LPGs	
2	No. of SHGs with Bank Linkages	
3	SHGs Linked with Sale of Milk, Milk Products (No.)	
4	No of SHG members Selling Milk to the Federation	
4	SHGs Linked with Federation/ Cooperative (No.)	
5	No. of SHGs members linked with Federation managed Livestock based Enterprises (No.)	

4. Economic Profile

SN	Particulars	Description
A	**Land holding details (HH)**	
1	Land less HH (No)	
2	Marginal farmer (<1 ha) (No)	
3	Small farmer (1-2ha) (No)	
4	Medium / Large farmer (>2 ha) (No)	
B	**Average Annual Family Income (Rs.)***	
1	Land less HH	
2	Marginal farmer	
3	Small farmer	
4	Medium / Large farmer	

***Note: This is the average annual income (Rs.) of the families.**

5. Fodder Collection from Planted Common Land Plots

SN	Particulars	Description
A	**Status of fodder production from planted plots**	
1	Total area covered under common land fodder plantation (ha)	
2	Years of plantation (2008, 09, 10)	
3	HH involved in collection of grass from planted plots (No)	
4	Per HH grass fodder collection from the planted plots (Kg/year)	
B	**Protection and management status of planted plots**	
1	Village institution involved in the protection and management of planted plots (SHGs/ VPs/MMD/User groups))	
2	HHs involved in intercultural operation	
4	Compost contribution from users (Kg/HH/year)	
5	Money contributed for grass cutting from planted plots (Rs./HH/year)	
6	Protection and management status (Care taker/Groups, etc.)	

6. Tree Leaf Fodder Collection from Forest

SN	Particulars	Description
1	HH Dependent on tree Fodder Collection from Forest (No.)	
2	No. of Months of tree fodder collection	

7. Forage crop production from private land

SN	Particulars	Description
A	No. of HH cultivating forage crops (No)	
1	Average area under forage crops (Naali/HH)	
2	Average annual forage production (Kg/HH/year)	
B	No. of HH planted fodder grass on private land (No)	
1	Average area under planted grass (Naali/HH)	
2	Average additional fodder production from planted grass (kg/HH/year)	
C	HH using cattle feed (No)	
1	Average cattle feed consumption (Kg/HH/year)	
D	HH involved in making hay treatment (No.)	
1	Average feeding of treated hay (Kg/HH/year)	

8. Livestock Management

SN	Particulars	Description
A	Household Engaged in Free Grazing on common land (No)	
B	Household Engaged in Stall-feeding (No)	
C	Household with Better Feeding Practices (Chaffer, trough) (No)	
1	HH with Better Feeding Techniques from Project Assistance	
2	HH with Better Feeding Techniques from Other Sources	
3	HH with Better Feeding Techniques with self efforts	

9. Livestock Health and Breed Improvement

SN	Particulars	Description
A	No. of Household Adopting AI Facilities (No.)	
B	No. of improved calf through AI (cattle, buffaloes)	
C	No. of Households using proper vaccination to their livestock (No)	
D	No. of Households regularly using mineral-mixture to their livestock (No)	

10. Livestock Production

SN	Particulars	Description
1	Household with Livestock (No)	
2	Household with Improved milch Cows (No)	
3	Household with Improved milch Buffalo (No)	
4	Average milk production from improved cows (Lit./HH/day)	
5	Average milk production from improved Buffalo (Lit./HH/day)	
6	Average milk production from local cows (Lit./HH/day)	
7	Average milk production from local buffalo (Lit./HH/day)	

11. Status of Milk Collection and Marketing

SN	Particulars	Description
A	HH engaged in milk sale (No)	
B	Total milk sale from village (Lit./day)	
C	Milk selling price at village (Rs./lit.)	
D	Transportation cost (Rs./HH/day)	
E	HH engaged in selling of Ghee (No.)	
F	Selling price of Ghee (Rs./Kg)	
G	HH selling milk to Federation (NO.)	

12. Income from Livestock Sector

SN	Particulars	Description
A	Household Engaged in Rearing of Goat (No)	
B	Average per HH annual selling of goats (No./HH/Year)	
C	Household Engaged in Sale of Improved Cattle (No)	
D	Average per HH annual selling of Improved Cattle (No./HH/Year)	
E	HH engaged in ploughing of others field (No)	
F	Annual income from ploughing (Rs/year)	
E	Average per HH income from sale of milk / milk products (Rs./Month)	
F	Average per HH total annual income from livestock sector (Rs./HH/Year)	