



RNR =
Renewable
Natural
Resources

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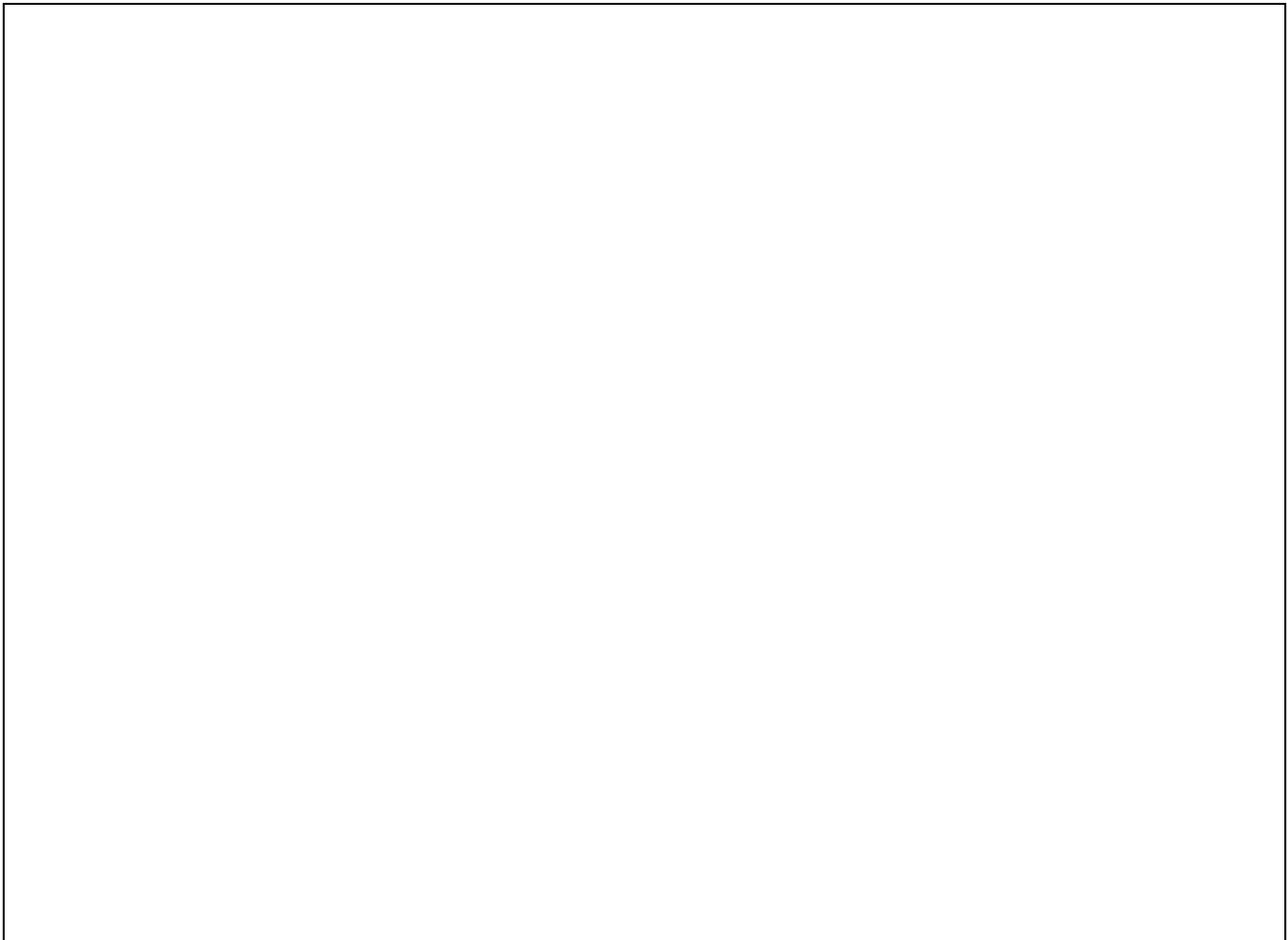
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**Assessment of the Socio-Economic Situation
of Forest Grazing in the proposed Rimchu FMU**



Socio-economic Interlinkages of Forest Grazing (Drawing by Karma Chewang)

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ABBREVIATIONS/ACRONYMS

BG-SRDP	Bhutan-German Sustainable RNR Development Project
BHU	Basic Health Unit
DOFS	Department of Forestry Services
FDC	Forestry Development Corporation
FMU	Forest Management Unit
FYM	Farm Yard Manure
GDP	Gross Domestic Product
ha.	hectare
HRH	Her Royal Highness
Kg	kilogram
Km	kilometer
LUPP	Land Use Planning Project
MoA	Ministry of Agriculture
Nos.	Numbers
NTFP	Non-timber Forest Product
PMU	Project Management Unit
PP	Pre-primary
PRA	Participatory Rural Appraisal
R-FMU	Rimchu FMU
RGOB	Royal Government of Bhutan
RNR	Renewable Natural Resources
RNRRC	RNR Research Center
Spp	Species
Yrs	Years

GLOSSARY

Dratshang	Central Monk Body
Geog	Block (consisting of few villages)
Langdos	Unit of land measure (approximately one third of an acre of dryland and a quarter of an acre of wetland)
Sokshing	Forest from which only litter can be collected
Tsamdrog	Pasture
Tsheri	Shifting cultivation plot

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At the dzongkhag level, the forestry personnel were instrumental in guiding the team to the study area. Their constant attention in introduction to the subjects of study, accompaniment and in arranging logistics at site was commendable.

The villagers deriving their livelihoods through agriculture and the migrating herder depending on the proposed Rimchu FMU for their myriad needs are thanked for keeping time aside to answer our many queries to provide information on cattle herding and forest grazing.

In the execution of the inventory, numerous people from the offices within the Ministry of Agriculture in the departments, Research Centres and dzongkhags have also been of great assistance in providing the Consultant with information and documentation that made this study possible.

EXECUTIVE SUMMARY

Background: Forests in Bhutan represent the single largest natural resource. Many tracts of the natural forests are still intact, covering an area of 20,0044 sq. km corresponding to 72% of the land area. Forest Management Plans have been prepared and today there are 14 management units in operation and 6 working schemes covering an area of 156,622 hectares. The environs of Rimchu, under Kabjisa geog of Punakha dzongkhag is targeted for such a forest management plan. This forest area here is also heavily grazed.

Increasing cattle population through the years has made the sustainability of the traditional grazing system questionable. Although, cattle grazing is known to be wide spread in all broadleaf forests, the extent, nature intensity and impact of grazing have not been adequately quantified.

Broadleaf forests are the “ food banks ” of farmers living in remote settlements for they provide buffers against famine when crops fail. The well being to the people in the vicinity of broadleaf forest is directly linked with how well broadleaf forest resources are conserved and managed.

Objective and Methodology of the study: The objective of this study was to assess the socio-economic situation of forest grazing within the proposed Rimchu Forest Management Unit.

For this study, an assortment of methods was used. Firstly, cattle-owning households from the adjoining villages dependent on the Rimchu Forest and the migrating herder using a questionnaire with structured and unstructured sections were interviewed. PRA tools were administered to facilitate the grazers’ assessment of their economic activities and subsequently their arrival at a prioritized ranking of these activities.

Findings: Six villages are dependent on Rimchu FMU namely Wokuna-Damche, Tshetena, Chortenebu, Yesakha, Botokha and Lower Rimchu. 61 households were interviewed from the six villages. With an average family size of 5.38 persons and the productive and dependent populations almost equal, the Rimchu residents are primarily farmers, depending on livestock and forestry resources for their livelihoods. Vegetable and cereal productions are the most important sources of income for the villagers. Non-timber forest products feature in third place in the repertoire of income sources. Except for the village of Tshetana, the other villages depend less on the forest for products to sell. Most of expenditure in the household is incurred on religious ceremonies followed by food and clothing. The villages have good access to the Primary School and a Basic Health Unit.

The people herd largely local cattle for dairy products, ploughing and Farm Yard Manure (FYM) and for some income through sale of its products to meet the household needs. Sale of livestock products makes 10 % of the total income of the villages, while 5 % of the expenditures is spent on livestock management. There have been efforts to rear improved breeds. The cattle are grazed in the proposed Rimchu FMU and there is a practice of releasing cattle without herders (160 bulls alone) for several months. There is pressure building up on grazing resources namely forage and tree fodder in the Rimchu FMU. Besides, cattle owned by the dratshang migrate every year to Rimchu FMU area where they are kept for some four months. Pasture owned by the dratshang (about 270 heads) and other individuals are grazed too but boundaries may not be entirely clear and therefore pose risks of encroachment onto government land and in each owner’s pasture.

Recommendations: It is recommended by the consultant that the project activity to promote improved cattle breeds and to reduce local cattle breeds are intensified through extension. Fodder and pasture development is also an important activity that could be taken up to build up resources for cattle and this can only succeed with farmers full participation. Registered pastures and migratory routes of cattle need to be demarcated. Extension work on importance of tree seedling and rehabilitation of degraded areas is to be launched with full participation of the farmers.

1 INTRODUCTION

1.1 Country background

With a land area of 46,500 square kilometers Bhutan is a landlocked mountainous country in the eastern Himalayas. The land rises from approximately 300 meters in the south to over 7,000 meters in the north. The southern belt has a hot humid climate with a rainfall ranging from 2,500 to 5,000 millimeters while the central inner Himalayas has a cool temperate climate with annual rainfall averaging at 1,000 millimeters. There is substantial variation within these broad ranges and the climate and rainfall characteristics change dramatically within short distances giving rise to niche areas with substantial agricultural and horticultural potential. Of the total land area only 7% is estimated to be suitable for agriculture with 38% contribution to the GDP.¹

More than 85% of the estimated population of 600,000 are rural households living on small land holdings and practicing an integrated agriculture, livestock and forest based farming system including such cottage activities as collection and processing of forest products, weaving, butter and cheese making. Production is still largely subsistence oriented wherein production and consumption activities are intertwined. The main crops cultivated in the 7% agricultural lands are cereals, fruits and vegetables, especially potatoes. Yields are low but with potential for raising them including potential for crop intensification and diversification.

1.2 Sector Background

Since the creation of the then Department of Forests in 1952 and Bhutan Logging Corporation (now Forestry Development Corporation), scientific forest management has been introduced. The policy decision to maintain at least 60% of the land area under forest cover was taken and 72% of the country is currently under forest cover. Forest Management Plans have been prepared and today there are fourteen management units in operation and 6 working schemes covering an area of 156,622 hectares.²

Forests in Bhutan represent the single largest natural resources. Many tracts of the natural forests are still intact, covering an area of 29,0044 sq. km corresponding to 72% of the land area (LUPP1995). About 35% of the forest is conifer, 52% is broad leaf forest, 11.2 % is Scrub forest and the plantation forest is nominal. Broadleaf forests in Bhutan are located across the southern part of the country. They fall into three vegetation zones- Tropical broadleaf forest zone, Sub-tropical broadleaf forest zone and warm temperate broadleaf zone. Scattered patches of broadleaf forests (e.g. oak, maple, and birch) also occur in the cool temperate zone in association with conifers. Nationally, the broadleaf forests occupy important niches as they provide goods and services to 80% of the population in the country.³

Broadleaf forests provide wood, fodder and non-wood products. Broadleaf forests are the “ food banks ” of farmers living in remote settlements for they provide buffers against famine when crops fail.⁴ The well being to the people in the vicinity of broadleaf forest is directly linked with how well broadleaf forest resources are conserved and managed.

From time immemorial, broadleaf forests have been used as grazing grounds for local and migratory cattle as numerous tracts of tshamdrops lie within the extensive broadleaf forest. Increasing cattle population through the years has made the sustainability of the traditional grazing system questionable. Although, cattle grazing is known to be wide spread in all broadleaf forests, the extent, nature intensity and impact of grazing have not been adequately quantified.

¹ Ministry of Agriculture, 1999

² The Last 25 Years, RNR Sector, MoA, 1999

³ Ministry of Agriculture, 1993

⁴ Wagner, 1985

About 13,600 hectares of broadleaf forest is estimated being degraded annually and, allegedly, cattle grazing is partly responsible for this, the others being fuel wood collection and expansion of agricultural land.⁵

1.3 Project Background

The Bhutan-German Sustainable RNR Development Project (BG-SRDP) is a project of the Royal Government of Bhutan (RGOB) with support from the German Government and has recently completed its second phase (January 1997- December 2000). Planning for the third phase (January 2001-December 2005) was done in a workshop in April 2000

The Project supports activities in the field of forestry (community forestry, forest management), agriculture, animal husbandry, irrigation, and watershed management as well as development of the rural infrastructure (feeder road, construction of RNR centers). (Project Document, BG-SDRDP/GTZ, 2000)

The project purpose is to enable "Farm families in Punakha and Wangdue-Phodrang Dzongkhag to manage the Renewable Natural Resources (RNR) in a profitable and sustainable way". With this, the project contributes to the overall goal to "uplift the socio-economic well-being of the people, while conserving the environment".

1.4 Objectives of the Study

The Rimchu FMU falls under the Kabjisa geog of Punakha dzongkhag in western Bhutan. It covers an area of about 9,880 acres of which 494 acres have been targeted for forestry management activities. The altitude of the area starts from 1450 masl. Presently, the main activity of the Forest Development Corporation (FDC) are clear felling and logging with subsequent reforestation and fencing on the planted areas. The warm temperate broadleaf forest of Rimchu has, among other planned activities, become the focus of BG-SRDP to conduct research on growth and regeneration dynamics of broadleaved forests .

Cattle owned by people living near the FMU graze the Rimchu forest and adjacent areas. Additionally, migrating cattle herds comprising of some 270 cattle owned by the Dratshang or the National Monk Body also graze the FMU.

Since a Forest Management Unit is proposed in Rimchu, and in order to plan activities in a more holistic manner, it was decided by the project and the Punakha dzongkhag assess the socio-economic and livestock dynamics in the area. The objectives of the study are therefore to assess the socio-economic situation of forests grazing within the proposed Rimchu Forest Management Unit and to study the forest grazing situation and elaborate proposals for a controlled forest grazing. The firm, Gonefel Options Consult, Thimphu was contracted to take up this assessment between the period 19 November to 24 December 2001, inclusive of the fieldwork and reporting to fulfill the following tasks:

⁵ Ministry of Agriculture, 1995

1. Meet and discuss with the Project Management Unit (PMU), relevant staff of the Ministry of Agriculture (MoA), especially with the Program Director of RNR-RC Yusipang, staff of the Divisional Forest Office as well as the Dzongkhag Forest Office, representatives and people of Kabjisa Geog, and other relevant institutions
2. Under the general supervision of BG-SRDP/GTZ and in conjunction with Wangdue Forest Division, the Forestry Sector, RNR-RC Bajo, and the Dzongkhag Forest Office, the consultant through analysis of existing secondary data (e.g. RNR Census) and complementary baseline survey will:
 - characterize the socio-economic situation of the villages dependent on R-FMU
 - evaluate the importance of forest grazing to the livelihood of local people in relation to other economic activities-growing crops, logging etc
 - assess – through interviews - the extent and intensity of the grazing pressure on forestlands in R-FMU, including tsamdrol ownership and distribution (of resident and external people), and the past grazing practices (historical development, changes over time) within the FMU.
 - appraise the aspirations of the local people and external cattle herders, and their attitudes to forest grazing, particularly in relation to the effect on tree seedling survival and growth.
 - consider - if a need be there to change the current grazing practice - possible social and technical feasible alternatives to the current practices through contacts with local farmers, herders, foresters and veterinarians and pasture agronomists.
3. Carry out a debriefing
5. Prepare a consultancy report in English. The structure and content of the report should be clear and concise and should contain a summary.⁶

1.5 Methodology

For this study, an assortment of methods was used. Firstly, cattle-owning households from the adjoining six villages of Woku-Damche, Tshetena, Botokha, Chorteneobu, Yesakha and Lower Rimchu dependent on Rimchu Forest Management Unit and the migrating herder using a questionnaire with structured and unstructured sections were interviewed. A PRA tool was administered with four groups to facilitate the grazers' assessment of their economic activities and subsequently their arrival at a prioritized ranking of these activities. Besides, prior to the field study, resource persons in the Ministry of Agriculture, RNRRCs, BG-SRDP/GTZ Project Management Unit and Punakha Dzongkhag were also consulted for their views and experiences pertinent to the assignment. Documentation relevant to the task was also reviewed to supplement information from the field.

For the socio-economic survey, 61 households from the villages were interviewed from the total number of households in the villages numbering 271, bringing the sample to almost 22% of the total. Though the sample is small, this was because only those houses with cattle holdings that graze their cattle in the Rimchu FMU was interviewed. Besides, because the work was also implemented during the paddy harvest season, it was difficult to contact respondents.

The Consultant was assisted in the fieldwork by two enumerators in the household surveys and the PRA exercises. A staff each from the PMU and the Punakha dzongkhag forestry sector facilitated the field program.

⁶ Terms of Reference, Assessment of socio-economic situation of Forest grazing in proposed Rimchu FMU.

The Participatory Rural Appraisal (PRA) was conducted with four groups. A total of 94 persons participated in the PRA of which 62 were females and 32 males. Firstly, the team listed the number of participants present categorizing them into male, female and their age. The team explained the objective of the exercise. Following the introductions, the team requested the villagers to discuss among themselves for about 20 minutes their primary economic activities. Then in a plenary the farmers submitted their economic activities that were noted in a chart paper by the facilitator. The farmers were then issued three sticks of varying lengths (long, medium and short) and requested the participants, one at a time, to prioritise their economic activity by placing the sticks against the activity on the chart paper. The total number of long, medium and the short sticks against each activity were subsequently added to arrive at a ranking of the economic activities. The participants were then thanked for sharing their views and time.

2 SOCIO-ECONOMIC ASSESSMENT

The socio-economic aspects appraised were population/demographic profile, access to social services, employment, education level, land and livestock holdings, and sources of income and expenditure of the six villages dependent on Rimchu FMU.

2.1 Demography

From a total of 461 persons in the households 216 are male and 245 female respectively. Average family size is 5.38 persons. The dependent age group of persons below 15 years and above 64 years of age totals 219 that are 47% of the total. The active population within the age group above 15 years and up to 64 years is 242 persons is 52%. The distribution shows almost equal incidence of dependent and productive population categories indicating sizable workload of the productive population in supporting the dependent population.

Table 1: Population/Demographic profile

No	Villages	Total No. of Population	Sex		Age Group (Yrs)		
			M	F	<15	15-64	>64
1	Wokuna-Damche (n=13)	80	42	38	27	44	9
2	Tshetena (n=9)	73	38	35	32	41	0
3	Botokha (n=3)	19	12	7	5	12	2
4	Chorteneobu (n=9)	68	28	40	29	35	4
5	Yesakha (n=24)	196	84	112	88	96	12
6	Lower Rimchu (n=3)	25	12	13	11	14	0
	(total n=61)	461	216	245	192	242	27
	In % of total	100 %	47 %	53 %	42 %	52 %	6 %

2.2 Employment

From 61 households of six villages interviewed, occupation wise, most of the people, that is 56% of the total population were engaged as farmers followed by students and minors at 21% and 18% respectively. Persons employed by the Royal Government of Bhutan total 3% only. More than half the population are engaged in farming indicating it as an important economic activity and one for household sustenance. Less than a quarter, but still a significant proportion of persons, are students. Although students currently are dependents, pursuing education may in future open avenues for employment other than the farm. A small number derive their livelihood from service with the government or employers outside the village.

Table 2: Occupation by category and village

No	Villages	Occupation					Total
		Student	Farmer	RGOB	Minor	Monk	
1	Woku-Damche (n=13)	15	43	1	15	6	80
2	Tshetena (n=9)	6	54	1	12	0	73
3	Botokha (n=3)	3	14	1	1	0	19
4	Chorteneobu (n=9)	15	42	2	7	2	68
5	Yesakha (n=24)	56	91	6	42	1	196
6	Lower Rimchu (n=3)	4	14	1	5	1	25
Total	(Total n=61)	99	258	12	82	10	461
	In % of Total	21 %	56 %	3 %	18 %	2 %	100 %

2.3 Access to social services

2.3.1 Health and Education

The education level obtained ranges between standard four to third year of university in the six villages interviewed. So far, the maximum level of education obtained is in reaching the third year of college from the village of Yesakha. The minimum level of education was attained from the village of Tshetena.

Table 3: Maximum education level by village

No.	Village	Education Level (maximum)
1	Woku-Damche (n=13)	Class X
2	Tshetena (n=9)	Class 1V
3	Botokha (n=3)	Class VI
4	Chorteneobu (n=9)	Class V
5	Yesakha (n=24)	3 rd year college
6	Lower-Rimchu (n=3)	Class V
Total	(Total n=61)	

There are a total of 115 children attending school from the six villages with 88% of them studying at the primary level. Yesakha village reported to have more than half the student population from the total number of students.

Table 4: Number of students by standard and village

No.	Village	Primary (PP-VI)	Junior High (VII-VIII)	High (IX-XII)	College	Total
1	Woku-Damche	18	1	1	0	20
2	Tshetena	9	0	0	0	9
3	Botokha	5	0	0	0	5
4	Chorteneobu	17	0	0	0	17
5	Yesakha	47	4	7	1	59
6	Lower Rimchu	5	0	0	0	5
		101	5	8	1	115
	In % of Total	88 %	4 %	7 %	1 %	100 %

The six villages dependent on Rimchu FMU easily access the primary school for the educational requirements of their children and the Basic Health Unit to address illnesses. From the interviewed villages, there are in total 99 school going children. The facilities are quite accessible

as compared to other areas as time taken to reach the school ranges from a few minutes to 2 hours from the villages. The children from Lower Rimchu go to the Goenshari Primary School that is about 6 km away and takes about 2 hours on foot.

Table 5: Access to Social Services

No	Village	Facility		Max. Distance In Minutes
		School	BHU	
1	Wokuna- Damche (n=13)	Yesakha Pry School	Kabjisa	Max: 120 min.
2	Tshetena (n=9)	Yesakha Pry School	Kabjisa	Max: 60 min
3	Botokha (n=3)	Yesakha Pry School	Kabjisa	Max: 30 min.
4	Chorteneobu (n=9)	Yesakha Pry School	Kabjisa	Max: 30 min.
5	Yesakha (n=24)	Yesakha Pry School	Kabjisa	Max: 3 min.
6	Lower Rimchu (n=3)	Goenshari	Kabjisa	Max: 90 min.

With the school and medical facilities near, the social services at least for the Rimchu FMU dependent villages are accessible. These may be an incentive for villagers to send children to school. The nearness of the BHU may also ensure that farmers resort to the modern health system to cure their illnesses and consequently ensure more time spent on productive activities.

2.4 Land use and Ownership

Results from the household interviews as summarized in Table 6, show that the villagers own maximum holdings comprising of wetland totaling 94.15 acres as compared to dry land which is 21.78 acres only of all the six villages. The village Yesakha has maximum wetland and dry land followed by the village Woku- Damche. The villagers of Lower Rimchu have minimum wetland. The village Yesaka has 5 acres of pasture land owned by the community and 2 acres of Shoksing maintained by the villagers for litter collection. Also, Yesakha village has the maximum orchard land in which mandarin is grown. Guava is also grown.

As the area falls within the wetland/rice farming system, it makes sense that the maximum land holdings are wetland. In Punakha dzongkhag, wetland is also used from January to June for growing a variety of vegetables that is an important cash crop as also corroborated in the output from the PRA prioritization exercise. Dryland other than being used for vegetables is also used partly to grow maize and other crops for cattle fodder.

Table 6: Land holdings (in acres)

No.	Villages	Wetland	Dry land	Tsheri	Orchard	Pasture	Shoksing
1	Woku-Damche (n=13)	22.00	2.35	0	1.75	0	2.00
2	Tshetena (n=9)	15.50	2.63	0.35	0.50	0	0
3	Botokha (n=3)	4.00	0.25	0	0	0	0
4	Chorteneobu (n=9)	17.90	3.15	0	0.36	0	0
5	Yesakha (n=24)	31.00	13.40	0.50	4.25	5.00	0
6	Lower Rimchu	3.25	0	0	0	0	0
Total		93.65	21.78	0.40	6.86	5.00	2.00

2.5 Livestock

The table below shows that from the interviewed 61 households there are from a total number of 334 cattle, 16% are improved cattle and the remaining 84% are local cattle. From the 52 heads of

improved cattle 69% comprise improved cows and 30% improved bulls. There are 282 local cattle of which 49% are cows and 51% are bulls.

Many villagers prefer mithun cross breeds to other breeds as they are hardy breed, and well adapted to rugged terrain and forest. Livestock rearing is the sole livelihood-generating venture for most of the herders.⁷

From the data it is suggested that the large numbers of local cattle are maintained as they are more convenient to care for entailing less inputs in terms of feed, ease of browsing in forests and more important for the manure that does not have to be carried as local cattle can walk across difficult terrain to fields where they can be tethered for fertilizing the fields.

It is often countered that the animals are essential to produce manure to meet the farmer's compost needs, and the manure resources justifies the predominance of non-productive animals in the system. Quite the reverse is true. As long as these animals are in the system, the farmers are not motivated to look at more environmentally sound cropping system, involving fodder legume rotations, horticultural perennial crops and more intensive grazing and forest land management.⁸

Of all the villages, Woku-Damche has the maximum number of improved cows and substantial income is obtained from the sale of dairy products mainly cheese and butter in Punakha and Thimphu markets.

Aside from the cattle, the villagers also have pigs and poultry supplementing protein in the family diet as well as being sources of household income.

Table 7: Livestock owned by type and village

No	Village	Improved Cattle		Local Cattle		Total Cattle	Pig (no)	Poultry (no)	Horses (no)
		Cow	Bull	Cow	Bull				
1	Wokuna-Damche (n=13)	18	7	15	18	58	20	56	1
2	Tshetena (n=9)	1	3	27	25	56	21	32	5
3	Botokha (n=3)	1	0	5	3	9	1	5	0
4	Chorteneobu (n=9)	7	2	26	24	59	16	32	6
5	Yesakha (n=24)	6	4	52	66	128	50	140	3
6	Lower Rimchu (n=3)	0	0	13	8	21	6	20	1
Total (n=61)		33	16	138	144	331	114	285	16
In % of Total (rounded)		10%	5%	42%	44%	100%			

In inquiring on the expenses incurred during a month for cattle upkeep, on an average, the villagers spend Nu. 210.93 per month. Nu. 95.86 is spent on cattle feed and Nu. 74.90 on salt and Nu. 64.70 spent on herders. Only four villages maintain herders. Expenditure for feed is mainly for milch cattle and for improved jersey cattle. Rearing of improved cattle breeds therefore incurs recurrent costs especially for improved feed to supplement stall-feeding of fodder and limited grazing.

⁷ Grazing Management in Broadleaf Forests, 2000, Dr. Lungten Norbu

⁸ Field Document No. FD99:12, John Davidson, December, 1999

Table 8: Expenses for the upkeep of the Cattle

No.	Cost Head	Woku-Damche (n=13) (Nu)	Tshetena (n=9) (Nu)	Botokha (n=3) (Nu)	Chorten-eobu (n=9) (Nu)	Yesakha (n=24) (Nu)	Lower-Rimchu (n=3) (Nu)
1.	Salt	70.00	118.77	25.66	88.33	71.75	70.00
2.	Feed	80.00	47.77	110.00	146.00	75.40	116.00
3.	Medicine	0	0	0	0	0	0
4.	Herder	48.46	66.66	0	16.66	127.00	0
Total		204.46	233.20	135.66	251.65	254.15	186.00

2.6 Income

The largest income earner from the villages is through the sale of vegetables at 31% followed by sale of crops (almost exclusively paddy) and forest products at 15 and 14% respectively of the total income earned. The forest products sold are mushroom, cane and fern. Other minor sources of income are from off-farm activities like wage labour in the logging operations from which is derived 10% of income. Approx. 15 % is earned from sale of livestock (5 %) and livestock products (10 %). Most of the production is consumed in the home because livestock products namely butter and cheese form important ingredients in the local dishes.

Of all the villages, Woku Damche and Yesakha village earn the most income with about a third of the income earned from the sale of vegetables. As can also be seen, Tshetana village earns 44% of total income from sale of non-timber forest products due its relative proximity to the forests as compared to other villages. Some income is also earned from remittances, which make up 13% of the total income. The villagers of Botokha are predominantly sharecroppers and have the lowest incomes and resort to working off-farm in logging as their principal source of generating income. As sharecroppers there may not be an incentive to invest in economic activities derived from agriculture, since others own the land. The village of Tshetena earns more income through the sale of non-timber forest products.

There is dependence on the forests for acquiring timber, firewood, grazing animals and for other non-timber forest products to fulfill dietary and other household needs. Some of these forest produce is also sold. The importance of forests in providing for all these needs therefore is significant.

Table 9: Total income (in Nu.) per year by village and source

Rank No.	Income source	Woku-Damche (n=13) Nu.	Tshetena (n=9) Nu.	Botokha (n=3) Nu.	Chorten-eobu (n=9) Nu.	Yesakha (n=24) Nu.	Lower-Rimchu (n=3) Nu.	Total Nu.	(%)
1	Sale of vegetable	163,800	7,570	2,000	31,500	55,100	18,000	277,970	31.5
2	Sale of crop ⁹	50,600	15,700	0	32,500	29,000	2,000	129,800	15.0
3	Forest product	0	55,260	1,500	29,500	33,500	7,650	127,410	14.0
4	Remittance	15,000	10,000	3,000	33,000	50,000	5,000	116,000	13.0
5	Off-farm	13,000	27,000	8,000	0	34,100	6,000	88,100	10.0
6	Livestock products	31,000	2,300	3,000	27,000	19,500	3,500	86,300	10.0
7	Sale of livestock	0	0	0	0	39,000	0	39,000	4.5
8	Sale of poultry	0	0	0	2,000	0	0	2,000	0.3
9	On-farm	0	0	0	4,000	8,150	0	12,150	1.3
10	Poultry products	0	0	0	0	4,000	0	4,000	0.40
Total		273,400	117,830	17,500	159,500	272,350	42,150	882,730	
%		31%	13%	2%	18%	31%	5%		100%

2.7 Expenditure

It is evident from table 10 below, that all the six villages spend most i.e. up to 40% of their income for religious ceremonies. Bhutanese are a religious people and do not mind spending on annual religious ceremonies and on rituals recommended by lamas and local healers to ward off illnesses and ill luck. About a quarter (22%) of their earnings is spent on food not produced at the farm and clothing for the family. The least, at 5% of total expenditure, is spent on livestock management since most of the cattle kept of local breeds and depend on the forests for grazing and these cattle can do with minimum expenses.

Table 10: Total Expenditure (in Nu) per village by cost head

Rank No.	Cost head	Woku-Damche (n=13) Nu	Tshetena (n=9) Nu	Botokha (n=3) Nu	Chorten-eobu (n=9) Nu	Yesakha (n=24) Nu	Lower-Rimchu (n=3) Nu	Total (Nu)	%
1	Religious Ceremony	84,700	27,700	2,000	37,000	102,500	20,000	273,900	40 %
2	Food	28,700	23,800	3,300	35,000	55,900	5,000	151,700	22 %
3	Clothing	34,000	29,000	2,300	20,000	53,800	8,000	147,100	22 %
4	Education	13,100	5,050	1,400	11,000	38,600	3,500	72,650	11 %
5	Livestock	2,000	0	2,000	35,00	24,720	0	32,220	5 %
Total		162,500	85,550	11,000	106,500	275,520	36,500	677,570	100 %
%		24 %	13 %	2 %	16 %	41 %	4 %		100 %

The income earned from the various sources is further supported by the farmers' prioritization of their economic activities summarised in the table below. The information is obtained from the PRA exercise conducted with four communities. Vegetable/cereals production stands out as the most important economic activity followed by livestock and then sale of forest products. With slight variation in the results from the income table and the table below, there is little doubt that important economic activities are farm based with dependence on the forests too for income.

⁹ Almost exclusively paddy

Table 11: Economic activities prioritisation

No.	Village	Rank 1	Rank 2	Rank 3
1	Woku-Damche	vegetable and cereal	livestock products	forestry products
2	Tshetena	forestry products	off-farm (logging)	vegetable production
3	Chorteneobu	vegetable and cereal	livestock products	forest products
4	Yesakha	cereal production	horticulture products	Live stock & off-farm activities

The details from the discussion are as below:

90% of the villagers of Wokuna-Damche depend mostly on vegetable and cereal production and 10% are reliant on livestock products and forest products such as assortment of mushrooms, ferns, and cane. This shows that manure from cattle are equally important to supplement the fertility of the soil aside from other source of FYM.

66% of Tshetena village solely depend upon forestry non-timber forest product (NTFP) since the forest area is located quite adjacent to, followed by 22% on off-farm activity due to the fact that villagers are working as a labor in logging division of the Forestry Development Corporation (FDC). 12% of the villagers are doing vegetable production in their nearby piece of land. Only nine villagers have participated on PRA exercise out of which three were males and six females.

48% of the villagers of Chorteneobu are depending on vegetable and cereal crop production, 29% on livestock production followed by forest products. The participants during PRA ranking exercise were 21 females and 10 males.

70% of the respondents of Yesakha ranked cereal production as first followed by 11% ranking horticulture as second. 9.5% ranked livestock production and off-farm as other economic activities.

3 GRAZING PRACTICES & ASSESSMENT

Grazing is an important element in the multiple use of the forest ecosystem in many countries. Forest grazing is one of the silvo-pastoral systems based on the utilization of native forests by domestic animals.¹⁰

Grazing effects become minimal, and increases the resilience of forest to regenerate when cattle population density is low or when grazing is effectively managed and regulated in areas with high cattle density. However, cattle eat so much of palatable biomass that there is very little left for the free-ranging ungulates.¹¹

3.1 Cattle development

While interviewing the villagers using a questionnaire having structured and unstructured questions, the greater number of the villagers reported that they keep their cattle mainly for dairy products, ploughing, farm yard manure and for generating income to meet the household. The villagers tend their cattle by themselves. In some cases, they hire a herder to look after the cattle.

¹⁰ Bland and Auclier, 1996; Etienne, 1996

¹¹ Dr. Sangay Wangchuk, 2001

With regard to the cattle holding, 31% reported increase in cattle population since they have acquired cattle that have multiplied over the years. 69% of the villagers indicated a decrease due to natural death cases, poor reproduction, and lack of capital to maintain larger numbers and predation by wild animals.

Separate official data on cattle increase/decrease from the Rimchu dependent villages were not available. However, data reviewed from the Dzongkhag for Kabji geog as a whole, show an increase of 13% between 1998-1999 in local cattle and an increase in improved cattle numbers was by 20%. Between 1999-2000, the increase in numbers of local cattle was 7% whereas that of improved cattle was 42%. The data from the Rimchu FMU dependent villages show the proportion of households indicating an increase or decrease as mentioned which are not entirely supported by the geog cattle population figures

79% of the villagers want to increase their cattle population for more dairy products and for ploughing fields. 21% responded negatively reasoning that they cannot afford to buy cattle. Again, this indicates a preference of farmers to keep cattle and continued importance of cattle rearing in the farming and livelihood system of villagers for carrying out agricultural activities as well as to address dietary requirements. The fodder species that cattle eat in Rimchu are named in local dialect. They are as *Damburu asha*, *Lamlam*, *Ngalam*, *Hamchusen*, *Tshaema dongkaru*, *Rabay dama*, *Bji*, *Haydo*, *Cholam*, *Bamboo*, *Ham*, *Jatsha*, *Hechutshow*, *Robjee*, *Seemi*, *Tompam*(*Brassiasopsis*), *Neytha*, *Ngatha*, *Ba*, *godochow*, *Chamadomkam*.

The scientific names (italicised) of the some of the local named fodder/forage species are mentioned after reference to literature:

Damburu asha	<i>Elatostema lineolatum</i>
Ngalashing	<i>Musa balbisiana</i>
Bji	<i>Elaeagnus parvifolia</i>
Chalum	<i>Acer campbellii</i>
Bamboo	<i>Bambusa spp.</i>
Jatsha	<i>Melia azedarach</i>
Robjee	<i>Cissampelos pareisa</i>
Ba	<i>Picea spinulosa</i>
Haydonum	<i>Acmella uliginosa</i>

3.2 Grazing situation

3.2.1 Herding

A total of 160 bulls are let loose in the Rimchu FMU for grazing after using the bulls for land preparation for paddy and wheat cultivation in the months of May-June and in November.

Some of the villages have a local cattle herder who looks after the cattle. In some cases, the herder is paid in kind amounting to 30 kg of paddy per bull per year. Some villagers graze their cattle in dratshang owned pastureland with prior consent from the head of the dratshang cattle herder. Also, the villagers of Botokha are sharecroppers of Ashi Sonam Choden Wangchuck who are allowed to graze their cattle at Ashi's owned tshamdrom in and outside Rimchu FMU.

It is learned that the cattle are let loose in Rimchu-FMU without the herders. This practice encourages the cattle browsing on growing tree seedlings and other valuable flora. This may lead to degeneration of the species in time to come. Therefore, vigilance, monitoring and information to grazers of vulnerable areas are activities that may be taken up by the Forestry sector.

Existing rules can also be enforced namely to stop grazing in specified location for a specified period; restrict grazing an area, which is fenced for natural regeneration or plantation area with or

without fencing for a given period or till the seedlings are well established; issue orders to effect the grazing in the forest on rotational basis at any time as per the plans.¹²

Local breeds are often driven to forest for grazing and consequently are more damaging to the forest. It is recommended to encourage improved breeds/reduce local breed numbers. This seems to have been started in the villages near Rimchu, although at the moment the numbers as compared to the local cattle are still small.

Reducing local breed may require culling. This sensitive issue has not been discussed with the farmers. Rural Bhutanese eat meat of domestic animals that have been slaughtered (especially by persons of a caste, considered low in the hierarchy) or those that die of natural causes. It is assumed that people also may not readily sell to slaughterhouses as in the field it has been found to be difficult to get poultry for slaughter if the owner comes to know that it will be killed.

Besides, farmers often do not have the cash available to purchase improved breeds and they also lack the know-how to care for these improved cattle. This is posing additional burdens/risks that they have to cope with in the absence of guidance (extension) and medical attention.

Tshamdrol areas belonging to dratshang, HRH Ashi Sonam Choden Wangchuk and a group of farmers, which requires further study in connection to correct locations and boundaries of the tshamdrols. Marking out the cattle route so that damages to the forest while en-route to the tshamdrol is minimized.

3.2.2 Reason to use Rimchu pasture for grazing

39% of the villagers revealed better fodder as reason to use Rimchu pasture for grazing the cattle followed by 32% of the villagers who felt the area as a convenient place for fodder. 16% are sharecroppers of Ashi Sonam hence they are allowed to use the Ashi-owned tshamdrol. 13% indicated that other areas are under the registration of other people and consequently not accessible to their cattle. Also, indicated is the absence of other areas to graze their cattle other than the Rimchu forest. This indicates that there is greater pressure on Rimchu forest, which will invariably affect the future growth of tree seedlings and other grass species in Rimchu.

Only 21% of the villagers mentioned that forest resources can be improved by the following measures namely: reducing the number of cattle grazing; plantation of more seedlings; controlled grazing and fencing of the area. 79% replied that they have no proposition for the betterment of forest resources.

3.2.3 History and locations of forest grazing in Rimchu

70 % of the villagers said that they have been grazing their cattle from their parents' time and 30% of the villagers grazed their cattle since 20 years in forest. Concerning taking their cattle in other forest/pasture lands, 51% of the villagers do not bring their cattle to the forest and 49% take their cattle to other pastures owned by either Ashi Sonam or the dratshang.

The pastures that the villagers are grazing their cattle is as follows: The villagers of Tshetena village take their cattle to Dolay Gompa (Thimphu), Kaina (Thimphu), and Hokotsho (Punakha). The villagers of Yesakha village take their cattle to Dolam Kinchoe (Ashi Sonam's pasture at Thimphu above Tango), Mischen (Punakha), Womisa (Thimphu), and at Hebiloom (Thimphu). The villagers of Chorteneobu take their cattle to Dolam Kinchoe (Thimphu), Chepgang (pastures belongs to dratshang, Thimphu). The villagers of Woku-Damche take their cattle to Meme Tsherina (Goenshari Gewog) and at Lamsabu and Rongtshang (out side FMU towards Thimphu).

¹² Forest & Nature Conservation Rules of Bhutan, 2000, Ministry of Agriculture

The map attached shows the spread of villages around the Rimchu FMU. It would be difficult to locate the grazing areas as farmers/herders have indicated the names of grazing areas saying 'above Thimphu', above Punakha etc. etc. Besides, some areas also fall within Thimphu dzongkhag.

The villagers take their cattle in other areas from three to six months. There is a need to develop improved pastures for cattle near villages. If this occurs then there is little need for cattle to graze in the forest in summer.¹³

According to the villagers, the dratshang herder migrates to Rimchu FMU with the cattle in the month of December every year and returns in the month of March.

Table 12 below shows that the average distance of grazing land from all the six villages is 5.25 km. There are 174 heads of cattle in total from the six villages. The cattle are released in the forest for four and a half months and three and half months elsewhere in other tshamdrops belonging to Ashi Sonam within and outside the Rimchu FMU.

Table 12: Grazing distance, period and number of cattle

No.	Distance of grazing land from village		No. of months grazed elsewhere	No. of months grazed in Rimchu forest	No. of cattle grazed in forests	Remarks
1.	Woku-Damche	4 km	3	6.5	19 nos.	Herded by herders and some house members
2.	Tshetena	7 km	3.5	3	53 nos.	Mostly within village field
3.	Botokha	4.5 km	3	5.5	6 nos.	Herded by one member of the family
4.	Chorteneobu	5 km	6	5.5	16 nos.	Herded by the herder
5.	Tesakha	6.5 km	4.5	4	70 nos.	Herded by the village herders and one member of the family
6.	Lower Rimchu	4.5 km	1	3	10 nos.	Some stall-fed. Don't graze in FMU rather they bring their cattle to Metse Chene (Goenshari)
Average		5.2 km	3.5	4.5		
Total					174 nos.	

3.2.4 Changes of grazing practices over time

While inquiring about the past changes of grazing practices over time, the feed back during household survey and during the time of PRA was that the farmers do not see any changes over the decades in grazing practices. It can be concluded that the farmers do not perceive changes may be due to lack of knowledge about the depletion of forest resources. Changing life style trends of farmers and herders are changing alongside the changing environment. In future, the activities of farmers and herders will gradually diversify.¹⁴

¹³ Forest grazing, T.Gibson, RGOB,/FAO, 1991

¹⁴ Grazing Management in Broadleaf Forests, Dr. Lungten Norbu, 2001

When asked whether there are more, less or the same quantity of pasture/fodder at Rimchu as compared to five years ago, only 1% said that there is more pasture established with felling trees. 3% of the respondents replied that there are less fodder/ pasture in Rimchu FMU due to increase in human and cattle population, due to roads for logging damaging odder species, bulls and other cattle from the neighboring villages are also being herded in Rimchu hence increasing competition. 64% responded that the fodder/pasture remained the same and 32% said that they have no any idea about the fodder/pasture depletion. While about two thirds feel a stable resource base and about one third not knowing of the situation, it can be concluded that till now the pasture and fodder resources are in stock though there is opportunities for degradation with rampant and uncontrolled grazing among other activities. Falling back on alternative fodder sources is one way of reducing pressure but entails development of such resources that will require concerted efforts of farmers and the concerned governmental agency to develop such a program.

16 % of the respondents said that there are more herders from the villages than there were before because increase in households means increase in cattle population hence more herders and 84% said that they have no idea. This may mean that a good many villagers are not aware of incoming herders owing to lack of contact and of the practice of letting loose cattle to graze in forest.

Similarly, 21% of the villagers said that there are more cattle from other areas than there were before due to increase in cattle population from within the area, increase in the migrating cattle population, more bulls due to more human population to cultivate their field, and reduction in pastures in other areas. 86 % responded by saying that the pressure on forest grazing is insignificant and difficult to appraise and 14% reasoned that there is inadequate forage in Rimchu forest.

3.2.5 Conflicts

With regards to conflicts with the migrating cattle herder and other adjacent villagers in relation to grazing to Rimchu, 75% of the villagers said that they have no conflicts and 25% said that they have conflicts because of the cattle trespassing in other owned tshamdros and cattle entering into their field and grazed but these are settled amicably at this level itself. The majority of the respondents report that they are on good terms with the migrating cattle herder. About one third of the villagers responded that they often were embroiled in conflicts with the migratory herder because the cattle belonging to the migratory herd enter their tsamdros and fields located adjacent or en route to the dratshang tshamdros.

80% of the villagers have not experienced any problem with the government forestry officials. However, 20% mentioned restrictions on cane and firewood collection and sale of forest products as problematic. However, the presence of forestry staff in uniform as part of the PRA team may have influenced the answers – particularly in regard to the prioritization of NFTP as a source of income. The informants have underplayed the importance of NFTP as a source of income.

The Rimchu FMU dependent cattle-owning farmers and the migratory herder nurture a good relationship through the years with instances of encroachment in each others tsamdros by cattle but not serious enough to warrant legal recourse.

3.2.6 Alternatives to forest grazing

When inquiring about the other alternatives to forest grazing, 67% of the villagers replied that the alternatives to forest grazing are rice straw and fodder seed provided by animal husbandry sector. 18%, responded that they provide husk, buckwheat and grazing within the vicinity and marginal areas of the field as alternative sources to forest grazing. However, 13% responded that they

again rely on the leaves of tree fodder that are lopped and slashed. This again has negative effect on the preservation of forest resources aside from browsing and trampling of valuable species damaged by the rearing cattle. Rest of the villagers opt for stall-feeding that may hold true in case of milking cows only.

3.2.7 Seasonal calender

Many villagers after cultivating their paddy field bring their cattle mainly bulls to graze in Rimchu FMU and live there for four and half months without herders to look after the cattle. Soon afterwards, they take back their cattle to their respective villages to cultivate their field at the time of sowing wheat. Again, once the purpose of usage of cattle ends, similar trend follows. This certainly indicates that there are no restrictions / controls on cattle grazing.

3.2.8 Lopping

Most trees in the tshamdrops and forests are lopped to supplement the feed of cattle in winter. Lopping of trees affects the growth and quality of trees due to the constant indiscriminate lopping by herders. Fodder trees are important to the herders in the study area for they are the only source of forage for their cattle in winter when grasses and other edible herbage dry up.¹⁵

3.2.9 Damage by trampling

It is seen generally that seedlings damage is due not only to browsing, but also to trampling by animals hooves. This can also be taken as evidence to declining forage resources; trampling damage was caused by cattle foraging around in the forest. According to Milne and Osoro (1999), when forage availability decreases, cattle browse even an unpalatable species. Browsing is most of the time responsible for mortality of some species. Trampling by animals hooves also can be taken as evidence of declining forage resources.¹⁶

Eighty percent of the villagers are conscious that cattle damage tree seedlings and that these should be safe-guarded as a future resource to meet needs like fuel, timber for building, to maintain good vegetative cover, to replace grazed areas as firewood and fodder may become scarce in future. Twenty percent of the respondents are not at all aware of condition and adequacy of resources.

3.2.10 Proposed measures

There is a grazing pressure of four and half months in Rimchu FMU. Tree seedlings are being damaged and browsed by the cattle. Therefore, protection of tree seedlings by relocation and replanting the important species is suggested.

According to the respondents, they report that the following measures if taken may protect seedlings: fence the area with barbed wire, herders care is needed, by not allowing the cattle's where ever there are maximum tree seedlings, by stall-feeding the cattle and improve pasture, divert the grazing pattern yearly to different pastureland, planting non-fodder trees around seedling areas, stop grazing, fence the area for natural regeneration and weeding encompassing seedling region.

If grazing is to be included as one of the management prescriptions in forest management plan, all stake holders including farmers have to participate in the planning and implementation of forest management plans. In certain cases, a few compromises have to be made such as in protecting the regeneration areas, plantation in critical watersheds by restricting grazing through agreement with the local people.

¹⁵ Grazing Management in Broadleaf Forests, Dr. Lungten Norbu, 2001

¹⁶ Grazing Management in Broadleaf Forests, Dr. Lungten Norbu, 2001

3.3 Cattle migration

Herders have considerable knowledge of the forest and the ecosystem they depend upon. They have learnt to devise indigenous grazing practices to optimize their uses of tshamdros. They know when and for how long each of the tshamdros tracts can be grazed. Every year, on their return to the broadleaf forest area in November, they usually start pasturing tshamdros located at the lowest altitude and move uphill. In the first days of their stay in tshamdros, cattle are left to graze for a short length of time. Cattle are rounded up in the evenings and restricted in makeshift enclosures to prevent excessive use of forage overnight. In time, cattle are left to graze overnight in and around tshamdros. When pastures begin to show evidence of decline in forage, cattle are taken to another tract of tshamdros and the same system of grazing is applied there.¹⁷

A discussion was held with the dratshang herder. He is 61 years of age, hailing from Wokuna village under Kabjisa geog of Punakha Dzongkhag. About 270 cattle heads belonging to Dratshang are in his care and custody. The migration of the herd is reported to start during seventh Bhutanese month (around late August) from Tharana, Thimphu to Rimchu, Punakha where they have their own tshamdros of about 8 langdos. The two acres of tsamdros are scattered and designated as Tsetaymoni, Richayna, Omtolakha, Pachagang and Kibeza. The dratshang herder reports to have started herding the dratshang's cattle ever since he was a child. To ease his task of managing such large herd of 270 cattle, five herders who are paid a monthly salary by the dratshang assist him. It was reported that even with these additional five herders, he finds it difficult to effectively manage such a large herd. On probing how he resolves this, he reports that, he deploys seven additional herders from the locality to whom he gives some share of livestock products as their wage.

According to him, the cattle reach Rimchu in the month of December and return in the month of March-April of the following year. This pattern has been followed ever since migration started during the 1950s. The herder took over the job from his father who also was the dratshang herder in his own time. Possibly, this had been the same practice before the 1950s.

While on migration cattle graze in other tshamdros of about three acres in places namely Gepayza, Pakom, Chigona, Milijap, Laduna, Zhopgang, Domchaymana, Jhibu, Bari and Zasa which are outside of the Rimchu forest towards Thimphu. They graze their cattle for about six months in these areas. The cattle mainly eat and browse *Ngala*, *Lam*, *Zoysay*, *Bji* and *Handa*.

In relation to resource use conflict, he mentioned that often there are problems with the villagers' dependant on Rimchu forest, particularly from villagers' cattle entering the dratsang owned pastureland. He mentions that availability of fodder species like *Ham*, *Ngala* and *Haydo* in the dratshang owned tsamdros is declining in the last five years. He attributed this decline to fencing and therefore access is denied, construction of motorable road and logging. The only strategy to improve the situation he suggests is to dismantle the fencing around fodder rich areas and stopping the logging operation. He also commented that some other sharecroppers take their cattle to other tshamdros owned by the landlords for grazing which results in reduced number of cattle in Rimchu.

Expenditure wise, the dratshang invests about Nu.17,990 per month for the upkeep of the cattle herd for expenses like salt, feed and salary for the herders. Herding of cattle is becoming difficult due to less porter availability to carry their belongings during migration. From the calculations made, the value of milk products from the dratshang herd comes to Nu. 27,600. The milk products are sold and these expenses met. What remains from the total earnings from the sale of milk products (Nu.27,600 less 17,990 = Nu.9610) – in kind (butter and cheese) is submitted to the dratshang each month. It may also be noted that the herder also has hired an additional 7 herders from the villages around Rimchu who are paid in dairy products – this is not in the attention of the dratshang but is a private arrangement initiated by the herder. So, the herder would be paying less than the Nu.9610 each month.

¹⁷ Condition and Potential for Improvement of High Altitude Rangelands, Dr. Pema Gyamtsho, 2001

4 CONCLUSIONS

- a) Forest grazing of cattle is important in the livelihood system of the people.
- b) The Rimchu dependent farmers are engaged in small scale commercial farming namely vegetable and cereal production for the marketing to Punakha. An all-weather road that passes in the area has facilitated transportation of these cash crops. There is no over dependence on the forests for extraction of non-timber forest products for domestic use and for the market except the village Tshetena.
- c) There is pressure on the grazing resources in the Rimchu FMU and villagers graze their cattle to forests area unattended most of the time.
- d) Tshamdrog area boundaries belonging to dratsang body, HRH Ashi Sonam and Gup Wangchuk are not clear. Tsamdrog owners in the villages cannot identify their own pastures. There is therefore the risk of encroachment of cattle in each others tsamdrog, onto government forests and fencing of areas in registered tsamdrog. There is an absence of clear and agreed upon cattle routes to tsamdrops owned by persons other than the government.
- e) The number of local cattle as compared to the improved cattle is still high and the adoption of improved breeds may be problematic because enhanced management capacity will then be required and cash for inputs to manage these breeds.
- f) Farmers are aware of the damage that can be done by cattle to tree seedlings and the logic of conserving these as future resources.
- g) Alternative pasture and fodder is not developed enough to relieve grazing pressure in the FMU.
- h) The Rimchu FMU area is a high rainfall area and therefore has a good forest cover. The terrain is sloping. Disturbance of the land by road construction and logging may trigger landslides and further erosion with the monsoonal runoffs.
- i) Eupatorium (species of weed) is spreading rapidly.

5 RECOMMENDATIONS

1. Demarcation and determination of the tshamdrog areas and marking out the cattle route so that damage to the forest while en route to the tshamdrog is minimized.
2. Increase the number of improved breeds while decreasing the number of local cattle, and encourage stall-feeding through extension and credit. Launch awareness campaigns on keeping lesser but more productive cattle.
3. Tree seedling protection through relocation and replanting of important tree species. Relocation here means uprooting of naturally regenerating tree seedlings and replanting in areas that are protected (fenced). Alternatively, after identification of naturally regenerating tree seedlings and if these occur in sizable colonies, these could be protected in the locations colonized.
4. Promotion of improved forage and fodder species in farm boundaries and marginal areas.

5. Use of the non-timber forest products (NTFP) esp. ferns, canes, mushrooms by the villagers which directly/ indirectly damages the tree seedlings, forages, flora etc. on the forest floor to be monitored.
6. Selective felling especially in view of the land topography and year-round rainfall.
7. Involvement of the locals while planning and implementation of forestry programs so that they will be aware of the events taking place in and around their village areas.
8. Periodic slashing of *Eupatorium* spp to keep it under control.
9. Following research needs are identified and recommended:
 - Document palatable and non-palatable feed and fodder species
 - Summer grazing study
 - Inventory of the species composition and trends in tshamdrops
 - Carrying capacity of the tshamdrog and other grazing land

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