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Local Participation in Forest Management Planning

*The Rapid Rural Appraisal (RRA) Exercise in the Khotokha
Forest Management Unit (KFMU)
Wangdue-Phodrang Dzongkhag; Western Bhutan*

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EXECUTIVE SUMMARY

The first ten-year Khotokha Forest Management Plan expired in 1994. A new forest management plan is currently under preparation by the Forestry Services Division of the Ministry of Agriculture, Royal Government of Bhutan. In the past, forest information collection and planning were often done in isolation of the socio-economic environment while at the same time blaming the local people for the absence of natural regeneration, and degradation of forests. There was no analysis of the local needs and aspirations from the surrounding forest. Due to its neglect in the planning process, the management plans, although technically sound, often fail to achieve the desired results of sustainable forestry.

The method adopted for the study was Rapid Rural Appraisal (RRA). RRA, with its creative approach to information collection, and a challenge to prevailing biases and perceptions about rural people's knowledge and problems, and its ability to generate useful information in a relatively short period of time, was found to be the most appropriate study method. The study covered the period from May to August 1995. Important findings are as follows:

1. The Khotokha Valley is the summer home of the people of Bjena and Rubesa gewogs. Bjenabs occupy the upper half of the valley while Rubes, the lower half. Not all Bjenabs and Rubes move to or own land in Khotokha. The farming system involves maintaining two houses, i.e. for winter and summer. The winter house, in the rice-growing belt, is considered the first home, and this is evident from bigger size construction, and proper maintenance.
2. The valley has high potential for livestock development. Currently, there are 1555 numbers of cattle. Cattle population shows a general trend of increase. The valuation of animal type is determined by special factors.
3. Improved pasture development is strong in the valley. An increased number of households are establishing improved pasture in their home gardens and agricultural fields. However, some households who have taken up large-scale pasture development were not successful due to lack of fertiliser, irrigation, and fencing materials.
4. Cattle migration between summer and winter homes follows a strict time schedule. All cattle from Maylo should move to Khotokha before the 15th day of 3rd Bhutanese month, and from Khotokha to Maylo not before the 15th of the 9th Bhutanese month. Failure to do so result in payment of fines in kinds to the community. The fines collected are used to perform community related religious rites.
5. People depend upon forests for house construction timber, shingle, fuelwood, fencing materials, farm implements, non-wood forest products, and grazing ground for cattle.
6. Construction timbers and roofing materials are the most important need of the farmers from the forest, followed by fuelwood and fencing materials. Bamboo is ranked fourth due to its multiple uses.
7. Bjenabs use fir for shingle (because of proximity to fir forest) while Rubes use blue pine (fir is far away for them). Good straight trees are getting harder to find every year. It is important for logging operations to leave behind good individual trees for the local people.
8. Blue pine is the no-choice common fuelwood species. People complain that the fuelwood amount received through the permit system is not enough (100 backloads per household). They require about 4 times more (360 backloads). For a family size of 7.2, it is 2 backloads of pine wood a day. Fire in the oven burns for 12 hours a day.
9. Khotokha has a high animal population, including wild boar and deer. The situation demands strong fencing around the home gardens and agricultural fields throughout the year. Obtaining adequate fencing materials is a problem because of the government restriction on cutting of trees, and the total cost of royalty being high for their income level.

10. Bamboo stock is seen declining due to: logging operations, extraction by outsiders, and wild boars and bears eating the young shoots. The non-wood forest products such as mushroom, fodder tree, leaf litter, brooms and medicinal plants are important from the subsistence point of use only. There are 12 species of edible mushroom.
11. In the last 5 years, 7 new houses were built in the valley which averages out at 1.4 new houses a year.
12. Sequencing of cattle grazing and logging operation in the forest is important to avoid conflicts between the two.
13. People are frustrated with the Tashila Ropeway. The ropeway cost for both people and agriculture goods is prohibitive. Their request for a road link has always been turned down by the government because of the Tashila Ropeway. According to a cost-benefit analysis, ropeway income from timber transport could hardly cover the expenditure even under most optimistic assumptions. The transport of people and goods is an outright loss due to the high operating cost of the ropeway. Further, to realise the full potential of the timber in the Khotokha Valley, a road connection is very important.

The single, short, field-based RRA exercise can not be considered an end to local participation. However, the present study could serve as a beginning point for understanding the subject of local participation in the forest management planning in Bhutan. Further involvement of people in the whole process of planning and implementing is important for the farmers to feel less threatened by forest utilization by those outside of the community.

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ACRONYMS AND ABBREVIATIONS

BG-IFMP	Bhutan German-Integrated Forest Management Project
FECSU	Farmer Extension Communication Support Unit
Forestry III	Third Forestry Development Project, E.Bhutan
FRDS	Forest Resources Development Section
FSD	Forestry Services Division
KFMU	Khotokha Forest Management Unit
MoA	Ministry of Agriculture
NITM	National Institute of Traditional Medicine, Thimphu
NMC	National Mushroom Centre, Semtokha
NRTI	Natural Resources Training Institute
PRA	Participatory Rural Appraisal
RNRRC	Renewable Natural Resources Research Centre
RRA	Rapid Rural Appraisal

GLOSSARY

Chiwog	A village grouping by geographical proximity for ease of physical communication by a messenger runner (Chipon)
Dzongkhag	Administrative District (20 Dzongkhags in the country)
Gewog	Village Block under one Gup
Gney	Religious site
Gup	Village Block Headman
Lhakhangs/ Goenbas	Monasteries
Shingle	Wooden roofing
Tsamdrog	Cattle grazing ground
Zaw	Bhutanese puffed-rice

1.0 INTRODUCTION

1.1 Overview

Bhutan is largely an agrarian society with 80 % of the population living in the villages (Wangchuck 1996). With a per capita of 4 ha forest land, a Bhutanese farmer lives in an intimate association with forest. The forest is the source for many of his home and farm needs: construction timber, fuelwood for cooking his meals, seasonal wild foods, fruits, cash, grazing ground for his livestock animals, and farm tools and implements. A recent RRA exercise in the Nahi **gewog** in Wangdue phodrang Dzongkhag found that forest foods constitute about 23 % of the total household diet and 19 % of the total household income (Namgyel 1996). In another RRA exercise in Zhemgang Dzongkhag, Wagner (1994) concludes that through incorporation of indigenous knowledge into management plans, farmers will feel less threatened by forest utilization by those outside of the community.

At the national level, timber harvest provided the first major source of revenue for the government in the early 1950s. First, the forests in the south adjoining the Indian plains were exploited and later in the interior when motorable roads opened up (Dasho Sangay Thinley, Jt. Secretary, FSD, pers.comm.). Today forest royalties on timber and other commercial products contribute 11 % to the Gross Domestic Product (GDP) (CSO 1994). However, even this figure is an underestimate of the value of forest products to the local and national economies, as many of the products harvested for commercial purposes do not enter into the national accounting system.

One of the four goals of the National Forest Policy is “ *Meeting the long term needs of Bhutanese people for wood and other forest products by placing country’s all production forest resources under sustainable management* ” (FSD 1995). Since 1976, 33 forest management plans have been prepared by the Forestry Services Division (see Fig.1 for distribution of Forest Management Units), covering an area of some 381,475 ha of forests (Pradhan, M.R. pers. comm.) which corresponds to 42 % of production forest¹ and 17 % of the total forest area². The ultimate goal of the Forestry Services Division is to eventually bring all of the Government Reserved Forest under the purview of forest management plans.

1.2 Forest Management Planning

Traditional forest management plans as developed and practiced in Central Europe and South Asia (British India) focused on silvicultural aspects such as site conditions, stand dynamics, growth and as well as natural or artificial regeneration. Today, due to high population pressures in many other areas, local dependence on the

¹ The total production forest is taken at 900,000 ha, according to Master Plan for Forestry Development 1991 (MPFD).

² The total forest is taken at 2,300,000 ha. MPFD 1991.

forest resources, and the multiple functions which the forests have to fulfill, the management plans developed in the past, although biologically sound (supposedly), have failed to achieve the desired results. Today, forest management decisions are influenced by considerations related to the forest ecosystem, the social environment, and economics (Kleine 1996). Therefore, a forest management plan, in the broadest sense, is an attempt to integrate all of the biological, social, economic, and other factors for managing a unit of forest area on a continuing basis.

Forest management planning in Bhutan follows a draft national management plan code developed in 1992³. The code encompasses the collection, analysis, and consideration of a broad spectrum of biological, social, and economic information. Earlier to the development of the code, the plan only dwelled on economic and silvicultural considerations. Even today, the socio-economic consideration in the forest management planning is still far from comprehensive.

1.3 Socio-Economic Conditions: A Neglected Parameter

Forests bear two superimposed imprints: that of the state to meet market demands for timber and fuelwood for rural, urban, and export, and that of the local people to subsist (Pathak 1994). Thus, forest management needs to incorporate the two factors. But, reference to past management plans shows an inadequate coverage of socio-economic conditions of the local people. The plan objectives, while claiming first to meet the local demand, is strongly oriented towards the market; rightly so, otherwise tree harvesting, which calls for capital investments, could not be justified. Local people with their subsistence lifestyle need no management plan to cut trees.

However, good forest management is contingent on the nature of the relationship between the local people, the forests, and the state (Pathak 1994). The Pakistani experience illuminates important issues in forest management planning, relevant to Bhutan as well.

“The plans are prepared in isolation of the socio-economic environment. The working plan mentions, as is the practice since very long, the pressure on forests of the local population and their cattle which are responsible in most forests for absence of regeneration and depletion of forests. But interestingly none of the working plan analyses the intensity of social pressure and requirements and biomass removed from the forest in question. Instead of trying to find a practicable solution centering around the idea ‘forests should be managed for the betterment of the society’ stringent legal and other punitive measures are suggested and presented. This is one of the major defects of the present working plan system which is responsible for the vicious circle.” (Khatak 1988)

Though the present management plans in Bhutan look into the social factors to the extent possible, the questionnaire survey⁴ which is the method employed currently to obtain socio-economic information, is a restriction to understand the people-forest

³ National Workshop on Forest Inventory and Management. 4 to 10 May 1992.

⁴ Questions on socio-economics are interspersed with other technical questions in the questionnaire survey (developed by FRDS). From the experience gained so far, a re-working on the questionnaire if the questionnaire survey to continue, otherwise RRA methods will be most useful.

interaction dynamics. As a result, the plan offers no analysis of needs and aspirations of the local people from the surrounding forest.

The other factors resulting in a deficiency of socio-economic considerations in the plan may include:

Firstly, the preparation of the forest management plan has to be completed within a stipulated time period and this is often a tight-budgeted time even for routine technical works. A detailed study of socio-economic aspects would off-set the time schedule.

Secondly, the impact of past management plans on the local populations is not properly monitored and evaluated and/or there is not yet a public complain with regard to the past management plans. Therefore, planners assume with great naturalness that the management plan is very comprehensive in nature.

Thirdly, there is a lack of strong theoretical and practical understanding of the subject by foresters. Thus, a comprehensive field methods for practical use in forest management planning, monitoring, and evaluation as available for forest inventory, are absent.

1.4 Local Participation

“The participation of the local community is the key to the conservation and utilization of the forest resources.” (His Majesty King Jigmi Singye Wangchuck 1979)⁵.

“Forestry is not about trees, it is about people. And it is about trees only insofar as trees can serve the needs of people.” (Westoby 1967).

“People are the real wealth of a nation. The basic objective of development is to create an enabling environment for people to enjoy long, healthy, and creative lives.” (UNDP 1990)

Today, there is a widespread recognition of the benefits of local participation in development and environmental programs (Borrini 1994). This stems from the belief that participation of the local people results in full employment of local knowledge, skills, and resources, and a means to play an active role in planning, deciding, implementing and evaluating initiatives. In other word, it is a means to facilitate and improve external interventions suiting local needs and aspirations.

However, local participation is generally understood by forest planners to mean involvement of people in tree planting, and forest protection forest programs. Participation in information sharing, planning, monitoring, evaluation and decision making in the management of the forest is nearly always lacking, and this is often due to:

⁵ The Royal Statement appears on the 1996 calendar issued by the Forestry Services Division.

Local Level

- * low literacy level of the community, therefore poor access to government information and initiatives.
- * poor appreciation of a clear and direct link between their contribution and the benefits for themselves and their community.

Central Planning Level

- * planners do not perceive people's views as important or worthwhile to study and note.
- * authorities reluctant to release information.
- * planners already overburdened, cannot dedicate time to the new task of involving people.
- * inadequate human and financial resources.
- * inadequate expertise and mechanisms on the part of the planning system.

Also local participation could mean different things to different people. The many different meanings are often due to reference to the different levels in the participation continuum. A "typology" of participation as developed by the International Institute for Environment and Development (IIED 1994) is presented in the table below.

Table 1: A Typology of Participation (IIED 1994)

Typology	Characteristics of each Type
1. Passive Participation	People participate by being told what is going to happen or what has already happened. It is a one-sided announcement by an outside agency without any listening to people's responses. The information being shared belongs only to external professionals.
2. Participation in Information Giving	People participate by answering questions posed by outsiders using questionnaire surveys or similar approaches. People do not have the opportunity to influence proceedings, as the findings of the research are neither shared nor checked for accuracy.
3. Participation by Consultation	People participate by being consulted, and outsiders listen to views. These outsiders define both problems and solutions, and may modify these in the light of people's responses. Such a consultative process does not concede any share in decision-making, and outsiders are under no obligation to incorporate people's views.
4. Participation for Material Incentives	People participate by providing resources, for example labour, in return for food, cash, or other material incentives. Much on-farm research falls in this category, as the farmer provide the fields but are not involved in the experimentation or the process of learning. It is very common to see this called participation, yet people have no stake in prolonging activities when the incentives end.
5. Functional Participation	People participate by forming groups to meet predetermined objectives related to the project, which can involve the development or promotion of outsider-initiated social organizations. Such involvement does not tend to be at early stages of project cycles or planning, but rather after major decisions have been made. These institutions tend to be dependent on outsiders, but may become self-dependent.
6. Interactive Participation	People participate in joint analysis, which leads to action plans and the formation of new local institutions or the strengthening of existing ones. It tends to involve interdisciplinary methodologies that seek multiple perspectives and make use of systematic and structured learning processes. These groups take control over local decisions, and so people have a stake in maintaining structures or practices.
7. Self-Mobilization	People participate by taking initiatives independent of outsiders to change or develop systems. Such self-initiated mobilization and collective action may or may not challenge existing inequitable distributions of wealth and power.

2.0 STUDY OBJECTIVE

The first Khotokha Management Plan (1984 to 1994) expired in 1994, and in its place a new forest management plan is currently under preparation by the Forestry Services Division (FSD). A background study on the socio-cultural-economic conditions of the local people living within the new Forest Management Unit was felt necessary. The broad objective set for the study was:

To provide information on the present land use practices and forest utilization by the local population of Khotokha valley for consideration in the new forest management plan for the Khotokha Forest Management Unit, to avoid potential conflicts between different forms of land use.

Within the above broad objective, the study was to look into the following specific issues.

- * Number of people, households, and cattle within the FMU
- * Farming system
- * Seasonal calendar for agriculture, grazing, and forest activity
- * Grazing intensity by both local and outside animals
- * Grazing problems and constraints from the farmers' point of view
- * Local dependence on forest resources e.g. timber and non-timber forest products
- * Ranking of forest resources
- * Identify and assess the forest resources which have a present or potential economic value for the local people.
- * Nature of forest utilization, and assess local demand for important forest resources
- * Resource mapping
- * Wildlife-people conflicts
- * Impacts of past forestry operations on local people
- * Ropeway transport
- * Sawmill off-cuts vs. blue pine poles for fencing

3.0 METHODOLOGY

3.1 Rapid Rural Appraisal (RRA)

The method adopted for the study was the RRA⁶. RRA, with its creative approach to information collection, its challenge to prevailing biases and perceptions about rural people's knowledge and problems (IIED 1995), and its ability to generate useful information in a relatively short period of time (Chambers 1987), was thought the most appropriate study method to gain an insight on the local socio-economic conditions useful for incorporation in the new forest management plan. Further, the method, which employs a multi-disciplinary team, and a range of field-based visualization, interviewing and group-works, promotes interactive learning, shared knowledge, problems, and flexible yet structured analysis. RRA as a study method to initiate analysis and planning of developmental activities is gaining ground in the country, and this is evident by a growing number of reports (Namgyel 1996; Kievelitz 1995; Wagner 1994; Gyeltshen et al. 1994; NRTI 1992).

⁶ During the one-day planning workshop in Lobeyisa (19.06.96) there was a lengthy discussion on RRA and PRA. The issue was which one to adopt for the general use, and in particular for the Khotokha exercise.

The one argument was that RRA and PRA are different in their purpose and process. RRA is extractive in nature, enabling outsiders to gain information and insights from the local people and about local conditions. PRA, on the other hand, involves a continual people's participation in planning, information sharing, and decision making. It is more than a single, short, field-based exercise. Therefore, it is not proper to call a something which it is not. "Labeling" in order to create the illusion of a certain "up-to-dateness" will pose a problem. A solid and good RRA study is better than a poorly done exercise labeled PRA.

The other argument was that RRA as a terminology usage is fast declining. It is better to stick to the mood of the time. PRA evolved and developed upon RRA, and the present exercise would encompass telling the people about the new forest management unit, and facilitating the people to identify problems, and noting the problems for the action required to address them. This very act should be considered as involving people in the forest management planning, and therefore the term PRA should not hurt.

The matter remained unresolved. The author belonged to the second argument group. However, as the new management plan does not envisage a people's programme such as community forestry, nor the people have expressed for one, the current exercise was meant to provide socio-economic information for management planning, and in a puritan sense, RRA seems the correct terminology. The author has taken the liberty to use the term RRA for this report.

3.2 RRA Approach and Methods

The field work was divided into five steps:

a) Review of Secondary Information

Little information was available on the subject and the study area. A RRA study conducted by the Natural Resources Training Institute as part of its training program (NRTI 1992) was unknown in the beginning, and therefore its information could not be used during the field work. One important information source was the Khotokha Forest Management Plan (1984 to 1994).

b) Preliminary Field Visit (07- 09 May 1996)

Situation Analysis. The author talked to relevant people both official and local. This also helped to draw a general plan of action for the main exercise, including logistics.

c) One Day Planning Workshop (19 June 1996)

Discussions on the study objective, forest management planning, and RRA principles and field methods were carried out by the RRA team.

d) Main Field Exercise (20 - 27 June 1996)

e) Verification Visit (30 - 31 July 1996)

Information gaps were filled in during this visit.

Field work employed a mix of methods. This included informal or semi-structured interviews, tape-recordings, direct observations, visual methods, focus group interviews, and village meetings. The feedback session every evening allowed the team to concentrate the following day on major issues identified.

A multidisciplinary team approach could only be employed for the main exercise, due to the team members being from different government departments and their inability to attend the whole duration of the study. However, as the primary database for the report was derived from the main exercise, it could be said that the findings constitute a RNR (Renewable Natural Resources) sector vision of livelihoods, social and institutional relations and interests, and opportunities of the local people in relation to forestry matters.

The RRA team, a composition of 12 members, were drawn from the three RNR sub-sectors of agriculture, livestock, and forestry (Appendix V). There was one lady member. The local livestock and forest officers were part of the team. A majority of the team members had experiences in RRA albeit in varying degrees. All the members were

natives wearing same dress and speaking or understanding the local language, except one expatriate consultant who was backstopping the team.

The team was divided into four groups of three members each, and group composition remained the same throughout. Each group covered a corner of the valley. There were two days for household interviews, two days village meetings, one day pilgrimage to religious sites and forest walk, and one day wrap up meeting of important issues for the final village meeting.

During the course of the RRA exercise, the team talked to or interacted with a total of 214 farmers either on an individual or group basis. Out of this total number, 125 were women and 89 were men. The farmer population constituted mainly elder men and women as the young and able bodied were busy with paddy transplantation in the lower valley. The team also talked to school teachers, students, and saw-mill workers. There was also many long hours of discussion with the local forest and livestock officers.

4.0 RRA FINDINGS

4.1 GENERAL CONDITION

4.1.1 Khotokha: An Overview

Khotokha, with an average altitude of 2617 m⁷, is one of the three broad highland valleys in the Wangdue phodrang Dzongkhag, west of the Black Mountain Range (Fig 2: Khotokha FMU). To its east is the valley of Gogona, and north east of Gogona is Phobjikha. Traditionally, these three highland valleys are important as summer pasture land for the cattle of the people in the rice-growing belt in the lower Dangchu Valley. The three also constitute the winter habitat for the black-necked crane (*Grus nigricolis*) in west-central Bhutan.

There is no motor road connection to Khotokha, but there are many footpaths to the valley from all directions. Since 1983, a ropeway has served between Chuzomsa and Tashila and thus to the east-west highway to transport timber from the valley. The Tashila Ropeway also transports people and goods in the morning and evening hours (8.00 to 9.00 am; 4.00 to 5.00 p.m). The Tashila Ropeway with a span of 5.2 kms, ascends from 1420 m to 2760 m⁸ over paddy fields, forests and rocky cliffs. The half-hour ride provides a great sense of adventure as the **open wooden box** sails over dizzying mountain heights. “*Oh no, not a second time !*” But, one will for two reasons. It is a no-choice situation. Either, take the ropeway or bear with the 1350 m uphill climb! The second reason is that, the ropeway thrill is too infectious not to take again.

On the Tashila Ropeway slope (south-west aspect), there is broad-leaved forest. Beyond Tashila, entering the Khotokha Valley, it is pure conifer forest mainly of blue pines. Blue pines show prolific and fine development in the Khotokha Valley (Fig 3: Transect: Chunzom-Khotokha). For more transects, see at the end of the report.

To supply raw material to the Tashila Ropeway, the Khotokha Forest Management Unit of 4908 ha was opened in 1984. The Ropeway would transport about 2600 m³ of sawn timber or 6900 m³ of standing volume annually (DoF 1984). As the first Management Plan (1984 to 1994) expired in 1994, a new management plan is currently under preparation by the Forestry Services Division.

⁷ Mean altitude of three villages: Shubesa (highest elevated village) 2780 m, Livestock Centre (valley bottom) 2590 m; Sheley (lowest elevated village) 2480 m.

⁸ The altitudes as measured during the field visit. A brochure on Tashila Ropeway gives an altitude range of 1300 to 2800 m, NRTI (1992): 1350 to 2800 m.

Fig.2: KHOTOKHA FMU

Fig. 3: TRANSECT: CHUNZOM - KHOTOKHA

4.1.2 Socio-Economic Data

4.1.2.1 Distribution Pattern of the Local Population

Khotokha is the traditional grazing area of the people of Bjena and Rubesa gewogs. But, not all of the people from the two gewogs migrate seasonally. Out of the total of 444 households⁹ living in the two gewogs, 215 households move in summer with cattle to Khotokha. The rest either move to Phobjikha (51 households) or do not move at all (168 households) (Table 2).

The grazing areas (tsamdrops) can be either privately or communal owned. While cattle remain in the valley, people grow crops such as wheat, barley, buckwheat, and potato to supplement the main cereal, rice, grown in the lowland. People maintain two homes, one in each valley. However, some have three homes; the third at either Gogona or Phobjikha.

Table 2: Distribution Pattern of Local Population

Gewog	Village (Chiwog based)	Total Household (HH)	Seasonal Migration to (HH No.)		One Settlement (HH No.)
			Khotokha	Phobjikha	
Bjena	Themakha	50	44	6	
	Phintshogang	21	21		
	Tokha	22	18	4	
	Wachey Toe	79	74		5
	Takakha	4	4		
	Gashikha	15	1	14	
	Umjegang	18	5	13	
	Jagarlingchu	31	7	24	
	Sub-total	240	174	61	5
Rubesa	Ula	22	2		20
	Rechoy	12			12
	Sheley	8	8		
	Jalla	30			30
	Japhu	22			22
	Rumina	18			18
	Neyzagang	11	1		10
	Zamday	30	14		16
	Samdrupgang	40	16		24
	Nayla	11			11
Sub-total	204	41		163	
Total		444	215	61	168

⁹ Mental estimate as derived by Gups of Bjena and Rubesa. The figure corresponds fairly well with MoA 1995 (499 households). However, the figure of people owning thrams (land registration) is more than the number of households (Total Thram holder 663; MoA 1995). This is because that sometimes more than one thram holder will be present in single household.

Khotokha Valley does not form an administrative unit by itself. Bjenab (people of Bjena Gewog) occupy the upper half of the valley, while Rubes (people of Rubesa Gewog) occupy the lower half. Bjena and Rubesa are two of the 15 gewogs under Wangdue- phodrang Dzongkhag. There are nine villages in Khotokha, and they are drawn from different households and different villages in the lowland (Table 3).

Table 3: Villages in Khotokha

Gewog	Village in Khotokha	Villages in lowland valley from which households come from
Bjena	Shubesa	Themakha, Balakha, and Phintshogang
	Soebesa	Balakha, Phintshogang, Tashitokha, and Eusakha
	Eusa	Wache Toe, Lumpa, Takakha, Gumena, and Tikekha
	Gangrichen	Ngawang, Umtegang, Bakakha, and Jagarlingchu
Rubesa	Penjorling	Samdrupgang, Zamday
	Jongphey	Samdrupgang
	Chuba	Samdrupgang
	Goensa	Zamday
	Sheley	Permanent settlement in the Khotokha Valley

4.1.2.2 Demographic Data

According to MoA 1995, the estimated total population for the two gewogs is 4119 (Bjena 2026; Rubesa 2093), and a mean household size of 8 people. Since about 215 out of total 444 households (Table 2) from the two gewogs move to Khotokha, the probable population in the Khotokha Valley during the summer period works out to 1820 (household number multiplied by mean household size). However, the number would be highly exaggerated as this high population level was not observed during the field visit.

While the present study attempted to rely on local official records, it was not possible as the two **gups** were busy with the paddy transplantation work and tax collection. However, the RRA information of a sample population shows a mean household size of 6.3 people and an equal ratio of male and female populations (Table 4). From this information, the population in the Valley during summer period could be estimated at 1354. This will be closer to the true population number.

Table 4: RRA Demographic Data Of a Sample Population

Village	Household Number	Male	Female	Total Number	Household Size (Mean)	Remarks
Penjorling	10	28	30	58	5.8	Seasonal migration
Jongphey	8	-	-	32	4	Seasonal migration
Sheley	4	20	18	38	9.5	Permanent settlement
Shubesa	4	17	19	36	9	Seasonal migration
Total	26	65	67	164	6.3	

4.1.2.3 Land Uses

All agriculture land in Khotokha is dryland (kamshing). The important crops are wheat, buckwheat, potato, and chilly. The valley is too high in altitude for rice to grow.

The valley has been traditionally important as grazing ground (tsamdrog) for the people in the lowland rice growing belt. The grazing areas are either privately or communally owned.

4.1.2.4 Income Source

As is the general case in the country, local people are simple farmers subsisting on agriculture and livestock produce. However, as rural life becomes linked to overall national development, cash is becoming important for the many things outside their traditional lifestyle boundary. This includes paying annual taxes (it was in-kind in the old days), school fees, transport fares, labour, farm implements, and food items from the local market.

Today the cash need is met from the sale of rice, livestock produce, potato, chilly and labour. In one interview, a farmer said that about 10 years ago the main source of income was from agriculture and livestock produce. Today, potato as cash crop is growing in importance. It forms about a quarter of the total cash income. In future, it has potential to be the top cash earner.

The local people are not interested in the logging operations and saw-mills as a source of employment or cash. As the farm labour is in short supply, the farm demand is high. Further, the remuneration received in the contract works is not attractive enough for the local farmers. Therefore, nearly all the workers in the commercial enterprises are from outside the valley.

4.1.2.4 Historical Timeline

Khotokha Valley is dotted with monasteries and important religious sites (lhakhangs, goenbas, and gneys). Farmers have difficulty remembering the dates of establishment of these religious institutions. They say that they were 'long, long ago' built by great lamas. Taking clue from the story of Gaywa Sakya Rinchen, it could be said that many of the lhakhangs and goenbas may be as many or more than 300 years old.

In 1958, a group of people from Phobjikha settled at Sheley on the lower edge of the valley. The earlier lifestyle of these settlers was nomadic, moving between Phobjikha and Jala-Ula, villages under Rubesa gewog.

During the Monkey/Bird year (1968/69), there was a cattle epidemic which killed many animals (Rinderpest disease; Dr.Phub Dorji, per.comm.). Vaccine was available, and therefore some animals were saved.

Sometimes in late 1970s or early 1980s, government introduced breeding bulls called 'Haryana'. 'Haryana' had a big body and long horns. The program was not successful as the off-springs did not survive. Today, there is not a single trace of 'Haryana'.

Starting in 1982/83, people witnessed development works in the valley. First was the Tashila Ropeway, introduction of Brown Swiss bull and improved potato seeds in 1983, Jersey breed and feeder road in 1985, improved pasture program in 1989, saw-mills in 1990, a community school in 1992, and a livestock extension centre in 1993 (Fig 3: Historical Time Line).

4.1.3 Development Institutions

4.1.3.1 School

The Khotokha Community School was established in 1992. Today it has classes from pre-primary to class IV, with a total of 223 students and 5 teachers (Table 5). People say that the establishment of the school was a landmark in their development history. They now pray that this school will grow into a primary school.

Table 5: School Statistics

Gewog	Student Number
Bjena	119
Rubesa	47
Others*	57
Total	223

Boy	Girl	Total
128	95	223

* Children of local government staff and saw-millers

4.1.3.2 Livestock Centre

The Khotokha Livestock Centre was established in 1993 under a livestock project. The centre and school are at close vicinity of each other, and both are supposed to be roughly located at the line dividing the two gewogs. Since Khotokha is a livestock valley, people consider the centre very important to them. Mr.K.B.Rai, extension officer, is currently the sole livestock person in the centre.

4.1.3.3 Forest Office

People say that they should consider themselves fortunate because there is a local forest office, otherwise they say they know what a trouble it is to go to far away forest office for permits. The local forest office is currently manned by Mr.Ugyen Tshering, Unit Incharge, and Mr.Karma, Forest Guard.

Fig 3: Historical Time Line

4.1.4 Farming System

Like any other Bhutanese farmer, people of Khotokha depend upon both agriculture and livestock for their livelihood. The two are inseparable components of the subsistence Bhutanese farming system. Agriculture provides the farmer with cereals and vegetables while livestock provides dairy products, draft power, and farm yard manure. Farm yard manure combined with forest litter remains the most important and often the only source of fertilizer to refurbish annually the depleted nutrients in agricultural fields.

During the summer agriculture season in the lowland valleys, the cattle herds are taken to the upland forests. Khotokha is a typical example of the few favourable situations in the country where people maintain two homes, i.e. summer and winter.

Intrinsically or psychologically, rice is the most important cereal crop to a Bhutanese farmer. Rice growing areas are held at higher esteem than non-rice growing areas. It is common to find a highlander lamenting that if only rice could grow in his or her valley.

The winter house at Maylo (rice-growing belt) is considered the first home. This is evident from the bigger size houses and proper maintenance when compared to the houses in Khotokha. Khotokha, the second home, is important for its open rangeland for the cattle grazing in summer; winter being severe for both people and cattle.

4.1.4.1 Agriculture

Except for rice, all other nine cereals (*Dru nga gu*¹⁰) can grow in Khotokha. The important ones are wheat, buckwheat, barley, and maize. Potato, as a cash crop, is gaining importance, and is already an important source of cash income to a growing number of households (Table 6).

People grew more bitter-buckwheat (**Jo**) and sweet-buckwheat (**Gayra**) in the past than they do now. This is because that blue pines have colonized open rangelands where buckwheat was cultivated earlier. It is said that much of today's young blue pine forests in the valley bottom was open space not long ago. The cropping calendar for major crops is presented in Table 7.

¹⁰ It is the Bhutanese collective term for 9 major cereal types i.e. white rice, red rice, wheat, sweet buckwheat, bitter buckwheat, maize, barley, millet, and mustard ... The growing of all **Dru nga gu** is taken to indicate the favourable condition of a place.

Table 6: Group Scoring of Important Crops

Crop	Score	Rank
Wheat	+	4
Radish	+	4
Potato	++++++	1
Barley	++++	3
Apple	+	4
Chilli	++++++	2

Group: 6 women; 3 men

Table 7: Cropping Calendar

CROP	BHUTANESE MONTH											
	1	2	3	4	5	6	7	8	9	10	11	12
Potato and Pumpkin												
Cucumber, Maize & Apple												
Chilly & Buckwheat												
Wheat & Barley												

4.1.4.2 Livestock

The Khotokha Livestock Centre was established in 1993. It has started maintaining an annual livestock census (Table 8).

Table 8: Livestock Census 1994-1995

GEWOG	SIRI	CROSS B. JERSEY	CROSS B. MITHUN	HORSE	PIG
Rubesa	301	58	60	47	46
Bjena	674	169	293	168	160
Sub-total	975	227	353	215	206

Source: Khotokha Livestock Extension Centre

N.B. Cattle number includes adult, under one year age and heifer, and only belonging to Khotokha.

Total Cattle Number (Local + Jersey-cross + Mithun-cross) = 1555

There is a general trend of cattle increase in the valley. In the village meeting attended by 56 farmers, 33 farmers said that they have more number of cattle now than in the last 5 years. About 8 farmers said that their cattle number decreased during the same period. One household mentioned that he has seen no increase nor decrease in his cattle number. Two households did not own cattle. The largest herd size would constitute about 50 cattle.

About 18 households, all Bjenabs, said that they have **tsamdrog** in the forests. People who have tsamdrops normally own large herds. The cattle remain in the forest for nearly six months. The rest of Bjenabs and Rubes keep cattle at their homesteads; free

ranging them in the open grounds and surrounding forests. A grazing tax of Nu.100 is levied for a tsamdrog registered individually or communally. However, the grazing tax for the free ranging cattle at the homesteads was abolished in 1993.

In another group exercise, about half the members valued the mithun-cross breeds and the other half the jersey-cross. The valuation of animal type is determined by special factors (Table 9). However, all point out the importance of maintaining a small siri herd as breeding stock for both mithun-cross and jersey-cross.

Table 9: Special Factors Determining the Breed Choice

MITHUN-CROSS	JERSEY-CROSS
Farmers own tsamdrog.	No tsamdrog (normally).
Large herd size.	Small to medium herd size.
Easy to rear because of the animal's surefooted nature in the forests.	Animal is clumsy in the forest; can not adapt to the forest condition. But, easy to rear in the home condition.
More butter content	More milk. Butter quality fairly good when mixed with the milk from local siri cows.
Graze in the forest.	Improved pasture at home.

As it is evident from the historical timeline, jersey-cross breed was only introduced as recently as mid 1980s. Today there is a population of jersey-cross of 227 numbers as against 353 numbers of mithun-cross (Table 8). This is a clear indication of high adoption level of jersey-cross by the people.

The horse population is also said to show a marked increase. With migratory lifestyle, no motor road situation and potato boom, more and more people are buying horses for transport purposes. At the same time there is a great sale of horses from Phobjikha as the people there rely more and more on road transport.

4.1.4.3 Cattle Migration

The seasonal migration of cattle between summer and winter homes follows a strict schedule particularly for Bjenabs. There is a strong community rule to govern the people's adherence to the schedule. All cattle from Maylo should have moved to Khotokha before the 15th day of the 3rd Bhutanese Month (April-May). Similarly, no cattle is allowed to move before the 15th day of the 9th Bhutanese Month (October/November) from Khotokha to Maylo. The primary reason for the strict schedule is that there will be no cattle nuisance during the rice growing season in Maylo. Cattle remain in Khotokha for six months in summer.

A defaulter to this rule pays a fine in-kind to the community. The fine is 20 **dres** (about 30 kg) wheat in the spring, and 20 **dres** rice in autumn for an adult, and half the volume for a young one. The fines collected would go to support community religious activities. However, there is a relaxation for pregnant cows, to avoid a miscarriage during migration.

For Rubes, there is no such strict schedule and community rule. However, they move their cattle at about the same time as Bjenabs.

4.1.4.4 Improved Pasture Development

An improved pasture development program started in 1989. Many households maintain pasture gardens at their homesteads. People say that the introduction of improved pasture is one of the best development activities that has happened to them. The pasture, a mixture of 3 species of grass, is harvested and stall-fed, especially to milking cows and calves. However, larger-scale pasture development by some households on the government lease land has not been successful due to lack of good irrigation facility, fertilizer input, and fencing materials.

4.1.5 Forest Resources

People depend upon the forest for the following supply of resources:

- i) House construction materials: beams, planks, rafters etc.
- ii) Shingle: roofing materials
- iii) Firewood: only source of energy for cooking, lighting, and space heating.
- iv) Fencing materials: home gardens and fields
- v) Farm Implements: ploughs, and other farm tool handles
- vi) Non Wood Forest Products: forest foods, bamboo, medicinal plants
- vii) Grazing land for cattle

4.1.5.1 Resource Scoring and Ranking

The scoring exercise first had the people identify the forest resources important to them and then score these with grains according to the relative importance of the resources. A separate scoring exercise was performed for each of three different farmer groups. The final ranking was done on the mean of the scores by the three farmer groups (Table 10).

Table 10: Ranking of Forest Resources

Forest Resource	1st Farmer Group Score	2nd Farmer Group Score	3rd Farmer Group Score	Mean	Rank
Cham	30	13	28	24	1
Shingle	36	17	18	24	1
Fuelwood	23	28	13	21	2
Poles	18	19	-	18	3
Bamboo	19	13	11	14	4
Farm Implements	16	8	10	11	5
Fodder Tree	1	12	6	6	6
Leaf Litter	1	6	-	3	7
Broom	4	2	-	3	7
Mushroom	1	4	2	2	8

Medicinal Plant	-	-	2	2	8
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House construction and roofing materials are the most important need of the farmers from the forests followed by fuelwood, and poles for fencing gardens and fields. Bamboo is also considered very important for its wide ranging uses from fencing material to bamboo thatching for houses. Farm implements feature next in importance.

The non-wood forest products (NWFP) such as mushroom, fodder tree, leaf litter, broom and medicinal plants are considered not very important by the people. These resources abound in the forests, and are free to use. Even for products which have value outside the valley, there is no system of collection and sale, e.g. mushrooms. The use of some products is not common, e.g. fodder tree and medicinal plants though people are aware of them.

4.1.5.2 Tree Resources: Needs Assessment

a) House Construction Timber

People identify three categories of houses. They are:

Category A: **Jang chim tho sum** (three-storey mud house):

Category B: **Jang chim tho gni** (two-storey mud house):

Category C: **Baa leb** (one-storey thatched house):

In the last 5 years, about 7 new houses have been built in the valley, thus averaging 1.4 houses a year. The new houses all fall under Category B. A crude approximation of timber requirement for the three categories of houses as given by a local builder and later modified by the two local gups is as follows (Table 11).

Table 11: Approximate Timber Requirement By Number of Trees For The Three Categories of House

Material Type	Category A		Category B		Category C		Crude Volume equivalent (for one average tree)*
	Hand saw	Hand hewn	Hand saw	Hand hewn	Hand saw	Hand hewn	
Big tree (for planks)	13 nos	30 nos	8 nos	20 nos	3 nos	6 nos	Avg. 6 ft. girth * 48 ft. length. 3.057 m ³ or 108 cft (quarter girth formula)
Shingle	NA	8 nos	NA	7 nos	NA	NA	
Chams		120 nos	-	80 nos			Avg. 3 ft 6 inch * 42 ft. length 0.91 m ³ or 32.16 cft (quarter girth formula)
Tsim	NA	100 nos	NA	90 nos	NA	80 nos	
Dangchu	NA	300 nos	NA	300 nos	NA	20 nos	
Sub-total	13	558	8	497	3	106	

* Estimate as drawn by Thinley Dorji, Range Officer, Wangdue

NA : Not Applicable

b) Shingle: The Roofing Material

Fir (*Abies densa*) is the most preferred species for shingle, followed by spruce (*Picea spinulosa*), hemlock (*Tsuga dumosa*), and blue pine (*Pinus wallichiana*). Bjenabs usually use fir while Rubes use blue pine (fir is far for Rubes).

People can obtain a maximum sanction of 5 numbers of trees for shingle purpose in a year. But, people normally apply for only one tree a year as this is what their physical strength or man-power would allow them to do so. Royalty for a tree is Nu.10.00 plus Nu. 0.75 as marking cost.

People prepare shingles in the month of November/December and leave them in the forest to dry until March/April when they are transported manually home. The new shingles are used to fix leakage in the roof. There is no overhauling of old shingles but only replacement in parts by new shingles. The shingles normally last for 5 years.

There are two shingle sizes i.e. **Big** (approx. 20 to 25 cm width; length 1.5 m) and **Small** (approx. 12 to 15 cm width; length 1.5 m). A person can carry about **Zung Duen** (7 pairs) of the Big size and **Zung chung** (12 pairs) of the small size. For transportation of shingles from the forest, people normally make do with their own household manpower or on 'help each other' basis with the neighbours. When this is not possible, they hire hands, and the cost is Nu.50.00 per person per day plus the full day food.

c) Fuelwood

Blue pine is the no-choice common fuelwood species. Hardwoods (oak and rhododendron) occur as scattered individuals in the blue pine forest and are therefore difficult to obtain in appreciable quantity. Fuel wood consumption by family size from a sample population on a daily basis is provided below (Table 12).

Table 12: Daily Fuelwood Consumption by Family Size

Household No.	Household Size	Blue Pine Backload (No.)	Remarks
1	2	1 backload	husband and wife team
2	6	2 backloads	
3	5	2 backloads	
4	9	3 backloads	

Mean Household Size: 7.2

Mean Backload used per day: 2 (blue pine) 1 (hard wood).

[According to farmers' estimate, 1 backload of hardwood = 2 backloads of blue pine.]

6 months stay in Khotokha = 180 days

Total backload for 6 months for a household of 7.2 members: $2 * 180 = 360$ backloads of blue pine

A simple field experiment (Photo 19,20 and 21 at the end) shows:

1 m³ stacked volume = 6 backloads [It is a woman's backload. Women generally transport firewood]

Therefore, 360 backloads of B/p = 60 m³ stacked volume for the six month period.

A household receives annually a permit for 2 numbers of trees or 100 backloads of fuelwood. Many say that this amount is not enough and they have to make use of fallen trees, branches, bushes, and wood chips left behind during cham conversion. This situation sometimes brings them into conflict with the government forestry personnel.

Wood energy remains the only source of energy for the rural Bhutanese for cooking, lighting, and space heating. The importance of wood energy to Bhutanese farm life is explained by the fire-hour factor (Table 13)

Table 13: Fire Hour Factor

START TIME	END TIME	HOUR NO.	ACTIVITY	REMARKS
5 a.m.	9 a.m.	4 hrs	Tea, rice, cheese preparation, cattle feed, pig feed.	Get up at 5 a.m. Busy time.
9 a.m.	11 a.m.	2 hrs	No active fire in the oven.	Fire does not die completely. It is just less intense.
11 a.m.	2 p.m.	3 hrs	Lunch, tea, pig feed etc.	
2 p.m.	4 p.m.	2 hrs	No active fire in the oven	Fire does not die completely.
4 p.m.	9 p.m.	5 hrs	Zaw frying, ara distillation, cattle and pig feed, and dinner.	Busy time.
9 p.m.	5 a.m.	8 hrs	Retire for the night.	Total Active Fire Four: 12 hours

There is a 12-hour fire in the oven on a normal day. On special days of religious rites, and during heavy working periods, the fire hour could go up in duration. It is said that fire in the oven does not die completely. The oven can be lighted easily at any time when the occasion demands.

d) Fencing Materials

Khotokha is occupied only seasonally. In recent years however, some households have been staying back in winter. The saw mill workers from outside the valley also stay year-round. During the summer season, agriculture fields need protection from the great livestock population present in the valley. The wild boar, which is a big menace, destroys crops and takes away a farmer's good night sleep. During the winter, wheat

fields in the deserted valley stand very vulnerable to invasion from wild ungulates (deer and sambar) and the few livestock animals left behind.

The situation demands strong fencing around the home gardens and agricultural fields throughout the year. Therefore, fencing material is an important requirement of the people, after construction timber, shingles, and fuelwood.

Blue pine trees and poles remain an important fencing material. The normal quota as allowed by forest rule is not enough. People say that blue pines grow like weeds, and the surrounding forest is so thickly stocked that taking out their domestic requirement will not harm the forest.

e) Non-Wood Forest Products (NWFPs)

The NWFPs are important to the people from the standpoint of subsistence use only. There is no known NWFP which the people sell within or outside the valley. Even some NWFPs such as mushrooms, which bear promise for augmenting real household income, is not collected for sale in the local dzongkhag market. People say that they have no tradition of selling NWFPs.

As the forest is their immediate home environment, people recognise a great number of plants both useful and not so useful to them. They have names for many, but many more are known by their physical appearances. Some of the plants which are important as food, spice, medicine, and home utility are provided below.

Table 14: Local Mushroom (edible)

Local Name	Scientific Name*	Remarks
1. Keysa Lusa shamu	Suillus pictus	2 varieties known; white and red variety.
2. Say chu shamu		
3. Ga shamu		
4. Taa shamu	Polyporus sulfurus	
5. Rapey Honrey/jaw	Hericium ramosa	
6. Jichu kangru	Clavaria botrytis	
7. Jili namchu	Auricularia auricula	
8. Tongphu shamu	Lentinus letideus	
9. Ram shamu	Grisola frondosa	
10. Nachi shamu		
11. Guep shamu		
12. Dungshing shamu	Rozites caperata	

* Scientific name available as against the local name from the National Mushroom Centre, Semtokha, Thimphu.

Table 15: Medicinal Plants

Local Name	Scientific Name	Plant Parts Used	Remedy For
*Dimoog / Jumoog	<i>Onosma hookeri</i>	root	Asthma, pneumonia and hypertension (bay thak)
* Tikta			Jaundice (thrib maen)
* Say we metok	<i>Rosa serecia</i>	flower	Regulates bile (thrib)
* Sho ma	<i>Rheumax nepalensis</i>	root	Wounds and cuts
* Sey yab	<i>Chenomeles sp. (?)</i>	fruit	Stomach ache
* Ker shing/Kebi tsang	<i>Berberis aristata</i>	bark	Eye infection
* Sechu meto		root	
** Ngasing thuep	<i>Viscum nepalense</i>	whole plant	For bone fracture
** Chi shu		bark	For bone fracture. Used together with Ngasing thuep.
** Doprasi		root	For swelling and it is also anti-flee
** Khempa	<i>Artemisia sp.</i>	leaves	For cold and blood clot.
** Tachup		whole plant	For joint swelling
** Chuda	<i>Acorus calamus</i>	root	Digestion and general skin diseases

* Source: A local Dungtsho (Indigenous Doctor)

** Source: Local farmers

Table 16: General Plant Use

Local Name	Scientific Name	Use
Kebi tsang	<i>Berberis aristata</i>	Fruits eaten & Fence materials
Shingtsa	<i>Eschscholzia fruticose</i>	Leaves to colour floor
Choka shing	<i>Rhus javanica</i>	Leaves used to polish silver cups
Detechang	<i>Polygonatum sibiricum</i>	Young shoots eaten as vegetable
Bji shing	<i>Euglenaus latifolia</i>	Fruits eaten
Thing ngey	<i>Xanthozylum sp.</i>	Spice
Dom cap		Pig feed
Dum shing		Extract edible oil from fruit
Rurum	<i>Hedera helix</i>	Fodder plant (climber)
Joga sithey	<i>Potentilla griffithii</i>	Root eaten as mascatory
Keza	<i>Canavis sativa</i>	Pig feed
Dhey shing	<i>Daphne</i>	Fibres made into a rope
Kasi kenday	<i>Phytolacca acinosa</i>	Vegetable & Pig feed
Pangkey	Pteris (?) fern	Young shoot eaten as vegetable & whole plant as cattle bedding
Tep shing	<i>Malus baccata</i>	Fence material
Dou		Pig feed
Chagilap	<i>Lycopodium sp.</i>	For decoration
Ra dum	<i>Rhododendron ciliatum</i>	Poison to cattle
Zentu shing	<i>Layonia ovalifolia</i>	Leaves to fold tobacco.
Eubay	<i>Girardinia sp.</i>	Carriage rope

Table 17: Bamboo

Local Name	Scientific Name	Remarks
1. Rim ba		Basket and fencing material
2. Chu ba	Borinda grossa	Cord material for tying bulls, basket, and fencing.
3. Hiksa		Basket

f) Bamboo

Bamboo ranks fourth in the order of people's priority. People identified three species of bamboo occurring in the forest (Table 17). Bamboo is the most important material for making cords to tie domestic animals. It is also the common tying material for roofs and fences. The most important use of bamboo is the bamboo mat for fencing, animal sheds and houses. Bamboo mats allow a farmer to make quick temporary sheds as guard houses on the agriculture fields

People say that the bamboo stock in the forest is declining. It is harder to get bamboo every year. The decline is due to the combined of the following:

- a) Bamboo extraction by outside corporate institutions and people.
- b) Bamboo utilization by logging and saw-mill workforce.
- c) Bamboo destruction by logging operations.
- d) The wild boars and bears relish on the young bamboo shoots, thus effecting natural regeneration.

The RRA team observed two households growing bamboo in their home gardens¹¹.

A five year-old clump was noted at one house at Shubesa (upper valley), and an older clump at another house at Jongphey (lower valley). The two households say that it is so convenient to have bamboos growing in the home gardens. The planting technique is through shoot-rhizome method taken from the local forest.

4.1.6 Wild Boar

Night-time invasion of home gardens and agriculture fields by wild boars is a nightmare for the farmers. Except for old family members, mothers, and small children, the household members have to take positions on the fields at night to keep away the marauding boars.

¹¹ The author on a field tour in 1995 also observed people in Gogona growing bamboos.

People say that since last year, the boar menace is decreasing. They did not see as many boars the last two years as they used to before.

4.1.7 Wild Dogs

There is a re-appearance of wild dogs. App Taazi of Jongphey village in the lower valley saw about 6 wild dogs kill his horse this winter. When he tried to chase them away, one black wild dog was not willing to go. There are now more and more reports of wild dogs killing horses.

According to the people, the present wild dogs are smaller in body size than they remember of them in the past, and they only attack horses. They move in groups, never less than a pair. They defecate all together in a line. This characteristic and hairs in the faeces can quickly tell a person of the presence of wild dogs.

4.1.8 Resource Use System

The human settlements are spread across the valley in all the four directions. Each settlement has its own geographical range of forest which it utilizes. Bjenabs graze their cattle at Shobela and Kikiphu, and also get their construction timber and roofing materials from these two areas. Rubes generally do not take cattle to graze for long periods in the forest.

As the settlements are in close quarter to the forest or sometimes inside the forest, secondary requirements of wood and non-wood resources are easily obtained from the nearby forests.

Table 18: Seasonal Calendar for Important Forestry Works

FORESTRY ACTIVITY	Bhutanese Month											
	1	2	3	4	5	6	7	8	9	10	11	12
Cattle Grazing												
Tree/Cham												
Shingle		trans- port								cut		
Tsim & Dangchu												
Firewood												
Mushroom												
Bamboo												
Leaf litter												

4.2 ISSUES

4.2.1 Fuelwood and Fencing Material

“ Friends, when we talk let us talk about matters very important to us. House construction timber. This is once a while requirement, and during the time when we want, we get. We just have to apply to the government. But, fuelwood and fencing materials they are our basic needs. We require fuelwood in the morning, afternoon and night. Fencing material this year and next year. We can't live without them. When we don't have enough of them, we have no choice than to go into the forests. So let us reflect and see if there are any constraints in regard to these two uses.”

(A farmer during the village meeting on 26.06.96)

On a day-to-day basis, fuelwood and fencing materials are the most important forest needs of the people. Fuelwood remains the only energy source for cooking (including animal feeds), lighting and space heating; fire in the oven burns for 12 hours a day. Strong fences are a must to keep away domestic animals, wild ungulates, and boars from the home gardens and agricultural fields.

People say that the annual household quota of 2 numbers of trees or 100 backloads of fuelwood is normally not enough. An average household requires about 360 backloads of fuelwood for the six months stay in Khotokha. Since the fuelwood is pine wood, it burns quickly, therefore the high consumption level.

Obtaining adequate fencing material is either restricted by rule or cost. For fencing material, people either apply for chams or for poles. The cham tree is then converted into fence materials. Poles are used directly.

According to forestry rule, people are entitled to a maximum number of 30 cham trees in a year at a royalty rate of Nu.10.75 per tree, and further, a maximum of 30 poles (tsim) at Nu.6.00 per pole. A cham-size tree is then converted (by splitting) into fence materials. People normally apply for chams as it is cheaper by volume out-turn than the poles. One cham tree will give about 50 to 60 fencing pieces whereas the pole just one to two.

A proper fencing of the home gardens and agricultural fields places a heavy demand on the farmer for more trees. People say that they find it hard to afford the royalty, especially when they apply for a large number of trees; as the total cost works out too high for their cash income. To overcome this difficulty, people cut the permitted number of trees but then the rest of the timber need is obtained 'illegally'. The practice often brings them into conflict with the forestry personnel.

They say that the trees are growing wild and in full abundance just near their homes. Cutting down a few trees indeed seems to boost the growth of the remaining trees and there is plentiful regeneration. They say that they will not cut more than they require.

However, some farmers believe that the government has laid down 'DOs and DON'Ts' and that everyone should respect them. As compared to the urban rate for timber, the rural rate is insignificant, and they say that the government is most kind to the rural people. **But, the practice of the forestry personnel keeping half the fine as reward is not a good system.** The fine should go in whole to the government.

4.2.2 Shingle

Good fir trees are increasingly becoming scarce. The reasons are that the local people are not allotted trees from the logging coupe, and the logging area expands every year and cover more forests. They say that good fir trees (straight grained) should be kept for them.

A farmer normally takes along with him a local expert who can tell the grain nature of the tree. Sometimes the marked and felled tree is not a straight grain, and it is of little or no use to them. They are not given a second tree, not without a new permit.

4.2.3 Logging Vs Grazing

People in general are ambiguous in their feelings towards logging, except for some small local impacts.

Logging opens up canopy and there is a good regeneration of grass on the ground for the cattle. However, the cattle can not graze in the initial 2 years after logging because of the tree debris which restrict the cattle movement and the rolling logs which destroy the ground vegetation. The disturbance by logging to cattle grazing is small, localised, and temporary.

But, on the other hand local people have had their cattle killed by falling trees and by traps set for wildlife by unknown forest workers. However, people say that because of these few incidents they do not mean logging should be stopped. They say that the logging is an important source of revenue for the government and they respect it. But, they feel that the logging activity and grazing can be sequenced to avoid future conflicts.

4.2.4 Sawmill Off-cuts

A few years ago, sawmill management allowed the local people to collect the off-cuts free for their private uses; off-cuts were particularly good as garden fencing materials. Today, the sawmill management dresses the good off-cuts as battens for export, and bad ones are all converted to charcoal. It has become difficult for the local people to obtain off-cuts.

4.2.5 Buffer Zone for Monasteries and Gneys

About 13 monasteries and seven gneys dot the mountains in the valley. They harbour around 23 meditation houses where yogis practice meditation. The valley is also the summer residence of the 63rd Je Khenpo, His Holiness Thinley Lhendup.

“Ours is a religious nation. The logging activity, settlement, and saw-mills could pollute the sanctity of our lhakhangs and gneys. We are not saying that this economic activity should not take place. They should. They are important to the country. All we want to say is that this economic activity should take place far away from lhakhangs and gneys.”

(Farmers during the village meeting on 26.06.96)

4.2.6 Tashila Ropeway and Road Link

Tashila Ropeway was established in 1983 with Swiss assistance for the sole objective of transporting timber from the Khotokha Valley. From the beginning, it was not meant for people and goods transport. However, recognising its social responsibility, it entertained and continues to entertain the transportation of people and goods in the morning and evening hours.

Starting a decade ago, the valley has seen a potato boom. However, the economic opportunity provided by potato growing as a cash crop is highly restrained by the small haulage capacity of the ropeway, high handling and carriage damage, and spillage of potato bags during haulage. The potato consignment is sometimes forced to lay on the open ground and in the rain because the ropeway is engaged in the priority timber transport.

People are acutely frustrated with Tashila Ropeway. People had long put a request for a road connection since the Sixth Five Year Plan. The request was always turned down because there is a ropeway link.

Some of the common public disappointments are:

“The ropeway is so expensive. It is Nu.25.00 for that half-hour ride. With the same amount we can make it to Thimphu. It is a no-choice situation. We think that we will not go on the ropeway but when we fall ill or there is some urgent matter we have to take it, and we have frequently something to buy from the Wangdue market.”

“This beautiful and productive valley has little value. Except for rice, all other cereals grow (*Dru nga gu*). We want to grow more potatoes but the transport cost is prohibitive. We first load onto the local tractor and unload it at the Tashila Top Station, load onto the Ropeway and unload it, and load again onto a truck and unload it in Phuntsholing. For Phobjibs (people of Phobjikha), it is one time loading and unloading business. We pay 3 times more transport cost than Phobjibs.”

“Phobjibs also have a good communication system. When the price of potato in Phuntsholing market is good, they quickly transport the goods. When the price is bad, they stay back at home. Here we don't have this flexibility because of Tashila Ropeway.”

“Look at Phobjibs. Where they are now. See what a road can do? They don't have rice fields and previously would range in our areas with bamboo products in exchange for rice. Today, they are very wealthy. They have moved ahead and we, backward. They own trucks and tractors, and their houses are beautifully painted. They all wear wrist watches and walk smart in fine ghos and lageys. This is all because of two things: potato and road.”

There is a forest road of about 14 kms long from the Tashila Top Station to the logging coupe at Shobela. On asking that there is a road network in the valley, people resign in despair.

“This road has neither a head nor a tail. What do we do with it? The road has no public benefits.”

A proper road link is the people's greatest wish.

“We have the finest timber in the country. Timber supply for the Punakha Dzong and Natural Resources Training Institute (NRTI) was from our valley. Much of timber resources still remain unexploited in Kikiphu, and Shobela. Government can make lot of revenue from our forests. We hope and pray that this rich forest resource of ours brings us a proper road link.”

4.2.7 Upstream Settlement and Pollution of Drinking Water Source

Paza chu, the main stream, descending from Shobela is the source of drinking water for the people of Gangrichen, Wachey, Shubisa, and Sheley villages. The upstream logging operation, logging settlement, and saw-mills have made Paza chu unfit for drinking for the people living downstream. Once a clean-water stream, Paza chu today carries refuse of human and animal excreta, saw dust, and charcoal.

“Health officials say that a dirty water is the real cause for many diseases. Drink clean water. Boil water. But, we are denied this here. It is a paradox. We have a mountain stream running by our houses, yet from the first dawn break to the sun set in the evening we spend considerable amount of time and effort in collecting drinking water from far away mountain springs.”

“The gentleman there... from whose compound we collect our drinking water is saying that he is thinking of charging for the water.”

(Village Meeting on 26.06.96)

The upstream pollution of water gets worse for the further downstream villages. People say that everyone likes to settle near a stream, and since it is an open drainage system, it is understandable that the running water to be a little bad. But, Paza chu today is physically too dirty with home and saw mill garbages. The irrigation canal which also serves as drinking water runs by charcoal kilns and heaps of saw dust.

5.0 DISCUSSION AND RECOMMENDATIONS

5.1 Local Demand for Timber

Khotokha is the traditional source of construction timber for areas beyond its valley boundary, particularly Bjena and Rubesa gewogs. This is because the two gewogs have broad-leaved forests, while for construction timber, blue pine is the most preferred species.

Assessment of the local demand should include the requirement of the households who live and who do not live, in Bjena and Rubesa gewogs (Table 2).

In the last five years, about seven new houses were constructed in the valley, resulting in a mean of 1.4 new houses a year. A socio-economic survey (MoA 1992) reports no new house in Bjena gewog and 2 new houses in Rubesa gewog in the preceding five year period, which gives a mean of 0.4 new houses a year. The final mean works out to 0.9 new houses a year. Therefore, we could assume one new house a year, which is not a heavy demand on the forest. But, people continually require timber for many other reasons such as repair and expansion of houses, construction of animal sheds, and fencing of gardens and agricultural fields (Table 19).

Table 19: Local Consumption By Timber Type

	1 July 1993 to 30 June 1994	1 July 1994 to 30 June 1995	1 July 1995 to 30 June 1996	Total Number	Avg. per household
Household Number	116	103	130	349	
Big Tree	135	170	221	526	1.50
Shingle	62	52	103	217	0.62
Cham	1082	916	1392	3390	9.71
Tsim	146	224	307	677	1.93
Dangchung	280	223	326	829	2.37

Source: Information taken out from the records of the Khotokha Forest Management Unit office.

On an average, a household through permit system obtains 1.5 big trees, 0.6 trees for shingle, 9.7 cham trees, 1.9 tsims, and 2.3 dangchungs. However, it is a common knowledge that people normally cut more number of trees than the permit states, perhaps by a factor of 2 for the big trees (e.g. big tree, shingle, and chams), and 10 for small trees (e.g. tsim and dangchung). Therefore, it may be necessary to take this factor into account while assessing the total local need.

5.2 Silvi-Social Synergism

“When I was a child (*about 40 years ago*), I would climb that small hillock and monitor my cattle grazing right down at the end of the valley. Today, it is blue pines everywhere. It will soon enter our houses.”

(An old lady from Gangrichen village)

People complain of blue pine aggression on the grazing ground, and government restriction on cutting them for their basic needs of fuelwood and fences. They say that surrounding blue pine is so overstocked that cattle can not graze in the forest anymore.

Blue pines, so thickly stocked, need thinnings for proper development of the final crops. Some blue pine forests already constitute of lanky (ungracefully tall and thin) trees. The thinned trees could fulfill the many wood demands of the local people while at the same time results in good management of forests.

5.3 Shingle

Shingle is a high priority need of the local people. During the logging operation, it will be of high social value to leave behind a few good individual trees (fir and blue pine). The experience from Korila Forest Management Unit, Mongar (Dorji 1995) is that today local people are undergoing hardships in obtaining roofing materials because past commercial logging operations have left behind only over-matured or deformed *Castanopsis* trees (roofing species).

5.4 Tashila Ropeway

The primary purpose of the ropeway establishment is conflicting. Helvetas (1984) states that it was established to transport timber from Khotokha while the DoF (1984) states that it was for people and agricultural goods. However, going by the experience so far, the transport of timber as the primary objective of the ropeway, is closer to the truth.

It took three years (1980 to 1983) to complete the work on Tashila Ropeway with a total cost of Nu. 70.00 lakhs.

An income analysis of the Tashila Ropeway for six months in 1984 (Helvetas undated) show that the timber transport constituted 87%, people transport 12%, and agricultural goods 2% of the total income. Further analysis show that the ropeway income from timber transport could hardly cover the expenditure even under most optimistic assumptions, and for transport of people and agricultural goods, it was an outright loss because of the high operating costs of the ropeway.

On the other hand, people find the ropeway cost for both people and agricultural goods prohibitive. At present, it is Nu.25.00 per person and Nu.20.00 per 100 kg load. People feel that Tashila Ropeway is a bottleneck for their social and economic development.

Tashila Ropeway is an outdated mode of transport system. It is proving costly to both the proprietor and the users. In its place, a road connection is very important, first to realise the full potential of timber, and secondly, for enhanced socio-economic development in the valley.

5.5 *Buffer Zone for Monasteries and Gneys*

In respect to the people's sentiment to preserving forests around monasteries and gneys, it is important for the forestry operation to leave a buffer zone. The size and area of a buffer zone could be determined locally in consultation with the local people.

5.6 *Drinking Water*

The pollution of drinking water source (Paza Chu stream) is a serious local concern. While administrative rule can be framed to control the pollution of the drinking water source by the upstream inhabitants, the lasting solution will be to install piped drinking water schemes for the different villages.

5.7 *Bamboo Decline*

The different species of bamboo found in the forests are very important to the local people for a wide variety of home uses. Local people are concerned that the bamboo stock in the forest is declining. There is an immediate need to understand the extent of bamboo extraction by both the locals and outside people, and also the bamboo damage by wild boars and bears.

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APPENDIX I: LEGENDS IN KHOTOKHA VALLEY

1. KHOTOKHA and MAYLO: WHAT DO THEY MEAN ?

People refer to their summer and winter homes by the generic terms of **Khotokha** and **Maylo** respectively. A few off-hand explanation of the two terms is, *Kha thosa* (meaning highland in Dzongkha) and therefore **Khotokha**, and **Maylo** as rice growing area. However, many farmers do not seem convinced of the literal meaning of the terms they use for their two homes because then all highlands and rice growing areas in the country should bear the same names. But, they do not.

Upon further probing, a plausible explanation by a key person which the people are happy with is as follows:

Once upon a time, Sakya Rinchen, a local yogi, meditated at **Sa Sega Dakphu**, the rocky cliff rising behind the present day community school. People in the valley did not support him in his meditation practice. Sometimes when they did, the ration was adulterated with ash and sand. He was disappointed with the people and left the valley and hence the name **Khotokha**, the Place of Disappointment (*Khota che* means disappointment in Dzongkha).

It is said Sakya Rinchen then founded the Phajoding Monastery (above Thimphu Valley) and later became the 9th Je Khenpo (Spiritual Leader) of the country (1744 - 1755 A.D.)

Today Sa Sega Dakphu is revered as the meditation cave (Gney) of Sakya Rinchen and is a favourite spot for meditation. There are currently seven meditation houses (Tsham khangs) at the site where yogis are practicing meditation.

On the name for the winter home, the story is as follows: Maylo is the Dzongkha word for 'mirror'. Overlooking the Bjena valley from the Khotokha ridge, a large stone (probably a micaceous stone) near a chorten which reflected like a glass mirror was seen, and hence the name **Maylo**. It is said the chorten is still present but the stone is not known. Maylo was a term popular with the Bjenab (people of Bjena gewog) but now, the Rubes (people of Rubesa gewog) also use it to mean their home in the rice belt.

2. Why rice won't grow in the Khotokha Valley

There are two important streams running down the Khotokha Valley. They are Khota Lae chu descending from Tashi La and Paza chu from Shobe La. Once upon a time Khota Lae chu personified the **serpent** and Paza chu the **boar**. One day the two wished to race and bet that if the serpent won, rice would grow in the valley and if the boar won, wheat and barley. The boar (Paza chu) as it is its nature dashed straight and won the race. The serpent on the other hand slithered back and forth on the ground and lost the race. Today the nature of the two streams is attributed to this story; Paza chu

running by the mountain side is swifter while Khota Lae chu running across the open field is serpentine.

3. The Heart Lake of Sha Radak¹²

Beside the ruins of a house in the valley bottom there is a small water pond which the locals refer to as the **Heart Lake** (La tsho) of the local deity **Sha Radak**. Sha Radak is said to watch the open rangeland around the **Heart Lake**. The local people are scared to put this land into any intensive agriculture use. If put to use, the person will be inflicted with illness. According to NRTI (1992), a farmer did try to put the land to use but became so seriously ill that he abandoned the plan. The plot remains untouched by the people to this day.

4. 'Raksa Cham' of Doley Goenba [after NRTI (1992)]

Long ago, when the Wangdue bridge was being constructed, people were frustrated to see every morning their previous day's work on the bridge pillaged by an unknown force.

One day people approached a learned lama about the problem. The Lama knew the cause of the problem. In the Wangdue river, there lived a '**Amm Tshomogem**' (mermaid), who was in love with a dancer from **Doley Goenba**. She was restless, and thus was destroying the day's work on the bridge construction.

The people brought the dancer to the river and made him perform a dance sequence called **Raksa Cham**. While **Amm Tshomogem** was watching the dance, people destroyed her home in the river. She could not live there anymore and left the place. Finally, the bridge was built.

The **Raksa Cham**, performed every year during the Wangdue Tshechu, is said to have originated from the **Doley Goenba** in the Khotokha Valley.

¹² Also reported in NRTI (1992)

APPENDIX II: BAMBOO PRODUCTS AND THEIR USES

Product Name	Use
1. Bay cha	Bamboo winnower
2. Ray dey	Bamboo mat where cereals are sun dried.
3. Lak chu	Bamboo basket for carriage of everyday cereals in the house.
4. Zay ko	Bamboo ring on which pots are placed during serving.
5. Ba sho	Bamboo container into which cow is milked.
6. So do	Bamboo container where fermented milk is churned for butter.
7. Luep	Storage container for cereals.
8. Zencha	Bamboo stick to stir rice in the pot.
9. To zar	Wooden ladle for rice.
10. Zhari	Wooden ladle for curry.
11. Wa du	Bamboo pipe to feed salt and oil into animal's mouth. Also to feed young calf with wheat porridge.
12. Khu dey	Bamboo container for dry pancakes.
13. Bay khu	Bamboo container for wool
14. Si pa	Bamboo container for butter and aezey (Chilly pickle).
15. Ja cha	Bamboo tea strainer
16. Tsha tha	Cord made from bamboo for tying animals.
17. Da dang shu	Bamboo bow and arrow.
18. Ba leb	Bamboo mat for roof and fence.
19. Chang sho	Bamboo wine strainer
20. Ba sho	Starch water strainer during rice cooking for large number of people.
21. Chang	Bamboo water jug

APPENDIX III: WILD MAMMALS FOUND IN THE VALLEY

English Common Name	Local Name	Scientific Name
1. Wild boar	Riphag	<i>Sus scrofa</i>
2. Wild dog	Phao	<i>Cuon alpinus</i>
3. Sambar deer	Shau	<i>Cervus unicolor</i>
4. Barking deer	Kasha	<i>Muntiacus muntjak</i>
5. Yellow throated marten	Acho yen ye	<i>Martes flavigula</i>
6. Red panda	Acho dongkap	<i>Ailurus fulgens</i>
7. Porcupine	Jithu	<i>Hystrix indica</i>
8. Leopard cat	Bja zee	<i>Felis bengalensis</i>
9. Leopard	Zee	<i>Panthera pardus</i>
10. Himalayan bear	Dhom	<i>Selenartus thibetanus</i>

APPENDIX IV: BIRDS IN KHOTOKHA VALLEY¹³

English Common Name	Local Name	Scientific Name	Habitat
1. Red billed chough	Tinku	Pyrrhocorax pyrrhocorax	Around habitation/settlement
2. Yellow billed chough	Tinku	Pyrrhocorax graculus	- do -
3. Rufous turtle dove	Thiligem	Streptopelia orientalis	- do -
4. Hill crow	O la	Corvus macrorhynchos	- do -
5. Hoopoe	Deythozem	Upupa epops	- do -
6. Cinnamon free sparrow	Bjichu nyazim	Passer rutilans	- do -
7. Nut cracker	Thangkerep	Nucifraga caryocatactes	Blue pine forest
8. Grey bulbul		Hypsipetes madagascariensis	- do -
9. Himalayan green finch		Carduelis spinoides	- do -
10. Cuckoo		Cuculus canorus	- do -
11. Grey winged blackbird		Turdus boulboul	- do -
12. Yellow billed blue magpie		Cissa flavirostris	- do -
13. Green backed tit		Parus monticolus	- do -
14. Black capped sibia	Bjichu gelong	Heterophasia capistrata	- do -
15. White collared blackbird		Turdus albocinctus	- do -
16. Yellow throated minivet		Pericrocotus solaris	
17. White winged grosbeak		Mycerbas carnipes	- do -
18. Grey drongo		Dicrurus leucophaeus	- do -
19. Brown bush warbler		Bradypterus luteoventris	- do -
20. White throated		Garrulax	- do -

¹³ Birds recorded during the RRA exercise (19.06.1996 to 27.06.96) by Ms.Durga Devi Sharma, NRTI, Lobeysa. The list also includes important birds such as black necked crane as reported by the local people.

laughing thrush		albogularis	
21. Tibetan siskin		Carduelis thibetana	- do -
22. Dark grey bushchat		Saxicola ferrea	- do -
23. Kaleej pheasant	Leko	Lophura leucomelana	- do -
24. Himalayan jungle nightjar		Caprimulgus indicus	- do -
25. Himalayan tree pie	Koketap	Dendrocitta	- do -
26. Rufous fronted tit		aegithalos iouschistos	- do -
27. Blue whistling thrush	Tepjinam	Myiophonus caeruleus	Streams/river
28. White capped redstart		Chaimarrornis leucocephalus	- do -
29. Palla's fishing eagle		Haliaeetus leucoryphus	
30. Rufous bellied niltava		Muscicapa sundara	
31. Himalayan cuckoo	Khuju	Cuculus saturatus	Mixed conifer forest
32. Indian cuckoo	Khuju	Cuculus micropterus	- do -
33. Brainfever bird		Cuculus varius	- do -
34. Satyr tragopan	Bap	Tragopan satyra	- do -
35. Common hill partridge	Kang kuru	Arborophila torqueola	- do -
36. Blood pheasant	Zem	Ithaginis cruentus	- do -
37. Himalayan wood owl		Strix aluco	Blue pine and Mixed conifer
38. Monal pheasant	Bjeda	Lophophorus impejanus	Mixed conifers
39. Black necked crane	Thrung thrun karm	Grus nigricollis	Meadow
40. Skylark		Alauda arvensis	- do -
41. White throated spinetail swift		Chaetura caudacuta	- do -

APPENDIX V: RRA TEAM

NAME	DISCIPLINE/INSTITUTION	REMARKS
1. D.B.Dhital	Management Planner, FRDS/FSD	Responsible for preparation of new Khotokha Forest Management Plan
2. Sangay Duba	Agronomist, RNRRC, Bajo, Wangdue	Agriculture researcher
3. Chimmi Dorji	Horticulturist, NRTI, Lobeysa	Lecturer
4. Dr. Phub Dorji	Vetinerary Doctor, NRTI, Lobeysa	Lecturer
5. Ms. Durga Devi Sharma	Naturalist, NRTI, Lobeysa	Lecturer (lady member)
6. Akey Dorji	Range Officer, BG-IFMP, Lobeysa	Forester
7. Ugyen Tshering	Trainee, NRTI, Lobeysa	Forester
8. Kesang Dorji	Trainee, NRTI, Lobeysa	Forester
9. K.B. Rai	OIC, Livestock Centre, Khotokha	Livestock extensionist
10. Ugyen Tshering	OIC, KFMU, Khotokha	Forester
11. Karma Dorji	Forest Guard, Khotokha	Forester
12. Phuntsho Namgyel	Forest Researcher, RNRRC, Yusipang	Team Co-ordinator
13. Dr. Uwe Kievelitz	GTZ Advisor	Technical backstopping