

EXECUTIVE SUMMARY

The following report presents the findings of social uses of forest areas in Nahi FMU survey conducted in villages of Nahi gewog, Wangdu-Phodrang Dzongkhag in April – May 2002. The survey was conducted as a part of the Bhutan-German Sustainable RNR Development Project (BG-SRDP /GTZ), forest function mapping “social use” for Nahi FMU. The objective of the study was to identify, locate and describe the social uses of forest products and areas; identify the management objective of the local population and produce a map that could help in identifying the forest areas that could be set aside for the future local use only.

Chapter one provides an introduction to the report, briefly outlining the background to the background of the study area, the objective and the hypothesis of the study.

Chapter two provides a detail account of the methodology used for the survey. Two questionnaires were used for the survey, stratified into village and household levels, in order to obtain information relating to the villages in detail. Other methodology tools used for the survey were village maps showing the general layout and key resource areas of the gewog, and which was drawn by the *Gup* Tandin ex-village headman/ *Gup* of Nahi Gewog; seasonal activity calendar has been drawn by villagers. The mappings of villages; socially used areas and Lhakhangs, tsamdrops and water sources have been done using GPS (4000 XL) on a point-wise location basis due to time constraint. Copies of the questionnaires, maps and calendars are attached at the end of the report.

Chapter three is divided into eight sections, presents a detail analysis of the findings of the survey. Section 3 describes the surveyed villages and the crop production of the gewog. From section 3.1 describes the various types of capital asserts of Nahi gewog; section 3.1.1 to section 3.1.2 describes and analyses the details of the Natural Capital of the village that includes sacred groves, tsamdrog, sokshing, NTFPs, timber, local water supply and finally the uses of chirpine forests. From section 3.2 to section 3.5 have the details of the human, social, physical and financial capital of the gewog that forms a part of their livelihood strategies. Section 6 has the detail analysis of the vulnerability factors that this gewog people have been coping with; and section 3.7 has the detail analysis of the Policy Institutions and Process (PIPs) that have great effect on all aspects of livelihoods of these villagers. Finally, section 3.8 has the detail analysis of the management objective of the villagers of Nahi gewog.

Chapter four has the detail analysis and discussion based on the hypothesis, “effects of Modernization in Nahi gewog”. This chapter is divided into four sections and represents the negative and positive impacts on the natural resources base due to change from subsistence to commercial use of forest resources; presence of relatively weaker social capital as compared to the traditional strong Bhutanese social network, leading to competition and unregulated or competitive use of these resources. The section also discusses on the hypothesis that the whether there is “too much or too little” of these resources for local people to share with the unintended beneficiaries. Section 4.2 has detail discussion based on the hypothesis, “impacts of operationalisation of FMU” and further discussion on the social, economic and ecological implications in the gewog. Lastly, section 4.4 brings out the strong discussion based on the hypothesis on “the diversification in livelihood Strategy” to lessen the pressure on the natural resource base and the negative and positive impacts on the livelihood of people of the gewog.

Chapter four presents conclusions based on the findings discussed above. Chapter five contains recommendations specific to the objective of the study, that is to provide information on social uses of the forest areas in Nahi FMU for the purpose of forest management planning. The recommendations pertain to Setting up of demonstration Plots; establishing complete inventory of NTFP species; explore the possibility of involving village community for the Protection of the Religious Places within the forest areas; incorporating Local Knowledge into Forest Management Planning; awareness building before FMU operationalization; forest areas to be set aside for local use only in future, place diversity high on the policy agenda.

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Bhutan-German Sustainable RNR Development Project (BG-SRDP/GTZ)

Proposed TOR for forest function mapping “social use” for Nahi FMU

Objective

To provide information on social uses of the forest areas in Nahi FMU for the purpose of forest management planning.

Specific tasks:

Based on the topographic map 1:50.000 (or, if available 1:25.000) the consultants shall identify, locate and describe the following social uses:

- Religious places within the forest area beside those already identified on the topo maps
- Areas used for shoksing (leaf litter collection)
- Areas under browsing rights (tsamdrog, tsamdo)
- Areas used for yak wintering
- Sources for local water supply (springs, irrigation channels, etc.)
- Forests used for local use (i.e. firewood, timber)

Furthermore, the consultants shall collect information on the present use of the chirpine areas and identify the management objective of the local population.

Output

The consultants shall

- prepare a map indicating all social uses within Nahi FMU in such a way, that it can be directly digitized by the GIS-Cell without further processing. This map shall contain a proposal, which forest areas should be set aside for local use only in future.
- Prepare a brief report describing all social uses of the forest area according to villages. This report shall include a proper estimate of the local wood demand (i.e. firewood, timber, shingleps, etc.) and of the NTFP collected by the local people.

The map shall be available latest 18th of February, the report by 28th of February.

Points for Discussion

- Specify “user” (within or without Nahi Geog)

CONTENTS

	Page Nos.
Acknowledgements	
Executive Summary	
Terms of Reference	
CHAPTER ONE	
INTRODUCTION	
1. Study Area: Nahi Gewog	1
1.1 Historical Background	2
1.2 Study Objectives	3
1.3 Hypothesis of the study	3
CHAPTER TWO	
METHODOLOGY	
2. Survey route and areas covered	6
2.1 Methods of targeting households for the survey and the interview format used	7
2.2 Questionnaire used for the survey	7
2.3 Constraints and Assumptions	8
CHAPTER THREE	
ANALYSIS OF FINDINGS	
3. Surveyed villages	10
3.1 Livelihood Assets of Nahi Valley	10
3.1.1 Natural Capital	11
3.1.1.1 Land	12
3.1.1.2 Land use types	12
3.1.1.3 Institutions as landowners	13
3.1.1.4 Community and Private Monasteries	14
3.1.1.5 The share cropping agreement	14
3.1.1.6 Traditional land use classes	15
3.1.1 (a) Sokshing	16
3.1.1 (b) Tsamdrog	17
3.1.2 (a) Fuel-wood	18
3.1.2 (b) Timber	21
3.1.2 (c) Sources for local water supply (springs, irrigation channels, etc.)	22
3.1.2 (d) NTFPs	24
3.1.2 (e) Present Use of the Chirpine areas	29
3.1.2 (f) Religious places within the forest area	30
3.2 Human Capital	31
3.3 Social Capital	31
3.4 Physical Capital	3
3.5 Financial Capital	32

3.6	External Factors that make villagers vulnerable	33	
3.7	Policies Institutions and Processes	36	
3.7.1	Important categories of institutions in Nahi valley include	36	
(a)	Gewog Yargye Tshogchung (GTY)	36	
(b)	Health Services	36	
(c)	Renewable Natural Resource Centre	37	
(d)	School	37	
(e)	Rural Water Supply Scheme (RWSS)	38	
(f)	Market	38	
(g)	Lhakhangs/ Monastries	38	
3.7.2	Villagers Perceptions of the Institutions	39	
3.8	The Management Objectives of Nahi Villagers	40	
CHAPTER FOUR			
DISCUSSION AND ANALYSIS			
4.	Effect of Modernization: From subsistence to commercial use of Forest products	41	
4.1	Modernization and Social Asset of Nahi gewog	42	
4.2	Too much or too little	43	
4.3	Impacts of Operationalisation of Forest Management Unit	43	
4.4	Diversification in Livelihood Strategy	45	
CHAPTER FIVE			
DISCUSSION AND ANALYSIS			
5.1	CONCLUSIONS	48	
CHAPTER SIX			
RECOMMENDATION			
6.1	Setting up demonstration Plots	50	
6.2	Establishing complete inventory of NTFP species	50	
6.3	Explore the possibility of involving village community for the Protection of the Religious Places within the forest areas	50	
6.4	Incorporating Local Knowledge into Forest Management Planning	50	
6.5	Awareness building before FMU operationalization	51	
6.6	Forest areas to be set aside for local use only in future	51	
6.7	Place diversity high on the policy agenda	52	
Appendix	I	Literature Reviewed	53
Appendix	II	Glossary of Bhutanese Terms	55
Appendix	III	Tables	56
Appendix	IV	Questionnaires used for the survey	70
Appendix	V	Mapping Exercises	79
Appendix	VI	Maps	83
Appendix	VII	Photographs	89

CHAPTER ONE

INTRODUCTION

The following chapter provides an introduction to the report, briefly outlining the background to the rationale for Social Uses of The Forest Areas in Nahi Forest Management Unit (FMU) by the villagers for the purpose of forest management planning. A brief introduction of the study area (Nahi gewog), objective, hypothesis and activities for the study areas are described. Although the natural heritage of Bhutan is still largely intact; but the conservation and sustainable utilization of the natural environment has become a part of the challenges in every sphere of modernization. There is already a mounting pressures on these resources for example, extraction rate for fuel wood, timber, woodlot, NTFPS and other forest products are already approaching unsustainable levels. The progressive removal of vegetative cover especially in the critical watershed areas will result in hydrological imbalance, leading to localized drying up of perennial streams and flash flooding. In some cases, this has been aggravated by poorly conceived new road construction and irrigation system. We need not look far beyond to see what the consequences can be when the associated risks are ignored.

1. Study Area: Nahi Gewog

Bhutan-German Sustainable RNR Development Project (GTZ) has selected Nahi geog as a pilot area. Nahi is one of the *gewogs*¹ under Wangdue-Phodrang Dzongkhag (District) Administration (Western Bhutan) with an area of about 65 square Kms with 162 households (*RNR Extension Diary 2002*) spread widely over the area. The gewog ranges from an altitude of 1200 meters at the easternmost corner to an altitude of 3600 meters in the west. The entire forest is Government owned and falls within the jurisdiction of the Divisional Forest Officer, Wangdue-Phodrang. A forest Range Officer is stationed at Wangdue-Phodrang directly in charge of the FMU (Forest Management Unit) and Foresters and Forest Guards assist him.

Rainfall averages 759 mm per year, most of which is, received during the months of June, July and August. Drought conditions prevail during the months of January to April. The FMU serves as the watershed for the river Hindey Rongchu, the main river going through the valley, and divides the valley into two halves and feeds a hydroelectric power station at Hitsho Thangkha. The soil is predominantly sandy loam and well drained in the lower elevation. In the middle slopes it is clay loam to clayey. The hardwood stands has lot of humus in the upper layer.

This steep valley has almost 91% of its area under forest cover. Forest is an integral part of the villagers' livelihood as it has been providing a wide range of environmental services, such as the supply of food and water, inputs for livestock, crop production activities and flood protection. Forest is one of the important sources of cash income. The most commonly collected forest products include mushroom, ferns, bamboo, wild asparagus, orchid etc. for self-consumption and for sale in market. The other forest products include walnut; champ, blue pine, chirpine, and

¹ Gewog: Block

oak used for construction purposes, firewood and farm implements. The forest is the principle source of energy for cooking and space heating for all households. About 12 different tree species have been identified by P.Namgyel (1996) that are commonly used as the firewood. Basic construction materials, tools, and other resources for the household and crop production purposes come from the forest. Thubten Sonam and Thrinang Wangdi (2001) in their analysis of the importance of forest to the villagers have rated forests as the 5th most important source of income for some households, while about 6 households rated it as the number one source of income another 10 households rated it as the second most important source of income. "The resource flows from the forests are critical especially in a subsistence farm to assure the smooth operation of the farming system". A comprehensive presentation of different uses and role of the forest in the valley's farming system by P.Namgyel (1996) has a wide range of forest products categorised into five different uses; as home use; food and nutrition, for farm use, medicine and for generating cash income. For example, about 11 different cash generating NTFPs have been identified among which included mushroom (about 22 species identified); asparagus, ferns, walnut and orchids (*Cymbidium hookerianum*) are considered as the most important by some of the households. He has identified wide range of NTFPs that is used by the households for consumption or for sale, and has even clearly specified the different utilities of the timber and other forest resources.

A Forest Management Unit was established in 1993, but still remains to be operationalised. The inventory of the Nahi FMU was completed in mid-1991 and the inventory shows that the volume of the growing stock over 10 cm DBH in the FMU as 2.01 million cubic metre of which 1.23 million cubic metres are in the accessible area of 5009.90 ha. The total conifer volume in the accessible forest area is 0.15 million cubic metres (12%) and that of hardwood 1.80 million cubic metres (88%). Different species of *Quercus* account for 40% of the volume, followed by miscellaneous broadleaved species 31%, in the accessible forest. The other main species found in the FMU are *Acer*, *Betula*, *Michelia* and *Rhododendron*. (*Management Plan for Nahi FMU, 1993-2002*).

The gewog consists of four main villages: Hebisa, Esawom, Esagom and Nabisa (divided into four chipon²) and about 94% of its settlements are found on the southwestern mountain slope of the valley (Appendix V, Page no.54). The geog ranges from an altitude of 1200 meters at the easternmost corner to an altitude of 3600 m in the west. This valley has recently been connected by a motorable road (11.85 Kms in length, GTZ Bhutan German Project) to the Wangdue-Tsirang and Thimphu highway that has started to play a vital role in the process of modernization of the gewog. However, there still remains a network of footpaths and mule tracks that link villages in the valley.

The villagers of Nahi gewog are of heterogeneous origin and status. The settlements are scattered deep into the valley and up the higher slopes.

1.1 Historical Background

Before the creation of Department of Forest in mid 1950s, the villagers of Nahi FMU had unlimited access to the forest for their timber and fuel wood requirement. Wangdue Forest Division was created in 1990 and the Management Plan for Nahi did not exist and the timbers marked for the villagers by DOF was purely on ad-hoc

² Chipon: A messenger runner nominated for a village who is the contact point between the village and Gup.

basis. Harvesting of timber on commercial line has been on limited scale within the FMU except for fuel wood for domestic consumption by the villagers. The demand is quite insignificant within the Unit but the impacts on the forest by the inhabitants who depend on the forest for fuel wood, timber and grazing is exemplified by the degraded nature of the forests around the settlements.

A detail study on the social uses of forest products/ produce and the management objective of the villagers of Nahi gewog are contextual issues in operationalising Forest Management Unit and for understanding natural regeneration of Nahi forest ecosystem for sustainable forest management planning.

In accordance with the above guidelines, the following report, which is based on an Ethno Botanical survey and the Livelihood Analysis Framework conducted in March-April 2002, aims to provide a comprehensive social use profile of the surveyed area of Nahi gewog.

1.2 Study Objectives

The overall objective of the study is, in a rural setting like Nahi gewog where the livelihood of the people are totally depended on the forests, it was felt necessary to provide information on social uses of the forest areas for the purpose of sustainable forest management planning.

Specific objectives:

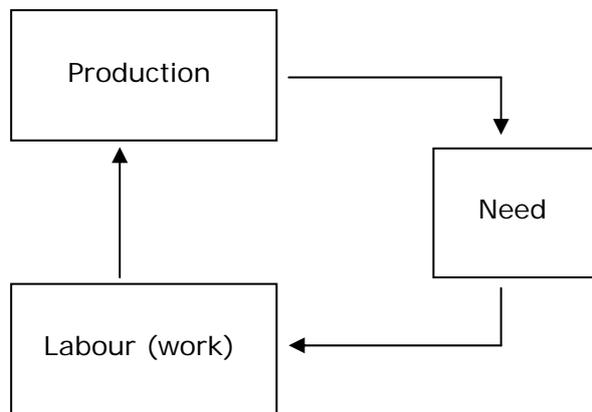
1. To document the social usage of forest areas by the local villagers.
2. To identify and locate forest area used by the villagers for the following purposes:
 - The important religious places (abode of God) within the forest area.
 - Areas and the pattern of shoksing (leaf litter collection) by different households/ hamlets.
 - Areas used for grazing their animals (tsamdrog), registered or, non-registered.
 - Areas, purposes and seasonality of NTFP collection.
 - Sources for local water supply (springs, irrigation channels, etc.).
 - Particular areas in the forests used for firewood collection, timber and for other purposes on permit and non-permit basis.
 - The present use of the chir pine forests/areas
 - Management objective of the villagers
3. To assess the sustainability of the present use pattern.
4. To propose management prescriptions for the future forest management planning with context to the impacts of modernisation.

1.3 Hypothesis

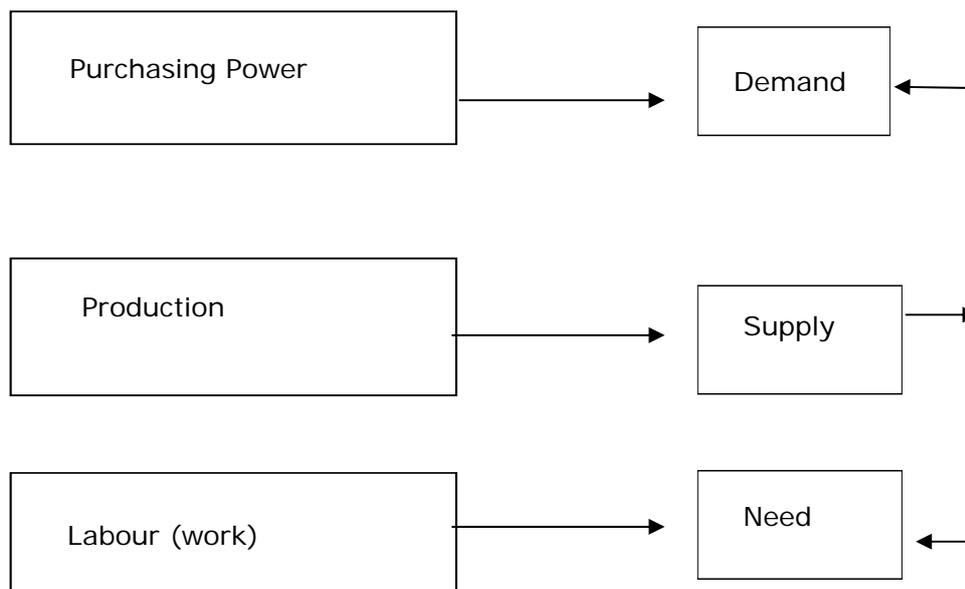
1. Modernisation has lead to both negative and positive impacts on traditional forest use pattern.

- a) Modernization is altering the sustainable and subsistent utilization of forest resources into harvesting for income generation. Increased commercialization leads to depletion that may lead to excessive deforestation.
- b) From subsistence farming to market economy, farmers increasing the use of fertilizers in the near future would result in the loss of productivity of land due to soil degradation ultimately resulting in lower yields. The continued loss of soil fertility, combined with the increase in population poses the threat of insufficient food, fiber, fuel-wood supplies in the future. More intensive cultivation, higher yielding crop varieties may ultimately substitute for losses in soil fertility and shortages of arable land.

b(i) Subsistence Economy:



(ii) Market Economy:



- c) Further market integration will put additional stress on the forest resources because external factors such as consumer demand will control the supply pattern of these products.
- 2. Infrastructure development is leading to both positive and negative impacts.
 - a) Economic benefits to the villagers such as better civic amenities facilities, good exposure to the outside world, exposure to diversified pattern of livelihood, better standard of living, improvement in the quality of life etc.
- 3. The productivity, sustainability and equitable resource access of the selected traditional forest usages are declining in the wake of modernization.

CHAPTER TWO

METHODOLOGY

The following chapter gives a detailed account of the methodology used for this report. The survey route is described and areas covered identified. This is followed by an account of how target households were selected and the format of the interviews. Methodology tools, specifically the questionnaires designed for the survey, geog map and sustainable livelihood framework are discussed in detail and the constraints encountered are outlined.

2. Survey route and areas covered

The survey was conducted in Nahi village, with assistance from Mr. Ambar Bahadur Ghalay, the agriculture extension agent (AEA). Between late March and Early April, 2002, a total of 53 households in Eusawom (Hali and Nahi) Eusagom (Lhamchen, Eusakha, Hamchi, Tashitshowa and Jongte), Nabesa (Gangkha, Ganguru, Lhakangchen) Hebisa (Tshokhothang, Chugeylo, Temo, Goaina and Rue-sha-ne) and Tongshithangkha, were interviewed.

Over this period, the survey team was able to conduct survey in 5 different villages. Table 2 shows the households surveyed; the villages in which they are located; the total number of households in each villages, and the number of households surveyed in each villages.

Table 2. Details of households surveyed in the 5 villages

SL No.	Village Name	Total no. of households	No. of Households surveyed	Total no. of houses surveyed
1.	Eusawom	21	1	9
	Hali		7	
	Nahi		1	
2.	Eusagom	26	7	14
	Lhamchen		3	
	Eusakha		1	
	Hamchi		1	
	Tashitshowa		1	
3.	Nabesa	26	4	10
	Gangkha		3	
	Ganguru		2	
	Lhakangchen		1	
4.	Hebisa	17	4	14
	Tshokhothang		6	
	Chugeylo		1	
	Temo		1	
	Goaina		1	
5.	Rue-sha-ne	6	1	6
	Tongshithangkha		6	
TOTAL		96		53

2.1 Methods of targeting households for the survey and the interview format used

In the above villages surveyed, the maximum possible numbers of houses surveyed, the number being depended on how many houses could be covered till the evening exclusive of the time taken to trek back to the campsite. Suitable households to be surveyed were selected on the basis of the ability and willingness of household members to communicate and articulate their views. Since the survey was on the social uses of forest the head of the family (the main decision maker either male or female) were interviewed. Some of informal interviews were also conducted with the other members of the families to clarify the names of the forest areas, to find out the villagers' management objectives plus to crosscheck on the informations provided by those interviewed.

To enter villages to conduct interviews that required time of the villagers was made easier and approachable for the team by the AEA who has been working in the valley for 4 yrs; and the recently appointed AHEA also accompanied the team. The *Gup* (village headman) was on a tour to Phuentsholing during the survey period. In addition to the questionnaires, seasonal activity calendars (both farming and forests resources used) and historical time line were drawn up in consultation with the elderly villagers and *Gup dep* (ex village headman) respectively. The methodology used for these exercises, in addition to a description of the questionnaires is described in the following sections.

The second trip to the field was to collect the GPS data of the forest areas used by the villagers. The areas covered to collect the data are tsamdrol, lhakhangs, villages, sources of water supply etc. To cover these areas *Gup dep Tandin* (Ex village headman) helped the team with his hand drawn map of these areas. The team managed to covered the mentioned areas especially tsamdrol, sources of water supply and lhakhangs with the help of the hand drawn map.

2.2 Questionnaire used for the survey

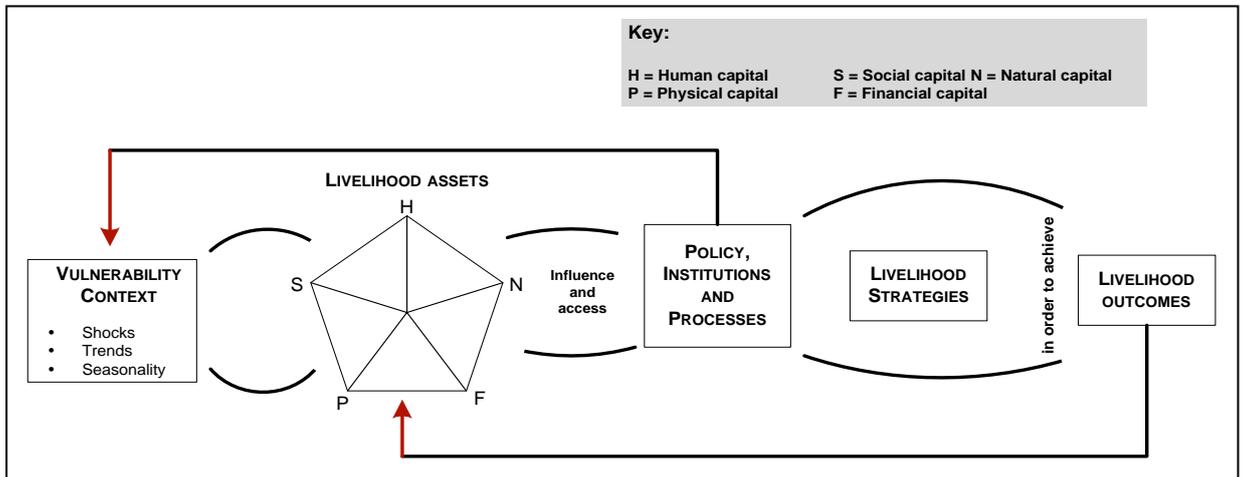
Prior to conducting the survey, the enumerators were trained in the use of the questionnaires so to elicit the maximum amount of information. Two questionnaires were used for the survey; one is the household level; ethno-botanical questionnaire and the other the village-level; livelihood analysis questionnaire, used as checklists and to understand the livelihood strategies of the villagers.

Ethno-botanical questionnaire, to obtain both the qualitative and quantitative data was used as a household level questionnaire to understand detailed social use of forests areas. Areas covered in the questionnaire included the size and the composition of households; the total number of people involved in the collection of fuel wood the total back loads collected per season, the distance from where it is collected; distance of household from the drinking water supply source, types of sources, alternative sources, irrigation system, the alternate way of watering their fields; use and areas from where NTFPs are collected; tsamdrol and the alternate areas or the system followed, sokshing practices and the areas from where it is collected; uses of chirpine forests.

Rationale for using the Sustainable Livelihood Analysis Framework:

The SL Framework was used to get better insight into the access that these villagers have to natural assets and the role that these assets play in their livelihood strategies and outcomes including their expectation and diversification due to

opening up of new Nahi road. The questionnaire was also used to enhance understanding of the role policies, institutions and processes play in determining access to natural assets, levels of vulnerability, and the types of livelihood strategies that are adopted by the villagers. The checklist also covered the external factors that make villagers vulnerable such as trend, shocks and seasonality. Sustainable Livelihood Framework is presented below:



The Framework has been used as a checklist as follows:

- Important issues/factors that affect the livelihoods of the villagers/ rural people such as the influences considered under the headings of 'vulnerability context', 'livelihood assets' and 'policies, institutions and process'.
- The relationships between these different factors and how they in turn might affect each other.
- To better understand and make sense of the complex reality of these peoples' livelihoods and their dependency on the forest.
- A focus for inter-disciplinary and multi-sector analysis of the causes of the present changing scenario (from barter to monetised economy) and of means whereby these people may want to improve upon or diversify their livelihoods strategies.
- A strategic recommendation could be developed for the sustainable development management plans for the future development activities in the gewog.

(Samples of the mentioned questionnaires are attached in Appendix I and II, page no. 53 at the end of the report)

2.3 Constraints and Assumptions

The collection of figures viz., exact distance of the areas for social uses are based on the general estimation, the exact pronunciation and the spellings of the name of the local areas are based on what was told by the villagers. However, the respondents in general were very friendly and open and provided information required for the survey. The maps have been produced to indicate all social uses within Nahi FMU that can be directly digitized by the GIS-Cell without further processing.

The mappings of villages, socially used areas have been done using GPS (4000 XL) on a point-wise location basis due to time constraint. It was impossible to collect the

CHAPTER THREE

ANALYSIS OF FINDINGS

This chapter represents the findings of the survey, which are discussed and analyzed on the basis of Sustainable Livelihood Framework in the following sections.

3. Surveyed villages

Villages in the surveyed areas are generally small, consisting of cluster of houses, separated from each other on the steep mountain areas.

The crop production is the principal activity of the households in the valley. The cereal crops grown in association are paddy, wheat, barley, mustard, maize and some buckwheat cultivated in the wetland and dry land. As the staple food crop, paddy is the main summer wetland crop grown by all the households in the valley.

The estimated annual production (Table 3) of five major crops cultivated in the valley based on the information collected during RNR Census 2001 (83 households were covered) indicate the yield to be much lower than the average yield obtained from one acre or hectare. For example, the annual yield of paddy and wheat, the two most important cereal crops in the valley 18.20 tons and wheat 2.2 tons respectively are much below the average yield.

Table 3 Annual production of five different crops

Crops	Quantity	Land Type	Season
Paddy	18.20 tonnes	Wetland	Summer-Autumn
Wheat	2.2 tonnes	Wetland / Dryland	Winter-Spring
Barley	1.6 tonnes	Wetland/Dryland	Spring-summer Autumn-winter
Mustard	9.66 quintal	Wetland	Winter –spring
Maize	3.36 quintal	Dryland	Spring-summer

Source: RNR Census 2001

3.1 Livelihood Assets of Nahi Valley

The livelihoods strategies of Nahi villagers are depended upon the following assets:

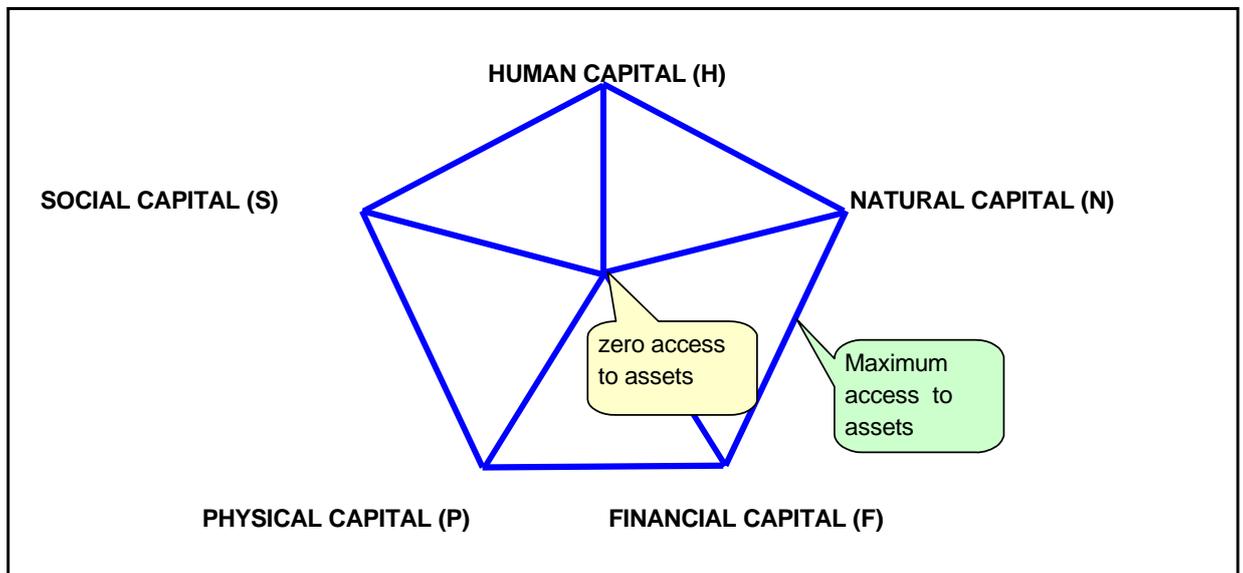
1. Natural capital
2. Human capital
3. Social capital
4. Physical capital
5. Financial capital

Some combination of these assets is required by people to achieve positive livelihood outcomes; that is, to improve their quality of life significantly on a sustainable basis. No single category of assets on its own is sufficient to achieve this, but all assets may not be required in equal measure.

It is important to note that a single asset can generate multiple benefits. For example, if someone has secure access to land (natural capital) they may also be able to get better access to financial capital, as they can use the land both for productive uses and as security for a loan.

The asset pentagon provides us with a visual representation of information about people's assets. It brings to life important inter-relationships between the various assets.

The asset pentagon is reproduced below.



Source: DFID. This diagram is representative and open to interpretation: there is no common scale for measuring the level of access.

3.1.1 Natural Capital

Natural capital is very important to the villagers of Nahi gewog as they derive all or part of their livelihoods from resource-based activities (land for farming, food, income from sale of NTFPs, collection of woodlot for cattle bedding and manure, timber, fuel-wood, water (for domestic and irrigation). However, it has been noticed that the importance goes way beyond this such as good health status (human capital) of the villagers due to clean air quality and lesser epidemic cases observed in the past.

The Bhutan Forest Act of 1969 defines forests as any land under forests, to which no person has acquired a permanent, heritable and transferable right of use and occupancy. All such areas are considered as Government Reserved Forests and the entire Nahi FMU falls within this category of reserved forests, except for the most part of the lands classified as cultivations that are private. The Government has the right to acquire these lands, if it is deemed necessary for the national benefit.

As per the Bhutan Forest Act of 1969 and National Forest Policy of 1974, the local inhabitants have the rights and privileges with regard to the use of forest.

The Forest Act permits grazing, collection of fuel wood, fodder and collection of woodlot for domestic use, either free or on payment of royalty. Fuel wood collection is permitted from only dead and fallen trees. Timber trees are issued for bona-fide domestic use, after a Forest Officer has marked them and royalty has been paid. Hunting is totally prohibited within the forest (*Management Plan for Nahi FMU, 1993-2002*).

The Natural Capital in Nahi gewog includes the social uses of forest areas as follows:

1 Land:

Traditional land use classes:

- a) Sokshing and
- b) Tsamdrog

2. Forest Produce/ Products:

- a) Firewood
- b) Timber
- c) Sources for local water supply (springs, irrigation channels, etc.).
- d) NTFP collection
- e) Chirpine forests/areas
- f) Religious places within the forest area

3.1.1.1 Land

There is a wide variation in the resources that make up natural capital, from intangible public goods such as the atmosphere and biodiversity to divisible assets used directly for production (trees, land, etc.). The quality of the land affects type of crop, yield, etc. and by implication the type of livelihood that can be sustained.

3.1.1.2 Land use types

Bhutanese people over the centuries have optimized land use for agricultural purposes. The agro-pastoral system strongly dependent on the forest is prevalent in the geog. Five different land use types were identified (Table 3.1.1.2) in the valley with wetland as the most dominant land use type that covers about (70%) followed by dry land (17%), kitchen garden (6%), *Pangzhing*⁴ (4%) and orchard (4%). The winter wetland crops include wheat, barley, and mustard, some buckwheat in the autumn cultivated by a few households. In the dry land mostly maize, barley, wheat and some buckwheat are cultivated.

Table 3.1.1.2 (i) Land use types in langdos³ in the geog

Land use (Langdos)	Hebisa	Eusawom	Eusagom	Nabisa	Total Langdos	% of cover-age
Wetland	143.3	100	136.63	136.5	516.43	70
Dryland	38	20.5	16.5	50.8	125.8	17
Pangzhing	13.5	8	6.5	3.6	31.6	4
Kitchen garden	12.9	6	10.05	13.85	42.8	6
Orchard	8.4	2.01	1.14	8.4	19.95	3
Total	216.1	136.51	170.82	213.15	736.58	100

Source: RNR Census 2001

³ Langdos: Certain land that is normally oxen-ploughed in one morning.
(1 langdo (on dry land): approximately a third of an acre=1350m². 1 langdo (wet land): approximately a quarter of an acre=1012m²)

⁴ Pangzhing: Land use similar to shifting cultivation, with very scanty tree cover and short-fallow rotation

The land area of the NFMU is estimated at 7654 ha, with the following major land use types (Dhittal 1993).

Table 3.1.1.2. (ii) Area of different Land uses

Land Use type	Area (ha)	Percentage (%)
Fir with other conifer	307.68	3.90
Hardwood forest	297.75	3.90
Hardwood with other conifer forest	1142.03	14.90
Other hardwood with oak forest	1702.92	22.30
Hemlock forest	91.06	1.20
Hemlock with other conifer forest	291.13	3.80
Juniper with hardwood forest	165.82	2.20
Blue pine forest	157.96	2.10
Blue pine with hardwood forest	700.65	9.20
Chir pine forest	813.14	10.60
Chir pine with hardwood forest	46.72	0.60
Oak with hardwood forest	958.56	12.50
Blanks	80.83	1.10
Cultivation (permanent)	582.05	7.60
Cultivation (shifting)	6.19	0.10
Grasses	20.02	0.30
Scrubs	236.62	3.10
Rocky areas	43.75	0.60
Total	7644.94	100.00

Source: RRA Study on the NTFPs in Nahi gewog (*Bhutan German Integrated Forest Management Project*); Phuntsho Namgyel, 1996.

3.1.1.3 Institutions as landowners

Besides private landowners, monasteries or Lhakhangs possess land in Nahi valley. The possession of land by different monastic bodies not residing in the area is due to the fact that during the reigns of the first and second kings the expected contributions of the ordinary people in taxes, goods and labour were very high and exceeded the resources of the people. Families who did not have a sufficient labour force very often could not deliver the expected contributions and surrendered their land to a monastery that they felt could protect and care for them. In this case the whole family 'belonged' to the monastery, was fed, received cloth and worked for the monastery. During the severe epidemic in the past the villagers from the valley tried to flee from the village surrendering their land to the monasteries whose monks were supposed to stay. These facts explain to some extent the fact that the monastic land is scattered throughout the whole area. The total agricultural land owned by the monastic bodies crop share today, seldom by the descendants of the former owners. These monastic institutions are represented in Nahi valley by different temples. One can distinguish three categories of temples:

3.1.1.4 Community and Private Monasteries

The owners of these community and private monasteries normally possess a lot of land that they offer for share cropping as well. The private temples are highly respected by the community.

The following table shows the landownership of institutions and the acreage with the number of sharecroppers per temple.

Today no wetlands are left fallow by the institutions owning land.

As can be seen in the table 3.1.1.4, most of the sharecroppers are living in Hebesa, Nabesa and Eusagong.

Table 3.1.1.4 Wetlands owned by various institutions in Nahi valley ⁴

SL No	Institutions	Acreage	Number of sharecroppers	Location
1	Khuju Lakhang	2.10	3	Hebesa
2	Pangso Lakhang	1.26	2	Hebesa
3	Lamisey Lakhang	?	?	Hali, Hebesa, Eusagongwog
4	Dongkala Lakhang in Paro	0.76	2	Hebesa
5	Jabchu Karmo (Nunnery in Punakha)	5.01	3	Hebesa
6	Wangdue Rabdey	8.65	8	Hebesa, Nabesa, Eusagongwog
7	Tashigang Lakhang	10.20	17	Hebesa, Nabesa, Eusagongwog
8	Talogoenpa at Punakha	2.00	2	Hebesa
Total		29.98	38	

Note: The above figures on cultivated land holdings of institutions reflect on those that are in the headman's records. ? indicates that the registration figures are not with the headman.

Source: Resource management by rural households in Nahi Gewog, PN 92.2267- 01.100, Marlene Richter

3.1.1.5 The share cropping agreement

The normal sharecropper in Nahi valley owns land less than 2 langdos, which is not sufficient to feed the family. Sharecropping is mainly done on wetlands. In most cases, a representative of the landowner or a representative of the institution makes a verbal but firm agreement with the sharecropper, in which the sharecropper's duties are fixed. The rent for wetlands depends mainly on the size and location of the field and is independent of the yield.

⁴ Source: Village headman of Nahi valley.

Rent for share cropped land

1 langdo of a central piece of land: 80 dre ⁵ paddy
1 langdo of an intermediate piece of land: 60 dre paddy
1 langdo of a piece of land on the rim: 50 dre paddy

The sharecropper is responsible for the plot and maintains the irrigation channel. The sharecropper does not pay a land tax to the headman nor does the government monasteries.

After harvest the sharecropper has to transport the share of the landowner to a collection point. A collector appointed from the managing monastery comes to collect the paddy. If the sharecropper has a 50:50 arrangement the division of the harvest is done in the field in the presence of the collector. He then brings the paddy to the milling machine for decortications and carries back only the rice. The landowner is responsible for the transport of his share to the monastery. If the sharecropper has to give a fixed amount of rice and is not able to pay his share because the harvest has not been good, his payment will be postponed until next year. However lagging behind in his payment, the farmer has to pay 3 dre interest for every 20 dre he owes to the landowner. In case the debts are piled up, the sharecropper has to pay his debt through labour contributing. Every sharecropper can terminate his contract after the harvest and look for better opportunities. He has to inform the landowner or the collector, if he does so. Every sharecropper was aware of the recent initiative of the Government to convince the monasteries to legally transfer share cropped land to the sharecroppers, but the monasteries in Nahi valley did not take up this initiative (*Bhutan-German Integrated Forest Management Project Thimphu, PN 92.2267-01.100, Marlene Richter*).

When looking at the Table 3.1.1.4 one has to keep in mind that, in reality the acreage might be greater than the registered amount because the former used chain measurement that is not as exact as the modern measurement methods used nowadays.

In summary, it can be stated that there are no landless families in Nahi valley, although they are not always in possession of enough of their own land or share cropped land to be self-sufficient. Referring to the high number of sharecroppers (more than 38) the availability of land for small farmers is still a crucial problem. Owing to the topography of the valley the prospects increasing cultivable land and consequently increasing the agricultural production are very limited. However, some land is not under cultivation because of irrigation problems. The actual landownership system in the Nahi valley seems to be quite complicated, because important landowners (about 20% of the wetlands) are institutions that are not residing in Nahi valley. Concerning the land use planning, this fact needs to be taken into consideration.

3.1.1.6 Traditional land use classes

These land use classes, which have not changed significantly, taken into account the agro-climate, land capability and the socio-cultural aspects of Bhutanese society. Thus system of land use is not dictated simply by the subsistence needs of

⁵ Dre: A standard dre (2 litres) contains 2 kg of dry sunflower seed or 2.4 kg of mustard seed

isolated communities but by a sophisticated ecological response to a risk-prone microclimate environment (*The Middle Path*: NEC, RGoB).

3.1.1 (a) Sokshing

A traditional system of using natural resources sustainably. The villagers use woodlot collected or the sokshing as bedding for cattle in their sheds, and the combination of decomposed litter and manure (farmyard manure) is applied to the field so as to improve soil fertility. This practice has been a lifeline for Bhutanese farmers as, generation after generation; farms have been kept their lands fertile through *sokshing* management. Although modern chemicals are now being used in limited quantities, the compost/leaf-litter from *sokshing* is still applied widely in the valley. The villagers of Nahi preferred Oak lanata than chirpine (Pinus roxburghii) needles because chirpine needles are brittle and not good for animal bedding and for decomposition as compared to the previous one.

The valley has been traditionally practicing Agro-Pastoral system and thus livestock is an important component of the valley's farming system. Most commonly found animals are cattle, horses, pigs and poultry mostly dominated by the local breed. The total number of cattle in 53 households surveyed is 317 and the Mean is 6 numbers of cattle. Out of the 53 households 45 households have been presently practicing sokshing and the rest 8 houses are using hay for animal bedding. The areas listed below in the table 3.1.1 (a) are used by 42 households are the registered areas of particular house(s) or, shared by certain number of households in the village. This signifies that every household in the valley is practicing sokshing as well as for manuring their farmlands. According to the Land Act of Bhutan, 1980; regarding use and ownership of all lands owned and utilized by a household – cultivable land as well as grazing land (tsamdrol) and sokshing – must be registered in the main thram (plot) held by the government. The Tram records are then verified during the cadastral surveys carried out from time to time. The following table has the name of the forest areas used by the villagers of five villages surveyed for the study.

Table 3.1.1(a) Name of Forest Areas Used for Sokshing by the villagers

Eusagom	Eusawom	Nabesa	Hebisa	Tongsithangkha
Lhamjagang Jinkha Jashina Eusagom Nimjab Jankha Lakiluma	Chachupha Shargang Tshokilo Jachhu Sisithangma Tshokha Baliho Thangsi Hali	Gangkhar Cheopang Hemisho Kotalumba Eowa Donkawa Dogona Lungana Kachhukha	Pangsumchey Chhagothangka Ashithang Jayethang Gangtokha	Thangom Geshigna Sisima Kotalumba Lajjayegkhagang Sepjikha Dopalumtalu Pangsapechhulum Laeothama Dopalam

Source: Survey on social use of forest area in Nahi FMU, April 2002

3.1.1 (b) Tsamdrog

There is approximately 1500 ha of registered tsamdrops within the Nahi FMU. These tsamdrops are either individually or community owned. Tsamdrops are government lands leased annually to herdsman or communities at Nu.100/- per tsamdrog per year. By tradition tsamdrops are always leased to the same lessee and renewal of lease is done annually. The cattle graze in the tsamdrog during the day and are brought back to their farms in the evening. Most of the farmers from the lower valley practice stall-feeding; the livestock are fed with tree fodder, grasses and hay. But collection of fodder from the forest is low. The Bhutan Forest Act of 1969 gives authority to the Department of Forest (DOF), to regulate and restrict grazing anywhere in the country, in order to prevent environmental damage (*Management Plan for Nahi FMU, 1993-2002*). These registered tsamdrog cannot be let out to others except under certain understanding between the households. Once tsamdrog has been registered under the individual household's name then the others cannot graze their cattle belonging to others under the pretext that they belong to the individual. The total areas for tsamdrog in the upper valley, Eusagom and Nabesa villages have about 333 acres and 300 acres by the lower valley Eusawom/ Hali (*Nahi Baseline Survey, BG/SRDP/GTZ; November, 2001; NRTI, Thumbten Sonam and Thringnam Wangdue*).

In reality the system of Tsamdrog and ownership in the valley seems to be more complex because the names provided by the respondents from the same village have provided different names for Tsamdrog as shown in the table 3.1.1 (b) below.

When respondents were enquired about the present status of the tsamdrog areas, out of the total 53 households surveyed, 43 households said that there are enough grasses for everyone's cattle in the mentioned areas.

Table 3.1.1(b) Name of the Forest Areas used for Tsamdrog by the villagers

Eusagom	Eusawom	Nabesa	Hebisa	Tongsithangkh-a
Usual areas:	Usual areas:	Usual areas:	Usual areas:	Usual areas:
Rashi Olakhaluma Lakiluma Tshokoma/ luma Rahilum chhorten Chasilumchhu	Tagoding Tawading Tagochhen Taoji Amchanka Tshokha	Nambipochh-e Lamigora Doma Bachhaluma Panche Nabiluma Chazampa Lunche-kate-m Tashichawa	Omshithangka Thujithang Khujila Lumana Masegang Chhagothang Thaledo Tshosawa Pangsengchen Tardophatta Gangmabu Yarchhet Chhorchhet Jamegu Dohotogang	Lamigora Tongajap Pangsho Omshi Jichurobji Tawapang Dangna Tshemo Hindirila
Alternate areas:	Alternate areas:	Alternate areas:		Alternate areas:
Hamchiphakha Romchuphakh-a Chhortengang Luchho	Chhortensa -wa Tshokilo	Chejena		Nabipangchen

Source: Survey on social use of forest area in Nahi FMU, April 2002

3.1.2 (a) Fuel-wood

Fuel wood is the sole source of energy for cooking in the valley. The collection of fuel wood is mainly the activity of both male and female members of the house depending upon whosoever is free from the daily farm and livestock activities. The fuel wood is collected in bulk in two seasons, for summer and winter; 2nd & 3rd month for summer stock and 8th & 9th month for winter stock based on the Bhutanese calendar. Access to fuel wood supply is easy in most of the villagers surveyed, with collection of dry wood being totally unrestricted. Households organize groups for cutting (men) and collecting (men & women). Some households also employ outside labour for this task. Regulations are enforced in the valley, as permits have to be obtained to fell trees and the trees have to be selected and marked by forestry staff prior to felling. Fuel wood used for cooking, preparation of animal feed and brewing local spirit is collected usually from the forest tracts or by lopping branches from trees on the tracts or on the private land and collecting driftwood from the nearby streams. Use of agricultural residues for fuel is also practiced by some of the households. Table 3.1.2 (a) i, has the list of tree species generally used for fuel wood in the villages and the table 3.1.2 (a) ii below has the village wise list of the areas from where fuel wood is collected.

Table 3.1.2 (a) i List of tree species used for fuel wood by the villagers

SL No	Local Name	Botanical Name
1	Etho metho	Rhododendron
2	Changshing	Albizia julibrissin
3	Goom shing	Quercus lanata
4	Jangta	Swida oblonga
5	Kamshing	Prunus cerasoides
6	Kashisang shing	Aeer oblongum
7	Phaytse	Bethamedia capitata
8	Sisi shing	Quercus griffithii
9	Taptoo	Desmodium motorium
10	Thom	Quercus glauca
11	Tongphu	Pinus roxburgii and Pinus Wallichinia
12	Zhentu	Lyonia ovulifolia

Source: RRA Study on the NTFPs in Nahi gewog (*Bhutan German Integrated Forest Management Project*); Phuntsho Namgyel, 1996.

The average annual fuel wood supply to the villagers for their bonafide use is 6151 m³ and is supplied both as truckload and headload. The Nahi FMU also provides fuel wood for bonafide local users, and the usual rate applicable to the rural users i.e., Nu⁶. 5/- for softwood and Nu.30/- for hardwood. The average DBH of trees issued, is about 35 to 40 cm and the number of trees ranges from 50 to 100 per applicant (*Management Plan for Nahi FMU, 1993-2002*). The villagers collect fuel wood from the nearby forests free of charge. The table 3.1.2 (a) ii, has the village wise lists of areas from where they have been collecting fuel wood free of charge.

⁶ Nu. (Gnultrum): Bhutanese currency; Nu.1/- = IC Re.1/-

Table 3.1.2 (a) ii Names of the forest areas for Fuel-wood Collection

Eusagom	Eusawom	Nabesa	Hebisa	Tongshithangkha
Gangu	Hali	Cheopang	Jashina	Baagang
Lekopankha	Laptadra	Domchhuga	Taptu	Gangtogo
	Laptakha	Tongchhugoma		
	Sisthang	Kuchigoma		
		Minchhulum		

Source: Survey on social use of forest area in Nahi FMU, April 2002, Nirvana Pradhan

P.Namgyel (1996) has ranked fuel-wood as the most important NTFP based on the number of hours the fire is burnt at home from cooking meals, frying zaw (local puffed rice) to brewing ara (local spirit); a common household activity. He has calculated that on a normal day, there is an eleven-hour-round fire. On special occasions (religious ceremonies, social functions and heavy work days) the fire hour could go up to 14 hours. To cope up with such work demands, a second kitchen is normally maintained outside. A little disarray in fuel-wood inventory at the household level could throw the houses out of the normal gear. Table 3.1.2. (a) iii below has the details of fire hour.

Table 3.1.2.(a) iii Details of Fire Hour

Start Time	End Time	Total hours	Activity	Remarks
04 a.m.	10 a.m.	6	Tea, meals, ara brewing, hot water, cattle and pig feed, butter & cheese making. Prepare packed lunch/ food for men & children	Get up at 04 a.m. and fire in the oven keeps burning till 10 a.m. One of the busiest hours of the day.
10 a.m.	01 p.m.	3	Rest	No fire in the oven
01 p.m.	03 p.m.	2	Tea, Snacks, cattle & pig feed.	Fire is lit again
03 p.m.	05 p.m.	2	Rest	No fire in the oven
05 p.m.	08 p.m.	3	Tea, meals, ara, cattle & pig feed.	Second busiest hours of the day. Milking & putting cattle to shed.
08 p.m.	04 a.m.	8	Night sleep	Retire to bed early.
T O T A L		24 hrs. Fire: 11 hours	Fire remains burning for 11 hours.	

Source: RRA Study on the NTFPs in Nahi gewog (Bhutan German Integrated Forest Management Project); Phuntsho Namgyel, 1996.

As seen in the above table 3.1.2. (a) iii: average fuel wood consumption per household appears to be greater in the households where there are greater number of livestock and secondly, the consumption pattern seem to vary according to the farm activities and seasons. Fuelwood consumption throughout the gewog is generally grater during the colder months from October till around March, with lesser wood being consumed during the warmer months from April to September.

A back load of fuel is equivalent to 35 to 40 kgs in weight; therefore, the average is 37.50 kgs. The table 3.1.2 (a) iv has the calculation of fuel wood consumption of the 5 villages (53 households) surveyed and the total number of days ie, 120 days per year is calculated on the basis of estimate provided by the villagers interviewed.

Table 3.1.2 (a) iv The fuel wood consumption pattern as on 1st April, 2002

Particulars	Total	Average per house
Total population of the 53 households surveyed	316	5.96
Total no. of villagers collecting fuel-wood from 53 household in 1 day	176	3.32
Total no. of times/ back loads 176 villagers collecting fuel wood in 1 day	365	2.07
Total no. of days villagers collecting fuel wood in 2 seasons* is 120 days		
Total back loads of fuel wood in 1 year	13,165.20	248.40
Total kgs of fuel wood in 1 year; 1 back load equivalent to average 37.50 kgs	4,93,582.50	9,315.00

Source: Survey on social use of forest area in Nahi FMU, April 2002, Nirvana Pradhan

*Firewood requirement in 2 seasons (2nd –3rd for summer stock & 8th –9th, Bhutanese months for winter stock)

The Fuel wood consumption in the above table is calculated as follows:

Mean household size of 53 households surveyed is 5.96, the Mean of the villagers involved in the activity of fuel wood collection is 3.32 and the Mean back load per day is 2.07. The total Fuel wood collection days (actual) in the whole year (summer and winter stock collection clubbed together) is 120 days. Therefore, the total consumption of fuel wood in a year by 53 households is 13,165.20 back loads and an individual household's consumption per year is 248.40 back loads. The fuel wood species commonly consumed as was told by the villagers are Tongphu (Blue

pine or Chir pine). Hardwood (oak and rhododendron) are difficult to obtain in appreciable quantity.

3.1.2 (b) Timber

The villagers of Nahi FMU obtain their timber requirement from the nearby forests by obtaining permits for harvesting of timber issued by DFO, on payment of the prescribed rural rate per tree ie. rate for logs for house construction is NU.12.08/- per cft.

The villagers of Nahi gewog are totally dependent on the supply of timber for the following uses:

- a. House construction materials; beams, planks, rafters etc.,
- b. Shingles: roofing materials
- c. Fencing material: home gardens and fields
- d. Farm implements: ploughs and other farm tool handles
- e. Poles for prayer flags etc.

House construction and roofing materials are the most important need of the villagers but the requirement pattern differs from house to house. The requirement of timber is depended upon the repair time or new construction time; even for the prayer flagpoles the demand is totally depended on the occasion. But, as for the farm implements and Bamboo for its wide uses from fencing material to thatching for houses is met from the nearby forests for free of charge.

The supply of timber within Nahi FMU is quite small and the share by percentage of the timber supplied from the Nahi FMU compared to the total supply of the Wangdue-Phodrang Dzongkhag is only 4% (*Management Plan for Nahi FMU, 1993-2002*).

Their direct dependency includes as mentioned earlier, the extraction of various commodities such as timber for construction, shingles (roofing material), fuel wood, animal feed and fodder as well as food. The three types of houses in Nahi (*RRA Nahi baseline survey 2001*); the baago (bamboo hut), dackcha zhigom (mixture of mud, bamboo, stones and some timber) and the typical stone or mud walled houses built with large amount of timber. The third type of house that is typical Bhutanese house is the most common house found in the valley reflects using a large amount of timber. The same study shows that about 68 houses are recorded in the third category and about 25 in the other two categories respectively. The following tables (table 3.1. 2 (b) i and table 3.1.2 (b) ii) has the list of tree species used for roofing materials and farm use species used by the villagers.

Table 3.1. 2 (b) i Roofing material species used by the villagers

SL No	Local Name	Botanical Name	Remarks
1	Ba shing	Tsuga dumosa	Very important
2	Dung shing	Abies densa	Very important
3	She shing	Picea spinulosa	Very important
4	Sisi shing	Quercus griffithii	Very important but not a common roofing material, lasts lifetime.
5	Sokey	Castanopsis hystrix	Important and is a common roofing material lasts 5 to 6 yrs, but difficult to get straight grain trees.
6	Thaedok	Pinus roxburghii	Less important because problem with pin borers and sometimes had to use it if no other species is available in time of use.
7	Thindok	Pinus wallichinia	Important and also a common roofing material lasts for 3 to 4 yrs and very easy to split.
8	Tsenden	Cupressus corneyana	Very important but expensive and rare lasts lifetime.

Source: RRA Study on the NTFPs in Nahi gewog (*Bhutan German Integrated Forest Management Project*); Phuntsho Namgyel, 1996.

Table 3.1. 2 (b) ii Farm use species used by the villagers

SL No	Local Name	Botanical Name	Uses
1	Goom	Quercus lanata	Plough
2	Jetshe shing		Plough
3	Kem		Manure
4	Kheybi sang	Berberis asiatica	Fencing material
5	Sisi	Quercus griffithii	Leaf litter/ woodlot
6	Taptoo	Desmodium motorium	Fencing material
7	Tongphu	Pinus wallichiana	Shingle (roofing material)

Source: RRA Study on the NTFPs in Nahi gewog (*Bhutan German Integrated Forest Management Project*); Phuntsho Namgyel, 1996.

3.1.2 (c) Sources for local water supply (springs, irrigation channels, etc.)

The water supply in the valley is dependant on the main river Hindey Rongchhu, its tributaries Chagyen Lum and Domjay Lum, as well as several natural springs in the valley.

Drinking water supply

Every household in the villages surveyed has its own water supply, either by a natural spring or by water tanks and water pipes leading to the households. The Royal Government through Rural Water Supply Scheme has built water tanks at the natural water sources in the villagers. In addition, several households have arranged for their own water supply from the nearby streams or small water springs.

Irrigation

The functioning of the irrigation system is prerequisite to secure food cultivation for subsistence farmers of the valley. All paddy fields are irrigated. Dryland crops are rain-fed or sometimes irrigated as well. There are three main irrigation channels in the Nahi valley (*Resource management by rural households in Nahi Gewog; Richter 1997*); Hali channel, Nabesa-Eusawom-Hebisa channel, Upper Eusagom channel, seven small channels and Nabesa upper channel.

The inhabitants of Hali constructed 3.5 km long earthen channel with some wooden flumes in between but there seem to be insufficient supply of water due to seepage problem in the Hali channel. The villager themselves first constructed the channel from Nabesa to Eusawom and later with the support from the Royal Government was extended up to Hebisa. The Government channel was partly done with cement and still has seepage. Unfortunately the water volume is not enough to reach Hebisa. The people requested assistance to blow up the rock near the source to ease the water flow. About 3.5 km of the channel need some repair. The rest of the channels mentioned are not facing any problem so far.

Traditionally a village managed irrigation system Chusup (Drinking Water and Irrigation water watcher) existed in paddy rice growing communities. His responsibilities included making sure that the traditional right-of-way for drinking water was respected by the concerned households and to ensure proper distribution of water for irrigation among the landowners. The local community to arbitrate minor disputes among the irrigation canal owners also legitimized him. Since his roles was based on traditional social sanctions, litigants were free to approach the Gups or court in case of disputes over the use of water. Unlike in the case of forest products, property rights over water were strictly enforced. The chusup also made sure that the existing or newly constructed water canals did not cause damage to nearby fields. The social hierarchy or kinship has played only a limited role in shaping of irrigation canal ownership status that exists today because the present irrigation ownership pattern is based on the landownership and is location specific. The lands Act of 1978 have drawn substantial direction from the informal Chusup institution as not much have changed both in spirit and structure of the law on the uses of water for irrigation.

Owing to social change and fluctuation of inhabitants the traditional structures very often do not function anymore, so water user groups have been created. The present water user groups system is based on the families using the same water sources have initiated the water user groups in the valley. The agreements are as follows: For 4 acres of wetlands a family receives 24 hours of constant water supply by rotation. Small holders have joined together to be able to irrigate 4 acres

together, so they enjoy the same conditions. Per 4 acres every family supplies two men/women for necessary maintenance of the channel until the repair is finished. Normally the user groups are functioning well, consequently so does the irrigation system. Every household has free access to drinking and irrigation water. The irrigation system in general is functioning and maintained by the water user groups. The following table has the village wise list of local water sources.

Table 3.1.2 (c) i The village wise List of local water supply sources (springs, irrigation channels, etc.

Eusagom	Eusawom	Hebisa	Nabesa	Tongshithangkha
Usual Source	Usual Source	Usual Source	Usual Source	Usual Source
Lakaluma Lhachhuy-u-wa Gang Redor Tshochaps-aluma	Nabumo Naluma Nagong Wangkh-a Tshakha	Pakachhelum Lobejachhu Domsuma Chhubelum Sabuna	Dongch- achhu Bacchul- uma	Bachhaluma Tasow Dongyachhachhu
Alternate Source	Alternate Source	(No alternate source)	Alternate Source	Alternate Source
Rajuba Jowlum Hetchhu Springs	Amchaluma Spring water		Dupchhu	Bacham

Source: Survey on social use of forest area in Nahi FMU, April 2002, Nirvana Pradhan

3.1.2 (d) NTFPs

However, Nahi Forest provides a wide range of NTFPs to the local inhabitants that are often critical to their livelihood. The NTFP in Nahi FMU includes forest plants for food (fruits, leafy vegetables, flowers, animals) medicines and for other usages such as for making farm implements, fencing materials, ropes, thatching materials and the most important of all, an important source of income; 19% second highest after the income form agriculture. Though NTFPs are important source of cash income for them but not the sole means of subsistence. As mentioned the villagers' uses of NTFPs are wide ranging, from use as beverages, food and medicine to fencing poles to farm tools.

The NTFPs contributions in the total household diet (P.Namgay 1996), forest plants source amounts to 21%, forest animals as 3%, home source 52% and market source as 24%. Apart from the diet source an income source from NTFPs will be increasing in the near future as the prices fetched in the market from these is very attractive to the villagers.

About 107 species of plants are identified as useful to the farmers, including 22 species of edible mushroom (P.Namgay 1996). The table 3.1.2 (d)i has the detail

list of NTFPs usages and the list of areas from where they are collected by the villagers.

Table 3.1.2 (d)i NTFP collected by Nahi Villagers

SL No	Local Name	Botanical Name	Uses	Collected by	Available Forest areas	Available Season
1	Euli (Rock Grass)	Erioscirus Comosus	Rope material	cow herders	Hebisa, Eusagom, Eusawom, Nabesa	
2	Ngakhachu (Wild asparagus)	Asparagus racemosus	Self consumption, Delicacy, high cash value	Womencow herders and by men if it is collected for selling purpose	Hebisa, Eusagom, Eusawom,	1 st , 2 nd , 3 rd , and 11 th , 12 th Bhutanese months
3	Nakey (ferns)	Diplazium polypodioides	Delicacy, cash value		Hebisa, Eusagom, Eusawom, Nabesa	1 st , 2 nd , 3 rd and 4 th Bhutanese months
4	Shamu (mushroom 20 spp)		Delicacy, high cash value		Hebisa, Eusagom, Eusawom, Nabesa	Different varieties from 1 st to 10 th Bhutanese months
5	Tago (walnut)	Juglans regia	Impt for religious ceremonies, high cash value	Collected by men for self consumption and selling purpose	Eusagom, Nabesa	7 th and 8 th months

6	Ba (Bamboo)	Borinda grossa	Impt for making mats, baskets etc., cash value, household utility	Collected by men For making household items And for selling purpose	Eusagom	
7	Olachotok (Orchids)	Cymbidium hookerianum	Delicacy, medicinal value, high cash value but banned by the RGoB	Women and men for selling purpose	Eusagom, Nabesa	8 th , 9 th and 10 th month
8	Adhurubji	Holboellia latifolia	Cord	Collected by men	Tongshithangka, Nabesa, Hebisa	10 th and 11 th months
9	Etho metho	Rhododendron arboreum	Incense		Lower valley, Hebisa	
10	Chasae sing	Erythrina sp.	Wooden containers			
11	Chakchel rubji		Cord			
12	Chalam	Aerisikkimensis	Wooden bowls	Collected by men		
13	Eubay	Girardinia diversifolia	Cord		Lower valley	9 th & 10 th months
14	Hikchu (small bamboo)	Drepanostachyum khasianum	Cord			
15	Joomu		Incense			
16	Khempa	Artemisia vulgaris	Incense			4 th to 12 th
17	Mukchi	Onosma hookeri	Red dye	Collected by women	Both upper and Lower Nahi valley	10 th & 11 th
18	Tabshing	Betula sp.	Wooden boxes	Collected by men		

19	Tongphu	Pinus wallichinia	Incense		Both upper and Lower Nahi valley	
20	Zocha (stinging nettle)	Laportea terminalis	Cord		Lower valley	9 th & 10 th months
21	Bamcha	Aconogonum molle	Vegetable	Usually collected by cowherders and men		3 rd & 4 th months
22	Bashikameto	Justica adatoda	Vegetable			3 rd & 5 th months
23	Domkey (fern)		Vegetable			3 rd & 6 th months
24	Kaytekaywa (yam)	Dioscorea bulbifera	Wild potato			11 th & 12 th months
25	Pagsiwa	Ardisia macrocarpa	Vegetable			11 th & 12 th months
26	Pangchi	Symplocos paniculata	Vegetable oil			
27	Siman	Sauraria nepalensis	Vegetable			
28	Thingngey/zhungthing	Xenthoxylum bungeanum	Spice			9 th months
29	Amla	Phyllanthus embilica	Fruit			4 th to 9 th months
30	Dezam	Myrica esculenta	Fruit			5 th & 6 th months
31	Nabtay		Fruit			
32	Phaytse	Benthamedia capitata	Fruit			11 th & 12 th months
33	Tong	Doeynia indica	Fruit			9 th to 11 th months

Source: RRA Study on the NTFPs in Nahi gewog (Bhutan German Integrated Forest Management Project), Phuntsho Namgyel, 1996. Survey on social use of forest area in Nahi FMU, April 2002, Nirvana Pradhan.

*(Read Bhutanese calendar as 1 month behind the English calendar)

The villagers of the upper valley Tongshithangkha, Gangkha, Nabesa collect NTFPs such as ferns, wild asparagus, mushrooms and orchid etc., from the nearby forests as mentioned below in the table 3.1.2 (c) ii, pack them in their mules and travel through the mule track that leads to Thimphu weekend's vegetable market.

Especially the prices fetched by sale of these NTFPs in Thimphu market are more attractive than in the nearby Wangdue and Punakha markets. Wild asparagus (*Asparagus racemosus*) is a high cash value, low volume product, grows in an open ground and is visible along the footpath of Eusawom and Hebisa villages. Orchid (*Cymbidium hookerianum*) that is called Olatshe by the villagers is common in Nabesa and Hali villages. In terms of cash value it is an extremely attractive product for the villagers. Therefore, the sale of orchid in the market is banned by a forest regulation. Fern (*Diplazium polypodioides*) locally called *Nakey* by the villagers is of high volume; low value product is common in moist areas in high forests such as Gangkha, Tshokhothang and Tongshithangkha villages.

Table 3.1.2 (c) ii, Village wise List of forest areas for NTFP collection

EUSAGOM	EUSAWOM	HEBISA	NABESA	TONGSHITHAN GKHA
Jashima Omlum Lhacheychhorten Lhochup Rachi Hebisa Kamzhing (rain-fed -dryland) Lumana Chhpaleha Okaluma Chhukha Chhuphakha Tagoding Lhachenphakha Tashichhoma Chhasilumphakha Gangulay Richukhachhu	Tagoding Tawading Tagochhen Nagsena Pangboma Josaja Gamsabu Lumana Tshokilo	Keliluma Lumana Bapthang Thamilhakhang Pegang Jachhelu Yankiluma Tandinlhakhang Jahnagompa Jomijatha Emachakaluma Tongzegang Tshacholum Tshokothangka Kinleygang Tshawathangkha	Lamigora Chhsampa Kotalumba Chakona Taksichawa Langchhukhata Tangojat Towajap Dana Kusidingdoro Tongchelhakhang-g Gangkhar Bachhuluma Chazampa Lamigora	Lamigora Tangajab Sisijampa Tshemo Dangnaluma Lunchukhattam

Source: Survey on social use of forest area in Nahi FMU, April 2002, Nirvana Pradhan

The income from the sell of wild animals such as deer, wild boar and sambar was mentioned by one of the extension agents as the survey team was served lunch with deer meat. This, as mentioned by one of the villagers is a usual scenario in the valley as some of the households' livelihood depends upon the income from the sale of the wild animals found in the valley.

Table 3.1.2 (d)iii List of Medicinal Plants

SL No.	Local Name	Botanical Name	Uses
1	chhasey	<i>Erythrina arborescens</i>	sprain
2	Khenpa	<i>Artemisia vulgaris</i> L.	Cough, cold & coughs
3	Ngeyshing	<i>Asparagus racemosus</i>	Sprains and body ache
4	Omla	<i>Embilica officinalis</i>	Cough & cold
5	Pumoruto		Rheumatic pain
6	Puti-shing	<i>Picorrhiza kurroa</i>	Headache & appetizer
7	Tseod	<i>Rubia cordifolia</i>	Body ache

Source: Survey on social use of forest area in Nahi FMU, April 2002, Nirvana Pradhan

The villagers of Nahi are not so well acquainted with the medicinal plants found in the valley; only few of the respondents mentioned couple of local names and their uses. If somebody from the family falls ill then the first thing they usually do is summon the religious man to conduct *Ringdro* (Puja); if the situation becomes worse summon the village health worker then finally to the hospital in Wangdue or to Thimphu. The villagers of Nahi valley have become more acquainted with the allopathic medicines.

3.1.2. (e) Present Use of the Chirpine areas

The chirpine forest areas village wise lists in the table 3.1.2.1 (d) are the areas used by the villagers for the following purposes:

- Resin extracted from the chir pine tree for space lighting
- Fuel wood
- Pine needles for animal bedding
- For making furniture
- For constructing sheds for livestock (cattle and pigs)
- For making construction materials such as, beams, planks, roofing, flooring and supporting poles but the villagers responded saying that it is used sometimes when the other good species (*Tsuga dumosa*, *Abies densa*, *Picea spinulosa*, *Quercus griffithii* and *Cupressus corneyana*) are not available during the time of their requirement.

Table 3.1.2. (e) Village wise list of chirpine forest areas:

EUSAGOM	EUSAWOM	HEBISA	NABESA
Gangu Chhukha Eusokha Docheke	Tshokhoding Gangu Ramijang Apsaragang Mutchuluma	Pangsho Talodogo Masagang Chhagothangka Pangumchhoma Chhugechhu Jashina Tshawathangkha Dushizongkha Emanchhenkha	Loujagijow Gangtokha Ganglakha Chhajajna Dongkhasachhu Lojja

Source: Survey on social use of forest area in Nahi FMU, April 2002, Nirvana Pradhan

3.1.2. (f) Religious places within the forest area

The villagers of Nahi worship the woody vegetation/ forests around Lhakhang areas as abode of deities. Especially the big old trees (told by Gup Tandin, ex village headman) are not touched by any of the villagers, as these trees are believed to be the abode of deities. Some of the mountaintops above every lhakhang are also believed to be the abodes of deities and are worshipped by the villagers. During the second field trip it has been observed that the footpaths leading to these lhakhangs are very narrow and difficult to trace and secondly, these forest areas are hardly visited by Nahi villagers except by the caretaker or by visiting or residing Lamas. The canopy density was >80% in these forest areas.

Table 3.2.1 (e) Location-wise detail of Lhakhangs of Nahi geowog

SL No	Name of Lhakhangs	Location	GPS
1	Changkha Lhakhamg	Nabesa village	27°27' 15 N 089°48' 44 E 7305 ft
2	Dana Lhakhang	Above Tshokhothang village	27°28' 33 N 89°50' 33 E 8666ft
3	Eusagom Lhakhang	Eusagom village	27°27' 27 N 89°50' 18 E 6663 ft
4	Khhujur Lhakhang	Above Tshokhothang village	27°27' 52 N 89°52' 33 E 6984 ft
5	Langphezhekhar Lhakhang	Above Tshokhothang village	27°28' 49 N 89°50' 54 E 8995 ft
6	Lhakhangchhen	Near Eusawom village	27°27' 15 N 89°50' 27 E 6279 ft
7	Shewakha Lhakhang	Above Tshokhothang village	27°27' 52 N 89°51' 08 E 7171 ft
8	Tandin Lhakhang	Hali village	27°26' 48 N 89°51' 26 E 5892 ft

Source: Survey on social use of forest area in Nahi FMU, April 2002, Nirvana Pradhan

3.2 Human Capital

The study conducted shows that the Human Capital varies according to household size, skill, knowledge, capacity to work and good health that together enable people to pursue different livelihood strategies and achieve their livelihood objectives. Besides farming villagers have developed other skills to improve their livelihood such as carpentry, petty contract, handicrafts, domestic helps and also few of them are in government services; by further discussions with the villagers it has been found out that some of their family male members are working as drivers and labourers (house and road) away from their village. The recent opening up of 11.5 Kms Nahi road has also contributed in diversifying the livelihood strategy of the villagers. The agriculture extension agent, Mr. Ambar Bdr.Ghalay shared his experience of 4 years in Nahi gewog said that the villagers have started showing interests in purchasing more of fertilizers, urea and seedling of variety of vegetables and fruits. Some of the villagers of Hebisa village have purchased 400kgs of ginger in 2001 from Gelephug (south-eastern Bhutan) market to grow in their fields so that they could regularize their ginger business with Phuentsholing (South-western border town) market. This could be also taken as a positive impact of the new Nahi road and the exposure to modernization.

3.3 Social Capital

Since social capital has a direct impact upon all the other types of capital. The labour exchange between the neighbours and relatives is a typical characteristic of Bhutanese farming system. This customary exchange system not only solves the problems of farm labour shortages during the peak seasons but also helps to maintain the communal harmony by creating the dependence on each other. For those poor farmers who cannot afford to hire labour the exchange system is very important especially to ensure that the farm production activities are being carried out on time. The relatives and the neighbors represent an important source of labour (for exchange system) for almost all the households (87%) in the valley especially for the crop production activities. The labour exchange system commonly practiced by the farmers is the only way to meet their labour requirement during the peak seasons. As in most subsistence farms, household is the single most important source of labour for any farm and non-farm activities (fuel wood and timber collection) for the households in Nahi valley complemented by the labour exchange system with neighbors and relatives. The farm family is the main source of labour for all the households in the upper and lower Nahi.

3.4 Physical Capital

The motorable road (11.85 Kms in length, GTZ BHUTAN German Project) has recently connected the valley to the Wangdue-Tsirang and Thimphu highway that has started to play a vital role in the process of modernization of the valley. The gewog has a primary residential school (till V standard with 133 students capacity); with concrete school building and a solar lighting facility but not an appropriate residential structure for the school children.

The valley so far has not been provided with electricity and telephone facilities. As for the public transport system for the villagers to communicate, villagers usually walk down to the nearest Wangdue market they usually hire yellow top taxis from Wangdue market that charges Nu.50/- per head till the end of the feeder road.

3.5 Financial Capital

The villagers hold Financial Capital in several forms: cash, bank deposits or liquid assets such as livestock and jewellery. In rare cases, such as house construction etc., with the help of *Gup* (village headman) financial resources are also obtained through credit-providing institutions like Bhutan Development Financial Corporation, Royal Insurance Corporation of Bhutan but in these cases liabilities are attached. One of the villagers (ex army man) from Hebisa, said that if the loan taken from these institutions is paid back within a short period of time then they are exempted from the interests. Excluding the income earned by the sale of vegetables, rice and NTFPs, the most common types are remittances and off season farm labour, firewood cutting, petty contracts, domestic helps in Gaselo and Lobesa areas, house construction, road construction and from sale of bamboo products (mats, baskets/ containers). Many of the farm families of the valley depend on the market for selling their farm products. The local Sunday markets in Wangdue Phodrang and Thimphu are two most important markets for selling the farm products from the valley.

A wide range of commodities including farm and forest products (Table 3.5) are marketed by most of the households from upper and lower valley. The commodities commonly marketed include some cereals (rice, maize, wheat), livestock products (butter, cheese, eggs), Vegetables and fruits (green sag, chilli, potato, apples, walnut) and forest products (asparagus, ferns, mushrooms).

Table 3.5 Commodities marketed out from the valley

	Upper Nahi No of farmers	Total Quantity per year	Lower Nahi No of farmers	Total Quantity per year	Total No of Farmers	Total Quantity supplied	Market Value (As per Unit) Nu.
Types of products							
Rice (Dre/yr)	17	1926	23	4708	40	6634	30-35
Maize (Kg/yr)	1	15	2	70	3	85	5
Wheat (Kg/yr)	1	240	0	120	1	360	10
Butter (Kg/yr)	2	314	3	139	5	453	160
Cheese (Balls/yr)	4	1605	7	1586	11	3191	8-10
Eggs (Dozen/yr)	1	33	1	500	2	533	60
Beans (Kg/yr)	2	80	6	540	8	620	15
Chilli (Kg/yr)	2	200	13	2200	15	2400	10-35
Sag (Bundles/yr)	2	90	1	100	3	190	2
Pani (*Bangchung/yr)	1	50	2	150	3	200	5
Fruits (Kg/yr)	7	2440	15	3150	22	5590	10-25
Fern (Bundles/yr)	2	460	8	240	10	700	3
Mushroom (Kg/yr)	7	220	8	250	15	470	25-30

Source: RRA Survey May 2001.

Rice is the most common commodity marketed by the majority of the farmers (42%) supplying a total of 6634 drey/yr, of which 71% comes from lower and 29% from the upper valley. The selling of rice is mainly to acquire cash required on the farm for purchase of essential household items from the markets or making necessary payments like taxes. Second to rice is the fruits that are being sold in the market as the second best source of cash income. Livestock is an important component of the farming system in Nahi. Among livestock cattle is the most important animal on the farm for crop production purposes and for their products. The products are an important source of nutrients for the family and an important source of cash income for some households.

The horse on the other hand is an important means of transport for most households. Most commodities going out or coming in are transported by horse and on human back. Considering the scattered settlement of farm households in the valley the horse will continue to play an important role in the farming system especially as an important means of transport for the farmers (*Nahi Baseline Survey*; November, 2001; NRTI, MoA, Thumbten Sonam and Thringnam Wangdue).

3.6 External Factors that make villagers vulnerable

The shocks, trends and seasonality issues that can have a great impact on villagers' livelihoods. The common link between these factors is that they are all somewhat outside people's control. For example, they have relatively little influence over weather patterns or population trends (as opposed to for example, to political and institutional factors that they can, in principle, directly influence).

The table 3.6 next page summarises common issues that have influences or have direct or indirect positive or negative impact on Nahi villagers.

<p>Trends (Positive/ negative effect on livelihoods)</p>	<p>Population The average household size of the 53 households surveyed is 6.1 during the time of survey. Villagers benefit from large family size as more no. of members will provide more labour contribution in the farming activities. But, the negative impact is more people to feed and support that could result in degradation of resources in the near future.</p> <p>Family planning awareness building programs is needed to educate the villagers</p> <p>Natural Resource It is an integral part of the villagers' livelihood. Their traditional practice of depending totally on forest for cattle grazing (tsamdrog), woodlot collection (sokshing); from the chirpine forests, collection of NTFP (both for sale and self consumption), collection of fuel-wood from the nearby areas & chirpine forests and collection of wood for farm implements etc., needs prior attention.</p> <p>The present use pattern urgently requires proper assessment and FMU at the present could be the best approach.</p> <p>Governance GYT, an established fora in which local people are able to assume greater responsibilities for the development of their communities, to participate in decision making that have a direct bearing on their lives and livelihoods and the future of their families and communities.</p> <p>Technology They use indigenous technologies for their farming activities. Their cattle plough fields and their other implements are also made by themselves or by the village blacksmiths. It is not possible to mechanize the farming system as it totally depends on the infrastructure such as road network in the valley. For the present situation their practices are best suited for them.</p> <p>Crop/Livestock health The health problem of cattle is taken care by the AHEA. But the diseases or, infected crops cannot be handled by the AESA due to the supply of lower quality insecticides etc. The AES needs to look into these areas to overcome this problem, as farm is the main source of food of the valley.</p>
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<p>Shocks (Negative effect)</p>	<p>Human Health From 4th –6th Bhutanese month (peak summer) the villagers are busy in with their farming activities such as transplanting, weeding and irrigating the paddy field. This is the season they suffer from epidemics such as diarrhea, headaches etc., which they believe is infected from outside whenever they go outside the valley to the market or visiting relatives and friends. This has negative effect, as this season requires more no. of helping hand in the farm.</p> <p>To overcome this problem BHU is urgently required in the valley.</p> <p>Natural During the survey villagers expressed that so far they have not faced any kind of natural shocks or calamities except for the crop damage by insects/diseases.</p> <p>Conflict Villagers usually have conflicts for irrigating their fields even though it has been regularized and also while grazing their animals even though they have the registered areas for the purpose. But these conflicts are easily resolved within the households or villages. Crop damage by wild animals is also a major conflict villagers are facing during the peak harvest seasons.</p> <p>Employment Opportunities Unemployment is not a problem in Nahi but there is a severe shortage of helping hand especially during the peak-farming season. Some of the household members have migrated to urban areas to better off their livelihood by doing businesses or work in the offices, household maids, some in the govt. service in the religious institutions as monks and some are in the schools away from the valley for higher education (valley has only one primary school i.e. till the V standard). The off-farm employments of some are causing shortage of helping hand in the farms.</p> <p>The better-off households could hire laborers during peak season but the worse off have to face the consequences. This problem could be overcome by introduction of better civic amenities and other infrastructure development in the valley.</p>
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<p>Seasonality (Accommodate and plan for change)</p>	<p>Prices Villagers are aware of the frequent changes/ increase in the prices of commodities in the market due to their regular visits in the nearby town. They are also made aware in the market the reasons of price changes. It has both negative and positive impact on them. Positive effect is that they could also fetch better prices by selling their products and also try to produce more farm products or, collect more forest products to sell in the market. Negative effect is that if they do not work hard it would be difficult for them to buy basic necessities and also the over production and over extraction of forest products leading to degradation of resources in the near future keeping in mind the population growth rate in the valley.</p> <p>FMU is felt necessary to provide them with sustainable utilization pattern of the NTFPs.</p> <p>Production The villagers have been accommodating with the present market structure and trends that could be witnessed easily. They have started showing keen interests to improve their farm products with the help of AEA as they are supplied with the varieties of fertilizers and seeds by the government. But the main problem expressed by them is the quality and supply time of these farm inputs are not up to their expectation. The supply and the quality are felt necessary to improve upon their production to the changing market structure.</p> <p>Shortage of labour</p> <p>Insufficient irrigation</p>
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Source: Survey on social use of forest area in Nahi FMU, April 2002, Nirvana Pradhan

It is important to recognize the above vulnerability, or livelihood insecurity because it is a constant reality for villagers. It is not just a passing state. It is something that people have to deal with every day. This is mainly because they do not have access to those resources that would help protect them from the negative effects of the issues listed above. And even when the effects are positive, this same condition – lack of assets – prevents them from taking advantage.

3.7 Policies Institutions and Processes

Policy, Institutions and Processes relate to the services and environment created by government, but this category also includes local-level institutions that are largely unaffected by government and the activities of private sector organizations. These effectively determine:

- Access (to various types of capital, to livelihood strategies and to decision-making bodies and sources of influence)
- The terms of exchange between different types of capital (markets)
- Incentives to undertake certain activities or invest in particular areas.

In addition, they have a direct impact upon both inter-personal relations (how different groups treat each other) and whether people are able to achieve a feeling of inclusion and well-being.

3.7.1 Important categories of institutions in Nahi valley include

(a) Gewog Yargye Tshogchung (GTY)

An established fora in which local villagers are able to assume greater responsibilities for the development of their communities, to participate in decision making that have a direct bearing on their lives and livelihoods and the future of their families and communities.

(b) Health Services

At present the geog do not have any health service centre and therefore, almost all health activities and services are covered from Wangdue. For basic health problems and medicines farmers approach village health workers and sometimes BHU in Gaselo for emergencies. The visits to BHU (Basic Health Unit)s and hospitals are common among farmers. Besides the traditional practices of performing local religious rites and remedies many respondents also at the same time visited hospitals and BHUs for treatment and medication every year. The farmers also mentioned for having received visits from health personals for treatment. Four-village health workers (VHW) are trained, two each in the upper and lower valley for rendering basic health services.

(c) Renewable Natural Resource Centre

Nahi RNR center from where agricultural and livestock extension services are availed and the RNR extension centre under the Department of Research & Development manages the extension programme of the MoA.

The programme is divided into 4 broad sub-programmes, viz:

- (i) Livestock Extension Programme
- (ii) Horticulture Extension Programme
- (iii) Fieldcrop Extension Programme and,
- (iv) School agriculture programme.

The RNR center is located in the lower valley and provides agriculture and livestock extension services to the valley. The Table 3.7.1 (b) presents the different RNR extension in the geog, contact made in a year by the farmers from the upper and lower valley and the reasons for their contact.

Table 3.7.1 (b) No of farmers contacting the extension

Details	Upper (UN)	Nahi	Lower (LN)	Nahi	Total
Livestock Extension	33 (35%)		31 (33%)		64 (67%)
Agricultural Extension	45 (47%)		37(39%)		82 (86%)
Forestry Extension	30 (32%)		28 (29%)		58 (61%)
Health Services	30 (32%)		25 (26%)		55 (58%)

Source: RRA Survey May 2001

The frequencies of farmers visits to the Livestock extension varied ranging between 1-3 times a year for 34 farmers while 19 farmers visited about 1-2 times in a month and 17 visited only when required.

The villagers contact forestry sector for various services but the forest services are available only from the Dzongkhag headquarter; therefore farmers have to come to Wangdue for any activity or service related to forest.

(d) School

The valley has a primary residential school (till V standard with 200 students capacity); with a concrete school building. The Headmaster of Nahi Primary Schol has already initiated rural School Development fund

under which it has cattle rearing and agriculture programmes as follows:

- I The school has a vegetable garden with a variety of vegetables and ginger plantation of 1300 kgs.
- II The GTZ project based at Lobesa has provided financial support for the purchase of cattle and for the construction of cattle shed to the school.

(e) Rural Water Supply Scheme (RWSS)

Under this scheme the Royal Government has constructed tanks at the natural water sources/ springs for the villagers. The traditional village institution *Chusup* (Drinking Water and Irrigation water watcher) is still practiced in some of the villages like Nabesa and Hebesa. The village community appoints them and their responsibility included making sure that the traditional right-of-way for drinking water was respected by the concerned households and to ensure proper distribution of water for irrigation among the landowners. The local community to arbitrate minor disputes among the irrigation canal owners also legitimized him. Since their roles was based on traditional social sanctions, litigants were free to approach the *Gups* (village headman) or court in case of disputes over the use of water. The *chusup* also made sure that the existing or newly constructed water canals did not cause damage to nearby fields.

(f) Market

The nearest market for them is Wangdue market. With the access road in the valley setting up of a general shop appears to be a promising enterprise.

(g) Lhakhangs/ Monasteries

Government Lhakhang: A caretaker is normally appointed by the Government and receives a food ration is responsible for the temple. The monastic body of Dzongkhag district manages the Government monasteries.

Community Lhakhang: Community temples are mostly constructed by and belong to the community of the valley. The community that also organizes prayers meets all maintenance costs. The community appoints the caretaker. The families of the valley contribute to his food ration.

Private Lhakhang: These belong to well-off private families who built them. The owners maintain the private temples. The owners of these private temples normally possess a lot of land that they offer for share cropping as well. The private temples are highly respected by the community.

3.7.2 Villagers Perceptions of the Institutions

Table 3.7.2 below summarises the nature of the institutions according to the nature of their relationships:

Table 3.7.2 Villagers Perceptions of the Institutions

Delivery and enabling agencies		
SL No	Agencies	Nature of relationship
1	GYT	There is a strong reciprocal relationship between the newly established GYT headed by the GUP and the villagers because this fora is the main entry point for the villagers to improve upon their livelihood strategy; and also an entry point to the livelihood assets.
2	Agriculture Extension Agent	The services includes providing technical expertise plus facilitates them in implementing newly available agricultural inputs etc. The agent has a strong positive relationship with the villagers. The frequencies of visit by the agent in all the villages have further strengthened the relationships and the effective implementation of the services
3	Animal Husbandry Extension agent	The AHEA also has a strong presence in the valley. The agent has a strong positive relationship with the villagers. The frequencies of visit by the agent in all the villages have further strengthened the relationships and the effective implementation of the services. During the time of emergency too the agent have provided them with all the possible services and facilities available with him
4.	Nahi Primary School	Due to convenient location of the school the villagers are encouraged to send their children to school. The school has a good rapport with the villagers as the authorities and the teachers of the school are very co-operative and try to provide suggestions best suited for the villagers and their children.
5	Lhaxhang	The reciprocal relationship between the Lhaxhangs and the villagers cannot be ignored because the traditional belief of Lhaxhang being the center of Bhutanese people's livelihood is visible in every human settlement in Bhutan.
6	Rural Water Supply Scheme	Under this scheme for drinking water, the Royal Government has constructed water tanks at the natural sources for the villagers.

Source: Survey on social use of forest area in Nahi FMU, April 2002, Nirvana Pradhan

3.8 The Management Objectives of Nahi Villagers

People pursue their preferred livelihood outcomes by drawing on a range of capital assets to pursue a variety of livelihood strategies. The choice of livelihood strategy is driven in part by people's preferences and priorities. But it is also influenced by the policies and by the formal and informal institutions and processes (PIPs) that impinge on people's everyday lives.

The villagers of Nahi geowg are subsistence farmers; forest and livestock are components of their farming system. Their livelihood strategy is based on the available natural resources such as land, water, fuel wood, timber and forests for tsamdrog and shokshing but does not totally depend on it alone. As shown in table 3.5 (Commodities marketed out from the valley) agriculture production is the main source of food, nutrition and income. The total quantity of rice marketed out of the valley per year is 6634 dre/ year, chilli 2400kgs/yr, maize 360 kgs/ yr, wheat 85 kgs /yr as compared to 700 bundles of fern and 470 kgs of mushroom (forest products) per year; the production from livestock marketed outside, butter 453 kgs, cheese 3192 balls, and eggs 533 dozens per year.

The villagers of Nahi valley believes that the following components would help in sustaining their present livelihood strategy:

- Sustainable supply of water, timber, fuel wood.
- Secure and sustainable tenure rights of sokshing and tsamdrog and if possible some rotation facility should be provided by the government.
- Better supply of agriculture inputs and implements.
- Sustainable supply of NTFPs in the forest so that they could earn some cash during the school opening season to meet the requirements of school going children.

It is further difficult to generalize the objective of the valley as a whole because every household surveyed has their individual management objective for their livelihood. But we could conclude by saying that the overall management objectives of the villagers of Nahi valley are as follows:

1. Improved food security
2. More sustainable use of Natural Resource base
3. Better access to income source
4. Reduced vulnerability
5. Better access to political capital (their opinion should be taken into consideration while introducing changes in the gewog)
6. Better access to information

These objectives they believe could be fulfilled with the help of government interventions.

CHAPTER FOUR

ANALYSIS AND DISCUSSIONS

The subsistence orientation is gradually disappearing in the valley and the gradual introduction to the modernization is making the peasant dominated sector more active, and enhanced monetization and market orientation. The following chapter hypothesize the situation that the introduction to modernization; basic infrastructure development has both negative and positive impacts in Nahi gewog. The discussion also focuses on the operationalization of Nahi FMU in the near future, the positive and negative social, ecological and economic implications on the sustainable development of the gewog.

4. Effect of Modernization: From subsistence to commercial use of Forest products

Bhutanese farmers – the prime participants in rural development – live and work under harsh mountain agro-ecological conditions. While they have to optimize the use of the scarce natural resources and at the same time conserve them. They are dependent on crops, livestock and forest products to sustain their livelihood. Cereals cattle and cheese are integral to their farming system. In Nahi gewog, the forestry production system encompasses timber, fuel wood, fodder, leaf litter, medicinal herbs and plants and mushrooms, while the pastoral production system includes cattle and pigs. Livestock forms an integral part of the Nahi farming system. It provides essential food items to the subsistence economy of the valley; particularly cheese, butter and meat that are commonly traded on a barter basis or sold for cash in the nearby urban towns like Thimphu and Wangdue.

Modernization is altering the sustainable and subsistent utilization of forest resources into harvesting for income generation. Increased commercialization leads to depletion of resources due to domestication or deforestation. The introduction of market economy is exerting pressure on the local forests as was evident from the Sunday vegetable market during the survey period. The villagers of Nahi gewog were selling bundles of ferns, asparagus, Mepchi (resinous strips of chirpine tree for space lighting and lighting cooking stoves), walnut and many other leafy vegetables from the forest. During the second field trip to tsamdrog areas of the lower Nahi valley, Sisizampa, Lamigora and Tashichawa, it was observed that the forests are mainly dominated by Walnut (*Juglans regia*) trees. It was evident that the walnut fruits were already collected by the villagers leaving behind the rotten fruits on the forest grounds and also there was hardly any left over of the ferns (nakey) in these areas. The villagers of upper valley, transport these forest products on mule back to Thimphu vegetable market to sell. The sale of these non-timber products can be key income sources for the villagers, especially where there are few

alternative livelihood options and when conventional development programmes do not easily reach these types of villagers.

The shift from subsistence farming to market economy would promote increased use of fertilizers in the near future would result in the loss of productivity of land ultimately resulting in lower yields. The continued loss of soil fertility, combined with the increase in population poses the threat to food supply in the future. However, if intensive cultivation can be encouraged with high-yield crop varieties, it would substitute for losses in soil fertility and shortage of arable land.

Further market integration will put additional stress on the forest resources because external factors such as consumer demand will control the supply pattern of these products. Especially, with the prospects of declining labour availability in farming, farmers strive to increase their collection of forest products for sell in the market that fetches better prices. The other options they would go for in the near future is expanding in their cattle population. Expansion in cattle population demands more tsamdrog area or, excessive grazing in the existing tsamdrops. In such a situation the biomass in the present tsamdrops cannot be sustained in the near future. If Yields and/or cropping intensity cannot be sustained in the longer run, the supply of Farmyard Manure (FYM) will also fall. Maintaining soil fertility, and labour productivity, requires enough fodder and tsamdrog to enable higher FYM application intensity.

Having to depend much on livestock by tradition, Nahi people own herds of cattle. There are registered tsamdrog areas and cattle are allowed to graze freely in these forest areas. With increase in cattle population grazing becomes intensive and with the same areas being grazed twice: by cows during the winter and summer, these areas are subjected to overgrazing. The adverse impact of grazing on seedlings and saplings is noticeable in many areas. The cattle browse, nibble, uproot and trample young regeneration. The constant grazing pattern also compacts the soil and hinders natural regeneration.

4.1 Modernization and Social Asset of Nahi gewog

The five capital assets presented in the SL Framework constitute livelihood 'building block' and can be substituted or converted into each other to a limited extent. In any form of traditional Bhutanese rural setting social capital plays a major role in the livelihood strategy of the community. Villagers /rural people in Bhutan draw on social capital such as family or kin-based security mechanism at times when financial capital is in short supply, or turn natural capital assets into financial capital. Indeed part of their strategy may be to increase the substitutability and convertibility of one asset into another.

Compared to the traditional Bhutanese rural setting; the social network in Nahi geowg is relatively low. This holds a strong argument in case of total dependence upon the natural resource base (common natural capital). It would be very difficult to resolve conflicts while utilizing these resources in the process of modernization that requires to meet the over

increasing household demands and the market demand based on the natural capital; this is a strong entry point to the financial and human capital for them to sustain and improve upon their livelihood. Degradation will take place due to over extraction of the natural assets to cope up with the modernization based on the ability of the competitors.

4.2 Too much or too little

The economic approach to assessing whether there is “too much” or “too little” for the villagers as opposed to being used for forestry operations that modify, degrade and even clear cut forests must ultimately concern itself with the valuation of ecological, social and economic benefits. In the chirpine forests areas in between Tshokkothang and Hebisa village the chirpine trees (*Pinus roxburghii*) were haphazardly debarked at Breast Height (BH) for collecting mepchis. Another observation that could not be ignored during the field trip was, big burnt patches on the chirpine trees till the breast height and also the left over of the timber that have been cut for making of various other farm implements and cattle sheds.

The pattern of fuel wood consumption in the valley cannot be ignored keeping in mind fuel wood as the only source of energy for cooking. With reference to the table 3.1.2.(a) iii Details of Fire Hour; fire remains burning for 11 hours and the table 3.1.2 (a) iv The fuel wood consumption pattern as on 1st April, 2002, average backload per house in the valley is 248.40/annum. Besides this regular pattern of collection in two seasons (summer and winter) it was also evident that the cowherds usually collect a back load or two of fuel wood everyday from tsamdrol areas.

The Major causes of deforestation is concentrated in the vicinity of human settlements and in areas easily accessible by roads, it is clear that human interference is the main cause of deforestation. The rate of deforestation might increase in the near future as from the past experience it has also been observed that forest degradation is more prominent in the close vicinity of human settlements. Some areas near the habitation have been degraded because the local people have been meeting their requirement from these areas. (*Management Plan for Nahi FMU Wanguephodrang Dzongkhag 1993-2002; Dhittal*).

4.3 Impacts of Operationalisation of Forest Management Unit

In terms of institutional processes, forestry is closer to social sectors such as education and health than to other natural resource sectors. For instance there is a clear public dimension and justification for collective action - the benefits of a forest impact nationally in the same way that public health affects society as a whole.

Natural resource management is at the core of the country's development strategies. The Goal of Nahi FMU is to protect the environment and at the same time provide sustained supply of all forest produce to meet the needs of the local population. Construction of road network is one of the management strategies of the FMU (*Management Plan for Nahi FMU Wanguephodrang Dzongkhag 1993-2002; Dhittal*) With the construction of the road network the villagers have better access to the outside world.

The development and operationalization of sustainable Forest Management Unit focuses on the following questions:

- What could be the economic, social and ecological implications of operationalizing the FMU in the gewog?

The **ecological implication** would be, conservation, improvement and extension of protective vegetal cover of the forest; improvement in the low stocked chirpine forests and improvement in the vegetal cover of the degraded and blank areas by affording strict protection measures and doing enrichment planting. The productivity of the forests can be increased by harvesting the old stock and inducing natural regeneration wherever feasible or carrying out artificial regeneration where natural regeneration is not forthcoming. But, the argument is logging, which is sustainable in principle, but is often not in reality. Logging operation would lead to consistent rise in both total area logged and total volume of wood removed. The removal of trees depending on the intensity of harvesting and the terrain causes immediate damage to surrounding forest and soil and can have long-term consequence on the ecosystem, like increasing vulnerability of remaining forests to fire, pests and storms. The tree plantation and artificial regeneration do not support the same level of biodiversity as natural forests but can bring economic benefits and provide some ecosystem services, such as watershed and soil protection, especially if suitable trees are planted on previously degraded land. However, when tree monoculture replaces native forests, much of an area's biodiversity is lost. Renewable resources are often thought to be indefinitely renewable but achieving renewability takes time – often decades, sometimes centuries. Yet some are location specific or depend on finite resources such as land. As natural systems are pressured to supply more and more, degradation of their productive capacity and even the possibility of ecosystem collapse cannot be ruled out. In many areas, exploitation of both biological and physical resources already exceeds the regenerative ability of natural system. Thus not only are many renewable resources becoming increasingly scarce, but damage to underlying systems that sustain or renew them threatens the near-term economic and human development.

The **economic and social implication** would be to meet the requirement of timber and other forest produce of the local people, government organizations and local wood based industries. But the argument is who else (other than the intended beneficiaries) benefits from this operation? Secondly, how and how far do the activities of

these unintended beneficiaries influence the capacity of rightful beneficiaries to voice their requirement and claim their entitlements? The answers to these questions depend crucially on the linkages between villagers and the institutional structure, especially the local civil servants at the DYT and GYT level. The answers also depend on the relationship between other agencies concerned with local-level development such as construction companies. The main concern is that the capacity of the villagers in relation to these groups is weak and the (often illicit) creation and use of capacity by outsiders limits the capacity of villagers to exercise their legitimate rights. This also poses limitations on the full utilization of other capital assets.

- What are the key relationships that provide the institutional context in which forest based livelihoods operate?
- What are the constraints and limitations in improving forest based livelihood in Nahi gewog?

The argument also focuses on the above questions that building of capacity by outsiders allows them to undermine the institutional arrangements intended to benefit the villagers and themselves become unintended beneficiaries. The villagers or intended beneficiaries must themselves be able to generate and use sufficient capacity and social capital if they are to access and convert – natural capital – to pursue better livelihood strategies.

The villagers have no alternative when the natural assets they depend on are degraded – this asset is an integral and irreplaceable aspect of their livelihood. A far more difficult and more critical problem is the vicious cycle of population growth, resource degradation and increase in vulnerability. In addition to human degradation, this cycle degrades and threatens to exhaust renewable resources on which local population depends. Thus development and environmental goals are inextricably linked. Development that improves livelihood of the people is essential, renewable resources which is both diverse and varied and often highly site specific, affecting clients with an enormous variety of interests, not just people relying on timber growth but also people relying on non-forest products such as collectors and herders that varies over time; consequently, policies that accelerate development can play a vital environmental role, if they are properly designed and makes standard forest management packages of services appropriate over the area involved.

4.4 Diversification in Livelihood Strategy

With reference to human capital and source of financial capital, of Nahi gewog (chapter three) the conventional wisdom for many years has been that rising output and incomes in agriculture itself are the catalyst for diverse non-farm activities in rural areas. However, in Nahi gewog, this has rarely been the case, since most household level diversification

is not just non-farm but non-rural in character (government servants, petty contracts and domestic help in urban towns). It does not work once the pace of delivery of new technology slows down or the forest resources depletes or the quality of the services hampers crop yields; as was told by the villagers that the saplings provided by the commission agent are of low quality plus the farm implements and other inputs are not delivered in time. The other major problem they have been facing is that agriculture inputs are not available with the commission agent at the time of requirement and they have been asked to collect it the next time. The villagers shared their problems regarding the distance they have to travel to reach the agent's store and the time and money spent for these problems. Evidence is mixed regarding the gains and losses to agriculture of household level diversification strategies; negative effects are associated with the withdrawal of critical labour inputs from the family farm, while positive effects include the alleviation of credit constraints and a reduction in the risk of innovation. It has also been understood that villagers migrants from remote areas are less likely to re-invest urban earnings in agriculture, while better-off migrants from nearby or high potential areas are more likely to do so. Where on-farm diversification occurs, it can generate many of the same beneficial effects on off-farm diversification.

Having alternatives for income generation can make the difference between minimally viable livelihoods and destitution. However, diversification does not have an equalising effect on rural incomes overall. Better-off families are typically able to diversify in more favourable labour markets than poor rural families. Total income and the share of income derived from non-farm sources are often positively correlated. Different income sources may have strongly differing impacts on rural inequality. For example, unequal land ownership may mean that a policy focus on crop income favours the rich above the poor; however, greater access to non-farm wage income would have the reverse effect.

As with agriculture, the effects of diversification on environmental resource management are mixed and context-specific. The growth of non-farm income sources might be expected to reduce the need for landless rural dwellers to carry out extractive practices in local environments for survival. On the other hand, for settled agriculturalists non-farm earning opportunities can result in neglect of labour-intensive conservation practices if labour availability is reduced. Diversification contributes positively to livelihood sustainability because it reduces proneness to stress and shocks. However, sustainable rural livelihoods need not equate with the sustainability of all components of underlying ecological systems due to substitutions that occur between assets during processes of livelihood adaptation over time.

The **Positive Effects** would be a diverse portfolio of activities contributes to the sustainability of a rural livelihood because it improves its long-run resilience in the face of adverse trends of modernization. In

general, increased diversity promotes greater flexibility because it allows more possibilities for substitution between opportunities that are in decline and those that are expanding.

The **Negative Effects** would be, widening disparities between the incomes of the rural poor and the better off because the better-off are able to diversify in more advantageous labour markets than the poor, and this in turn reflects asset poverty especially with respect to human capital. As evident from Nahi gewog that some types of diversification may result in stagnation on the home farm resulting in depletion of the labour force required to undertake peak farm production demands such as land preparation and harvesting.

CHAPTER FIVE

CONCLUSIONS

- This steep valley has almost 91% of its area under forest cover. Forest is an integral part of the villagers' livelihood as it has been providing a wide range of environmental services, such as the supply of food and water, inputs for livestock, crop production activities and flood protection. The villagers of Nahi gewog are of heterogeneous origin and status. The settlements are scattered deep into the valley and up the higher slopes. Villages throughout Nahi valley are small and scattered, generally containing up to 6 households. The largest and most populated settlements are Eusagom and Eusawom, with 21 and 26 households respectively. Households in this gewog have 5 to 6 persons per household, and the population is generally thought to be growing.
- Infrastructure is limited; this valley has recently been connected by the motorable road (11.85 Kms in length, GTZ Bhutan German Project) to the Wangdue-Tsirang and Thimphu highway that has started to play a vital role in the process of modernization of the gewog. With most of the available facilities such as health center for the gewog is located at the nearest urban town, Wangdue-Phodrang. The health extension center or Basic Health Unit (BHU) is needed in the gewog as this is a serious constraint faced by the villagers in the gewog. Furthermore, the existing facility such as school hostel building is urgently required to be improved to function efficiently.
- The major development in the gewog has been the recently constructed motorable road, implementation of the Rural Water Supply Scheme and provision of facilities - a primary school, RNR Extension services (agriculture and animal husbandry) and village health workers-though some of these need upgrading or improvement; increased attention in the area of agriculture; repair works in the irrigation and drinking water sources for Hali village; an establishment of BHU (basic health unit); new construction of hostel building for the school, improve existing facilities or to provide additional ones where urgently required.
- Forest is an integral part of the villagers' livelihood as it has been providing a wide range of environmental services, such as the supply of food and water, inputs for livestock, crop production activities. With the emphasis on agriculture, in terms of priority and available manpower, cattle rearing and collection of forest products plays a very important role in the economy of the gewog. Modernization is altering the sustainable and subsistent utilization of forest resources into harvesting for income generation.

- The diversity of livelihoods by Nahi villagers has been a strong indicator of effects of modernization. The villagers in the recent years have been experiencing the important feature of their survival. They have been experiencing the flexibility, resilience and stability of diversification that makes them less vulnerable than undiversified ones and sustainable over time precisely because they allow for positive adaptation to changing circumstances.

It seems probable that individual level diversity characterises those (poorer) households in Nahi gewog with low human capital, while higher human capital enables household level diversity combined with occupational specialisation.

- Finally, the collection and use of forest products or services by the villagers of the gewog has been increasing to adapt to the changing positive or negative pattern of market economy and modernization. The social use pattern and the areas used for these purposes are required to be monitored and regularized for the socio-economic and ecological sustainability of the gewog.

CHAPTER SIX

RECOMMENDATIONS

The following recommendations focus specifically on the objectives; the social use areas are classified and recommended according to the functional zonation for the purpose of forest management planning.

6.1 Setting up demonstration Plots

Demonstration plots should be set up in the areas used for tsamdrog, sokshing and collection of NTFPs to conduct the phytosociology⁷ research and observation for a period of up to 3 years. The regular observation and research on these observation plots would help in testing/ evaluating the socio-economic and ecological feasibility of identifying the areas that could be set aside for future use by the villagers and; selecting plant species that could be commercially viable for the benefits of the villagers.

6.2 Establishing complete inventory of NTFP species

There is an urgent need to establish complete inventory of NTFP species found in this gewog. While such a list has been compiled by Mr. Phuntsho Namgyel but information on altitude, localities, habitats and

⁷ Phytosociology: Interactions among the flora of particular areas esp. with plant communities

quantities collected for all these species and identification is required to complete the study.

6.3 Explore the possibility of involving village community for the Protection of the Religious Places within the forest areas

For the protection and conservation of country's national treasure, DFO, DFEO and Gup should explore the possibilities of making the villagers responsible for strictly protecting these areas and they should be made aware of the consequences that would result in any kind of human/biotic interference. Besides making the villagers aware of the cultural and religious significance of these areas they should also be made aware of the long-term ecological, social and economic benefits too.

6.4 Incorporating Local Knowledge into Forest Management Planning

The study shows that farmers possess a great deal of knowledge concerning forest resources and their uses much of which would be useful while planning for forest management and also would feel less threatened by forest resource utilization by those outside of the gewog. Incorporation of the local knowledge about the location of these products and the consideration of the role of NTFPs in villagers livelihood would be important while planning for activities that may affect these resources.

6.5 Awareness building before FMU operationalization

The awareness-building workshop should be conducted with the local villagers to make them aware of the activities to avoid unnecessary conflicts in future. Conflict over objectives (i.e. final outcomes) is inherent and should not be avoided. Resolution of conflict over any issue involving values is a live process, which cannot be reduced to a single formula nor negotiated by proxy.

6.6 Forest areas to be set aside for local use only in future

Recommendation 6.1, is to be seriously taken into consideration before finalizing on the forest areas to be set aside for future use only; as it becomes a basis to understand the status of vegetation of these areas. The lists of the forest areas (Annexure III) contain the forest areas presently used for tsamdrog, fuel wood, sokshing, chirpine, NTFP and water for drinking and irrigation.

The **sokshing** areas are scatteredly located around the vicinity of the villages and some on both sides of the small streams that serves as the source of irrigation channels (**Annexures**). The

areas used for sokshing near the streams and water sources should be reconsidered and monitored by the forest department, as these are water catchments that need to be protected.

Presently the villagers have no complaints related to **tsamdrog** and there are enough of fodder for everyone' cattle and the field observation during the survey supports this statement made by the villagers. But, before the carrying capacity of these **Tsamdrog** (areas contain in the map and annexure) gets depleted the villagers should be encouraged to switch over to one of the following options best suited to their requirements:

- regulated grazing
- cut down on the number of less productive cattle, should be introduced with improved breeds or lesser number of productive cattle
- encourage and introduce villagers to plant improved fodder species for stall feeding

These options would be more sustainable socially, economically and ecologically in the long-run than keeping aside particular areas for tsamdrog purposes.

There are no particular areas for collecting **NTFPs**, these are usually collected from tsamdrog areas or near and around the network of footpaths leading to the villages and water sources.

Appendix III has the details list of the areas from where the villagers collect NTFPs.

The map contains the sources of water supply and Appendix III has the detail list of the names of sources of water supply. The local villagers should be made aware of the benefits of protecting these watershed catchments and should be made responsible for the protection. The collection of NTFPs (including fuel wood or, dead trees or, sokshing) should be completely stopped in these areas.

The use of chirpine forest for collecting mepchis should be monitored by the Forest Department especially in the upper valley where most of the settlements are located.

6.7 Place diversity high on the policy agenda

Policies should aim to achieve more resilient or more sustainable forest based livelihoods that need to recognise the other alternative and the positive attributes of diversity for achieving those ends. The differing nature of diversity as seen in Nahi gewog between individuals, households, and larger social or economic arenas; capabilities by individuals as well as households 'to turn their hand to anything' confers the benefits of flexibility in the presence of risk already identified. It is well to recognize that the benefits of diversity are context-specific. They apply most forcefully in contexts of high seasonality, high risk, absent markets, poor infrastructure, declining farm size, and similar adverse factors.

APPENDIX I

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APPENDIX II

GLOSSARY OF BHUTANESE TERMS

Chipon
gewog

Messenger or a representative of the Gup within a

Chhu	River
Chusup	Drinking Water and Irrigation water watcher
Dre	A standard dre (2 litres) contains 2 kg of dry sunflower seed or 2.4 kg of mustard seed
Dzongkhag area	District; administrative unit covering a geographical area
Dzongkhag Yargay Tshogchung	A representative body of the district; District Development Council
Gewog	A sub-division of a district; an administrative block covering a number of villages
Gewog Yargay Tshogchung	A representative body in the block; Block Development Council
Gup	Administrative head of a block
Kamzhing	Rain-fed dryland
Lhakhang	Temple
Landgos	Certain land that is normally oxen-ploughed in one morning. (1 langdo (on dry land): approximately a third of an acre=1350m ² . 1 langdo (wet land): approximately a quarter of an acre=1012m ²)
Pangzhing	Land use similar to shifting cultivation, with very scanty tree cover and short-fallow rotation
Sokshing	Public woodlot on which either individuals or a community have user right for leaf-litter, fodder and dry firewood
Tsamdrog	Natural pasture/ grassland on which an individual or a community has grazing rights
Thram	Registered land

APPENDIX III

TABLES



1(a) Names of Forest Areas used by EUSAGOM village

Tsamdrog		Fuel-wood	Sokshing	Water		Chirpine	NTFP
Usual	Alternate			Usual	Alternate		
Rashi (3)	Hamchiphakha	Gangu (2)	Lhamjagang	Lakiluma (6)	Rajuba	Gangu (3)	Jashima
Olakhalum (2)	Romchuphakha	Lekopankha	Jinkha	Lhachhuyuwa	Jowlum (2)	Chhukha	Omlum
Olakhalumba	Chhortengang		Jashina	Gang	Hetchhu	Eusokha	Lhachey chhorten
Lakiluma	Luchho		Eusagom	Redor	Springs	Dochekeo	Lhochup
Tshokoma/luma (2)			Nimjab (west)	Tshochapsaluma			Rachi
Rahilum chhorten (2)			Jankha				Hebisa (2)
Chasilumchhu			Lakiluma				Kamzhing (rain-fed dryland)
							Lumana (2)
							Chhpaleha
							Okaluma (2)
							Chhukha (2)
							Chhuphakha (2)
							Tagoding
							Lhachenphakha
							Tashichhoma
							Chhasilumphakha
							Gangulay

							Richukhachhu
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(b) Names of Forest Areas used by EUSAWOM village

Tsamdrog		Fuel-wood	Sokshing	Water		Chirpine	NTFP
Usual	Alternate			Usual	Alternate		
Tagoding (3)	Chhortensawa	Hali (3)	Chachupha	Nabumo (3)	Amchaluma (2)	Tshokhoding (4)	Tagoding (3)
Tawading	Tshokilo	Laptadra	Shargang	Naluma (3)	Spring water	Gangu	Tawading
Tagochhen		Laptakha	Tshokilo	Nagong		Ramijang	Tagochhen
Taoji		Sisithangma	Jachhu	Wangkha		Apsaragang	Nagsena
Amchanka			Sisithangma	Tshakha		Mutchuluma	Pangboma
Tshokha			Tshokha				Josaja
			Baliho				Gamsabu
			Thangsi				Lumana
			Hali				Tshokilo

(c) Names of Forest Areas used by NABISA village

Tsamdrog	Fuel-wood	Sokshing	Water	Chirpine	NTFP
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Usual	Alternate			Usual	Alternate		
Nambipochhe	Chejena	Cheopang	Gangkhar (2)	Dongchachhu (3)	Dupchhu	Loujagijow	Lamigora (4)
Lamigora (2)		Domchhuga	Cheopang	Bacchuluma		Gangtokha	Chhsampa (2)
Doma		Tongchhugoma	Hemisho			Ganglakha (2)	Kotalumba
Bachhaluma (2)		Kuchigoma	Kotalumba			Chhajajna (2)	Chakona
Panche		Minchhulum	Eowa			Dongkhasachhu	Taksichawa (2)
Nabiluma			Donkawa			Lojja	Langchhukhata
Chazampa (2)			Dogona				Tangojat
Lunchekatem (2)			Lungana				Towajap
Tashichawa			Kachhukha				Dana
							Kusidingdoro (2)
							Tongchelhakhang
							Gangkhar
							Bachhuluma
							Chazampa
							Lamigora

(d) Names of Forest Areas used by HEBISA village

Tsamdrog		Fuel-wood	Sokshing	Water		Chirpine	NTFP
Usual	Alternate			Usual	Alternate		
Omshithangka (2)		Jashina	Pangsumchey	Pakachhelum (4)		Pangsho	Keliluma (3)
Thujithang		Taptu	Chhagothangka	Lobejachhu (5)		Talodogo	Lumana
Khujila			Ashithang	Domsuma		Masagang	Bapthang
Lumana			Jayethang	Chhubelum		Chhagothangka	Thamilhakhang (2)
Masegang (3)			Gangtokha	Sabuna		Pangumchhoma	Pegang
Chhagothang						Chhugechhu	Jachhelu
Thaledo						Jashina	Yankiluma
Tshosawa						Tshawathangkha	Tandinlhakhang
Pangsengchen						Pechuko	Jahnagompa
Tardophatta						Dushizongkha	Jomijatha
Gangmabu						Emanchhenkha	Emachakaluma
Yarchhet							Tongzegang
Chhorchhet							Tshacholum
Jamegu							Tshokothangka
Dohotogang							Kinleygang
							Tshawathangkha

(e) Names of the Forests Areas use by TONGSITHANGKHA village

Tsamdrog		Fuel-wood	Sokshing	Water		Chirpine	NTFP
Usual	Alternate			Usual	Alternate		
Lamigora (2)	Nabipangchen	Baagang	Thangom	Bachhaluma (3)	Bacham	Lamigora (6)	
Tongajap (2)		Gangtogo	Geshigna	Tasow		Tangajab (4)	
Pangsho (2)			Sisima	Dongyachhachhu		Sisijampa	
Omshi			Kotalumba			Tshemo (2)	
Jichurobji			Lajjayegkhagang			Dangnaluma	
Tawapang			Sepjikka			Lunchukhattam	
Dangna			Dopalumtal				
Tshemo			Pangsapechhulum				
Hindirila			Laeothama				
			Dopalam				

2. FUEL WOOD Species and collection Areas

SL No	Local Name	Botanical Name	Name of collection areas				
			Eusagom	Eusawom	Nabesa	Hebesa	Tongshithangkha
1	Etho metho	Rhododendron	Gangu	Hali	Cheopang	Jashina	Baagang
2	Changshing	Albizia julibrissin	Lekopankha	Laptadra	Domchhuga	Taptu	Gangtogo
3	Goom shing	Quercus lanata		Laptakha	Tongchhugoma		
4	Jangta	Swida oblonga		Sisthang	Kuchigoma		
5	Kamshing	Prunus cerasoides			Minchhulum		
6	Kashisang shing	Aeer oblongum					
7	Phaytse	Bethamedia capitata					
8	Sisi shing	Quercus griffithii					
9	Taptoo	Desmodium motorium					
10	Thom	Quercus glauca					
11	Tongphu	Pinus roxburgii and Pinus Wallichinia					

12	Zhentu	Lyonia ovalifolia				
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3. IRRIGATION system and source of Nahi villages

3 (a) Eusagom

SL No	NAME of villages	Type of source	Irrigation	
1	Jongte	Rain-fed	No irrigation chhannle	
2	Eusagom	Natural source	Raashi- 2 in a month,	
3	Eusagom		Raashi- 1 in every 13 days	
4	Eusagom		Raashi- 2 in a month	
5	Eusagom		Yes	
6	Eusagom			
7	Eusagom			
8	Eusagom			
9	Lhachen			
10	Lhachen			
11	Lhachen			
12	Eusakha			
13	Hamchi			- 1 in a week
14	Tashitshowa			Yes

3(b) Eusawom

SL No.	NAME of villages	Type of source	Irrigation
1	Hali	Natural source	Emachema – 1 in 9 days
2	Hali		Emachema – 1 in 9 days
3	Hali		Emachema - 1 in 9 days
4	Hali		- 1 in a week
5	Hali		- 1 in a week
6	Hali		- 3 in a month
7	Nahi		Yes
8	Nahi		- 1 in 7 days
9	Nahi		Yes

3(e) Tongshithangkha

3(c) Hebesa

SL No	NAME of villages	Type of source	Irrigation
1	Tshokothang		No fields
2	Tshokothang		1 in 18 days
3	Tshokothang		No fields
4	Tshokothang	Rain water Kamzhing	No
5	Tshokothang		Yes
6	Tshokothang		Yes
7	Hebesa		Yes
8	Hebesa		Yes
9	Hebesa		1 in 18 days
10	Hebesa		1 in 7 days
11	Hebesa		Yes
12	Temo		Yes
13	Gogona		Yes
14	Rue-sha-na		1 in 18 days

3(d) Nabesa

SL No	NAME of villages	Type of source	Irrigation
1	Gang-se-mo		Yes
2	Gangrumu		1 in 11 days
3	Gangkha		1 in 11 days
4	Nabesa		Yes
5	Gangkha		Yes
6	Lhakhang-chen		Yes
7	Nabesa		Yes
8	Nabesa		Yes
9	Nabesa		No
10	Gangkha		Yes

SL No	NAME of villages	Type of source	Irrigation
1	Tongshithangkha		1 in 4 days
2	Tongshithangkha		1 in 7 days
3	Tongshithangkha		1 in 14 days
4	Tongshithangkha		1 in 5 days
5	Tongshithangkha		1 in 5 days
6	Tongshithangkha		1 in 7 days

4.GPS Data of Nahi Gewog

4(a)Location Details of Villages

SI No	Village Name	Location Details	GPS
1	Chhogelo	Below Tshokhothang village (above RNR center)	27°27' 40 N 089°48' 11 E 7271 ft
2	Eusagom	Upper valley	27°27' 26 N 089°50' 22 E 6568 ft
3	Eusawom	Upper valley	27°27' 14 N 089°50' 35 E 6165 ft
4	Gangkha	Upper valley	27°27' 06 N 089°48' 59 E 7088 ft
5	Hali	Lower valley (Other side of the Ringde Hongchhu)	27°26' 48 N 089°51' 26 E 5891 ft
6	Hamchi	Upper valley	27°26' 01 N 089°49' 50 E 6057 ft

4(b)Location Details of Tsamdrog

SL No	Tsamdrog Name	GPS
1	Langjogang	27°26' 57 N 089°49' 46 E 5891 ft
2	Shintshebeluma	27°26' 59 N 089°49' 11 E 6277 ft
3	Sakamanggang	27°26' 45 N 089°49' 00 E 6332 ft
4	Chasizampa	27°26' 48 N 089°48' 39 E 6332 ft
5	Tshecona	27°26' 46 N 089°48' 38 E 6754 ft
6	Sisizampa	27°26' 41 N 089°48' 11 E 6518 ft
7	Lamigora	27°26' 39 N 089°48' 08 E 6518 ft
8	Tashichawa	27°26' 47 N 089°47' 55 E 6520 ft

7	Nabesa	Upper valley	27°27' 20 N 089°48' 41 E 7284 ft
8	Ngasi	Lower valley Above Nahi Pry. School (Other side of the Ringde Hongchhu)	27°27' 01 N 089°50' 58 E 5639 ft
9	Tongshithang kha	Upper valley and uppermost village	27°26' 46 N 089°51' 01 E 6096 ft
10	RNR centre	Upper valley Above new Nahi road	27°27' 04 N 089°51' 33 E 6093 ft

4(c) Location Details of Lhakhangs

SL No	Name of Lhakhangs	Location	GPS
1	Changkha Lhakham ^P	Nabesa village	27°27' 15 N 089°48' 44 E 7305 ft
2	Dana Lhakhang ^P	Above Tshokhothang village	27°28' 33 N 089°50' 33 E 8666ft
3	Eusagom Lhakhang ^P	Eusagom village	27°27' 27 N 089°50' 18 E 6663 ft
4	Khujur Lhakhang ^P	Above Tshokhothang village	27°27' 52 N 089°52' 33 E 6984 ft
5	Langphezhekhar Lhakhang	Above Tshokhothang village	27°28' 49 N 089°50' 54 E 8995 ft
6	Lhakhangchhen ^P	Near Eusawom village	27°27' 15 N 089°50' 27 E 6279 ft
7	Shewakha Lhakhang ^P	Above Tshokhothang village	27°27' 52 N 089°51' 08 E 7171 ft
8	Tandin Lhakhang ^P	Hali village	27°26' 48 N 89°51' 26 E 5892 ft

4(d) Location Details of Chhortens / Stupas

SL No	Name of Chhorten	Location	GPS
1	Eusawom Chhorten ^P	Eusawom village	27°27' 22 N 89°51' 43 E 5895 ft
2	Chhorten	Below Langjogang Tsamdrog	27°26' 59 N 89°49' 36 E 5891 ft
3	Gangkha Chhorten ^P	Gangkha village	27°27' 08 N 89°49' 04 E 6983 ft

4(e) Location Details of Water Source (Irrigation, drinking and Spring)

SL No	Name of water source	Location	GPS
1	Danalum irrigation	Upper Tongshithangkha village	27°26' 46 N 089°48' 11 E 7271 ft
2	Bachalum irrigation	Lower Tongshithangkha village	27°26' 53 N 089°48' 21 E 7253 ft
3	Okalum irrigation ^P		27°27' 53 N 089°49' 55 E 76645 ft
4	Spring Water	Above Dana Lhakhang	27°28' 36 N 089°50' 37 E 8767 ft
5	Irrigation for eusagom village		27°26' 30 N 089°49' 06 E 6978 ft

5.NTFP collected by Nahi Villagers

SL No.	Local Name	Botanical Name	Uses	Collected by	Available Forest areas	Available Season
1	Euli (Rock Grass)	Erioscripus Comosus	Rope material	cow herders	Hebesa, Eusagom, Eusawom, Nabesa	
2	Ngakhachu (Wild asparagus)	Asparagus reacesosa	Self consumption, Delicacy, high cash value	Women, cowherders and by men if it is collected for selling purpose	Hebesa, Eusagom, Eusawom, Nabesa	1 st , 2 nd , 3 rd , and 11 th , 12 th Bhutanese months
3	Nakey (ferns)	Diplazium polypodiodes	Delicay, cash value		Hebesa, Eusagom, Eusawom, Nabesa	1 st , 2 nd , 3 rd and 4 th Bhutanese months
4	Shamu (mushroom 20 spp)		Delicay, high cash value		Hebesa, Eusagom, Eusawom, Nabesa	Different varieties from 1 st to 10 th Bhutanese months
5	Tago (walnut)	Juglans regia	Impt for religious ceremonies, high cash value	Collected by men for self consumption and selling purpose	Eusagom, Nabesa	7 th and 8 th Bhutanese months
6	Ba (Bamboo)	Borinda grossa	Impt for making mats, baskets etc.,	Collected by men For making household tems	Eusagom	

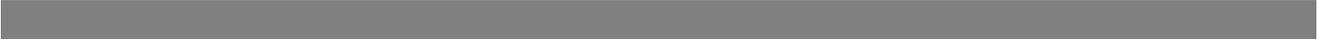
			cash value, household utility	And for selling purpose		
7	Olachotok (Orchids)	Cymbidium hookerianum	Delicacy, medicinal value, high cash value but banned by the RGoB	Women and men for selling purpose	Eusagom, Nabesa	8 th , 9 th and 10 th Bhutanese month
8	Adhurubji	Holboellia latifolia	Cord	Collected by men	Tongshithang kha, Nabesa, Hebesa	
9	Etho metho	Rhododendron arboreum	Incense		Lower valley, Hebesa	
10	Cha sae sing	Erythriana sp.	Wooden containers			
11	Chakchel rubji		Cord			
12	Chalam	Aeer sikkimensis	Wooden bowls	Collected by men		
13	Eubay	Girardinia diversifolia	Cord		Lower valley	
14	Hikchu (small bamboo)	Drepanostachy um khasianum	Cord			
15	Joomu		Incense			
16	Khempa	Artemisia vulgaris	Incense			
17	Mukchi	Onosma hookeri	Red dye	Collected by women	Both upper and Lower Nahi valley	
18	Tabshing	Betula sp.	Wooden boxes	Collected by men		
19	Tongphu	Pinus wallichinia	Incense		Both upper and Lower Nahi valley	
20	Zocha (stinging nettle)	Laportea terminalis	Cord		Lower valley	
21	Bamcha	Aconogonum molle	Vegetable			
22	Bashika meto	Justica adatoda	Vegetable			

23	Domkey (fern)		Vegetable	Usually collected by cowherders and men		
24	Kayte kaywa (yam)	Dioscorea bulbifera	Wild potato			
25	Pagsiwa	Ardisia macrocarpa	Vegetable			
26	Pangchi	Symplocos paniculata	Vegetable oil			
27	Siman	Sauraria nepalensis	Vegetable			
28	Thingngey/zhungthing	Xenthoxylum bungeanum	Spice			
29	Amla	Phyllanthus embilica	Fruit			
30	Dezam	Myrica esculenta	Fruit			
31	Nabtay		Fruit			
32	Phaytse	Benthamedia capitata	Fruit			
33	Tong	Doeynia indica	Fruit			

Read Bhutanese calendar as 1 month behind the English calendar.

APPENDIX IV

QUESTIONNAIRES USED FOR THE SURVEY



Questionnaire for Ethno-Botanical Survey Nahi Gewog

Village

Name.....Person's Name:.....

Male Female Thram

No:.....

TIMBER

SL No.	What Item Is it used for	Name of Plants/ Tress	How often do you collect them	From where Name & Distance	Who collects them

OTHER USES OF PLANTS (tools mats, ropes, crafts and other household thing like pails)

SL No.	Name of the plant	Uses (Used for)	Who collects them

COMMERCIAL USES OF PLANTS (plants you gather from the forests to sell)

SL No	Name of the Plants	Purpose	Selling Price	Who collects

TSAMDROG (Grazing Land)

SL No.	No.of cattle owned	Tsamdrog area/ Name and distance	Are there enough fodder for every ones cattle	Which is the alternate areas for grazing Name/ Distance	For stall feeding where do you collect the fodder from NAME and Distance

YAK WINTERING

SL No.	No.of Yak owned	What do you feed them	Where do they graze Name and Distance	Are there enough fodder for every ones yak	Where do they graze during Winter Name & Distance	Are there enough fodder for every ones yak	Which is the alternate place Name & Distance

FUEL WOOD

SL No.	Household Size	Name of the Plant/ Tree	How far is the place from where it is collected	How many person collects from your house	How many times/ back loads a day do they collect	Total no. of times collected in a month/ season/year

SOKSHING (woodlot/ leaf litter collection)

SL No.	Name from where it is collected from	Is the same area used every season/ year	Who collects them	Other Details Or Remarks

NTFP from the forests

SL No.	Name of the plants	Names of the area and Location (how far?)	Size of the area (sq.km)	Used For	Collected by (who collects?)

MEDICINAL PLANTS

SL No	Plants	Purpose	Who collects

THE PRESENT USE OF THE CHIRPINE FOREST (Thetongphu)

SL No.	Name & Distance	Why & Uses	How often	Details of the Domestic and Commercial

Local water supply (springs, irrigation channels, etc.)

SL No.	Where do you collect water from Name & Distance and Time	How much water is required for domestic use	Who collects water	Does your field have irrigation channel	How are the fields watered	Is there any alternate Water source Name & Distance

Livelihood Analysis Questionnaire

1. General Information on Village:

Village Name	Location	Total Population	Total no. of Houses	Total No. Participants	
				Male	Female

- 2. Institutions:** (i) access /livelihood strategies and to decision-making bodies and sources of influence)
 (ii) returns (economic and otherwise) to any given livelihood strategy

a) Village Institutions

SL No.	Name of the Institutions	Activities
1		
2		
3		
4		

a) Formal/Govt Institutions

SL No.	Name of the Institutions	Activities
1		
2		
3		
4		
5		

2. Capital:

	(i) Natural capital	Details

	(ii) Physical Capital	Details

	(iii) Social Capital	Details

	(iv) Human Capital	Details

	(v) Financial Capital	Details

3. Forest Resources Used:

SL No.	Resources Type	Names & Location of the area	Size of the area (sq.km)	Use Pattern
1	Religious places (Sacred Groves)			
2	Shoksing (leaf litter collection)			
3	Tsamdrog (Grazing Area)			
4	Areas used for yak wintering			
5	Local water supply (springs, irrigation channels, etc.)			
6	Local use (i.e. firewood, timber)			

7	Use of the Chirpine areas			
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4. Vulnerability

SL No.	Trends (Positive/ negative effect on livelihoods)	Shocks (negative effect)	Seasonality (accommodate and plan for change)
1	Population	Human Health	Prices
2	Natural Resource	Natural	Production
3	Economic	Economic	Health
4	Governance	Conflict	Employment Opportunities

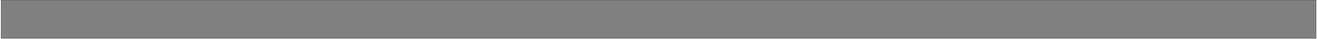
5	Technology	Crop/Livestock health	
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4. List of Forest Product/ Produce Users:

SL No.	Names	Male	Age	Female	Age	What Product/ Produce	Local and Botanical Names	For what purpose

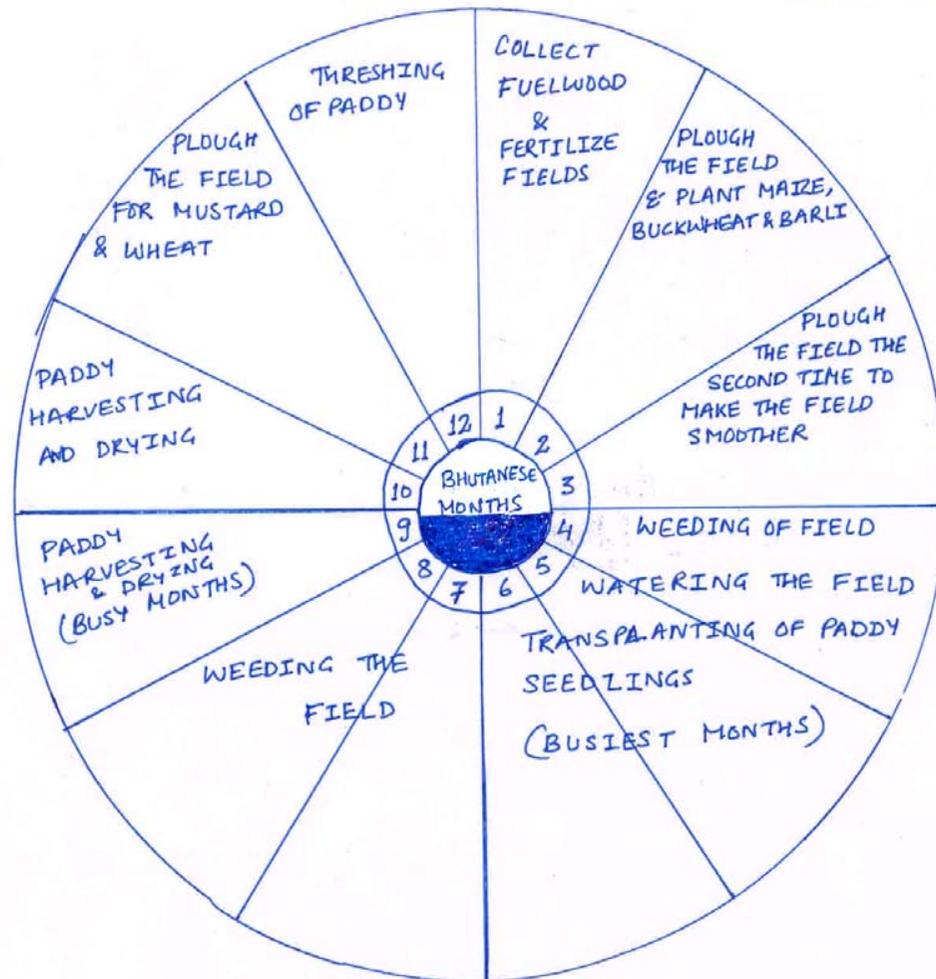
APPENDIX V

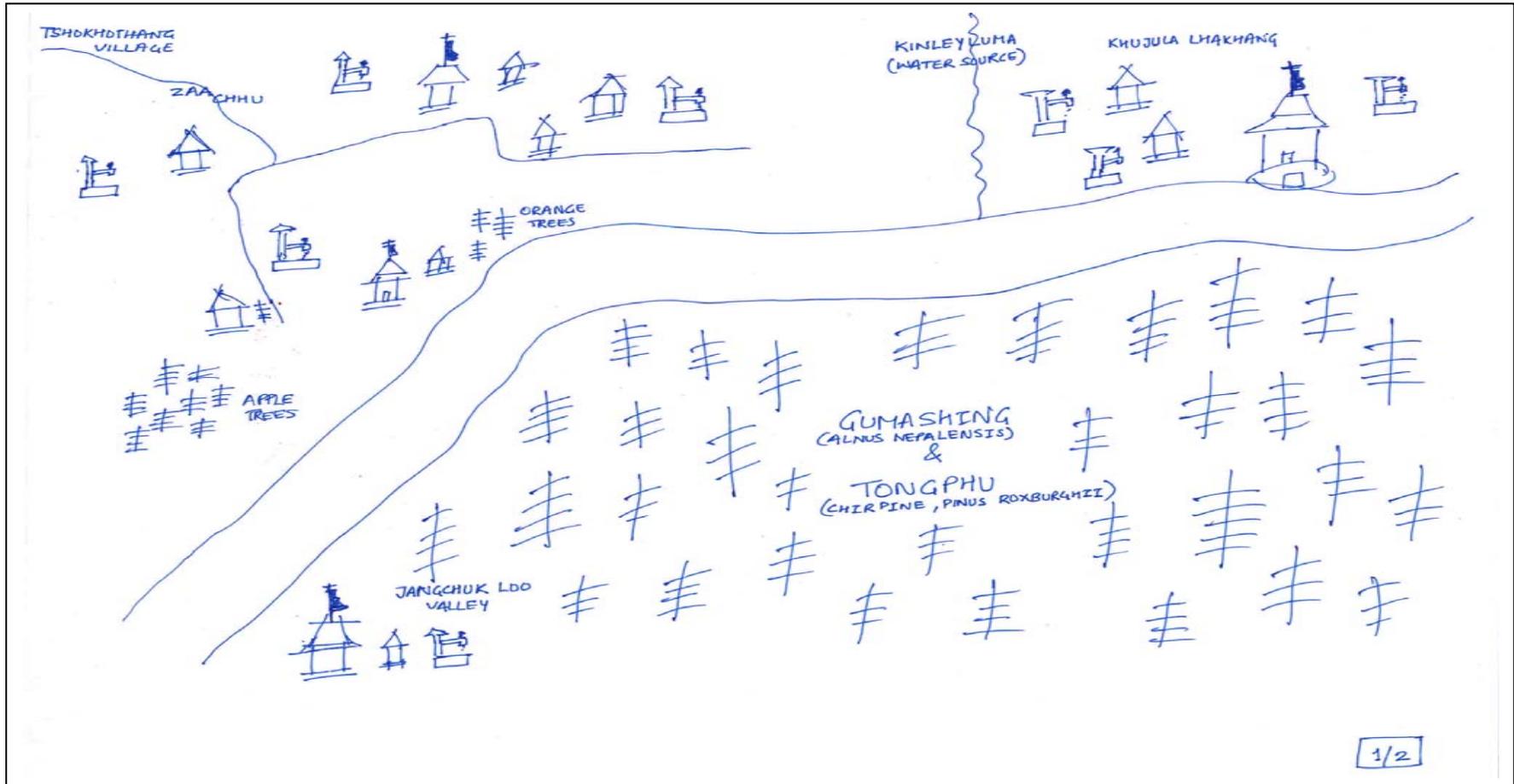
MAPPING EXERCISES

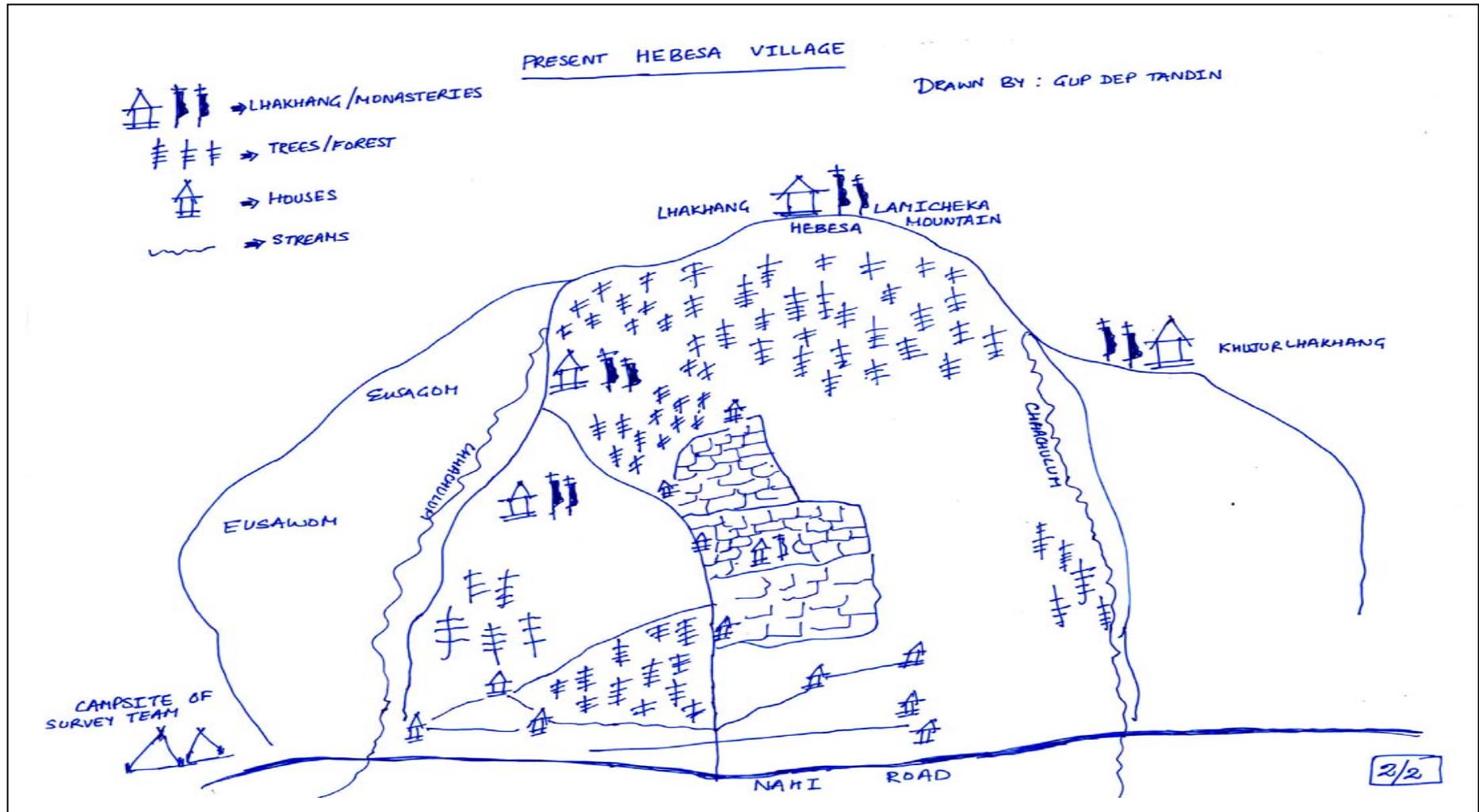


SEASONAL FARMING ACTIVITY CALENDAR OF MAHI VILLAGERS

DRAWN BY : VILLAGERS OF
TSHOKHOTHANG



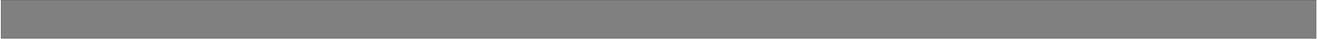




Present Hebesa Village

APPENDIX VI

MAPS



APPENDIX VII

PHOTOGRAPHS



APPENDIX VII

PHOTOGRAPHS

