

Chapter 4

Description of the Study Area

This chapter presents elaborate description of the study area to better contextualize the research concept and provide in depth information of research sites for better understanding. Descriptions of each site are structured into biophysical, cropping system and socio-economic aspects.

4.1 Bio-physical characteristics of Phobjikha

Phobjikha geog is located in the east-central part of Wangdiphodrang Dzongkhag. The total area of Phobjikha is approximately 138.2 km² (LUPP, 1995). The geog consists of eight villages namely, Gangphay, Rabu, Wangchan, Tangchan, Kulthang, Nangphal, Dokser, and Dangpar.

Phobjikha valley is aligned along a north to southeast axis with two major lateral valleys (upper and lower) on the eastern side. It is a relatively wide valley with the floor largely composed of marshes vegetated by dwarf bamboo. Moderate to steep slopes comprising of vegetation and farmlands encircle the valley on either side of the marshy land. The geog has a vast stretch of valley and is also rugged in nature but most agriculture lands are situated on gentle slopes to valleys that are already under agricultural cultivation or have potential for agriculture. The settlements are widely scattered. It is the home to the black-necked cranes during the winter with potentials for eco-tourism. The altitude ranges from 2,800 - 4,000 m. Forest constitutes about 69% of the total land area, which comprises of mixed broadleaf, blue pine, fir and mixed coniferous forest. The geog is also rich in natural pasture.

The soil types found in the valley are sandy-loam to clayey-loam and are in general, fertile and good for crops like potato, vegetables, wheat and buckwheat. The farmers usually incorporate compost (FYM) while cultivating their field which helps to improve their soil condition.

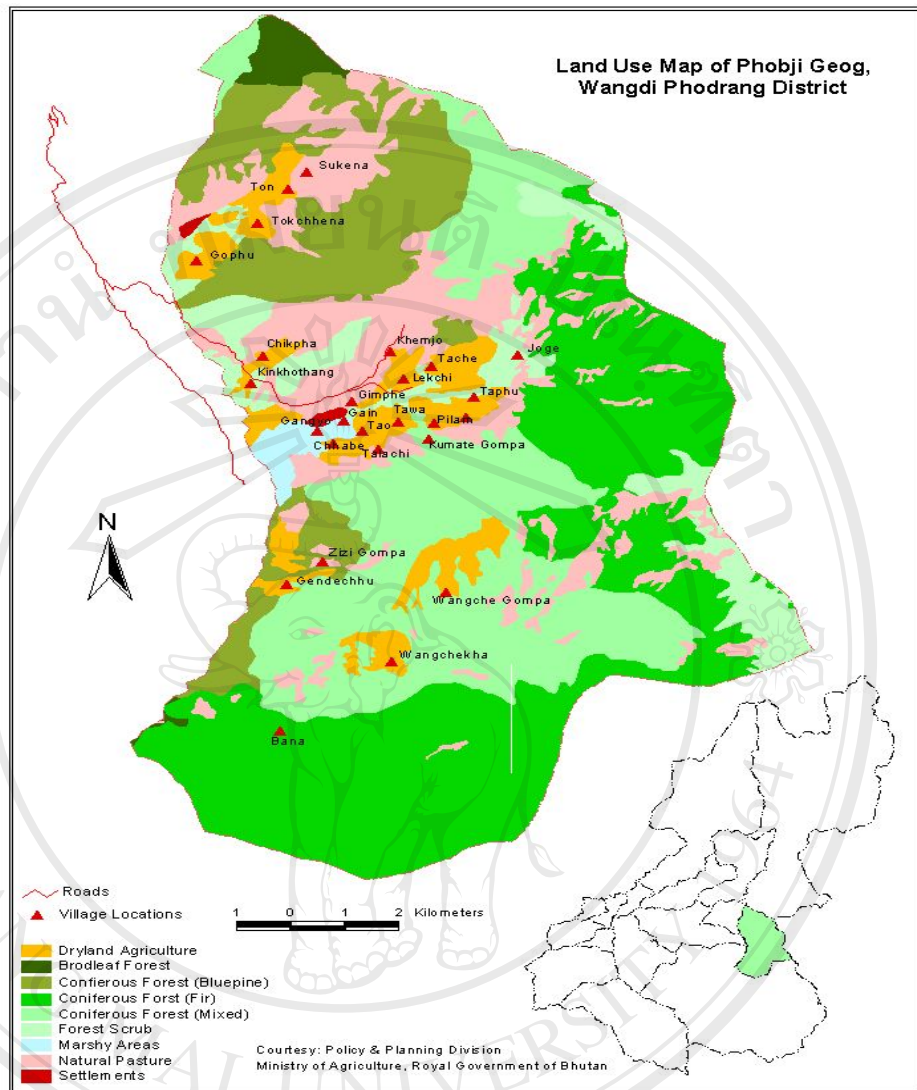


Figure 4.1: Land Use Map of Phobjikha.
 Source: MoA, 2004.

Phobjikha has a cool temperate climate characterized by moderately warm summer with chilly winter as the valley receives snowfall in the winter. The temperature and rainfall of 2003 is presented in Figure 4.2. The temperature ranges from 21°C in summer to as low as -7°C in winter. Precipitation ranges from 1,000 mm to 1,650 mm. The wettest month in the valley is during the month of July and the coldest month is January.

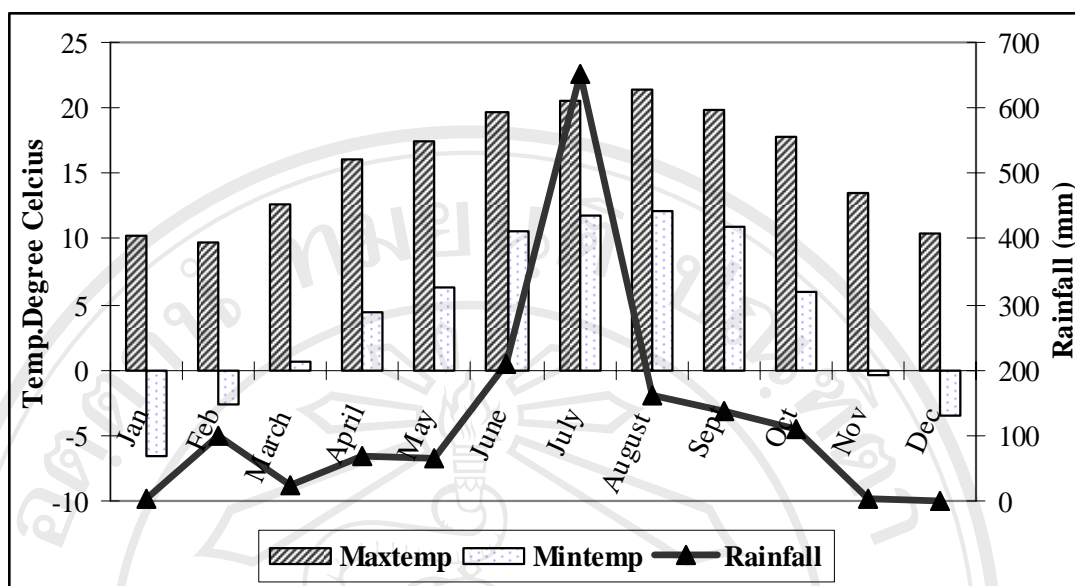


Figure 4.2: Rainfall and temperature of Phobjikha valley 2003.
Source: MoA, 2004.

The land use patterns of Phobjikha are shown in Table 4.1. Dry land constitutes of 87% out of total operational land, where they grow mainly potato, wheat, barley, buckwheat. The wetlands owned by the farmers are very less and those are mostly located in lower altitude in the different Geogs. The farmers give their wetlands to the share croppers.

Table 4.1: Phobjikha geog (Wangdiphodrang).

| Land use type | Area in ha |
|------------------------|------------|
| Wet land | 13 |
| Dry land | 219 |
| Tseri/ Pangshing | 9 |
| Kitchen Garden | 10 |
| Orchard | 1 |
| Operational Land Total | 252 |

Source: RNR Census, 2002.

4.1.1 Crop diversity and cropping systems

Farmers in Phobjikha valley grow diverse crops ranging from potato, summer wheat, buckwheat, barley, winter wheat radish and turnip. Almost all the farmers practice potato based cropping system. From the total operational land of area of 252 ha, dryland accounts for 87%. Out of total dryland of 219 ha potato covers 60% followed by Wheat, Barley, Turnip, Radish and Buckwheat. Three varieties of potato is commonly grown in the valley, Desiree (red), Kufri Jyoti (white) and Yusikaap (white). Desiree constitutes 60 - 70% as it is preferred by the Bhutanese farmers due to higher price in the market, good taste and good keeping quality

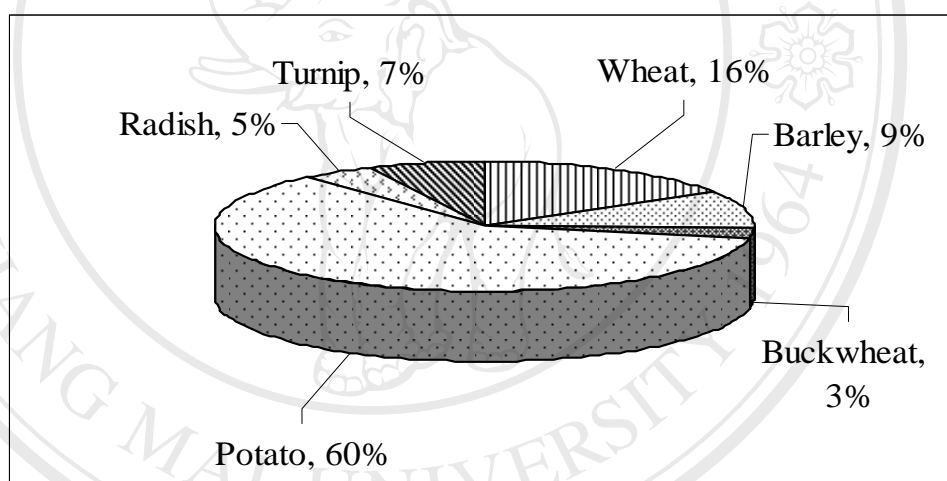


Figure 4.3: Crop types and share of cropped farmland in Phobjikha valley.
Source: RNR Census, 2002.

Potatoes, buckwheat and wheat are grown in summer; winter wheat and barley, turnips and radish are grown in winter. Farmers are aware of crop rotation so, they follow crop rotation to avoid mixture of varieties and to avoid diseases transformation. Especially in case of potato they rotate the field with wheat, barley and buckwheat. Fertilizers are usually applied to potatoes and after potato crop like winter wheat and barley are grown normally where the farmers do not put fertilizers. Crop cultivation and management follow traditional methods.

Table 4.2: Cropping calendar in Phobjikha valley.

| Crops | Jan | Feb | March | April | May | June | July | August | Sept | Oct | Nov | Dec |
|-----------|-----|-----|----------------|-------|-----|----------------|------|----------------|----------------|----------------|----------------|-----|
| Potato | | | P | | | | | H | | | | |
| Buckwheat | | | | | S | | | | | H | | |
| Turnip | | | S | | | | | | | H | | |
| Wheat | | | S ₁ | | | | | | S ₂ | | H ₁ | |
| Radish | | | S ₁ | | | H ₂ | | H ₁ | | S ₂ | | |
| Barley | | | H ₂ | | | | | | | S | | |
| | | | | | | H | | | | | | |

Source: RNR Census, 2002.

S= Sowing; P= Planting; H=Harvesting; S₁= Summer sowing; H₁= Harvesting summer sown crop; S₂= Winter crop; H₂= Harvesting winter sown crop

4.1.2 Demography and access to services

Phobjikha has a population of approximately 1,850 and 274 households. The traveling distance is about 66 km from Wangdiphodrang. The local economy of Phobjikha is agricultural based. Subsistence farmers striving their way through to catch up with economic development inhabit the valley. The livelihood of almost all households is based on subsistence agriculture and livestock rearing. Livestock comprise mainly of sheep, cattle, pigs and poultry. Horses and yaks are also owned by few of the households. The main diet of people consists of mainly wheat flour and rice. Livestock products supplement their dietary requirements and wool from sheep supplements their clothing requirements. Barter is still prevalent amongst the non-migrating residents who barter cane products for rice and chili from people of lower altitudes. Potato is the most important cash crop of the valley.

About 86.3% of the households depend on potato as the main source of income. Phobjikha is known for potato production in the whole country. Potatoes being the biggest and most important source of their income, the people of Phobjikha are moving towards increased potato production and more land is set aside for it.

About 60% of available dry land is use for potato production. Potatoes are transported to Phuntsholing where it is auctioned and the villagers there buy rice and oils and other necessary commodities that are not produced in the valley and are transport it back to Phobjikha. The geog is also one of the livestock priority areas of Wangdiphodrang Dzongkhag.

Access to different kinds of information in Phobjikha geog is high, more than 90% of farmers accessed information through the radio, and Kuensel. The farmers were receiving regular information about the government laws and policies through the Gup (village head man). Farmers were receiving marketing and business related information regularly. (During the marketing season of cash crop such as potatoes, Bhutan Broadcasting Service announces the daily rise or fall in the prices at the FCB auction yards in Phuntsholing.)

Government facilities in the area include a primary school, community school at Taphu, a forest office, and an upgraded BHU (Basic Health Unit). The DSC, which deals with potato farming, distribution of seeds and marketing of the product is also located at the centre of geog. Apart from the above there is also an agricultural extension center that includes animal husbandry and pasture development components. The geog has small market to cater the needs of the public. There is no electricity as the valley is known for the winter habitat of the rare and endangered Black Necked Cranes (*Grus Nigricollis*). The Royal Society for the protection of nature (RSPN) is responsible for the conservation of Black Necked Cranes. The geog is now connected with telephone which has greatly helped in communication.

4.2 Bio-physical characteristics of Sephu

Sephu geog is located in the North-eastern part of Wangdiphodrang Dzongkhag. The total area of Sephu geog is approximately 1,105.7 km². (LUPP, 1995). The national highway leading to central and eastern Bhutan passes from the geog. The geog comprises of nine villages. More than 50% of areas are covered by mountains. Forest constitutes about 39% of the total land area, which comprises of

mixed broadleaf, blue pine, fir and mixed coniferous forest. The major soil type in the Sephu valley is clay loam and sandy loam which are good for crops like potato, wheat, buckwheat, mustard and vegetables.

Sephu geog has a cool temperate climate with warm humid summers and chilly winters. The temperature ranges from 22⁰ C in summer to as low as – 4⁰ C in winter. The geog receives an annual rainfall within the range of 800 mm to 1,500 mm most of which falls within the monsoon months. The altitude ranges between 2,800 - 5,000 m.

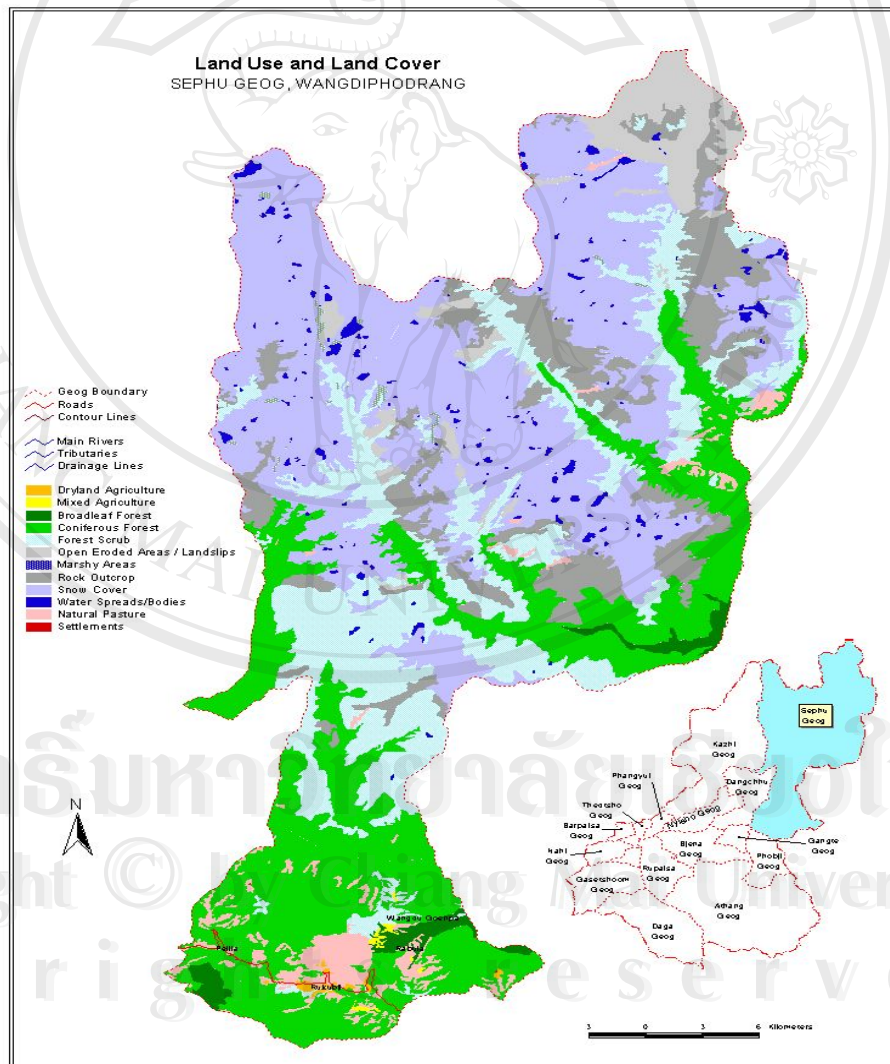


Figure 4.4: Land Use and Land Cover, Sephu geog.

Source: MoA, 2004.

The geog has rugged terrain with pockets of gently sloping land areas that are already under agricultural cultivation or have potential for agriculture. The settlements are widely scattered which hamper any developmental programs in the geog. The wet land in the geog is very rare. Therefore, the agriculture activities are minimum, basically seasonal dry land farming of potato, wheat, Buckwheat are the major crops. The geog has 196 ha of lands which are cultivable shown in Table 4.3. The major occupation of people in Sephu is mainly livestock rearing (Yak and Rams herders)

Table 4.3: Sephu (Wangdiphodrang).

| Land use type | Area in ha |
|------------------------|------------|
| Wet land | 9 |
| Dry land | 121 |
| Tseri/ Pangshing | 54 |
| Kitchen Garden | 12 |
| Operational Land Total | 196 |

Source: RNR Census, 2002.

4.2.1 Crop diversity and cropping systems

Farmers in Sephu valley grow diverse crops ranging from potato, summer barley, wheat, mustard, winter wheat radish and turnip. Almost all the farmers practice potato based cropping system. From the total operational land of area of 196 ha, dryland accounts for 61%. Out of total dryland of 121 ha potato covers 42% followed by Barley, Wheat, Radish Turnip, and mustard. Three varieties of potato is commonly grown in the valley, Desiree (red) , Kufri Jyoti (white) and Yusikaap (white). During contract system, to avoid admixture of the variety Sephu valley was separated to grow Kufri Jyoti so, it is know as Kufri Jyoti pocket. More than 70% of growers grow this variety, which has very good market in India.

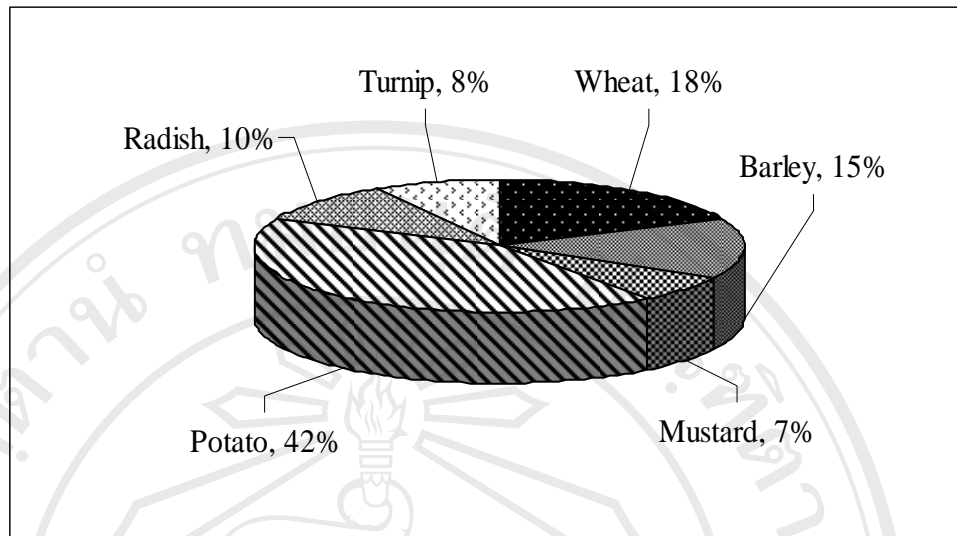


Figure 4.5: Crop types and share of cropped farmland in Sephu valley.
 Source: RNR Census, 2002.

The principal crops grown in the geog are potato, wheat, barley, mustard and vegetables. Potato dominates other crops as the main source of cash income and grown in 51 ha out of 121 ha dry land which constitutes 42%. There is possibility for farm mechanization as some of the agriculture lands are on gentle to moderate slopes. The area under potato can be increased substantially but the transportation of the produce from the farm to road head is the major constraint

Table 4.4: Cropping calendar at Sephu.

| Crops | Jan | Feb | Mar | Apr | May | June | July | Aug | Sept | Oct | Nov | Dec |
|---------|-----|-----|-----|-----|-----|------|------|-----|------|-----|-----|-----|
| Potato | | | P | | | | | H | | | | |
| Turnip | | | | | | | S | | | | H | |
| Wheat | | | | | | | | | S | | | |
| Radish | | | S | | | | H | H | | | | |
| Barley | | | | | | | | | | S | | |
| Mustard | | | S | | | | H | | | H | | |

Source: RNR Census, 2002.

S= Sowing; P= Planting; H=Harvesting.

4.2.2 Demography and access to services

The geog has 268 households and population of approximately 1,060. The geog consists of nine villages namely, Busa, Zeyerey, Lobsur, Rabo, Thangnay, Bumulo, Reybana, Kumbo and Rukubji. The geog is located about 81 km. away from Wangdiphodrang Dzongkhag and is connected by the Wangdi-Trongsa highway. The geog has 121 ha of dry land, 54 ha of Tseri land as per the revenue collection report recorded in the Dzongkhag. The geog is also livestock priority areas of Wangdiphodrang Dzongkhag. People mostly derive their livelihood from livestock most commonly yak and cattle.

The geog is situated on East-West highway which facilitates good transport and communication. The geog has one community school and one primary school to educate the village children. Basic Health Unit (BHU) grade-II provides medical attention to the village people as well as to the travelers. The BHU has telephone facility which can be used by the general public for the communication. The Agriculture and livestock extension centre provides service like information and training on production aspects and management to the farmers of the valley. As Sephu being one of the pockets for seed multiplication (Kufri Jyoti) of DSC, the farmers receive information and training from DSC on seed multiplication of potato and other crops too. Since, the households are scattered in the valley the farthest village from the Extension Centre, School, BHU is almost 3 km.

4.3 Bio-physical characteristics of Ura

The geog covers an area of about 267 km². The geog is located in the south-eastern part of Bumthang Dzongkhag. It is bordered by Chhoekhor and Chhume geogs to the west, Tang geog to the north, Zhemgang and Mongar Dzongkhags to the south, and Lhuentse Dzongkhag to the east. The altitude of the geog ranges from approximately 2,800 - 5,000 m. Forest covers 85% of total area comprises of coniferous forest and forest scrub. 98% of forest is under coniferous forest. The Ura valley has natural as well as improved pasture land.

The soil type in the geog is deep brown sandy loam and sandy loam and clayey which are good for potato, vegetables, buckwheat and barley cultivation. The soil being sandy loam favours for potato cultivation in the geog. The farmers use chemical fertilizers for potato production and more organic manure for other crops which helps to improve their soil condition and to improve their yield level.

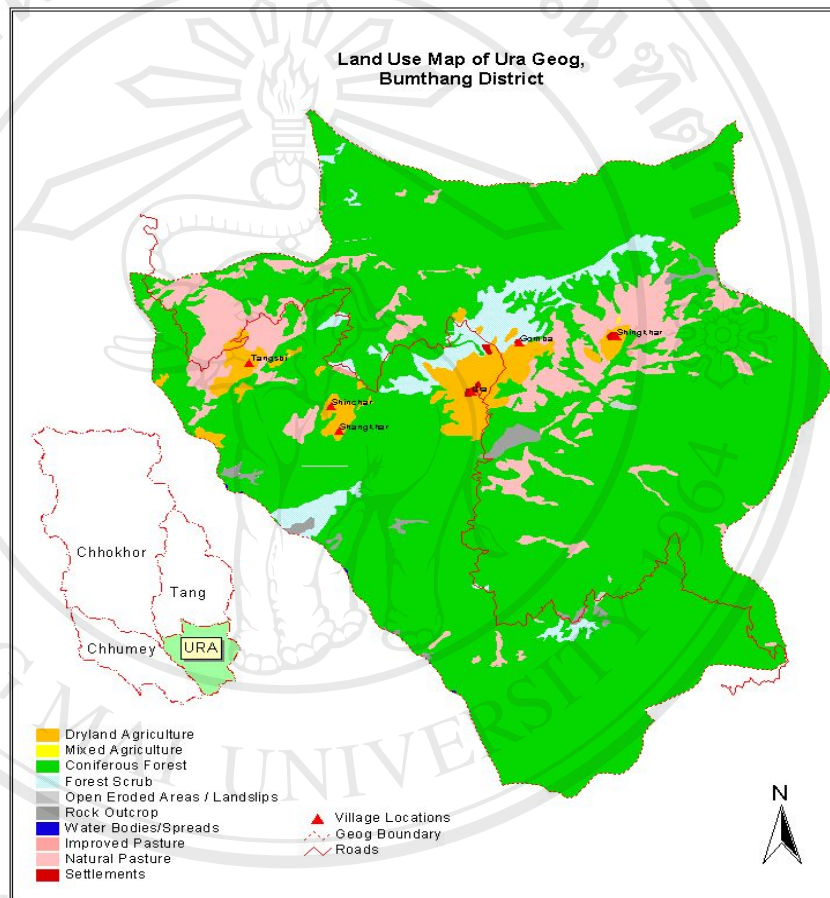


Figure 4.6: Land use map of Ura.

Source: MoA, 2004.

Ura has a cool temperate climate with warm humid summers and chilly winters. The temperature ranges from 20⁰ C in summer to as low as – 5⁰ C in winter. The geog receives an annual rainfall within the range of 800 - 1,200 mm most of which falls within the monsoon months.

The land use pattern of Ura is shown in Table 4.5. The Tseri/Pangshing (fallow land after slash and burn) constitutes 55% of the total operated land. Dry land consist of 304 ha (39%) in the geog.

Table 4.5: Ura Geog (Bumthang).

| Land use type | Area in ha |
|------------------------|------------|
| Wet land | 24 |
| Dry land | 304 |
| Tseri/ Pangshing | 432 |
| Kitchen Garden | 16 |
| Orchard | 3 |
| Operational Land Total | 779 |

Source: RNR Census, 2002.

4.3.1 Crop diversity and cropping systems

Ura valley grow diverse crops ranging from potato, maize, barley, wheat, sweet buckwheat, bitter buckwheat, wheat, mustard, millet, radish and turnip. Farmers practice potato based cropping system.

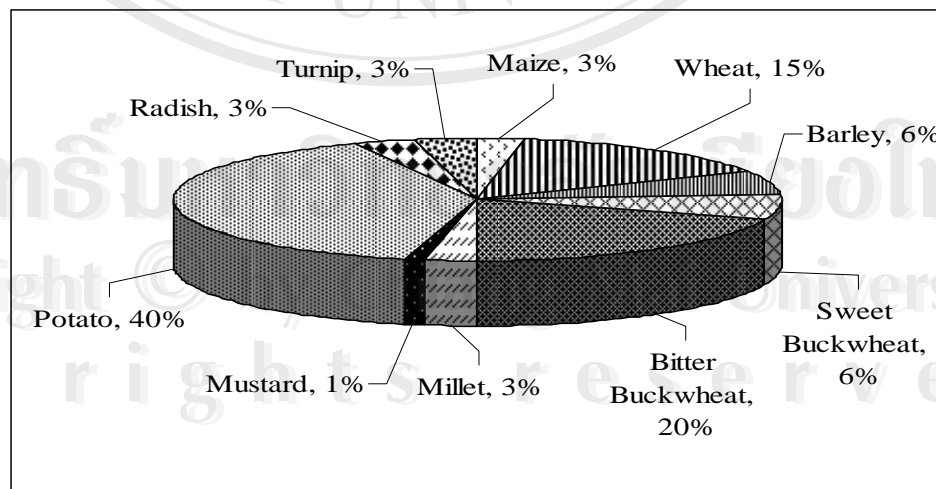


Figure 4.7: Crop types and share of cropped farmland in Ura valley.

Source: RNR Census, 2002.

From the total operational land of area of 779 ha, dryland accounts for 39%. Out of total dryland of 304 ha potato covers 40% followed by bitter buckwheat, Wheat, sweet buckwheat, Barley, Radish Turnip, millet and mustard. Farmer grows mainly Desiree for good taste and market and Yusikaap for higher yield. The main crops found in the geog are maize wheat, sweet buckwheat, bitter buckwheat, millet, barley, radish, turnip and potatoes. Potato dominates other crops as the main source of cash income and grown in 120 ha out of 304 ha dry land which constitutes 40% of the dry land cultivated

Table 4.6: Cropping calendar in Ura.

| Crops | Jan | Feb | Mar | April | May | June | July | Aug | Sept | Oct | Nov | Dec |
|---------|-----|-----|-----|-------|-----|------|------|-----|------|-----|-----|-----|
| Potato | | | P | | | | H | | | | | |
| B.wheat | | | | | S | | | | | H | | |
| Turnip | | | | | | | S | | | | H | |
| Wheat | | | | | | | | | S | | | |
| Radish | | | S | | | H | | H | | | | |
| Barley | | | | | | | | | S | | | |
| Mustard | | | S | | | | | | | H | | |

Source: RNR Census, 2002.

S= Sowing; P= Planting; H=Harvesting.

4.3.2 Demography and access to services

Ura geog consists of six major villages with 308 households. The people of Ura Geog have identified potato, vegetables and medicinal & aromatic plants as priority cash crops for their geog. Therefore, production of these crops are given priority through conducting farmers training, demonstration, on farm trials, holding field days, discussion, supply of improved seeds and seedlings.

The east-west national highway that links the western part of the country with eastern Dzongkhags passes through the Geog. Ura, Shingkhar and Shingneer villages are connected by feeder road. Ura village has electricity supply from a micro-hydel

located in the village. Ura Geog has three community schools and one Lower Secondary School with a total student of 470 from 308 households. The geog has good educational coverage. Majority of households are within one hour's walking distance from the nearest community primary school. The geog has Basic Health Unit (BHU) and three others Out Reach Clinics (ORC) to render public health services. Over 70% of the population of the Geog has access to piped drinking water supply and sanitation. It has one RNR Centre located at Pangkhar to support the farmers of the geog.

4.4 Summary

All the three sites are located above 2,500 m. The average annual rainfall is less than 1500 mm. The rainfall is mostly in the month of June to September. The summer temperature ranges from 18⁰ C to 22⁰ C and winter the temperature sometime goes – 7⁰ C. The cool temperature reduces the diseases and insect pest damage thus increasing the productivity level and tubers quality. The soils found in the areas are clay loam to sandy loam which highly favours the potato production. The forest is mainly broad leaf forest and it covers 69% in Phobjikha, 39% in Sephu and 85% in Ura. The selected sites were the seed potato producing areas in Bhutan. The dryland in Phobjikha constitutes about 87%, 61% in Sephu and 39% in Urea. The farmers grow diverse crops like potato, wheat, maize, barley, buckwheat, mustard, radish and turnip. Potato covers 60% in Phobjikha, 42% in Sephu and 40% in Ura out of the total cultivable dryland. The potato is the main cash crop for the farmers. The majority of the farmers depend on potato for their livelihood beside livestock products.

Access to services like School, Basic Health Unit and RNR Agriculture services are adequate. In Ura valley 70% of population have access to pipe drinking facilities. The Phobjikha and Sephu also have the pipe drinking water facilities but not to all the households. The Phobjikha is situated 20 km away from the East- West highway but it is connected with the feeder road. The East- West highway passes through Sephu and Ura so, the transportation of the produce to Phuntsholing for auction yard is feasible.