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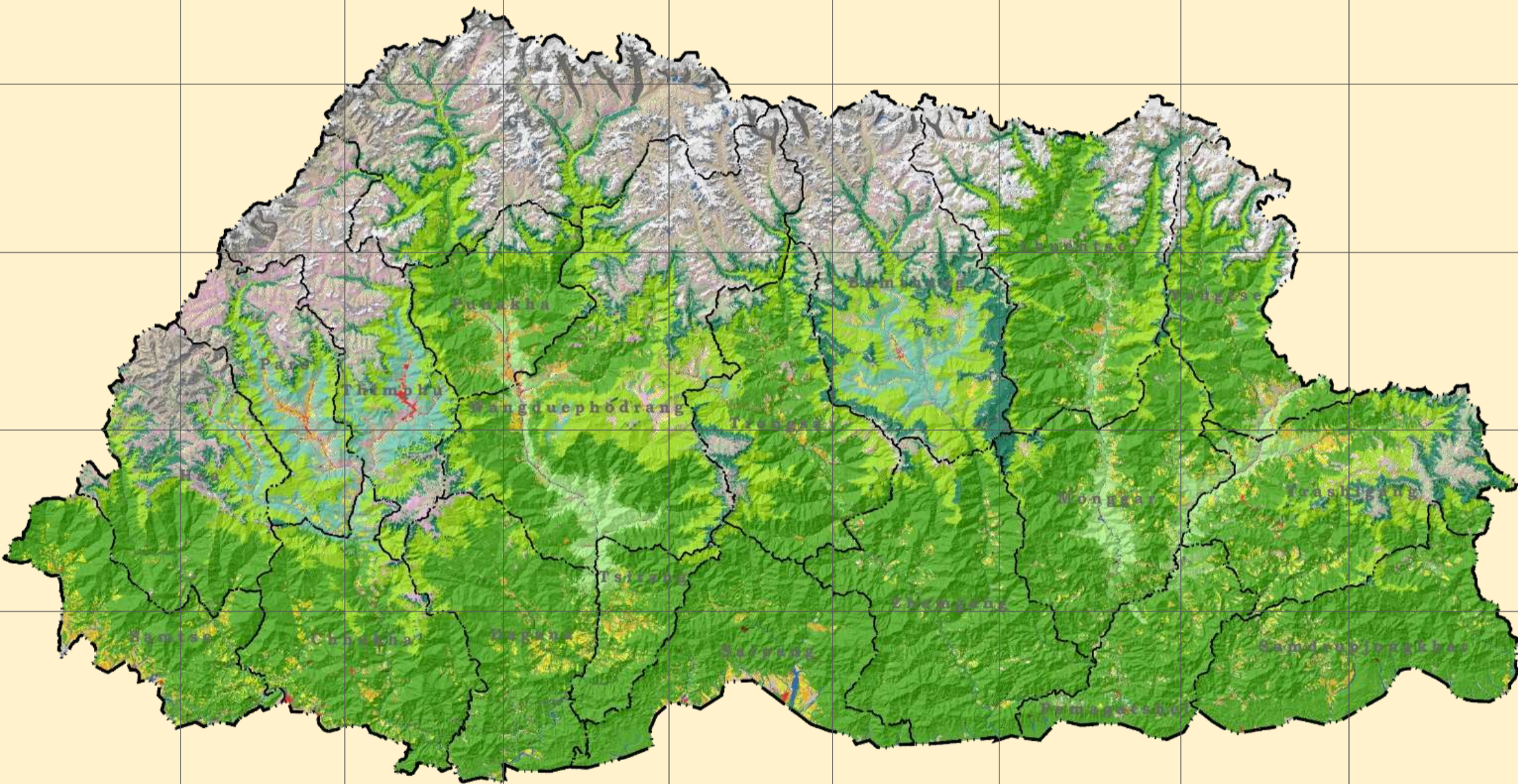
Royal Government of Bhutan
Ministry of Agriculture and Forests
Department of Forests and Park Services



LAND USE AND LAND COVER

OF

BHUTAN 2016



MAPS AND STATISTICS

Forest Resources Management Division

**LANDUSE AND LAND COVER
OF
BHUTAN 2016**

MAPS AND STATISTICS

Forest Resources Development Division

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སློབ་པོ།
MINISTER

སོ་ནམ་དང་ནགས་ཚལ་ལྷན་ཁག།
ROYAL GOVERNMENT OF BHUTAN
Ministry of Agriculture & Forests
Tashichhodzong, Thimphu : Bhutan



Foreword

Bhutan is a small country with high forest cover ranging from dense subtropical forest to alpine scrubs. Majority of population of Bhutan depends on natural resources and subsistence agriculture farming as the prime source of livelihood. However, due to accelerated socio-economic development of the nation, widespread conversion of both forest and agriculture land for developmental activities are observed throughout the country.

In order to monitor the land use and land cover change, the need for having updated and periodic land use and land cover assessment is indispensable. Such information is vital for strategizing the country's plans and programme for pursuing the national goal of sustainable development. The Ministry of Agriculture and Forests (MoAF) have been carrying out periodic national land use and land cover assessment over the last few decades. The first land use and land cover assessment was published in 1995 and the second assessment in 2010, which were both technically supported by international experts.

I am very happy that third land use land cover assessment in 2016 was successfully carried out by the national experts, which is first of its kind. This assessment was important not only to monitor the land use and land cover change but also help in the development of national forest monitoring system (NFMS) of Bhutan. The information from this assessment provides the latest land use and land cover status of Bhutan.

I therefore, welcome this publication of land use land cover of Bhutan 2016 which will serve as a source of geospatial and related information to government agencies, academic institutions, researchers and other users.

Yeshey Dorji
MINISTER



ཏུང་ཚེན།
SECRETARY

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Preface



The Ministry of Agriculture and Forests (MoAF) is pleased to bring out the land use and land cover Atlas of Bhutan 2016. This land use and land Cover 2016 constitutes the most comprehensive and updated information. It also provides spatially explicit overview of the current land use and land cover maps and statistics of 20 Dzonkhags.

The objective of this assessment was to update land use and land cover information which would enable in planning long-term conservation of natural resources and monitoring the land use and land cover changes. With the increasing pressure on land use due to our rapid developmental activities, information on the current status and trend of land use practices is necessary to understand the spatial distribution of land use and land cover. This exercise is complementary to the National Forest Inventory report for understanding the state of forest.

The Ministry of Agriculture and Forests commends the national experts, working in geographical information system (GIS) and remote sensing (RS) for their valuable contributions on the publication of the land use land cover (LULC 2016). Ministry would like to acknowledge all the relevant agencies who have collaborated and shared their information to produce this publication. Particularly I would like to thank National Land Commission Secretariat (NLCS) for sharing the national cadastral data which benefited immensely for mapping agricultural lands.

I would also like to thank Forest Resources Management Division, DoFPS for the useful national Land Use Land Cover 2016 of Bhutan.

Rinzin Dorji
SECRETARY



དཔལ་ལྷན་འབྲུག་གཞུང་། མོ་ནམ་དང་ནགས་ཚལ་ལྷན་ཁག། ནགས་ཚལ་དང་སྤྱིང་ཀ་ཞབས་ཏོག་ལས་ཁུངས།



Royal Government of Bhutan
Ministry of Agriculture and Forests
Department of Forests and Park Services
Thimphu: Bhutan

DIRECTOR

Acknowledgement



Department of Forest and Park Services (DoFPS) since its establishment has observed maturity in the way the forest resources are managed particularly in the capacities of technological advancement at landscape level management of natural resources. National experts working with geographical information system and remote sensing of the Ministry of Agriculture and Forests (MoAF) has produced the National and Dzongkhag statistics of the 2016 assessment of the land use and land cover of Bhutan.

The Land Use Land Cover 2016 of Bhutan provides useful information on the coverage and distribution of major land cover types in Bhutan to enable management and monitoring of natural resources and changes in forest area and carbon stock.

DoFPS would like to appreciate the support provided by Mr. Lobzang Dorji, Chief Forestry Officer, Forest Resources Management Division (FRMD) and all the relevant agencies for the conduct of the Land Use Land Cover 2016 (LULC 2016) of Bhutan. The Department also would like to commend on the excellent job done by the technical national experts, working in geographical information system (GIS) and remote sensing (RS) from relevant agencies under the MoAF.

The national land use land cover mapping would not have been possible without Bhutan REDD+ Readiness project funded by Forest Carbon Partnership Facility (FCPF) delivered through World Bank (WB).

I am sure this document will serve as significant source of information for many of the developmental programs of the country.

Phento Tshering
DIRECTOR

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DESCRIPTION OF CLASSES

1. FORESTS

Forests means land with trees spanning more than 0.5 hectares with trees higher than 5 meters and a canopy cover of more than 10 percent. It does not include land that is predominantly under agricultural or urban land use (National Forest Policy of Bhutan, 2011). This class is further divided into different forest type.

1.1 Blue Pine Forest (FCb)

The “Blue Pine Forest” consists of pure or dominant stands of blue pine, usually at an altitude between 1500m and 3200m asl. Smaller areas of mixed conifers and broadleaf forest may occur interspersed in the blue pine mapping unit, but because of their small areas they are often left unrecorded.

1.2 Chir Pine Forest (FCc)

The “Chir Pine Forest” consists normally of pure stands of chir pine, usually at altitudes between 700m and 2000m asl. at relatively dry areas. However, in depressions and water courses, broadleaf might occur but these areas are usually small and included within the chir pine mapping unit.

1.3 Mixed Conifer Forest (FCmc)

The “Mixed Conifer Forest” includes mixed stands of spruce, hemlock, juniper, fir, larch, taxus and blue pine. Some broadleaf inclusions are also common particularly oaks, rhododendron, maple and birch. It usually occurs between 2500m and 3500m asl.

1.4 Fir Forest (FCf)

The “Fir Forest” consists either of largely pure stands of fir or few stands of other species such as junipers, taxus and larch. This category occurs mostly above 3000m asl.

1.5 Broadleaf Forest (FB)

The “Broadleaf Forest” consists of dominantly broadleaf trees. Commonly broadleaf forest is found below 3000m asl. In some case broadleaf is mixed with few stand of other conifer species, however, owing to the smaller area, it is mapped under broadleaf forest.

2. ALPINE SCRUB (AS)

Alpine scrub is woody plant characterized by stunted growth (height less than 5meter) due to harsh condition. They are found at higher elevation above 3500 meter asl. close to tree line. Predominant species includes dwarf rhododendrons and junipers.

3. SHRUBS (SH)

Shrubs are perennial plants with persistent and woody stem without any defined main stem with height less than 5 meter. It also includes abandoned agricultural fields with overgrown bushes and other regeneration in disturbed areas.

4. MEADOWS (Md)

Meadows include any areas dominated by grasses or any herbaceous plant without or with few scattered trees or shrubs on it. It occurs at all elevations, but is relatively more common at higher elevations.

5. CULTIVATED AGRICULTURAL LAND

Cultivated agricultural land includes only those agricultural land that are cultivated at the time of land cover assessment. It is further divided into sub classes.

5.1 Chhuzhing (AC)

Chhuzhing means irrigated and or bench terraced agricultural land for paddy based cropping systems.

5.2 Kamzhing (AK)

Kamzhing refers to cultivated rain-fed areas (dry land). Some Kamzhing lands have certain level of land shaping.

5.3 Orchards (AO)

Orchard refers to planted fruit bearing trees like apple, orange, areca nut, etc.

6. BUILT UP AREAS (BA)

Built up areas includes artificial constructions covering the land with an impervious (e.g. concrete, CGI sheet, thatch) surface. It includes airport, rural settlements, urban areas, schools & institutes, industrial areas, hospital premises, sewage treatment plant, sports and leisure facilities and roads.

7. NON BUILT UP AREAS (NBA)

This class is defined by absence of the original (semi-) natural cover mainly due to anthropogenic factors. It includes waste dump sites, mines, stone quarries and other extraction sites.

8. WATER BODIES

This class includes both natural and artificially created water bodies. It is further dived into two sub classes:

8.1 Lakes (WL)

Lakes refers the area of perennial and natural water surrounded by land. It includes both natural and manmade.

8.2 Rivers (WR)

Rivers refers to perennial flow of water and the river beds. It also includes artificially constructed reservoir (dam) along the course of perennial rivers.

9. SNOW AND GLACIERS (SG)

This class includes both perpetual and seasonal snow cover and glaciers.

10. MORAINES (Mo)

Moraines refers to a mass of rocks and sediments carried down and deposited by a glacier typically as ridges at its edges or extremity.

11. SCREE (Sr)

Scree refers to a mass of small loose stones that form or cover a slope on a mountain.

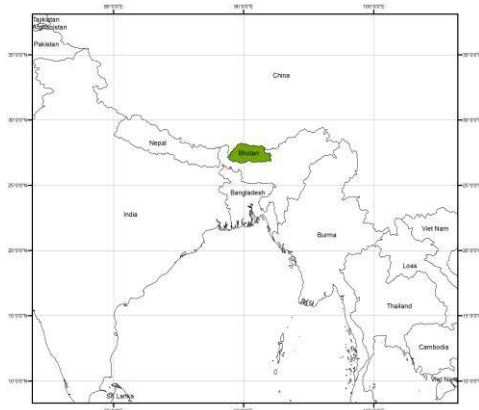
12. LANDSLIDE (Ls)

This class includes mass movement of soils debris due to gravitational force triggered by other factors such as rainfall and earthquakes.

13. ROCKY OUTCROPS (RO)

Rocky outcrops refer to natural cliffs and rocky areas

1 BHUTAN



BHUTAN IS A KINGDOM in the Eastern Himalayas. It is situated between the Tibetan plateau in the North and the Indian plain in the South. Bhutan's total area is 38394 km². 70 million years ago, during the Cretaceous Period, the Tethys Sea covered the area where we today find the Himalayas. North of the Tethys Sea was the Asian Continent and to the South the Indian Continent. During the Tertiary Period, more than 10 million years ago, tectonic movements (the continental drift) pressed the Indian plate against the Asian, and the Himalayan Range was erected. The way the Himalayas were created explains the topography and geology of Bhutan today. The V-shaped valleys, formed by rivers and streams, between the high mountain ranges aligned North-South, drain the catchments from the high altitudes in the North to the plains in the South. Within a distance of less than 175km, the altitude declines from approx. 7500 m to only approx. less than 100m above sea level. A few broad U-shaped glacial valleys are also found in the Eastern and central part of the country.

Bhutan is divided into six agro-ecological zones namely Alpine, Cool Temperate, Warm Temperate, Dry Subtropical, Humid Subtropical and Wet Subtropical (Dorjee, 1995). The climate and soils determine the natural vegetation zonation. According to Grierson and Long (1983), the major vegetation zones of Bhutan is broadly categorized as Subtropical forest, Warm broadleaf forest, Chir pine forest, Cool moist broadleaf forest, Evergreen oak forest, Blue pine forest, Spruce forest, Hemlock forest, Fir forest, Juniper/rhododendron, Dry alpine scrub.

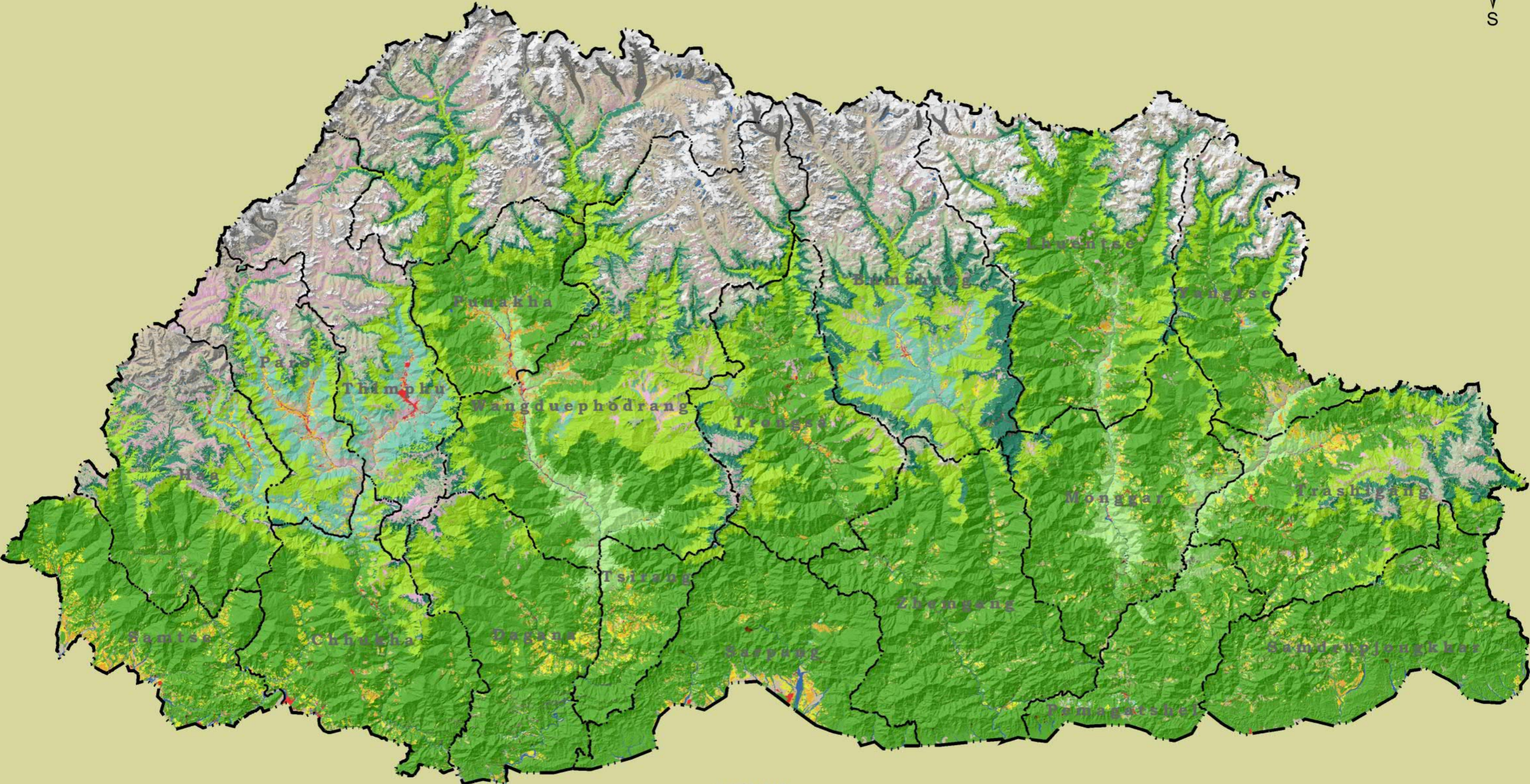
In Bhutan, majority of the total population are subsistence farmers and depend on agriculture and livestock for their livelihoods. However, due to very rugged terrain (limited agricultural land) and extreme climatic conditions (short growing season), agriculture in the country is severely constrained. As a result, most of the agricultural lands are located in the narrow 'V' shaped valley bottoms and lower hill slopes which are often threatened by flash floods and land degradation. *Kamzhing*, *Chhuzhing* and orchards are the main agriculture land use types in the country. Farmers grow varieties of crops including rice, maize, wheat, barley, millet, potato, mustard, beans, ginger, chilli and different green leafy vegetables. Oranges, apples and cardamom are also grown as main cash crops.

The LULC (2016) land cover assessment shows a national forest cover of 70.77% (excluding shrubs), of which 45.94% is Broadleaf, 13.53% is Mixed Conifer, 6.02% is Fir, 2.64% is Chir pine and 2.64% is Blue pine. The Alpine Scrub is 3.39%, Shrubs constitute 9.74%, while cultivated agricultural land and meadows account for 2.75% and 2.51% respectively. The snow cover constitutes 5.35% and rocky outcrops 4.15% while water bodies, built up areas, non-built up areas, landslides and moraines constitute less than 1% each.

Land Cover Class	Sub Class	Area (Ha)	Area (%)
Alpine Scrubs		130097.72	3.39%
Built up		7457.03	0.19%
Cultivated Agriculture		105682.43	2.75%
	Chhuzhing	31891.87	0.83%
	Kamzhing	68260.64	1.78%
	Orchards	5529.92	0.14%
Forests		2717161.64	70.77%
	Bluepine	101155.06	2.64%
	Broadleaf	1763899.46	45.94%
	Chirpine	101537.45	2.64%
	Fir	230983.99	6.02%
	Mixed conifer	519585.68	13.53%
Landslides		3730.22	0.10%
Meadows		96273.61	2.51%
Moraines		14393.94	0.37%
Non Built up		595.89	0.02%
Rocky Outcrops		159455.55	4.15%
	Rocky Outcrops	119754.16	3.12%
	Scree	39701.39	1.03%
Shrubs		374032.56	9.74%
Snow and Glacier		205343.63	5.35%
Water Bodies		25175.78	0.65%
	Lake	6252.58	0.16%
	Rivers	18923.20	0.49%
Grand Total		3839400.00	100.00%

Altitude (M)	<600	600-1200	1200-1800	1800-2400	2400-3000	3000-3600	3600-4200	4200-4800	4800-5400	5400-6000	6000-6600	>6600
Area SqKm	2000.00	3900.62	5030.58	5320.38	5700.07	5200.09	4345.00	3900.25	2490.25	441.12	52.86	12.78

Bhutan Land Use Land Cover 2016



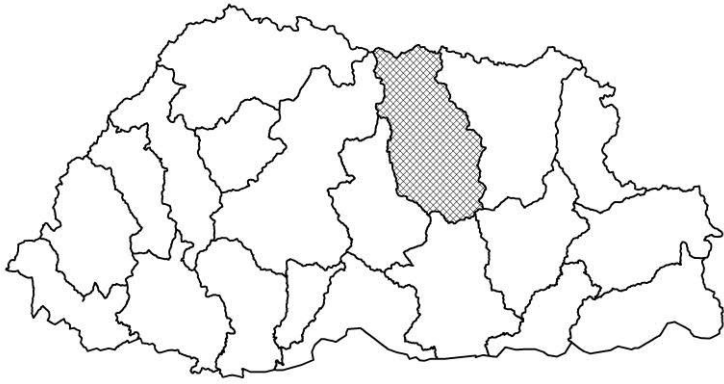
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Legend

Alpine Scrubs	Broadleaf	Chhuzhing	Fir	Lake	Meadows	Moraines	Orchards	Rocky Outcrops	Shrubs
Bluepine	Built up	Chirpine	Kamzhing	Landslides	Mixed conifer	Non Built up	Rivers	Scree	Snow and Glacier

2 BUMTHANG



BUMTHANG DZONGKHAG is situated between Trongsa and Lhuentse Dzongkhags. (27°19' to 28°04' latitude and 90°28' to 91°00' longitude) and shares its borders with China in the North. The total area of Bumthang Dzongkhag is approximately of 2667.76 km².

The elevation ranges from 2000 m to 6800 m above sea level. Bumthang remains cold for the major part of the year so the summer period is rather short. The climate is mainly temperate with an annual rainfall between 1000 mm and 1500 mm.

Bumthang has about 51.79% of its total area under forest cover consisting of mainly blue pine species. The Dzongkhag falls under the

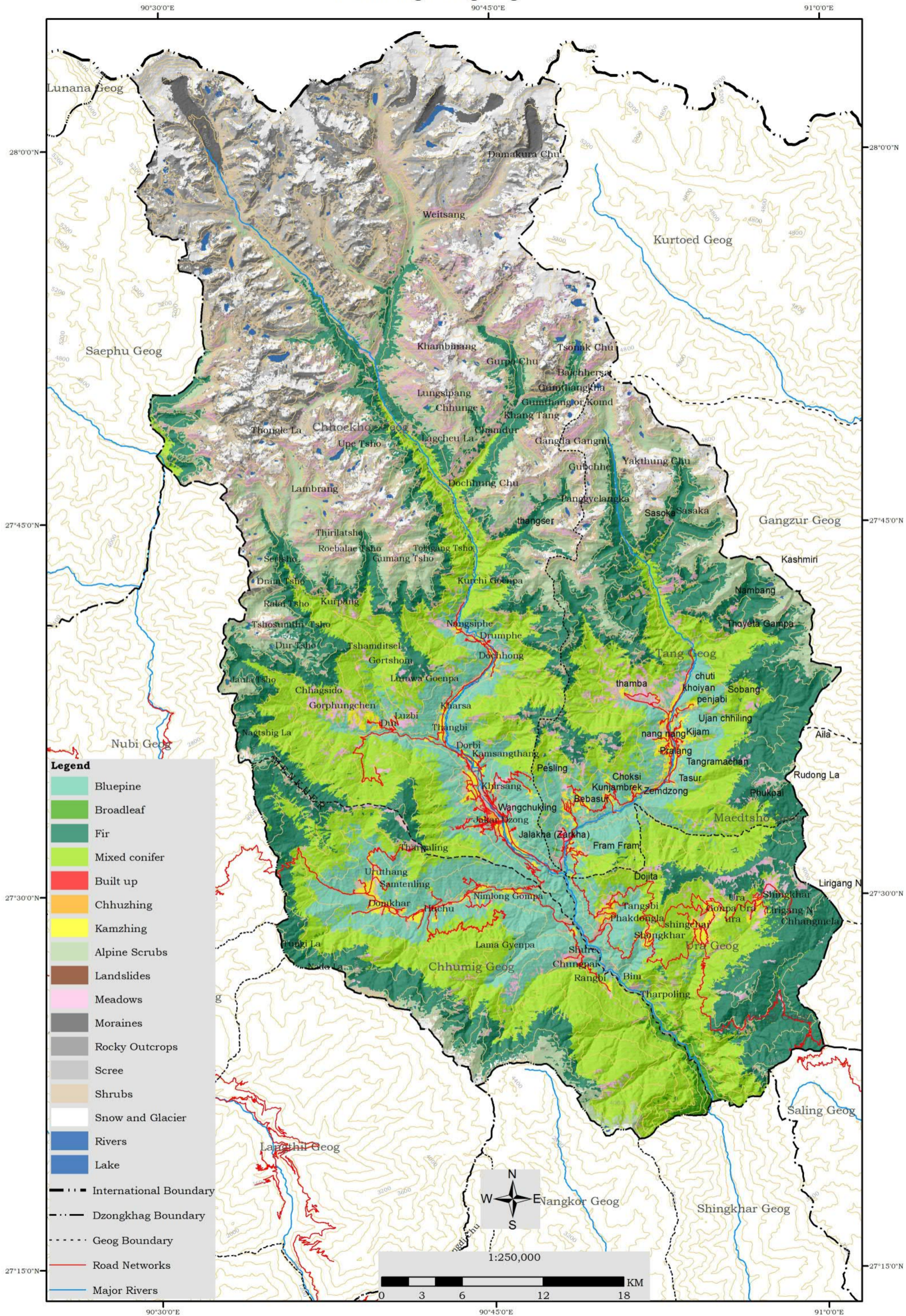
Wangchuck Centennial National Park and Phrumsengla National Park.

Only about 1.26% of the Dzongkhag's total area is under agriculture mainly *Kamzhing* followed by *Chhuzhing*. Some of the import crops grown are potato, buckwheat, and up-land paddy.

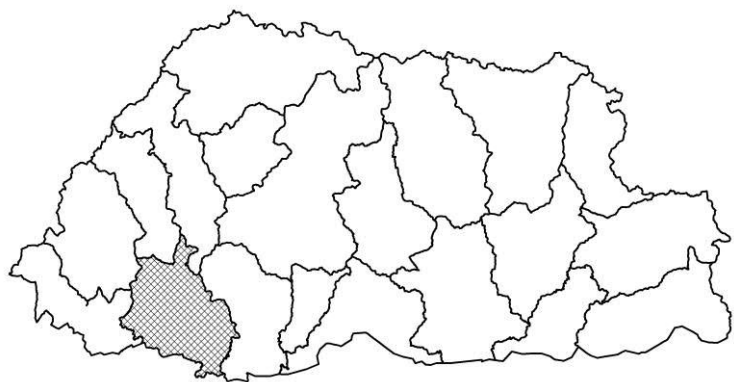
Land Cover Class	Sub Class	Area (Ha)	Area (%)
Alpine Scrubs		24647.39	9.16%
Built up		470.78	0.17%
Cultivated Agriculture		3394.27	1.26%
	Chhuzhing	68.61	0.03%
	Kamzhing	3325.67	1.24%
Forests		139356.72	51.79%
	Bluepine	28614.70	10.63%
	Broadleaf	1474.88	0.55%
	Fir	49315.79	18.33%
	Mixed conifer	59951.35	22.28%
Landslides		2.90	0.00%
Meadows		10125.98	3.76%
Moraines		2032.70	0.76%
Rocky Outcrops		23778.90	8.84%
	Rocky Outcrops	15153.74	5.63%
	Scree	8625.16	3.21%
Shrubs		34318.15	12.75%
Snow and Glacier		29118.21	10.82%
Water Bodies		1845.19	0.69%
	Lake	1347.84	0.50%
	Rivers	497.36	0.18%

Altitude (M)	<600	600-1200	1200-1800	1800-2400	2400-3000	3000-3600	3600-4200	4200-4800	4800-5400	5400-6000	6000-6600	>6600
Area (SqKm)	0.00	0.00	0.00	8.77	276.81	703.73	689.37	513.45	460.29	51.67	4.04	0.19

Bumthang Dzongkhag



3 CHHUKHA



CHHUKHA DZONGKHAG lies within the 26°43' to 27°18' latitude and 89°15 to 89°49' longitude. It borders with Samtse to the West, Ha to the North-West, Paro and Thimphu to the North and Dagana to the East. Towards the South, it borders with India. It covers an area of approximately 1879.77 km².

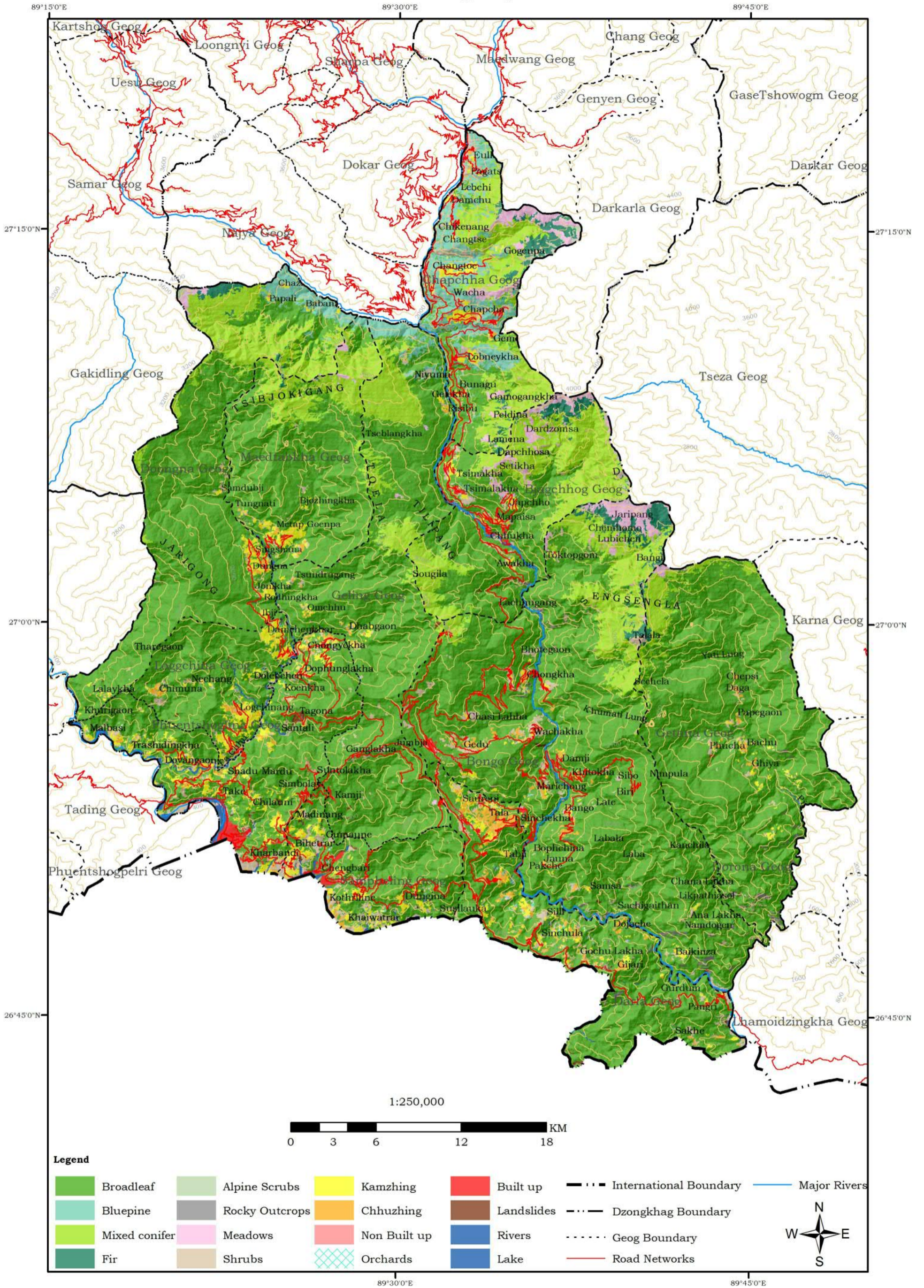
The Chhukha Dzongkhag has an altitudinal range between 200m to 4400m asl and the summer is hot and winter is cold. Annual precipitation ranges from 750 mm in the North to 4000mm in the South. The forest covers about 89.26% of the total area of the Dzongkhag.

Chhukha Dzongkhag is dominated by *Kamzhing* where potato, maize, wheat, barley, ginger, chilli and green vegetable are grown. However, *Chhuzhing* is also found in its lower altitudes. The main sources of rural cash income are oranges and potatoes.

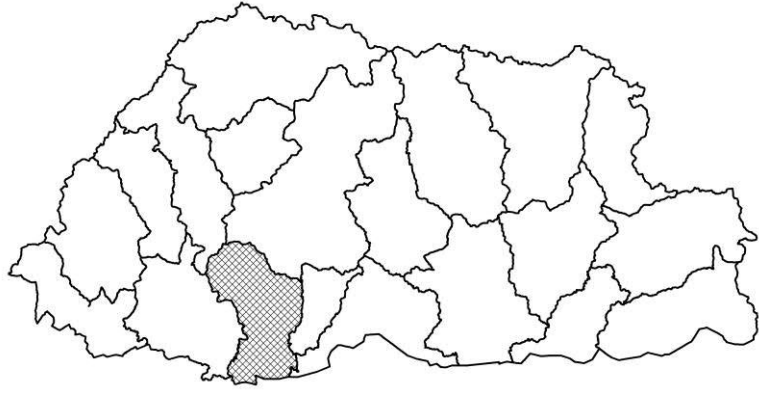
Land Cover Class	Sub Class	Area (Ha)	Area (%)
Alpine Scrubs		178.25	0.10%
Built up		834.56	0.45%
Cultivated Agriculture		7858.10	4.22%
	Chhuzhing	1882.87	1.01%
	Kamzhing	5653.05	3.04%
	Orchards	322.19	0.17%
Forests		166151.06	89.26%
	Bluepine	4977.63	2.67%
	Broadleaf	136087.35	73.11%
	Fir	2189.20	1.18%
	Mixed conifer	22896.87	12.30%
Landslides		348.09	0.19%
Meadows		2625.19	1.41%
Non Built up		44.65	0.02%
Rocky Outcrops		461.87	0.25%
Shrubs		6261.76	3.36%
Water Bodies		1385.73	0.74%
	Lake	2.62	0.00%
	Rivers	1383.11	0.74%
Grand Total		186149.27	100.00%

Altitude (M)	<600	600-1200	1200-1800	1800-2400	2400-3000	3000-3600	3600-4200	4200-4800	4800-5400	5400-6000	6000-6600	>6600
Area (SqKm)	122.32	329.33	398.78	388.96	358.53	220.52	55.95	0.38	0.00	0.00	0.00	0.00

Chhukha Dzongkhag



4 DAGANA



falls under this Dzongkhag.

Kamzhing followed by *Chhuzhing*) are the dominant agriculture land use type. Some of the important crops grown in this Dzongkhag are maize, rice and millet. Orange and cardamom are also grown as cash crops.

DAGANA DZONGKHAG lies between 26°41' to 27°16' latitude and 89°43' to 90°03' longitude and shares border with Chhukha and Thimphu Dzongkhags to the West, Wangdue-Phodrang Dzongkhag to the North, Tsirang Dzongkhag to the East. The Dzongkhag covers an area of approximately 1722.83 km².

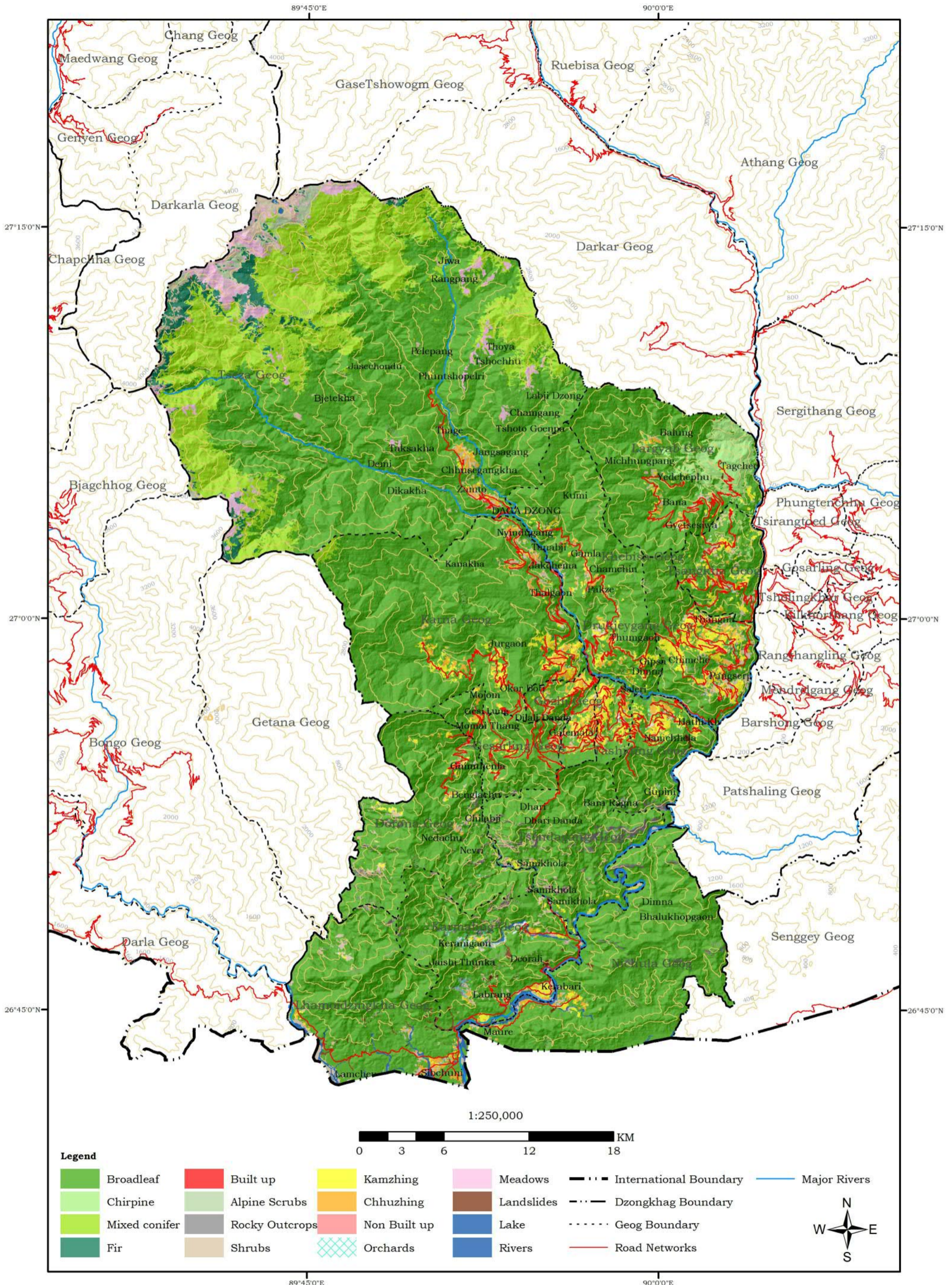
The elevation of the Dzongkhag ranges from less than 100 m to 4700 m above sea level. Northern part of Dzongkhag lies in temperate zone while the lower Southern parts of the Dzongkhag lies in subtropical zone. The annual rainfall ranges from 750 mm to 2000 mm.

Dagana has about 89.14% of its total area under forest cover consisting of mainly broadleaf species. Phibsoo Wildlife Sanctuary also

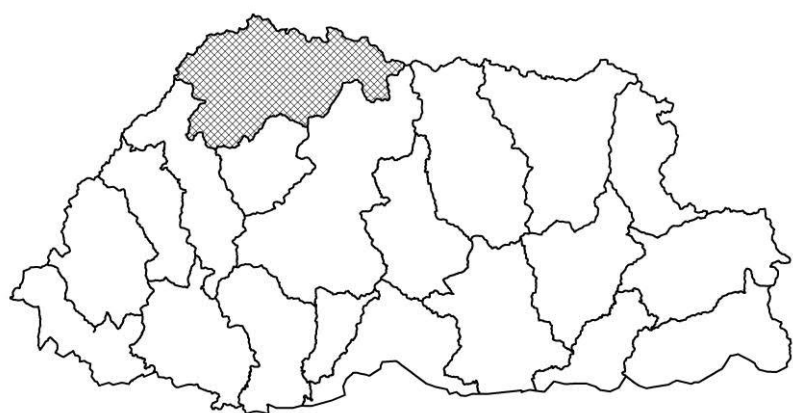
Land Cover Class	Sub Class	Area (Ha)	Area (%)
Alpine Scrubs		824.03	0.48%
Built up		107.15	0.06%
Cultivated Agriculture		7396.92	4.34%
	Chhuzhing	2028.81	1.19%
	Kamzhing	4798.88	2.81%
	Orchards	569.22	0.33%
Forests		152086.11	89.14%
	Broadleaf	129693.17	76.02%
	Chirpine	1966.87	1.15%
	Fir	1916.96	1.12%
	Mixed conifer	18509.11	10.85%
Landslides		290.62	0.17%
Meadows		2252.14	1.32%
Non Built up		7.11	0.00%
Rocky Outcrops		849.64	0.50%
Shrubs		5213.50	3.06%
Water Bodies		1580.71	0.93%
	Lake	28.27	0.02%
	Rivers	1552.44	0.91%

Altitude (M)	<600	600-1200	1200-1800	1800-2400	2400-3000	3000-3600	3600-4200	4200-4800	4800-5400	5400-6000	6000-6600	>6600
Area SqKm	250.30	326.14	326.42	329.98	286.70	120.91	63.82	17.64	0.00	0.00	0.00	0.00

Dagana Dzongkhag



5 GASA



GASA DZONGKHAG lies to the North of Punakha Dzongkhag. It has an area of approximately 3134.45 km². Two main rivers, Pho Chhu and Mo Chu, originates from the snowclad catchments in the Northern part of this Dzongkhag. The elevation ranges from about 1500 m to 7500m above sea level. Gasa Dzong is located on a hill top with a small town emerging on the South-Eastern facing slope.

Precipitation during autumn and spring is in the form of snow and the summers are cool. Most of the Dzongkhag is therefore covered by snow during the winter.

Approximately 19.60% of the total area is under forest cover. Most of the forest occurs in the Southern part of the Dzongkhag. Alpine pastures serves as important grazing land for yaks. Major area of

Gasa Dzongkhag falls under the Jigme Dorji National Park, and many different types of valuable medicinal plants and herbs are grown in the higher altitude areas. The national animal, Takin, is also found in this Dzongkhag.

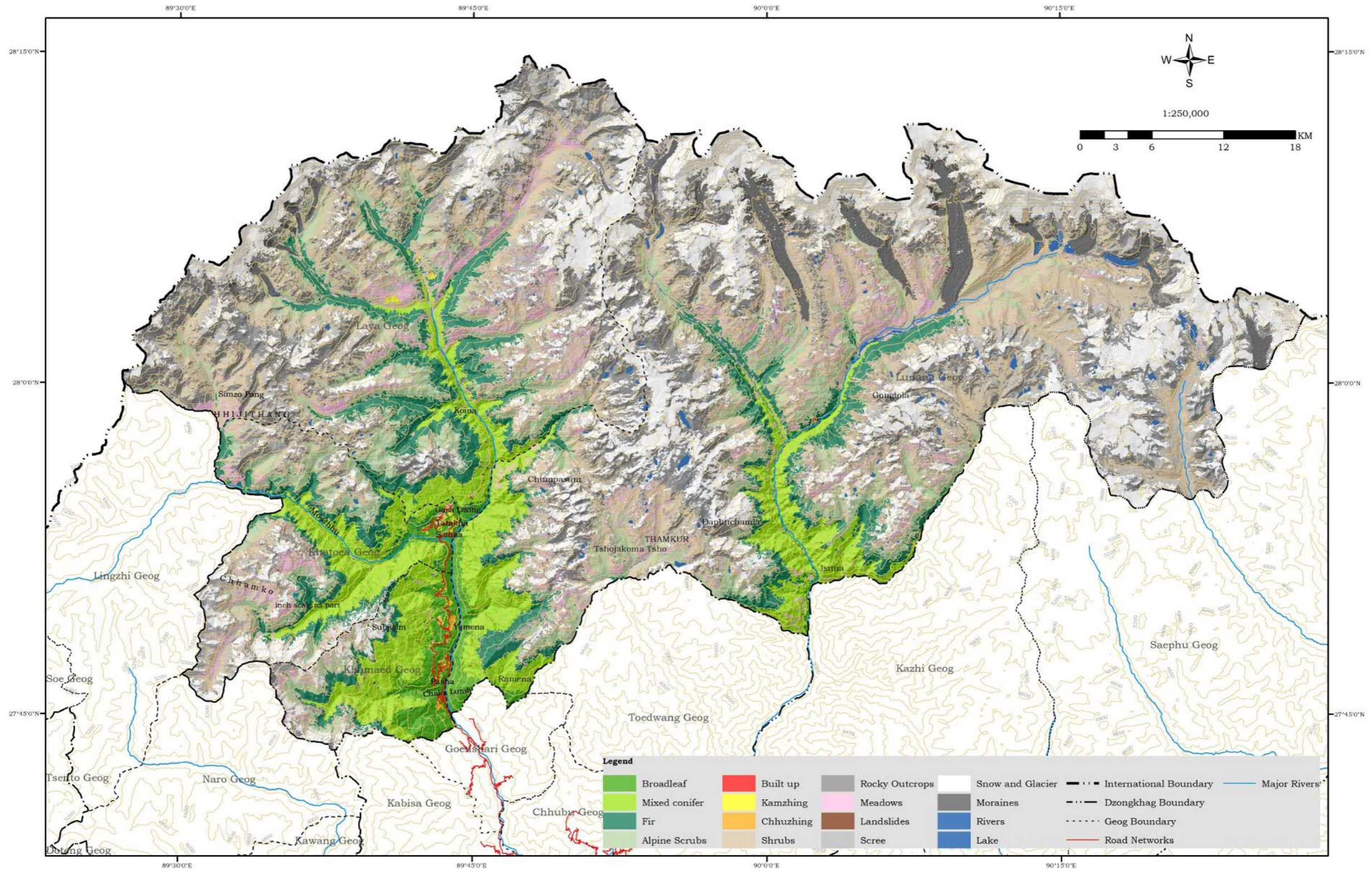
The major portion of land is of little use for arable purpose. The Dzongkhag has, however, a good but small productive area of *Chhuzhing* and *Kamzhing* in the lower altitudes. Livestock rearing is an important occupation in the Northern part where agriculture is not possible due to the short growing season.

The major cash income is from the sale of animal products. The people of Gasa often barter their products with the people of Punakha.

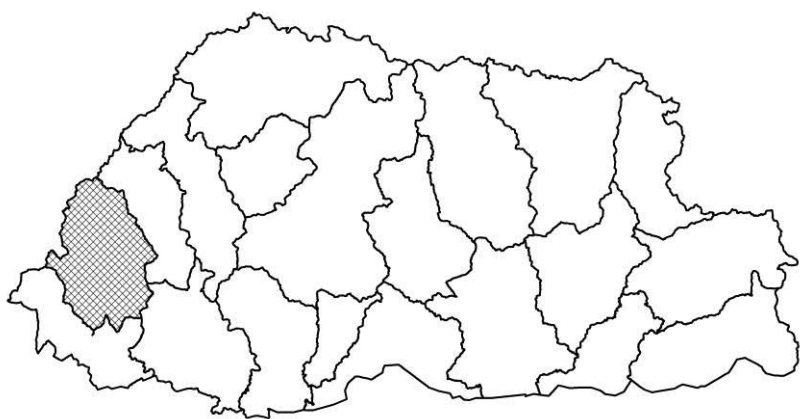
Land Cover Class	Sub Class	Area (Ha)	Area (%)
Alpine Scrubs		25344.42	8.17%
Built up		21.35	0.01%
Cultivated Agriculture		461.01	0.15%
	Chhuzhing	148.40	0.05%
	Kamzhing	312.62	0.10%
Forests		60852.99	19.60%
	Broadleaf	7164.41	2.31%
	Fir	25137.07	8.10%
	Mixed conifer	28551.51	9.20%
Landslides		64.42	0.02%
Meadows		10985.12	3.54%
Moraines		9402.26	3.03%
Rocky Outcrops		62700.68	20.20%
	Rocky Outcrops	50554.02	16.29%
	Scree	12146.66	3.91%
Shrubs		69547.95	22.41%
Snow and Glacier		68734.06	22.14%
Water Bodies		2283.49	0.74%
	Lake	1819.83	0.59%
	Rivers	463.66	0.15%

Altitude (M)	<600	600-1200	1200-1800	1800-2400	2400-3000	3000-3600	3600-4200	4200-4800	4800-5400	5400-6000	6000-6600	>6600
Area SqKm	0.00	0.00	1.76	32.59	101.10	201.08	488.36	961.36	985.59	277.97	39.17	12.02

Gasa Dzongkhag



6 HAA



HAA DZONGKHAG lies in the extreme West of the country (27°1' to 27°37' latitude and 88°54 to 89°23' longitude). It borders with Samtse and Chhukha Dzongkhags to the South and Paro Dzongkhag to the East. Towards West it borders with India and China. It covers an area of approximately 1904.87 km². Ha Chhu is the main river in the Dzongkhag.

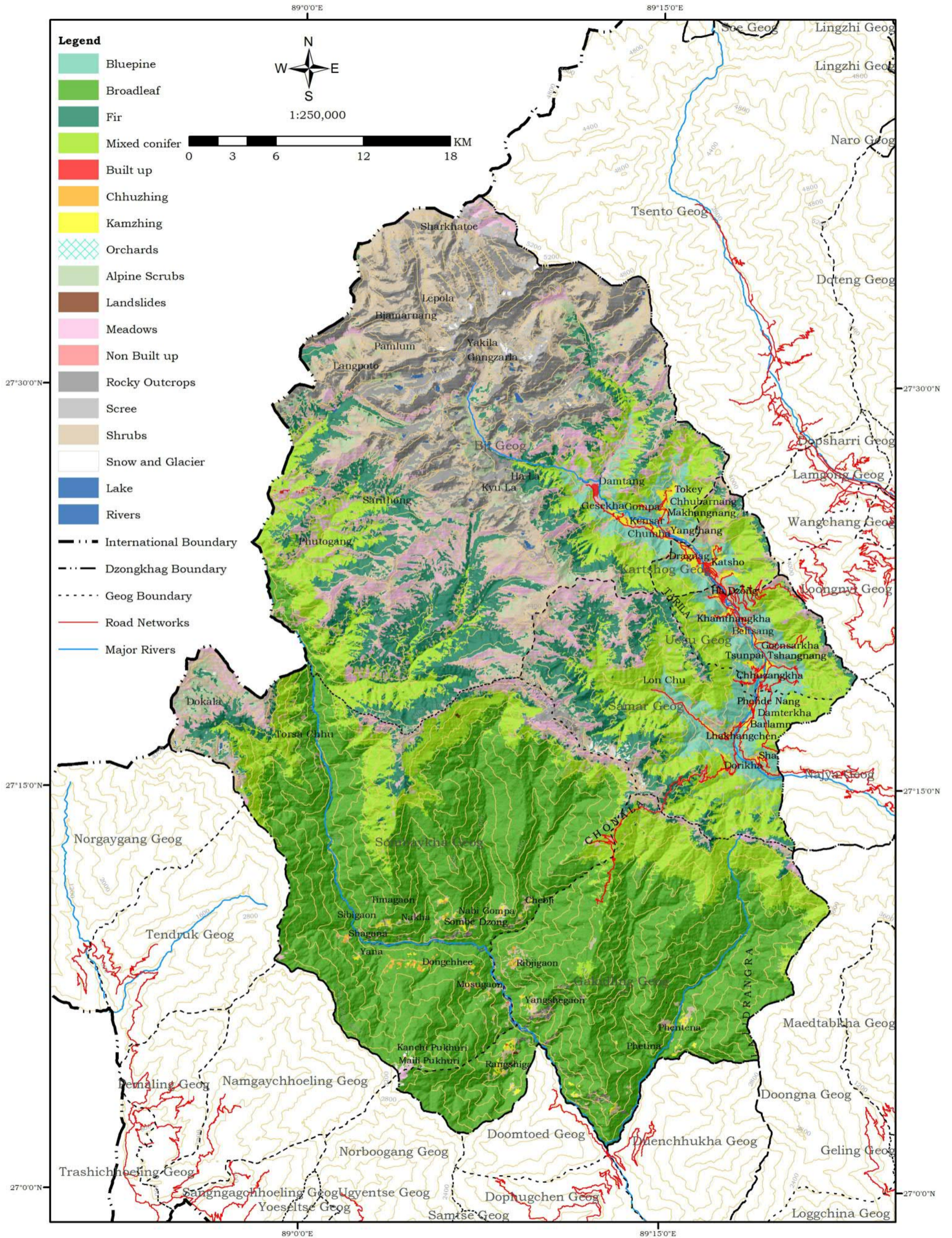
Haa Dzongkhag has an altitudinal range between 600m to 5600m asl and has a temperate climatic condition with cool summer and cold winter. The annual rainfall is about 750mm to 2000mm with precipitation in the form of snowfall during winter. Conifer and broadleaf forests dominate the Dzongkhag forest type with 33.37 and 33.30% of the total area respectively. The North-West part of Dzongkhag is under Jigme Khesar Strict Nature Reserve.

Only about 0.91% of the total area is under cultivated agricultural land. *Kamzhing* is the dominant land use type in the Dzongkhag and farmers grow mostly maize, potatoes, wheat, buckwheat, barley, chilli and other vegetables.

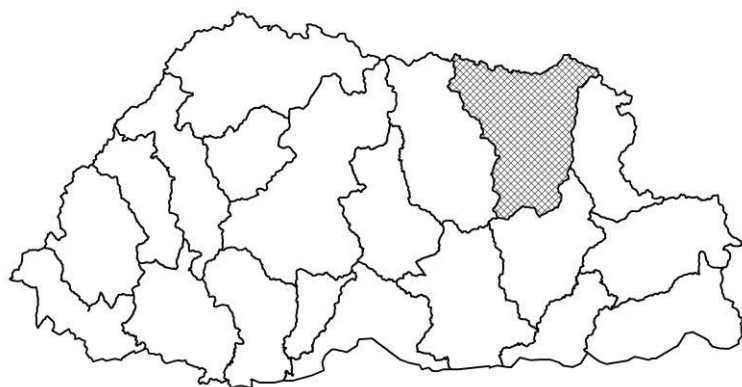
Land Cover Class	Sub Class	Area (Ha)	Area (%)
Alpine Scrubs		4314.45	2.29%
Built up		271.34	0.14%
Cultivated Agriculture		1711.26	0.91%
	Chhuzhing	181.44	0.10%
	Kamzhing	1481.85	0.79%
	Orchards	47.97	0.03%
Forests		125772.40	66.67%
	Bluepine	8101.97	4.30%
	Broadleaf	62824.79	33.30%
	Fir	19325.08	10.24%
	Mixed conifer	35520.56	18.83%
Landslides		18.65	0.01%
Meadows		9481.98	5.03%
Non Built up		2.71	0.00%
Rocky Outcrops		15873.90	8.42%
	Rocky Outcrops	14018.66	7.43%
	Scree	1855.23	0.98%
Shrubs		30113.74	15.96%
Snow and Glacier		399.51	0.21%
Water Bodies		675.32	0.36%
	Lake	218.22	0.12%
	Rivers	457.09	0.24%

Altitude (M)	<600	600-1200	1200-1800	1800-2400	2400-3000	3000-3600	3600-4200	4200-4800	4800-5400	5400-6000	6000-6600	>6600
Area SqKm	0.83	40.83	126.68	197.41	341.33	410.98	452.47	273.28	40.99	0.42	0.00	0.00

Haa Dzongkhag



7 LHUENTSE



LHUENTSE DZONGKHAG (27°23' to 28°04' latitude and 90°46' to 91°28' longitude) is bordered by Bumthang Dzongkhag to the West, Trashigang Dzongkhag to the East and Mongar Dzongkhag to the South. It borders with China to the North. Lhuentse covers an area of approximately 2808.53 km².

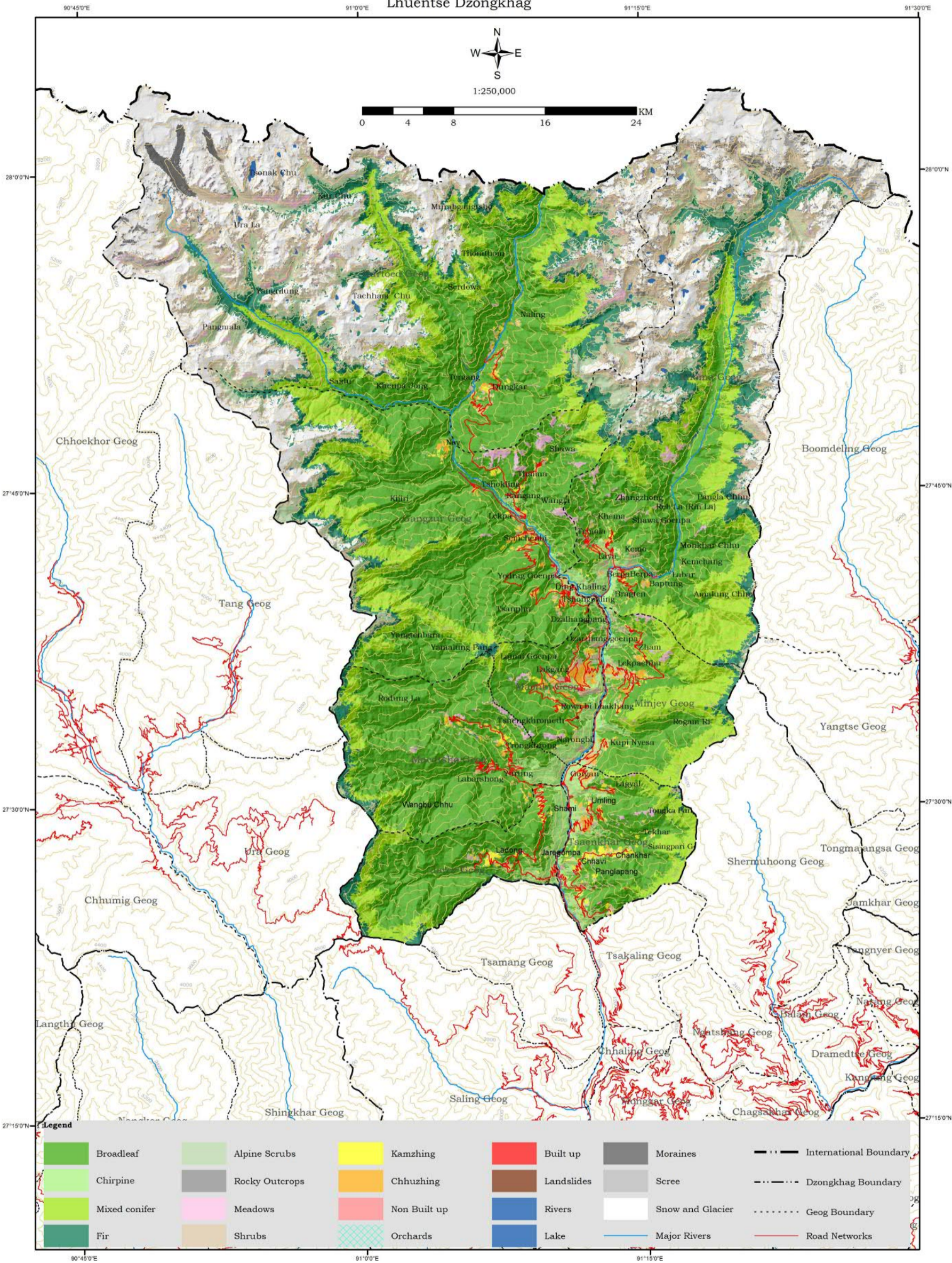
The elevation ranges from 900 m to 6300 m above sea level. The climate is characterized by warm summer and cold winter. The annual rainfall ranges from 1000mm to 1500mm. Almost 64.79% of the Dzongkhag's total area is under forest cover. Lemon grass, which can be used for essential oils production is grown naturally under the chir pine stands. The Dzongkhag falls under Wangchuck Centennial National Park, Phrumsengla National Park and Bumdeling Wildlife Sanctuary.

Kamzhing is the dominant agriculture land use followed by *Chhuzhing*. Rice, maize, chilli, potatoes and soya beans are cultivated in the Dzongkhag.

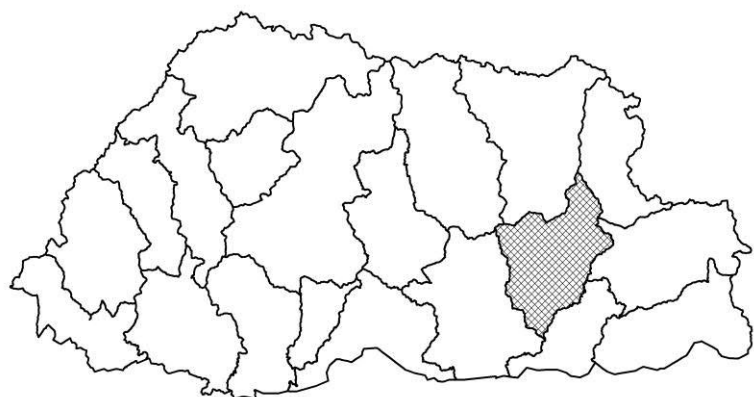
Land Cover Class	Sub Class	Area (Ha)	Area (%)
Alpine Scrubs		11475.78	4.05%
Built up		162.29	0.06%
Cultivated Agriculture		3720.01	1.31%
	Chhuzhing	1736.53	0.61%
	Kamzhing	1981.14	0.70%
	Orchards	2.34	0.00%
Forests		183421.01	64.79%
	Broadleaf	112022.02	39.57%
	Chirpine	7871.83	2.78%
	Fir	21430.27	7.57%
	Mixed conifer	42096.89	14.87%
Landslides		103.99	0.04%
Meadows		3245.66	1.15%
Moraines		965.61	0.34%
Non Built up		8.70	0.00%
Rocky Outcrops		4935.01	1.74%
	Rocky Outcrops	4228.30	1.49%
	Scree	706.71	0.25%
Shrubs		26464.62	9.35%
Snow and Glacier		47425.82	16.75%
Water Bodies		1162.13	0.41%
	Lake	565.05	0.20%
	Rivers	597.08	0.21%

Altitude (M)	<600	600-1200	1200-1800	1800-2400	2400-3000	3000-3600	3600-4200	4200-4800	4800-5400	5400-6000	6000-6600	>6600
Area SqKm	0.00	24.26	191.20	406.93	560.21	482.02	449.68	461.57	233.18	28.33	0.67	0.00

Lhuentse Dzongkhag



8 MONGAR



MONGAR DZONGKHAG lies in the Eastern part of the country. (26°55' to 27°36' latitude and 90°57' to 91°29' longitude) Dzongkhag share its border with Lhuentse to the North, Zhemgang to the West and the Trashigang, Trashigang and Pemagatshel Dzongkhags to the East and South-East.

The Dzongkhag covers an area of approximately 1944.95km². The altitude varies from 300 m to 4200 m above sea level. The climatic zones are subtropical in the lower and Southern part of the Dzongkhag, and temperate in the North and at the higher altitudes. The annual precipitation ranges from 1000mm to 2000mm. The summer is hot and the winters is cold.

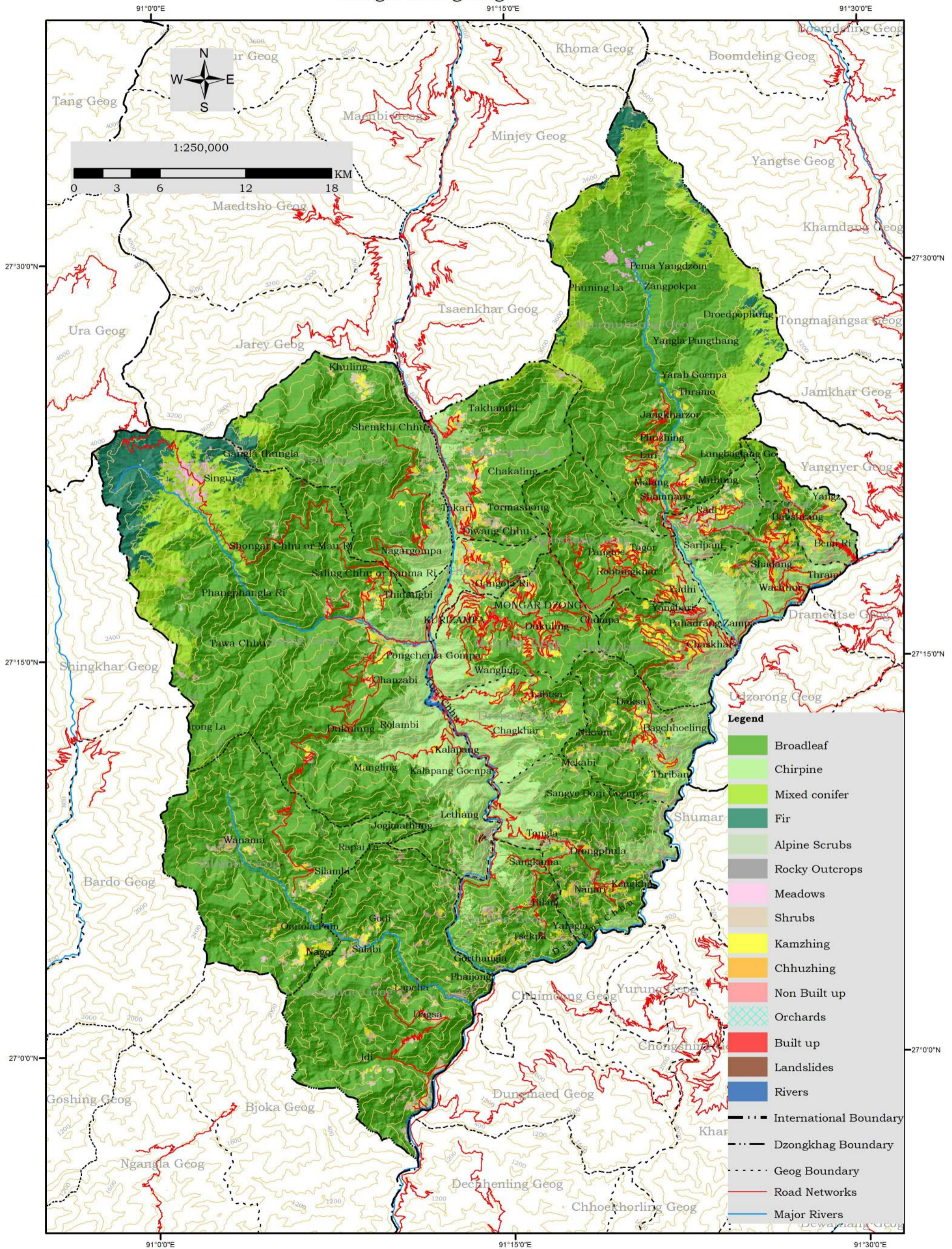
Approximately 91.35% of the total area is under forest cover with broadleaf trees as the dominating species. Lemon grass, which can be used for essential oils production, grows profusely under the chir pine stands. The lemon grass is an important natural resource for the people. The Dzongkhag falls under Thrumshingla National Park and Bumdelling Wildlife Sanctuary.

Kamzhing and *Chhuzhing* dominate the agricultural land use type. Some of the crops grown are rice, maize, wheat, potato and vegetables. The major sources of cash income are vegetables and citrus fruits. Lemon grass also provides supplementary income to the people.

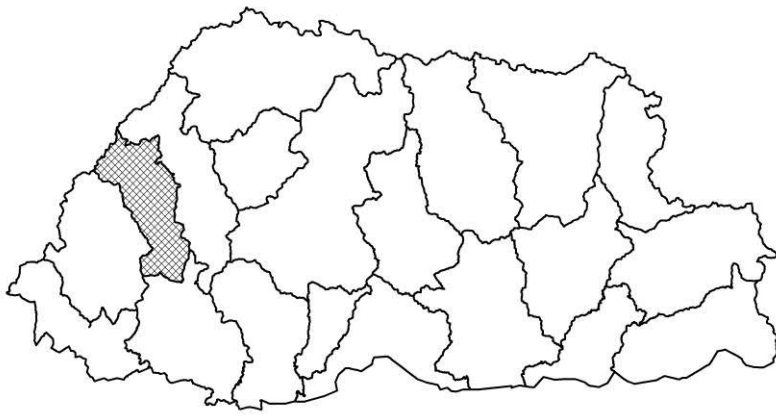
Land Cover Class	Sub Class	Area (Ha)	Area (%)
Alpine Scrubs		33.91	0.02%
Built up		256.40	0.13%
Cultivated Agriculture		6558.73	3.41%
	Chhuzhing	690.62	0.36%
	Kamzhing	5858.10	3.04%
	Orchards	10.02	0.01%
Forests		175886.94	91.35%
	Broadleaf	131209.45	68.15%
	Chirpine	26334.90	13.68%
	Fir	4794.12	2.49%
	Mixed conifer	13548.47	7.04%
Landslides		364.32	0.19%
Meadows		738.12	0.38%
Non Built up		7.86	0.00%
Rocky Outcrops		1.73	0.00%
Shrubs		7794.10	4.05%
Water Bodies		893.87	0.46%
	Rivers	893.87	0.46%

Altitude (M)	<600	600-1200	1200-1800	1800-2400	2400-3000	3000-3600	3600-4200	4200-4800	4800-5400	5400-6000	6000-6600	>6600
Area SqKm	43.44	338.08	523.81	456.84	323.28	220.71	38.10	0.00	0.00	0.00	0.00	0.00

Mongar Dzongkhag



9 PARO



PARO DZONGKHAG (27°11' to 27°46' latitude and 89°07 to 89°32' longitude) lies to the East of Ha and West of Thimphu.. It has a geographical area of about 1287.13 km². The Paro Valley is considered as one of the most beautiful valleys in Bhutan. Pa Chhu, which originates from Jumolhari mountain range flows through the Dzongkhag.

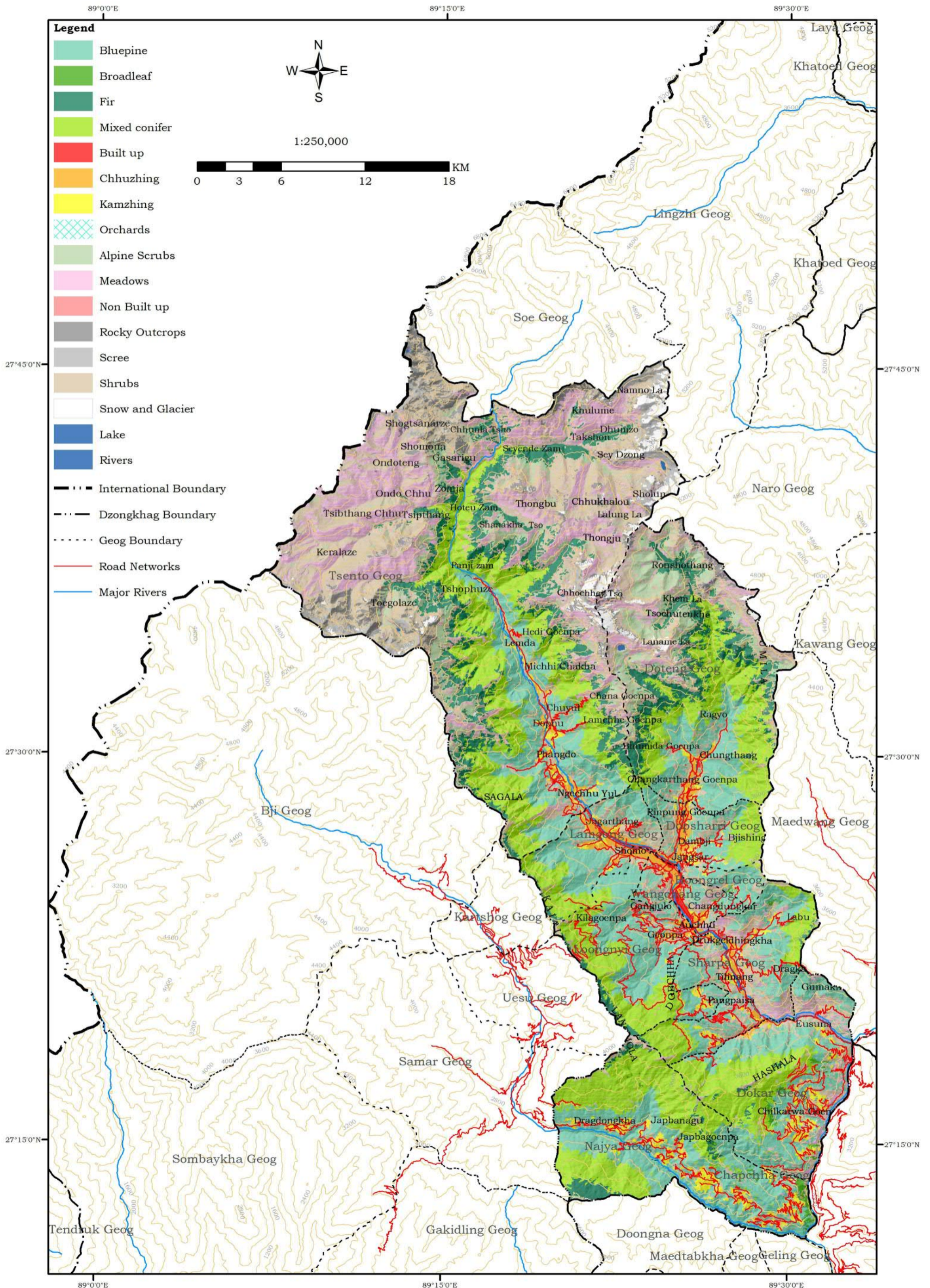
Paro Dzongkhag has an altitudinal range between 2000m to 5600m asl and has a temperate climatic condition with warm summer and cold and dry winter. The annual rainfall in the Dzongkhag varies between 500mm and 1000mm. Dzongkhag lies in the temperate zone, where conifer species (51.64%) dominant forest type. The broadleaf forest however constitutes only about 0.37%. The Northern part of Dzongkhag falls under the Jigme Dorji National Park.

Paro valley is also considered as country's most fertile agricultural land. The main agriculture land use types are *Chhuzhing*, *Kamzhing* and horticulture. Rice, apple, wheat, potatoes and other vegetables are grown as important crops.

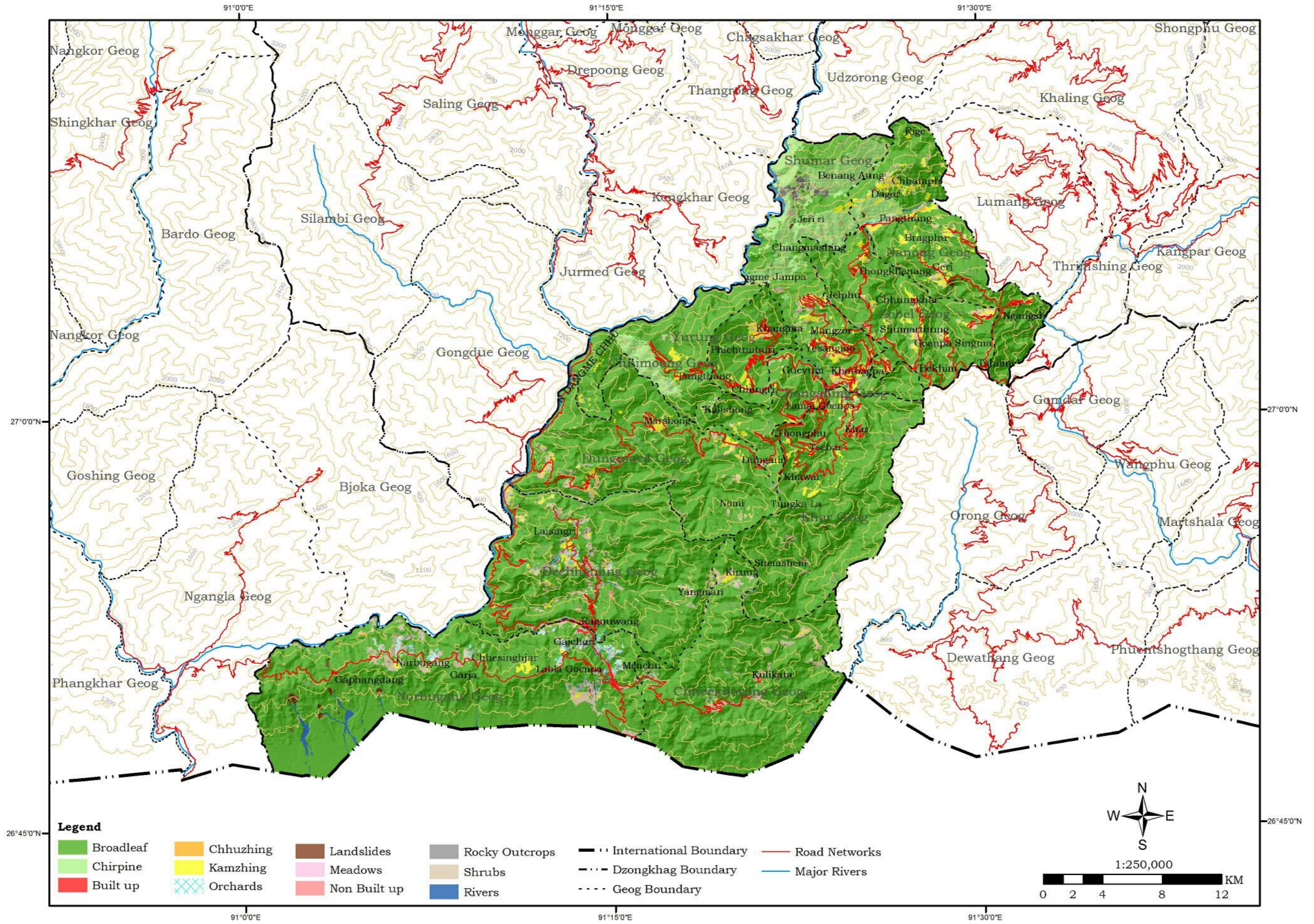
Land Cover Class	Sub Class	Area (Ha)	Area (%)
Alpine Scrubs		5449.12	4.28%
Built up		599.87	0.47%
Cultivated Agriculture		5432.10	4.26%
	Chhuzhing	1860.66	1.46%
	Kamzhing	2884.64	2.26%
	Orchards	686.80	0.54%
Forests		66282.67	52.00%
	Bluepine	28483.82	22.35%
	Broadleaf	472.74	0.37%
	Fir	9838.96	7.72%
	Mixed conifer	27487.14	21.57%
Meadows		12703.51	9.97%
Non Built up		37.06	0.03%
Rocky Outcrops		5598.49	4.39%
	Rocky Outcrops	3758.10	2.95%
	Scree	1840.39	1.44%
Shrubs		28938.39	22.70%
Snow and Glacier		1897.11	1.49%
Water Bodies		522.98	0.41%
	Lake	54.10	0.04%
	Rivers	468.88	0.37%

Altitude (M)	<600	600-1200	1200-1800	1800-2400	2400-3000	3000-3600	3600-4200	4200-4800	4800-5400	5400-6000	6000-6600	>6600
Area SqKm	0.00	0.00	0.00	72.63	314.32	316.77	242.98	279.28	51.94	0.20	0.00	0.00

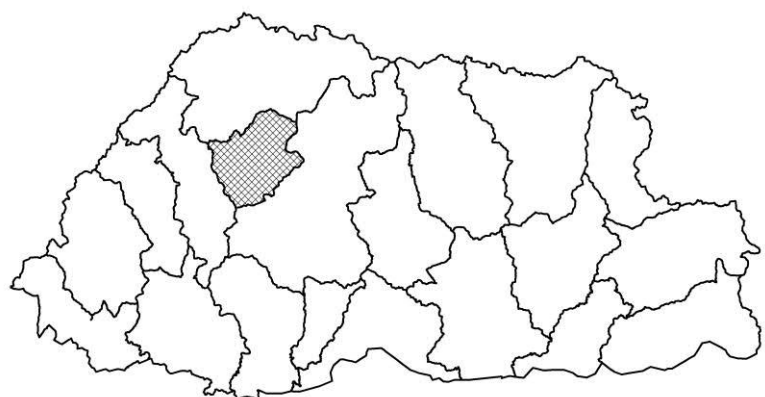
Paro Dzongkhag



Pema Gatsel Dzongkhag



11 PUNAKHA



PUNAKHA DZONGKHAG lies to the East of Thimphu Dzongkhag and it is an entry point to Gasa Dzongkhag to the North. It has an area of approximately 1109.57 km². The elevation ranges from 1300 m to 4800 m above sea level.

The Punakha Dzong lies on the confluence of the Pho Chhu and the Mo Chhu. Until 1964, Punakha was the capital of Bhutan. Today it functions as the winter residence of the Monk body. The valley of Punakha enjoys a subtropical climate with cool winters and warm to hot summer. The annual precipitation ranges from 500mm to 1500mm.

Approximately 83.63% of the total area is under forest cover. Some parts of the Dzongkhag fall under the Jigme Dorji National Park where

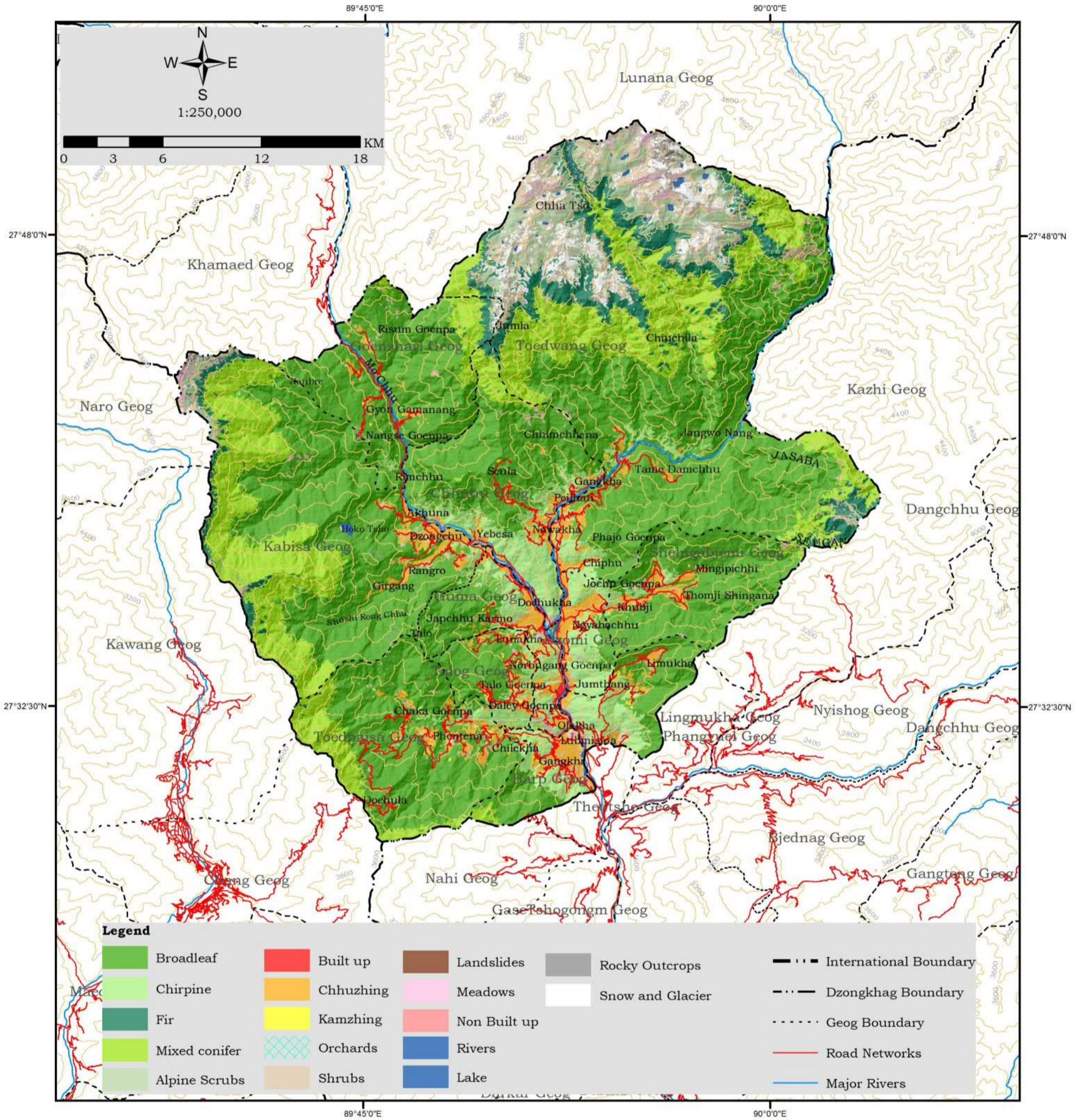
wide varieties of flora and fauna are found.

The major portion of the agricultural land is *Chhuzhing*. It occurs mostly along the valleys of Pho Chhu and Mo Chhu, while *Kamzhing* is spread across the Dzongkhag. Rice, wheat, maize, potato, chilli and barley are important annual crops.

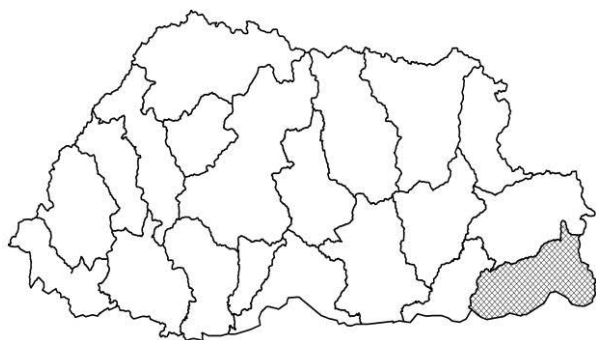
Land Cover Class	Sub Class	Area (Ha)	Area (%)
Alpine Scrubs		3584.04	3.26%
Built up		296.01	0.27%
Cultivated Agriculture		4696.61	4.27%
	Chhuzhing	4302.79	3.92%
	Kamzhing	384.92	0.35%
	Orchards	8.89	0.01%
Forests		91894.87	83.63%
	Broadleaf	59422.12	54.08%
	Chirpine	8363.43	7.61%
	Fir	5419.11	4.93%
	Mixed conifer	18690.21	17.01%
Landslides		7.30	0.01%
Meadows		482.82	0.44%
Non Built up		3.84	0.00%
Rocky Outcrops		249.56	0.23%
Shrubs		5665.59	5.16%
Snow and Glacier		2188.69	1.99%
Water Bodies		808.71	0.74%
	Lake	162.73	0.15%
	Rivers	645.98	0.59%

Altitude (M)	<600	600-1200	1200-1800	1800-2400	2400-3000	3000-3600	3600-4200	4200-4800	4800-5400	5400-6000	6000-6600	>6600
Area SqKm	0.00	0.15	191.89	301.22	257.36	168.87	128.90	60.45	0.73	0.00	0.00	0.00

Punakha Dzongkhag



12 SAMDRUP JONGKHAR



SAMDRUP JONGKHAR DZONGKHAG lies in the extreme South-Eastern part of the country. (26°47' to 27°15' latitude and 91°23' to 92°07' longitude) It shares borders with Zhemgang, Pemagatshel and Trashigang Dzongkhags. Towards South and East it borders with India. Samdrup Jongkhar Dzongkhag covers an area of approximately 1877.93 km².

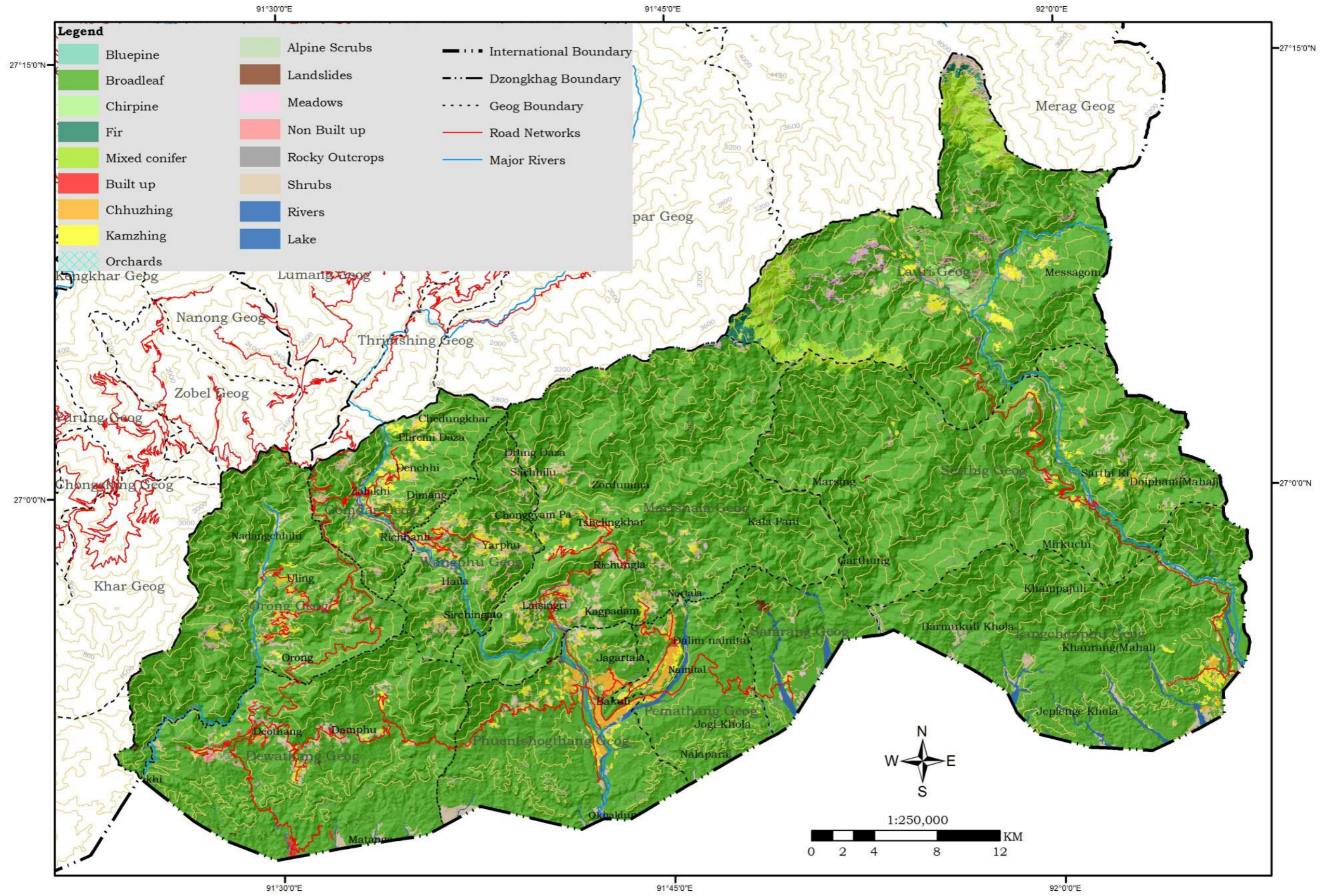
The elevation ranges from 200m to 4500m above sea level. Samdrup Jongkhar has subtropical climate with hot and humid summer and dry and cool winter. The annual rainfall is between 1000mm and 5000mm. About 90.75% of the total area of the Dzongkhag is under forest cover. Some highly priced tree species like teak and sal are grown as forest plantation. The Dzongkhag falls under the Jomotsangkha Wildlife sanctuary.

Kamzhing are the most common agricultural land use type followed by *Chhuzhing*. Crops commonly grown are maize, rice, millet, buckwheat, potatoes, mustard, chilli, various types of beans, ginger and other vegetables. Orange are also grown in the Dzongkhag.

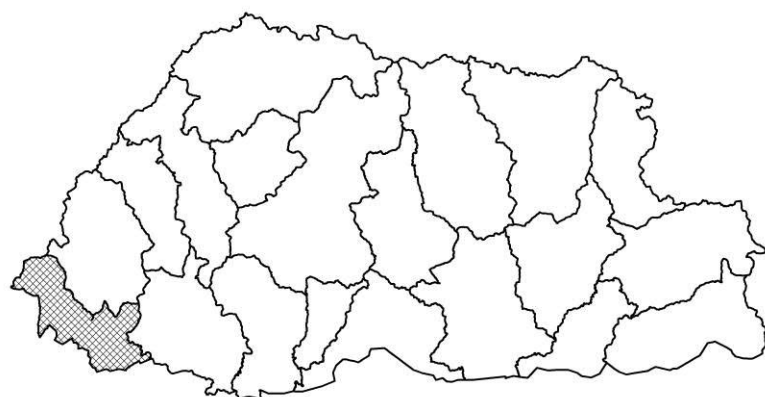
Land Cover Class	Sub Class	Area (Ha)	Area (%)
Alpine Scrubs		25.12	0.01%
Built up		186.03	0.10%
Cultivated Agriculture		5485.04	2.95%
	Chhuzhing	1169.23	0.63%
	Kamzhing	4160.95	2.24%
	Orchards	154.86	0.08%
Forests		168689.68	90.75%
	Broadleaf	164129.88	88.30%
	Chirpine	531.53	0.29%
	Fir	419.60	0.23%
	Mixed conifer	3608.67	1.94%
Landslides		363.75	0.20%
Meadows		479.23	0.26%
Non Built up		34.91	0.02%
Rocky Outcrops		173.95	0.09%
Shrubs		8740.67	4.70%
Water Bodies		1703.08	0.92%
	Lake	3.37	0.00%
	Rivers	1699.71	0.91%

Altitude (M)	<600	600-1200	1200-1800	1800-2400	2400-3000	3000-3600	3600-4200	4200-4800	4800-5400	5400-6000	6000-6600	>6600
Area SqKm	399.98	432.23	482.48	334.94	155.88	60.58	8.90	0.32	0.00	0.00	0.00	0.00

Samdrup Jongkhar Dzongkhag



13 SAMTSE



SAMTSE DZONGKHAG lies in the South-West of the country. (26°48' to 27°16' latitude and 88°44' to 89°22' longitude) and shares border with the Indian plains to the South, Ha to the North and Chhukha Dzongkhags to the East. It covers an area of approximately 1304.85 km².

The Samtse Dzongkhag has an altitudinal range between 200m to 4400m asl and the summers are hot and humid, while the winters are dry and cool. The annual rainfall ranges 1500 mm to 4000 mm. The forest cover is about 81.42% of the total area of the Dzongkhag.

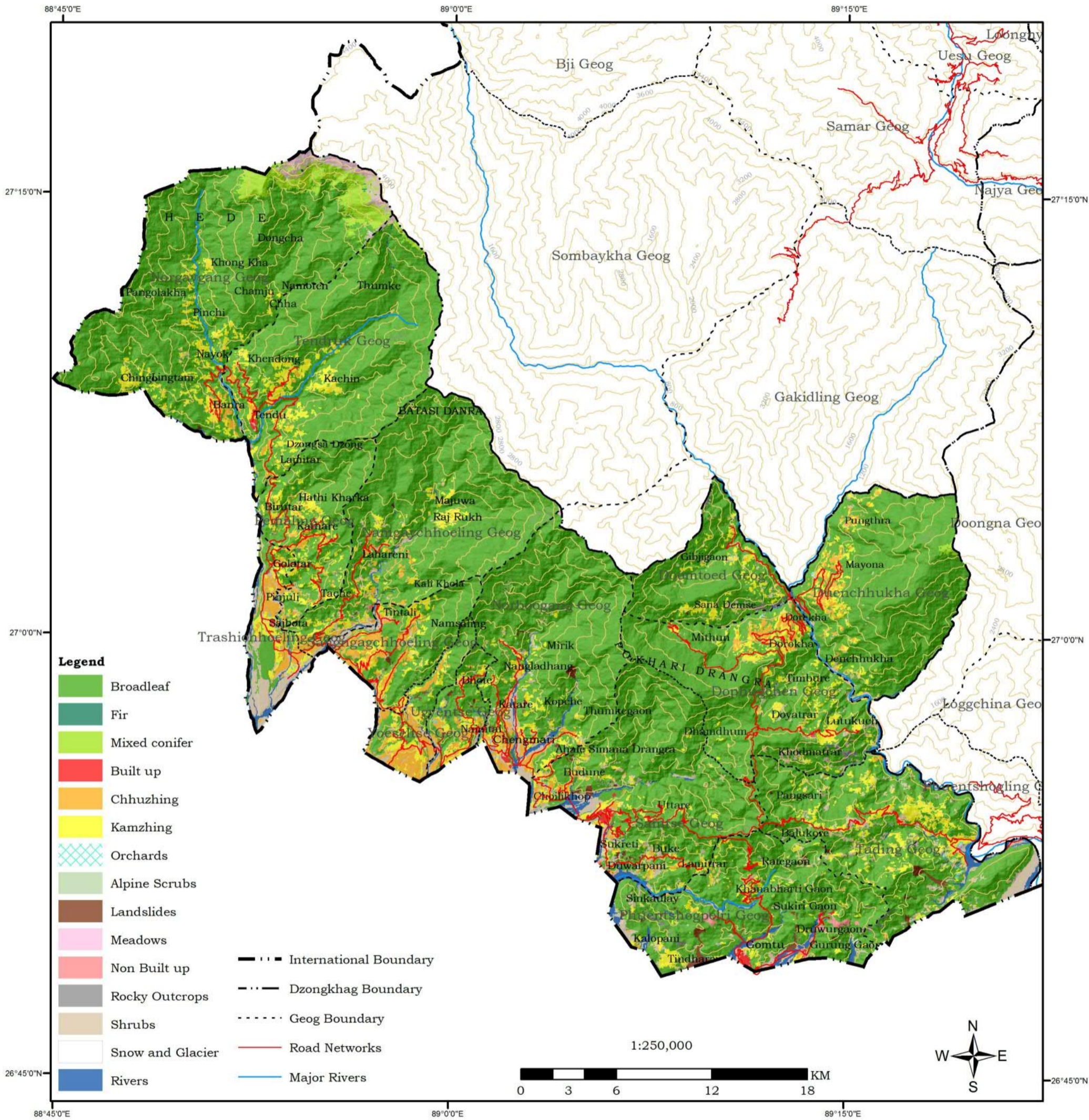
Both *Chhuzhing* and *Kamzhing* are main agricultural land use type in the Dzongkhag. Rice, maize, ginger, wheat and millet are the dominant crops. The main cash crops grown in the Dzongkhag are

oranges, banana, areca nut and cardamom.

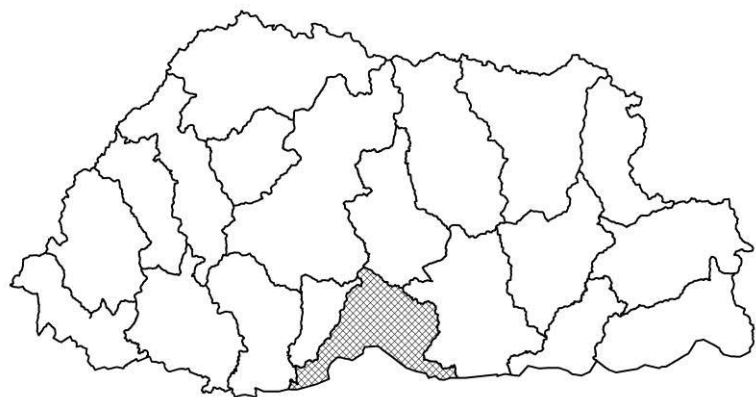
Land Cover Class	Sub Class	Area (Ha)	Area (%)
Alpine Scrubs		18.24	0.01%
Built up		312.79	0.24%
Cultivated Agriculture		14713.81	11.39%
	Chhuzhing	4315.54	3.34%
	Kamzhing	10002.54	7.74%
	Orchards	395.73	0.31%
Forests		105203.15	81.42%
	Broadleaf	103528.65	80.12%
	Fir	25.01	0.02%
	Mixed conifer	1649.49	1.28%
Landslides		615.40	0.48%
Meadows		244.86	0.19%
Non Built up		159.74	0.12%
Rocky Outcrops		201.01	0.16%
Shrubs		5619.28	4.35%
Snow and Glacier		3.45	0.00%
Water Bodies		2124.21	1.64%
	Rivers	2124.21	1.64%

Altitude (M)	<600	600-1200	1200-1800	1800-2400	2400-3000	3000-3600	3600-4200	4200-4800	4800-5400	5400-6000	6000-6600	>6600
Area SqKm	240.24	363.43	300.37	223.56	120.33	24.48	8.58	0.40	0.00	0.00	0.00	0.00

Samtse Dzongkhag



14 SARPANG



SARPANG DZONGKHAG lies in the South of the country (26°43' to 27°13' latitude and 90°00' to 90°46' longitude) where it borders Dagana, Tsirang, Wangdue Phodrang, Trongsa and Zhemgang Dzongkhags. Towards the Southern part of Dzongkhag, it shares the border with India. It covers an area of approximately 1666.15 km².

The elevation of Sarpang Dzongkhag ranges from less than 200 m to 4200 m above sea level. The summer is hot and humid while the winter is dry and warm. The average annual rainfall ranges from 1500 mm to 5000mm.

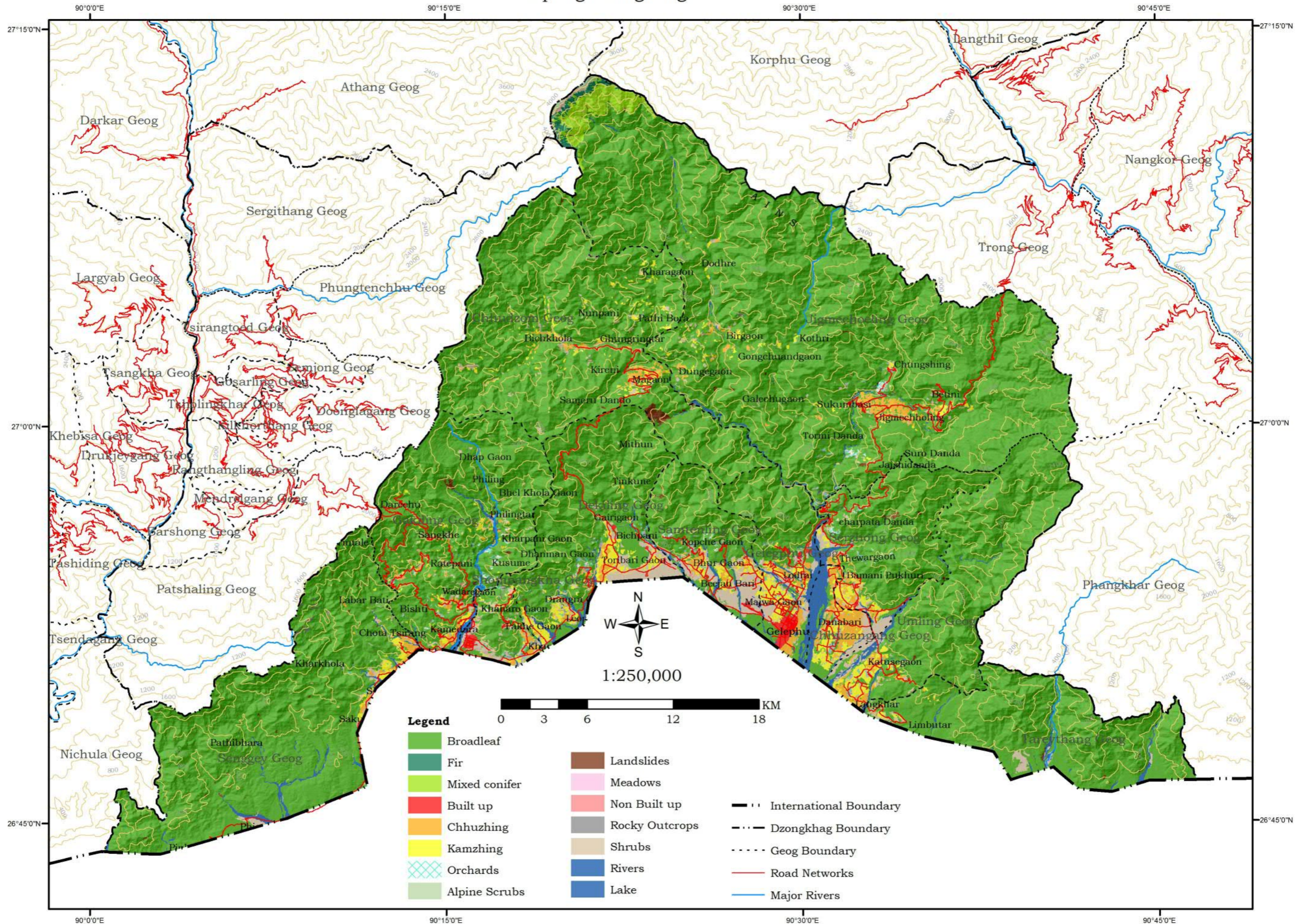
The area under forest cover is about 89.58% of the total area of the Dzongkhag. The broadleaf forests constitute 88.64% of the entire forest cover. The Dzongkhag falls under Royal Manas National Park, and Phibsoo Wildlife Sanctuary linking to the Indian Buxa Tiger Reserve.

Kamzhing is the dominant agriculture land use type followed by *Chhuzhing*. Some of the areas with the best potential for *Chhuzhing* are found around Gelephu which therefore also is known as the “Rice Bowl of Bhutan”. Maize, rice, mustard and millet are some of the major annual crops. Some of the cash crops grown in the Dzongkhag are orange, cardamom areca nut, ginger, and banana.

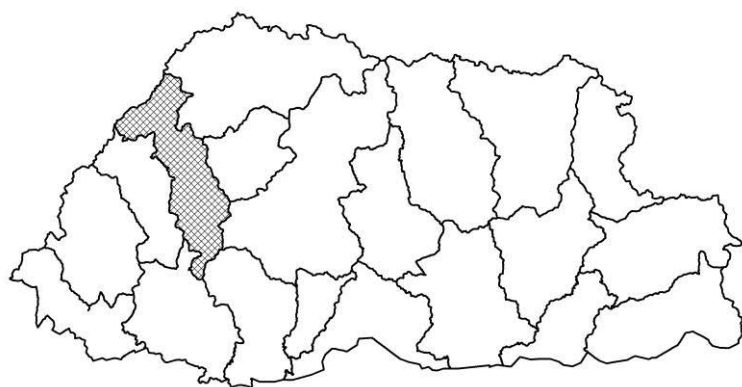
Land Cover Class	Sub Class	Area (Ha)	Area (%)
Alpine Scrubs		72.72	0.04%
Built up		450.80	0.27%
Cultivated Agriculture		8029.80	4.90%
	Chhuzhing	3062.25	1.87%
	Kamzhing	3906.43	2.38%
	Orchards	1061.12	0.65%
Forests		146852.30	89.58%
	Broadleaf	145299.97	88.64%
	Fir	334.70	0.20%
	Mixed conifer	1217.63	0.74%
Landslides		446.49	0.27%
Meadows		15.32	0.01%
Non Built up		9.99	0.01%
Rocky Outcrops		61.93	0.04%
Shrubs		5021.09	3.06%
Water Bodies		2967.67	1.81%
	Lake	2.25	0.00%
	Rivers	2965.42	1.81%

Altitude (M)	<600	600-1200	1200-1800	1800-2400	2400-3000	3000-3600	3600-4200	4200-4800	4800-5400	5400-6000	6000-6600	>6600
Area SqKm	407.60	418.75	407.27	325.17	68.95	19.45	7.60	0.00	0.00	0.00	0.00	0.00

Sarpang Dzongkhag



15 THIMPHU



THIMPHU DZONGKHAG lies in the Western part of the country (27°8' to 27°59' latitude and 89°13 to 89°46' longitude). It borders with China in the North, Paro Dzongkhag in the West, Chhukha Dzongkhag in the South and Punakha Dzongkhag in the East. It has a geographical area of about 1795.87 km². Thimphu is the capital of the country.

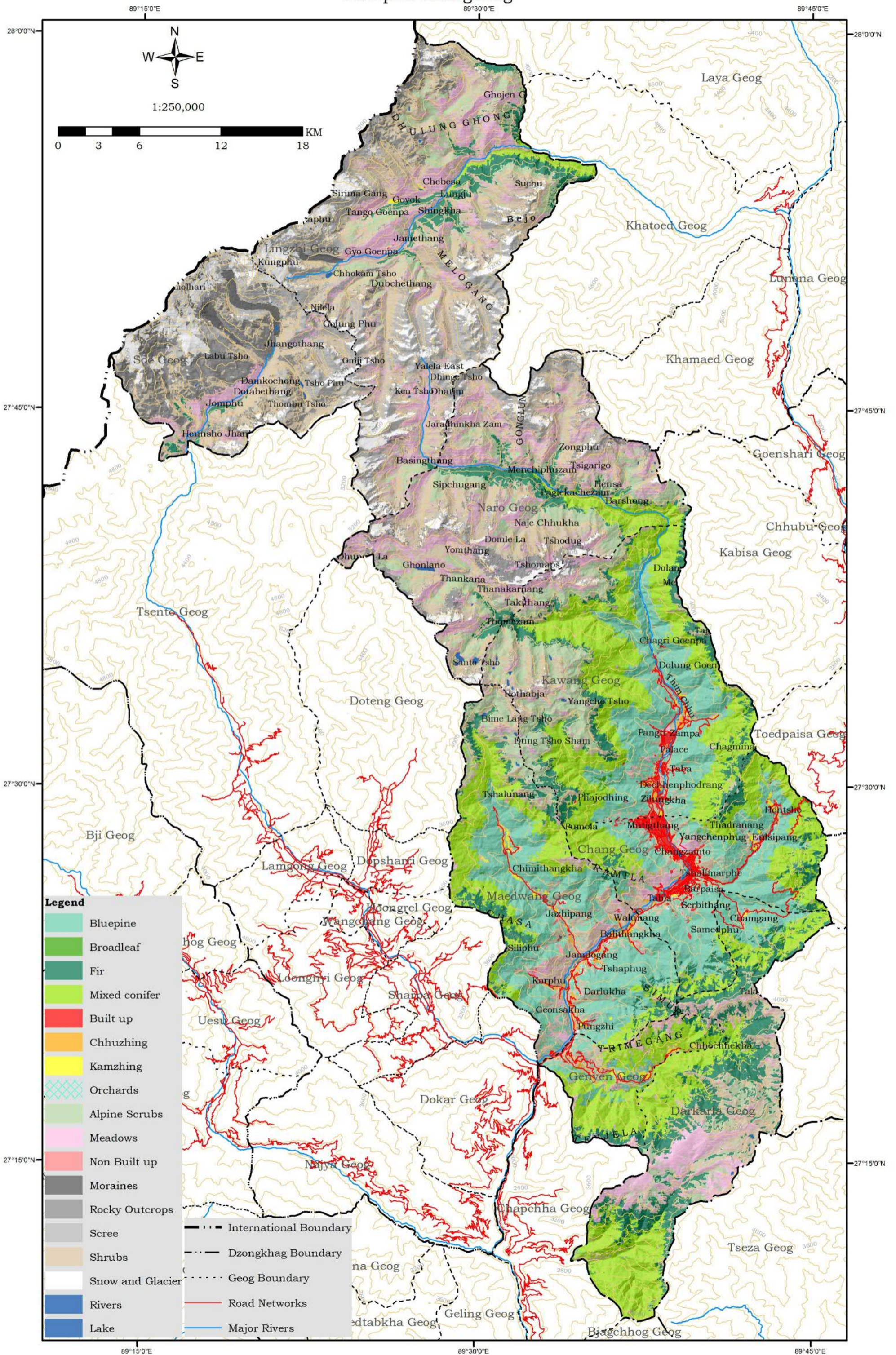
Thimphu Dzongkhag has an altitudinal range between 2100m to 6800m asl and has a temperate climatic condition with warm summer and cold and dry winter. The annual rainfall in the Dzongkhag varies between 500mm and 1000mm. The forest cover is about 40.04 %. The Northern part of Dzongkhag falls under the Jigme Dorji National Park.

Most of the cultivated agricultural lands are located in the Southern part along the Wang Chhu valley. The dominant land use types in the Dzongkhag include Apple orchard, *Chhuzhing* and *Kamzhing*. Rice and wheat are more extensively grown in the Dzongkhag compared to other crops. Apple is the major cash crop grown in the Dzongkhag.

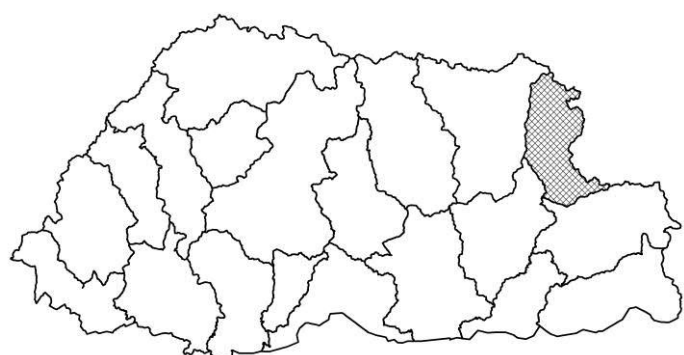
Land Cover Class	Sub Class	Area (Ha)	Area (%)
Alpine Scrubs		13408.29	7.54%
Built up		1380.18	0.78%
Cultivated Agriculture		1699.70	0.96%
	Chhuzhing	484.91	0.27%
	Kamzhing	473.11	0.27%
	Orchards	741.67	0.42%
Forests		71213.78	40.04%
	Bluepine	26122.82	14.69%
	Broadleaf	171.83	0.10%
	Fir	14280.09	8.03%
	Mixed conifer	30639.04	17.23%
Meadows		18328.89	10.31%
Moraines		754.57	0.42%
Non Built up		86.79	0.05%
Rocky Outcrops		20987.35	11.80%
	Rocky Outcrops	9471.05	5.33%
	Scree	11516.30	6.48%
Shrubs		39745.36	22.35%
Snow and Glacier		9767.24	5.49%
Water Bodies		468.59	0.26%
	Lake	248.57	0.14%
	Rivers	220.01	0.12%

Altitude (M)	<600	600-1200	1200-1800	1800-2400	2400-3000	3000-3600	3600-4200	4200-4800	4800-5400	5400-6000	6000-6600	>6600
Area SqKm	0.00	0.00	0.00	43.53	262.65	345.31	348.15	528.72	218.27	30.67	4.58	0.15

Thimphu Dzongkhag



16 TRASHI YANGTSE



TRASHI YANGTSE DZONGKHAG lies in the North-East of the country. (27°22' to 27°58' latitude and 91°20' to 92°46' longitude) It borders with Lhuentse, Mongar and Trashigang Dzongkhags. Towards the East and North-East it borders with India and China respectively. Trashigang Dzongkhag covers an area of approximately 1449.26 km².

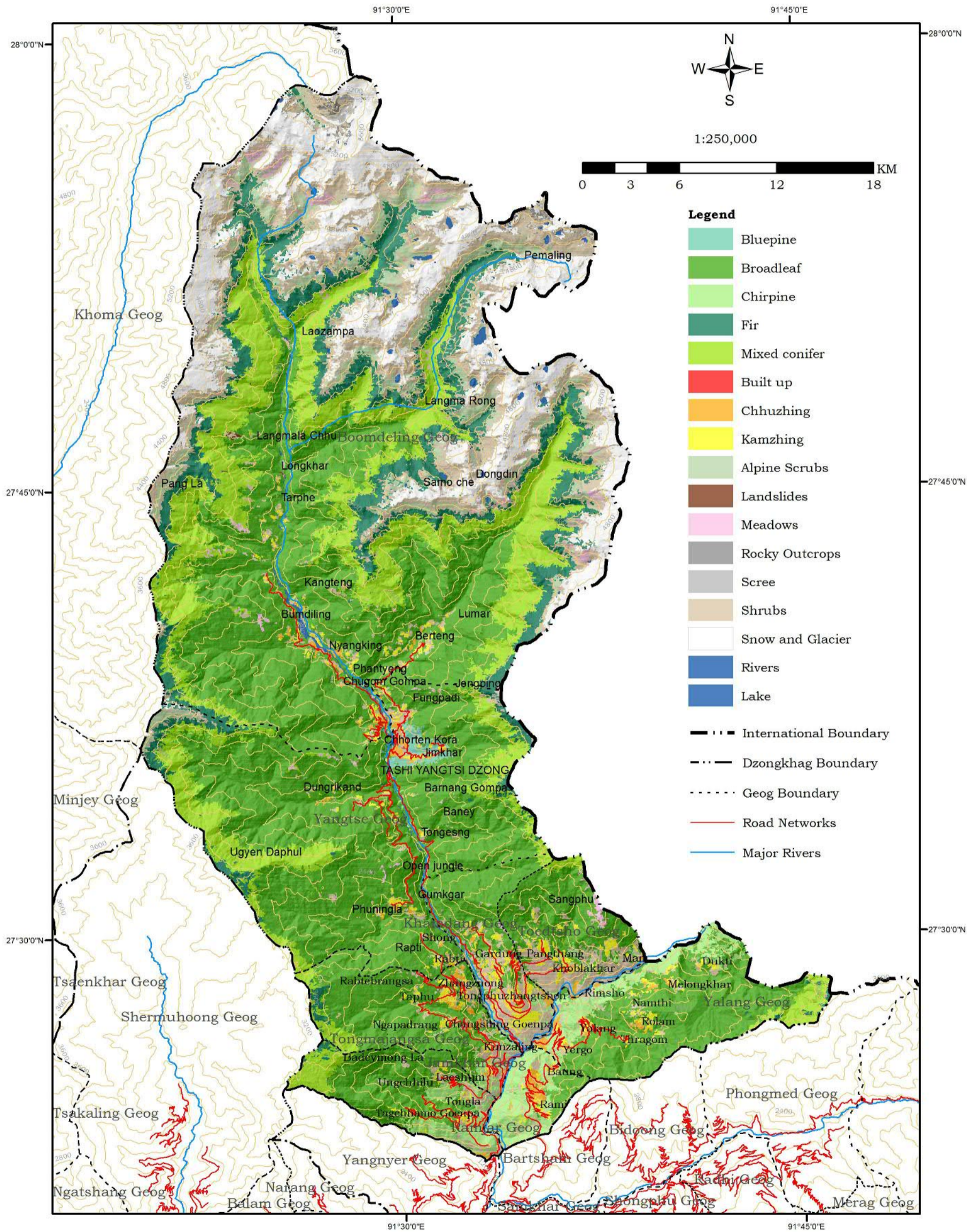
The elevation of the Dzongkhag ranges from 800 m to 6000 m above sea level. The annual rainfall is between 1000mm and 1500mm. The winter is cold while the summer is hot. About 69.97% of the total area of the Dzongkhag is covered by forest. Broadleaf species dominate the forests type with 43.63%. The Dzongkhag falls under Bumdelling Wildlife Sanctuary which is the important winter nesting place for the black-necked cranes.

Kamzhing is the most dominant agriculture land use type. *Chhuzhing* constitute a small part of the cultivated land. The crops grown are maize, rice, beans, millet, potatoes, chilli and other vegetables.

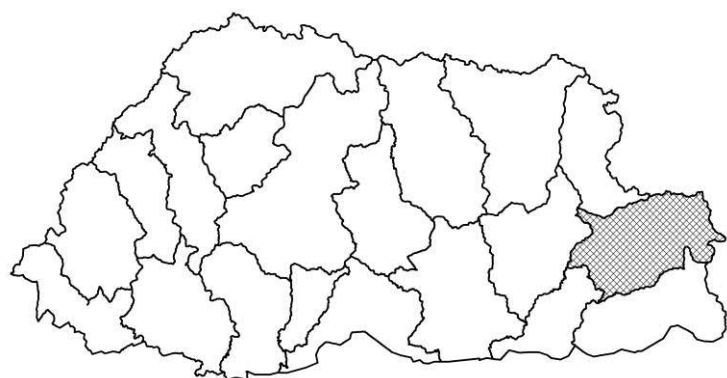
Land Cover Class	Sub Class	Area (Ha)	Area (%)
Alpine Scrubs		4577.71	3.19%
Built up		70.53	0.05%
Cultivated Agriculture		3488.91	2.43%
	Chhuzhing	1044.97	0.73%
	Kamzhing	2443.95	1.70%
Forests		100399.99	69.97%
	Bluepine	423.06	0.29%
	Broadleaf	62612.17	43.63%
	Chirpine	4136.11	2.88%
	Fir	11269.60	7.85%
	Mixed conifer	21959.04	15.30%
Landslides		32.50	0.02%
Meadows		821.40	0.57%
Rocky Outcrops		463.87	0.32%
	Rocky Outcrops	358.55	0.25%
	Scree	105.32	0.07%
Shrubs		16319.93	11.37%
Snow and Glacier		16459.87	11.47%
Water Bodies		861.61	0.60%
	Lake	391.85	0.27%
	Rivers	469.77	0.33%

Altitude (M)	<600	600-1200	1200-1800	1800-2400	2400-3000	3000-3600	3600-4200	4200-4800	4800-5400	5400-6000	6000-6600	>6600
Area SqKm	0.00	33.37	95.86	233.04	330.96	270.87	228.45	196.91	45.93	3.15	0.00	0.00

Trashi Yangtse Dzongkhag



17 TRASHIGANG



TRASHIGANG DZONGKHAG (27°22' to 27°29' latitude and 91°22' to 92°07' longitude) lies to the North of Samdrup Jongkhar Dzongkhag. Dzongkhag shares its border with Trashi Yangtse, Mongar, Pemagatshel and towards the North and East it borders with India. The Dzongkhag covers an area of approximately 2204.21km².

The altitude varies from 500 m to 4500 m asl. The climate is warm during the summer and cold during the winter. The annual rainfall ranges from 1000mm to 2000mm.

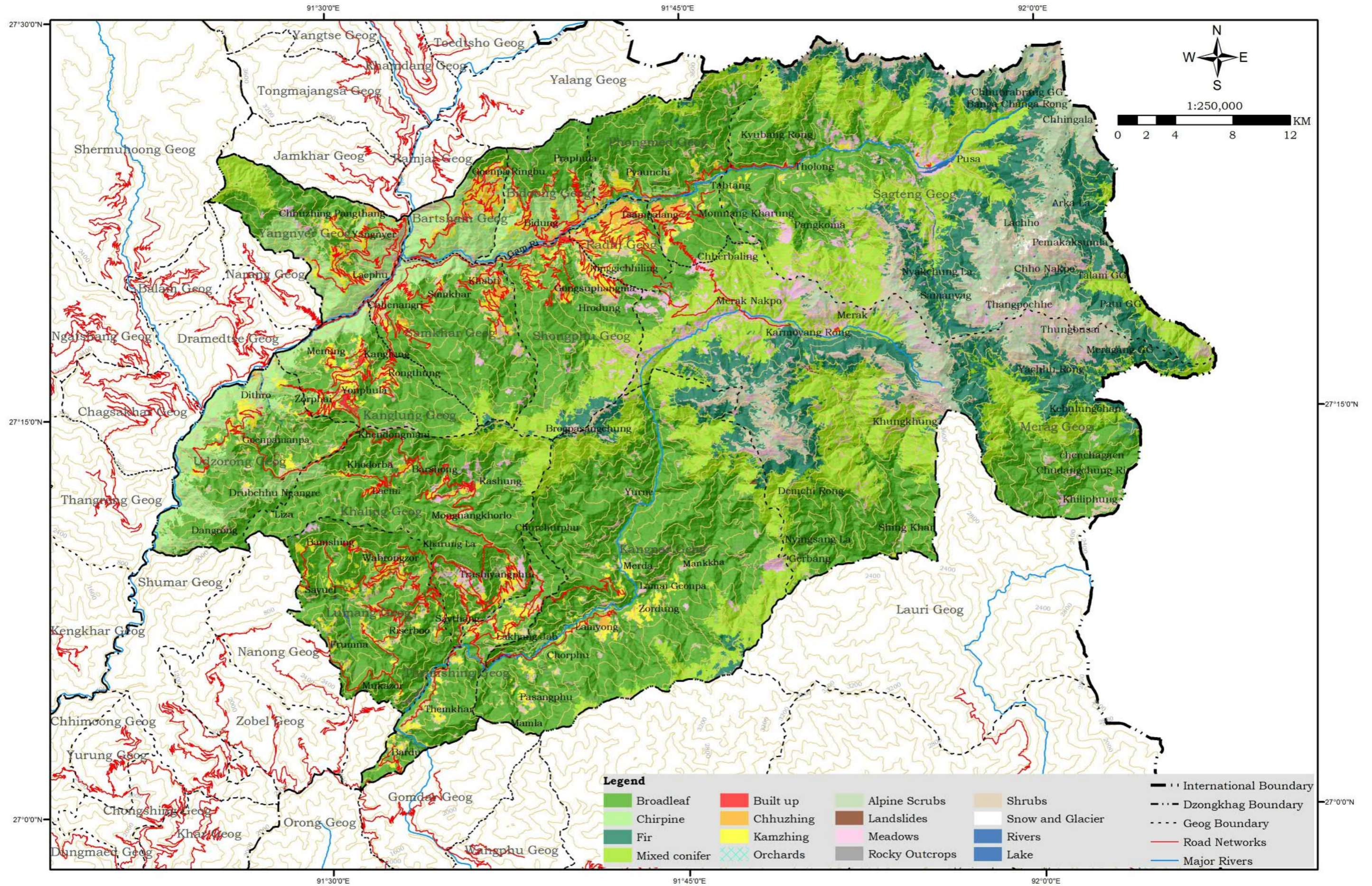
About 79.15% of the total area is under forest cover. Lemon grass, which is used for essential oils production, grows profusely under the chir pine stands. The Dzongkhag falls under Sakteng Wildlife Sanctuary.

Kamzhing and *Chhuzhing* dominates the agricultural land use type. Some of the crops grown in the Dzongkhag are maize, rice, wheat, potato and other vegetables.

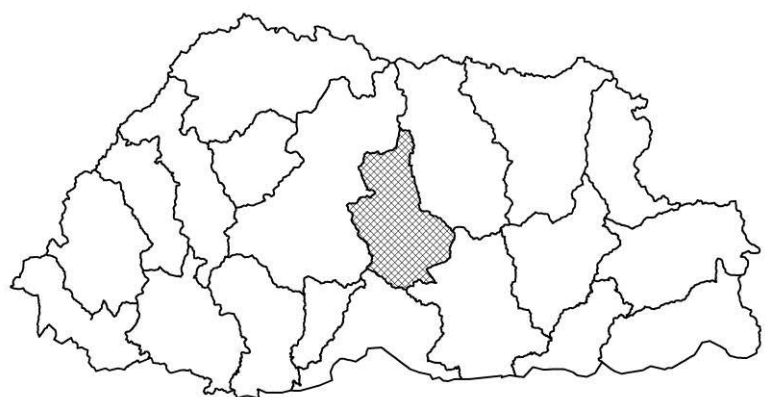
Land Cover Class	Sub Class	Area (Ha)	Area (%)
Alpine Scrubs		9355.03	4.29%
Built up		623.76	0.29%
Cultivated Agriculture		9837.27	4.51%
	Chhuzhing	1676.50	0.77%
	Kamzhing	8156.65	3.74%
	Orchards	4.12	0.00%
Forests		172757.66	79.15%
	Broadleaf	98767.26	45.25%
	Chirpine	12473.81	5.72%
	Fir	21487.82	9.85%
	Mixed conifer	40028.78	18.34%
Landslides		235.52	0.11%
Meadows		7079.29	3.24%
Rocky Outcrops		76.59	0.04%
Shrubs		17356.12	7.95%
Snow and Glacier		199.02	0.09%
Water Bodies		733.03	0.34%
	Lake	72.21	0.03%
	Rivers	660.82	0.30%

Altitude (M)	<600	600-1200	1200-1800	1800-2400	2400-3000	3000-3600	3600-4200	4200-4800	4800-5400	5400-6000	6000-6600	>6600
Area SqKm	3.90	98.87	320.04	473.90	477.35	404.19	359.16	56.07	0.00	0.00	0.00	0.00

Trashigang Dzongkhag



18 TRONGSA



TRONGSA DZONGKHAG lies within 27°08' to 27°47' latitude and 90°15' to 91°45' longitude. It borders with Wangdue Phodrang Dzongkhag in the West, Bumthang Dzongkhag in the East and Sarpang and Zhemgang Dzongkhags in the South. The Dzongkhag occupies an area of approximately 1822.13 km². The Trongsa Dzong is historically important both from political and religious aspects.

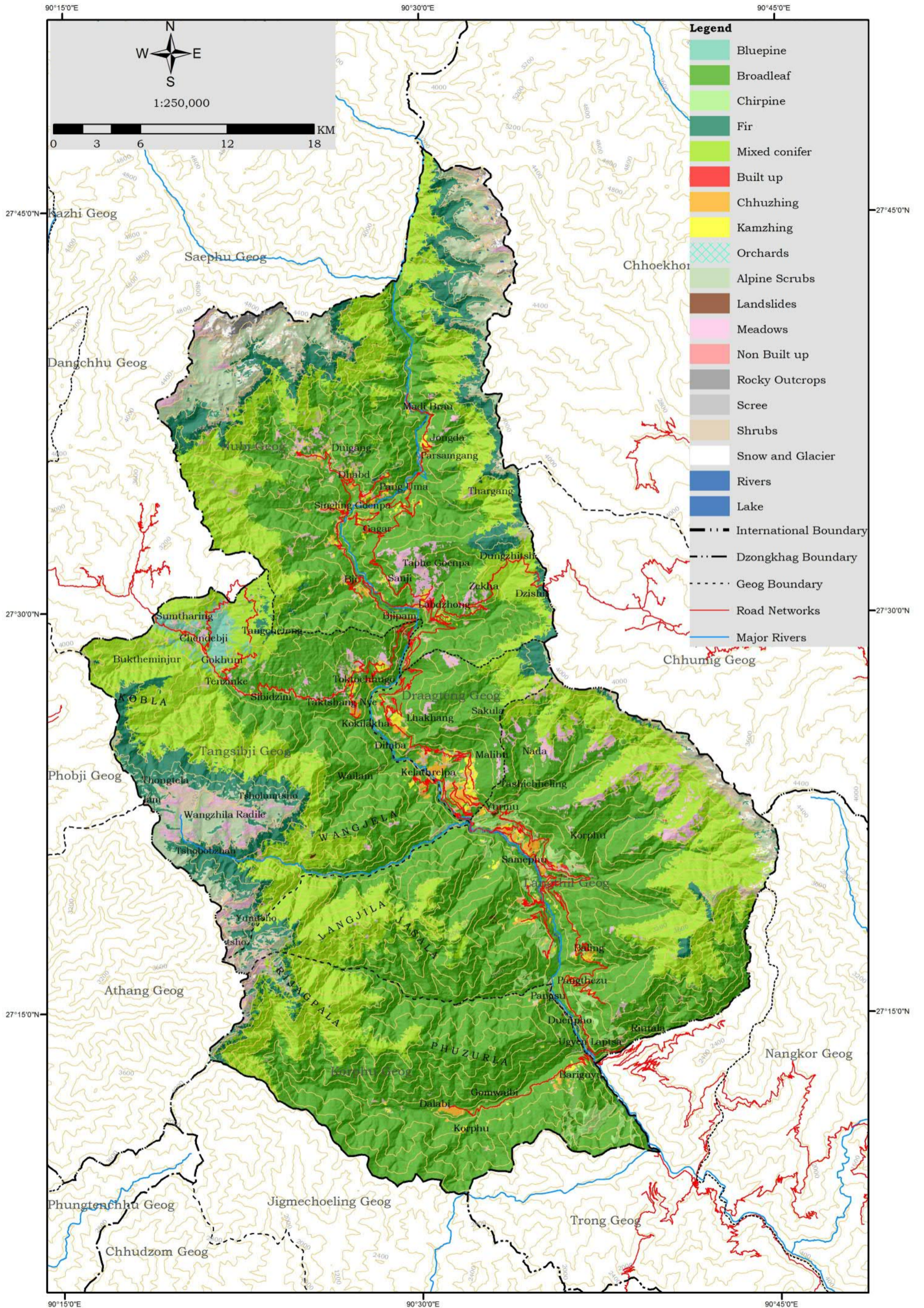
The elevation ranges from 600 m to 5100 m asl. Climate is warm in summer and cold in winter. The annual rainfall ranges from 1500 mm to 3000 mm. Approximately 85.59% of the total area is under forest cover consisting of mainly broadleaf species. The Dzongkhag falls under the Jigme Singye Wangchuck National Park and Wangchuck Centennial National Park.

The land cover percentage of *Kamzhing* and *Chhuzhing* is almost equal. Some of the important crops grown in the Dzongkhag are potato, maize, wheat, rice and buckwheat.

Land Cover Class	Sub Class	Area (Ha)	Area (%)
Alpine Scrubs		7935.06	4.42%
Built up		476.23	0.27%
Cultivated Agriculture		2551.86	1.42%
	Chhuzhing	1231.80	0.69%
	Kamzhing	1317.81	0.73%
	Orchards	2.25	0.00%
Forests		153725.14	85.59%
	Bluepine	1005.75	0.56%
	Broadleaf	90914.38	50.62%
	Chirpine	1941.97	1.08%
	Fir	12786.82	7.12%
	Mixed conifer	47076.22	26.21%
Landslides		121.38	0.07%
Meadows		4460.10	2.48%
Non Built up		7.96	0.00%
Rocky Outcrops		555.97	0.31%
	Rocky Outcrops	506.25	0.28%
	Scree	49.72	0.03%
Shrubs		8345.78	4.65%
Snow and Glacier		1001.89	0.56%
Water Bodies		426.08	0.24%
	Lake	37.46	0.02%
	Rivers	388.62	0.22%

Altitude (M)	<600	600-1200	1200-1800	1800-2400	2400-3000	3000-3600	3600-4200	4200-4800	4800-5400	5400-6000	6000-6600	>6600
Area SqKm	0.11	44.46	180.67	341.84	530.40	391.53	226.76	95.59	2.36	0.00	0.00	0.00

Trongsa Dzongkhag



19 TSIRANG



TSIRANG DZONGKHAG lies in the South of the country within 26°49' to 27°11' latitude and 90°00' to 90° 20' longitude. It borders with Wangdue Phodrang, Dagana and Sarpang Dzongkhags. It covers an area of approximately 637.83 km².

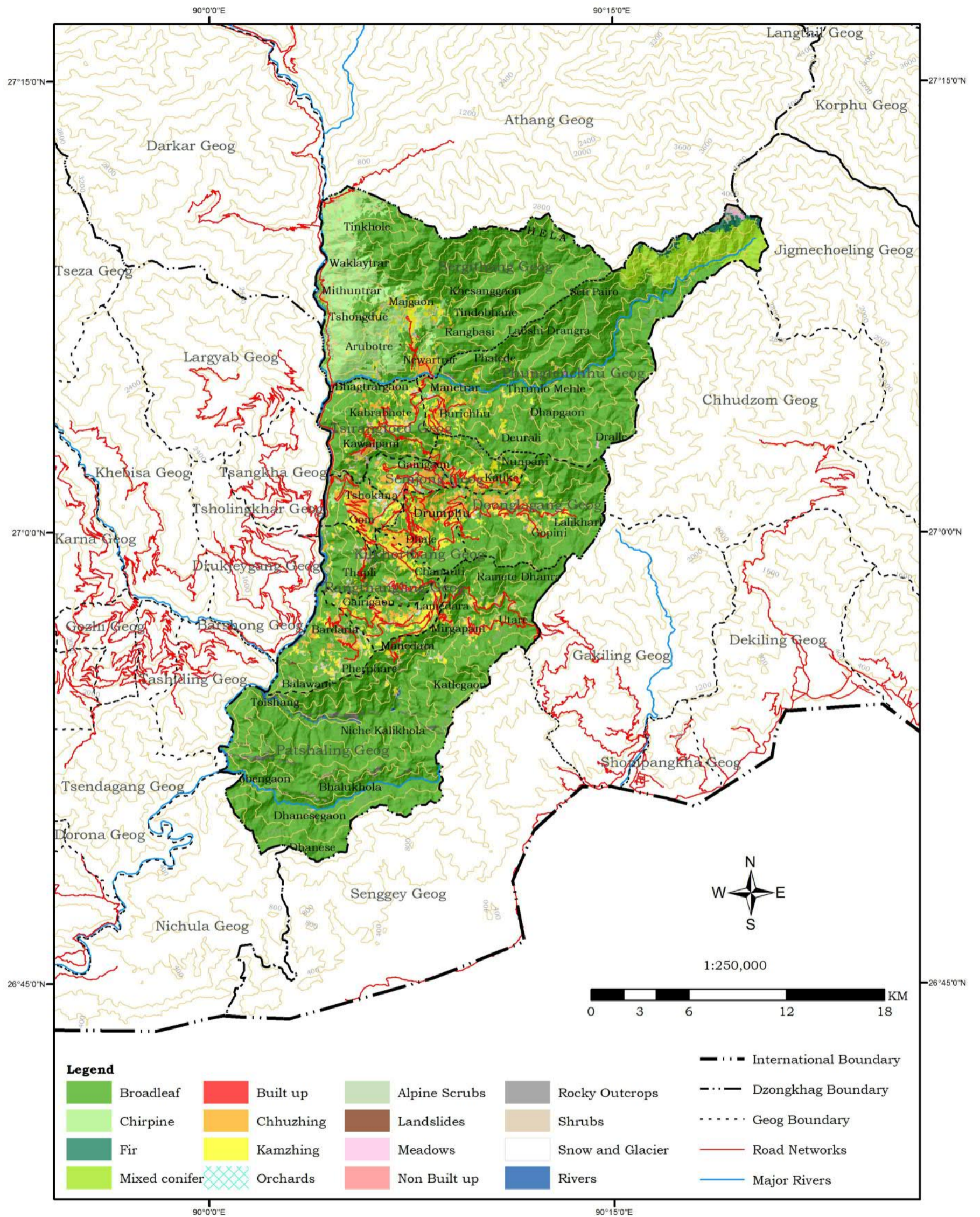
Tsirang Dzongkhag has an altitudinal range between 300 m to 4200 m above sea level. The summer is hot and humid while the winter is dry and moderately cold. The rainfall is between 1000 mm and 3000 mm per year. The Dzongkhag has a forest cover of 87.50%.

Kamzhing followed by *Chhuzhing* are the dominant agriculture land use type. Altogether, about 9.03% of Tsirang's area is under agriculture cultivation. Some of important crops are maize, rice, potatoes and other vegetables. Tsirang is famous for its oranges which is a major source of the cash income.

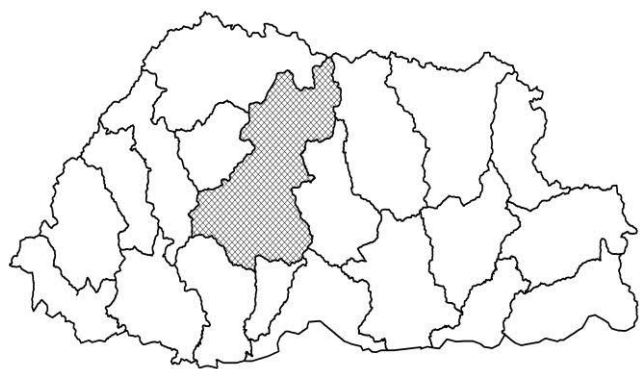
Land Cover Class	Sub Class	Area (Ha)	Area (%)
Alpine Scrubs		13.29	0.02%
Built up		69.85	0.11%
Cultivated Agriculture		5704.65	9.03%
	Chhuzhing	2080.67	3.29%
	Kamzhing	3320.45	5.26%
	Orchards	303.54	0.48%
Forests		55265.12	87.50%
	Broadleaf	49038.60	77.64%
	Chirpine	4111.54	6.51%
	Fir	254.73	0.40%
	Mixed conifer	1860.25	2.95%
Landslides		24.05	0.04%
Meadows		59.94	0.09%
Non Built up		1.78	0.00%
Rocky Outcrops		215.93	0.34%
Shrubs		1376.32	2.18%
Water Bodies		432.34	0.68%
	Rivers	432.34	0.68%

Altitude (M)	<600	600-1200	1200-1800	1800-2400	2400-3000	3000-3600	3600-4200	4200-4800	4800-5400	5400-6000	6000-6600	>6600
Area SqKm	56.02	202.89	191.82	119.50	43.26	20.01	4.34	0.00	0.00	0.00	0.00	0.00

Tsirang Dzongkhag



20 WANGDUE PHODRANG



WANGDUE PHODRANG DZONGKHAG lies in the central part of Bhutan (27°06' to 28°02' latitude and 89°42' to 90° 32' longitude) and shares border with Gasa, Punakha, Thimphu, Dagana, Tsirang, Sarpang, Trongsa and Bumthang Dzongkhags. Small portion in the Northern part of the Dzongkhag borders with China. It occupies an area of approximately 4035.65 km².

The elevation of the Dzongkhag ranges from 500 m to 7070 m above sea level. The average annual rainfall is approximately 1000mm. Northern part of the Dzongkhag receives precipitation in the form of snow

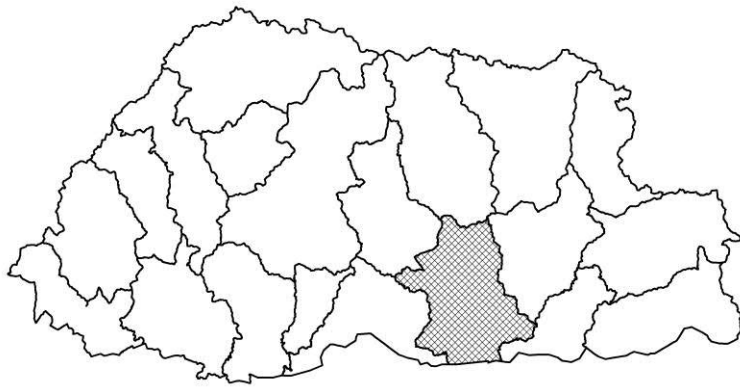
About 66.07% of the total area is under forest cover. The higher ridges along the central valley provide rich pasture for livestock. Phobjikha valley (Gangte and Phobji Gewogs) is famous as the winter resting place for the black-necked crane. The Dzongkhag falls under the Jigme Dorji National Park, Jigme Singye Wangchuck National Park and Wangchuck Centennial National Park.

Chhuzhing dominates the agricultural land use type followed by *Kamzhing*. Paddy cultivation is a major agricultural activity which is practiced along the Dang Chhu and the Punatsang Chhu valley.

Land Cover Class	Sub Class	Area (Ha)	Area (%)
Alpine Scrubs		17564.27	4.40%
Built up		544.76	0.14%
Cultivated Agriculture		5818.41	1.46%
	Chhuzhing	3117.61	0.78%
	Kamzhing	2700.81	0.68%
Forests		264061.88	66.07%
	Bluepine	3425.30	0.86%
	Broadleaf	109145.22	27.31%
	Chirpine	28085.92	7.03%
	Fir	28508.62	7.13%
	Mixed conifer	94896.82	23.75%
Landslides		58.64	0.01%
Meadows		12058.15	3.02%
Moraines		1238.81	0.31%
Non Built up		133.19	0.03%
Rocky Outcrops		21755.85	5.44%
	Rocky Outcrops	18899.96	4.73%
	Scree	2855.89	0.71%
Shrubs		46540.44	11.65%
Snow and Glacier		27875.28	6.98%
Water Bodies		1991.19	0.50%
	Lake	1285.47	0.32%
	Rivers	705.72	0.18%

Altitude (M)	<600	600-1200	1200-1800	1800-2400	2400-3000	3000-3600	3600-4200	4200-4800	4800-5400	5400-6000	6000-6600	>6600
Area SqKm	2.80	122.71	355.80	538.00	727.95	783.88	500.52	492.98	455.97	49.71	4.41	0.42

21 ZHEMGANG



ZHEMGANG DZONGHAG borders with the Trongsa, Sarpang, Samdrup Jongkhar, Mongar and Bumthang Dzongkhags. It covers an area of approximately 2416.58 km². Two major rivers, Chamkhar Chhu and Mangde Chhu flows through this Dzongkhag. The elevation ranges from less than 100 m to 3600 m above sea level. Zhemgang is well known throughout the country, for its “Bangchungs” made from a particular cane.

The Dzongkhag experiences temperate and subtropical climate owing to its variation of altitude. The rainfall varies from 1000 mm to 5000 mm on the Southern foothills, reaching its maximum during July and August.

The forest constitutes 94.17% of the total area of Zhemgang Dzongkhag. *Kamzhing* is the dominant agriculture land use type followed by *Chhuzhing*. Some of the important crops grown in the Dzongkhag are maize, potato, paddy and buckwheat. Orange is one of the main cash crop of the Dzongkhag.

Land Cover Class	Sub Class	Area (Ha)	Area (%)
Alpine Scrubs		1276.59	0.53%
Built up		123.69	0.05%
Cultivated Agriculture		3446.26	1.44%
	Chhuzhing	789.41	0.33%
	Kamzhing	2297.53	0.96%
	Orchards	359.32	0.15%
Forests		225361.47	94.17%
	Broadleaf	212502.37	88.80%
	Chirpine	1211.02	0.51%
	Fir	2250.45	0.94%
	Mixed conifer	9397.63	3.93%
Landslides		356.78	0.15%
Meadows		78.25	0.03%
Non Built up		1.40	0.00%
Rocky Outcrops		294.43	0.12%
Shrubs		6435.54	2.69%
Snow and Glacier		273.48	0.11%
Water Bodies		1660.60	0.69%
	Lake	12.73	0.01%
	Rivers	1647.87	0.69%

Altitude (M)	<600	600-1200	1200-1800	1800-2400	2400-3000	3000-3600	3600-4200	4200-4800	4800-5400	5400-6000	6000-6600	>6600
Area SqKm	267.91	711.41	653.68	404.74	207.20	113.19	42.90	15.46	0.00	0.00	0.00	0.00

Zhemgang Dzongkhag

