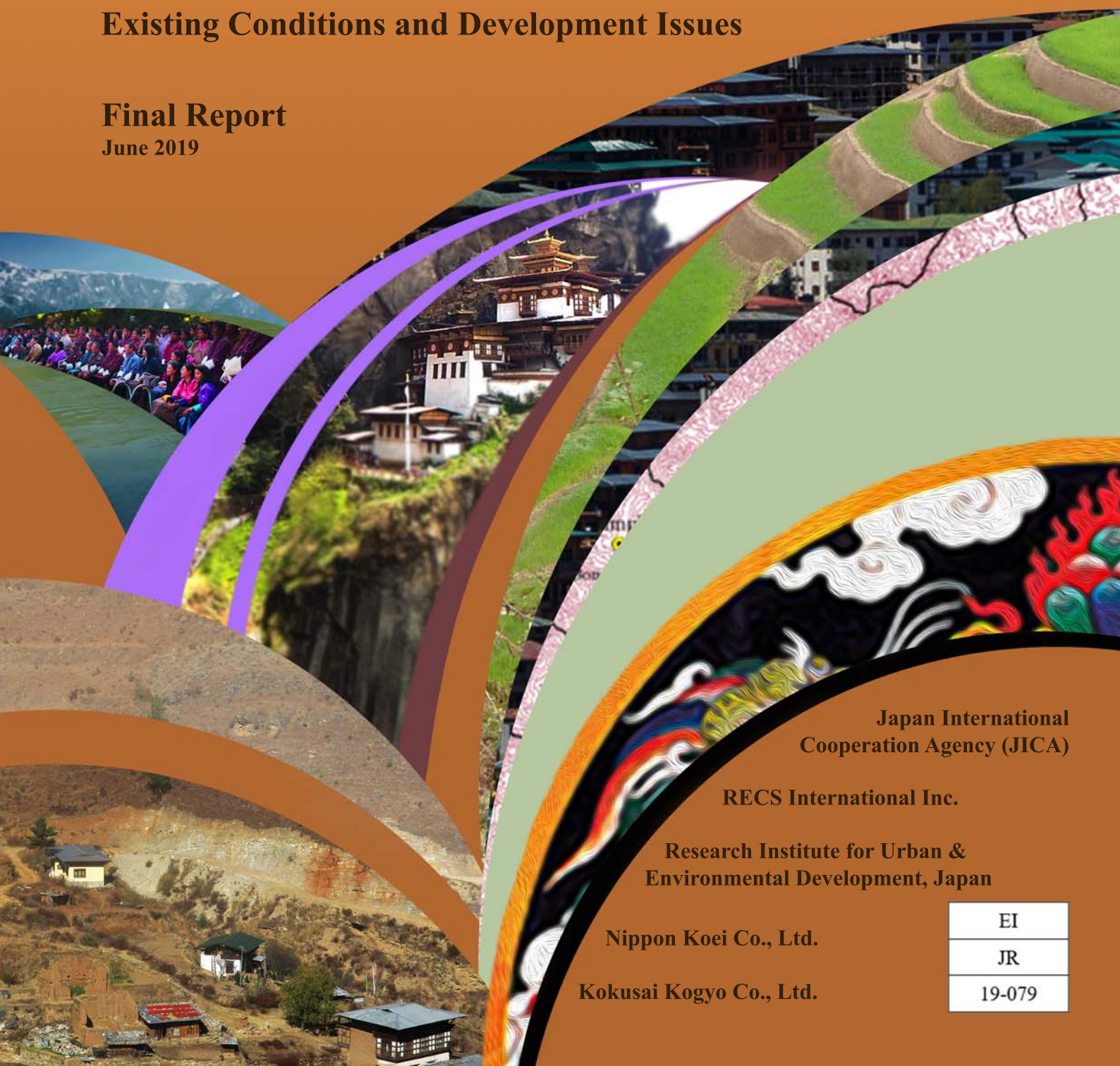
Kingdom of Bhutan
Ministry of Works and Human Settlement
(MoWHS)

The Project for Formulation of Comprehensive Development Plan for Bhutan 2030

Volume II

Existing Conditions and Development Issues

Final Report
June 2019



Japan International Cooperation Agency (JICA)

RECS International Inc.

Research Institute for Urban & Environmental Development, Japan

Nippon Koei Co., Ltd.

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ABBREVIATIONS

(ORGANIZATION)

ADB	Asian Development Bank
AFD	Administration and Finance Division
BAFRA	Bhutan Agriculture and Food Regulatory Authority
CoRRB	Council for RNR Research of Bhutan
DAMC	Department of Agriculture Marketing and Cooperatives
DDM	Department of Disaster Management
DGM	Department of Geology and Mines
DHI	Druk Holding and Investments
DHS	Department of Human Settlement
DoA	Department of Agriculture
DoFPS	Department of Forest & Park Services
DoI	Department of Industry
DoL	Department of Livestock
DoR	Department of Roads
FCBL	Food Corporation of Bhutan Limited
GEF	Global Environment Facility
GNHC	Gross National Happiness Committee
HRMD	Human Resources Management Division
IAU	Internal Audit Unit
ICMOD	International Centre for Integrated Mountain Development
IMF	International Monetary Fund
IUCN	International Union for Nature Conservation
JICA	Japan International Cooperation Agency
KGUMSB	Khesar Gyalpo University of Medical Sciences of Bhutan
MoAF	Ministry of Agriculture and Forests
MoE	Ministry of Education
MoEA	Ministry of Economic Affairs
MoF	Ministry of Finance
MoFA	Ministry of Foreign Affairs
MoH	Ministry of Health
MoHCA	Ministry of Home and Cultural Affairs
MoIC	Ministry of Information and Communications
MoLHR	Ministry of Labour and Human Resources
MoWHS	Ministry of Works and Human Settlement
NBC	National Biodiversity Centre
NEC	National Environment Commission
NECS	National Environment Commission Secretariat
NRDCL	Natural Resource Development Corporation Limited
NRH	National Referral Hospital
NSB	National Statistics Bureau
NSSC	National Soil Service Centre
PPD	Policy & Planning Division
RBP	Royal Bhutan Police
RDTC	Rural Development Training Centre
RGoB	Royal Government of Bhutan
RIM	Royal Institute of Management
RITH	Royal Institute for Tourism and Hospitality
RMA	Royal Monetary Authority
RRH	Regional Referral Hospital
RUB	Royal University of Bhutan
SC	Steering Committee
TCB	Tourism Council of Bhutan
TTI	Technical Training Institute
UNDP	United Nations Development Programme
WB	World Bank
WG	Working Group
WHO	World Health Organization
WWF	World Wildlife Fund

(GENERAL TERM)

AI	Artificial Intelligence
AKRA	Agency Key Result Area
AR	Advanced Region
BHU	Basic Health Units
BLSS	Bhutan Living Standards Survey
BSER	Bhutan State of Environment Report
CF	Community Forest
CNDP	Comprehensive National Development Plan
CSI	Cottage and Small Industries
CSMI	Cottage and Small Medium Industry
DC	District centres
DCR	Development Control Regulation
DEM	Digital Elevation Model
DMO	Destination Management Organization
ECCD	Early Childhood Care and Development
ECR	Extended Classroom
EDP	Economic Development Policy
EIA	Environmental Impact Assessment
EV	Electric Vehicles
FDI	Foreign Direct Investment
FMU	Forest Management Unit
FNCA	Forest and Nature Conservation Act of Bhutan 1995
FNCRR	Forest and Nature Conservation Rules and Regulations 2017
FYP	Five Year Plan
GC	Gewog Centre
G2C	Government-to-citizen
GDP	Gross Domestic Product
GHG	Greenhouse Gas
GIS	Geographic Information System
GLOF	Glacial Lake Outburst Flood
GNH	Gross National Happiness
GRF	Government Reserved Forest
GVC	Global Value Chain
HRD	Human Resource Development
HRDP	Human Resource Development Plan
ICT	Information and Communication Technology
IT	Information Technology
JPT	JICA Project Team
KPI	Key Performance Indicator
LAP	Local Area Plan
LFMP	Local Forest Management Plans
LUC	Linked Urban Centre
LULC	Land Use Land Cover
MAP	Medicinal and Aromatic Plant
MDG	Millennium Development Goal
MFCTC	Macroeconomic Framework Coordination Technical Committee
NCR	National Capital Region
NFE	Non-Formal Education
NGO	Non-governmental Organization
NIMP	National Irrigation Master Plan
NKRA	National Key Result Area
NIMP	National Irrigation Master Plan
NIWR	National Integrated Water Resources
MP	Management Plan
NPO	Non-profit Organization
NWFP	Non-Wood Forest Products
OC	Outreach Centre
OGOP	One Gewog One Product
ORC	Outreach ClinicPA Protected Area
PA	Protected Area
PAM	Production-Access-Marketing
PF	Preservation Forest
PHCB	Population and Housing Census of Bhutan
PNH	Primary National Highway
PPP	Public Private Partnership
PS	Primary School
RBC	River Basin Committee
RD	Record of Discussions
RC	Regional Centre
RIA	Rural Intervention Area
RMNP	Royal Manas National Park
RNR	Renewable Natural Resources
RUF	Resource Utilization Forest
SAP	School Agriculture Program
SDC	Sub-district Centres
SDG	Sustainable Development Goal
SEA	Strategic Environmental Assessment
SEZ	Special Economic Zones
SHM	Stakeholder Meeting
SGNH	Strategy for Gross National Happiness
SMEs	Small and Medium-sized Enterprises
SNH	Secondary National Highway
SRFL	State-Reserved Forest Land
SSR	Self Sufficiency Rate
SWOT	Strength, Weakness, Opportunity and Threat
TTS	Trunk Traffic System
UAV	Unmanned Aerial Vehicle
UMA	Urbanization Management Area
URGD	Urban- Rural Growth Difference

LOCAL LANGUAGE IN DZONGKHA

Chortens	Stupa
Chhu	River
Chugo	Hard Cheese
Druk Gyalpo	The King of Bhutan
Dungkhag	County
Dzong	Fortress, which is commonly used as an administrative centre of local government and traditionally is the abode of monks.
Dzongdag	District Administrator
Dzongkhag	District
Dzongkhag Tshogdu	District Council
Gewog	Village Block
Gewog Tshogde	Village Block Council
Gup's office	Head of Village Block Council
Lhakhang	Buddhist temple
Thromde	Municipality
Yenlag Thromde	Satellite Town

UNIT OF MEASUREMENT

AREA

m^2	square meter
km^2	square kilometer
ha	hectare (= 10,000 m^2)

LENGTH

mm	millimeter
cm	centimeter
m	meter
km	kilometer

WEIGHT

µg	micro gram
mg	milligram
kg	kilogram
t	ton (=1,000 kg)
MT	metric ton
kt	kilo ton

VOLUME

l	liter
m^3	cubic meter (= 1,000 liter)
MCM	million cubic meter
BCM	billion cubic meter

TIME

sec, s	second
min	minute
h, hr	hour
d	day
y /yr	year

ENERGY

W	watt
kW	kilowatt
kWh	kilowatt-hour
MW	megawatt
GWh	gigawatt-hour
cal	calorie
J	joules (=4.18 cal)
kj	kilo joules

CURRENCY

BTN	Bhutanese Ngultrum
INR	Indian Rupee
JPY	Japanese Yen
USD / US$	United States Dollar

OTHER

%	percent
Avg	average
degree	degree celsius
cap	capita
dB	decibel
mil.	million
nos.	numbers
pcu	passenger car unit
ppm	parts per million
asl	above sea level

CHAPTER 1 INTRODUCTION

1.1 Background

The principle of Bhutanese national policy is the successful balance between development and prosperity in urban and rural areas. However, Bhutan is facing increasing rural-urban migration, mainly from east to west. This rural-urban migration is deemed to be contributing to the problems facing rural areas. These problems include labour shortages, which have led to the increase of fallow agricultural land and sociocultural break-up. Furthermore, this influx of people into the main cities, such as Thimphu, is being linked with rising unemployment.

One of the causes of domestic migration is the gap in happiness levels between urban and rural areas. According to the results of the third Gross National Happiness (GNH) survey conducted in 2015, the GNH Index in urban areas was estimated to be 0.811, compared to 0.731 in rural areas. In addition, according to the Poverty Analysis 2012, the poverty rate in urban areas is predicted to be 1.8%, compared to 16.7% in rural areas.

With a view to addressing the issue of rural-urban migration and promoting regionally balanced development, the Royal Government of Bhutan (RGoB) is planning to launch sectorial interventions, such as the development of special economic zones, industrial estates, hydropower projects, tourism, farming and agro-based industries. In this context, the RGoB has requested the Government of Japan to implement 'The Project for Formulation of Comprehensive Development Plan for Bhutan 2030' (hereafter known as 'the Project'), with the aim of promoting a comprehensive and coordinated approach to development.

In response to this request from the RGoB, the Japan International Cooperation Agency (JICA), the official agency responsible for development assistance, decided to undertake the Project, starting with the dispatch of a mission to carry out a detailed planning survey. On 18 August 2016, the JICA signed a Record of Discussions (RD) with the Gross National Happiness Committee (GNHC), witnessed by the Ministry of Works and Human Settlement (MoWHS), regarding the undertaking of the Project.

1.2 Objectives and Outputs

The objective of the Project is the formulation of a Comprehensive National Development Plan (CNDP) for Bhutan. Ultimately, it aims to promote well-balanced development between urban and rural areas across the entire country through the implementation of the CNDP. This well-balanced development will contribute to the maximization of GNH.

The outputs of the Project are as follows:

(a) The formulation of the CNDP for Bhutan 2030.
(b) The formulation of recommendations regarding an institutional framework within which to implement the CNDP.

<u>Significance and Importance of the Project</u>

The Royal Government of Bhutan (RGoB) has formulated the socioeconomic development plans and sector strategies. However, the spatial development plan encompassing the entire national territory has not yet been prepared. Thus, the Project will be the first attempt to envisage the national spatial structure in terms of its coherence with the socioeconomic

development and sector strategies. The 12th Five-Year Development Plan may include the introduction of the spatial plan. This spatial plan will be used as a guideline at the point of departure to build the future image of Bhutan.

His Majesty the Third King of Bhutan set forth the national objectives as aiming to maximize the prosperity of the nation's residents rather than economic prosperity. In 1972, His Majesty the Fourth King of Bhutan inherited the national objectives and established the concept of Gross National Happiness (GNH) to conceptualize the prosperity of the nation's residents. GNH was formulated to measure national prosperity via comprehensive cultural, societal, environmental, educational and community indices. The RGoB began to pursue this unique approach at an early date, when sustainable development was not well known, let alone highly regarded, within the global community, whose focus was on maximizing economic efficiency. The concept of GNH was epoch-making.

Developed countries have monetized the value of environmental and natural resources to take full advantage of their economic benefits and efficiency. Meanwhile, developing countries have been forced into competitive practices as a result of the economic development models established by developed countries. Bhutan proposed its unique approach at that time to differentiate itself from the economic development models pursued by most other countries.

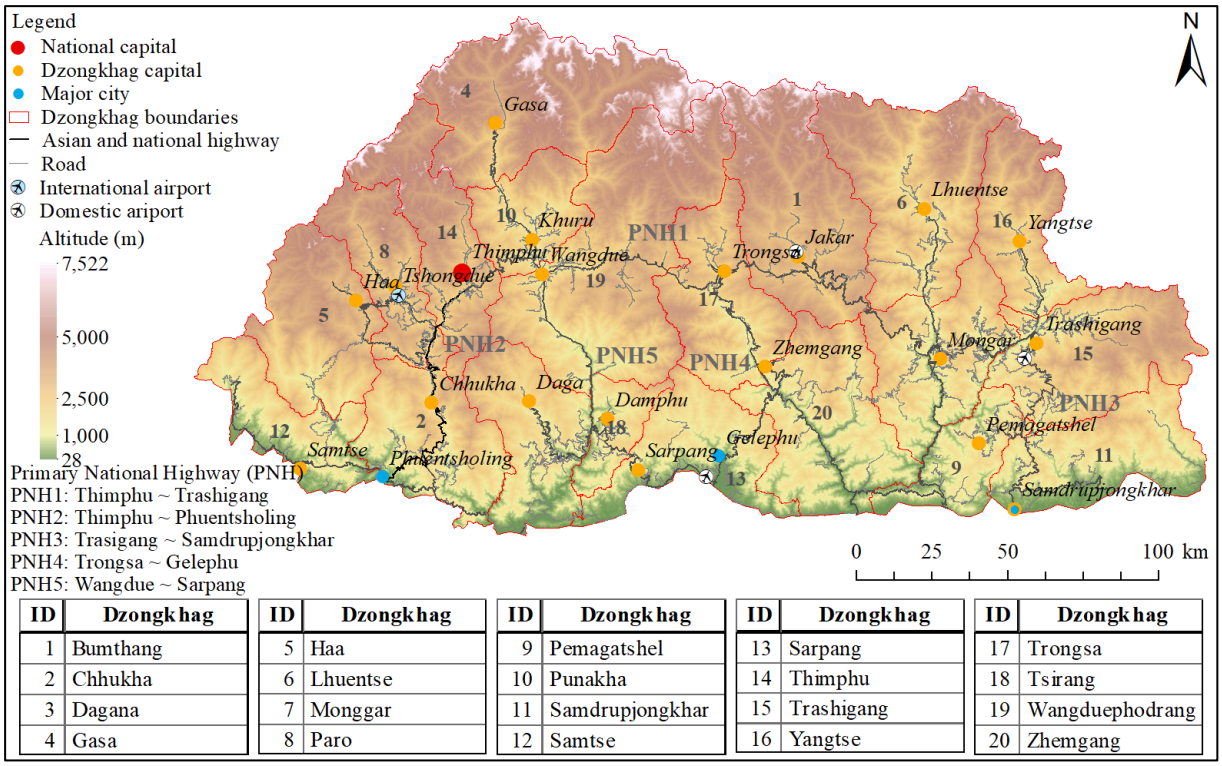
Japanese society recognizes the symbiosis between humans and nature in culture, tradition and lifestyle. This notion runs counter to the idea of controlling the environment and other resources for economic development. This kind of "conquering nature" approach has been pursued in most developed countries. By contrast, the *satoyama* and *satoumi* principles[1] have been adopted in Japan to deliver sustainable development at a local level, while its value has recently been newly recognized. For instance, the *satoyama* principle encompasses the concept that limited human interaction with nature enables the biodiversity of the natural environment, on which the villagers' lives and livelihood depend, to be enhanced. The *satoyama* principle points to a way of achieving sustainable development in combination with improvements in the livelihoods of, and environmental management by, local residents. As such, Japan has earned the right to support the formulation of a Comprehensive National Development Plan (CNDP) for Bhutan.

1.3 Study Area and Administrative Setting

1.3.1 Study Area and Basic Data of Bhutan

The target area of the Project (hereafter 'the Study Area') covers the Kingdom of Bhutan, with a land area of 38,394 km^2. Figure 1.3.1 shows the topography and Dzongkhag (or district) boundaries of Bhutan. Table 1.3.1 includes basic data on the country, including Bhutan's socioeconomic and social situation.

[1] In Japanese, in the simplest terms, *sato* means a village, *umi* means the ocean or sea and *yama* means mountains, forests or woods. The Japanese Ministry of the Environment defines *satoumi* as "a coastal area where biological productivity and biodiversity have increased through human interaction". *Satoumi* represents the close connection between the village and the ocean to which the villagers' lives and livelihoods are tied. *Satoyama*, on the other hand, means the foothills or forests, with farmlands, ponds and grasslands, bordering a village, upon which the villagers' lives and livelihoods likewise depend.



ID	Dzongkhag	ID	Dzongkhag	ID	Dzongkhag	ID	Dzongkhag	ID	Dzongkhag
1	Bumthang	5	Haa	9	Pemagatshel	13	Sarpang	17	Trongsa
2	Chhukha	6	Lhuentse	10	Punakha	14	Thimphu	18	Tsirang
3	Dagana	7	Monggar	11	Samdrupjongkhar	15	Trashigang	19	Wangduephodrang
4	Gasa	8	Paro	12	Samtse	16	Yangtse	20	Zhemgang

Source: ASTER Global Digital Elevation Model (GDEM) for elevation data, Bhutan Geospatial Portal for administrative boundaries and the DoR for roads

Figure 1.3.1 Topography and Dzongkhag Boundaries of Bhutan

Table 1.3.1 Basic Data on Bhutan

Item (Unit)		Value
Land area[1] (km^2)		38,394
Population in 2017[2] (persons)		727,145
Population growth rate between 2005 and 2017[2] (%/year)		1.3
Percentage of urban population in 2017[2] (%)		37.8
Population age distribution in 2017[2] (%)	Young population [~14]	26.0
	Productive population [~64]	68.0
	Aged population [65~]	5.9
	Total	100.0
GDP in 2015[3] (market price, BTN millions)		59,240
GDP per capita in 2015[3] (BTN per capita)		78,252
GDP growth rate in 2014/2015[3] (market price, %/year)		5.45
Industrial structure in 2016[4] (%)	Agriculture, livestock and forestry	16.5
	Industry	41.5
	Services	42.0
	Total	100.0
Employment by industry in 2016[5] (%)	Agriculture and forestry	57.2
	Industry	8.7
	Services	34.2
	Total	100.0

Item (Unit)	Value
Export value in 2017[6] (BTN millions) *excluding electricity	25,313.75
Main export product in 2017[6]	Ferrosilicon, Cardamoms, semi-finished iron products, Portland Pozzolana Cement
Import value in 2017[6] (BTN millions) *excluding electricity	66,921.18
Main import product in 2017[6]	Light oils, Motor spirit, parts, ferrous products
Annual international visitor in 2016[7] (persons)	254,704
Unemployment rate in 2017[2] (%)	2.44
Inflation rate in 2016[8] (%)	3.2
Constitution[9]	Constitutional monarchy
Parliament[9]	Bicameral legislature
Language[9]	Dzongkha (national), Sharchhopka, Nepali, Tshangla, etc.
Religion[9]	Lamaistic Buddhism, Hinduism and others
Ethnic composition[9]	Ngalops, Sharchops, Lhotsampa and others
Literacy rate[2] (%)	71.4
Poverty rate in 2017[10] (%)	8.2
Currency[11]	Bhutan Ngultrum (BTN) (BTN1.00=INR1.00=USD0.01395, as of September 2018)

Source: [1]Statistical Yearbook of Bhutan 2017, [2]Population and Housing Census of Bhutan 2017, [3]NSB Data, [4]National account Statistics 2017 [5]Labour Force Survey Report 2016 [6]Bhutan Trade Statistics 2017, [7]Bhutan Tourism Monitor 2017, [8]Bhutan at a Glance 2017, [9]CIA World Factbook (https://www.cia.gov/library/publications/the-world-factbook/geos/bt.html), [10] Bhutan Poverty Analysis 2017, [11]OANDA.COM (http://www.oanda.com)

1.3.2 Local and National Administrative Structure

The Constitution of the Kingdom of Bhutan entered into force in 2008 and its framework is based on the constitutional monarchy. The Constitution stipulates His Majesty the King (or Druk Gyalpo) as the Head of State and the symbol of the unity of the people. The Constitution defines the parliament as the body in which all legislative powers under the Constitution are vested and which comprises the King, the National Council and the National Assembly. There are 10 ministries, headed by the Prime Minster and line ministers, comprising the national administration, which works to achieve the highest possible GNH index. There are national commissions designated for this specific purpose. They include, but are not limited to, the Gross National Happiness Commission (GNHC), the National Land Commission Secretariat (NLCS),

the National Environmental Commission (NEC), the Dzongkha Development Commission and the Royal Civil Service Commission. The 10 ministries are:

- Ministry of Agriculture and Forests (MoAF),
- Ministry of Economic Affairs (MoEA),
- Ministry of Education (MoE),
- Ministry of Finance (MoF),
- Ministry of Foreign Affairs (MoFA),
- Ministry of Health (MoH),
- Ministry of Home and Cultural Affairs (MoHCA),
- Ministry of Information and Communications (MoIC),
- Ministry of Labour and Human Resources (MoLHR) and
- Ministry of Works and Human Settlement (MoWHS).

The Local Government Act of Bhutan 2009 established a local government in each of the 20 Dzongkhags. Each Dzongkhag is ultimately overseen by the Ministry of Home and Cultural Affairs. The parliament passed the bill amending the Local Government Act in 2014. The Local Government (Amendment) Act of Bhutan stipulates that the local government comprises three pillars. The Dzongkhag Tshogdu (District Council) is the highest decision-making body in the Dzongkhag and is established in each Dzongkhag; however, the Dzongkhag Tshogdu is not allowed to exercise legislative functions, although it may make rules and regulations consistent with parliamentary laws. The Gewog Tshogde (County Council) is the highest decision-making body in each Gewog under the Dzongkhag. At the third level, the Thromde Tshogde (Municipal Council) is established in each Thromde (municipality). There are two types of Thromde: the Dzongkhag Thromde and Yenlag Thromde. The Constitution of Bhutan defines the Yenlag Thromde as a satellite town. The Yenlag Thromde functions either under the Dzongkhag Administration or the Gewog Administration, as decided by the Government.

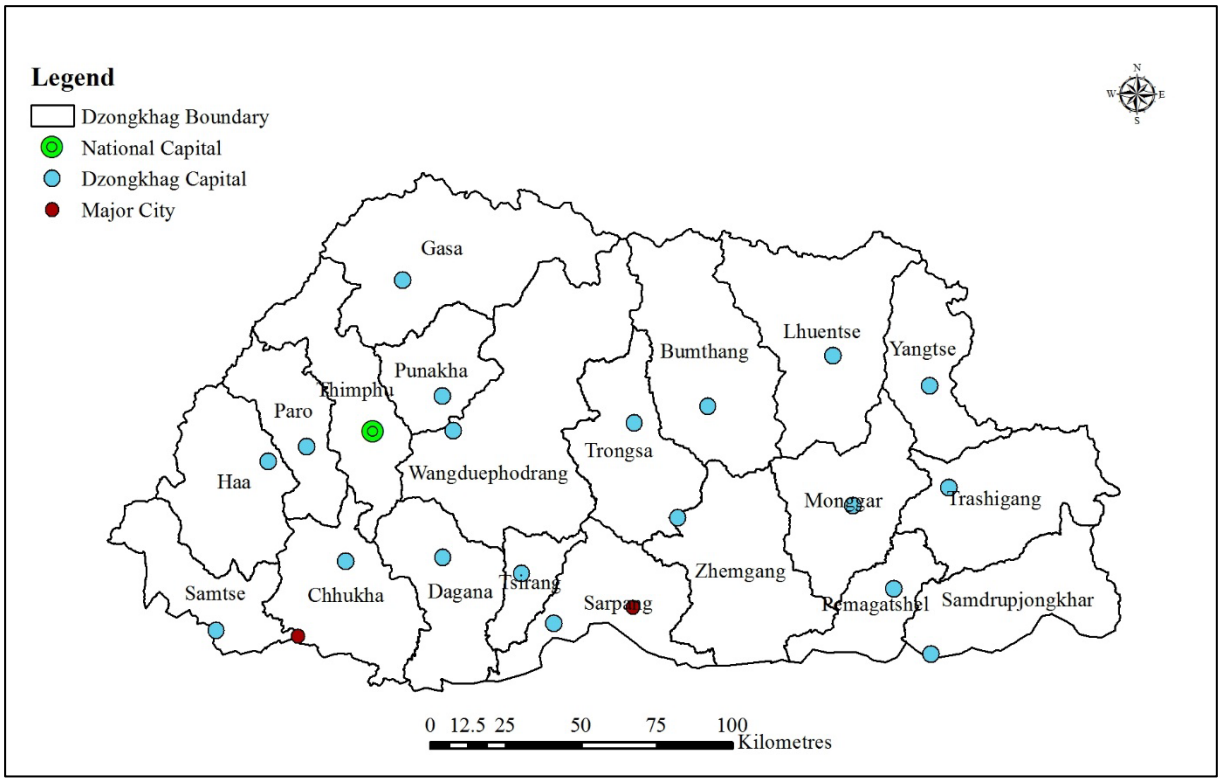
There is a local government administration at the Dzongkhag, Gewog and Thromde levels. The local government administration is staffed by civil servants and the Dzongdag is the most senior civil servant in the Dzongkhag Administration.

1.3.3 Administrative Boundaries

The administrative boundaries of Bhutan consist of Dzongkhag (District) and Gewog (Village Block) boundaries. The details are described below.

(1) Dzongkhag Boundaries

The Study Area, Bhutan, comprises 20 Dzongkhags (Districts). A map of the Dzongkhag administrative areas is shown in Figure 1.3.2.



Source: Bhutan Geospatial Portal (Dzongkhag Boundaries)

Figure 1.3.2 Dzongkhag Boundaries

The area of each Dzongkhag is listed in the following Table 1.3.2. The total area is estimated at 38,771 km^2, according to GIS data provided by the Bhutan Geospatial Portal. On the other hand, the official national land area is 38,394 km^2, according to the Statistical Yearbook of Bhutan 2016, National Statistics Bureau.

Table 1.3.2 List of Each Dzongkhag Area

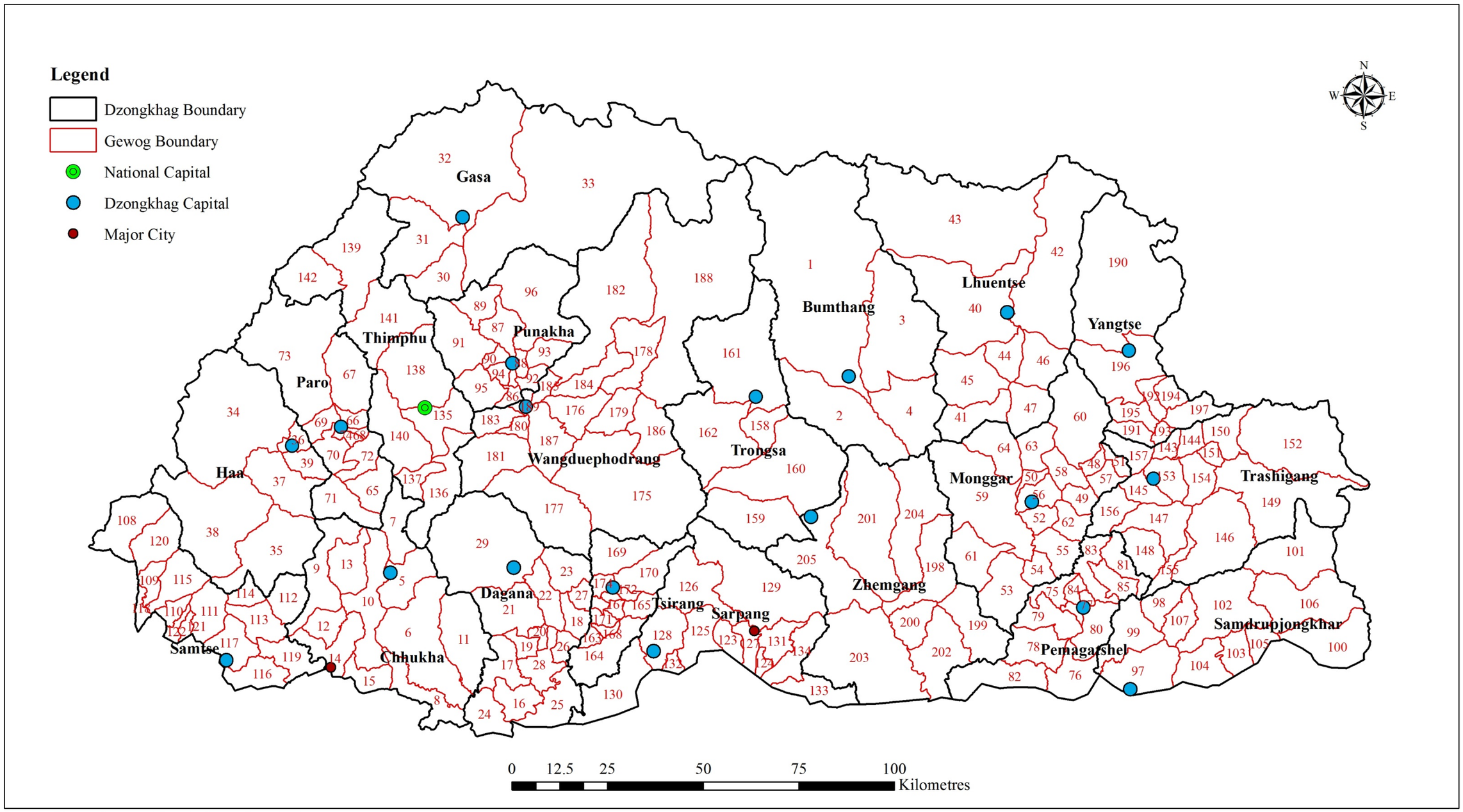
Dzongkhag Name	(Abbreviation)	Area (km^2)	Ratio (%)
Bumthang	BUM	2,717	7.01
Chhukha	CHU	1,880	4.85
Dagana	DAG	1,723	4.44
Gasa	GAS	3,134	8.08
Haa	HAA	1,905	4.91
Lhuentse	LHU	2,859	7.37
Monggar	MON	1,944	5.01
Paro	PAR	1,287	3.32
Pemagatshel	PEM	1,022	2.64
Punakha	PUN	1,110	2.86

Dzongkhag Name	(Abbreviation)	Area (km^2)	Ratio (%)
Samdrupjongkhar	SJO	1,877	4.84
Samtse	SAM	1,305	3.37
Sarpang	SAR	1,655	4.27
Thimphu	THI	1,796	4.63
Trashigang	TRG	2,204	5.68
Trongsa	TRO	1,814	4.68
Tsirang	TSI	638	1.65
Wangduephodrang	WAN	4,036	10.41
Yangtse	TRY	1,449	3.74
Zhemgang	ZHE	2,417	6.23
	Total Area	**38,771**	**100.00**

Source: Bhutan Geospatial Portal

(2) Gewog Boundaries

The Gewog is a sub-district administrative entity consisting of a group of villages in Bhutan. There are 205 Gewogs in total. The map below shows the Gewog boundaries. The area of each Gewog is listed in Table 1.3.3.



Source: Bhutan Geospatial Portal (Gewog Boundary)

Figure 1.3.3 Gewog Boundaries

Table 1.3.3 List of Each Gewog Area

ID	Gewog Name	Area (km^2)	Ratio (%)	Dzongkhag Name
1	Chhoekhor	1,530.51	3.95	Bumthang
2	Chhume	401.12	1.03	Bumthang
3	Tang	520.03	1.34	Bumthang
4	Ura	265.67	0.69	Bumthang
5	Bjachho	140.52	0.36	Chhukha
6	Bongo	399.37	1.03	Chhukha
7	Chapchha	129.18	0.33	Chhukha
8	Dala	135.55	0.35	Chhukha
9	Dungna	202.49	0.52	Chhukha
10	Geling	221.92	0.57	Chhukha
11	Getana	241.59	0.62	Chhukha
12	Logchina	71.92	0.19	Chhukha
13	Metap	129.67	0.33	Chhukha
14	Phuentsholing	133.55	0.34	Chhukha
15	Samphelling	74.00	0.19	Chhukha
16	Deorali	91.22	0.24	Dagana
17	Dorona	107.69	0.28	Dagana
18	Drugyelgang	57.38	0.15	Dagana
19	Gesarling	38.32	0.10	Dagana
20	Gozhi	21.73	0.06	Dagana
21	Kalidzingkha	190.58	0.49	Dagana
22	Khipisa	95.92	0.25	Dagana
23	Lajab	108.58	0.28	Dagana
24	Lhamoizingkha	106.13	0.27	Dagana
25	Nichula	138.98	0.36	Dagana
26	Trashiding	39.53	0.10	Dagana
27	Tsangkha	36.67	0.09	Dagana
28	Tsendagang	95.84	0.25	Dagana
29	Tseza	594.25	1.53	Dagana
30	Goenkhame	149.28	0.39	Gasa
31	Goenkhatoe	286.91	0.74	Gasa
32	Laya	967.01	2.49	Gasa
33	Lunana	1,731.26	4.47	Gasa
34	Bji	748.84	1.93	Haa
35	Gakiling	339.44	0.88	Haa
36	Katsho	40.65	0.10	Haa
37	Sama	200.97	0.52	Haa
38	Sombey	508.52	1.31	Haa
39	Uesu	66.46	0.17	Haa
40	Gangzur	535.10	1.38	Lhuentse
41	Jaray	137.90	0.36	Lhuentse
42	Khoma	653.94	1.69	Lhuentse
43	Kurtoe	961.64	2.48	Lhuentse
44	Menbi	88.86	0.23	Lhuentse
45	Metsho	218.78	0.56	Lhuentse
46	Minjay	137.95	0.36	Lhuentse
47	Tsenkhar	124.54	0.32	Lhuentse
48	Balam	27.23	0.07	Monggar
49	Chaskhar	51.89	0.13	Monggar
50	Chhali	24.41	0.06	Monggar
51	Drametse	28.64	0.07	Monggar
52	Drepung	51.52	0.13	Monggar
53	Gongdue	186.35	0.48	Monggar
54	Jurmey	56.11	0.14	Monggar
55	Kengkhar	98.58	0.25	Monggar
56	Mongar	73.22	0.19	Monggar
57	Narang	49.91	0.13	Monggar
58	Ngatshang	71.76	0.19	Monggar
59	Saleng	461.68	1.19	Monggar
60	Shermung	302.04	0.78	Monggar
61	Silambi	159.64	0.41	Monggar
62	Thangrong	68.51	0.18	Monggar
63	Tsakaling	88.61	0.23	Monggar
64	Tsamang	144.17	0.37	Monggar
65	Doga	106.04	0.27	Paro
66	Dopshari	33.90	0.09	Paro
67	Doteng	194.77	0.50	Paro
68	Hungrel	10.46	0.03	Paro
69	Lamgong	49.00	0.13	Paro
70	Lungnyi	75.71	0.20	Paro
71	Naja	136.66	0.35	Paro
72	Shapa	80.21	0.21	Paro
73	Tsento	579.74	1.50	Paro
74	Wangchang	20.65	0.05	Paro
75	Chhimung	52.83	0.14	Pemagatshel
76	Chokhorling	126.47	0.33	Pemagatshel
77	Chongshing	31.03	0.08	Pemagatshel
78	Dechhenling	137.02	0.35	Pemagatshel
79	Dungmin	109.98	0.28	Pemagatshel
80	Khar	114.08	0.29	Pemagatshel
81	Nanong	81.69	0.21	Pemagatshel
82	Norbugang	181.65	0.47	Pemagatshel
83	Shumer	92.16	0.24	Pemagatshel
84	Yurung	28.20	0.07	Pemagatshel
85	Zobel	67.00	0.17	Pemagatshel
86	Bapisa	24.65	0.06	Punakha
87	Chhubu	91.31	0.24	Punakha
88	Dzoma	21.92	0.06	Punakha
89	Goenshari	88.39	0.23	Punakha
90	Guma	37.00	0.10	Punakha
91	Kabjisa	206.11	0.53	Punakha
92	Lingmukha	33.80	0.09	Punakha
93	Shengabjimi	62.43	0.16	Punakha
94	Talo	25.51	0.07	Punakha
95	Toepisa	102.79	0.27	Punakha
96	Toewang	415.66	1.07	Punakha
97	Dewathang	194.89	0.50	Samdrupjongkhar
98	Gomdar	80.87	0.21	Samdrupjongkhar
99	Jangchhubling	163.04	0.42	Samdrupjongkhar
100	Langchhenphu	222.43	0.57	Samdrupjongkhar
101	Lauri	275.53	0.71	Samdrupjongkhar
102	Martshala	296.37	0.76	Samdrupjongkhar
103	Pemathang	76.54	0.20	Samdrupjongkhar
104	Phuntsthothang	130.18	0.34	Samdrupjongkhar
105	Samrang	51.25	0.13	Samdrupjongkhar
106	Serthig	306.17	0.79	Samdrupjongkhar
107	Wangphu	79.79	0.21	Samdrupjongkhar
108	Bara	188.00	0.48	Samtse

ID	Gewog Name	Area (km^2)	Ratio (%)	Dzongkhag Name
109	Biru	51.08	0.13	Samtse
110	Chargharay	38.25	0.10	Samtse
111	Chengmari	116.57	0.30	Samtse
112	Denchhukha	104.03	0.27	Samtse
113	Dorokha	104.16	0.27	Samtse
114	Dungtoe	48.27	0.12	Samtse
115	Namgyel Chhoeling	127.32	0.33	Samtse
116	Pagli	102.45	0.26	Samtse
117	Samtse	115.52	0.30	Samtse
118	Sipsu	27.00	0.07	Samtse
119	Tading	108.68	0.28	Samtse
120	Tendu	131.92	0.34	Samtse
121	Ugentse	18.64	0.05	Samtse
122	Yoeseltse	22.96	0.06	Samtse
123	Bhur	54.68	0.14	Sarpang
124	Chhuzagang	21.40	0.06	Sarpang
125	Dekiling	113.46	0.29	Sarpang
126	Doban	222.27	0.57	Sarpang
127	Gelephu	54.45	0.14	Sarpang
128	Hiley	142.15	0.37	Sarpang
129	Jigmichhoeling	501.30	1.29	Sarpang
130	Senge	214.33	0.55	Sarpang
131	Sherzhong	78.36	0.20	Sarpang
132	Shompangkha	21.47	0.06	Sarpang
133	Taklai	109.06	0.28	Sarpang
134	Umling	122.43	0.32	Sarpang
135	Chang	156.88	0.40	Thimphu
136	Dagala	204.24	0.53	Thimphu
137	Genye	60.93	0.16	Thimphu
138	Kawang	297.68	0.77	Thimphu
139	Lingzhi	386.79	1.00	Thimphu
140	Mewang	230.10	0.59	Thimphu
141	Naro	281.37	0.73	Thimphu
142	Soe	177.89	0.46	Thimphu
143	Bartsham	34.86	0.09	Trashigang
144	Bidung	46.39	0.12	Trashigang
145	Kanglung	67.18	0.17	Trashigang
146	Kangpara	343.64	0.89	Trashigang
147	Khaling	155.56	0.40	Trashigang
148	Lumang	105.69	0.27	Trashigang
149	Merak	456.25	1.18	Trashigang
150	Phongme	99.41	0.26	Trashigang
151	Radi	28.58	0.07	Trashigang
152	Sakteng	455.11	1.17	Trashigang
153	Samkhar	90.52	0.23	Trashigang
154	Shongphu	92.78	0.24	Trashigang
155	Thrimshing	53.63	0.14	Trashigang
156	Udzorong	100.02	0.26	Trashigang
157	Yangnyer	74.34	0.19	Trashigang
158	Dragteng	84.59	0.22	Trongsa
159	Korphu	290.23	0.75	Trongsa
160	Langthil	508.21	1.31	Trongsa
161	Nubi	558.50	1.44	Trongsa
162	Tangsibji	372.18	0.96	Trongsa
163	Barzhong	21.75	0.06	Tsirang
164	Beteni	170.63	0.44	Tsirang
165	Dunglegang	46.02	0.12	Tsirang
166	Gosarling	10.24	0.03	Tsirang
167	Kikorthang	17.71	0.05	Tsirang
168	Mendrelgang	14.83	0.04	Tsirang
169	Patakla	136.45	0.35	Tsirang
170	Phuentenchhu	136.45	0.35	Tsirang
171	Rangthangling	24.58	0.06	Tsirang
172	Shemjong	14.66	0.04	Tsirang
173	Tsholingkhor	13.12	0.03	Tsirang
174	Tsirangtoe	31.40	0.08	Tsirang
175	Athang	778.42	2.01	Wangduephodrang
176	Bjena	118.93	0.31	Wangduephodrang
177	Daga	346.79	0.89	Wangduephodrang
178	Dangchhu	171.23	0.44	Wangduephodrang
179	Gangte	99.67	0.26	Wangduephodrang
180	Gasetsho Gom	29.01	0.07	Wangduephodrang
181	Gasetsho Om	208.21	0.54	Wangduephodrang
182	Kazhi	629.11	1.62	Wangduephodrang
183	Nahi	67.55	0.17	Wangduephodrang
184	Nyisho	116.85	0.30	Wangduephodrang
185	Phangyuel	31.89	0.08	Wangduephodrang
186	Phobji	151.25	0.39	Wangduephodrang
187	Ruepisa	158.72	0.41	Wangduephodrang
188	Sephu	1,108.01	2.86	Wangduephodrang
189	Thedtsho	20.01	0.05	Wangduephodrang
190	Bumdeling	851.25	2.20	Yangtse
191	Jamkhar	51.59	0.13	Yangtse
192	Khamdang	45.38	0.12	Yangtse
193	Ramjar	22.45	0.06	Yangtse
194	Toetsho	49.00	0.13	Yangtse
195	Tomzhangtshen	64.43	0.17	Yangtse
196	Trashiyangtse	275.12	0.71	Yangtse
197	Yalang	89.83	0.23	Yangtse
198	Bardo	209.69	0.54	Zhemgang
199	Bjoka	194.87	0.50	Zhemgang
200	Gozhing	99.12	0.26	Zhemgang
201	Nangkor	492.56	1.27	Zhemgang
202	Ngangla	215.78	0.56	Zhemgang
203	Pangkhar	536.66	1.38	Zhemgang
204	Shingkhar	308.77	0.80	Zhemgang
205	Trong	359.13	0.93	Zhemgang
	Total Area	38,770.99	100.00	

Source: Bhutan Geospatial Portal (Gewog Boundary)

1.4 Arrangements for Implementing the Project

The arrangements for implementing the Project on the Bhutan side was discussed and confirmed based on the RD at the first Steering Committee meeting in February 2017 and at the first Working Group meeting in January 2017, respectively. The Steering Committee (SC) is the highest organization supervising the Project's activities and approving the Project's outcomes. The SC is chaired by the Secretary of the Gross National Happiness Commission (GNHC) and co-chaired by the Chief Representative of the JICA Bhutan Office. The SC's members comprise six secretaries of two national commissions and four ministries. The Working Group has been established to comprehensively exchange the opinions and views of line ministries and departments. The members of the Working Group consist of representatives from three national commissions, eight ministries, the Centre for Bhutan Studies and GNH, the National Statistics Bureau, the Tourism Council of Bhutan, the JICA Bhutan Office and local government officials. The MoWHS appoints a Core Member from among the officials of the Department of Human Settlement to coordinate the SC and the WG. They practically support and collaborate with the JICA Project Team as its Counterparts on a daily basis. Table 1.4.1 shows the roles played by the SC, the WG and the Core Member.

Table 1.4.1 Roles of the Steering Committee, Working Group and Core Members

Organization	Steering Committee	Working Group	Core Member
Roles	• Monitoring and management of the Project • Discussion and approval of reports • Coordination with related organizations • Review and discussions of main issues	• Collaboration with JICA Project Team members on a daily basis • Study and analysis of technical matters in reports • Coordination of stakeholders and related organizations • Preparation of reports and presentations for the SC • Correspondence relating to requests and questions from the SC • Information collection and analysis • Preparation of planning documents for each sector	• Collaboration with JICA Project Team members on a daily basis • Study and analysis of technical matters in reports • Coordination with related organizations, including central government and local governments • Coordination with the SC and the WG • Holding consultation meetings • Public relations with the Bhutanese people • Correspondence relating to requests and questions from the SC • Information collection and analysis • Preparation of planning documents for each sector
Affiliation	• Secretary, Gross National Happiness Commission (GNHC) (Chair) • Chief Representative, JICA Bhutan Office (Co-Chair) • Secretary, Ministry of Works and Human Settlement (MoWHS) • Secretary, Ministry of Home and Cultural Affairs (MoHCA) • Secretary, Ministry of Agriculture and Forests (MoAF) • Secretary, Ministry of Economic Affairs (MoEA) • Secretary, National Land Commission Secretariat (NLCS) • Secretary, National Environment Commission (NEC) • Director, Department of Human Settlement • Leader of the JICA Project Team	• Gross National Happiness Commission • National Land Commission Secretariat • National Environment Commission • Centre for Bhutan Studies and GNH • National Statistics Bureau • Tourism Council of Bhutan • Local Government Officials [MoWHS] • Department of Roads • Department of Engineering Services • Department of Human Settlement • Policy and Planning Division • Directorate [MoHCA] • Department of Culture • Department of Disaster Management • Department of Local Government [MoAF] • Department of Agriculture • Department of Forests and Park Services [MoEA] • Department of Cottage and Small Industries • Department of Geology and Mines • Department of Hydropower and Power Systems • Department of Industry [Ministry of Information and Communication] • Policy and Planning Division [Ministry of Education] • Policy and Planning Division [Ministry of Health] • Directorate of services [Ministry of Finance] • Department of Macroeconomic Affairs [JICA Bhutan Office] • Representative [JICA Project Team] • Members	• Department of Human Settlement, MoWHS

Source: Modified based on the RD and discussions with SC meetings, WG meetings and Core members meetings

In order to carry out the Project, the operational approaches are as proposed below.

(1) Collaboration with Bhutanese Officials to Formulate the CNDP

The Bhutanese people must decide on the future of the country. The Project aims to support decision-making by the Bhutan side. The JICA Project Team will provide the technical materials and share Japan's and other countries' experience and knowledge of CNDPs.

Bhutan's participation will be critical if the level of ownership is to be raised, in order to enhance motivation to implement the CNDP. The JICA Project Team will collaborate with the Bhutan side on a daily basis, while meetings will be held between them both whenever necessary. Additional experts may participate in the meetings as necessary. The meeting will focus on works rather than liaison. Occasionally, a special theme will be proposed to encourage interest among the counterparts (CPs).

(2) Experience and Knowledge of CNDPs in Japan

The first CNDP for Japan was formulated in 1962 to boost its growth pole strategy, to create a new industrial city and to designate a special area for industrial consolidation. The CNDP was revised four times and was developed into a national spatial plan. The concept of each CNDP reflected the circumstances of the time. These trends shifted from the formulation of an effective national development plan to local governance and participation approaches. The goals of the nation, such as the growth pole strategy, the concept of a settlement area and regional revitalization in response to globalization, have shifted to reflect the needs and demands of the prevailing era. The realization of a development plan depends heavily on the nation's financial situation, as well as on the capacity of the central government, local governments and the population. Nowadays, local governance and participation approaches are common themes. The framework surrounding the implementation of a development plan, along with lessons learned from the Japanese planning experience, will be shared with the Bhutan side. The Local Government Act formulated by the RGoB authorizes a process of decentralization. The organizational and institutional characteristics developed from Japan's experience will be presented where relevant to Bhutanese policy.

The outcomes of the Project will include a land use plan. The MoWHS is currently preparing a new spatial planning act. This upcoming act will specify how the land use plan is to be implemented at the national, regional, city and local levels. It will be required to coordinate of roles played by different administrative units in each land use plan. Details of the Japanese land use control and planning system will be shared with the Bhutan side.

(3) Broad Capacity Development to Establish Arrangements for Implementation

A recommendation will be formulated regarding the institutional framework within which to implement the CNDP in the Project. Capacity development is one of the main outputs to be tackled by the Project. However, the participation of related organizations needs to be significant if this mandate is to be achieved. These related organizations, such as ministries and national commissions, will recognize the issues needed to carry out the CNDP in discussion with stakeholders. These mutual affects should produce the required momentum to take the actions that will improve the formulation and implementation of the CNDP. As a whole, the improved capacity of personal, organizational, societal and legal systems will support the establishment of the arrangements for implementation.

1.5 Project Schedule

The Project's activities in Bhutan started in mid-January 2017. When the Project was commenced, the project period was determined to be 24 months until December 2018. Due to delayed delivery of the Population and Housing Census of Bhutan 2017, the project period was extended for approximately 30 months until June 2019. The work schedule of the Project is shown in Figure 1.5.1. The main points of the Project's work/ schedule are as follows:

(a) The country's existing conditions will be analysed by October 2017. This analysis includes site visits to the Dzongkhags and the preparation of tentative development alternatives. An existing land cover map will be prepared using remote sensing analysis in order to classify the land cover using satellite images from 2016 and 2017.
(b) The development alternatives will be finalized and the most suitable alternative will be selected. Development visions and development objectives will be proposed. A national spatial structure will be formulated to envisage the urban centres, axes and land use, which will be achieved by March 2018.
(c) A new national land use plan will be prepared in line with the envisaged national spatial structure and transport network, to be completed in October 2018. Urban centres and main villages will be specified and designated.
(d) General guidelines for priority sectors, including rural development and depopulation countermeasures, industrial development and transport, will be proposed. Industrial development includes sectors with high growth potential, such as hydroelectric power, mining, tourism and cottage and small industries. Recommendations for implementing the CNDP will be suggested by March 2019.
(e) The overall outcomes of the above steps will be presented at seminars in Tokyo in March 2019 and Bhutan in June 2019, respectively.
(f) The SEA will be applied throughout the duration of the Project. Meetings with stakeholders will be convened to facilitate discussion with Dzongkhag representatives.
(g) Technical meetings will be held during four visits to Japan in order to gain insights from Japan's own experiences of CNDPs and rural development.

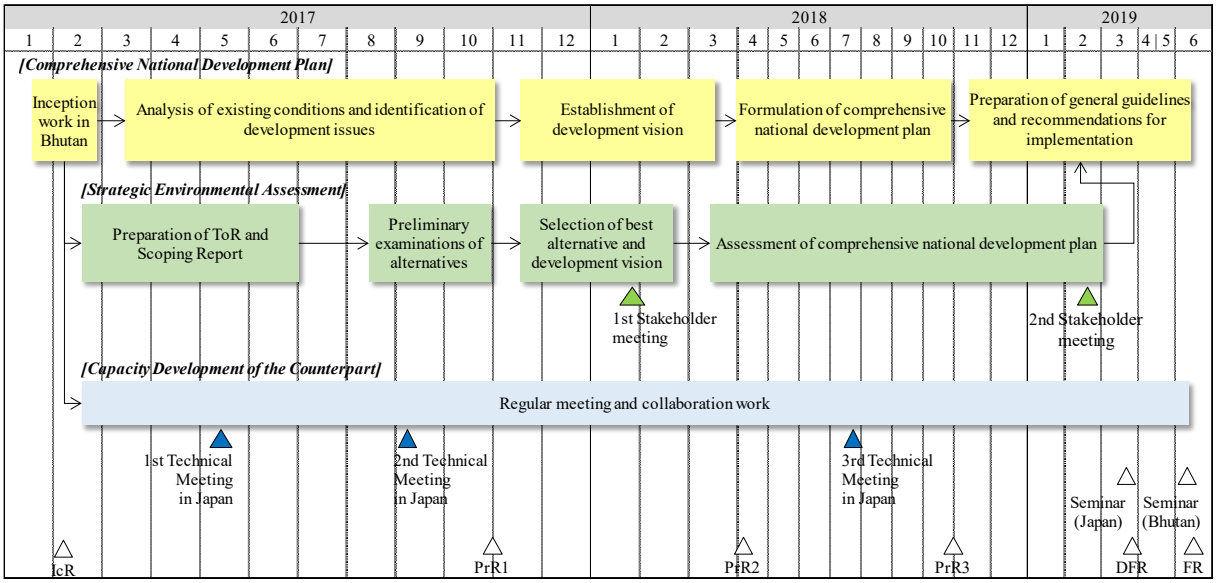


Figure 1.5.1 Work Schedule

1.6 Project Reports

The reports listed in Table 1.6.1 will be submitted to the MoWHS and JICA, and these will be the Project outputs

Table 1.6.1 Project Reports

Report	Contents	Due	Number of copies
Inception Report (IcR)	• Project approaches • Project procedures and methods • Work plan	January 2017	• English: 30 sets (for the Bhutan side: 25 sets) • Electronic files (CD-R): two sets (for the Bhutan side: one set)
Progress Report 1 (PrR1)	• Examination of existing conditions and identification of development issues • GIS database and existing land use map	October 2017	• English: 30 sets (for the Bhutan side: 25 sets) • Japanese (summary): seven sets • Electronic files (CD-R): two sets (for the Bhutan side: one set)
Progress Report 2 (PrR 2)	• Development vision • Development objectives • Development scenarios • SEA	March 2018	• English: 30 sets (for the Bhutan side: 25 sets) • Japanese (summary): seven sets • Electronic files (CD-R): two sets (for the Bhutan side: one set)
Progress Report 3 (PrR 3)	• National land use plan • Specification of functions required in towns and main villages	October 2018	• English: 30 sets (for the Bhutan side: 25 sets) • Japanese (summary): seven sets • Electronic files (CD-R): two sets (for the Bhutan side: one set)
Draft Final Report (DFR)	• General guidance for priority sectors • Recommendations for implementing the CNDP	March 2019	• English: 30 sets (for the Bhutan side: 25 sets) • Japanese (summary): seven sets • Electronic files (CD-R): two sets (for the Bhutan side: one set)
Final Report (FR)	• Overall outcomes of the Project	June 2019	• English: 100 sets (for the Bhutan side: 95 sets) • Japanese (summary): 10 sets • Electronic files (CD-R): 10 sets (for the Bhutan side: five sets)

The contents of the Final Report will cover the subjects specified below:

(a) The examination and analysis of existing conditions and development issues,
(b) A Strategic Environmental Assessment,
(c) The development vision,
(d) The development objective,
(e) The development strategy and scenario,
(f) The socioeconomic framework,
(g) The national spatial structure,
(h) The national land use plan,
(i) The specification of the basic physical and social infrastructure services needed in the cities, towns and main villages,
(j) General guidance for priority sectors, including rural development and depopulation countermeasures, industrial development and transport and
(k) Recommendations for the implementation of the Comprehensive National Development Plan.

The Final Report will consist of five volumes, including the summary (Volume I), the examination of existing conditions and the identification of development issues (Volume II), the Comprehensive National Development Plan (Volume III), appendices (Volume IV) and GIS

maps (Volume V).

CHAPTER 2 VISION OF THE EXISTING NATIONAL POLICY AND THE PLAN FOR BHUTAN

2.1 The Constitution of the Kingdom of Bhutan

A monarchy was established in Bhutan in 1907, when His Majesty the First King was elected. Bhutan did not have a written constitution and organic laws; however, monastic and government leaders made an agreement to establish the monarchy. The Royal Decree for the Constitution of the National Assembly was declared legal and constitutional in 1953, while revisions were made to the royal decree in 1968. The royal decree set forth the rules of the National Assembly and the conduct of its members. The National Assembly comprised three categories of members, including representatives of the people, monastic representatives and government officials. His Majesty the King (Druk Gyalpo) was both head of state and head of the government. Under His Majesty the King, the Royal Advisory Council and the Council of Ministers were established as the executive organizations. The Royal Secretariat took charge as the intermediary between the executive organizations. There were 18 Dzongkhags, Gewogs and two municipalities forming the local administration. These circumstances imply that Bhutan made efforts to strengthen its democracy through establishing a parliament with people's representatives under a monarchical system, and by attempting to balance the governmental and monastic spheres. In line this, His Majesty the Forth King determined the introduction of a formal Constitution in 2004.

The Constitution of the Kingdom of Bhutan was enacted in 2008. The Constitution stipulates that the country is a democratic constitutional monarchy. The Constitution comprises 35 articles and defines the role of His Majesty the King as the Head of State and the symbol of the people. The Constitution defines the roles of the parliament, which consists of the National Council and the National Assembly, and allows for the decentralization of power and authority to the elected local governments, which are made of up the Dzongkhag Tshogdu, the Gewog Tshogde and the Thromde Tshogde.

The Constitution also raises important subjects related to national identity and the unification of the people of the State. Article 1 designates Dzongkha as the national language and Article 3 specifies Buddhism as the Bhutanese national religion and its spiritual heritage. Article 4 highlights the conservation of tangible and intangible cultures and Article 5 sets the minimum target percentage of forest cover at 60%. Article 8 specifies the duties of citizens, that is, to preserve the national territory, culture and environment and to be responsible for the unity of Bhutan through mutual respect. Article 9 lays out the principles of the state policy to ensure the wellbeing of the people by pursuing Gross National Happiness (GNH). Box 2.1.1 shows an abstract of the related articles of the Constitution.

Box 2.1.1 Abstract of the Constitution of the Kingdom of Bhutan

Article 1 Kingdom of Bhutan
8. Dzongkha is the National Language of Bhutan.

Article 3 Spiritual Heritage
1. Buddhism is the spiritual heritage of Bhutan, which promotes the principles and values of peace, non-violence, compassion and tolerance.

Article 4 Culture
1. The State shall endeavour to preserve, protect and promote the cultural heritage of the country, including monuments, places and objects of artistic or historic interest, Dzongs, Lhakhangs, Goendeys, Ten-sum (Three types of sacred treasures comprising of images,scriptures and stupa), Nyes, language, literature, music, visual arts and religion to enrich society and the cultural life of the citizens.
2. The State shall recognize culture as an evolving dynamic force and shall endeavour to strengthen and facilitate the continued evolution of traditional values and institutions that are sustainable as a progressive society.

Article 5 Environment
1. Every Bhutanese is a trustee of the Kingdom's natural resources and environment for the benefit of the present and future generations and it is the fundamental duty of every citizen to contribute to the protection of the natural environment, conservation of the rich biodiversity of Bhutan and prevention of all forms of ecological degradation including noise, visual and physical pollution through the adoption and support of environment friendly practices and policies.
3. The Government shall ensure that, in order to conserve the country's natural resources and to prevent degradation of the ecosystem, a minimum of sixty percent of Bhutan's total land shall be maintained under forest cover for all time.

Article 8 Fundamental Duties
1. A Bhutanese citizen shall preserve, protect and defend the sovereignty, territorial integrity, security and unity of Bhutan and render national service when called upon to do so by Parliament.
2. A Bhutanese citizen shall have the duty to preserve, protect and respect the environment, culture and heritage of the nation.
3. A Bhutanese citizen shall foster tolerance, mutual respect and spirit of brotherhood amongst all the people of Bhutan transcending religious, linguistic, regional or sectional diversities.

Article 9 Principles of State Policy
1. The State shall endeavour to apply the Principles of State Policy set out in this Article to ensure a good quality of life for the people of Bhutan in a progressive and prosperous country that is committed to peace and amity in the world.
2. The State shall strive to promote those conditions that will enable the pursuit of Gross National Happiness.

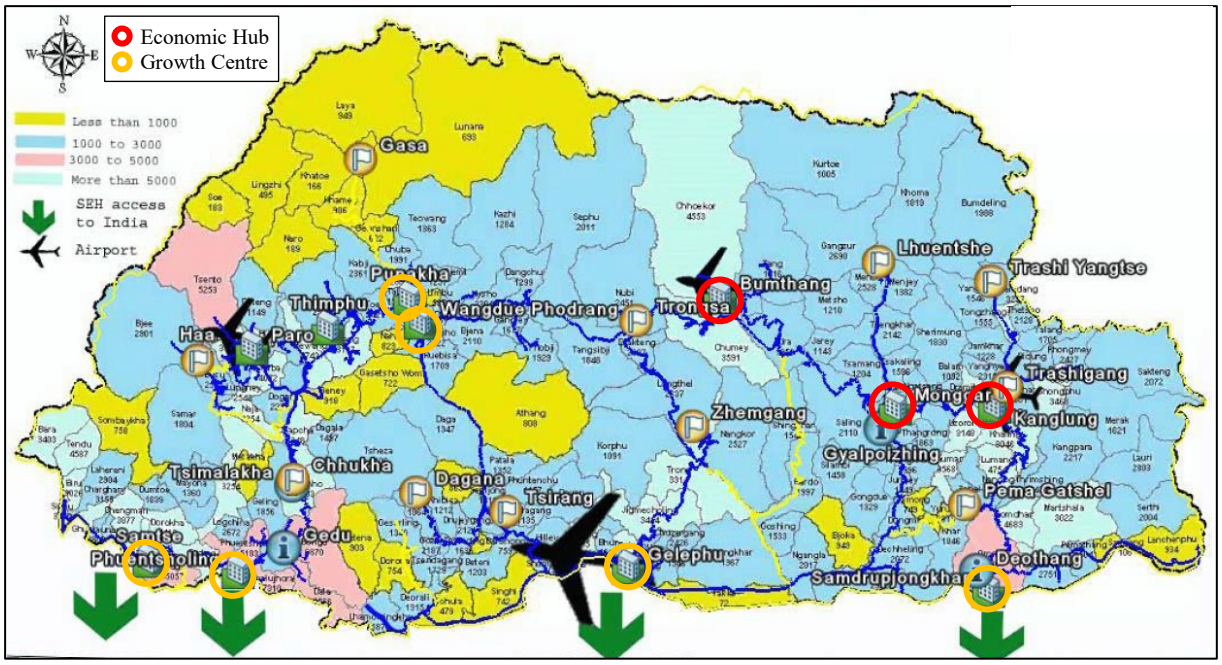
2.2 The Existing National Policy and Strategy

2.2.1 Strategy for Gross National Happiness

Bhutan's development process has necessarily been dedicated to the creation of socioeconomic infrastructure and political consolidation in the last five decades following the adaption of the First Five-Year Development Plan in 1961. The country's socioeconomic situation has improved due to the large efforts made by the government. As a result of the modernization of the country, Bhutan began to be challenged by new social problems, as has been experienced by many developed and developing countries, Rural-urban migration started as people left the rural and remote areas, although the government has invested a great deal in improving the quality of life in rural and remote areas. The younger generation has enjoyed high quality education and obtained higher education certificates. They could not find any job opportunities, although they are not interested in working in agriculture. This is a complicated dilemma for the country. In these circumstances, the Gross National Happiness Commission formulated the Strategy for Gross National Happiness in 2008 to develop a long-term framework for the 20 years leading up to 2028. The strategy aimed to form the guideline for the 10th Five-Year Development Plan (2008-2013). The strategy has not been approved, but is recognized as the most important reference for national and local government officials.

The Population and Housing Census counted the urban population as being 196,111 people in 2005, or 31% of the total population of 634,982 people. The strategy estimated that the urban population will increase to 605,696 people, or 69% of the total population of 872,758 people, by 2028. The estimate assumes that the urban population will increase more than threefold in this 20 years. In Thimphu, the urban population will increase from 79,185 people in 2005 to 240,989 people in 2028. Five Dzongkhags had an urban population of more than 10,000 in 2005, but the number of Dzongkhags with an urban population of more than 10,000 will increase to 11 by 2028.

To meet the challenges of this rapid urbanization, the strategy suggests the strengthening of the capital city, Thimphu, as a key driver of national economic growth and the designation of nine urban development areas in strategic locations, in order to achieve balanced development. These urban development areas consist of Economic Hubs (Bumthang, Monggar and Kanglung) and Growth Centres (Gelephu, Paro, Phuentsholing, Punakha/Wangdue, Samdrupjongkhar and Samtse). The Economic Hubs are located along the East-West national highway in the latitudinal central region. The Growth Centres are located along the East-West national highway and the proposed Southern East-West national highway. Figure 2.2.1 shows the location of the Economic Hubs, the Growth Centres and the national highways.



Source: Strategy for Gross National Happiness

Figure 2.2.1 Envisaged Spatial Structure with Economic Hubs, Growth Centres, Dzongkhag Headquarter Towns and Other Towns with the National Highway Network

The strategy proposes seven thrust areas to achieve the envisaged spatial structure. The thrust areas will benefit from a combination of policies and investments necessary to ensure that the Economic Hubs and Growth Centres fulfil their envisaged aims. The thrust areas comprise:

- Innovation, creativity and enterprise in tourism, tourism-related industries, hydropower and knowledge industries,
- A national spatial policy to classify the land use at the macro and micro levels, which delineates the boundaries of urban areas and proposes land use classes within urban areas,
- Strategic infrastructure to improve the transport and ICT networks through the establishment of Community Information Centres in all Gewogs,
- A strategy for knowledge, innovation and life-long learning skills to foster the highest standards of excellence from primary through to tertiary and continuing education,
- Integrated rural-urban development and poverty alleviation through the enhancement of agriculture and non-timber forest products,
- A health sector that provides care and relief for everyone with preventive strategies and curative services, and
- An environment that enables good governance.

The improvement of the transport network targets the primary national highway network, which is made up of two East-West national highways and five North-South national highways, as well as secondary national highways that interconnecting Dzongkhag headquarters. The strategy also recommends that the Southern East-West national highway become part of Asian Highway 48. Air transport will be reinforced by opening an all-weather international airport in Gelephu and two domestic airstrips in Bartsham (Trashigang) and Bumthang in the east of Bhutan. The international logistics will be improved by enhanced access to Haldia Port in West Bengal and Jawarharlal Nehru Port in Mumbai.

2.2.2 Bhutan 2020

The first Five-Year Development Plan was formulated in 1961. Since then, the Royal Government of Bhutan has successfully completed seven Five-Year Development Plans going up to 1996. The socioeconomic situation of Bhutan changed during the implementation of the Five-Year Development Plans. Visioning is a means of determining the future in the long term, and periodic reviews and the preparation of long-term plans are complementary activities that work to achieve this direction. In 1999, the Planning Commission (which has now become the Gross National Happiness Commission) prepared a vision document whose perspective extended to 2020, going beyond the planning period of the Five-Year Development Plans.

Bhutan 2020 is a vision document that envisages the peace, prosperity and happiness of the country, with which the Five-Year Development Plan must be in line. Bhutan 2020 reviewed past performance, development issues and challenges for the future, and formulated overarching goals and guiding principles, in order to envision the status of Bhutan in 2020 and over the centuries.

The overarching goal of the document is to ensure Bhutan's future independence, security and sovereignty. The guiding principles are composed of six subjects. Identity must be secured by respecting the cultural imperative. The unity and harmony of society is the second principle. Stability provided by a firm monarchy is the third. Self-reliance is the fourth. Sustainability, which encompasses social, financial, economic, cultural and environmental aspects, is the critically important fifth principle. Flexibility to adapt to change without causing problems is consistent with concept of the Middle Path, and is the sixth. By putting these guiding principles in place, Bhutan 2020 envisages the state's image as a nation that embraces the benefits of modernization without negative effects, with a self-confident and self-reliant population, an economy that uses our rich biodiversity to fuel new and clean industries, an intact environment and decentralized institutions with dynamic private sector activity. The overarching goal, guiding principles and envisaged image for Bhutan in 2020 are shown in Box 2.2.1.

The GNHC is contemplating the preparation of a new vision document extending up until 2040 or 2050. They will start the preparation after approval of the 12th Five-Year Plan (2018-2023) in December 2018.

Box 2.2.1 Abstract of Bhutan 2020: A Vision for Peace, Prosperity and Happiness

Overarching Goal

- Ensure the future independence, security and sovereignty of the Kingdom.

Guiding Principles

- Identity: Our independence, sovereignty and security will continue to be dependent upon the assertion of our distinctive Bhutanese identity. This has provided the key to our survival as a nation state in the past and it will continue to be so in the future. This requires us to continue to articulate an unambiguous cultural imperative in all that we do and to actively promote an awareness and appreciation of the continued relevance of our cultural heritage.
- Unity and Harmony: If we are to build the just and harmonious society consistent with our values, we must be tolerant and share our commitment to a distinctive Bhutanese path of development.
- Stability: In Bhutan, this stability is guaranteed by the monarchy.
- Self-reliance: For us, self-reliance is an imperative necessity. Our dependence upon others for some of the basic necessities of life, for skills and experience, and for development financing creates vulnerabilities and dependencies that are inconsistent with sovereignty, security and national dignity.
- Sustainability: Sustainability has many dimensions - social, financial, economic, cultural and environmental - and they are all of critical importance in Bhutan since they all impact, directly and indirectly, on our sovereignty and security.
- Flexibility: Flexibility not only implies the ability to distinguish between the positive and negative forces of change but also the capacity to adapt to change and to social innovation.

Bhutan in 2020

Our nation

- Our Kingdom would be a secure state at peace with itself. We would have provided evidence to the world that it is possible to embrace the benefits of modernization without being overwhelmed by its negative forces… that it is possible to be the same while being distinctively different.

Our people

- We will be a self-confident and more self-reliant nation with a compassionate, tolerant and egalitarian society in which our people live in harmony and unity sharing a common sense of purpose and destiny. Population growth rates will be stabilizing. Concepts of health care and education will have been redefined. Education will have evolved in ways that foster the development of the innate potentials of children who will appreciate the importance of moral and ethical choices in their lives. Our system of health care will rival those existing in industrialized countries today and industrialized countries will look to us for advice on indigenous medicine. Our heritage and culture will continue to live in the minds of our people but it will have acquired new forms and meanings that infuse it with contemporary relevance.

Our economy

- Our economic structure will be broader and deeper. Bhutan will not only be an important producer of hydropower but also in the vanguard of scientific and technological advance with new and clean industries based on our rich biodiversity. People will choose to visit Bhutan for a variety of reasons. Some to spend time at our internationally recognized 'centres of excellence'. We will have avoided the negative effects of indiscriminate

urbanization and new growth centres will have been established that provide alternatives to existing centres of attraction. Rural areas will have undergone a major transformation and the incomes of farmers will be incomparably higher than those of today. Virtually all Bhutanese will have access to basic infrastructure and services. Developments in transport will have changed the lives of many people as well as greatly facilitated economic growth.

Our environment

- Our natural environment and natural resource endowments will still be largely intact but our approach to environmental conservation will have evolved in ways that make it more dynamic and development oriented.

Our institutions

- Our institutions will have evolved along Bhutanese lines that provide for stability and participation with a hereditary monarchy remaining the jewel in our institutional crown. The private sector will be much more broadly established. It will have established its place as the main engine of growth and will serve as the magnet for the employment of our young people. Law and jurisprudence will have evolved along Bhutanese lines to meet the needs and requirements of a society in change. The process of decentralization will have been completed. At the local level, people will 'own' the development process, with institutions having evolved in ways that give new dimensions to traditional concepts of representation and democracy.
- We will have demonstrated that, with confidence, wisdom, forethought and imagination, it is possible for even a small mountainous nation to carve out a distinctive place for itself in the 21st century.

2.3 The Existing Five-Year Development Plan

2.3.1 The 11th Five-Year Plan (2013~2018)

The First Five-Year Plan was formulated to guide the nation's economic development in 1961. It was fully funded by India and its planning period went from 1961 to 1966. A decade later, the Planning Commission was established to make planning more effective at the time of formulation of the Third Five-Year Plan (1971-1976). Following organizational reforms, which included the establishment of a Policy and Planning Department (PPD) within ministries and the transformation of the Planning Commission into as an apex body of the Ministry of Planning, the Gross National Happiness Commission became responsible for the Five-Year Plan in 2007.

When the Project started, the 11th Five-Year Plan (2013-2018) is the latest one and focuses on self-reliance and inclusive development. The Royal Government of Bhutan recognizes the urgent need to pursue the self-reliance objective in order to transform the national economy into a more diversified economy that creates productive employment opportunities, ensures a broader tax base and provides an enabling environment for private sector development. This is being done to prepare for a circumstance whereby foreign partners phase out providing development assistance to Bhutan as the national economy improves.

Inclusive development aims to reduce poverty and inequality by enhancing living standards and quality of life. Although poverty was significantly improved through intensive government investment, disparities still exist between regions and gender. The 11th Five-Year Plan focuses on resolving these disparities using the accumulated investment made in the past. Plus, the 11th Five-Year Plan ensures Green strategies to adopt the rigorous environmental standards in the economic development.

To realize the objectives of the 11th Five-Year Plan, the Government of Bhutan established the National Key Result Areas (NKRAs) as outcomes at the national level, as listed below. The NKRAs are categorized into four pillars of GNH. All ministries and local governments have to contribute to the 16 NKRAs through their respective Sector Key Result Areas (SKRAs) and Dzongkhag Key Result Areas (DKRAs). Table 2.3.1 shows the NKRAs listed under the sustainable socioeconomic development pillar, one of the four pillars. Each NKRA has KPIs to be achieved in the planning period. These Key Performance Indicators (KPIs) include the GDP growth rate, the poverty rate, the cereal self-sufficiency rate and the employment rate.

16 National Key Result Areas in Four Pillars

[Pillar 1: Sustainable Socioeconomic Development]
1 Sustained Economic Growth
2 Poverty Reduced and MDG Plus Achieved
3 Food Secure and Sustained
4 Full Employment
[Pillar 2: Preservation and Promotion of Culture]
5 Strengthened Bhutan Identity, Social Cohesion and Harmony
6 Indigenous Wisdom, Arts and Crafts Promoted for Sustainable Livelihoods
[Pillar 3: Environmental Conservation]
7 Carbon Neutral/Green and Climate Resilient Development
8 Sustainable Utilization and Management of Natural Resources
9 Water Security
10 Improved Disaster Resilience and Management Mainstreamed
[Pillar 4: Good Governance]
11 Improved Public Service Delivery
12 Democracy and Governance Strengthened
13 Gender Friendly Environment for Women's Participation
14 Corruption Reduced
15 Safe Society
16 Needs of Vulnerable Groups Addressed

Table 2.3.1 National Key Result Areas and Key Performance Indicators in Sustainable Socioeconomic Development

National Key Result Areas	Key Performance Indicators	Baseline	Target
1. Sustained Economic Growth	Annual average GDP growth (%)	8-9	>10
	Percentage of domestic financing out of total expenditure (%)	65	>85
	Annual average fiscal deficit over plan period (%)	0.3	<3
2. Poverty Reduced and MDG Plus Achieved	Income poverty reduced (%)	12 (2012)	<5
	Multidimensional poverty reduced (%)	25.8 (2010)	<10
	Gini coefficient reduced	0.36 (2012)	<0.3
3. Food Secure and Sustained	Cereal self-sufficiency (%)	64 (2011)	>75
	Milk self-sufficiency (%)	90 (2011)	100
4. Full Employment	Full employment (%)	97.9	>97.5
	Youth unemployment reduced (%)	7.3	<2.5
	% of regularly paid employees (%)	23.9	>40

Source: The 11th Five-Year Plan

The 11th Five-Year Plan contains the programme profiles proposed by the ministries and agencies of 20 strategic sectors. Table 2.3.2 shows the indicative investment amount for each sector. The estimated capital reveals that the road and bridge sector has the highest priority, as this sector has the most invested in it, occupying 26.2% of the total amount. Education and health also share relatively large amounts at 7.6% and 7.8%, respectively, which reflects the inclusive development objective.

Table 2.3.2 Indicative Investment Amount by Sector

Sector	Amount (BTN millions)	%	Sector	Amount (BTN millions)	%
Renewable Natural Resources	3,966	6.60	ICT and Media	1,874	3.12
Roads and Bridges	15,996	26.62	Education	4,568	7.60
Human Settlement and Housing	245	0.41	Health	4,663	7.76
Construction	4,868	8.10	Employment and Human Resource Development	1,365	2.27
Geology and Mines	421	0.70	Culture	2,467	4.11
Tourism	371	0.62	Environment	1,348	2.24
Hydromet	740	1.23	Sports	395	0.66
Energy	2,866	4.77	Governance	8,490	14.13
Trade	759	1.26	Vulnerable Groups	780	1.30
Industry	1,891	3.15	Total	60,084	100
Transport and Communications	2,011	3.35			

Source: The 11th Five-Year Plan

In its pursuit of achieving the NKRAs and KPIs, the 11th Five-Year Plan sets forth the strategic thrust areas that will be the focus of strategic infrastructure development, the goal of which will be balanced regional development to ensure that development is spread equitably across the country. The suggested activities include the development of regional hubs in Kanglung and Nganglam to provide alternatives to Thimphu and Phuentsholing in the Eastern Region as a countermeasure to rural-urban migration. The plan for these suggested activities is to develop dry ports in Phuentsholing, Jigmichhoeling (Sarpang) and Nganglam, as well as industrial parks in Bondeyma (Monggar), Dhandhum (Samtse), Phuntsthothang (Samdrupjongkhar) and Jigmichhoeling (Sarpang).

2.3.2 The 12th Five-Year Plan (2018~2023)

The Royal Government of Bhutan began to prepare the 12th Five-Year Plan in January 2016, with consultation meetings convened at different levels and with the various stakeholders comprising the involved ministries, agencies, local governments and private sectors. The planning process will attempt to formulate the Plan based on inclusive and broad-based participatory planning, and will aim to achieve a national consensus on the 12th Plan. This national consensus will ensure that all stakeholders will take ownership of its implementation.

The Third Parliamentary elections were conducted in October 2018. The new government was formed with effect from November 1, 2018. Thereafter, the Plan was reviewed by the government. The 12th FYP was approved by the joint cabinet-GNHC meeting held December 2018. Unlike past FYPs which commenced from the first month of a fiscal year in July, the 12th Plan period will be from November 1, 2018 to October 31, 2023 in order to align with the term of the incoming Government.

Objective and key priorities

The objective of the Plan is "Just, Harmonious and Sustainable Society through enhanced Decentralization". This objective is underpinned by principles of leaving no one behind, narrowing the gap between the rich and poor, and ensuring equity and justice in line with the Sustabinalbe Development Goals (SDGs).

Since the Plan will be the last plan before graduating from the list of Least Developed Countries (LDCs) in 2023, the key priorities are given to addressing the last mile challenges as below:

- Quality improvement of health and education services.
- Narrowing the gap between the rich and the poor.

- Addressing needs of vulnerable group (senior citizens, disabled persons, orphans etc).
- Economic diversification for strengthening the economy.
- Employment generation particularly for youth.
- Preservation and promotion of culture and traditions.
- Conservation and sustainable utilization of environment.
- Consolidation and maintenance of existing infrastructure.
- Investment more on softer aspects of development such as human resources (particularly doctors, nurses, teachers, technicians etc.) and systems.

National Key Result Areas in the Plan

Key deliverables of the Plan have been identified as 17 National Key Result Areas (NKRAs) at national level, Agency Key Result Areas (AKRAs) at agency level and Local Government Key Result Areas (LGKRAs) at local government level. These results will contribute to achieving the Plan objective. To measure progress of these results, each NKRA, AKRA and LGKRA has corresponding Key Performance Indicators (KPIs) with baseline and targets for the Plan period. At the time of writing this report, baseline and targets have not been opened yet.

Table 2.3.3 shows the KPIs and Key Strategies of the NKRAs which are relevant to the economy, social services, human settlement and environmental management. Those sectors are related to the CNDP. In NKRA 1, an annual real GDP growth rate is targeted at 5-6%. The economic growth increases GDP per capita to over USD 4,500 and maitaines fiscal deficit over the Plan period below 3% of GDP. The economic diversification is expected to improve non-hydro revenue growth rate to 15% (NKRA 2) and to reduce youth unemployment rate to 6 - 6.5%. The CNDP is specified as one of key strategies to create integrated human settlement in NKRA 15. As the RGoB has accomplished to establish the social services in the country for about 50 years, the Plan puts emphasis to quality matters more than quantity to reduces the social inequality.

Table 2.3.3 Key Performance Indicator and Key Strategies of the 12th FYP

Key Performance indicator	Key Strategies
NKRA 1: Macroeconomic Stability	
・ Target annual real GDP growth rate of 5-6 percent. ・ Increase GDP per capita from USD 3438 to over USD 4500. ・ Maintain fiscal deficit over the plan period below 3 percent of GDP. ・ Reduce current account deficit from 29 percent to below 12 percent of GDP. ・ Maintain sustainable public debt thresholds	1) Broadening revenue base and streamlining tax administration. 2) Instituting expenditure control measures. 3) Exploring additional concessional financing windows. 4) Boosting private investment and savings. 5) Managing hydropower related inflows.
NKRA 2: Economic Diversity and Productive Capacity	
・ Increase non-hydro revenue growth rate from 12 percent to 15 percent. ・ Improve Distance to Frontier Score (Doing Business) from 65.37 to more than 70 on the scale of 0-100.	1) Attract private and foreign investment by creating enabling business environment particularly improving indicators of ease of doing business in which Bhutan is lagging behind. In addition, Economic Development Policy (EDP) 2016 will be implemented and economic infrastructure such as industrial estate, mini-industrial estate and dry-ports will be established. 2) Promotion of high value added CSIs through support to product design and branding, skill development and facilitate marketing. 3) Accelerating tourism sector development through diversification of products, services and amenities, and intensifying marketing to promote Bhutan as a year around destination for high end tourism. 4) Diversifying into hydropower allied industries and securing energy security for economic growth.
NKRA 3: Poverty Eradication and Reducing Inequality	
NKRA 4: Vibrant Culture and Tradition	
NKRA 5: Healthy Ecosystem Services	
・ Reduce annual average Ambient Air Quality level (PM 10) below 60 μg/m3 for Thimphu and below 120 μg/m3 for Pasakha. ・ Maintain number of Tigers living within geographical boundaries of the country above 103.	1) Innovative financing for sustainable management of protected areas. 2) Initiating payment for ecosystem services. 3) Strengthening research on biodiversity information. 4) Promoting traditional knowledge and customary practices in conservation and sustainable use of biodiversity. 5) Implement Access to Benefit Sharing Policy 2015.
NKRA 6: Carbon Neutral, Climate and Disaster Resilient Development	
・ Maintain carbon neutral status as a ratio of total national emissions against total national sequestration below 1:3. ・ Develop National and Sectoral Disaster Management and Contingency Plans.	1) Mainstreaming environment in all sectoral and local government plans. 2) Managing waste through “Pay as You Throw Approach” or “Big Bin Small Bin” approach. 3) Enhancing mitigation and adaptation to climate change. 4) Strengthening preparedness and response to both natural and manmade disasters.
NKRA 7: Quality of Education and Skills	
・ Increase proportion of students who score at least 60 percent each in Math, Science, English and Dzongkha in Bhutan Certificate of Secondary Education (Class X) from 13 percent to 20 percent. ・ Increase the mean score in the core subjects in Program for International Student Assessment (PISA). ・ Increase proportion of TVET graduates employed within 6 months to one year of graduation from 80 percent to 90 percent. ・ Maintain or increase proportion of In-country TEI graduates employed within one year of graduation.	1) Making teaching a profession of choice. 2) Strengthening ECCD and primary education. 3) Shifting from examination based to holistic assessment system. 4) Creating pathways between mainstream and vocational education. 5) Revampting technical and vocational education. 6) Strengthening value education in schools and institutes.
NKRA 8: Food and Nutrition Security Ensured	
・ Reduce food insufficiency from 6.2 percent to below 2.4 percent. ・ Reduce prevalence of stunting from 21.2 percent to less than 15 percent.	1) Providing critical support for agricultural production. 2) Implementation of the Irrigation Master Plan 2016. 3) Establishing network of post-production and marketing facilities. 4) Strengthening price support for agriculture produce. 5) Strengthening research and extension services.

NKRA 9: Infrastructure, Communication and Public Service Delivery	
・ Improve average satisfaction rating for public services from 3.8 to above 4 on the scale of 1-5. ・ Improve Inclusive Digital Index from 3.74 to 6.5 on the scale of 1-10.	1) Streamlining public services through Whole-of-Government approach. 2) Strengthening G2C Office. 3) Leveraging ICT as an enabler and industry. 4) Implementing the Bhutan Transport 2040. 5) Ensuring all-weather road network including blacktopping of remaining GC roads.
NKRA 10: Gender Equality	
NKRA 11: Productive and Gainful Employment	
・ Maintain national unemployment rate below 2.5 percent. ・ Reduce youth unemployment rate from 12 percent to 6 - 6.5 percent.	1) Creating adequate gainful jobs. 2) Providing dedicated job placement services. 3) Skilling the workforce. 4) Promoting entrepreneurship. 5) Incentivising Local Governments (LGs) to create jobs.
NKRA 12: Reduce Corruption	
NKRA 13: Democracy and Decentralization	
NKRA 14: Healthy and Caring Society	
・ Reduce suicide rate from 12 to less than 12 per 100,000 population. ・ Reduce premature mortality due to non-communicable diseases below 25 percent.	1) Upgrading skills of health workers and ensuring adequate deployment. 2) Promoting Bhutan as a centre of excellence for indigenous medicine in the region. 3) Curbing Non-communicable diseases. 4) Strengthening tertiary healthcare services. 5) Strengthening healthcare services and facilities at dzongkhag and gewog level. 6) Automating and digitising patient information for efficient management, tracking and follow-up.
NKRA 15: Livability, Safety and Sustainability of Human Settlements	
・ Increase proportion of households with improved sanitation ・ facilities from 74.8 percent to 100 percent. ・ Increase proportion of population that feels safe while walking in their neighborhood to above 63 percent. ・ Develop policy on affordable housing/home ownership by 2020.	1) Implementing Comprehensive National Development Plan 2030 for integrated human settlement. 2) Promoting green and energy efficient buildings. 3) Mainstreaming measures to reduce vulnerability to disasters. 4) Enhancing access to safe, inclusive and green public spaces. 5) Promoting affordable housing and homeownership schemes. 6) Improving efficiency and effectiveness of Thromde and municipality services.
NKRA 16: Justice Services and Institutions	
NKRA 17: Sustainable Water	
・ Provide all households with access to 24 hours supply of safe drinking water. ・ Increase coverage of Chuzhing area under assured irrigation from 39,578 acres to 48,350 acres.	1) Implementing integrated watershed management plans. 2) Building and rehabilitating adequate and climate resilient water infrastructure. 3) Improving drinking water quality and safety. 4) Providing adequate irrigation water. 5) Better implementation of water legislation and governance. 6) Exploring creation of a dedicated water agency.

Source: Report on The Twelfth Five Year Plan to The First Session of the Third Parliament, January,2019

Fiscal projections

The resource envelope for the Plan is estimated at Nu. 280,773 million of which domestic revenue is Nu. 217,728 million and the grant is Nu. 63,044 million (Table 2.3.4). The estimated revenue is expected to fully cover the current expenditure, but finance 21% of capital expenditure. Of the total grant, external grant is Nu. 61,651 million. The Government of India forms major portion of the external grant. Other sources are expected from the European Union (EU), Japan and United Nations (UN) agencies. In the fiscal projections, efforts shall be made to achieve the following targets for improved fiscal conditions:

- Average fiscal deficit below 3% of GDP.
- At least 80% of total expenditure by domestic revenue.
- Tax to GDP ratio at 12%.
- Budget variance below 3%.
- Non-hydro debt below 35% of GDP.

Table 2.3.4 Fiscal Framework for 12th FYP

Particular	Total (Nu. In million)	Particular	Total (Nu. In million)
Revenue & Grants	280,773	Fiscal Balance	-29,243
Domestic Revenue	217,728	As % of GDP	-2
External Grants	61,651	Financing	29,123
Internal Grants	1,393	Net External Borrowing	4,074
Outlay	310,016	Net Domestic Borrowing	25,169
Current	193,895		
Capital	116,121		

Source: Report on The Twelfth Five Year Plan to The First Session of the Third Parliament, January,2019

The indicative capital outlay is estimated at Nu. 116 billion, of which about Nu.1 billion is for Bhutan Economic Stabilization Fund. The remaining capital outlay of Nu.115 billion is allocated as Nu. 15 billion for Flagship Programmes, Nu. 50 billion for local governments and Nu. 50 billion for Central Agencies (Ministries, Autonomous Agencies, Constitutional Bodies and Judiciary).

The Flagship Programmes are interventions to address high priority national issues such as economic diversification, employment generation, drinking water, healthcare and public services through coordinated multi-sectorial approach. The capital grants allocation to the local governments has increased by 100% to Nu. 50,000 million from Nu. 25,000 million in the 11th FYP to meet the increasing demand of public services from the local governments. Capital grants to local governments is allocated based on Resource Allocation Formula (RAF) and Common Minimum Infrastructure (CMI) needs (Table 2.3.5).

Table 2.3.5 Resources allocated to Local Government in 12th FYP

	LGs Resources to be allocated based on RAF (Nu. in M)	Resources to be allocated for CMI (Nu. in M)	Total (Nu. in M)
Dzongkhags	17,000	3,019	20,019
Gewogs	12,000	7,855	19,855
Thromde 'A's	10,000	126	10,126
Total	39,000	11,000	50,000

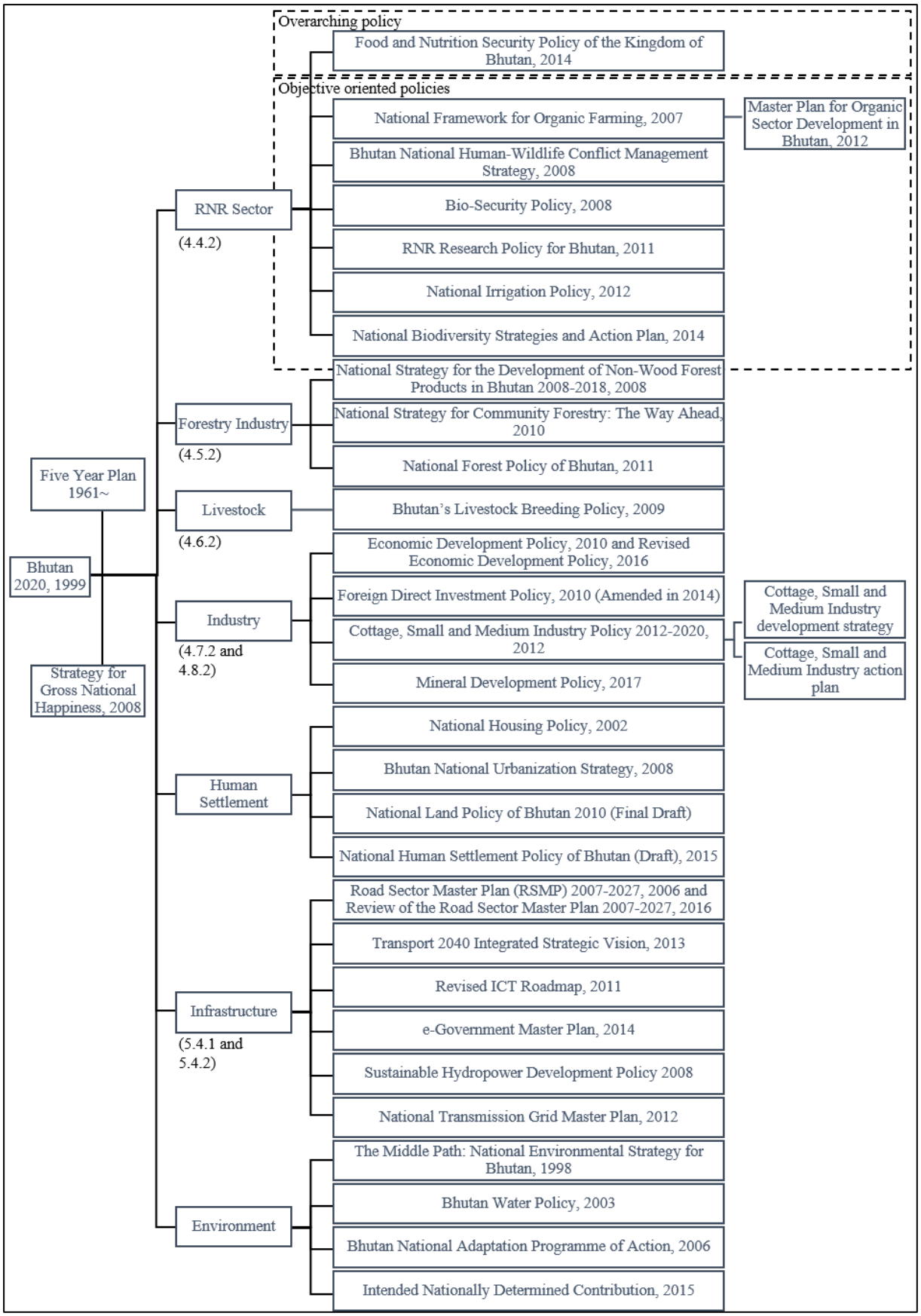
Source: Report on The Twelfth Five Year Plan to The First Session of the Third Parliament, January,2019

2.4 The Existing Sectoral Policy and Plan

Under the supreme policy documents of the Bhutan 2020, the Strategy for Gross National Happiness and the Five-Year Plan, which integrate various sectors, the ministries have prepared policies, strategies and plans for their respective sectors. The Bhutan 2020 is the policy document which shows the vision to be pursued in the long term. The Five-Year Plan sets forth the socioeconomic targets to be achieved over the next five years. The Strategy for Gross National Happiness is a document that attempts to show the spatial structure of urban centres and the transport network that meets the needs of the assumed population distribution. The Strategy was prepared nine years ago and does not reflect the latest information. The Strategy needs to be updated. The Comprehensive National Development Plan (CNDP) of the Project will be the document that integrates the policies and plans of different sectors in order to fill the gaps between the Strategy, the 12th Five-Year Plan and the latest information available.

Figure 2.4.1 shows the composition of sectoral policies, strategies and plans to be integrated into the CNDP. Some of these policy and strategy documents have not yet been approved, but it will be worthwhile to reflect the proposed concepts in the CNDP. The sectoral policies, strategies and plans have been formulated to respond to the sectoral development plans

specified in the Five-Year Plans. They are not hierarchically structured, but are established to fufill the requirements of the sectoral development plans. Outline of each policy and strategy is mentioned in the section of the related sector in this report. The number in the parenthesis in the figure shows the related section number.



Note: Figure in parenthesis shows subsection that mentions the related policies and plans.

Figure 2.4.1 Sectoral Policies and Plans

2.5 Sustainable Development Goals

The Sustainable Development Goals (SDGs) are the successors of the Millennium Development Goals (MDGs), which were created in 2001. In 2015, the UN Summit adopted the 2030 Agenda for Sustainable Development, which established the SDGs as development targets from 2016 to 2030. The SDGs comprise 17 goals and 169 targets, and include new areas such as climate change, economic inequality, innovation, sustainable consumption, peace and justice. The SDGs leave nobody behind; they are a universal call to action in the fight to end poverty, protect the earth and ensure that all people enjoy peace and prosperity, including the next generation.

A national sensitization workshop was convened in Bhutan in 2015. The Royal Government of Bhutan assessed how the SDGs could be integrated with the Five-Year Plan. The assessment identified 15 SDG Goals that were already integrated into the 16 NKRAs of the 11th Five-Year Plan. Of the 169 SDG development targets, 143 of them were found to be possibly relevant for Bhutan and 134 of them were already integrated. Since both the SDGs and the 11th Five-Year Plan in line with the GNH are imperatively targeted at the well-being of the people, the development targets of the SDGs are already in line with the KPIs of the Five-Year Plan. Therefore, the NKRAs and KPIs of the 12th Five-Year Plan will be probably established to meet the development targets.

Source: National SDG Report for HLPF 2018 on the implementation of the SDGs in Bhutan (Draft), GNHC, 2017

Figure 2.5.1 A Snapshot of the Current Status of Goal Attainment by Bhutan

Given the early stage of SDG implementation and complexities associated with indicator adoption and data availability, it is not possible to assess the progress of each goal objectively through the use of targets and indicators. However, the Gross National Happiness Commission (GNHC) carried out to assess the progress using the methodology and the set of broad criteria discussed in draft of National SDG Report for HLPF (High Level Political Forum) in December 2017. Out of 17 goals, eight goals are found On Track and nine goals At Risk as shown in Figure 2.5.1.

Assessment of SDG Index by SDSN

The Bertelsmann Stiftung and the Sustainable Development Solutions Network (SDSN) prepared the 2018 SDG Index and Dashboards report. In their latest estimated ranking and scores, the index score of Bhutan was estimated the 83th place of 156 countries in the world. The Bhutan's index score is 65.4 which is better than the regional average score of 64.1 in East and South Asia as shown in Figure 2.5.2. To assess a country's progress on a particular indicator, the progress was classified into the four bands. The green band is bounded by the maximum that can be achieved for each variable and the threshold for achieving the SDG. Three colour bands ranging from yellow to orange and red denote an increasing distance from SDG achievement. The red band is bound at the bottom. If the country has less than 50% of the indictors available under a goal, the dashboard colour for that goal is grey.

The two goals of SDG 1 End Poverty and SDG 13 Climate Action are rated within the green band in Bhutan as the progress reached to the level of achievement. The four goals of SDG 2 Zero Hunger, SDG 4 Quality Education, SDG 5 Gender Equality and SDG 9 Industry, Innovation and Infrastructure are rated in the red band. Those goals n

eed the significant improvement. Yet, SDG 7 Affordable and Clean Energy is in a relatively good status since it is rated in the yellow band.

Source: SDG Index and Dashboards Report 2018, the Bertelsmann Stiftung and the Sustainable Development Solutions Network

Figure 2.5.2 Overall Performance and Current Assessment of SDG in Bhutan

Figure 2.5.3 shows the estimated performance by indicator in the SDG of which achievement is rated in green, yellow and red bands. Among the red-band goals, SDG 4 needs the established education service to the people. This is an important approach to foster quality human resource in the country with small population. Yet, SDG 9 needs improvement of internet and logistics. Due to the mountainous topography and landlocked location, it requires the considerable investment to create the well-established logistics. However, a high-grade internet system is a good solution in Bhutan. In SDG 5, the female to male mean years of schooling of population is lower than the average of 181 countries. Seats held by women in national parliaments is

limitedly six out of 47 members in cabinets and parliament after the national election in 2018. Those may show the gender inequality. Meanwhile, the number of female students is larger than male students in lower secondary schools. middle secondary schools and higher secondary schools (Annual Education Statistics 2018, the Ministry of Education). In the tertiary education, the male students are, in contrast, larger than female students. The female already holds seats. Yet, Bhutan adequately has the female human resources in the secondary education who will resolve the gender inequality in the near future.

Green band

SDG1 – End Poverty	Value	Rating	Trend
Poverty headcount ratio at $1.90/day (% population)	0.1	●	↑
Projected poverty headcount ratio at $1.90/day in 2030 (% population)	0.0	●	••
SDG13 – Climate Action			
Energy-related CO_2 emissions per capita (tCO_2/capita)	1.3	●	→
Imported CO_2 emissions, technology-adjusted (tCO_2/capita)	0.2	●	••
Climate Change Vulnerability Index	0.1	●	••
CO_2 emissions embodied in fossil fuel exports (kg/capita)	0.0	●	••

Yellow band

SDG7 – Affordable and Clean Energy			
Access to electricity (% population)	100.0	●	↑
Access to clean fuels & technology for cooking (% population)	68.0	●	↑
CO_2 emissions from fuel combustion / electricity output ($MtCO_2$/TWh)	NA	●	••

Red band

SDG2 – Zero Hunger			
Prevalence of undernourishment (% population)	NA	●	••
Prevalence of stunting (low height-for-age) in children under 5 years of age (%)	33.6	●	↗
Prevalence of wasting in children under 5 years of age (%)	5.9	●	↑
Prevalence of obesity, BMI ≥ 30 (% adult population)	6.4	●	→
Cereal yield (t/ha)	3.4	●	↑
Sustainable Nitrogen Management Index	0.8	●	••

Red band (continued)

SDG4 – Quality Education			
Net primary enrolment rate (%)	81.0	●	
Mean years of schooling	3.1	●	
Literacy rate of 15-24 year olds, both sexes (%)	87.3	●	
SDG5 – Gender Equality			
Unmet demand for contraception, estimated (% women married or in union, ages 15-49)	15.6	●	→
Female to male mean years of schooling of population age 25 + (%)	50.0	●	••
Female to male labour force participation rate (%)	78.1	●	→
Seats held by women in national parliaments (%)	8.5	●	→
SDG9 – Industry, Innovation and Infrastructure			
Proportion of the population using the internet (%)	41.8	●	↑
Mobile broadband subscriptions (per 100 inhabitants)	68.4	●	↑
Quality of overall infrastructure (1= extremely underdeveloped; 7= extensive and efficient by international standards)	4.3	●	••
Logistics performance index: Quality of trade and transport-related infrastructure (1=low to 5=high)	2.0	●	••
The Times Higher Education Universities Ranking, Average score of top 3 universities (0-100)	0.0	●	••
Number of scientific and technical journal articles (per 1,000 population)	0.1	●	••
Research and development expenditure (% GDP)	NA	●	••

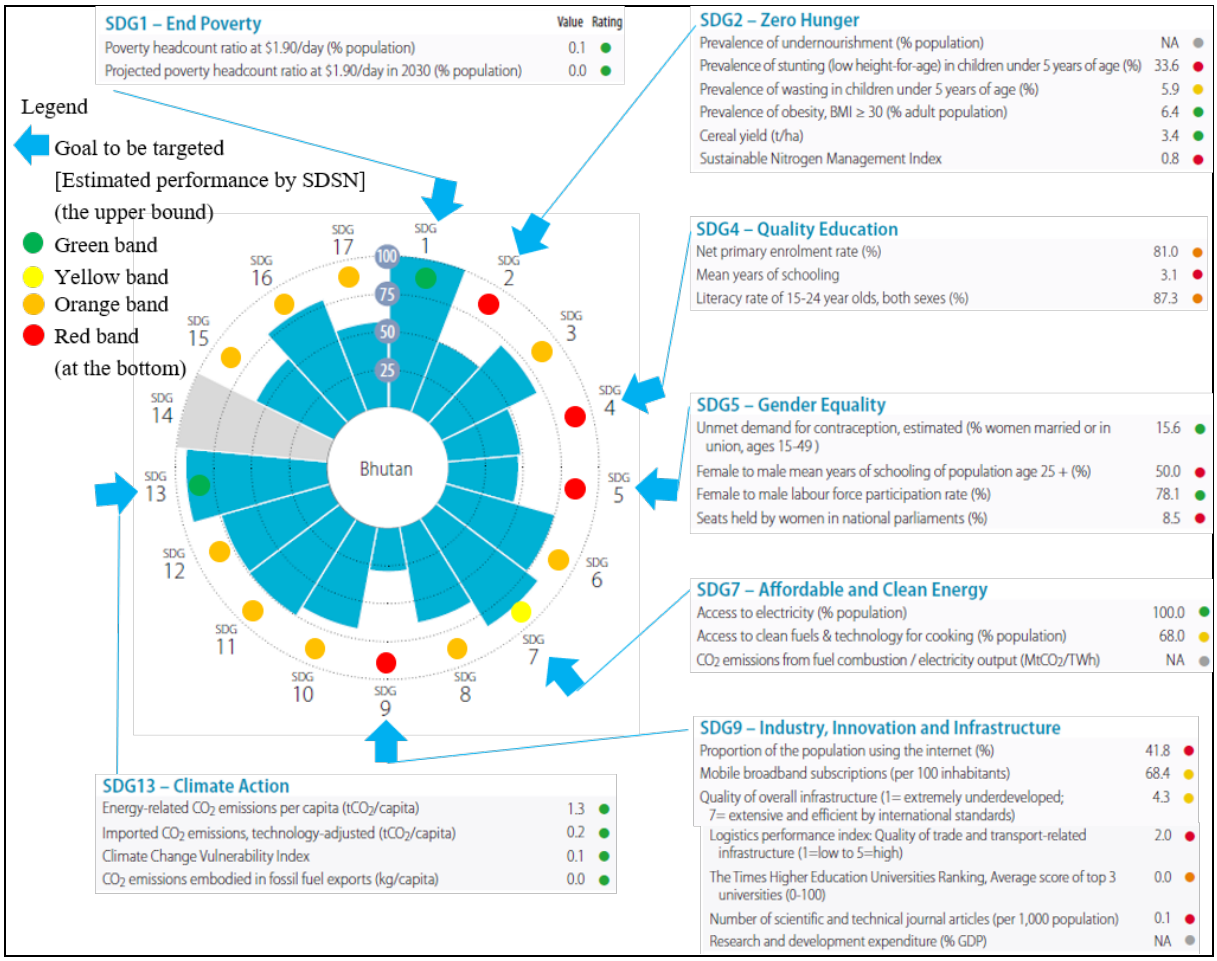
Source: SDG Index and Dashboards Report 2018, the Bertelsmann Stiftung and the Sustainable Development Solutions Network

Figure 2.5.3 Estimated Performance by Indicator of Bhutan

Way forward to improve performance

Efforts for the improvement of performance are made to reflect the status of affairs in Bhutan. It takes some time to improve the performance of all the 16 goals excluding SDG 14to the level within the green band, because 14 goals of 16 goals are estimated below green. The efforts should be made to the prioritized goals. Bhutan accomplished SDG 1 and SDG 13 to be at the level in green band. Performance of those goals needs to be maintained. SDG 7 in yellow band is another goal to be improved by use of clean energy for cooking. SDG 2, SDG 4, SDG 5 and SDG 9 are the goals estimated red at the bottom which require improvement in the short term. Those improvements consequently improve the goals classified to on track and at risk by GNHC. Figure 2.5.4 shows the target goals to be improved.

Many countries started efforts to find the ways for achieving the SDGs. They are still in the stage of learning through trials and errors. The stakeholders include local government, private sectors, citizens and social communities. Participation from the different types of organizations is must to establish an effective system for the sustainable development. As being common in other countries, Bhutan will need to develop an institutional framework involving the local government linking the people and the private sector under the initiatives of the GNHC.



Source:
1) SDG Index and Dashboards Report 2018, the Bertelsmann Stiftung and the Sustainable Development Solutions Network
2) National SDG Report for HLPF 2018 on the implementation of the SDGs in Bhutan, GNHC

Figure 2.5.4 Target Goals to be Improved for Bhutan

CHAPTER 3 NATURAL ENVIRONMENT OF BHUTAN

3.1 Climate

3.1.1 Climatic Zones in Bhutan

The climate in Bhutan varies substantially from one Dzongkhag to another due to dramatic changes in the country's topography and altitude. Bhutan has three climatic zones, as shown in Table 3.1.1 and below:

Around 70% of the precipitation in Bhutan is generated by the monsoon, which is generally defined as a seasonal wind in southern Asia; it blows from the southwest in summer (bringing rain) and from the northeast in winter, while pre-monsoon activity generates about 20% of the precipitation. The summer monsoon lasts from late June through to late September. The winter starts from December and generally lasts until February; the months between summer and winter are spring and autumn. However, this definition cannot always be applied to all areas of the country; it depends on the location.

The annual precipitation level varies widely in different parts of the country. The northern region receives about 40 mm of annual precipitation, mostly in the form of snow. The temperate central valley receives a yearly average of about 1,000 mm of rainfall, while the southern region gets more than 1,500 mm of rainfall annually (Second National Communication to the United Nations Framework Convention on Climate Change (UNFCCC), 2011).

Table 3.1.1 Climatic Zones of Bhutan

Belt	Physical features	Altitude	Climatic characteristics	Temperature
Southern belt	Himalayan foothills	150 m – 2,000 m	Subtropical climate High humidity and heavy rainfall	15 ºC – 30 ºC all year round.
Central belt	River valleys	2,000 m – 4,000 m	Cool winters, hot summers and moderate rainfall	15 ºC – 26 ºC (June – September) and -4 ºC – 15 ºC (winter season).
Northern belt	Snow-capped peaks and alpine meadows	over 4,000 m	Cold winter and cool summer	-*

Note: *: No data is available in the source table.
Source: Second National Communication to the United Nations Framework Convention on Climate Change (UNFCCC), 2011

3.1.2 Meteorological Data

The Department of Hydromet Services at the Ministry of Economic Affairs operates the meteorological network for the collection of climate data in Bhutan. There are three main types of meteorological station: Class A stations (20 stations), real-time automatic weather stations (AWS) (11 stations) and Class C stations (61 stations), which are classified according to the parameters collected and the types of equipment used. Of the three stations, Class A stations are present in every Dzongkhag. The following sub-sections summarize the meteorological conditions over the most recent five-year period (2012-2016) at six selected Class A stations (Table 3.1.2 and Figure 3.1.1), considering their geographical location in the country, altitude and data availability.

Table 3.1.2 Selected Class A Stations

Class A Station	Dzongkhag	Altitude (m)	Year of Installation
Bhur	Sarpang	390	1993
Chamkhar	Bumthang	2,470	1993
Namjayling	Haa	2,751	2006
Monggar	Monggar	1,580	1993
Pemagatshel	Pemagatshel	1,780	2006
Simtokha	Thimphu	2,310	1992

Source: National Center forHydrology and meteorology,
http://www.hydromet.gov.bt/readmore/stations.pdf

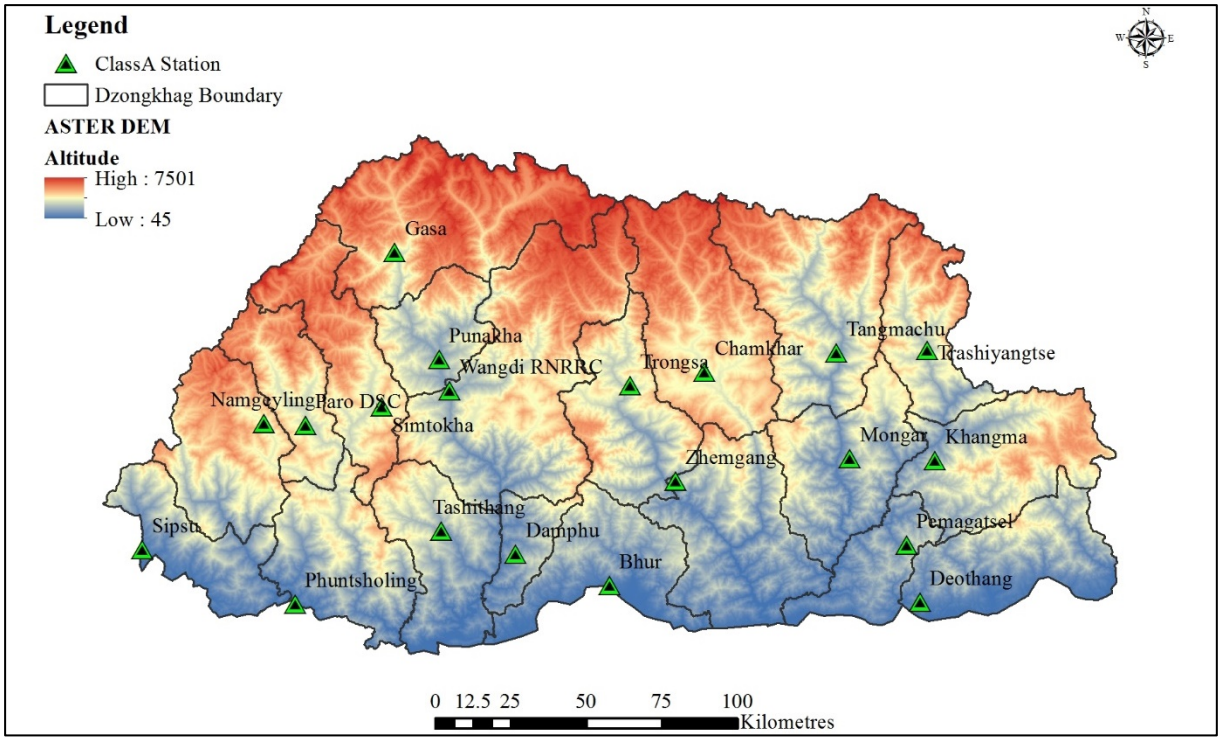


Figure 3.1.1 Location of the Selected Class A Stations

(1) Temperature

Table 3.1.3 shows the monthly average of the daily maximum and minimum temperatures recorded at the six selected stations. Bhur (Sarpang), located at the lowest altitude along the border with India, records the highest temperatures, with an annual average of maximum and minimum temperatures of 27.3 ºC and 19.9 ºC, respectively. On the other hand, Chamkhar (Bumthang) and Namjayling (Haa), which are located at higher altitudes show lower temperatures, having recorded an annual maximum and minimum average of 18.3 ºC and 16.1 ºC at Chamkhar and 16.6ºC and 3.8ºC at Namjayling, respectively. The month in which the lowest temperature was recorded at the two stations was in January, measuring -5.2 ºC and -7.0 ºC, respectively. The remaining three stations recorded intermediate temperatures, although at Simtokha (Thimphu), located at the rather high altitude of 2,310m, a rather low temperature was recorded in winter, i.e., -3.9 ºC in January.

Table 3.1.3 Monthly Average of Maximum and Minimum Temperatures at Selected Class A Stations

Unit: ºC

Station	Dzongkhag	1	2	3	4	5	6	7	8	9	10	11	12	Annual
Bhur	Sarpang	22.2	24.1	27.1	27.6	28.6	29.1	29.6	30.7	29.2	29.1	26.3	24.0	27.3
		13.4	15.9	18.4	20.3	22.0	22.9	23.5	24.0	23.8	21.9	18.3	14.7	19.9
Chamkhar	Bumthang	11.9	14.0	16.3	17.7	19.8	22.6	23.0	23.3	22.2	19.7	16.5	13.1	18.3
		-5.2	-0.8	2.7	6.2	9.6	13.8	14.6	14.0	13.0	6.8	0.5	-2.3	6.1
Namjayling	Haa	10.5	12.4	14.2	15.2	18.1	23.0	21.1	21.3	19.6	16.7	15.0	12.8	16.6
		-7.0	-4.0	-0.2	3.9	8.0	12.0	13.4	12.2	10.6	3.9	-2.0	-5.3	3.8
Monggar	Monggar	17.3	20.6	23.0	22.7	25.4	26.7	26.7	27.0	25.5	24.2	20.8	17.3	23.1
		6.2	8.4	10.9	12.8	15.7	18.2	18.2	18.2	17.1	13.5	9.7	7.2	13.0
Pemagatshel	Pemagatshel	15.0	17.2	20.3	21.2	23.0	24.0	23.7	24.5	24.2	23.3	20.2	16.7	21.1
		4.1	6.3	9.5	12.3	15.1	17.7	18.1	18.0	17.1	13.0	8.4	5.7	12.1
Simtokha	Thimphu	15.3	17.8	20.1	22.5	24.9	26.9	26.8	27.5	26.1	23.6	20.5	17.2	22.4
		-3.9	-0.7	3.9	7.4	11.3	15.5	16.2	15.5	14.4	7.8	1.6	-1.3	7.3

Note: Upper: monthly average of daily maximum temperature,
Lower: monthly average of daily minimum temperature
Source: Department of Hydromet Services, MoEA

(2) Precipitation

Monthly precipitation becomes high in the summer months from June to September, as it is affected by the tropical monsoon, but it is low in the winter months from November to February, resulting in the dry season (Table 3.1.4). Precipitation also varies according to the altitude of the meteorological station. The annual precipitation level in Bhur, located in a lowland area with a subtropical climate, is close to 5,000 mm, while that of Chamkhar, Namjayling and Simtokha, located at high altitudes, is less than 1,000 mm. Monggar and Pemagatshel, located at medium altitudes, record annual precipitation levels of more than 1,000mm.

Table 3.1.4 Monthly Average Precipitation at the Selected Class A Stations

Unit: mm

Station	Dzongkhag	1	2	3	4	5	6	7	8	9	10	11	12	Annual
Bhur	Sarpang	10.7	24.9	48.0	224.4	319.3	911.4	1,417.5	1,069.7	763.2	138.0	12.0	1.2	4,940.1
Chamkhar	Bumthang	3.9	14.4	35.4	65.6	99.1	76.7	160.0	119.4	86.6	42.1	2.2	0.7	705.9
Namjayling	Haa	5.9	7.9	39.8	73.3	70.6	94.2	196.6	177.3	124.4	67.4	16.7	3.9	878.0
Monggar	Monggar	6.4	11.5	26.0	102.2	101.4	155.1	180.8	177.4	183.7	57.4	24.2	13.5	1,039.4
Pemagatshel	Pemagatshel	11.0	18.1	55.0	119.7	148.0	340.3	379.4	270.6	245.4	34.2	23.3	13.0	1,657.9
Simtokha	Thimphu	7.2	9.1	22.5	37.5	55.6	89.0	175.8	92.5	96.0	37.5	23.6	7.8	654.1

Source: Department of Hydromet Services, MoEA

(3) Relative Humidity

Monthly average relative humidity varies according to monthly rainfall: it becomes high in summer and low in winter. Relative humidity ranges between 70% to more than 80% from June to September, except in Simtokha and Namjayling, while it drops to 49.3% in November in Namjayling and 48.8% in December in Simtokha. Of the stations, Bhur, which has a subtropical climate, records the highest annual value of 76.8%, while Namjayling and Simtokha record lower values, i.e., 61.7% and 57.9%, respectively. The remaining stations record intermediate values.

Table 3.1.5 Monthly Average Relative Humidity at Selected Class A Stations

Unit: %

Station	Dzongkhag	1	2	3	4	5	6	7	8	9	10	11	12	Annual
Bhur	Sarpang	69.3	67.5	66.2	74.2	83.6	87.6	88.2	88.3	87.3	74.0	67.2	68.1	76.8
Chamkhar	Bumthang	71.9	68.5	67.9	71.5	70.7	71.5	76.1	75.3	76.3	72.3	66.9	72.3	71.8
Namjayling	Haa	61.0	58.3	55.8	60.3	59.6	66.4	70.7	71.8	70.6	61.5	49.3	54.9	61.7
Monggar	Monggar	65.9	67.2	64.7	71.3	74.8	82.2	85.1	81.5	84.5	72.3	64.9	66.8	73.4
Pemagatshel	Pemagatshel	66.8	64.6	64.6	71.5	78.4	84.6	86.3	85.5	84.5	76.3	69.2	71.3	75.3
Simtokha	Thimphu	53.1	50.4	55.1	53.9	57.8	62.8	67.3	65.9	66.1	59.8	54.0	48.8	57.9

Source: Department of Hydromet Services, MoEA

(4) Wind

Wind speed fluctuates according to the season. It gets high from winter to spring and low from summer to autumn. It also varies according to the altitude of the station: stations located at high altitudes, such as Chamkhar, Namjayling and Simtokha, record relatively high wind speed, while those at low and intermediate altitudes record low wind speeds.

Table 3.1.6 Monthly Average Wind Speed at the Selected Class A Stations

Unit: m/s

Station	Dzongkhag	1	2	3	4	5	6	7	8	9	10	11	12	Annual
Bhur	Sarpang	0.8	0.9	1.0	0.9	0.7	0.5	0.5	0.4	0.4	0.5	0.6	0.6	0.7
Chamkhar	Bumthang	1.2	1.4	1.2	1.1	1.1	1.1	0.8	0.7	0.8	0.8	1.0	1.1	1.0
Namjayling	Haa	1.1	1.4	1.5	1.5	1.2	1.0	0.8	1.0	0.7	0.9	1.0	1.0	1.1
Monggar	Monggar	0.8	0.9	1.1	1.1	0.9	0.6	0.5	0.5	0.5	0.8	0.7	0.7	0.8
Pemagatshel	Pemagatshel	0.2	0.5	0.6	0.7	0.5	0.4	0.3	0.3	0.3	0.4	0.5	0.5	0.4
Simtokha	Thimphu	0.9	1.1	1.1	1.1	1.0	0.9	0.8	0.8	0.7	0.8	0.8	0.8	0.9

Source: Department of Hydromet Services, MoEA

Table 3.1.7 below shows the monthly dominant wind direction at the selected six Class A stations. It is revealed that the most frequent wind direction is southward, specifically between WSW and SE. There seems to be no conspicuous difference in wind direction according to season at any of the stations.

Table 3.1.7 Monthly Dominant Wind Direction at the Selected Class A Stations

Station	Dzongkhag	1	2	3	4	5	6	7	8	9	10	11	12	Annual
Bhur	Sarpang	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR
Chamkhar	Bumthang	SE	SE	SE	SSE	SE	SE	SE	SE	SE	SE	SE	SE	SE
Namjayling	Haa	S	S	S	S	SSE	S	S	S	S	S	S	S	S
Monggar	Monggar	SW	SSW	SSW	SSE	SW	SW	WSW	WSW	WSW	SW	WSW	WSW	WSW
Pemagatshel	Pemagatshel	E	SW	SSE	SW	SSW	SW	SW	WSW	SW	WSW	WSW	WSW	WSW
Simtokha	Thimphu	S	S	SSW	SSW	SSW	SSW	SSW	SSW	SSW	S	SSW	S	SSW

Note: NR: No record. E: East, SE: South East, SSE: South-Southeast, S: South, SSW South-Southwest, SW: Southwest, WSW, West-Southwest, W: West

Source: Department of Hydromet Services, MoEA

(5) Sunshine Hours

Hours of sunlight show an opposite trend to that of rainfall. They are shortest in summer from June to August, as they are affected by tropical monsoon, while they become longest from late autumn to winter between November and January. There are, however, no big differences between the stations.

Table 3.1.8 Monthly Average Hours of Sunlight at the Selected Class A Stations

Unit: hours/day

Station	Dzongkhag	1	2	3	4	5	6	7	8	9	10	11	12	Annual
Bhur	Sarpang	6.6	5.6	5.1	4.4	3.8	2.3	2.9	3.4	3.8	7.2	7.5	7.0	5.0
Chamkhar	Bumthang	6.5	6.6	5.9	4.9	4.5	4.1	3.4	4.5	4.4	6.5	6.7	6.3	5.4
Namjayling	Haa	5.8	5.8	5.9	5.2	4.8	3.6	2.9	4.0	3.4	5.6	6.4	5.7	4.9
Monggar	Monggar	6.6	6.1	5.8	4.1	3.9	3.3	3.4	4.1	4.6	4.6	7.2	5.5	4.9
Pemagatshel	Pemagatshel	6.5	6.2	5.7	5.0	4.2	2.9	2.3	3.2	4.3	6.9	7.2	6.2	5.0
Simtokha	Thimphu	6.9	4.6	6.6	6.2	5.5	2.8	3.7	4.8	3.3	5.8	6.4	6.5	5.3

Source: Department of Hydromet Services, MoEA

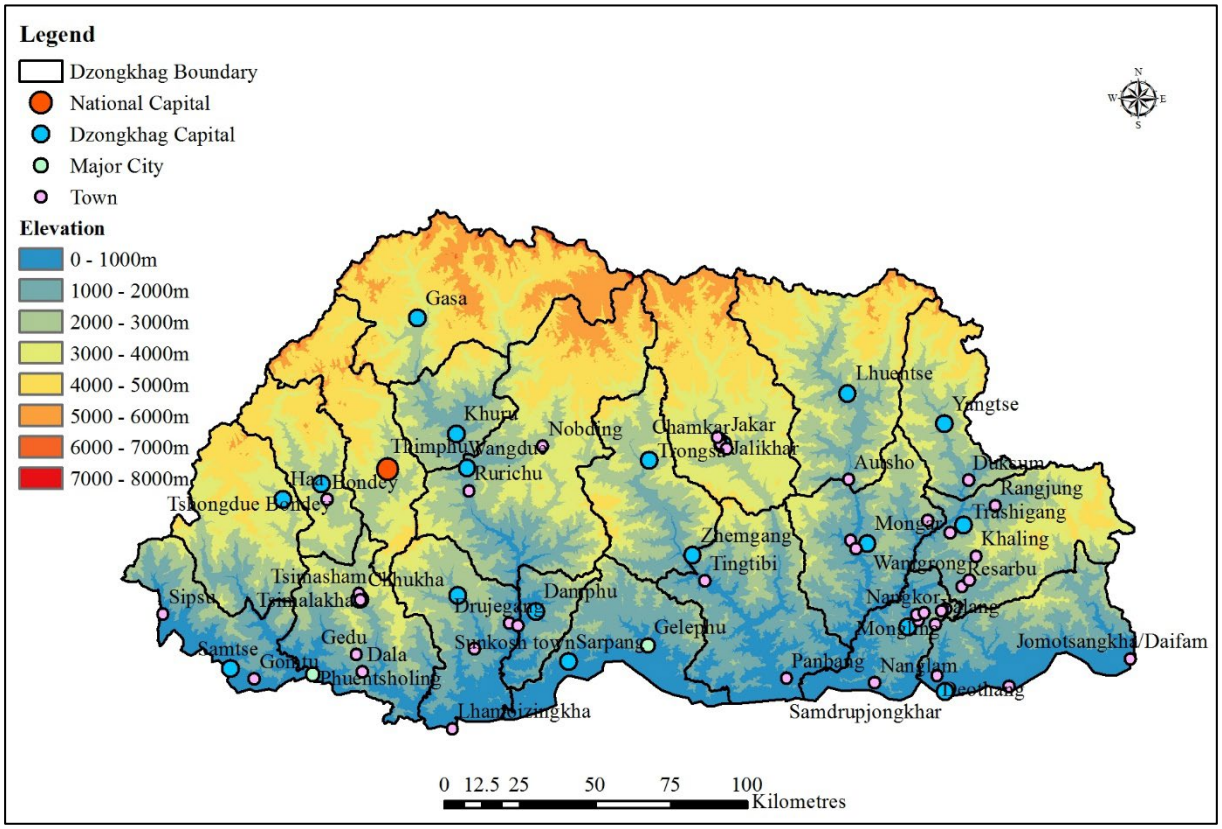
3.2 Topography

In order to understand the topographic characteristics of the Study Area, the ASTER GDEM (30 m resolution) was prepared by and a digital elevation model (DEM) and slope data were generated using the ASTER GDEM. Detailed topographic characteristics are described in terms of elevation and slope conditions.

(1) Elevation

Bhutan is a country located in the eastern part of the Himalayan mountain range. An elevation map (Figure 3.2.1) was generated using the ASTER GDEM. In the Study Area, the lowest elevation is 45 m and the highest elevation is 7,500 m. Moreover, the elevation increases from south to north.

The capital, Thimphu, is located at an elevation of roughly 2,350 m. Other major cities are distributed at elevations of less than 2000 m. The areas of each elevation range are listed in Table 3.2.1. As outlined in this table, about 43% of the land in Bhutan is located at an elevation of more than 3,000 m.



Source: ASTER GDEM

Figure 3.2.1 Elevation Classification

Table 3.2.1 Area of Each Elevation Range

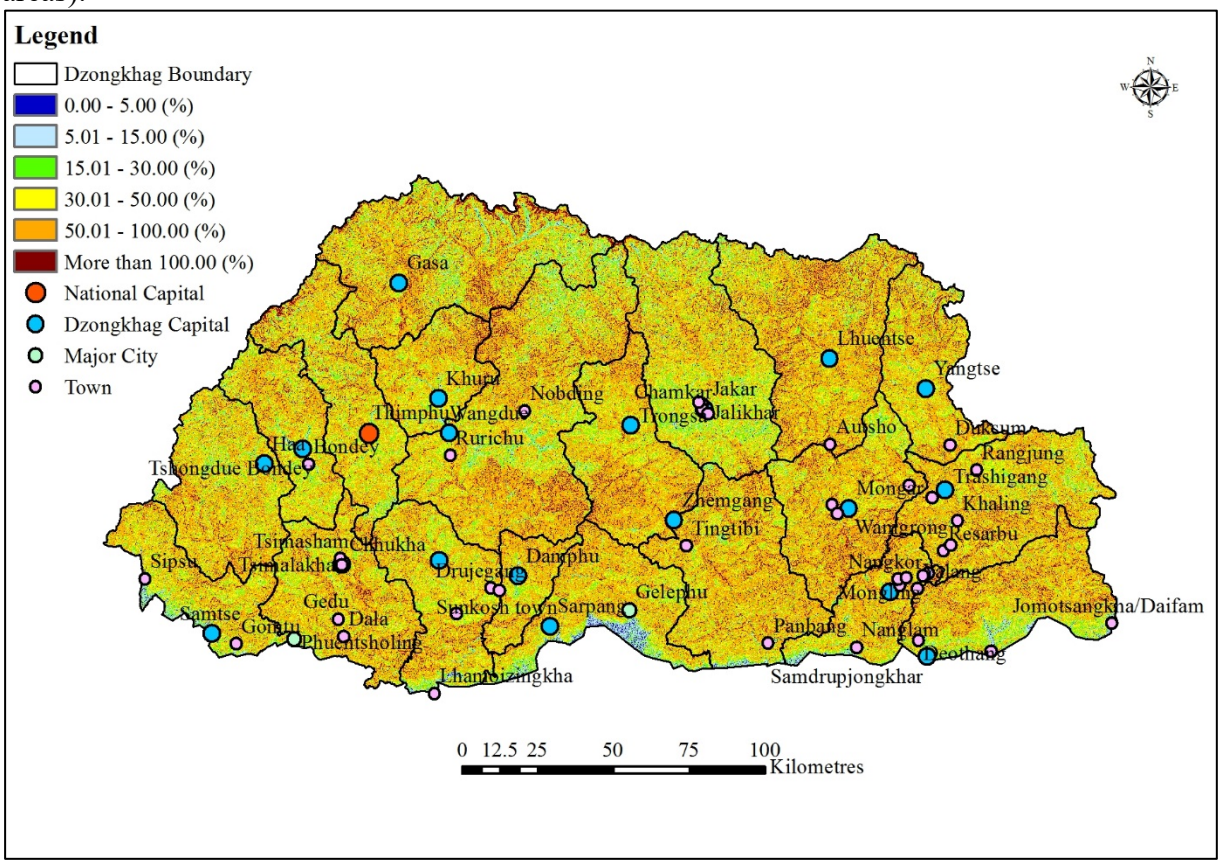
Elevation Range (m)	Area (km^2)	Ratio (%)
0 - 1000	4,568.82	11.78
1000 - 2000	8,280.10	21.36
2000 - 3000	9,294.71	23.97
3000 - 4000	8,212.31	21.18
4000 - 5000	6,493.49	16.75
5000 - 6000	1,840.58	4.75
6000 - 7000	76.92	0.20
7000 - 8000	4.06	0.01
Total	38,771.00	100.00

Source: ASTER GDEM (JICA Project Team)

(2) Slope Conditions

The slope data in percentage units (%) was taken from the ASTER GDEM using the ArcGIS 3D Analyst extension module. The calculated slope data is shown in Figure 3.2.1 and Table

3.2.2. According to the slope data, gently sloping areas (ranging from 0% to 15%, where 15% is approximately 8.5 degrees) make up approximately 5.3% of the total area of Bhutan, and are distributed across the southern, central and northern parts of Bhutan (blue and cyan coloured areas). Moderately sloping areas (ranging from 15% to 30%, where 30% is approximately 16.7 degrees) make up roughly 13.7% of the total area of Bhutan (green coloured areas). On the other hand, steep areas (ranging from 50% to 100%, where 50% is approximately 26.6 degrees and 100% is 45 degrees) make up roughly 45.7% of the total area of Bhutan (orange coloured areas).



Source: ASTER GDEM

Figure 3.2.2 Slope Classification

Table 3.2.2 List of Area for Each Slope Range

Slope (%)	Area (km^2)	Ratio (%)
0.00 – 5.00	269.91	0.70
5.01 – 15.00	1,796.21	4.63
15.01 – 30.00	5,293.49	13.65
30.01 – 50.00	10,640.07	27.44
50.01 – 100.00	17,697.73	45.65
More than 100.00	3,073.59	7.93
Total	38,771.00	100.00

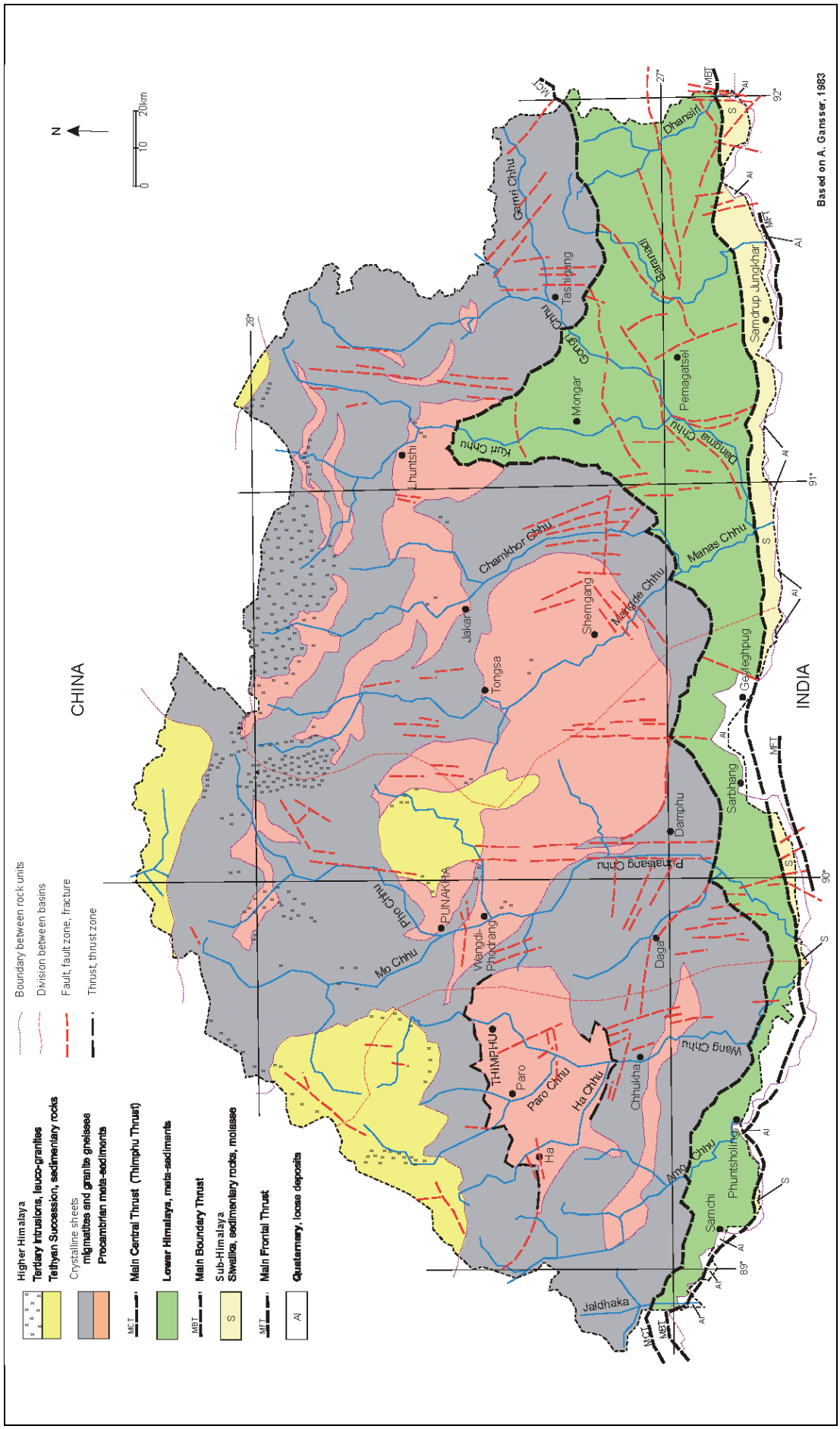
Source: ASTER GDEM

3.3 Geology

The Bhutan Himalayas have been under investigation since 1868. The first geological map was developed by Gansser et al. from their five expeditions in Bhutan in 1993, and it has been updated as geological surveys were conducted. The latest geological map was edited in 2011 and is available from the Department of Geology and Mines, Ministry of Economic Affairs.

The latest geological map classifies the geological formation of Bhutan into 35 types on a 1:500,000 scale. Although the latest map is highly detailed, it is too informative to gain an overview of geological conditions. A simple map is more suitable for this purpose. In 2004, the 2003-2022 Power System Master Plan carried out an analysis of geological conditions using a simple map, as shown in Figure 3.3.1.

Tectonic activity raised the Himalayan mountain range and lifted the terrain in the Tertiary and Quaternary Eras. The terrain rises from the south to the north. The Lower Himalayas are formed from huge sedimentary sections dating from the late Precambrian Era. The Lower Himalayas extend towards the south along international boundaries. They are narrow and highly compressed compared to the Higher Himalayas. The Higher Himalayas are made up of crystalline thrust sheets and Tethyan sediments. These crystalline thrust sheets widely cover the country and are made up of granite-gneiss masses and metasediments. The Tethyan sediments are formed from weakly metamorphosed sedimentary series. The sub-Himalayan range lies to the south. It is made up of clastic deposits called Siwaliks, which are the result of erosion and fluvial deposits.



Source: The 2003-2022 Power System Master Plan, 2004

Figure 3.3.1 Geological Map Based on Gansser et al., 1983

3.4 Soil

The general characteristics of the colour, texture and depth of the country's soil were first provided by Karan (1967)[1]. The author suggested that their zonal distribution from north to south is equivalent to Bhutan's climatic and vegetation zones. Following this, Bhutan's soils were classified by Okazaki (1987)[2] based on this concept. He suggested that there were five major soil groups (yellow soils, yellow brown forest soils, brown forest soils, podzols and alpine meadow soils) based on altitude and precipitation.

According to the FAO/UNESCO soil map created in 1977, which presents the general characteristics of Bhutanese soil using soil classification, 27% of Bhutan is covered by either cambisols or fluvisols. Cambisols are most common in medium-altitude zones, while fluvisols mostly occur in the southern belt. By and large, cambisols make good land for a wide variety of agricultural uses and are intensively used. As for fluvisols, most of them have good natural fertility and are planted for the purpose of annual crops and orchards, many are which are used for grazing. Less fertile acrisols, ferralsols and podzols were estimated to cover 45% of the country. Furthermore, 21% of the soil-covered area is very shallow, mostly covered by lithosols on steep slopes.

Besides, the National Soil Service Centre (NSSC) also has reported on the detailed characteristics of Bhutanese soil.

- Soil types vary according to different altitudes and, despite steep gradients, there are areas of deep and well-developed soils for cultivation.
- Farming on steep slopes is limited, which is more due to the risks associated with steep slope cultivation such as erosion and climate than it is to poor soil quality.
- Dryland soils are mostly higher in nutrients than wetland soils.
- Warm temperatures and dry subtropical soils are most favourable for soil with a high nutrient status, while humid and wet subtropical soils have a low nutrient status.

When it comes to productivity, it also depends on other important features such as cultivation conditions, farming practices and geoclimatic conditions. Production is the result of a complex and entangled combination of these factors. To achieve more production, it is also important to know the detailed soil nutrient status and chemical properties of soils. The overall soil nutrient status or the chemical properties of Bhutanese soils can be summarized as follows:

- Soil pH: within the low to medium range
- Exchangeable Al saturation %: low to very low, indicating no aluminium toxicity
- Organic matter content: moderate
- Carbon to nitrogen (C/N) ratio: between 11–14.1 (typical for agricultural soils)
- Phosphorus and potassium content: low in most soil (phosphate deficiency is considered more severe as the underlying geology is rich in potassium)
- Base saturation (BS) %: low or very low in most soils
- Cation exchange capacity (CEC): low in most soils

Although the concrete figures are not clear, when CEC and BS values are low, soil amendment is generally necessary to increase productivity.

[1] Bhutan – A Physical and Cultural Geography.
[2] Soil of the Bhutan Himalaya: 145–184.

3.5 Fauna and Flora

3.5.1 Overview

Bhutan has a wide range of forest ecosystems ranging from tropical lowland forests, coniferous and temperate broadleaf forests and alpine meadows and scrub forests. Biogeographically, the country lies in a global ecozone, in between the warm Indo-Malayan ecozone in the south and the temperate Palearctic ecozone in the north (WWF, Bhutan, 2009). Although Bhutan is one of the smallest countries in the world, it has one of the richest concentrations of biodiversity.

3.5.2 Flora

(1) Vascular Plants

The country's diverse ecosystems and ecofloristic zones harbour a rich array of vascular plants. The Royal Botanic Garden of Edinburgh, which published the Flora of Bhutan (1983-2001), has recorded 5,603 species of angiosperms and gymnosperms. These include 369 species of orchids and 46 species of rhododendrons. Of the recorded plant species, 105 are said to be endemic to Bhutan and are found nowhere else in the world. In addition, the National Biodiversity Centre has recorded 410 species of pteridophytes (ferns and fern allies) through inventories in various regions of the country.

Bhutanese flora is also rich in plant species with enormous commercial and scientific value. The Institute of Traditional Medicine Services (ITMS) uses more than 200 species in the formulation of various traditional medicines. Bhutanese flora is considered to be of immense scientific value, not only due to its high level of diversity but also because it is relatively well preserved compared to the flora in other Himalayan regions (Biodiversity Action Plan (BAP), 2009).

(2) Non-Vascular Plants

According to the 2014 National Biodiversity Strategies and Action Plan (NBSAP), there is no detailed inventory of this group of non-vascular plants in spite of the fact that Bhutan contains many species of these plants, such as sphagnum mosses, liverworts and hornworts. Currently, only 282 species under 156 genera of mosses have been recorded in Bhutan (Long, 1994).

(3) Fungus

About 350 species of fungus have been identified and recorded in the country. However, it has been pointed out that this number could get much higher once a complete survey is carried out. The current number is based on a partial inventory carried out in the country, and then only of those species whose identity is confirmed. The National Mushroom Centre (NMC) has recorded more than 90 species of forest mushrooms in Bhutan, of which about 53 are edible. Many of these edible mushrooms are local delicacies and contribute to the livelihoods and nutrition of the Bhutanese people (NBSAP, 2014).

(4) Insect-Fungi

Bhutan is also believed to be very rich in insect-fungi, although records are currently very limited. The Chinese caterpillar fungus *Cordyceps sinensis*, found in the country's alpine meadows, is highly valued for its medicinal properties as an aphrodisiac and as a cure of lung and kidney ailments. Even with the limited studies on this group of organisms, more than 100 species of insect-fungi have been recorded in the country to date (NMC Publication), of which around 50 have been recorded in the Gedu forest area (Chhukha Dzongkhag) alone (NBSAP,

2014).

(5) Lichens and Lichenicolous Fungi

Currently, only about 287 lichens and lichenicolous fungi are known to exist in Bhutan, although experts estimate that there may be over 1,000 species. Most species are those common to the Himalayas, except for some eastern North American species which are also found in Bhutan (NBSAP, 2014).

3.5.3 Fauna

(1) Mammals

Close to 200 species of mammal are known to exist in the country. This is extraordinary for one of the smallest countries in Asia. Its ecological integrity means that Bhutan has the right conditions to be a prime sanctuary for numerous Palearctic and Indo-Malayan mammal species. These species include 27 globally threatened mammals listed on the IUCN Red List, including the Bengal tiger *Panthera tigris tigris*, the snow leopard *Uncia uncia*, the clouded leopard *Neofelis nebulosa*, the red panda *Ailurus fulgens*, the Bhutan takin *Budorcas taxicolor whitei*, etc.
Bhutan is also known to be rich in wild felids, harbouring 11 of the 36 globally recorded species. A study conducted in a 74km^2 area of Royal Manas National Park in 2012 recorded six felid species, which is about 16% of the world's felid species. This has confirmed Bhutan as a hotspot for wild felids (NBSAP, 2014).

(2) Avifauna

Currently, it is estimated that around 700 bird species can be found in Bhutan, of which 18 are globally threatened and are listed on the IUCN Red List. The country is recognized as being part of several globally important bird regions. It is part of the Sino-Himalayan mountain forests, the Indo-Burmese forests, the Indo-Gangetic grasslands, South Asian arid habitats and wetlands on the Tibetan Plateau – all of which are categorized as globally important bird regions by BirdLife International (BAP, 2009).
Of the four critically endangered species found in Bhutan, the White-bellied Heron is the most studied species; the country harbours a population of 22 individuals out of the estimated global population of 50-200 birds (NBSAP, 2014).

(3) Herpetofauna

According to NBSAP (2014), although a limited number of studies and documentation have been carried out in the country so far, Bhutan has thus far recorded 61 species of amphibians (59 anurans, one caudate and one caecilian) and 124 species of reptiles (82 snakes, 20 lizards, two crocodiles, 20 turtles and one tortoise) (Wangyal, 2013, Wangyal, pers.com. Aug, 2014).

(4) Invertebrates

Invertebrates are one of the least studied groups in the country. Although Bhutan is reportedly estimated to have 800 to 900 species of butterfly (van der Poel and Wangchuk, 2007), only about 586 species of butterfly and 69 species of moth have been recorded to date (Singh, 2014). The first preliminary report on macro-invertebrates at Nika Chhu, Mangde Chhu, Chamkhar Chhu, Kuri Chhu and their tributaries catalogued about 1,107 fresh water insects (Wangchuck Centennial Park (WCP) and WWF, 2012). In addition, 50 species of Odonata were recorded in an inventory taken in a few selected pockets of the country (Mitra, 2008).

(5) Fish Fauna

Recent studies have reported a total of 91 freshwater native fish species in Bhutan (Gurung et al., 2013) including the 49 species identified earlier (Dubey, 1978). However, it is widely believed that the current list of fish species in Bhutan is a gross underestimate of the actual diversity of freshwater fish. Of the known species, the Golden Mahseer (*Tor putitora*) is considered endangered and is listed as a totally protected species in the Forest and Nature Conservation Act of Bhutan, 1995.

3.5.4 Threatened Species

There are 27 globally threatened mammal species in Bhutan, of which one is critically endangered, 11 are endangered and 15 are vulnerable. In terms of avifauna, 18 threatened species are found in Bhutan, of which four are critically endangered and 14 are vulnerable. There are 182 species of butterflies categorized as rare and threatened species (IUCN, 2016).

Under domestic legislation, threatened animal and plant species are stipulated in the 2006 Forest and Nature Conservation Act as "Totally Protected Species," consisting of 24 animals and birds and seven plant species, as listed in the tables below. Hunting, Killing, Trapping, Transporting, Capturing, Breeding, Cultivating or Possessing protected species, or keeping them as pets, are basically prohibited.

Table 3.5.1 Totally Protected Animal and Bird Species Listed in Schedule 1

No.	Common name	Scientific name	No.	Common name	Scientific name
1	Asian Elephant	*Elephas maximus*	13	Peacock Pheasant	*Polyplectron bicalcaratum*
2	Clouded Leopard	*Neofelis nebulosa*	14	Raven	*Corvus corax*
3	Golden Langur	*Presbytis geei*	15	Rufous-Necked Hornbill	*Aceros nipalesis*
4	Musk Deer	*Moschus chrysogaster*	16	Golden Mahseer	*Tof tor*
5	Pangolin	*Manis crassicaudata*	17	Spotted Deer	*Axis*
6	Pigmy Hog	*Sus sylvanicus*	18	Gaur	*Bos gaurus*
7	Snow Leopard	*Panthera uncia*	19	Leopard	*Panthera pardus*
8	Takin	*Budorcas taxicolor*	20	Leopard Cat	*Felis bengalensis*
9	Tiger	*Panthera tigris*	21	Himalayan Black Bear	*Selenarctos thibetanus*
10	Wild Buffalo	*Bubalus bubalis*	22	Red Panda	*Ailurus fulgens*
11	Black Necked Crane	*Grus nigricollis*	23	Serow	*Capricornis sumatraensis*
12	Monal Pheasant	*Lophophorus impejanus*	24	White-bellied Heron	*Ardea insignis*

Source: Forest and Nature Conservation Rules, 2006

Table 3.5.2 Totally Protected Plant Species Listed in Schedule 1

No.	Dzongkha name	English name	Scientific name
1	Agar/agaru	Eaglewood/Indian Aloeswood	*Aquilaria agallocha*
2	Pang-gen-metog	Gentiane	*Gentiana crassuloides*
3	-	Snowdon Lily	*Lloydia yunnanensis*
4	Tsher-ngeon meto	Blue Poppy	*Meconopsis grandis*
5	Hashing	Himalayan Yew	*Taxus baccata*
6	Bhreeng-geera-dza	Ginseng	*Panax pseudoginseng*
7	Yar-tsa-Goen-bup	Chinese Caterpillar	*Cordyceps sinensis*

Source: Forest and Nature Conservation Rules, 2006

3.6 Water System and Water Resources

3.6.1 Water Resources at the National and Local Levels

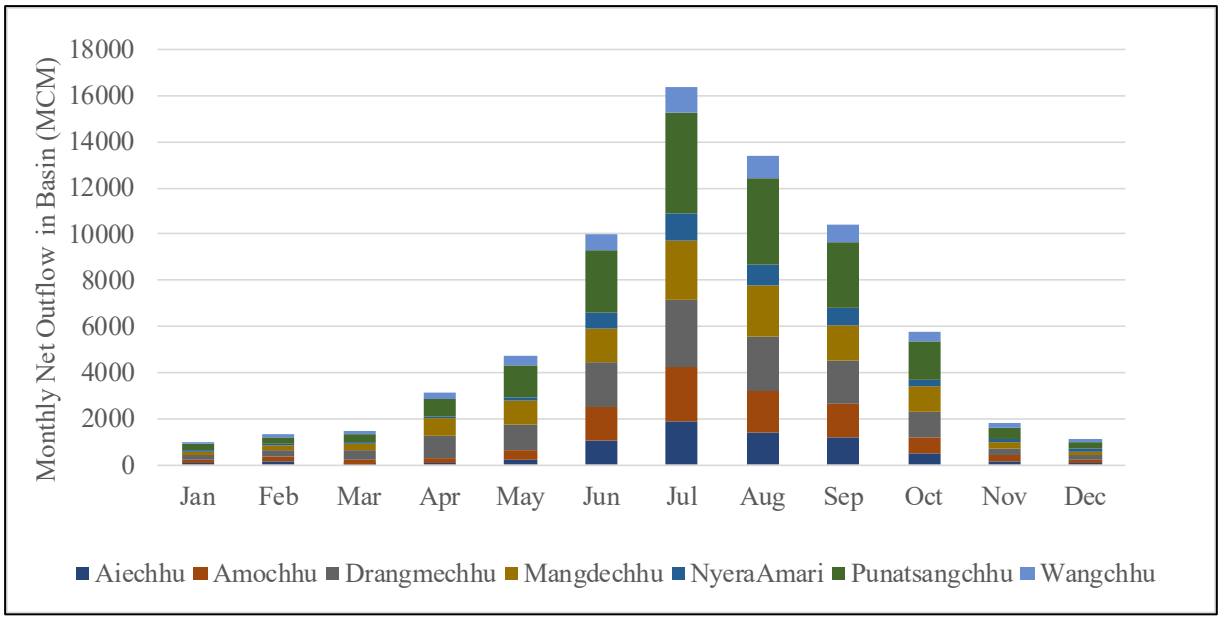
Bhutan is blessed with enormous water resources, made up of various forms of rivers, tributaries, springs, lakes, glaciers, snow, ice, groundwater, precipitation and other wetlands. In this report, water availability is defined as follows by the NEC: *"Runoff generated from rainfall within the concerned area augmented by the inflow from upstream areas after deducting consumption".* The water availability per capita in Bhutan is estimated as being one of the highest in the world, as shown by Table 3.6.1. The long-term average runoff of whole country is 70,576 million cubic metres per year. This figure shows that Bhutan has an abundant water supply, in line with existing analyses of water availability such as Falkenmark's Water Stress Indicators. Likewise, the quality of Bhutanese water resources has been evaluated as good, according to surveys carried out in selected rivers by the NEC.

Table 3.6.1 Water Resources in Bhutan

Characteristic National Features	Unit	Quantity
Annual precipitation range	mm/year	2,500 to 5,550
Long-term mean annual runoff in the country	million m^3/year	70,576 (=2,238 m^3/s)
Per capita mean annual flow availability	m^3/year/capita	94,500

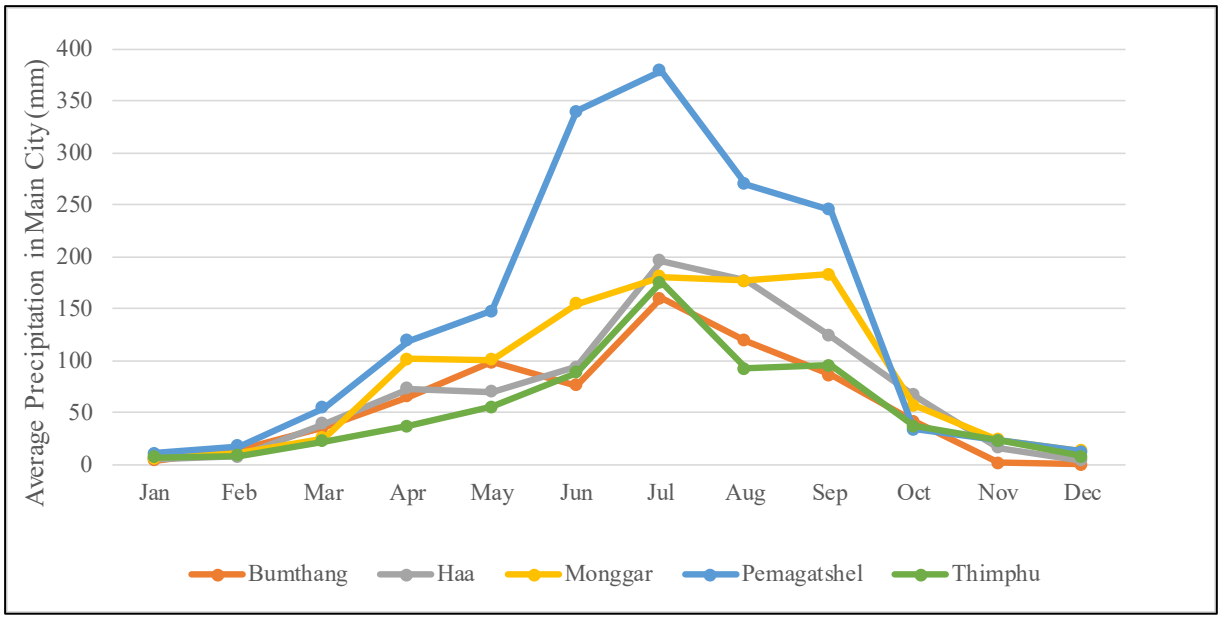
Source: National Environmental Committee, Asian Development Bank, "Water: Securing Bhutan's Future"

Water resources in Bhutan are evaluated as abundant and healthy at the macro level. At the local level, on the other hand, water shortages and contamination occur in cities in the southern and central regions, such as Thimphu, Gelephu, Nganglam and Monggar. The uneven distribution of rainfall causes water shortages. Rivers are main water source in Bhutan, and its discharge largely relies on precipitation. Their interdependence is shown in Figure 3.6.1 and Figure 3.6.2. The drying up of water resources is also reported between November and March when the rainfall decreases. In terms of the problem of water quality, water pollution has been reported due to domestic sewage, industrial effluent, pesticides and herbicides.



Source: ASTER GDEM

Figure 3.6.1 Monthly Net Outflow of Basin



Source: National Environmental Committee, NIWRMP, Department of Hydromet Services, MoEA

Figure 3.6.2 Monthly Mean Precipitation in the Main Cities

3.6.2 Water System

(1) Rivers and River Basins

Rivers and basins are the principal water resources in Bhutan as mentioned in 3.6.1. More than 85% of the water resources for rivers comes from rainfall, alongside glacial meltwater at 2-12% and snow meltwater at 2%.

Table 3.6.2 outlines the major rivers and basins in Bhutan and the annual flows. There are four major rivers and 10 hydrological basins, which are grouped into five management basins as follows: 1) Amochhu, 2) Wangchhu, 3) Punatsangchhu, 4) Mangdechhu and 5) Drangmechhu. The Manas, one of the major rivers found just before reaching India, is composed of the Mangdechhu and the Drangmechhu. These major rivers generally flow from north to south with their sources in alpine areas. The flow volume changes, depending on the season.

Table 3.6.2 Catchment Area and Annual Flow of the Five Major Hydrological Basins

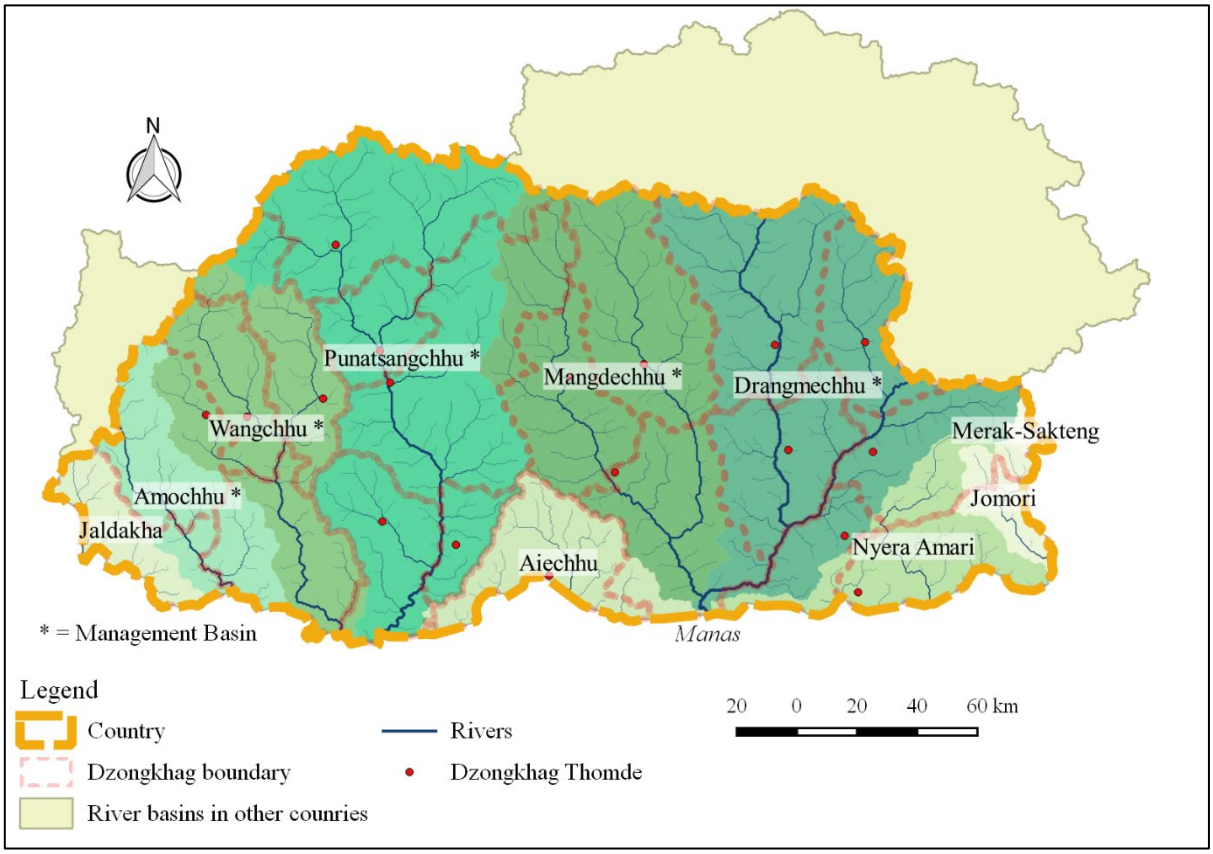
Major River (Management Basin)	Hydrological Basin	Area (km^2)*1	Annual Flow (MCM)*2
Amochhu (Amochhu)	Amochhu	2,323.84	9,375.07
	Jaldhaka	963.99	
Wangchhu (Wangchhu)	Wangchhu	4,637.12	5,209.06
Punatsangchhu (Punatsangchhu)	Punatsangchhu	9,731.51	19,129.79
	Aiechhu	1,956.09	6,989.14
Manas (Mangdechhu)	Mangdechhu	7,446.94	11,797.24
(Drangmechhu)	Drangmechhu	8,545.14	13,569.14
	Nyera Amari	2,288.09	4,506.57
	Jomori	731.09	
	Merak-Sakteng	138.03	
4 (5) (nos.)	10 (nos.)	38,761.84	70,576.01

Source: *1 Area is calculated by ArcGIS, *2 flow data is from NEC, 2016

(2) Boundaries of the River Basins

Figure 3.6.3 shows the rivers and river basins in Bhutan. The river basins cross the boundaries between Dzongkhags and national borders. For instance, the Amochhu basin extends into both

Chukha and Haa. All of the rivers originate within Bhutan except for the Amochhu and Drangmechhu, which stem from China. Most of the rivers flows into the Brahmaputra river, which flows from east to west in the direction of India. The construction of a dam and the pollution emitted by it have severely affected life downstream, including the ecosystem.



Source: NCLS

Figure 3.6.3 Map of Basin Boundaries with Rivers

(3) Water Systems Other Than Rivers

Table 3.6.3 shows the inventory of water resources other than rivers. Wetlands in Bhutan are crucially important, not only for human beings but also for ecosystems. These wetlands have been reported as being fragmented and lost in and around cities and towns.

Table 3.6.3 Inventory of Lakes, Glaciers and Marshes

Type of Wetland	Unit (Nos.)	Total Area (m^2)	Average Area (m^2)
Glacier	885	642	-
Debris-covered glacier	50	16.1	
Glacial lake	637	23,230,604	36,468
Lake	1722	49,973,272	29,020
Suprasnow lake	110	52,327	475
Supraglacial lake	495	28,554,801	57,686
Marshes	63	497,334	7,894

Source: National Integrated Water Resources Plan, 2016

Groundwater

Whilst groundwater exists, its development is considered as being in its infancy. However, its potential has been highlighted, especially in the cities, for drinking and industrial use in the south.

3.6.3 Water Supply System

Water use is prioritized by the Water Act of Bhutan 2011 as follows; 1) for drinking and sanitation; 2) for agriculture 3) for energy; 4) for industry; 5) for tourism and recreation; and 6) for other uses. Water allocation is supposed to be determined according to these priorities.

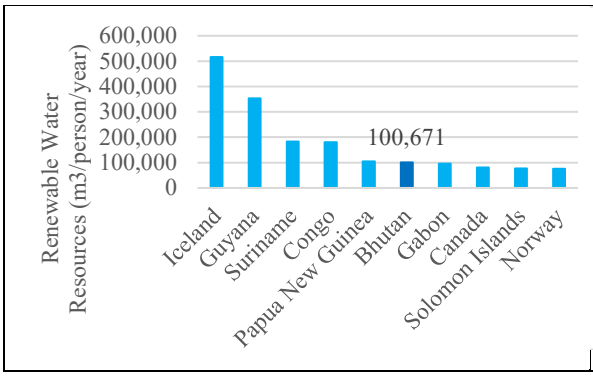
In 2008, the Millennium Development Goals (MDGs) stipulated that, for "Safe Drinking Water" in urban areas of Bhutan, 99% of the people living those areas should have access to the improved water supply system, while for the rural area this percentage was 88%.

The source of the urban water supply is surface water and some groundwater. The quantities available in each urban area differs from their scale. In rural areas, it is common for most communities to be located in slope areas; their water resources are mainly springs. The Water User's Association is in charge of its management.

3.7 Bhutanese Significance of Enriched Enviornment

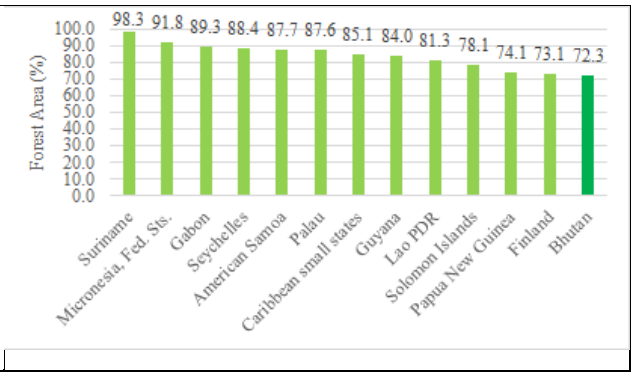
Bhutan is highly blessed with renewable water resources, forests and renewable energy. Its wealth is better than any other country in the world. For instance, renewable water resources per capita are the sixth largest in the world (Figures 3.7.1 and 3.7.3). The proportion of forest area to the national territory in 13th place (Figure 3.7.2). The penetration rate concerning the use of renewable energy is ranked in 15th place (Figure 3.7.4).

Furthermore, the absorbed amount of GHG exceeds the amount of emission. Bhutan is a hard-to-find country which contributed to the reduction of GHG emissions globally in 2012 (Figure 3.7.5). This contribution should be acknowledged in order to enhance the national value.



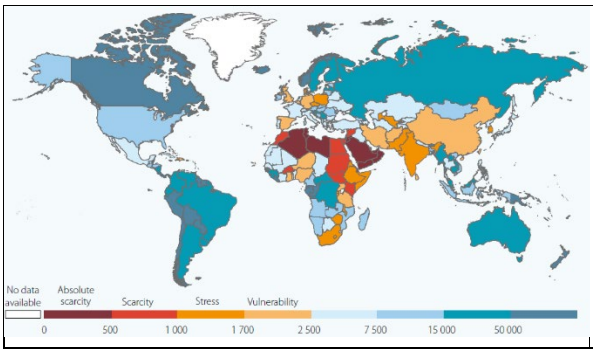
Note: Minimum water consumption of 1,700 m^3/capita/year
Source: FAO AQUASTAT

Figure 3.7.1 Top 10 Countries of Total Renewable Water Resources per Capita in 2014



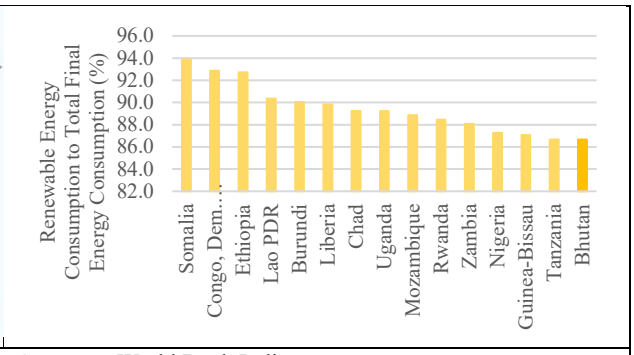
Source: World Bank Indicator

Figure 3.7.2 Top 13 Countries of Forest Area in 2015



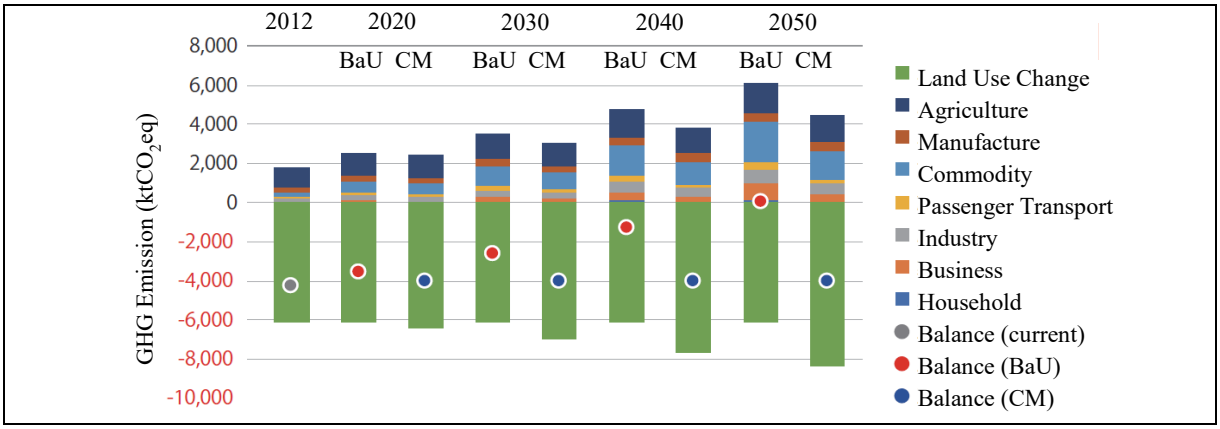
Source: WWAP, with data from the FAO AQUASTAT database.(http://www.fao.org/nr/water/aquastat/main/index.stm) (aggregate data for all countries except Andorra and Serbia, external data), and using UN-Water category thresholds.

Figure 3.7.3 Total Renewable Water Resources per Capita in 2013 (m^3/year/person)



Source: World Bank Indicator

Figure 3.7.4 Top 15 Countries of Renewable Energy Consumption to Total Final Energy Consumption in 2014



Note: BaU: Business as Usual, CM: Countermeasure
Source: Institute for Global Environmental Strategies (IGES)

Figure 3.7.5 Estimate of GHG Emission (Carbon Neutral)

The carbon negative situation may change as the emissions increase over carbon absorption in

2050, whereby the country develops without undertaking any countermeasures. In this business-as-usual (BaU) case, logistics will be increased eight times from 2012 and the existing forest areas will be maintained. The estimate also reveals that the carbon negative situation will be maintained as the countermeasure case, if equipment is installed, the modal share of bus transportation is enhanced, and the forest area is well managed by means of trimming and afforestation with an increase of 10% in the land area. The use of renewable energy will also contribute to a reduction in GHG emissions.

With technical support from the Danish Ministry of Foreign Affairs, the NEC estimated the penetration rate of renewable energy in fuel consumption in 2005 and 2040 (Table 3.7.1). The estimates reveal that the usage of renewable energy can be increased from 72.7% to 82.7% in the RE and EE scenario with countermeasures.

Table 3.7.1 Final Energy Consumption (toe) by Fuel in a Combined Energy Efficiency and Renewable Energy Scenario compared to Baseline

Item		Unit	2005	%	Baseline 2040	%	RE and EE 2040	%
Exhaustible energy	Gas and diesel oil	toe	48,711	12.5	113,031	12.1	75,360	10.4
	Coal	toe	27,498	7.1	64,078	6.9	27,387	3.8
	Gasoline	toe	11,311	2.9	22,140	2.4	14,340	2.0
	LPG	toe	5,054	1.3	48,295	5.2	0.0	0.0
	Kerosene	toe	10,973	2.8	9,842	1.1	0.0	0.0
	Residual fuel oil	toe	1,638	0.4	6,488	0.7	5,947	0.8
	Jet kerosene	toe	957	0.2	2,447	0.3	2,447	0.3
Renewable energy	Electricity	toe	50,471	13	411,663	44.2	473,856	65.5
	Fuel wood	toe	231,872	59.7	205,136	22.0	61,928	8.6
	Briquettes	toe	65	0.0	43,507	4.7	11,078	1.5
	Biogas	toe	0	0.0	5,405	0.6	5,692	0.8
	Solar heating	toe	0	0.0	311	0.0	42,402	5.9
	Biofuel (diesel)	toe	0	0.0	43	0.0	3,515	0.5
	Other biomass	toe	0	0.0	0	0.0	0.0	0.0
Total		toe	388,550	100.0	932,386	100.0	723,952	100.0
Total of renewable energy		toe	282,408	72.7	666,065	71.4	598,471	82.7

Source: Bhutan: A national strategy and action plan for low carbon development

Note: EE = energy efficiency; RE = renewable energy. Conditions of EE and RE are mentioned below.

Road transport:
- Heavy duty – 5% electricity, 10% biodiesel, (85%diesel);
- Light duty – 50% electricity, 10% biodiesel, (30% diesel, 10% gasoline);
- Motorized two wheelers – 50% electricity, (50%gasoline).
- Energy intensive industry – 90% electricity, 4% coal, 3% diesel, 3% residual fuel oil
- Other industry – 80% electricity, 10% coal, 10% fuel wood

Rural households:
- Cooking – 73% electricity, 10% solar, 10% wood, 5% briquettes, 2% biogas;
- Hot water heating – 53% electricity, 30% solar, 10% wood, 5% briquettes, 2% biogas;
- Space heating – 73% electricity, 12% solar, 10% wood, 5% briquettes.
- Urban households and tertiary sector:
- Cooking – 100% electricity;
- Hot water heating – 50% electricity, 50% solar;
- Space heating – 80% electricity, 20% solar.

CHAPTER 4 THE SOCIOECONOMIC CONDITIONS OF BHUTAN

4.1 Population and Migration

4.1.1 Demographic Composition and Population Distribution

The actual resident population of Bhutan, as per the definition of the Population and Housing Census of Bhutan (PHCB) 2017 and as enumerated on census day, is 735,553 (681,720 Bhutanese and 53,833 non-Bhutanese). In terms of analysis, 727,145 people, which excludes the 8,408 tourists/non-Bhutanese found in hotels on census day, are designated by the NSB. Of this number, 380,453 (52.3%) are male and 346,692 (47.7%) are female, as shown in Table 4.1.1.

The urban population consists of 274,316 people (37.7%) out of the total population, while 452,829 (62.2%) are located in rural areas. Compared to the result of the PHCB 2005, the share of the urban population has increased by 6.8% from 30.9% between two census periods. The sex ratio of the resident population is 109.7 males per 100 females across all age groups.

In the 12 months prior to the census, there was a total of 11,239 children. The total fertility rate is 1.7, which is much smaller than that of 2005 (2.5) and the replacement level of 2.1. The average annual population growth rate between 2005 (634,982) and 2017 (727,145) was 1.14%.

Table 4.1.1 Population by Age, Sex and Rural/Urban Location in Bhutan (2017)

Unit: Number of People and Percentage (%)

Age	Urban			Rural			Total (Both Areas)			Sex
Group	Male	Female	Total	Male	Female	Total	Male	Female	Total	Ratio
0-4	11,059	10,394	21,453	18,117	17,904	36,021	29,176	28,298	57,474	103.1
5-9	11,429	11,138	22,567	20,606	19,818	40,424	32,035	30,956	62,991	103.5
10-14	12,129	12,156	24,285	22,527	22,140	44,667	34,656	34,296	68,952	101.0
15-19	15,058	15,320	30,378	19,621	18,287	37,908	34,679	33,607	68,286	103.2
20-24	18,941	16,748	35,689	22,134	17,592	39,726	41,075	34,340	75,415	119.6
25-29	18,698	16,888	35,586	24,104	19,590	43,694	42,802	36,478	79,280	117.3
30-34	14,698	13,055	27,753	20,361	17,066	37,427	35,059	30,121	65,180	116.4
35-39	12,039	10,421	22,460	17,650	15,439	33,089	29,689	25,860	55,549	114.8
40-44	8,387	6,481	14,868	13,887	12,740	26,627	22,274	19,221	41,495	115.9
45-49	6,810	5,128	11,938	12,055	11,540	23,595	18,865	16,668	35,533	113.2
50-54	4,706	3,628	8,334	10,750	10,233	20,983	15,456	13,861	29,317	111.5
55-59	2,895	2,599	5,494	9,484	8,920	18,404	12,379	11,519	23,898	107.5
60-64	2,150	2,171	4,321	8,348	8,042	16,390	10,498	10,213	20,711	102.8
65-69	1,481	1,517	2,998	6,104	5,552	11,656	7,585	7,069	14,654	107.3
70-74	1,069	1,332	2,401	4,807	4,260	9,067	5,876	5,592	11,468	105.1
75-79	802	913	1,715	3,163	2,993	6,156	3,965	3,906	7,871	101.5
80-84	542	630	1,172	2,109	2,116	4,225	2,651	2,746	5,397	96.5
85-	420	484	904	1,313	1,457	2,770	1,733	1,941	3,674	89.3
All Ages	143,313	131,003	274,316	237,140	215,689	452,829	380,453	346,692	727,145	109.7

Source: NSB, 2017 PHCB

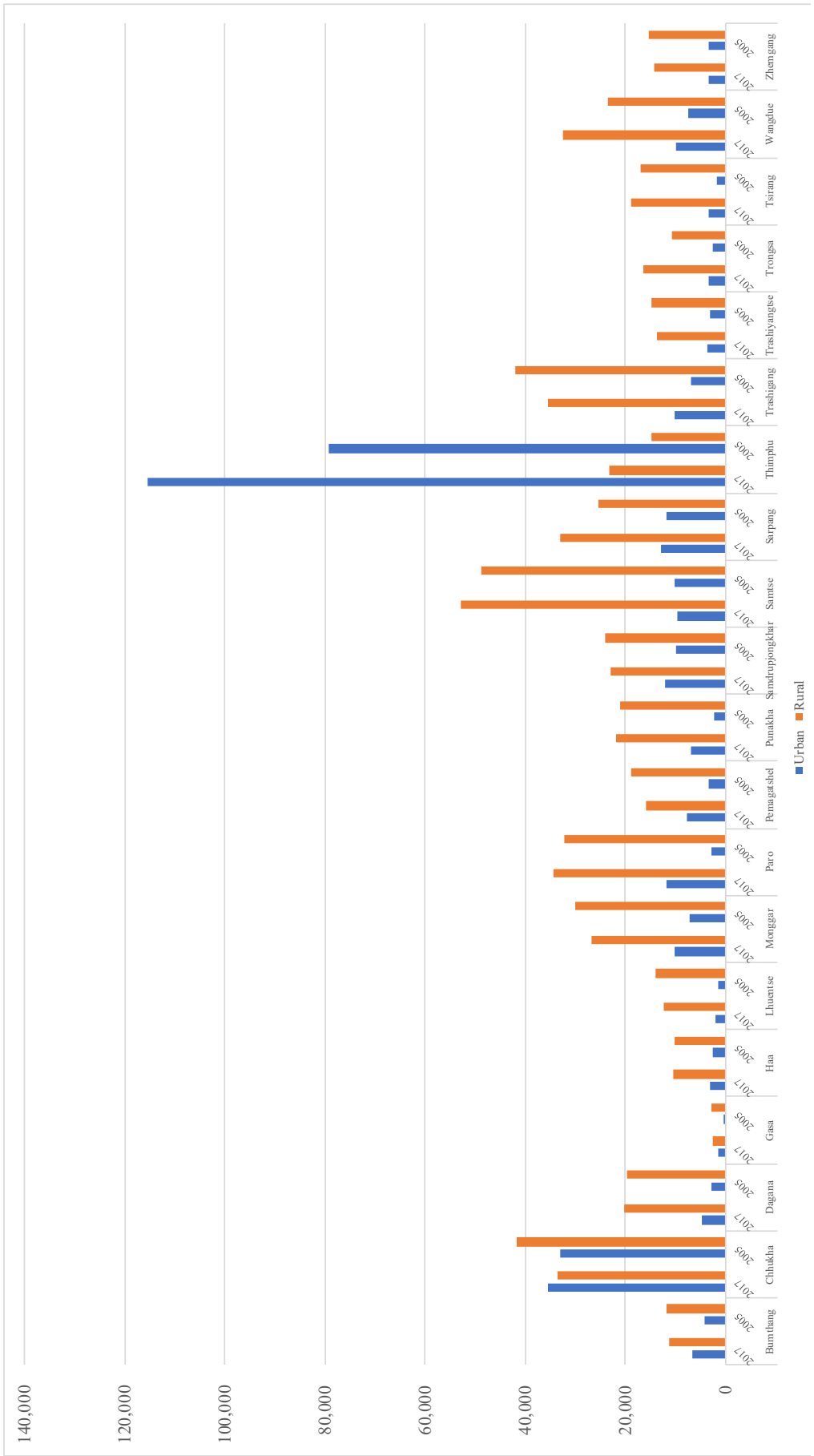
As shown in Table 4.1.2, the distribution of the population varies widely across the different dzongkhags. The most populated dzongkhag is Thimphu with 138,736 people, accounting for 19.1% of the total population. This is followed by Chhukha with 68,966 people (9.5%) and Samtse with 62,590 people (8.6%). Together, the three most populated dzongkhags account for 37.2% of the total population. The least populated dzongkhag is Gasa with 3,952 people (0.5%), followed by Haa with 13,655 people (1.9%) and Lhuentse with 14,437 people (2.0%).

Table 4.1.2 Distribution of the Population by Dzongkhag (2017)

Dzongkhag	Urban			Rural			Both Areas			Share (%)
	Male	Female	Total	Male	Female	Total	Male	Female	Total	
Bumthang	3,570	3,066	6,636	5,826	5,358	11,184	9,396	8,424	17,820	2.5
Chhukha	18,917	16,538	35,455	17,124	16,387	33,511	36,041	32,925	68,966	9.5
Dagana	2,450	2,263	4,713	10,506	9,746	20,252	12,956	12,009	24,965	3.4
Gasa	795	571	1,366	1,309	1,277	2,586	2,104	1,848	3,952	0.5
Haa	1,672	1,417	3,089	5,763	4,803	10,566	7,435	6,220	13,655	1.9
Lhuentse	1,140	959	2,099	6,267	6,071	12,338	7,407	7,030	14,437	2.0
Monggar	5,417	4,880	10,297	12,830	14,023	26,853	18,247	18,903	37,150	5.1
Paro	6,058	5,855	11,913	17,883	16,520	34,403	23,941	22,375	46,316	6.4
Pemagatshel	4,079	3,546	7,625	7,843	8,164	16,007	11,922	11,710	23,632	3.2
Punakha	3,691	3,163	6,854	11,388	10,498	21,886	15,079	13,661	28,740	4.0
Samdrupjongkhar	6,518	5,656	12,174	11,811	11,094	22,905	18,329	16,750	35,079	4.8
Samtse	4,803	4,871	9,674	27,219	25,697	52,916	32,022	30,568	62,590	8.6
Sarpang	6,741	6,206	12,947	17,277	15,780	33,057	24,018	21,986	46,004	6.3
Thimphu	59,453	56,064	115,517	13,069	10,150	23,219	72,522	66,214	138,736	19.1
Trashigang	5,366	4,721	10,087	18,048	17,383	35,431	23,414	22,104	45,518	6.3
Yangtse	1,887	1,660	3,547	6,832	6,921	13,753	8,719	8,581	17,300	2.4
Trongsa	1,832	1,639	3,471	10,046	6,443	16,489	11,878	8,082	19,960	2.7
Tsirang	1,885	1,625	3,510	9,641	9,225	18,866	11,526	10,850	22,376	3.1
Wangduephodrang	5,182	4,649	9,831	19,120	13,235	32,355	24,302	17,884	42,186	5.8
Zhemgang	1,857	1,654	3,511	7,338	6,914	14,252	9,195	8,568	17,763	2.4
Bhutan (Total)	143,313	131,003	274,316	237,140	215,689	452,829	380,453	346,692	727,145	100.0

Source: PHCB 2017

Figure 4.1.1 shows the distribution of the population by urban and rural across the different Dzongkhags in 2005 and 2017. Urban population in the country has increased from 196,611 (30.9% of the total population) to 274,316 (37.7% of the total population). In 2017, Thimphu has the most populated urban population with 115,517 people. It is followed by Chhukha with 35,455 people, Sarpang with 12,947 people and Samdrupjongkhar with 12,174, respectively. On the other hand, Samtse has the most populated rural population with 52,916, followed by Paro with 30,403 and Sarpang with 33,057 people.



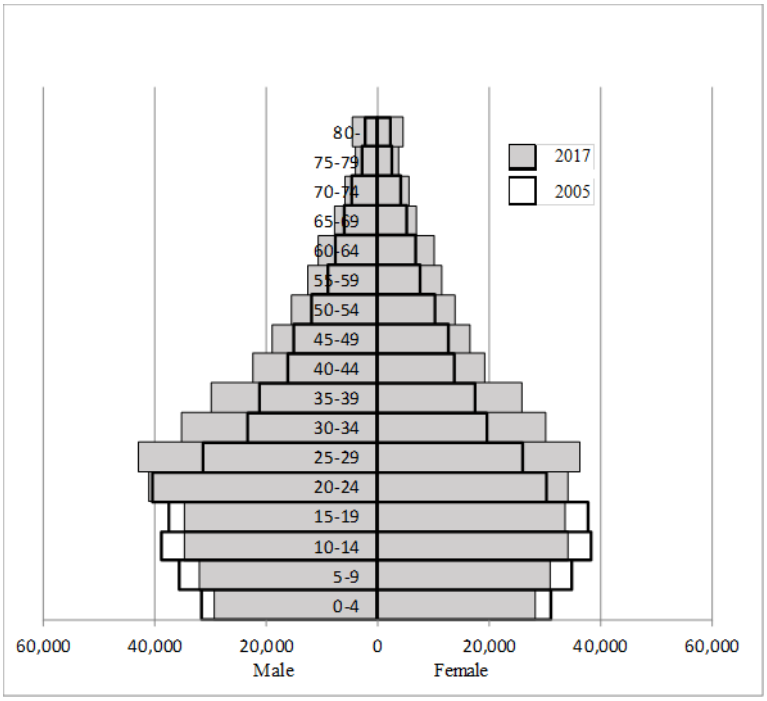
Source: the PHCB2005 & PHCB2017

Figure 4.1.1 Distribution of the Population by Urban/Rural by Dzongkhag (2005 & 2017)

The age structure and sex composition of a population is represented by a population pyramid. In a developing country, the shape of the population pyramid is usually broad-based, depicting a higher proportion of the population in the younger age groups. For populations in developed countries, the pyramid usually has a narrower base, indicating a lower proportion of the population in the younger age groups.

Figure 4.1.2 shows the population pyramid for Bhutan in 2005 and 2017. From the figure, declining of the size of young generations (the age groups 0-4 to 15-19) and fertility rates are seen in the country between 2005 and 2017. In the contrast, the size of working age population has steadily increasing.

The proportion of males compared to females is higher throughout the country. This may be due to the presence of a relatively large number of male expatriate workers, who are mostly employed in the construction sector.



Source: PHCB 2005 and PHCB 2017

Figure 4.1.2 Population Pyramid for Bhutan (2005 & 2017)

4.1.2 Migration

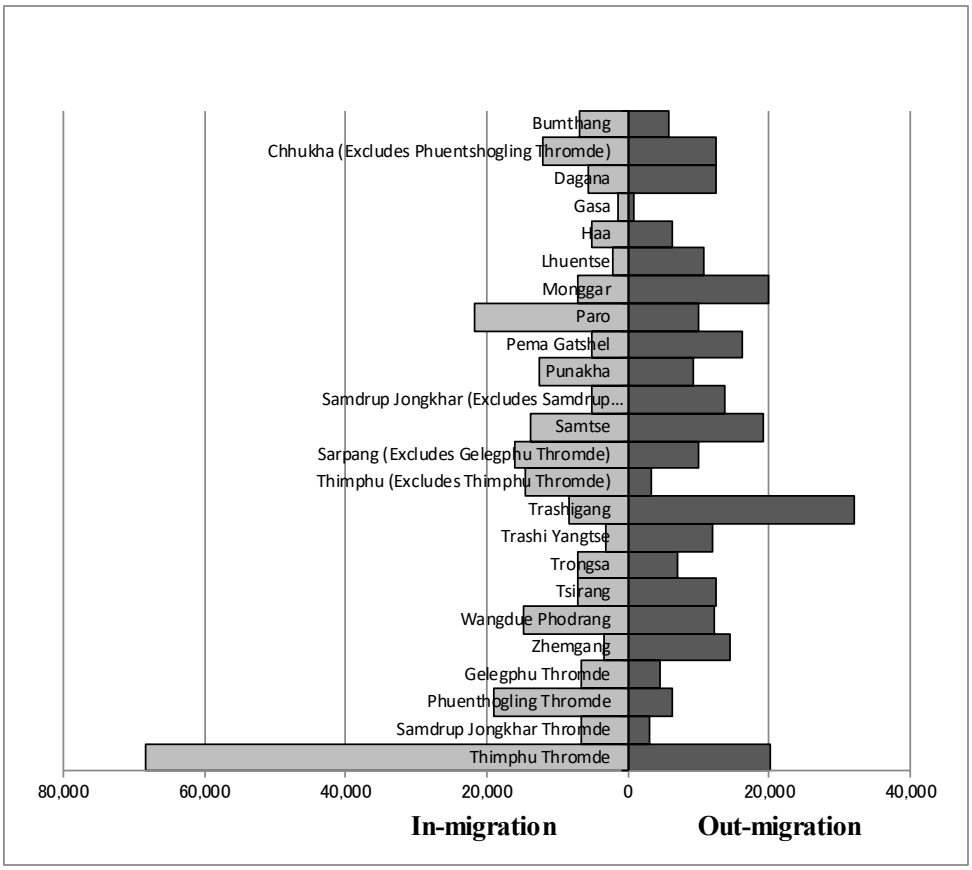
(1) Internal Migration

PHCB 2017 report on interregional (and inter–Dzongkhag/Thromde) migration clearly indicates that migration from the central western, central eastern and eastern regions of Bhutan is the main reason for the current concentration of population in the western region. As shown in Table 4.1.3 and Figure 4.1.3, of all the Dzongkhags/Thromdes, Thimphu Thromde has received the highest number (68,310) of in-migrants (lifetime migrants). This term is defined by the NSB as a person whose area of residence at time of the census differs from their area of birth. Thimphu Thromde is followed by Paro Dzongkhag (21,709), Phuentsholing Thromde (19,038) and Sarpang Dzongkhag (16,017). In terms of out-migration, Trashigang is the highest with a total of 31,930, followed by Thimphu Thromde and Monggar Dzongkhag with 20,096 and 19,800 people, respectively.

Table 4.1.3 In-Migrants and Out-Migrants by Place of Birth, Irrespective of Duration of Stay in the Place of Enumeration, and by Thromde and Dzongkhag

	Place of enumeration (current place)																								
Place of Birth	*1. Bumthang*	*2. Chhukha*	*3. Dagana*	*4. Gasa*	*5. Haa*	*6. Lhuentse*	*7. Monggar*	*8. Paro*	*9. Pemagatshel*	*10. Punakha*	*11. Samdrupjongkhar*	*12. Samtse*	*13. Sarpang*	*14. Thimphu*	*15. Trashigang*	*16. Yangtse*	*17. Trongsa*	*18. Tsirang*	*19. Wangdue Phodrang*	*20. Zhemgang*	*Gelegphu Thromde*	*Phuentshogling Thromde*	*Samdrup Jongkhar Thromde*	*Thimphu Thromde*	***Total Out-Migrants***	***Total Population By Place of Birth***
1. Bumthang	10,549	201	78	17	68	63	203	430	47	251	45	216	320	327	183	89	356	132	275	102	136	255	69	1962	5825	16374
2. Chhukha (Excludes Phuentshogling Thromde)	130	27,683	311	34	436	40	284	1,245	149	630	119	819	427	673	198	81	257	201	826	106	205	2070	176	3124	12541	40224
3. Dagana	241	735	18,560	122	192	27	141	1021	118	752	265	504	734	712	146	53	313	583	1074	168	258	754	132	3483	12528	31088
4. Gasa	26	15	13	2,542	12	3	10	55	1	159	0	23	12	49	14	0	16	10	53	8	9	29	7	175	699	3241
5. Haa	67	393	87	16	7,238	32	91	1133	48	270	47	664	161	358	120	30	132	82	264	43	70	455	80	1639	6282	13520
6. Lhuentse	419	366	178	59	163	12,048	644	915	190	538	126	430	341	579	412	134	257	155	577	59	179	500	193	3250	10664	22712
7. Monggar	824	884	387	89	320	551	29,165	1258	567	640	427	960	891	912	1274	455	673	416	1082	262	387	1018	529	4994	19800	48965
8. Paro	199	597	164	53	386	64	229	21,746	102	667	114	584	367	644	291	57	201	228	541	90	194	798	160	3177	9907	31653
9. Pemagatshel	344	714	265	39	225	129	651	985	17,855	462	672	1000	999	631	972	240	451	404	650	200	356	1195	739	3758	16081	33936
10. Punakha	161	291	188	237	197	59	136	944	80	14,869	56	303	264	769	181	70	214	189	963	86	112	366	64	3202	9132	24001
11. Samdrupjongkhar (Excludes Samdrup Jongkhar Thromde)	216	514	221	61	269	105	484	779	602	415	19,753	737	679	599	857	250	358	285	676	151	318	750	1116	3352	13794	33547
12. Samtse	282	1,586	361	91	620	67	291	2,185	295	747	304	47,947	863	1,023	336	98	361	311	850	156	386	2339	264	5400	19216	67163
13. Sarpang (Excludes Gelegphu Thromde)	241	408	243	29	113	40	113	621	139	424	179	508	18,613	406	201	50	277	689	527	396	1017	699	138	2481	9939	28552
14. Thimphu (Excludes Thimphu Thromde)	62	233	57	21	112	29	48	531	20	401	29	146	188	7,770	100	26	86	73	225	18	49	146	53	543	3196	10966
15. Trashigang	802	1,215	567	108	492	304	1,562	2,198	1,078	1002	922	1,736	1,601	1,592	35,403	870	802	1043	1361	305	563	2186	1181	8440	31930	67333
16. Yangtse	346	373	197	40	180	190	417	1071	188	410	210	493	622	630	933	13,734	268	219	507	103	178	577	343	3476	11971	25705
17. Trongsa	615	208	159	17	73	44	154	482	75	380	53	224	498	338	133	55	9,017	183	420	281	140	297	61	2099	6989	16006
18. Tsirang	201	400	686	45	97	27	104	683	100	776	391	390	1,602	559	169	33	336	14,490	1,319	239	488	704	109	3042	12500	26990
19. Wangdue Phodrang	336	465	256	71	264	59	183	1094	83	1326	91	458	473	824	267	69	351	295	21,257	118	168	599	175	4091	12116	33373
20. Zhemgang	533	463	457	28	160	86	273	859	330	387	194	1004	2,623	446	263	96	445	668	601	13,749	522	606	284	3,048	14,376	28125
Gelegphu Thromde	82	154	125	12	76	19	109	214	109	143	77	285	695	109	145	26	111	158	227	126	2,207	435	88	1,102	4,627	6834
Phuentshogling Thromde	85	610	129	17	215	32	128	448	176	247	95	603	323	200	205	56	126	145	333	66	192	5,731	190	1,750	6,371	12102
Samdrup Jongkhar Thromde	34	94	50	5	47	27	144	152	181	95	302	172	126	67	191	56	40	46	104	31	99	242	2,116	722	3,027	5143
Thimphu Thromde	538	1039	481	97	509	216	692	2406	391	1464	336	1476	1,208	2,113	803	301	616	676	1387	284	583	2,018	462	39,048	20,096	59144
Total In-Migrants	6784	11958	5660	1308	5226	2213	7091	21709	5069	12586	5054	13735	16,017	14,560	8394	3195	7047	7191	14842	3,398	6,609	19,038	6,613	68,310	273,607	
Outside Bhutan	486	1639	628	86	1191	166	880	2845	697	1272	920	886	1,495	1,844	1698	367	3889	691	6076	605	1,040	2,882	595	7,109		39987
Not Reported	1	28	117	16	-	10	14	16	11	13	27	22	21	11	23	4	7	4	11	11	2	7	1	84		461
Total Population By Place of Enumeration	17820	41308	24965	3952	13655	14437	37150	46316	23632	28740	25754	62590	36,146	24,185	45518	17300	19960	22376	42186	17,763	9,858	27,658	9,325	114,551		727145

Source: NSB, the PHCB 2017



Source: PHCB 2017

Figure 4.1.3 In-Migration and Out-Migration in the Dzongkhags

Table 4.1.4 summarizes the main reasons for migration. In both sex, "family move" ranks as the most frequent reason, followed by "employment" as the second most frequent reason, and by "education" as the third most frequent reason.

Table 4.1.4 Main Reasons for Migration

Reason for Migration	Male		Female		Both Sex	
	Persons	Percent	Persons	Percent	Persons	Percent
Never moved	153,260	40.8	158,105	46.2	311,365	43.4
Employment	**70,132**	**18.7**	**21,091**	**6.2**	**91,223**	**12.7**
Education	**33,378**	**8.9**	**25,945**	**7.6**	**59,323**	**8.3**
Training	2,987	0.8	1,736	0.5	4,723	0.7
Marriage	7,699	2.0	25,541	7.5	33,240	4.6
Family move	**49,195**	**13.1**	**78,731**	**23.0**	**127,926**	**17.8**
Transfer of work place	28,946	7.7	9,026	2.6	37,972	5.3
Resettlement	5,992	1.6	5,511	1.6	11,503	1.6
Natural Calamities	266	0.1	290	0.1	556	0.1
Security	619	0.2	259	0.1	878	0.1
Health	1,766	0.5	2,398	0.7	4,164	0.6
Business/official tours	4,443	1.2	2,904	0.8	7,347	1.0
Retirement	3,793	1.0	872	0.3	4,665	0.6
Tourist	140	0.0	118	0.0	258	0.0
Visiting only	7,486	2.0	7,093	2.1	14,579	2.0
Other	5,004	1.3	2,229	0.7	7,233	1.0
Don't know	671	0.2	555	0.2	1,226	0.2
Total	375,777	100.0	342,404	100.0	718,181	100.0

Source: NSB, PHCB 2017

Table 4.1.5 shows the four (4) migration stream between urban rural areas. The four flows are urban to urban, urban to rural, rural to urban and rural to rural. The rural to urban flow of migration is the highest as compared to other steams, accounting for 44.2% of the all lifetime migrants. Rural to rural make up the second largest stream with 36.6%.

Table 4.1.5 Lifetime Migrants by Urban/Rural Migration Stream in 2017

Migration Stream	Male		Female		Both sex	
	Persons	(%)	Persons	(%)	Persons	((%)
Urban-Urban	18178	10.7	18,751	11.5	36,929	11.1
Urban-Rural	13,874	8.1	13,273	8.1	27,147	8.1
Rural-Urban	74,518	43.7	73,006	44.6	147,524	44.2
Rural-Rural	63,885	37.5	58,531	35.8	122,416	36.6
Total Lifetime Migrant	170,455	100.0	163,561	100.0	334,016	100.0

Source: NSB, PHCB 2017

According to the report, Migration in Bhutan (Its Extent, Causes and Effects) (2013) by the Ministry of Agriculture and Forests (MoAF), about 21.4 % of the total population were found to be migrants, of which 18.2% were rural-to-urban migrants and 3.2% were rural-to-rural migrants.

(2) International Migration

The total number of international migrants by the top five countries of origin amounted to about 50,000 people in 2013, while the number of migrants by destination amounted to about 89,000 people, as shown in Table 4.1.6. India has the largest migrant stock by origin. On the other hand, Nepal has the largest migrant stock by destination. These numbers have steadily increased in the recent years.

Table 4.1.6 International Migration in 2013

Migrants by origin: top five countries or areas		**Migrants by destination: top five countries or areas**	
India	48,076	Nepal	79,823
China	973	India	6,770
Nepal	769	Australia	1,617
The United States of America	146	Denmark	597
Japan	137	The Netherlands	348
Total	50,101	Total	89,155

Source: United Nations, DESA-Population Division and UNICEF (2014). Migration Profiles

4.2 GDP and Economic Structure

(1) GDP and Economic Sectors

The real GDP at market prices in Bhutan steadily increased at an average annual growth rate of 5.5% between 2010 and 2015, as shown in Table 4.2.1. As for the overall economic structure by sector, the secondary sector (industry), which includes construction and extractive activities (mining and quarrying), as well as the tertiary sectors, such as trade and transport and telecommunications, are the main drivers of economic growth. It is noted that the hotel and restaurant sector grew the most (21.1%) between 2010 and 2015, although the total added value of this sector is still small.

The primary sector (agriculture, livestock and forestry) grew by 2.8% between 2010 and 2015, accounting for 13.2% of the total GDP in 2015. The agricultural sector (i.e., crops) was the main driver of growth in the primary sector.

The secondary sector (industry) grew by 5.3% in the same period. The secondary sector contributed 46.0% of the GDP in 2015. Electricity and construction were the leading and stable drivers of growth in the industry sector in terms of value-added volume.

The service sector accounted for 40.9% of the GDP in 2015; transport, storage and communications, and community, social and personal services (including government services) occupied a large portion of this.

Table 4.2.1 Real GDP Growth by Sector between 2000 and 2015

Unit: BTN Millions at Constant (2000) Prices

	2000	*2005*	*2010*	*2011*	*2012*	*2013*	*2014*	*2015*	**Average growth rate (%) between 2010-2015**
GDP at market prices	**19,736**	**28,879**	**45,432**	**49,017**	**51,503**	**52,606**	**55,629**	**59,240**	***5.45***
Net taxes on products	424	1,039	1,760	2,113	2,903	2,655	3,024	2,572	*7.88*
GDP at basic prices	**19,312**	**27,840**	**43,672**	**46,905**	**48,600**	**49,951**	**52,605**	**56,668**	***5.35***
Agriculture, livestock and forestry	**5,289**	**6,043**	**6,513**	**6,670**	**6,820**	**6,984**	**7,149**	**7,475**	***2.79***
Crops	2,516	2,861	3,100	3,191	3,266	3,377	3,511	3,713	*3.67*
Livestock production	1,468	1,728	1,919	1,941	1,966	2,006	2,052	2,121	*2.02*
Forestry and logging	1,305	1,455	1,494	1,538	1,588	1,601	1,586	1,641	*1.90*
Industry	**6,950**	**10,621**	**20,115**	**20,931**	**22,348**	**23,220**	**24,082**	**26,039**	***5.30***
Mining and quarrying	315	447	788	979	957	1,303	1,525	1,729	*17.01*
Manufacturing	1,619	2,214	4,302	4,616	4,930	4,671	5,099	5,324	*4.35*
Electricity and water	2,255	3,259	9,389	8,872	8,822	9,771	9,495	10,200	*1.67*
Construction	2,761	4,701	5,635	6,464	7,639	7,475	7,963	8,786	*9.29*
Services	**7,072**	**11,176**	**17,044**	**19,303**	**19,432**	**19,747**	**21,374**	**23,154**	***6.32***
Wholesale and retail trade	882	1,878	2,540	3,028	3,556	3,798	4,317	4,866	*13.89*
Hotels and restaurants	88	186	348	491	577	665	781	907	*21.12*
Transport, storage and communications	1,800	2,661	3,941	4,489	4,749	4,977	5,425	5,902	*8.41*
Financing, insurance and real estate	1,392	2,554	3,973	4,841	4,493	4,576	4,751	5,014	*4.76*
Community, social and personal services (including govt)	2,814	3,753	6,047	6,254	5,852	5,519	5,885	6,243	*0.64*
Private social and recreational services	96	144	195	200	205	211	215	221	*2.57*

Source: NSB data

Between 2000 and 2015, the contribution to the GDP of the primary sector (agriculture, livestock and forestry) rapidly decreased from 27.4% to 13.2%, as shown in Table 4.2.2. On the other hand, the shares in the GDP occupied by industry and services increased from 36.0% to 46.0%, and from 36.6% to 40.9%, respectively.

Over the past few years, the economic structure has more or less remained the same in terms of the share each sector occupies in the GDP.

Table 4.2.2 Shares in the Real GDP of Each Sector between 2000 and 2015

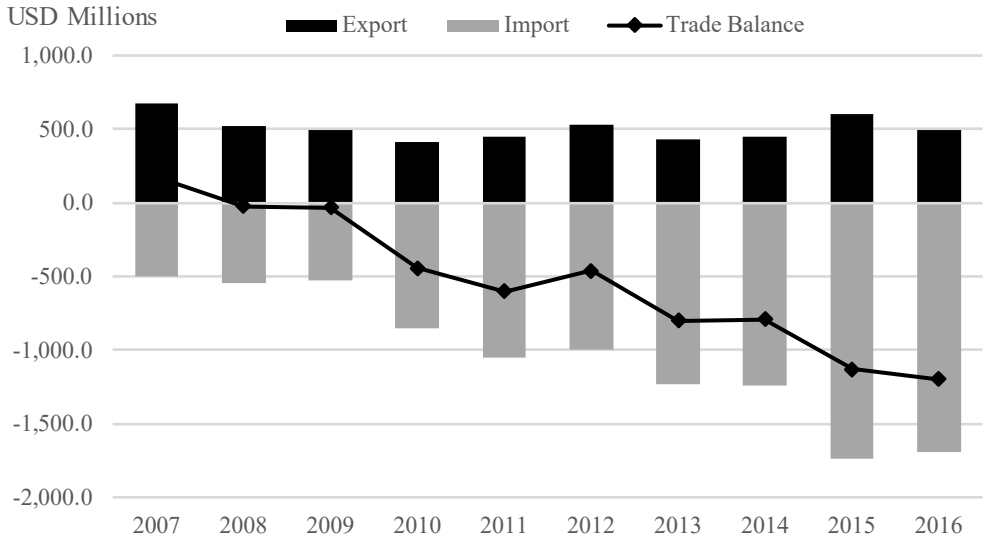
Unit: Percent (%)

	2000	*2005*	*2010*	*2011*	*2012*	*2013*	*2014*	*2015*
GDP at basic prices	**100.0**	**100.0**	**100.0**	**100.0**	**100.0**	**100.0**	**100.0**	**100.0**
Agriculture, livestock and forestry	**27.4**	**21.7**	**14.9**	**14.2**	**14.0**	**14.0**	**13.6**	**13.2**
Crops	13.0	10.3	7.1	6.8	6.7	6.8	6.7	6.6
Livestock production	7.6	6.2	4.4	4.1	4.0	4.0	3.9	3.7
Forestry and logging	6.8	5.2	3.4	3.3	3.3	3.2	3.0	2.9
Industry	**36.0**	**38.2**	**46.1**	**44.6**	**46.0**	**46.5**	**45.8**	**46.0**
Mining and quarrying	1.6	1.6	1.8	2.1	2.0	2.6	2.9	3.1
Manufacturing	8.4	8.0	9.9	9.8	10.1	9.4	9.7	9.4
Electricity and water	11.7	11.7	21.5	18.9	18.2	19.6	18.0	18.0
Construction	14.3	16.9	12.9	13.8	15.7	15.0	15.1	15.5
Services	**36.6**	**40.1**	**39.0**	**41.2**	**40.0**	**39.5**	**40.6**	**40.9**
Wholesale and retail trade	4.6	6.7	5.8	6.5	7.3	7.6	8.2	8.6
Hotels and restaurants	0.5	0.7	0.8	1.0	1.2	1.3	1.5	1.6
Transport, storage and communications	9.3	9.6	9.0	9.6	9.8	10.0	10.3	10.4
Financing, insurance and real estate	7.2	9.2	9.1	10.3	9.2	9.2	9.0	8.8
Community, social and personal services (including govt)	14.6	13.5	13.8	13.3	12.0	11.0	11.2	11.0
Private social and recreational services	0.5	0.5	0.4	0.4	0.4	0.4	0.4	0.4

Note: Due to rounding, some totals may not correspond with the sum of the separate figures.
Source: NSB data

(2) Balance of Trade and Services

In 2016, the value of goods exported by Bhutan decreased by 19% to reach USD 490.1 million, while the value of its imported goods decreased by 3% to reach USD 1,688.3 million (in comparison with the 2015 value). This resulted in a large negative trade balance of USD 1,198.2 million, as shown in Figure 4.2.1.



Source: Directions of Trade statistics, IMF (September 2017)

Figure 4.2.1 Total Merchandise Trade by Value

Exports of merchandise in Bhutan are highly concentrated among its partners. Bhutan's biggest partner, India, accounts for 90% or more of its exports, as shown by Table 4.2.3. India is also

the biggest exporter of goods to Bhutan, accounting for 86% of its imports. With relatively high trade restrictions and no direct access to international ports, Bhutan's trade with the rest of the world is limited. Being a landlocked country and dependent on Indian ports, Bhutan conducts most of its cross-border trade with India. Apart from India, Bangladesh has traditionally been an important trading partner, while more recently, Northeast Asian countries such as China, Japan and Korea have joined Bhutan's trading partners.

Table 4.2.3 Main Importers and Exporters in Bhutan (2012-2016)

Importers (from Bhutan)			Exporters (to Bhutan)		
	USD Millions. (Total for five years)	%		USD Millions. (Total for five years)	%
India	2,267	90.1	India	5,921.9	85.9
Bangladesh	145.3	5.8	Singapore	128.6	1.9
Germany	28.6	1.1	Japan	124.4	1.8
Nepal	25.4	1.0	China, P. R.: Mainland	103.1	1.5
Netherlands	13.1	0.5	Thailand	85.7	1.2
Italy	12.6	0.5	Korea, Republic of	84.9	1.2
Japan	5.9	0.2	Germany	83.2	1.2
United States	3.1	0.1	Austria	53.9	0.8
China, P. R.: Hong Kong	1.6	0.1	Nepal	34.6	0.5
Luxembourg	1.5	0.1	Sweden	33.4	0.5
Others	11.6	0.5	Others	239.6	3.5
Total	2,515.4	100.0	Total	6,893.3	100.0

Source: Directions of Trade statistics, IMF (September 2017)

Bhutan's principal export is electric power (to India), which accounted for about 37% of its total exports in 2016. Table 4.2.4 shows that Bhutan's major export items, in terms of goods and therefore excluding services such as electricity and water utilities, are natural resources or semi-processed products such as ferrosilicon, Portland Pozzolana Cement, cardamom and semi-finished iron products. The export of ferrosilicon represented about 31% of Bhutan's total goods exports.

Table 4.2.4 Bhutan's Top Five Export Goods (Excluding Electricity)

BTC Code	Commodity Description	BTN Millions	%
7202.21.00	Containing by weight more than 55% of silicon (ferrosilicon)	6,830	30.7
2523.29.30	Portland Pozzolana Cement	1,600	7.2
0908.31.00	Uncrushed, unground cardamom	1,342	6.0
7207.12.00	Other, of rectangular (other than square) cross-section (semi-finished products)	1,278	5.8
7214.30.00	Other, of free-cutting steel (bars and rods of iron)	841	3.8
Other goods		10,335	46.5
Total (excluding electricity)		22,226	100.0

Note: BTC refers to Bhutan Trade Classification
Source: Bhutan Trade Statistics 2016, Ministry of Finance, Bhutan

Unlike exports, as illustrated by Table 4.2.5, imports are spread evenly across several items. The largest import good is diesel oil, which comprises 9% of total imports, followed by hydraulic turbines and water wheels. Many of the top five imports are used for building or maintaining hydropower plants. The high volume of imported materials with which to build hydropower plants has expanded Bhutan's trade and current account deficits.

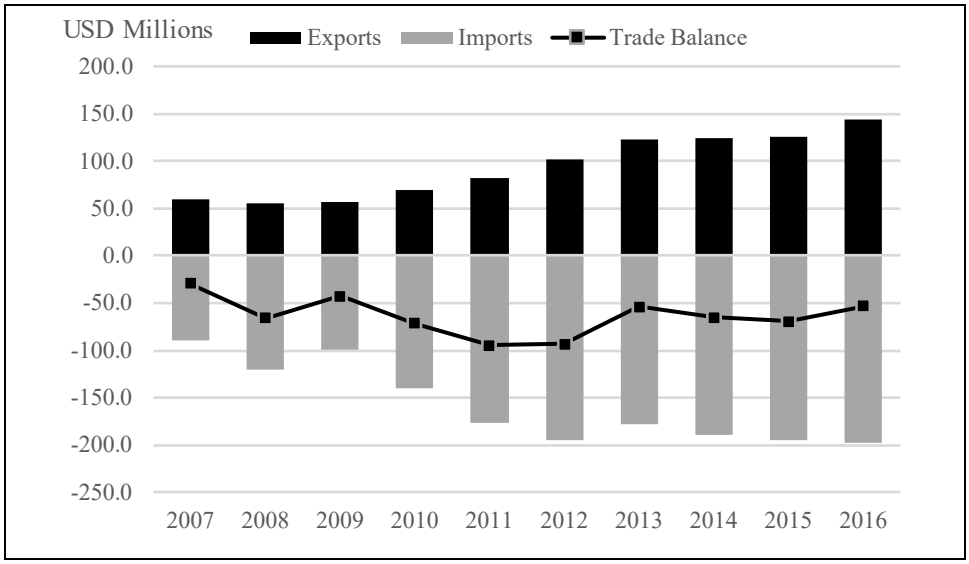
Table 4.2.5 Bhutan's Top Five Import Goods (Excluding Electricity)

BTC Code	Commodity Description	BTN Millions	%
2710.19.15	Other light oils and preparations (diesel)	5,776	8.6
8410.90.00	Parts, including regulators (hydraulic turbines and water wheels)	4,012	6.0
8503.00.00	Parts (electric motors, generators and rotary converters)	2,351	3.5
7203.10.00	Ferrous products obtained by direct reduction of iron ore	1,840	2.7
2710.12.10	Motor spirit including aviation spirit (petrol)	1,755	2.6
Other goods		51,453	76.6
Total (ex. Electricity)		67,187	100.0

Note: BTC refers to "Bhutan Trade Classification."
Source: Bhutan Trade Statistics 2016, Ministry of Finance, Bhutan

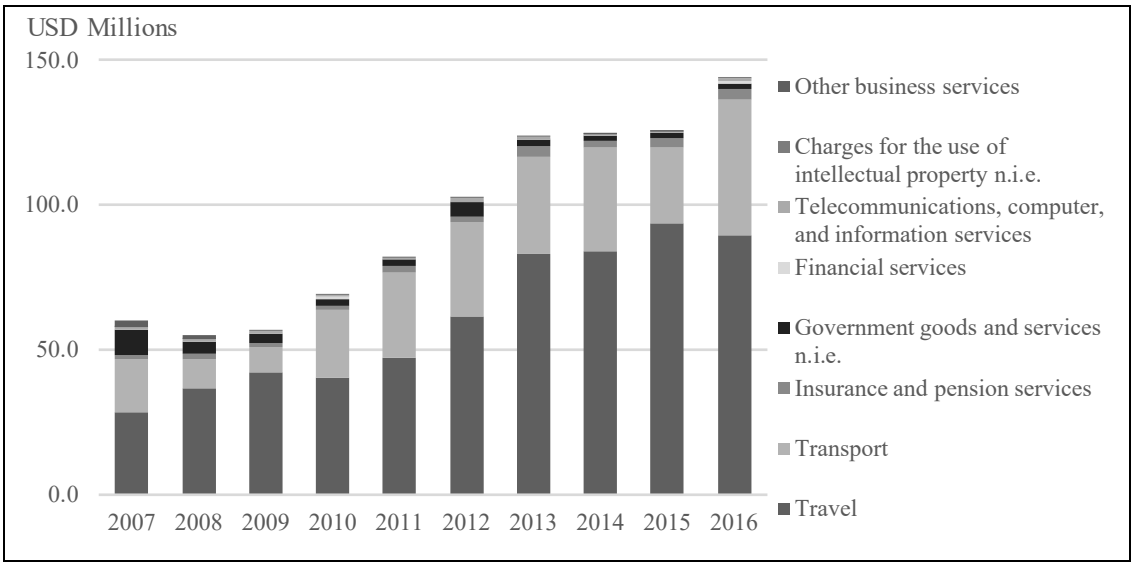
In 2016, as shown by Figure 4.2.2, the value of Bhutan's services exports increased substantially by 15% compared to the 2015 value, reaching USD 143.8 million, while its services imports increased slightly by 1% and reached USD 197.1 million. There was a moderate trade in services deficit of USD 53.3 million.

As for services exports, "Travel" occupied the largest share in 2016 at 62%, followed by "Transport" (33%), as shown in Figure 4.2.3. On the other hand, "Construction" occupies the largest share of services imports, followed by "Travel" and "Transport".



Source: the International Trade Centre Database (September 2017)

Figure 4.2.2 Total Trade in Services by Value



Source: the International Trade Centre Database (September 2017)

Figure 4.2.3 Services Exports by Value and Sector

(3) Balance of Payments

Both trade and current account deficits continue to remain elevated at over 20% of the nominal GDP. The current account deficit increased from 23.0% of the GDP in FY 2011/12 to 29.0% of the GDP in FY 2015/16, as shown in Table 4.2.6. The trade deficit increased by 80% to BTN 35.8 billion between FY 2011/12 and FY 2015/16. A large part of Bhutan's deficit has been caused by trade with India. Hydropower continues to remain Bhutan's largest export, while its export of ferroalloys has decreased.

Bhutan's capital and financial account balance increased by 51.6% to BTN 55.1 billion in FY 2015/16 as compared to FY 2014/15, due to the country's increased hydropower loan disbursements to India.

Table 4.2.6 Balance of Payments in Bhutan

Unit: BTN Millions

	2011/12	***2012/13***	***2013/14***	***2014/15***	***2015/16***
Trade Balance (Goods)	-19,881	-20,709	-24,171	-26,663	-35,829
With India	-12,795	-17,469	-17,362	-18,963	-28,793
Current Account Balance	-19,528	-25,759	-29,682	-35,645	-41,212
With India	-15,413	-26,616	-25,775	-30,177	-39,336
Capital and Financial Account Balance	19,939	31,689	31,709	36,339	55,100
Errors and Omissions	-9,479	3,282	2,253	-1,265	919
Overall Balance	-9,068	9,212	4,281	-571	12,567
In Percentage of the Nominal GDP					
Trade Balance (Goods)	*-23.1*	*-19.5*	*-21.5*	*-21.2*	*-25.2*
Current Account Balance	*-23.0*	*-25.0*	*-26.4*	*-28.3*	*-29.0*
Overall Balance	*-10.6*	*9.3*	*3.8*	*-0.5*	*8.8*

Source: RMA data

(4) Description of Macroeconomic Performance and Economic Activity in the National Development Plans

1) The 11th Five-Year Plan (2013-2018)

In the 11th Five-Year Plan, the real GDP is projected to increase by an average of 12.4% per annum, with the electricity sector driving most of the growth, as shown in Table 4.2.7. This is based on the

assumption that the hydropower projects currently in the pipeline will be completed as scheduled. The real GDP growth rate is expected to spike to 17.4% and then to 24.0% towards the end of the Plan period, driven primarily by the industry sector, which is expected to grow by 30.8% and 42.5 % in the last two years of the Plan due to the commissioning of three mega projects. The services sector is expected to grow at a consistent rate of an average 9% per annum, primarily fuelled by tourism and the expanding non-tradable sector. Primary sector growth is expected to remain moderate, at less than 2% per annum.

According to NSB data on the GDP as of 2017, the actual growth rates of the primary sector, the industry sector and the service sector between 2013 and 2015 were 3.4%, 5.9% and 8.3%, respectively.

Table 4.2.7 Real GDP Growth Projection by the 11th Five-Year Plan

	2013/14	2014/15	2015/16	2016/17	2017/18	Average Growth Rate (%)
Agriculture, livestock and forestry	1.83	1.83	1.83	1.83	1.84	1.83
Industry	6.39	6.25	5.80	30.84	42.54	18.36
Electricity, gas and water	*5.32*	*6.15*	*3.93*	*69.01*	*81.37*	*33.16*
Services	9.30	8.87	8.91	8.96	9.00	9.01
Real GDP at factor cost	7.02	6.83	6.70	17.80	24.72	12.62
Real GDP at market prices	7.07	6.88	6.76	17.36	24.02	12.42

Source: Gross National Happiness Commission, 11th Five-Year Plan

2) The 12th Five-Year Plan (2018-2023)

The "Guideline for Preparation of the 12th Five-Year Plan" outlines the strategic planning framework, objectives and the National Key Result Areas (NKRAs) with their associated Key Performance Indicators (KPI).

As one of the 16 NKRAs, "Macroeconomic Stability Ensured" is designated with KPIs including description, unit of measurement, baseline year, baseline and target, as shown in Table 4.2.8. This NKRA aims at sustaining economic growth with a sustainable fiscal deficit, price stability, full employment and a sound financial system in the economy.

Table 4.2.8 Examples of Key Performance Indicators (KPI) for Macroeconomic Stability

No.	KPI	Description	Unit of measurement	Baseline year	Baseline	Target
1.1	Annual real GDP growth	The indicator measures the rate at which the Gross Domestic Product (GDP) changes/grows from one year to another by considering the effects of inflation.	Percentage (%)	2015	6.49	-
1.2	GNI per capita	The indicator measures the change in GNI per capita	USD	2015	2,478	4,036
1.3	Annual debt service ratio	The indicator measures the ratio of total external debt to total export earnings.	Percentage (%)	2014/15	19.9	Less than or equal to 25

Source: Gross National Happiness Commission, Guideline for Preparation of the 12th Five-Year Plan

3) Bhutan 2020

In the section on Economic Growth and Development in Bhutan 2020, the nation's comparative advantages by economic activity are discussed as follows.

Table 4.2.9 Comparative Advantages by Economic Activity

Economic Activity	Description of Comparative Advantages
Production of hydropower	Only a small percentage of the nation's potential for hydropower production, estimated at 20,000 MW, has so far been tapped, and its further potential is almost unlimited. This potential can be exploited through run-of-the-river technologies, which would have little negative impact on the natural environment.
Natural resource-based processing industries	Cheap hydropower gives us a distinct comparative advantage in the development of natural resource-based industries oriented towards the sub-regional market. Already, particle board, ferrosilicon and calcium carbide have captured large markets in India; we are also among the major suppliers of cement to Assam. There appears to be a great deal of potential for the development of resource-based industries and experience suggests that major new industries can often be created.
Horticultural development	Horticulture has been identified as an area in which Bhutan possesses clear regional and seasonal comparative advantages in terms of the cultivation of both temperate and subtemperate fruits and vegetables. It has been accorded priority as a means of raising the cash incomes of farmers, generating export revenues and improving the nutritional status of the rural population.
Off-farm employment and rural industrialization	The reduction in population pressure on rural areas as a result of rural-urban migration will facilitate land consolidation. In turn, this will facilitate agricultural mechanization and modernization. This will result in increased farm incomes that can be invested in rural areas to create off-farm employment and to promote rural industrialization.
Small and cottage industries	This has been identified as another priority area with programmes already in place aimed at enlarging the access of small-scale producers to technology, credit and markets. This will enable them to produce profitably for the domestic market, and the priority is dictated more by the need to maintain our rich crafting traditions and to create productive employment than it is by the need to capture export markets.
Tourism	The nation's tourism potential has been recognized as very considerable, and this potential must be explored in the future. This sector has a greater advantage as there is only one Bhutan to be explored by others.

Source: Planning Commission, Bhutan 2020

4.3 Employment

Bhutan's workforce and employment structure are summarized in Table 4.3.1. The labour force participation ratio (the share of the labour force, or economically active population, divided by the working age population) varied between 60% and 65% from 2005 to 2017. The employment ratio (the share of employed people divided by the labour force) ranged between 97% and 98%.

The unemployment ratio was low and remained between 2% and 3% for all age groups. However, the youth unemployment ratio, which remained between 9% and 13%, was much higher than the national average of all age groups.

Table 4.3.1 Key Indicators of Employment in Bhutan

Key Indicators	*2005*	*2017*	*2013*	*2014*	*2015*	*2016*
(1) Population	634,982	727,145	745,939	755,710	764,667	774,367
(2) Working Age Population	425,023	537,728	529,534	556,740	558,960	570,231
(3) Economically Active Population (Labour Force),	256,895	340,236	345,786	348,742	352,953	354,652
(4) Employed People	249,030	332,099	335,870	339,569	344,293	347,130
(5) Unemployed People	7,865	8,137	9,916	9,173	8,660	7,522
(6) Labour Force Participation Rate (%): (3)/(2)	60.4	63.3	65.3	62.6	63.1	62.2
(7) Employment Rate (%): (4)/(3)	96.9	97.6	97.1	97.4	97.5	97.9
(8) Unemployment Rate (%)	3.1	2.4	2.9	2.6	2.5	2.1
(9) Youth Unemployment Rate (%)	-	10.6	9.6	9.4	10.7	13.2

Source: the PHCB 2005 & PHCB 2017 and the Labour Force Survey Report (LFSR) 2016
Note: LFSR defines 'youth', as those persons between the ages of 15 and 24 years.

The share of the employed population engaged in each economic activity according to the

Labour Force Survey Report is summarized in Table 4.3.2, with the agricultural sector employing the most people (59.4% in 2010 and 57.0% in 2016), followed by the public administration, trade and manufacturing sectors. The share occupied by the construction sector decreased from 3.2% to 2.6% between 2013 and 2016.

Table 4.3.2 Share of the Employed Population in Each Economic Activity (2010～2016)

Economic Activity	*2010*	*2013*	*2014*	*2015*	*2016*
Agriculture and forestry	59.4	56.3	56.7	58.0	57.2
Mining and quarrying	0.3	0.4	0.9	0.6	0.3
Manufacturing	3.9	6.1	7.0	6.5	5.7
Electricity, gas and water supply	1.6	1.2	0.9	0.8	1.3
Construction	0.8	3.2	2.0	1.8	2.6
Wholesale and retail trade	9.6	7.7	7.8	7.8	7.7
Hotels and restaurants	1.2	3.1	2.9	2.3	2.6
Transport, storage and communications	3.0	3.6	3.0	3.7	3.8
Financial intermediation	0.7	0.9	0.8	0.7	1.0
Real estate, renting and business activities	4.1	1.2	1.2	0.9	0.8
Public administration and defence	8.0	8.5	11.5	9.2	8.9
Education	3.0	3.9	2.4	3.3	3.5
Health and social work	1.7	3.5	2.8	4.0	2.5
Private households with employed people and others	2.4	0.2	0.2	0.6	2.1
Total	100.0	100.0	100.0	100.0	100.0

Sources: MoLHR, the Labour Force Survey Report (LFSR) 2010, 2013, 2014, 2015 and 2016

As shown in Table 4.3.3, the agricultural sector also occupied the largest share in the PHCB 2017. As for the percentages reported by the PHCB 2017 for the employed population engaged in each economic activity and in each dzongkhag, the share occupied by the agricultural sector in Samtse (71.6%), Lhuentse (69.9%), Dagana (69.1%), and Trashiyangtse (67.5%) is much higher than the national average of 43.9%.

In the manufacturing sector, Chhukha is the dzongkhag that has the highest share of employees at 12.1%. Thimphu (15.7%), Paro (15.3%), Gasa (15.2%) and Wangduephodrang (14.4%) have higher shares of construction employees compared to other dzongkhags.

Thimphu has the highest share of employees in the retail and wholesale trade (10.4%), transport/communications (7.4%), health services (3.5%) and finance (2.4%), while Paro holds the highest share of employees in the hotel and restaurant sector (9.5%).

Table 4.3.3 Share of the Employed Population by Economic Activity and Dzongkhag (2017)

Dzongkhag	Agriculture	Mining/quarrying	Manufacturing	Electricity/gas/water	Construction	Retail/wholesale trade	Hotels/restaurants	Transport/communications	Finance/insurance	Public administration/security	Education	Health service	Others	Total
Bumthang	40.6	0.2	4.8	0.9	11.9	5.3	5.2	2.4	0.6	10.2	5.7	1.5	10.7	100.0
Chhukha	35.5	1.4	12.1	5.1	9.0	8.1	3.3	4.4	1.1	9.9	4.4	1.3	4.4	100.0
Dagana	69.1	0.1	1.0	1.7	8.1	3.0	1.1	1.4	0.4	5.3	4.5	1.1	3.1	100.0
Gasa	61.0	0.0	1.6	0.4	15.2	2.1	0.8	0.3	0.8	8.6	4.8	0.9	3.4	100.0
Haa	42.3	0.1	3.2	0.9	12.2	4.1	1.6	1.5	0.5	20.1	5.2	1.7	6.5	100.0
Lhuentse	69.9	0.0	2.1	0.7	4.7	3.1	0.6	0.6	0.3	5.2	6.3	1.2	5.3	100.0
Monggar	63.8	0.1	1.0	2.0	7.7	3.5	1.3	1.3	0.5	5.5	5.4	2.2	5.8	100.0
Paro	33.4	0.1	2.7	0.9	15.3	6.3	9.5	5.5	0.6	11.7	5.6	1.0	7.4	100.0
Pemagatshel	55.0	2.6	8.7	1.3	6.8	3.8	1.3	3.1	0.4	5.7	5.2	1.1	4.7	100.0
Punakha	46.7	0.0	1.6	2.2	13.9	5.7	6.5	3.3	0.3	7.9	6.0	1.0	4.8	100.0
Samdrupjongkhar	52.2	2.2	2.8	1.3	10.1	4.4	1.7	2.7	0.7	11.6	5.2	1.6	3.6	100.0
Samtse	71.6	1.3	5.0	0.6	2.8	2.8	1.1	1.7	0.3	6.2	3.4	0.7	2.6	100.0
Sarpang	45.9	0.2	3.3	2.0	13.7	6.6	2.1	3.7	0.6	10.9	4.1	2.0	4.9	100.0
Thimphu	5.7	0.9	6.2	2.1	15.7	10.4	7.1	7.4	2.4	24.0	5.2	3.5	9.5	100.0
Trashigang	63.8	0.1	1.3	1.0	9.4	3.4	1.2	1.5	0.3	4.7	6.2	1.4	5.7	100.0
Trashiyangtse	67.5	0.0	1.3	2.9	6.6	2.7	0.7	2.5	0.5	3.8	6.8	1.1	3.6	100.0
Trongsa	32.8	0.2	0.4	33.1	11.7	3.0	1.7	3.7	0.3	5.4	4.1	0.9	2.6	100.0
Tsirang	60.6	0.1	1.4	1.5	8.8	4.0	1.8	2.0	0.4	5.5	3.8	1.0	8.9	100.0
Wangduephodrang	39.0	0.3	1.3	21.0	14.4	3.6	2.5	3.8	0.3	7.2	2.7	0.7	3.3	100.0
Zhemgang	60.8	0.1	1.3	1.7	10.2	2.9	1.3	1.2	0.4	7.2	5.4	1.8	5.6	100.0
Bhutan (total)	**43.9**	**0.7**	**4.1**	**4.3**	**10.9**	**5.5**	**3.4**	**3.6**	**0.8**	**10.7**	**4.8**	**1.7**	**5.7**	**100.0**

Notes: (1) "Others" includes the real estate, renting and business activities subsector.
(2) Due to rounding, some totals may not correspond with the sum of the separate figures.
Source: the PHCB 2017

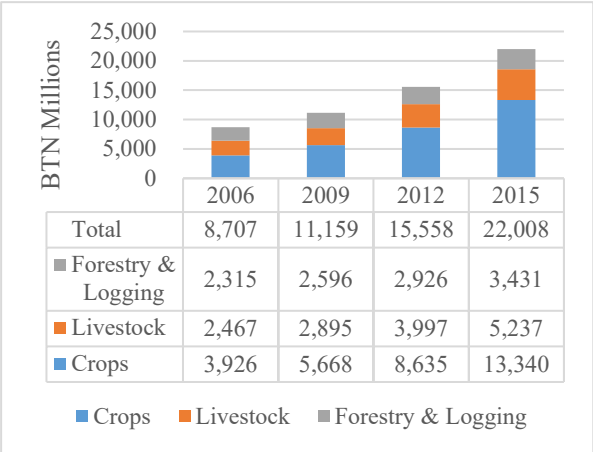
4.4 The Renewable Natural Resources (RNR) Sector and Agriculture

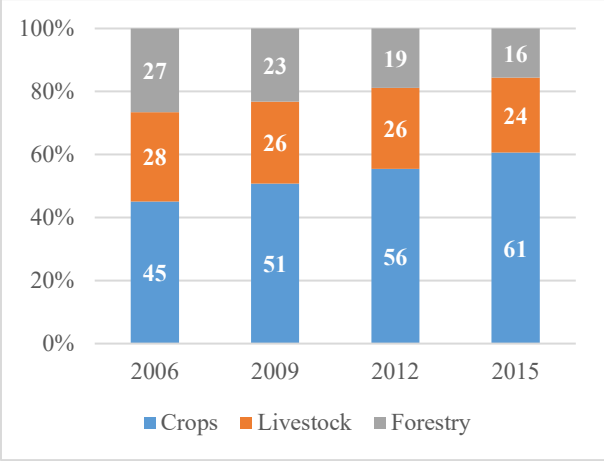
4.4.1 The Current Conditions and Organization of the RNR Sector and Agriculture

(1) Current Conditions

1) GDP

The agriculture, forestry and livestock sectors are under the control of the Ministry of Agriculture and Forests (MoAF), and these sectors are often referred to as the Renewable Natural Resources (RNR) sector in Bhutan. Among the economic activities of the RNR sector, the share occupied by crop activity in the GDP has increased 16%, whereas that of forestry and logging activity has decreased by 11% in the last decade (Figure 4.4.1). Due to the Constitution's stipulation that a minimum of 60% of the country's total land should be maintained under forest cover at all times, it may have resulted in the less active use of forest resources.





Source: Statistical Yearbook of Bhutan

Figure 4.4.1 GDP in Current Price and Percentage Share by RNR Activity

2) Geographical conditions

The agricultural area of Bhutan is about 1,100 km^2, or around 3% of the national land (Table 4.4.1). The precipitous land characteristics of Bhutan mean that suitable land for agriculture is confined to limited areas. It is generally accepted that land with less than a 3% slope is suitable for agriculture, but a mere 0.3% of the national land in Bhutan meets this criterion (Table 4.4.2). For example, farmers in Japan who cultivate either wetlands with more than a 5% slope or drylands with more than a 14% slope are eligible to receive a subsidy for farming in a disadvantageous area; however, only 5.5% of Japan's land has a land slope of less than 15%. Table 4.4.3 shows the percentage share by altitude. Temperate and alpine zones occupy 71.1% of the land, and cool highland farming is practiced in these zones. The main crops cultivated in these zones differ from subtropical ones and they tend to be potatoes, wheat, barley, cabbages, radishes, and so forth. Furthermore, the size of the landholding size, its location and the parcel of land tends to be small and scattered.

Table 4.4.1 Area of Land Use and Percentage Share in 2010

Type of vegetation and land use	Area (km^2)	Share (%)
Forest land	27,035	69.73
Agricultural land	1,121	2.89
Bare land	1,308	3.37
Degraded land	206	0.53
Marshy land	3	0.01
Meadows (pasture)	1,572	4.06
Shrubs	4,191	10.81
Snow covered	2,993	7.72
Body of water	274	0.71
Built up area (settlement)	62	0.16
Non-built up area (waste dump sites, mines, stone quarries and other extraction sites)	3	0.01
Total	38,771	100.00

Source: Land Cover Assessment 2010 by the MoAF

Table 4.4.2 Percentage Share by Land Slope

Unit: %

0–3%	3–8%	8–15%	15–25%	25–50%	50–100%	> 100%
0.3	1.6	3.6	8.6	36.5	43.8	5.7

Source: Bhutan RNR Statistics 2015

Table 4.4.3 Percentage Share by Altitude

Unit: %

Wet Subtropical (100–600)	Humid Subtropical (600–1200)	Dry Subtropical (1200–1800)	Warm Temperate (1800–2600)	Cool Temperate (2600–3600)	Alpine (3600–7500)
5.6	10.2	13.1	18.6	23.9	28.6

Source: Bhutan RNR Statistics 2015

3) Self-sufficiency

Table 4.4.4 and Figure 4.4.2 show the trading trends of agriproducts and the self-sufficiency rate of each agriproduct, respectively. While the trade balance of cereals, meats, fish and dairy products is in deficit, potatoes, fruits, spices and NWFPs are in surplus. Rice has the largest import value and deficit among all of the agriproducts, and it accounts for 2.5% of the total import value. Under these circumstances, the RGoB has been making a tremendous effort to increase the self-sufficiency rate of rice, but it still remains at about 50%. Although the same can be said for meat and fish, it may be more difficult to change the situation of these products due to the religious aspect. Only eggs have achieved self-sufficiency over the decade, because the act of slaughtering is not required.

Table 4.4.4 Balance between the Export and Import of Major Commodities

Unit: BTN Millions

Commodity	2006	2009	2012	2015
Rice	(472)*	(713)	(1,196)	(1,668)
Wheat/barley	(57)	(148)	(20)	(107)
Potatoes	116	359	374	311
Apples	70	92	45	94
Citrus fruits	194	386	447	454
Betel nuts	4	(3)	28	77
Cardamom	64	89	434	939
Chilli	(12)	(18)	(51)	(70)
Ginger	3	22	19	69
Mushrooms	3	5	6	12
Beef	(153)	(200)	(427)	(570)
Pork	(68)	(127)	(225)	(328)
Chicken	(11)	(30)	(73)	(173)
Fish	(78)	(116)	(126)	(322)
Dairy products	(293)	(460)	(598)	(1,378)
Egg	(14)	(37)	0	0
Cordyceps	16	75	102	194

* The figures in parentheses are in deficit.

Source: Bhutan Trade Statistics, Bhutan RNR Statistics 2015

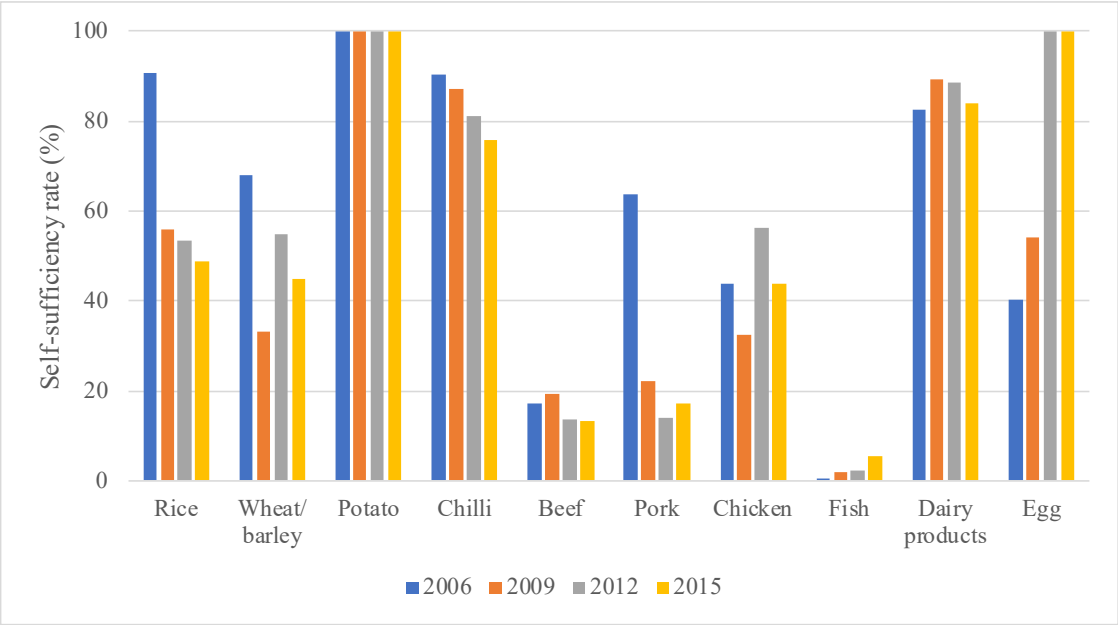


Figure 4.4.2 Self-Sufficiency Rate of Major Agriproducts

4) Agricultural land and production

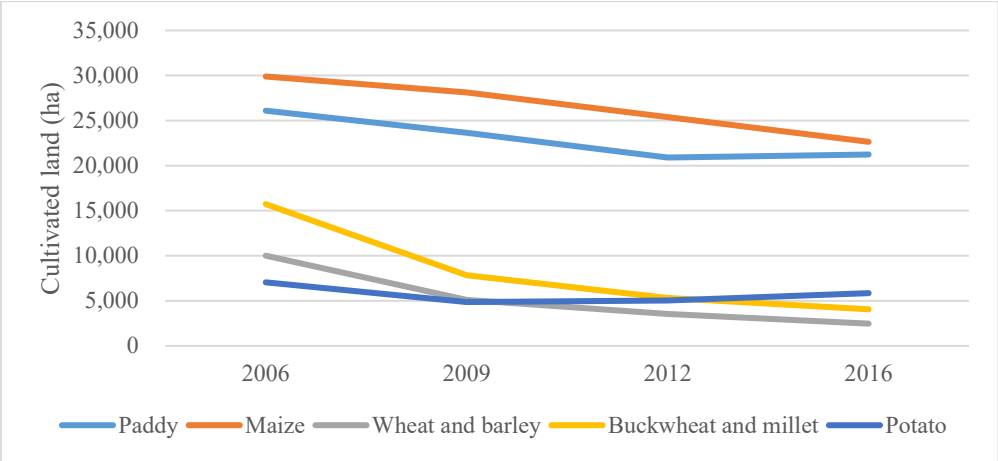
Agricultural land is composed of four categories, including wetland, dryland, orchard and plantation; wetland and dryland occupy about 90% of the agricultural area of Bhutan (Table 4.4.5).

Table 4.4.5 Agricultural Land Type and Percentage Share in 2010

Land type	Area (ha)	Share (%)
Wetland	31,127	27.8
Dryland	69,487	62.0
Orchard	7,125	6.4
Plantation	4,382	3.9
Other horticulture	17	0.0
Total	112,137*	100

* The itemized totals may not agree exactly with the figure in the total because the data are rounded to integers.
Source: Land Cover Assessment 2010 by the MoAF

The land on which major cereals and potatoes are cultivated tends to decrease year on year (Figure 4.4.3). Although land for cultivating rice has decreased by 19% over the decade, rice production increased by 17% over the same period and reached more than 85,000 tons in 2016 (Table 4.4.6). This is attributed to an increase in yield from 2.8 ton/ha in 2006 to 4.0 ton/ha in 2016. However, it is not clear that what kinds of factors have contributed to this increase in yield, for example, fertilizer, the introduction of new varieties, irrigation, and so forth.



Source: Bhutan RNR Statistics, DoA Agricultural Statistics

Figure 4.4.3 Cultivated Land for Major Cereals and Potatoes

Table 4.4.6 Production and Yield of Major Cereals and Potatoes

Crops	Production (tons)				Yield (tons/ha)			
	2006	2009	2012	2016	2006	2009	2012	2016
Rice	72,513	67,245	78,014	85,090	2.8	2.8	3.7	4.0
Maize	68,799	61,140	73,024	82,035	2.3	2.2	2.9	3.6
Wheat and barley	13,589	6,077	7,394	4,223	1.4	1.2	2.1	1.7
Buckwheat and millet	18,138	8,090	8,268	5,419	1.2	1.0	1.6	1.3
Potatoes	58,460	45,476	43,000	58,820	8.3	9.4	8.6	10.0

Source: Bhutan RNR Statistics, DoA Agricultural Statistics

Horticultural crops are also an important source of income, although their production fluctuates and is gradually declining, except for areca nuts and ginger (Table 4.4.7). Diseases that afflict chillies and citrus fruits, such as bacterial wilt disease and citrus greening disease, may have provoked this decline in production. Under the negative regulations for the use of agrochemicals, it may prove difficult to control these diseases. It may also indicate that fallow and damage by wildlife have increased and that the number of agricultural workers has decreased. Even the future of areca nuts and ginger is not clear, as India, the main export destination of these products, is seeking to ban the importation of these products to protect their domestic products from other countries.

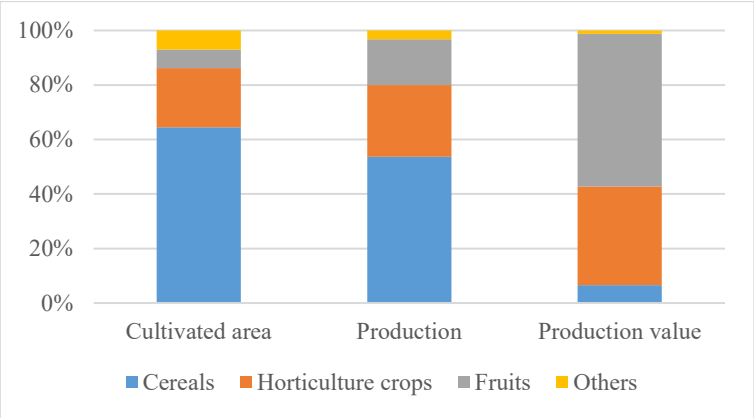
Table 4.4.7 Production of Major Horticultural Crops

Unit: ton

Crops	2006	2009	2012	2015
Apples	10,646	6,931	7,666	5,308
Areca nut	9,958	6,373	7,788	9,406
Citrus fruits	82,725	44,295	49,501	15,977
Cardamom	2,899	422	643	2,091
Chillies	10,799	9,144	7,726	7,073
Ginger	5,031	3,766	5,014	7,434

Source: Bhutan RNR Statistics, DoA Agricultural Statistics

Figure 4.4.4 shows the relative importance of the production and production value of major agricultural commodities. While cereals are grown on 65% of cultivated land and account for 54% of production, their share of production value is only 7%. In contrast, cultivated areas and the production of horticultural crops and fruits occupy a relatively low production share, but their production values account for 36% and 56%, respectively.



Source: Agricultural commercialization and diversification in Bhutan, IFPRI, 2010

Figure 4.4.4 Proportion of Major Agricultural Commodities in Cultivated Area, their Production and their Production Value in 2008

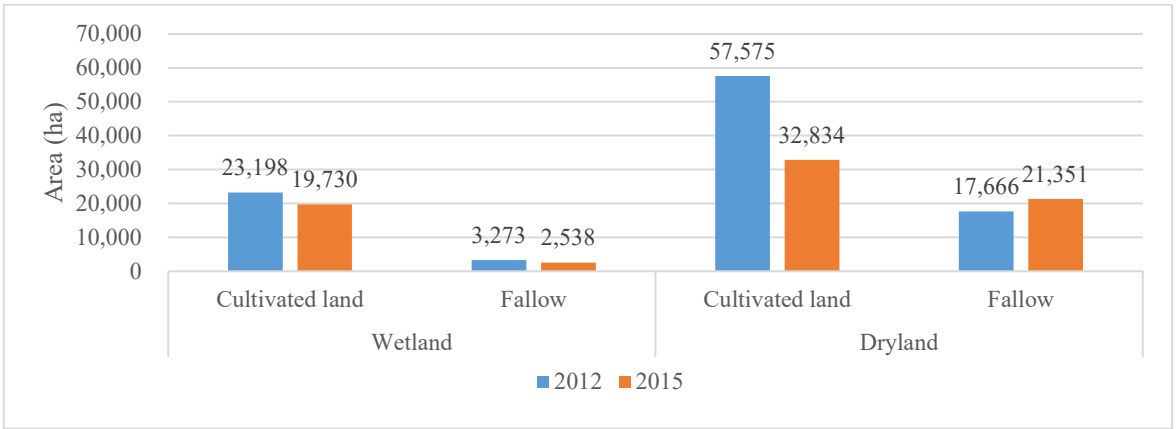
Farmers mainly carry out subsistence farming on their own farms; less than 1% of workers in the RNR sector are paid[1]. The average size of landholdings is about 1.4 ha and the majority (42%) of households have 0.4 to 1.2 ha, followed by 1.2–2.0 ha (22%) and then less than 0.4 ha (17%) (Table 4.4.8).

Table 4.4.8 Average Total Landholding Area and Proportion of Households by Size in 2013

Average	Percentage of households by landholding size				
	< 0.4 ha	0.4–1.2 ha	1.2–2.0 ha	2.0–4.0 ha	> 4.0 ha
1.4 ha	17	42	22	15	4

Source: Bhutan RNR Statistics 2015

As can be seen above, the cultivated land on which major cereals and potatoes is being grown is decreasing. This is due to labour shortages as well as a high proportion of fallow land. Approximately 23% of rural households reported that some of their land is fallow[2]. As of 2015, 31% of the total wetland and dryland is unused (Figure 4.4.5). The use of fallow land is key to increasing crop production and ensuring food security.



Source: DoA Agriculture Statistics

Figure 4.4.5 Cultivated and Fallow Land by Type (2012 and 2015)

[1] MoLHR Labour Force Survey Report 2015
[2] RNR sector, 11th FYP

Concerning support for farmers, extension services are reaching farmers through extension agents in each of the country's Gewogs. Each Dzongkhag has a District Agriculture Officer and an Assistant Dzongkhag Officer, who connect each Dzongkhag and Gewog to the DoA.

In Bhutan, there are subsidies not on the price of agriproducts, but on agricultural materials such as seeds, seedlings, fertilizer, agrochemicals, etc. Currently, these subsidies are paid to dealers of agricultural materials as a commission fee to support their business; this then allows the farmer to access to agricultural materials at a low fixed price.

Box 4.4.1 Examination of Actual Rice Yield and Production

Based on the available information and the following assumptions, the actual yield and production of rice are examined.

- Landholding size per household: 1.4 ha
- Ratio of wetland to dryland: 38:62 (19,730:32,834 ha)
- Projected wetland size per household: 0.5 ha (1.4 x 0.38 = 0.5)
- Yield: 4.1 tons/ha
- Paddy production per household: 2,050 kg
- White rice production per household: 1,230 kg (milling ratio: 0.6)
- Number of household members in rural areas: 4.8 (Bhutan Living Standards Survey 2012)
- Annual consumption of white rice per capita: 140 kg/person
- Annual consumption of white rice per household: 672 kg (55%)
- Surplus: 558 kg (45%)

As the projected rural to urban population ratio is 7:3, it is expected that this surplus will be able to feed the population in urban areas. Nevertheless, the amount of rice imported is almost equal to the amount produced. This may indicate that the actual yield and production are not actually reaching this level, or that the annual consumption per capita is rather larger than expected.

5) Fertilizer and agrochemicals

Although Bhutan started using fertilizer in the 1960s to increase food production, its use is currently decreasing and its estimated rate of application is merely 24.6 kg/ha. As the import and use of fertilizer is regulated by the government, only about 30% of farmers use fertilizer. As of 2012, 5,991 ha of cultivated land for cereal applied fertilizer, out of 55,146 ha[3]. It is not clear that yields of more than 3 tons/ha have been truly accomplished with this amount of fertilizer. In contrast, it has been shown that the use of agrochemicals has been increasingly controlling weed and haulm destruction in potatoes.

[3] DoA Agriculture Statistics 2012

Table 4.4.9 Distribution of Fertilizers (Tons) and Agrochemicals (kg)

Items	2005-2006	2009-2010	Items	2005-2006	2009-2010
Fertilizer	3,041	2,479	Chemicals	5,845	11,302
Urea	1,611	1,219	Fungicides	2,515	3,423
NPK compound	965	838	Herbicides	809	3,004
SSP	451	412	Insecticides	2,521	4,875
KCl	15	10			

Source: Bhutan agricultural sector review, World Bank, FAO, 2012

6) Mechanization

Currently, 53% of households are facing the constraints of labour shortages (DoA Agriculture Statistics 2015). Mechanization is one of the solutions to this problem and will also contribute to cost reduction as shown in Table 4.4.10. According to Farm Machinery Corporation Limited, there is a huge amount of potential farmland for mechanization. It is said that 52% of wetland and 35% of dryland could potentially be mechanized. But the mechanization of agriculture is still less common and more than 80% of households use bullocks to cultivate their land (RNR Census 2009). So far, about 7% of arable land is semi-mechanized, mostly with subsidized power tillers supplied through the Japanese 2KR grant schemes. To promote mechanization through improved access to machinery, hiring services are provided using these power tillers and other machines, including transplanters, power reapers, combine harvesters and water pumps. In 2015-2016, hiring services were provided to 14 dzongkhags, covering about 3,200 ha and benefiting 9,704 households.

Table 4.4.10 Comparison of Working Capacity, Required Labour, and Cost by Methods

Activities	Methods	Working capacity/ Required labour		Cost (BTN/ac)
Land preparation	Using spade	200	m^2/day	4,000
	Bullock	1,000		2,000
	Power tiller	4,000		1,000
	Tractor	10,000		800
Transplanting	Manual	20	person-day	4,000
	Machine	1		1,500
Weeding	Manual	40	person-day	8,000
	Weeder	10		2,000
Harvesting	Local sickle	200	m^2/day	4,000
	Serrated sickle	300		2,600
	Power reaper	8,000		1,500
Threshing	Manual	20	capacity	1,250
	Pedal	70		350
	Machine	350		350

Source: AMC website

7) Irrigation

In Bhutan, irrigation has been developed by farmers' own initiatives and investments in construction, and managed by communities. There are more than 1,200 of such irrigation systems in the country, of which about 1,000 are currently functional and irrigate about 26,000 ha of agricultural land[4]. But their infrastructure is generally prone to leaking and damage due to landslide and river flooding. In addition, the government has pursued irrigation development for large-scale irrigation systems since the late 1960s through donor assistance (Table 4.4.11).

[4] DoA, 2013, Report on National Irrigation Database and Canal Alignment Mapping.

The National Irrigation Information System confirms that there are 2,582 km of irrigation channels, covering 32,338 ha of agricultural land with 46,096 beneficiary households (Table 4.4.12). The covered area accounts for 42% of utilized agricultural land.

Still, DoA Agriculture Statistics (2015) indicates that 28% of households have difficulties with insufficient irrigation supply. Therefore, the National Irrigation Master Plan (2016) aims to expand by 10,800 ha of irrigated land by 2032 through existing irrigation improvement project and new irrigation system development (Table 4.4.13). If this is achieved, then 56% of utilized agricultural land will be irrigated.

Table 4.4.11 Some of Large-scale Irrigation Systems with Different Irrigation Schemes

Irrigation system	Irrigation scheme	Dzongkhag	Area covered (ha)	Household benefited
Yudhiri irrigation system	Hilly scheme	Trashigang	522	652
Taklai irrigation system	Foot hill scheme	Sarpang	1,323	530
Paro valley irrigation system	Valley bottom scheme	Paro	413	–

Source: JICA data collection survey report, 2017

Table 4.4.12 Length, Household, and Land Covered by Irrigation as of 2013

Dzongkhag	Length (km)	Household benefited	Area covered (ha)
Bumthang	42	618	649
Chhukha	64	1,003	1,097
Dagana	217	1,754	3,280
Gasa	6	54	64
Haa	23	203	276
Lhuentse	187	2,098	1,948
Monggar	61	1,645	953
Paro	156	7,214	2,133
Pemagatshel	15	323	294
Punakha	457	8,996	3,725
Samdrupjongkhar	66	1,103	1,062
Samtse	77	1,457	2,206
Sarpang	197	3,526	4,090
Thimphu	86	856	724
Trashigang	76	4,771	1,576
Yangtse	138	3,726	1,120
Trongsa	53	545	522
Tsirang	162	1,490	2,131
Wangduephodrang	426	3,608	3,489
Zhemgang	73	1,106	1,001
Total	2,582	46,096	32,338

Source: Bhutan RNR Statistics 2015

Table 4.4.13 Proposed New Irrigated Area by Dzongkhag in NIMP

Unit: ha

Dzongkhag	Existing irrigation improvement	Irrigation development project			Total
		New hill	Dry land	Wet subtropical	
Bumthang	74	31	6	0	112
Chhukha	128	158	78	0	365
Dagana	586	111	155	0	852
Gasa	3	2	4	0	10
Haa	16	5	10	0	31
Lhuentse	175	137	130	0	442
Monggar	216	90	48	0	354
Paro	190	66	134	0	390
Pemagatshel	0	7	14	0	21
Punakha	194	140	283	0	617
Samdrupjongkhar	99	0	0	481	580
Samtse	143	0	0	2,283	2,426
Sarpang	44	0	0	1,636	1,681
Thimphu	236	12	23	0	271
Trashigang	35	296	130	0	462
Yangtse	90	75	86	0	251
Trongsa	65	116	88	0	268
Tsirang	347	62	124	0	533
Wangduephodrang	322	200	244	0	766
Zhemgang	235	92	41	0	368
Total	3,200	1,600	1,600	4,400	10,800

Source: NIMP, 2016

8) Human-wildlife conflict

According to the DoA Agriculture Statistics 2015, 43% of households suffer from crop damage by wild animals. The statistics also reported that wild animals damage 4-7% of the cultivated area for major cereals and potatoes (Table 4.4.14). As the affected production value of rice and maize is equivalent to BTN 150 million in total, the introduction of countermeasures to mitigate damage by wild animals is indispensable. Currently, famers spend an average of 53 days and 63 nights per year protecting against damage by wild animals.

The MoAF has introduced electric fencing as the most effective solution to mitigate and curb the impact of the human-wildlife conflict. As of February 2018, a total of 2,775 km of electric fencing was constructed, benefiting 15,041 households (Table 4.4.15). The total agricultural land covered by electric fencing stands at 12,667 ha, representing about 17% of utilized agricultural land. However, some of the farmers interviewed mentioned the following problems: (a) solar-powered electric fences do not work properly when it is continuously cloudy and (b) the wooden poles supporting the fences rot easily and need replacing almost every year. One of the solutions is to use iron poles instead of wooden ones, but this is extraordinarily costly: BTN 35,000/km to use wooden poles and BTN 200,000/km to use iron poles. The cost benefit should always be taken into consideration. Table 4.4.16 shows an example cost-benefit analysis.

Table 4.4.14 Harvested Area, Production and Crop Value Affected by Wild Animals in 2015

Crops	Area (ha)	Share (%)	Production (ton)	Share (%)	Value (BTN Millions)
Rice	790	4	2,330	3	82
Maize	1,688	7	3,753	4	68
Wheat and barley	145	5	221	4	8
Buckwheat and millet	170	5	216	4	7
Potatoes	201	4	1,083	2	22

Source: DoA Agriculture Statistics 2015, value is calculated by JICA Project Team

Table 4.4.15 Length, Household, and Land Covered by Electiric Fence as of February 2018

Dzongkhag	Fence length (km)	Household benefited	Dryland covered (ha)	Wetland covered (ha)
Bumthang	186	986	455	29
Chhukha	61	497	570	136
Dagana	190	868	621	338
Gasa	68	129	58	65
Haa	125	624	129	0
Lhuentse	51	369	131	44
Monggar	123	764	461	103
Paro	75	354	259	206
Pemagatshel	116	812	969	0
Punakha	214	620	138	168
Samdrupjongkhar	156	1,178	236	266
Samtse	52	803	347	204
Sarpang	158	1,905	934	1443
Thimphu	103	503	262	45
Trashigang	132	686	854	252
Yangtse	201	645	505	43
Trongsa	272	1,156	476	656
Tsirang	117	594	328	157
Wangduephodrang	268	888	37	339
Zhemgang	107	660	191	212
Total	2,775	15,041	7,960	4,707

Source: DoA Website

Table 4.4.16 An Example of Cost-Benefit Analysis

Item	Unit	Description	Example
Information on cultivation and damage			
(1) Cultivated land	Ha		1
(2) Yield	kg/ha	Expected yield with no damage by wild animals	4,000
(3) Farmgate price	BTN/kg		25
(4) Rate of production decrease	Ratio	Damage rate with no countermeasures	0.2
(5) Affected production value	BTN	(1) x (2) x (3) x (4)	20,000
Information on countermeasures			
(a) Material costs	BTN/ha		13,000
(b) Operational costs	BTN/ha	Fuel, maintenance costs, etc.	1,000
(c) Effectiveness of materials	Ratio	Damage rate with countermeasures	0.05
(d) Affected production value with countermeasure	BTN	(1) x (2) x (3) x (e)	5,000
(e) Total cost	BTN	(a) + (b) + (d)	19,000
Results			
Cost benefit	Ratio	(5) / (e)	1.05
Profit and loss	BTN	(5) - (e)	1,000

9) Marketing

Table 4.4.17 shows sales to production ratio of major agricultural commodities in 2008. The total production of cereals is more than double that of other commodities; however, only 2% of these crops are for sale, as cereals are mostly consumed at home. On the other hand, the sales ratio of horticultural crops and fruits is comparatively high at 39% and 65%, respectively. Items for export are mainly potatoes, apples, oranges, spices and off-season vegetables.

Table 4.4.17 Sales Ratio of Major Agricultural Commodities in 2008

Commodity	Production (tons)	Sales (tons)	Sales ratio (%)
Cereals	161,623	2,832	2
Horticultural crops	79,464	31,359	39
Fruits	50,696	32,847	65
Others	9,595	1,008	11

Source: Agricultural commercialization and diversification in Bhutan, IFPRI, 2010

According to the Commodity Chain Analysis of 2007, the marketing channels for rice, maize and potatoes can be summarized in Table 4.4.18, below.

Table 4.4.18 Sale Destinations of Rice, Maize and Potatoes in 2007

Sale destination	Rice	Maize	Potatoes
Neighbouring households	8	72	0
Local markets	88	6	7
Urban markets	0	0	6
Auctions	0	0	87
Dealers	0	22	0
Export	2	0	0
Total	100	100	100

Source: Commodity Chain Analysis, MoAF

For other agriproducts, marketing relies on public agencies, namely the Food Corporation of Bhutan Ltd. (FCBL) and domestic and foreign traders. The FCBL supports Bhutanese farmers/growers to market their agricultural produce by providing auction services at various

auction yards. The following table (Table 4.4.19) shows the main commodities traded and the volume auctioned between July 2016 and December 2016.

Table 4.4.19 Volume of Agriproducts Auctioned between July 2016 and December 2016

Commodity	Quantity (tons)
Potatoes	24,091
Vegetables	3,320
Citrus fruits	610
Spices	246
Other fruits	127
Apples	14
Pulses	11
Total	28,419

Source: Commodity marketing through the auction yards, DAMC

To create an efficient market infrastructure network across the country, the RGoB is placing more emphasis on the establishment of "farm shops" through the collaboration of the FCBL and the Department of Agricultural Marketing and Cooperatives (DAMC). There are currently 153 farm shops in the country. One very important function of the farm shop is the buy-back function. Although it has been implemented on an ad hoc basis in the past, the buy-back or procurement of farm produce by farm shops is a strategy to assure farmers that there will be a market for their produce at any given time. This government reassurance encourages them to keep producing and to not be deterred by market failures[5].

10) Cooperatives

Communities have been forming informal farming groups for centuries in Bhutan. In 2001, the government promulgated the first Cooperative Act, which was amended in 2009. Under the Act, a farmers' group is defined as "a group of not less than three members deriving economic benefits from one or more economic enterprises related to the Renewable Natural Resource Sector". As for cooperatives, they are required to have a minimum membership of 15 people as well as a bank account. As of 2017, the DAMC has registered 361 farmers' groups and 56 cooperatives[6]. The average membership of farmers' groups and cooperatives is 42 and 20 people, respectively, ranging from between three and 118 and 15 and 231. The DAMC has worked to find financial resources to provide incentives for farmers' groups and cooperatives. Currently, a 10-year tax holiday is being offered to cooperatives established outside of Thimphu and Phuentsholing or to commercial farming enterprises established between 2010 and 2015. If it is an organic enterprise, payment is exempted for another five years. Moreover, farmers' groups and cooperatives are provided with capacity building training in business management and governance from the local agricultural extension officer. Despite these various forms of support, the net income of each group/cooperative is comparatively low when set against the number of members (Table 4.4.20). It indicates that the operation of farmers' groups and cooperatives does not always start on the right track.

[5] DAMC Annual Report 2016–17
[6] DAMC website, http://www.agrimarket.gov.bt/public/, accessed on 1st May, 2017

Table 4.4.20 Percentage Share of Net Income Per Group/Cooperative in 2016–17

Net income (Nu.)	Share (%)
< 100,000	54
100,000–200,000	14
200,001–300,000	6
300,001–400,000	8
400,001–500,000	10
> 500,001	8

Source: Annual Report 2016–17, DAMC

11) Number of agricultural workers and amount of cultivated land in each Dzongkhag

Samtse has the largest number of agricultural workers and the biggest area of dryland, while it also has the second largest area of wetland (Table 4.4.21). Chhukha, Monggar, Punakha, Samdrupjongkhar, Sarpang, Trashigang and Wangduephodrang seem to be active in terms of both the number of agricultural workers and the amount of cultivated land. In many cases, Dzongkhags with large areas of cultivated land also have large populations of agricultural workers, with the exception of Dagana, Paro and Tsirang. Their agricultural population is less than 10,000, but they have large areas of cultivated land with more than 3,000 ha. Although large populations of agricultural workers and large areas of cultivated land are not always indicative of high production, being equipped with land and labour are two of the three factors governing production, the other being capital. Hence, these areas are expected to promote crop and horticultural cultivation and therefore ensure food security.

Table 4.4.21 Number of Agricultural Workers and Amount of Cultivated Land in Each Dzongkhag

Dzongkhag	Agricultural workers	Cultivated land (ha)	
		Dryland	Wetland
Bumthang	5,227	404	60
Chhukha	12,521	2,545	760
Dagana	9,136	3,421	1,421
Gasa	2,077	168	65
Haa	5,676	911	70
Lhuentse	3,829	1,020	732
Monggar	15,722	2,890	352
Paro	4,940	1,430	1,640
Pemagatshel	11,714	1,768	120
Punakha	12,446	388	2,612
Samdrupjongkhar	11,658	2,107	972
Samtse	25,476	4,956	2,502
Sarpang	16,433	2,304	1,747
Thimphu	3,448	305	219
Trashigang	11,541	2,149	1,226
Yangtse	5,471	710	800
Trongsa	5,900	680	569
Tsirang	7,552	2,294	1,320
Wangduephodrang	19,764	1,404	1,976
Zhemgang	9,108	981	568
Total*	199,640	32,834	19,730

* The itemized totals may not agree exactly with the figure in the total because the data are rounded to integers

Note: The top five Dzongkhags in terms of agricultural workers, dryland and wetland are highlighted

Source: MoLHR Labour Force Survey Report 2015, DoA Agriculture Statistics 2015

12) Cereal crop and potato production in each Dzongkhag

The area characteristics for the cultivation of cereals and potatoes are shown in Table 4.4.22. Rice is mainly cultivated in Paro, Punakha, Samtse, Sarpang and Wangduephodrang. Rice yield in Paro, Punakha and Wangduephodrang is more than 4.5 tons/ha, while in Samtse and Sarpang it is around 3.8 tons/ha. This indicates that there is room to improve productivity in these locations through the development of irrigation. Other options to increase production include the promotion of upland rice cultivation in hilly areas where the construction of irrigation facilities is difficult. After considering the amount of rice consumed by the population, only Punakha produces rice in large enough amounts to sell it to other Dzongkhags.

Monggar, Samdrupjongkhar, Samtse, Trashigang and Tsirang are known for maize production. Of the 20 Dzongkhags, nine of them (Dagana, Lhuentse, Monggar, Pemagatshel, Samdrupjongkhar, Trashigang, Yangtse, Tsirang and Zhemgang) produce a surplus. There is potential to increase production in Dagana, Samtse and Zhemgang, as their yield is still below average.

The top five Dzongkhags for potato production are Bumthang, Chhukha, Monggar, Trashigang and Wangduephodrang. All of these Dzongkhags produce enough surplus to market it, and Haa, Paro and Yangtse also produce a certain amount of surplus. Although Monggar produces the fourth largest amount of potatoes, its yield (6.5 ton/ha) is far below the national average (10.3 ton/ha). The price of potatoes varies seasonally, peaking between October and November when the demand of for seed potatoes in India is high. To generate more income, (a) the establishment of cold storage and (b) cultivation timed to coincide with India's off-season would be of considerable help.

Other cereals such as wheat, barley and buckwheat are also important in specific areas. For example, Bumthang produces the largest amount of buckwheat and has the highest yield of all the Dzongkhags; it is introduced to tourists as the Dzongkhag's signature agricultural product.

Table 4.4.22 Top Three Cereal Crops/Potatoes Produced in Each Dzongkhag

Dzongkhag	1st (tons)		2nd (tons)		3rd (tons)	
Bumthang	Potatoes	4,364	Buckwheat	696	Wheat	332
Chhukha	Potatoes	6,927	Maize	3,516	Rice	2,545
Dagana	Maize	6,385	Rice	5,442	Potatoes	180
Gasa	Potatoes	277	Rice	200	Barley	187
Haa	Potatoes	2,365	Buckwheat	484	Wheat	357
Lhuentse	Maize	3,462	Rice	3,283	Potatoes	1,089
Monggar	Maize	16,509	Potatoes	4,920	Rice	1,065
Paro	Rice	8,820	Potatoes	3,875	Wheat	527
Pemagatshel	Maize	6,745	Potatoes	1,378	Rice	367
Punakha	Rice	11,971	Wheat	450	Maize	208
Samdrupjongkhar	Maize	7,057	Rice	3,492	Potatoes	1,288
Samtse	Rice	9,312	Maize	7,206	Millet	306
Sarpang	Rice	6,671	Maize	5,297	Millet	360
Thimphu	Potatoes	2,079	Rice	1,175	Wheat	111
Trashigang	Maize	10,439	Potatoes	5,561	Rice	4,539
Yangtse	Maize	3,213	Rice	2,939	Potatoes	2,115
Trongsa	Rice	2,381	Maize	1,349	Potatoes	340
Tsirang	Maize	7,295	Rice	4,715	Potatoes	259
Wangduephodrang	Potatoes	11,766	Rice	9,043	Wheat	784
Zhemgang	Maize	4,528	Rice	1,838	Barley	297

Note: The top five Dzongkhags for rice, maize and potato production are highlighted
Source: DoA Agriculture Statistics 2015

13) Horticultural crop production in each Dzongkhag

The variety of horticultural crops under cultivation depends on the agro-ecological zone (Table 4.4.23). Apples and mandarins are grown in temperate zones, while areca nuts and ginger are mostly cultivated in southern parts of Bhutan. Chilli is produced almost everywhere, as it is an important Bhutanese foodstuff, but the self-sufficiency of chilli is less than 80%. Although chilli is a self-pollinated crop, it is reported that its pollination rate increases through cross-pollination by bees, making for a larger chilli. Hence, further studies on chilli are expected from multiple perspectives to ensure that it becomes self-sufficient. There is potential to commercially exploit apple production in suburban areas, including Thimphu and Paro, while fresh fruit juice kiosks or parlours may also do well. To increase sales of agricultural commodities, horticultural crops and fruits produced during India's off-season are good sales prospects. Commodities produced between May and October are readily sold in India, as this period coincides with the Indian monsoon season while Bhutan's climate at this time facilitates production.

Table 4.4.23 Top Three Horticultural Crops Produced in Each Dzongkhag

Dzongkhag	1st (tons)		2nd (tons)		3rd (tons)	
Bumthang	Turnips	738	Radishes	155	Chilli	147
Chhukha	Ginger	1,499	Mandarins	1,380	Areca nuts	959
Dagana	Mandarins	2,886	Areca nuts	554	Pumpkins	440
Gasa	Chilli	34	Radishes	26	Cabbages	25
Haa	Turnips	2,142	Apples	310	Cardamom	156
Lhuentse	Chilli	534	Cabbages	263	Mandarins	245
Monggar	Mandarins	2,271	Chilli	650	Radishes	473
Paro	Apples	3,213	Chilli	1,349	Cabbages	1,136
Pemagatshel	Mandarins	572	Radishes	304	Pumpkins	258
Punakha	Chilli	599	Beans	375	Cucumbers	309
Samdrupjongkhar	Ginger	1,799	Areca nuts	915	Radishes	456
Samtse	Areca nuts	3,100	Ginger	2,258	Cardamom	1,180
Sarpang	Areca nuts	3,818	Mandarins	3,042	Ginger	656
Thimphu	Apples	1,543	Cabbages	355	Chilli	336
Trashigang	Chilli	666	Radishes	578	Cabbages	545
Yangtse	Chilli	407	Pumpkins	384	Cabbages	229
Trongsa	Cabbages	287	Chilli	235	Radishes	195
Tsirang	Mandarins	2,560	Ginger	662	Beans	640
Wangduephodrang	Turnips	6,446	Radishes	944	Chilli	851
Zhemgang	Mandarins	671	Ginger	91	Radishes	80

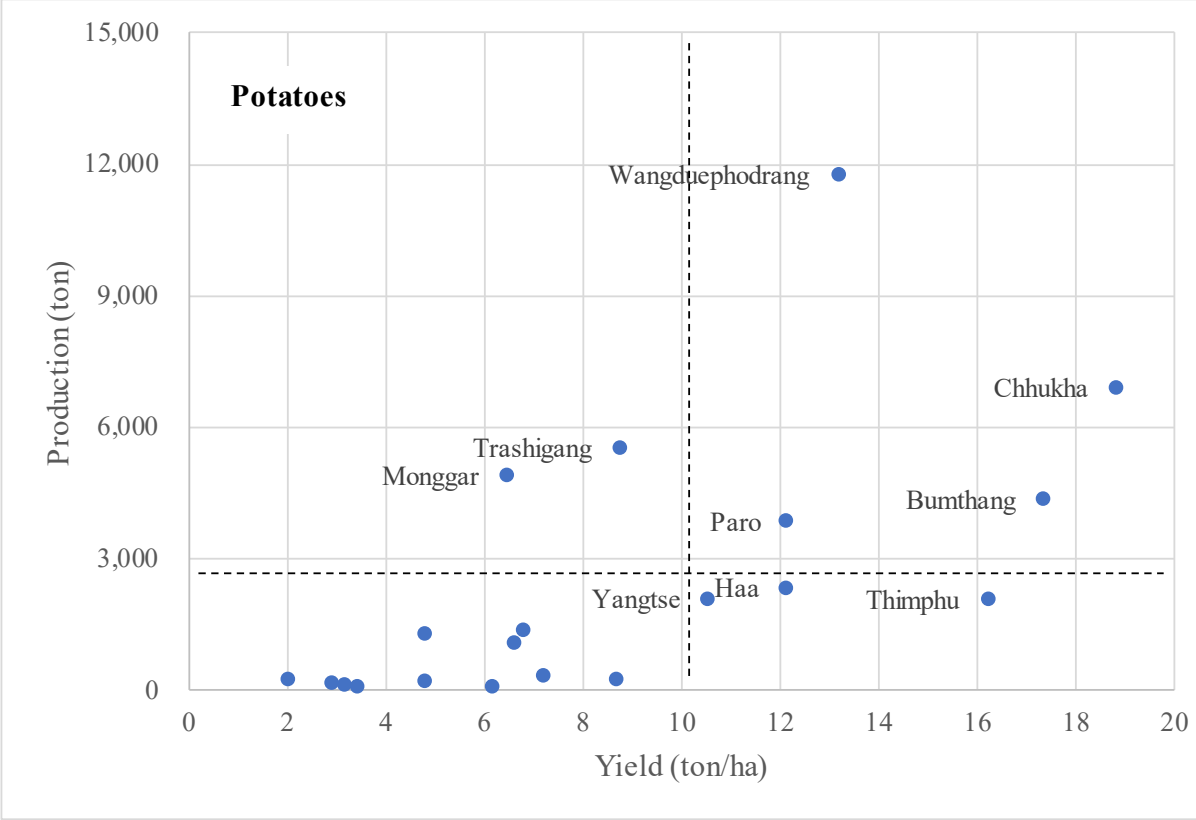
Source: DoA Agriculture Statistics 2015

14) Potential Agricultural Land

In this article, two crops, namely rice and potatoes, are selected for examination. Rice shows the largest production in the lowland areas and potatoes are the most income-generating crop in the dryland.

Production and yield by each Dzongkhag

Production and per unit area productivity of each commodity in the Dzongkhags are plotted to categorize agricultural characteristics of the Dzongkhags (Figure 4.4.6).



Note: Dotted line shows the average
Source: Agriculture Statistics 2015, DOA

Figure 4.4.6 Point Diagram of Yield and Production by Each Dzongkhag in 2015

Dzongkhags are classified into four categories, as follows:

- Bottom left: production is low due to a low yield and small cultivated area
- Bottom right: production is low due to a small cultivated area, although yield is above average
- Top left: production is high because of a large cultivated area, although yield is below average
- Top right: production is high because of a high yield and large cultivated area

There seems to be more room to increase production for two categories (bottom right and top left) by enhancement of yield and/or expansion of the cultivated area. As for yield enhancement, it is necessary to understand current farming practices by farmers and to introduce farming techniques based on needs. At the same time, there is a possibility of increasing yield when crops are grown under potential agriculture land. To expand cultivated land for more production, it is important to grasp how much potential agricultural land is distributed in each of the Dzongkhags. Hence, in this article, potential agricultural land for both wetland and dryland are examined from the view point of elevation and slope.

Potential agricultural land

Based on the classification of elevation and slope, overall potential agricultural land is defined as shown in Table 4.4.24 Of the total land, 70% of wetland and 50% of dryland is categorized as potential land. The potential agricultural land area given here is more than the currently cultivated land area, and therefore there is room to improve production when these lands are preferentially and fully utilized.

Table 4.4.24 Overall Classification of Potential Agricultural Land and its Area

	Elevation (m)	Slope (%)	Area (ha)
Wetland	< 2,800	< 36	22,600
Dryland	< 3,200	< 36	35,155

Table 4.4.25 and 4.4.26 shows the distribution of potential agricultural land in each Dzongkhag. Samtse has the largest potential wetland, followed by Punakha and Sarpang. As for dryland, potential areas are more distributed in Samtse, Sarpang, and Trashigang. The figures in parentheses show the utilization of potential land in comparison to the harvested area. Note that it is assumed that potential land is preferentially used for cultivation and actual land usage does not always correspond to these figures. Based on the analysis results, among Dzongkhags with more than 1,000 ha of potential wetland, Sarpang shows the lowest wetland utilization rate, followed by Samtse and Punakha. Potential dryland in Bumthang, Trashigang, and Sarpang are also not fully utilized. These Dzongkhags have more potential to increase production through the enhancement of cropping intensity.

Table 4.4.25 Wetland with Suitable Environment by Each Dzongkhag

Unit: ha

Bumthang	Chhukha	Dagana	Gasa	Haa
63 (95)*	1,005 (76)	1,295 (100)	83 (79)	92 (76)
Lhuentse	Monggar	Paro	Pemagatshel	Punakha
847 (86)	388 (91)	1,730 (95)	14 (100)	3,357 (78)
Samdrupjongkhar	Samtse	Sarpang	Thimphu	Trashigang
1,127 (86)	3,574 (70)	2,737 (64)	367 (60)	959 (100)
Yangtse	Trongsa	Tsirang	Wangduephodrang	Zhemgang
613 (100)	657 (87)	1,206 (100)	2,004 (99)	482 (100)

* Figures in parentheses show the percentage proportion of potential land utilization
Note: The top five Dzongkhags for wetland with suitable environment are highlighted

Table 4.4.26 Dryland with Suitable Environment by Each Dzongkhag

Unit: ha

Bumthang	Chhukha	Dagana	Gasa	Haa
2,386 (17)*	2,303 (100)	2,418 (100)	134 (100)	982 (93)
Lhuentse	Monggar	Paro	Pemagatshel	Punakha
738 (100)	2,180 (100)	1,903 (75)	1,325 (100)	215 (100)
Samdrupjongkhar	Samtse	Sarpang	Thimphu	Trashigang
2,052 (100)	5,114 (97)	3,410 (68)	302 (100)	3,349 (64)
Yangtse	Trongsa	Tsirang	Wangduephodrang	Zhemgang
931 (76)	619 (100)	1,586 (100)	1,903 (74)	1,304 (75)

* Figures in parentheses show the percentage proportion of potential land utilization
Note: The top five Dzongkhags for dryland with suitable environment are highlighted

15) Food security

As stated in the Food and Nutrition Security Policy of the Kingdom of Bhutan 2014, food security is the fundamental right of all people living in Bhutan. At the World Food Summit held in 1996, food security is defined as follows: food security exists when all people, at all times, have physical and economic access to sufficient, safe and nutritious food that meets their dietary needs and food preference for an active and healthy life. Although there are slightly different definitions depending on the organization, four factors, namely, i) food availability, ii) food access, iii) utilization and iv) stability, are commonly adopted. The Food and Nutrition Security Policy in Bhutan is also in line with these factors.

When it comes to the considered risks for food security, the following points are enumerated.

- Large-scale natural disasters and abnormal climate
- Contagious animal disorder and plant pestilence and disease
- Risk to food safety
- Political uncertainty of the exporting country
- Trade embargo regulated by the exporting country
- Exchange rate fluctuations
- Increase in food demand derived from the population increase

For example, India embargoed the export of rice in 2008 (corresponding to the fourth line) and the Royal Government of Bhutan banned the import of pepper from India due to residual pesticide (corresponding to the third line). These incidents resulted in a hike in food prices, producing psychological uncertainty about food security. In fact, a specific target for the self-sufficiency rate (SSR) has been clearly stated in the 10th Five-year Plan (FYP) for 2008-2013, while it was not mentioned in previous FYPs.

There is no doubt that SSR is one of the important indicators related to food availability, but

food security also needs to consider maximum food production capacity and food supply in emergency situations. They are associated with utilization and food access, among the four factors of food security. Maximum food production capacity is the indicator of how much domestic food can be produced when national agricultural resources, i.e., natural resources including farmland, water, agriculture workers and agricultural techniques, are fully utilized. More specifically, it is defined as follows: the maximum food production capacity indicator is the maximum per capita daily calorie supply from domestically produced food, depending on several production scenarios, with the full utilization of agricultural resources to maintain life and health. This is calculated in the following manner.

Maximum food production capacity indicator (kcal/person-day)

$$= \frac{\sum_i (production\ of\ commodity\ \times calorie\ of\ commodity\ per\ unit\ weight)}{population\ \times\ number\ of\ days\ per\ year}$$

This report examines the following three scenarios of maximum food production capacity.

- Scenario A: Maintaining the status quo
- Scenario B: Cultivating maize instead of potato and vegetable to maximize per capita daily calorie supply in an emergency case
- Scenario C: Cultivating maize instead of potato and vegetable to maximize per capita daily calorie supply in an emergency case to serve the projected population in 2030

The maximum food production capacity indicator in Scenarios A, B and C is 1,696 kcal, 1,939 kcal and 1,448 kcal, respectively (Table 4.4.27). As the national average daily per capita energy intake is estimated to be 2,555 kcal[7], this indicates that all production needs to increase by 150% to maintain the same energy intake from domestic products under the given conditions in 2015. Scenario B also seeks to maximize the per capita daily calorie supply without any consideration of nutritional balance; however, it does not reach the national average daily per capita energy intake.

[7] http://www.fao.org/ag/agn/nutrition/btn_en.stm, accessed on 1 May 2017.

Table 4.4.27 Maximum Food Production Capacity Under the Various Conditions

Unit: kcal/person-day

Commodity	Scenario A	Scenario B	Scenario C
Rice	676	676	577
Maize	710	1,161	606
Potato	122	0	104
Vegetable	85	0	72
Fruit	57	57	49
Beef	4	4	3
Pork	4	4	3
Chicken	8	8	7
Egg	16	16	14
Fish	0	0	0
Milk	0	0	0
Butter	0	0	0
Cheese	0	0	0
Sugarcane	1	1	1
Oil seeds	13	13	11
Total*	1,696	1,939	1,448

* The itemized totals may not agree exactly with the figure in the total because the data are rounded to integers.

In an emergency case, such as an embargo from exporting countries, about 800 kcal should be covered by stockpiles. Reserves comprising rice, oil and sugar are maintained by the FCBL and it is requested to maintain 1,400 tons of rice, 200 tons of sugar and 58 tons of oil. In 2017, 1,208, 132 and 176 tons were respectively reserved, according to news sources. Besides the national food security reserve, the South Asian Association for Regional Cooperation (SAARC) Food Bank, which is composed of 180 tons of rice is also maintained by the FCBL. Reserves of rice are equivalent to 785 tons of white rice, which would only last for 2.5 days based on the population in 2015. This is rather small compared to other countries (Table 4.4.28).

Table 4.4.28 National Food Security Reserves in Some Countries

Unit: month

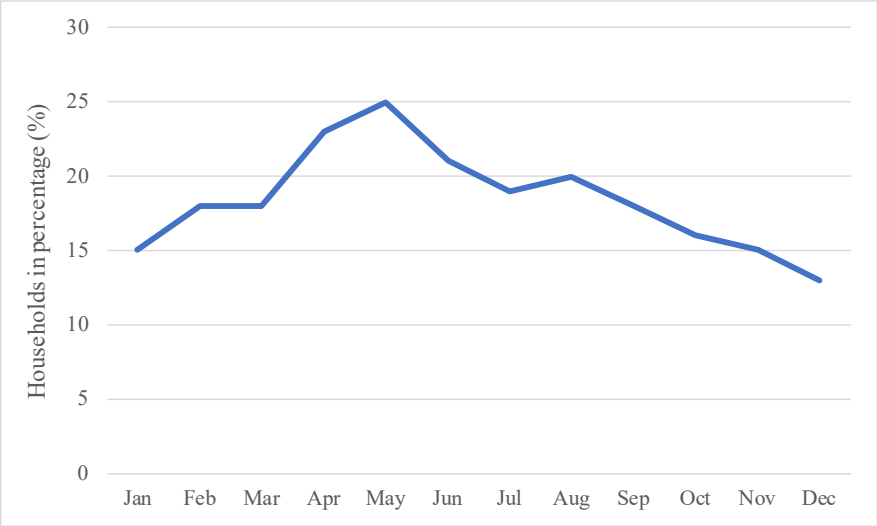
Commodity	Switzerland	Finland	Japan
Rice	4	-	1.5
Wheat	4	8	2.3
Durum wheat	4	-	-
Sugar	4	-	-
Oil	4	8	-
High protein food	2–3	-	-
High energy food	3–4	-	-

Based on these assessments, it is not realistic to provide a sufficient energy intake from only domestic products under current circumstances. Hence, production enhancement of potential agriculture land is the key to reinforce food security.

At a local level, 37% of farming households answered that they could not produce enough agricultural crops as food for their households (DoA, 2015). They faced the severest food shortage in May, followed by April and June (Figure 4.4.7). To cope with food shortages, they mainly tried to provide for their labour force or earned cash in alternative ways, including off-farm activities, the sale of livestock products, and cash remittance from employed family members (Table 4.4.29). For example, the following points are worthy of consideration to secure their food security.

- Variety selection and introduction of cultivation techniques for winter cropping

- Introduction of labour-saving techniques and small-scale agricultural machinery, which allow farmers to reduce their labour force and engage in income-generation activities
- Irrigation facilities improvement which allow farmers to facilitate both cereals and horticulture crops
- Expansion of certification system and improvement post-harvesting processing, aimed at both global and domestic markets



Source: Agriculture Statistics 2015, DOA

Figure 4.4.7 Proportion of Farming Households Facing Food Shortage in 2015

Table 4.4.29 Food shortage coping mechanism in 2015

Coping mechanism used	Percentage (%)
Off-farm activities (weaving, pottering, business, etc)	14
Sale of livestock products	14
Cash remittance from employed family members	11
Exchange with labour	9
Borrowed from neighbours (cash or in kind)	9
Daily wage (amount earned from working in others' field	9
Sale of forest product	2

Source: Agriculture Statistics 2015, DOA

16) Nutrition

The nutritional status in Bhutan has been improving as compared to the past, as shown in the table below. For example, the underweight of children under five years decreased from 38% in 1989 to 12.7% in 2010. Other nutritional objectives related to MDG targets were all achieved by 2015. On the other hand, two major indicators of significant undernutrition, namely, the prevalence of stunting among children under five years and women of reproductive age with anaemia, still show high rates compared to the rest of the world: 34% in 2010 and 44% in 2011 (IFPRI, 2015).

Table 4.4.30 Nutritional status in Bhutan

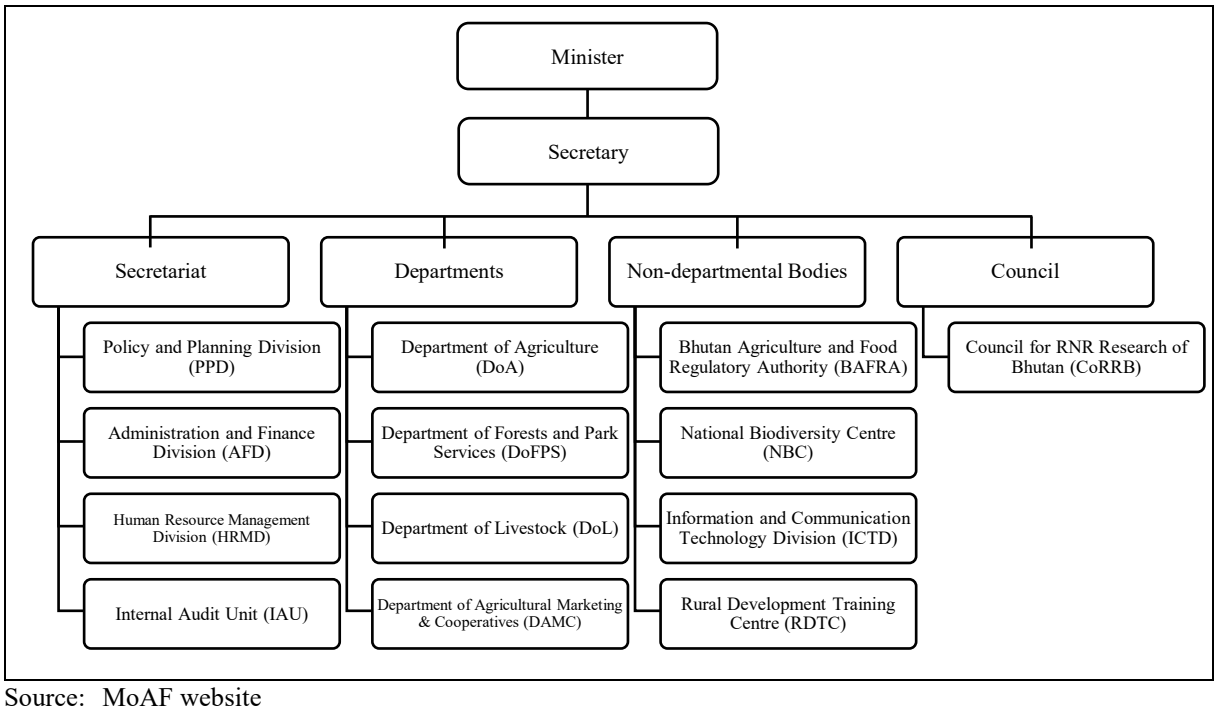
Indicators	Unit	From	To	MDGs target
Under 5 underweight	%	38 in 1989	12.7 in 2010	19 in 2015
Under 5 mortality	deaths per 1,000 live births	123 in 1990	37.3 in 2015	41 in 2015
Infant mortality	ditto	90 in 1990	30.0 in 2015	30 in 2015
Maternal mortality	deaths per 100,000 live births	560 in 1990	86 in 2015	140 in 2015

Source: Annual Health Bulletin Bhutan 2016, Ministry of Health

While the nutritional status in Bhutan has been improving, there is still room for improvement in food habits. A previous survey confducted by the JICA mentioned that all community members understood the importance of an intake of three meals per day, comprising green and yellow vegetables and root crops for a healthy life, through the sensitization of nutrition. But, this is not always put into practice. In Bhutan, cereals and protein account for 53% and less than 10% of the total daily calorie intake per capita. This results in the excess intake of fat, although it is said that the balanced intake ratio of protein, fat and carbon is about 10-20:20-25:50-70. Daily vegetable intake per capita is 139 g, which does not come close to the minimum recommendation (200 g) by the World Vegetable Centre. Although traditional food habits should be respected, at the same time, health concerns derived from food habits need to be taken into consideration in the course of pursuing the enhancement of Gross National Happiness (GNH).

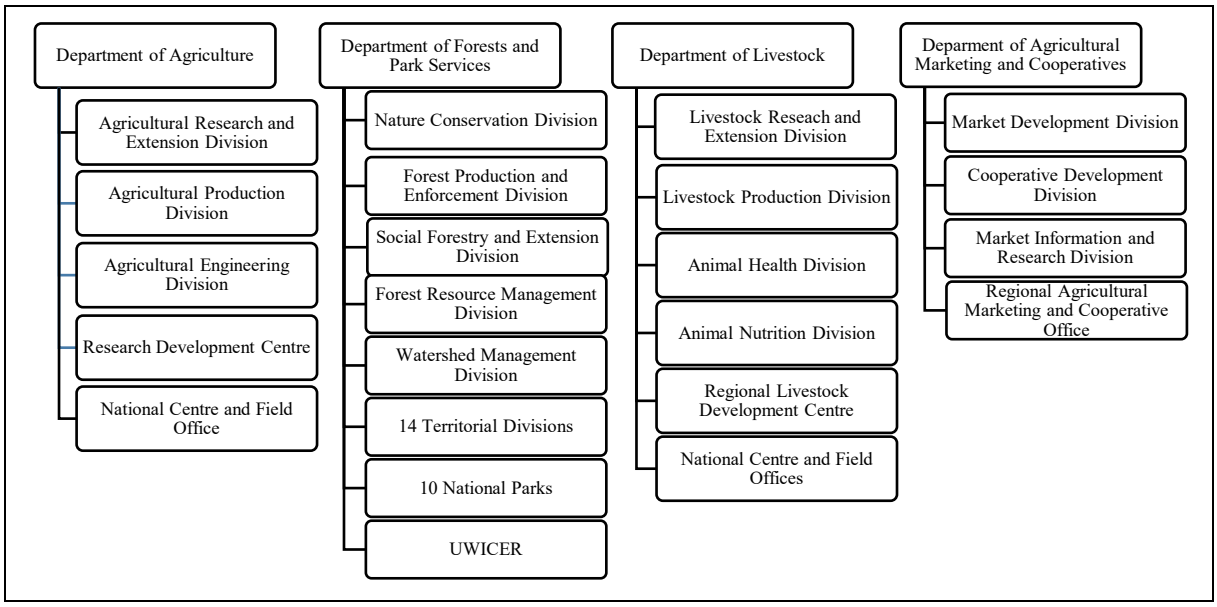
(2) Organization

The following figure shows the organization of the RNR sector and its departments.



Source: MoAF website

Figure 4.4.8 Organizational Diagram of the Ministry of Agriculture and Forests



Source: MoAF website

Figure 4.4.9 Organizational Diagram of the Departments

Under the departments, there are several object-oriented organizations, as shown below.

Table 4.4.31 Object-Oriented Organizations under the Departments

Department	Object-oriented organization
Department of Agriculture (DoA)	Agricultural Machinery Centre National Mushroom Centre National Post Harvest Centre National Plant Protection Centre National Seed Centre National Soil Service Centre
Department of Forests and Park Services (DoFPS)	Nature Study Centre Ugyen Wangchuk Institute of Environmental Conservation
Department of Livestock (DoL)	Fodder Seed Production Centre National Artificial Insemination Centre National Centre for Animal Health National Centre for Aquaculture Vaccine Production Centre

Source: MoAF website

The major mission of each department/agency are summarized in the table below.

Table 4.4.32 Major Mission of Each Department/Agency in the RNR Sector

Department/Agency	Mission
Department of Agriculture (DoA)	To ensure food security and to increase income through the improved management of arable and horticultural crops, as well as medicinal plants
Department of Forests and Park Services (DoFPS)	To ensure the sustainable management of forest resources, efficient and effective forestry administration and service delivery
Department of Livestock (DoL)	To attain food security and self-sufficiency in livestock products in order to enhance rural livelihoods and to alleviate poverty
Department of Agricultural Marketing and Cooperatives (DAMC)	To promote the marketing of RNR products through the promotion of efficient and effective marketing systems, the facilitation of links between institutions and the strengthening of farmers' groups and cooperatives
Bhutan Agriculture and Food Regulatory Authority (BAFRA)	To contribute towards the national goal of food self-sufficiency by safeguarding the country's farming system against exotic pests and diseases and ensuring the quality farming inputs through the effective enforcement of standards and regulations
National Biodiversity Centre (NBC)	To contribute to the conservation and sustainable use of Bhutan's diverse biological resources in order to support the ecological integrity and socioeconomic well-being of the country
Information and Communication Technology Division (ICTD)	To support extension and farmer training through extension communication materials and audiovisual programmes, as well as the publication of documents
Rural Development Training Centre (RDTC)	To meet the skill and knowledge needs of modern day farmers and contribute towards improving the image of the farming profession
Council for RNR Research of Bhutan (CoRRB)	To facilitate innovative and effective RNR research that supports social, economic and environmental sustainability through the development of science and technology, thereby contributing to the goals of GNH

Source: MoAF website

The RNR sector has the largest number of staff members of all the ministries; the distribution of staff throughout the sector's departments is shown in the table below. The DoFPS has the largest number of staffs of all the RNR sector departments with a figure almost twice that of the DoA, which has the second largest number of staff members. This is because the DoFPS manages forest and protected areas, which dominate more than 70% and 50% of Bhutan's land, respectively.

Table 4.4.33 Distribution of Staff Throughout the Departments as of April, 2012

DoA	DoFPS	DoL	DAMC	BAFRA	NBC	ICTD	RDTC	CoRRB
819	1,591	817	41	183	39	18	16	22

Source: Bhutan RNR Statistics 2015

Aside from the aforementioned departments, there are two autonomous agencies: the Food Corporation of Bhutan Ltd. (FCBL) and the Natural Resource Development Corporation Ltd. (NRDCL). The major mission of each is summarized in the table below.

Table 4.4.34 Major Missions and Objectives of the Autonomous Agencies

Agency	Mission
Food Corporation of Bhutan Ltd. (FCBL)	To provide access to food at reasonable prices anywhere and at any time to secure national food security
Natural Resource Development Corporation Ltd. (NRDCL)	To be the pioneer in the professional management of natural resources such as timber, sand and stone, and to make these resources available, affordable and accessible

Source: FCBL website[8] and NRDCL website[9]

[8] http://www.fcbl.bt/, accessed on 1 May, 2017
[9] http://www.nrdcl.bt/index.php, accessed on 1 May, 2017

4.4.2 Policy and Programme of the RNR and Agricultural Sectors

The RNR sector is expected to contribute to the improvement of food and nutrition security, overcoming poverty by improving rural livelihoods and the sustainable management and utilization of natural resources. All of these are linked with the overall vision of Gross National Happiness (GNH).

(1) The Food and Nutrition Security Policy of the Kingdom of Bhutan, 2014

This policy was promulgated to create an enabling environment for a healthy population through ensuring their physical, economic and social access to safe and adequate nutritious food at all times. This serves as the foundation of the RNR sector; its goals and objectives are presented in the table below.

Table 4.4.35 Policy Goals and Objectives of the Food and Nutrition Security Policy

Policy goals		Objectives	
1.	Ensure the availability of a safe and adequate variety of food to meet the food requirements of the population at all times	1.1	Ensure sustainable domestic food production and productivity
		1.2	Strengthen the sustainable management of natural resources for food production
		1.3	Maintain safe and adequate food reserves in strategic locations
		1.4	Facilitate the importation of safe foods and improve access to international food distribution facilities
2.	Enhance physical, economic and social access to safe, affordable and adequate food	2.1	Increase the efficiency of systems involved in marketing, trading and distributing safe food
		2.2	Diversify the options for sustainable rural- and urban-based livelihoods
		2.3	Improve the range of social support available to poor and socioeconomically vulnerable communities and individuals
3.	Promote appropriate consumption practices and enable the optimum utilization of food by all	3.1	Promote nutrition education and awareness to encourage healthy food habits and dietary diversification
		3.2	Promote appropriate materials to educate about infant and young child feeding practices
4.	Sustain a conducive and stable environment for the availability, accessibility and utilization of food	4.1	Develop and implement adaptation and mitigation measures for longer-term climate and environmental changes
		4.2	Improve disaster preparedness capacity to respond to disaster
		4.3	Ensure market interventions and the price stability of food commodities

Source: Food and Nutrition Security Policy of the Kingdom of Bhutan, 2014

(2) RNR 11th Five-Year Plan

The 11th Five-Year Plan for the RNR sector between 2013 and 2018 provides the overarching direction of the Ministry's future goals, objectives and areas of thematic focus, thereby ensuring consistency and coherence with the country's needs. It also articulates the strategic interventions that would be required to achieve the identified goals and objectives for the 11th FYP. In the 11th FYP for the RNR sector, the MoAF sets out the following four key objectives.

1. **Enhance food and nutrition security** by making a variety of food available through improved production and access, as well as enabling the effective utilization of food
2. **Enhance sustainable rural livelihoods** by making rural livelihoods productive and sustainable by generating employment opportunities, increasing the cash income of rural households and implementing Rural Economic Advancement Programmes in selected vulnerable Gewogs
3. **Accelerate the growth of the RNR sector** to 4% through the commercialization/diversification of agriculture, private sector participation and value addition on exports
4. **Promote the sustainable management and utilization of natural resources** for health, happiness and the economy

Source: 11th FYP for the RNR sector

Based on these key objectives, 16 national programmes were formulated, as shown in Table 4.4.36.

More than 30% of the total budget has been allocated to the Agricultural Infrastructure Development Programme. Eighty-nine percent of this programme covers the installation and improvement of irrigation systems and the rest is for the construction of farm roads. The programme outline states that that inadequate maintenance, the use of inappropriate technologies and technical designs and low water delivery efficiency results in low crop yields. However, it is important to make a clear assessment of the extent to which irrigation could contribute to increasing production.

The National Livestock Commodity Development programme receives more than 20% of the total budget. In this programme, the DoL places emphasis on enhancing production efficiency and the delivery of livestock services, as well as enhancing breed improvement. However, there is a dilemma between self-sufficiency in livestock products and religious sentiment against slaughtering.

There are four programmes, namely the National Organic Development Programme, RNR Research and Extension Services, the School Agriculture Programme and the Rural Development Training Programme that share less than 1% of the total budget. This may indicate that the budget for research and capacity development for young people and farmers is not always sufficient.

Table 4.4.36 List of National Programmes for the RNR Sector

Programme	Department	Outlay (capital) (BTN Millions)	Share (%)
National Field Crops Commodity Development	DoA	430.00	8.9
National Horticulture Commodity Development		230.00	4.7
Agriculture Infrastructure Development		1,600.00	32.9
National Organic Development		40.00	0.8
National Livestock Commodity Development	DoL	1,035.00	21.3
Targeted Highland Development		55.00	1.1
Sustainable Management of Forest Landscapes and Conservation of Biodiversity	DoFPS	200.00	4.1
Sustainable Management of State Forests		140.10	2.9
Integrated Watershed Management		550.00	11.3
Marketing and Cooperative Development	DAMC	180.08	3.7
RNR Research and Extension Services	CoRRB	20.00	0.4
School Agriculture Programme		20.00	0.4
National Biosecurity and Food Safety	BAFRA	65.00	1.3
Rural Development Training Programme	Secretariat	21.00	0.4
Biodiversity Conservation		65.00	1.3
Coordination and Support Service		205.04	4.2
Total		4,856.22	100*

* Total will not come to exactly 100% due to rounding off
Source: 11th FYP for the RNR sector

There are some ongoing RNR programmes supported by donor agencies, as shown below.

Table 4.4.37 List of Donor Program for RNR Sector

No	Project Title	Funding Agency	Implementing Agency	Total Budget (Original Currency)	Total Budget (BTN Millions)	Start	End
Department of Agriculture							
1	Adapting Integrated Crop Management Technologies to Commercial Citrus Enterprises in Bhutan and Australia	Australia	DoA/ Horticulture Division	AUD 161,500	23.443	Sept 2012	Oct 2017
2	Commercialization of Vegetable Production	GoI	DoA	BTN 40.0 m	40.000	Jul 2014	Jun 2018
3	Cereal and Vegetable Oil Seed Crop Intensification	GoI	DoA	BTN 60.0 m	60.000	Jul 2014	Jun 2018
4	Improvement of Irrigation Infrastructure and Arable Land Development	GoI	DoA	BTN 390 m	390.000	Jul 2014	Jun 2018
5	GCCA Support Programme	EU	DoA	BTN 74 m	74.000	Oct 2013	Sep 2019
Department of Livestock							
1	Livestock Support Project (SLDI) Phase II	GoI	DoL	BTN 420 m	420.000	Jul 2013	Jun 2018
2	Agriculture and Livestock Support Programme	GoI	DoL	BTN 100 m	100.000	Jul 2014	Jun 2018
3	GCCA Support Programme	EU	DoL	BTN 62.25 m	62.250	Oct 2013	Dec 2019
Department of Forests and Park Services							
1	Sustainable Financing for Biodiversity Conservation and Natural Resource Management	GEF/WB / BTFEC	WCD	USD 3.28 m	142.800	Jul 2013	Dec 2018
2	GCCA Support Programme	EU	DoFPS	BTN 66.8 m	66.800	Oct 2013	Sep 2019
Department of Agricultural Marketing and Cooperatives							
1	Strengthening Agricultural Marketing and Trade	GoI	DAMC	INR 50 m	50.000	Jul 2013	Jun 2018
Bhutan Agriculture and Food Regulatory Authority							
1	Strengthening of the Bio-Security System	GoI	BAFRA	BTN 60 m	60.000	Jul 2014	Jun 2018
2	GCCA Support Programme	EU	BAFRA	BTN 13 m	13.000	Oct 2013	Sep 2019
National Bio-diversity Centre							
1	Implementing the Nagoya Protocol in Bhutan	GEF-NPIF/ UNDP TRAC	NBC	USD 4 m	248.230	Oct 2014	Sep 2018
2	GCCA Support Programme	EU	NBC	BTN 15 m	15.000	Oct 2013	Sep 2019
Council for RNR Research of Bhutan							
1	Global Climate Change Alliance - Climate Change Adaptation in the RNR Sector	EU	All sectors (CORRB as PCU)	BTN 39.1 m (CoRRB+ PCU)	39.100	Oct 2013	Sep 2019
Information and Communication Services (ICS)							
1	GCCA Support Programme	EU	ICS	BTN 5.00m	5.000	Oct 2013	Sep 2019

No	Project Title	Funding Agency	Implementing Agency	Total Budget (Original Currency)	Total Budget (BTN Millions)	Start	End
Area Development Project							
1	Remote Rural Communities Development Project	WB	Six western Dzongkhags	USD 9.00 m	500.490	Nov 2012	Nov 2017
Secretariat/Other Cross Sector Projects							
1	Technical Cooperation Project in Support of the RNR Sector	EU	PPD/DAMC	EUR 4.60 m	331.200	Jul 2014	Jun 2019
2	GCCA Support Programme	EU	PPD	BTN 1.5 m	1.500	Oct 2013	Sep 2019
3	Climate Change Adaptation in the Himalayas	ICIMOD	Tsirang Dzongkhag	USD 500,000	30.00	Feb 2015	Feb 2018

Source: A Profile of Donor Supported Projects in the Renewable Natural Resource (RNR) Sector, Policy and Planning Division, Ministry of Agriculture and Forests, Royal Government of Bhutan, May 2015

(3) Objective-Oriented Policies for the RNR sector

As described above, the Food and Nutrition Security Policy is the foundation of the RNR sector. In addition, the following objective-oriented policies have also been devised to set a course towards achieving the overall vision of GNH.

1) RNR Research Policy for Bhutan, 2011

The RNR Research Policy provides a strategic framework for all RNR research stakeholders, including ministries, development partners, the private sector, farmers and individuals, to help them understand what needs to be undertaken in order to address the needs of RNR research in Bhutan. The RNR Research Policy has two policy goals, as shown below.

- Policy goal 1: A prioritized programme of high quality and relevant research undertaken for the development of Bhutan's RNR sector
- Policy goal 2: An efficient and effective RNR research system that produces high quality research results and facilitates their use in the plans and programmes of the MoAF

2) RNR Marketing Policy (Draft), 2016

The RNR Marketing Policy covers those areas in which the state assumes primary responsibility for providing support to smallholder crop, livestock and NWFP producers, thereby enabling them to commercialize their products and add value onto their primary products. This document outlines the key policy interventions and instruments to be applied by the RGoB in the marketing of RNR products. Such interventions include the promotion of fair competition and pricing; the formulation and application of tariff policies; the facilitation of market access; the provision of marketing information; the provision of RNR marketing infrastructure and logistics; the establishment of RNR marketing cooperatives, commodity associations and other groups; the building of marketing capacity and skills; and the facilitation of marketing finance provision for the RNR sector. The RNR Marketing Policy comprises the following six strategic objectives consistent both with the challenges facing the country and with international good marketing practice:

- Policy objective 1: Strengthen the legislative, macroeconomic and trading environments

- Policy objective 2: Enhance the addition of value to RNR products
- Policy objective 3: Strengthen the RNR marketing infrastructure
- Policy objective 4: Enhance access to RNR marketing finance
- Policy objective 5: Enhance RNR commodity marketing
- Policy objective 6: Strengthen RNR marketing information and risk management

3) Cooperatives (Amendment) Act of Bhutan, 2009

This provides a legal framework for the formation of cooperatives and farmers' groups in order to enhance their economies of scale. It also regulates the registration, governance, financial management, merging, dissolution and insolvency of cooperatives and the role of the RGoB.

4) Cooperatives Rules and Regulations of Bhutan, 2010

In exercise of the authority granted by Articles 5 and 28 of the Cooperatives (Amendment) Act of Bhutan 2009, this document has been formulated and adopted to facilitate the implementation of the cooperatives' activities.

5) National Irrigation Policy, 2012

The policy provides clear direction on the measures that need to be adopted to increase the irrigated areas of Bhutan, to improve irrigation water management and to determine the optimal utilization of national water resources for crop production.

6) Bhutan National Human-Wildlife Conflict Management Strategy, 2008

This strategy document describes measures to reduce human-wildlife conflicts to a manageable level in Bhutan and to offset losses from wildlife damages. This will help to enhance the livelihoods of farmers, increase human welfare and alleviate poverty.

7) National Framework for Organic Farming, 2007

The National Framework for Organic Farming 2007 defines the Bhutan's vision and principles for the development of organic farming as a way of life and its aim to become fully organic by 2020.

8) Master Plan for Organic Sector Development in Bhutan, 2012

The Master Plan for Organic Sector Development in Bhutan reviews the current policies, practices and situations of organic farming and outlines the practical potential of interventions, investments, research and development and policy decisions that need to be made in order to achieve the "all organic status in 2020" as envisaged by the National Framework, by converting all existing farming practices to organic methods.

9) Food Act of Bhutan, 2005

The Act works to protect human health through the trade of food and subjects all food businesses in Bhutan to health and safety standards. It is the responsibility of research to contribute to the availability of safe and healthy food.

10) Bio-Security Policy, 2008

This policy promulgates food safety standards for the Bhutanese people; the protection of human health against zoonotic and pest-borne diseases; the sustainable use of natural resources; the protection of agricultural production systems from pests and diseases; and the facilitation

of safe and sustainable trade and tourism.

11) Seeds Act of Bhutan, 2000

This regulates the quality of seeds, the sale of seeds and the certification of the country's seed industry to enhance rural incomes and livelihoods.

12) Plant Quarantine Act of Bhutan, 1993

The Act prevents pests from being introduced into the country through regulating the import and export of plants and plant products.

13) Pesticides Act of Bhutan, 2000

The Act provides for integrated pest management in Bhutan, restricting the use of pesticides to be a last resort against pests and diseases.

14) Biodiversity Act of Bhutan, 2003

This act provides for the conservation and sustainable use of biological diversity. It also authorizes the implementation of the Access and Benefit-Sharing regime in order to derive additional benefits in a fair and equitable manner. Its first three purposes and objectives are as follows:

- To ensure the national sovereignty of the RGoB over genetic resources in accordance with the relevant national and international laws
- To ensure the conservation and sustainable use of biochemical and genetic resources
- To ensure that the benefits gained from using genetic resources are equitably shared

15) National Biodiversity Strategies and Action Plan, 2014

To ensure the conservation and sustainable utilization of biodiversity, 20 national targets have been enumerated. The national targets that are directly related to agricultural activities are as follows:

- National target 7: Areas under agriculture and forestry, including rangeland, are managed through the adoption of sustainable management practices, ensuring the conservation of biological diversity
- National target 8: By 2020, the level of pollution from different sources affecting biodiversity and ecosystem functions, including from the use of fertilizers and agrochemicals, is maintained within national environmental standards

4.5 Forestry Industry

4.5.1 Current Conditions and Organization of the Forestry Industry

(1) Current Conditions

1) Introduction

For the people of Bhutan, forests are a vital source of livelihood as they provide goods and services for the well-being of society. It also provides a habitat for a diverse range of animal and plant species. It offers watershed protection, provides timber for constructing houses, non-wood forest products (NWFPs), food and medicines, and offers various recreational options. It

prevents soil erosion and helps to maintain the water cycle. One of the Bhutan's largest economies is hydropower generated from rivers and streams, which would dry up if the forests were allowed to degrade.

As clearly stated in the Constitution, Bhutan will strive to maintain the majority of its land under forest cover forever. The conservation of nature is also one of the pillars of its development philosophy, Gross National Happiness, as well as being a critical dimension of Bhutan's vision for 2020. Therefore, it is crucial to use natural resources in a sustainable manner in order for the population's needs to be met. Any trade-offs between the use of forest resources for the economy and conservation should be effectively managed to avoid any deterioration of the health of ecosystems and biodiversity.

In order to achieve this, different forest management regimes are practiced in Bhutan, such as protected areas, forest management units (FMUs) and community forests (CFs). Reforestation is also carried out annually in order to replenish timber taken for various purposes, areas damaged by forest fires, watershed management and timber harvested for NWFPs. In addition, as stated in the Timber Pricing and Marketing Policy 1999 and the Forest and Nature Conservation Rules 2017, timber exports are banned due to the priority of meeting domestic demand first and foremost. On the other hand, exports of wood products are allowed after value is added to the wood. The Rules include 22 finished such forest products, for example, particle boards, plywood, furniture, block boards, briquettes and handicrafts.

Because of all the above reasons, as well as the many other potential adverse effects of environmental degradation on human health and the economy, the government has committed to maintaining at least 60% of the country's land area under forest cover, despite the ever-increasing demand for timber and other natural resources for infrastructural development and livelihoods. It is crucial for Bhutan to use natural resources in a sustainable manner in order to meet the needs of the population.

2) Importance of forestry for the economy

From the viewpoint of the national accounts, the share accounted for by forestry and logging in the GDP has been gradually decreasing, as shown in the table below. It was 3.50% in 2010, but when it was last measured in 2017, this percentage was 2.44%. Its 20.8% share in the agriculture, livestock and forestry industries in 2010 decreased to 14.0% in 2017.

Table 4.5.1 GDP Percentage Share of Forestry and Logging at Current Prices (2010 - 2017)

Sector	2010	2011	2012	2013	2014	2015	2016	2017
1. Agriculture, Livestock and Forestry	16.80	16.33	15.96	16.10	16.77	16.67	16.52	17.37
1.1 Crops	9.01	9.02	8.86	8.92	10.06	10.10	9.95	10.64
1.2 Livestock	4.29	4.09	4.10	4.31	4.07	3.97	3.89	4.29
1.3 Forestry and Logging	3.50	3.21	3.00	2.87	2.64	2.60	2.68	2.44

Source: Statistical Yearbook of Bhutan 2015 - 2018, National Statistics Bureau, RGoB

The volume and value of exports/imports of each forestry commodity from 2012 to 2017 is tabulated below. The volume of cordyceps exported is not high, but it is dominant in terms of value due to its high unit price. In 2014, its export value exceeded BTN 375 million, or 2.14% of the total value of commodities exported in 2014. Other commodities that have been recently exported are two NWFPs, mushrooms and incense.

Table 4.5.2 Volume and Value of Forestry Commodities Exported, (2012-2017)

Commodity	Volume (MT)						Value (BTN Millions)					
	2012	2013	2014	2015	2016	2017	2012	2013	2014	2015	2016	2017
Cordyceps (kg)	0	872.3	654.6	902.2	898.0	640.0	101.6	258.8	375.3	194.2	141.0	188.3
Mushrooms	2.0	…	3.2	3.0	4.1	4.0	6.3	…	11.4	12.1	18.5	18.6
MAPs*	0	20.0	24.0	…	…	…	0.1	0.8	2.7	…	…	…
Incense	0	0	3.0	…	…	10.9	…	…	2.4	…	…	6.8

Note: * Medicinal and Aromatic Plants
Source: Statistical Yearbook of Bhutan 2017/2018, National Statistics Bureau, RGoB

Recent government import statistics have shown that no forestry commodities are included in the list of major commodities. However, in terms of value, the import of wood charcoal ranked at eighth place (BTN 1,408 million, 2.08% of the total value of commodities imported) in the top 10 commodities imported in 2015. In 2014, it was ranked at fifth place (BTN 1,387 million, 7.54% of the total value of commodities imported). The share of the total import value of forestry commodities decreased to less than 30% in 2015, it increased by 1.5% in terms of value.

3) Forest cover

The first national forest inventory survey was recently completed to gauge the current condition of Bhutanese forests. The survey was carried out over three years, from 2012 to 2015. According to the resulting report, the National Forestry Inventory Report, published by the Department of Forests and Park Services (DoFPS) of the MoAF in February 2017, the percentage of national land under forest cover is 71% (margin of error: 2%), with an estimated area of 2,730,889 ha covered by forest out of the total land area of 3,839,400 ha.

In Bhutan, more than 50% of the total land area is covered by protected areas and biological corridors. Some areas are not suitable for harvesting timber using current technology due to the land slope, as logging on land with more than a 45-degree gradient is prohibited by law. As a result, approximately 14% of forest area is economically accessible and available for commercial timber production[10]. Although the forest area per capita in Bhutan looks large, it is actually rather small compared to other countries with significant forest cover, such as Finland and Sweden.

Table 4.5.3 Forest Area and Available Forest Area per Capita in 2015

Area	Bhutan	Finland	Sweden
Forest area (1,000 ha)	2,988	23,285	29,048
Percentage of land area under forest cover (%)	72.28	73.11	68.92
Forest area per capita (ha)	3.79	4.25	2.98

Source: FAOSTAT website (http://www.fao.org/faostat/en/), accessed on 6 August, 2018

The whole forest area is composed of 11 different forest types, as shown below.

[10] National Forest Policy 2010

Table 4.5.4 Forest Cover by Forest Type

Forest Type	Forest Area (ha)	Forest Cover (%)	Margin of Error (%)*	90% Confidence Interval	
				Lower	Upper
Cool Broad-Leaved Forest	986,765	26	1	25	26
Warm Broad-Leaved Forest	693,683	18	2	17	18
Fir Forest	352,552	9	2	9.0	9.3
Subtropical Forest	241,804	6	3	6	7
Blue Pine Forest	137,230	4	4	3	4
Chir Pine Forest	98,563	3	7	2	3
Hemlock Forest	88,327	2	6	2.2	2.4
Juniper-Rhododendron Scrub	57,242	1	12	1.3	1.6
Spruce Forest	40,183	1	7	1.0	1.1
Evergreen Oak Forest	31,464	1	0	0.8	0.8
Dry Alpine Scrub	2,654	0	56	0.0	0.1
Total**	2,730,467	-	-	-	-

Note: *Margin of error increases as the sample size becomes smaller.
**Total area may differ from other data because the figures are estimated.
Source: National Forestry Inventory Report, Volume 1, DoFPS, MoAF, February 2017

The majority of the forest area is Cool Broad-Leaved Forest, which covers 986,765 ha (26%), followed by Warm Broad-Leaved Forest, covering 693,683 ha (18%) and Fir Forest, covering 352,552 ha (9%). Dry Alpine Scrub Forest occupies the smallest area, covering 2,654 ha (<1%).

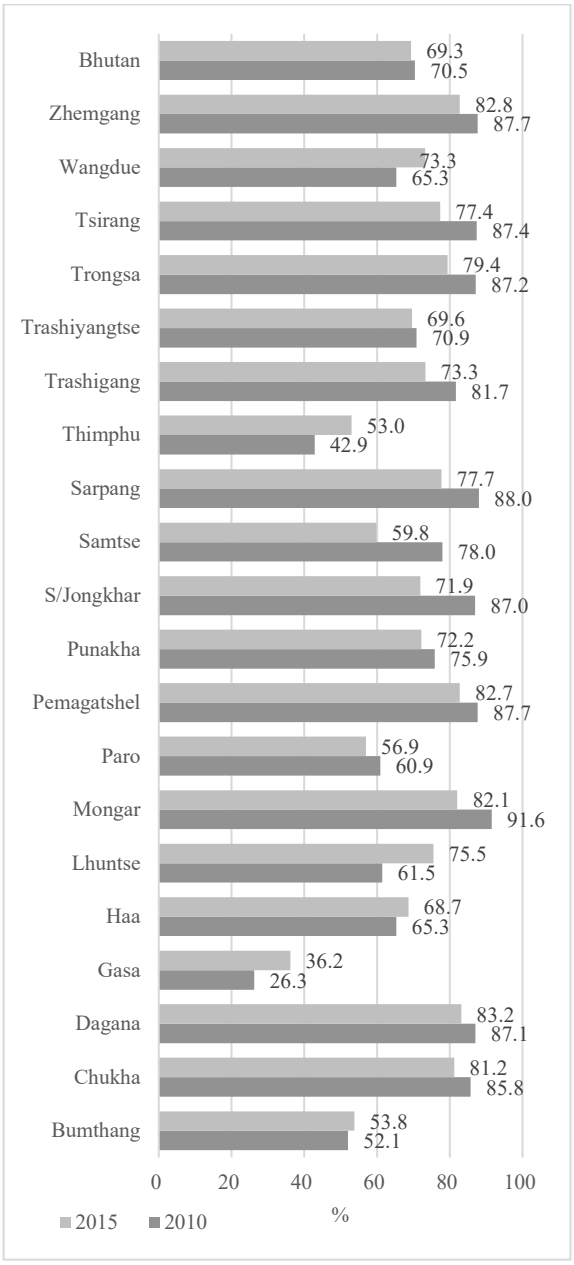
The Dzongkhag with the largest forest area is Wangduephodrang with 292,824 ha; it is followed by Lhuentse with 213,792 ha and Zhemgang with 198,036 ha. Forest area is the smallest in Tsirang with 48,857 ha, followed by Paro with 72,574 ha and Samtse with 77,299 ha. Dagana, Pemagatshel and Zhemgang have the highest forest cover rate of 83% each, followed by Monggar (82%) and Chhukha (81%). On the other hand, Gasa has the least at 36%, followed by Thimphu (53%) and Bumthang (54%).

Table 4.5.5 Forest Cover by Dzongkhag

SN	Dzongkhag	Dzongkhag Area (ha)	Forest Area (ha)	Forest Cover (%)	Margin of Error (%)	90% Confidence interval	
						Lower	Upper
1	Bumthang	269,091	144,842	54	13	47	60
2	Chhukha	186,149	151,164	81	7	75	86
3	Dagana	170,608	141,861	83	7	77	88
4	Gasa	310,398	112,272	36	28	26	48
5	Haa	188,635	129,500	69	11	61	75
6	Lhuentse	283,091	213,792	76	12	66	83
7	Monggar	192,536	158,031	82	7	76	87
8	Paro	127,461	72,574	57	16	48	65
9	Pemagatshel	101,217	83,745	83	10	75	89
10	Punakha	109,878	79,316	72	14	62	80
11	Samdrupjongkhar	185,881	133,622	72	9	65	77
12	Samtse	129,216	77,299	60	13	52	67
13	Sarpang	163,928	127,397	78	9	71	83
14	Thimphu	177,841	94,256	53	16	45	61
15	Trashigang	218,253	159,998	73	8	67	79
16	Yangtse	143,496	99,860	70	14	60	78
17	Trongsa	179,607	142,571	79	10	72	85
18	Tsirang	63,163	48,857	77	13	68	85
19	Wangduephodrang	399,641	292,824	73	8	67	78
20	Zhemgang	239,308	198,036	83	6	78	87
	Total*	3,839,398	2,661,817	-	-	-	-

Note: *Total area may differ from other data because the figures are estimated.
Source: National Forestry Inventory Report, Volume 1, DoFPS, MoAF, February 2017

Here, the latest data on forest cover by Dzongkhag, as displayed above, are compared with the Bhutan Land Cover Assessment 2010 (National Soil Services Centre and PPD, MoAF, January 2011). (Note that the Bhutan Land Cover Assessment 2010 applied digital image processing methods, while the National Forestry Inventory used the sampling survey method at 1,685 plots across the country.)



Source: Bhutan Land Cover Assessment 2010, National Soil Services Centre and PPD, MoAF, January 2011
National Forestry Inventory Report, Volume 1, DoFPS, MoAF, February 2017

Figure 4.5.1 Changes in Forest Cover by Dzongkhag (2010 - 2015)

Although the forest cover estimation methods for both surveys are different, forest cover has increased by more than 10% in Lhuentse and Thimphu over the last five years. Forest cover rates in Gasa and Wangduephodrang have also increased by 9.9% and 8.0% respectively. On the other hand, forest cover rates in four Dzongkhags (Samtse, Samdrupjongkhar, Sarpang and Tsirang) have decreased by more than 10%. Particularly, a 18.2% drop in forest cover was observed in Samtse. Of the 20 Dzongkhags, forest cover rates decreased in 14 of them, even though the national forest cover rate is almost the same (the national forest cover rate estimated by the Bhutan Land Cover Assessment 2010 was 70.46%).

4) The utilisation of forest resources

In Bhutan, the utilisation of forest resources is regulated by a management plan and

management units. In order to meet timber demand without compromising the forest health, management units have been implemented. In so doing, all forest area identified as harvestable is recorded to determine the growth of stock, assess demand and stock availability and gauge the need for protection. The management unit operates within the limitations of the annual allowance of harvestable timber without weakening the ecological productivity of the forest area.

The two tables below show forest production data for 2013 and 2014. The total supply of timber to the Dzongkhags was about 127,000 m^3 in 2013, but it decreased to 79,000 m^3 in 2014. Essentially, the marketing of timber is under the control of the DoFPS because it is responsible for monitoring the movement of timber around the country through its Divisions, Parks, Range Offices and Check Posts. The goal of this is to avoid the misuse of timber; it is therefore assumed that the big changes in supply in the same Dzongkhag (e.g., Bumthang and Paro) may reflect changes in demand in these areas.

Table 4.5.6 Supply of Timber to Dzongkhags (2013 and 2014)

Unit: quantity in M^3

Dzongkhag	2012-2013				2013-2014			
	Commercial	Concessional	Free	Total	Commercial	Concessional	Free	Total
Bumthang	12,325	15,225	0	27,550	1,359	4,357	0	5,716
Chhukha	1,921	5,385	0	7,305	3,509	1,643	0	5,151
Dagana	648	3,730	12	4,390	808	2,442	12	3,261
Gasa	307	577	0	884	1,979	760	0	2,739
Haa	3,200	2,827	1,087	7,113	847	2,860	0	3,707
Lhuentse	2,599	2,709	12	5,320	2,461	1,604	18	4,083
Monggar	5,896	5,127	130	11,154	4,405	3,298	120	7,823
Paro	10,503	7,560	0	18,062	223	3,387	0	3,610
Pemagatshel	573	1,150	5	1,728	1,014	767	0	1,781
Punakha	121	4,577	8	4,705	261	3,525	0	3,786
Samdrupjongkhar	724	2,051	0	2,775	1,783	722	0	2,505
Samtse	1,595	4,985	667	7,247	576	2,239	0	2,815
Sarpang	125	537	5	668	758	2,325	31	3,114
Thimphu	3,429	2,517	671	6,617	5,193	3,022	139	8,353
Trashigang	1,726	3,957	4,099	9,782	375	5,769	2	6,145
Yangtse	1,332	1,202	0	2,535	833	1,908	0	2,741
Trongsa	245	1,384	0	1,629	127	367	0	494
Tsirang	189	520	0	709	149	233	0	382
Wangduephodrang	2,295	1,819	0	4,114	3,400	5,481	0	8,881
Zhemgang	1,036	1,356	0	2,392	1,278	910	0	2,188
Total	50,789	69,195	6,696	126,680	31,339	47,616	322	79,276

Source: Bhutan RNR Statistics 2015, Policy and Planning Division, MoAF, July 2015

Firewood is still indispensable for Bhutanese people in winter, with the exception of the southern subtropical zone. In rural areas, dry firewood and lops/tops that are collected and transported by men or draught animals are supplied royalty-free. However, any type of firewood that is collected and transported by mechanised devices is subject to royalty and permit fees. In urban areas, firewood is supplied by authorised agencies. The supply of firewood for industrial and other commercial use is secondary priority, as it is only granted if domestic demand is met. As compared to the total amount of timber supplied, the total amount of firewood supplied in 2013 and 2014 was not subject to much change.

Table 4.5.7 Supply of Firewood to Dzongkhags (2013 and 2014)

Unit: quantity in M^3

Dzongkhag	2012-2013				2013-2014			
	Commercial	Concessional	Free	Total	Commercial	Concessional	Free	Total
Bumthang	240	8,890	0	9,130	4,374	4,977	0	9,351
Chhukha	20	26	0	46	47	18	0	65
Dagana	1,069	61	1	1,131	2,331	72	1	2,404
Gasa	13	8	0	20	17	4	0	21
Haa	927	3	0	930	13	1	0	14
Lhuentse	893	2,204	0	3,097	593	1,755	0	2,348
Monggar	3,398	2,490	0	5,888	2,788	1,983	0	4,771
Paro	127	450	0	577	26	210	0	236
Pemagatshel	310	143	4	457	873	232	0	1,105
Punakha	1	26	0	28	3	28	0	30
Samdrupjongkhar	273	5	0	278	246	25	0	271
Samtse	3,653	126	3	3,782	3,252	87	0	3,339
Sarpang	8	8	14	30	201	86	124	410
Thimphu	321	166	290	778	135	187	1,032	1,354
Trashigang	3,879	3,332	603	7,813	2,119	3,402	90	5,611
Yangtse	743	186	0	929	2,354	487	0	2,841
Trongsa	95	338	0	433	64	560	0	624
Tsirang	3	57	0	60	24	59	0	83
Wangduephodrang	10	78	0	89	927	10	0	938
Zhemgang	35	3	0	39	26	7	0	33
Total	16,018	18,600	915	35,534	20,413	14,190	1,247	35,850

Source: Bhutan RNR Statistics 2015, Policy and Planning Division, MoAF, July 2015

5) Non-wood forest products

Non-wood forest products (NWFPs) are one of the most important sources of income for people living in rural areas. Cordyceps (*Ophiocordyceps sinensis*) is a typical and popular NWFP and is normally exported to foreign countries. Its revenue accounted for nearly 15% of the total export value of major commodities of the primary sector in 2014.

According to the Forest Facts and Figures 2016 published by the DoFPS, MoAF, in July 2017, 30 kinds of NWFPs are being utilised in Bhutan, and 24 of them are plant products, as listed below.

Twenty-four plant products collected and traded in Bhutan:

Cane/cane shoots, charcoal, *Daphne bholua* (bark), incense (leaves/wood), large/small bamboo, leaf mould, lemongrass oil, mushrooms, *Ophiocordyceps sinensis* (whole product), *Oroxylum* (fruit), *Paris polyphylla*, *Picorrhiza*, pine needles, *Piper longum* (fruit), resin, *Rubia cordifolia* (plant), *Swertia chirayita* (plant), *Terminalia spp* (fruit), Thatch grass, *Thysanolaena latifolia* (Inflorescence), *Viscum nepalense* (whole product), wildlings (seeds/ seedlings), wood burrs and *Zanthyoxylum* (fruit)

The collection and management of NWFPs are carried out in a group formed with the technical support of the DoFPS or on an individual basis. No royalties are levied for domestic consumption, but the collection of raw material for trade/industrial use requires the payment of a minimal royalty to the government.

As shown below, the cash income generated from edible forest products is still low, except for cordyceps.

Table 4.5.8 Cash Income Generated by Edible Forest Products (2014 - 2017)

Unit: BTN Millions

Edible Forest Product	Amount Generated in			
	2014	2015	2016	2017
Bamboo products (shoots)	1.0	1.9	2.0	2.8
Cane products (shoots/patsha)	0.3	2.0	2.0	1.6
Ferns (nakay)	3.0	2.6	6.0	3.7
Damru	0.3	0.5	1.0	0.7
Medical and aromatic plants	5.0	12.0	39.0	25.0
Wild mushrooms	19.0	15.0	21.0	12.0
Cordyceps	198.0	168.0	138.0	190.0
Total	227.0	201.0	208.0	235.8

Source: Agriculture Statistics 2014 - 2017, DoA, MoAF

6) Community forests

Community forests (CFs) are now widely practiced in Bhutan. The initiative has the goal of: (1) balancing conservation with sustainable utilisation, (2) supporting decentralisation and devolution through the empowerment of local communities, (3) improving the governance of CFs to improve forest conditions and equitably distributing the benefits, (4) generating income for local communities through the commercial harvesting of timber and NWFPs, (5) contributing to the alleviation of poverty and (6) providing timber for rural construction. (National Strategy for Community Forestry, Social Forestry Division, DoFPS, MoAF, May 2010.)

Since the first CF was handed over in 1997, namely Dozam CF in Drametse Gewog, Monggar, the number of CFs has increased to 693, covering 76,738 ha. Moreover, 28,000 households are now part of CF management groups. The target for the 11th Five-Year Plan is to have 750 CFs by 2018.

Table 4.5.9 Number of Community Forests by Dzongkhag as of July 2017

Dzongkhag	Number of CFs	Number of CF Management Group Members (households)	CF Area (ha)
Bumthang	30	876	3,079
Chhukha	50	1,681	3,516
Dagana	25	942	1,843
Gasa	7	181	452
Haa	18	534	1,697
Lhuentse	25	776	1,771
Monggar	31	1,853	6,808
Paro	26	1,485	4,218
Pemagatshel	47	2,246	4,014
Punakha	39	1,305	3,623
Samdrupjongkhar	41	2,115	5,275
Samtse	52	2,083	4,740
Sarpang	31	1,212	3,164
Thimphu	21	837	2,750
Trashigang	50	2,818	9,229
Yangtse	29	1,389	3,372
Trongsa	27	870	2,764
Tsirang	38	2,303	5,766
Wangduephodrang	81	2,248	5,987
Zhemgang	25	1,037	2,671
Total	693	28,791	76,738

Source: personal communication with the DoFPS, MoAF, July 2017

(2) Organisation

The Department of Forests and Park Services (DoFPS), under the Ministry of Agriculture and Forestry (MoAF), is the organisation responsible for the public administration of forest and park services in Bhutan. Its vision, mission and core mandates are shown below.

Vision: Sustaining Bhutan's forest resources & biodiversity for the happiness of present and future generations.
Mission: To conserve and manage Bhutan's forest resources & biodiversity to ensure social, economic and environmental well-being, and to maintain a minimum of 60% of the land under forest cover for all times to come.
Core Mandates: Maintenance of a minimum of 60% of the country's geographical area under forest cover for all times to come as mandated by the Constitution of Bhutan through development and implementation of forestry programs; Conservation, protection, sustainable management and utilisation of state forests, forest soil, water resources and biodiversity through insightful application of good science and science based management prescriptions; Ensuring Bhutan's commitments to international and regional conventions, treaties and non-legally binding instruments through participation, facilitating and enactment of enabling policies, legislations, strategies, plans, and programs.

Source: http://www.dofps.gov.bt/?page_id=135

To accomplish these mission and mandates, the DoFPS has five Functional Divisions at its headquarters, one conservation research and training institute, 10 Protected Area Offices and 14 Territorial Divisions. The Functional Divisions provide technical backstopping to the Field

Divisions, which are composed of the Territorial Divisions and Parks. The Field Divisions implement the Department's plans, programmes and activities at the field level. There are also 70 Range Offices, 81 Beat Offices, 41 Forest Check Posts, and 16 Forest Management Unit Offices under the DoFPS. In addition, there are two object-oriented organisations under the DoFPS (see Figure 4.4.9 and Table 4.4.31).

As of April 2015, the Department has 1,591 staff members in total, representing 44% of the total staff at the MoAF and making it the largest department. Among the 1,591 DoFPS staff members, 231 (14.5%) officers are stationed across the 20 Dzongkhags, but an additional 1,093 (68.7%) staff are dispatched to the Territorial Divisions/Parks spread across the country. A detailed breakdown of the distribution of DoFPS staff in each Dzongkhag is shown below.

Table 4.5.10 Distribution of DoFPS Staff across the 20 Dzongkhags by Sex

Dzongkhag	Bumthang	Chhukha	Dagana	Gasa	Haa	Lhuentse	Monggar
Male	7	16	10	4	10	6	16
Female	1	0	1	1	0	1	1
Total	8	16	11	5	10	7	17
Dzongkhag	Paro	Pemagatshel	Punakha	S/jongkhar	Samtse	Sarpang	Thimphu
Male	12	11	14	15	12	13	4
Female	2	0	2	1	1	0	5
Total	14	11	16	16	13	13	9
Dzongkhag	Trashigang	Yangtse	Trongsa	Tsirang	Wangduep hodrang	Zhemgang	BHUTAN
Male	1	11	13	16	11	10	212
Female	0	0	0	0	3	0	19
Total	1	11	13	16	14	10	231

Note: The top five Dzongkhags are highlighted.
Source: Bhutan RNR Statistics 2015, Policy and Planning Division, MoAF, July 2015

Ninety-two percent of DoFPS staff members stationed in the Dzongkhags are male, while only 8% of staff members are female. Some Dzongkhags, such as Trashigang (1) and Gasa (5) have a relatively small staff presence, but it should be noted that the above table does not include the 1,093 staff stationed in the Territorial Divisions/Parks. If we also consider these staff members, far more DoFPS staff are actually distributed in each Dzongkhag to monitor forest conservation and the sustainable utilisation of resources.

The Natural Resources Development Corporation Ltd. (NRDCL) is a state-owned company with the mandate of extracting and marketing sand and stones at affordable prices in addition to timber, and to make these resources "affordable, accessible and available for judicious use in the best interest of the nation and people". In short, while the DoFPS's vision is the sustainable management of natural resources, the NRDCL's vision is the sustainable utilisation of natural resources.

The NRDCL carries out its businesses under the Forest Management Plans in approved Forest Management Units (FMUs) and Working Schemes (WS), and works towards sustainable forest management for the benefit of both the present and future generations of Bhutan. Forestry operations outside of the FMUs are also carried out to maintain forest health and hygiene.

Table 4.5.11 Timber Supplied by the NRDCL

Unit: m^3

Year	2008	2009	2010	2011	2012	2013
Commercial	44,174	53,490	49,583	49,781	56,322	49,498
Concessional	4,332	5,097	7,023	6,060	5,239	8,269
Total	48,506	58,587	56,606	55,841	61,561	57,767

Source: Bhutan RNR Statistics 2015, Policy and Planning Division, MoAF

The amount of timber produced by the NRDCL was recorded at 49,740 m^3 in 2015, with a revenue of BTN 280 million.

4.5.2 Policies and Programmes for Forestry

Environmental conservation continues to be recognised as one of the four pillars of Gross National Happiness. The Bhutanese Constitution contains the policy of maintaining a minimum of 60% of the total land area under forest cover and elevates the importance of ecological integrity and sustainable economic development to the status of a constitutional requirement.

(1) The 11th Five-Year Plan (2013-2018)

In the current 11th Five-Year Plan (2013-2018), one of the pillars of GNH is also a target for the forestry subsector, namely the conservation, sustainable utilisation and management of the environment. More precisely, the Plan stipulates that the proportion of the forest area under sustainable forest management is to increase from 6.6% to 12% by 2018 under National Key Result Area 8 – the Sustainable Utilisation and Management of Natural Resources.

Furthermore, "Conservation of the Environment" is one of the Central Plans in the current 11th Five-Year Plan (2013-2018). One of the strategies of the Central Plan promulgates that the "sustainable production and utilisation of timber and non-timber forest-based products will be pursued through sustainable forestry management practices". The three key programmes outlined in the Central Plan are: (1) the Sustainable Management of Forest Landscapes and the Conservation of Biodiversity, (2) Integrated Watershed Management and (3) National Biodiversity Conservation. They are all tightly linked to forests and the forest area.

(2) The 11th Five-Year Plan for the RNR Sector (2013-2018)

"Promoting the sustainable management and utilisation of natural resources" is regarded as one of the main objectives for achieving the overall goal of the 11th Five-Year Plan for the RNR sector, namely "a Green economic growth, inclusive social development, poverty alleviation and climate smart sustainable management and utilisation of natural resources". The strategic framework chapter of the Plan also mentions that "While the protection of environment and unique flora and fauna will form an important objective for the sector, sustainable utilisation of forest, land, biodiversity, and water resources will be accorded equal importance to promote economic development of both rural and urban populations".

Towards this end, the MoAF is focusing on the sustainable utilisation and management of natural resources. Community-based natural resource management is being enhanced through community and private forestry. The ecological integrity of forest areas is being upheld by preventing environmental degradation caused by unsustainable economic practices and by improving the productive capacity of degraded forest land through afforestation and reforestation. Forest fire management is being enhanced through better fire-monitoring systems and forest fire voluntary services. Timber, sand, ecotourism and NWFPs (cordyceps, rubia, chirata, lemongrass and pipla) are priority forestry commodities mentioned in the 11th Five-Year Plan for the RNR sector.

(3) National Forest Policy of Bhutan, 2011

The framework for the National Forest Policy of Bhutan consists of the underlying principles on which the policy is based, a long-term goal, as well as major policy objectives and specific statements to facilitate various aspects of forest production, use and management. The major policy objectives are as follows:

- The sustainable management of Government Reserve Forests
- Forest production
- Nature conservation
- Watershed management
- Social forestry, including community and private forests
- Forest-based industry including wood-based and non-wood forest products
- Institutional arrangements

(4) Forest and Nature Conservation Act of Bhutan, 1995

This Act covers forest management, prohibitions and concessions in state forests, forestry leases, social and community forestry, the transportation and trade of forestry produce, protected areas, wildlife conservation, soil and water conservation and forest fire prevention. There were forestry leases for an area of 5,200 ha from 2008 to 2014.

(5) Forest and Nature Conservation Rules and Regulations of Bhutan, 2017

In exercise of the authority conferred by the Forest and Nature Conservation Act 1995, this document has been formulated and adopted to facilitate the implementation of forest management schemes. In this document, "Protected Area" shall mean an area, which has been declared to be a National Park, Conservation Area, Wildlife Sanctuary, Wildlife Reserve, Biological Corridor, Nature Reserve, Strict Nature Reserve, Research Forest, Heritage Forest, Critical Watershed or any other area, by the Government. Of the 10 types of Protected Area, National Parks, Wildlife Sanctuaries, Biological Corridors, Nature Reserves and Strict Nature Reserves had been actually established sofar.

(6) National Strategy for Community Forestry: The Way Ahead, 2010

This strategy is based on a thorough analysis of and reflection on the experience gained so far in Community Forestry, and on the overarching goal of the 10th Five-Year Plan, i.e., poverty reduction. The strategy is based on the following key principles.

- Community Forestry should balance conservation with sustainable utilisation
- Community Forestry should support decentralisation and devolution through empowerment of local communities
- Community Forestry should improve governance of Community Forests to improved forest conditions and equitable distribution of benefits
- Community Forestry should generate income for local communities through commercial harvesting of timber and NWFPs.
- Community Forestry should contribute to poverty reduction.
- Community Forestry should provide timber for rural construction.

It charts the way ahead to ensure that Community Forestry contributes to Bhutan's overall socioeconomic and environmental development goals and to local democratisation, thus guiding the future implementation of the Community Forestry programme.

(7) National Strategy for the Development of Non-Wood Forest Products in Bhutan 2008-2018, 2008

This strategy was developed with the aim of contributing to poverty reduction through NWFP development, while ensuring that NWFP resources are managed sustainably. The strategic plan follows the three guiding principles set out below.

- Policy, legal and regulatory frameworks should form the basis for further development of NWFP program.
- NWFP harvesting should be based on the principle of sustainability (resource availability and sustainable management principles).
- Resource utilisation should be community-based.

It describes the overall short-term and long-term objectives, followed by a more in-depth description of the strategic plan for each theme, including: legal framework, organisations and institutions, capacity building, NWFP resource management, marketing and trade and finally, research.

4.6 Livestock

4.6.1 Current Conditions and Organization of Livestock

(1) Current Conditions

1) Introduction

Livestock plays a vital role in Bhutan, particularly for Bhutanese farmers in rural areas. The various types of livestock serve diverse functions, ranging from being a source of food, fertilisers and raw materials for clothes, to being a labour force on farms and serving transportation purposes. Due to its mountainous terrain, large areas of the country can only be used for livestock production, and it is often the only economic activity available for highlanders. In other parts of the country, livestock is an integral component of a deeply-rooted farming system and one of the few means of asset creation.

2) Importance in the economy

The two tables below show the volume and import/export value of each livestock commodity from 2012 to 2017. Until 2011, no livestock commodities had been exported, but exports of three commodities, namely dairy products, live animals and meat, began in 2012.

Table 4.6.1 Volume and Export Value of Livestock Commodities (2012-2017)

Commodity	Volume (MT)						Value (BTN Millions)					
	2012	2013	2014	2015	2016	2017	2012	2013	2014	2015	2016	2017
Dairy Products	139	0	0.1	...	0.5	0.2	5.7	...	0.0	61.0	0.6	0.03
Live Animals (Thousands)	0	0	23	...	...	...	0.1	...	1.1	...	...	...
Meats	19	0	0	...	...	...	0.5	...	...	...	...	...

Source: Statistical Yearbook of Bhutan 2017/2018, National Statistics Bureau, RGoB

The volume and value of imports have been far greater than those of exports. Nearly 8,000 tons of dairy products alone were imported in 2014. Imports of both dairy products and fish are on the increase, while the import trends of the other four commodities have fluctuated, though there are missing data in recent years.

Table 4.6.2 Volume and Import Value of Livestock Commodities (2012-2017)

Commodity	Volume (MT)						Value (BTN Millions)					
	2012	2013	2014	2015	2016	2017	2012	2013	2014	2015	2016	2017
Dairy Products	4,358	6,206	7,807	1,480	...	1,510	603.3	1003.5	1246.3	820.2	...	578.8
Pork	1,890	2,314	2,165	...	...	1,870	225.5	312.7	312.7	...	...	276.7
Beef	3,906	4,429	3,740	...	...	3,120	427.3	547.8	501.4	...	...	447.6
Chicken	1	1,006	1,302	1,369	...	1,585	0.1	116.4	165.8	173.7	...	205.1
Fish	2,539	2,872	3,101	2,479	...	1,311	126.4	284.1	394.4	316.7	...	177.8
Mutton	61	83	33	...	...	34	11.2	15.6	8.4	...	...	10.9

Source: Statistical Yearbook of Bhutan 2017/2018, National Statistics Bureau, RGoB

In 2017, more than 9,400 tons of the six livestock commodities were imported, which amounted to over BTN 1.6 billion. The trade balance of livestock commodities has thus been in constant import surplus. Recently, the total amount of livestock import surplus seems to decrease due to the sharp drop of dairy products imports, but exports of livestock commodities have been still quite minimal.

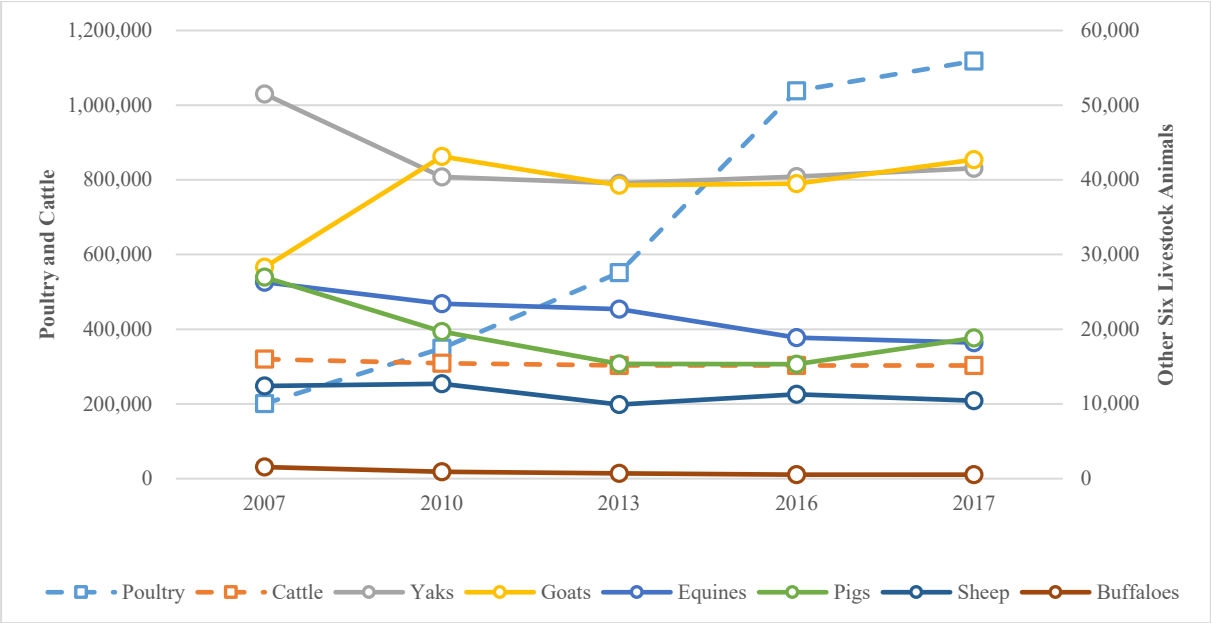
3) Population and production of livestock

The livestock statistics prepared by the Department of Livestock, MoAF, include population data on eight livestock animals, namely cattle, yaks, buffaloes, equines, pigs, poultry, sheep and goats. Of these, the poultry and cattle population are rather large, exceeding 300,000. Between 2007 and 2017, there was a fivefold increase in the poultry population, while the buffalo and horse populations decreased continually. The populations of other animals, with the exception of goats, did not vary much during the same period.

Table 4.6.3 Change in Livestock Populations by Type between 2007 and 2016

Type	Population (No.)					Population Trend (2007=100%)				
	2007	2010	2013	2016	2017	2007	2010	2013	2016	2017
Poultry	200,629	349,004	551,185	1,038,553	1,118,178	100%	174%	275%	518%	557%
Cattle	319,899	309,277	303,150	303,297	303,250	100%	97%	95%	95%	95%
Yaks	51,500	40,374	39,543	40,438	41,528	100%	78%	77%	79%	81%
Goats	28,300	43,134	39,264	39,513	42,689	100%	152%	139%	140%	151%
Equines	26,303	23,423	22,692	18,890	18,211	100%	89%	86%	72%	69%
Pigs	26,966	19,711	15,373	15,324	18,815	100%	73%	57%	57%	70%
Sheep	12,415	12,699	9,917	11,277	10,444	100%	102%	80%	91%	84%
Buffaloes	1,551	928	691	532	550	100%	60%	45%	34%	35%

Source: Livestock Statistics 2007, 2010, 2013, 2016 and 2017, Department of Livestock, MoAF



Source: Livestock Statistics 2007, 2010, 2013, 2016 and 2017, Department of Livestock, MoAF

Figure 4.6.1 Change in Livestock Populations by Type (2007-2017)

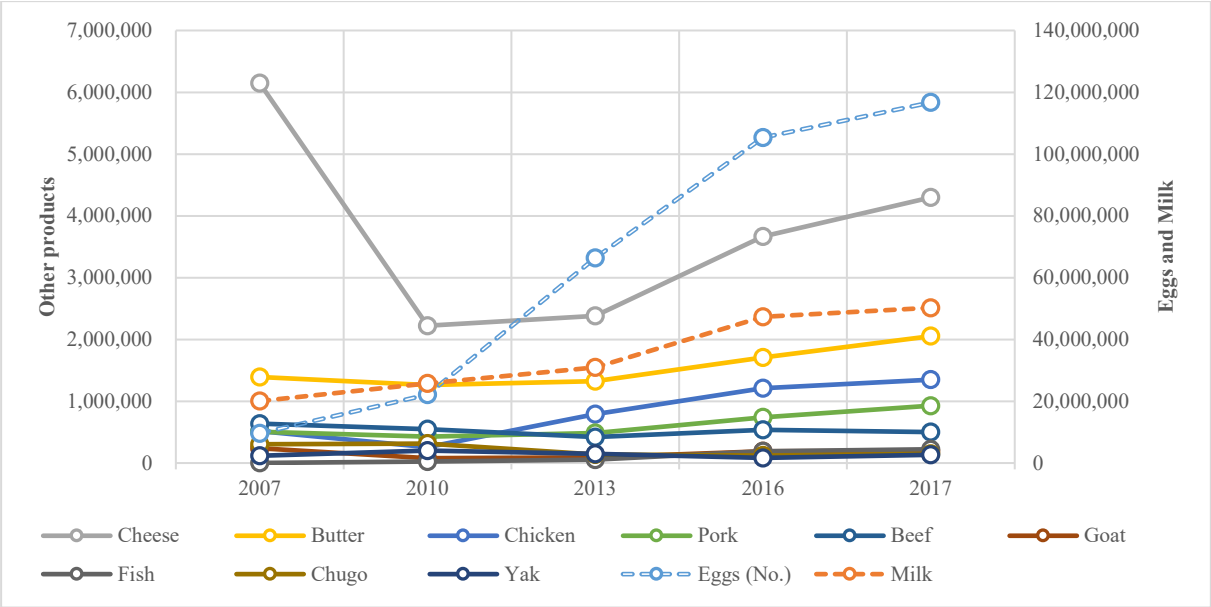
Changes in the volume of dairy and meat products produced has also been recorded for the same period. Egg production has increased almost twelvefold in the last ten years. Poultry population increased fivefold during the same period, so this improvement in productivity seems to have contributed to the twelvefold expansion in egg production. Of the 10 dairy and meat products (except eggs), milk is produced in the largest volumes (ranging from 20,000 to 50,250 tons) throughout the period. Its production volume also more than doubled during the period, even though the cattle population did not increase, as indicated above. Fish production was low during the period, but its production increase rate is remarkable, with more than 160 times more produced in 2017 as compared to 2007.

Table 4.6.4 Changes in Livestock Production by Product between 2007 and 2017

Product	Production (kg, Excluding Eggs)					Production Trend (2007=100%)				
	2007	2010	2013	2016	2017	2007	2010	2013	2016	2017
Eggs (No.)	9,629,748	22,145,790	66,374,262	105,346,207	116,707,124	100%	230%	689%	1094%	1212%
Milk	20,059,360	25,719,910	30,920,261	47,270,328	50,250,504	100%	128%	154%	236%	251%
Cheese	6,146,410	2,222,400	2,382,436	3,664,557	4,298,041	100%	36%	39%	60%	70%
Butter	1,393,660	1,262,450	1,322,285	1,708,703	2,052,949	100%	91%	95%	123%	147%
Chicken	514,870	256,800	788,661	1,208,711	1,348,760	100%	50%	153%	235%	262%
Pork	506,610	427,400	485,217	740,245	928,226	100%	84%	96%	146%	183%
Beef	637,650	546,920	420,499	536,806	500,724	100%	86%	66%	84%	79%
Goat	238,870	78,460	90,349	191,221	194,541	100%	33%	38%	80%	81%
Fish	1,340	23,120	54,661	187,631	222,518	100%	1725%	4079%	14002%	16606%
Chugo*	303,126	314,280	137,972	121,270	147,776	100%	104%	46%	40%	49%
Yak	116,580	201,700	148,333	83,055	134,265	100%	173%	127%	71%	115%

Note: Chugo is a type of hard cheese.
Source: Livestock Statistics 2007, 2010, 2013, 2016 and 2017, Department of Livestock, MoAF

On the other hand, the production of certain dairy products decreased, such as cheese and Chugo (a hard cheese). By 2017, beef and goat production had not recovered to 2007 levels. The production of yak meat fluctuated during the period from 2007 to 2017.



Source: Livestock Statistics 2007, 2010, 2013, 2016 and 2017, Department of Livestock, MoAF

Figure 4.6.2 Changes in Livestock Production by Product between 2007 and 2017

In the 11th Five-Year Plan for the RNR sector (2013-2018) prepared by the MoAF, production targets for 2018 were set for several livestock products. Together with the 2017 production data, these targets are summarized below.

Table 4.6.5 Production Targets in 2018 for Livestock Products

Product	Milk (MT/year)	Eggs (millions/year)	Chicken (MT/year)	Pork (MT/year)	Fish (MT/year)	Beef (MT/year)
(a) Target in 2018	40,000	92	1,200	1,000	750	600
(b) Production in 2017	50,250	116.7	1,349	928	223	501
(c) Percentage (b/a)	126%	127%	112%	93%	30%	84%

Source: 11th Five-Year Plan for the RNR sector (2013-2018), MoAF
Livestock Statistics 2017, Department of Livestock, MoAF

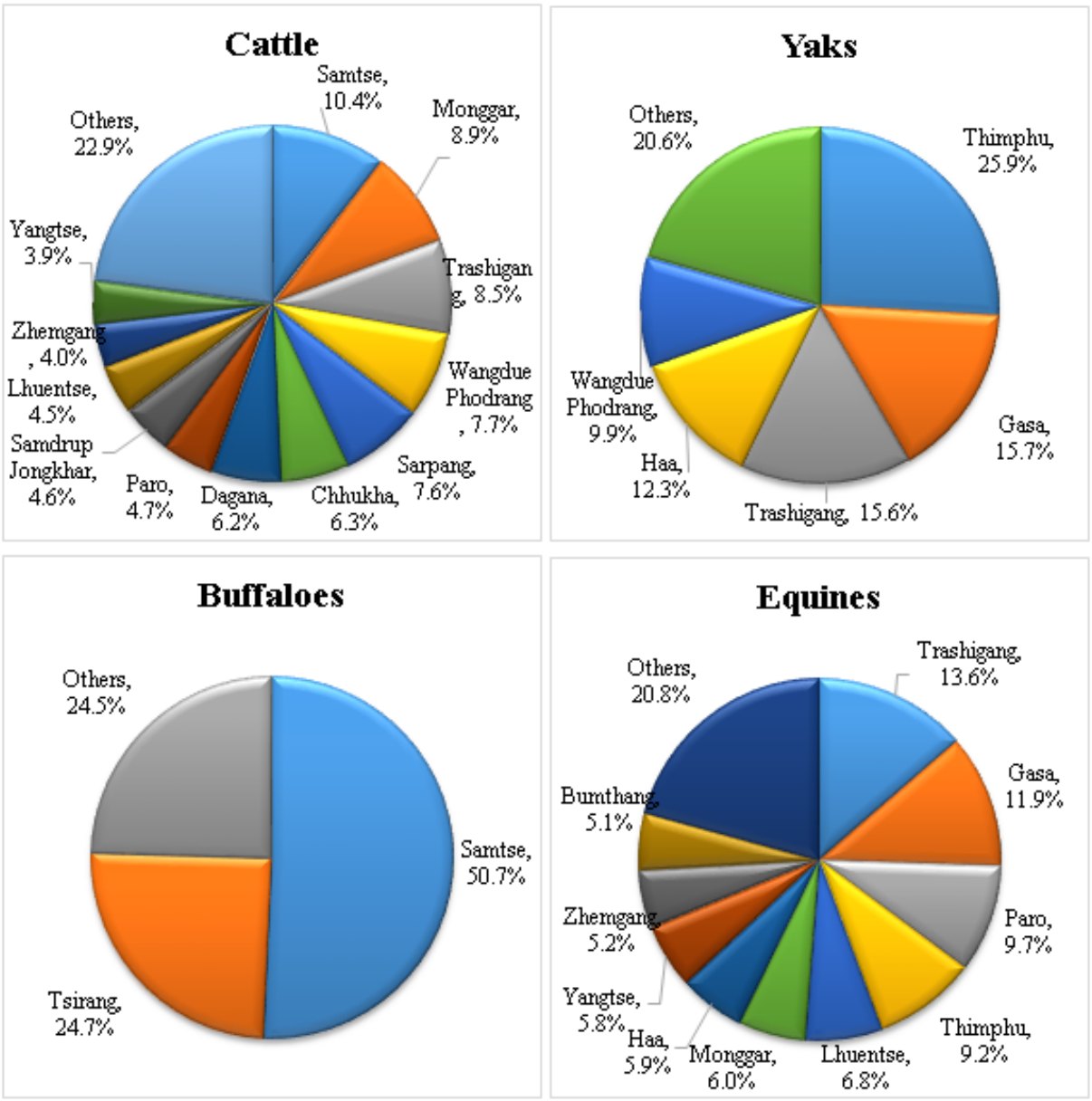
Of the six livestock products, three of them (milk, eggs and chicken) have already hit the 2018 production targets stipulated by the plan. Beef and pork production came close to these targets, while fish production was still far lower than the target at 30%.

In the Bhutan RNR Statistics 2015 prepared by the MoAF, the recent self-sufficiency rates of dairy products are shown for the last three years (2012-2014). The three-year average self-sufficiency rate of milk is 64.1%, followed by butter (82.6%) and cheese (72.5%). The self-sufficiency rate of eggs has been at 100% since 2012. The average self-sufficiency rate of goat production was 62.0% over the last three years (2012-2014), while that of chicken was 47.4%, that of pork was 16.3%, that of beef was 13.3% and that of fish was 2.7%.

4) Livestock distribution by region

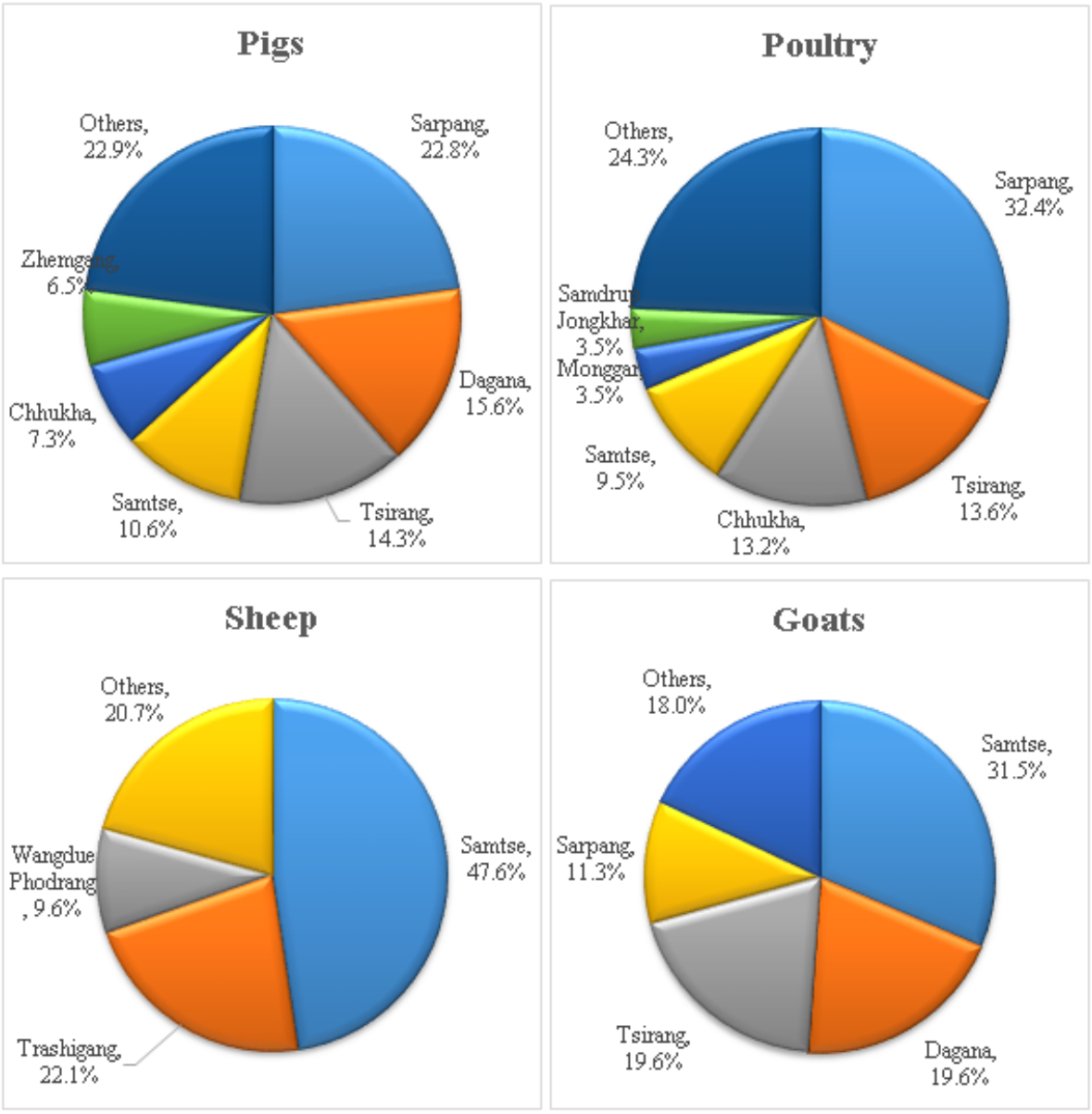
The population distributions of each livestock animal across the Dzongkhags in 2017 are shown in pie charts, below. Cattle (including mithun and *Bos frontalis*) and equines (including horses, mules and donkeys) are widely distributed in many Dzongkhags, but other animals are unevenly distributed. For instance, yaks are mainly kept in Thimphu, Gasa, Trashigang, Haa and Wangduephodrang. More than 80% of buffaloes are only raised in Samtse and Tsirang. It is assumed that these uneven distributions are mainly the result of the optimal natural conditions suited to each animal.

The distribution patterns of small and medium size livestock, such as pigs, poultry, sheep and goats, differ for each animal. Nearly a quarter of pigs are found in Sarpang and another five Dzongkhags (Dagana, Tsirang, Samtse, Chhukha and Zhemgang) contain half of the pig population. Hence, more than 75% of pigs are raised in these six Dzongkhags. More than 75% of sheep are distributed in the three Dzongkhags of Samtse, Trashigang and Wangduephodrang. Goats are mainly raised in Samtse (32%), Dagana (20%), Tsirang (20%) and Sarpang (11%); these four Dzongkhags contain 82% of Bhutan's goats. In general, small and medium size livestock are mainly raised in southern Dzongkhags.



Source: Livestock Statistics 2017, Department of Livestock, DoAF

Figure 4.6.3 Distribution of the Large Livestock Population by Dzongkhag in 2017



Source: Livestock Statistics 2017, Department of Livestock, DoAF

Figure 4.6.4 Distribution of the Small/Medium Livestock Population by Dzongkhag in 2017

In the following table, the percentage of each livestock animal in each Dzongkhag, as calculated in 2017, is compared to livestock populations in 2007. From 2007 to 2017, a significant increase in the poultry was observed in all of the Dzongkhags, particularly Sarpang and Thimphu where it became more than 10 times higher. As a result, the poultry population increased fivefold across the whole country. In Sarpang, the pig population doubled, making it the top Dzongkhag in terms of the pig population. The same thing was observed in Samtse for sheep and goats. The cattle population in Gasa increased by 215% in 2017 as compared to 2007, but Gasa is not ranked in the top five Dzongkhags in terms of cattle population. The major Dzongkhags for cattle population were Samtse and Monggar, where it decreased by more than 10%. The yak population in Yangtse and Trongsa increased very much in this decade, but it didn't increase much in the most populated Dzongkhags.

Table 4.6.6 Livestock Population in 2017 as a Percentage of 2007 Levels by Livestock Animal and by Dzongkhag

Dzongkhag	Cattle	Yaks	Buffaloes	Equines	Pigs	Poultry	Sheep	Goats
Bumthang	107%	**115%**	0%	65%	1300%	792%	15%	20%
Chhukha	61%	NR	17%	71%	**26%**	**960%**	45%	**51%**
Dagana	126%	NR	133%	78%	**134%**	181%	22%	**211%**
Gasa	215%	**54%**	NR	**172%**	0%	301%	0%	NR
Haa	98%	**105%**	NR	77%	11%	272%	0%	36%
Lhuentse	98%	73%	NR	66%	23%	285%	41%	113%
Monggar	**86%**	NR	NR	**42%**	13%	203%	5%	14%
Paro	94%	62%	NR	**110%**	35%	175%	NR	28%
Pemagatshel	95%	NR	NR	33%	52%	441%	0%	30%
Punakha	118%	NR	NR	57%	18%	291%	NR	562%
Samdrupjongkhar	81%	NR	27%	36%	43%	446%	54%	427%
Samtse	**88%**	NR	**43%**	170%	**116%**	**338%**	**183%**	**246%**
Sarpang	**111%**	NR	31%	156%	**207%**	**1278%**	106%	158%
Thimphu	83%	**107%**	NR	**127%**	16%	**1150%**	3%	176%
Trashigang	**90%**	**55%**	NR	**58%**	17%	170%	77%	222%
Yangtse	100%	181%	0%	64%	12%	523%	**128%**	178%
Trongsa	118%	314%	NR	44%	8%	201%	17%	354%
Tsirang	97%	NR	**74%**	39%	**168%**	**956%**	20%	**169%**
Wangduephodrang	**117%**	141%	NR	39%	45%	533%	**56%**	26%
Zhemgang	89%	NR	NR	50%	96%	348%	0%	13%
Total	95%	81%	35%	69%	60%	532%	80%	150%

Note: Figures of more than 150% are highlighted and the highly populous Dzongkhags are shown in bold.
NR = No Record

Source: Livestock Statistics 2007 and 2017, Department of Livestock, MoAF

In both Pemagatshel and Zhemgang, there was no increase in livestock population between 2007 and 2017 (with the exception of poultry) and they are not ranked as highly populous Dzongkhags for any livestock animals. This may imply that livestock activities in these two Dzongkhags are more subsistence-oriented than in some of the others. In contrast, the livestock populations of four animals increased by over 150% in Samtse (goats - 246%, poultry - 338%, sheep - 183% and equines - 170%), and it is ranked as highly populated Dzongkhag for six livestock animals (cattle, buffaloes, pigs, poultry, sheep and goats). Hence, Samtse seems to be one of the most active livestock production areas in Bhutan.

5) The role of livestock in Bhutan

Bhutan practices a variety of livestock activities. Dairy farming is one of the most significant activities because dairy products, especially butter and cheese, are important components of the Bhutanese diet. More recently, they have also become an important source of cash for some households. The major features of dairy farming are listed below.

i) The population of crossbred cattle (i.e., those crossed with exotic breeds) had increased by over 100% by 2000, whereas the indigenous cattle population and the overall cattle population decreased. There was a steady increase in the country's total milk production, which was mainly due to the increased number of crossbred cattle. However, domestic demand is still not being met by domestic production.
ii) Although the predominant local cattle breed in Bhutan, Siri, is a poor milk producer, it has survived over the centuries as a result of its adaptability to different agroecological systems, its resistance to disease and its usefulness as a draught animal.

iii) Large-scale livestock farming (over 50 cattle) is still rare and dairy farming is mainly practiced by smallholders. However, smallholder dairy farming plays an economically, environmentally and socially important role in the livelihoods of rural Bhutanese.

Finally, it is worth mentioning that livestock functions as a safety mechanism in case of food shortages, because people often sell their livestock in a lean year to get some cash income to buy food. According to the Agriculture Statistics 2014 (DoA, MoAF), the sale of livestock products is the second most popular countermeasure to cope with food shortages after off-farm activities.

(2) Organization

The Department of Livestock (DoL) under the Ministry of Agriculture and Forestry (MoAF) is the organisation responsible for the public administration of livestock in Bhutan. Its vision and mission statements are shown below.

Vision: To attain food security and self-sufficiency in livestock products through enhanced rural livelihoods to alleviate poverty.
Mission: To increase livestock productivity by ensuring prompt delivery of appropriate technologies and services through commodity based approach.

Source: http://www.moaf.gov.bt/agencies/department-of-livestock/dol-about-us/

To accomplish the mission statement, the DoL has four divisions and regional livestock development centres, as shown above (see Figure 4.4.9 and Table 4.4.31). Of the five object-oriented organisations under the DoL, two are summarised below.

Table 4.6.7 Summary of Two of the DoL's Object-Oriented Organisations

Name	Summary of the Organisation
National Centre for Animal Health	Started in 1978 and located in Babesa, Thimphu. National focal agency for all matters related to animal health in the country. Composed of four major units: the Laboratory Services Unit, the Disease Prevention and Control Unit, the Drugs, Vaccines and Equipment Unit and the Biological Production Unit.
National Centre for Aquaculture	Established in 1984 and located in Gelephu. It employs 20 technical staff plus 20 supporting staff. The centre hatches six exotic carp species and one local fish variety to provide fingerlings to about 600 fishermen across the country. It also provides them with various technical services.

Source: http://www.ncah.gov.bt/bg.php and site survey

As of April 2015, the Department has a total of 817 staff, who represent 22% of the total staff employed by the MoAF, making it the third largest department after the DoFPS (1,591 staff) and the DoA (819 staff). Of the 817 staff members employed by the DoL, 404 (49.4%) of them are officers stationed across the 20 Dzongkhags, an increase from 395 in 2012. A detailed distribution of the DoL's staff is shown below.

Table 4.6.8 Distribution of DoL Staff across the 20 Dzongkhags by Sex

Dzongkhag	Bumthang	Chhukha	Dagana	Gasa	Haa	Lhuentse	Monggar
Male	14	17	19	7	13	17	21
Female	0	2	1	0	4	1	5
Total	14	19	20	7	17	18	26
Dzongkhag	Paro	Pemagatshel	Punakha	Samdrupjongkhar	Samtse	Sarpang	Thimphu
Male	23	22	22	19	24	19	15
Female	2	0	1	1	2	3	6
Total	25	22	23	20	26	22	21
Dzongkhag	Trashigang	Yangtse	Trongsa	Tsirang	Wangduephodrang	Zhemgang	BHUTAN
Male	28	12	13	20	23	18	366
Female	2	2	1	0	4	1	38
Total	30	14	14	20	27	19	404

Note: The top five Dzongkhags are highlighted.
Source: Bhutan RNR Statistics 2015, Policy and Planning Division, MoAF

Ninety-one percent of the DoL staff stationed in the Dzongkhags are male, while less than 10% are female. Of the 20 Dzongkhags, 30 DoL staff members have been assigned to Trashigang, followed by Wangduephodrang with 27, Samtse with 26 and Monggar with 26. Trashigang raises the second largest populations of cattle, yaks and sheep of the 20 Dzongkhags, while Wangduephodrang does not have very high livestock populations, with the exception of cattle (fourth highest of the 20 Dzongkhags) and sheep (third highest). However, it has the largest territorial area in Bhutan (4,035.65 km^2, 10.4%) and contains 15 Gewogs, which may be why it has the second largest number of DoL staff. As pointed out above, Samtse is one of the most active Dzongkhag for livestock production, so number of DoL staff stationed there is also large.

4.6.2 Policies and Programmes for Livestock

(1) The 11th Five-Year Plan (2013-2018)

In Bhutan, livestock is regarded as a subsector of the renewable natural resources (RNR) sector. The current 11th Five-Year Plan (2013-2018) emphasises the necessity of transforming the RNR sector into a commercially viable sector that provides higher returns to farmers, improves rural livelihoods, reduces imports and promotes exports, and offers attractive employment opportunities to young people. To achieve this goal, the Plan proposes the gradual transition from subsistence to commercial production through the introduction and application of technologies that improve crop, forest and livestock productivity (11th Five-Year Plan 2013-2018, p. 174).

(2) The 11th Five-Year Plan for the RNR Sector (2013-2018)

According to the 11th Five-Year Plan for the RNR Sector, the "optimisation and effective utilisation of resources to enhance productivity and production" is regarded as one of the most important strategies to achieve the various challenges facing the RNR sector, including: (1) food security, (2) poverty reduction, (3) the transformation of agriculture from subsistence to commercial farming, (4) markets and (5) the efficient use of inputs. The strategy outlines four prioritised livestock issues: (1) livestock management, (2) animal health, (3) feed and fodder and (4) the management and utilisation of natural resources. The five priority livestock commodities in the 11th Five-Year Plan for the RNR Sector are dairy products, eggs, pork, poultry and fish.

(3) Livestock Act of Bhutan, 2001

This Act aims to ensure that only appropriate and acceptable livestock, poultry and fish breeds can be introduced in the country, and makes provisions for the regulation of livestock breeding, health and production, the sale of animals, animal products, feed, drugs and other inputs necessary for enhancing livestock production.

(4) Bhutan's Livestock Breeding Policy, 2009

In 1985, a detailed study of the Government's livestock breeding policy was carried out. After a thorough discussion of all of its relevant aspects, Bhutan's first livestock breeding policy was formulated at the beginning of the Seventh Five-Year Plan period. The document was very comprehensive and farsighted; indeed, many of the policies framed during that period are still in force. It was inevitable that a new livestock breeding policy would need to be drafted to encompass the changes in livestock development and farmers' perceptions that have occurred over the past one and a half decades. In essence, this document makes a humble effort to redefine Bhutan's livestock breeding policies into a form suited to the current needs and which is able to adapt to future trends.

The current revised livestock breeding policy is the result of numerous deliberations at various forums and group discussions with a range of professionals. It covers: (1) cattle and mithun breeding for draught animals, manure and milk, (2) cattle breeding for dairy production, (3) yak breeding for dairy, meat, draught animals and fibre, (4) buffalo breeding for milk, draught animals and manure, (5) sheep and goat breeding, (6) pig breeding for pork, (7) chicken breeding for eggs and meat, (8) equines and equine breeding and (9) fish breeding.

(5) Livestock Rules and Regulations of Bhutan, 2008

This document aims to protect the environment, as well as the health and life of animals and humans, from the risks inherent in the entry, establishment and spread of exotic pests and diseases in Bhutan. It aims to strengthen the control and eradication of animal pests and diseases already present in the country, to ensure the quality and safety of animal healthcare services and genetic resources, as well as to facilitate the conservation and sustainable use of animal genetic resources, to protect and promote animal welfare and to ensure the quality and safety of food of animal origin.

4.7 Industry

4.7.1 Current Conditions and Organization of Manufacturing

(1) Current Conditions

1) Overall view of Bhutanese industry

Industries in Bhutan include a whole range of industrial sectors implemented by businesses in all fields, including mining, manufacturing, wholesale/retail trade and other service industries. Of these industries, mineral-, agro-, forest- and wood-based industries are major industries in Bhutan. These major industries are not labour-intensive, but they are capital-intensive. The industrial sector has, until recently, played a relatively minor role in the economy in terms of its contribution to the GDP and the creation of jobs. The share of firms operating in small and cottage industries is more than 90% and are therefore dominant in Bhutan, as shown by Table 4.7.1. On the other hand, the share of large- and medium-sized firms is very small. This trend has not changed for several years.

The scale of the industry is determined by the size of its capital investment and the number of people it employs. An investment of less than one million BTN or employing between one and four people is defined as Cottage. An investment of between one and 10 million BTN or employing between five and 19 people is defined as Small. An investment of between 10 and 100 million BTN or employing between 20 and 99 people is defined as Medium.

Table 4.7.1 Size of Firms[11] in Bhutan

Firm Size	2012		2013		2014	
	Number	%	Number	%	Number	%
Large	141	0.4	162	0.4	177	0.4
Medium	240	0.6	268	0.7	296	0.7
Small	3,014	8.1	3,053	7.6	3,659	8.5
Cottage	21,210	56.9	23,324	58.4	25,156	58.8
Other (Contract)	12,677	34.0	13,144	32.9	13,511	31.6
Total	37,282	100	39,951	100	42,799	100

Source: Statistical Yearbook of Bhutan, 2016

Currently, Bhutanese industry is dominated by a few major mineral-based manufacturing firms, as well as a large number of smaller firms in the fields of handicrafts, food processing, construction, wood and paper processing. As the statistics show, the number of industrial establishments increased between 2012 and 2015, although the total number decreased in 2015 mainly due to the decline of the construction sector. The service and trade sectors are the main industrial sectors in Bhutan. As the table shows, the production and manufacturing sector is not yet fully developed and therefore occupies a relatively small share.

Table 4.7.2 Number of Industrial Establishments by Sector

Sector	2012		2013		2014		2015	
	Number	%	Number	%	Number	%	Number	%
Production and Manufacturing	2,240	4.0	2,485	4.0	2,823	4.0	2,073	3.7
Services	22,365	39.4	24,322	39.1	26,465	37.9	18,067	32.5
Contract	12,677	22.4	13,144	21.0	13,511	19.3	4,298	7.7
Trade	19,423	34.2	22,331	35.9	27,048	38.8	31,150	56.1
Total	56,705	100.0	62,282	100.0	69,847	100.0	55,588	100.0

Source: Statistical Yearbook of Bhutan, 2016

Table 4.7.3 below shows the number and type of operational industrial licenses in each Dzongkhag. The number of companies listed is small compared to the previous table, since it only counts operational industrial licenses. One third of Bhutan's total companies have chosen to operate in Thimphu. In particular, 46.5% of companies in the service sector operate in Thimphu. 43.4% of companies in the production and manufacturing sector operate in Chhukha, as many projects related to hydropower construction are based, as well as Pasakha Industrial Estate on the border with India. While western regions such as Thimphu, Chhukha and Paro are home to active operational companies, there is less economic activity in other regions. Strictly speaking, Gasa, Dagana, Tsirang, Lhuentse, Haa and Zhemgang have less than 10 companies each. There are huge regional gaps in terms of industrial development between the western region and other regions. Industrial firms are highly concentrated in the four Dzongkhags of Thimphu, Chukka, Sarpang and Paro, regardless of firm size. In particular, Thimphu has highest

[11] The scale of the industry is determined by the size of its capital investment and the number of people it employs. Cottage: an investment of less than BTN one million or employing between one and four people; Small: an investment of between BTN one and 10 million or employing between five and 19 people; Medium: an investment of between BTN 10 and 100 million or employing between 20 and 99 people.

number of firms. There are great differences between economically active Dzongkhags and other Dzongkhags.

Table 4.7.3 Operational Industrial Licenses, as of June 2016

Dzongkhag	Type of Economic Activity							
	Production and Manufacturing		Services		Construction		Total	
	Number	%	Number	%	Number	%	Number	%
Bumthang	1	0.6	15	6.1	10	3.0	26	3.5
Chhukha	75	43.3	15	6.1	32	9.9	122	16.5
Dagana	3	1.7	0	0.0	4	1.2	7	0.9
Gasa	0	0.0	0	0.0	0	0.0	0	0.0
Haa	0	0.0	2	0.8	7	2.1	9	1.2
Lhuentse	0	0.0	0	0.0	9	2.8	9	1.2
Monggar	5	2.9	4	1.6	21	6.4	30	4.0
Paro	5	2.9	39	16.0	10	3.0	54	7.2
Pemagatshel	10	5.8	2	0.8	11	3.4	23	3.1
Punakha	0	0.0	16	6.6	5	1.5	21	2.8
Samdrupjongkhar	9	5.2	7	2.9	13	4.0	29	3.9
Samtse	21	12.1	2	0.8	10	3.0	33	4.4
Sarpang	8	4.6	6	2.5	25	7.6	39	5.2
Thimphu	18	10.4	114	46.5	110	33.6	242	32.5
Trashigang	1	0.6	3	1.2	26	7.9	30	4.0
Yangtse	2	1.2	0	0.0	9	2.7	11	1.5
Trongsa	4	2.3	4	1.6	13	4.0	21	2.8
Tsirang	0	0.0	2	0.8	2	0.6	4	0.5
Wangduephodrang	10	5.8	13	5.3	6	1.8	29	3.9
Zhemgang	1	0.6	1	0.4	5	1.5	7	0.9
Total	173	100.0	245	100.0	328	100.0	746	100.0

Source: Department of Industry, Ministry of Economic Affairs

2) Production and manufacturing

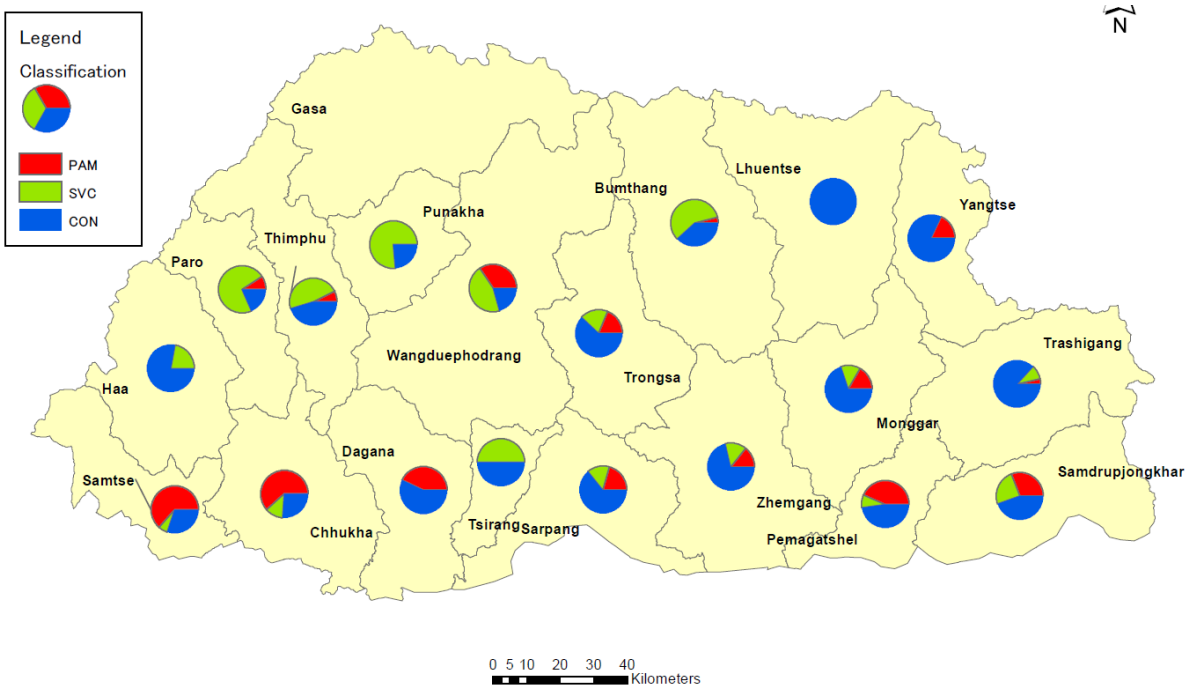
The production and manufacturing industrial sector are extracted from the previous Table. There are four subsectors in the manufacturing sector, which are agro-based, forest-based, mineral-based and other. Almost all production and manufacturing companies are located in Chhukha, Samdrupjongkhar, Samtse and Sarpang southern Bhutan, which neighbour the border with India and are where Bhutan's industrial estates are located. Pemagatshel and Wangduephodrang have a lot of mineral-based companies due to the availability of mineral resources in these Dzongkhags. Mineral-based industries dominate the production and manufacturing sector, followed by agro-based and forest-based industries. Number of other in Chukha is relatively high due to the existence of other manufacturing sectors such as daily necessities in Pasakha industrial estate, and the function of the commercial hub.

Table 4.7.4 Production and Manufacturing Subsectors, as of June 2016

Dzongkhag	Agro-Based	Forest-Based	Mineral-Based	Other	Total
Bumthang	0	0	1	0	1
Chhukha	19	5	9	42	75
Dagana	0	0	2	1	3
Gasa	0	0	0	0	0
Haa	0	0	0	0	0
Lhuentse	0	0	0	0	0
Monggar	1	0	3	1	5
Paro	1	0	3	1	5
Punakha	0	0	0	0	0
Pemagatshel	0	0	7	3	10
Punakha	0	0	0	0	0
Samdrupjongkhar	1	2	6	0	9
Samtse	7	0	9	5	21
Sarpang	4	1	3	0	8
Thimphu	3	4	6	5	18
Trashigang	1	0	0	0	1
Yangtse	0	0	2	0	2
Trongsa	0	0	3	1	4
Tsirang	0	0	0	0	0
Wangduephodrang	1	0	8	1	10
Zhemgang	0	0	1	0	1
Total	38	12	63	60	173

Source: Department of Industry, Ministry of Economic Affairs

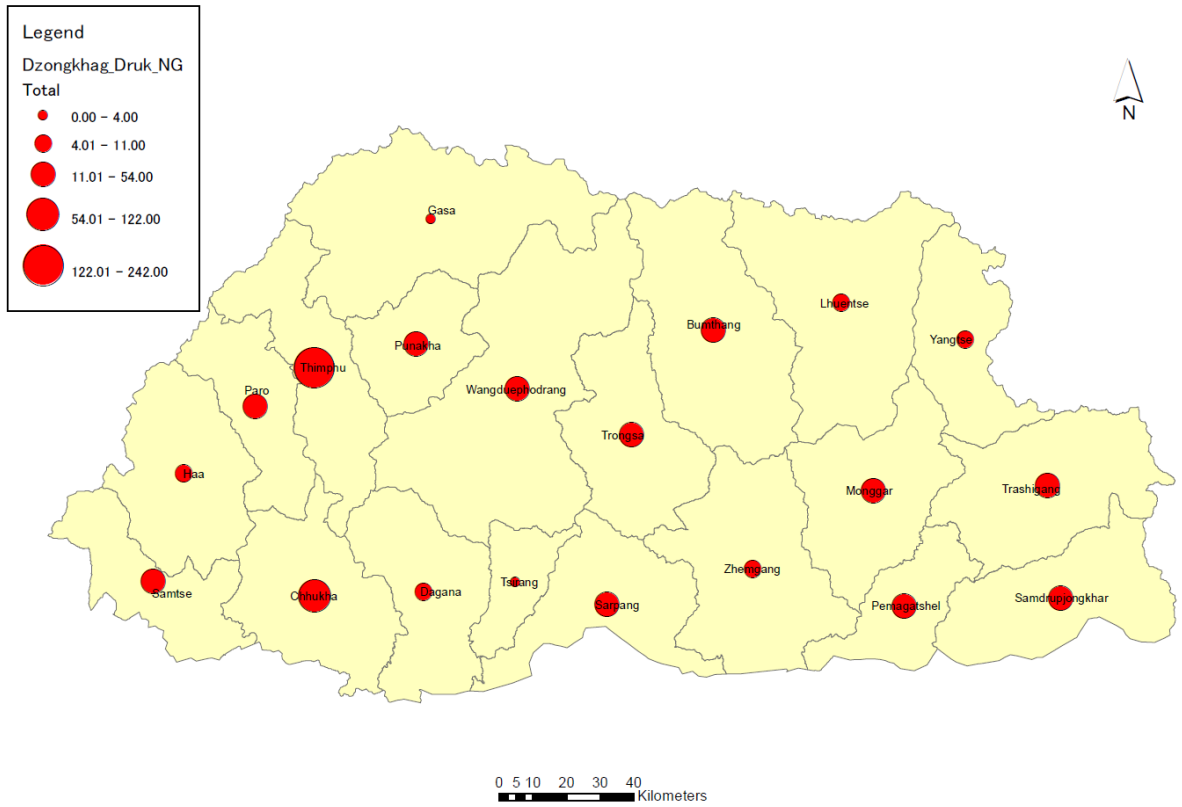
Figure 4.7.1 visually represents the presence of industrial sectors in each Dzongkhag. It indicates that the services sector is popular in western Bhutan, such as in Paro, Thimphu and Punakha. The construction sector is a mainstream sector in the east and in Haa, where there are many remote areas, although the actual number of companies is very small in these areas. The south is home to an active production and manufacturing sector, especially in Chhukha and Pemagatshel.



*PAM: Production and Manufacturing, SVC: Services, CON: Construction
Source: Department of Industry, Ministry of Economic Affairs

Figure 4.7.1 Operational Industrial Licenses by Classification

The total number of operational industrial licenses is summarized in Figure 4.7.2. Basically, this figure visually represents the number of operational industrial companies in each Dzongkhag. This figure clearly shows that Dzongkhags such as Gasa, Tsirang, Lhuentse and Yangtse, which are located in remote and less populated areas, have less operational industrial companies.



Source: Department of Industry, Ministry of Economic Affairs

Figure 4.7.2 Total Number of Operational Industrial Licenses

3) Major industrial products

According to the trade statistics, the main Bhutanese industrial products are mineral-based products such as ferrosilicon, semi-finished iron products, cement and calcium carbide, which are mainly produced in the industrial estates. The agro-based industry produces canned fruits, vegetable juice, jams and pickles, mainly for the domestic market. Forest-based industries are mainly composed of small-scale industries, sawmills, furniture workshops and veneer board firms. The products produced include furniture, fruit boxes, veneer, plywood, blockboard and wooden handicrafts.

4) Market

All products exported must go through India, due to geographical and political limitations. Most mineral-based products, as Bhutan's major industrial products, are exported to India, followed by Bangladesh and other countries. A very limited number of products are exported to other countries such as the Netherlands, the United States of America, Germany and Japan.

5) Industrial estates

The 11th Five-Year Plan, suggests a development plan for Bhutan's industrial estates in order to achieve economic expansion and to enhance diversification. Bhutan clearly identifies its southern areas as its industrial hub for trade, transport, storage and manufacturing. The Department of Industry (DoI) of the Ministry of Economic Affairs (MoEA) is responsible for the development and management of industrial estates in cooperation with other ministries. When identifying the location of a new industrial estate, the Ministry of Home and Cultural Affairs will look into it and suggest a plan to protect cultural and historical places of interest.

Currently, Pasakha Industrial Estate operates in the mineral-based, agro-based and heavy industries. Heavy industry causes pollution and is recognized as an environmental problem. Motanga Industrial Estate in Samdrupjongkhar mainly produces silicon. The biggest cement factory in Bhutan is located in Nganglam, Pemagatshel, although it is not part of the industrial estate by DOI. Additionally, there is the aggregation area of minieral based industry in Gomus, Samtse. On the whole, factories produce agro-based, mineral-based and forest-based products at operating industrial estates and export to them to India and Bangladesh. Table 4.7.5, below, shows the current situation of industrial estates. Almost all of the companies operating in these estates are from Bhutan. For instance, there are just three joint venture companies of the 33 companies operating in Pasakha Industrial Estate. Of these three joint venture companies, two are from India and the other is from Nepal. One hundred foreign-invested companies are not allowed to operate in Bhutan.

Table 4.7.5 Current Situation of Industrial Estates

Name	Dzongkhag	Acreage	Status	Type of Industry
Bjemina	Thimphu	32.750	Operational	Food and agro-based
Pasakha	Chukka	188	Operational	Mineral-based, agro-based, forest-based
Motanga	Samdrupjongkhar	155.568	Semi operational	Mineral-based, agro-based, forest-based
Jigmeling	Sarpang	755.550	Under preparation	Food- and agro-based, forest-based, mineral-based
Dhandhum	Samtse	349.070	Under preparation	Food, Agro-based, (Green Industry)
Bondeyma	Monggar	110.340	Under preparation	Food- and agro-based, forest-based, mineral-based

Source: Department of Cottage and Small Industry, Ministry of Economic Affairs

(2) Organization

1) Ministry of Economic Affairs

The Ministry of Economic Affairs (MoEA) is responsible for the formulation and planning of policies and the proper management of the country's economy. The MoEA is composed of several technical departments, the most important of which from an industrial point of view are the Department of Industry (DoI) and the Department of Cottage, Small and Medium Industry (DoCSMI).

The DoI is entrusted with the responsibility of fostering sustainable industrial development in harmony with the nation's objectives and priorities. Accordingly, its functions are promotional as well as regulatory in nature, covering the industrial sectors classified broadly under manufacturing and services. The Royal Government of Bhutan (RGoB) focuses on industrialization through private sector development. The DoI is responsible for the creation of an enabling environment for industrial development, including industrial estate development and support for private sector initiatives. The regulatory services that it provides include the implementation of rules and regulations to manage the industrial sector, so as to promote integration and links with other sectors.

2) Ministry of Labour and Human Resources

The mission of the Ministry of Labour and Human Resources (MoLHR) is "to facilitate the development of human resources in order to promote economic development and to ensure gainful employment for the entire Bhutanese workforce". To this end, the efforts of the Department of Employment (DoE) under the MoLHR are focused on the promotion of employment. The DoE is the main department responsible for spearheading the functions

inherent in and the mandate of promoting entrepreneurship and self-employment in Bhutan.

3) Druk Holdings and Investments

Druk Holdings and Investments (DHI) is a government-owned holding company established by the RGoB. The primary purpose of DHI is to hold and manage commercial companies on behalf of the Government, to make new investments, raise funds and promote private sector development.

4) Business associations

Business associations are essential stakeholders as far as industrial development is concerned. Many business associations exist, focusing on various areas and with different memberships and capacities. It should be noted that the Bhutan Chamber of Commerce and Industry (BCCI) has taken a strong role in advocating the RGoB to change its policies and regulations to encourage economic development. There are 11 business chambers or associations by type of industry, including the BCCI.

4.7.2 Industrial Policies and Programmes

(1) Economic Development Policy

The revised Economic Development Policy (EDP), which was published in June 2016, provides the highest level of "strategic direction" to ensure that the economy takes centre stage in development initiatives. The EDP specifies priority sectors, also known as the five jewels, which are hydropower, cottage and small industries, mining, tourism and agriculture. Overall, it contains 10 industrial policies for industries. Brief summaries of these policies are given below.

- An enabling environment shall be created through the adoption of policies and regulations that promote investments.
- Designated areas shall be identified and developed for the establishment of industries. At the same time, the establishment of industries outside of these designated industrial areas shall be permitted based on the land use plan and/or environmental clearance.
- Business infrastructure shall be developed to encourage investments and exports.
- National standards shall be developed and enforced to foster the recognition of industrial products.
- All industries must strictly abide by environmental laws.
- Industrial estates shall be removed from restricted areas by the Ministry of Home and Cultural Affairs.
- The RGoB shall allow industries to import used but certified non-polluting machines that meet the minimum energy efficiency standards.
- The MoEA shall promote the development of assembly line production systems in order to promote manufacturing in the country.
- The RGoB shall implement the amended Companies Act as a priority.

(2) Programme

The flagship programme in the 11th Five-Year Plan, which aims to promote economic growth and to achieve the objective of self-reliance, is the Rapid Investments in Selected Enterprises programme, which includes priority sectors. Some of its key programmes are as follows.

1) The promotion of exports and market access

This programme aims to strategically enhance Bhutan's export capacity and to leverage its comparative advantages to build our competitiveness in the international market through the promotion of exports and marketing, as well as to facilitate exports by integrating into the regional and international trading environment.

2) The promotion of sustainable and environmentally-friendly industrial development

This will focus on the development of industrial estates to encourage private sector development and to enhance regional socioeconomic activity. To promote balanced regional development and to enhance the rural economy, some industrial estates will be developed and established in Bondeyma in Monggar, Dhandhum in Samtse, Motanga in Samdrupjongkhar and Jigmeling in Sarpang. Furthermore, the development and management of the industrial estates in Jigmeling and Dhandhum would be undertaken based on the PPP model and additional infrastructure would be developed in existing industrial estates.

4.8 Mining

4.8.1 Current Conditions and Organization of Mining

(1) Current Conditions

1) Overview

Mining is identified as one of the five jewels in the revised Economic Development Policy (EDP). The direct contribution made by the mining sector to the GDP is only around 3% and it creates jobs for around 2,000 people. The mining sector mostly contributes to the mineral-based industries. Bhutan is endowed with rich mineral resources, such as dolomite, limestone, gypsum, slate and coal. It also has small marble, quartzite, granite, talc, iron ore and pink shale deposits. There is further potential to discover many more minerals in Bhutan, as only about 30% to 40% of the country has been geologically mapped on a 1:50,000 scale. The status of minerals, provided by the Department of Geology and Mines (DGM), is set out below.

Mineral resources are categorized into metallic mineral resources and non-metallic mineral resources. Production of mineral resources in Bhutan are almost non-metallic mineral resources, that export to India and Bangladesh. DGM takes initiative to add value to the mineral resources for export. However, India and Bangladesh consider imposing tax the value added mineral products from Bhutan.

Metallic mineral resources are mainly categorized into base metal, precious metal and rare metal. Bhutan has copper and zinc as the base metal and tungsten as the rare metal. As for metallic mineral resources of Bhutan, development is not started yet due to the difficulties of extraction.

Base metal is the basis of industry and used for several purposes. Among base metal, copper is used for electric wire, electronic device and alloy. Zinc is used for corrosion protection of steel. Rare metal has the special features, that can be used to produce high technology products. Among rare metal, tungsten is used for sources of carbide tool and high-speed steel.

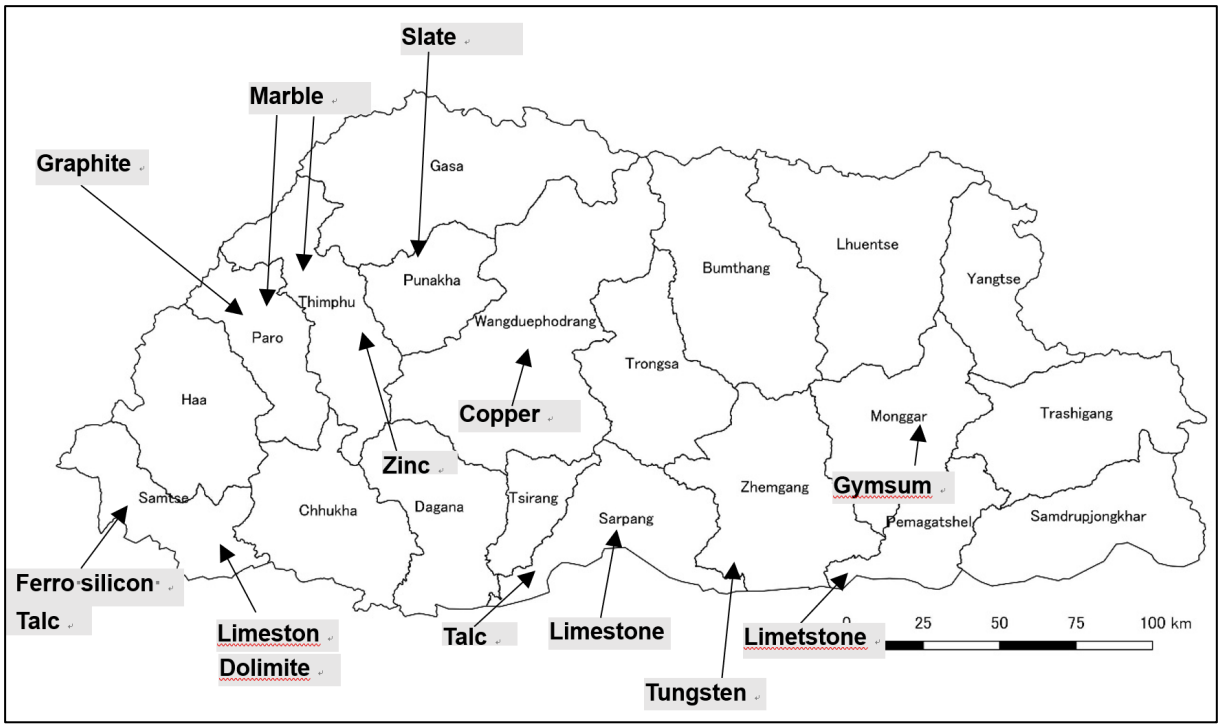
The international market for copper and zinc is kind of an oligopolistic market by specific countries. Specifically, Chile and Peru are major supply countries for copper, China and Australia are major supply countries for zinc. Tungsten has the potential of selling for international market. However, tungsten in Bhutan is reserved in the national park. It is essential

to consider of the development for the metallic mineral resources by considering the international market and demand.

Table 4.8.1 Location and Reserves of Major Minerals

Mineral	Location	Reserves (in millions of tons)	Current purpose of use	Situation
Copper	Gongkhola in Black Mountain, Zhemgang	2.5 (inferred)	-	Difficult to extract due to the remote and high place
Zinc	Genekha, Thimphu	3.116 in Chakula (proved) 0.514 in Romegong Ri (probable)	-	Not investigated yet
Tungsten	Dholpani and Bhurkhola, Gelephu	0.45 down to a depth of 30 m in Dholpani (estimated)	-	The place of reserve is in the national park
Coal	Deothang and Bangtar, Samdrupjongkhar	Very tentative reserve	Source of fuel	Moderate production in all mineral resources
Dolomite	All along the foothills of Southern Bhutan	Enormous reserve (no documents available)	Sources of cement, glass and refining iron and steel	Huge reservation. One of the main mineral resources for production and export
Graphite	Khepchishi (above an altitude of 3,992 m), Paro	23.53 (proved by drilling)	-	Difficult to extract due to the remote and high place
Gypsum	Khothakpa and Uri Chu, Pemagatshel	56.45 in Khothakpa (proved) 13.60 in Uri Chu and Khar (estimated)	Sources of cement	The current deposit is almost exhausted and shifted to another deposit, that is close to current deposit.
Limestone	Pagli in Titi, Samtse Gholtey, Gelephu Kanamakra, Gelephu Korungri and Kerungri, Samdrupjongkhar	Reserve almost exhausted Reserve being assessed Huge, high grade reserve Huge, cement grade reserve	Sources of cement and calcium carbide	One of the major minerals.
Marble	Khanku, Paro In northern regions of Bhutan, such as Haa (Wangtsa, Chaylaila), Thimphu (Jemina), Wangduephodrang (Sha Bhel), Paro (Hasilo and Pangpeysa) and Chhukha (Bunakha)	12.44 (proved) 29.59 (probable, but reserve not proven)	Sources of stone materials, tile, glass industry and calcium carbonate	One of the major mineral resources
Slate	Bhel (Bonsegeoma) and Kobja, Wangduephodrang	16 million m^3	For roofing purpose	A large portion has already been extracted for roofing purposes
Talc	All the foothill belts of southwest Bhutan	Reserve has not been properly assessed because the deposits are very erratic and patchy in nature	Source of chalk	Developed at some extent
Ferrosilicon	Quartzite in the shumer formation	Reserve has not been systematically assessed.	Source of materials for iron manufacture	The top commodity for export from Bhutan

Source: Information of Performance Audit Report of Tax on Mining and Quarrying Sector, Royal Audit Authority



Source: Information from DGM

Figure 4.8.1 Mineral Resources Places

2) Mineral production

Mineral production in Bhutan by type of mineral is summarized in Table 4.8.2, below. As the Table shows, current mineral production is used to provide construction materials such as dolomite, limestone, gypsum and stone. In other words, Bhutan's mineral production is dominated by non-metal resources, not relatively precious metal resources. As for mineral production for export, dolomite, gypsum and phyllite are the major items that are distributed to neighbouring countries such as India and Bangladesh.

Table 4.8.2 Mineral Production by Type and Use, 2015

Minerals	Unit	Export		Domestic		Total	
		Production	%	Production	%	Production	%
Dolomite	Metric tonnes	2,495,580	93.7	166,730	6.3	2,662,310	100
Gypsum	Metric tonnes	343,684	88.3	45,681	11.7	389,365	100
Stone	Metric tonnes	104,482	4.7	2,098,584	95.3	2,203,065	100
Phyllite	Metric tonnes	36,592	90.5	3,826	9.5	40,417	100
Limestone	Metric tonnes	24,579	2.9	825,853	97.1	850,431	100
Marble	Square feet	14,543	14.9	83,105	85.1	97,648	100
Coal	Metric tonnes	5,403	6.3	79,762	93.7	85,164	100
Talc	Metric tonnes	3,470	59.8	2,338	40.3	5,807	100
Quartzite	Metric tonnes	2,120	2.7	77,699	97.3	79,818	100
Granite	Square feet	0	0	63,438	100.0	63,438	100
Iron Ore	Metric tonnes	0	0	43,202	100.0	43,202	100
Slate	Square feet	N/A	N/A	N/A	N/A	N/A	N/A
Calc Tufa	Metric tonnes	N/A	N/A	N/A	N/A	N/A	N/A
Clay	Metric tonnes	N/A	N/A	N/A	N/A	N/A	N/A

Source: Statistical Yearbook, 2016, NSB

(2) Organization of the Mining Sector

Until recently, as mining is part of the public sector, the DGM under the Ministry of Economic

Affairs has conducted both the administrative management and regulation of this sector. In other words, the same Department simultaneously exercises both development administration and regulatory functions. In that sense, it has been pointed out that this regulatory system may not be fair. It has been seen as tantamount to a conflict of interest for the Ministry. Against this background, a mineral development policy has just been published in 2017, specifying an appropriate institutional arrangement. The policy states that a Mining Regulatory Authority (MRA) should be established to regulate the sector. The institutional arrangement of the mining sector is as follows:

1) DGM

- To be responsible for all policy and promotional functions related to mining
- To issue and administer permits for prospecting and exploration
- To assess and decide on the lease of mines
- To propose and periodically revise mineral rents and royalties and to establish the applicable fees and charges

2) MRA

- To lease and regulate all mining and related activities
- To levy and collect royalties, mineral rent, surface rent, fees and applicable charges
- To oversee and manage the mine reclamation fund and to ensure mine reclamation
- To issue and administer permits for the surface collection of minerals, sand and stones

3) Private sector

The private sector is the main player in the mining sector. Mining activities are now mostly carried out by private agencies, with the exception of a few captive mines operated by government-owned and -controlled enterprises. The private sector obtains a license from the DGM and then operate mines and quarries under the supervision of the DGM. Currently, there are 14 active mines and 40 quarries in the country, covering 3,319.86 acres.

4.8.2 Mining Policies and Programmes

The main mining policies and programmes are specified in the Economic Development Policy and the Mining Development Policy, 2017.

(1) Policies

1) Economic Development Policy (EDP)

While the EDP emphasizes the importance of the mining sector for increasing economic activity and development, it also points out that mineral exploitation may have a negative social and environmental impact. Thus, the EDP states that the mining sector should be adequately managed in the interest of the well-being of all citizens and the environment. To enable further development, this policy places emphasis on improving the capacity of relevant agencies, both in terms of institutional capacity and human resource development, including the geological mapping of the country's minerals. Furthermore, the EDP states that mineral resources should be utilized in a sustainable manner to diversify the economy, as they form an integral part of the industrial supply and value chains. Several programmes have been planned to achieve this purpose.

2) Mineral Development Policy, 2017

This policy mainly specifies objectives and addresses factors such as institutional arrangements, leasing and mineral rights, environmental stewardship, social risk management and mitigation and socioeconomic benefits and benefit sharing. The policy classifies minerals into strategic, industrial and construction minerals. The policy explains leasing and permit procedures according to type, such as prospecting permits, exploration permits, mining leases and collection permits. It is worth noting that the policy addresses relatively newly emerging concepts, such as value addition, transparency and information sharing, environmental stewardship and local benefits. The policy emphasizes adding value to the minerals rather than simply distributing them as raw materials. Another important point of the policy is addressing local benefits.

(2) Mining Programme in the 11th Five-Year Plan

The role of the mineral sector is expected to increase due to the high future demand for industrial minerals and construction materials. The mining sector is thus making the geological mapping and investigation of the country's minerals a higher priority. In order to ensure mineral development, the DGM will further strengthen both the technical and human capacities of the state and private sectors. Scientific mining will be ensured through improvements made to the regulatory framework and by strengthening its implementation. The DGM will continue to conduct geological mapping surveys. According to DGM engineers, the land in Bhutan is divided into 72 areas, which should be surveyed one by one every year.

4.9 Tourism

4.9.1 Current Conditions and Organization of the Tourism Sector

(1) Current Conditions

1) Annual visitor numbers

Recently, the number of visitors to Bhutan has been continuously increasing. In 2016, the total number of visitors to Bhutan drastically spiked to 209,570 arrivals. The number includes all visitors to the Bhutan, not only for leisure and holidays, but also for official, business and other purposes. Bhutan has categorized its visitors into regional visitors and international visitors. Regional visitors are Indian, Bangladeshi and Maldivian nationals arriving in Bhutan, while international visitors are the nationals of all other countries coming to Bhutan. In 2016, there were 106,034 regional visitors 103,536 international visitors.

Table 4.9.1 Number of Tourists by Year

aw	2008	2009	2010	2011	2012	2013	2014	2015	2016
Tourists	27,636	23,480	40,783	64,028	105,407	116,209	133,480	155,121	209,570

Source: Bhutan Tourism Monitor, 2016

2) Visitor categories

Table 4.9.2, below, shows the purpose of visits. It is clear that the visitors have mainly come to Bhutan for leisure purposes, while share of visitors coming for other purposes, such as official and business reasons, is very small. Around 176,000 visitors were counted as tourists out of the total 209,570 visitors.

Table 4.9.2 Total Visitors in 2016 and Main Reasons for Visit

Unit: %

	Leisure	Official	Business	Others
Purpose	84	5	3	8

Source: Bhutan Tourism Monitor, 2016

3) Tourists by nationality

According to 2016 statistics, the majority of tourists were from India (64.7%), followed by China (5.2%), Bangladesh (4.4%), the USA (4.1%), Japan (2.7%), Thailand (2.4%), and so on, as shown in Table 4.9.3.

Table 4.9.3 Top 20 Tourist Nationalities in 2016

No	Country	Number of Visitors	Share
1	India	114,301	64.7
2	China	9,208	5.2
3	Bangladesh	7,753	4.4
4	USA	7,292	4.1
5	Japan	4,833	2.7
6	Thailand	4,177	2.4
7	UK	3,124	1.8
8	Singapore	3,015	1.7
9	Germany	2,297	1.3
10	Malaysia	1,967	1.1
11	Australia	1,818	1.0
12	Taiwan	1,812	1.0
13	France	1,501	0.8
14	Vietnam	1,247	0.7
15	Canada	1,110	0.6
16	Switzerland	1,105	0.6
17	South Korea	1,035	0.6
18	Italy	1,024	0.6
19	Spain	787	0.4
20	Netherlands	641	0.4

Source: Bhutan Tourism Monitor, 2016

4) Major tourism resources

Bhutan's tourism resources are its unspoiled nature and unique Buddhist culture, including cultural landscapes, heritage buildings and archaeological sites. Furthermore, each area has a different culture and traditions. The Table below shows the tourism resources of each area.

Table 4.9.4 Tourism Resources by Area

Area	Tourism resources
East	Unspoiled nature, spectacular scenery, traditional fabrics, religious festivals including animist rituals
West	Economic and administrative centre, Dochula Pass, religious festivals, representative museums, Paro Taktsang, trekking tours
Central	Divine monuments, nomad festivals, precious birds, several national parks in Thrumshingla
South	Animal protection area, Manas National Park and Khengpas

Source: the TCB website

5) Major tourism routes

Bhutan only has a limited road network. This means that tourist destinations and routes are naturally limited. There are some standard travel plans. The most popular travel route is the western Bhutan circuit, which has good access to tourist destinations. Tourists select a travel

route depending on their preference, for example, nature, sacred places, etc. The typical travel routes are summarized in the Table below.

Table 4.9.5 Typical Travel Routes in Bhutan

	Western tourism route	Nature observation	Sacred places, Bumthang	Across Bhutan
Days taken	6	7	8	14
Places visited	Paro, Wangduephodrang, Thimphu,	Paro, Wangduephodrang, Phobjikha, Punakha,	Paro, Thimphu, Trongsa, Bumthang, Wangduephodrang, Punakha	Paro, Thimphu, Bumthang, Monggar, Trashigang, Lhuentse,
Characteristics	Most typical travel route with good access	Emphasis on nature observation, seeing black-necked cranes in Phobjikha	Visiting famous temples in Paro and Bumthang, Traditional cultural experience route	Travel to Bhutan's major cities

Source: the Globe-Trotter Travel Guide Book

6) Popular festivals

There are around 20 festivals celebrated across Bhutan, including Tshechu[12], Drupchen[13] and others. More than 50% of all visitors to popular festivals experienced Thimphu Tshechu, Paro Tshechu and Thimphu Drupchen. Festivals in Bumthang, such as Jambay Lhakhang Drupchen and Jakar Tshechu with Punakha Dromche, were also popular with tourists. However, only 400 tourists experienced Thimphu Tshechu, which is the most popular festival. Thus, not very many tourists have so far experienced popular Bhutanese festivals.

7) Major trekking routes

The major trekking routes used by international tourists in 2016 are summarized in the Table below. The top three trekking routes, namely the Druk path trek, the Bumdrak trek and the snowman trek, were taken by 64% of total trekkers in 2016. As the Table shows, the major trekking areas stem from Thimphu and Paro, via Gasa.

Table 4.9.6 Popular Trekking Routes

No	Trekking Route	Number of Trekkers	Area
1	Druk Path	1,173	Thimphu, Paro
2	Jomolhari	767	Thimphu, Paro
3	Bumdrak	605	Thimphu, Paro
4	Laya Gasa	213	Thimphu, Paro, Gasa
5	Snowman	175	Thimphu, Paro, Gasa
6	Dagala Thousand Lakes	144	Thimphu
7	Bumthang Cultural	143	Bumthang
8	Gangtey	141	Wangduephodrang
9	Chele La	103	N/A
10	Bumthang Owl	99	Bumthang

Source: TCB website and Bhutan Tourism Monitor, 2016

12 Tshechu are annual religious Bhutanese festivals held in each district or Dzongkhag of Bhutan on the 10th day of a month in the lunar Tibetan calendar.

13 A drubchen is a traditional form of Tibetan Buddhist meditational retreat, which lasts for about 10 days.

8) Royalties

Bhutan has adopted a special policy based on the principle of "high value, low negative volume", called the royalty system. All international tourists, with the exception of regional tourists, have to pay a fixed royalty for their tourism activities. The royalty includes inland tax, accommodation, meals, guides, domestic travel, camping for trekking tours and transfer. This royalty is USD 290 during the on season, which covers the months of March, April, May, September and October, while it is USD 240 per person during the off-season, in the months of January, February, June, July, August and December.

9) Tentative List of World Heritage as of 2012

Department of Culture, Ministry of Home and Culture submitted the tentative list of world heritage. Currently, four cultural heritages and four national parks are listed on the tentative list. However, the nomination was done in 2012. UNESCO requested for the Department of Culture to formulate the national heritage act to register the world heritage of UNESCO. According to the recommendation from the UNESCO, Department of Culture, Ministry of Home and Culture is formulating the cultural heritage bill of Bhutan.

Table 4.9.7 Tentative List of World Heritage

No	Name	Year	Place
1	Ancient Ruin of Drukgyel Dzong	2012	Paro
2	Dzongs	2012	Punakha, Wangduephodrang, Paro, Trongsa, Dagana
3	Sacred Sites associated with Phajo Drugom Ahigpo and his descendants	2012	Mainly west area such Thimphu and Paro
4	Tamzhing Monastery	2012	Bumthang
5	Royal Manas National Park	2012	Zhemgang, Sarpang, Pemagatshel
6	Jigme Dorji National Park	2012	Gasa, Thimphu, Wangduephodrang, Paro, Punakha
7	Bumdeling Wildlife Sanctuary	2012	Yangtse,
8	Sakteng Wildlife Sanctuary	2012	Trashigang, Samdrupjongkhar

Information of national park is written in another chapter. Therefore, only cultural heritage is shown in the Figure below. Considering regional spread, most of tentative world heritages are located in west. However, Tamzhing monastery is in Bumthang.

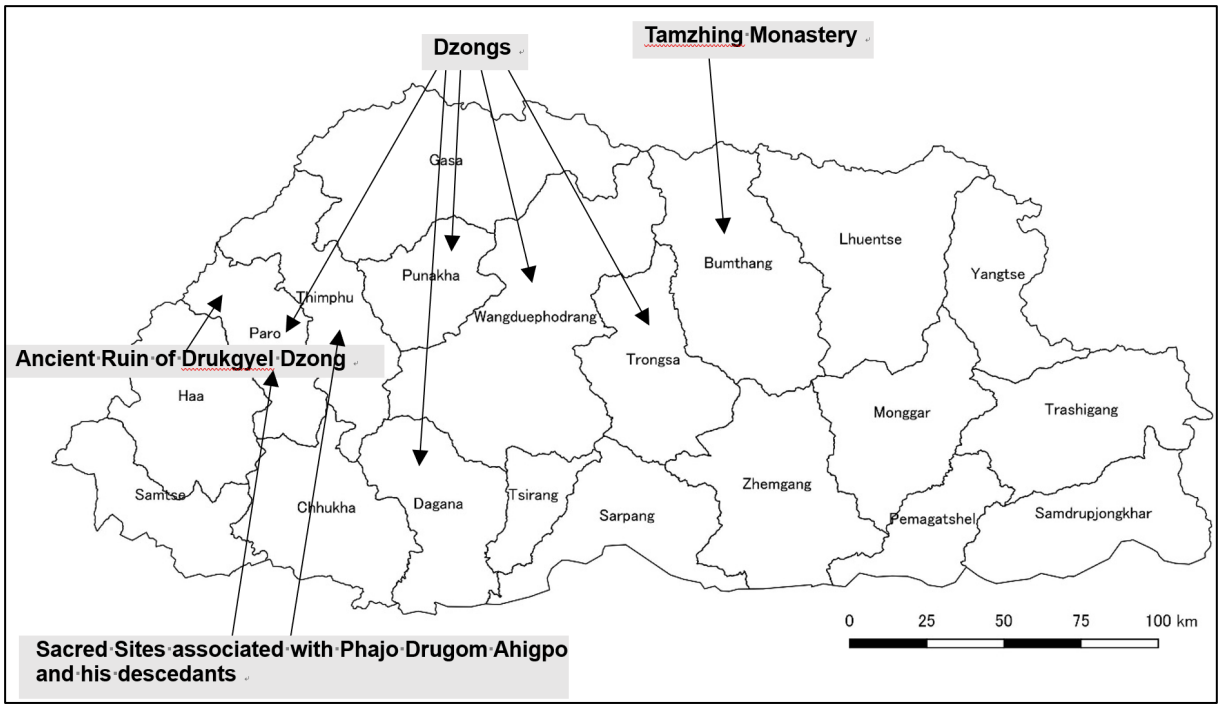


Figure 4.9.1 Tentative List of World Heritage except for National Park

(2) International Tourism Statistics

1) Purpose of visiting for international tourists

The main purpose of visiting Bhutan for international tourists was for cultural reasons (88%), followed by nature (7%), adventure (4%) and spiritual and wellness (1%). Cultural reasons including experiencing tshechus and festivals, visiting dzongs and monuments and experiencing the Bhutanese way of life.

2) International tourists by Dzongkhag

As Table 4.9.8 shows, there are clear disparities in terms of tourist destinations. The most popular destinations were mainly in western and central Bhutan, such as Paro, Thimphu, Punakha, Wangduephodrang, Bumthang and Trongsa. On the other hand, Pemagatshel, Dagana, Tsirang and Samtse received almost no visitors. Compared to the number of visitors in 2014, most Dzongkhags saw a drop in visits, with the biggest decrease in Paro, Thimphu, Punakha and Wangduephodrang. An increase in tourist numbers was observed in Tsirang, Sarpang, Zhemgang, Gasa, Lhuentse, Yangtse, Samdrupjongkhar, Trashigang, Monggar, Haa, Chhukha and Bumthang.

Table 4.9.8 International Tourists by Dzongkhag in 2014 and 2015

Dzongkhag	2014		2015	
	Number of Tourists	%	Number of Tourists	%
Paro	56,528	27.2	48,584	26.0
Thimphu	55,383	26.6	46,875	25.2
Punakha	43,003	20.6	38,083	20.5
Wangduephodrang	18,256	8.7	15,911	8.6
Bumthang	12,327	5.9	12,856	6.9
Trongsa	6,957	3.3	6,399	3.4
Chhukha	4,826	2.3	3,846	2.1
Haa	2,801	1.3	3,518	1.9
Monggar	2,464	1.2	2,763	1.5
Trashigang	2,272	1.1	2,405	1.3
Samdrupjongkhar	2,056	1.0	2,164	1.2
Yangtse	672	0.3	936	0.5
Lhuentse	230	0.1	565	0.3
Gasa	480	0.2	543	0.3
Zhemgang	205	0.1	298	0.2
Sarpang	179	0.1	233	0.1
Pemagatshel	96	0.0	68	0.0
Dagana	18	0.0	14	0.0
Tsirang	8	0.0	10	0.0
Samtse	3	0.0	3	0.0
Total	196,437	100.0	173,218	100.0

Source: Bhutan Tourism Monitor, 2015

3) Length of stay

In 2015, international tourists spent an average of 6.93 nights in Bhutan. Visitors from 52 countries spent between one and five nights, those from 34 countries spent between six and seven nights, those from 21 countries spent between eight and nine nights, while those from 12 countries spent more than 10 nights. The top 10 countries in terms of length of stay is shown in the Table below.

Table 4.9.9 Average Length of Stay of the Top 10 Countries in 2015

Ranking	Country	Length of Stay
1	Australia	9.41
2	Germany	8.90
3	France	8.64
4	UK	8.07
5	USA	6.76
6	Malaysia	6.21
7	China	5.89
8	Singapore	5.69
9	Japan	4.88
10	Thailand	4.25

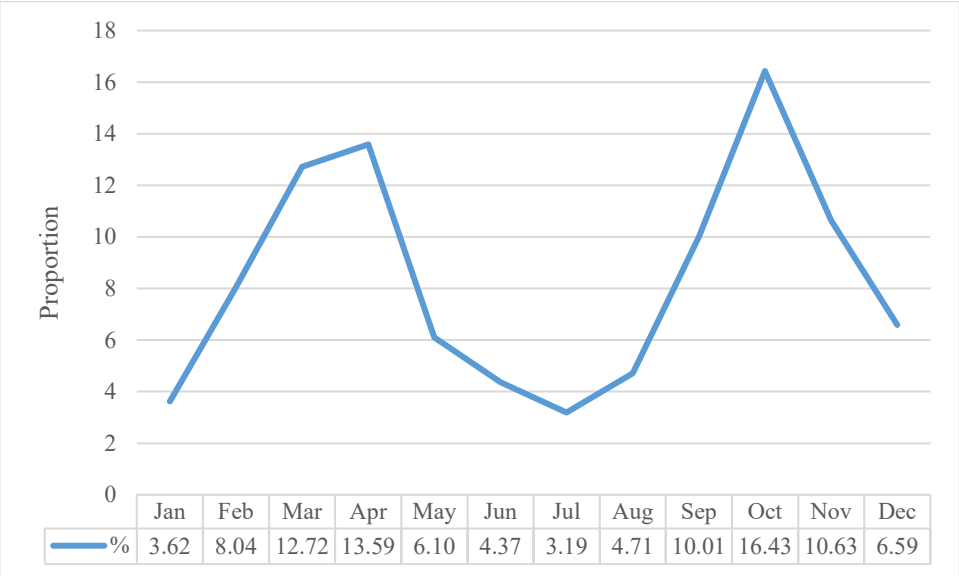
Source: Bhutan Tourism Monitor, 2015

4) Sources of information

Twenty-three percent of the sample population reported that they had learned about Bhutan on the Internet, 22.7% heard about the country through personal communication, 17.6% through travel publications, 11.4% through a travel agent, 11% through the mass media and 4.8% from their workplace.

5) Number of tourists by month

The majority of tourists (16.43%) visited Bhutan in October. The second highest group (13.59%) visited in April and the third highest (12.72%) visited in March. The number of visitors was lowest in July (3.19%), followed by January (3.62%). On a seasonal basis, 37.07% of tourists visited in autumn, followed by spring (32.42%), winter (18.24%) and summer (12.26%). Spring and autumn therefore remained the peak tourist seasons, as in previous years.



	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
%	3.62	8.04	12.72	13.59	6.10	4.37	3.19	4.71	10.01	16.43	10.63	6.59

Source: Bhutan Tourism Monitor, 2015

Figure 4.9.2 Proportion of Tourists by Month, 2015

6) Bed nights

In line with the number of tourists visiting each Dzongkhag, it was similarly observed that Paro (32.85%), Thimphu, (25.1%) Punakha (15.67%), Bumthang (9.61%) and Wangduephodrang (6.73%) recorded the highest number of bed nights in 2015.

Table 4.9.10 Tourists by Bed Nights in Each Dzongkhag, 2015

Dzongkhag	Bed Nights	%
Paro	112,171	29.97
Thimphu	85,711	22.90
Punakha	53,503	14.30
Bumthang	32,813	8.77
Wangduephodrang	32,813	8.77
Trongsa	22,983	6.14
Chhukha	7,435	1.99
Haa	4,512	1.21
Monggar	4,310	1.15
Trashigang	4,280	1.14
Samdrupjongkhar	3,988	1.07
Yangtse	3,627	0.97
Lhuentse	2,377	0.64
Gasa	1,188	0.32
Zhemgang	1,182	0.32
Sarpang	824	0.22
Pemagatshel	418	0.11
Dagana	96	0.03
Tsirang	22	0.01
Samtse	7	0.00
Total	374,260	100.00

Source: Bhutan Tourism Monitor, 2015

7) Entry and exit points

More than 90% of international tourists arrived by air, while 9.8% used land transportation. The highest proportion of tourists entered Bhutan through the Bangkok-Paro route (46.05%), followed by Kathmandu-Paro (26.22%), Delhi-Paro (12.4%), Singapore-Paro (8.4%), Kolkata-Paro (4.66%) and others. Of the tourists who used land transport, 74.11% entered Bhutan through Phuentsholing, 24.6% through Samdrupjongkhar and 0.84% through Gelephu. 45.98% of visitors left Bhutan through the Paro-Bangkok route, followed by Paro-Kathmandu (25.02%). Of the 6.42% of tourists who left Bhutan over land, 57.9% departed through Phuentsholing, 24.6% through Samdrupjongkhar and 1.85% through Gelephu.

8) Revenue from the tourism sector

Gross earnings from tourism were USD 71.04 million in 2015 and USD 73.2 million in 2014, which was a decrease of 2.94%. Revenue for tour operators was USD 48.93 million, an increase of 1% from USD 48.61 million in 2014. These amounts include expenses incurred for accommodation, food, transportation and tour guides. Royalty payments to the central government in the form of a welfare levy was USD 18.68 million in 2015.

(3) Organization of the Tourism Sector

1) Tourism Council of Bhutan

The Tourism Council of Bhutan (TCB), headed by the tourism council in the organization, is responsible for the development of the tourism sector in Bhutan. The Council is an independent authority which exercises the highest level of decision-making. The Council is chaired by the prime minister and has 11 members from ministries, associations and the private sector. The TCB provides general directions to the secretariat of the tourism council. In addition, the TCB implements plans and other activities related to the tourism sector.

2) Associations

There are several associations related to the tourism sector, such as the Association of Bhutanese Tour Operators, the Hotel Association of Bhutan, the Hotel and Restaurant Association of Bhutan and the Guide Association of Bhutan. As of December 2015, there were 1,653 tour operators, 1,268 licensed guides and 104 tourist standard accommodations of three stars and above registered with the TCB.

3) Airlines

Drukair and Bhutan Airlines are also part of the tourism sector in the airline industry.

4.9.2 Tourism Policies and Programmes

(1) Policies

The Bhutanese government has been developing and issuing regulatory frameworks, such as the pronouncement of the tourism principle, since 1974. As yet, the government have not developed any acts or policies focused on the tourism sector. Instead, the EDP has the tourism policy. According to the EDP, the tourism policy is guided by the principle of "high value, low negative impact". Additionally, the EDP clearly states that Bhutan will seek to encourage and promote tourism throughout the country all year round and that the tourism sector will be used as a means of diversifying the rural economy. The EDP also states that the Government will adopt a Tourism Policy to promote sustainable tourism. The plan for the Bhutanese tourism sector is not to simply increase the number of tourists, but to receive less tourists who will spend more time in several Dzongkhags, although no clear statement has so far been issued. Chinese, Japanese, Singaporean, Thai, Australian, Korean, North American, Swiss, French, German and British tourists are attracted to Bhutan through the promotional activities of travel agents in each country and by tourism expos.

(2) Programmes in the 11th Five-Year Plan

1) Sustainable tourism development

The aim of this programme is product diversification in order to even out regional and seasonal disparities, improving the quality and standards of services including accommodation and tourist attractions, exploring new markets and decentralizing tourism planning and development to the care of the TCB. Furthermore, the programme ensures that local communities can benefit from tourism. The main focus for this industry continues to be Bhutan's establishment as a high-end sustainable tourism destination.

2) Strengthening the Royal Institute of Tourism and Hospitality

The Royal Institute of Tourism and Hospitality, an institute under the governance of the TCB, will aim to enhance the quality of tourism and hospitality professionals by improving the training programme to meet international standards so that Bhutan will become a regional centre of excellence. The training modules and curriculum will be reviewed and improved based on periodic training needs assessments. Tourism and hospitality professionals trained to international standards and the construction of infrastructure and facilities are listed as the expected results of this programme. The promotion of Bhutan as a high-end tourist destination is the expected outcome of the programme's various activities, such as the diversification of tourism products, the development of an institutional plan, the creation of public-private community partnerships, the improvement of tourism services, and so on.

4.10 Cottage and Small Industries

4.10.1 Current Conditions and Organization of Cottage and Small Industries

(1) Overview

Cottage and Small Industries (CSI) make up more than 90% of Bhutan's total industries, with 17,364 industrial licenses as of June 2016. The number of CSI licenses for each sector is summarized in Table 4.10.1, below. Additionally, CSIs provide over 66,000 jobs as of April 2016. CSIs in Bhutan are classified into three sectors, namely services, production and manufacturing and construction. CSIs are predominantly categorized in the service sector. The production and manufacturing sector have the lowest share of CSIs at around just 10%. As mentioned in section 4.7, an investment of less than one million BTN or employing between one and four people is defined as the cottage industry. An investment of between one and 10 million BTN or employing between five and 19 people is defined as the small industry.

Table 4.10.1 Number of CSI Licenses by Sector

Sector	2012		2013		2014		2016	
	Number	%	Number	%	Number	%	Number	%
Services	8,079	61.8	7,939	63.2	9,946	65.5	11,550	66.6
Production and manufacturing	1,329	10.2	1,287	10.3	1,571	10.3	2,091	12.0
Construction	3,660	28.0	3,322	26.5	3,676	24.2	3,723	21.4
Total	13,068	100	12,548	100	15,193	100	17,364	100

Source: Annual Report 2017 by the Department of Cottage and Small Industry

1) Service sector

The Table below shows the businesses categorized under the services sector in 2011, since no later data are available. Hotels and restaurants dominate the service sector, followed by other service activities such as consultancy, banking, real estate, beauty parlours, transport activities, travel agents and the repair of personal and household goods.

Table 4.10.2 Types of Business in the Service Industry in 2011

Business Type	Percentage
Hotels and restaurants	40
Other service activities (consultancy, banking, real estate, beauty parlours, etc.)	22
Auxiliary transport activities and travel agents	8
Repair of personal and household goods	6
Tailoring services	4
Machinery and equipment rental	4
Maintenance and repair of vehicles and motorcycles	4
Land transport services	3
Recreational, cultural and sporting activities	3
Agricultural, forestry and mining-related services	2
Education, health and other social facilities	2
Publishing, printing and recording	1
Post and telecommunications	1

Source: Overview 2011 of CSI of Bhutan by the Department of Cottage and Small Industry

2) Production and manufacturing sector

Furniture, publishing and printing, food products and beverages, and wood and wood products were major production and manufacturing industries in 2011. The share occupied by highly technological manufacturing and innovative production was very low to almost non-existent.

Table 4.10.3 Types of Business in the Production and Manufacturing Industry in 2011

Business Type	Percentage
Furniture	23
Publishing and printing	20
Food products and beverages	13
Wood and wood products	13
Mining and quarrying	8
Fabricated metal products	6
Chemical products	4
Forestry and related activities	3
Other non-metallic mineral products	3
Textiles and crafts	2
Others	2
Agricultural and related activities	1
Paper and paper products	1
Rubber and plastic products	1

Source: Overview 2011 of Cottage and Small Industry of Bhutan by the Department of Cottage and Small Industry

3) Construction sector

The construction sector covers a wide range of economic sectors, including hydropower, urban infrastructure and housing, schools, etc. The main products of CSIs in this sector are small infrastructure projects, housing and schools. The previous census (2005) indicates that 40% of the urban population are still living in rented housing. The housing market still has great potential in terms of the expansion of the construction sector because urbanization has advanced.

(2) Industrial Firms by Dzongkhag

CSIs are clustered mainly in Thimphu, Chhukha, Sarpang and Paro. Thimphu and Paro are Bhutan's economic centres, with relatively highly populated Dzongkhags. Chhukha and Sarpang contain the country's industrial estates and are located on the border with India. These Dzongkhag offer relatively better conditions for CSIs. In contrast, there are very few firms in Gasa, Haa, Lhuentse, Yangtse and Zhemgang.

Table 4.10.4 Number of Cottage, Small, Medium and Large Industrial Firms by Dzongkhag 2015

Dzongkhag	Cottage	Small	Medium	Large	Total
Bumthang	597	166	13	3	779
Chhukha	2,152	458	64	74	2,748
Dagana	420	121	3	1	545
Gasa	78	17	0	0	95
Haa	197	129	2	0	328
Lhuentse	182	78	0	0	260
Monggar	666	142	7	2	817
Paro	1,178	442	40	10	1,670
Pemagatshel	467	184	6	7	664
Punakha	569	127	12	7	715
Samdrupjongkhar	655	149	7	9	820
Samtse	695	203	18	13	929
Sarpang	1,295	404	10	9	1,718
Thimphu	4,959	2,360	113	55	7,487
Yangtse	262	111	1	0	374
Trashigang	578	178	2	1	759
Trongsa	414	111	5	2	532
Tsirang	332	104	2	0	438
Wangduephodrang	758	215	20	10	1,003
Zhemgang	365	86	2	0	453
Total	16,819	5,785	327	203	23,134

Source: Statistical Yearbook of Bhutan, 2016

(3) Organization

1) Department of Cottage and Small Industry

The EDP states that the RGoB will promote CSIs to create employment, support the equitable distribution of income and bring about balanced regional development. The Department of Cottage and Small Industry (DCSI) has been created to promote and develop these industries. Within the development framework of CSIs, particular attention should be given to women's enterprises.

2) Bhutan Development Bank Limited (BDBL)

The Bhutan Development Bank Limited (BDBL), formerly called the Bhutan Development Finance Corporation Ltd, was established in 1988. The role of the BDBL is to address the credit needs of CSIs, with a special focus on providing credit to rural agricultural communities. A second required function of the BDBL is to act as a development financial institution for providing credit to CSIs. BDBL is currently almost entirely owned by the RGoB.

3) Business Development Service providers

In September 2009, the Government advertised for Business Development Service (BDS) providers to register on a National Register, but very few registered. Currently, there are 29 registered private sector BDS providers considered to be "active", of which 21 operate in the Information and Communication Technology (ICT) sector. The full list, categorized by activity and location, is given below.

4.10.2 Policies and Programmes for Cottage and Small Industries

(1) Policies for Cottage and Small Industries

1) Economic Development Policy

CSIs are also recognized as one of the five jewels by the EDP. The EDP contains specific policies to boost CSIs; there are 11 in total. Brief summaries of these policies are listed below.

- The MoEA, in collaboration with the RMA, shall identify, test and introduce new financial products suitable for CSIs onto the market by 2017.
- The RMA shall require financial institutions to reserve at least 20% of their total lending portfolio for CSIs.
- The Royal Government shall designate CSI start-ups, technology upgradation and diversification as a priority sector for preferential lending under the Economic Stimulus Plan.
- The Royal Government shall develop and adopt the business incubation guidelines by 2016 and establish at least three incubation centres in different locations by 2020.
- The Royal Government shall continue to expand the Credit Guarantee Scheme for CSIs.
- The Royal Government shall design and implement schemes, such as the rural enterprise development schemes, to promote promising new industries, particularly in rural areas.
- The Royal Government shall identify and establish networks with relevant multilateral and regional agencies to promote a culture of entrepreneurship, innovation and creativity among CSIs.
- The Royal Government shall identify critical skill training needs and provide regular training to potential entrepreneurs free of charge.
- National Resource Inventories shall be updated periodically, starting in 2016, and made available to prospective entrepreneurs to enable the identification of areas of opportunity for investment.
- The MoEA shall identify the available opportunities for large and medium industries to subcontract/outsource to small and cottage industries and will initiate these business links and partnerships by 2016.
- The Royal Government shall expedite the implementation and achievement of CSMI Policy goals through coordinated ownership between sectors.

2) Cottage, Small and Medium Industry Policy 2012-2020

The RGoB developed a Cottage, Small and Medium Industry (CSMI) policy in 2012 due to the need to formulate a comprehensive CSMI development policy, given how important they are to the overall economy. The overall objective of this policy is to create jobs and generate more income by promoting the creation of new CSMIs and improving the performance and competitiveness of existing ones, this will have the effect of increasing their participation and contribution to the Bhutanese economy.

3) Cottage, Small and Medium Industry development strategy

The development of the CSMI sector in Bhutan is considered by both the DCSI and CSMI stakeholders in general as a high priority activity that will help to promote sustainable and

inclusive growth, thereby reducing poverty and enhancing employment. The integration of CSMI development planning into national development planning needs to address issues such as how CSMI development affects poverty reduction, skill upgradation and job creation targets, both in terms of quality and quantity. These different aspects of CSMI development cut across all sectors and require an integrated approach to the preparation of a national CSMI development strategy and action plan. CSMI strategy seeks to operationalize the CSM policy using the same period, namely 2012-2020.

4) Cottage, Small and Medium Industry action plan

An action plan, prepared by the DCSI, is basically a sequence of steps or activities that must be performed effectively if the CSMI policy and development strategy is to succeed. Action plans have three core elements: (1) specific actions or tasks with allocated responsibilities, (2) a time horizon or deadline by which they must be completed and (3) resource allocation setting out the funds available for specific activities. There will be three CSMI action plans spanning the period up to 2020: 2012-2014, 2015-2017 and 2018-2020.

(2) Programmes for CSI

1) Skill development training

The DCSI identifies critical skill training needs and regularly provides training free of charge to both potential and existing CSIs. The promotion of business skills for CSIs is one of the most important tools for enhancing the country's entrepreneurial capabilities. During the year 2016-17, 106 CSIs were provided with skill development training. Over seven years, 741 entrepreneurs have been trained in the following fields.

2) Decentralized Hands-On Programme Exhibition

As part of the community capacity and rural enterprise development project, which is technically and financially supported by JICA, the Decentralized Hands-On Programme Exhibition (D-HOPE) was initiated to enhance the production and marketing skills of rural entrepreneurs. The D-HOPE helps entrepreneurs to showcase the live production process of various local products for visitors and customers. The D-HOPE programmes have been promoted through exhibitions and catalogues at an event called the Festival of Happiness.

3) Business advocacy workshops

The main objective of business advocacy workshops is to promote the growth of CSIs through the dissemination of information pertaining to starting and operating a business. Advocacy workshops include information on rules and regulations, licensing procedures, current policies, various financing schemes, incentives and skill development support available to CSIs. The Department also uses this platform to familiarize local authorities with information on doing business so that they can provide support services to CSIs under their jurisdiction. During the year 2016-2017, 360 participants were trained in eight Dzongkhags. So far, the Department has conducted business advocacy workshops with 949 entrepreneurs in various Gewogs and Dzongkhags.

4) Cottage and Small Industry business incubation facilities

The objective of the business incubation programme is to support aspiring entrepreneurs with good business ideas at the start-up stage, by providing them with a favourable working space at a nominal lease rate. This enables aspiring entrepreneurs to access facility-based services,

common secretarial services, business development services (BDS) and advisory and mentoring services, provided by both in-house staff and external business experts. The incubation term lasts a maximum of two years, after which they are required to move out.

Establishment of a business incubator in Changzamtog, Thimphu

For the first time, a customized, mixed-type incubator for production and manufacturing start-ups is being established in Bhutan. The construction work for the three storey building, which cost BTN 60 million, is nearing its completion. Upon completion, it will incubate around 31 new businesses at any given time. The incubator will provide a physical workspace with amenities and various business development services to new start-ups during the incubation period.

Industrial service centre in Changzamtog, Thimphu

As per the Government's directive, the existing industrial service centre is being converted into an incubation centre. The sheds are being taken over and converted into incubation spaces as and when the lease terms of the existing tenants expire. So far, seven sheds have been taken and handed over to new businesses. These new businesses are expected to complete their incubation period within two years.

5) Rural Enterprise Development Scheme (REDS)

The Rural Enterprise Development Scheme (REDS) was started in 2006 with funding support from the UNDP and was implemented by the Department of Industry. Since the creation of the DCSI in July 2010, the project has been the responsibility of this Department. Under this scheme, the DCSI provides funds to CSIs in the form of grants. It particularly targets rural entrepreneurs, providing them with funds for the purchase of essential machinery and equipment, either for starting up a new CSI or expanding a viable existing one. The Government of India is currently funding the scheme. The main objective of the scheme is to help CSIs to invest in modern technology and to upgrade and expand their capacity, or to take their business in a new direction using modern equipment.

4.11 Investment Promotion

4.11.1 Current Conditions and Organization of Investment Promotion

(1) Current Conditions

1) The current situation of Foreign Direct Investment

Bhutan is clearly committed to fostering private sector development and attracting Foreign Direct Investment (FDI), which is shown in policy documents such as the Economic Development Policy, the 2010 Foreign Direct Investment Policy and the 2010 Framework for Private Participation in Infrastructure. FDI is becoming important for Bhutan's economy and economic development, particularly in the growing tourism sector. However, Bhutan is still recognized as an undeveloped business environment in terms of FDI. There was only very limited FDI in the country until the early 2000s. In the initial stage, FDI inflows were almost exclusively directed towards the hotel sector, such as Aman Resorts.

As indicated by Table 4.11.1 below, FDI trends have not been stable. FDI inflows depend highly on funding from the International Finance Cooperation (IFC) and hydropower projects. As of 2013, 43 FDI projects have been approved and 23 projects are in the pipeline. The FDI projects are in domains such as hotels, hydropower, pharmaceuticals, dairy, steel, water bottling and banking. The holdings of foreign investors range from 20% to 100%. FDIs in Bhutan are come

from India, Hong Kong, the USA, Japan, Singapore, Samoa, France and Vietnam. The largest percentage of FDIs are in the banking sector, with the IFC buying a 20% stake in Bhutan National Bank, followed by foreign investment in the hydropower sector.

Table 4.11.1 Foreign Direct Investment Trends

Item	Unit	1990	2010	2013	2014	2015	2016
FDI, net inflows	% of GDP	0.5	4.7	1.1	1.5	0.5	0.4
FDI, net inflows	Current, USD millions	1.6	75.3	20.4	29.0	10.8	8.1

Source: World Bank

2) Public-private partnerships

Overall, the Government has promoted the reform programme to turn Bhutan into an attractive investment destination. It is also looking beyond traditional greenfield sectors and seeking to promote investment in PPPs (public-private partnerships). For this purpose, the 2010 Framework for Private Participation in Infrastructure complements the FDI policy and enables the construction of large-scale infrastructure projects such as airports, highways and recreational facilities in a PPP model.

The landmark PPP project is the Thimphu Tech Park project. The Thimphu Tech Park project aimed to establish an IT park and related infrastructure close to Thimphu. This PPP project was originally jointly implemented by FDI and the Government's holding company, DHI. The first development phase was completed in November 2011 and first tenants started operating in early 2012. The Ministry of Economic Affairs (MoEA) is also seeking to establish special economic zones (SEZs) under a PPP model. Three potential sites have already been identified in Samdrupjongkhar, Sarpang, and Samtse, and DHI is currently planning the project implementation.

3) Market size

With an estimated population of about 750,000 people, Bhutan itself has a small domestic market. Nonetheless, there are some opportunities for small and medium-sized investors, as well as for larger transnational corporations, such as the tourism sector. Construction is booming due to rapid urbanization, particularly around Thimphu, as well as hydropower projects, which are the most important driver of economic growth in Bhutan. PPPs are encouraged for infrastructure projects. Domestic consumption is largely dependent on imports, which has the potential to open up opportunities for import substitution.

(2) Organization of Investment Promotion

In Bhutan, FDI is coordinated and monitored by the Department of Industry (DoI), MoEA. The DoI acts as the country's investment promotion agency and as a focal point for investors. In addition, DHI acts as the leading developer and venture partner for larger infrastructure development projects, including PPPs such as the Thimphu Tech Park. The regulation and supervision of all projects, however, remains under the remit of the DoI. In 2010, the legislature passed a comprehensive overhaul of Bhutan's economic development strategy and regulatory environment, consolidating the most relevant provisions for foreign investors into the EDP and the complementary FDI Policy. Under these streamlined regulations, investors face a three-tier structure of foreign ownership that is applicable to both new and existing entities. With the exception of some specific provisions and incentives set out in the 2010 FDI Policy, foreign investment projects are subject to the same laws, rules and regulations as domestic firms. This right to equal treatment is formalized in the FDI Registration Certificate, which is issued by the MoEA to foreign investors upon application. The DoI shall have powers to:

- Issue or refuse to issue a Foreign Direct Investment Registration (FDIR) Certificate,
- Approve or refuse priority sector applications,
- Cancel or suspend a FDIR Certificate,
- Enter business premises to monitor compliance with Certificate conditions or with the provisions of rules, regulations and the FDI Policy and
- Improve penalties within the provisions of these rules and regulations.

(3) Foreign Direct Investment Policy, 2010 (Amended in 2014)

The Ministry of Economic Affairs published the FDI Policy in 2010 and amended it in 2014 to achieve the objectives set by the EDP. The Policy laid down stipulations on general conditions, guarantees, operating environments and FDI approval, among other things.

In accordance with the FDI Policy, the EDP describes the country's path to achieving a minimum average economic growth rate of 10% and how it will strive to become a middle-income country by 2020. It specifies strategies to reduce unemployment and achieve economic self-reliance. The importance of FDI in achieving the above purposes is emphasized in the EDP. Furthermore, the Policy clearly defines priority sectors, negative sectors and prohibited activities.

Table 4.11.2 Priority, Negative and Prohibited Sectors for FDI

Priority	Negative	Prohibited
・Education ・Health ・Hotels/resorts (four star and above) ・Infrastructure facilities ・Research and development ・Head office services ・IT ・Construction ・Waste management ・Water supply and management, urban water treatment and supply ・Technical and vocational education ・Transportation and related services ・Consultancy services ・Financial services	・Media and broadcasting ・Distribution services including wholesale, retail and micro trade ・Mining for the sale of minerals in their primary or raw forms ・Hotels (three star and below) ・General health services ・Industries that do not meet Certificate of Origin requirements ・Activities in the prohibited list	・Activities that violate any relevant laws of the Kingdom of Bhutan ・Activities that threaten national security and the public sector ・Activities that have harmful effects on public health, the environment and Bhutanese morals and culture ・Arms, ammunitions and explosives ・The production of hazardous chemicals ・Activities based on imported waste ・The production, display and sale of pornographic material ・Gambling and betting ・Tobacco and tobacco-based products

Source: Foreign Direct Investment Rules and Regulations 2012 and the EDP

4.11.2 Investment Climate

(1) Business Environment

Bhutan ranked 73 out of 190 countries on the ease of doing business index in 2016. Paying taxes, trading across borders and enforcing contracts are the major factors that have helped Bhutan to rise in the rankings, while resolving insolvency, protecting minority investors and dealing with construction permits are negative factors which have decreased its rank.

Table 4.11.3 Bhutan's Rank on the Ease of Doing Business Index

Items	Ranking
Starting a business	94
Dealing with construction permits	97
Getting electricity	54
Registering property	51
Getting credit	82
Protecting minority investors	114
Paying taxes	19
Trading across borders	26
Enforcing contracts	47
Resolving insolvency	169

Source: Doing Business 2017

When compared to its neighbouring countries, Doing Business 2017 shows that Bhutan is relatively highly (73) on the ease of doing business index. The country's score is higher than the regional average. Bhutan has a relatively better business environment than other countries in the region in terms of the ease of doing business.

Table 4.11.4 Ranks of Regional Countries on the Ease of Doing Business Index

Country	Rank	Score
Bhutan	73	65.37
Thailand	46	72.53
China	78	64.28
Nepal	107	58.88
India	130	55.27
Maldives	135	53.94
Regional average	-	52.87

Source: Doing Business 2017

(2) Conditions for FDI

1) FDI approval

The criteria for approval and denial may be based on the envisaged contribution of the proposed activity to the following.

- GNH principles including FDI focus area
- Generation of employment for Bhutanese
- Revenue contribution
- Foreign exchange earnings
- Value addition
- Invention and innovation

2) FDI company

The FDI company is defined as a business incorporated or registered in the country for undertaking commercial activity in which 20% or more of the equity by foreign investors. Foreign equity of less than 20% shall not be permitted. However, the FDI company shall be one in which 10% or more of the equity is owned or beneficially held by foreign institutional.

3) Access to land

Land or space for establishing FDI business shall be available either on lease or ownership based on the provisions of the Land Act of Bhutan, 2007 and amendments. Local partners shall

be allowed to capitalize land as their equity contribution.

(3) Infrastructure and Utilities

1) Information and communication technology

The RGoB continues to promote the development of ICT as a platform for sustainable development and economic diversification, which will be beneficial for the population's well-being. It aims to deliver an ICT infrastructure to all 205 Gewogs. In early 2011, the Government was on track to achieving this goal by providing fixed-line and mobile network access across almost all of Bhutan in all Gewog centres.

2) Energy

Bhutan's electricity tariffs are among the lowest in the world, making it an ideal investment destination for high energy consumption services such as data storage. Under the current tariff schedule, the price for one kilowatt–hour of low-voltage electricity ranges from USD 0.02 to USD 0.04, depending on demand. In comparison, the average 2008 household price for one kilowatt–hour was about USD 0.113 in the United States of America and about USD 0.206 in Japan, according to the annual report by the Bhutan Electricity Authority.

3) Transport

Bhutan's current transport network remains inadequate, with a limited road network, no navigable waterways and no domestic rail network. The RGoB is aware of these limitations and is investing significant amounts in upgrading the infrastructure and improving the main and feeder road networks, especially in rural areas. Infrastructure development is a central priority of the 11th Five-Year Plan. To complement the Government's efforts, multilateral and bilateral development partners are continuing to provide technical assistance and funding.

(4) Education

Substantial progress has also been made in the improvement of Bhutan's education system. Basic education consists of seven years of primary schooling and four years of lower and middle secondary schooling. This can be followed by two years of higher secondary education as well as tertiary education. The language of instruction is in English and education is free up until the 10th grade. The general level of English language proficiency is very high. To this end, the Government's priorities include a comprehensive overhaul of its technical and vocational education and training programmes, including improving the link between university and vocational training courses.

(5) Labour

Bhutan's labour force, although comparatively well-educated, cannot fully meet the demands of the evolving private sector. A labour survey conducted on Bhutanese firms found that some firms responded that the lack of labour skills was limiting the private sector. Increasing youth unemployment rates are supporting the view that there are gaps in skills and knowledge. At the same time, a study by the World Bank has also found that competitiveness as measured by labour productivity is high, particularly in the services sector. However, the average labour costs per worker are higher than in other countries of the region.

(6) Financial Sector

The country's financial system consists of four commercial banks, one development bank, two

insurance companies, one pension fund and one securities exchange. As the country's central bank, the Royal Monetary Authority (RMA) regulates both banking and non-banking financial institutions. The legal and regulatory framework of the central bank was significantly strengthened through the enactment of a new RMA Act in 2010.

(7) Incentives for Investors

Incentives are targeted at specific sectors and areas to promote green and sustainable industrial development. The majority of FDI is in sectors that have been given incentives, including hotels. While incentives support the channelling of investment into key areas, business potential apparently drives investment attraction.

1) Incentives for investment

According to the EDP, there are three types of incentives, namely general incentives, sector-specific incentives and performance-based incentives. General incentives can apply to all sectors. Sector- specific incentives are available to the sectors specified. The incentives listed in the Fiscal Incentives Act 2016 by the Ministry of Finance are summarized as follows:

- FDI law provides for equal treatment in the provision of incentives and privileges,
- Fiscal incentives provided for domestic investment also apply to FDI.
- Bhutan moved away from time-bound incentives to sector-based incentives in 2010.
- Different forms of incentives are currently in place, namely general incentives, sector-specific incentives and performance-based incentives, for different industry types and sizes, including FDI.

2) General incentives

- Duty exemption on the import of capital goods for industries
- Sales tax exemption on industrial raw materials
- Tax exemption on hard currency earnings
- Reinvestment allowance of up to 25% (tax deductible)
- Environmentally friendly technology upgradation (15% tax rebate)
- Expenditure incurred in R and D (tax deductible)

3) Sector-specific incentives

Sector-specific tax incentives are provided to the following sectors and mainly comprise income tax holidays of between five and 15 years:

- Agriculture
- ICT, IT/Information Technology Enabled Services (ITES)
- Tourism and hotels
- Film and media
- Construction
- Transport
- Education
- Health
- Infrastructure

4.12 Public Finance System

The present state of Bhutan's national budget is described in the budget report "National Budget: Financial Year 2017-18". Although the outlay for the fiscal year 2017-2018 is BTN 55.9 billion, the total budget appropriation for the same fiscal year is BTN 60.7 billion, a sum made up of total expenditure (BTN 57.9 billion), lending and repayment.

After the rupee crisis in 2012-2013, the Bhutanese economy has shown a steady growth of 5-7%. As a result, Bhutan's fiscal scale has been steadily expanding.

Table 4.12.1 Budget Outcomes and Estimates

(BTN Millions)

Sl. No	Particulars	Outcomes				Revised Budget	Budget Estimates
		2012-13	2013-14	2014-15	2015-16	2016-17	2017-18
A	Resources	30,656	37,819	36,231	42,039	47,890	51,403
	I. Domestic Revenue	21,102	23,245	25,141	28,034	29,167	34,700
	i. Tax	15,403	16,183	18,387	19,885	21,078	24,444
	ii. Non-tax	5,699	7,062	6,754	8,149	8,089	10,256
	II. Other Receipts	-8	338	1,135	-884	195	0
	III. Previous Year's Advance	0	0	0	0	630	0
	IV. Grants	9,563	14,236	9,955	14,890	17,897	16,702
	i. Programmes	2,618	1,750	2,125	2,340	1,700	1,700
	ii. Project-tied	6,944	12,487	7,830	12,550	16,197	15,002
	a) GoI	3,643	9,059	4,469	9,447	12,689	12,146
	b) Others	3,301	3,427	3,361	3,103	3,508	2,857
B	Outlay	34,901	33,523	34,334	43,603	54,380	55,850
	I. Total Expenditure	36,528	34,610	36,476	44,688	56,283	57,916
	i. Current	18,097	17,941	21,032	22,881	25,671	28,570
	ii. Capital	18,431	16,668	15,444	21,808	30,612	29,346
	II. Net Lending	-739	-1,332	-2,553	-1,885	-1,902	-2,065
	Ⅲ.Advance/Suspence(Net)	-887	250	411	800	0	0
C	Overall Balance	-4,245	4,296	1,897	-1,564	-6,490	-4,447
D	Financing	4,245	-4,296	-1,897	1,564	6,490	4,447
	I. Borrowing	16,463	1,535	1,685	1,819	3,827	2,472
	i. Project-tied (external)	—	—	—	—	956	1,172
	ii. Programmes (external)	—	—	—	—	2,870	1,300
	II. Repayment	15,971	2,577	2,772	3,034	2,823	2,820
	i. External	—	—	—	—	2,814	2,810
	ii. Internal	—	—	—	—	9	10
E	Resource Gap	-3,752	3,254	810	2,779	-5,487	-4,796
Fiscal balance % of GDP		-4.1%	3.9%	1.5%	-1.1%	-4.1%	-2.5%
Resource gap % of GDP		-3.6%	2.9%	0.6%	2.0%	-3.4%	-2.7%
Resources % of GDP		29.3%	33.9%	29.0%	29.6%	29.9%	28.6%
Outlay % of GDP		33.4%	30.1%	27.5%	30.7%	34.0%	31.0%
Nominal GDP		104,473	111,400	125,064	142,107	159,928	180,035

Source: National Budget: Financial Year 2014-15～2017-18

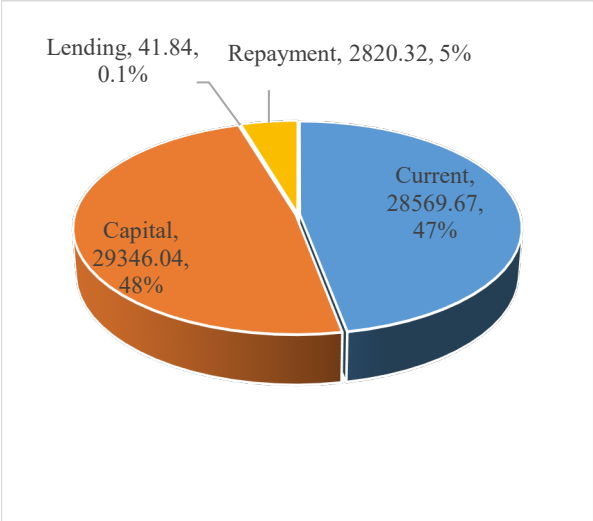
(1) Revenue

Bhutan's total estimated resources are BTN 51.4 billion, of which domestic revenue accounts for BTN 34.7 billion and external grants for BTN 16.7billion. Of this total domestic revenue, direct tax accounts for 42.1%, indirect tax for 28.4% and non-tax revenue for 29.6%. Corporate

income tax and sales tax are the two main tax sources, while the percentage coming from income and property tax is relatively small. The hydropower sector contributes about 45% of the Government's gross revenue through corporate tax, dividends, profit transfers, royalties and interest receipts. This contribution accounts for about 25% of the Government's total domestic revenue. Project-tied grants from the Government of India account for the majority of the external grants, followed by grants from international organizations such as ADB and developed countries.

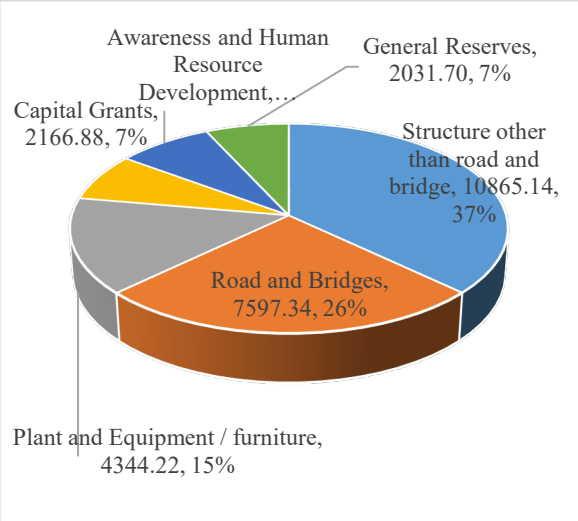
(2) Expenditure

47% of Bhutan's total expenditure is current and 48% is capital expenditure (Figure 4.12.1). Roads, bridges and other structures account for 63% of capital expenditure (Figure 4.12.2). The high proportion of capital expenditure is due to the fact that Bhutan is in the economic development stage, which requires a lot of new investment, especially in the hydroelectric power sector. At the same time, it reflects the severe terrain conditions which requires much more to be spent on infrastructure.



Source: National Budget: Financial Year 2017-18

Figure 4.12.1 Total Budget Appropriation



Source: National Budget: Financial Year 2017-18

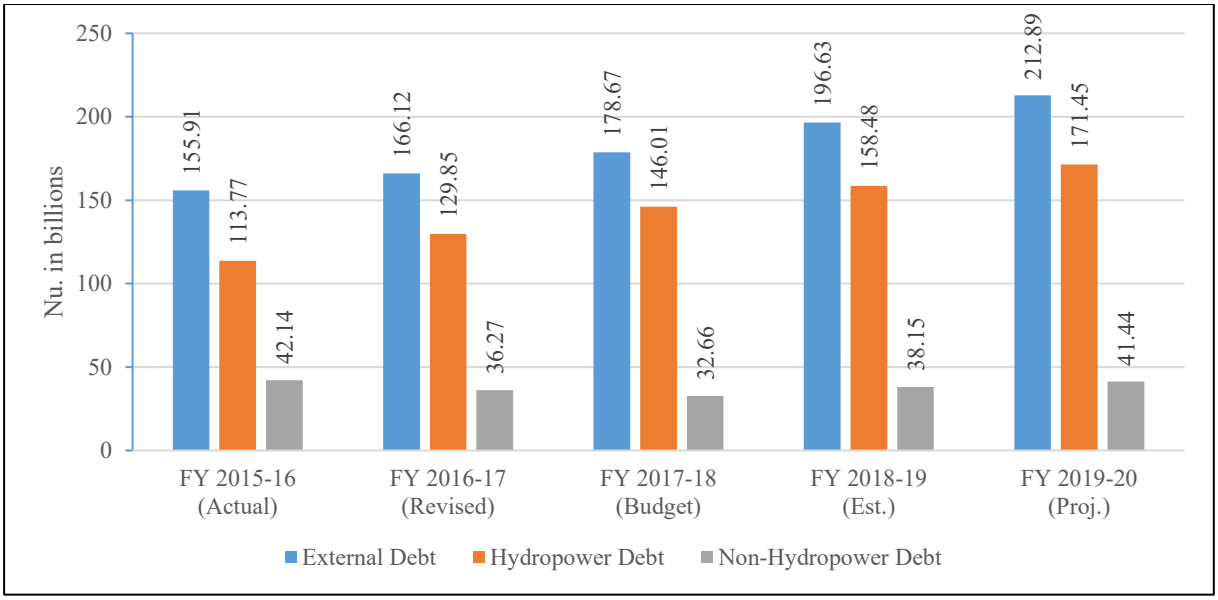
Figure 4.12.2 Composition of Capital Expenditure

Fifty-seven percent of capital expenditure is financed through external grants. Of the total budget appropriation of BTN 60.7 billion, 26% is allocated to the social services, of which the health sector takes 8% and education sector takes 16%. Thirty-four percent is allocated to economic and public services, of which the road sector accounts for 12%, followed by the agricultural sector (9%), the housing and community sector (7%), the communication sector (3%) and the mining and manufacturing sector (3%). Other sectors are general public services (23%), law and order services (4%) and cultural services (4%).

(3) Trends and Prospects

As per the macroeconomic projections in the Macroeconomic Framework Coordination Committee (MFCC), economic growth is projected to remain sustainable in the medium term. According to the 12th Five-Year Plan (FYP) Guideline, domestic revenue for the next FYP period starting in 2018 is expected to double to BTN 251 billion, up from BTN 129 billion in the 11th FYP period, due to the commissioning of three hydroelectricity projects. Meanwhile, external grants are projected to decline by 20% to BTN 54 billion. Total expenditure is expected

to be around BTN 300 billion, of which BTN 185 billion will be current and BTN 115 billion will be for capital expenditure. Total expenditure is expected to increase by 39.3% from that of the 11th FYP period. However, capital expenditure is expected to increase by only 5%, because current expenditure is due to increase significantly by about 75% due to the commissioning of three new hydroelectricity projects. The Guideline points out that the rationalizing and managing of expenditure will be critical in the 12th FYP.

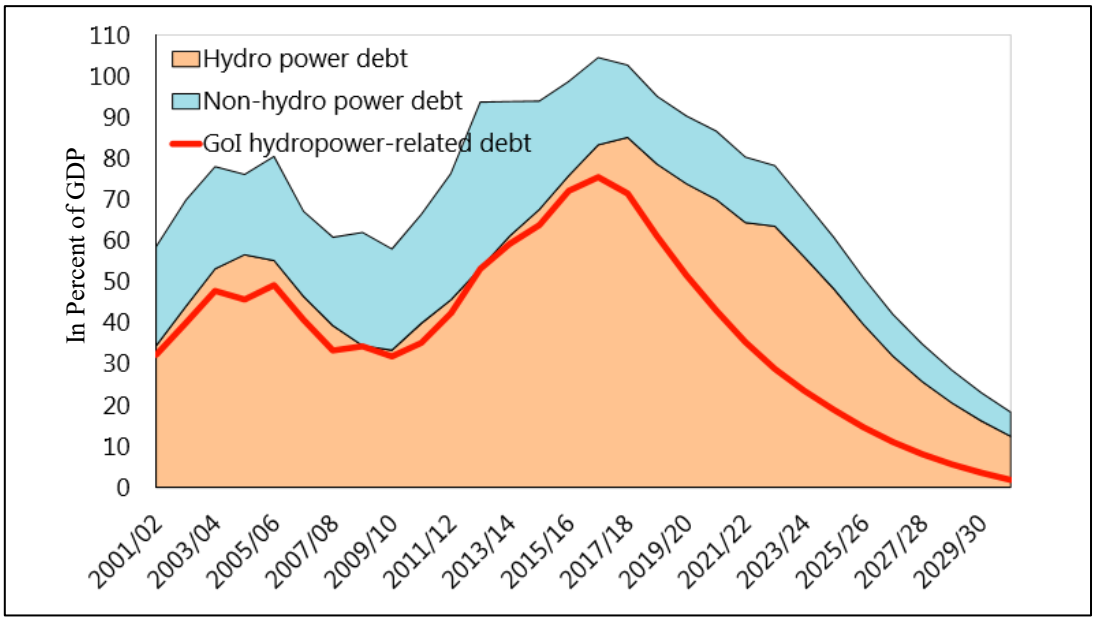


Source: National Budget / Financial Year 2017-18

Figure 4.12.3 Debt Stock and Debt Indicators

(4) Public Debt Stock

The external debt outstanding in the FY 2017-18 is projected to be BTN 179 million, equivalent to 99.2% of the GDP, and will further increase to BTN 197 million by the end of the FY 2018-19, as shown in Figure 4.12.3. Hydropower loans account for 82% of the total external debt, while non-hydropower loans account for 18%. As hydropower loans constitute most of the external debt, and hydropower projects are commercially viable and self-liquidating, the high debt to GDP ratio does not pose any risk of debt default, according to the budget report. In spite of the high level of debt, the Joint World Bank – IMF Debt Sustainability Analysis Report 2016 categorized Bhutan as being only in moderate risk of debt distress. Figure 4.12.4 shows the estimated external debt outstanding, and indicates that hydropower debt will decrease to less than 20% of the GDP by 2029/30.



Source: IMF Staff Report for the 2016; Article IV Consultation -Debt sustainability analysis

Figure 4.12.4 Hydropower and Non-Hydropower Debt Outstanding