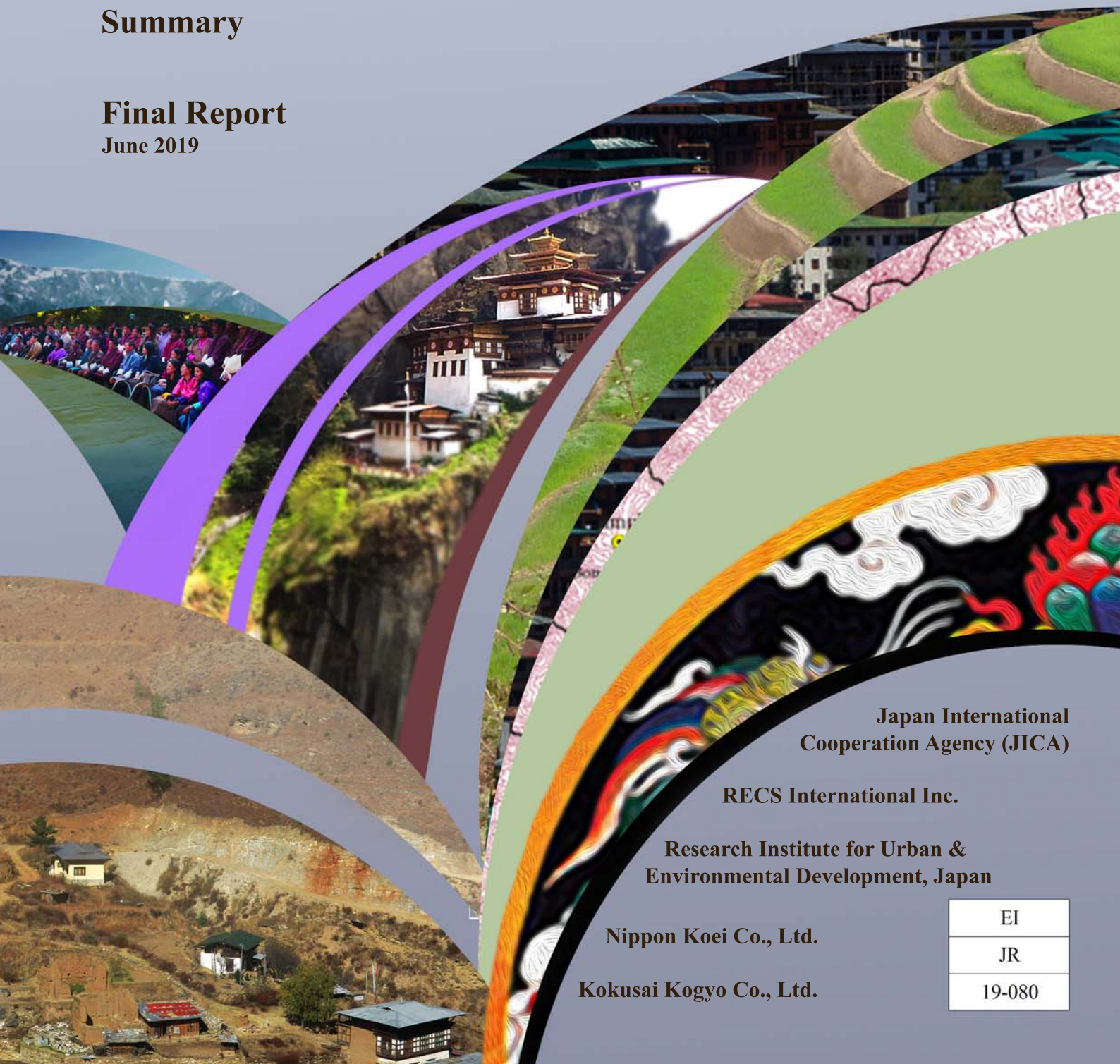
Kingdom of Bhutan
Ministry of Works and Human Settlement
(MoWHS)

The Project for Formulation of Comprehensive Development Plan for Bhutan 2030

Volume I
Summary

Final Report
June 2019



Japan International Cooperation Agency (JICA)

RECS International Inc.

Research Institute for Urban & Environmental Development, Japan

Nippon Koei Co., Ltd.

Kokusai Kogyo Co., Ltd.

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Abbreviations

(Organization)

DHS	Department of Human Settlement
DMO	Destination Management Organization
DoFPS	Department of Forest & Park Services
GNHC	Gross National Happiness Committee
JICA	Japan International Cooperation Agency
MoAF	Ministry of Agriculture and Forests
MoEA	Ministry of Economic Affairs
MoWHS	Ministry of Works and Human Settlement
NLCS	National Land Commission Secretariat
NSB	National Statistics Bureau
RGoB	Royal Government of Bhutan
SC	Steering Committee
WG	Working Group

(General term)

BTN	Bhutanese Ngultrum
CF	Community Forest
CNDP	Comprehensive National Development Plan
CSI	Cottage and Small Industries
DC	District Centre
DMO	Destination Management Organization
ECCS	Early Childhood Care and Development
ERC	Extended Classroom
EV	Electric Vehicle
FMU	Forest Management Unit
FNCA	Forest and Nature Conservation Act of Bhutan 1995
FYP	Five Year Plan
GC	Gewog Centre
GDP	Gross Domestic Product
GIS	Geographic Information System
GLOF	Glacial Lake Outburst Flood
GNH	Gross National Happiness
ICT	Information and Communication Technology
IT	Information Technology
LAP	Local Area Plan
LFMP	Local Forest Management Plan
LUC	Linked Urban Center
MAP	Medicinal and Aromatic Plant
NLUP	National Land Use Plan.
NWFP	Non-Wood Forest Products
OC	Outreach Centre
PA	Protected Area
PF	Preservation Forest
PHCB	Population and Housing Census of Bhutan
RC	Regional Centre
RD	Record of Discussions
RIA	Rural Intervention Area
RNR	Renewable Natural Resources
RUF	Resource Utilization Forest
SDC	Sub-district Centre
SDG	Sustainable Development Goal
SEA	Strategic Environmental Assessment
SFA	Sustainable Forest Area
SME	Small and Medium-sized Enterprise
SRFL	State-Reserved Forest Land
SSR	Self Sufficiency Rate
TTI	Technical Training Institute
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

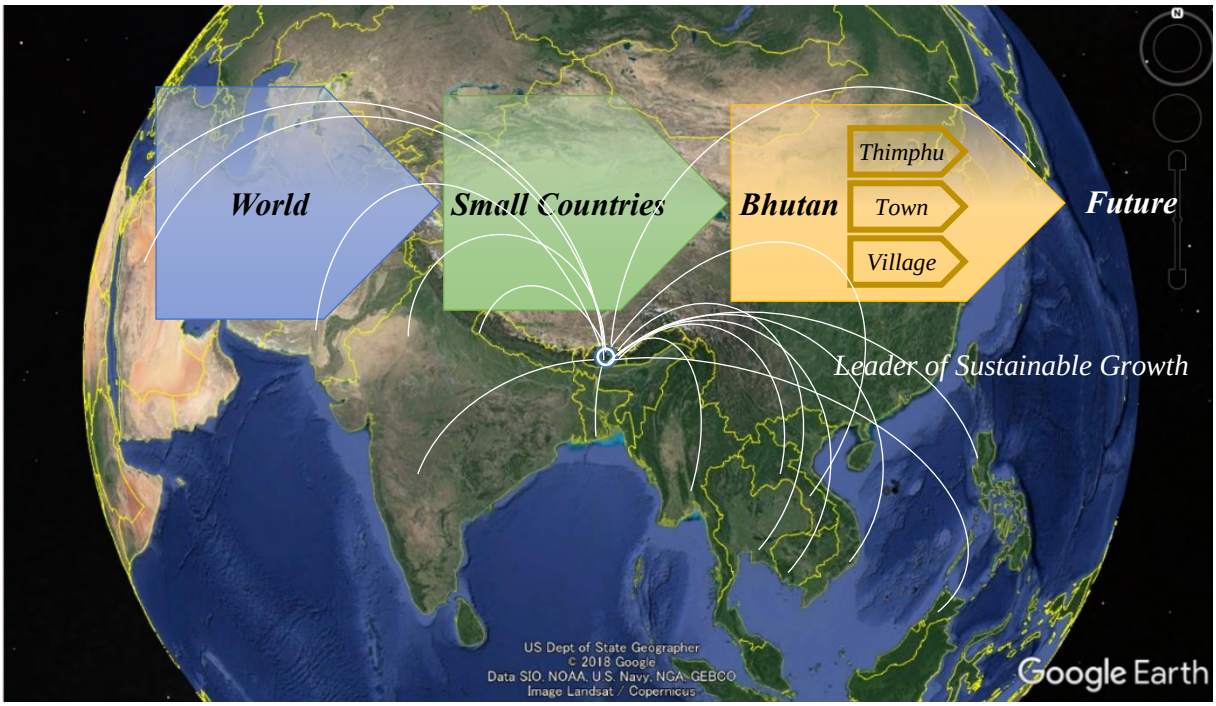
Currency

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

Executive Summary



Creating A Model of a Country with a Small Population to Change the Global Future Based on Bhutan

Bhutan is a landlocked country with a small population and a mountainous topography. These characteristics have been considered as development constraints. However, if Bhutan overcomes these constraints and achieve sustainable growth, it will be a leader among countries with small populations in the world. In turn, other countries of this kind will be able to acquire knowledge and experience from Bhutan, which will useful in achieving their own sustainable development.

Development Vision for Comprehensive National Development Plan for Bhutan

Comprehensive Long-term Vision: National Identity

⇩

Promotion of regionally balance development and reduction of disparity between Urban and Rural Areas
Middle path
Realization of alternative socio-economy

⇩

Vision: A GREENIST country leading Sustainable Development

The Constitution of Bhutan sets out the country's national identity and envisaged state imagery. Based on this envisaged state imagery, the vision of the Comprehensive National Development Plan (CNDP) is established in line with the national identity, in order to pursue the promotion of regionally balance development, the middle path and an alternative socio-economy.

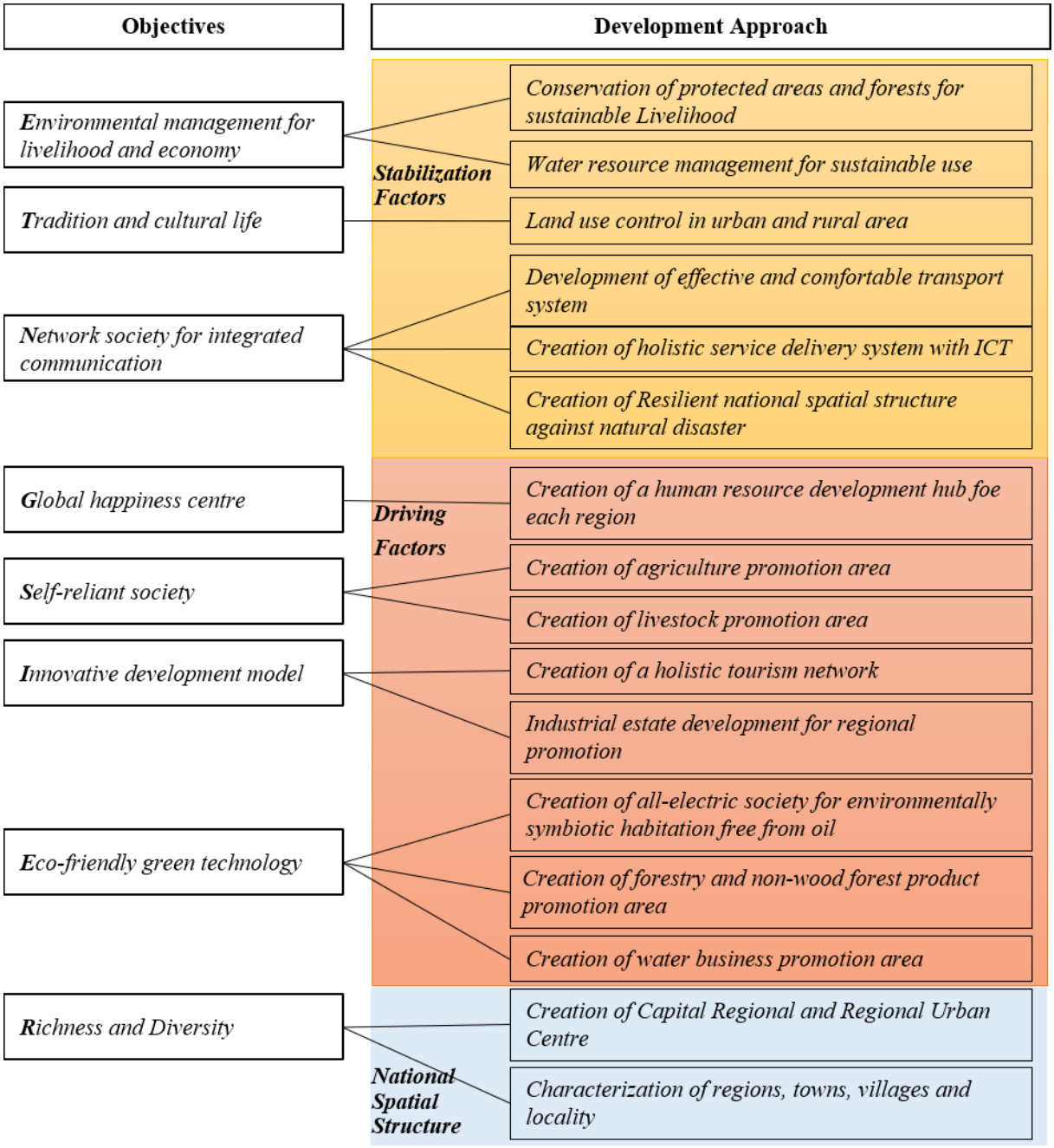
The proposed vision focuses on the creation of a supportive environment for a desirable economy, society and environment in the long run.

Objectives, Description and Key Result Area of GREENIST

Objective	Description	Key Result Area	Unit	Baseline	Indicator in 2030
Global happiness centre	To promote well-being through use of local resources and share experience and knowledge with the international community.	Reduce gap in the GNH Index between urban and rural by 50%		0.08 (2015)	0.04
Richness and Diversity	To promote diversity in urban and rural areas by creating National Capital Region and Linked Urban Centres.	Maintain the percentage of the regional population in Central Eastern and Eastern Regions	%	36	35
Eco-friendly green industry	To promote green industries with comparative advantages e.g., hydropower, export-oriented agriculture and NWFP using renewable resources in keeping with a concept of zero-emission and a commitment to remain carbon neutral.	Develop new export-oriented products utilizing RNRs	Number	-	10
Environmental management for livelihood and economy	To ensure sustainable livelihood and living environment through management by communities and proper land use control system.	Create hygienic environment for people in urban and rural areas	%	60 (Drinking water) 54 (Sanitation)	95 (Drinking water and sanitation)
Network society for integrated communication	To link the entire country and society with road network consisting of east-west and north-south highways with further linkage to air transport, information technology and advanced means of transport.	Improve travel time between Eastern and Western Regions	hour	20	16
Innovative development model	To develop innovative solutions for problems and constraints such as human-wildlife conflict, mountainous topography, and natural disasters etc. through appropriate technology characterized by environmentally symbiotic society, balancing economic growth and environmental conservation.	Apply IT solutions to overcome social issues	Case	0	10
Self-reliant society	To pursue for a sustainable society through effective use of renewable energy, enhanced food supply from domestic agriculture produce and diverse human resources.	Start the implementation of regional centre for business, medical and education	Number	0	6
Tradition and cultural life	To pursue development that is inclusive and mindful of tradition and culture of the country.	Designate at least one cultural heritage area in Dzongkhag	Dzongkhag	0	20

The acronym GREENIST in the vision represents the eight objectives to be realized in the course of development. Each objective has a particular target to realize its concept. For instance, a network society for integrated communication is realized when a ladder-type arterial road network is established. An innovative development model will be achieved when local problems and constraints are overcome. Key result areas are set for each objective. These have respective indicator to be achieved by 2030. The estimated real GDP based on market prices will be increased from BTN 70,485 million in 2018 to BTN 92,200 million in 2023 and BTN 147,400 million in 2030, respectively. As for the growth rate of the real GDP at market prices, estimated average annual growth rates between 2018 and 2023, and between 2023-2030 are steadily increased from 5.5% to 6.9%, respectively.

Development Approach for Bhutan



A set of development approaches are elaborated to pursue the objectives. The 14 sector-wise development approaches are divided into two categories. The first category is to identify stabilization factors as a cornerstone or solid base for Bhutan in the long term, with respect to the environment, human resources, social ties and traditions. The second category involves the identification of the driving factors in the country necessary to the promotion of eco-friendly technology, a varied way of life, a new economic model and a self-sufficient economy. The above figure shows the interlinks between the sector-wise development approaches to objectives defined in the vision.

Target for the National Spatial Structure

Highest priority on economic development will expand the regional disparity

⇩

Thus, balanced development to mitigate the regional disparity will be pursued.

Creation of "Capital Region" + Development of "regional urban centre" + "good access to urban centre within region"

⇩

But no town should be the Second Thimphu

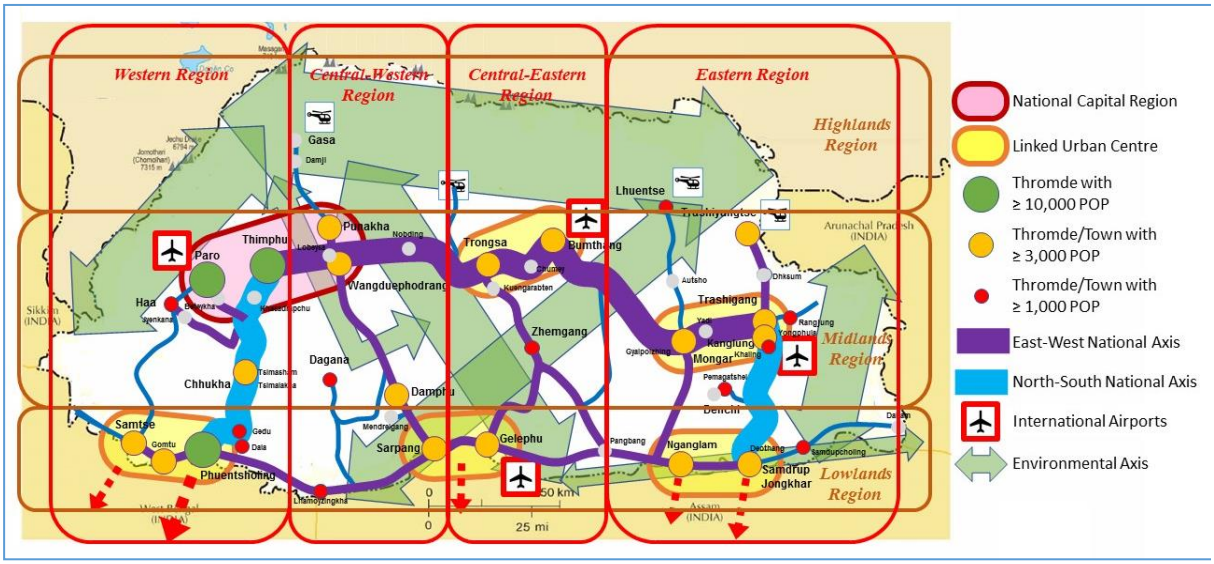
National minimum to be ensured by the national government + Regional promotion developing comparative advantage

⇩

Characterization of regions, towns, villages and locality

An approach that pursues economic development as the highest priority is considered inappropriate for Bhutan, because it could exacerbate regional disparities. Balanced development to mitigate regional disparity is the way forward. Characterization of the economy, culture and lifestyle in regions, towns, villages and localities will diversify the way of life in the country and contribute to the balanced development. Those characterized regions, towns, villages and locality will be interlinked in an integrated communication network comprising land transport, air transport, ICT and social networks.

National Spatial Structure for Balanced Development



A national spatial structure is proposed, which is simultaneously drawn from viewpoints specified below.

(a) Major urban regions:

i) *Paro-Thimphu-Punakha/Wangdue will be formed as the National Capital Region, and development pressure on Thimphu will be dispersed across the region.*

ii) *Linked Urban Centres (LUCs) will be designated in five locations and functional demarcation/linkage between the core towns will be pursued. The LUCs will comprise Phuentsholing/Samtse, Trongsa/Bumthang, Sarpang/Gelephu, Monggar/Trashigang and Nganglam/Samdrupjongkhar.*

(b) Main national axes in the north-south and east-west directions to interlink major urban regions.

(c) Grid structure of the nation divided in both longitudinal and latitudinal directions:

i) *The Western Region will be the "Business and Commercial Region".*

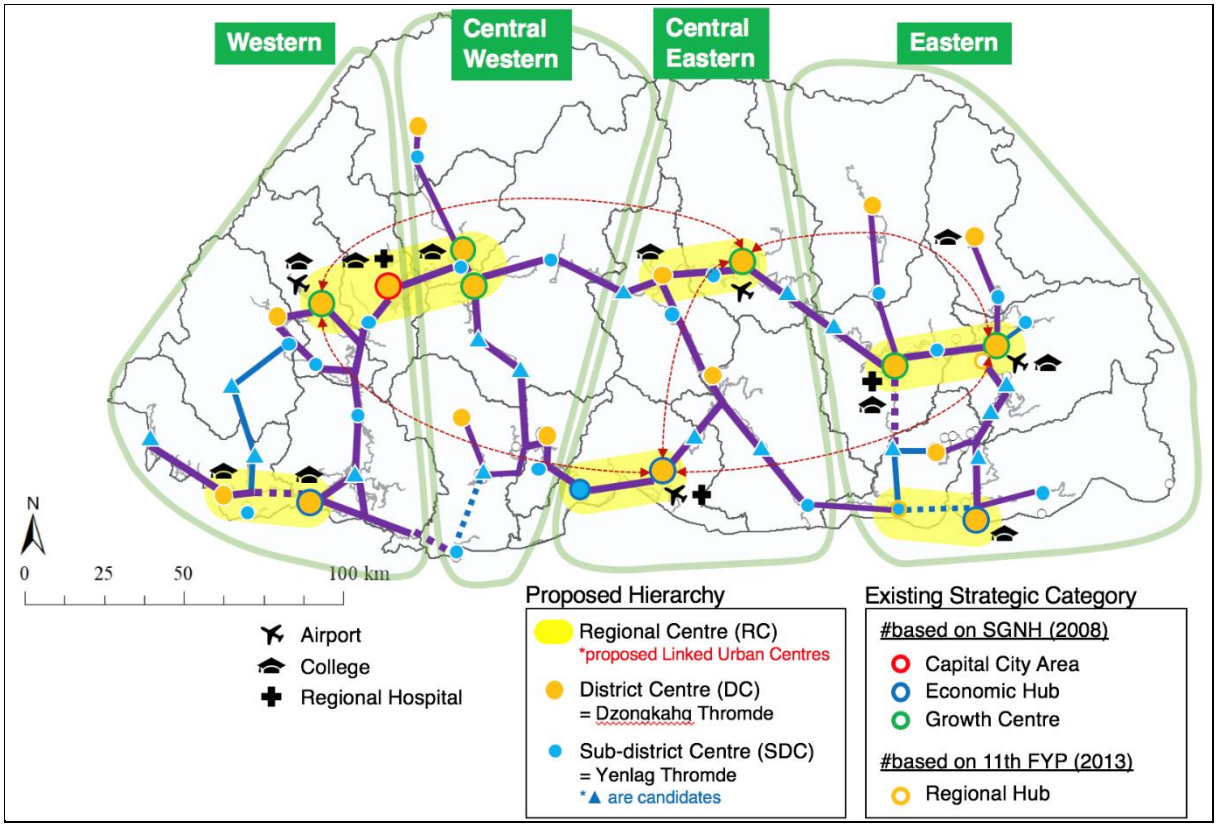
ii) *The Central Western Region will be the "Agro-production and R&D Region".*

iii) *The Central Eastern Region will be the "Tradition and Interaction Region".*

iv) *The Eastern Region will be the "Science and Incubation Region".*

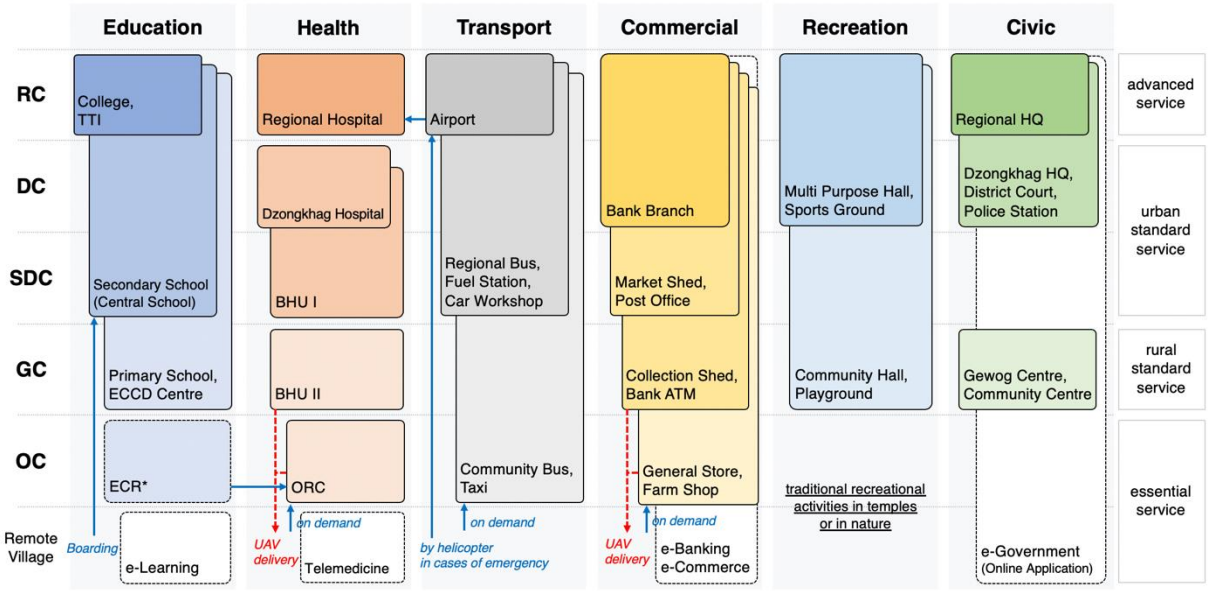
(d) Protected areas, including biological corridors, will be tied together and integrally form the environmental axes of the nation.

National Holistic Service Network

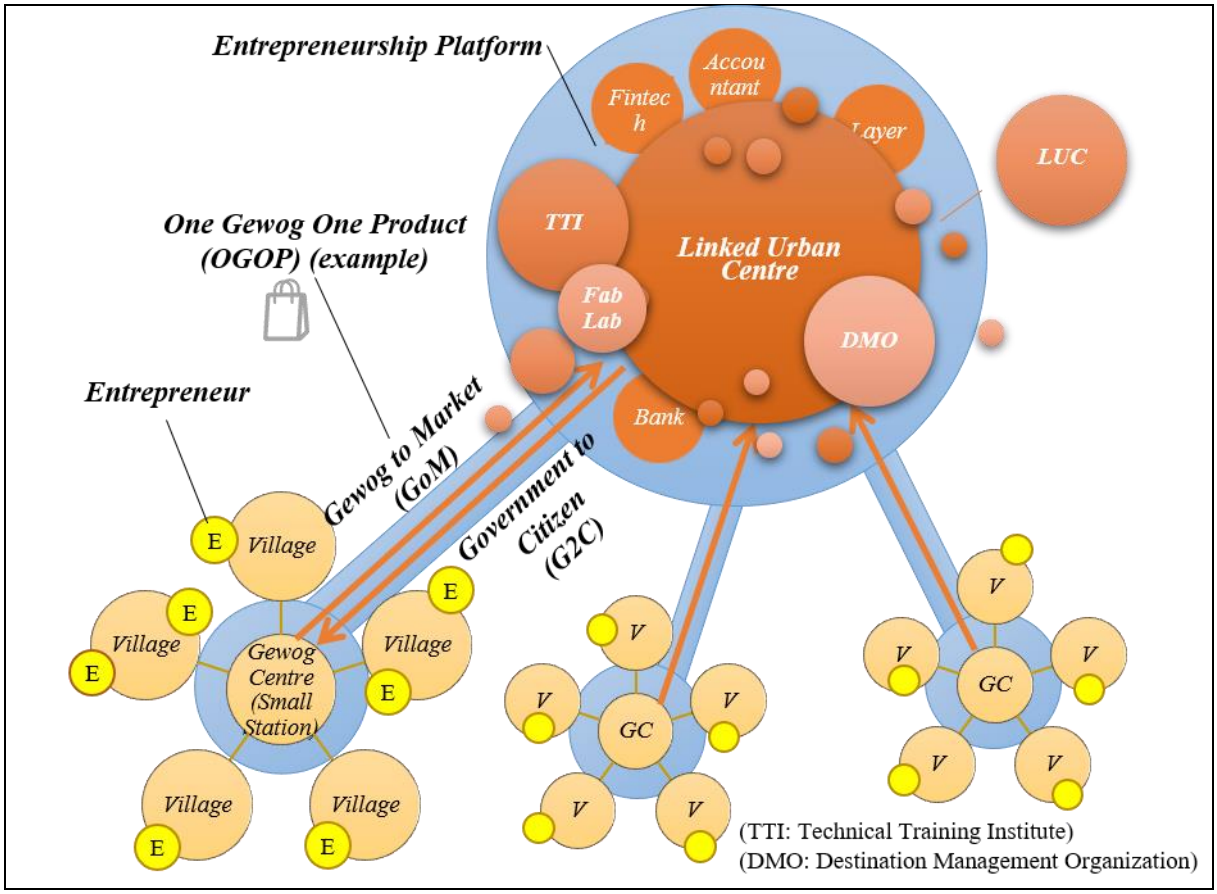


The hierarchy of the Holistic Service Delivery System consists of a Regional Centre, a Dzongkhag Centre, a Sub-dzongkhag Centre, a Gewog Centre and an Outreach Centre. By 2030, it will be necessary to promote service facility distribution in order to meet the minimum requirements of each function, such as education, health, transport, commercial, recreation and civic services. A Sub-district Centre will be a roadside station along the highway between each town. A Gewog Centre will be the main hub of the rural service network. An Outreach Centre will deliver essential services to remote villages.

Proposed Service Delivery System by Function



Spontaneous Development in Dzongkhags



The spontaneous motivation from villages and local people is key to realizing the effort needed for regional development. In LUCs, colleges and technical institutes will support the development of human resources for entrepreneurs. If a fab lab collaborates with the technical training institute, this will provide an incubation centre for people who are willing to develop their ideas in order to resolve the social problems in their locality. Each centre will be interlinked in order to create a platform for entrepreneurship as a base for regional promotion in collaboration with a DMO, private companies and a banking organization.

One Gewog One Product (OGOP) Programme is an initiative of the Queen's Project Office. The programme provides an outlet to market and sell products made by farmers from local communities. This programme aims at the promotion of the local communities in villages as a bottom-up approach. This kind of approach should be pursued to promote the entrepreneurs who will lead the new economic activities in local communities. Gewogs will deliver specialty products to the market in Dzongkhag Thromdes and towns. Currently, the Gewog government and Gewog's residents do not have enough human resource to encourage their areas. The Dzongkhags government must have the primary responsibility to supplement deficiency of performance the Gewog government aiming at the regional promotion from the bottom approach.

Land Use Category for National Land Use Plan

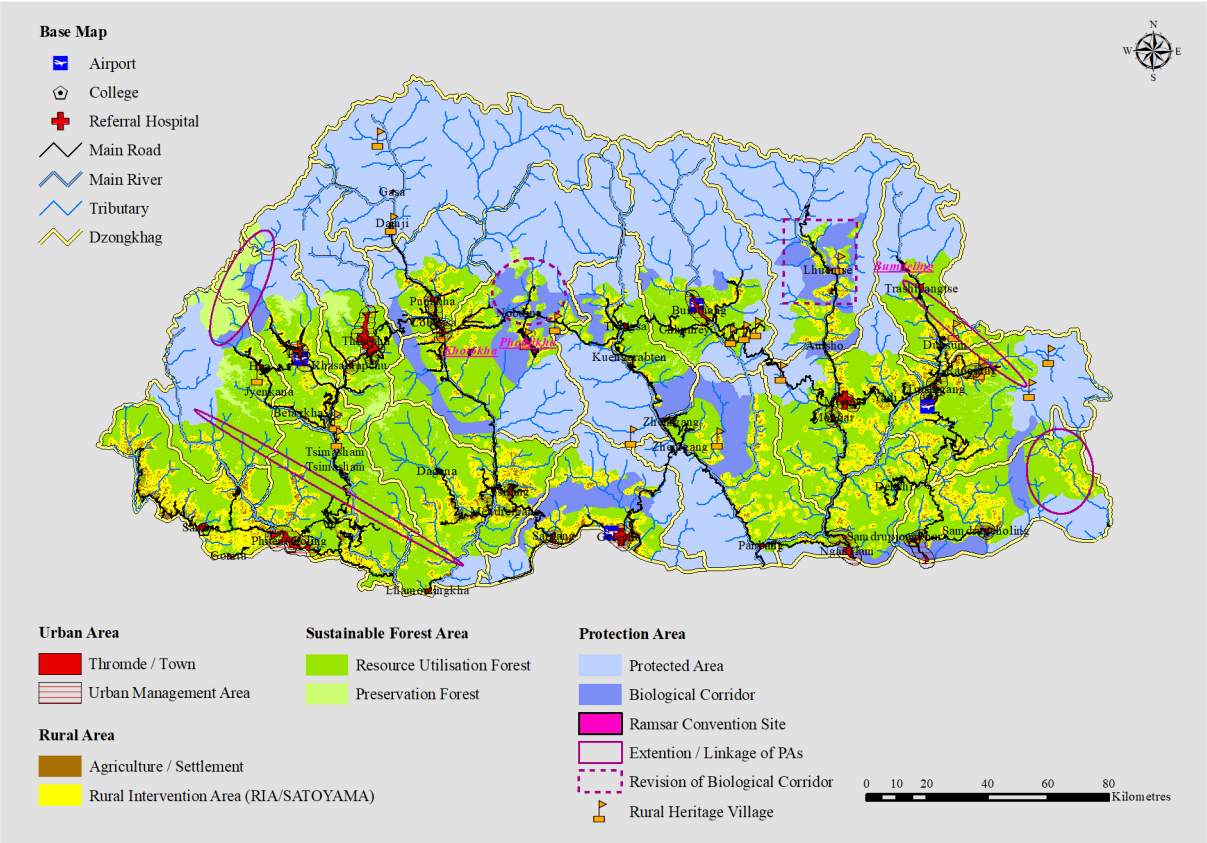
	Land Use Category		Elements	Characteristics
	Category	Sub-Category		
Human Settlements	**Urban Area**		**Thromde/Town <UMA>**	*** Population in primary industry: less than 50%. * Large population with higher density. * Accumulated with residential and commercial facilities. * Providing urban services to the srrounding rural areas.**
	UMA **Rural Area**		**Agriculture/Settlement <UMA> <RIA>**	*** Populatin in primary industry: more than 50%. * Small populaiton wit lower density. * Small population with lower density. * Primary functions are agricullture and residence. * Providing urban areas with various benefits; foods, water, natural environment, etc.**
Nature/Culture Conservation	RIA (SATOYAMA) **Sustainable Forest Area**	**Resource Utilization Forest**	**FMU CF Forest Management Area of LFMP <RIA>**	**Forests where sustainable utilization of forest resources is promoted.**
		Preservation Forest	**Shrubs, Meadows, Snow Cover, Bare Land, etc. (by Land Cover 2016)**	**Areas to be preserved for conservation of national land.**
	Protection Area (Overlapped with above 3 areas)	**Nature Protection Area**	**PA ・National Park ・Wild Sanctuary ・Strict Nature Reserve ・Biological Corridor**	**Areas to be protected for conservation of natural environment.**
			Ramsar Convention Site	**Significant wetlands designated for the 'Ramsar List' for the conservation and wise use of all wetlands to achieve sustainable development throughout the world.**
		Culture Protection Area	**Rural Heritage Village, etc.**	**Areas to be protected for conservation of cultual landscapes such as excellent scenic views of farming villages.**

UMA: Urbanization Management Area **FMU: Forest Management Unit** **LFMP: Local Forest anagement Plan**
RIA: Rural Intervention Area **CF: Community Forest** **PA: Protected Area**

There are two aspects to the National Land Use Plan (NLUP): one is an "umbrella plan" which presents the envisaged national land use and provides a direction to the plan formulated by the individual sector; the other is a "platform" on which to foster common ground where the related land use regulations/plans under different pieces of legislation are coordinated. Each of the land use categories corresponds to the legislation currently being enacted to implement the power of legislation applied to each piece of land.

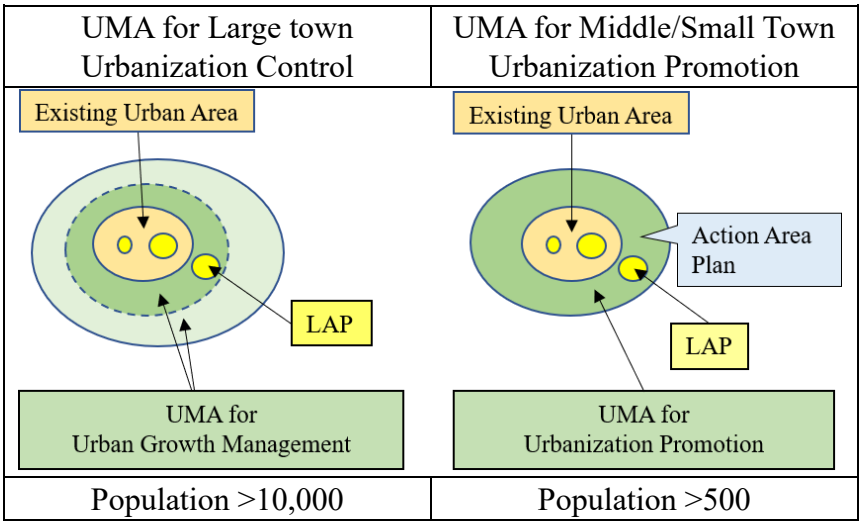
Land use has the two ultimate objectives: "primary human settlement" and "primary nature/culture conservation". Land for "primary human settlement" shall be categorized into a) an Urban Area and b) a Rural Area. Land for "primary nature/culture conservation" shall be categorized into c) a Sustainable Forest Area (SFA) and d) a Protection Area (PA).

Proposed National Land Use Plan



The total residential land required to meet the population growth in the Urban Area in 2030 is estimated at 17 km^2. As rapid urbanization is expected in the Urban Area, it will be necessary to set up a system to implement the proper management of urban growth. For this purpose, "Urbanization Management Areas" (UMAs) outside Thromdes/towns are proposed. Outer boundaries of UMAs are to be designated as urban growth boundaries to limit unplanned developments. The Thromdes/towns where UMAs are recommended to be established shall be those having approximately 0.3 km^2 or more of the required residential land in 2030.

Two Types of Urbanization Management Area



Suggestions for Improvement by Sector

In CNDP, the suggestions for improvement are addressed for each sector as mentioned below.

(a) Urban development

i) *To create National Capital Region and Linked Urban Centres to realize the envisioned national spatial structure.*

ii) *To formulate the urbanization management area to achieve sustainable land use in towns and their surrounding areas.*

(b) Rural development

i) *To improve the standard of living including the accessibility to various facilities, such as medical and health services, housing conditions, asset ownership and environmental issues in the Rural Area.*

ii) *To create jobs related to primary-sector activities. Jobs related to agro-processing and handicraft-making, utilizing local specialism, are to be expected. Tourism and care facilities for the elderly could also create new job opportunities in the Rural Area.*

(c) Agriculture promotion

i) *To improve the self-sufficiency rate for rice. Conventional development such as irrigation development, promotion of double cropping and the introduction of machineries should be continued. In addition, countermeasures for major constraints that farmers are facing, e.g., shortage of labour, human-wildlife conflicts and weed infestation should be promoted.*

ii) *To promote market-oriented agriculture to strengthen the "Bhutan brand" and to cater the market needs of import countries. The proposed actions include certification with a grading system, antenna shops, farm road and storage facilities.*

iii) *To improve nutrition by carrying out activities related to awareness and diversification of food diet. Integrated general guidance for nutrition should be prepared for an awareness campaign on nutrition.*

(d) Livestock promotion

i) *To promote cattle and poultry productions in a short term. Cattle produce five commodities including the four dairy products which are essential components of the Bhutanese diet. Poultry produces chicken meat and eggs.*

ii) *To promote pig and fish production in a medium term. The import volumes and amounts of these products have been relatively high.*

(e) Forestry promotion

i) *To prioritize the utilization of non-wood forest products (NWFPs) including medicinal and aromatic plants (MAPs) in the short term because transportation and harvesting of the NWFPs and MAPs are much easier than timber. Research and marketing should be further promoted. The unitization of NWFPs will promote income generation opportunities in the Rural Area.*

ii) *To utilize the medium-to-long term target is to utilize timber after the accessibility improvements in the forest road network.*

(f) Tourism promotion including CSI

i) *To establish a Destination Management Organization (DMO) in each Dzongkhag which acts as the main body for supporting the creation of tourist destinations. The DMO is composed of commerce and industry, hotels, agriculture and forestry, transportation business operators, restaurants and local people.*

ii) *To develop value-added products under one narrative and theme by collaborating with expertise, such as marketing professionals and designers. It is effective to create a regional brand and new products.*

iii) *To create a holistic tourism network covering four tourism areas: integrated tourism in western area; culture and nature experience tourism in central area; nature and handicraft experience in eastern area; health tourism in central south area; and winter resort in western south and eastern south areas.*

(g) Information technology and mechanical promotion

i) *To create two economic corridors in the southern and central areas of Bhutan for regional balance. The southern economic corridor will be comprised of agro-based industry, mineral-based industry and manufacturing.*

ii) *To develop the central economic corridor focusing on the knowledge and information industry. The second IT park will be developed for domestic companies in Monggar, while the first IT park is operational in Thimphu for international companies. The satellite office will be established and connected with the IT parks in the northern area. The IT parks will also be connected with the factories in the southern economic corridor, aiming at establishment of IoT.*

(h) Mining and manufacturing promotion

i) *To formulate a strategic mining master plan to set out the long-term prospects of mineral resource development including international demand.*

(i) Inland transport development

i) *To create a ladder-type arterial road network for an efficient and reliable transport system. The target travel times are set at eight hours or less for six north-south routes and 16 hours or less for two east-west routes.*

ii) *To study the landslide and slope failure prevention methods. Physical improvement on slope such as non-frame and cribwork with rock bolts is one of the prevention methods. A tunnel is another method. But, the tunnel is expensive compared with other landslide countermeasures. Comparison of alternative measures should be examined to verify economic and financial viability.*

(j) Air transport development

i) *To develop the second international airport by expanding the existing domestic airports in Glephu, Yongphula and Bumthang. As those existing domestic airports have advantage and disadvantage, a comprehensive study is necessary to select the most suitable airport.*

(k) Transport using advanced technology

i) *To promote electric cars and UAVs (unmanned aerial vehicles) to take advantage of a sufficient electricity supply.*

(l) Resilient national spatial structure against natural disaster

i) *To strengthen "self-reliability" in towns and villages in emergency. Training and drills for evacuation and first aid in schools and in the community should be carried out, as well as building up stocks of water and food.*

ii) *To prepare a temporary operation centre for national government functions in Paro and a disaster response hub for Phuentsholing.*

(m) Human resource development

i) *To create a human resource development hub in each region by upgrading and expanding of higher education institutes and creating domestic and international academic linkages.*

22 High Priority Projects

Sector and Project	Organization
Urban development	
Eastern Region Development Programme	TCB, **Eastern Dzongkhag**,
Formulation of Regional Plan for Sarpang-Gelephu Linked Urban Centre	**DHS**, Sarpang Dzongkhag,
Project of Land Use Zoning and Instructional Improvement in Thimphu, Phuentsholling and Gelephu	**MoWHS**
Rural development	
Development of a Comfortable Rural Living Environment	**MoWHS**, MoH, LGs, MoE, LGs
Project for Dzongkhag Vitalization in Eastern Region	**MoEA**
Agriculture promotion	
Improvement in cultivation techniques for labour saving	**DoA** (ARDC)
Establishment of community-wildlife coexistence	**DoA** (NPPC)
Livestock promotion	
Productivity improvement by Breeding improvements and Better feeding	**MoAF**, LGs
Forestry promotion	
Further research and marketing of NWFPs and MAPs	**MoAF**, MoH, LGs, Research Institutes
Tourism promotion including CSI	
Artist-in-residence Programme	Dzongkhag, **TCB**
Information technology and mechanical promotion	
Development of Gyalpozhing Tech Park for Entrepreneurship Development	**MoEA**, DHI, GCIT
Formulation of a Plan for Social Experiment Projects	**MoEA**, DHI, GCIT
Mining and manufacturing promotion	
Formulation of a Mining Master Plan	**MoEA**
Inland transport development	
EW-1 e~h Wangdue-Trongsa, Trongsa-Bumthang, Bumthang-Mongar, Mongar-Trashigan	**MoWHS**
Technology Transfer Programme for Slope Protection and Tunnel (Planning, Design, Pilot Project, OJT)	**MoWHS**
Technology Transfer Programme for Development of Road Structure Design Standard (Planning, Design, Pilot Project, OJT)	**MoWHS**
Air transport development	
Comprehensive Master Plan for a Second International Airport Development and Improvements to Domestic Airports	**MoIC**
Development of a Subsidy Scheme to Promote Domestic Air Transport Use by Local People	**MoIC**
Transport using advanced technology	
Drone-based Freight Transport System for Remote Areas	**MoIC**

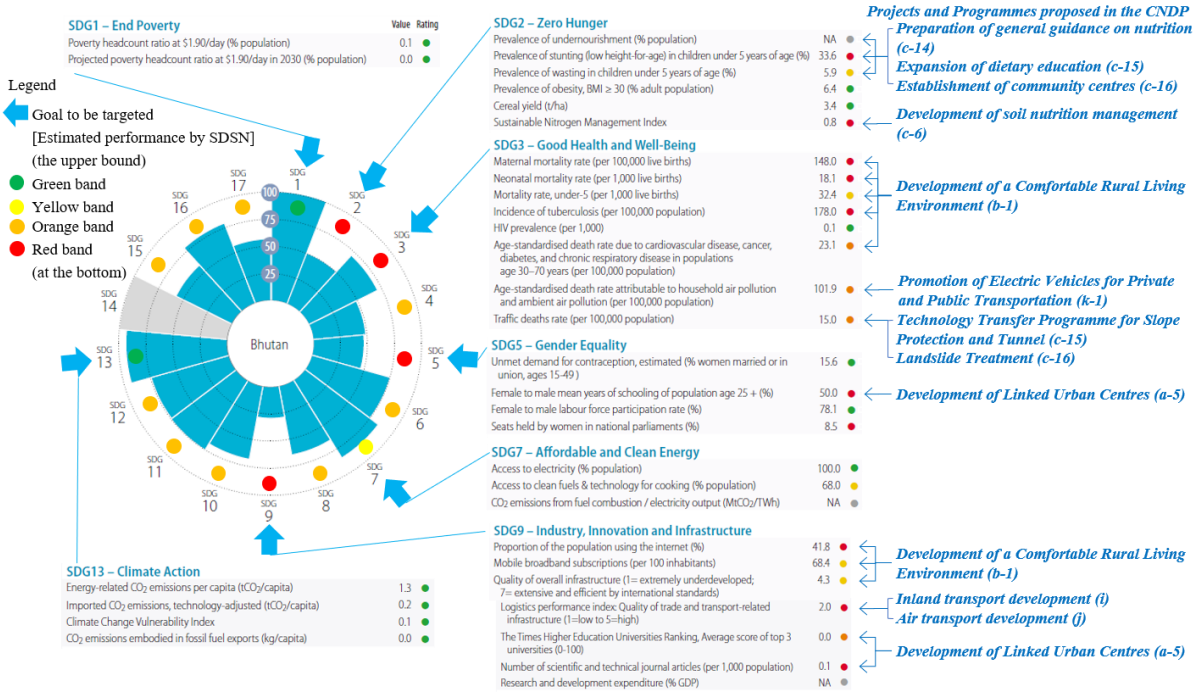
A set of projects is proposed with regard to the development guidance for urban development, rural development, the renewable natural resource sector, industries and transport in the CNDP. Fifty-one projects are proposed for the short-term projects. They are expected to commence in the short term and will be preferably completed by 2023. The short-term projects are classified into 11 categories, according to the classification of the sector and assessed in respect of the assessment criteria. The 22 high-priority projects are selected with the highest evaluation points in each category. The high-priority projects will contribute to at least one of the assessment criteria in the realization of a national spatial structure and at least one of the assessment criteria for the other standards. Each project is assessed according to whether a project might cause any positive and negative impacts to nine domains of GNH.

Contribution to Improve the Index of Gross National Happiness of Bhutan

Domain	Urban development		Rural development		Agriculture promotion		Livestock promotion		Forestry promotion		Tourism promotion including CSI		Information technology and mechanical promotion		Mining and manufacturing promotion		Inland transport development		Air transport development		Transport using advanced technology	
	Rural	Urban	Rural	Urban	Rural	Urban	Rural	Urban	Rural	Urban	Rural	Urban	Rural	Urban	Rural	Urban	Rural	Urban	Rural	Urban	Rural	Urban
Psychological Well-being	X	X	X		X						X	X	X									
Health	X	X	X		X								X								X	
Time Use	X	X	X		X								X				X	X	X	X	X	
Education	X	X	X		X						X	X	X	X	X		X					
Cultural Diversity	X	X	X		X				X		X	X	X	X								
Good Governance					X				X		X	X	X		X		X	X			X	
Community Vitality	X	X	X		X		X		X		X	X	X				X	X				
Ecological Diversity and Resilience		X	X		X				X				X	X			X	X			X	
Living Standard	X	X	X		X		X		X		X	X	X	X	X		X	X				

The impact of the proposed projects on nine domains of GNH is assessed in a qualitative manner. A project having an impact on either the promotion of the Capital Region or the promotion of LUCs, among other evaluation criteria, is evaluated according to whether it improves the Urban Area. The impact of other projects on either vitalization in the Rural Area or vitalization in the Eastern Region is evaluated according to whether it contributes to the Rural Area. Then, the impact of the proposed projects is assessed for each domain in the Urban Area and the Rural Area. "X" means the proposed project in the 11 categories will have a positive impact in terms of improving a domain of the GNH. The proposed project will improve the low-index domains of education, ecological diversity and living standards in the Rural Area. It will also contribute to the upgrading of the low-index domains of cultural diversity and community vitality in the Urban Area.

Contribution to Improve the Sustainable Development Goal Index of Bhutan



The Bertelsmann Stiftung and the Sustainable Development Solutions Network (SDSN) prepared the 2018 Sustainable Development Goal (SDG) Index and Dashboards Report. Progress is classified into 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 increasing distance from SDG achievement. The red band is bound at the bottom.

The two goals of SDG 1 End Poverty and SDG 13 Climate Action are rated within the green band as, in Bhutan, progress has reached 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 need to see significant improvement.

Efforts to improve performance are made to reflect the state of affairs in Bhutan. The implementation of the CNDP will help to improve the indicators of the red band goals when its proposed projects are realized. Those projects include nutrition improvement and soil nutrition management, which contribute to SDG2. Improvements in living standards along with an enhanced education system will upgrade the level of achievement of SDG3. This is an important approach in order to foster quality human resources in a country with a small population. The proposals for an integrated communication network will improve logistics performance, while the proposed linkage with international academia will enhance research and development. Those will improve the level of achievement with regard to SDG9.

CHAPTER 1 INTRODUCTION

1.1 Background

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 (SEZs), 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 the Formulation of the 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 Implementation Arrangement

(1) Objectives

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 the Urban and the Rural Area across the entire country through the implementation of the CNDP. This well-balanced development will contribute to the maximization of Gross National Happiness (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

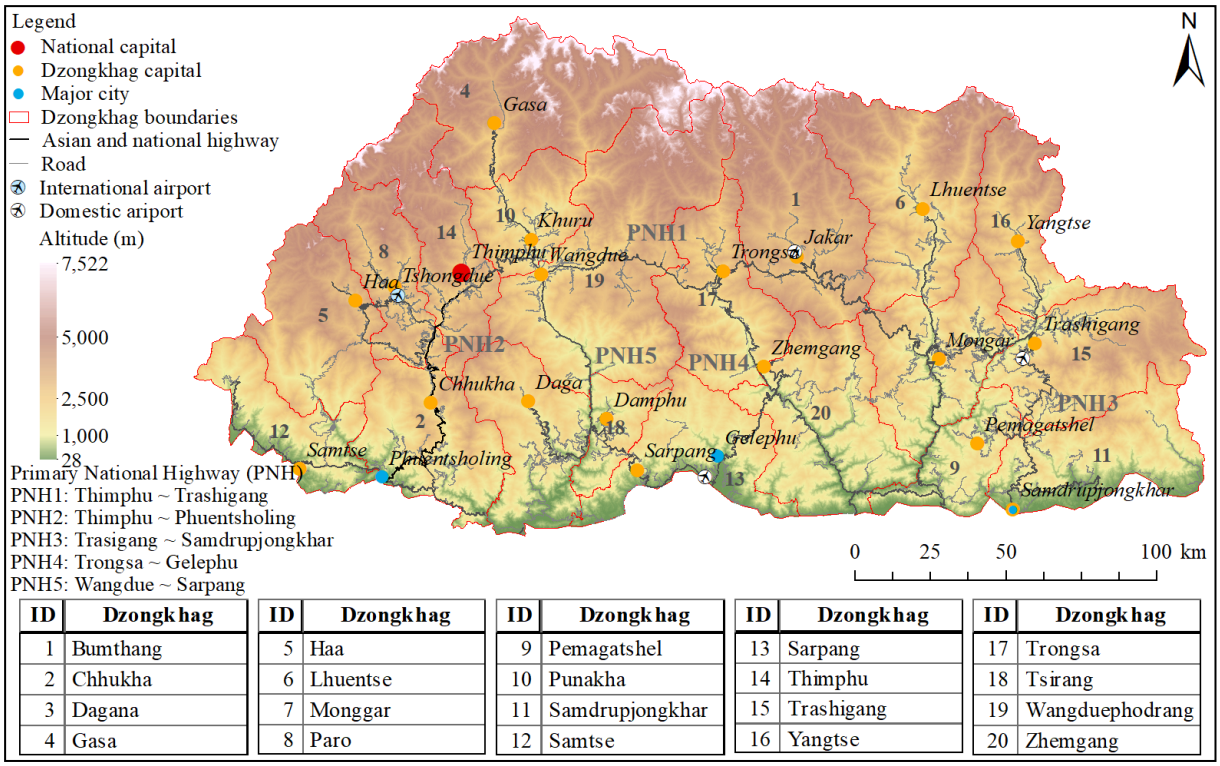
(2) Significance and Importance of the Project

The RGoB has formulated the socio-economic 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 socio-economic development and sector strategies.

(3) Study Area and Basic Data on 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 1.1 shows the topography and Dzongkhag (or district) boundaries of Bhutan. Table 1.1 includes basic data on the country, including Bhutan's socio-economic and social situation.

The name of the JICA Project Team is not indicated in the source information for tables and figures in this report as requested by the Ministry of Works and Human Settlement. The tables and figures, where no source is indicated, are prepared by the JICA Project Team.



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 Department of Roads (DoR) for roads

Figure 1.1 Topography and Dzongkhag Boundaries of Bhutan

Table 1.1 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
Export value in 2017[6] (BTN millions) *excluding electricity		25,313.75
Import value in 2017[6] (BTN millions) *excluding electricity		66,921.18

Item (Unit)	Value
Main export product in 2017[6]	Ferrosilicon, cardamoms, semi-finished iron products, Portland Pozzolana cement
Main import product in 2017[6]	Light oils, Motor spirit, parts, ferrous products
Annual international visitor numbers 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) (BTN 1.00 = INR 1.00 = USD 0.01395, as of September 2018)

Source: [1]Statistical Yearbook of Bhutan 2017, [2]Population and Housing Census of Bhutan (PHCB) 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 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 (WG) meeting in January 2017, respectively.

The Steering Committee (SC) is the highest organization supervising the Project's activities and approving its outcomes. The SC is chaired by the Secretary of the 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 WG has been established to comprehensively exchange the opinions and views of line ministries and departments. The WG consists of representatives from three national commissions, eight ministries, the Centre for Bhutan Studies and GNHC, the NSB, the Tourism Council of Bhutan (TCB), the JICA Bhutan Office and local government officials.

The MoWHS appoints a Core Member from among the officials of the Department of Human Settlement (DHS) to coordinate the SC and the WG. They practically support and collaborate with the JICA Project Team (JPT) as its Counterparts on a daily basis. Members of the SC and the WG are shown in the table below.

Table 1.2 Members of the Steering Committee and Working Group

SC/WG	Organization
Steering Committee	• Secretary, GNHC (Chair) • Chief Representative, JICA Bhutan Office (Co-chair) • Secretary, 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 Settlements • Leader of the JICA Project Team
Working Group	• GNHC • NLCS • NEC • Centre for Bhutan Studies and GNH • NSB • TCB • Local government officials • MoWHS ✓ DoR ✓ Department of Engineering Services

SC/WG	Organization
Working Group	✓ Department of Human Settlement ✓ Policy and Planning Division • 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

1.4 Project Schedule

The Project's activities in Bhutan started in mid-January 2017. Due to the timing for the finalization of the Population and Housing Census of Bhutan 2017, the project period was extended for approximately 29 months until May 2019.

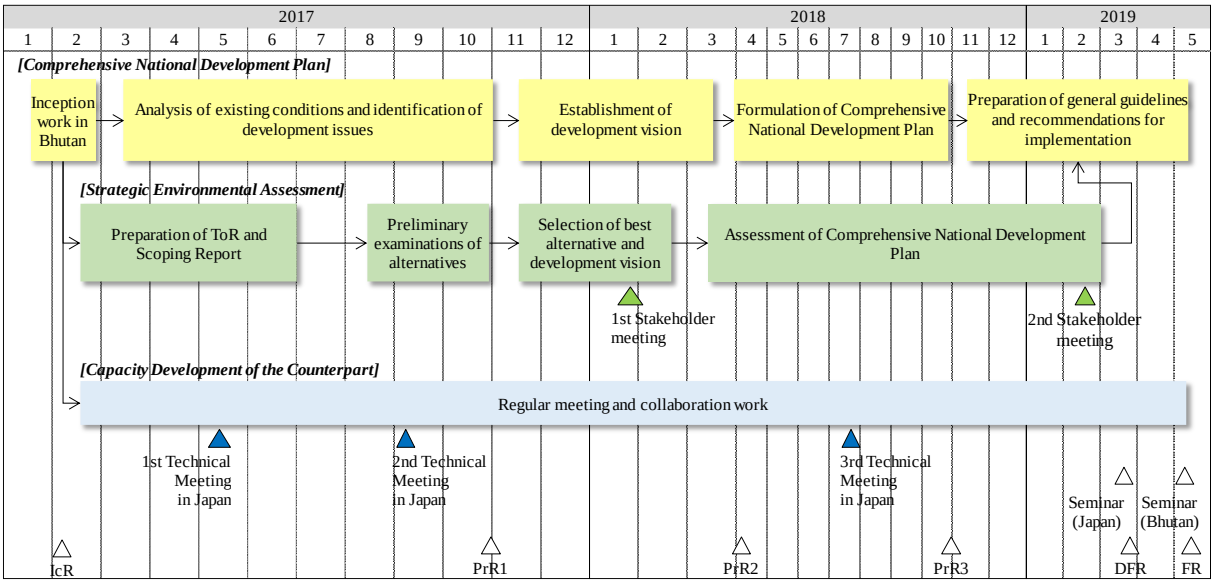


Figure 1.2 Work Schedule

CHAPTER 2 EVOLVING THE DEVELOPMENT ALTERNATIVES

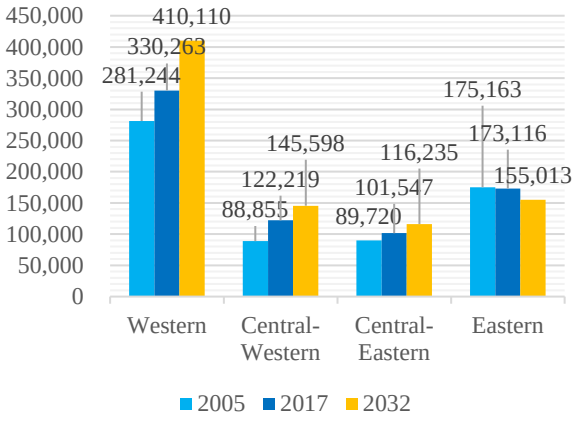
2.1 Development Issues

(1) Development Issues for National Socioeconomy, Urban Area and Rural Area

Issues to be addressed for national socioeconomy

The principle of Bhutanese national policy is the successful balance between development and prosperity in the Urban and the Rural Areas. However, Bhutan is facing increasing rural-urban migration, mainly from east to west. The latest population census reveals that depopulation started in the Eastern Region as the regional population decreased from 175,163 in 2005 to 173,116 in 2017. The National Statistics Bureau (NSB) assumes it will further decrease to 155,000 in 2032 (Figure 2.1). the contrary, the percentage of the urban population increased from 31% in 2005 to 38% in 2017 (Figure 2.2). The NSB updated the national population projection, indicating that the percentage will exceed 50% in 2037. This rural-urban migration is deemed to be contributing to the problems facing the Rural Area. These problems include labour shortages, which have led to an increase in fallow agricultural land and sociocultural disruption. Furthermore, this influx of people into the main cities, such as Thimphu, is being linked with rising unemployment and the sprawl of the Urban Area (Figure 2.3). The balanced development of rural and urban areas is the most important and challenging issue.

At the macro economy, the trade balance has been deficit due to economic dependency on the imported goods. The sales of electric are the largest export product and a sole means of acquisition of foreign currency in Bhutan. The Bhutanese economy has to diverse the tourism and other economic activities for means of obtaining foreign currency. On the other hand, improvement for self-sufficiency of energy and foods is another issue. The effective use of electricity needs to reduce the dependency on the imported fossil fuel. The supply of domestic agriculture produce also needs to be pursued.

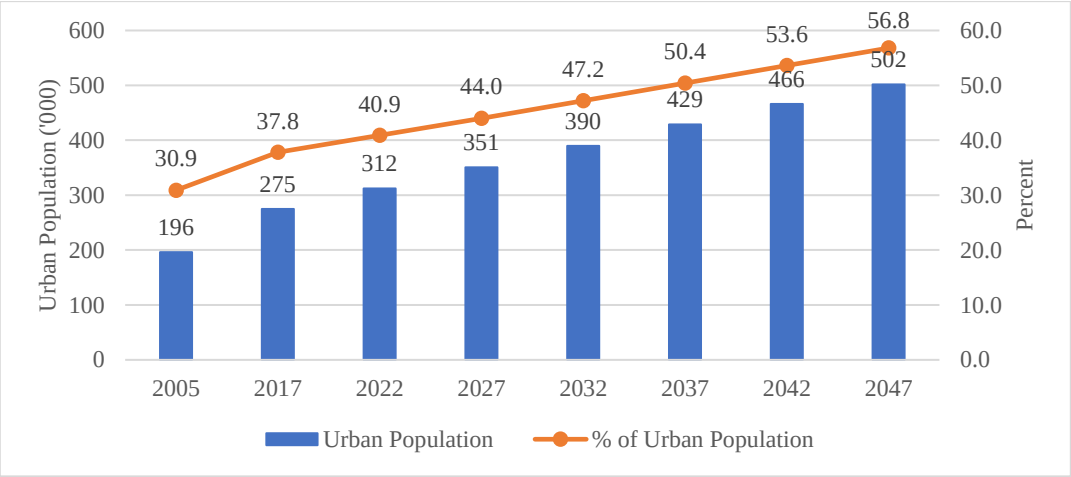


Population by Region

Dzongkhag by Region

Source: NSB

Figure 2.1 Existing Population (2005 and 2017) and Estimated Population (2032) by Region



Source: NSB

Figure 2.2 Urban Population (in 1,000s) and Percentage of Urban Population, Bhutan 2017-2047

Source: 30 Years of Change in Bhutan (1981-2016), Personal Perspective, Karma Ura

Figure 2.3 Landscape Before and After Rapid Urbanization in Thimphu from 1975

Issues to be addressed for urban area

Countermeasures in urban areas may be critical so that migrants can be received without serious environmental and social problems. These countermeasures encompass the following aspects.

- The creation of jobs opportunities.
- Land use control to maintain good environmental quality, economic efficiency and cultural attractiveness.
- Efficient transport system and infrastructure.
- Affordable housing.

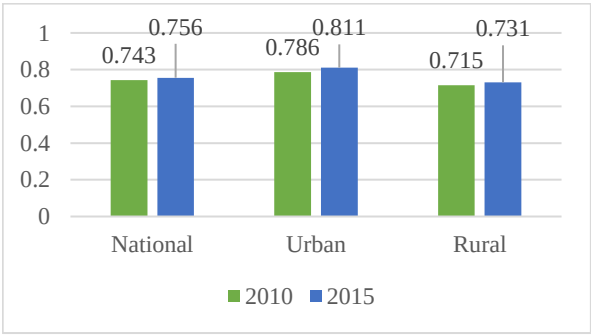
Issues to be addressed for rural area

Countermeasures in rural areas must be consisted of a comprehensive approach that cover the economic and social aspects. The necessary countermeasures must deal with the following topics.

- The expected human resources will be local residents and migrants who are willing to commit themselves to development in local areas. Since the local people are the most important resources to vitalize the rural area, the local people will recognize the value of rural life in local areas and encourage it and be capable of development in local areas.
- The good living environment will be provided in the rural areas. Although the public services will not be provided equally in all the villages, a holistic delivery service system should be established to meet the acceptable level for the local people.
- The economic activities other than agriculture will be identified in rural area.

(2) Necessary Improvements in the GNH Index in the Urban Area and the Rural Area

One of the causes of domestic migration is the gap in happiness levels between the Urban and the Rural Areas. According to the results of the third GNH survey conducted in 2015, the GNH Index in the Urban Area was estimated to be 0.811, compared to 0.731 in the Rural Area (Figure 2.4). In addition, according to the Poverty Analysis 2012, the poverty rate in the Urban Area is predicted to be 1.8%, compared to 16.7% in the Rural Area.



Source: Provisional Findings of 2015 GNH Survey, Centre for Bhutan Studies and GNH Research

Figure 2.4 Gross National Happiness Index in the Urban and the Rural Areas

The overall degree of GNH Indices is improved by degree enhancement in the case of nine domains: psychological well-being, health, time use, education, cultural diversity, good governance, community vitality, biological diversity and living standard.

The degree of GNH Indices is analysed for the Urban and the Rural Areas in each Dzongkhag on the Project. The degree of the three domains of education, living standards and ecology is lower than the national average in more than 11 Dzongkhags in the Rural Area (Table 2.1). In contrast, the degree of cultural diversity and community vitality is below the national average in more than nine Dzongkhags in the Urban Area. The factors of high relevance to these low-degree domains are analysed to find a way to improve GNH in the Rural and the Urban Areas.

Table 2.1 Domains Where the Degree Is Lower Than the National Average for Each Dzongkhag with Urban and Rural Distinctions

Dzongkhag	Psychological wellbeing		Health		Time use		Education		Cultural diversity		Governance		Community vitality		Ecology		Living Standard	
	Rural	Urban	Rural	Urban	Rural	Urban	Rural	Urban	Rural	Urban	Rural	Urban	Rural	Urban	Rural	Urban	Rural	Urban
Bumthang							X							X	X			
Chukha	X								X	X	X	X	X	X				
Dagana			X		X	X											X	
Gasa							X				X							
Haa							X			X	X							
Lhuentse			X				X								X		X	
Mongar						X	X			X				X	X		X	
Paro						X			X	X	X			X	X			
Pemagatshel			X				X			X					X		X	
Punakha		X				X	X			X				X			X	
Samdrupjongkhar							X				X	X		X			X	
Samtse	X		X							X		X		X			X	
Sarpang			X		X	X				X				X	X			
Thimphu					X					X	X	X	X	X				
Trashigang	X				X		X										X	
Trashiyangtse	X						X								X		X	
Trongsa			X			X	X			X					X		X	
Tsirang															X		X	
Wangduephodrang	X					X	X		X	X		X			X		X	
Zhemgang	X		X				X								X		X	

Note: X refers to a domain where the degree is lower than the national average.

More than 100 indicators are established to estimate the degree of the nine domains. Among those indicators, one indicator (domain indictor) is selected to represent the other indicators (factors) for each domain (Table 2.2).

Table 2.2 Domain and Domain Indicator

Domain	Domain Indicator
Psychological wellbeing	Happiness (scale from 1 to 10)
Health	Self-reported health status (scale from 1 to 5)
Time use	Self-reported health status (scale from 1 to 5)
Education	Schooling (number of years attending formal school)
Cultural diversity and resilience	Cultural knowledge (scale from 1 to 5)
Good governance	Government performance (scale from 1 to 5)
Community vitality	Community relationship (scale from 1 to 4)
Ecological diversity and resilience	Ecological issues (scale from 1 to 5)
Living standard	Satisfaction with living standards (scale from 1 to 5)

The strength of the relationship between the domain indicator and the factors is assessed by regression analysis. In the Rural Area, the factors that are relevant to the low-degree education domain include satisfaction with family relationships (coefficient=0.366), satisfaction with health (0.357) and satisfaction with standards of living (0.193). Those highly relevant factors imply that health conditions, family relationships and income affect the degree of the education domain. If those factors are improved, the degree of this domain may be enhanced. The factors relative to the living standard domain include satisfaction with the major occupation (0.194), financial security (0.152) and satisfaction with work-life balance (0.123). The factors relative to the ecological diversity domain are good governance (0.050), feeling responsible for conserving the environment (0.042) and agreeing nature is a spiritual domain (0.030). Satisfaction with living standards and financial security require reliable income resources. Thus, job opportunities influence the degree of the education and living standard domains. The improvements necessary to achieve

a higher degree on the GNH Index in the Rural Area include i) job opportunities to support a sufficient livelihood in the local area, ii) a cultural life with a rich environment and community bonding to make family relationships and work-life balance satisfactory within daily life with respect to nature, and iii) a living environment with access to education and health services, in order to sending children to school in good health.

In the Urban Area, the factors that are relevant to the low-degree cultural diversity domain include satisfaction with living standards (0.072), good governance (0.056) and cultural knowledge (0.056). The factors relative to the community vitality domain include community vitality (0.092), spirituality (0.072) and government performance (0.048). Enhancement of cultural life with a rich environment and community bonding is effective in terms of improvement to a better degree on the GNH Index in the Urban Area. The enhancement is relevant to cultural knowledge, community vitality and spirituality. Enhancement of job opportunities for a sufficient livelihood in the local area is another effective approach to improve the satisfaction with living standards. Those enhancements in turn support the improvement in the two domains.

In preparation of the CNDP, the above-mentioned improvement should be considered in order to maximize the target outcomes and in turn raise the degree of GNH in the entire country. The details of the analysis are given in Chapter 7 of Volume 2 of this report.

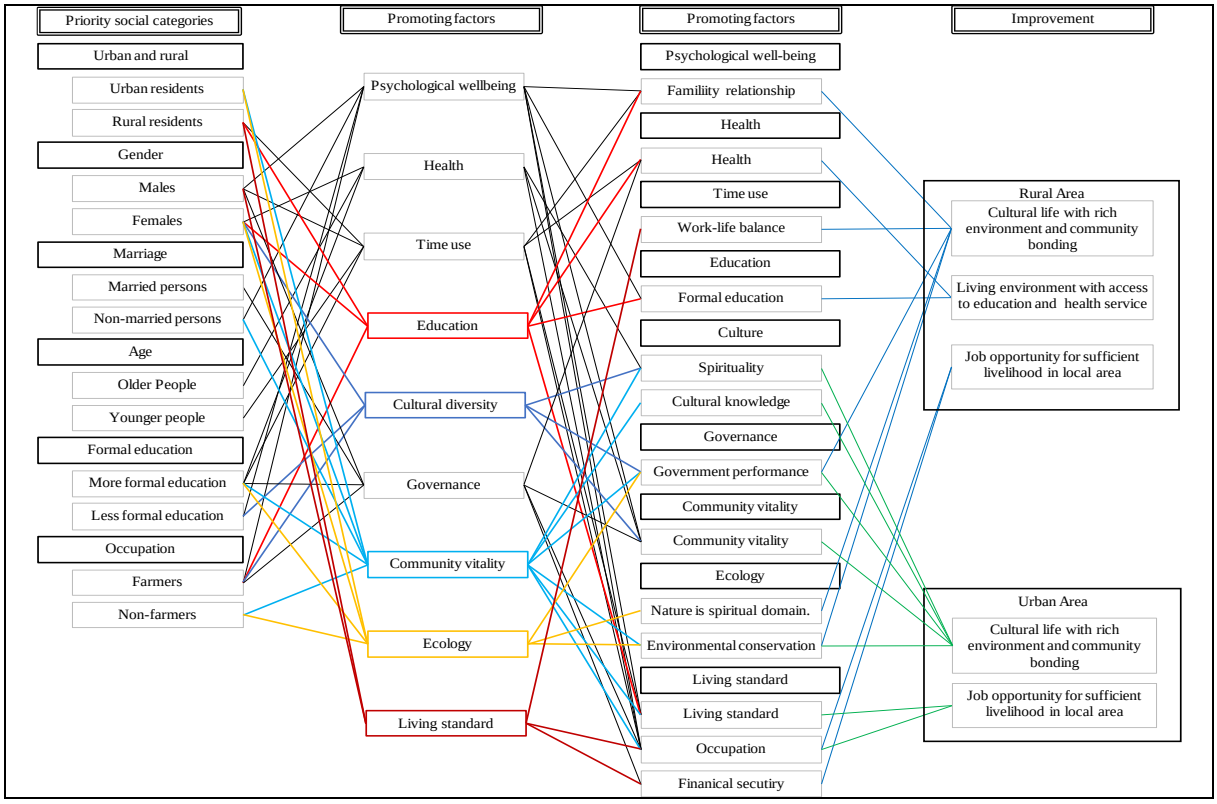


Figure 2.5 Necessary Improvements in GNH in the Urban Area and the Rural Area

2.2 Creation of Development Alternatives

On the Project, development alternatives for the CNDP were proposed in order to seek a suitable new direction for Bhutan. These development alternatives are the target of the Strategic Environmental Assessment (SEA).

Seven factors have been established to define the characteristics of each alternative. The seven factors are the planning framework, food self-sufficiency, the economy, society, transport,

spatial structure and land use. The planning framework include three options. The first option is to concentrate on the population and economic activities in the existing advanced regions in the west and south of Bhutan. The second option is to promote the Central and Eastern Regions. The third option is to widely disperse the population and economic activities in the country. For the economy factor, three options are established for different approaches. These include industries with comparative advantages, such as hydropower and tourism, collective industries including small and cottage industries, and self-sufficient industries. The transport factor includes three options. The first option is to prepare a new international airport and a new national highway. The second option is to construct local roads, while the third option is to improve the existing main transport facilities. Those factors and options are important in shaping the future of Bhutan.

These seven factors and established options are elaborated to meet the development issues specified in Section 2.1 of this report. Those seven factors are also established to reflect the necessary improvements in the GNH Index in the Urban and the Rural Areas. The creation of job opportunities is one of the development issues and necessary improvements to achieve higher GNH Indices. The economy factor shows the different economic options to be encouraged. The planning frame factor indicates three options for the regions in which the economic activities will be concentrated. The living environment with good access to education and medical services is required for better GNH Indices. The society factor establishes options to meet this requirement. Advanced education and medical services are to be developed in the Western and Southern Regions. Alternatively, the service level within Dzongkhags is to be upgraded to improve the level of daily service. The last option is to highlight the traditional service in local areas. The established options for the seven factors reflect the development issues and necessary improvements for GNH. Figure 2.6 shows the relation between the seven factors, development issues and necessary improvements in terms of GNH.

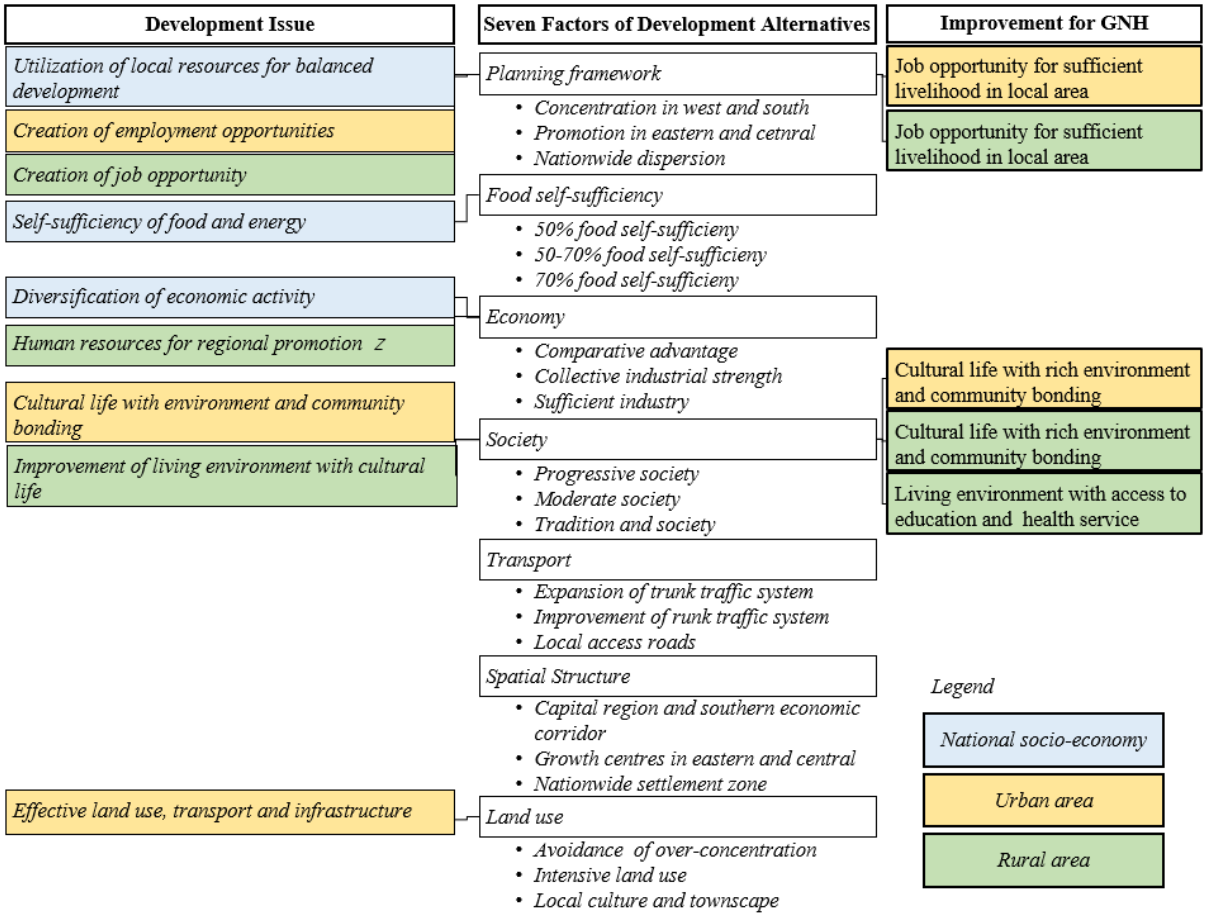


Figure 2.6 Relation Between the Seven Factors, Development Issues and Necessary Improvements in Gross National Happiness

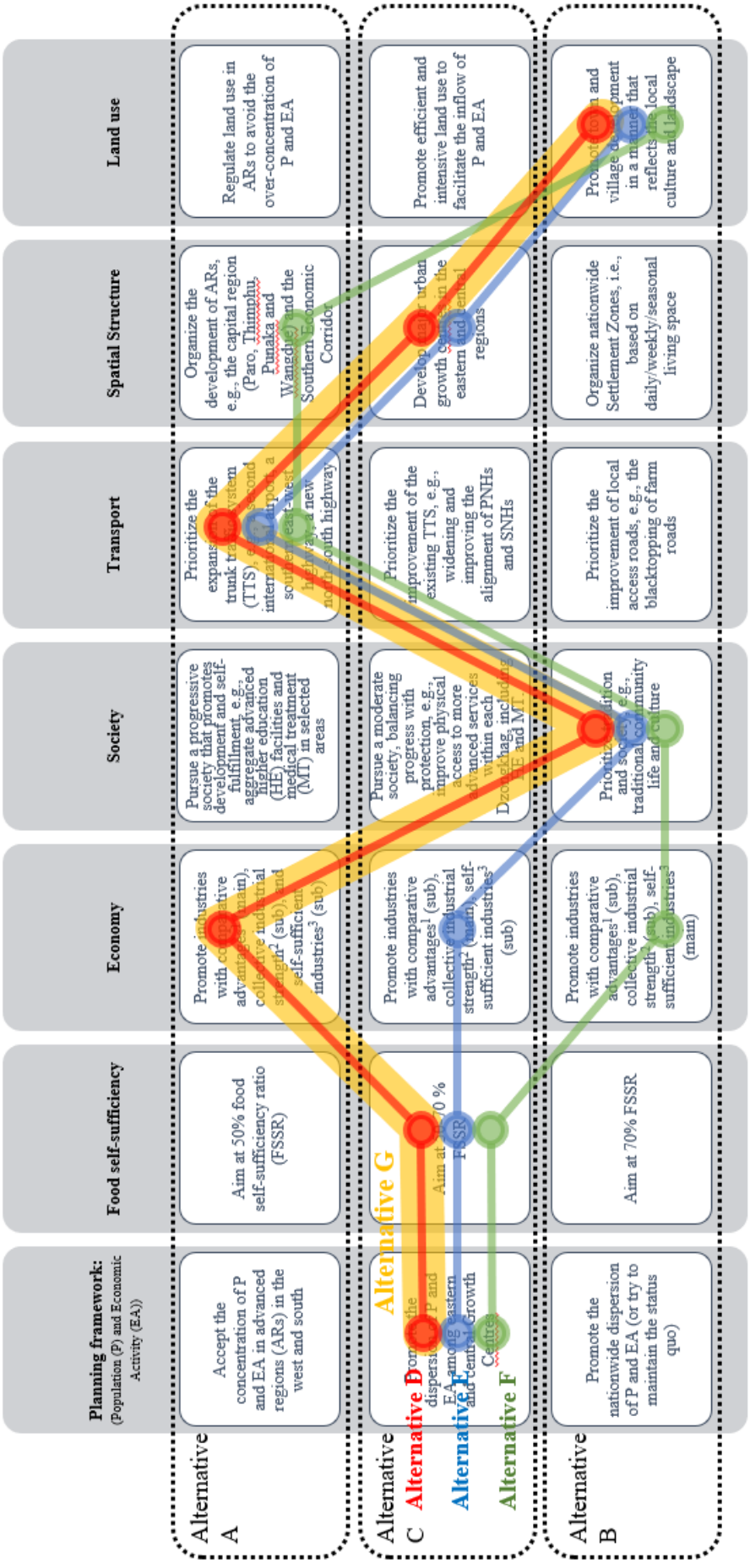
A total of three prototypes has been elaborated for the development alternatives, which effectively represent the full spectrum of development possibilities available to the country (Figure 2.7 and Figure 2.8).

Type A is an alternative that seeks to promote the development of advanced economic regions, such as Thimphu and Phuentsholing, with the aim of using the profits of this development to then develop more backward regions. Type B seeks to promote the organization of settlement areas with a rich spiritual heritage and local culture in order to reduce regional disparities across the nation. Type C looks at promoting the organization of a regional structure that facilitates active interaction between diverse sub-regions in order to balance development with environmental protection. It should be noted that Type A reflects the existing development pattern, as it follows current socio-economic trends and existing development plans. The spatial implication for each development alternative has been illustrated (Figure 2.8).

Further analysis has been undertaken to combine these seven factors in order to pursue a more suitable alternative for Bhutan. Members of the Working Group convened workshops and held group discussions to seek original ideas for development alternatives. They created three alternatives (Alternatives D-F) which differed from the prototypes. However, the proposed development alternatives also have common underlying factors, which include the following subjects: (i) the pursuit of moderate to high economic growth, (ii) the promotion of regional development in the Central and Eastern Regions, (iii) the organization of Settlement Zones to provide public services to the entire country, (iv) the promotion of small and medium-sized enterprises (SMEs) should be attempted after hydropower development, (v) the creation of an

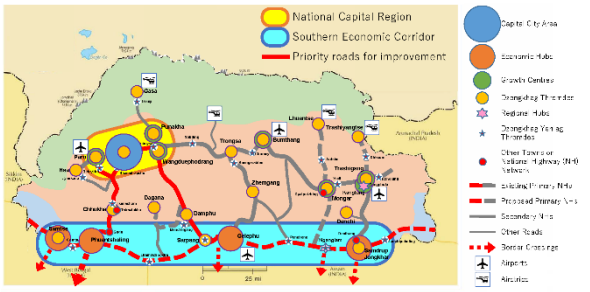
efficient transport network, and (vi) the conservation of tradition and culture. A development alternative that reflects the above topics has been established as Alternative G. The options for the economic factor selected in Alternatives D to F are different from each other. Reflecting the expectation for economic growth, as expressed by the participants in the workshop, Alternative G selected the option highlighting industries with comparative advantages. This option gives secondary priority to collective industrial strength and self-sufficient industries. Those industries are given the highest priority in Alternative E and Alternative F. The option selected in Alternative G reflects the option for the economic factor selected in Alternative E and Alternative F.

In order to refine the ideas of development alternatives, the first stakeholder meetings were held three times in Thimphu, Gelephu and Monggar, in order to collect opinions from local governments and the representatives of the people in all Dzongkhags, in January and February of 2018. They formulated development alternatives for their own Dzongkhag. As shown in Figure 2.9, the factors garnering the highest points are the same as the factors selected in Alternative G except for transport and society. Dzongkhag representatives highlighted their need to improve local roads (transport) and social services (society) within the Dzongkhags. This opinion reflects their need to improve the living conditions in local areas. On the contrary, Alternative G looks after the trunk road network at the national level. This national trunk road is critical if local roads are to effectively function. Alternative G is deemed to support the opinions expressed in the stakeholder meeting.

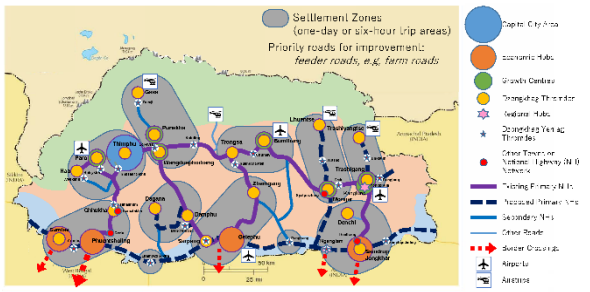


Note: Example of economic activities
1: Industries with comparative advantages, e.g., hydropower, tourism, export-oriented agriculture, working abroad, information technology etc.
2: Collective industrial strength, including the promotion of agro-technology, SMEs, industrial clusters and the "alternative economy"
3: Self-sufficient (SS) industries, e.g., SS agriculture, import substitution, industrial construction, domestic industries etc.

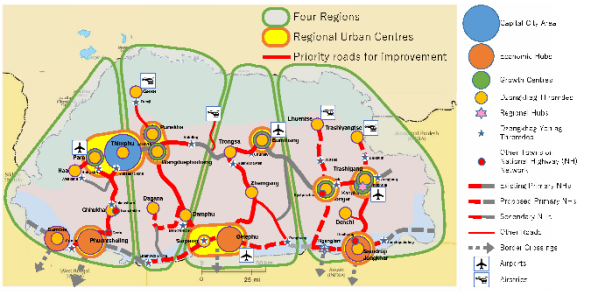
Figure 2.7 Seven Factors of Development Alternatives A-G



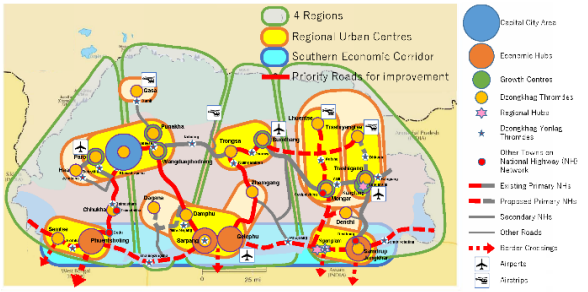
Alternative A



Alternative B



Alternative C



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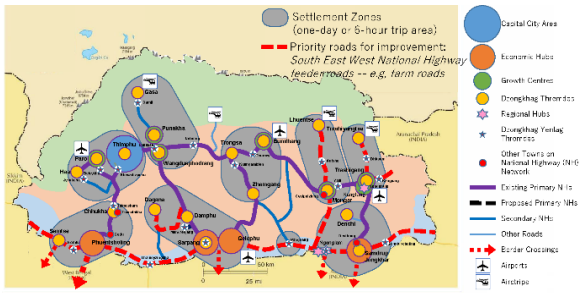

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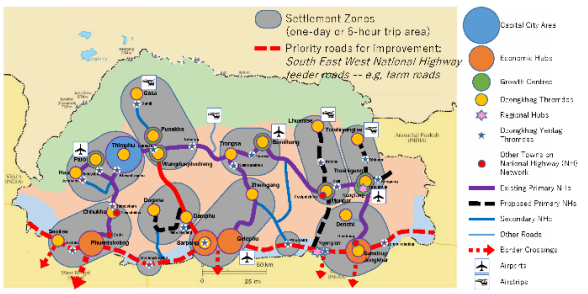
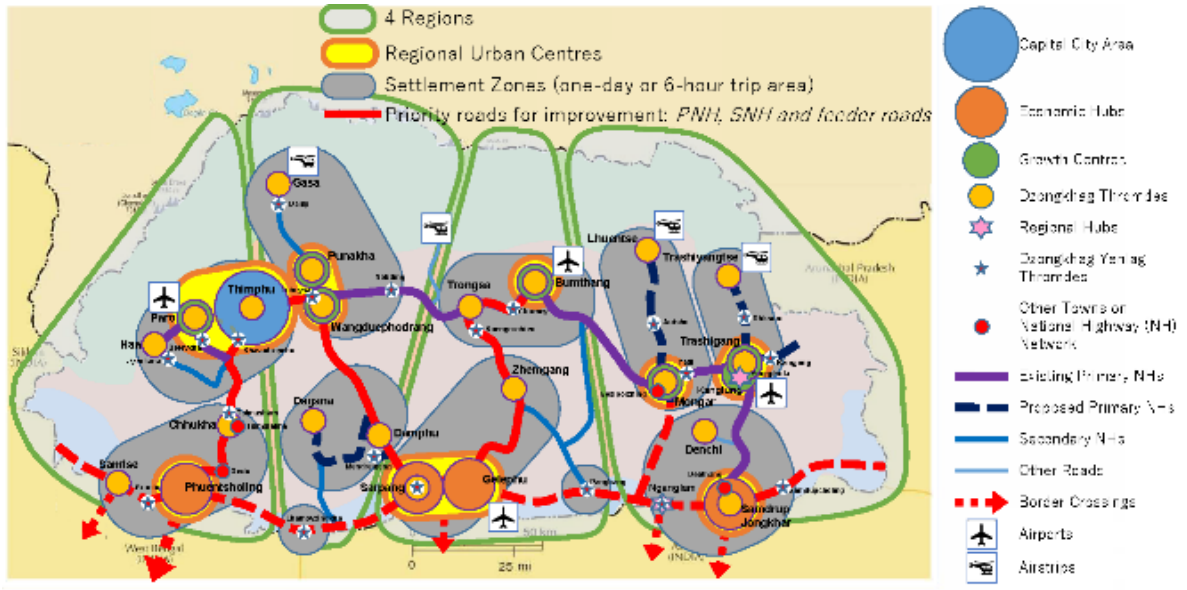
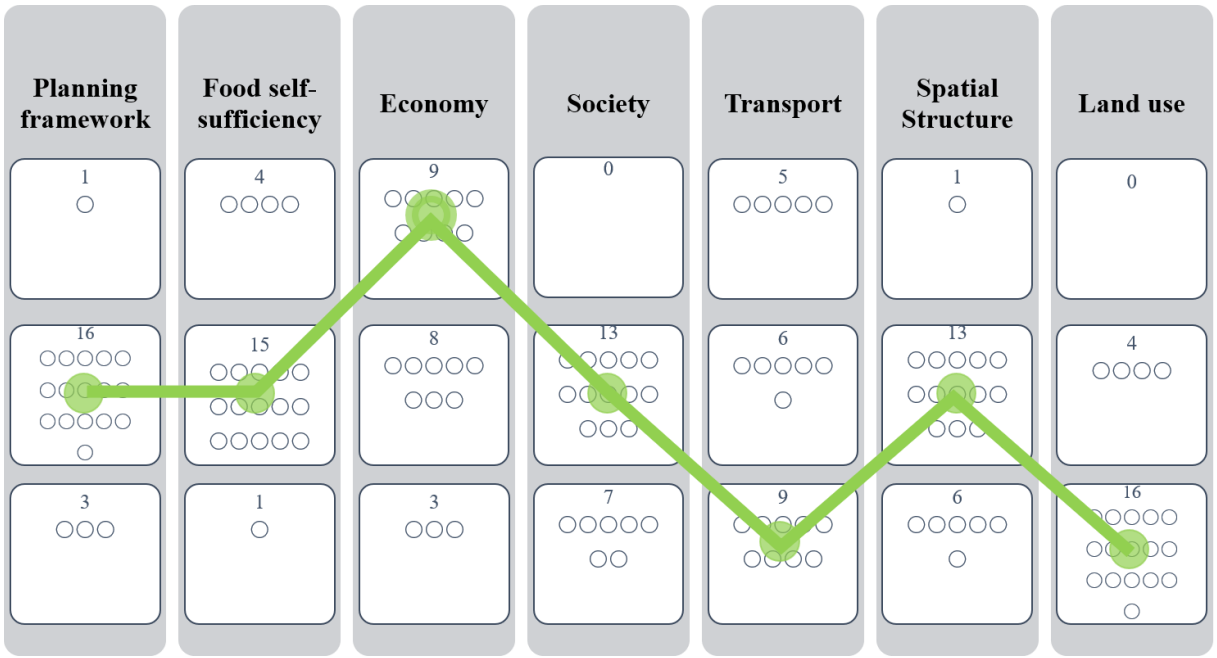


Alternative F



Alternative G

Figure 2.8 Spatial Implications of Development Alternatives A-G



Note: The numerical value in each box indicates the number of Dzongkhags that selected the option in the first stakeholder meeting.

Figure 2.9 Seven Factors Suggested by 20 Dzongkhags in the First Stakeholder Meeting

2.3 Predictions for and Comparison of the Effects of the Development Alternatives

(1) Effects of Development Alternatives from Nine Domains of Gross National Happiness

All the development alternatives, i.e., A to C (Prototypes A to C) and D to F, which were created by WG members, and G reflecting the underlying factors mentioned above, were evaluated with regard to nine domains of GNH during the workshops in Tokyo and Thimphu. Table 2.3 summarizes the evaluation results, showing that Alternative G received the highest score although the difference between the second highest (C and D) is marginal.

Table 2.3 Evaluation Results for the Development Alternatives (A to G) from Nine Domains of Gross National Happiness

Nine Domains of GNH	Description	A	B	C	D	E	F	G
Psychological well-being	Experience of happiness without psychological stress due to threats related to finance, health and social ties	+	+	+	+	+	+	+
Health	Healthy life with efficient health services No fear of disease, pollution etc.	++	+	++	++	+	+	++
Time use	Balance between work, leisure, social activity and sleep	+	+	+	+	++	++	+
Education	Efficient education service Human resource sufficient to support economic development and regional development	++	+	++	++	+	+	++
Cultural diversity	Conservation of tangible and intangible traditional assets including landscape	-	++	+	+	++	++	+
Good governance	Effective management without causing serious social and environmental problems	+	+	++	++	+	+	++
Community vitality	Strong ties among communities and families.	-	++	+	+	++	++	++
Ecological diversity	Natural environment of good quality Safe living conditions in relation to natural disasters	-	++	+	+	++	++	+
Living standard	Safe living conditions including income and property assets No social disparity No poverty	+	None	++	++	+	none	++
Regional promotion	Balanced development across the country.	+	+	++	++	+	+	++
Total score		7	12	15	**15**	**14**	**13**	16

(2) Potential Impacts of the Development Alternatives

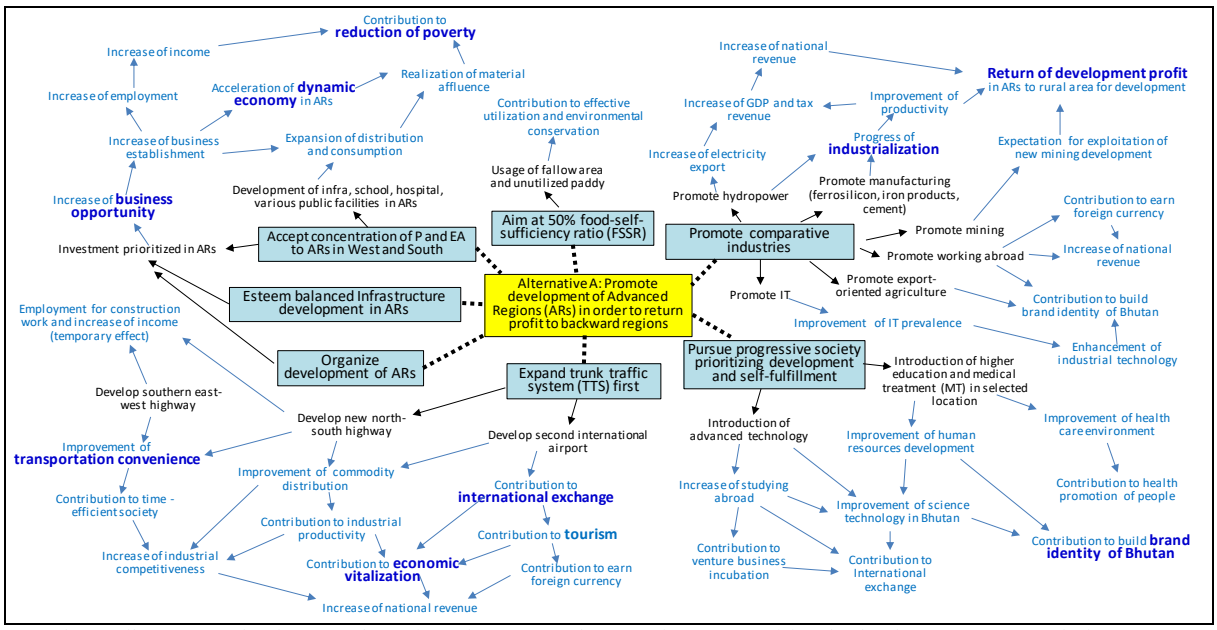
The potential anticipated impacts of the implementation of the development alternatives are identified through the linkage diagram method in which the actions and/or initiatives that will be involved in each development alternative are examined (Figure 2.10 and Figure 2.11). The anticipated potential impacts are itemized and divided into positive and negative impacts. The relative magnitude of the anticipated impacts was estimated according to the rating criteria from *major positive impact* (+2) to *major negative impact* (-2) and *irreversible impact*. The potential impacts of each development alternative can be summarized as follows.

(a) Alternative A will be effective for economic growth, but may exacerbate existing social issues in Bhutan, such as rural-urban migration and social disparities between the Urban and the Rural Area. The negative impacts will also be physical in nature, including large-scale topographic modification, which may cause landslides, erosion etc.

(b) Alternative B will be effective for the conservation of culture, tradition and local communities, and it will incur the least amount of negative physical negative impacts. However, there will be concern over sluggish economic growth and national financial balance.

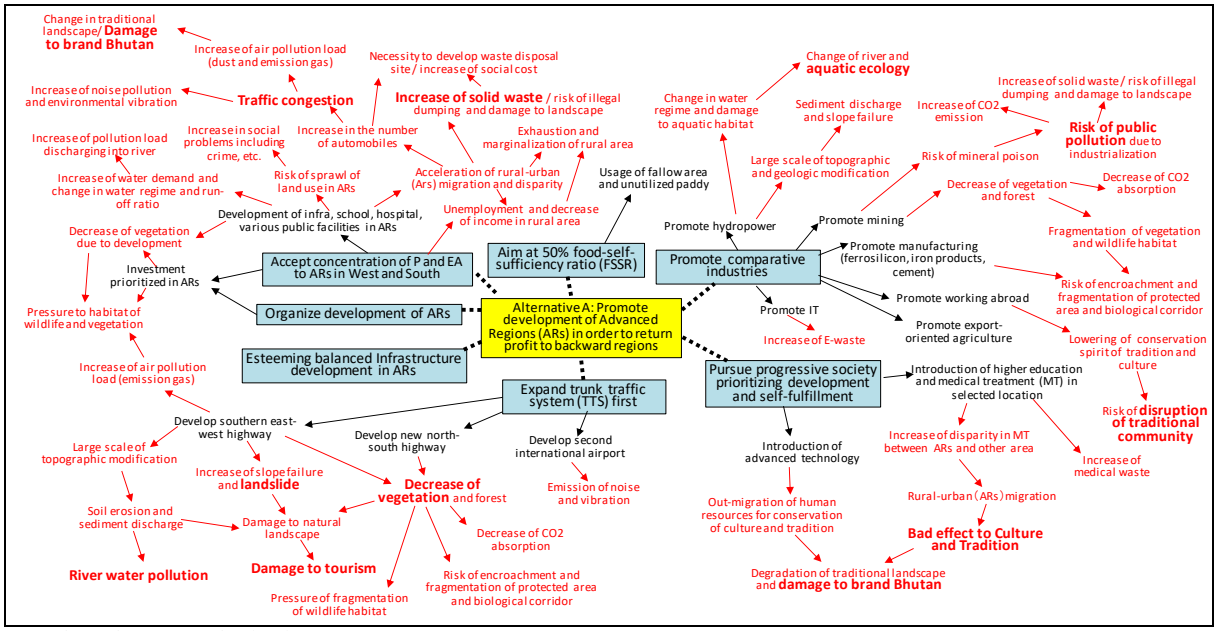
(c) Alternative C will have a moderate impact and balance progress with conservation, serving as an in-between stage for Alternatives A and B. The negative impacts will also be moderate, being somewhere between A and B.

(d) Alternative G will prioritize both economic growth and the conservation of culture and tradition. This alternative will be most effective for tackling existing social issues in Bhutan. The negative impacts will be moderate, although greater than those caused by Alternative C; this is because Alternative G will include large-scale topographic modification due to the fact that it prioritizes improvements in the trunk traffic system, as well as economic development through the promotion of comparative industries.



Legend: Yellow square: development alternative. Blue squares: the seven factors comprising the development strategy. Black text: actions/initiatives to be involved in the development alternative. Blue text: positive impacts. Red text: negative impacts. Bold text: significant impacts in terms of strategic environmental objectives. EA: economic activity. ARs: Advanced Regions in the west and south. NCR: National Capital Region. HE: higher education. MT: medical treatment, TTS: trunk traffic system.

Figure 2.10 Identification of the Anticipated Positive Impacts of Alternative A (Example)



Legend: The same as that in Figure 2.10.

Figure 2.11 Identification of the Anticipated Negative Impacts of Alternative A (Example)

(3) Integrated Assessment Results

The development alternatives were finally evaluated as shown in Table 2.4 by taking into consideration, the assessment of environmental and social impacts, the evaluation results from nine domains of GNH, and the overall objectives of the Project described below:

- Reduction of out-migration from rural to urban areas and from east to west;
- Reduction of economic and social disparities through the vitalization of rural life; and
- Well-balanced development across both urban and rural areas throughout the entire country.

It is concluded that Alternative G is the most preferable (the best) alternative of all the development alternatives, although there are various uncertainties in terms of the actions/initiatives to be taken for each development alternative. It should be noted, however, that there are several irreversible negative impacts that will be generated, even in the most preferable (the best) alternative. This means that the irreversible negative impacts could prompt a trade-off with the accomplishment of the development objectives in the CNDP unless appropriate countermeasures are taken.

Table 2.4 Strategic Assessment and Comparison of the Development Alternatives

Alternative	Assessment in Terms of Environmental and Social Impacts	Assessment in Terms of the Project Objectives	Rating
Alternative A	・ The physical negative impacts of this alternative will be the most significant of all the alternatives and the negative social impacts will also be the largest although the economic effects will be high. (Rating: -14) ・ Cultural diversity, community vitality and ecological diversity score minus point although health and education scores two points. (Total score: 7) ・ None of the Project objectives (reduction of out-migration, reduction of economic and social disparities, and well-balanced development) will be accomplished.	・ The Project objects cannot be accomplished, but existing and socio-economic issues will be accelerated.	×
Alternative B	・ The physical negative impacts will be the least among all of the alternatives. The social effects will be the most functional, but this alternative will have the fewest economic benefits. (Rating: -4) ・ Cultural diversity, community vitality and ecological diversity score two points. (Total score: 12) ・ The Project objectives (reduction of out-migration, and reduction of economic and social disparities) can be accomplished to some extent.	・ The Project objectives can be accomplished to some extent, but economic growth will stagnate and this may cause the country financial problems.	△
Alternative C	・ The physical negative impacts of this alternative will be moderate, situated somewhere between Alternatives A and B. The economic and social effects will also be moderate. (Rating: -7) ・ Health, education, good governance and living standard score two points. (Total score: 15) ・ All of the Project objectives (reduction of out-migration, reduction of economic and social disparities, and well-balanced development) can be accomplished to a certain extent.	・ The Project objectives can be accomplished to a certain extent, but there may not be enough economic growth.	○
Alternative G	・ The physical impacts of this alternative will be relatively high, in a similar manner to Alternative A. The social effects of this alternative will be moderate, but it will have the biggest economic effects. (Rating: -6) ・ Health, education, good governance, community vitality and living standard score two points. (Total score: 16) ・ All of the Project objectives (reduction of out-migration, reduction of economic and social disparities, and well-balanced development) are expected to be accomplished.	・ The Project objectives are expected to be accomplished through the well-balanced development of the Urban and the Rural Areas.	◎
No action (without the Project)	・ Physical problems such as landslides, erosion and the generation of public nuisance will continue in the ARs. The economic and social problems of rural-urban migration and disparities between urban and rural areas will continue. (Rating: -14) ・ The Project objectives (reduction of out-migration, reduction of economic and social disparities, and well-balanced development) are not accomplished because no action will be taken (without Project).	・ Existing environmental and socio-economic issues will continue. The Project objectives are not accomplished because no action will be taken (without Project).	×

Note: ◎: suitable, ○: fair, △: not suitable, ×: not acceptable

CHAPTER 3 VISION AND OBJECTIVES

3.1 Development Vision

A vision for CNDP is based on the Constitution of the Kingdom of Bhutan. It is for a time horizon of 2030. It draws its framework from Vision Document-Bhutan 2020, the principles of Gross National Happiness and other policy documents. It also endeavours to bring together the policies, programs, strategies and plans of the country.

A formulation of vision should be done through consultative process. During the process, there were representation from people and all levels of government, to understand situation of the country today and aspiration for the future. Such process not only makes stakeholders take active part, it would also make them take ownership of the project during implementation. In line with this, the development direction and development vision have been discussed in the SC meeting, the WG meetings, the Core Member meetings and the first stakeholder meetings (Figure 3.1).

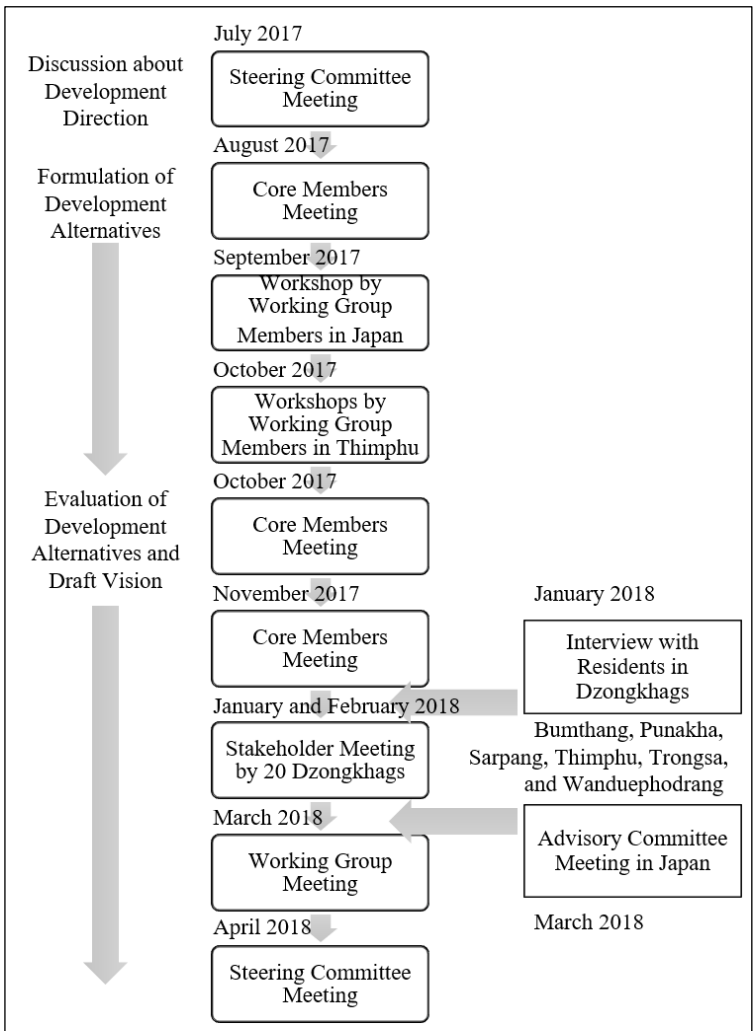


Figure 3.1 Process to Formulate the Development Vision

The vision for a sustainable development of Bhutan is proposed below:

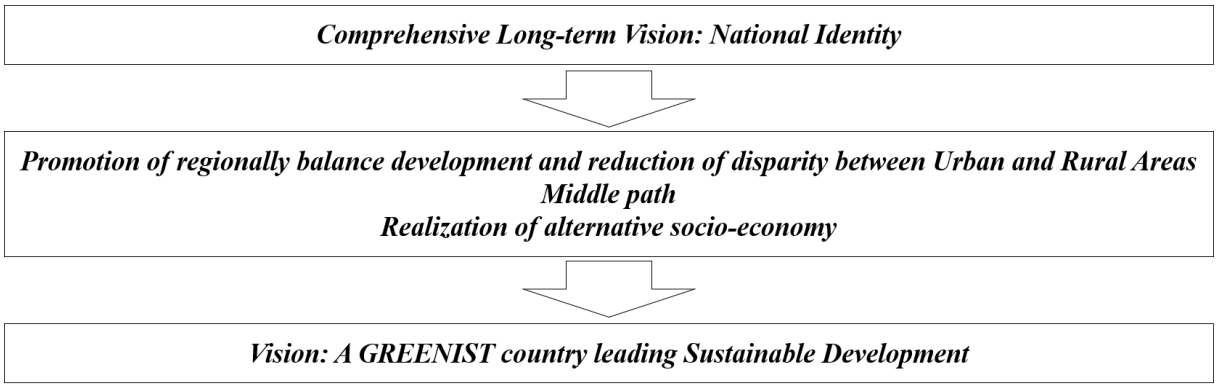


Figure 3.2 Key Concepts and Development Vision

The acronym GREENIST represents the objectives to be realized in the course of development, as described in Table 3.1.

Table 3.1 Objectives and Description of GREENIST

Objective	Description
G*lobal happiness centre*	To promote well-being through use of local resources and share experience and knowledge with the international community.
Richness and Diversity	To promote diversity in urban and rural areas by creating National Capital Region and Linked Urban Centres.
E*co-friendly green industry*	To promote green industries with comparative advantages e.g., hydropower, export-oriented agriculture and NWFP using renewable resources in keeping with a concept of zero-emission and a commitment to remain carbon neutral.
E*nvironmental management for livelihood and economy*	To ensure sustainable livelihood and living environment through management by communities and proper land use control system.
N*etwork society for integrated communication*	To link the entire country and society with road network consisting of east-west and north-south highways with further linkage to air transport, information technology and advanced means of transport.
I*nnovative development model*	To develop innovative solutions for problems and constraints such as human-wildlife conflict, mountainous topography, and natural disasters etc. through appropriate technology characterized by environmentally symbiotic society, balancing economic growth and environmental conservation.
S*elf-reliant society*	To pursue for a sustainable society through effective use of renewable energy, enhanced food supply from domestic agriculture produce and diverse human resources.
T*radition and cultural life*	To pursue development that is inclusive and mindful of tradition and culture of the country.

Table 3.2 shows the key result areas for each objective defined in the GREENIST vision and related to economic growth. It is expected that the key result areas will be achieved by the implementation of the CNDP by 2023.

Table 3.2 Key Result Areas of GREENIST and Economic Growth Objectives

Objective	Key Result Area	Unit	Baseline	Indicator in 2030	Remark
Global happiness centre	Reduce gap in the GNH Index between urban and rural by 50%		0.08 (2015)	0.04	GNH Index was estimated at 0.811 in the Urban Area and 0.731 in the Rural Area, respectively, in the third GNH survey
Richness and Diversity	Maintain the percentage of regional population in the Central Eastern and Eastern Regions	%	36	35	The NSB's projection indicates that the population in the Eastern and Central Eastern Regions will decrease to 28% of the total population in 2032
Eco-friendly green industry	Develop new export-oriented products utilizing RNRs	Number	-	10	Potential RNR products include water, NWFPs and MAPs
Environmental management for livelihood and economy	Create hygienic environment for people in the Urban and Rural Areas	%	60 (Drinking water) 54 (Sanitation)	95 (Drinking water and sanitation)	The 12th FYP specifies 75% of total households will have access to a 24/7 drinking water service and 70% of total households will have access to a sanitation facility in 2023
Network society for integrated communication	Improve travel time between the Eastern and Western Regions	Hour	20	16	
Innovative development model	Apply IT technology to overcome social issues	Case	0	10	IT includes: - Distance learning - Online medical examination - Distance medicine - Teleworking - E-banking - SNS marketing - Wildlife conflicts - Internet direct sales - Manufacturing using IoT - Automatic home delivery - Automatic agricultural job
Self-reliant society	Start implementation of Regional Centres for business, medical and education	Number	0	6	National Capital Region and 5 LUCs
Tradition and cultural life	Designate at least one cultural heritage area in Dzongkhags	Dzongkhag	0	20	
Economic growth	Achieve an annual average GDP growth rate higher than 6%	%/year	5.1 (2018)	>6	
	Create new job opportunities	Job	-	60,000	

3.2 Development Approach for Bhutan

Based on the vision and GREENIST objectives, development approaches have been established as shown in Figure 3.3. They are divided into two categories. The first category comprises of **Stabilization Factors** which represent environment, human resources, social ties and traditions. They will be a cornerstone or solid base for development in the long run. The second category is for creating **Driving Factors** in the country by enhancing eco-friendly technology, diverse way of life, a new economic model and self-sufficient economy. There are 14 sector-wise development approaches. The figure shows the interlinkages between the sector-wise development approaches with the issues in the national socio-economy, urban areas and rural areas.

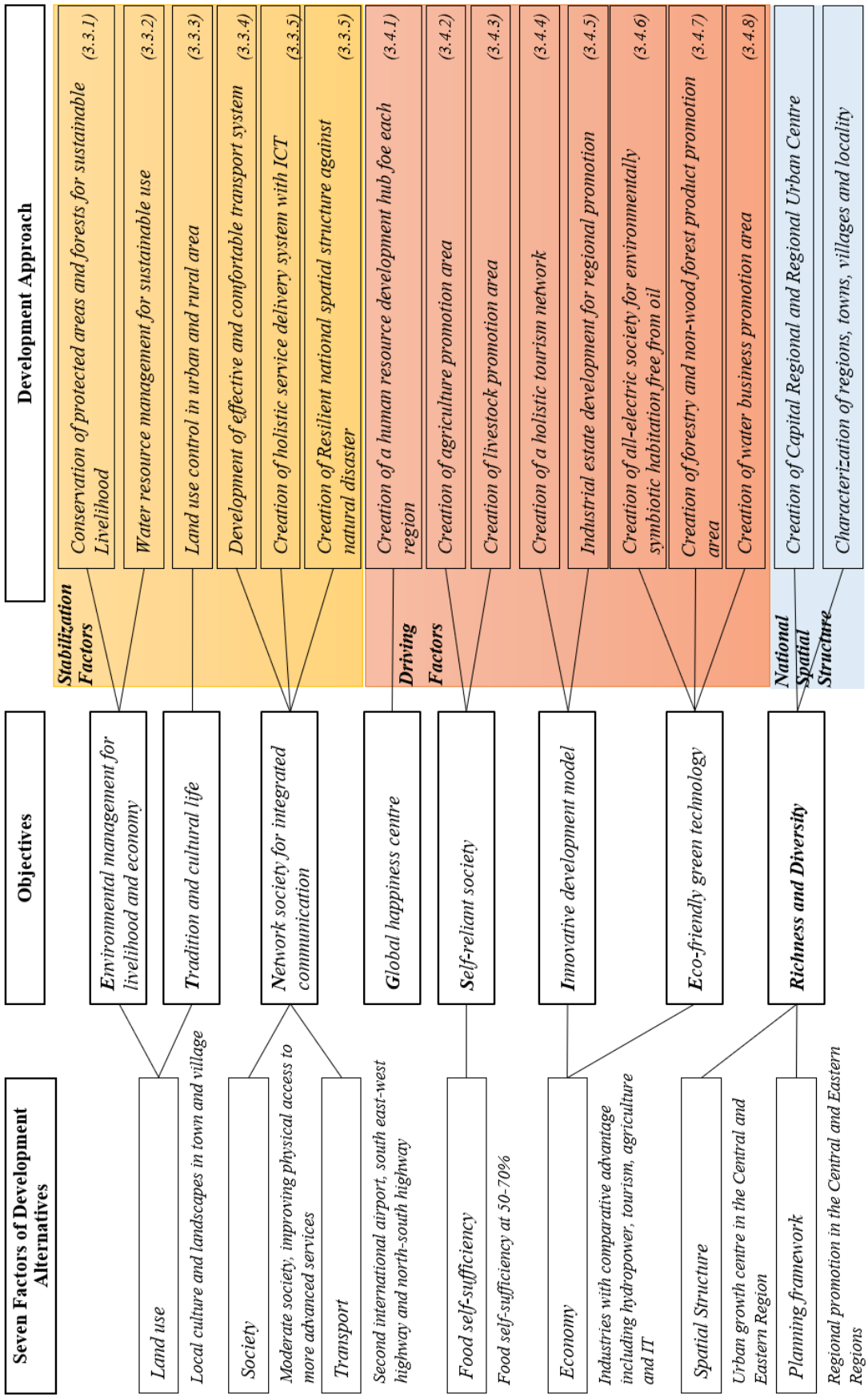


Figure 3.3 Development Approach for Bhutan

3.3 Development Approach for Stabilization Factors

3.3.1 Conservation of Protected Areas and Forests for Sustainable Livelihoods

Forest and nature protection policies are inseparable and should be implemented in a close relationship in Bhutan, in view of its geographical condition and administrative structure. Forest covers 71% of national lands. However, forest management has been implemented only in limited areas, such as Protection Areas (PAs), Forest Management Units (FMUs), Local Forest Management Plans (LFMPs) and Community Forests (CFs). Figure 3.4 shows the relationship between Forest Areas (by "Land Cover") and PAs. Their overlapping portions are extensive, which occupy 29% of the total land area. However, 42% of national lands covered by forest is outside land use control policy. A CF programme was established as a representative measure for practising a human-nature symbiosis. in 1995. Aiming at the identification of potential areas for forest production, an LFMP is applied to all Forest Areas outside the FMUs, CFs and other existing forest management schemes.

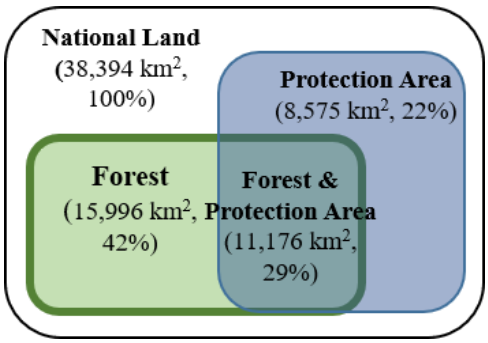


Figure 3.4 Relationship Between Forests and Protection Areas

Table 3.3 Proposed Forest Zoning System

Zoning	Function
Resource Utilization Forest (including human-nature symbiosis areas)	FMU CF Other potential production forests Forests for recreation
Preservation Forest	Prevention of landslides, collapses etc. Preservation of water sources
Nature Protection Area	Conservation of forest ecosystem Protection of wild/endangered animals

It could be necessary to take a broader view including in terms of the multiple function of Forest Areas. Therefore, a forest zoning system focusing on the functional aspects of forests is proposed (Table 3.3). Figure 3.4 shows the concept of the Forest Areas and PAs. It is envisaged that the whole of the Forest Areas would be covered by any of the forest management schemes in the future.

3.3.2 Water Resource Management for Sustainable Use

Although there is plenty of water from the wide viewpoint of water availability, its accessibility is limited owing to topographical reasons, poor supply capacity, contamination and unstable river flows stemming from uneven precipitation as mentioned in previous sections.

The principle of water resource management is to ensure its accessibility for all in Bhutan. On top of that, water and its management essentially represent the basic structure across a wide area. The points below should be considered:

(a) Organizational coordination to optimize cross-sectoral structures: The National Integrated Water Resources Management Plan (NIWRMP) was presented in 2016 with the formation of the five management basins. Each management basin is supposed to be operated by its designated River Basin Committee (RBC); however, no such body has been formed to date except Wangchhu Basin. Holistic management by RBCs and water users' associations for local water management should be established to enable sustainable water resource management for water quality and quantity.
(b) Promotion of an attractive water basin as the centre of the community, culture, tourism, tradition, religion and ecological biodiversity.
(c) Study on water resource conservation including water sources, facilities and groundwater.
(d) ICT application for water resource management of both supply and demand.

3.3.3 Land Use Control in the Urban and the Rural Areas

(1) Defining the Urban Area

As for the Urban Area, there have been various attempts in Bhutan to define it, although a comprehensive agreement does not appear to have been reached to date. Three categories are proposed to constitute the Urban Area in the National Land Use Plan (NLUP).

(a) Dzongkhag Thromdes and Yenlag Thromdes
(b) A Commercial Centre which shall be designated from the towns listed in the PHCB 2017 and satisfy the basic characteristic of the Urban Area specified below.
   - ✓ A population of 500 or more
   - ✓ No significant population decrease during the period 2005-2017 period
   - ✓ A town area of not less than 0.2km^2[1]
(c) A project town which is developed as a result of, for example, an industry and college development project. When the development is completed, the town may be categorized as a "Commercial Centre". Gedu in Chhukha Dzongkhag is a typical example of this town.

Twelve towns satisfy the population criterion of 500 or more from among the 20 towns listed in PHCB 2017 excluding 40 Thromdes. Two areas are regarded as conurbations so that 14 towns/areas in total are designated as Commercial Centres. Thus, the number in the Urban Area is 54.

[1] Adopted from the criteria for Yenlag Thromdes in the Thromde Rules 2011.

(2) Urban Growth Management via the Introduction of an "Urbanization Management Control Area"

As rapid urbanization and population growth are expected to continue in the Urban Area, it is urgently required to set up a system to implement the proper management of urban growth. For this purpose, it is proposed to leave the current urban-rural dichotomy aside and create "Urbanization Management Areas" (UMAs) outside Thromdes/towns, whose outer boundaries are to be designated as urban growth boundaries to limit unplanned developments. The Urban Area will be expanded beyond thromde and town to cover the UMA.

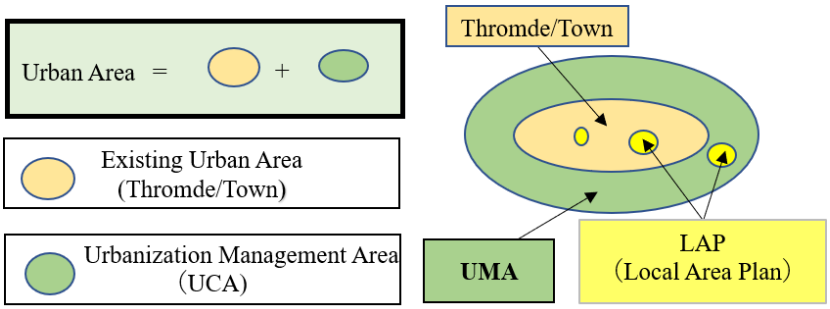


Figure 3.5 Urbanization Management Control Area Concept

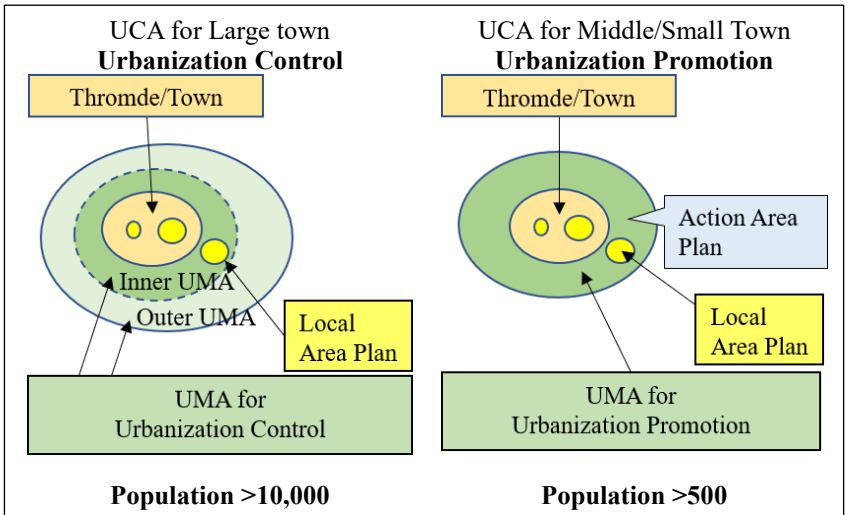


Figure 3.6 Two Types of Urbanization Management Area

The UMAs are expected to function as a buffer zone for coordinating the Urban Area and the Rural Area (for agriculture and settlement) in order to pursue planned urban developments as well as the preservation of proper agriculture land. The following two functions of UMAs are proposed, depending on each town's status and problem.

(a) UMAs for urbanization control for towns with a population of approximately 10,000 or more to restrict urban sprawl and excessive growth of large cities. In Thromdes/towns with strong development pressure, there is the possibility of sprawls occurring outside the UMA. To cope with the problem, it is advisable to establish an UMA sufficiently broad enough to prevent such sprawls or to prepare a dual UMA, i.e., an inner UMA and an outer UMA. In an inner UMA, only planned developments shall be permitted. After the Local Area Plan (LAP) is implemented, the planned area is incorporated in the thromde and town. The land pooling is applicable to implementation of the LAP.

(b) In an outer UMA, developments shall be prohibited in principle. The outer UMA is an area reserved for the 2030 plan, with no development permitted for a certain period. The policy (delineation) should be reviewed and renewed every five years or so.

(c) UMAs for urbanization promotion to facilitate intensive and efficient development in small/medium towns where the potential is relatively limited, so that the regional balance can be redressed. The formulation of Local Area Plans (LAPs) and Action Area Plans is highly encouraged as the promotion of planned development is essential.

3.3.4 Development of an Effective and Comfortable Transport System

A transport system consisting of road networks and airports is proposed as shown in Figure 3.7. The road networks are formulated with the ladder-type arterial road network with six north-south routes and two east-west routes. The southern part of the East-West Highway is an essential corridor to formulate a ladder-type arterial road network for ensuring effective transport system development. As for airports, the internationalization of four candidate locations in Yonphula, Gelephu, Bumthang and Samdrupjongkhar and four helipads in difficult areas, in order to provide redundancy to the road network, are proposed.

One-day-long (eight hours) travel for north-south routes and two-day-long (16 hours) travel for east-west routes are desirable. Variations in the target travel speeds are within a range of between 21.6 km/h and 31.5 km/h for north-south routes and between 30.5 km/h and 37.8 km/h for east-west routes.

Networking for northern major area such as Gasa, Lhuentse and Trashiyangtse is difficult due to the steep mountainous terrain. Therefore, the introduction of intermodal networking with road networks and heliports to secure a backup function for cul-de-sac road networks is essential.

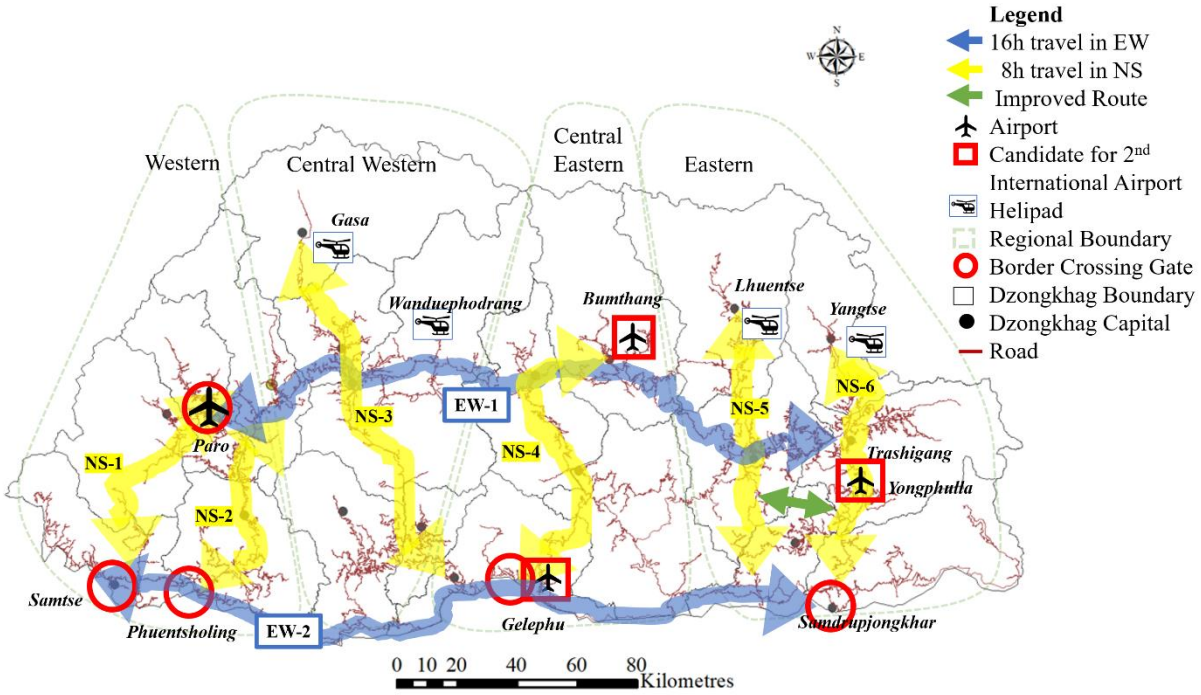


Figure 3.7 Proposed Transport System

3.3.5 Creation of Holistic Service Delivery System with ICT

For building a holistic service delivery system, the nationwide network of Bhutan should be premised on an effective hierarchy. The term *social services* includes all community-based functions/facilities related to education, health, transport, commercial, recreation and civic services. A set of centres in a hierarchic manner is proposed for the holistic system as specified below. Considering the limitations in budgets and human resources, each service base should be essentially compact. The proposed hierarchy model as stated is shown in Figure 3.8.

(a) A Regional Centre (RC), as the core town of the region. Due to the presence of insufficient populations of towns in order for them to function as RCs, an RC comprises a combination of neighbour towns.
(b) A District Centre (DC) consists of middle-level service facilities, such as central schools, Dzongkhag hospitals, bus terminals and bank branches. A Dzongkhag Thromde should be a suitable location.
(c) Sub-district Centres (SDCs) are designated as rest areas along the highway between each town and correspond to roadside stations according to the Japanese experience (see Box 3.1). Most Yenlag Thromdes, which are considered as the satellites of Dzongkhag Thromdes, might be the suitable locations for SDCs.
(d) A Gewog Centre (GC) is the main hub of the rural service network. So far, more than 80% of GCs can access the nearest RC or DC within a driving duration of three hours (a day trip).
(e) Outreach Centres (OCs) for delivering essential services to remote villages. The largest facilities for community services such as primary schools, outreach clinics or community temples, might be regarded as OCs.

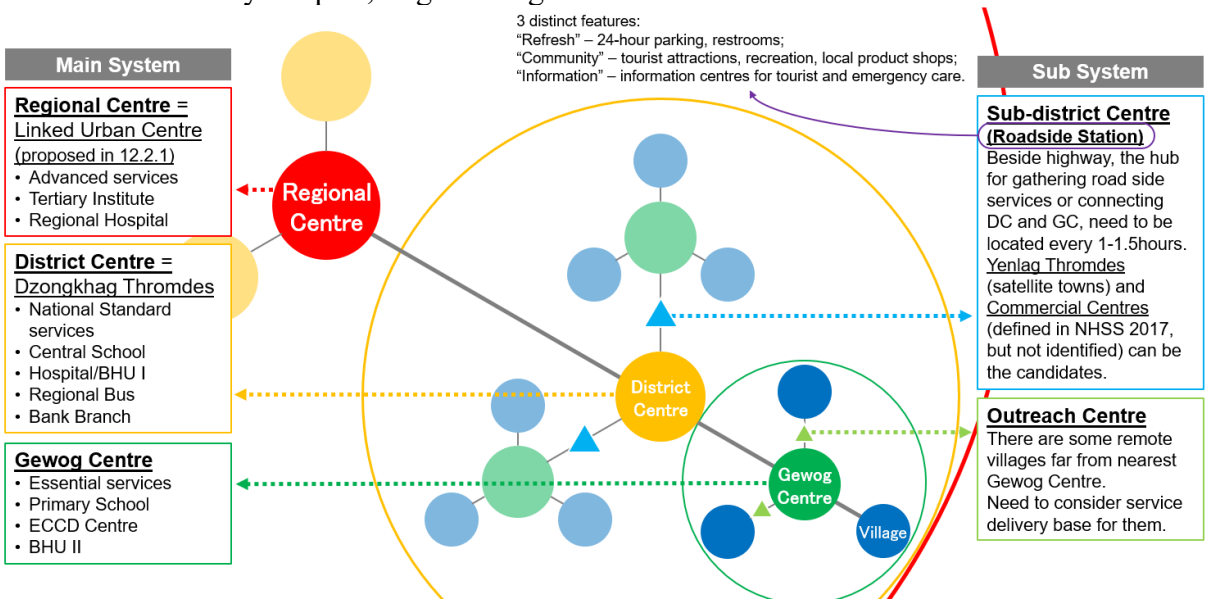


Figure 3.8 Proposed Hierarchy Model

The holistic network should be connected by a physical transport network. For the present, all human settlements from the capital city down to the remote villages are covered by a mobile communication network. Moreover, a next-generation transport system is now under development, including eco-friendly electric cars, UAVs (unmanned aerial vehicles) such as drones, and automatic driving systems using artificial intelligence (AI). The severe alpine conditions in Bhutan are suitable for durability testing. The government should cope with the changing situation positively through improving related laws, rules and regulations.

Box 3.1 Michi-no-Eki in Japan

The roadside station is famously known as "Michi-no-Eki" in Japanese. The Michi-no-Eki system was launched in the 1990s to create a safe, comfortable road traffic environment and unique, lively spaces that showcase the individuality of a region. As of November 2017, there are 1,134 roadside stations across Japan. Each roadside station usually has three distinct features: "Refresh" – rest facilities that include free 24-hour parking and restrooms; "Community" – regional cooperation where cultural centres, tourist attractions, and recreation and other local development facilities promote interaction with the region; "Information" – where road information, tourist information and emergency care information are readily available. (Information derived from the Michi-no-Eki Official Website, *What Are Michi-no-Eki?*, https://www.michi-no-eki.jp/about/english, accessed 12 January 2018).

Figure B3.1 presents the distribution of 130 roadside stations (as of October 2016) in the Kyushu Region in the west of Japan. This region has a land area of 36,753 km^2 which is approximately 4% smaller than the national land of Bhutan, which covers 38,394 km^2. There were 130 roadside stations in October 2016. Figure B3.2 depicts the layout of a roadside station in Ehime Prefecture, where local farmers produce and sell their original agro-produce in a direct market space. The sales amount as a result of direct selling equates to 15% of total sales in a town.

Source: Ministry of Land, Infrastructure and Transport

Figure B3.1 Distribution of Roadside Station in Kyushu Region

Source: Uchiko Fresh Park KaRaRi

Figure B3.2 Layout of Uchiko Fresh Park KaRaRi (Example)

3.3.6 Creation of Resilient National Spatial Structures Against Natural Disaster

The current capital area (Thimphu, Paro, Haa) is located in one of the lowest disaster risk areas. The biggest threat to the capital area concerns earthquakes (such as the one that hit the area in 2011). Clearly, towns in the Eastern and Southern Regions have the highest disaster risk throughout the country. Although the glacial lake outburst flood (GLOF) risk poses an enormous threat to Punakha, Wangduephodrang, and Bumthang, affected areas of land may be limited as compared to the case of an earthquake.

Table 3.4 Nationwide Disaster Risk by Major Town in Bhutan

	Earthquake (including landslide due to earthquake)	Landslide (due to rain)	Flood	GLOF
Thimphu, Paro, Haa	Medium risk	Low risk	Medium risk	Low risk
Punakha, Wangduephodrang	Low risk	Low risk	**High risk**	**High risk**
Trongsa	Medium risk	**High risk**	Low risk	Low risk
Bumthang	Low risk	Low risk	**High risk**	**High risk**
Monggar, Trashigang	**High risk**	**High risk**	Medium risk	Low risk
Samdrupjongkhar	**High risk**	Medium risk	Medium risk	Low risk
Gelephu, Sarpang	Medium risk	**High risk**	**High risk**	Low risk
Phuentsholing	**High risk**	**High risk**	**High risk**	Low risk

When it comes to national resiliency, necessary countermeasures are proposed to respond to the two issues as specified below.

(a) Issue 1: How to overcome the difficulty of prompt access linked to road conditions, because roads will be easily damaged and blocked by disasters.

i) Strengthen "self-reliability" in towns and villages in emergency. Training and drills for evacuation and first aid in schools and in the community will be carried out, as well as building up stocks of water and food in order to survive at least for a week until roads are opened and available for the delivery of supplies.

ii) The utilization of air transport, which includes airplanes and helicopters, for critical relief such as in providing rescue, doctors, water, food and medical goods, because road access should not be considered as a first option, especially in an emergency period.

(b) Issue 2: How to ensure the continuity of national government operational functions if Thimphu is hit by an earthquake.

iii) Paro as a temporary operation centre for national government functions, taking advantage of the short distance from Thimphu, and the availability of transportation infrastructure including an airport.

iv) Phuentsholing as a disaster response hub for Thimphu in order to mobilize domestic resources, supply and allocate international resources, and gather all information and reports from the damaged area.

3.4 Development Approach for Driving Factors

3.4.1 Creation of a Human Resource Development Hub for Each Region

The history of the higher education system in Bhutan shows that Thimphu has not been the only centre for higher education. Sherubtse College, one of the oldest colleges in Bhutan, was established in Kanglung, Trashigang, in the Eastern Region. Kanglung Town is now regarded as one of the largest college towns in Bhutan. Creating a human resource development hub in each region should be pursued to satisfy domestic demand and open the door to international academia by utilizing existing higher education as proposed below.

(a) Expansion of higher education

i) Upgrading projected programmes at the Jigme Namgyal Engineering College

ii) Expansion of classes at the College of Science and Technology

iii) Expansion of the agriculture and environmental management programme at the College of Natural Resources

(b) Domestic academic linkage

iv) Teacher incubation centre in Paro and Samtse in Western Bhutan
v) Business incubation centre in Paro and Chhukha in Western Bhutan
vi) Medical incubation centre in Western Bhutan
vii) Engineering, science and liberal arts incubation centre in Samdrupjongkhar and Trashigang in Eastern Bhutan
viii) Culture and nature incubation centre in Trongsa and Punakha in Central Bhutan
ix) New research centre related to material engineering, natural resource management or emerging agriculture in South Central Bhutan

(c) International academic linkage

x) Inviting international students and researchers to Bhutan to take part in projected programmes such as astrology, Buddhism studies, organic farming, hydropower and GNH

Note : CLCS: College of Language and Culture Studies, CNR: College of Natural Resources, CST: College of Science and Technology, FNPH: Faculty of Nursing and Public Health, FTM: Faculty of Traditional Medicine, GCBS: Gaeddu College of Business Studies, GCIT: Gyalpozhing College of Information Technology, JNEC: Jigme Namgyal Engineering College, JSWL: Jigme Singye Wangchuck School of Law, NRC: Norbuling Rigter College, PCE: Paro College of Education, RAHS: Reldri Academy of Health Sciences, RC: Rigney College, RIM: Royal Institute of Management, RTC: Royal Thimphu College, SC: Sherubtse College, SCE: Samtse College of Education, YCAS: Yonphula College of Advance Studies

Figure 3.9 depicts the domestic and international academic linkage.

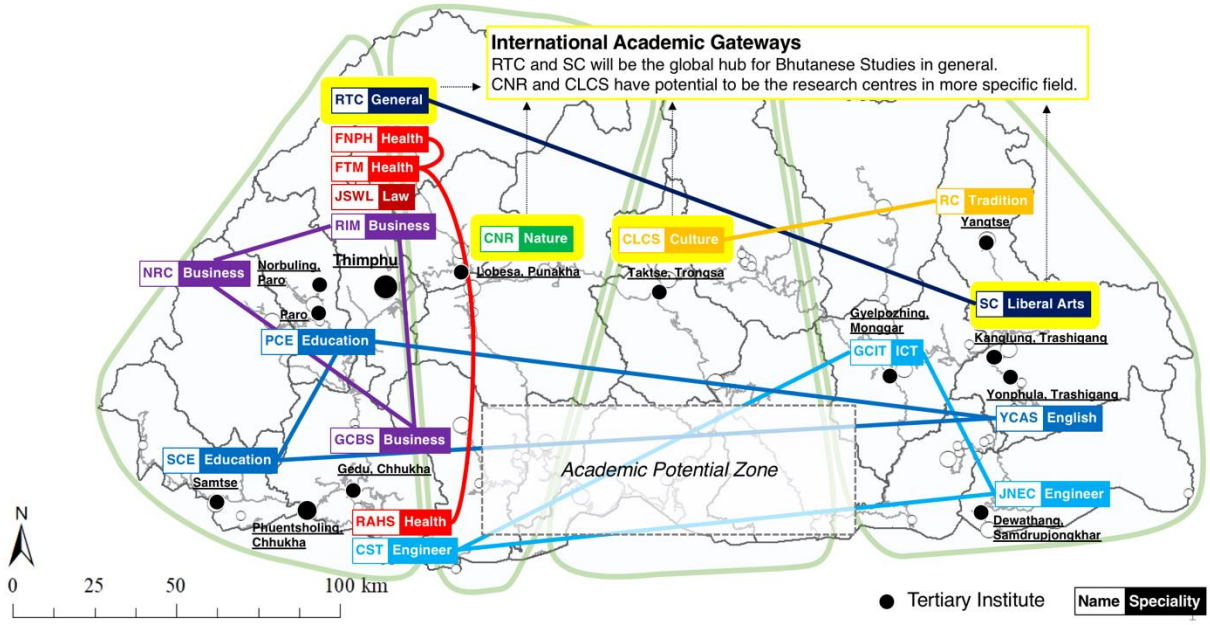


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Figure 3.9 Domestic and International Academic Linkage

3.4.2 Creation of Agriculture Promotion Areas

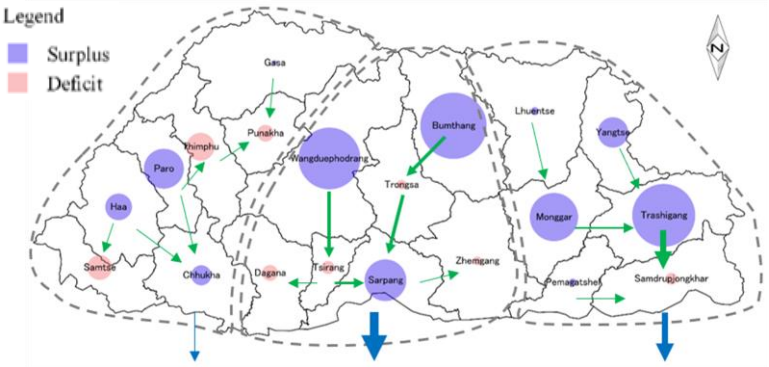
Currently, many foodstuffs are imported from foreign countries and the national food reserve of rice would only last for 2.5 days based on the population in 2015. To secure the availability of and access to food, it is desirable that agricultural resources are primarily utilized for food purposes, followed by cash crop cultivation. Future scenarios of crop production are described in the order of priority as follows: (1) rice as a staple food, (2) potato as a food and cash crop, and (3) other potential crops for income generation.

(1) Future Rice Distribution

Improvements in rice self-sufficiency are beneficial for food security as well as the mitigation of trade balance deficits. When intensive development and support, such as dissemination of varieties for winter cropping, irrigation development based on watershed management, human-wildlife conflict, improvement of milling ratio, are provided to the Dzongkhag, the following conditions for rice cultivation will be met by 2030: (i) yield in intensively supported Dzongkhags reaches 5.5 ton/ha, (ii) yield in other Dzongkhags increases by at least 20%, and (iii) potential wetland areas are fully utilized. The self-sufficiency rate (SSR) for rice under these conditions is just above 60%.

(2) Further Potato Production Promotion

There are some reasons for promoting potato production as follows: (a) potato is one of the staple foods in Bhutan, (b) there is an available global market through auction sites, (c) potato has a longer preservation period than many other vegetables. Through supply of quality seed and dissemination of appropriate cultivation techniques, conditions to be attained by 2030 for potato production are as follows: (i) yield in intensively supported Dzongkhags reaches 18.8 ton/ha, (ii) yield in other Dzongkhags increases by at least 20%, and (iii) potatoes are newly cultivated in 50% of unutilized potential dryland. When these conditions are met, 12 Dzongkhags will show a surplus. Excess amounts will be distributed to neighbouring Dzongkhags and exported to foreign countries.



Note: Green arrows show domestic potato distribution. Blue arrows show exports to foreign countries. The width of arrows is based on distribution amounts.

Figure 3.10 Supply-Demand Analysis and Distribution of Potatoes in 2030

(3) Local Potential Product

There is a diversity of agricultural products in Bhutan as shown in Figure 3.11. It is advisable to formulate a wide-scale production area to offer more competitiveness through improvements in infrastructure, strengthening bargaining power, widening marketing networks and so forth. There are other various local products in each Dzongkhag, such as coffee, avocado, pomegranate and cold-water fishery. To exhibit their local products and find marketing

opportunities, it is proposed to establish antenna shops or roadside stations near to export gates or auction sites in Phuentsholing Gelephu and Samdrupjongkhar.

Product	Potential	Challenge
Apple	• Available domestic and global market • Processing: juice, jam etc.	• Cold storage • Processing
Areca nut	• Available domestic and global market • Multiple harvesting	• Processing • Pestilence and diseases
Buckwheat	• Health promoting value • Processing: snacks, noodle, alcohol etc.	• Branding • Quality processing
Cardamom	• Available global market • Longer preservation period	• Quality drying • Storage
Chilli	• Available domestic market • Longer preservation period	• Quality drying • Processing
Ginger	• Available domestic and global market • Multiple purposes: fresh, preserved, dried etc.	• Processing

Product	Potential	Challenge
Maize	• Available domestic and global market • Multiple purposes: processed food, feed etc.	• Human-wildlife conflict
Mandarin	• Available global market • Processing: juice, jam etc.	• Citrus greening • Cold storage
Organic product	• Available market for high-end hotels • High selling price	• Certification process • Year-round cultivation
Temperate fruits	• Climatically suitable • Processing: juice, jam, alcohol etc.	• Marketing
Wheat	• Available domestic market • Flour processing: snacks, bakery, noodle etc.	• Milling facility

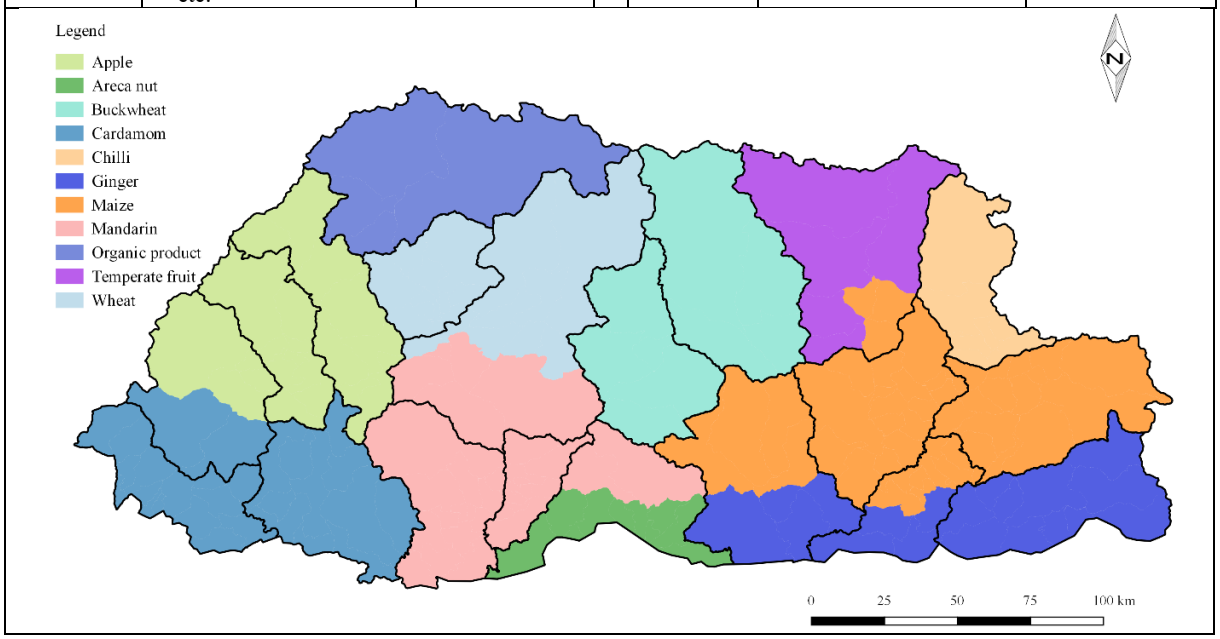


Figure 3.11 Local Potential Product and Proposed Production Area

3.4.3 Creation of Livestock Promotion Areas

Livestock is not especially significant in terms of the national economy. However, various livestock products distinctively represent important parts of the Bhutanese diet. Bhutan imports livestock products worth BTN 2.4 billion (out of a total value of BTN 8 billion for agricultural imports). The situation is still not self-sufficient as a whole. Self-sufficiencies in terms of dairy products and eggs are improving but there are challenges in the meat sector due to religious and cultural issues. The Dzongkhags for livestock promotion are tentatively selected for the National Spatial Plan as shown in Figure 3.12. Currently, seven livestock products (pork, mutton, poultry, eggs, dairy products, fish and honey) are considered to be the prioritized and important commodities for livestock promotion. In general, many Dzongkhags where livestock activities should be promoted are observed in the southern belt. This coincides with the climate and vegetative conditions there, which are more favourable for livestock rearing as compared to the northern and central parts.

Dzongkhag	Bumthang	Chhukha	Dagana	Gasa	Haa	Lhuentse	Monggar	Paro	Pemagatshel	Punakha	Samdrupj Jongkhar	Samtse	Sarpang	Thimphu	Trashigang	Trongsa	Tsirang	Wangduep Phodrang	Yangtse	Zhemgang
Dairy	X	X		X	X	X	X	X	X		X	X		X	X	X		X	X	
Eggs		X					X	X	X				X	X			X			
Pork			X									X	X				X			X
Mutton			X								X	X	X				X			
Poultry			X						X			X	X				X			
Fish					X						X	X	X							X
Honey	X												X				X			

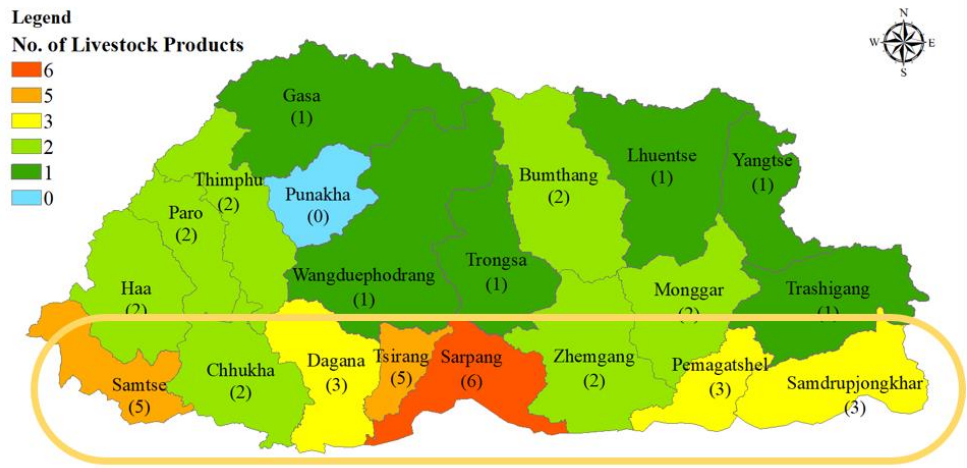


Figure 3.12 Major Livestock Products to be Promoted by Dzongkhag

3.4.4 Creation of a Holistic Tourism Network

Most tourists visit only Paro, Thimphu, Punakha and Wangduephodrang. However, there are attractive tourism resources in the central and eastern areas. The future tourism zone will be established in four areas covering the entire nation.

(a) A western area, comprising Thimphu, Paro, Punakha, Gasa, Haa and Wangduephodrang, will offer integrated tourism such as urban, religious, highland and garden tourism.

(b) A central area, which is full of rich culture and nature, will provide the cultural and nature experience tourism with a base in Bumthang.
(c) An eastern area, which is characterized by beautiful landscape such as paddy fields, Sakteng Wildlife Sanctuary and traditional handicrafts, will provide garden tourism and handicraft experience tourism.
(d) A southern area, including Samtse and Samdrupjongkhar, will offer winter resort tourism by exploiting the comfortable climate. The area around Gelephu, Dagana and Tsirang will be a potential site for health tourism because of their hot springs and access to medical herbs. In addition, southern Dzongkhags should become regional tourism hubs.

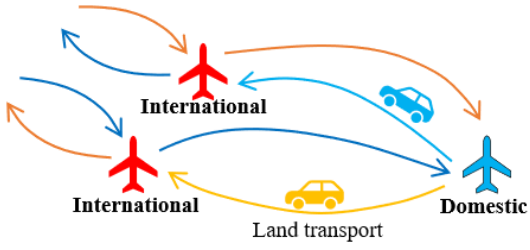
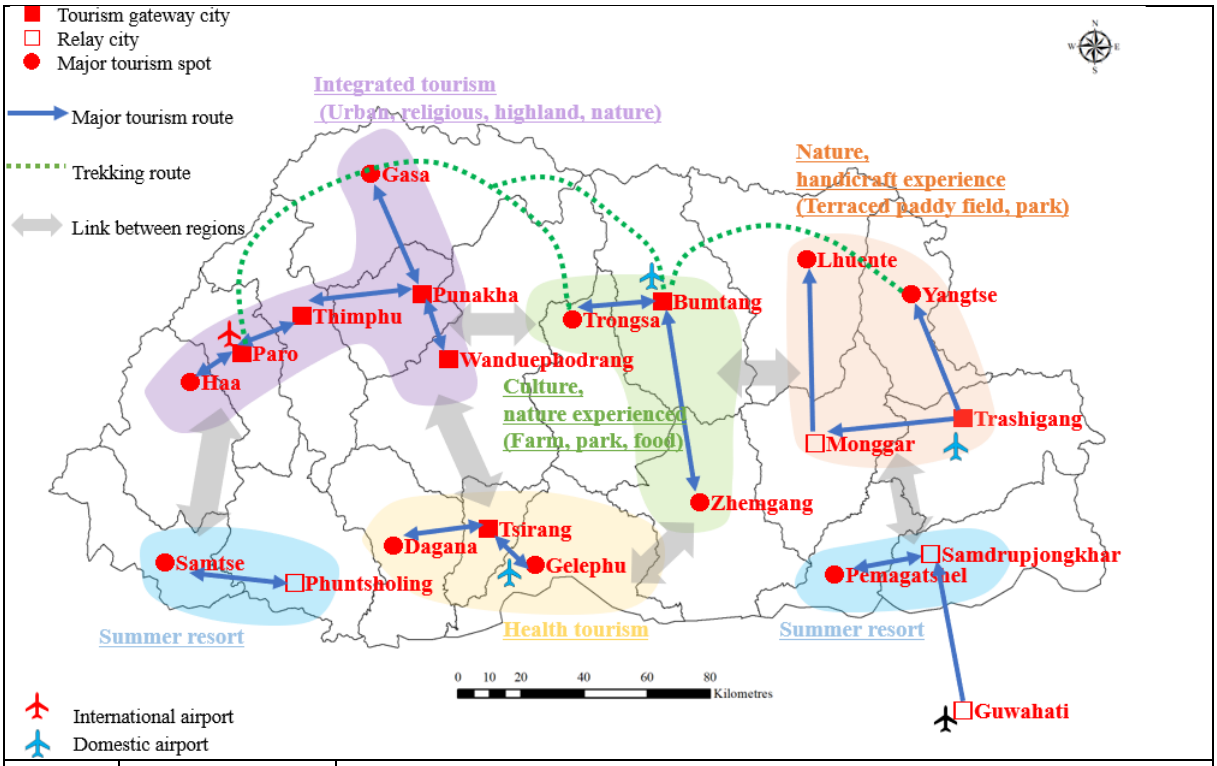


Figure 3.13 Air and Ride Approach

Figure 3.14 presents the characteristics of tourism development by zone, with a combination of nature, culture and wellness offers. Domestic and international airports in the Central and Eastern Regions will support the regional promotion of those regions. Tourists will arrive at either an international airport or a domestic airport. They will travel around the country and leave from another airport. This will involve a combination of air transport and land transport; this is known as an “air and ride approach” (Figure 3.13).



Tourism Circuit	Regional Tourism Hub	Tourism Resources	
		Main Tourism Resources	Local Industry and Products
Western Area	・ Paro (international airport) ・ Thimphu ・ Punakha	・ Ancient Ruins of Drukgyel Dzong ・ Dzongs ・ Sacred sites associated with Phajo Drugom Ahigpo ・ Taktsang Lhakhang ・ Phobjikha ・ Trekking	・ Papermaking ・ Spa and wellness ・ Special bread made without rice flower ・ Incense
Central Area	・ Bumthang (airport) ・ Trongsa	・ Tamzhing Monastery ・ Dzong ・ Tshechu	・ Fabrication ・ Dairy products ・ Local beer
Eastern Area	・ Trashigang (airport) ・ Monggar ・ Samdrupjongkhar	・ Areas associated with royal family ・ Sakteng Wildlife Sanctuary ・ Bumdeling Wildlife Sanctuary	・ Traditional textiles and dyeing ・ Weaving ・ Bamboo products ・ Papermaking ・ Woodworking
Southern Area	・ Sarpang (airport) ・ Zhemgang ・ Chhukha	・ Nature tourism ・ Hot springs ・ Royal Manas National Park (RMNP) ・ Birdwatching	・ Metalmaking (copper, bronze) ・ Bamboo products

Figure 3.14 Future Tourism Destination

3.4.5 Industrial Estate Development for Regional Promotion

Two economic corridors will be created in the southern and central areas of Bhutan for regional balance as specified below.

Sothern Economic Corridor

(a) Samtse and Phuentsholing have been the centre of the mineral-based industry. The new Dhandhum Industrial Estate in Samtse will focus on the green industry such as food and agro-based products.
(b) The Jigmeling Industrial Estate in Gelephu will be an industrial centre with housing, schools and hospitals. It could be the model of regional development.

(c) Nganlam is home to the biggest cement factory in Bhutan. The development of Motanga, Kuri Gongri and Nyera Amari will offer opportunities for regional development in this area.

Central Economic Corridor

(a) Thimphu with its information technology park will become the centre of an advanced technology industry. Research and development for medical research using medical herbs will be another option.
(b) The Bondeyma Industrial Estate in Monggar focuses on environmentally friendly industries such as food and agro-based industry. Nettle can be used for herbal tea and carpetmaking. The cultivation and product development of nettle are highly recommended. The second IT park of Bhutan will be developed in Monggar. This IT park will cooperate closely with the Gyalpozhing College of Information Technology.
(c) Trongsa will have an industrial agglomeration area for oil seeds and dairy farming. The abundance of medical plants such as nettle, turmeric and gooseberry will help to develop a clustered industry. A satellite office and a business incubation centre for the promotion of both local and advanced technology industries are recommended. Those satellite office and business incubation centre will interlink with the second IT park in Monggar.
(d) Yangtse will have an industrial agglomeration area for woodturning and papermaking. Yangtse should also develop an satellite office and a business incubation centre to be cooperated with the IT park in Monggar. Utilizing the information technology, Yangtse will disseminate the culture and art to the world.

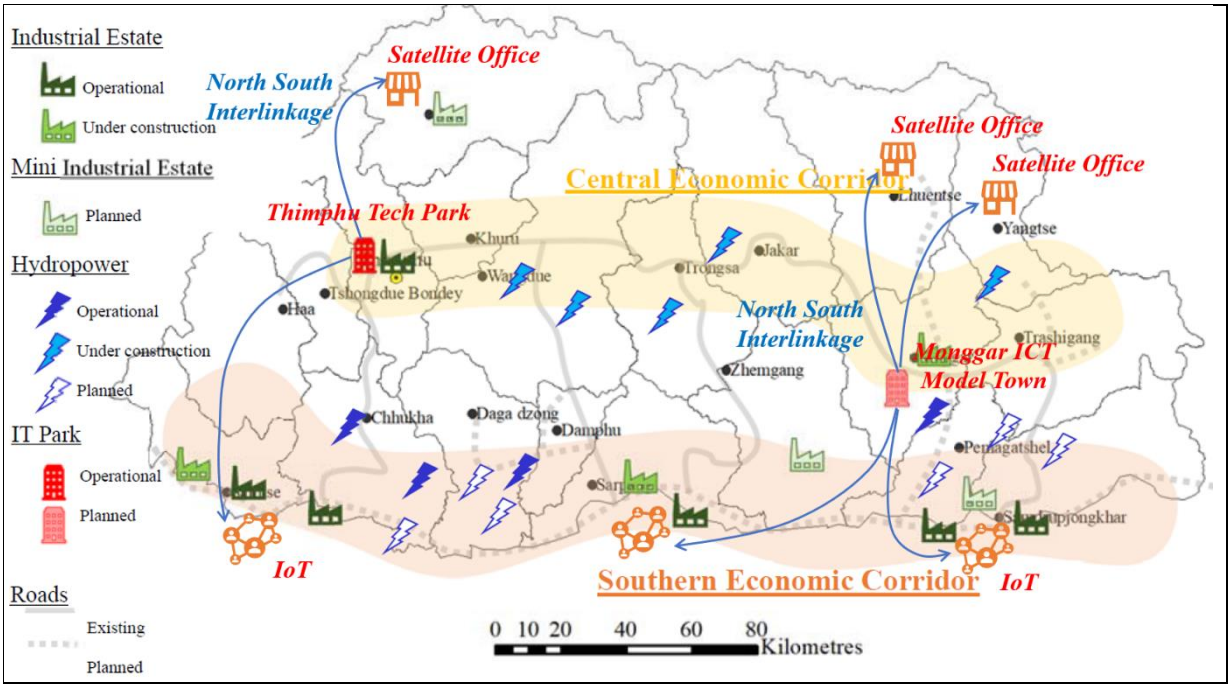


Figure 3.15 Central and Southern Economic Corridors for Regional Development

Bhutan has attempted to promote industry in the domestic market. On the other hand, the export industry following electricity and tourism is necessary to acquire foreign currency. Taking advantage of the extensive volume of clean water, a water-related industry may be one of the prospective options. Table 3.5 shows the location requirements by type of industry. The industries, by giving high regard to water when considering location requirements, are mentioned below. Those industries are heavy industries that need strict environmental management without causing a negative impact.

(a) Food and beverage: highly positive, exporting safe water and safe food.
(b) Pulp and paper: relatively positive, exporting paper and pulp to Assam if raw material is available.
(c) Medical product: relatively positive, if foreign capital company develops the processing system in areas where research institution has not been established.
(d) Iron and steel: positive exporting aluminium to Assam using raw material from India.
(e) Non-ferrous metal: positive, exporting steel to Assam using raw material from West Bengal and electricity, which is insufficient in India.
(f) Oil and coal: negative due to the low accumulation of experienced engineers and supply and parts industries.
(g) Chemical products: negative due to the low accumulation of experienced engineers and supply and parts industries.

In addition, the Integrated Circuit industry and fine chemicals are options which require high-quality water.

Table 3.5 Location Requirements by Type of Industry

Type of Industry (Major Division)		Type of Industry	Market and Transport							Utility and Resources					Accumulation of Industry	
			Access to Market	Convinient Logistics and Transport	Access to Seaport	Access to Airport	Access to Artery Road and Highway	Accumulation in Urban Area	Land (Large Size)	**Water**	Electricity	Raw Materials	Labour Force	Experienced Engineer and Expert	Supporting and Parts Industry	University and Research Institute
Light Industry		Food	X	X			X	X		X				***Highly positive***		
		Beverage	X	X			X	X		X		X				
Heavy Industry	Low Environmental Impact	Pulp and Paper		X	X					X	X		***Relatively positive***			
		Medical Product	X	X						X				X		X
	High Environmental Impact	Iron and Steel	X	X	X		X		X	X	X				***Positive***	
		Non-ferrous Metal	X	X	X		X		X	X	X					
		Oil and Coal	X	X	X				X	X	X			X	***Negative***	
		Chemical Product	X	X					X	X	X			X	X	

Note: 1) X means the requirement gives a high regard to location.
2) IT includes processing and service.
Source: Based on information from the Japan Industrial Location Center

3.4.6 All-electric Society for Environmentally Symbiotic Habitation Free from Oil

In Bhutan, CO_2 emissions have increased, especially in the cargo/transportation sector. The fuel for vehicles is petrol, which is wholly imported. On the other hand, the main industry in Bhutan is hydroelectric power generation. Therefore, shifting to an all-electric society free from oil would effectively support sustainable development. There are various kinds of green technology that should be installed to address the prevailing social issues in Bhutan, as described below.

- Promotion of electric cars and quick charging stations
- Electrification of public transportation (electric buses and cable cars)
- Maintenance of roads, bridges and dams using drones
- Drone-based freight transport system for remote areas
- Streamlining work in forests and on farms using drones and robots

Electric Car[1]

Electric Bus[2]

Drone Freight Transport System[2]

Forest Survey Using a Drone[3]

Weeding Robot[3]

Source:
1) Ministry of Economy, Trade and Industry of Japan
2) Ministry of Land, Infrastructure, Transport and Tourism of Japan
3) Forestry Agency, Ministry of Agriculture, Forestry and Fisheries of Japan

Figure 3.16 Examples of Measures Utilizing Green Technology

To begin with, partial implementation (as pilot projects) should occur in areas chosen with consideration of the local power supply and natural environment conservation needs. In addition, it can be expected to promote economic development by establishing experimental sites as "Living Labs" for green technology, which target developed countries, where trials are difficult due to strict regulations. The following regions can be prospective areas for the pilot projects.

(a) The National Capital Region (Paro, Thimphu, Punakha and Wangduephodrang) will be suitable areas for electric cars and the electrification of public transportation.
(b) In Samtse, Chhukha and Dagana, drones will be applied to the periodic/disaster inspection of bridges and dams, where several dams and the National Highway exist.
(c) In Monggar and Trashigang, experiments using robots will be expected to streamline work in forests and on farms, taking advantage of fertile agricultural land and the existence of engineering colleges.

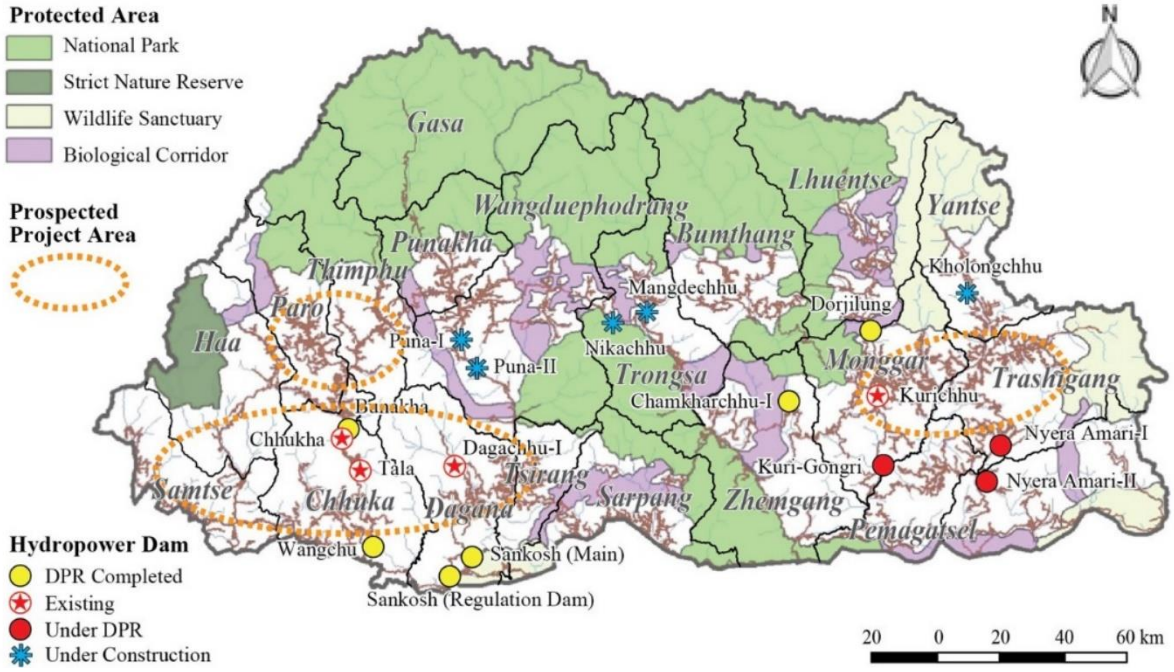


Figure 3.17 Prospective Project Areas for Environmental Technology

3.4.7 Creation of Forestry and Non-wood Forest Product Promotion Areas

Here, in Bhutan, a forest is considered to be a protective subject, rather than a source of resources to be utilized. On the other hand, many houses and buildings in Bhutan are constructed with timber, while firewood is still one of the most important heating fuels during the winter period. However, this utilization of forest resources, fundamentally for domestic demand, is carefully monitored and appropriately controlled by the Department of Forest and Park Services (DoFPS). Therefore, forestry can be a good example of the wise use of renewable natural resource in line with a self-sufficient economy.

By pursuing existing state policies on forestry, the utilization of forest resources including NWFPs is crucial to promote sustainable livelihoods in rural villages. An attempt has been made to contrast forest promotion areas and other lands using the Land Use Land Cover (LULC) 2016 data and GIS information on the protection areas, the elevation of land, the land slope, the distribution of operational forest production areas (Forest Management Units) and the forest road network. In the Northern Region, the land elevation is very high and its slope is very steep; hence, vast lands are excluded from the forestry and NWFP promotion area. The large areas in the Central Region (border areas of Wangduephodrang, Trongsa, Sarpang and Zhemgang) are also not defined as forest promotion areas primarily due to the existence of national parks there. By and large, forest promotion areas are mainly distributed in the Western and Eastern Regions in the southern territories.

The promotion areas for the NWFPs are set as the same as the forestry promotion areas, because no NWFPs can be harvested without the existence of a rich and healthy forest.

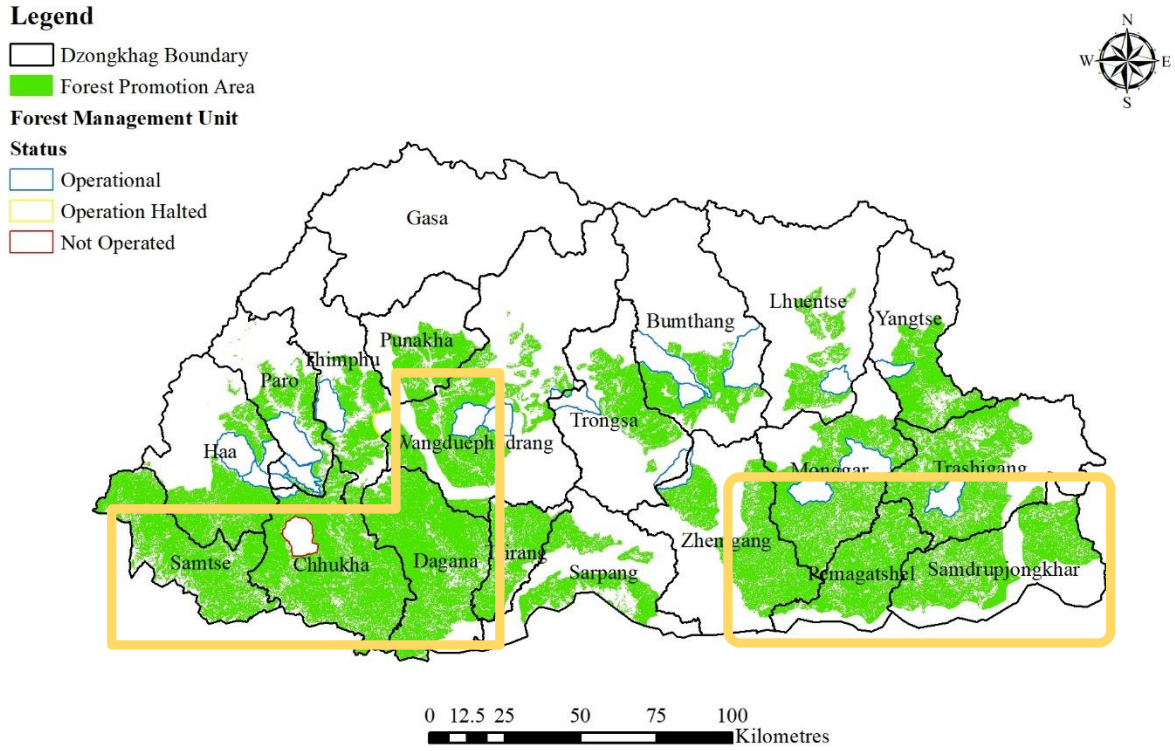


Figure 3.18 Tentative Forestry and Non-wood Forest Product Promotion Areas

3.4.8 Creation of Water Business Promotion Areas

The attempt is not only to optimize water utilization in Bhutan, but also to make Bhutan attractive as a "green country" in the eyes of the world. Encouraging the private sector and local people to change their mindset concerning water as a more valuable resource ensures the assurance of water security. Moreover, this development should help foster the local economy.

The potential for a global water business market can be found in India, Bangladesh, Singapore, Japan, Taiwan, Thailand, Indonesia, South Korea and the US, as well as European countries[2]. In order to promote business in this area, the strategies below are considered.

(a) Creation of value-added water by applying the approaches as below.
- ✓ High mineral content
- ✓ Believed to be holy water
- ✓ Awarded internationally or nationally
- ✓ Use of technological filtration or related equipment
- ✓ Addition of concoctions of herbs, which must be certified as healthy and effective
- ✓ Elaborate bottling, labelling and packaging
- ✓ Collaboration with branded international corporations in the beverage and other fields
- ✓ Unique water types, such as natural sparkling

(b) Type of water business suitable for local characteristics: Places near to borders are recommended for larger-scale water businesses. Northern parts and the Rural Area are recommended for the promotion of higher value-added products.

[2] Ministry of Labour and Human Resources, Detailed Feasibility Report on Mineral Water Project for Bhutan.

(c) Application of higher-quality standards: The Bhutan Drinking Water Quality Standard of 2016 aims to ensure clean water. More strict criteria for the water business are useful, compared to Indian Standard 13428 or the European Codex Standard. If Bhutan could develop its own quality standard for Bhutanese branded water, the water would be able to be branded "the healthiest water" in the world.

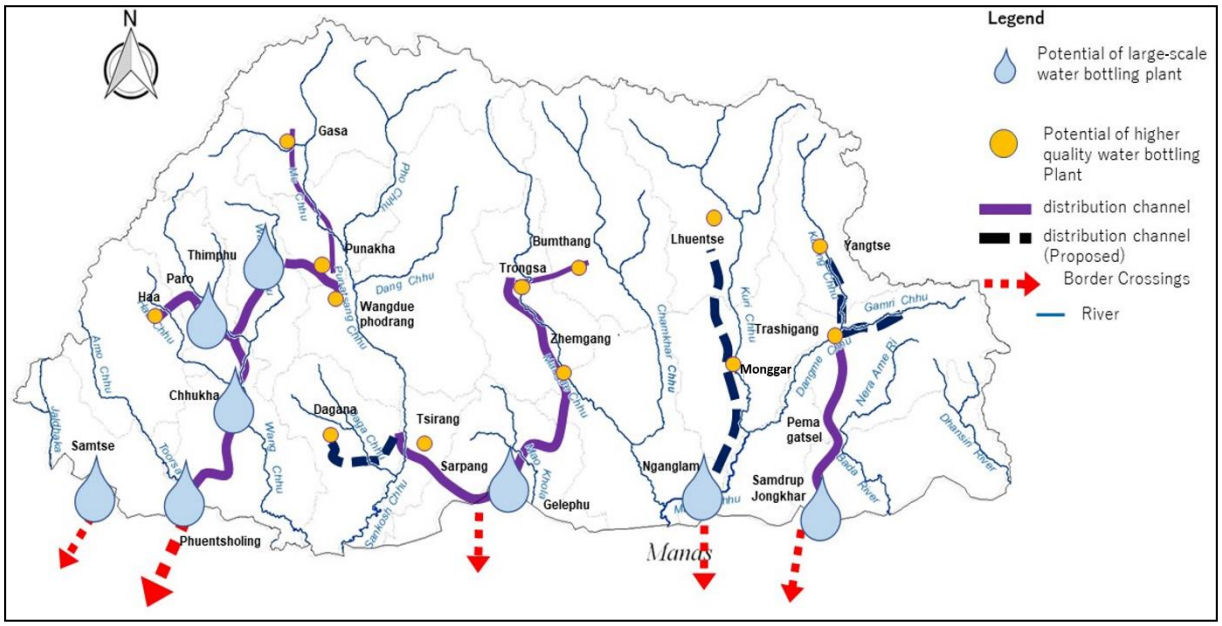


Figure 3.19 Potential Areas for Bottled Water Plants

3.5 Development Scenario

Branding Bhutan, which recognizes that the country has some supreme value, is highly desirable to realize the national security of Bhutan in the long term. For this reason, the branding is pursued not only for economic purposes but also for the endurance of the country.

Bhutan started to modernize the country when the first Five-year Plan (FYP) was formulated in 1961. Implementing the first and consecutive FYPs, social services and infrastructure have been significantly improved in the country. These improvements have contributed to economic and social development. Such improvements should be continued to achieve a national minimum and create a fundamental base for the country.

The development approaches proposed in the CNDP will help to stabilize the base of the country and drive the national economy. While the central government will attempt to nation-build, regional development should be pursued in the next step. This challenge should be initiated by local governments. As the proposed development approaches will be realized, the living environment must be prepared in a manner to be ready for attracting in-migrants and tourists. Interaction with "outsiders" will encourage local people to acknowledge the value of their local resources. Respect for cultures and traditions from outsiders will boost the pride of local people and make them recognize their locality as a precious asset where young people will also want to continue living. Tourism through the utilization of culture and tradition will strengthen this movement.

In the long run, Bhutan will be recognized as a country pursuing an environmentally symbiotic country in the world. Bhutan will be a place where it is easy to live, which fosters a meaningful motivation in those who have gained experience overseas to return to Bhutan and play an active role in the country's development.

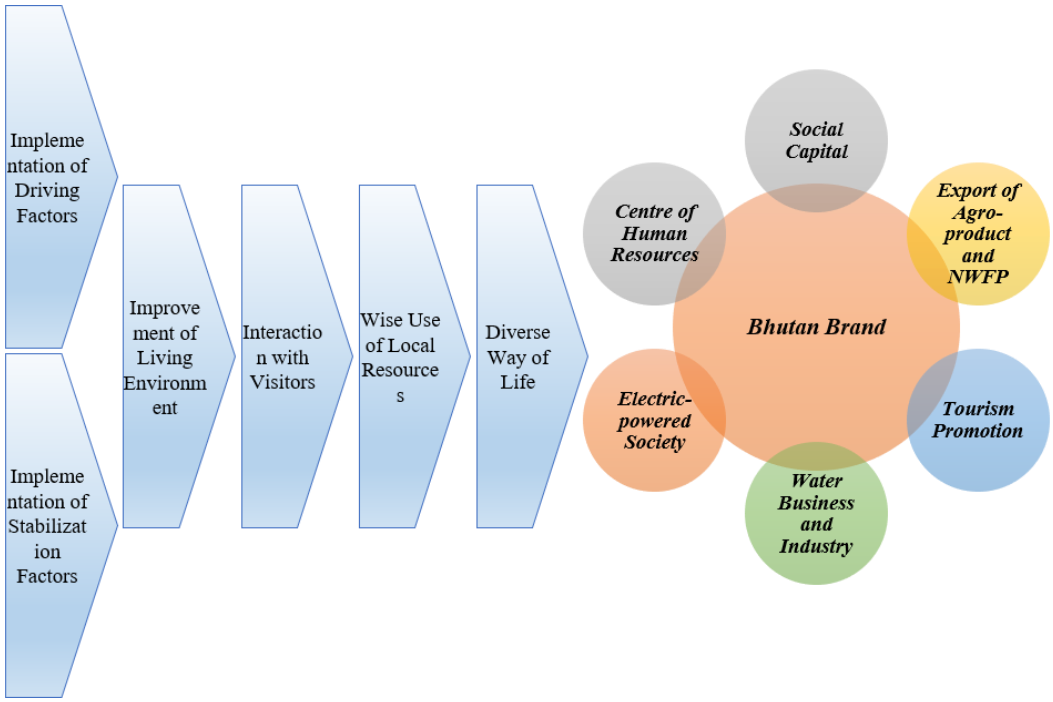


Figure 3.20 Development Scenario toward Bhutan Brand

The spontaneous motivation from villages and local people is key to realizing the effort needed. The RGoB established G2C (Government to Citizen) Office under the Prime Minister's Office and started the public service delivery via various platforms such as online, SMS, toll free number. The RGoB has made attempt to support the life in different places in the country. In addition, the GC (or small station) will be the base for social services for the people in villages and the Rural Area. This is an approach initiated by the central government.

On contrary, One Gewog One Product (OGOP) Programme is an initiative by the Queen's Project office. The programme provides an outlet to market and sell products made by farmers from local communities. This programme aims at promotion from the local communities in villages as the bottom-up approach. This kind of the bottom-up approach should be pursued to promote the entrepreneurs who will lead the new economic activities in local communities. Gewog will deliver the speciality products to the market in Dzongkhag Throme and towns.

In LUCs, the college and technical institute will support the development of human resources for entrepreneurs. If a fab lab collaborates with the technical training institute, this will provide an incubation centre for people who are willing to develop their ideas in order to resolve the social problems in their locality. Those instalments will be interlinked in order to create a platform for entrepreneurship as a base for regional promotion in collaboration with destination management organization, private companies and a banking organization.

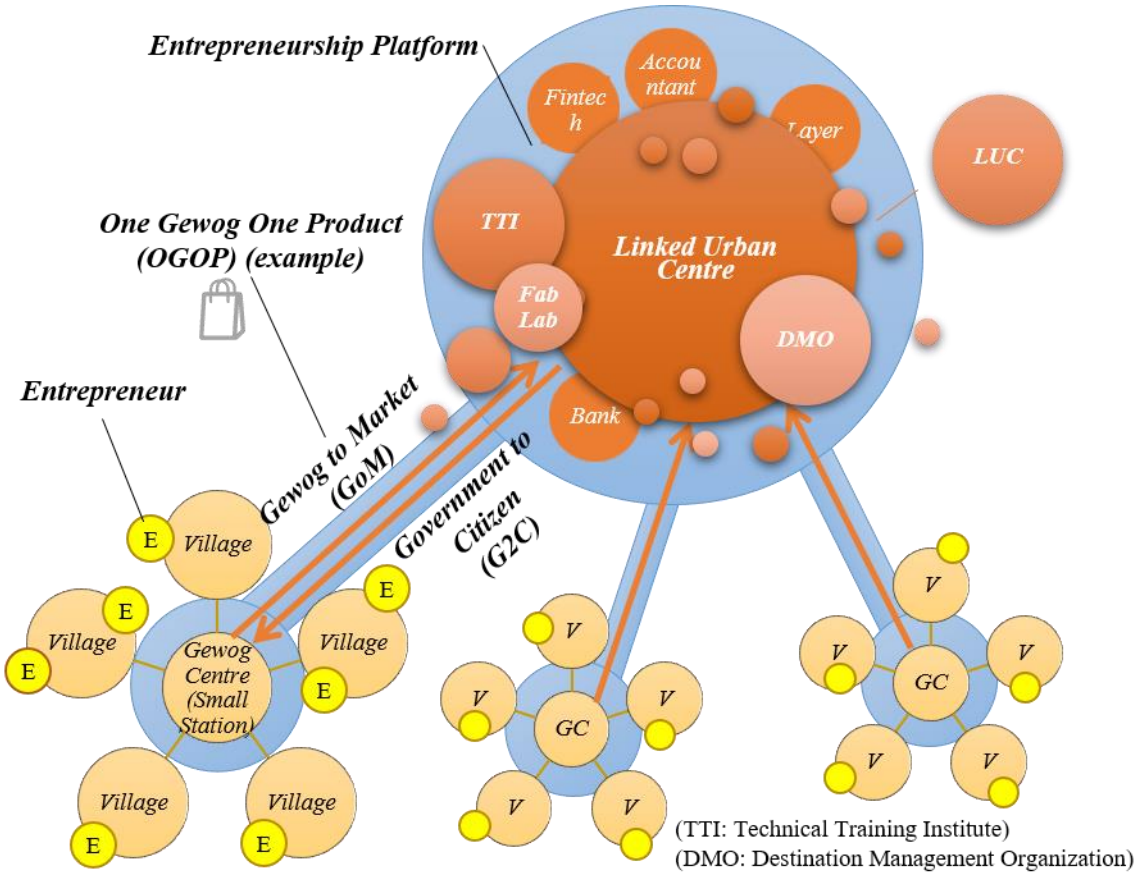


Figure 3.21 Spontaneous Development in Dzongkhags

3.6 Planning Framework

(1) National Population Projection

The NSB released official population projections from 2017 to 2047 based on the PHCB 2017 in January 2019. As shown in

Table 3.6, the population of the whole country is also projected until 2030 on the Project using the component method. As for the total fertility rate, it is assumed to be declining, i.e., from 1.9 in 2017 to 1.73 in 2030 (1.70 in 2032 and the remaining period), according to the assumptions of the NSB. The total population projection in 2023 and 2030 amounts to 769,463 and 813,713, respectively. The difference between the population projections of the NSB and those of the JICA Project Team is small. On this Project, the official population projections of the whole country by the NSB are used as a control total. On the other hand, Dzongkhag population projections and urban and rural population projections are based on JICA Project Team projections[3].

[3] In the national population projections, the cohort component method is employed for both the NSB's official population projections from 2017 to 2047 and the JICA Project Team projections. This method estimates the population change, namely, fertility, mortality and net migration rates, in future time periods. As for Dzongkhag population projections, the trend analysis is basically applied by the NSB in accordance with the change in the share of each Dzongkhag in the total population. In turn, to match the projected total population in the country and the sum of populations of all the Dzongkhags, the estimated population of all the Dzongkhags is adjusted by the ratio between them. On the other hand, the cohort component method is basically employed by the JICA Project Team. The results are also adjusted with policy interventions (projects)

Table 3.6 Projected Population of Bhutan (2017-2030)

	Year	People			Percent		
		Total	Male	Female	Total	Male	Female
NSB	2005	634,982	333,595	301,387	*100.0*	*52.5*	*47.5*
NSB	2017	727,145	380,453	346,692	*100.0*	*52.3*	*47.7*
NSB Prj	2023	**770,276**	**401,092**	**369,184**	***100.0***	***52.1***	***47.9***
NSB Prj	2030	**815,755**	**422,679**	**393,076**	***100.0***	***51.8***	***48.2***
JPT Prj	2023	769,463	400,853	368,610	*100.0*	*52.1*	*47.9*
JPT Prj	2030	813,713	421,922	391,791	*100.0*	*51.9*	*48.1*

Note: Prj = Projections; JPT = JICA Project Team
Sources: Based on NSB, PHCB2005&2017, Population Projections Bhutan 2017-2047

(2) National Urban and Rural Population Distribution

The projected urban population of the whole country is derived from the sum of the projected population of Thromdes and towns. The urban population in the country will steadily increase from 275,000 in 2017 to 332,000 in 2023, and to 413,000 in 2030. The proportion of the urban population in 2017 was 37.8% and that in 2023 and 2030 will further increase to 43.1% and 50.6%, respectively. On the other hand, the rural population in the country will decrease from 452,200 in 2017 to 438,300 in 2023, and to 402,900 in 2030.

Table 3.7 Projected Urban and Rural Populations of Bhutan (2017-2030)

	2005	2017	2023	2030	Annual Average Growth Rate (%) 2005-2017	Annual Average Growth Rate (%) 2017-2023	Annual Average Growth Rate (%) 2023-2030
Total	634,982	727,145	770,276	815,755	1.14	0.97	0.82
Urban population	196,041	274,967	331,928	412,815	2.86	3.19	3.16
Rural population	438,941	452,178	438,348	402,940	0.25	-0.52	-1.20
Share (%) of urban population	30.9	37.8	43.1	50.6	-	-	-

Sources: Based on NSB, PHCB 2005 and 2017

(3) Comparison of the Projected Regional Population in 2030

The regional populations are projected for four regions, namely, the Western, Central Western, Central Eastern and Eastern Regions, in 2030. The population growth rates between 2017 and 2030 of the Western and Central Western Regions in cases with policy interventions are lower than in cases without policy interventions. The population growth rates of the Central Eastern and Eastern Regions in cases with policy interventions are higher than those in cases without no policy interventions. These correspond to the basic concept of the strategy for the national spatial structure and Alternative G of the SEA, which emphasizes the development of the Central Eastern and Eastern Regions. In cases with policy interventions, the positive impacts of the proposed LUCs and regional development projects including industrial estate development and the expansion of courses offered by colleges or newly developed colleges are

and spatial development strategies (LUCs).
Concerning the projections of urban and rural populations, the urban-rural growth difference (URGD) method is used by the NSB to project the share of the urban population. The JICA Project Team, on the other hand, uses the cohort component method for four Thromdes and then make adjustments in relation to policy interventions (projects) and spatial development strategies (LUCs). The populations of other towns are basically projected until 2023 based on the growth rates between 2005 and 2017, then modified from 2023 to 2030 by decreasing the rates. The total population of all the Thromdes and towns represents the urban population in the country.

considered.

The projected populations of the Western, Central Western and Central Eastern Regions in 2030 amount to 120%, 108% and 126%, compared to the populations of these regions in 2017, respectively. The projected populations of the Eastern Region in 2030 is 91% compared to that of 2017.

Table 3.8 Comparison of the Projected Regional Populations in 2030 in Cases With and Without Policy Interventions

Region	Pop. of 2030; cases with policy interventions/pop. of 2017	Pop. of 2030; cases without policy interventions/pop. of 2017	Pop. of 2030; cases with policy interventions/pop. of 2030; cases without policy interventions	Pop. of 2030; cases with policy interventions/pop. of 2030; cases without policy interventions (unit: person)
Western	119.9%	123.2%	97.4%	-10,701
Central Western	107.8%	111.8%	96.4%	-4,865
Central Eastern	126.1%	112.0%	112.5%	14,271
Eastern	91.0%	90.3%	100.8%	1,295

Sources: Based on NSB, PHCB 2017

(4) Population by Dzongkhag Until 2030

Projected Populations by Dzongkhag (2005-2030)Table 3.9 shows the projected population by dzongkhag, which is based on the cohort component method with policy interventions, considering the internal migration in relation to several regional development projects, namely, industrial estate development and the expansion of courses offered by colleges as well as the positive impacts of the proposed Linked Urban Centres (LUCs) from a future perspective by region. As a result, the population of Thimphu will amount to 188,800 as of 2030, followed by that of Sarpang, which will amount to 70,600 in 2030, while Chukka, Samtse and Paro will reach 68,800, 67,600 and 55,600 in 2030, respectively.

Table 3.9 Projected Populations by Dzongkhag (2005-2030)

Dzongkhag	2005	2017	2023	2030
Bumthang	16,116	17,820	18,332	17,791
Chhukha	74,682	68,966	71,118	68,819
Dagana	22,375	24,965	25,434	24,678
Gasa	3,116	3,952	4,329	4,516
Haa	12,745	13,655	13,690	13,002
Lhuentse	15,395	14,437	13,305	11,143
Monggar	37,069	37,150	36,235	37,049
Paro	35,260	46,316	51,770	55,620
Pemagatshel	22,287	23,632	23,261	21,710
Punakha	23,462	28,740	31,639	33,327
Samdrup Jongkhar	33,889	35,079	34,958	37,092

Dzongkhag	2005	2017	2023	2030
Samtse	59,003	62,590	61,735	67,570
Sarpang	37,191	46,004	49,462	70,633
Thimphu	94,102	138,736	166,423	188,762
Trashigang	48,783	45,518	42,611	38,078
Trashiyangtse	17,740	17,300	16,350	14,406
Trongsa	13,344	19,960	24,045	27,181
Tsirang	18,667	22,376	23,373	23,371
Wangduephodrang	31,120	42,186	45,802	47,044
Zhemgang	18,636	17,763	16,403	13,961
Bhutan	634,982	727,145	770,276	815,755

Sources: Based on NSB, PHCB 2017

(5) GDP Projections

Table 3.10 shows (i) the real GDP projection by economic sector between 2015 and 2030, (ii) the average annual growth rate and (iii) the shares in the same period. This projection is derived from the following basic strategies for national spatial planning as well as existing economic projections including the Macroeconomic Framework Coordination Technical Committee (MFCTC), the 12th FYP and the International Monetary Fund's World Economic Outlook Database (October 2018).

(a) Regional promotion to mitigate rural-urban migration and promote a self-sufficient national economy
(b) Promotion of economic and living bases in regions (LUCs)
(c) Industrial infrastructure development (industrial hubs and transport networks)
(d) Public service system development
(e) Export-oriented agriculture and industry sector development and service sector development including tourism, trade and IT sector

The real GDP at market prices in Bhutan steadily increased from 5% to 8% annually between 2015 and 2018, while the estimated average annual growth rates between 2018 and 2020, between 2020 and 2023 and between 2023-2030 are about 6.7%, 4.7% and 6.9%, respectively. A big expansion of the industry sector from 2023 to 2024 is derived from the completion and operation of the Punatsangchhu I and II hydroelectric power generation projects. In sector-wise analysis, the growth rates of services sector are higher than the national average both between 2018 and 2023 and between 2023 and 2030. The growth rate in manufacturing sector will be 8.0% and higher between 2023 and 2030 mainly due to the industrial estate development. The growth rates of agriculture, livestock and forestry sector will be stable at 4.3% and 2.8%. As a whole, the base for the balanced economic structure apart from heavy reliance on hydroelectric power will be formulated. GDP per capita at market prices in current US dollars will be approximately USD 3,500 in 2017, USD 5,700 in 2023 and USD 10,800 in 2030.

Table 3.10 Real GDP Projection by Economic Sector

(a) Value Added of GDP

Unit: BTN Millions at Constant (2000) Prices

	2015	*2016*	*2017*	*2018*	*2020*	*2023*	*2030*
GDP at market prices	**59,325**	**64,084**	**67,051**	**70,485**	**80,300**	**92,200**	**147,400**
GDP at basic prices	**56,755**	**61,128**	**63,781**	**66,701**	**78,000**	**89,400**	**143,100**
Agriculture, livestock and forestry	**7,502**	**7,795**	**8,060**	**8,445**	**9,200**	**10,400**	**12,700**
Industry	**26,061**	**27,868**	**28,539**	**28,871**	**32,600**	**34,900**	**55,800**
Manufacturing	*5,324*	*5,453*	*5,753*	*6,344*	*7,500*	*9,300*	*16,000*
Services	**23,192**	**25,465**	**27,182**	**29,385**	**36,200**	**44,100**	**74,600**

(b) Average Annual Growth Rate of Each Economic Sector

Unit: Percent (%)

	2015	*2016*	*2017*	*2018*	*2018-2020*	*2020-2023*	*2023-2030*
GDP at market prices	**6.6**	**8.0**	**4.6**	**5.1**	**6.7**	**4.7**	**6.9**
GDP at basic prices	**7.9**	**7.7**	**4.3**	**4.6**	**8.1**	**4.7**	**6.9**
Agriculture, livestock and forestry	**4.9**	**3.9**	**3.4**	**4.8**	***4.2***	***4.4***	***2.8***
Industry	**8.2**	**6.9**	**2.4**	**1.2**	**6.3**	**2.3**	**6.9**
Manufacturing	4.4	*2.4*	*5.5*	*10.3*	*8.7*	*7.5*	*8.1*
Services	**8.5**	**9.8**	**6.7**	**8.1**	**11.0**	**6.8**	**7.8**

(c) Shares in the Real GDP of Each Economic Sector

Unit: Percent (%)

	2015	*2016*	*2017*	*2018*	*2020*	*2023*	*2030*
GDP at basic prices	**100.0**	**100.0**	**100.0**	**100.0**	**100.0**	**100.0**	**100.0**
Agriculture, livestock and forestry	**13.2**	**12.8**	**12.6**	**12.7**	**11.8**	**11.6**	**8.9**
Industry	**45.9**	**45.6**	**44.7**	**43.3**	**41.8**	**39.0**	**39.0**
Manufacturing	*9.4*	*8.9*	*9.0*	*9.5*	*9.6*	*10.4*	*11.2*
Services	**40.9**	**41.7**	**42.6**	**44.1**	**46.4**	**49.3**	**52.1**

Note: Due to rounding, some totals may not correspond with the sum of the separated figures.

(6) Employment

Employment Projections shows the projection of employed persons according to the broad economic sectors from 2017 to 2030 (Table 3.11). The number of projected employed persons will increase from 332,000 in 2017 to 395,000 in 2030. According to the broad economic sectors, the number of employed persons in the agriculture, livestock and fishery sector (the primary sector) will slightly decrease from 182,600 in 2017 to 170,000 in 2030. On the other hand, those in the industry (the secondary sector) and services sectors (the tertiary sector) will see an increase from 35,100 in 2017 to 42,000 in 2030, and from 114,400 in 2017 to 183,000 in 2030. Employment in the agriculture, livestock and fishery sector relevant to livelihood in the Rural Areas will be maintained. Furthermore, more than 68,000 new employments will be generated in the services sector. Those estimated employments are in line with objectives of the CNDP.

Table 3.11 Projected Employed Persons by Broad Economic Sector

(1) Employed Persons by Broad Economic Sector	2017	2020	2023	2030
Agriculture, livestock and forestry	182,583	182,000	186,000	170,000
Industry	35,107	35,000	34,000	42,000
Services	114,409	131,000	144,000	183,000
Total	332,099	348,000	364,000	395,000

(2) Share (%) of Employed Persons by Broad Economic Sector	2017	2020	2023	2030
Agriculture, livestock and forestry	55.0	52.3	51.1	43.0
Industry	10.6	10.1	9.3	10.6
Services	34.5	37.6	39.6	46.3
Total	100.0	100.0	100.0	100.0

Note: Due to rounding, some totals may not correspond with the sum of the separated figures.
Source: Based on the data of the NSB and the MoLHR

CHAPTER 4 NATIONAL SPATIAL STRUCTURE

4.1 Key Concept for National Spatial Structure

(1) Target for the National Spatial Structure

An approach that pursues economic development as the highest priority is considered inappropriate for Bhutan, because it could exacerbate the regional disparities. Balanced development to mitigate regional disparity is the way forward, aimed at the creation of the Capital Region, the development of Regional Urban Centres and the establishment of good access to the urban centre within a region. However, this does not mean that just any town or village will be able to become a second Thimphu. This means that a national minimum needs to be ensured by the national government; meanwhile, a target for the national spatial structure will be envisaged in order to achieve the development of regions, towns, villages and localities with unique characteristics of their own (Figure 4.1). Characterization of economy, culture and lifestyle in regions, towns, villages and localities will diverse the way of life in the country and contribute to the balanced development.

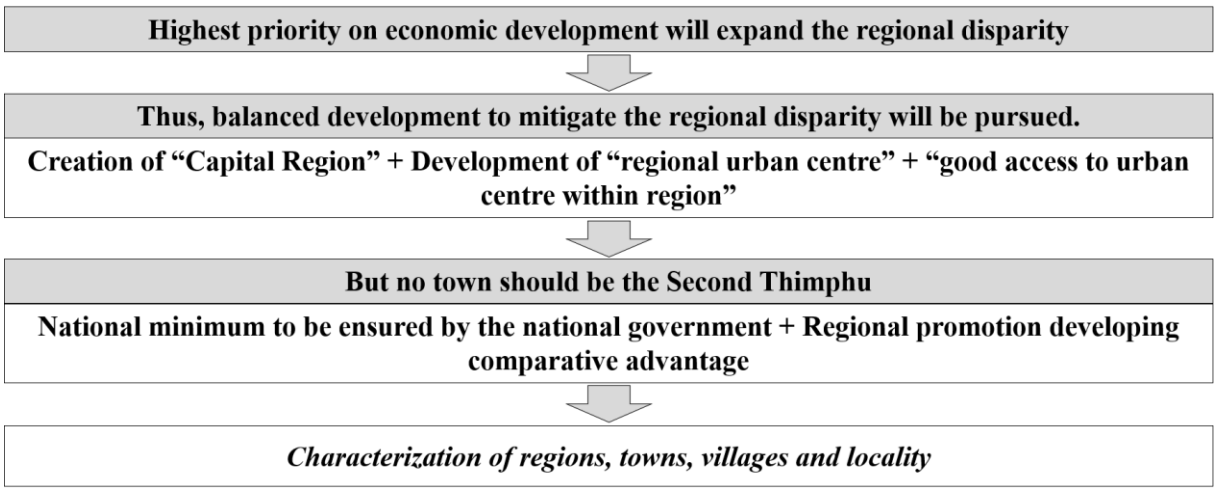


Figure 4.1 Key Concepts and Target for the National Spatial Structure

(2) Creation of the Capital Region

In order to grow Bhutan's national economy, towns with a sizeable population more than 10,000 population are necessary. According to the PHCB2017, Thimphu Thromde is the only town with more than 100,000 population in the country. Phuetsholling Thromde is the second largest town with 28,000 population. Excluding these Thromdes, there is no town more than 10,000.

Thimphu Thromde is the town that must drive the economy. Concerning environmental and social aspects, human settlements have encroached on flatlands in valleys in and around Thimphu. Development in neighbouring cities such as Paro, Punakha, and Wangduephodrang needs to be promoted in order to relax the urbanization of Thimphu,

(3) Creation of Linked Urban Centres

The LUC is a concept in which a combination of two towns creates a centre for social services, markets and economic activities in a region. Existing higher education institutions and medical hospitals are placed in different towns. The concept involves utilizing capital investment for

those facilities. Tromdes and towns constituting LUCs have to satisfy all the conditions of:

(a) locating outside the National Capital Region;
(b) locating on either of the two East-West national highways;
(c) having qualified urban centre status as Dzongkhag Thromde, Yenlag Thromde or regional hub;
(d) having reasonable population size as an urban center - i.e., within the top 20 (or not less than 2,849 population) out of all 60 census towns in PHCB 2017;
(e) locating within 3-hour drive distance (measured by target travel speed in the Project) to the neighbouring urban centre - which satisfies all the conditions from (a) to (d) – on the same East-West national highway; and
(f) having easy access to any of North-South national highways directly or via the neighbouring urban centre specified in (e).

The Thromdes and towns constituting the LUCs are selected to meet the specified conditions. The selection result is shown in Table 4.1.

Table 4.1 Selection Result of Thromdes/Towns Constituting Linked Urban Centres

Linked Urban Centre	Each Urban Centre	Condition (✓: satisfactory)					
		(a)	(b)	(c)	(d)	(e)*2	(f)
Trongsa-Bumthang	Trongsa	✓ Central Eastern	✓ PNH1	✓ DT	✓ 18th (3,122 persons)	✓ 1.8 h (68 km)	✓ PNH5
	Bumhang				✓ 9th (6,243 persons)		
Monggar -Trashigang	Monggar	✓ Eastern		✓ DT(T) + RH(K)	✓ 7th (7,646 persons)	✓ 2.4 h *3 (91 km)	✓ PNH3 PNH11
	Trashigang (T) + Kanglung (K) *1				✓ 19th(T)+15th(K) (3,037 (T)+ 3,223(K) persons)		
Samtse -Phuentsholing	Samtse	✓ Western (South)	✓ PNH2	✓ DT	✓ 11th (5,396 persons)	✓ 2.0 h (61 km)	✓ AH48
	Phuentsholing				✓ 2nd (27,658 persons)		
Sarpang -Gelephu	Sarpang	✓ Central Eastern		✓ YT	✓ 17th (3,152 persons)	✓ 1.3 h (39 km)	✓ PNH5
	Gelephu			✓ DT	✓ 4th (9,858 persons)		
Nganglam - Samdrupjongkhar	Nganglam	✓ Eastern		✓ YT RH	✓ 10th (5,418 persons)	✓ 3.0 h (90 km)	✓ PNH3 PNH11
	S/jongkhar			✓ DT	✓ 5th (9,325 persons)		

Note:
*1 Trashigang (mother town) and Kanglung (satellite town) form a twin-core urban centre.
*2 Target travel speeds (km/h) are 37.8 (PNH1) and 30.5 (PNH2).
*3 Target travel time (as well as the route length) is of Monggar-Trashigang (91 km). Trashigang-Kanglung (17 km) takes 0.6 hours at a pace of 29.2 km/h (PNH3).
*4 DT: Dzongkhag Thromde, YT: Yenlag Thromde and RH: Regional Hub

(4) Creation of Attractive Settlement Zones

An important attempt from a long-term perspective is to differentiate the characteristics of each town and village as the next step after achieving a national minimum for social services.

Characteristics can be represented by the spatial structure which closely implies intangible cultures such as lifestyles and communities. Currently, the Urban Area is surrounded by the Rural Area comprising human settlements and agricultural land. This Rural Area should be regarded as characteristic of Bhutan. Thus, a human settlement will be formed in each town area where the population is concentrated, in the Rurban[4] Area coexisting with the Rural Area and scattered settlements, and in the Satoyama[5] Area surrounding the rurban area.

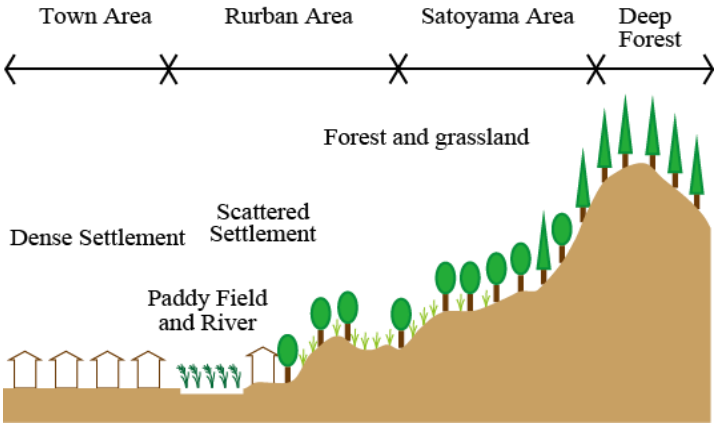


Figure 4.2 Longitudinal Profile of the Town Area, Rurban Area and Satoyama Area (Example)

(5) Network Society to Interlink Settlement Area with an Integrated Communication System

Settlement areas for towns and main and other villages will be interlinked with an integrated communication system for land and air transport. An ICT network will be utilized to create a national backbone to supplement those transport options. Figure 4.3 presents a conceptual diagram of a network society in which every region, town and village have their own special characteristics.

[4] Rurbanism was proposed in the US. Rurban is a composite word of urban and rural proposed by C. J. Galpin, an American rural sociologist, to draw attention to the social relations of small country towns and farmers living in the vicinity. The Rurban Area covers a mixed area comprising an urban environment and an agricultural natural environment, as well as a mixture of urban and farmer populations. The concept is aimed at social development for the integration of towns and farming villages.

[5] In Japanese, *sato* means a settlement in its simplest definition, while *yama* refers to mountains, forests or woods. *Satoyama* in turn means foothills or forests with farmlands, ponds and grasslands bordering a village, in which the villagers' lives and livelihoods are inseparable. Biological productivity and biodiversity have increased by the satoyama principle, as a result of limited human interaction. In line with the symbiosis between human life and nature, the satoyama principle dates back to ancient times and its value has been recognized anew recently. The Satoyama Initiative was adopted by the 10th Conference of the Parties to the Convention of Biological Diversity (CBD COP-10) in 2010 in Nagoya, Japan. This conference recognized the Satoyama Initiative as a potentially useful tool to better understand and support human-influenced natural environments for the benefit of biodiversity and human well-being.

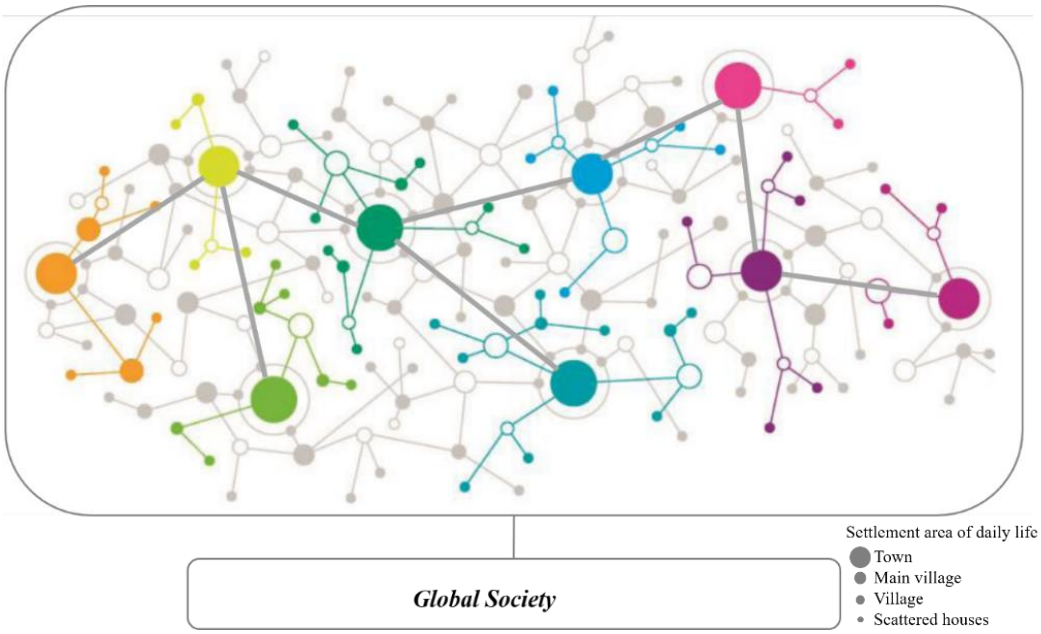


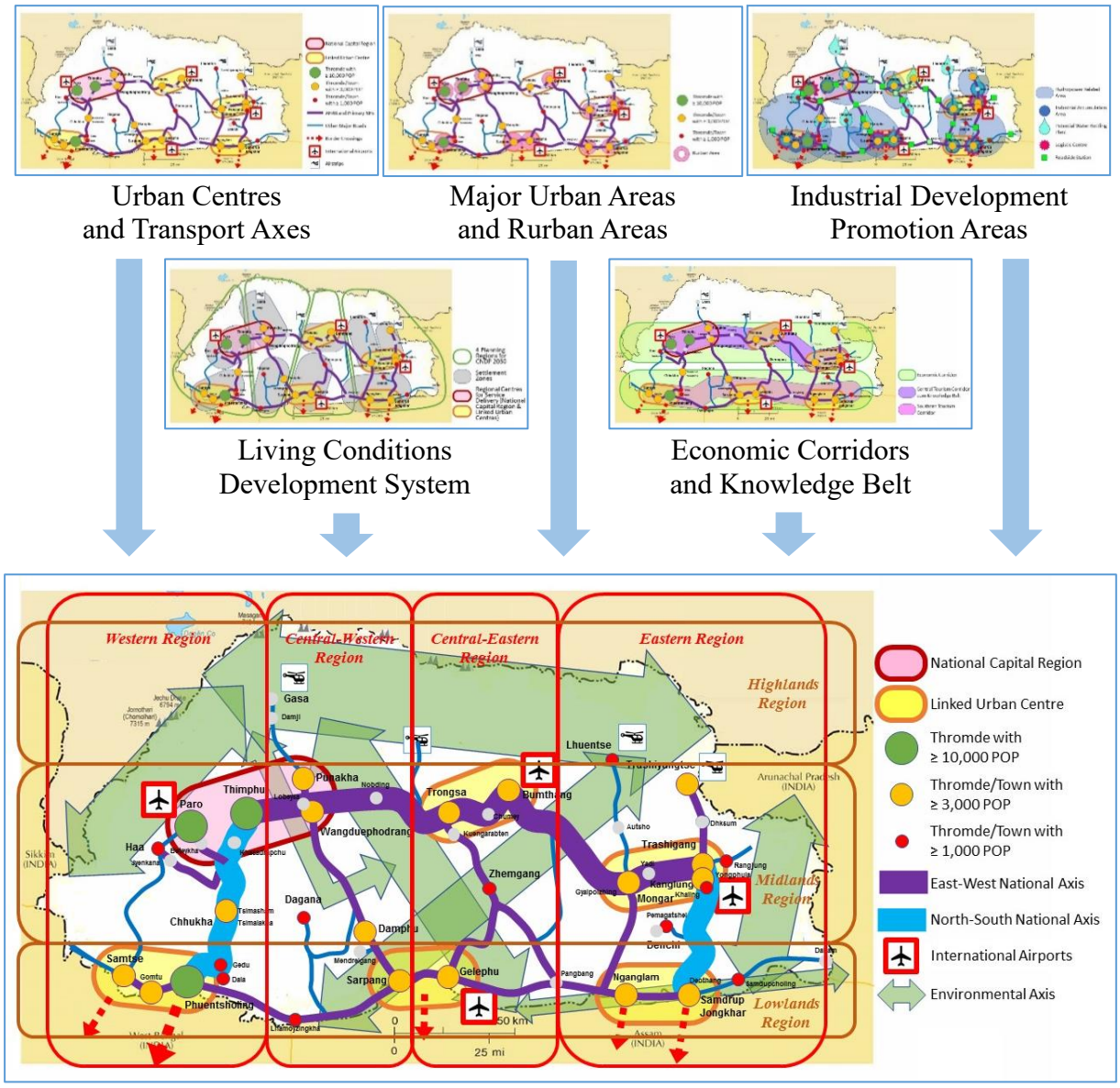
Figure 4.3 Conceptual Diagram of a Network Society

4.2 Proposed National and Regional Spatial Structure

(1) National Spatial Structure

Development approaches for the future were proposed from various sectoral aspects. Based on these proposals and implications, a national spatial structure is proposed, which is simultaneously drawn from two viewpoints: a) main national axes and major urban regions, and b) the grid structure of the nation divided in both vertical/longitudinal and horizontal/latitudinal directions. The key points are as follows:

(a) Paro-Thimphu-Punakha/Wangduephodrang will be formed as the National Capital Region, and development pressure on Thimphu will be dispersed across the region.
(b) Considering the regional balance, LUCs will be designated and, within each area, functional demarcation/linkage between the core towns will be pursued.
(c) To facilitate the regional development of the eastern half of the nation (for instance, through tourism promotion), Bumthang, Gelephu, and Yongphula will be candidates to be upgraded to international airport status. At the same time, National Highway No. 3 will be improved as the second international surface axis in order to promote development in the east.
(d) Protected areas, including biological corridors, will be tied together and will integrally form the environmental axes of the nation.
(e) Each planning region proposed for the CNDP 2030 (i.e., any of the four longitudinal regions) is latitudinally composed of highland, midland and lowland areas. Thus, characteristics of each latitudinal area should be reflected properly in the planning of each region.



Spatial Structure Summary: Composed of National Axes, Major Urban Centres and Lat/Log Regions

Figure 4.4 Proposed National Spatial Structure

(2) Regional Spatial Structure

Future perspective is proposed for four regions, based on the competitive advantage derived from a SWOT (Strength, Weakness, Opportunity and Threat) analysis. The Western Region will be the "Business and Commercial Region". This region includes the western part of the Capital Region and the LUC of Samtse and Phuentsholing. The Central Western region will be the "Agro-production and R&D Region". This region covers the eastern part of the Capital Region. The Central Eastern region will be the "Tradition and Interaction Region" containing the two LUCs of Trongsa/Bumthang and Sarpang/Gelephu. The Eastern Region will be the "Science and Incubation Region". There will be two LUCs: Monggar/Trashigang and Nganglam/Samdrupjongkhar.

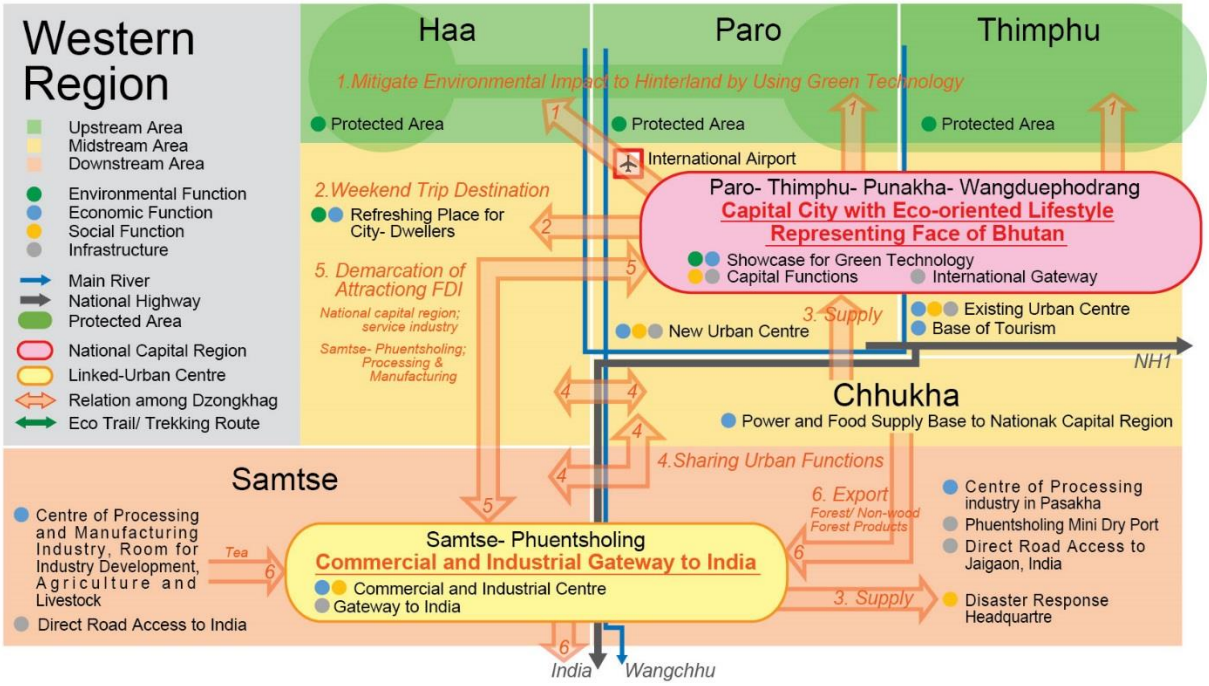


Figure 4.5 Future Perspective of the Western Region

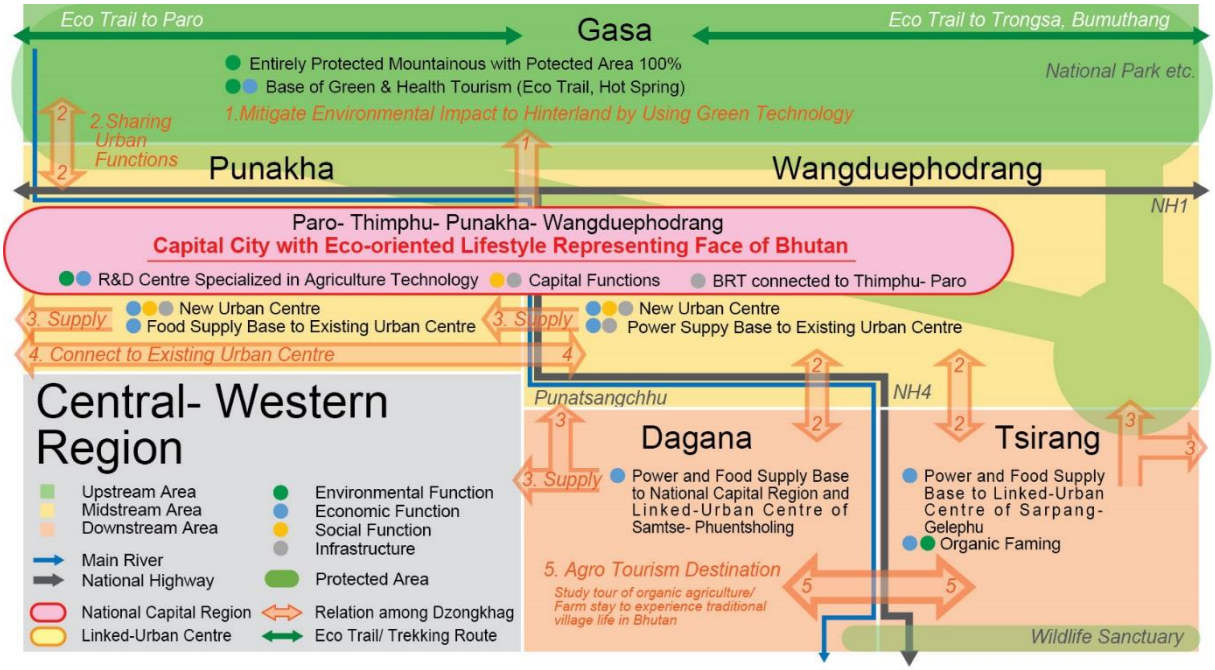


Figure 4.6 Future Perspective of the Central Western Region

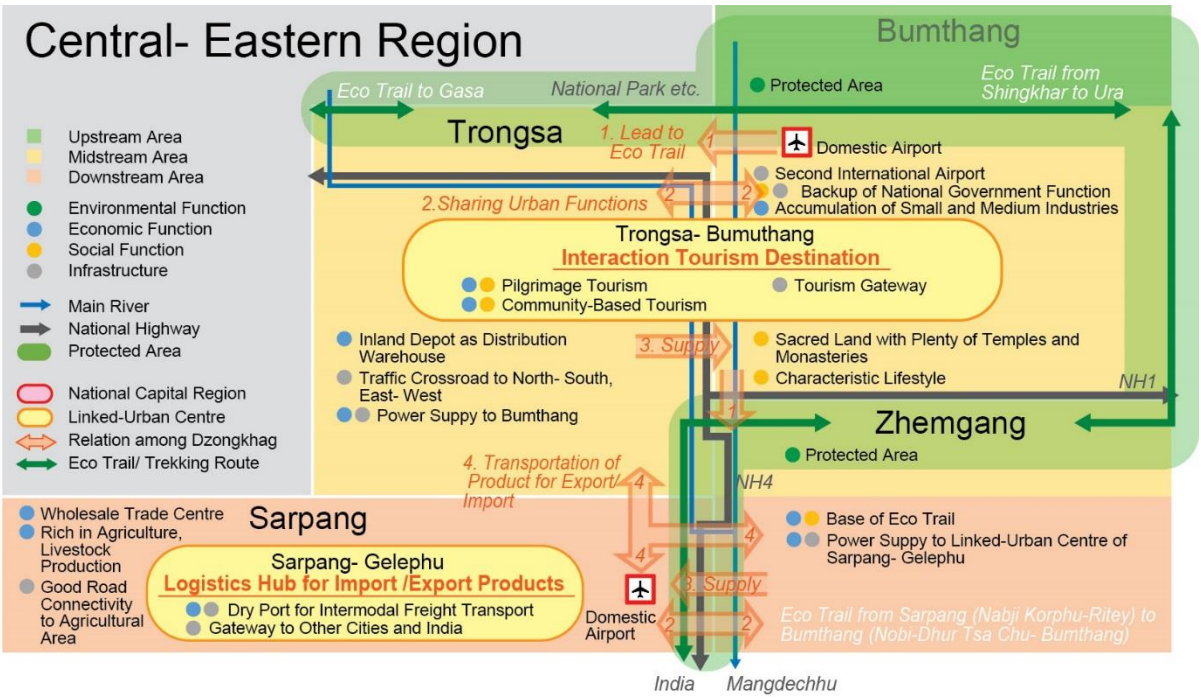


Figure 4.7 Future Perspective of the Central Eastern Region

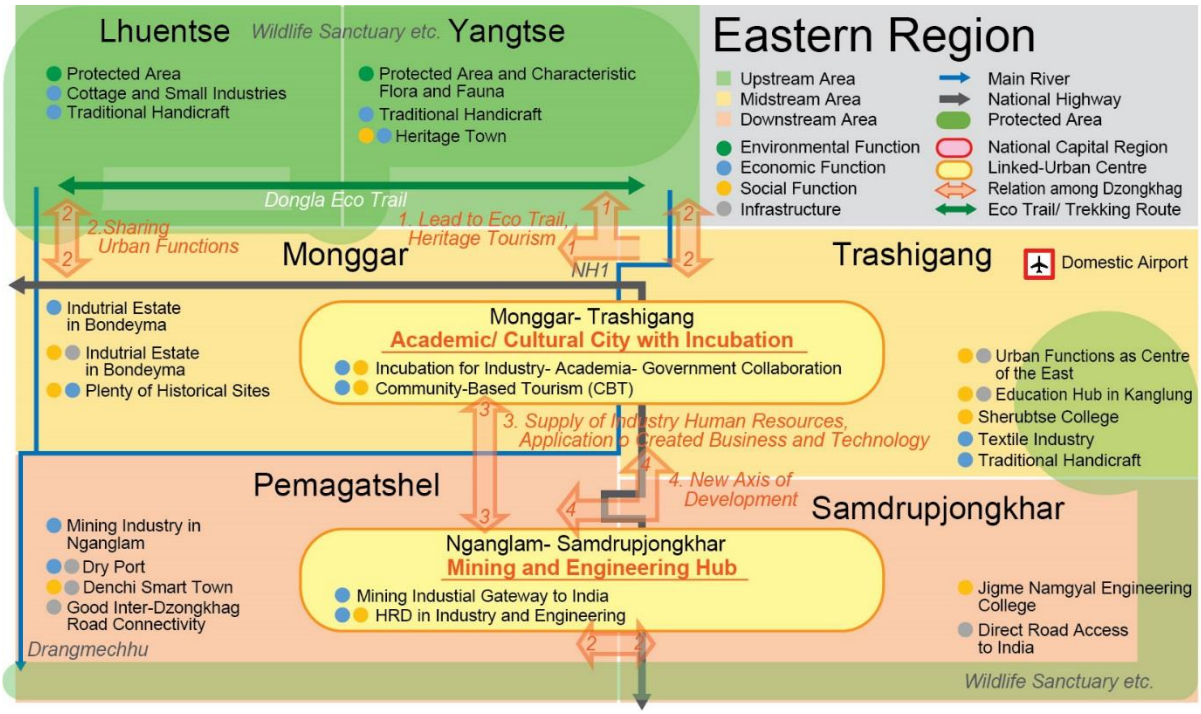


Figure 4.8 Future Perspective of the Eastern Region

4.3 Enhancement of Local Characteristics of Dzongkhags in Support of Gross National Happiness Improvements

Available resources and comparative advantages are different for each Dzongkhag. A blanket approach to increase the GNH Index of every Dzongkhag risks repressing its characteristics. In contrast, an approach to enhance the outstanding feature of each Dzongkhag contributes to the creation of a diverse society in the country. In the CNDP, one of nine domains selected for each Dzongkhag represents its locality and comparative advantage. The enhancement of the selected domain may contribute to improve the index of other domains. This selection is a tentative outcome (Figure 4.9), which should be updated and applied by the Dzongkhag government to more appropriately reflect local conditions.

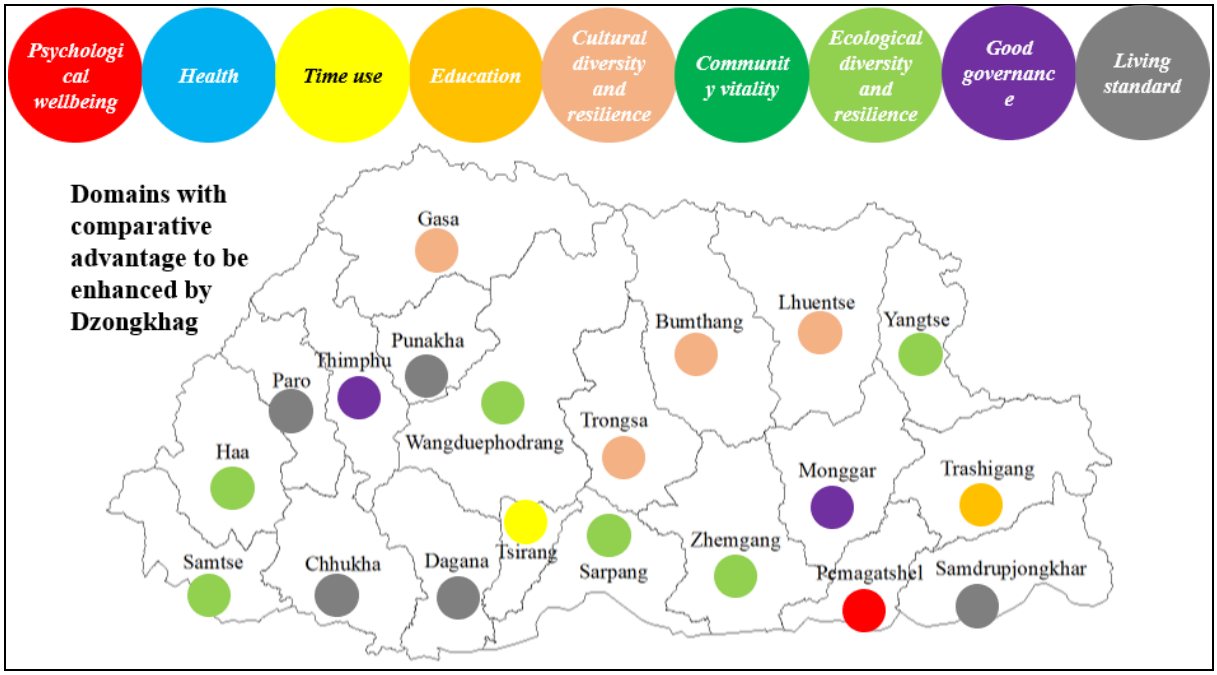
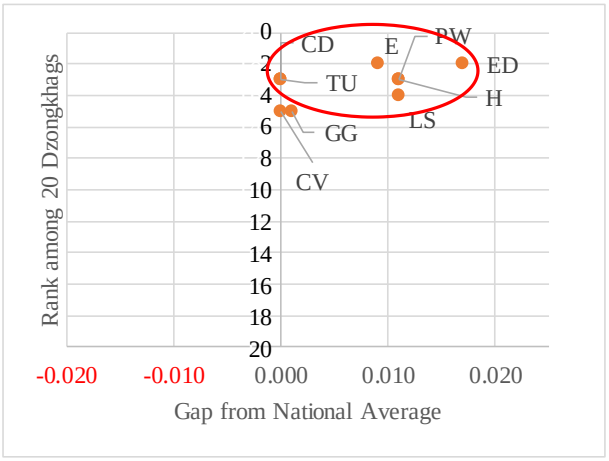


Figure 4.9 Domain with Comparative Advantage to be Enhanced in Dzongkhag

The inventory of resources was listed for each Dzongkhag in the 11th FYP. Every resource is classified into one of nine domains of GNH (Chapter 8 of Volume 2 of this report). Scoring the number of resources in each domain, the domain with rich resources is selected for each Dzongkhag. On the other hand, the domains in which the GNH Index is higher than the national average is clarified. Yet, a SWOT analysis was carried out during the first stakeholder meetings for Dzongkhag representatives and residents. Their suggested items in terms of strength (S) and opportunity (O) are classified into their respective domains. Among these superior domains, a target domain is selected. By way of example, Figure 4.10 sets out the process for selecting the target domain to be pursued in Bumthang.

Domain with High Index in GNH Survey



Superior Domain → **Target Domain**

PW, H, TU, E, CD, ED, LS

Score Calculated from Inventory of Resources in the 11th Five-year Plan

Domain	Score
PW	2.5
H	3.5
TU	3.0
E	2.5
CD	3.0

Domain	Score
GG	2.0
CV	3.0
ED	3.0
LS	0.5

H, TU, CD, CV, ED → CD

Strength and Opportunity Presented in Stakeholder Meeting

Strength	Tourist destination	LS
	Pilgrimage destination	CD
	Topographically suitable for agricultural development activities	LS
	Suitable for livestock farming	LS
	Domestic airport	LS
	Accessibility	LS
	Timber Harvesting (Community Forest)	ED
	Rich Architecture	CD
Opportunity	Local tour operators/guides	LS
	Organic farming (Commercialize)	LS
	Value added dairy products	LS
	Potential for international airport	LS
	Increase in economy	LS
	Inter-dzongkhag timber supply	LS

CD (6), ED (4), LS (11)

Weiight for Strenght and Opportunity by Domain
LS x 1
CD x 3
ED x 4
Other x 5

Legend:

PW	Psychological Well-being	E	Education	CV	Community Vitality
H	Health	CD	Cultural Diversity	ED	Ecological Diversity
TU	Time Use	GG	Good Governance	LS	Living Standards

Sources: 1) Strength and Opportunity: Stakeholder Meeting in 2017
2) GNH Index: GNH Survey in 2015

Figure 4.10 Tentative Target Domain to Be Pursued in Bumthang (Example)

CHAPTER 5 NATIONAL LAND USE PLAN AND HOLISTIC SERVICES

5.1 National Land Use Plan

5.1.1 Significance of the National Land Use Plan in Bhutan

Currently, there are legal systems and plans regarding land use in Bhutan, which were established individually for each objective of the use in question, such as urban use, agriculture use, forest and protection. However, there is no obvious system that exists to support the efficient coordination of these legal systems and related plans. Furthermore, there is no nationwide land use map to serve as the basis for the coordination of holistic land use, nor a policy to facilitate the consolidation process.

Therefore, it is now necessary to establish the NLUP, that is, an integrated plan by which all the land use legislation and plans currently in the remit of different sectors can be totally coordinated.

There are two aspects to the NLUP: one is an "umbrella plan" which presents an envisaged national land use and provides a direction to the plan formulated by the individual sector; the other is a "platform" on which to foster common ground where the related land use regulations/plans under different pieces of legislation are coordinated.

Figure 5.1 shows the structure of the NLUP, a related regulatory plan and a regulatory measure. Land use control is implemented by exercising the power of legislation applied to each piece of land. Therefore, in order to ensure the effectiveness of the NLUP, it is essential to link all related legislation to the NLUP. On this basis, establishing land use categories in the NLUP is recommended, each of which corresponds to the legislation currently being enacted.

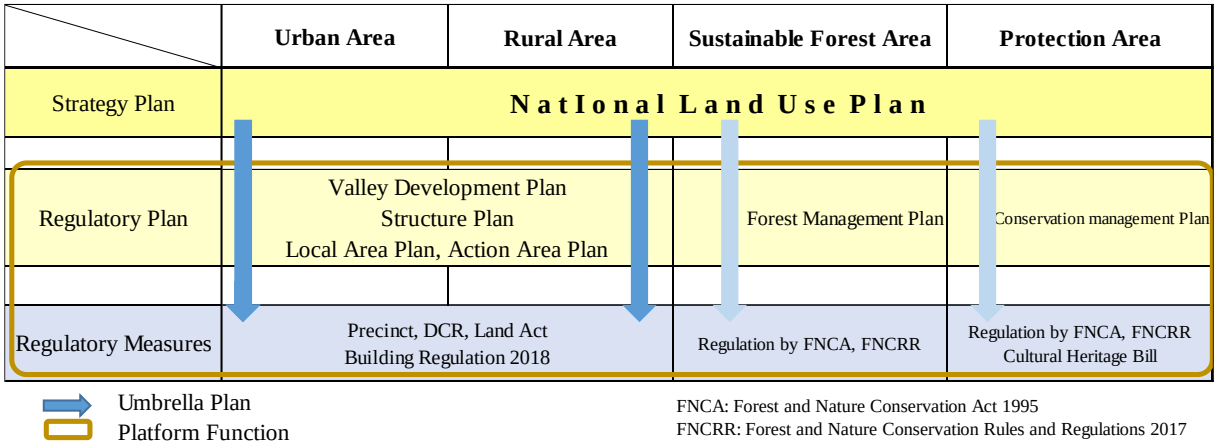


Figure 5.1 Structure of the National Land Use Plan, Regulatory Plan and Regulatory Measures

5.1.2 Land Use Category

Land use has various patterns and stages, which may be aligned in between the two ultimate objectives of land use, namely, "primary human settlement" at one end, and "primary nature/culture conservation" at the other. Based on this broad view, it is proposed to establish four categories of land use.

Land for "primary human settlement" shall be categorized into a) an Urban Area and b) a Rural Area, depending on the characteristics of the area, i.e., an area where the urban and commercial character is dominant or an area where agriculture is dominant, respectively.

Land for "primary nature/culture conservation" shall be categorized into c) a Sustainable Forest Area (SFA) and d) a PA, depending on whether sustainable resource use is feasible or nature/culture protection is more important.

Figure 5.2 Outline of Land Use Category

(1) Urban Area

Out of 60 Thromdes/towns selected as towns in the PHCB 2017, 54 of which comprise 20 Dzongkhag Thromdes, 20 Yenlag Thromdes and 14 Commercial Centres are included in the Urban Area list in the NLUP.

Table 5.1 Thromdes/Towns in the Urban Area

Urban Area	Thromde/Town	Dzongkhag	Population in 2017
1	Thimphu	Thimphu	114,551
2	Phuentsholing	Chhukha	27,658
3	Paro	Paro	11,448
4	Gelephu	Sarpang	9,858
5	Samdrupjongkhar	Samdrupjongkhar	9,325
6	Wangduephodrang	Wangduephodrang	8,954
7	Monggar	Monggar	7,646
8	Punakha	Punakha	6,262
9	Bumthang	Bumthang	6,243
10	Samtse	Samtse	5,396
11	Tsirang	Tsirang	3,448
12	Tashi Yangtse	Trashiyangtse	3,187
13	Trongsa	Trongsa	3,122
14	Trashigang	Trashigang	3,037
15	Zhemgang	Zhemgang	2,711
16	Haa	Haa	2,596
17	Daga (Dzong)	Dagana	1,547
18	Lhuentse	Lhuentse	1,500
19	Gasa	Gasa	779
20	Denchi	Pemagatshel	340
21	Nganglam	Pemagatshel	5,418
22	Tsimasham	Chhukha	3,977
23	Gomtu	Samtse	3,661
24	Sarpang	Sarpang	3,152
25	Rangiung	Trashigang	2,024
26	Lhamoidzingkha	Dagana	1,961
27	Samdrupchoelin	Samdrupjongkhar	1,713
28	Khasadrapchu	Thimphu	966
29	Panbang	Zhemgang	800
30	Lobesa	Punakha	784
31	Autsho	Lhuentse	775
Urban Area	Thromde/Town	Dzongkhag	Population in 2017
32	Yadi	Monggar	730
33	Nobding	Wangduephodrang	713
34	Damji	Gasa	587
35	Jyenkana	Haa	502
36	Beteykha	Paro	465
37	Kuengarabten	Trongsa	424
38	Chhmay	Bumthang	393
39	Duksum	Trashiyangtse	360
40	Mendrelgang	Tsirang	62
41	Kanglung	Trashigang	3,223
42	Gedu	Chhukha	2,849
43	Jomotsangkha	Samdrupjongkhar	1,136
44	Khaling	Trashigang	1,129
45	Olde Pemagatshel	Pemagatshel	1,038
46	Dala	Chhukha	1,037
47	Drametse	Monggar	969
48	Lingmethang	Monggar	952
49	Sipsu	Samtse	617
50	Dagapela	Dagana	578
51	Drukjeyganq	Dagana	575
52	Nangkor	Pemagatshel	522
53	Wamgrong	Trashigang	484
54	Resarbu	Trashigang	211
55	Rurichu	Wangduephodrang	213
56	Khothakpa	Pemagatshel	146
57	Yalang	Pemagatshel	62
58	Kheriqonpa	Pemagatshel	61
59	Sunkosh	Dagana	52
60	Mongling	Pemagatshel	38
	Total of 60 census towns		274,967
	Total of 54 census towns		274,395

Note: 1) Samdrupjongkhar Thromde includes Deothang Town.
2) Monggar Town includes Gyalpozhing Town and Kilkha Town.
3) Zhemgang Town includes Tingtibi Town.
4) Tsimasham Town includes Tsimalakha Town and Chhukha Town.
5) Wamgrong Town and Resarbu Town are included as part of the Urban Area as they are regarded as conurbation towns, though they do not satisfy the population criterion of not less than 500 persons.

Dzongkhag Thromdes Yenlag Thromdes Commercial Centre towns
Census towns other than those in the Urban Area

The residential land required to meet the population growth is calculated with a population density of 80 persons/ha[6] referring to the Spatial Planning Standards, on the premise of developments by LAPs. As a result, the total residential land required in the Urban Area in 2030 is estimated at 17 km^2.

The Thromdes/towns where UMAs are recommended to be established shall be those having approximately 0.3 km^2 or more of the required residential land in 2030; this equates to 11

[6] In the case of development by the land pooling method, the population density may be assumed to be 120 persons/ha.

Thromde/town/conurbation areas. The total required residential land in the 11 areas occupies 84% of the total required residential land across the whole of the Urban Area for 54 Thromdes/towns.

Table 5.2 Estimation of Population Growth and Required Land in the Urban Area and Urbanization Management Areas

Thromdes/Towns	Population				Change from 2017 to 2030	Required Residential Land in 2030 (km^2)	Conurbation
	2005	2017	2023	2030			
Bumthang	4,203	6,243	7,609	9,157	2,914	0.4	
Chhmay	–	393	461	535	142	0.0	
Phuentsholing	20,537	27,658	32,304	36,622	8,964	1.1	
Tsimasham	6,449	3,977	3,977	3,977	0		
Gedu	4,288	2,849	2,849	2,849	0		
Dala	1,652	1,037	1,037	1,037	0		
Daga (Dzong)	1,146	1,547	1,797	2,068	521	0.1	
Lhamoizingkha	778	1,961	3,113	4,809	2,848	0.4	
Dagapela	145	578	1,154	2,216	1,638	0.2	
Drukjeyganq	552	575	587	598	23	0.0	
Gasa	402	779	1,084	1,479	700	0.1	
Damji	–	587	688	799	212	0.0	
Haa	2,495	2,596	2,648	2,698	102	0.0	
Jyenkana	–	502	589	683	181	0.0	
Lhuentse	1,175	1,500	1,695	1,900	400	0.0	
Autsho	301	775	1,244	1,940	1,165	0.1	
Monggar	5,793	7,646	8,784	10,002	2,356	0.3	
Drametse	541	969	1,297	1,704	735	0.1	
Lingmethang	819	952	1,026	1,101	149	0.0	
Yadi	–	730	856	994	264	0.0	
Paro	2,932	11,448	15,995	21,894	10,446	1.3	
Beteykha	–	465	545	633	168	0.0	
Denchi	–	340	399	463	123	0.0	
Nganglam	1,018	5,418	8,838	14,006	8,588	1.1	
Olde Pemagatshel	1,135	1,038	993	952	-86		
Nangkor	672	522	522	522	0		
Punakha	2,292	6,262	10,351	16,609	10,347	1.3	(1)
Lobesa	–	784	919	1,067	283	0.0	
Samdrupjongkhar	8,595	9,325	10,016	12,449	3,124	0.4	
Samdrupchoelin	393	1,713	3,576	7,168	5,455	0.7	
Jomotsangkha	957	1,136	1,238	1,341	205	0.0	
Samtse	4,981	5,396	5,616	5,830	434	0.1	
Gomtu	4,254	3,661	3,661	3,661	0		
Sipsu	904	617	617	617	0		
Gelephu	9,199	9,858	10,419	20,850	10,992	1.4	(2)
Sarpang	2,619	3,152	3,458	3,771	619	0.1	
Thimphu	79,185	114,551	137,056	161,243	46,692	5.8	(3)
Khasadrapchu	–	966	1,133	1,315	349	0.0	
Trashigang	2,383	3,037	3,429	3,840	803	0.1	(4)
Rangiung	633	2,024	3,619	6,258	4,234	0.5	
Kanglung	1,717	3,223	4,416	5,933	2,710	0.3	
Khaling	1,349	1,129	1,129	1,129	0		
Wamgrong	581	484	484	484	0		
Resarbu	153	211	248	288	77		
Tashi Yangtse	2,735	3,187	3,440	3,695	508	0.1	
Duksum	283	360	406	454	94	0.0	
Trongsa	2,695	3,122	3,360	3,599	477	0.1	
Kuengarabten	–	424	497	577	153	0.0	
Tsirang	1,666	3,448	4,960	6,979	3,531	0.4	
Mendrelgang	–	62	73	84	22	0.0	
Wangduephodrang	6,714	8,954	10,340	11,831	2,877	0.4	
Nobding	473	713	875	1,061	348	0.0	
Zhemgang	3,007	2,711	2,711	2,711	0		
Panbang	379	800	1,162	1,651	851	0.1	
Urban Population	196,111	274,395	331,300	412,133	137,738	17.0	
UMA only		220,549		336,848	116,299	14.5	

Note: Punakha-Lobesa, Gelephu-Sarpang, Thimphu-Khasadrapchu and Trashigang-Rangiung-Kanglung are regarded as conurbation areas. Thromdes and towns in yellow cell need to establish a UMA.

Required Residential Land in 2030 (km2)= (Population Increase between 2017 and 2030 ÷ Population Density (80 persons/ha)

As the spatial feature of the Urban Area in Bhutan, human settlements are located along highways. A UMA will be applied to the section around the Urban Area and highway in such cases. For example, the three towns of Khaling, Wamgrong and Resarbu may be regarded as one conurbation located along the highway. A UMA will be designated around these towns and along the highway to create one conurbation in a well-ordered manner (Figure 5.3).

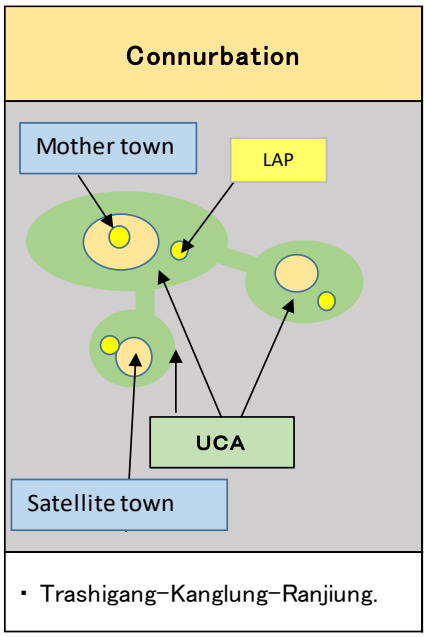


Figure 5.3 Image of an Urbanization Management Area to Be Applied to a Conurbation

(2) Rural Area

The Rural Area shall comprise agricultural lands and settlements. In the NLUP, the Rural Area is defined as cultivated agricultural land (chhuzhing, kamzhing, orchard), based on the Land Cover 2016 classification. Further, the section surrounding a Rural Area within a 500-m buffer is to be designated as a Rural Intervention Area (RIA), which is in line with the Satoyama concept[7] from Japan. An RIA is categorized as an interface zone between human activities and nature and has traditionally supported the livelihood of rural people. The scenic landscapes of rural villages may also be valued as important local resources for tourism in the future. It is an effective approach to designate and preserve some selected rural scenic sites as Cultural Protection Areas.

<u>Rationalization of land conversions of wetland and dryland</u>

Wetland (chhuzhing) conversion into residential land is currently permitted only in the case of inherited chhuzhing with a maximum of 50 decimals. It should be necessary to look into the possibility of a more flexible enactment of regulations within a UCA in order to permit and streamline wetland conversion into residential land.

There are many drylands (kamzhing and orchard), on the other hand, which should be protected as farms producing important cash crops. Some of the farmlands offer beautiful scenery, which should also be evaluated as cultural heritage. On the Project, a preliminary land suitability analysis was carried out to clarify if the available land meets the land requirement as explained in Box 5.1. From a quantitative perspective, kamzhing has enough lands to supply a built-up area with an incrementally increasing population until 2030. But excess and deficiency can occur, depending on the location.

[7] Satoyama is derived from the Japanese term for landscapes that represent how human activities are interrelated with the natural environment. The landscapes include woodland, grassland, paddy fields, farmland, rivers and human settlements. The Ministry of the Environment of Japan and the United Nations University Institute for the Advanced Study of Sustainability (formerly the United Nations University Institute of Advanced Studies) jointly initiated the Satoyama Initiative to support harmony between society and nature by promoting socioeconomic activities that are in line with natural processes.

Box 5.1 Preliminary Land Suitability Analysis

According to the population projection by the NSB, the total population will be 815,755 in 2030. The land demand for newly built-up areas with an average population density at 80 persons/ha accounts for 1,107 ha.

The size of potential land within a 1-km distance from a built-up area, with less than a 15% slope area, is estimated at 3,840 ha for chhuzhing and 3,625 ha for kamzhing (Table B5.1). Dryland has enough land to meet the land demand. But excess and deficiency can occur, depending on the location. For example, the potential developable land for converting into agricultural lands within the UMA of Thimphu is 1.5 km^2, which is far below the required 5.8 km^2. Even if expanding the Study Area to the UMA of Khasadrapchu as a conurbation, the developable land totals 4.1 km^2; thus, 1.7 km^2 are still required. Consequently, it is necessary to study the possibility of raising the population density from 80 persons/ha to 120 persons/ha and improving the land use efficiency in urban core precincts by adopting urban renewal developments in a grey field. As the land requirement cannot be met from the agricultural land, an alternative proposal is to densify the towns. The building heights will be allowed up to 10 floors.

Table B5.1 Land Area with Less Than a 3,000-m Elevation by Land Cover and Slope Within 1 km of a Built-up Area

Land Cover	<5%	<15%	<30%	<50%
Meadows	65	439	934	1,312
Shrubs	930	3,986	7,674	12,568
Forests	1,087	7,426	26,816	62,393
Chhuzhing	883	3,849	5,690	5,438
Kamzhing	732	3,625	7,677	10,498
Orchards	73	415	863	928

Source: ASTER GDEM and land cover map prepared by MoAF using satellite images from 2016

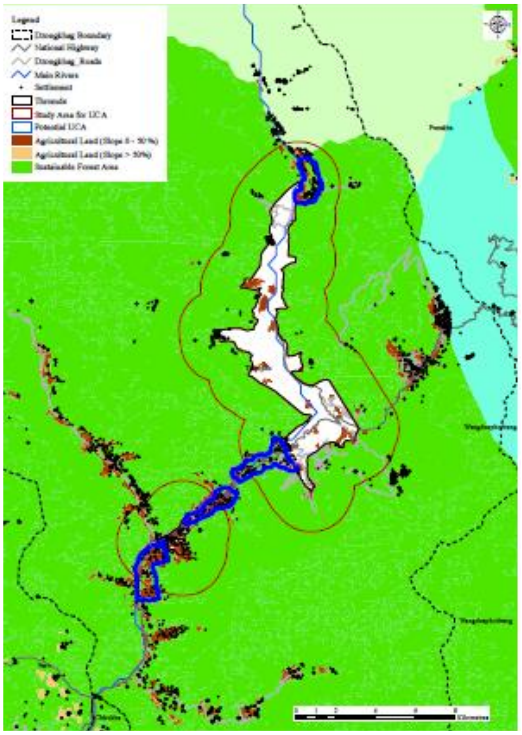


Figure B5.1 Urbanization Management Area Establishment in Thimphu

Measures to address abandoned farmlands and vermin

Abandoned land for agriculture has been on the increase because of the migration of people to large commercial towns, which has reduced the availability of labour for farming in the Rural Area. In addition, damage by animals to agricultural land has become very serious of late. Realizing land use which enables the aggregation of dispersed farmlands should be explored, so that neighbouring farmers can cooperatively work towards efficient cultivation and vermin prevention. It may be necessary to study the possibility of converting land use, such as converting abandoned farmlands into forests in places where the potential for agriculture is scarce.

(3) Sustainable Forest Area

It is appropriate to maintain, in the future, the current level of Forest Area, which equates to 70% of the land. It should be noted that it takes 100 years to restore and revitalize forest once it is felled and developed.

An SFA is state-reserved forest land (SRFL), which is legally defined as a "forest" in the 1995 Forest and Nature Conservation Act (FNCA)[8]. This area can be subcategorized as follows: Resource Utilization Forest (RUF), which includes an FMU, a CF etc., and a Preservation Forest (PF).

The boundary between an RUF and a PF will be precisely delineated according to the results of an LFMP for each Gewog. LFMPs have recently been operationalized and, to date, cover 10% of the total Forest Area. Therefore, the NLUP has provisionally adopted the "forest map" in the Land Cover 2016 document which includes RUF, "shrubs", "meadows", "snow cover" and "bare land" in line with PF criteria.

(4) Protection Area

A PA is an area where the protection of nature and culture is obligated by any legislation which relates to, and thus overlaps with, any of the above three categorized land types. The area should be subcategorized as a Nature PA and a Cultural PA. A Nature PA consists of a Protected Area (including Biological Corridors) designated under the FNCA of 1995 and Ramsar Sites. A Cultural Protection Area is expected to comprise Rural Heritage Villages designated under the Cultural Heritage Bill.

Nature Protection Area

In Bhutan, 51% of the land is designated as Protected Area (PA) which is considerably extensive compared to an international standard. However, there are some rooms for improvement in the quality of the management. It should be targeted to expand PA to cover 60% of the land by adopting the following proposed measures.

(a) Formation of a nation-wide PA network to designate Biological Corridors in north-west, south-west and north-east areas of the land.
(b) Designation of Ramsar Convention Sites as PA

Cultural Protection Area

Cultural Protection Area is an attempt to find out and protect special values of landscape focusing on, for example, architectural style, settlement patterns, land-use patterns and natural settings, not only on individual cultural facility. The NLUP includes villages listed as candidates of Rural Heritage Villages by Ministry of Home and Cultural Affairs.

[8] According to the FNCA, "forest" means any land or waterbody, whether or not under vegetative cover, in which no person has acquired a permanent and transferable right of use and occupancy, irrespective of whether such land or waterbody is located inside or outside forest boundary pillars. This includes land registered in a person's name as tsamdrog (grazing land) or sokshing (woodlot) for the collection of leaf litter.

5.1.3 National Land Use Plan

Table 5.3 shows the estimated land use frame in 2017 and 2030.

Table 5.3 Current and Future Land Use Frame

	Land Use Category	2017		2030		Increase and Decrease	
		Land Area	%	Land Area	%	Land Area	%
1	Urban Area	141	0.36	158	0.41	17	0.04
2	Rural Area	1,000	2.58	983	2.53	-17	-0.04
3	State Reserved Forest Land	37,630	97.06	37,630	97.06	0	0
1)	Sustainable Forest Area	17,876	46.11	14,367	37.06	-3,509	-9.05
2)	Protection Area	19,753	50.95	23,263	60.00	3,509	9.05
	Total	38,771	100.00	38,771	100.00	0	0

Note:
1) The total area of 38,771km^2 is calculated based on GIS (Geographic Information System) data provided by DHS (Department of Human Settlement) and does not conform to that of 38,394 km^2 according to Land Cover 2016.
2) Urban Area in 2030 = Urban Area in 2017 + required residential land.
3) The Rural Area excludes overlaps the Urban Area and the PA, which is smaller than cultivated agriculture area of Land Cover 2016.
4) The RIA is not reflected in this table.
5) The PA includes Biological Corridors, the Royal Botanical Park and the Ramsar Wetland Sites.
6) The PA which overlaps the Urban Area is included in the Urban Area. The overlapping Rural Area and the SFA is included in the PA.

A map of the NLUP for 2030 is shown in Figure 5.4. The map indicates the following items:

(a) Urban Area: 54 Thromdes/towns
  i) UMA: 11 Thromdes/towns/conurbations
(b) Rural Area
  ii) Agriculture land
  iii) RIA (Satoyama)
(c) SFA (legally defined as SRFL by FNCA, 1995)
(d) PAs: Nature PAs and Cultural PAs
  iv) Nature PAs: National Parks, Wild Sanctuaries, Biological Corridors and Ramsar Sites
  v) Cultural PAs: Rural Heritage Villages
  vi) Proposed area for establishing/expanding Nature PAs

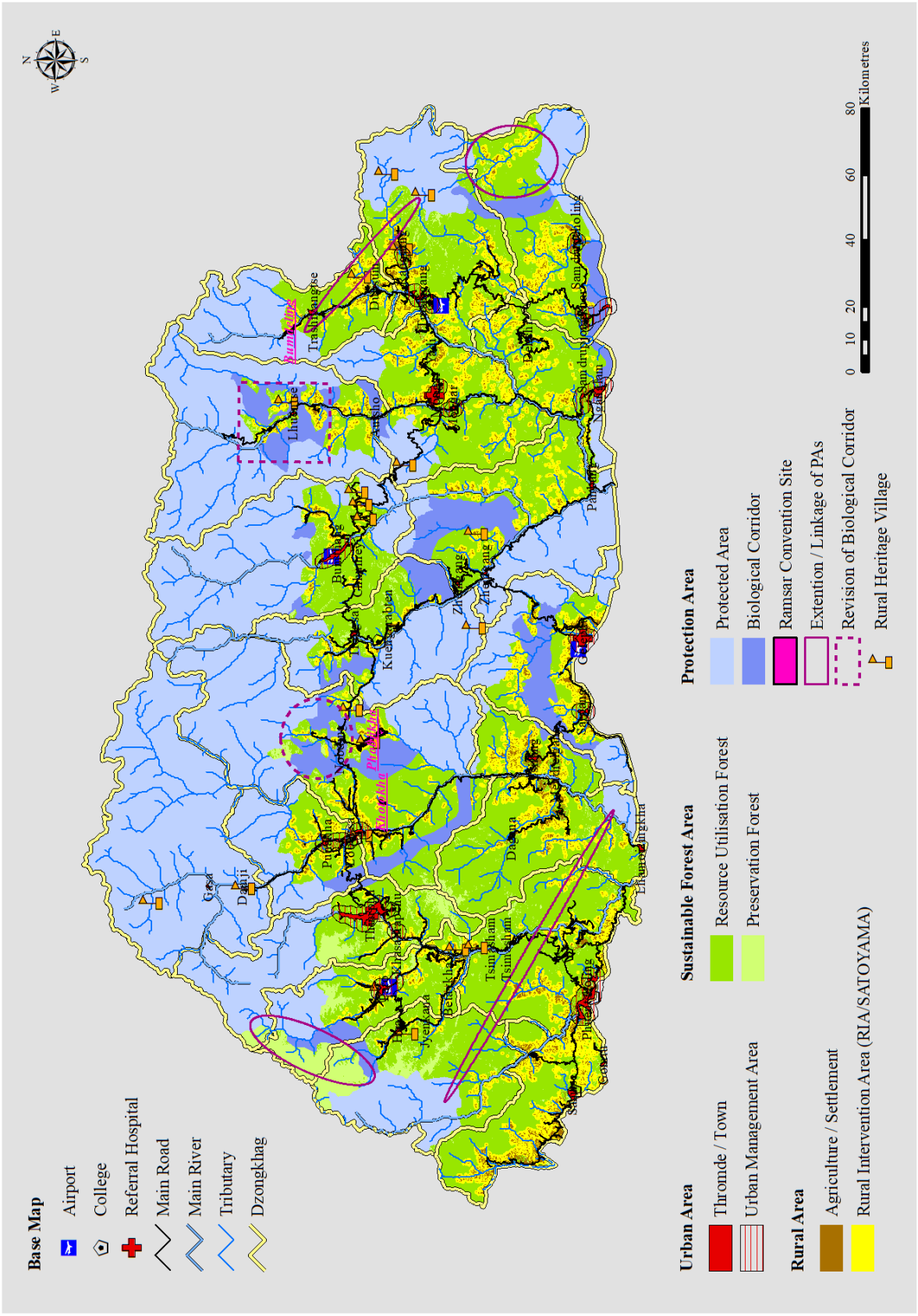


Figure 5.4 National Land Use Plan

5.2 Specifications of Holistic Service Delivery System

(1) Specifications for Each Hierarchical Class

The hierarchy of the Holistic Service Delivery System consists of an RC, a DC, an SDC a GC and an OC. The specifications and function of each hierarchy are shown as follows.

The role of the RC, at the top of hierarchy, should be to distribute advanced service facilities, such as tertiary institutes and regional hospitals, as a hub of each region. The six proposed LUCs (including the National Capital Region) could be RCs.

Second, the DC is generally a Dzongkhag Thromde. Distributing urban standard service facilities as an urban hub is the objective of the DC. In Bhutan, each Dzongkhag Thromde is located within a six-hour driving distance from its neighbour in general. To maintain accessibility between each other and to improve the road network are the priorities for the DC.

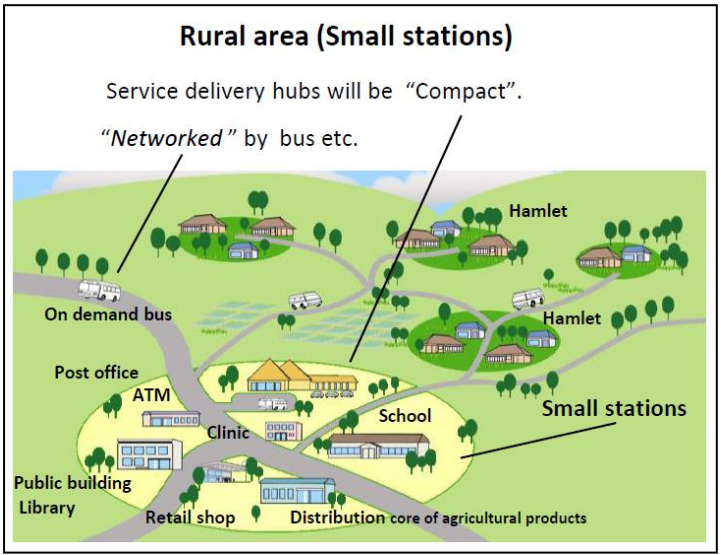
Third, the special objective of the SDC is to deliver roadside services in lieu of the DC. Roadside services include amenities, such as public toilets, a cafeteria, a farm shop, a fuel station and an automobile workshop. The SDC should be located every one to 1.5 hours' driving distance on the National Highway. Existing Yenlag Thromdes, census towns, Commercial Centres, as defined in the National Human Settlement Strategy (MoWHS, 2017), and road maintenance centres under the remit of the DoR are taken into consideration as candidates.

The GC should be the distribution base for rural standard services or essential services, which are needed for daily life. However, the accessibility of a GC is classified into three types.

Box 5.2 Small Station in Japan

Japan is well on the way to becoming an ageing society with fewer children. This social change has progressed at a rapid pace which other countries have never experienced. Depopulation started due to a declining total fertility rate. Such social phenomena can be clearly seen in rural areas where the aged population has become dominant in the community and younger generations have left for urban areas to seek higher education and employment. It is difficult for the government to sustain the level of social services for daily life and to meet the needs of local people.

The small station is a concept to enhance social services provided to the population in rural areas where people live in small hamlets dispersed across a wide area. Basic social services are delivered in a public facility such as an unused part of a primary school or community hall. This public facility is a small service delivery hub providing a clinic, shop and postal service. The people living in small hamlets are transported to the small service delivery hub by a community bus and other means. The small service delivery hub and the transport system create a compact network.



Source: Cabinet Office

Figure B5.3 Small Station Concept

- A GC Type 1 (GC1) is located within one hour's driving distance (commuting distance) from the nearest DC. This means that GC1 residents can receive urban services. Thus, in a GC1, only essential service facilities are needed.
- A GC Type 2 (GC2) is located within three hours' driving distance (day trip distance) from the nearest DC. Rural standard service facilities should be distributed in GC2s as a rural hub (a small station; see Box 5.2).
- A GC Type 3 (GC3) is located more than three hours' driving distance from the nearest DC. Regarding GC3s, because of limited budgets, it is hard to offer standard service facilities. Nevertheless, essential service facilities should be distributed among surrounding villages.

Depending on the existing road network, 80 out of the 205 GCs are regarded as GC1s, 72 are regarded as GC2s and the rest are regarded as GC3s.

Finally, if some remote villages are located more than three hours' driving distance from the nearest GC, establishing an OC beside a farm road as a substitute for a GC should be taken into consideration.

Table 5.4 provides a summary of the above information.

Table 5.4 Specifications for Each Hierarchical Class

	Urban			Rural			
	Regional Centre	District Centre	Sub-district Centre	Gewog Centre			Outreach Centre
				Type 1	Type 2	Type 3	
Objective	To distribute advanced service facilities as a hub in each region	To distribute urban standard service facilities as an urban hub	To deliver roadside services as an SDC	To distribute essential service facilities as a peri-urban settlement	To distribute rural standard service facilities as a rural hub	To distribute essential service facilities as a remote village hub	To deliver essential services for remote villages as a Sub-GC
Accessibility Criterion	Balanced location in the region	Within six hours' drive from the neighbouring DC	Beside the National Highway (every one to 1.5 hours)	Within one hour's drive from the nearest DC	Within three hours' drive from the nearest DC	More than three hours' drive from the nearest DC	Beside a farm road (every two to three hours)
Candidates	Proposed LUCs	Existing Dzongkhag Thromdes	Existing Yenlag Thromdes, towns (based on census) or Commercial Centres*	Existing GCs (205 in total)			Where a PS, an ECR or an ORC is located
Numbers Nationwide	1 (or 2) by region	20	Around 30-40	Around 80	Around 70	Around 50-60	Around 100-200

Abbreviations: ECR = extended classroom; PS = primary school; ORC = outreach clinic.
Note: *Commercial Centres proposed in the Bhutan National Human Settlement Strategy (MoWHS, 2017)

(2) Proposed Service Delivery System by Function

By 2030, it will be necessary to promote service facility distribution in order to meet the minimum requirements of each function, such as education, health, transport, commercial, recreation and civic services. In line with the objective for Bhutan 2030, education, health and transport services should be sustained, commercial and recreation services should be expanded, and all citizens should be encouraged to seek physical and spiritual well-being. In addition, civic services such as administrative and community services should be available to 100% of Bhutanese citizens. An overview of this section is shown in Figure 5.5.

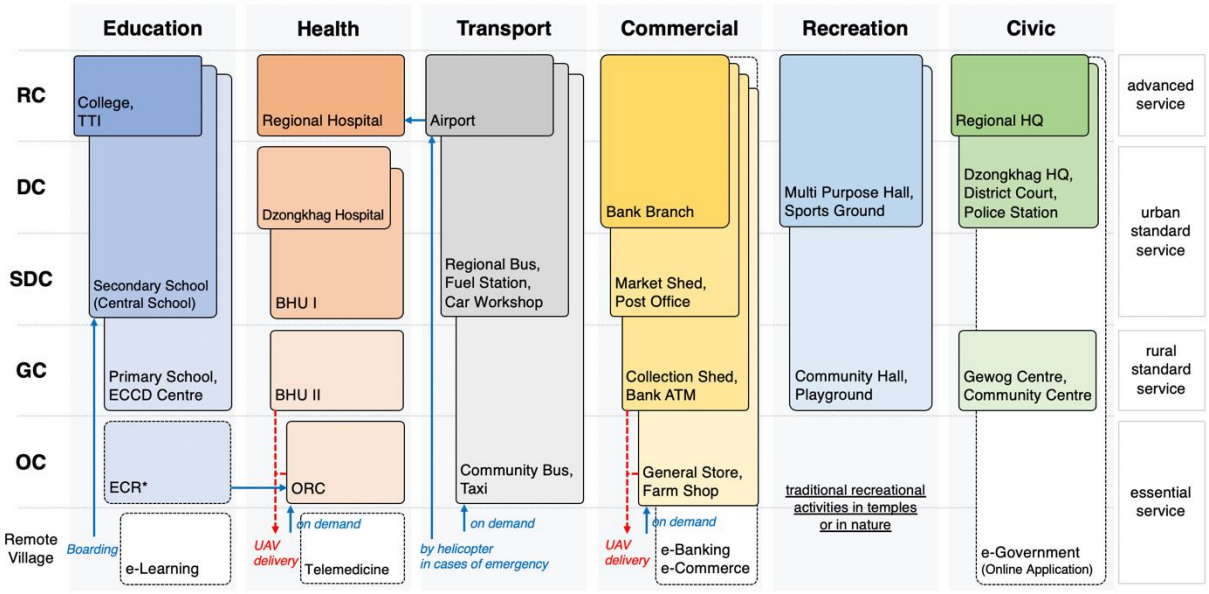


Figure 5.5 Proposed Service Delivery System by Function

Education

(a) Secondary education facilities, such as lower, middle and higher secondary schools, are located far from settlements. Providing boarding for central school students from remote villages could be one way of providing secondary education nationwide.
(b) Primary education, as the basis for an essential education service, should be secured for each GC at a minimum. Only 30% of settlements are located within a 1-km radius of a primary school. There is still room for improvement.
(c) The enrolment ratio to early childhood care and development (ECCD) centres is still 21.8%. The additional distribution of an ECCD centre to each GC will be the minimum goal by 2030.
(d) Community education, such as extended classroom (ECR) or non-formal education (NFE) facilities, should be sustained in OCs and remote villages.
(e) E-learning systems for providing educational opportunities should be promoted.

Table 5.5 Accessibility from Education and Health Facility

	PS (Grades PP-6)		LSS (Grades 7-8)		MSS (Grades 9-10)		HSS (Grades 11-12)		Health	
	1 km	3 km	1 km	3 km	1 km	3 km	1 km	3 km	1 km	3 km
Western	27.3%	72.7%	17.4%	57.4%	11.6%	42.7%	4.0%	17.6%	21.1%	66.4%
Central Western	28.7%	77.6%	14.3%	46.4%	8.7%	34.1%	3.6%	16.3%	32.9%	84.3%
Central Eastern	30.1%	74.8%	13.0%	39.1%	7.2%	25.0%	1.4%	9.8%	36.2%	82.6%
Eastern	39.0%	87.7%	16.9%	53.8%	10.0%	39.1%	3.4%	15.4%	44.2%	90.1%
BHUTAN	32.2%	79.4%	15.7%	50.2%	9.5%	36.2%	3.2%	15.1%	34.6%	81.7%

Abbreviations: PS = primary school (includes LSS, MSS, HSS with Class PP-6); LSS = lower secondary school (includes MSS, HSS with Class 7-8); MSS = middle secondary school (includes HSS with Class 9-10); HSS = higher secondary school.
Note: Accessibility = proportion of settlement within a 1-km/3-km radius of an education/health facility.

Health

More than 80% of settlements are located within a 3-km radius of any health facility. However, providing adequate health services in remote areas is difficult. In order to provide appropriate services, it is necessary to utilize next-generation technology, including ICT, in order to solve the problems in OCs or remote villages, as well as carry out the measures proposed below:

(a) Telemedicine-based, continuous online regular medical examinations.
(b) UAV-based (e.g., drone-based) medicine transport systems from the neighbouring basic health unit (BHU-II) or ORC (Outreach Clinic).
(c) An air transport system using helicopters in emergency situations, especially for newborn babies and elderly people.

Transport

(d) Public transport networks including intercity traffic and regional traffic.
(e) Urban service facilities concentrated in each terminal of public transport such as interregional bus, community bus and taxi services.
(f) Establishment of SDCs as soon as possible to prepare sufficient roadside services including a fuel station, a charging station for electric cars and an automobile workshop.

Commercial

(g) One or more collection sheds to sell agro-products and daily necessities in the Rural Area part of each GC.
(h) One or more farm shops and general stores in each OC or higher.
(i) One or more bank branches in each DC.
(j) One or more bank ATMs in each GC.
(k) Financial services for remote villages via online services (e-banking, e-commerce).
(l) A UAV-based delivery system for delivering actual products.

Recreation

(m) A multipurpose hall and sports ground of a sufficient size in each DC.
(n) Community halls without political or religious purposes and playgrounds for children in each GC.

Civic services

(o) G2C services, such as birth registrations and passport issuances, provided at community centres attached to GCs which are connected to the Internet.

(p) An e-government system with online applications available anywhere in the country including OCs and remote villages.

(3) Hierarchical National Service Network

A map of the hierarchical service network on a nationwide scale is shown in Figure 5.6. Since details cannot be precisely drawn on this scale, only the location of top-level facilities (airports, colleges and regional hospitals) for each function is mapped.

In this figure, existing Yenlag Thromdes are shown as SDCs. In addition, the temporary candidates for SDCs are marked with a triangle. However, these candidates should be examined and specified by the appropriate department.

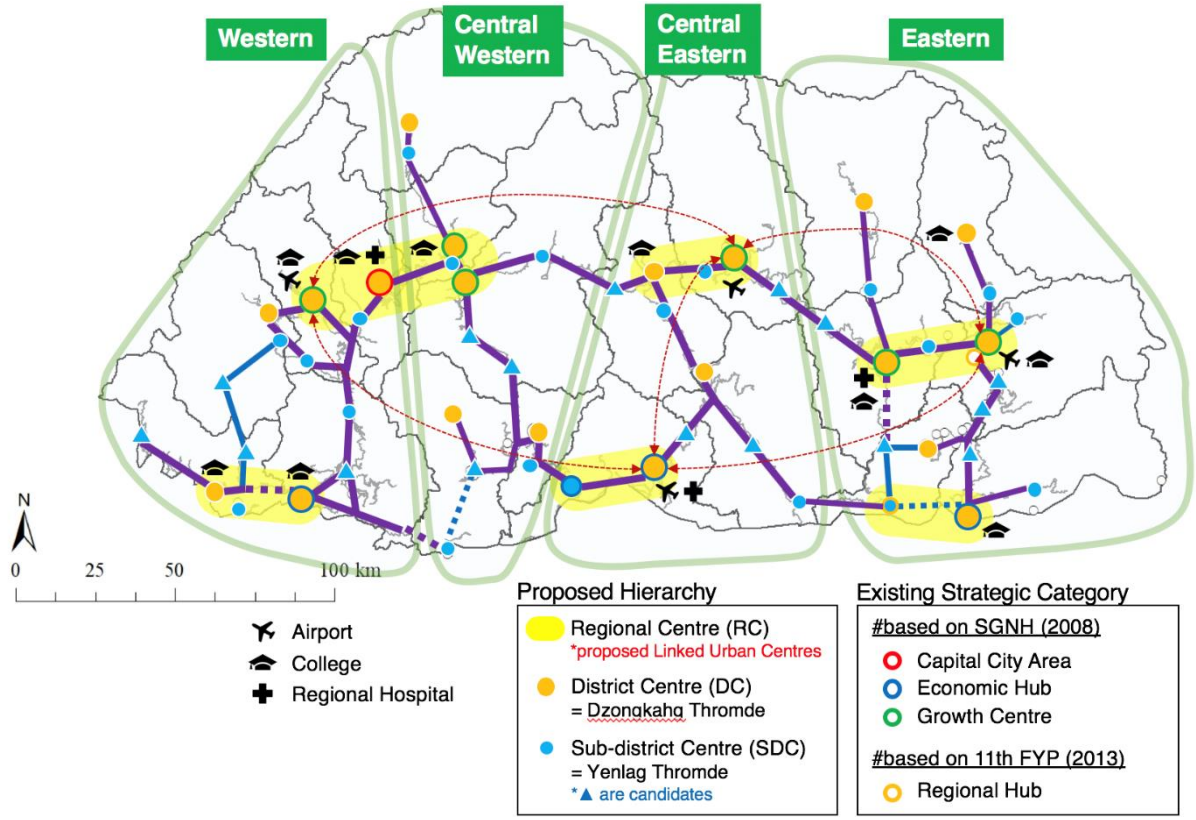


Figure 5.6 Hierarchical National Service Network

Figure 5.7 through Figure 5.10 show the service delivery network in each region.

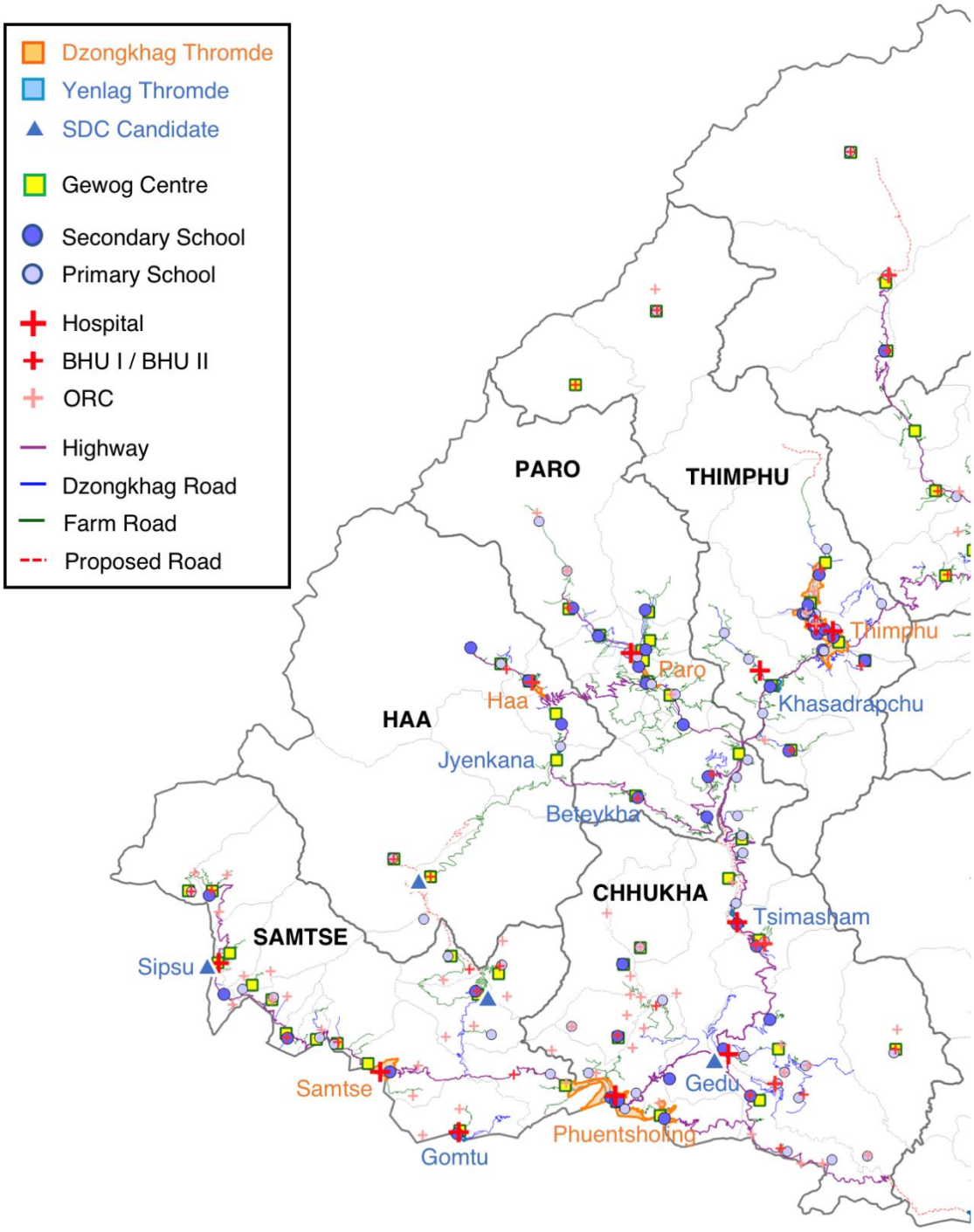


Figure 5.7 Service Delivery Network in the Western Region

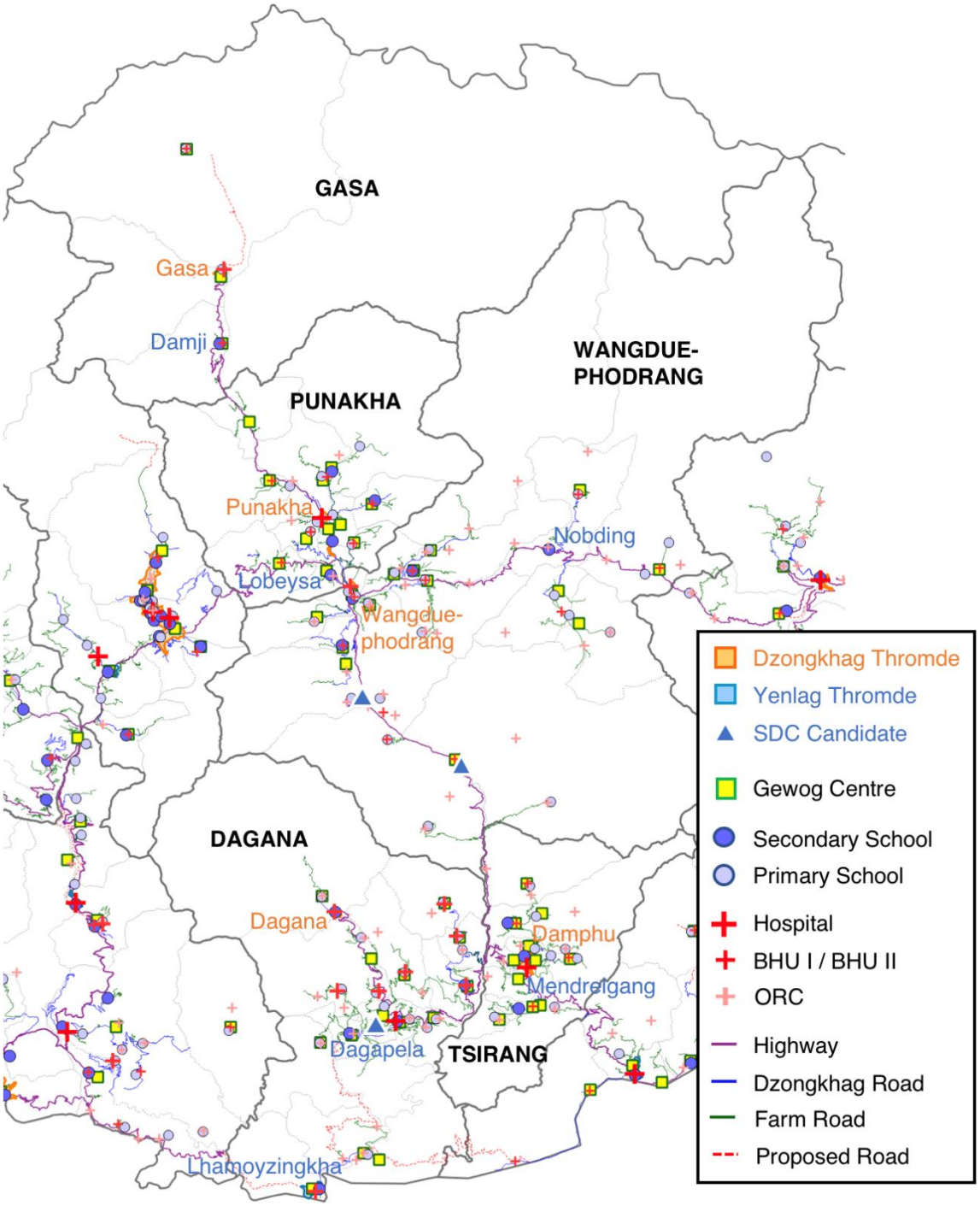


Figure 5.8 Service Delivery Network in the Central Western Region

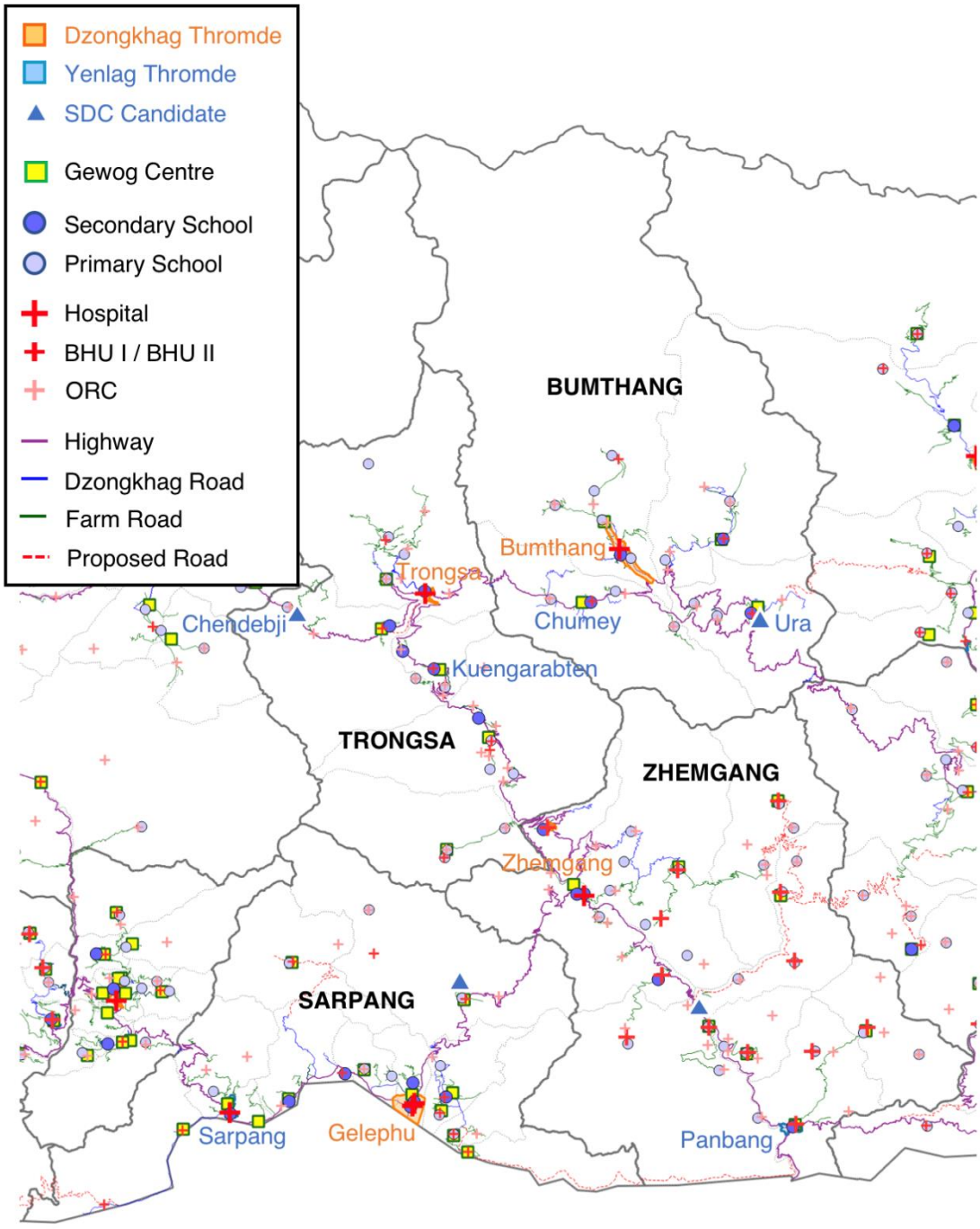


Figure 5.9 Service Delivery Network in the Central Eastern Region

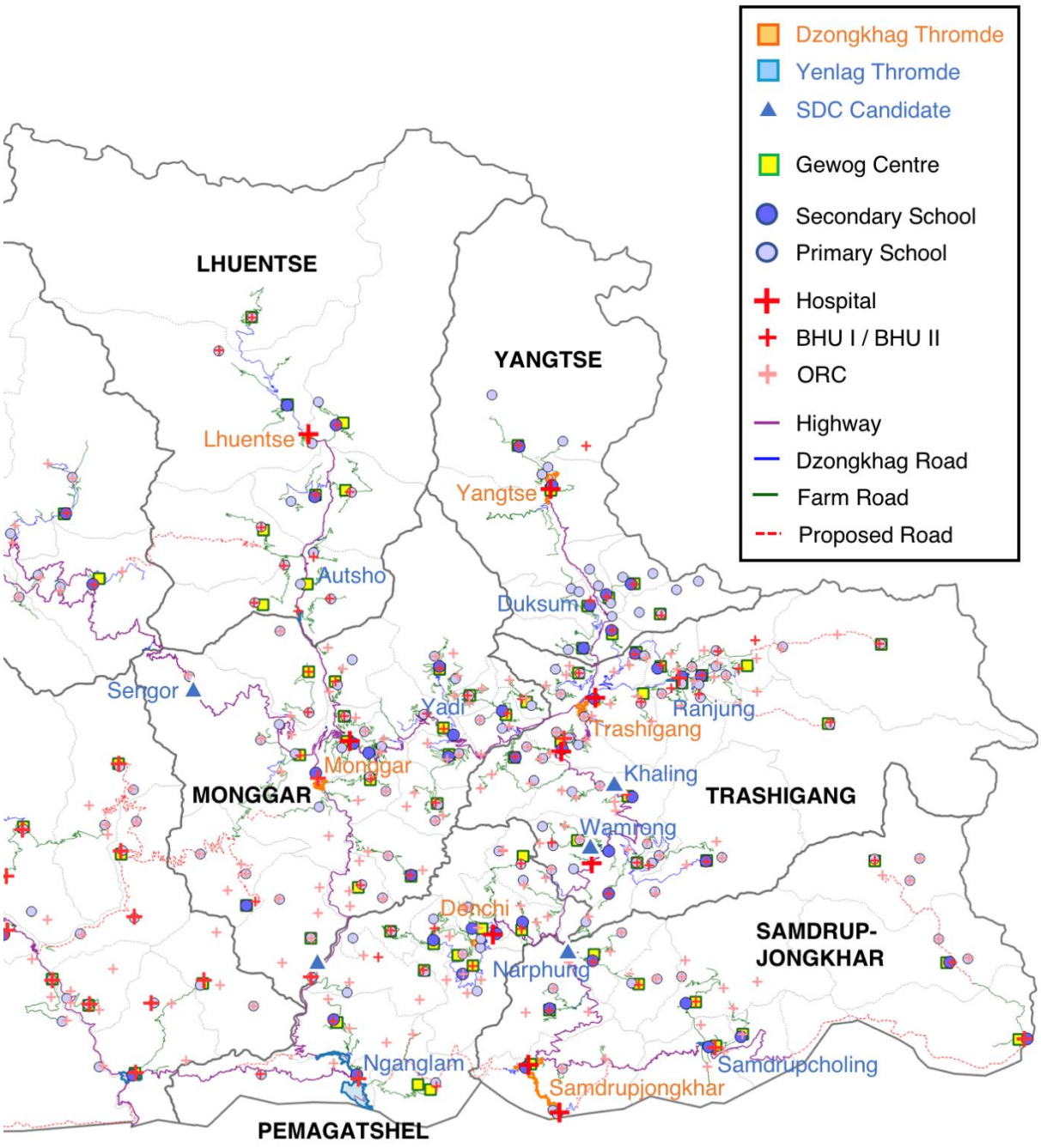


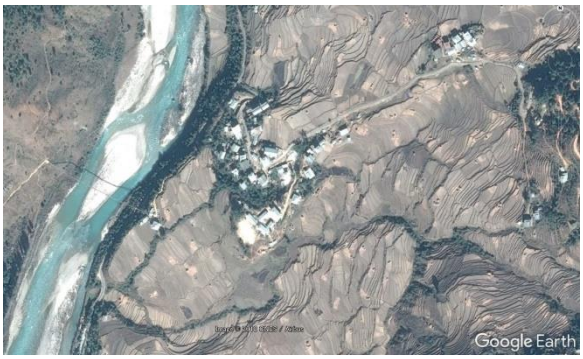
Figure 5.10 Service Delivery Network in the Eastern Region

CHAPTER 6 GENERAL GUIDANCE FOR URBAN AND RURAL DEVELOPMENT

6.1 Creation of Livable and Vibrant Urban Area

The spatial plan for the Capital Region, the LUCs and the towns with a UMA will be formulated to reflect the local conditions of each planning area taking into consideration the following:

(a) Identification of envisaged function of towns: The local government, the local people and the private companies should pursue the comparative advantage of each town utilizing local resources.
(b) Undertake a study to identify a suitable design for new settlement areas: The landscape in and around the Urban Area is a critical aspect concerning the presentation of local characters. The most suitable form of a new settlement area should be identified in each town. An agriculture area will require conversion into a settlement area. However, the landscape should be designed to promote the image of Bhutan and locality well.



Small Settlement Alongside the Main Road in Punakha

Scattered Houses on the Slope Area in Paro

Planned Development in Bajo

Settlement Along the Main Road in Paro

Source: Google Earth for Imagery

Figure 6.1 Forms of Settlement In and Around the Urban Area

(c) Undertake a study to establish the service system: Each town will be a core to provide the service system in its administrative area and surrounding areas to overcome the challenging conditions in the dispersed settlements with small populations. The LUC is expected to provide public services to the surrounding areas in a holistic manner.

The necessary actions for the Urban Area and regional promotion include the projects listed below:

- Capital Region Development Programme (including inland transport improvement)
- Eastern Region Development Programme focusing on Small Base and Roadside Station
- Formulation of the Structural Plan to Apply Urbanization Management Areas
- Project for Development of Linked Urban Centres including Public Service and Infrastructure Improvement in Gelephu and Sarpang
- Development of LUCs
- Project of Land Use Zoning and Instructional Improvement in Thimphu, Phuentsholling and Gelephu

6.2 Creation of Livable Rural Area

(1) Envisaged Lifestyle in the Rural Area

For young people in Bhutan, professions in the primary industries (agriculture, forestry and animal husbandry) are unpopular because they basically involve physical labour, which is not always clean, and remuneration, which is unstable due to natural disasters. Cheaper Indian farm produce is flowing into Bhutan and more popular than domestic produce. This is one of the major explanations for the falling income levels of domestic farmers. In the end, many farmer parents do not want their children to take over their farms.

Consequently, (1) there are more abandoned farmlands due to labour shortages and the removal of farm households from the Rural Area and (2) the population is rapidly ageing in rural communities (Box 6.1); hence, (3) human vitality in the Rural Area is weaker than before.

A desirable lifestyle in the Rural Area is temporarily assumed to be "living in a reasonable house within a rich natural environment and with a decent household income which enables the purchase of necessary daily goods and food". Further discussions should be conducted by the government, but differences in the GNH Index between the Urban and the Rural Areas apparently result from two specific domains, namely, living

Box 6.1 Community Sustainability at High Risk

The JICA cooperates with the Department of Local Governance in implementing the "Support for Community Engagement in Local Governance (SCLG) Project". The Japanese expert carried out a community survey in a small chiwog called Dompala, Punakha. The outcome of the survey was introduced in an article in *Kuensel*. The following is an extract from the article, which discusses how the community is in a threat to continuous sustainability.

We found 47 males and 46 females currently residing in Dompala while 20 males and 23 females were out-migrated to nearby places like Kuruthang. The number of male out-migrants who were residing far from Dompala was 62 and that of female was 56. Many of them are in Thimphu and a few abroad. In sum, 82 males and 79 females were out of the chiwog while there were only 93 residents.

(snip)

However, survey result also shows that Dompala will not sustain itself. It is a matrilineal society where a man comes in to marry a lady and stay in Dompala. We found only two young ladies aged between 16 and 25 residing there, and only one of them was single. No opportunity, therefore, to increase the number of households in coming years. In this regard, sustainability of Dompala is absolutely at high risk.

(skip the rest)

standards and education[9].

(2) Approach for Rural Development

Two approaches in rural development are proposed: 1) improvements in living conditions and 2) intangible (non-structural) measures.

Improvements in living conditions (public facility development)

In general, the standard of living in Bhutan has improved of late. As a whole, there are no significant differences between the Rural and the Urban Areas. However, many indicators in the Rural Area are inferior to those in the Urban Area. There are still some gaps, including in relation to the accessibility to various facilities, such as medical/health services, housing conditions, asset ownership and environmental issues, in turn indicating that some further improvements are necessary to realize a liveable rural area in Bhutan. Priority Dzongkhags are proposed by facility type with the reference data in the table below.

Table 6.1 Proposed Priority Dzongkhags by Facility Type

Facility (indicator)	Priority Dzongkhags	National Average
Electrification (mean rate of non-electrification households for lighting)	Gasa (Rural-35.5%, Urban-0.7%, Total-24.8%) Zhemgang (Rural-14.3%, Urban-0.8%, Total-11.6%)	Rural-4.7%, Urban-1.1%, Total-3.4%)
Water Supply (rate of piped water accessibility)	Gasa (Rural-93.0%, Urban-99.4%, Total-95.0%) Chhukha (Rural-94.9%, Urban-99.6%, Total-95.0%)	Rural-97.1%, Urban-99.4%, Total-98.0%)
Sanitation (flush toilet usage rate)	Gasa (Rural-15.9%, Urban-65.4%, Total-31.1%) Bumthang (Rural-16.9%, Urban-19.7%, Total-18.0%)	Rural-69.6%, Urban-89.0%, Total-76.8%)
Health (proportion of households that did not visit a health facility during the past one year)	Gasa (Rural-12.1%, Urban-24.6%, Total-16.0%)	Rural-10.2%, Urban-9.6%, Total-9.9%)
Road (proportion of households that that take more than 30 minutes to reach the nearest road head)	Gasa (Rural-66.5%, Urban-0.0%, Total-46.0%) Zhemgang (Rural-26.8%, Urban-0.7%, Total-21.8%) Yangtse (Rural-25.7%, Urban-0.6%, Total-21.1%)	Rural-12.9%, Urban-0.8%, Total-8.4%)

Source: 2017 Population & Housing Census of Bhutan

The standard levels of several facilities in the less populated Rural Area are not necessarily the same as those in the highly populated Urban Area. It is an urgent task for the ministries/agencies concerned to decide on appropriate standards by facility and locality in consideration of the number of beneficiaries,

Intangible (non-structural) measures

Income generation (creation of job opportunities) is not an easy task, because most of the Rural Area in Bhutan is only engaged in primary economic activities (agriculture, livestock and forestry). Accordingly, a practical approach is necessary to create jobs related to primary-sector activities. Jobs related to agro-processing and handicraft-making, utilizing local specialisms, are as to be expected, but the most important consideration is that any products must be sold via a market-in, or demand-driven, approach.

Currently, human-wildlife conflict in the Rural Area is one of the serious problems in Bhutan; thus, new job opportunities for young people and others could be created by researching and developing equipment or tools to mitigate human-wildlife conflict issues. Other industries, such

[9] The education domain comprises literacy (3/10), schooling (3/10), knowledge (1/5) and value (1/5); and the living standard domain comprises income (1/3), assets (1/3) and housing (1/3).

as tourism and care facilities for the aged, could also create new jobs in the Rural Area. The rapidly ageing rural society may need nursing facilities in the near future.

When 1) improvements in living conditions and 2) intangible (non-structural) measures are compared, it seems that each involves advantages and disadvantages as follows:

Table 6.2 Advantages and Disadvantages of the Two Approaches

Approach	Improvements in living conditions	Intangible (non-structural) measures
Advantage	Quick outcome after completion	Outlay is smaller than living condition improvements
Disadvantage	Needs a certain amount of outlay	Slow outcome because of the limited number of beneficiaries

(3) Way Forward

In the Rural Area, it is important to pay attention to specific features which are not observed in the Urban Area. There are still many beautiful landscapes which are not well recognized by local administrators and residents in the Rural Area. It is extremely important to conserve these pristine rural landscapes in consideration of passing on Bhutanese culture and tradition, as well as turning them into possible attractions for both foreign and domestic tourists in the future.

If the GNH Index in the Rural Area exceeds that in the Urban Area in the future, will it be possible to judge whether a desirable lifestyle in the Rural Area has materialized? The answer is probably "no", but this simply means that only qualitative data are used to determine whether rural residents feel happier than urban dwellers. However, it will be possible to explain the extent to which life in the Rural Area has moved closer to a desirable lifestyle. To achieve a desirable lifestyle in the Rural Area in the future, practical discussions (e.g. Is it necessary to have higher indices in all nine domains of the GNH Index in the Rural Area? Or is it enough to have five higher indices out of the nine domains in the Rural Area? Or is it better to prioritize domains to be improved in the Rural Area by acknowledging that some domains are difficult to improve from the viewpoint of their compositions?) should be conducted at central and local government levels. At the central government level, broader policy for rural development should be formulated and more practical procedures and measures should be planned at the local government level.

Lastly, it should be noted it is one of very difficult tasks to achieve rural development as well as mitigate rural-urban migration in Bhutan, where cheaper duty-free food imported from India is available all over the country. The professions in primary industries are unpopular, particularly among young people, for various reasons. Steady progress should be continued.

CHAPTER 7 GENERAL GUIDANCE FOR INDUSTRIAL DEVELOPMENT

7.1 Agriculture Promotion

About half of the population will reside in the Rural Area and 43% of working population is engaged in agriculture sector. Appropriate improvement and development in agriculture increasingly secure better livelihoods for a large section of the population in Bhutan, as well as being conducive to improved food and nutritional security.

When it comes to development guidance for agriculture in Bhutan, there are some preconditions such as the low SSR for rice, increasing rural-urban migration, expanding regional disparities between the Rural and the Urban Areas, and a long-term decrease in agriculture workers. Taking these conditions into account, the following items are proposed as major development guidance areas for agriculture: a) improvement in the SSR for rice, b) promotion of market-oriented farming and c) nutritional improvement.

Mini-harvester
(It looks like a grass cutter but is less expensive. As it is portable, it can even be used in the terrain area.)

Source: MAFF (Ministry of Agriculture, Forestry and Fisheries)

Drone
(There are several usages such as sowing, providing countermeasures for human-wildlife conflict and growth surveys.)

Figure 7.1 Small-scale Machinery

(1) Improvement in the Self-Sufficiency Rate for Rice

As for the improvement in food security, an increased SSR for rice is prioritized as the most symbolic indicator – rice is a staple food and the main imported agro-product. In the CNDP, the SSR for rice in 2030 is targeted at 60%. To achieve the target rate, problems to be addressed were enumerated and necessary actions to be made were clarified, while a holistic diagram was created as shown in Figure 7.2. Major issues to be addressed are: 1) lack of labour, 2) increase in fallow, 3) wildlife infestation, 4) lack of irrigation, 5) land degradation, 6) weed infestation and 7) low milling ratio.

Production enhancement through area expansion and yield increase is the major approach. Under this approach, conventional development such as irrigation development, promotion of double cropping and the introduction of machineries should be continued. In addition, it is indispensable to propose countermeasures for major constraints that farmers in Bhutan are facing, e.g., shortage of labour, human-wildlife conflicts and weed infestation. Introducing labour-saving technologies and ICT applications (Figure 7.1) will help to mitigate these constraints. On the other hand, a soil nutrition study will help to support food and nutrition security.

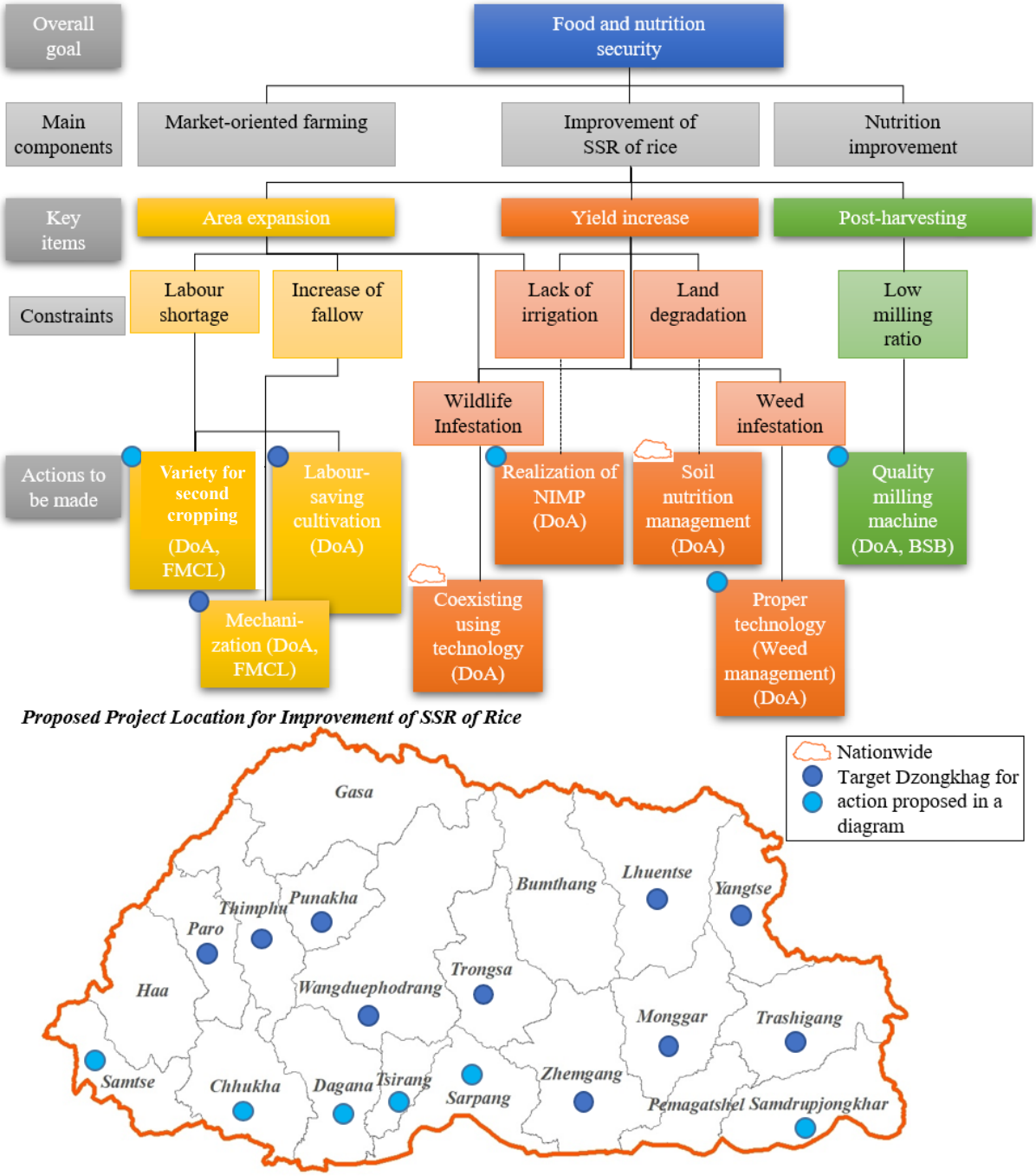


Figure 7.2 Problem Analysis Diagram for Improvement and Proposed Actions in the Self-sufficiency Rate for Rice

(2) Promotion of Market-oriented Agriculture

Increasing income through the promotion of market-oriented farming is one of the solutions to mitigate rural-urban migration and correct regional disparity among the reasons behind continuous rural-urban migration. As such, the cultivation of agro-products with the domestic and/or export market in mind is required. It is important for market-oriented farming to strengthen the "Bhutan brand" and to grasp the market needs of import countries.

At the same time, improving cultivation techniques to meet the requirements of import countries and introducing eco-friendly cultivation to ensure sustainable cultivation on hilly terrain, which represents the majority of agricultural land in Bhutan, are necessary. Six actions are proposed

for future projects:

(a) Certification with a grading system to apply the Bhutan brand to agriculture produce
(b) Antenna shops nationwide to promote agriculture produce
(c) Capacity building to cultivate horticulture
(d) Low-cost slope cultivation techniques on hilly terrain
(e) Farm road and storage facilities to improve the supply system

The results of the previous JICA project implemented in the world could be utilized for the project activities proposed above. An example of market-oriented agriculture is summarized as follows: Smallholder Horticulture Empowerment Project (SHEP) developed an innovative approach to address the challenges of stagnant subsistence-based smallholder horticulture in Kenya. The innovation, subsequently entitled "the SHEP approach", shows the farmers the effectiveness practicing market-oriented horticultural farming for improving their livelihoods. Inspired by the approach, the smallholder farmers have taken action to practice "farming as a business" by establishing linkages with business service providers through interactive forums, identifying the market demand through market survey by themselves, producing what the market requires, and finally selling quality horticultural crops to their target market. The farmers who took part in SHEP have significantly increased their income from horticulture farming. After two years of the project activities, the average 2,500 smallholder-farmers' income had doubled from US$ 273 to US$ 560. Their living standards have subsequently improved after their participation in SHEP.

Box 7.1 Good Practice of Market-oriented Farming

The results of the previous JICA project related to market-oriented agriculture implemented in the world could be utilized on future projects. One example is summarized as follows. The Smallholder Horticulture Empowerment Project (SHEP) developed an innovative approach to address the challenges of stagnant subsistence-based smallholder horticulture in Kenya. The innovation, subsequently entitled “the SHEP approach”, shows farmers the effectiveness of practising market-oriented horticultural farming in order to improve their livelihoods. Inspired by the approach, smallholder farmers have taken action to practise “farming as a business” by establishing linkages with business service providers through interactive forums, identifying the market demand through market surveys conducted by themselves, producing what the market requires, and finally selling quality horticultural crops to their target market. The farmers who took part in the SHEP have significantly increased their income from horticulture farming. After two years of project activities, the average income for the 2,500 smallholder-farmers concerned doubled from USD 273 to USD 560. Their living standards have subsequently improved after their participation in the SHEP.

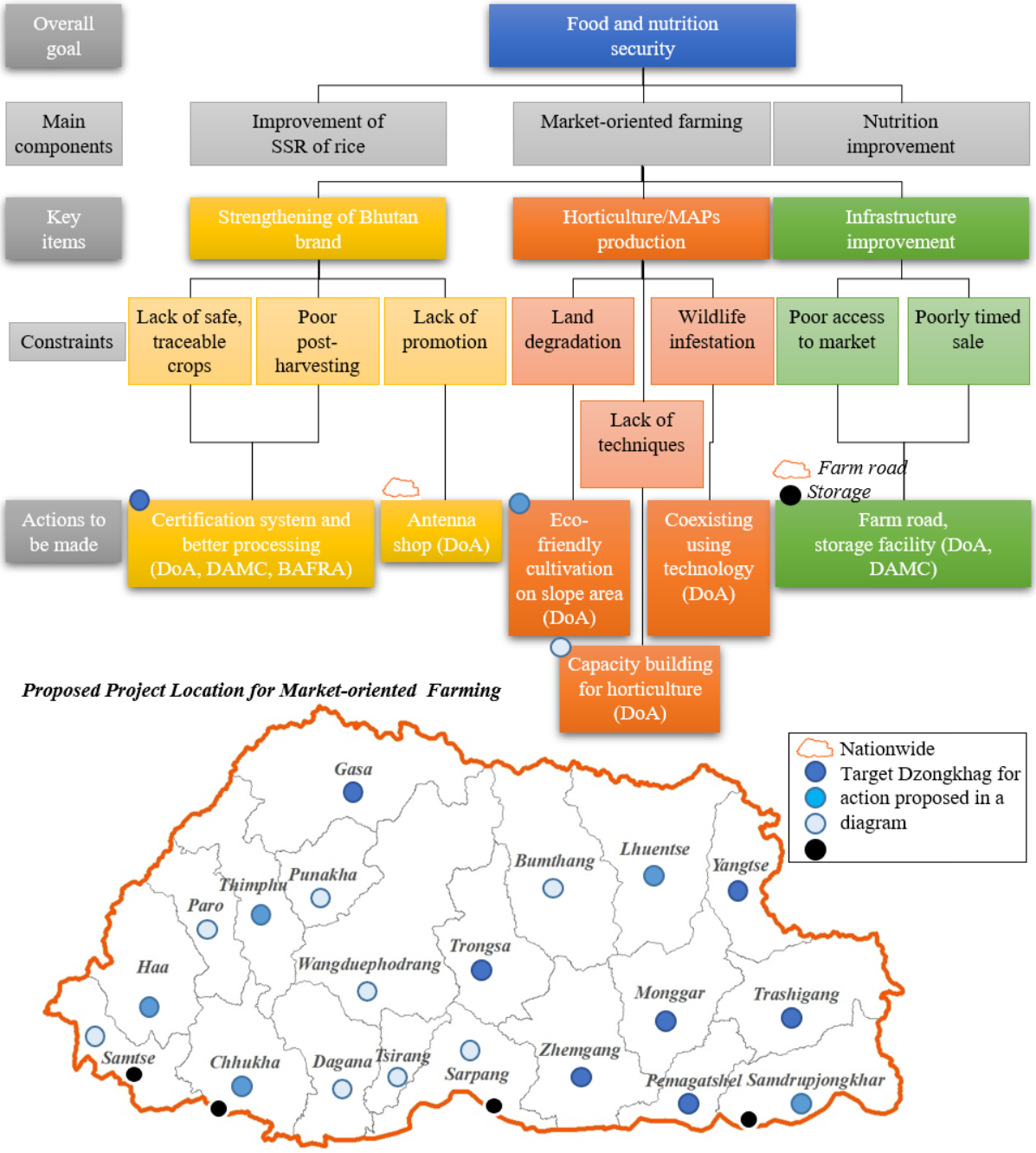
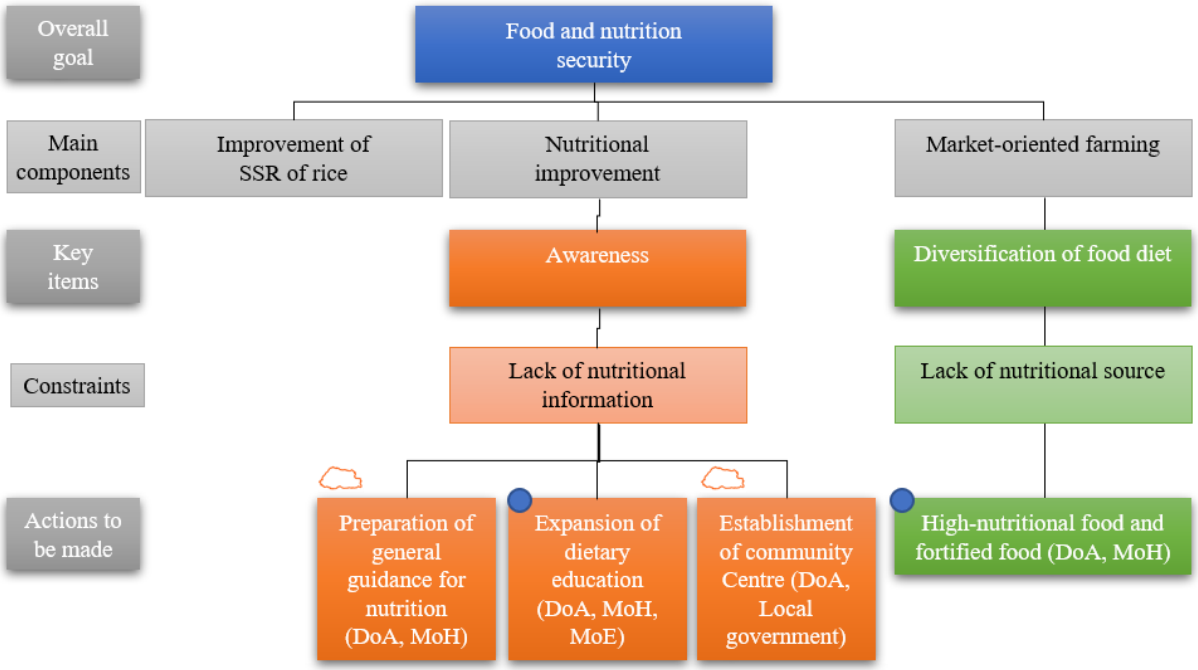


Figure 7.3 Problem Analysis Diagram and Proposed Actions for Market-oriented Farming

(3) Nutritional Improvement

Health concerns derived from food habits should be taken into consideration in the course of pursuing the enhancement of GNH, since nutritional improvement is also stated in national policy as well as Sustainable Development Goal (SDG) targets. As nutritional improvement is a comparatively new concept in Bhutan, activities related to 1) awareness and 2) diversification of food diet are proposed. First of all, integrated general guidance for nutrition in Bhutan should be prepared for an awareness campaign about nutrition by a community-based nutrition group and schools. From the viewpoint of production, nutritional improvement through the cultivation of high-nutrition foods is one of the options along with the sale of products conducive to income generation.



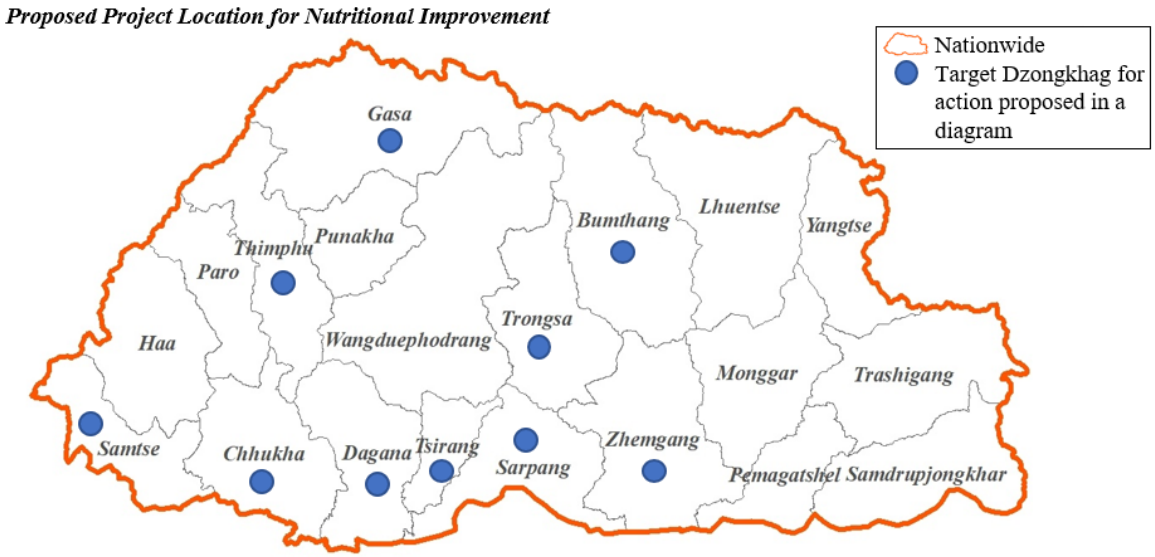


Figure 7.4 Problem Analysis Diagram and Proposed Actions for Nutritional Improvement

7.2 Livestock Promotion

(1) Development Approaches for Livestock Promotion

In Bhutan, livestock products are broadly categorized into two types: dairy products and meat products. They are composed of several kinds of products as follows.

- Dairy products: milk, butter, cheese, chugo (a type of hard cheese)
- Meat products: pork, beef, yak, chevon, chicken, fish

Cattle produces five commodities including the four dairy products which are very important components of the Bhutanese diet. Poultry produces chicken meat and eggs, but other animals (except for yaks) produce one commodity each. Taking the above data and facts into account, cattle and poultry promotion is the most important, and production increases should be urgently achieved. As for cattle, the promotion of dairy products takes precedence over beef in consideration of the religious sentiments about slaughter, which persist in Bhutanese society.

Table 7.1 Animal and Commodity Matrix

Commodity		Cattle	Yaks	Pig	Poultry	Chevon	Fish	Bee
Dairy	Milk	X	X					
	Butter	X	X					
	Cheese	X	X					
	Chugo	X	X					
Meat	Beef	X						
	Yak		X					
	Pork			X				
	Chicken				X			
	Chevon					X		
	Fish						X	
Egg						X		
Honey								

Among other livestock animals, the production expansion of pig and fish can next be prioritized because the import volumes and amounts of these products have been relatively high. Target animals for promotion are categorized into three time frames.

- Short term: cattle, poultry
- Medium term: pig, fish
- Long term: other animals

Much of the livestock production system in Bhutan is still on a small scale and performed in backyards. For various reasons (laborious daily work, harsh natural conditions, less developed distribution networks, less investment in livestock activities etc.), a commercial production system is marginally practised. Under current circumstances, it is important to 1) improve the productivity of livestock animals and 2) increase the livestock population in order to boost livestock production and substitute it with imported livestock production, as shown below:

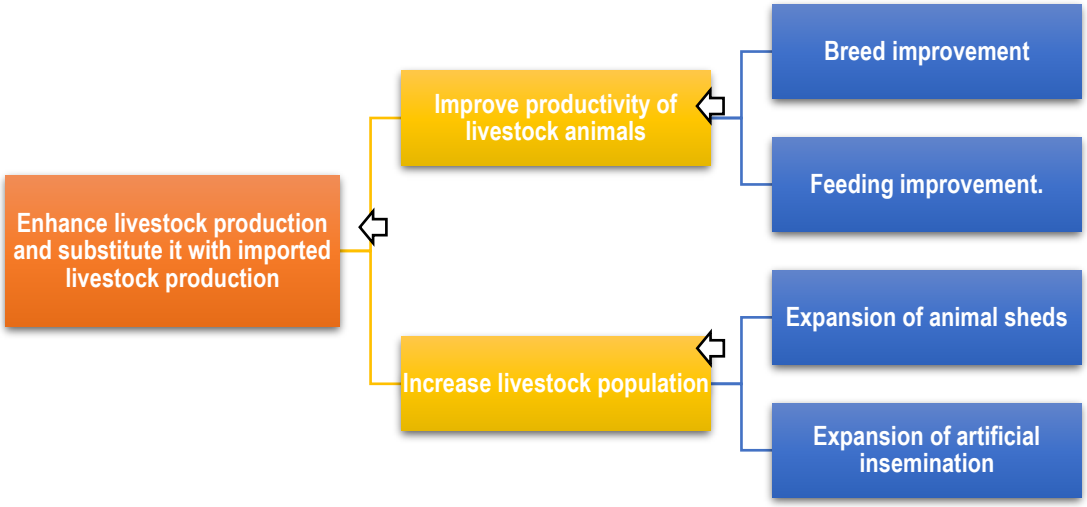


Figure 7.5 Approach to Boost Livestock Production

The regional distribution of livestock depends on animal type. Cattle and equines (including horses, mules and donkeys) are widely distributed in many Dzongkhags across the country. Other livestock animals are unevenly distributed. More than 50% of poultry is raised in Sarpang and Tsirang. The uneven livestock distribution is largely associated with suitable living conditions for each livestock animal. This indicates that livestock promotion should be planned by Dzongkhag in consideration of various factors, such as natural conditions, the distribution of the current animal population and market accessibility.

(2) Productivity Improvement

Cattle

Breed improvement has been implemented by the Department of Livestock (DoL) over a long period, such as exotic dairy cow breed introduction. In 2014, the National Jersey Breeding Centre in Samtse released a dairy breed called "Karan Fries", which was developed in India by crossing a Holstein Friesian with a Tharparkar, an Indian breed. It offers more milk production, high disease resistance and adaptability to local conditions. These breed improvement efforts should be continued in order to tackle the low productivity rate.

National Jersey Breeding Centre in Samtse released a dairy breed called "Karan Fries" by crossing Holstein Friesian with Tharparkar, an Indian breed in 2014. (Photo obtained from MoAF Web site, http://www.moaf.gov.bt/karan-fries-a-new-dairy-breed-in-bhutan/)

Siri [10] is the predominant local cattle breed in Bhutan, with good resistance to disease and usefulness as a draught animal. However, it produces less milk, which in turn results in less income for farmers. (The average yield is about 1.3 l per day and 300-380 l in a lactation period of about 270-280 days.) On the other hand, pure Jersey cattle among the exotic cows can produce a daily milk yield of 4-15 l per day with over 2,000 l in a lactation period of 305 days. The milk production difference is quite large. For the majority of small-scale livestock farmers, who experience difficulties in introducing

[10] *Siri* is the broad terminology used to describe all local cattle types of the Himalayan Belt.

improved husbandry for pure Jersey breed cattle, F1 female cross-bred cattle will be suitable. The F1 female (Mithun cross-bred cattle) produces about 2-3 l of milk per day during a lactation period of 270-280 days. (The major advantage of cross-bred dairy cattle is that they exhibit the strengths of parent breeds from which they descend with an added advantage of heterosis.) *Nublang* is the native cattle breed of Bhutan. It is considered as the most adaptable to a wide range of agro-climatic conditions in Bhutan. These genetically valuable breeds should be carefully conserved as well as utilized as materials for breed improvements in the future.

Feeding improvements are another factor affecting productivity. In Bhutan, the ordinary feed resources available to farmers are common property resources (forest and community grazing grounds around settlements), forest, cultivated fodder and crop residues. Feeding improvement measures through fodder and pasture enhancements, such as introducing leguminous fodder, seem to be more practical.

Feed management improvement is another factor to affect milk productivity. Items such as moisture content of silage, length of silage, mixture of mould and/or toxic grasses in silage, stable nutritional balance often influence milk production. Though these items on feed qualities are difficult to monitor at a farm level, feed management improvement is considered as one of important issues over the long run.

Poultry

In the case of layers (egg-laying hens), many egg producers in Bhutan currently raise exotic breeds, Hy-line Brown and Hy-line Silver Brown, provided by the DoL. Generally, these breeds have a higher laying performance than local breeds, but they also need to be fed better-quality feed compared to local ones.

To compensate for concentrate feeding and reduce the costs of production, local resources can be utilized. For instance, sweet potato and taro are good sources of energy substitution. For protein substitution, earthworm meal, maggot meal and concentrated leaf protein are possible alternatives. Organic wastes from households and by-products from local industries, such as rice mills, could be possible substitutions for commercial feed.

(3) Population Increase

To increase the livestock population, one of the more effective measures is the expansion of animal sheds because livestock rearing usually needs these physical facilities. The stagnated livestock population may result from the fact that domestic livestock products are more expensive than imported ones, but government support, in the form of providing shed construction materials, must be continued because livestock population increases are vital to improve self-sufficiency in livestock production and to reduce imports of livestock products.

In addition, artificial insemination technology should be expanded, alongside the provision of adequate facilities, because it is still not commonly practised in Bhutan, even though it was introduced many years ago. On 22 May 2017, the MoAF issued the Livestock Rules and Regulations of Bhutan 2017, which includes a clause on artificial insemination and embryo transfer. There are 13 breeding farms and centres under the DoL across the country for various livestock animals. Strengthening these existing organizations in terms of both human resources and facilities is considered to be highly important to the success of artificial insemination interventions.

7.3 Forestry Promotion

(1) Importance of the Local Forest Management Plan

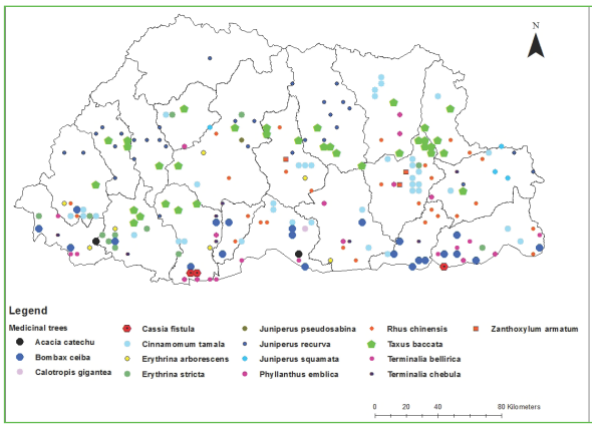
The keywords for forestry development are "sustainable management and utilization of natural resources". They are included in the DoFPS mission statement. As the National Forest Policy 2011 declared, all forest should be managed sustainably under a management plan. The utilization-oriented management plans in Bhutan include those for FMUs and CFs. Currently, the DoFPS promotes the preparation of an LFMP, which is applied to all Forest Areas outside the FMUs, CFs and other existing forest management schemes. This means that all SRFL in Bhutan would be covered by any management plan when an entire Gewog formulates its own LFMP. This is focused on the identification of potential areas for forest production, with each Gewog encouraged to form and implement an LFMP for its jurisdiction. At the moment, there are 22 LFMPs across nine Dzongkhags.

When the LFMP is prepared by each Gewog administration, location identification of the forestry promotion area is especially important for sustainable management and utilization.

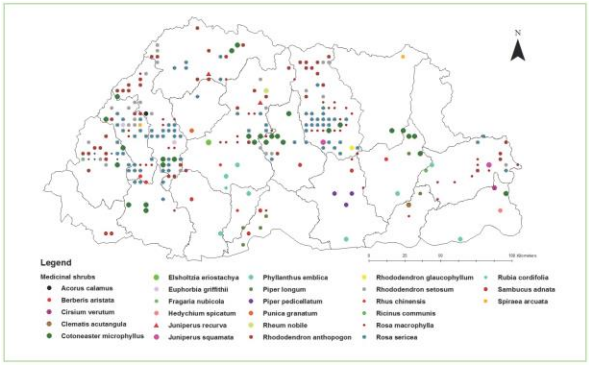
(2) Short-term target

As accessibility to available forest resources is still limited, the utilization of NWFPs should be prioritized in the short term because transportation and harvesting of the NWFPs are much easier than for timber. But research and marketing related to the NWFPs should be further promoted, since much knowledge, particularly on medicinal and aromatic plants (MAPs), is not systematically organized. The sustainable management and utilization of NWFPs (including MAPs) will promote more development, as well as income generation opportunities, in the Rural Area.

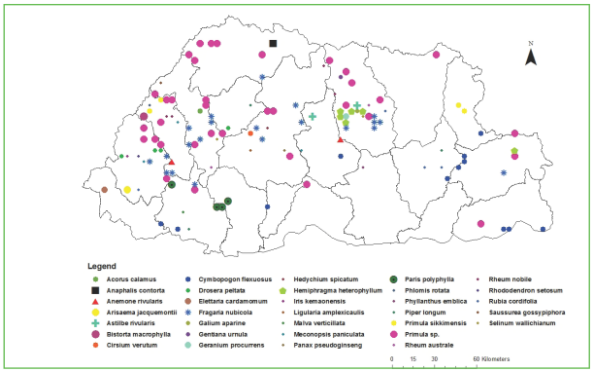
The recently released National Forestry Inventory Report, Vol. II (2018), reveals that 76 medicinal plants of different life forms (trees, shrubs and herbs) grow naturally across the country. Distribution maps of recorded medicinal trees, shrubs and herbs are shown below.



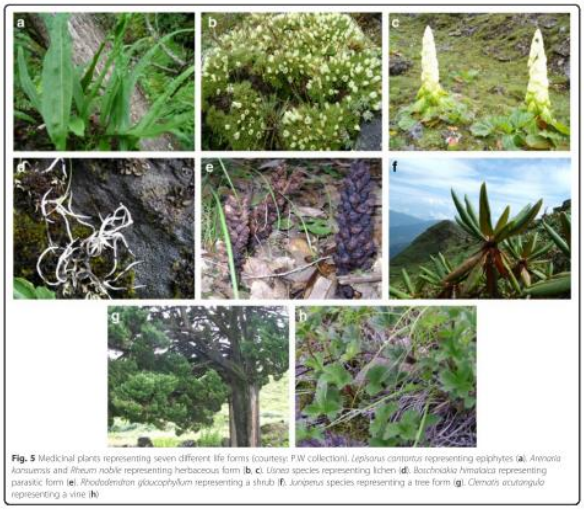
Medicinal Trees



Medicinal Shrubs



Medicinal Herbs



Source: Wangchuk, P. et al. 2016. Medicinal Plants of Dagala Region in Bhutan: Their Diversity, Distribution, Uses and Economic Potential. *Journal of Ethnobiology and Ethnomedicine*, 12:28.

Source: National Forest Inventory Report, Volume II, 2018, DoFPS, MoAF

Figure 7.6 Distribution of Medicinal Plants in Bhutan

In addition, the promotion of wood-based industries is also proposed. According to the DoFPS, the present demand level for timber is very high due to the construction boom, meaning there is a shortage of supplies. As the LFMPs are gradually formulated across the country from now on, more wood materials will be traded. If wood-based industries, such as sawmills, furniture workshops, plywood manufacturers and briquette factories, are set up, they will use wood materials to manufacture value-added products, which in turn will lead to increased job opportunities in the Rural Area. The following items are also listed in the Forest and Nature Conservation Rules and Regulations of Bhutan 2017 as exportable finished forest products.

Table 7.2 List of Exportable Finished Forest Products

218. The finished forest products with the following specification/description shall be allowed to be exported:	
(1) Particle board	(2) Plywood
(3) Broom handles	(4) Railings
(5) Furniture	(6) Packing box
(7) Photo frames	(8) Sawdust
(9) Block board	(10) Decorative bits with design profiles
(11) Skirting*	(12) Green charcoal
(13) Briquettes	(14) Earbuds, chopsticks and toothpicks
(15) Handicraft items	(16) Incense stick and powder
(17) Wooden cable drums	(18) Wooden crate
(19) Laminated beams	
(20) Timber retrieved from dismantled house but not from old heritage timbers from temples	
(21) Fabricated timber structures for exhibition and other related use	
(22) Wood parquet	

*Max. width 4", max. thickness 1", one side grooved, can be of any length
Source: Forest and Nature Conservation Rules and Regulations of Bhutan, 2017, DoFPS, MoAF

The exportable items above are not considered as highly value-added products, except for furniture and incense. If these products are attractive in terms of good design and/or competitive price, marketing opportunities could increase, both domestically and internationally.

(3) Medium- to Long-term Target

Timber utilization should be possible after accessibility improvements to the forest road network; as such, this activity is considered as a medium- to long-term target. Along with road accessibility and cable crane system improvements for the transportation and collection of logs, a higher level of timber utilization can be realized.

As timber exportation is legally banned, the expansion of domestic sawmill capacity is another important factor to support timber utilization in the future. The number of sawmills in Bhutan was 138 in 2017, but many of them are on a small scale with only 29 of them being integrated sawmills (Forestry Facts and Figures 2017, DoFPS, MoAF). The gradual introduction of integrated sawmills, which offer multiple functions to process logs, is considered to be crucial in the long run.

The development of various wood products for exportation to India is another long-term issue. Though 22 finished forest products are legally allowed for export, only particle board is now being exported to India, according to recent trade statistics.

7.4 Tourism Promotion Including Cottage and Small Industries

(1) Tourism Promotion and Local Resources

The direction of tourism development in Bhutan is sustainable tourism, such as nature tourism, agro-tourism, specific and special place tourism, wellness tourism, and eco-tourism, which is in line with the "High Value, Low Impact" policy. Utilization of local resources, such as

agriculture, music and storytelling, Tshechu (festival), natural resources, arts and crafts, traditional landscapes, local cottage and small industries (CSI), national parks and cultural heritage, should be recommended. In other words, the tourism sector should be clustered by making use of local resources including CSI. Once local products are transformed into tourism products for international tourists, they can become the outputs of an export industry.

Figure 7.7 Relationship Between Tourism and Local Resources

(2) Tourism Development Plan by Destination

Each destination is clearly characterized by its tourism resources and the potential to encourage international tourists to stay longer and become repeat visitors. The concept of each destination will be explained below.

Integrated tourism destination: western zone

Paro, Thimphu and Punakha could play a role as the gateway to Haa, Gasa and Phobjikha. Gasa may have the potential to offer wellness tourism involving MAPs, traditional medicine and hot springs. Paro is home to a well-known and typical religious site in the form of Taktsang Monastery. Haa will focus on community-based sustainable tourism, such as farm stays. Punakha will formulate integrated cultural tourism by highlighting not only Dzong and but also other historic spots and ancient temples. Wangduephodrang could provide community-based tourism as it is a typical rice-producing area. Phobjikha Valley is one of the most obvious sites for community-based tourism, owing to the landscape and the presence of rare black-necked cranes.

Culture, nature experience destination: central zone

This zone, comprising Bumthang, Trongsa and Zhemgang, is commonly recognized as the religious heartland with the oldest Buddhist temples and monasteries in Bhutan. International tourists could enjoy the nomadic culture and life in the form of the Tshechu festival in Bumthang and farm stays. This zone has plenty of untouched landscapes on the way to Zhemgang and Thrumshingla National Parks, which have precious wild animals such as the golden langur and birds.

Nature and handicraft experience destination: eastern zone

This zone, consisting of Trashigang, Yangtse, Monggar and Lhuentse, could provide experiences of nature and handicrafts to tourists. In this zone, a rich cropping area with beautiful terraced paddy fields is the site of popular livelihoods and could be the basis of nature tourism. Trashigang is the gateway to Merak and Sakteng, where a unique nomadic lifestyle and Sakteng Wildlife Sanctuary can be experienced. This zone has different types of genuine handicrafts, such as lacquerware in Yangtse, kishu thara in Lhuentse and weaving in Trashigang.

Winter resort destination: south-eastern and south-western zone

Two places in the southern area could be specified as winter resorts, i.e., around Samtse and Pemagatshel. This zone could provide backwoods and a winter resort for domestic and international tourists, mainly from India and Bangladesh.

Health tourism destination: south central zone

Wellness tourism in this zone could integrate unique traditions, culture, landscape, nature, food, traditional medicine and religion into one programme. Particularly, hot springs in Gelephu, Bhutanese traditional medicine with MAPs, and hiking should be integrated into a programme for health tourism in this zone.

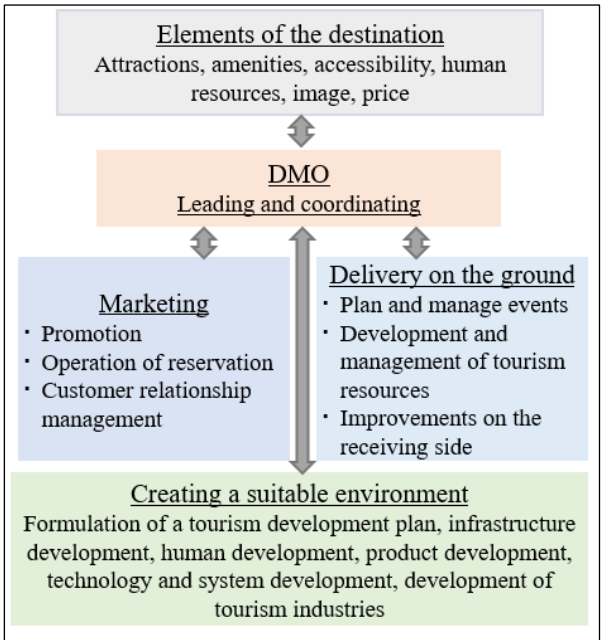
Aiming at regional development in the Eastern Region, two tourism promotion projects are proposed.

(a) Project for Strengthening the Capacity for Tourism Promotion in the Eastern Region: This project is to establish the brand of the Eastern Region in Monggar, Trashigang, Yangtse and Lhuentse. A marketing and promotion strategy are formulated. A Destination Management Organization is established in each Dzongkhag. Unique souvenirs and handicrafts are developed.
(b) Artist-in-residence Programme: This programme is to invite talented artists from around the world and to create artistic work in Yangtse. The regional development will be conducted by the artists and through their art. The key issue is to promote Dzongkhags as creative towns.

(3) Cottage and Small Industry Development with a Single Narrative and Theme-based Tourism

Value-added products under one narrative and theme should be developed. It is more effective to create a regional brand and develop new products by collaborating with outside experts, such as marketing professionals and designers.

It is recommended that the tourism and CSI sector becomes the sixth sector industry through the diversification of primary, secondary and tertiary industries. The sixth sector industry comprises making products (discovering resources), processing (creating resources in the area) and selling (expanding local consumption). It is essential to consider refining and selling resources that are "buried" in the local community. Refined local resources contribute to the creation of a regional brand.



Source: UNWTO (United Nations World Tourism Organization)

Figure 7.8 Functions and Roles of the Destination Management Organization

(4) Destination Management Organization

The DMO is an organization or corporate entity which acts as the main body for supporting the creation of tourist destinations. The DMO is composed of tourism stakeholders, such as commerce and industry, hotels, agriculture and forestry, transportation business

operators, restaurants and local people. The DMO should tackle issues such as tourism infrastructure development, marketing, delivery on the ground, and creating a suitable environment.

(5) Enhancement of favourable treatment for specified purposes

The RGoB sets minimum selling prices for packages to the country. Although the RGoB has introduced favourable treatment in the minimum daily package to attract the tourists in the rainy season and winter for mitigating the seasonality, further favourable treatment for the specific group is worth thinking about to meet the specified purposes as below.

- Tourists who visit in Central Eastern Region and Eastern Region to promote these regions.
- Youth who will be a repeat guest in the future.
- Elderly people who have sufficient time to visit a lot of places.

(6) Conformity with Tourism Flagship Program

The RGoB prepared the final draft flagship program which will be the base for the 12th Five Year Plan for the tourism sector. It will change the focus to different key initiatives.

- Five focus dzongkhags have been identified for tourism development.
- At least one project will be developed in each 20 Dzongkhags. Some of the projects identified were adventure sports, water-based sports, development of festivals and development of infrastructure and promotion.
- The third focus will be on Policy and regulatory frameworks, institutional strengthening and skills development.

The holistic tourism network as one of the development approaches and the development guidance for the tourism promotion proposes the tourism route and institutional improvement. Those proposals complement the key initiatives suggested in the flagship program.

7.5 Information Technology and Mechanical Promotion

(1) Development of an ICT Infrastructure

ICT is one of the important infrastructure components in Bhutan as it can facilitate access to information from around the world without any geographical restrictions. ICT gives new opportunities to Bhutanese people in terms of improving their living conditions and economic development. Thus, the foundation of solid ICT networks, such as fixed and mobile networks, cloud sharing platforms, data centres, cyber security and an open-access environment, should be developed.

(2) ICT for Sectors

The Rural Area is facing several social issues, such as regional revitalization and depopulation. Hence, efforts to pursue ICT-based solutions will be an option in addition to traditional approaches. ICT applications in sectors will be established via new industries, in turn creating new job opportunities.

Table 7.3 shows the possible ICT applications to resolve issues in education, health, disaster prevention, agriculture, tourism and construction.

Table 7.3 Examples of ICT Application in Sectors

Sector	Overview	Possible Locations
Education	Distance learning, programming education, lifelong learning by e-learning	Remote area
Health/nursing	Online medical examination, health information network, electronic health records	Remote area
Working style	Teleworking	Everywhere in the country
Finance	Fintech and E-banking	Everywhere in the country
Disaster prevention	Disaster prevention mapping using GIS, sharing information on damage and recovery	Mainly in hazard areas
Construction	Building information modelling (BIM), GPS	Construction sites
Tourism	SNS marketing, tourism applications, digital boards	Main tourism places
Agriculture	Drones, Internet direct sells, traceability, point-of-sale data, agro-technology	Farmlands and agro-processing on industrial estates
Fab lab	Manufacturing using analogue and digital machine tools	Education facilities

(3) Development of an ICT Model Town, Centred on Gyalpozhing Tech Park

Gyalpozhing College of Information Technology was opened in 2017 and provides practical courses, for example, in computer applications, networking and information technology management. In future, the college plans to provide courses in trending topics, such as AI, cloud computing and big data. As the second tech park in Bhutan, the development of Gyalpozhing Tech Park in Monggar is proposed on the Project to exploit the accumulation of IT engineers from the college. It is suggested that the Thimphu Tech Park is mainly used for international companies, while Gyalpozhing Tech Park is used for domestic companies and entrepreneurs, because access to Gyalpozhing is likely to be an issue for international investors, as it takes one day to travel there from Thimphu and five hours from India through Nganlam. Monggar should be developed as an ICT model town, founded on the close collaboration between Gyalpozhing College of Information Technology and Gyalpozhing Tech Park. Based on ICT applications in various sectors, several social initiatives will be conducted in Gyalpozhing. One option will be to introduce ICT to the Bondeyma Industrial Estate.

Source: Gyalpozhing College of Information Technology

Figure 7.9 Gyalpozhing College of Information Technology Master Plan

7.6 Mining and Manufacturing Promotion

(1) Formulation of a strategic mining plan and management system

A mining strategic plan, which sets out the long-term prospects including international demand, should be formulated. The completion of the mapping of mineral resources and the formulation of data management should be essential preconditions to the formulation of the strategic master plan.

Bhutan has rare metals such as tungsten. Tungsten has the potential for export, although this may be difficult to develop due to the reservation status of tungsten. If Bhutan seriously considers further mining development in the case of tungsten, it should be discussed and coordinated with agencies and local people.

As the Mineral Development Policy from 2017 encouraged, industrial mineral resources such as limestone, dolomite and gypsum should be identified as the final products appropriate for further value addition. Currently, most of those minerals are exported to India and Bangladesh. This is because of a lack of local industries in Bhutan that can utilize mineral resources domestically. The potential for these mineral resources will be huge. Thus, the Bhutanese government should study this potential and promote local industries in order to pursue development in this area within the country.

(2) Development of the business environment

Industrial estates have developed. In order to adapt to the global trend, especially in the case of India and Bangladesh, industrial estates located in the southern area should enhance the sophistication of manufacturing, such as value addition to mineral materials by utilizing the accumulated technology and human resources. The activation of a cross-industry association and government-industry-academia collaboration will provide the comprehensive information necessary for product development and marketing. All manufacturing sectors, including those involved in mineral products, have a high index value. In other words, these industries have the potential to boost other sectors. Thus, promotion of the manufacturing sector is recommended in order to develop the business environment.

In order to attract investment into Bhutan, an increase in location competitiveness should be improved through the development of the business environment. Bhutan has advantages in terms of infrastructural development, such as a stable power supply. However, Bhutan's labour force and location may be categorized as disadvantages, which are difficult to improve.

Thus, Bhutan's legal and institutional arrangements and living environment should be improved. Particularly, this should include regulatory reform concerning the specification of an SEZ along with incentives. Improving urban functions and facilities in neighbouring industrial estates will be necessary in order to promote their location. Social services, such as education, health, caregiving, commerce and entertainment, should be developed in the cities neighbouring the industrial estates.

Most industrial estates in Bhutan operate as single-function SEZs, such as the manufacturing sector, at present. There are possibilities to add to the list of functions, such as logistics, commerce, knowledge-based industries and international education. Jigmeling, in particular, has the potential to increase the range of functions available, such as trade, logistics and commerce, due to favourable access to Gelephu Airport.

CHAPTER 8 GENERAL GUIDELINE FOR TRANSPORTATION DEVELOPMENT

8.1 Road Network Development

The proposed ladder-type arterial road network connects four regions, RCs and almost all the DCs. Aiming at an efficient and reliable transport system, there are multiple issues that need to be resolved. First, the travel time on some sections of the road network is still poor compared with the target travel time. Some sections on the arterial road network are unreliable to secure transportation throughout the year.

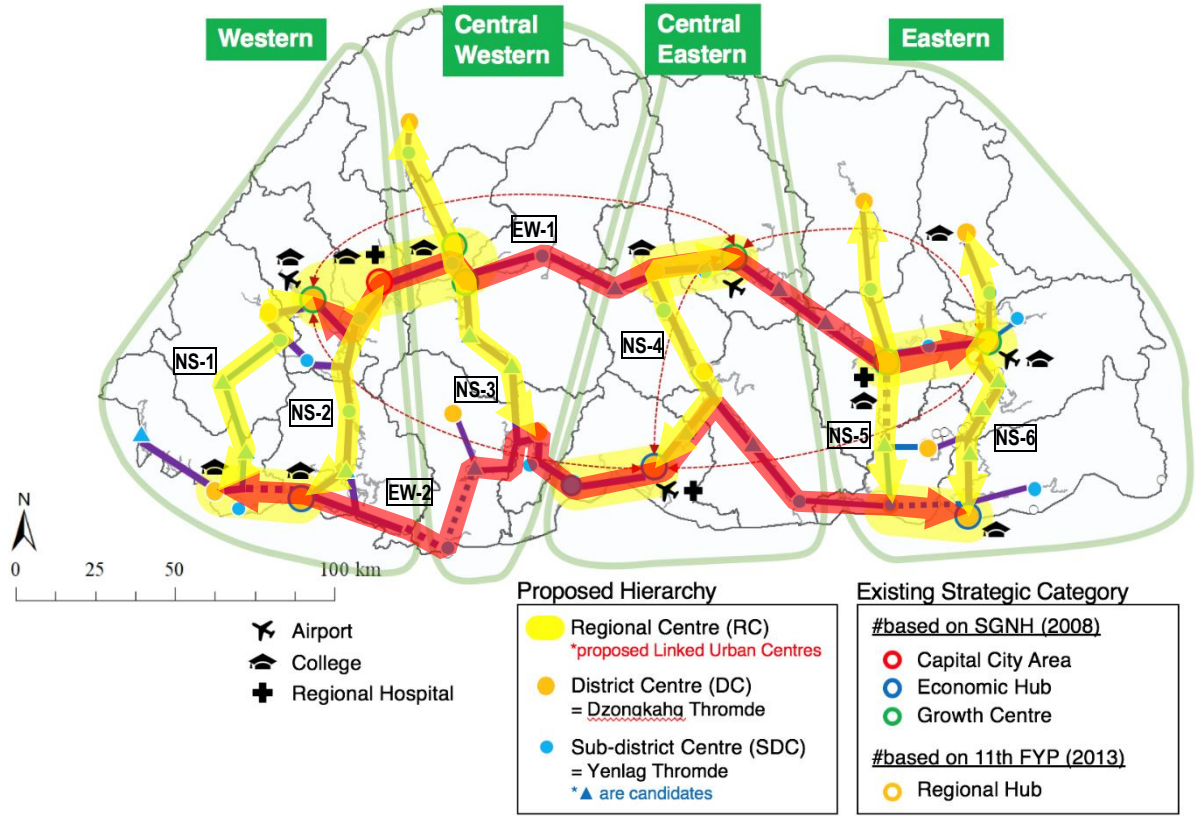


Figure 8.1 Proposed Transport System for the Hierarchical National Service Network

(1) Development Target for the Road Network

The target travel times are set at eight hours or less for six north-south routes and 16 hours or less for two east-west routes on a ladder-type arterial road network. A target speed is proposed for each route based on the road design standards in Bhutan, as shown in Figure 8.2. Table 8.1 shows the current average travel speed (km/h), desirable travel time and target travel speed (km/h) of each road section on north-south routes and east-west routes.

Road Classification	Primary National Highway				Secondary National Highway				Dzongkhag Road				Farm Road			
Terrain classification	L	R	M	S	L	R	M	S	L	R	M	S	L	R	M	S
Design speed (km/h)	60	50	40	30	50	40	30	20	40	30	20	15	30	25	15	10
Traffic volume (vpd)	>200				100-200				30-100				<30			

Note: vpd = vehicles per day, L= level terrain (0 to 10°), R = rolling terrain (10 to 25°), M = mountainous terrain (25 to 60°), S = steep terrain (more than 60°).
Source: Road Classification System in Bhutan, RGoB MoWHS, Department of Roads, June 2017

Figure 8.2 Road Design Standards in Bhutan

Table 8.1 Outline of Proposed Routes

Type	Routes		Route Length (Missing Section) (Km)	Average Travel Time (H)	Average Travel Speed (Km/h)	Desirable Travel Time	Target Travel Speed (Km/h)	Target Design Speed (Km/h)	Remarks
	ID	Name							
North-south route	NS-1	Paro-Samtse	201 (95)	-	-	Eight hours' travel (one day)	25.1	30	Haa-Samtse section is missing (under construction)
	NS-2	Thimphu-Phuentsholing	142.5	4.5	31.5		31.5	40	Via Damchu-Chukha Bypass
	NS-3	Gasa-Sarpang	213	10.3	20.9		26.6	30	
	NS-4	Bumthang-Gelephu	312	12	26		26.3	30	
	NS-5	Lhuentse-Nganglam	173 (98)	-	-		21.6	30	Monggar-Kurizampa (double lane) Kurizampa-Nganglam (Single lane)
	NS-6	Trashiyangtse-Samdrup Jongkhar	234	8.5	27.5		29.2	30	
East-west route	EW-1	Paro-Trashigang:	605	20	30.2	16 hours' travel (two days)	37.8	40	
	EW-2	Samtse-Samdrup Jongkhar (without environmental negative impact)	488 (231)	-	-		30.5	40	Lhamoizhingkha-Sarpang, Nganglam-Dewathang, and Gelephu-Panbang sections are missing (planning stage)

Note: Source of average travel time is based on interview results with commercial drivers.

(2) Prioritization of Route Improvements

Road network improvements should be prepared to evaluate the importance of each road section. The evaluation will be carried out based on a district-wise security risk analysis for disasters and a bottleneck analysis. The district-wise security risk analysis is examined based on the endemic functions of districts. Earthquake, landslide, flood and GLOF are considered as disaster risks. The section-wise bottleneck analysis is examined in relation to the target travel time. The security risk and bottlenecks are classified into three levels of priority, i.e., high,

middle and low, for each road section.

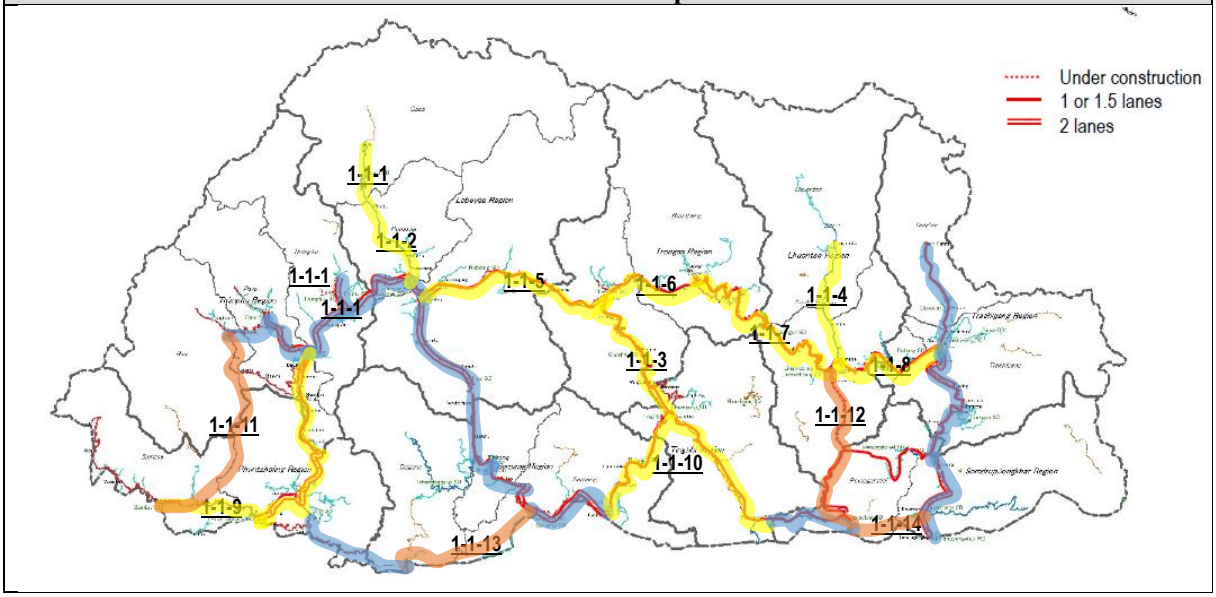
Projects for the creation of the ladder-type arterial road network are formulated to meet the following principles:

(a) High-priority sections mainly refer to missing sections and sections under construction. The implementation needs a large budget, a long implementation period and careful environmental considerations, compared with widening improvements. Considering the above and the limited budget allocation in the 12th FYP, a middle-term implementation schedule is appropriate for project implementation.
(b) Middle-priority sections with double laning should be promptly started in the short term.
(c) Low-priority sections are mainly double-laned sections and low-traffic-demand sections. Improvement works for low-priority sections can be considered in the long term.

Table 8.2 Proposed Projects for the Formulation of a Ladder-type Arterial Road Network

ID	Title of Project	Project Cost (Million BTN)	Implementation Schedule	Responsible Organization	Possibility of Environmental and Social Negative Impact	Remarks
1-1-1	NS-3-a: Gasa-Punakha	918	Long	MoWHS	Minor impact on roadside residents is anticipated due to widening improvement	27 km, double laning
1-1-2	NS-3-b: Punakha-Mesina	408	Long	MoWHS	Same as above	12 km, double laning
1-1-3	NS-4-b: Trongsa-Zhemgang	3,774	Middle	MoWHS	Same as above	111 km, double laning
1-1-4	NS-5-a: Lhuentse-Monggar	2,550	Long	MoWHS	Same as above	75 km, double laning
1-1-5	EW-1-e: Wangdue-Trongsa	4,386	Short	MoWHS	Same as above	129 km, double laning
1-1-6	EW-1-f: Trongsa-Bumthang	2,312	Short	MoWHS	Same as above	68 km, double laning
1-1-7	EW-1-g: Bumthang-Mongar	6,562	Short	MoWHS	Same as above	193 km, double laning
1-1-8	EW-1-h: Monggar-Trashigang	3,094	Short	MoWHS	Same as above	91 km, double laning
1-1-9	EW-2-a: Samtse-Phuntsholing	2,074	Short	MoWHS	Same as above	61 km, double laning
1-1-10	EW-2-g: Gelephu-Panbang	5,610	Short	MoWHS	Same as above	165 km, double laning
1-1-11	NS-1-b: Haa-Samtse	3,230	Middle	MoWHS	Same as above	95 km, double laning (under construction)
1-1-12	NS-5-b: Monggar-Nganglam	3,332	Middle	MoWHS	Same as above	98 km, double laning[1)]
1-1-13	EW-2-e: Lamoizingkha-Sarpang	3,718	Middle	MoWHS	Impact on Phipsoo Wildlife Sanctuary is anticipated	87.5 km, new
1-1-14	EW-2-i: Nganglam-Dewathang	3,145	Middle	MoWHS	Impact on Royal Manas National Park is anticipated	74 km, new

Location Map



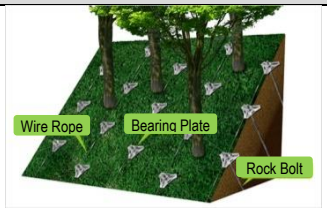
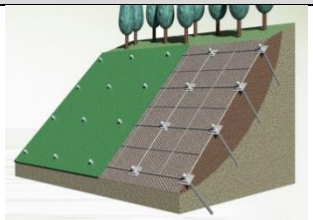
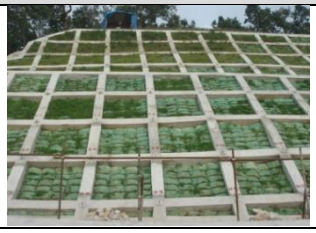
Note: Short term 2018-2022, middle term 2023-2027, long term 2028-2030;
high priority, middle priority, low priority;
project cost BTN 42.5 m/km (new), BTN 34 m/km (double laning).
1) A potential alternative route is to connect between Kuri-Gongri-and Sherichu.

8.2 Countermeasure for Landslides and Slope Failure

(1) Slope Failure Prevention Measures on Natural Slopes

Table 8.3 presents a comparison of the three countermeasures for slope failure on natural slopes. Two countermeasures, namely, non-frame methods and GF rock bolt measures, which are manufactured by Japanese companies, are compared with traditional methods, i.e., cribwork with rock bolts. These two countermeasures are advantageous in that forestation can take place after construction to improve the landscape. But they need to install rock bolts in the whole construction area, meaning that the economic burden is worse than for cribwork in many cases. The non-frame method can be constructed without deforestation as well as preserving existing trees in the construction area. It is also more economical than the *GF rock bolt* method. Therefore, the non-frame method shall be adopted to deal with slope failure on natural slopes. Meanwhile, cribwork with rock bolt can be adopted for cut slopes where slope failure is concerned.

Table 8.3 Comparison of Three Slope Failure Prevention Measures on Natural Slopes

Construction Method	Non-frame	GF Rock Bolt and Rope Net	Cribwork with Rock Bolts
Photo/schematic image			
Manufacturer	Nippon Steel and Sumikin Metal Products Co., Ltd.	Tokyo Rope MFG Co., Ltd.	-
Environment	Unnecessary to deforest and environmentally friendly <good>	Necessary to deforest due to installation of metal mesh; planting and seeding are available after construction <fair>	Planting and seeding are available inside the frame; landscape is no better than other methods <poor>
Economics	More expensive than cribwork with rock bolts in many cases due to installing the rock bolt in the whole construction area <fair>	Needs more materials than the non-frame method and more expensive <poor>	Unnecessary to install the rock bolt in the whole area and more economical than other methods in many cases <good>

(2) Tunnel Introduction

A tunnel is one of the bypass measures to avoid landslides and slope failure. The development of 10 tunnels is proposed by the DoR, which will overlap with the proposed arterial road network. A tunnel requires a large amount of cost compared with other landslide countermeasures. Therefore, a comparison of alternative measures should be examined to verify economic and financial viability, together with an implementation scheme.

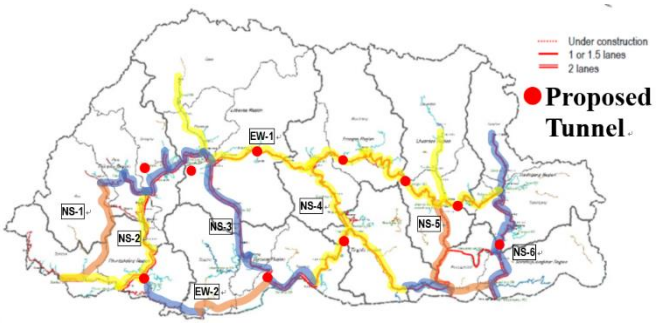


Figure 8.3 Position of Proposed Tunnels by the Department of Roads

A technical and financial feasibility analysis is necessary for the tunnel on priority routes, as well as technology transfer relevant to tunnel engineering. Technology transfer in the case of tunnel engineering will include geological investigation and analysis, structure design and construction, and O&M. A comprehensive technology transfer plan and programmes are required for surveying, planning, designing, constructing, maintaining and operating mountainous tunnels, as outlined in Figure 8.4 below.

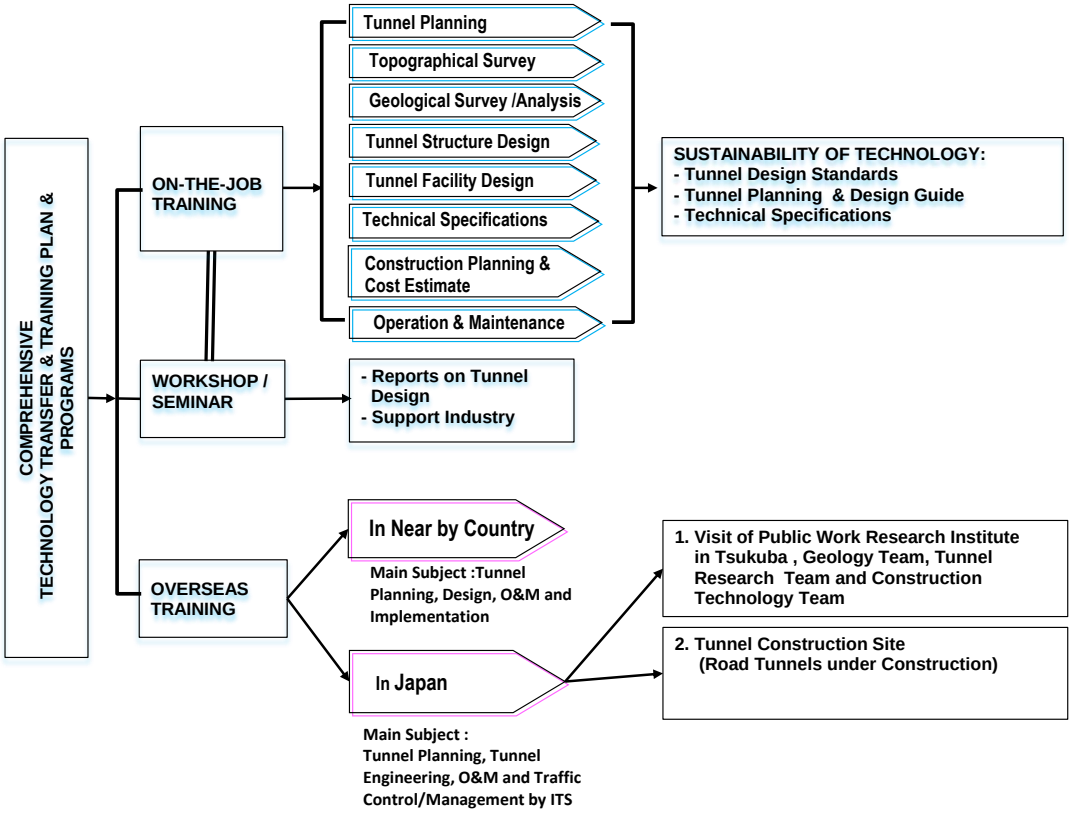


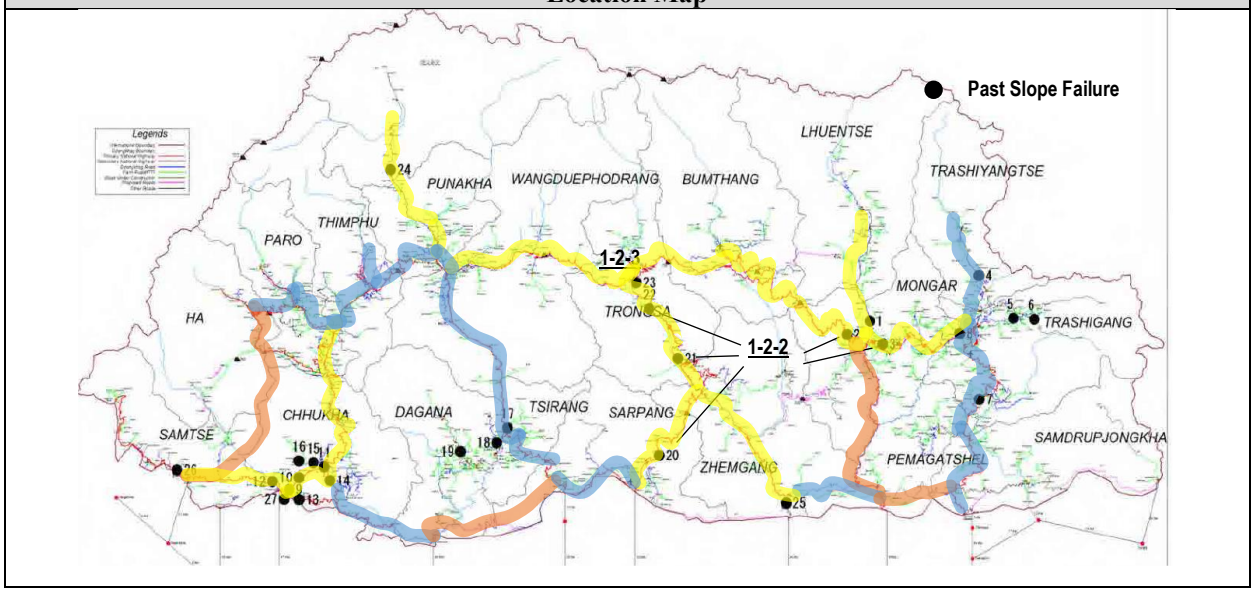
Figure 8.4 Comprehensive Tunnel Technology Transfer Plan/Programmes

Projects for the elimination of road closures due to landslides and slope failure are formulated to meet the following principles. The construction of landslide treatments and bypass structures such as tunnels and bridges need a large amount of funding and a long implementation period. Current practice in the area of landslide treatment and tunnel technology in Bhutan is not matured. Therefore, stepwise implementation which starts with technology transfer is essential.

Table 8.4 Proposed Projects for the Elimination of Road Closures Due to Landslides and Slope Failure

ID	Title of Project	Project Cost (Million BTN)	Implementation Schedule	Responsible Organization	Possibility of Environmental and Social Negative Impact	Remarks
1-2-1	Technology Transfer Programme for Slope Protection and Tunnel (Planning, Design, Pilot Project, On-the-job Training)	0	Short	MoWHS	Nil	Donor assistance
1-2-2	Landslide Treatment	1,500	Middle	MoWHS	Minor impact on project site is anticipated	Five locations on middle-priority sections
1-2-3	Tomang Cliff Tunnel Project	2,100	Middle	MoWHS	Minor impact on approach road and portals is anticipated	840 m (tunnel: 745 m)

Location Map



Note: Short term 2018-2022, middle term 2023-2027, long term 2028-2030; Landslide Treatment Project cost = BT 300 million/site.

8.3 Inter- and Intraregional Public Transport System and Infrastructures

RCs are mostly connected by frequent long-distance interregional bus services. However, the service level of these bus services is still low because of the existence of an old and uncomfortable bus fleet, dysfunctional bus terminals, unreliable bus operations etc. Public and private bus operators need to use their bus fleet over a long period to ensure profitability of their business. This is more apparent in remote areas due to low operational profitability. Therefore, improvements to the bus fleet, in terms of passenger comfort and capacity, and subsidies for bus operations in remote areas are important issues.

Bus terminals for interregional and intercity services are not functional in terms of ticket sales, waiting areas, information about bus operations and transfers etc. Therefore, appropriate terminal facilities for major hubs in the interregional and intercity bus networks should be provided.

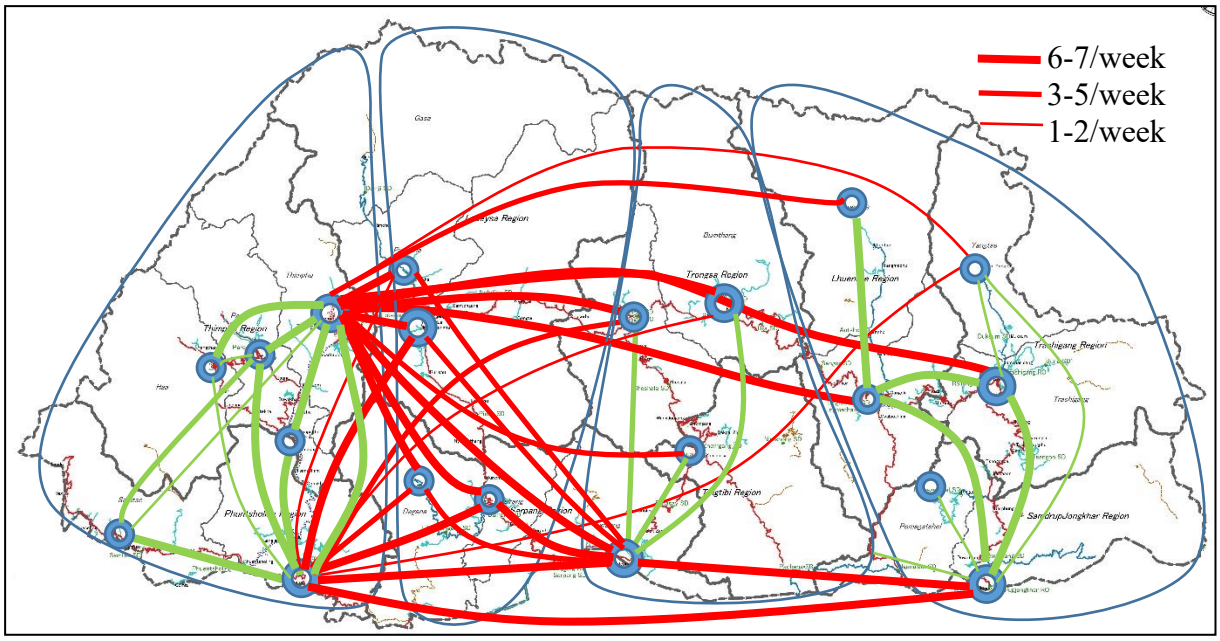


Figure 8.5 Existing Inter- and Intraregional Bus Network

The following measures are proposed to improve the inter- and intraregional public transport.

(a) Development of a subsidy system for bus procurement and bus operations, based on performance-based evaluation criteria for unprofitable routes, in order to improve the bus fleet.
(b) Development of criteria for bus terminals and bus stops including facilities for electric vehicles (EVs), i.e., workshops, quick chargers etc.
(c) Introduction of a bus information system (centre, bus location system, bus schedule), a smart card for city buses, EV buses for cities, an advanced IT system to enhance convenience for users and environmentally friendly systems.
(d) Location of transit facilities including interregional bus terminals, community bus terminals and taxi stands close to public facilities in DCs and SDCs to ensure convenience for users.

8.4 Air Transport Development

(1) Second International Airport

Palo International Airport is constructed on riverbeds between steep mountains. Therefore, the entry method to the airport is limited, and it is difficult to extend the runway and expand the airport site. The capacity of the runway at the airport is estimated to exceed capacity by around 2023, and there is an urgent need to develop a second international airport to compensate for excess demand.

The primary aircraft operated by Drukair for international flights is the Airbus A319 and the runway length of Paro International Airport is sufficient for the necessary take-off run length of this class of aircraft. Therefore, an alternative study for the development of a second international airport in another region, with a special focus on Gelephu Airport, which is planned to be an international airport by the RGoB, is necessary. In line with regional promotion in the Eastern Region, Yonphula Airport is a suitable location; however, a hilly topography is a constraint in terms of obtaining a runway with an adequate length. The unforeseeable weather is an obstacle to securing the reliability of airline schedules. Due to the option to operate a

second international airport in Yonphula, Samdrupjongkhar is listed as the second choice for the site of an international airport in the Eastern Region. This would require a large hill cut to be made in order to flatten the land. Another option is to expand the existing domestic airport into the second international airport in Bumthang. This option would contribute to the development in the Central Region, but this would be far from the case in the Eastern Region. Flatland is not available to an adequate extent around Bumthang Airport. Table 8.6 presents a provisional comparison of candidate locations for the second international airport. Each candidate location has advantages and disadvantages. A feasibility study is necessary to decide on the site of the second international airport.

Table 8.5 Specification of Aircraft and Existing Airports

Type	Specification			Paro International Airport	Bumthang Airport	Gelephu Airport	Yonphula Airport
	Sheet	Take-off Run	Landing				
AIRBUS A319	124-156	1,850 m	1,360 m	2,265 m	1,200 m	1,500 m	1,266 m

Source: Airbus A319 specification (Airbus website)

Table 8.6 Provisional Comparison of Candidate Locations for the Second International Airport

Candidate	Accessibility to Settlement Zone	Technical Feasibility and Land Availability	Natural/Social Environmental Impact	Impact on Eastern Regional Economy
Yonphula	Fair (Approx. 20 km from Trashigang)	Bad (Airport expansion needs large hill cut to create flatland)	Fair (Limited resettlement would be necessary for airport expansion)	Good (Near Trashigang/direct air access for foreign tourists)
Gelephu	Good (Approx. 3 km from Gelephu)	Fair (River treatment is necessary for airport expansion/flatland for expansion is available)	Fair (Limited resettlement would be necessary for airport expansion)	Fair (Far from the Eastern Region/access via domestic air for foreign tourists)
Bumthang	Good (Approx. 1 km from Bumthang)	Bad (River treatment to prevent flooding is necessary for airport expansion/flatland for expansion is limited)	Fair (Very limited resettlement would be necessary for airport expansion)	Bad (Near the Eastern Region/access via land for foreign tourists)
Samdrup Jongkhar	Fair (Airport development in the Urban Area is impossible)	Bad (Large hill cut to create flatland in a mountainous area is necessary because the existing flatland is occupied)	Fair (Very limited resettlement would be necessary due to the mountainous area)	Bad (Near the Eastern Region/access via land for foreign tourists)

(2) Domestic Air Transport Service

The proposed arterial road network covers the entire country; however, networking for the major northern area, including Gasa, Lhuentse and Trashiyangtse, is difficult due to the steep mountainous terrain. It is important to secure the redundancy of transport systems in terms of

national and regional security, especially in the case of natural disasters.

The number of domestic air transport passengers is small, especially on the Paro-Trashigang route, because local people are not aware of domestic air transportation or because of much higher ticket prices compared with bus transport. Private airlines find it difficult to participate in a domestic air transport service because of low profitability.

The following measures are proposed to improve the domestic air transport service:

(a) Development of airstrips or helipads at the end of feeder sections in the road network, such as Gasa, Lhuentse and Trashiyangtse, for a helicopter service is important.
(b) Development of a subsidy system for domestic air transport operations, based on performance-based evaluation criteria for unprofitable routes, in order to promote domestic air transport as well as the participation of private airlines.

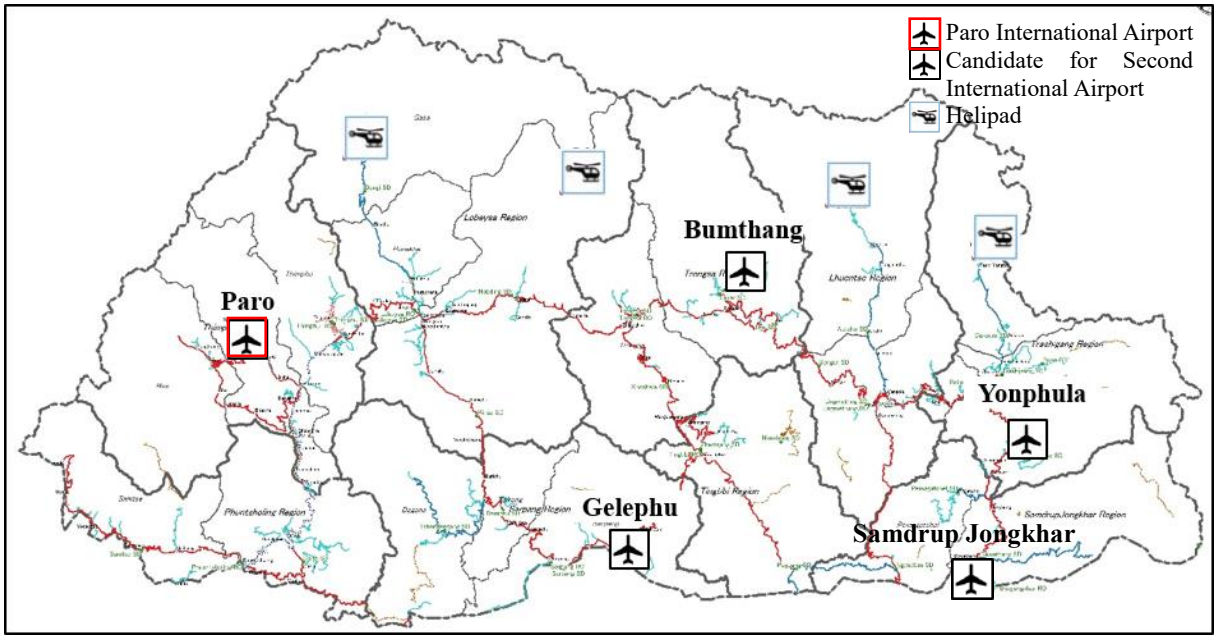


Figure 8.6 Proposed Air Transport System

8.5 Transport Using Advanced Technology

The transport sector discharges a significant share of CO_2 compared to other sectors in Bhutan. Hydroelectric power generation dominates the electric generation system in Bhutan. Taking advantage of a sufficient electricity supply, the promotion of electric cars is proposed as well as the introduction of a drone-based freight transport system for remote areas.

About 70 EVs were registered around 2015 including for government use, private use and taxi use. However, the number of EVs has not increased (93 EVs were registered in 2017). There are several reasons behind the poor promotion results, at both the institutional and the infrastructural level, as listed below:

- Not affordable due to high initial costs of EVs
- Insufficient performance of EVs in terms of driving distance
- Limited performance and number of quick chargers

The following measures for private EVs are proposed to overcome the current constraints:

(a) Promotion of initial demand: Subsidies and tax cuts play a major role in the rapid spread of EVs in the world. The level of subsidies for purchasing EVs varies by country, and the EV penetration rate tends to be high in countries with high subsidies.
(b) Installation of quick charging stations: Most EV users normally charge their vehicles at home or at work. They use quick charging stations during long-distance driving. It is necessary to install these quick charging stations to meet the needs of EV owners.
(c) Establishment of an autonomous market: A robust government initiative regarding an EV share target is essential.
(d) Human resource development for maintenance of EVs and related facilities

A road map for the promotion of electric cars and quick charging stations, as well as the electrification of public transportation, is summarized in Table 8.7.

Table 8.7 Road Map for the Promotion of Electric Vehicles

	Short Term	Middle Term	Long Term
Private use			
1 Promotion of initial demand (preferential taxation, subsidy etc.)			
2 Installation of quick charging stations			
3 Establishment of an autonomous market			→
Public use (urban)			
4 Promotion of initial demand (preferential taxation, subsidy etc.)		→	
5 Installation of quick charging stations		→	

Note: Short term 2018-2022, middle term 2023-2027, long term 2028-2030.

CHAPTER 9 PRIORITY PROJECTS TO IMPLEMENT THE COMPREHENSIVE NATIONAL DEVELOPMENT PLAN

9.1 Assessment of Priority Projects

A set of projects is proposed in the development guidance for urban development, rural development, RNR sector, industries and transport of the CNDP. Fifty-one projects are proposed for the short-term projects. They are expected to commence in the short term and will be preferably completed by 2023, but the timing of their completion could be expanded beyond 2030. The short-term projects are classified into 11 categories, according to the classification of the sector and assessed in respect of the assessment criteria. The priority project must contribute to at least one of the assessment criteria in the realization of a national spatial structure and at least one of the assessment criteria for the other standards. Excluding two short-term projects, 49 projects are selected as the priority projects in Table 9.1. The high priority projects are selected from the priority projects with the highest evaluation points in each category. The number of high priority projects is 22 as shown in Table 9.2. The high priority projects are framed in by the red line in the table. Each project is also assessed if a project could cause any positive and negative impacts to nine domains of GNH.

The implementation cost for all proposed projects is estimated at BTN 74,082 million. The short-term projects require the implantation cost of BTN 36,605 million.

Table 9.1 Evaluation of Proposed Projects in Priority Sector

ID	Sector and Project	Relevance of 12th FYP				Schedule[3]	Project Cost (million BTN)				Organization[4]	Realization of National Spatial Structure					Economic Enhancement				Social Enhancement			Environmental Enhancement		Total Score	Effect on GNH Nine Domains4)								
		Category[1]	Sl. No	Title	Additional[2]		Total	Short	Middle	Long		1.1 Promotion of Capital Region	1.2 Promotion of Linked Urban Centre	1.3 Vitalization in Rural Area	1.4 Vitalization in Eastern Region	1.5 Promotion of Integrated Communication Network	2.1 Enhancement of Food and Energy Self-sufficiency	2.2 Promotion of Innovative Economic Model	2.3 Creation of Job Opportunities	2.4 Creation of Job Opportunities for Young Generation	3.1 Promotion of Diversified Value of Life	3.2 Promotion of Tradition and Cultural Life	3.3 Human Resource Development	4.1 Improvement of Environmental Management	4.2 Promotion of Eco-friendly Green Technology		Psychological Well-being	Health	Time Use	Education	Cultural Diversity	Good Governance	Community Vitality	Ecological Diversity and Resilience	Living Standard
a	**Urban development**																																
a-1	Capital Region Development Programme Including Inland Transport Improvement	MoWHS	1.2	Preparation of human settlement plans	Y	S	21	21			**MoWHS**, NLCS	X				X		X			X	X	X	X	X	8			P		P			P	P
a-2	Eastern Region Development Programme	FL (MolHR, MoEA)	7	Startup & CSI Development	Y	S	56	56			**Dzongkhag**		X	X	X	X		X			X	X	X	X	X	10	P		P	P	P		P		P
a-3	Formulation of a Structure Plan for Urbanization Management Areas	MoWHS	1.2	Preparation of human settlement plans	Y	S	151	151			**MoWHS**, NLCS		X									X		X		3					P			P	P
a-4	Formulation of Regional Plan for Sarpang-Gelephu Linked Urban Centre	MoWHS	1.2	Preparation of human settlement plans	Y	S	15	15			**DHS**, Sarpang Dzongkhag		X	X	X	X		X	X	X	X	X	X			10	P	P	P	P	P				P
a-5	Development of Linked Urban Centres	MoWHS	1.2	Preparation of human settlement plans	Y	S	53	53			**Dzongkhag**		X	X	X	X		X	X	X	X	X				9	P	P	P	P	P				P
a-6	Project for Institutionalising Land Use Control Measures in Urbanization Management Areas of Thimphu, Phuentsholing, and Gelephu	MoWHS	1.2	Preparation of human settlement plans	Y	S	25	25			**MoWHS**		X	X	X	X		X	X	X	X	X	X			10	P	P	P	P	P				P
b	**Rural development**																																
b-1	**Approach 1: Development of a Comfortable Rural Living Environment**	FL (NEC, MoH)	2, 9	24*7 Safe Drinking Water Health		S, M, L					**MoWHS**, MoH, LGs			X					X	X	X	X				5		P	P				P	P	P
(1)	Establishment of a Rural Living Environment Comparable to That of the Urban Area	FL (NEC, MoH)	2, 9	24*7 Safe Drinking Water Health		S, M, L	2,550	1,200	850	500	MoWHS, MoH, LGs			X					X	X	X	X				5		P	P				P	P	P
(2)	Development of a Better Educational Environment	MoE	1.1 1.2 1.3 1.4 1.5 1.6	Improve Quality and Inclusive Education Improve Health and Wellbeing of Children and Youth Enhance Equitable and Quality Tertiary Education Enhance Teacher Development and Support Strengthen and Expand Vocational Education in Schools Enhance Adult Literacy and Lifelong Learning		S	2,400	2,400			MoE, LGs			X									X			2			P	P			P		
b-2	**Approach 2: Creation of Job Opportunities in the Rural Area**	FL (QPO, MoLHR, MoEA, LGs)	4, 7, 8	OGOP Startup & CSI Development Rural Economy Development	Y	S					**MoAF**, LGs, Private sector			X			X		X	X						4							P		P
(1)	Promotion of agro-processing which leads to an expansion of	FL (QPO, MoLHR,	4, 7, 8	OGOP Startup & CSI	Y	S	225	225			MoAF, LGs, Private			X			X		X	X						4							P		P

ID	Sector and Project	Relevance of 12th FYP				Schedule[3]	Project Cost (million BTN)				Organization[4]	Realization of National Spatial Structure					Economic Enhancement				Social Enhancement			Environmental Enhancement		Total Score	Effect on GNH Nine Domains4)								
		Category[1]	**Sl. No**	**Title**	**Additional[2]**		**Total**	**Short**	**Middle**	**Long**		1.1	1.2	1.3	1.4	1.5	2.1	2.2	2.3	2.4	3.1	3.2	3.3	4.1	4.2									
												Promotion of Capital Region	Promotion of Linked Urban Centre	Vitalization in Rural Area	Vitalization in Eastern Region	Promotion of Integrated Communication Network	Enhancement of Food and Energy Self-sufficiency	Promotion of Innovative Economic Model	Creation of Job Opportunities	Creation of Job Opportunities for Young Generation	Promotion of Diversified Value of Life	Promotion of Tradition and Cultural Life	Human Resource Development	Improvement of Environmental Management	Promotion of Eco-friendly Green Technology		Psychological Well-being	Health	Time Use	Education	Cultural Diversity	Good Governance	Community Vitality	Ecological Diversity and Resilience	Living Standard
	local farm produce marketing	MoEA, LGs)		Development Rural Economy Development							sector																						
(2)	Research and development of equipment for human-wildlife conflicts	FL (MoLHR, MoEA, LGs)	7, 8	Startup & CSI Development Rural Economy Development	Y	S, M	90	30	60		MoAF, LGs, Research Institutes			X			X	X	X	X					X	6	P						P	P	P
(3)	Promotion of green tourism taking advantage of abundant natural resources	FL (TCB, MoLHR, MoEA, LGs)	6, 7, 8	Tourism Development Startup & CSI Development Rural Economy Development	Y	M	225		225		TCB, LGs			X					X	X	X	X		X		6	P				P		P	P	P
(4)	Development of care facilities for older people to cope with the ageing society in the Rural Area	NA				L	150			150	MoH, LGs			X				X	X	X	X	X				6	P	P					P		P
(5)	Promotion of construction and maintenance jobs to young people	NA				L	600			600	MoWHS, LGs			X					X	X	X					4							P		P
	Approach 3: Transformation of Jobs in Primary Industries into Attractive Offers for Young People																																	
b-3	**(Agriculture-related jobs)**	MoAF	1.4	Enhance agriculture infrastructure & farm mechanization	Y	S					**MoAF**, LGs			X			X		X	X						4			P				P		P
(1)	Policies to promote the consolidation of fallow and abandoned farmlands	MoAF	1.4	Enhance agriculture infrastructure & farm mechanization	Y	S	34	34			MoAF, LGs			X			X									2			P				P		P
(2)	Development of cool storage warehouses	MoAF	1.1	Enhance cereal production	Y	S	95	95			MoAF, LGs			X			X		X	X						4			P				P		P
(3)	Expansion of finance support for agriculture	FL (MoLHR, MoEA)	7	Startup & CSI Development	Y	S	250	250			MoAF, LGs			X			X		X	X						4	P						P		P
((4)	Expansion of crop insurance system	NA				S	52	52			MoAF, RICBL, LGs			X			X		X	X						4	P						P		P
b-4	**(Forestry-related jobs)**	FL (MoLHR, MoEA, LGs)	7, 8	Startup & CSI Development Rural Economy Development	Y	S, M, L					**MoAF**, NRDCL, LGs			X					X	X						3					N		P	N	P
(1)	Development of forest roads and cable cranes in order to ship timbers	NA				S, M, L	750	250	250	250	MoAF, NRDCL, LGs			X					X	X						3					N		P	N	P
(2)	Support of modern sawmills, wood products and handicraft enterprises	FL (MoLHR, MoEA, LGs)	7, 8	Startup & CSI Development Rural Economy Development	Y	M, L	60		30	30	MoAF, LGs			X					X	X						3							P		P
(3)	Research and development of non-wood forest products and marketing promotion	FL (MoLHR, MoEA, LGs)	7, 8	Startup & CSI Development Rural Economy Development	Y	S	27	27			MoAF, LGs			X			X		X						X	4				P	P		P		P
b-5	**(Livestock-related jobs)**	FL (MoLHR,	7, 8	Startup & CSI Development	Y	S, M,					**MoAF**, LGs			X			X		X	X						4							P		P

ID	Sector and Project	Relevance of 12th FYP				Schedule[3]	Project Cost (million BTN)				Organization[4]	Realization of National Spatial Structure					Economic Enhancement				Social Enhancement			Environmental Enhancement		Total Score	Effect on GNH Nine Domains4)								
		Category[1]	Sl. No	Title	Additional[2]		Total	Short	Middle	Long		1.1 Promotion of Capital Region	1.2 Promotion of Linked Urban Centre	1.3 Vitalization in Rural Area	1.4 Vitalization in Eastern Region	1.5 Promotion of Integrated Communication Network	2.1 Enhancement of Food and Energy Self-sufficiency	2.2 Promotion of Innovative Economic Model	2.3 Creation of Job Opportunities	2.4 Creation of Job Opportunities for Young Generation	3.1 Promotion of Diversified Value of Life	3.2 Promotion of Tradition and Cultural Life	3.3 Human Resource Development	4.1 Improvement of Environmental Management	4.2 Promotion of Eco-friendly Green Technology		Psychological Well-being	Health	Time Use	Education	Cultural Diversity	Good Governance	Community Vitality	Ecological Diversity and Resilience	Living Standard
		MoEA, LGs)		Rural Economy Development		L																												
(1)	Development of cool storage warehouses for dairy products	FL (MoLHR, MoEA, LGs)	7, 8	Startup & CSI Development Rural Economy Development	Y	S, M	300	150	150		MoAF, LGs			X			X		X	X							4						P		P
(2)	Development of slaughterhouses	FL (MoLHR, MoEA, LGs)	7, 8	Startup & CSI Development Rural Economy Development	Y	L	75			75	MoAF, LGs			X			X		X	X							4	N					P		P
	(Economic generation)																																	
b-6	Project for Dzongkhag Vitalization in Eastern Region	FL (MoLHR, MoEA)	7	Startup & CSI Development	Y	S	35	35			**MoEA**			X	X				X	X			X			5				P	P	P	P	P	P
c	**Agriculture promotion**																																	
(1)	**Improvement in the Self-sufficiency Rate for Rice**																																	
	Approach 1: Area expansion																																	
c-1	Rice variety improvement and area expansion for second cropping	MoAF	1,1	Enhance cereal productivity	Y	M	456	319	137		**DoA** (ARDC, NSC), FMCL			X			X		X	X			X			5	P			P			P		P
c-2	Improvement in cultivation techniques for labour saving	MoAF	1.4	Enhance agricultural infrastructure & farm mechanization	Y	S	182	182			**DoA** (ARDC)			X	X		X	X	X	X			X	X	X	9	P		P	P			P		P
c-3	Promotion of mechanization	MoAF	1.4	Enhance agricultural infrastructure & farm mechanization		S	138	138			**DoA** (AMC), FMCL			X	X		X	X	X	X			X			7	P		P	P			P		P
	Approach 2: Yield increase																																	
c-4	Establishment of community-wildlife coexistence	MoAF	4.4	Enhance research knowledge and information management		S	226	226			**DoA** (NPPC)			X	X		X	X	X	X			X	X	X	9	P		P	P			P	P	P
c-5	Realization of the National Irrigation Master Plan	MoAF	1.1	Enhance cereal productivity		M	620	310	310		**DoA**			X	X		X		X	X			X			6	P			P			P		P
c-6	Development of soil nutrition management	MoAF	4.3	Enhance adoption of RNR technologies		S	140	140			**DoA** (NSSC)			X	X		X						X	X	X	6	P			P			P		P
c-7	Development of weed control methodology	MoAF	1,1	Enhance cereal productivity	Y	S	137	137			**DoA** (AMC, NPPC)			X	X		X						X	X	X	6	P		P	P			P		P
	Approach 4. Post-harvesting																																	
c-8	Improvement in rice milling ratio	MoAF	1,1	Enhance cereal productivity	Y	S	132	132			**DoA** (AMC, NPHC), BSB			X	X		X		X	X			X			6	P		P						P
(2)	**Promotion of Market-oriented Agriculture**																																	
	Approach 1: Strengthening of the Bhutan brand																																	
c-9	Expansion of the certification system	MoAF	FL	Organic Bhutan	Y	S	181	181			**DoA**, DAMC, BAFRA			X	X								X			3	P			P		P	P		P
c-10	Development of market-oriented post-harvesting skills	MoAF	2,1	Establish commodity value chain for RNR produce	Y	S	140	140			**DoA** (AMC, NPHC)			X	X				X	X			X			5	P			P			P		P
	Approach 2: Horticulture/medicinal and																																	

ID	Sector and Project	Relevance of 12th FYP				Schedule[3]	Project Cost (million BTN)				Organization[4]	Realization of National Spatial Structure					Economic Enhancement				Social Enhancement			Environmental Enhancement		Total Score	Effect on GNH Nine Domains4)								
		Category[1]	Sl. No	Title	Additional[2]		Total	Short	Middle	Long		1.1	1.2	1.3	1.4	1.5	2.1	2.2	2.3	2.4	3.1	3.2	3.3	4.1	4.2									
												Promotion of Capital Region	Promotion of Linked Urban Centre	Vitalization in Rural Area	Vitalization in Eastern Region	Promotion of Integrated Communication Network	Enhancement of Food and Energy Self-sufficiency	Promotion of Innovative Economic Model	Creation of Job Opportunities	Creation of Job Opportunities for Young Generation	Promotion of Diversified Value of Life	Promotion of Tradition and Cultural Life	Human Resource Development	Improvement of Environmental Management	Promotion of Eco-friendly Green Technology		Psychological Well-being	Health	Time Use	Education	Cultural Diversity	Good Governance	Community Vitality	Ecological Diversity and Resilience	Living Standard
	aromatic plant production																																
c-11	Promotion of environmentally balanced slope cultivation	MoAF	4,3	Enhance adoption of RNR technologies		S	131	131			**DoA** (NSSC)			X	X								X	X		4	P			P	P		P	P	P
c-12	Strengthening of capacity for horticulture production	MoAF	2,1	Establish commodity value chain for RNR produce	Y	S	174	174			**DoA** (ARDC), DAMC			X					X	X			X			4	P			P			P		P
	Approach 3: Infrastructure improvement																																
c-13	Improvement in farm accessibility, transportation and storage facilities	MoAF	2,1	Establish commodity value chain for RNR produce	Y	M	620	412	208		**DoA**, DAMC			X	X	X			X	X			X			6	P			P			P		P
(3)	**Nutritional Improvement**																																
	Approach 1: Awareness raising for nutrition																																
c-14	Preparation of general guidance on nutrition	MoH	2.8	Nutritional status of the general population improved	Y	S	131	131			**MoH**, DoA										X		X			2	P	P		P			P		P
c-15	Expansion of dietary education	MoE	2.9	School agriculture programme	Y	S	161	161			**MoE**, DoA										X		X			2	P	P		P			P		P
c-16	Establishment of community centres	NA			S	S	67	67			**DoA**, LG			X									X			2	P	P		P			P		P
	Approach 2: Diversification of food diet																																
c-17	Promotion of high-nutrition food and fortified food	NA				S	131	131			**DoA**, MoH			X					X	X			X			4	P	P		P			P		P
d	**Livestock promotion**																									0								
d-1	**Approach 1: Productivity improvement**	MoAF	1.6, 1.7, 1.8 1.9, 1.10	Enhance meat production Enhance egg production Enhance dairy production Enhance livestock input supply Enhance animal health and nutrition services	Y	S					**MoAF**, LGs															2						P		P
(1)	Breeding improvements in cooperation with various breeding centres/farms under the Do	MoAF	1.6, 1.7, 1.8	Enhance meat production Enhance egg production Enhance dairy production	Y	S	86	86			MoAF, LGs			X			X									2						P		P
(2)	Better feeding through fodder and pasture improvements	MoAF	1.9, 1.10	Enhance livestock input supply Enhance animal health and nutrition services	Y	S	65	65			MoAF, LGs			X			X									2						P		P
d-2	**Approach 2: Population increase**	MoAF	1.6, 1.7, 1.8	Enhance meat production Enhance egg production Enhance dairy production	Y	M					**MoAF**, LGs			X			X		X	X			X			5						P		P
(1)	Provision of animal shed construction materials	MoAF	1.6, 1.7, 1.8	Enhance meat production Enhance egg production Enhance dairy production	Y	M	43		43		MoAF, LGs			X			X									2						P		P
(2)	Expansion of facilities to provide effective artificial insemination at a reasonable price	MoAF	1.6, 1.8	Enhance meat production Enhance dairy production	Y	M	35		35		MoAF, LGs			X			X		X	X			X			5						P		P
e	**Forestry promotion**																									0								
e-1	**Approach 1: Acceleration of**	MoAF	3.1	Sustainable management	Y	S					**MoAF**, LGs			X										X	X	3						P	P	P	

ID	Sector and Project	Relevance of 12th FYP				Schedule[3]	Project Cost (million BTN)				Organization[4]	Realization of National Spatial Structure					Economic Enhancement				Social Enhancement			Environmental Enhancement		Total Score	Effect on GNH Nine Domains4)								
		Category[1]	Sl. No	Title	Additional[2]		Total	Short	Middle	Long		1.1	1.2	1.3	1.4	1.5	2.1	2.2	2.3	2.4	3.1	3.2	3.3	4.1	4.2								
												Promotion of Capital Region	Promotion of Linked Urban Centre	Vitalization in Rural Area	Vitalization in Eastern Region	Promotion of Integrated Communication Network	Enhancement of Food and Energy Self-sufficiency	Promotion of Innovative Economic Model	Creation of Job Opportunities	Creation of Job Opportunities for Young Generation	Promotion of Diversified Value of Life	Promotion of Tradition and Cultural Life	Human Resource Development	Improvement of Environmental Management	Promotion of Eco-friendly Green Technology		Psychological Well-being	Health	Time Use	Education	Cultural Diversity	Good Governance	Community Vitality	Ecological Diversity and Resilience	Living Standard
	LFMP formulation		3.3	and utilization of timber Enhance community based forest management and conservation																													
(1)	Prioritization of Gewogs where the LFMP is significantly important	MoAF	3.1 3.3	Sustainable management and utilization of timber Enhance community based forest management and conservation	Y	S	2	2			MoAF, LGs			X										X	X	3					P	P	P	
(2)	Close cooperation from the gewog administration to formulate the LFMP	MoAF	3.1 3.3	Sustainable management and utilization of timber Enhance community based forest management and conservation	Y	S	19	19			MoAF, LGs			X										X	X	3					P	P	P	
e-2	**Approach 2: Further research and marketing of NWFPs and MAPs**	FL(QPO, MoLHR, MoEA, LGs)	4, 7, 8	OGOP Startup & CSI Development Rural Economy Development	Y	S, M, L					**MoAF**, MoH, LGs, Research Institutes			X			X	X	X	X		X	X	X	X	9					P		P		P
(1)	Enabling rural residents to utilize NWFPs and MAPs	FL(QPO, MoLHR, MoEA, LGs)	4, 7, 8	OGOP Startup & CSI Development Rural Economy Development	Y	S, M	90	45	45		MoAF, MoH, LGs, Research Institutes			X			X	X	X	X		X	X	X	X	9					P		P		P
(2)	Promoting NWFPs and MAPs domestic and international market	FL(QPO, MoLHR, MoEA, LGs)	4, 7, 8	OGOP Startup & CSI Development Rural Economy Development	Y	M, L	90		45	45	MoAF, MoH, LGs			X			X	X	X	X		X	X	X	X	9							P		P
e-3	**Approach 3: Improvements in accessibility to available forest resources**																																
(1)	Better accessibility to available forest resources by improve forest road and cable crane networks.	NA		(included in b-12. Development of forest roads and cable cranes in order to ship timbers)		S, M, L	(750)	(250)	(250)	(250)	MoAF, NRDCL, LGs			X					X	X						3					N		P	N	P
f	**Tourism promotion including CSI**																																
f-1	Project for Strengthening the Capacity for Tourism Promotion in the Eastern Region	FL	6	Tourism Development	Y	S	215	215			Dzongkhag, **TCB**			X	X			X	X	X	X	X	X			8	P			P	P	P	P		P
f-2	Artist-in-residence Programme	FL	6	Tourism Development	Y	S	7	7			Dzongkhag, **TCB**		X	X	X			X	X	X	X	X	X		X	10	P			P	P	P	P		P
g	**Information technology and mechanical promotion**																																
g-1	Development of Gyalpozhing Tech Park	FL	3	Digital Drukyul	Y	S	287	287			**MoEA**, DHI, GCIT		X		X	X		X	X	X	X		X		X	9				P	P			P	P
g-2	Formulation of a Plan for Social Experiment Projects	FL	3	Digital Drukyul	Y	S	215	215			**MoEA,** DHI, GCIT			X	X	X		X	X	X	X		X		X	9	P	P	P	P		P	P	P	P
h	**Mining and manufacturing promotion**																																

ID	Sector and Project	Relevance of 12th FYP				Schedule[3]	Project Cost (million BTN)				Organization[4]	Realization of National Spatial Structure					Economic Enhancement				Social Enhancement			Environmental Enhancement		Total Score	Effect on GNH Nine Domains4)								
		Category[1]	Sl. No	Title	Additional[2]		Total	Short	Middle	Long		1.1	1.2	1.3	1.4	1.5	2.1	2.2	2.3	2.4	3.1	3.2	3.3	4.1	4.2									
												Promotion of Capital Region	Promotion of Linked Urban Centre	Vitalization in Rural Area	Vitalization in Eastern Region	Promotion of Integrated Communication Network	Enhancement of Food and Energy Self-sufficiency	Promotion of Innovative Economic Model	Creation of Job Opportunities	Creation of Job Opportunities for Young Generation	Promotion of Diversified Value of Life	Promotion of Tradition and Cultural Life	Human Resource Development	Improvement of Environmental Management	Promotion of Eco-friendly Green Technology		Psychological Well-being	Health	Time Use	Education	Cultural Diversity	Good Governance	Community Vitality	Ecological Diversity and Resilience	Living Standard
h-1	Formulation of a Mining Master Plan	MoEA	1.5	Others (Exploration of minerals)		S	215	215			**MoEA**		X						X				X	X		4				P		P			P
h-2	Project for Improving the Management of Investments	MoEA	1.5	Others (Investment promotion)		S	36	36			**MoEA**		X						X				X			3				P		P			P
i	**Inland transport development**																																	
(1)	**Formulation of a Ladder-type Arterial Road Network**																																	
i-1	NS-3-a: Gasa-Punakha	NA				L	918			918	**MoWHS**		X			X			X							3			P			P	P	P	P
i-2	NS-3-b: Punakha-Mesina	NA				L	408			408	**MoWHS**		X			X			X							3			P			P	P	P	P
i-3	NS-4-b: Trongsa-Zhemgang	NA				M	3,774		3,774		**MoWHS**		X			X			X							3			P			P	P	P	P
i-4	NS-5-a: Lhuentse-Mongar	NA				L	2,550			2,550	**MoWHS**		X			X			X							3			P			P	P	P	P
i-5	EW-1-e: Wangdue-Trongsa	MoWHS	2	Wangdue-Chuserbu, Chuserbu-Trongsa		S	4,386	4,386			**MoWHS**		X		X	X			X							4			P			P	P	P	P
i-6	EW-1-f: Trongsa-Bumthang	MoWHS	2	Trongsa-Nangar		S	2,312	2,312			**MoWHS**		X		X	X			X							4			P			P	P	P	P
i-7	EW-1-g: Bumthang-Monggar					S	6,562	6,562			**MoWHS**		X		X	X			X							4			P			P	P	P	P
i-8	EW-1-h: Monggar-Trashigan	MoWHS	2	Yadi-Lingmethang, Yadi-Trashigang		S	3,094	3,094			**MoWHS**		X		X	X			X							4			P			P	P	P	P
i-9	EW-2-a: Samtse-Phuntsholing	NA				S	2,074	2,074			**MoWHS**		X			X			X							3			P			P	P	P	P
i-10	EW-2-g: Gelephu-Panbang	NA				S	5,610	5,610			**MoWHS**		X			X			X							3			P			P	P	P	P
i-11	NS-1-b: Haa-Samtse	MoWHS	10	Construction of Haa-Samtse Highway		M	3,230		3,230		**MoWHS**		X			X			X							3			P			P	P	P	P
i-12	NS-5-b: Mongar- Nganglam	NA				M	3,332		3,332		**MoWHS**		X			X			X							3			P			P	P	P	P
i-13	EW-2-e: Lamoizingkha-Sarpang	NA				M	3,718		3,718		**MoWHS**		X			X			X							3			P			P	P	P	P
i-14	EW-2-i: Nganglam-Dewathang	NA				M	3,145		3,145		**MoWHS**		X			X			X							3			P			P	P	P	P
(2)	**Elimination of Road Closures Due to Landslides and Slope Failure**																																	
i-15	Technology Transfer Programme for Slope Protection and Tunnel (Planning, Design, Pilot Project, OJT)	MoWHS	13	Tunneling		S	22	22			**MoWHS**					X				X			X	X		4			P				P		
i-16	Landslide Treatment	MoWHS	15	Slope stabilization along National Highway		M	1,800		1,800		**MoWHS**		X			X			X							3			P				P		
i-17	Tomang Cliff Tunnel Project	NA				M	2,100		2,100		**MoWHS**		X			X			X							3			P				P		
(3)	**Securing Road Surface Properties**																																	
i-18	Technology Transfer Programme for Development of Road Structure Design Standard (Planning, Design, Pilot Project, OJT)	NA				S	22	22			**MoWHS**			X		X				X			X			4			P				P		
(4)	**Improve Bus-related Facilities to Provide an Efficient and Comfortable Service to Passengers**																																	

ID	Sector and Project	Relevance of 12th FYP				Schedule[3]	Project Cost (million BTN)				Organization[4]	Realization of National Spatial Structure					Economic Enhancement				Social Enhancement			Environmental Enhancement		Total Score	Effect on GNH Nine Domains4)								
		Category[1]	**Sl. No**	**Title**	**Additional[2]**		**Total**	**Short**	**Middle**	**Long**		1.1	1.2	1.3	1.4	1.5	2.1	2.2	2.3	2.4	3.1	3.2	3.3	4.1	4.2									
												Promotion of Capital Region	Promotion of Linked Urban Centre	Vitalization in Rural Area	Vitalization in Eastern Region	Promotion of Integrated Communication Network	Enhancement of Food and Energy Self-sufficiency	Promotion of Innovative Economic Model	Creation of Job Opportunities	Creation of Job Opportunities for Young Generation	Promotion of Diversified Value of Life	Promotion of Tradition and Cultural Life	Human Resource Development	Improvement of Environmental Management	Promotion of Eco-friendly Green Technology		Psychological Well-being	Health	Time Use	Education	Cultural Diversity	Good Governance	Community Vitality	Ecological Diversity and Resilience	Living Standard
i-19	Development of Intercity Bus Terminal	NA				S	500	500			**Dzongkhag/ Thromde**		X			X										2			P						
i-20	Development of Intercity Bus Stop (Shelter Type)	NA				M	287		287		**Dzongkhag/ Thromde**		X			X										2			P						
i-21	Introduction of Bus Information System (Centre, Location, Schedule)	NA				M	300		300		**MoIC**					X										1			P						
i-22	Incentive System for Unprofitable Intercity Line Operator	NA				M	72		72		**MoIC**								X							1			P						
i-23	Development of City Bus Terminal	NA				S	500	500			**Dzongkhag/ Thromde**	X	X			X										3			P						
i-24	Introduction of EV Bus and Quick Charging Facility for City Bus	NA				M	200		200		**Dzongkhag/ Thromde**	X	X													2			P						
i-25	Introduction of Bus Information System (Centre, Location, Schedule)	NA				M	300		300		**Dzongkhag/ Thromde**					X										1			P						
i-26	Introduction of Smart Card System	NA				M	100		100		**Dzongkhag/ Thromde**					X										1			P						
j	**Air transport development**																																		
(1)	**Strategic Development of a Second International Airport**																									0									
j-1	Comprehensive Master Plan for a Second International Airport Development and Improvements to Domestic Airports	NA				S	9	9			**MoIC**			X	X				X	X						4			P						
j-2	Improvements to Domestic Airports	MoIC	1, 2	Development and improvement of Aerodrome, Expansion of Gelephu airport		M	2,000	2,000			**MoIC**			X	X				X	X						4			P						
j-3	Development of a Second International Airport	NA				M/L	5,000		3,000	2,000	**MoIC**								X	X						2			P						
(2)	**Supplemental Transport Service to the Arterial Road Network and the Promotion of a Domestic Air Transport Service**																																		
j-4	Development of a Subsidy Scheme to Promote Domestic Air Transport Use by Local People	NA				S	72	72			**MoIC**		X		X	X			X							4			P						
j-5	Improvement in Helipads	NA				M	2,000		2,000		**MoIC**										X					1		P	P			P		P		
k	**Transport using advanced technology**																																		
k-1	Promotion of Electric Vehicles for Private and Public Transportation	NA				S/M L					**Thromde**					X		X		X			X	X	X	6			P					P	
(1)	EV-Private: Promotion of Initial Demand (Preferential Taxation, Subsidy etc.)	MoIC	5	Bhutan Sustainable Low Emission Transport System		M	72		72		**Thromde**					X		X		X			X	X	X	6			P					P	

ID	Sector and Project	Relevance of 12th FYP				Schedule[3]	Project Cost (million BTN)				Organization[4]	Realization of National Spatial Structure					Economic Enhancement				Social Enhancement			Environmental Enhancement		Total Score	Effect on GNH Nine Domains4)								
		Category[1]	Sl. No	Title	Additional[2]		Total	Short	Middle	Long		1.1 Promotion of Capital Region	1.2 Promotion of Linked Urban Centre	1.3 Vitalization in Rural Area	1.4 Vitalization in Eastern Region	1.5 Promotion of Integrated Communication Network	2.1 Enhancement of Food and Energy Self-sufficiency	2.2 Promotion of Innovative Economic Model	2.3 Creation of Job Opportunities	2.4 Creation of Job Opportunities for Young Generation	3.1 Promotion of Diversified Value of Life	3.2 Promotion of Tradition and Cultural Life	3.3 Human Resource Development	4.1 Improvement of Environmental Management	4.2 Promotion of Eco-friendly Green Technology		Psychological Well-being	Health	Time Use	Education	Cultural Diversity	Good Governance	Community Vitality	Ecological Diversity and Resilience	Living Standard
(2)	EV-Private: Installation of Quick Charging Stations	NA				M/L	29		15	15	**Thromde**					X		X		X			X	X	X	6			P					P	
(3)	EV-Public: Promotion of Initial Demand (Preferential Taxation, Subsidy etc.)	NA				S/M	72	36	36		**Thromde**					X		X		X			X	X	X	6			P					P	
(4)	EV-Public: Installation of Quick Charging Stations	NA				S/M	29	15	15		**Thromde**					X		X		X			X	X	X	6			P					P	
k-2	Drone-based Freight Transport System for Remote Areas	NA									**MoIC**			X		X		X		X			X	X	X	7		P	P			P		P	
(1)	UAV: Development of Technical Arrangements	NA				S/M	36	18	18		**MoIC**			X		X		X		X			X	X	X	7		P	P			P		P	
(2)	UAV: Development of Environmental Arrangements	NA				M	36		36		**MoIC**			X		X		X		X			X	X	X	7		P	P			P		P	
	Total						**74,082**	**36,605**	**29,937**	**7,541**																									

Note: 1) NA: A related projet1is not available in the 12th FYP. 2) Yes: A proposed project is not specified in 12th FYP. 3) Short term: ~2023, Midde term: ~2028, Long term: 2029~. 4) P: Positive effect, N: Negative effect, 5) A project in a red box is a high priority project. 4) Organization in bold letter is responsible for proposal and implementation of a proposed project.

Table 9.2 Number of Proposed Projects, Priority Projects and High Priority Projects

	Category	All Projects	Short-term Projects	Priority Projects	High Priority Projects
a	Urban development	6	6	6	3
b	Rural development	6	6	6	2
c	Agriculture promotion	17	16	14	2
d	Livestock promotion	2	1	1	1
e	Forestry promotion	3	2	2	1
f	Tourism promotion including CSI	2	2	2	1
g	Information technology and mechanical promotion	2	2	2	2
h	Mining and manufacturing promotion	2	2	2	1
i	Inland transport development	26	10	10	6
j	Air transport development	5	2	2	2
k	Transport using advanced technology	2	2	2	1
	Total	73	51	49	22

9.2 Conclusion and Recommendations from the Results of the Environmental Impact Assessment

The Environmental Impact Assessment (EIA) for the CNDP was applied by focusing on general guidance in the priority sectors and a total of 30 priority projects and programmes, although the level of impact assessment is preliminary because of a great deal of uncertainties in the individual planning. Based on the results of the EIA, the following conclusion and recommendations are made:

(a) Most of anticipated negative impacts from the implementation of general guidance and priority projects and programmes are manageable; they can be avoided and/or mitigated if appropriate prevention measures are provided in a timely manner.
(b) Among the potential negative impacts, those caused by the physical alteration of land will be significant in terms of the generation of plural types of negative impacts, such as erosion/ landslides/slope failure, deforestation, increase in pollution load on rivers including sedimentation and dust generation. In addition, the impacts of land devastation are cumulative by nature and practically irreversible if appropriate measures are not taken. Earlier remedial action is indispensable for preventing land degradation.
(c) New road construction within PAs will be required for the completion of a ladder-type road network. A strict SEA should be applied on each individual project for new road construction by comparing alternatives in terms of route, dimension, etc., including the option of "no action".
(d) As for potential impacts in socio-economic respects, the creation of conflict among stakeholders and unrest/worry among local people is anticipated in the course of spatial planning and the introduction of new technology/systems. Enough discussion and coordination with tactful explanations are effective in minimizing such conflict and anxiety at the planning stage.

(e) In the case of the necessity for land acquisition and involuntary resettlement, due to the development of infrastructure, public facilities, etc., enough coordination with tactful explanations regarding the necessity of development is indispensable in order to secure agreement from stakeholders, especially landowners. Fair compenzation shall be provided where land acquisition is inevitable, pursuant to relevant laws and regulations in Bhutan, including the Land Act (2007) and Land Rules and Regulations (2007).
(f) Forestry promotion may cause both positive and negative impacts; positive impacts include contributions to the sustainable management and utilization of forest resources, and the promotion of NWFPs and MAPs, which will further contribute to the creation of job opportunities while negative impacts include the overgathering of NWFPs and MAPs, which can lead to the extinction of plant species. The establishment of a sustainable gathering system and the cultivation of NWFPs and MAPs are required.
(g) Tourism promotion is an important enabler of economic development, especially in the Eastern Region, in Bhutan. It will, however, cause various types of negative impacts because tourism development will require such initiatives as infrastructure development and service facilities development, which may increase pollution load on rivers and the air, as well as the generation of wastes. Careful planning and management to minimize such negative impacts are expected during facility development.
(h) Mining development within the Protected Areas will be required for the exploration of tungsten. A strict SEA shall be applied to compare alternatives including the option of 'no action' in the mining master plan.
(i) Finally, as for individual plans and priority projects/programmes proposed in the CNDP, an SEA and/or an EIA should be applied in the planning and feasibility study stages, as per the requirements under the Environmental Assessment Act (2000), and other related legislations, as necessary.

CHAPTER 10 RECOMMENDATIONS FOR THE IMPLEMENTATION OF COMPREHENSIVE NATIONAL DEVELOPMENT PLAN

10.1 Implementation Structure

The government of Bhutan is expected to approve the CNDP, to share the vision of the future it presents, and to implement the policies and projects proposed in the plan. The proposals discussed in the CNDP should be reflected in various types of long-term visions, plans and strategies formulated by the government of Bhutan in the future. The existing long-term vision of Bhutan 2020 will reach to the end of the planning period. The proposed vision, objectives and strategies are expected to be converted into a new long-term vision of Bhutan 2040/2050, which the Bhutan government is contemplating. The 12th FYP (2018 to 2023) has started. The proposals in the CNDP are expected to be studied and reflected in the course of implementing the 12th FYP. GNHC will play a key role to reflect the CNDP to the long-term vision and the 12th FYP.

Among other things, the CNDP encompasses a national spatial structure, national land use, transportation and a holistic service delivery system. The National Spatial Plan, which conforms to the National Spatial Planning Act, scheduled to be enacted in the near future, is expected to be formulated based on the CNDP. The National Spatial Planning Bill will be put up in the winter session of the National Assembly in 2019. The MoWHS will utilize the CNDP to prepare the National Spatial Plan. If deliberations in the National Assembly and the budget allocation go smoothly, the National Spatial Plan will be prepared in the second half of the fiscal year 2019-2020. The legal endorsement is indispensable to the process to officially authorize the Urban Area; therefore, it is recommended that the Urban Area be legally stipulated within the framework of the Spatial Planning Act, rather than that of the Local Government Act, as it comprises commercial centres and projects towns which are not within the remit of local governments and thus not within the scope of the Local Government Act. Figure 5.2 of this report indicates how the proposed land use categories in the National Land Use Plan are interrelated with the existing legal system. The NLCS is considering the formulation of national land use zoning. The National Land Use Plan of the CNDP will be a useful reference to guide the planning direction of national land use zoning. Figure 5.2 shows how the land use categories of the proposed national land use plan are related to existing acts and regulations.

In terms of promoting the CNDP effectively, for example, it would be appropriate to allow management organizations to exercise control over special budgets (to be used only for surveys, software projects and pilot projects), to allocate budgets for policy formation involving several ministries and agencies, and to prioritize projects to be executed by local governments. One way of obtaining good results would be to experimentally execute policies and projects as model or pilot projects in order to identify the effects and issues, to make improvements and to generate successful examples, based on experience. They could then be applied widely, rather than spending long periods of time on formulating plans and strategies, and on their authorization.

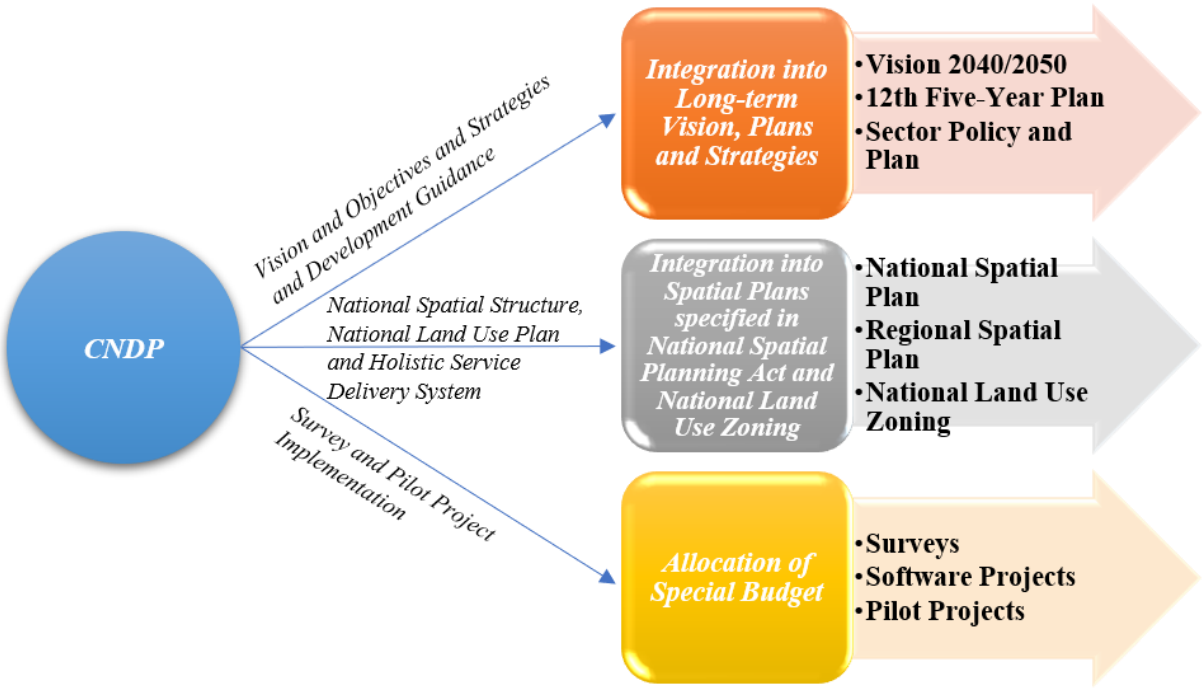


Figure 10.1 Implementation Structure for the Comprehensive National Development Plan

10.2 Monitoring System

The GNHC is a likely candidate to be the management organization that will liaise with and monitor the relevant stakeholders when implementing the CNDP. The GNHC, which has control over the 12th FYP, could additionally act as the CNDP management organization, thus integrating progress management and monitoring and implementing both plans efficiently.

The roles played by local government, and especially the Dzongkhag, will be extremely important in implementing the CNDP. Each Dzongkhag will assume an important role in actively promoting priority projects and other matters mentioned in the CNDP, while liaising with Gewogs and private-sector entities. The organization of and human resources in local governments need to be enhanced for that purpose.

Monitoring of the CNDP should be performed comprehensively and efficiently. Monitoring will be performed on the basis of the following two types of indicators. The first type covers socio-economic indicators specific to each region. The second type concerns the progress and issues relating to major policies and projects proposed in the CNDP. The data will be provided by the central ministries or local governments in charge of each policy and project.

The monitoring indicators will be prepared based on statistical surveys and operational materials. It would be desirable to conduct supplementary sampling surveys and make estimates, as required. The monitoring should be performed regularly and the results published widely to the public, instead of being shared only among government personnel.

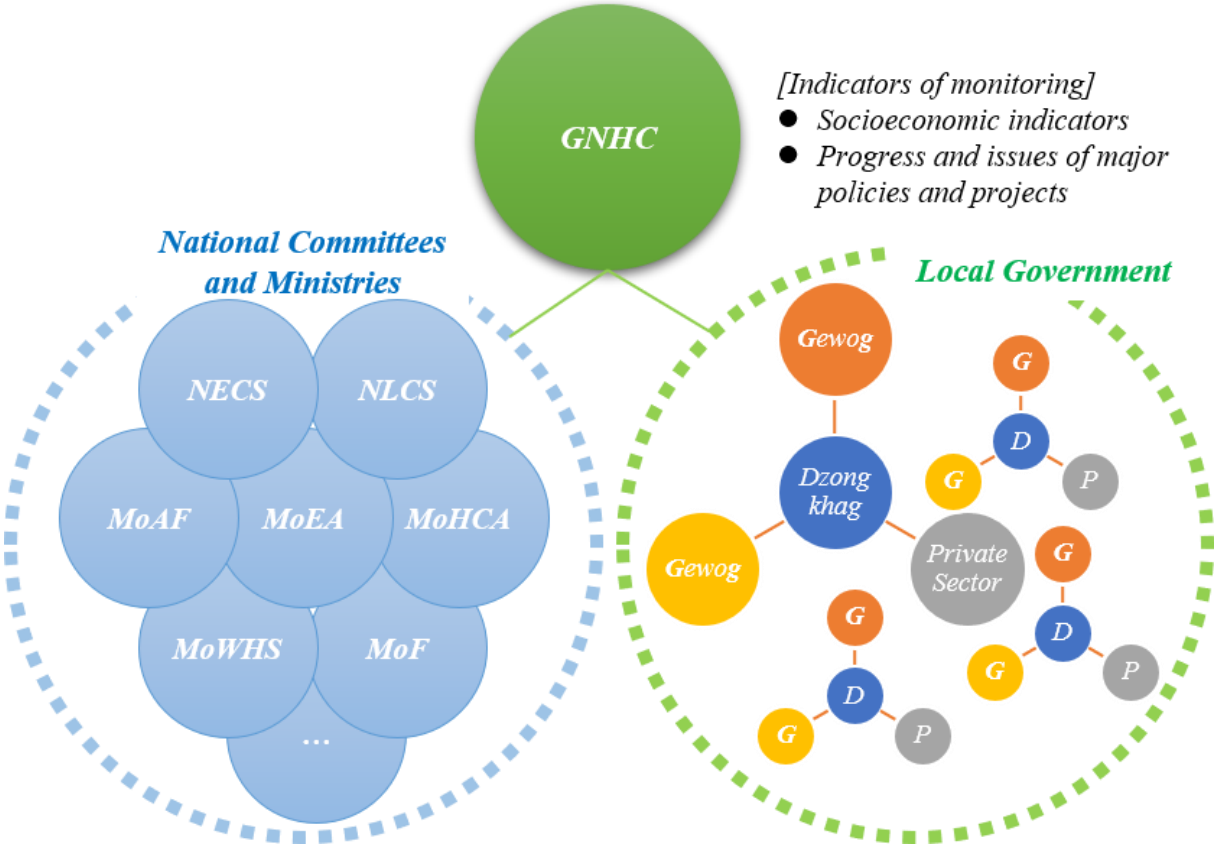


Figure 10.2 Monitoring System for the Comprehensive National Development Plan

10.3 Enhancement of Local Administration

The 12th FYP states that the capital allocation ratio to local governments will be expanded significantly to 50% from 30%. The decentralization of authority and human resources needs to be promoted to implement the FYP. The government of Bhutan is currently formulating a National Decentralization Policy, and the details are likely to be specified in its Implementation Plan.

Under the circumstances, the roles played by Dzongkhag governments will be rather important in promoting regional development pursuant to the CNDP. Economic development officers were recently assigned in every Dzongkhag government. Although their knowledge and abilities need to be improved, they could be human resources to take roles in the regional promotion. Dzongkhag governments should function as autonomous local governments and leaders in regional development, instead of local branches of the central ministries.

This plan proposes the establishment of a section in each Dzongkhag government to comprehensively promote regional development. One way of doing this would be to reorganize the current Planning Sections into Planning and Promotion Sections. The mission of the new section would be to proactively and strategically promote projects for regional development and job opportunity creation in cooperation with relevant sections, rather than merely formulating plans and monitoring indicators.

The personnel of the new section should preferably include the following staff:

(a) Promising civil servants dispatched from the central government
(b) Civil servants who have worked as National Civil Servants for a certain period and returned to their home town on their own initiative

So far, regional development in Bhutan has been promoted in order to respond to the basic needs of residents, including basic education and health and medical services. These efforts have steadily yielded results. From now onwards, it is important that they utilize local resources to either produce high-value products and sell them to markets outside their region or attract tourists from outside their region, as well as provide high-level services in addition to the above. This is the reason why the focus has been placed on the Dzongkhags. Needless to say, the roles played by the Gewogs will be most important for grass-roots democracy and reflecting local needs as experienced in towns and villages in Japan and other countries (Box 10.1). Currently, the Gewog administration and Gewog residents do not have enough human resource to promote their areas. The Dzongkhag Administration should have the primary responsibility to enhance shortage in the performance of the Gewog administration at the regional promotion through the bottom approach.

Box 10.1 Vitalization of a Remote Island: Ama Town

Ama Town is located on a remote island approximately 600 km east of Tokyo. Its population decreased from 7,000 in 1950 to 2,370 in 2010. Then, the pace of depopulation declined, as the population remained almost stable at about 2,350 for the next five years until 2015. This was due to the considerable efforts made by the town and island people to encourage migration to the island. They revitalized the senior high school by introducing a unique education programme in which the social issues on the island informed the content of the study materials for students. In-migrants have brought with them ideas, information, social networks and technology. However, those efforts were initiated by town officials and local people for a long time. This is one of the examples of rural development in Japan, where many towns and villages are engaged in promoting their local areas.

Source: Google

Figure B10.1 Location of Ama Town

Source: Ama Town

Figure B10.2 Immigrants in Ama Town

Enhancement of local government self-reliance through own-source revenue generation

In order to promote decentralization, local governments will need to increase their own sources of revenue and enhance fiscal independence. This point is also discussed in the National Decentralization Policy. In reality, however, independent sources account for less than 1% of local government revenue. Even though it is understood to be difficult for Dzongkhags and Gewogs in the Rural Area in obtaining large-scale sources of revenue, there is sufficiently high potential in the Urban Area.

Land holding tax and real estate tax function to secure fiscal resources for urban development and infrastructure improvement, to suppress land speculation, and to return to society the profits from development (i.e., unearned income). Land lots with high economic value should be taxed

heavily, which would also help to eliminate dissatisfaction among landowners whose lands are designated as UMAs, as proposed in the CNDP, and subject to strict controls.

Furthermore, an increase in burden should also be considered for those who possess an automobile, use petrol and park their automobile in public spaces, in order to control automobiles that crowd the Urban Area. This would be effective in helping to secure fiscal resources for improving road maintenance and public transportation systems and improving the urban environment, in addition to curbing precious foreign exchange outflows.

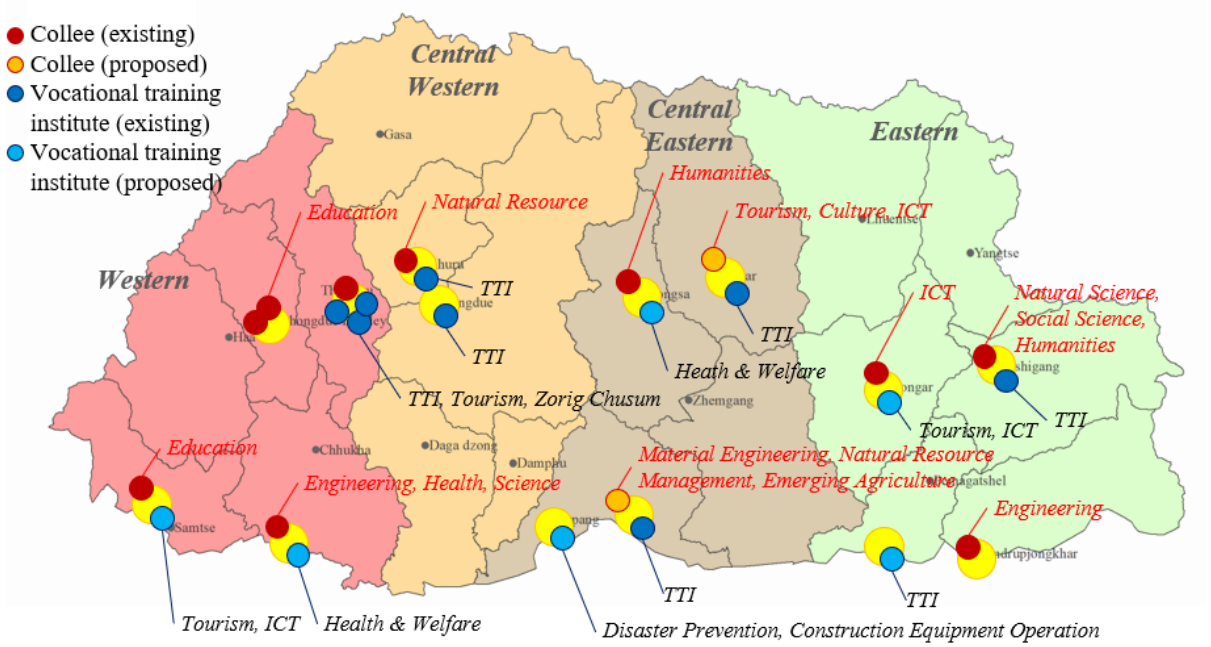
As Thimphu and other cities build up their own sources of revenue, budgets for urban development and urban infrastructure improvement could be secured, making it possible to allocate national budgets with a priority for developing the Rural Area where the level of GNH is low. It is necessary to look into revision taxes and other fiscal incentives as the first thing to consider if those suggestions are acceptable in the taxation system in Bhutan.

10.4 Enhancement of Higher Education

(1) Tertiary Education

The Royal University of Bhutan (RUB) has adopted a policy of distributing distinctive colleges in each region. In each college, students need to select one course and take compulsory classes on each course.

For developing human resources who will contribute to regional development, the policy of equilibrium nationwide, i.e., not concentrating colleges in specific regions, is rather important. New colleges are proposed for the LUCs (Figure 10.3). In order to utilize limited talented personnel effectively, it is necessary to shift to a cross-disciplinary or an inter-disciplinary system. In addition, the number of teachers should be increased.



Note: TTI includes civil, electrical and mechanical engineering.

Source: Modified from a table published by the Ministry of Education (2017)

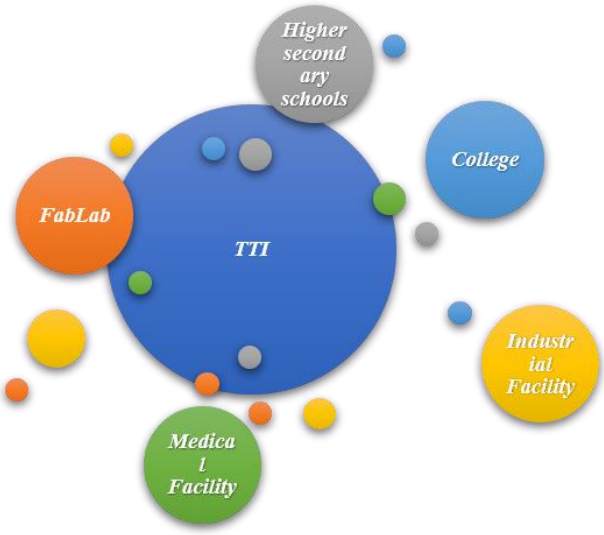
Figure 10.3 Proposed College and Vocational Training Institutes

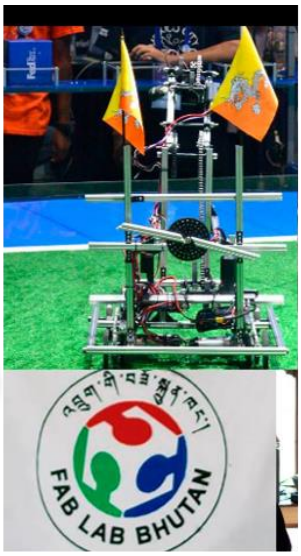
(2) Technical Education

The Technical Training Institute (TTI) has been positioned as a higher education institution.

The future TTI will aim to train human resources in each region based on the issues and strengths of region. It is necessary to create spaces for collecting and training talented people who are interested in manufacturing, even if the scale is small, such as in the case of a fab lab[11], in each region. This kind of place will be positioned as the base f or a regional industrial incubation centre. Collaboration with other facilities such as colleges, higher secondary schools, medical facilities or industrial facilities, can be the one of the solutions in the face of limited national budgets (Figure 10.4). The priority sector will cover the following fields.

(a) Engineering sector
 i) Engineer
 ii) Disaster prevention expert
(b) Medical sector
 iii) Medical doctor
 iv) Nurse, care worker
(c) Tourism sector
 v) Chef
 vi) Service staff
(d) ICT sector
 vii) Programmer
 viii) System engineer
 ix) Graphic designer
 x) Business entrepreneur
(e) Regional development sector
 xi) Regional development expert





Druk-Bot was developed by three young people at the **FabLab** Bhutan. It moved into the quarter-finals in the First Global Robotics competition in Mexico held August 2018. The Druk-Bot was ranked 17th out of 161 participating countries. (Source: FabLab Bhutan)

Figure 10.4 Technical Training Institute (TTI) with a Fab Lab, in Collaboration with a College, Medical Facility and Industrial Facility, for Human Resource Development

10.5 Contribution of the Comprehensive National Development Plan to Improving the Gross National Happiness Index

The impact of the proposed projects on the nine domains of the GNH is assessed in a qualitative manner. As shown in the project list in Chapter 9, the effect on the nine domains has been evaluated for each project. Furthermore, in order to evaluate the proposed project's impact on the realization of national spatial structure and economic and social enhancements, 14 evaluation criteria have been established. A project having an impact on either the promotion of the Capital Region or the promotion of Linked Urban Centres, among the evaluation criteria, is evaluated to improve the Urban Area. The impact of other projects on either vitalization in

[11] Bhutan's first fab lab was opened in July 2017. A fab lab is a network platform for makers, inventors, artists, researcher, entrepreneurs and creative people. The fab lab has digital machine and manual tools to experiment with turning ideas into products. There are 411 fab labs in 75 countries as of January 2019 (http://wiki.fablab.is/wiki/Portal:Labs).

the Rural Area or vitalization in the Eastern Region is evaluated as contributing to the Rural Area. In turn, the impact of the proposed projects is assessed for each domain in the Urban Area and the Rural Area (Table 10.1 and Table 10.2). The proposed project will improve the low-index domains of education, ecological diversity and living standards in the Rural Area. It will also help in upgrading the low-index domains of cultural diversity and community vitality.

Table 10.1 Impact of the Proposed Projects in the Comprehensive National Development Plan on the Nine Domains in the Rural Area

Domain	Urban development	Rural development	Agriculture promotion	Livestock promotion	Forestry promotion	Tourism promotion including CSI	Information technology and mechanical promotion	Mining and manufacturing promotion	Inland transport development	Air transport development	Transport using advanced technology	Impact
Psychological Well-being	X	X	X			X	X					・Resolution of local issues such as wildlife conflicts, labour saving, and support for the elderly will lead to increased happiness. ・Enhancement of culture and community vitality will increase a feeling of satisfaction about living in the Rural Area.
Health	X	X	X				X				X	・Provision of medical services will improve access to medical facilities. ・Improving medical services in Regional Centres will improve access to better medical services for people in the Rural Area within their region. ・Application of IT and UAVs will improve medical services in the Rural Area and remote areas. ・Promotion of dietary education will diversify dietary habits.
Time Use	X	X	X				X		X	X	X	・Improvements in water supply, education and transport including UAVs will ease the burden and time spent on a daily basis on activities such as carrying water, going to school and going to a market. ・Application of IT will broaden the range of options related to communication, commercial dealings and social services. It will diversify how time is used.
Education	X	X	X			X	X	X	X			・Improvements to transport and education facilities will improve access to education in the Rural Area. ・Development of higher education in Regional Centres will support people in the Rural Area in finding higher education in the region where they live. ・Provision of higher education relevant to engineering, IT, medical care, tourism and regional development will produce graduates who can address pertinent issues in the Rural Area.

Cultural Diversity	X	X	X		X	X	X					・Resource management of NWFPs by the community will enhance the importance of lifestyle with a strong sense of connection with nature. ・Tourism will be promoted as a vehicle for regional development. This tourism development will increase the recognition of culture and history in the Rural Area.
Good Governance			X		X	X	X	X	X		X	・Establishment of a certification system will promote speciality produce from agriculture, forestry, livestock and NFWPs. This will promote competition in the market and enhance pride in the community. ・Preparation of a mining master plan will be a useful tool to supervise mining development.
Community Vitality	X	X	X	X	X	X	X		X			・Promoting agriculture, livestock, forestry and tourism will result in strong community ties. ・Making the people more conscious of history and culture will increase interest in participating in the community. ・Dealing with an issue in the community will strengthen bonds within that community.
Ecological Diversity and Resilience		X	X		X		X		X		X	・Resolution of wildlife conflicts will improve a sense of connection with nature. ・Forest will be managed in an appropriate manner in accordance with the Land Forest Management Plan and the National Land Use Plan.
Living Standard	X	X	X	X	X	X	X	X	X			・Improvements to water supply, sanitation and electricity supply will improve the living environment in the Rural Area. ・Enhancing economic activities in agriculture, livestock, forestry, NWFP and tourism will diversify job opportunities and raise household income in the Rural Area. ・Application of IT and other appropriate technology will achieve labour-saving outcomes in agriculture. ・Transport development will improve access to social services and markets.

Table 10.2 Impact of Proposed Projects in the Comprehensive National Development Plan on the Nine Domains in the Urban Area

Domain	Urban development	Rural development	Agriculture promotion	Livestock promotion	Forestry promotion	Tourism promotion including CSI	Information technology and mechanical promotion	Mining and manufacturing promotion	Inland transport development	Air transport development	Transport using advanced technology	Impact
Psychological Well-being	X					X						・The way of life will be diversified and enhanced in the Urban Area and Regional Centres where education and medical services and industry are accumulated. ・Appreciation of local culture and history will improve the sense of satisfaction with life in line with tourism promotion.
Health	X											・Improved medical services in Regional Centres will improve medical services in the Urban Area in each region.
Time Use	X								X	X		・Improvements to the national highway, public transport and air transport will reduce the travelling time in the Urban Area and between towns.
Education	X					X	X					・Development of higher education in Regional Centres will improve higher education in the Urban Area in each region. ・Higher education will produce graduates who will support growing industries, such as tourism and IT.
Cultural Diversity	X					X	X					・Urban development and tourism development will be carried out to produce the characteristics for each Urban Area. This characterization will enhance recognition of the importance of culture and tradition.
Good Governance						X			X			・Local government will support the efforts of the private sector and residents to promote tourism and regional development.
Community Vitality	X					X			X			・Local government, the private sector and residents will deal with urban development and tourism promotion. Participation from a broad range of stakeholders will strengthen unity among individuals.
Ecological Diversity and Resilience	X						X		X			・Spatial plans for the National Capital Region and Structure Plan will help to create human settlements in an orderly and balanced way between the Urban

												Area, the Rural Area and nature. ・ Research and development in IT and advanced technology will be applied to overcome natural disasters and wildlife conflicts.
Living Standard	X					X	X		X			・ Development of Regional Centres will provide bases for social services and economic activities. ・ Tourism and IT will generate job opportunities in the emerging industries.

10.6 Contribution of the Comprehensive National Development Plan to Improve the Sustainable Development Goal Index of Bhutan

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 to equate to 83rd place among the 156 countries in the world. Bhutan's index score was 65.4 which is better than the regional average score of 64.1 in East and South Asia.

To assess a country's progress in terms of a particular indicator comprising respective SDGs, progress is classified into 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 increasing distance from SDG achievement. The red band is bound at the bottom.

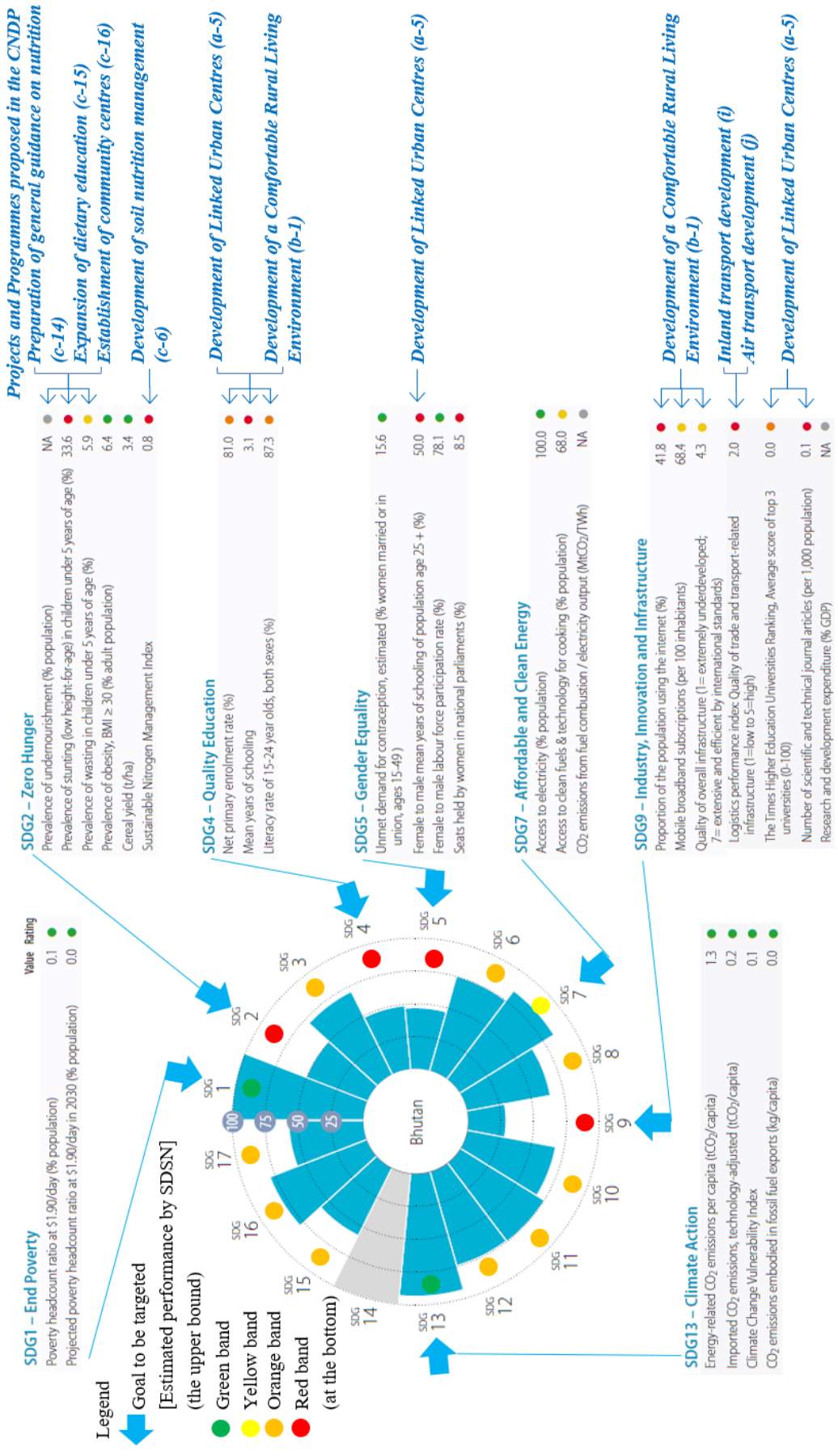
The two goals of SDG 1 End Poverty and SDG 13 Climate Action are rated within the green band as, in Bhutan, progress has reached the level of achievement. The four goals of SDG 2 Zero Hunger, SDG 4 Quality Education, SDG 5 Gender Equality and SDG 9 Industry, Innovation and Infrastructure are rated in the red band. Those goals need to see significant improvement. Yet, SDG 7 Affordable and Clean Energy has a relatively good status since it is rated according to the yellow band.

Figure 10.5 shows the estimated performance by indicator according to the SDGs, where achievement is rated in green, yellow and red bands. Among the red band goals, SDG 4 calls for an established education service for the public. This is an important approach in order to foster quality human resources in a country with a small population. Yet, SDG 9 needs to see improvements in terms of the Internet and logistics. Due to the mountainous topography and landlocked location, considerable investment is required to create well-established logistics. However, a high-grade Internet system is a good solution for Bhutan. For SDG 5, female-to-male mean in terms of years of schooling among the population is lower than the average for 181 countries. Seats held by women in the national parliament is limited: there are only six women among the 47 cabinet and parliamentary members following the national election in 2018. This could highlight a broader gender inequality. Meanwhile, the number of female students is larger than that of male students in lower, middle and higher secondary schools (Annual Education Statistics 2018, Ministry of Education). In the case of tertiary education, the number of male students, in contrast, is larger than that of female students. The female already holds seats of members in the national parliament. Yet, Bhutan has adequate female human resources in secondary education which will resolve gender inequality in the near future.

Efforts to improve performance are made to reflect the state of affairs in Bhutan. It takes some time to improve the performance for all 16 goals excluding SDG 14 (this focuses on life below water which is not relevant to Bhutan). However, the implementation of the CNDP will help to

improve the indicators of the red band goals when its proposed projects and programmes are realized. Those projects include nutrition improvement and soil nutrition management, which contribute to SDG2. Improvements in living standards and the establishment of a holistic service system, along with an enhanced education system will upgrade the level of the net primary enrolment rate, literacy rate and mean years of schooling in line with SDG3. The proposals for an integrated communication network will improve logistics performance, while the proposed linkage with international academia will enhance research and development. Those will improve the level of achievement with regard to SDG9.

Many countries have initiated efforts to find ways to achieve the SDGs. They are still at the stage of learning through trial and error. Stakeholders include local governments, the private sector, citizens and social communities. Participation by different types of organizations is must to establish an effective system for sustainable development. In common with other countries, Bhutan will need to develop an institutional framework involving local governments, which links the people and the private sector under the initiatives of the GNHC.



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

Figure 10.5 Contribution of the Comprehensive National Development Plan to Improve the Sustainable Development Goal Index of Bhutan