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**National Land Use Zoning
Implementation Guidelines 2018**



National Land Commission Secretariat
Royal Government of Bhutan

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Foreword

Bhutan is a small land locked and mountainous country sandwiched between India and China. Its rugged terrain with limited arable land calls for sustainable and prudent use of the scarce land resource for various developmental activities. While the Bhutanese should uphold the Constitutional requirement of a minimum of 60% of total land area to be maintained under forest cover for all times, we must make optimal use of land for socio-economic development purposes.

There is an urgent need to assess the present and future needs of land by evaluating its capability to meet the competing demand for its uses. Without compromising both the former and the latter, we must strive towards adopting sustainable options in choosing those that bring about the desired socio-economic and environmental well-being of our citizenry. To meet this end the National Land Use Zoning (NLUZ) exercise shall be a crucial part of our national interventions.

A guideline is formulated for NLUZ exercise with the purpose to consolidate the stakeholders' collaborations and cooperation in bringing about a common consensus in making priorities and delineating zones for different land uses according to its best suitability and capability. It is to foster better coordination amongst the implementing agencies and establish succinct approach in the National Land Use Zoning project. This guideline will facilitate the coordinating agency and other stakeholders in planning, implementing, monitoring and evaluation of NLUZ and serve as a reference in future to guide for any land use zoning exercises. The outcome of the NLUZ would provide a scientific basis for good land governance and facilitate the derivation of spatial vision for the country's overall development.

However, as the National Land Use Zoning exercise is first of its kind beyond the Local Area Plans in major urban areas, there may have subtle inadvertent oversights in the guideline due to human considerations. Nonetheless, for any situation of contraventions, the national interest shall always be placed highest priority over individual wants and sectoral preferences and conflicts in land uses.

In order to successfully complement NLUZ exercise and to come up with a harmonious and mutually inclusive strategy for optimum utilization of the limited and priceless land, I solicit far-reaching collaboration, cooperation and commitment from the cross-sectorial agencies including the grassroots participation.

TASHI DELEK!



(Pema Chewang)
Secretary

ACRONYMS

AKRA	Agency Key Result Areas
DEM	Digital Elevation Model
EDP	Economic Development Policy
FYP	Five Year Plan
GDP	Gross Domestic Product
GNH	Gross National Happiness
GNHCS	Gross National Happiness Commission Secretariat
SRF	State Reserve Forest
IPCC	Intergovernmental Panel on Climate Change
INDC	Intended Nationally Determined Contribution
JICA	Janpan International Cooperation Agency
LDN	Land Degradation Neutrality
LULC	Land Use Land Cover
MCDA	Multi Criteria Decision Analysis
M&E	Monitoring & Evaluation
MoAF	Ministry of Agriculture and Forests
MoEA	Ministry of Economic Affairs
NECS	National Environment Commission Secretariat
NKRA	National Key Result Areas
NLCS	National Land Commission Secretariat
NLUZ	National Land Use Zoning
NSB	National Statistical Bureau
NSDI	National Spatial Development Infrastructure
NSSC	National Soil Services Centre
PA	Protected Areas
PMO	Project Management Office
RS	Remote Sensing
SGNH	Strategic Gross National Happiness
THPP	Targeted Household Poverty Program
TWG	Technical Working Group
UN	United Nations
NHLC	NLUZ High Land Committee Meeting

1. EXECUTIVE SUMMARY

The National Land Use Zoning (NLUZ) exercise will enable establishment of a harmonized national land use system. It will revalidate and delineate the existing National Parks, Biological Corridors, Agriculture Land, Industrial Areas, Human Settlements, Heritage Sites and others based on consultation with concerned sectors. The exercise will identify and designate dysfunctional and functional land for developmental activities. Further, online geo-database and maps of national zoning will be developed to facilitate spatial decision-making process. Besides providing sound basis for the determination of land use ordinances and enforcement, it will also provide impetus to the people to make optimum, judicious and sustainable use of the limited land resource.

The NLUZ will not only address above issues and concerns but will eventually establish spatially enabled land governance system for an integrated socio-economic development. A systematic land governance would ensure food security, economic self-reliance, and most importantly the optimal use of limited land resources for sustainable socio-economic development in the country. This in turn would reduce dependency, and secure and strengthen national sovereignty.

The NLUZ exercise in summary will constitute three phases for the entire cycle as follows:

Phase I (2017 – 2019)

- i. Establish Project Management Office (PMO);
- ii. Development of NLUZ implementation guidelines;
- iii. Conduct stakeholder consultation and adoption of NLUZ guidelines;
- iv. Parameterize each land uses by the concerned agencies based on the capability/ suitability assessment and submit to NLCS/ PMO;
- v. Carry out Land Use Land Cover (LULC) mapping lead by MoAF & NLCS; and
- vi. Implement pilot exercises at least in two Dzongkhags.

Phase II (2019– 2021)

- i. Review pilot exercises;
- ii. Based on the pilot exercises, zoning for entire country shall be carried out and produce national zoned maps;
- iii. Develop draft National Land Use Strategy; and
- iv. Submit for approval of the Royal Government.

Phase III (2021 – 2023)

- i. Review the Land Act 2007 and other relevant land use acts/ policies/ rules and regulations to incorporate and harmonize the provisions of NLUZ;
- ii. Submit for amendment of the Land Act 2007 as appropriate, and
- iii. Advocate, publicize and sensitize about the NLUZ and amended acts/ policies/ rules and regulations.

Considering the importance of NLUZ for the country, National Land Commission Secretariat (NLCS) had initiated and convened the first High Level Consultation (HLC) meeting to discuss on the matter. This was followed by stakeholder consultations to seek further directions and way forward. The general consensus of the consultation has fostered urgent need to take up NLUZ. Accordingly, the TWG was formed and the concept paper was developed. The concept paper was presented to the 14th Gross National Happiness Commission (GNHC) meeting. The commission meeting approved the proposal and directed NLCS to undertake NLUZ as a project.

As highlighted in Phase I of the NLUZ exercise, this guideline is developed to ensure better coordination amongst the stakeholders in the implementation of NLUZ. The guideline includes implementation arrangements with corresponding roles and responsibilities of the stakeholders. Further, it details out the implementation strategy, framework cycle, action plan and monitoring and evaluation processes.

2. INTRODUCTION

Bhutan has 664,000 acres (7% of the total land area) of arable land, out of which about 500,000 acres have been utilized and registered on freehold with a balance of approximately 164,000 acres. Further, about 8,344 acres of state land has been leased out for socio-economic developmental activities, such as, mining, commercial, business, and pasture (tsamdro) developments. In addition, there is an ever-increasing pressure on limited land from accelerated socio-economic development activities taking place in the country, such as, construction of farm roads, electricity transmission/distribution lines, industries and urbanization (BSOE NEC 2016).

The scarcity of arable land is a huge concern for the country, which was explicitly highlighted by His Majesty the King during the 109th National Day on 17th December, 2016. Thus, an efficient and judicious use of the limited land by the key stakeholders through proper integrated zoning has become so crucial for an overall sustainability and to safeguard the national food security by enhancing food production in the country.

The National Action Program (NAP) to Combat Land Degradation mentions “at the macro-level and as a cross-sectoral issue, the policy perspective on national land use and management is presently lacking (NAP, 2010). Consequently, the conflicts of land uses between various sectors persist and in many instances, defy land capability.” It states that programs and activities for proper land use and management have remained compartmentalized within various sectors. There is also a lacuna in the institutional setting with respect to the overall coordination and management of the technical aspects of land use. For instance, random and haphazard development within the vicinity of heritage sites at times results in losing of important cultural heritage to other socio-economic development uses. At the moment, in the absence of proper zonation of areas for specific purpose, it has been extremely difficult for the competent agencies to regulate such developments. NLUZ has been initiated as one of the major collaborative activities in the 11th FYP and will be spilled-over to the 12th FYP as one of the key cross-sectoral performance indicators. NLCS in close consultation with GNHCS shall lead the coordination of this particular program.

This exercise shall broadly ensure nationwide spatial integration and establish coherent zoning ordinances to facilitate and boost the SmartGrowth of the country, without undermining the carrying capacity of the land and its environment. The NLUZ can be used for monitoring, multi-disciplinary policy making and suitability mapping of the scarce resource of land in the country.

2.1. Rationale

On 16th September 2014, during the grant of land kidu in Zhemgang Dzongkhag, His Majesty the King emphasized that the land is central to the lives of the people since

it is the primary sources of food, shelter and clothing. His Majesty went on to state that the land provides security of inheritance to individuals and families which in turn would augment the socio-economic development and wellbeing of the nation. This overarching concern is upheld in numerous national and international obligations in the light of land as being the most important component of the environment in addition to its indispensability as the critical factors of production. The Intergovernmental Panel on Climate Change (IPCC) states that the mountainous countries will experience a decline in crop yield due to increase in water stress (either too much or too little) and land degradation (IPCC, 2007). Recognizing soil as the largest terrestrial soil organic carbon (SOC) storage, Bhutan's Intended Nationally Determined Contribution (INDC) mentions that the soil and land development as a means to both mitigate and adapt to climate change and ensure continuous ecosystem services (INDC, 2015).

According to the National Biodiversity Strategies and Action Plan (NBSAP), the incomplete physical zonation of the Protected Areas (PA) has resulted in an ad hoc zoning of services/facilities and resource extraction, at times, challenging the conservation objectives and policies and therefore recommends to complete zonation of the PA by 2018 (NBSAP 2014).

The State of the Environment 2016 recommends identification and prioritization of critical forests, habitats, and watersheds; completion of land capability mapping at the earliest to identify areas that can sustainably support various uses such as agriculture or other development activities; and demarcation of boundaries of all PA on the ground by the end of 11th FYP.

Further the following policies and legal provisions emphasize the need for NLUZ exercise:

- i. Article 5 (b) of the Constitution of the Kingdom of Bhutan 2008 states, "The Government shall ensure a minimum of 60% of total land area is maintained under forest cover for all time.";
- ii. The Economic Development Policy of the Kingdom of Bhutan 2016 requires NLC to prepare a national land use plan for State Reserve Forest Land outlining use of land for optimal use by 2018 and all relevant sectors are mandated to provide sectoral parameters to NLC by 2017;
- iii. The Bhutan National Adaptation Program of Action (NAPA) 2006 entails clear zoning of vulnerable areas of natural hazards;
- iv. Section 303 of the Land Act of Bhutan 2007 requires assessment of present and future needs by evaluating the land's capability to supply them; identifying and resolving conflicts between competing uses, between the needs of individuals and those of community, and between the needs of the present generations and those of future generations; and seeking sustainable options and choosing those that bring about the desired economic, social and environmental wellbeing of the citizens of Bhutan; and

- v. Bhutan National Human Settlement Strategy 2017, aims to ensure an integrated and regionally balanced development of settlements, both rural and urban inclusive of environmental conservation, preservation of culture and decentralization to promote participatory development.

Despite these mandates and provisions enshrined in various national documents, socio-economic development activities continue to take place in a sporadic manner impacting the state of natural environment. This is however largely due to lack of proper NLUZ put in place in the country. Therefore, in order to have a more sustainable socio-economic development, it is imperative to have a sound NLUZ system put in place to judiciously harness our limited land resources, based on their potential, to provide various ecosystem services for the well-being of the present and future generations.

Moreover, an essential point of take-off for NLUZ at present is to take advantage of the comprehensive national cadastral data/information that NLCS houses along with the completion of the 1: 25,000 scale topography base mapping with JICA's support. These two elements shall be the basis for comprehensive Land Use Land Cover (LULC) mapping to undertake the NLUZ exercise. Further, the Geo – Information (GI) Policy of Bhutan is also being drafted by the NLCS in collaboration with the Centre for GIS Coordination (CGISC) and advisory support from the Netherlands, which will be the overall policy framework for the National Spatial Data Infrastructure (NSDI) in the country.

3. GUIDING PRINCIPLES

This guideline has been developed based on the following six main principles:

- a. Optimize the use of different land resources based on their capability/potential;
- b. Minimize land degradation, ensure sustainable agriculture, reduce climate change, and enhance ecosystem services through appropriate land use system;
- c. Ensure constitutional requirement of 60% forest cover at all times;
- d. Safeguard food and nutrition security;
- e. Enhance socio-economic development while ensuring environment wellbeing;
- f. Ensure sustainable land resource and environment management to enhance resilience to climate change;
- g. Promote sustainable and regional balanced socio-economic development; and
- h. Promote Smart Growth, habitats and preserve heritage sites.

4. PURPOSE OF THE GUIDELINE

- a. To foster better coordination amongst the implementing agencies;
- b. To establish clear approach in implementing NLUZ project;
- c. To facilitate PMO and other stakeholders in planning, implementing, monitoring and evaluation of NLUZ; and
- d. To serve as future reference and guide for any land use zoning exercises.

5. OBJECTIVES OF NLUZ

Broadly the objectives of NLUZ embrace the overall objectives of Strategic Gross National Happiness (SGNH) that underlines better quality of life for the people, a strong and competitive economic position, and an environment of the highest quality. Specifically, the NLUZ inspires to achieve the following objectives:

- a. To establish a harmonized national land use system in the country;
- b. To revalidate and delineate designated areas, viz. wetlands, parks and protected areas, biological corridors, agriculture land, human settlements, industrial e states, heritage sites and many more for better management;
- c. To designate dysfunctional and functional land for any categories of development;
- d. To establish sound online database and maps of national zoning to facilitate scientific based decision-making process;
- e. To make optimum, rational and sustainable use of limited land by discouraging competition and avoiding land use conflicts;
- f. To provide scientific basis for land governance;
- g. To facilitate the establishment of land use ordinances and enforcement; and
- h. To optimize the use of different land resources based on their potential.

6. IMPLEMENTATION STRATEGY

NLUZ exercise shall be implemented as core mandate of the NLCS as it forms an essential part of NSDI development and spatially enabled land governance. As land in general cuts across all sectors, NLUZ initiatives involve multi-stakeholder participation. To foster better coordination and ensure efficiency, effectiveness and accountability in the NLUZ implementation, the guideline outlines the institutional structure and roles and responsibilities of every stakeholder.

6.1. Institutional Structure

The institutional structure, as presented in Figure 6.1, intends to enhance the stakeholders' participation, ownership, and accountability across the relevant agencies in NLUZ implementation. However, NLCS shall be the overall lead agency, while constant guidance and support shall be sought from the GNHCS and concerned agencies.

However, in the process of the implementation, based on the need the guideline shall ensure required institutional restructuring through timely amendment and consultations.

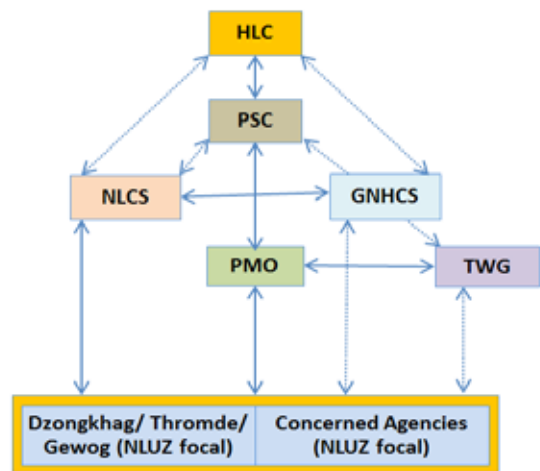


Figure 6.1: Institutional structure for implementing NLUZ

6.2. Roles and responsibilities

The implementation of the NLUZ activities requires multi-sectoral involvements beyond the scope of the institutional structure, the guideline include roles and responsibilities of the key stakeholders as follows:

6.2.1 High Level Committee

- Shall be chaired by the Secretary, GNHCS with the head of the relevant agencies as members;
- Shall serve as national level decision making committee for NLUZ;
- Address any submissions by the PSC;
- Ensure cross – sectoral harmonization in NLUZ implementation;
- Take part in annual and terminal review of the NLUZ implementation;
- Resource mobilization; and
- Resolve inter sectoral conflicts, if any.

6.2.2 Project Steering Committee

- a. Shall be chaired by the Secretary, NLC with the nominees from the relevant agencies as members;
- b. The committee shall meet on quarterly basis and as deemed necessary by the chair;
- c. Shall endorse annual work plan and budget;
- d. Guide and ensure effective functioning of PMO;
- e. Review, resolve and act on the PMO submission;
- f. Decide on human resource development for the NLUZ;
- g. Endorse submission of the PMO that merits HLC's approval;
- h. Quarterly review of the NLUZ implementation; and
- i. Resolve inter-sectoral conflicts, if any.

6.2.3. National Land Commission Secretariat

- a. Provide necessary support to PMO for its smooth functioning;
- b. Develop Terms of Reference for the PMO and seek endorsement from PSC;
- c. Provide dedicated manpower, office space and support facilities;
- d. Develop the national land use strategy; and
- e. Develop national land use rules & regulations (ordinances).

6.2.4 Gross National Happiness Commission Secretariat

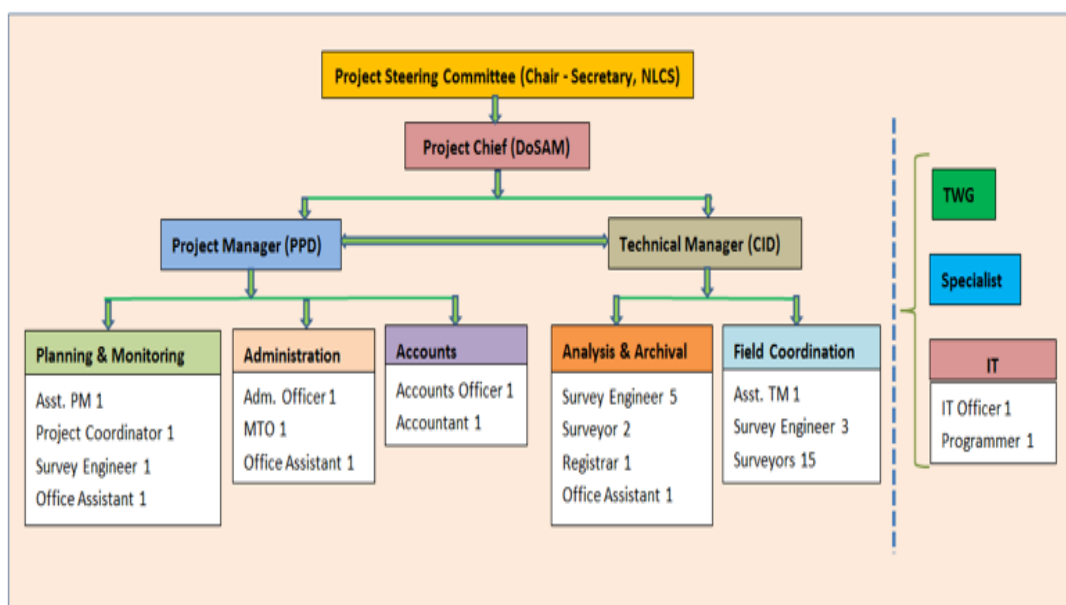
- a. Spearhead spatial envisioning exercises and align with the national goals and vision;
- b. Endorse additional land use themes (zones), if need be, beyond what is prescribed in this guideline;
- c. Explore donor support and carry out budgeting; and
- d. Conduct/ lead/ coordinate the Evaluation of NLU.

6.2.5 Project Management Office

The PMO will be based at the NLCS (Figure 6.2.5) and will be coordinating the implementation of NLUZ activities with the following mandate:

- a. Coordinate HLC, PSC and TWG meetings as and when required;
- b. Coordinate field monitoring and ensure effective implementation of the zoning exercises;
- c. Submit quarterly progress report to PSC;d. Ensure fund position in close liaison with the funding agency and relevant stakeholders;

- e. Work closely with the agencies and zoning focal persons on information/ data consolidation and reporting.
- f. Besides, PMO shall execute the following key technical activities:
 - i. Receive, review and finalize sectoral land use parameters involving the TWG and concerned agencies;
 - ii. Sensitize/ stakeholder consultation on NLUZ;
 - iii. LULC production in collaboration with the Ministry of Agriculture and Forests.
 - iv. Acquisition of satellite imageries, topographical and agro-metrological data; and
 - v. Coordinate data processing, in-situ data collection (field work), modeling and classification, field validation and mapping.



6.2.6 Concerned Agencies

- a. Ensure TWG participation;
- b. Identify agency NLUZ focal person, preferably from PPD;
- c. Carry out land use parameterization based on the capability/ suitability assessment at agency level and submit to PMO/ NLCS;
- d. Ensure sharing existing land use datasets to PMO/ NLCS;
- e. Take part in NLUZ coordination meeting, including resolving negotiation for competing/ conflicting land use cases as and when called for; and
- f. Ensure annual budgeting for NLUZ related activities at the agency level.

6.2.7 Dzongkhag Administration & Thromde

- a) Support for the field work in implementing NLUZ data collection and validation exercises;
- b) Participate in land use parameterization exercises carried out by concerned agencies;
- c) Participate in negotiation for competing/ conflicting land uses;
- d) Ensure local government level sensitization and awareness on NLUZ and NLUZ implementation; and
- e) Support grassroots awareness on NLUZ implementation.

6.2.8 Gewog Administration

- a) Support and take part in NLUZ field work;
- b) Ensure community participation on NLUZ activities, including land use parameterization; and
- c) Participate in negotiation for competing/ conflicting land uses.

6.2.9 NLUZ Technical Working Group

- a. TWG meeting shall be chaired by Project Chief;
- b. Convene TWG meeting as and when necessary;
- c. Develop, harmonize, consult and present NLUZ related strategies and guidelines;
- d. Technical advices for PMO the effective implementation of NLUZ; and
- e. Participate in PSC as observers.

6.3 Capacity Development

The existing NLCS staffs would carry out the NLUZ as part of the organizational mandates. However, there is additional need for new recruitment, preferably on contract basis to form dedicated team for PMO. As indicated in the Figure 6.2.5, nearly 15 Surveyors and 8 support staffs need to be recruited on contract basis. At managerial and professional level, the existing relevant staff of NLCS shall multitask. Given that the NLUZ is being initiated for the first time there will be capacity gaps at all levels, be it managerial, technical or at operational levels. As such, in the due course of NLUZ implementation, it will be important to have appropriate capacity development supports.

It is therefore recommended to implement the following capacity development plan:

Sl.	Field of capacity development	Target group	Agency	No.	Course level (Min.)	Institute/ country
1	National spatial envisioning & best practices	Policy & Research staffs	NLCS, GNHCS & TWG	10	Certificate/ study tour	Unspecified
2	Zoning ordinance/ Land use regulations	Policy & Research staffs	NLCS	2	Certificate	Unspecified
3	Formulation of national land use strategy	Policy & Research staffs	NLCS, GNHCS & concerned agencies	10	Study tour	Unspecified
4	Land use parameterization & land use negotiation	Survey engineers, LR & policy personnel	NLCS & PMO	5	Certificate	Unspecified
5	Land Use Land Cover mapping	GIS/ RS & Survey engineers	MoAF & NLCS	4	Certificate	Unspecified
6	Topographical and agro-metrological data analysis	Survey engineers & CID	NLCS & PMO	4	Certificate	Unspecified
7	Land capability assessment	Soil analysts	NSSC, MoAF	3	Training	Unspecified
8	Multi-Criteria Decision Analysis (MCDA)	Survey engineers & CID	NLCS	4	Certificate	Unspecified
9	In-situ data collection and data processing, modeling & classification Survey engineers, surveyors & CID	NLCS & PMO	4	Certificate	Unspecified	
10	Zone mapping	Survey engineers & mappers	NLCS & PMO	4	Certificate	Unspecified
11	Geo-spatial analysis	Survey Engineers	NLCS	3	Certificate	Unspecified
12	Rationalizing zones	Survey engineers, LR & Policy personnel	NLCS & concerned agencies	7	Study tour	Unspecified
13	Conflict resolution	Policy personnel & lawyers	NLCS & concerned agencies	2	Study tour	Unspecified

6.4. Action Plan & Budgeting

The action plan (annexure 1) which is developed in consultation with GHNS shall be the basis for the consultation with the concerned agencies. The action plan shall be referenced for the budgeting estimation. The abstract of overall budgeting/costing as indicated in the table below subsumes the NLUZ activities under broad reforms heading.

7. NLUZ FRAMEWORK

Figure 6.4: Key reforms and time frames for NLUZ implementation

Sl	Reforms	Costing (US\$)	Timeline					
			2017-2018	2018-2019	2019-2020	2020-2021	2021-2022	2022-2023
1	Road map/ NLUZ implementation guidelines	22,000.00						
2	Project Management Office	299,200.00						
3	Procurement of satellite imagery	821,820.00						
4	Capacity development	374,000.00						
5	Land Use Land Cover (LULC)	1,962,205.88						
6	Parameters of each land use zone	27,500.00						
7	Pilot Implementation	1,455,882.35						
8	Land use zone maps	220,000.00						
9	Harmonized land use strategy	294,800.00						
10	National Spatial vision	118,800.00						
11	Review Land Act 2007 and Policies	132,000.00						
12	Enforcement	440,000.00						
13	Monitoring & Evaluation	22,000.00						
	Total	6,190,208.24						

7.1 Framework Cycle

The Figure 7.1 shows the NLUZ framework cycle consisting seven stages in total and every stage corresponds to a lead agency. The stages are defined as follows:

7.1.1 Parameterization of land uses and Land Use Land Cover Mapping

7.1.1.1. Land use parameterization
Despite the sectors have defined land use parameters built either within the sector specific rules and regulations or any legitimate guidelines, there are incidences of land use conflicts arising



within and amongst the sectors, especially due to competing interests for land uses. For the purpose of NLUZ exercises, the following parameters shall be used as an illustration under the four main land use themes, viz. social, economic, culture and environment:

a. Social

i. Alienable land (State land)

- » Adopt Use Right System (URS) parameters.

ii. Institutional Infrastructure (Education, Health, other institutions)

- » Road accessibility,
- » Slope till 30% most suitable, and stability.
- » Away from hazardous zone and polluting setups.

iii. Private agriculture areas

- » Soil suitability, water source.

iv. Human settlement (urban, rural, semi-urban, peri-urban)

- » Slope gradient (30%)
- » Demography
- » Land suitability
- » Water source availability

The Bhutan National Human Settlement Strategy 2017 shall determine the technical parameters of human settlements.

v. Transportation & communication

- » Road right – of – way
- » Power transmission buffer

The Road Master Plan 2007 – 2027 shall determine the technical parameters for the nationwide transport and communication.

vi. Waste and sewer management.

The location of sanitary landfill or open dump site shall be determined through the following parameters:

- » Within a distance in or around human settlement that poses environment and health hazards;
- » Near water catchment areas
- » Near rivers, wetlands, water bodies or ground water source
- » Unstable or landslide prone areas
- » Notified areas as habitat of endangered flora and fauna
- » Within motorable distance of 3kms from Dzong or other monuments of culture or historical importance

However, the Waste Prevention and Management Regulation, 2012 is considered to derive the parameters.

vii. Restricted areas (military areas, airfields, etc.)

Refer identified areas as per Thram (cadastral database) shall be used for NLUZ mapping exercises.

b. Economic

i. Commercial agriculture farming

- » Soil quality (depth, percentage of stones, subsoil texture, water retaining capacity, erodibility and drainage, NSSC 2005) to support sustained production;
- » Slope below 450 gradient capable of farming;
- » Slope below 170 gradient capable of supporting farm mechanization;
- » Potential for assured irrigation for Chhuzhing; and
- » Based on land capability classification and suitability evaluation.

Besides these, Interim Guideline on Lease of GRF for Commercial Agriculture 2011 shall be referred to derive the parameters.

ii. Industrial areas (industrial parks, mini industrial estates, service centre, special economic zones, dry-ports)

- » Access to infrastructure
- » Water source
- » Stable area
- » Away (to be defined in dataset) from human settlements (except service centres)

iii. Hydropower

The 2003 – 2022 Power System Master Plan (PSMP) and revised PSMP 2040 shall be the basis to derive the parameters.

iv. Mining

Parameters shall be derived based on the geological maps; and Mines and Minerals Act 1995.

v. Tourism

Parameters beyond the cultural and environment inclusion shall be submitted to NLCS prior to NLUZ exercises.

c. Culture

i. Heritage sites (as described in the Cultural heritage bill)

- » Cultural sites
- » Archaeological sites

- » Heritage buildings
- » Core and buffer zone for the designated heritage buildings and cultural sites.

Parameters shall be derived based on the Draft Cultural Heritage bill and its subsequent, rules and regulation.

d. Environment

- i. Heritage forests
- ii. Community forest
- iii. National Parks
- iv. Wildlife Sanctuaries
- v. Biological Corridors
- vi. Strict Nature Reserve
- vii. Ramsar sites and wetlands area
- viii. Forest Management Units
- ix. Degraded Watershed and Catchment areas
- x. Forest Plantation
- xi. Nature Recreation sites (eg. Kuenselphodrang nature park)
- xii. Permanent Forestry Research and Monitoring Plots
- xiii. Key Biodiversity Areas (Outside Protected Areas, eg. Roosting area of Black Necked Crane/White bellied Heron)

Parameters on the above shall be derived based on the following legislations in place:

- » Forests and Nature Conservation Act of Bhutan 1995; and;
- » Forests and Nature Conservation Rules and Regulations of Bhutan 2017;
- » National Forest Policy of Bhutan 2011;
- » National Strategy for Community Forestry, The Way Head 2010;
- » Vision and Strategy for Nature Conservation Division 2003;
- » Bhutan Biological Conservation Complex;
- » The Water Act of Bhutan 2011;
- » The Water Regulation of Bhutan 2014; and
- » Forest Plantation Strategy.

- viii. Environmental Buffers
 - » River/stream buffer
 - » Buffer from degraded areas
 - » International Boundary buffers

- ix. Bare area (rocky outcrops)
 - » Shall refer LULCM 2017.

An exhaustive parameterization shall be carried out and compiled as references for NLUZ exercises, in addition to the above parameters. However, for any additional

land uses that required beyond the scope of the agreed parameters, it shall be determined through detail sectoral consultation and research conformation.

7.1.1.2 Land Use Land Cover Mapping

Form a working group comprising of GIS experts from relevant agencies and prepare modalities to carry out LULC mapping that is specific to the need of NLUZ exercise, using scale of 1: 25,000 topographical base mapping with high resolution images which is underway with JICA support.

The steps as indicated under part a. of the Figure 7.2 highlights the inputs for the LULC mapping for NLUZ exercise.

7.1.2 *Data coordination and management*

In this stage, the following tasks shall be carried out:

- » Data acquisition from the concerned agencies and collection from the field;
- » Data processing or preparation;
- » Classification of land use data based on Food and Agriculture Organization (FAO) standards; and
- » Data validation upon field works and random sampling.

7.1.3 *Mapping*

Based on the spatial and non-spatial data acquired from the concerned agencies, Multi – Criteria Decision Analysis (MCDCA) shall be applied. The spatial and non-spatial categories of data are broadly classified as follows:

- » Spatial
 - o LULC maps
 - o Demography (PHCB 2017)
 - o Cadastral information
 - o Road network maps
 - o Topographical maps
 - o Digital Elevation Model (DEM)
 - o Heritage sites
 - o Biological corridors
 - o Administrative boundaries
 - o Metrology data
 - o Soil data
 - o Hazard maps
 - o Utility maps

- » Non-spatial
 - o Output from the parameterization exercises by the concerned agencies
 - o Comprehensive Development Plan & Human Settlement Strategy
 - o Agriculture Land Development guidelines;
 - o National Spatial Policy
 - o Sectoral policies/ guidelines/ strategies/ acts/ rules & regulations/ by-laws.
 - o Literature review for international good practices in deriving the parameters.

The part **b.** of **Figure 7.2** highlights the abstract inputs for this stage.

A general flowchart is developed in line with the framework cycle, mainly to build technical clarity for the implementation of NLUZ activities. However, methodology (7.2) shall spell out detail technical steps, mainly pertaining to analysis with AHP (Analytical Hierarchical Process) of GIS-MCDA.

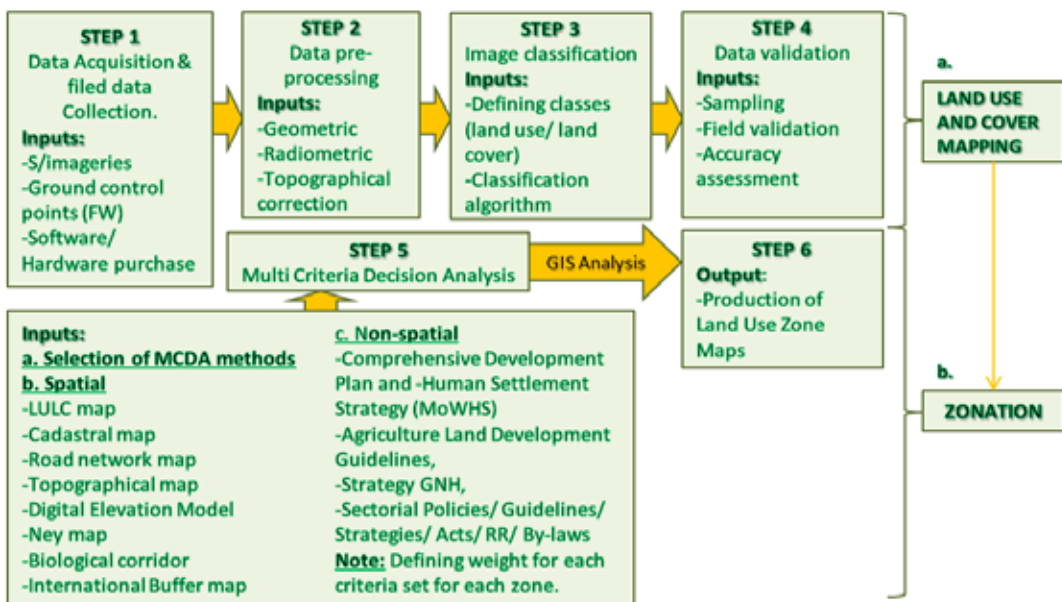


Figure 7.2: NLUZ general technical flowchart

7.1.4 Development of national land use strategy

Establish a working group led by NLCS with the members from the concerned agencies (NLCS, MoAF, MoWHS, MoEA, GNHCS, NEC, MoHCA and other relevant agencies). The group shall develop a draft strategy and carry out wider consultation amongst the stakeholders.

The strategy shall include the following key aspects:

- » Strategize land uses amongst the sectors and agencies in line with the prevailing legislations, policies and the NLUZ outcomes;

- » While making optimal utilization of limited land resources, the strategy shall ensure there is no adverse impact on the environment wellbeing;
- » Ensure proper utilization of land as per its bearing capacity and the potentials;
- » Ensure resolving the conflict of land uses; and
- » Rationalize the zones for various land uses.

7.1.5 Zoning ordinances and enforcement

In this stage, the land use rules and regulations shall be formulated as a part of zoning ordinances. In order to formulate the rules and regulations, the Land Act 2007 and related legislations and policies shall be reviewed based on the inferences derived from the NLUZ exercises and propose for amendments. The formulated zoning ordinance or rules and regulations thereafter shall be submitted to the government for endorsement.

The endorsed rules and regulations shall be enforced by NLCS and the concerned agencies, including local government.

7.1.6 Evaluation of NLUZ

This shall be executed as detailed under the Monitoring & Evaluation part of this guideline.

7.1.7 National spatial envisioning

Bhutan needs a spatial vision to inform development planning and policy in general and to facilitate strategic land uses for the entire sectors. The nationwide zoning exercise shall form the basis to rationalize the national spatial envisioning, in order to;

- » Tackle inherited spatial divisions – the division that perpetuated exclusion and distorted growth patterns;
- » Unlock development potential – unlock development potential through spatially enabled targeted interventions;
- » Guide and inform infrastructure investment and prioritization – spatial investment framework to support growth and inform the long-term infrastructure investment strategy;
- » Manage contemporary economic and demographic shifts – support economic dynamics by concentrating productive activity, entrepreneurs, workers and consumers in a place without congestion; and
- » Facilitate coordination between parts of government and other agents – used to bring different actors and interests together to define a common future, binding all spheres and sectors.

Taking into account some of international perspectives, the overall spatial vision shall conform to the following normative principles:

- » Righteousness – The policy of confining particular agencies to limited space (ghettoization and segregation) and the unfair allocation of public resources between areas must be reversed.
- » Sustainability – Sustainable patterns of consumption and production should be supported, and ways of living promoted that do not damage the natural environment.
- » Resilience – Vulnerability to environmental degradation, resource scarcity and climatic shocks must be reduced.
- » Conservation – Biological and ecological systems is protected and conserved reasonably.
- » Quality – The aesthetic and functional features of infrastructure and the built environment need to be improved to create more livable, vibrant and valued community.
- » Efficiency – Productive activity and jobs should be supported, and burdens on business minimized. Efficient commuting patterns and circulation of goods and services should be encouraged, with regulatory procedures that do not impose unnecessary costs on the development.

Besides these, concepts of spatial policy under Strategy Gross National Happiness 2008 shall be considered to undertake the spatial envisioning exercise. The formulated national spatial vision shall then be included under the overall national development vision for sound spatial integration.

7.2. METHODOLOGY

Remote Sensing (RS) and Geographical Information System (GIS) are fundamental tools for the inventory and analysis of natural resources for planning, management and development. The technologies of RS give comprehensive information of land use/ land cover and can determine the change in land use/land cover over a period of time. The combination of RS & GIS technologies has immensely helped in environmental and water management, planning and community development, natural resources management, assessing disaster/ hazard areas, and of course, in the field of land use zoning. It considers various factors or criteria for the analysis, visualization and presentation to support the spatially enabled decision-making processes. One of the widely used methods with these fundamental technologies in spatially enabled land-use decision making process is spatial Multi Criteria Decision Analysis (MCDA). For NLUZ as well, GIS-MCDA method adopting widely used decision-making process called the Analytical Hierarchy Process (AHP) which considers primary importance of stakeholder involvement and their demands.

7.2.1. Analytical Hierarchy Process (AHP) Background

The AHP is a theory of measurement through pairwise comparisons and relies on the judgment of experts to derive priority scales. It is a solution to the findings that lacks common, understandable and ease-to-implement methodology for a complex decision (Bhushan & Rai,2004; Saaty, 2008). The AHP helps structure

the decision-makers' thoughts and can help in organizing the problem in a manner that is simple to follow and analyze. It fosters popular participation, especially engaging the stakeholders, community leaders, experts and the general public (Malzewski,1999). Broad areas in which the AHP is applied includes alternative selection, resource allocation, forecasting, business process re-engineering, quality function deployment, public policy decisions, healthcare and many more (Bhushan and Rai,2004). As this tool being simple and powerful, it is widely used in the field of business, government, social studies, research and development, mainly for the reasons: 1) ease of implementation, 2) theoretically proven concept and 3) market-tested and accepted methodology capable of producing results that agree with perceptions and expectations. In general, the AHP is a systematic approach to give decision-making on experience, intuition and heuristics structure of a well-defined methodology derived from sound mathematical principles.

7.2.2. AHP steps

The AHP principally decomposes the problems into a hierarchy of sub-criteria problems which can be more easily comprehended and subjectively evaluated. Then the subjective evaluation is converted into numerical values processed to rank each alternative on a numerical scale. The AHP methodology can be summarized and explained as follows:

Step 1: The unstructured problem is decomposed into a hierarchy of goals, criteria, sub-criteria and alternatives.

Step 2: Relative ratings from expert or decision makers are collected using pairwise comparison between different criteria or alternatives. The comparison is done on a qualitative scale ranging from 1 to 9. Experts can rate the comparison as equal, marginally strong, strong, very strong, and extremely strong (Refer Table below: Gradation Scale for qualitative comparison of alternatives).

Numerical Value	Verbal Meaning
1	Equally important
2	Equally to moderately more important
3	Moderately more important
4	Moderately to strongly more important
5	Strongly more important
6	Strongly to very strongly more important
7	Very strongly more important
8	Very strongly to extremely more important
9	Extremely more important

Step 3: The pairwise comparison scales generated at step 2 is then use as input in the pairwise comparison matrix with diagonal elements.

Step 4: The step deals with the calculation of weights and can be further subdivided into three sub-steps:

- i. The columns of the pairwise comparison matrix is summed;
- ii. All individual matrix elements are divided by their column total, which results in a normalized pairwise comparison matrix; and
- iii. By computing the average of the elements in each row of the normalized matrix, the final weights can be obtained.

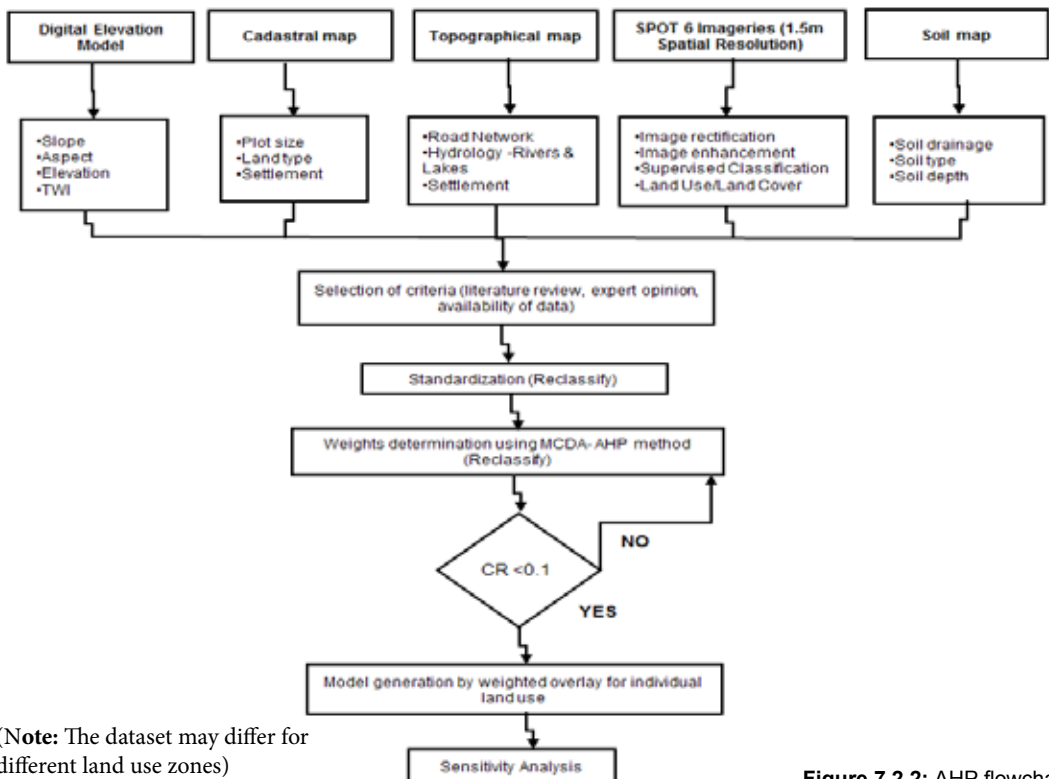
Step 5: In this step, it determines whether the comparisons are consistent or not. This can be done by following two sub-steps mentioned below:

- i. Firstly, the weighted sum vector is calculated; and
- ii. Calculate the value of Lambda (λ) (average value of the consistency vector), the consistency index (CI) and consistency ration (CR).

If the calculated value of $CR < 0.10$, it indicates that there is a reasonable level of consistency in the pairwise comparisons, and if the values of $CR \geq 0.10$, it indicates that the comparisons are inconsistent and have to be reconsidered.

Step 6: Model generation by Weighted Overlay Method for individual land use.

Step 7: Overlay or mesh all maps of different land use and resolve the conflict land use.



(Note: The dataset may differ for different land use zones)

Figure 7.2.2: AHP flowchart

8. MONITORING & EVALUATION

The guideline itself shall form as the basis for monitoring and evaluation. However, Figure 8 which is indicative of result based framework shall provide as broad guide for NLUZ monitoring and evaluation.

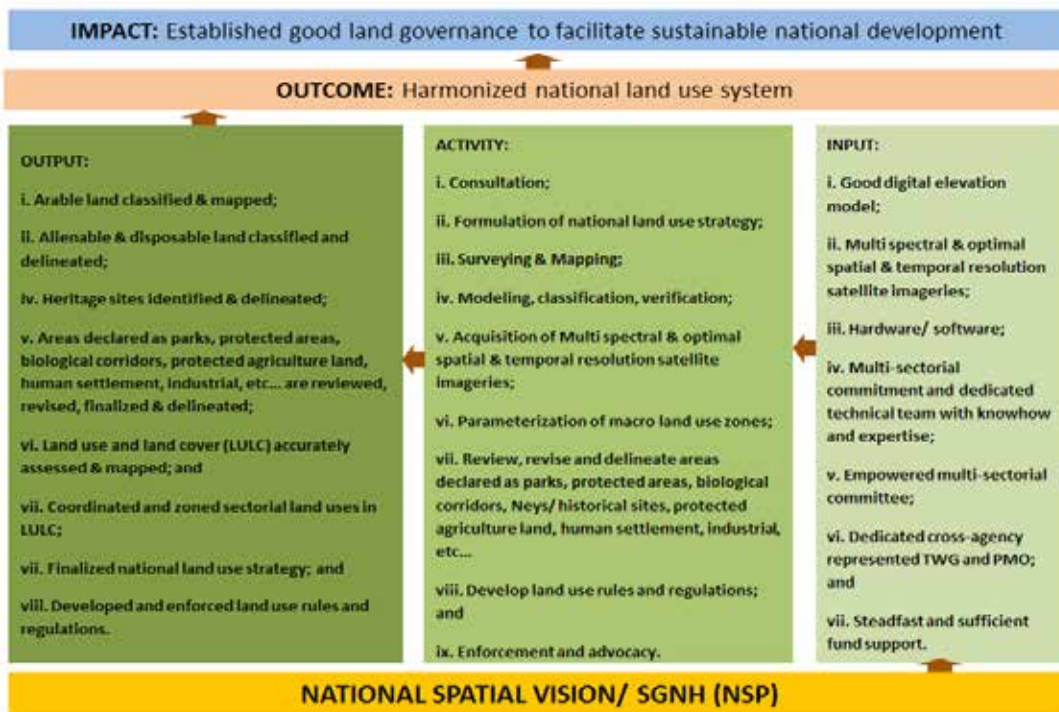


Figure 8: Result framework of NLUZ exercise

Considering the institutional structure, following M&E shall be carried out at respective levels:

- PMO shall coordinate and lead the monitoring of the activities based on the result framework as in Figure 5 and target set under action plan (annexure 1);
- PMO shall review the progress on quarterly basis and conduct field visits at appropriate stages to confirm and assess physical and financial progress;
- PMO in consultation with the involved stakeholders shall conduct the mid-term review of the project involving PSC for any decision, if needed;
- The international accreditation committee shall be formed and ensure the standard of the reforms under the project; and
- The evaluation shall be coordinated by PPD of the NLCS in consultation with relevant agencies and in line with the Evaluation Protocol and Guidelines set by GNHCS.

9. Annexure

Annexure 1: NLUZ Action Plan

Draft NLUZ Action Plan (2017-2028)												
Activity Reforms	Actions	Phases	Indicator	Baseline	Target	Timeline		Lead Agency	Collaborating Agencies	Funding	Implementation status	Remarks
						Start date	End date					
1. Road mapping	1.1. Drafting NLUZ implementation guidelines	Phase I	Finalized draft on NLUZ guidelines	0	1	9/20/2017	10/30/2017	GNHCS & NLCS	TWG & Concerned agencies	0	Not executed	Output
	1.2. Consultation on NLUZ guidelines & finalization	Phase I	Finalized NLUZ guidelines	0	1	9/20/2017	12/30/2017	GNHCS & NLCS	TWG & Concerned agencies	0	Not executed	Output
2. Project Management Office	2.1. Establishment PMO											
	2.2. HR recruitment and capacity building	Phase I	PMO established	0	NA	1/1/2018	12/1/2018	NLCS	WMD, DoFFS/ GNHCS	World Bank (WB)	On-going	
	2.3. Procurements											
3. Land Use Land Cover (LULC)	3.1. Data acquisition & field data collection											
	3.2. Data processing	Phase I	Revalidated/ finalized LULC map	0	Entire country	1/1/2019	6/1/2020	NLCS	TWG & Concerned agencies	WB	Not executed	LULC Map
	3.3. Image classification											
	3.4. Data validation											
4. Parameters of each land use zone+A13:M21	4.1. Land use classification parameters for one Dzongkhag (Southern Belt)	Phase I	Finalized land use parameters & criteria	0	Pilot (Southern Belt)	1/1/2019	6/1/2020	NLCS	NLCS & GNHCS	WB	Not executed	Output
	4.2. Criteria setting for one Dzongkhag (Southern Belt)											
5. Pilot Implementation	5.1. Pilot exercises in at least two Dzongkhags	Phase I	Completed and assessed pilot exercises	0	1	1/1/2019	6/1/2020	NLCS	Concerned agencies	0	Not executed	Output

Draft NLUZ Action Plan (2017-2028)												
Activity Reforms	Actions	Phases	Indicator	Baseline	Target	Timeline		Lead Agency	Collaborating Agencies	Funding	Implementation status	Remarks
						Start date	End date					
6. Pilot : Land use zone maps (GIS Analysis -MCDA)	6.1. Acquisition of satellite imageries, topographical and agro-metrological data	Phase I	Finalized zoned maps of pilot Dzongkhag	0	Pilot Dzongkhag (Southern Belt)	1/1/2019	6/1/2020	NLCS	Concerned agencies	WB	Not executed	Outcome
	6.2. Data processing											
	6.3. In-situ data collection (Field work)											
	6.4. Modeling and classification											
	6.5. Field validation											
	6.6. Mapping											
7. Region I Parameters of each land use zone	7.1. Land use classification parameters for Dzongkhags falling under Region I	Phase II	Finalized land use parameters & criteria	0	Region I	7/1/2020	6/1/2021	NLCS	TWG and concerned agencies	WB/ RGoB	Not executed	Output
	7.2. Criteria setting for Dzongkhags falling under Region I											
	8.1. Acquisition of satellite imageries, topographical and agro-metrological data											
	8.2. Data processing											
8. Reion I: Land use zone maps (GIS Analysis -MCDA)	8.3. In-situ data collection (Field work)	Phase II	Finalized zoned maps of Region I	0	Region I	7/1/2020	6/1/2021	NLCS	TWG and concerned agencies	WB/ RGoB	Not executed	Outcome
	8.4. Modeling and classification											
	8.5. Field validation											
	8.6. Mapping											

Draft NLUZ Action Plan (2017-2028)												
Activity Reforms	Actions	Phases	Indicator	Baseline	Target	Timeline		Lead Agency	Collaborating Agencies	Funding	Implementation status	Remarks
						Start date	End date					
9. Region II Parameters of each land use zone	9.1. Land use classification parameters for Dzongkhags falling under Region II.	Phase II	Finalized land use parameters & criteria	0	Region II	7/1/2021	6/1/2022	NLCS	TWG and concerned agencies	WB/ RGoB	Not executed	Output
	9.2. Criteria setting for Dzongkhags falling under Region II.											
10. Region II: Land use zone maps (GIS Analysis -MCDA)	10.1. Acquisition of satellite imageries, topographical and agro-metrological data	Phase II	Finalized zoned maps of Region II	0	Region II	7/1/2021	6/1/2022	NLCS	TWG and concerned agencies	WB/ RGoB	Not executed	Outcome
	10.2. Data processing											
	10.3. In-situ data collection (Field work)											
	10.4. Modeling and classification											
	10.5. Field validation											
	10.6. Mapping											
11. Region III Parameters of each land use zone	11.1. Land use classification parameters for Dzongkhags falling under Region III.	Phase II	Finalized land use parameters & criteria	0	Region III	7/1/2022	6/1/2023	NLCS	TWG and concerned agencies	WB/ RGoB	Not executed	Output
	11.2. Criteria setting for Dzongkhags falling under Region III.											
	12.1. Acquisition of satellite imageries, topographical and agro-metrological data											
	12.2. Data processing											
	12.3. In-situ data collection (Field work)											
	12.4. Modeling and classification											
12. Region III: Land use zone maps (GIS Analysis -MCDA)	12.5. Field validation	Phase II	Finalized zoned maps of Region III	0	Region III	7/1/2022	6/1/2023	NLCS	TWG and concerned agencies	WB/ RGoB	Not executed	Outcome
	12.6. Mapping											

Draft NLUZ Action Plan (2017-2028)												
Activity Reforms	Actions	Phases	Indicator	Baseline	Target	Timeline		Lead Agency	Collaborating Agencies	Funding	Implementation status	Remarks
						Start date	End date					
13. Preparation of harmonization of land use strategy	13.1. Stakeholder consultation	Phase III	Harmonization of land use strategy prepared	0	Entire country	7/1/2023	6/1/2024	NLCS	TWG and concerned agencies	WB/ RGOB	Not executed	
	13.2. Resolve conflicts											
	13.3. Rationalize zones											
	13.4. Drafting national land use strategy											
	13.5. Present land use strategy and seek approval from NLC											
	13.6. Conduct public consultation at various levels (General public, LGs, MPs, NCs, Civil societies, Experts, Ministries & agencies.)											
14. National Spatial vision	14.1. Organize envisioning workshop where major stakeholders present land related issues and their spatial vision.	Phase III	Finalized National Spatial Vision doc ref. NLUZ	0	Entire country	7/1/2024	6/1/2025	GNHCS, NLCS and others	TWG & Concerned agencies	WB/ RGOB	Not executed	
	14.2. Align sectorial spatial vision with national goals and vision											
	14.3. Finalize list of major land use themes (Zones): Agriculture, biological corridor, religious and heritage sites, forest, human settlements, industrial areas, etc)											

Draft NLUZ Action Plan (2017-2028)												
Activity Reforms	Actions	Phases	Indicator	Baseline	Target	Timeline		Lead Agency	Collaborating Agencies	Funding	Implementation status	Remarks
						Start date	End date					
15. Review Land Act 2007	15.1. Conduct study and necessary amendments on Land Act 2007	Phase III	Reviewed and necessary amendments proposed	0	Entire country	7/1/2025	6/1/2026	NLCS	TWG and concerned agencies	WB/ RGOB	Not executed	
	15.2. Submit for the amendment as appropriate and accordingly advocate, publicize and sensitize.	Phase III	Necessary amendments approved and sensitized	0	Entire country				PMO & Concerned agencies		Not executed	
16. Enforcement	16.1. Enforcement of National Land Use Strategy	Phase III	Enforcement mechanism established	0	Entire country	7/1/2026	6/1/2017	NLCS	PMO & Concerned agencies	WB/ RGOB	Not executed	
	16.2. Enforcement of amendment on Land Act	Phase III	Enforcement mechanism established	0	Entire country						Not executed	
17. Monitoring & Evaluation	17.1. The PMO, PPD (NLCS) and the concerned agencies shall monitor the action plans and its indicators on periodic basis.	Phase III	Frequency of monitoring carried out	0	Quarterly	7/1/2020	6/1/2028	PMO,PPD(NLCS)	Concerned agencies	WB/ RGOB	Not executed	
	17.2. GNHC shall evaluate the policy impact at national level in line with the Evaluation Protocol and Guidelines.	Phase III	Frequency of evaluation carried out	0	After the project	6/30/2020	6/1/2028	NLCS,GNHCS	TWG and Concerned agencies		Not executed	

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