

GEDU



Divisional Forest Office Management Plan

(January 2026 – December 2035)

Divisional Forest Office, Gedu

Department of Forests & Park Services
Ministry of Energy & Natural Resources
Royal Government of Bhutan



Supported by:



Federal Ministry
for the Environment, Nature Conservation,
Nuclear Safety and Consumer Protection

based on a decision of
the German Bundestag

IKI
INTERNATIONAL
CLIMATE INITIATIVE



Plan prepared by:

1. Jigme Lharig, Forestry Officer, DFO, Gedu
2. Yeshe Gyeltshen, Forestry Officer, DFO, Gedu
3. Rinzin Dorji, Chief Forestry Officer, DFO, Gedu
4. Tshering Phuntsho, Sr. Forestry Officer, DFO, Gedu
5. Sonam Lhendup, Forestry Officer, DFO, Gedu
6. Sangay Wangmo, Sr. Forest Ranger III, DFO, Gedu
7. Lhab Dorji, Forest Ranger I, DFO, Gedu
8. Tshering Wangchuk, Forestry Officer, DFO Gedu

Photos:

1. Mr. Rinzin Dorji, Chief Forestry Officer, DFO, Gedu.
2. Jigme Lharig, Forestry Officer, DFO, Gedu
3. Yeshe Gyeltshen, Forestry Officer, DFO, Gedu
4. Sonam Lhendup, Forestry Officer, DFO, Gedu
5. Birkha Bdr. Mongar, Sr. Forest Ranger III, DFO, Gedu
6. Ashman Tamang, Forest Ranger II, DFO, Gedu

Review and endorsement:

Reviewed and endorsed by the 76th session of the Departmental TAC meeting.

Suggested Citation:

Divisional Forest Office Management Plan (January 2026-December 2035). Divisional Forest Office, Gedu (2026), Department of Forests and Park Services, Ministry of Energy and Natural Resources, Royal Government of Bhutan.

Copyright: © Divisional Forest Office, Gedu.

Contact:

Divisional Forest Office, Gedu.

Email: divisionalforestofficegedu@gmail.com

Telephone no: 05-282310

Approval Sheet

Period of the Plan

This plan is valid for the period of 10 years from January, 2026 to December, 2035

Submitted for approval:



Rinzin Dorji
Chief Forestry Officer
(Divisional Forest Office, Gedu)

**Technically reviewed & recommended
for approval:**



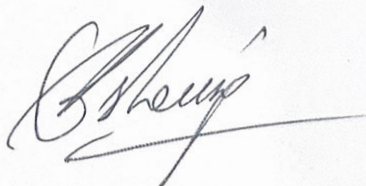
Chief Forestry Officer
Forest Resources Planning and
Management Division

Recommended for approval:



Director
Department of Forests
and Park Services

APPROVED



Secretary
Ministry of Energy and Natural Resources

Foreword



Forests have long been central to the livelihoods of the Bhutanese people and are deeply interwoven with the country's social, cultural, and traditional values. Beyond their contribution to socio-economic development, forests play a critical role in climate regulation and the provision of essential ecosystem services. Recognizing this importance, Bhutan is among the few countries to enshrine environmental conservation in its Constitution. Article 5 of the Constitution mandates that at least 60 percent of the country's land area be maintained under forest cover for all time. Bhutan has further reinforced its global environmental leadership by committing to remain

carbon neutral at the 15th Conference of Parties to the UNFCCC in 2009, a pledge reaffirmed through its Intended Nationally Determined Contribution submitted in 2015 under the Paris Agreement.

Currently, forests cover over 69.7 percent of Bhutan's total land area, making them an indispensable national asset. These forests sequester an estimated 8.5 million tonnes of carbon annually, sustain reliable water flows critical for hydropower generation, and provide essential resources such as timber and firewood to citizens. In light of Bhutan's national and international commitments, as well as the social, cultural, economic, and ecological benefits derived from forests, sustainable forest resource management remains imperative, particularly through targeted and effective interventions at the Divisional level.

Accordingly, this Divisional Forest Management Plan has been developed as a comprehensive framework for sustainable forest management within the Divisional Forest Office. The plan takes stock of existing management initiatives and presents the current status of forest area, biodiversity conservation, growing stock, resource allocation, local socio-economic conditions, and human-wildlife conflict. It prescribes strengthened conservation measures, sustainable resource utilization, climate change adaptation and mitigation actions, and human-wildlife conflict management, supported by a phased implementation plan, financing framework, and monitoring system. Developed through broad stakeholder consultation, the plan ensures shared ownership and institutional endorsement. The Division Forest Office is commended for this important milestone toward advancing sustainable forest management and biodiversity conservation.

Tashi Delek!

A handwritten signature in blue ink, consisting of stylized, overlapping loops and lines.

Director

Acknowledgement



The Divisional Forest Office Management Plan is the result of a collective and dedicated effort by the staff of the Divisional Forest Office, Gedu. The Division sincerely acknowledges the commitment, professionalism, and teamwork demonstrated by all officers and staff who contributed their time, experience, and technical inputs toward the successful formulation of this plan. Their sustained engagement throughout the planning process ensured that the document is comprehensive, practical, and grounded in field realities.

The formulation of this Management Plan was made possible through the unwavering support and guidance of the IKI Task Force Members under the IKI

Project. The Division is deeply grateful for their strategic direction, technical advice, and continuous encouragement throughout the planning process. The Division further expresses its sincere gratitude to the IKI Project, “Living Landscapes: Securing High Conservation Values in South-Western Bhutan,” for its generous financial support, which enabled the conduct of comprehensive socio-economic and field surveys. The data generated through these assessments formed a critical foundation for evidence-based planning and significantly informed the management prescriptions contained in this plan. WWF-Bhutan, together with the Project Coordination Unit, played a pivotal role in facilitating the timely procurement of essential equipment and field gear, and in delivering capacity-building programs both within and outside the country. These interventions greatly strengthened the technical capacity of the field teams involved in the assessment.

The Division would like to extend special appreciation to Mr. Jigme Lharig and Mr. Yeshe Gyeltshen, who played a crucial leadership role in guiding and coordinating the formulation of this Management Plan. His dedication, technical oversight, and leadership were instrumental in bringing the planning process to completion. Finally, the Division extends its heartfelt thanks to all individuals, institutions, and stakeholders who, in various capacities, contributed to the development of this Management Plan. Their collective efforts have resulted in a key milestone that will guide sustainable forest management and biodiversity conservation in the Division in the years to come.

Abbreviations

AAC	Annual Allowable Cut
ABS	Access and Benefit Sharing
ADB	Asian Development Banks
AGB	Above Ground Biomass
APA	Annual Performance Agreement
BBR.....	Baseline Biodiversity Report
BBPL.....	Bhutan Board Particle Limited
BC	Biological Corridors
BGB	Below Ground Biomass
BMG	Biodiversity Monitoring Grid
BLC.....	Bhutan Logging Corporation
CF.....	Community Forest
CFMG	Community Forest Management Group
CFO.....	Chief Forestry Officer
CFS	Cluster Finance
COP.....	Conference of Parties
CWD	Coarse Woody Debris
DBH	Diameter at Breast Height
DFO.....	Divisional Forest Office
DoFPS	Department of Forest and Park Services
eDATS	Electronic Daily Allowance & Travel System
ESS.....	Environmental Social Safeguard
FMIS	Forest Monitoring and Information sections
FMU	Forest Management Unit
FNCA	Forest and Nature Conservation Act
FNCRR	Forest and Nature Conservation Rules and Regulations
FRPMS.....	Forest Planning and Management Section
G2C	Government to Citizens
GDP.....	Gross Domestic Product
GRM	Grievance Redress Mechanism
HCV	High Conservation Values
HCVA.....	High Conservation Value Areas
HCVMA....	High Conservation Value Management Area
HWC	Human Wildlife Conflict
INDC.....	Intended Nationally Determined Contributions
IUCN.....	International Union of Conservation for Nature
IWBI	Integrated Wood Based Industry
KBA	Key Biodiversity Areas

LFMA..... Local Forest Management Areas
 LSD Legal Service Division
 METT+ Monitoring Effectiveness Tracking Tool
 NBS Nature-Based Solutions
 NCS Nature and Conservation Section
 NFI National Forest Inventories
 NGOs Non-Governmental Organizations
 NRDCCL Natural Resource Development Corporation Limited
 Nu..... Ngultrum
 NWFP..... Non-Wood Forest Product
 NWIS National Waste Inventory Survey
 OFS Online Forestry Services
 PA Protected Area
 PHCB Population Housing Census of Bhutan
 PMC Professional Management Category
 QRT Quick Response Team
 RBA..... Rapid Biodiversity Assessment
 RBM..... Riverbed Material
 RGoB Royal Government of Bhutan
 SDSS Spatial Decision Supporting System
 SMART Spatial Monitoring and Reporting Tool
 SOC Soil Organic Carbon
 SRF State Reserved Forest
 SS Senior Supervisor
 TAC Technical Advisory Committee
 UNFCCC... United Nations Framework Convention on Climate Change
 UWIFoRT.. Ugyen Wangchuck Institute of Forestry Research and Training
 VU Vulnerable
 WBI..... Wood Based Industries

Contents

Foreword	4
Acknowledgement	5
Abbreviations	6
Executive Summary	14
Chapter 1: Background	16
1.1. Rationale	16
1.2. History and Significance	16
1.2.1. Importance of forests	16
1.2.2. Overview of the Sustainable Forest Management	17
1.3. Policies and Legislations	18
1.3.1. National Forest Policy 2011	18
1.3.2. Forest and Nature Conservation Act of Bhutan (1969, 1995, 2023)	18
1.3.3. Forest and Nature Conservation Rules (2000,03,06,17,20,23,24)	18
1.3.4. Land Lease Rules and Regulations of Bhutan 2018	19
1.3.5. Biodiversity Act of Bhutan 2003	19
1.3.6. Land Act of Bhutan 2007	19
1.3.7. National Environment Protection Act 2007	20
1.3.8. Waste Prevention and Management Act of Bhutan 2009	20
1.3.9. Climate Change Policy of the Kingdom of Bhutan, 2020	20
1.3.10. Nationally Determined Contribution, 2021	20
1.3.11. National Adaption Plan of the Kingdom of Bhutan, 2023	21
1.3.12. Water Act of Bhutan, 2011	21
1.3.13. Mines and Mineral Act of Bhutan 1995 and Regulation	21
1.3.14. Economic Development Policy of Bhutan 2016	22
1.3.15. National Biodiversity Strategy and Action Plan of Bhutan, 2025	22
1.4. Purpose and Objectives	23
1.4.1. Vision	23
1.4.2. Mission	23
1.4.3. Purpose	23
1.4.4. Objectives	23
Chapter 2: Current Status	24
2.1. Boundary and Area	24
2.2. Administration	26
2.2.1 Administrative set up	26
2.2.2 Mandates	27
2.2.2.1. Forest Resources Planning and Management Section	27
2.2.2.2. Forest Monitoring and Information Section	28



2.2.2.3. Nature Conservation Section	29
2.2.2.4. Administrative Section	29
2.2.3. Human Resource	30
2.2.4. Infrastructure	31
2.2.4.1. Office Structure	31
2.2.4.2. Basic Mobility Facilities.....	32
2.2.5. Budget and Revenue	32
2.2.5.1. Budget for past five years	32
2.2.5.2. Revenue for past five years and projection for next five years ..	36
2.3. Biodiversity Conservation	38
2.3.1. Forest ecosystem	38
2.3.1.1 Floral composition	39
2.3.1.1.1. Forest structure and species diversity.	40
2.3.1.2. Faunal composition	42
2.3.1.2.1. Mammal	42
2.3.1.2.2. Bats	43
2.3.1.2.3. Avifauna	43
2.3.2. Aquatic Ecosystem	44
2.3.2.1. Fishes	45
2.3.3. Agricultural ecosystem	45
2.3.4. Others	45
2.3.4.1. Butterflies	45
2.3.4.2. Herpetofauna	45
2.4. Existing Management Regimes	46
2.4.1. Area-Based Management Regimes	48
2.4.1.1. Forest Management Unit	48
2.4.1.2. Local Forest Management Area	48
2.4.1.3. Community Forest	48
2.4.1.4. Private Forest	51
2.4.2. Cross-Cutting Management regimes.....	52
2.5. Forest Resources and Utilization	53
2.5.1. Forest Resources	53
2.5.1.1. Forest cover by forest types	53
2.5.1.2. Stem density by forest types	53
2.5.1.3. Growing stock	54
2.5.1.4. Basal Area by forest types	54
2.5.1.5. Biomass by forest types.....	55
2.5.1.6. Carbon stock by forest types	56
2.5.1.7. Biomass and carbon increment by forest types	57
2.5.1.8. Carbon Sequestration	58
2.5.2. Function Mapping	58
2.5.2.1. Area under existing management regimes.....	59
2.5.2.2. Management circles outside existing Management Regimes..	60
2.5.3. Forest Resource Utilization	63



2.5.3.1. Rural Timber Allotment in five years (2019-2023)	63
2.5.3.2. Commercial Timber Allotment in five years (2019-2023)	64
2.5.3.3. Non-Wood Forest Product Allotment in five years (2019-2023)	65
2.5.3.4. Surface collection allotment in five years (2019-2023)	66
2.5.3.5. Total SRF land allotted for developmental activities 2019-2023.....	67
2.5.3.6. Forestry Clearance issued in SRF land allotment for developmental activities in five years (2019-2023)	69
2.5.3.7. SRF land destroyed by Forest Fires in five years (2019-2023)	70
2.5.3.8. Wood-Based Industries	70
2.6. Local People and Livelihood	72
2.6.1. Demography	72
2.6.2. Annual Household Income	74
2.6.3 Annual Household Expense	75
2.6.3b. Agriculture	75
2.6.3.1b. Landholding	75
2.6.3.2b. Types of crops grown	76
2.6.4. Livestock	78
2.6.4.1 Livestock types and populations	78
2.6.4.2 Livestock Tending Options	79
2.6.4.3. Importance of livestock to the household	79
2.6.4.4. Livestock Farming Challenges	80
2.6.5. Forest Resources use by communities	81
2.6.5.1. Forest Resources availability trend	81
2.6.5.2. Types of forest resources collected	81
2.7 Human Wildlife Conflict	82
2.7.1. Livestock depredation by wild predators	82
2.7.2. Crop damage by Wild animals.....	87
2.7.3 Human-wildlife Conflict Interventions.....	88
2.8. Climate Change and its impacts	89
2.8.1. Climate Vulnerability (CVCA).....	89
2.8.1.1. Exposure	89
2.8.1.2. Sensitivity	90
2.8.1.3. Adaptive Capacity	91
2.8.1.4 Vulnerability Index	93
2.8.1.5. Impacts and coping mechanisms.....	94
2.8.1.6. Forest Carbon Sequestration and Climate Change Mitigation	95
2.9.1. HCV Concept Overview	95
2.9.2. HCVA in Divisional Forest Office, Gedu.....	96
2.9.3. Significance of HCVA	96
2.9.4 Screening and Identification of the HCVA.....	97
2.9.5. Threats and Strategic Approach to Mitigate the Threat.....	98
2.9.6. Strategic Approaches to Mitigate Threats.....	98
2.9.7. Management and Monitoring of HCVA	99
2.9.8. Management of Transboundary issues	100



Chapter 3: Threats and Challenges	101
3.1. Threats	101
3.2. Challenges	106
Chapter 4: Management Prescription	108
4.1. Management prescriptions of DFO	108
4.2. Management Prescriptions for HCVA as per the indicative MPF for HCVA	110
4.3 Gender Mainstreaming	112
4.4. Environmental and Social Safeguards (ESS)	112
4.4.1 Grievance Redressal Mechanism	113
Chapter 5: Implementation Plan and Financial Outlay	115
5.1. Implementation Plan and Financial Outlay of DFO	115
5.2. Implementation Plan and Financial Outlay for High Conservation Value Area	121
Chapter 6: Monitoring and Evaluation Framework	122
6.1. Monitoring and Evaluation Framework for DFO	122
6.2. Monitoring and Evaluation of High Conservation Value Area	127
Chapter 7. Stakeholder consultation and endorsement	128
7.1 Stakeholder consultation	128
7.2 Finalization and Endorsement of the DFO Management Plan	129
Annexure I: Annual Operational Plan	130
Annexure II: Bhutan METT+ FORM (REFINED FOR DFO)	132
Reference	174

Figures

Figure 1: Administrative boundary of DFO, Gedu	24
Figure 2: Land Use Land Cover, 2016 of DFO, Gedu	26
Figure 3: Organogram of DFO, Gedu	27
Figure 4: Budget Allocation by Category for the past 5 years.	35
Figure 6: Forest types of DFO, Gedu	39
Figure 7: Cluster dendrogram of vegetation types using Sorensen Method.	40
Figure 8: a) Diameter class in each Gewogs. b) Height Class in each Gewog	41
Figure 9: Water sources and river system of DFO Gedu	44
Figure 10: Thematic representation of existing management regimes	47
Figure 11: Community Forest under DFO	49
Figure 12: Thematic representation of function mapping	59
Figure 13: Area Showing Existing Management Regimes	60
Figure 14: Management circles outside existing management regimes	61
Figure 15: Trend for allotment of rural timber in five years (2019–2023)	64



Figure 16: Trend for allotment of rural timber in five years (2019–2023)	65
Figure 17: Trend for surface collection for five years (2019–2023)	67
Figure 18: Trend for area of forest lost for developmental activities in (2019–2023).....	69
Figure 19: Area lost to forest fire in the past five years (2019–2023)	70
Figure 20: Ratios of age groups under DFO	73
Figure 21: Ratios of age groups for respondents	74
Figure 22: Varieties of cereal crops grown by the household.....	76
Figure 23: Varieties of cereal crops grown by the communities in each gewog.....	77
Figure 24: Varieties of cash crops grown by the communities.	77
Figure 25: Livestock tending types practiced by communities in each Gewogs.....	79
Figure 26: Perceived livestock rearing problems by the communities	80
Figure 27: Perceived trend of forest resources collected by the communities	81
Figure 28: Number of livestock killed in the last three years.....	82
Figure 29: Types of Livestock killed by wild predators	83
Figure 30: Types of wild predators raiding livestock	84
Figure 31: Places of livestock killed	85
Figure 32: Species of wild animals damaging crops	87
Figure 33: Quantity of crops lost to wild animals per Gewog.....	87
Figure 34: Amount lost to the wild animals.....	88
Figure 35: The normalized exposure index score map of DFO, Gedu.	90
Figure 36: The normalized sensitivity index score map of the DFO, Gedu. Higher index values indicate higher sensitivity and vice versa.....	91
Figure 37: The normalized adaptive capacity index score map of DFO Gedu. Higher index values indicate higher adaptive capacity and vice-versa.	92
Figure 38: Vulnerability index map of DFO,Gedu	94
Figure 39: Six Categories of High Conservation Value Area.....	95
Figure 40: Map showing the location of Tumdra HCVA.....	96
Figure 41: Summary Map of all Priority 1 (red), Priority 2 (green), Priority 3 (orange) and Priority 4 (yellow) areas in the IKI landscape.	97
Figure 42: Conceptual model for conservation for DFO.....	101
Figure 43: Threat ratings of DFO	102
Figure 44: Number of illegal incidents in 2023–2024.....	103

Tables

Table 1: Land Use Land cover 2016 of DFO, Gedu.....	25
Table 2: Overall staff strength of the Division	30
Table 3: List of building infrastructure of DFO, Gedu.....	31
Table 4: List of vehicle inventory	32
Table 5: Budget utilization (Nu. in millions) from FY 2020–2021 to FY 2023–2024	33
Table 6: Revenue projected (Nu. in million) for the next 5 years (2024–2028).....	37
Table 7: List of Forest Management Unit	48
Table 8: List of Local Forest Management Area	48
Table 9: List of Community Forest	50



Table 10: List of Private Forests under DFO	51
Table 11: List of cross-cutting management regimes under DFO.....	52
Table 12: Forest types with detailed area and its cover percentage	53
Table 13: Average stem density per hectare by forest types	54
Table 14: Growing stock per hectare by forest types	54
Table 15: Basal area per hectare by forest types	55
Table 16: Biomass stock per hectare by forest types.....	56
Table 17: Carbon stock per hectare by forest types	56
Table 18: Average biomass and carbon increment per hectare by forest types	57
Table 19: Carbon sequestration	58
Table 20: Area statement of management and working circles	61
Table 21: Area statement of protection circles	62
Table 22: Area statement of non-production circles	63
Table 23: Volume of Rural Timber Allotted from 2019-2023	64
Table 24: Non-wood forest product allotted in five years (2019-2023)	65
Table 25: Amount of surface collection product allotted in the past five years	66
Table 26: Area of SRF allotted for developmental activities in the past five year.....	68
Table 27: Area lost to forest fire	70
Table 28: List of Wood-based Industries under DFO	71
Table 29: Sex ratios in each Gewogs	73
Table 30: Average Amount of income earned from different sectors.....	74
Table 31: Average amount of expenses for different sectors	75
Table 32: Composition of landholding types across Gewogs in acres.....	75
Table 33: Varieties of vegetable(n) crops grown by the communities	78
Table 34: Livestock types and numbers raised by the farmers.....	78
Table 35: Importance of Livestock to the communities	80
Table 36: Varieties of forest resources collected by the communities.....	81
Table 37: Livestock depredation by wild predators.....	83
Table 38: Types of wild predators against the livestock.....	84
Table 39: The age category that wild predators depredate	85
Table 40: Amount of estimated loss incurred per incidence in Ngultrum.....	86
Table 41: Number of livestock and estimated amount lost	86
Table 42: Weights and significance of indicators on exposure and sensitivity	89
Table 43: Weights and significance of indicators for adaptive capacity.	91
Table 44: Exposure, sensitivity, adaptive capacity and vulnerability index scores of the gewogs of DFO, Gedu	93
Table 45: List of high-ranking threats on HCVs.....	98
Table 46: List of Strategic Approaches that can Mitigate Potential Threat in the Selected HCV Management Area	98
Table 47: Response framework for Priority Areas produced by HCV Screening	100
Table 48: Indicative Management Plan Framework for HCVA	111
Table 49: Implementation framework	115
Table 50: Implementation framework for HCVA	121
Table 51: Monitoring and Evaluation Framework	122
Table 52: Monitoring and Evaluation framework for HCVA.....	127



Executive Summary

The Divisional Forest Office (DFO) in Gedu, established in 1985 as the sub-divisional forest office and later upgraded to divisional forest office in 1988, oversees all of Chukha Dzongkhag. Covering 1,857.38 sq. km, DFO Gedu is located between approximately 26.717° and 27.300° latitude, and 89.250° and 89.817° longitude. It is bordered by Samtse to the west, Haa to the northwest, Paro and Thimphu to the north, and Dagana to the east, with India's Buxa Tiger Reserve along the southern boundary.

The DFO's altitude varies from 200 to 4,400 meters above sea level, with annual precipitation ranging from 4000mm to 6000mm. The dominant forest types include warm broad-leaved forests (31.96%), cool broad-leaved forests (18.32%), subtropical forests (11.93%), and evergreen oak forests (11.63%). High-altitude forests such as fir, hemlock, blue pine, spruce, juniper rhododendron, and dry alpine scrub occupy the remainder. These forests cover 89% of the DFO's area and support 834 plant species from 141 families, along with 28 mammal species (including tiger, elephant, and snow leopard) and 247 bird species from 61 families. DFO Gedu also forms an essential part of the Wangchu and Amochu basins, with 478 water sources providing environmental services to approximately 5,127 households.

The Tumdra Ney area, covering 511 acres within Darla Gewog, is designated as a High Conservation Value Area (HCVA) due to its cultural and spiritual significance. This sacred area, connected to local deities and cultural heritage, has management guidelines for visitor control, waste management, and nature-based solutions to protect its sanctity, reduce pollution, and enhance landscape resilience.

With local communities relying heavily on natural resources for their livelihood, the plan emphasizes sustainable livelihoods and nature-based enterprises. It focuses on community engagement through capacity-building for sustainable Non-Wood Forest Product (NWFP) harvesting and gender-inclusive economic activities. These initiatives aim to reduce unsustainable resource use and relieve pressure on forest ecosystems while enhancing local economic resilience.

The plan includes comprehensive strategies on different regimes, climate, environmental and social safeguards for sustainable forest management, conservation, public service delivery and preventing human-wildlife conflicts, curb illegal activities such as logging and poaching, and managing ecological impacts from infrastructure development. Key measures include Spatial Monitoring and Reporting Tool) SMART patrolling, community education on waste management, and promoting ecotourism are aligned with conservation goals.

An estimated budget of about Nu. 99.54 million over the next decade is required to support the implementation of this 10-year strategy, prioritizing community involvement in biodiversity conservation, resource management, climate adaptation, and human-wildlife conflict mitigation. This holistic and climate approach aims to ensure the long-term sustainability of natural resources and environmental stewardship.



Key facts of DFO Gedu

Sl.No		Forest statistics	
1	Total Forest Area	ha	162,878.84
2	Forest Cover Percent	%	91
3	Broad-leaved forest	%	82.91
		ha	137150
4	Conifer forest	%	17.09
		ha	28272.18
5	Basal area per hectare	m²/ha	28.43
6	Growing Stock per hectare	m³/ha	239.35
Protected Areas			
1	Biological Corridors	ha	NA
		No.	NA
2	Key Biodiversity Areas	ha	25,300
		No.	1
3	High Conservation Value Area	ha	206.4
		No.	1
4	Botanical Garden	Ha	NA
		No.	NA
Sustainable Forest Management Regimes			
1	Forest Management Units Area	ha	10676.53
		No.	1
2	Total Area of Community Forest	ha	5660.56
3	Total Community Forest	No	56
4	Total households involved in CF	No	1905
5	Local Forest Management Area	ha	4636.9
		No.	1
6	NWFP Groups	ha	8.02
		No	2
Wood-based industries			
1	Wood-based industries	No	42
Field Division and field offices			
1	Divisional Forest Office	No.	1
2	Divisional Range Office	No.	3
3	Divisional Beat Office	No.	5
4	Integrated Check Post	No.	5
5	Biodiversity Information Center	No	NA



Chapter 1: Background

1.1. Rationale

Bhutan though a small country, is widely recognized across the world for its environmental conservation initiatives and as a carbon negative country in 21st century. The intact natural resources that we have today is a testimony to the farsighted conservative visions of our successive monarchs and the sound environment conservation policies of the country. However, over the years, the forest management policies have undergone significant changes from that of more conservation focused to sustainable utilization of forest resources. Though scientific management of our forest resources based on the principles of sustainability had long been practiced, it has become even more imperative than ever before in light of the changing climate and its impacts. Today climate change and its impacts has widely affected many countries. Bhutan by virtue of being located in a most fragile mountainous ecosystem is even more poised to the impacts of climate change. Thus, Bhutan is one of the few countries in the world that enshrines forest and environmental conservation aspects in its Constitution. Article 5 of the Constitution of the Kingdom of Bhutan reflects commitment to ensure that, in order to conserve the country's natural resources and to prevent degradation of the ecosystem, a minimum of sixty percent of Bhutan's total land shall be maintained under forest cover for all time.

Division Forest Office (DFO) as the custodian of our forest resources in the Dzongkhags, plays an integral role in conserving and protecting our natural forest resources besides catering forestry services to the people of the country. It is one of the main players in implementing our sound environmental conservation policies and ensuring our commitment to remain carbon neutral and maintain 60% forest cover for all times to come. Though management of forest resources within the division's jurisdiction is guided by the noble principles of sustainability, it is even more important to be scientific along with long term goals and objectives. It is also equally important to review and evaluate such goals and objectives on a periodic basis. Therefore, in order to do so, a comprehensive and holistic Division Forest Management Plan with time bound vision, mission, objectives and goals is imperative. It shall serve as an overarching scientific Forest Management Plan in scientifically managing the forest resources within the jurisdiction of Forest Divisions.

1.2. History and Significance

1.2.1. Importance of forests

The Article 5 of the Constitution of the Kingdom of Bhutan states that: "Every Bhutanese is a trustee of the kingdom's natural resources and environment". The Royal Government is enjoined in the Constitution to conserve and improve the environment and safeguard the country's biodiversity. It is further directed to secure sustainable development while promoting economic and social development. The Constitution has enshrined the Government to ensure that a minimum of 60% of the country's land should be maintained under forest cover for all times to come. Bhutan is the only carbon-neu-



tral country in the world, absorbing carbon more than it emits. The Royal Government of Bhutan (RGoB) has made an international commitment to remain carbon neutral for all times to come. At the divisional level, these constitutional principles guide all forest management and conservation activities implemented by the DFO.

1.2.2. Overview of the Sustainable Forest Management

Sustainable forest management in Bhutan is anchored in a commitment to maintain at least 60% of the country's area under forest cover for all times to come, as enshrined in the Constitution of Bhutan. This national policy emphasizes the conservation and sustainable utilization of biodiversity, forest, and water resources. The Forest and Nature Conservation Act (FNCA) of 2023 further supports this framework by outlining provisions for the protection, conservation, and sustainable use of forest resources. This legislative environment sets the stage for various forest management activities across the country, ensuring that forestry practices align with the principles of sustainability and biodiversity conservation. Bhutan encompasses the estimated forest cover of 69.71% of total land area and the Divisional Forest Office, Gedu established in 1988, plays a pivotal role in this national effort. Initially, a sub-Divisional Forest Office was set up at Gedu in 1985, utilizing the old site office of the Bhutan Logging Corporation (BLC) The DFO, Gedu now encompasses the entire Chukha Dzongkhag, covering 11 gewogs with a total area of 1,857.38 km². This division is strategically located, serving as a crucial gateway for the import and export of forestry products.

The division includes three Range offices in Gedu, Tsimasham, and Phuentsholing, and five Beat Offices in Chapcha, Wangkha, Darla, Kungkha, and Pasakha. Over the years, these offices have been instrumental in evolving both administrative and technical aspects of forest management. The division's efforts are aligned with the national mandate to conserve and promote sustainable utilization of forest resources, ensuring that productive forest areas are managed sustainably to meet long-term needs for wood and other forest produce.

Key functions of the DFO, Gedu include the preparation of annual management plans and the monitoring and evaluation of their implementation by the Natural Resources Development Corporation and other relevant agencies. The division provides technical guidance and promotes public participation in the management of natural resources. Additionally, it plays a vital role in poverty reduction and development by verifying and issuing forestry clearances for land allotment, road construction, telephone and transmission lines, quarrying, mining, and other developmental activities. Since November 2023, the DFO has started to facilitate the export of timber extracted from scientific thinning and private registered land, contributing to the Gross Domestic Product (GDP) of the country. The significance of the DFO, Gedu extends beyond resource management to include service delivery within its jurisdiction. By implementing five-year plans and monitoring the utilization of forestry resources, the division ensures adherence to relevant laws and regulations. This comprehensive approach underscores the importance of sustainable forest management and biodiversity conservation at both the national and divisional levels, contributing to Bhutan's overarching goals of environmental sustainability and socio-economic development. Traditional management systems, integrated with modern practices, further enhance the division's ability to maintain ecological balance while supporting community livelihoods.



1.3. Policies and Legislations

1.3.1. National Forest Policy 2011

The National Forest Policy 2011 was formulated to keep up with changing times and the evolution of forest management concept of the SRF. Since 1957, Forest governance has transitioned from providing “free access” to “almost no access” to “managed access”.

The Forest Policy 2011 broadly stipulates to apply scientific management approaches to all of Bhutan’s forest and biodiversity resources for the benefit of people without compromising the conservation values and the constitutional mandate of maintaining a minimum of 60 % forest cover for all time.

The Policy while stating about different management regimes also has provisions on the forest-based industries and need of proper utilization and marketing in developing private sector and rural communities. Some of the main features of the Policy include a science-based participatory approach to forest governance and sustainable forest management with emphasis on efficient and environment friendly technologies for value-addition and waste minimization.

1.3.2. Forest and Nature Conservation Act of Bhutan (1969, 1995, 2023)

The Bhutan Forest Act 1969 is one of the first Acts passed by the RGOB-The Act nationalized “all land under which no person has acquired a permanent heritable and transferable right of use and occupancy” as forest. It further identified and provided directives regarding the forest rights, uses, royalties and penalties. The Act stipulated that at least 60% of the country should remain forested at all times.

The Bhutan Forest Act 1969 was repealed and ratified in 1995. The Forest and Nature Conservation Act of Bhutan 1995 identifies and outlines the requirement of management plan for production and protection of the forest and wildlife. Emphasis was given to the community and social forestry and encouraged the participation of the community and private individuals in managing the forestry resources. The Act also provided the legal basis for defining management restrictions in the process of forest planning and function mapping.

The FNCA of Bhutan 1995 was revised in the year 2023 to cope with emerging conservation issues without compromising the development needs of the Country and its people. Besides harmonizing obsolete sections and subsections of the previous Act, the FNCA of Bhutan 2023 formulated a mechanism for payment for ecosystem services.

1.3.3. Forest and Nature Conservation Rules (2000, 2003, 2006, 2017, 2020, 2023, 2024)

The Forest and Nature Conservation Rules (FNCR) 2000 was revised in 2003 and again in 2006 to mainly accommodate a broader scope of the power and duties vested by the FNCA 1995 which were not covered by earlier FNCRs. The FNCA 1995 mandated the Department to manage SRF including Community Forests (CF), protect and conserve wildlife, soil & water and other related natural resources of Bhutan. The FNCR 2006



issued authority and provisions for the preparation of management plans for Protected Area (PA), Forest Management Units (FMU), CF, NWFP (Non-Wood Forest Produce Management Area), Soil & Water conservation. Various amendments to the FNCR 2006 have been done over the years due to changing time but keeping in line with the provisions of the NFP 2011. Further, a separate amendment to the FNCR 2006 was carried out due to the adoption of the revised rule for the rural timber allotment as part of the implementation of the Government to citizen services programmed. The FNCR 2006 was again revised in 2017 which was an amalgam of all the different amendments made to the FNCR 2006 and the provision on the Rules on Biological Corridors (BC) 2007, which defined the protection status and prescription of the BC plan.

The FNCRR 2017 was revised in 2023 to accommodate all the requirements vested in FNCA of Bhutan 2023. Major changes in the FNCRR 2023 includes the deletion of Chapter on Surface Collection of Sand and Stone as the mandate is transferred to the Department of Geology and Mines. In addition to fine tuning the provisions of the FNCRR 2017 the FNCRR 2023 underscores expediting public service delivery through online platforms. The amended FNCRR 2024 introduced targeted refinements to the FNCRR 2023 to address implementation challenges, clarify procedures, and simplify processes, enhancing practicality and efficiency without altering the core conservation objectives.

1.3.4. Land Lease Rules and Regulations of Bhutan 2018

The Land Lease Rules and Regulations of Bhutan 2018 implements the provisions of the Land Act of Bhutan 2007 and necessitates the requirement of forestry clearance for issuance of SRF land of lease. Further, it strongly discourages and forbids lease of land registered under Government institutions and areas which are under different management regime or (system/ or practice) namely designated Parks, Nature Reserve, Protected Area (PA), BC, Buffer Zones, CF, Critical Watershed, Wetland, High Risk Zones, Nyes, Sacred Grooves (religious sites), monuments and Restricted Zones. However, the Secretariat can make exemptions for only those critical infrastructures of national importance and public need under special circumstances as deemed relevant by it.

1.3.5. Biodiversity Act of Bhutan 2003

The Biodiversity Act of Bhutan 2003 provides for the conservation and sustainable utilization of biological resources & associated traditional knowledge and ensures Sui Generis protection of plant varieties. It also authorizes the implementation of the Access and Benefit-sharing (ABS) regime to derive additional benefits in a fair and equitable manner.

1.3.6. Land Act of Bhutan 2007

The Land Act of Bhutan 2007 provides for the leasing of state land for economic and various other activities. All Tsamdro (grazing) and Sokshing (forest land for collection of leaf litter) rights shall revert back to the State and convert to leasehold uses with management plan giving preference to previous right holders.



1.3.7. National Environment Protection Act 2007

The National Environment Protection Act 2007 provides for the establishment of an effective system to conserve and protect the environment through the National Environment Commission or its successors, designation of competent authorities and constitution of other advisory committees, so as to independently regulate and promote sustainable development in an equitable manner. The Act also calls for conservation and protection of wetlands, alpine regions, watersheds, and other vulnerable ecosystems in addition to the existing protected areas.

1.3.8. Waste Prevention and Management Act of Bhutan 2009

The Waste Prevention and Management Act of Bhutan 2009 promotes minimization and sound management of waste in the country through the 3 Rs (Reduce, Reuse and Recycle). The Act further identifies different agencies for regulation of waste in the country wherein it empowers the then Ministry of Agriculture and Forests to ensure prevention and management of waste with respect to the agricultural sector, including livestock and forestry.

1.3.9. Climate Change Policy of the Kingdom of Bhutan, 2020

Bhutan, a landlocked country in the Eastern Himalayas, is highly vulnerable to the impacts of climate change due to its fragile mountain ecosystems, dependence on climate-sensitive sectors (like agriculture, hydropower, and forestry), and limited adaptive capacity. Despite being a net carbon sink-absorbing more greenhouse gases than it emits-Bhutan faces increasing risks from climate-induced disasters such as glacial lake outburst floods (GLOFs), erratic rainfall, landslides, and droughts.

To address these challenges and align with its international commitments under the United Nations Framework Convention on Climate Change (UNFCCC) and the Paris Agreement, Bhutan adopted the Climate Change Policy of Bhutan 2020. This policy provides a strategic framework for coordinated action on climate change mitigation and adaptation, while ensuring that development remains sustainable and resilient. It also provides strategic guidance to ensure that Bhutan remains carbon neutral and protects the well being of the people by adapting to climate change efficiently and effectively. Additionally, the policy also aims to address challenges and opportunities such as international support in the form of finance, technology, capacity building, research and awareness arising from recent developments in the national and international arena of climate change, which will be critical in implementing climate actions. This policy also ensures meaningful participation of all relevant stakeholders in climate change actions in a coordinated and coherent manner with clear roles and responsibilities.

1.3.10. Nationally Determined Contribution, 2021

Bhutan's 2nd NDC was officially launched on June 5, 2021, coinciding with World Environment Day and ahead of COP26. It reaffirms Bhutan's pledge to remain carbon neutral, and outlines enhanced mitigation measures via sector-specific Low Emission Development Strategies (LEDS) and updates to the National REDD+ Strategy and Action Plan. Bhutan's 2nd NDC advances LEDS across multiple sectors to decouple devel-



opment from emissions. It also highlights key sector specific adaptation and mitigation measures and initiatives that will be taken by Bhutan. In presenting the second NDC, Bhutan maintains the commitment to remain carbon-neutral where emission of greenhouse gases will not exceed carbon sequestration by our forests and sinks as first pledged in 2009 and reaffirmed in the first NDC. At the same time, Bhutan calls on the international community to continue and enhance the support for Bhutan's efforts to mitigate and adapt to climate change. While Bhutan's first NDC covered broad priority action areas, the second NDC further enhanced our actions by elaborating priority mitigation actions in the form of LEDS, roadmaps and strategies.

1.3.11. National Adaption Plan of the Kingdom of Bhutan, 2023

The National Adaptation Plan (NAP) process was initiated by Bhutan in line with the UNFCCC Cancun Adaptation Framework (2010), which called on countries to formulate medium- and long-term strategies to address climate change impacts. While Bhutan had earlier prepared two National Adaptation Programmes of Action (NAPAs) focused on urgent and immediate needs, the NAP aims to provide a comprehensive, long-term framework for integrating climate change adaptation into national planning and development.

Bhutan began developing its NAP with support from the Green Climate Fund (GCF), the UNDP, and other partners around 2019. The objective is to identify, prioritize, and mainstream adaptation needs across key sectors such as agriculture, forestry, water resources, health, energy, and infrastructure, ensuring that climate resilience is embedded within the country's socio-economic development guided by the philosophy of Gross National Happiness (GNH). The NAP process also emphasizes strengthening institutional coordination, scientific data and climate information systems, and financing mechanisms to support sectoral adaptation. Importantly, it helps Bhutan align national adaptation planning with its Climate Change Policy (2020) and the Second Nationally Determined Contribution (2021).

1.3.12 Water Act of Bhutan, 2011

The Water Act of Bhutan, 2011 provides the legal framework for the protection, conservation, development, and sustainable management of water resources in Bhutan. The Act recognizes water as a public trust and a vital national resource, ensuring its equitable and sustainable use for present and future generations. The Act establishes principles for integrated water resources management, regulates water abstraction and pollution, and sets out institutional roles for water governance at national and local levels. It also provides for the protection of watersheds, water sources, and water quality, while promoting efficient water use, conflict resolution, and environmental sustainability in line with Bhutan's development and conservation priorities.

1.3.13 Mines and Mineral Act of Bhutan 1995 and Regulation

The Mines and Minerals Act of 1995 provides the legal framework for the exploration, extraction, management, and conservation of mineral resources in Bhutan. It recognizes minerals as a state-owned resource and aims to ensure their sustainable utilization while safeguarding the environment and supporting national development. The Act establishes



licensing and permit systems for prospecting, mining, and processing of minerals, defines the roles and responsibilities of regulatory authorities, and sets out procedures for revenue collection, royalty payments, and enforcement of compliance. The Mines and Minerals Regulations operationalize the Act by detailing application procedures, safety and environmental standards, reporting requirements, and penalties for violations. Together, the Act and its Regulations aim to balance economic development, environmental protection, and responsible resource management in Bhutan.

1.3.14 Economic Development Policy of Bhutan 2016

The Economic Development Policy of Bhutan outlines the nation's strategy to achieve sustainable, inclusive, and equitable economic growth while maintaining the country's unique cultural heritage and environmental conservation priorities. Rooted in the philosophy of Gross National Happiness (GNH), the policy emphasizes that economic development must contribute not only to income generation but also to social well-being and ecological balance. Key objectives include diversifying the economy, promoting private sector development and entrepreneurship, fostering rural development, enhancing human capital and skills, and ensuring sustainable use of natural resources. The policy also encourages investment in infrastructure, innovation, and trade, while prioritizing environmental stewardship and social equity. Overall, it provides a roadmap for Bhutan to achieve balanced economic growth that aligns with its development philosophy and long-term national goals.

1.3.15 National Biodiversity Strategy and Action Plan of Bhutan, 2025

The National Biodiversity Strategy and Action Plan (NBSAP) of Bhutan is a strategic framework aimed at conserving biodiversity, promoting sustainable use of biological resources, and ensuring equitable benefit-sharing. Aligned with the Convention on Biological Diversity (CBD), the NBSAP integrates Bhutan's development priorities, traditional knowledge, and conservation commitments into a coherent national plan.

The strategy focuses on ecosystem and species conservation, habitat restoration, and protection of genetic resources, while emphasizing community participation and mainstreaming biodiversity into sectoral policies such as agriculture, forestry, and tourism. The Action Plan outlines priority activities, targets, and institutional responsibilities to achieve these goals, ensuring that biodiversity contributes to both environmental sustainability and socio-economic development in Bhutan.



1.4. Purpose and Objectives

1.4.1. Vision

- **Contribute to a sustainable Forest Ecosystems for the people, Nature and Economy.**

1.4.2. Mission

- **Contribute to conserve and manage Bhutan's natural resources through the adoption of innovative technologies to ensure socio-economic and environmental wellbeing, while maintaining a minimum 60% of the land under forest cover for all times to come.**

1.4.3. Purpose

To sustainably conserve and manage the forest resources and biodiversity of DFO Gedu, ensuring social, economic, and environmental well-being for present and future generations, while contributing to the national commitment of maintaining at least 60 percent of Bhutan's land area under forest cover in perpetuity.

1.4.4. Objectives

The objectives of this management plan are:

1. To provide effective and efficient public service delivery.
2. To ensure the sustainable management of forest resources through sustainable management practices.
3. To conserve biodiversity and enhance ecosystem services through effective management of natural habitats and conservation of species.
4. To effectively address the adverse impact of climate change through mitigation, adaptation, and community engagement for long-term environmental health and resilience.
5. To develop and implement strategies for mitigating human-wildlife conflict.



Chapter 2: Current Status

2.1. Boundary and Area

DFO Gedu lies between 26.717° and 27.300° latitude and 89.250° and 89.817° longitude, covering an area of 1,857.38 sq. km. This excludes a small part of Babana in Dungna and Papaling in Metakha Gewog, which fall under the Selala Forest Management Unit (FMU) managed by the DFO, Paro. It borders Samtse to the west, Haa to the northwest, Paro and Thimphu to the North, and Dagana to the East. It is adjacent to the Buxa Tiger Reserve in West Bengal, India in the south. It covers eleven Gewogs under Chukha Dzongkhag with an altitudinal range between 200 m.a.s.l to 4400 m.a.s.l (Figure 1). Annual precipitation ranges from 4000mm to 6000mm. The dominant forest types are warm broad-leaved forest (31.96%) followed by the cool broad-leaved Forest (18.32%), Subtropical Forest around 11.93% and Evergreen Oak Forest covers the remaining 11.63%. High-altitude mountain forests include Fir Forest (6.92 %), Hemlock Forest (5.64 %), Blue Pine Forest (2.04 %), and Spruce Forest (0.63 %). Juniper Rhododendrons (0.31 %) and Dry Alpine Scrub (0.04%).

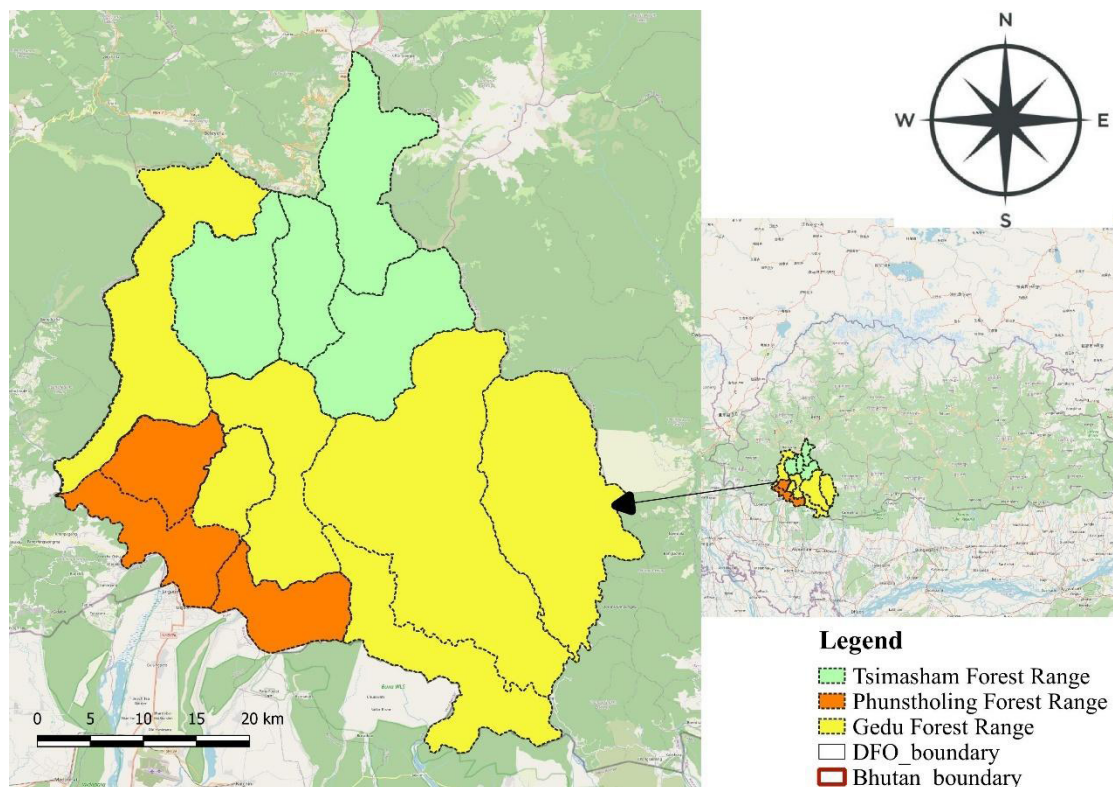


Figure 1: Administrative boundary of DFO, Gedu

Table 1: Land Use Land cover 2016 of DFO, Gedu

Land class	Area (Ha)	Cover percentage
Alpine Scrubs	406.67	0.12
Built up	840.61	0.24
Cultivated Agriculture	7911.28	2.28
Forests	323,015.90	93.19
Landslides	351.51	0.10
Meadows	4407.01	1.27
Non-Built up	45.08	0.01
Rocky Outcrops	466.35	0.13
Shrubs	7237.36	2.09
Water Bodies	1953.91	0.56

The Table 1 outlines the distribution of various land cover types, highlighting their respective areas in hectares and percentage contributions. Cultivated agriculture is the most dominant, covering 7,911.28 hectares (2.28%), followed by shrubs, which span 7,237.36 hectares (2.09%). Meadows cover 4,407.01 hectares (1.27%), while water bodies account for 1,953.91 hectares (0.56%). Built-up areas occupy 840.61 hectares (0.24%), and alpine scrub covers 406.67 hectares (0.12%). Rocky outcrops and landslides cover 466.35 hectares (0.13%) and 351.51 hectares (0.10%), respectively. The smallest proportion is represented by non-built-up areas, which span just 45.08 hectares (0.01%). This distribution reflects a landscape dominated by agricultural and shrub lands, with smaller contributions from other natural and human-modified land cover types as shown in figure 2.



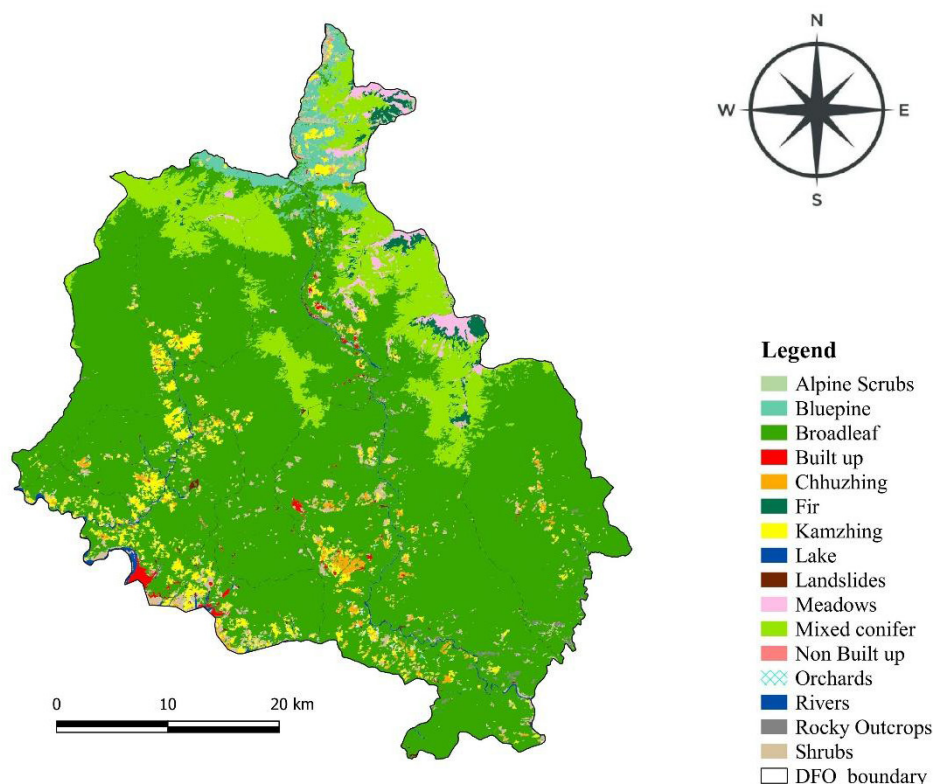


Figure 2: Land Use Land Cover, 2016 of DFO, Gedu

2.2 Administration

2.2.1 Administrative set up

The Divisional Forest Office, Gedu looks after the jurisdiction of all the 11 Gewogs under Chukha Dzongkhag, which comprises one Dungkhag i.e., Phuentsholing Dungkhag. The DFO has three Range Office jurisdictions and one Forest Management Unit namely, Gedu Range, Tsimasham Range, Phuentsholing Range and Metabchu FMU. The range offices is further narrowed to 5 Beat offices such as Chapcha Beat, Wangkha Beat, Kungkha Beat, Darla Beat and Pasakha Beat office. The Tsimasham Range includes Gelling, Chapcha, Bjachho, and Bongo, while the Gedu Range covers Dungna, Gelling, Bongo, Getana, Phuentsholing, and Darla. The Phuentsholing Range encompasses Gelling, Darla, Sampheling, Phuentsholing, and Logchina. The Metabchu FMU specifically includes Metakha.

At the Divisional Headquarter, the section is divided into four sections, including the administrative section in line with the mandates of the DoFPS. The sections are Forest Monitoring and Information sections (FMIS), which mainly mandated to issuance of Forestry Clearances for developmental activities in SRF land and its monitoring, enforcement and awareness of laws, Secondly, Forest Planning and Management Section (FRPMS), which is mandated for planning and implementation of Management Plan of Scientific Thinning, Community Forestry and timber allocation and utilization through approvals including the exports.

The Nature and Conservation section (NCS) is core mandated to conduct the time monitoring and conservation of any biodiversity key species and related species under DFO and coordinate the Human Wildlife related conflicts and the Administrative section role is to regulate and manage the Human Resources, inventories of the equipments issued and the management of pool vehicles, besides the section is also mandated to look after the financial related activities under DFO, Gedu.(Figure 3)

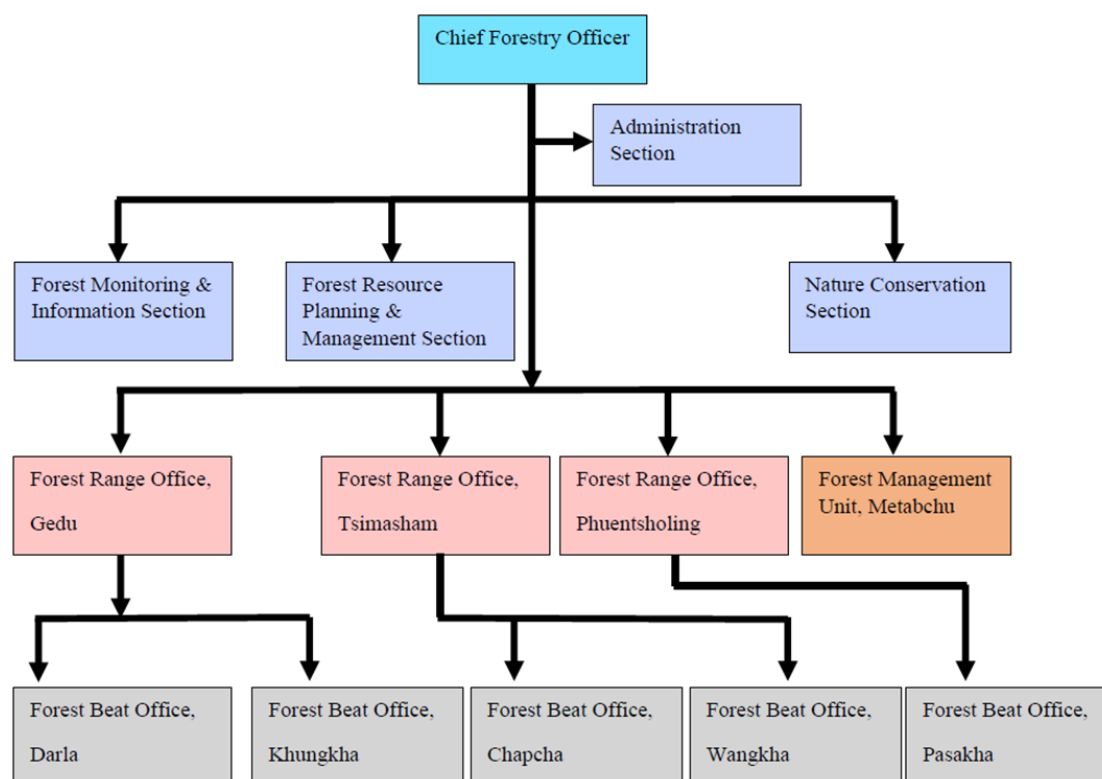


Figure 3: Organogram of DFO, Gedu

2.2.2 Mandates

The Division is mandated to carry out several routine activities inclusive of service delivery, planning and execution of silvicultural operations, patrolling and conservation activities as listed below.

2.2.2.1. Forest Resources Planning and Management Section

1. Scientific forest management through planning, implementation, and extraction of forest resources from forest management units, local forest management areas, Nationwide thinning areas & working schemes.
2. Community-based Forest Resource Management through planning and implementation of activities including the revision of Community Forestry & Non-Wood Forest Product management areas, community-based forest enterprise.
3. Processing for approval of allotment of timbers, firewood, and NWFP only for commercial purposes (Online Forestry Services (OFS)).
4. Processing for approval of export and import of all forest products (OFS).



5. Timber Allocation and Utilization including facilitation activities with Wood-based Industries, natural resources pricing, timber disposal, and utilization.
6. Non-Wood Forest Produce Allocation and Utilization.
7. Planning and implementation of afforestation and reforestation plantation under DFO (Including BBPL lease land activities).
8. Management of trees outside the forest mainly in agroforestry and private forestry.
9. Coordinate and plan for all forest fire and forest pest-related programs under DFO.
10. Planning, coordination, and Open auction of timber from ad-hoc areas under DFO as per Third-party modality and other relevant modalities.
11. Maintain record and Registration of Integrated Wood Based Industry (IWBI), Primary and Secondary wood-based Industry, under DFO.
12. Inventory of FMU, CF, NWFP, LFMP, & NFI.
13. Support and assist FMIS in the event of monitoring.

2.2.2.2. Forest Monitoring and Information Section

1. Enforcement of FNCA, 2023, FNCRR, 2023, and any other rules and amendments that may be endorsed by the higher authority through coordination with Range and Beat Offices.
2. Awareness of FNCA, 2023, FNCRR, 2023, and any other rules and amendments that may be endorsed by the higher authority through coordination with Range and Beat Offices.
3. Monitoring the implementation of terms and conditions of forestry clearances, and forest produce clearances.
4. Monitoring of FMU, LFMP, CF, Plantation, and NWFP management prescriptions as per M&E framework including Bhutan METT+ (Monitoring Effectiveness Tracking Tool).
5. Provide feedback and recommendations to the Division and the Range/Beat/ FMU staff based on the monitoring and evaluation.
6. Provide legal advice to the field staff and legal backstopping to Range Offices in coordination with the Department and Legal Service Division (LSD), Ministry.
7. G2C services.
8. OFS focal, SMART Focal, and Drone Focal.
9. Open Auction of the illegal timber/NWFP.
10. Process Forestry clearance from SRFL for developmental activities (OFS and Government to Citizens (G2C)).
11. Data Compilation and Management in FIRMS and maintain the record of spatial data of all the Spatial Data (Forest cover, Spatial Decision Supporting System (SDSS) & remote sensing, Drone data) under DFO
12. Monitoring of revenue collection and deposit by Range/beat offices and FMU. (Data Manager).
13. Monitor the forestry offence and settlement
14. Focal for Uniform code of conduct.



2.2.2.3. Nature Conservation Section

1. Identifying, Planning, & Monitoring HCV (High Conservation Values), KBA (Key Biodiversity Areas), and Other Conservation Areas under DFO
2. Coordinate resident elephant monitoring with the concerned Range Office.
3. Protection and conservation of natural habitats of flora and fauna under DFO.
4. Species conservations and surveys.
5. Planning and conducting an annual survey of BMG (Biodiversity Monitoring Grid) under DFO.
6. Fishing license monitoring.
7. Research on flora and fauna under DFO in consultation with the Department.
8. Process and review clearance and research permit for any research conducted within DFO.
9. Management of wildlife rescue facilities.
10. Coordinate and lead Human Wildlife Conflict (HWC) mitigation including wildlife rescue.
11. Assessment of watersheds & wetlands and design & implementation of interventions for their protection and management.
12. Identify recharge areas and implement revival measures for drying water sources.
13. Wildlife feeding reduction advocacy and awareness.
14. Register the wildlife trophies under DFO.
15. Planning, and coordination of any ecotourism-related activities under DFO.
16. Advocate on waste management.
17. Support and assist FMIS in the event of monitoring.
18. Maintain taxa-wise data and submit it to FIRMS for annual update.
19. Annual Performance Agreement (APA) progress report focal.
20. Focal for Handset.

2.2.2.4. Administrative Section

1. HR activities of DFO.
2. Administrative activities including annual rimdro.
3. Advocate the staff to prevent corruption activities under DFO. (awareness of ACC rules, asset declaration, Maintaining gift records.etc...).
4. Awareness related to existing financial rules and regulations.
5. Store inventory and management of fixed assets, vehicles, equipment, etc.
6. Inventory, record, and issuance of forestry documents.
7. HR Travel Focal: Process and create travel approval in eDATS (electronic Daily Allowance & Travel System).
8. Finance Focal (Cluster Finance, Phuentsholing): Process payments and maintain records of payments made for the construction/renovation of office buildings and staff quarters.
9. Submission of financial and physical progress reports of capital projects.



10. Process payments and maintain records of utility bills and other monetary bills.
11. Collect, deposit, and maintain records of FWF and Department FWF for transparency.
12. Focal for annual budget preparation for the Division.
13. Inventory and issuance of arms and ammunitions and processing of related legal documents with relevant authority.
14. Coordinate maintenance of arms and ammunition.

2.2.3. Human Resource

The total strength of the staff under the Division stands to a count of 68 heads with a total of 59 technical staff and 9 non-technical staff as shown in Table 3.

Table 2: Overall staff strength of the Division

Name of Office	Technical staff (Nos.)	Non-Technical (Nos.)
Division HQ	7	5 (2 drivers, 2 ESP and 1 Adm. Assistant)
Tsimasham Range	16	1 (ESP)
Gedu Range	19	1 (ESP)
Phuentsholing Range	16	2(1 (ESP), 1 Driver)
Metabchu FMU	1	0
Total	59	9

The Division's Professional Management Category (PMC) consists of five staff members, including the CFO and four Section Heads, all based at the Division headquarters, along with one SS and S-level Forest Ranger. These staff members oversee the Division's strategic planning, budgeting, reporting, data compilation, and project management, as well as handling correspondence with external agencies.

In other categories, the Division has 14 Senior Supervisors (SS) level staff and 40 Supervisors (S) level staff, who work with dedication and integrity across various Ranges and Beat jurisdictions. All range offices under DFO, Gedu, are currently led by three SS-level Forest Rangers.

The field staff primarily engage in land inspections and assessments for issuing Forestry Clearances, timber marking, conducting SMART patrols to curb illegal activities, responding to human-wildlife conflict cases, and periodically monitoring activities such as Community Forests (CFs), Non-Wood Forest Products (NWFPs), Local Forest Management Areas (LFMA), and plantations.

A key mandate of the Division is to provide forestry services to the public, with the Range and Beat offices serving as immediate points of public service delivery. The efforts and outputs of the field offices contribute directly to the achievement of section targets, which in turn help meet the Division's Annual Work Plan (AWP) goals.

Additionally, the Division is supported by one S-level Administrative Assistant, three O-level staff (drivers), and four ESPs who are stationed in various field and Division offices, as shown in Table 2.

2.2.4. Infrastructure

2.2.4.1. Office Structure

The Divisional Forest Office, Gedu has a total of eight office structures (Table 3) in each range and beat Offices including the Division headquarter. Prior to the establishment of the new office structure of the Divisional headquarter (two storied building), the office was based at current offices of Gedu Range since the establishment of Division in 1988.

The Beat Offices were established to facilitate timely service delivery to communities living far from the Range Offices. Several offices under the Divisional Forest Offices, Gedu, including the Beat Offices at Wangkha, Pasakha, and Kungkha, require major maintenance and additionally, the Phuentsholing Range Office needs to be rebuilt, as it was established in 1962 and has deteriorated drastically over time.

Table 3: List of building infrastructure of DFO, Gedu

Sl. No.	Name of Building	Building Type	Year of Construction/Procurement	Location	Geog	Dzongkhag	Present Condition	Current status/use
1	Division office building	Permanent	2021 (19 Nov)	Gedu	Bongo	Chukha	Good	Use (New office)
2	Gedu Range Office building	Permanent	1988	Gedu	Bongo	Chukha	Poor	Use
3	Staff quarter (Old Gedu Range Office)	Permanent	2005	Gedu	Bongo	Chukha	Good	Use
4	Darla Beat office building	Permanent	2012	Darla	Darla	Chukha	Good	Use
5	Kungkha Beat Office building	Permanent	2003	Kungkha	P/ling	Chukha	Good	Use
6	Chasilakha Beat Office building	Permanent	1962	Chasilakha	Bongo	Chukha	Poor	Unused
8	Phuentsholing Range office building	Permanent	1962	P/ling	P/ling	Chukha	Good	Use
9	Pasakha Beat Office building	Permanent	2004	Pasakha	Sampheling	Chukha	Poor	Use
11	Ranger quarter	Permanent	1962	Kharpandi Goenpa	P/ling	Chukha	Good	Use
12	Tsimasham Range Office Building	Permanent	2016	Tsimasham	Bjabcho	Chukha	Good	Use (New office)
13	Tsimasham Range Office Building (Old)	Permanent	1974	Tsimasham	Bjabcho	Chukha	Poor	Unused
14	Wangkha Beat Office building	Permanent	1999	Wangkha	Bjabcho	Chukha	Good	Use
15	Chapcha Beat Office building	Permanent	1998	Chapcha	Chapchap	Chukha	Good	Use



2.2.4.2. Basic Mobility Facilities

The Divisional Forest Office, Gedu, is equipped with three pool vehicles and two motorcycles (Table 4). Two Hilux vehicles are stationed at the Divisional Office in Gedu, primarily to support mobility requirements of the Division Office and the nearby Gedu Range Office, with occasional services extended to the Tsimasham Range Office. A Bolero Camper is based at Phuentsholing to cater to the range's workload and the longer distance from Gedu. In addition, two Royal Enfield motorcycles are allocated, one for the Phuentsholing Range and another for the Tsimasham Range, to enhance field mobility and operational efficiency.

Most areas under the Divisional Forest Office in Gedu are accessible via farm roads, which poses a challenge for vehicle maintenance due to poor road conditions and results in significant annual maintenance costs.

To ensure timely service delivery and effective monitoring, the Divisional Forest Office expects one vehicle (Bolero) for mobility at each Range Office in the future and backed up by motorcycle.

Table 4: List of vehicle inventory

Sl. No.	Vehicle No.	Vehicle Type	Acq- year	Registration date	Location	Remark
1	BG-2-A1321	Mitsubishi L200	2019	21st Jan, 2020	Division Office	New
2	BG-3-A0191	Toyota Hilux	2009	24th Dec, 2009	Division Office	Running condition
3	BG-1A-2672	Bolero Camper 4WD	2016	8th March, 2016	Phuntsholing Range	Running condition
4	BG-2-A0582	Himalayan Royal Enfield	2024	2024	Tsimasham Range	New
5	BG-2-A0581	Himalayan Royal Enfield	2024	2024	Phuntsholing Range	New

2.2.5. Budget and Revenue

2.2.5.1. Budget for past five years

Divisional Forest Office Gedu received a recurring budget of Nu. 229.752 million from the Royal Government of Bhutan (RGoB) and various projects over the past five financial years 2019-2023 to 2023-2024 for the sustainable management of forests and improvement of the livelihood of the communities. This budget covered personal emoluments, operational and management services, Monitoring of Forestry Programs under Divisional Forestry Services, and Infrastructure Development Services. The majority of the funds, Nu. 164.712 million was allocated for personnel emoluments and received the highest in the 2019-2020 financial year, as shown in Table 5 and Figure 4. The DFO has

utilized a substantial amount of budget with support from various projects and RGoB for the sustainable management of forests and the improvement of the livelihood of the communities. The detailed budget utilization is shown in the table

Table 5: Budget utilization (Nu. in millions) from FY 2020–2021 to FY 2023–2024

Activities	Years									
	2020-2021		2021-2022		2022-2023		2023-2024		2024-2025	
	Cur-rent(m)	Capi-tal(m)	Cur-rent(m)	Capi-tal(m)	Cur-rent(m)	Capi-tal(m)	Cur-rent(m)	Capi-tal(m)	Cur-rent(m)	Capi-tal(m)
PERSONNEL EMOLUMENTS										
Pay and Allowances	26.379		25.887		24.769		34.972		34.551	
Other Personnel Emoluments	0.837		0.850		0.862		1.118		1.139	
Contributions - Provident Fund	3.190		3.120		2.941		2.751		2.752	
Travel - In-country	1.247		1.198		1.122		2.926		3.219	
OPERATION & MANAGEMENT SERVICES										
Utilities -Telephones and Internet	0.214		0.221		0.084		0.046		0.043	
Utilities - Postage			0.130							
Utilities - Electricity, Water, Sewerage	0.117		0.103		0.123		0.123		0.108	
S & M - Office Supplies, Printing, Publications	0.108		0.077		0.077		0.097		0.097	
S & M- Animal feed					0.383		0.020		0.016	
S & M - Uniforms, Extension Kits, Linens	0.081		0.025		0.071		0.070		0.068	
Maintenance of Property - Buildings			0.025		0.038				0.015	
Maintenance of Property - Vehicles	0.535		0.590		0.650		0.650		0.491	
Maintenance of Property - Equipment					0.007					
Maintenance of Property - Computers			0.020		0.015					
Op. Exp. - Taxes, Duties, Royalties, Fees, Handling Charges, Bank Charges	0.061		0.070		0.102		0.174		0.112	
Hospitality & Entertainment	0.010		0.013		0.010					
Retirement Benefits			3.417		9.302		0.593		0.44	
Purchase of Vehicles										
Furniture				0.190						

Monitoring of forestry programs under divisional forestry services										
Travel - In-country	4.409									
Waste Management Program										
Celebration of Social Forestry Day										
Capacity building and training for local level on forest management, Forest Law Enforcement, GIS, GPS, and REDD+ Implementation										
Maintenance of Beat Offices and Tsimasham and Gedu Range		1.000								
Operational Plan Preparation and review of Metabchu FMUs (training)		1.000								
Promoting inclusive, sustainable, and resilient Agri-Food systems in Bhutan (Plantation)						0.233				
Agriculture, landscape and community Livelihoods in Bhutan						0.050				
Amenities at the Gharial farm and Phuentsholing Range Office		0.400								
Feed survival and development of endangered species		0.380		0.526						
S & M - Seeds, Seedlings Maintenance of Property - Buildings										
Install physical barriers for the protection of the crop and property (conservation of Asian elephants)								0.800		
Formation, strengthening of existing quick response teams (Conservation of Asian elephants)								0.100		
Improve degraded elephant habitats(-conservation of Asian elephants)								0.200		
Raising of nursery at Gedu Range, Tsimasham Range, and Phuentsholing Range										

S & M - Seeds, Seedlings										
Conduct Inventory and allotment of sand, boulders & RBM, and monitoring				0.300	2.679					
TADA for Civil Servants for COV-ID-19 Duty				0.600						
Infrastructure development services										
Construction of Divisional Forest Office										
Building	7	3.5		0.761		1.037				
roads		1.239		0.779						
REDD readiness project supports the conduct of the National Forest Inventory			3.097							
Total	10.103	37.188	7.519	38.843	3.156	43.235	1.320	43.540	43.051	

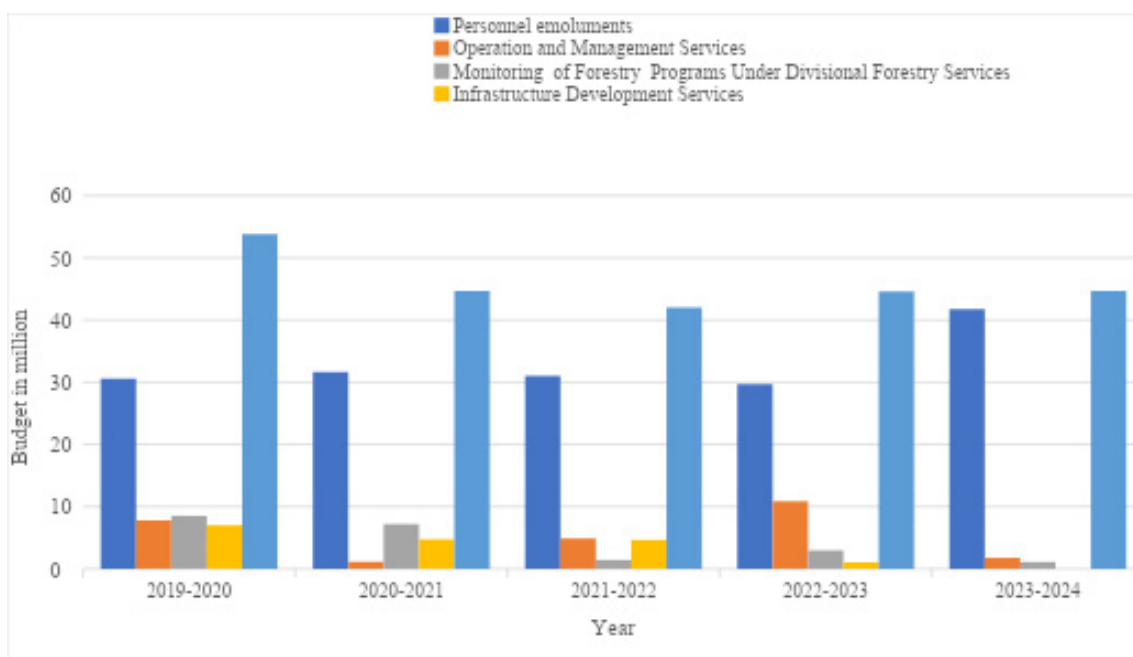


Figure 4: Budget Allocation by Category for the past 5 years.



2.2.5.2. Revenue for past five years and projection for next five years

DFO Gedu has generated the highest revenue over the past five years from service charges associated with the export of RBM (Riverbed Material) boulders, aggregates, stone chips, and sand, amounting to 46.72 million. This category consistently contributes substantially each year, with the highest single-year revenue in 2021 at 13.17 million. Followed by Service charges, Royalties from NWFP have generated the second-highest revenue amounting to Nu. 18.203M

A handwritten signature or mark, possibly a stylized 'G' or 'S', located below the text.

Table 5: Revenue generated (Ngultrum (Nu.) in million) in the past five years (2019-2023)

Revenue Head	Illegal Timber	Timber Misuse	Fishing & Aquatic	Poaching & wildlife Crime	Land-related Offence	Forest Fire	Rural Timber Allotment	Commercial Timber allotment	NWFP	Fishing Fees	Permit fees	Service charge	Power chain renewal/Registration
2019	0.517	0.001	0.054	0.040	0.022	0.005	0.209	0.133	5.105	0.030	1.574	5.757	0.002
2020	0.777	0.031	0.004	0.000	0.042	0	0.063	0.287	5.670	0.170	1.286	8.593	0.030
Year	2021	0.527	0.004	0.000	0.000	0.005	0.042	0.347	4.879	0.221	1.350	13.170	0.001
2022	1.920	0.030	0.017	0.023	0.011	0	0.024	0.868	1.686	0.235	0.292	15.303	0.001
2023	0.956	0.000	0.148	0.010	1.264	0.01	0.047	0.105	0.862	0.484	0.259	3.897	0.007
Total Revenue (Million)	4.696	0.066	0.223	0.073	1.339	0.020	0.384	1.739	18.203	1.139	4.761	46.720	0.040

Table 6: Revenue projected (Nu. in million) for the next 5 years (2024-2028)

Revenue Head	Illegal Timber	Timber Misuse	Fishing & Aquatic	Poaching & wildlife Crime	Land-related Offence	Forest Fire	Rural Timber Allotment	Commercial Timber allotment	NWFP	Fishing Fees	Permit fees	Service charge	Power chain renewal/Registration
2024	1.033	0.014	0.049	0.016	0.295	0.0044	0.084	0.383	1.092	0.251	1.047	10.278	0.009
2025	1.136	0.016	0.054	0.018	0.324	0.0048	0.093	0.421	1.092	0.276	1.152	11.306	0.010
Year	2026	1.250	0.017	0.059	0.019	0.0053	0.102	0.463	1.092	0.303	1.267	12.437	0.011
2027	1.375	0.019	0.065	0.021	0.392	0.0059	0.112	0.509	1.092	0.333	1.394	13.681	0.012
2028	1.512	0.021	0.072	0.023	0.431	0.0064	0.124	0.560	1.092	0.367	1.533	15.049	0.013
Total Revenue (Million)	6.307	0.088	0.300	0.098	1.798	0.027	0.515	2.335	5.460	1.529	6.394	62.751	0.054

With the handing over of surface collection to the Department of Geology and Mining, revenue generated from NWFP is expected to decrease by 50%, as the majority of revenue previously came from sand, RBM, boulders, and aggregates. Additionally, there will no longer be any revenue from Gharial Farm, as it has been relocated outside our jurisdiction. However, the revenue generated by the other head seems to have increased by 10 % in the next 5 years.

2.3. Biodiversity Conservation

The major ecosystems are broadly categorized into forest, aquatic, and agricultural systems. The forest ecosystem is subdivided into temperate, subtropical, and alpine types, with a focus on major forest types, floral and faunal species diversity, species composition, and forest condition. The aquatic ecosystem is classified into lentic systems (such as ponds and lakes), lotic systems (rivers and streams), and wetlands, emphasizing floral and faunal species diversity and the condition of these ecosystems. The agricultural ecosystem includes pastoral, homestead, and agroforestry systems, highlighting the types of crops grown and livestock reared. At the core, the diagram outlines critical aspects of these ecosystems, such as their current status and significance, ecosystem services, conservation and management initiatives, threats, challenges, and opportunities. This comprehensive framework underscores the interconnectedness and importance of diverse ecosystems in sustaining biodiversity and human livelihoods.

The Divisional Forest Office (DFO) Gedu undertakes various initiatives to conserve biodiversity, including habitat management, community-based conservation programs, HWC awareness, waste management, and the sustainable utilization of forest resources through the export of forest products from scientific thinning sites. These efforts aim to maintain ecosystem health, support sustainable livelihoods, and safeguard key species while contributing to national biodiversity and conservation goals.

2.3.1. Forest ecosystem

The study area lies between 26°43' to 27°18' latitude and 89°15' to 89°49' longitude, bordering Samtse to the west, Ha to the northwest, Paro and Thimphu to the north, Daga-na to the east, and India to the south. The altitudinal range spans from 200 m to 4,400 m above sea level, with hot summers, cold winters, and annual precipitation ranges from 4000mm to 6000mm. Warm broad-leaved Forest dominates the area (31.49 %), followed by Cool broad-leaved Forest (18.10 %), Subtropical Forest (11.71 %), and Evergreen Oak Forest (11.65 %). High-altitude forests include Fir Forest (7.29 %), Hemlock Forest (5.81 %), Blue Pine Forest (2.15 %), Spruce Forest (0.63 %), Juniper Rhododendron (0.31 %), and Dry Alpine Scrub (0.04 %) (Forest Types of Bhutan, 2022), with an overall forest cover of about 89 % (Forest Types of Bhutan, 2021).



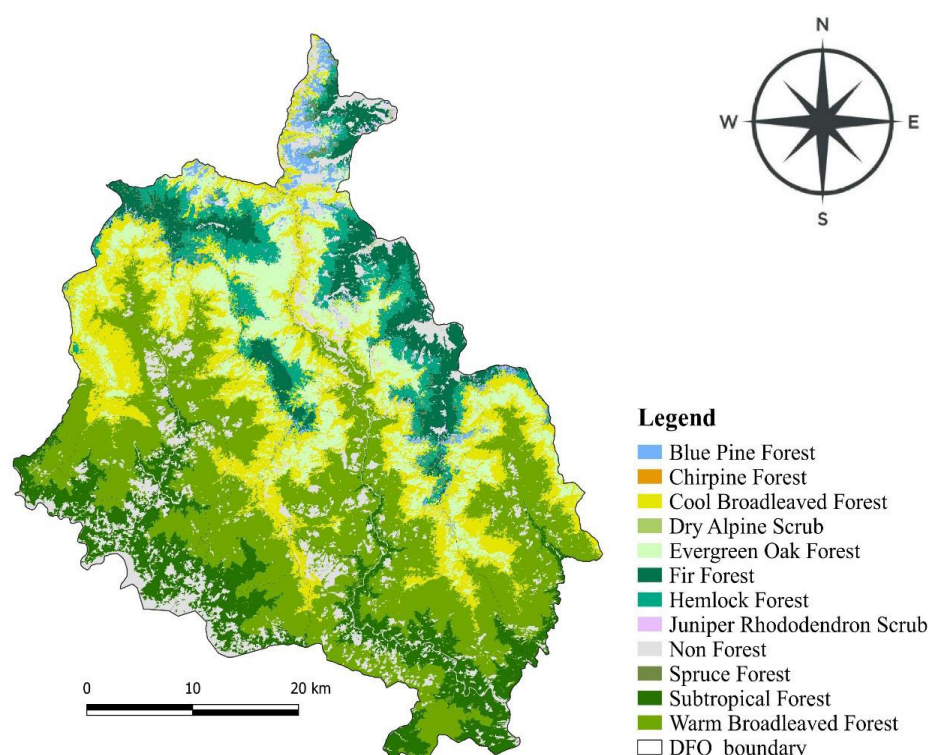


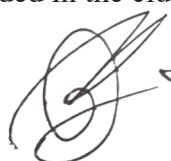
Figure 6: Forest types of DFO, Gedu

2.3.1.1 Floral composition

Recently, the Division has conducted several surveys, including the National Forest Inventory (NFI), National Tiger Survey, Red Panda Survey, assessment of Key Biodiversity Areas (KBAs), and biodiversity monitoring of six permanent grids. These surveys aimed to assess the Division's biological diversity and identify threats to certain species. Additionally, the Rapid Biodiversity Assessment (RBA) was undertaken to document the wide range of species found in the Gedu Division, which is vital for effective management planning. The RBA was conducted following the Biodiversity Monitoring and Social Survey Protocol 2020, developed by the Department, and referenced the Forest Management Code of Best Practices.

In the recent RBA survey, the total of 834 species belonging to 141 families were recorded in the 9 forest types with 15 major life form groups and the groups are Evergreen trees, Deciduous trees, Deciduous shrubs, Evergreen shrubs, Perennial herbs, Annual herbs, shrub, climbers, climbing shrub, climbing herb, orchids, shrub, Herb and all the spore bearing plants including trees ground vegetation and epiphytes from 204 sampling plots.

The entire forest of DFO, Gedu (administratively under Chukha Dzongkhag is categorized into nine types (Figure 7) at a distance threshold of 22% similarity index. PCORD software was employed to classify different forest types. The forest was classified based on the Relative Basal Area of trees and shrubs of each plot. The cluster analysis grouped homogenous plant communities and site factors. The MONTE CARLO test of significance was performed to determine indicator species in each cluster. The top two indicator species with lowest significant P value were added in the cluster dendrogram.



For instance, 204 plots were classified into 9 Clusters vegetation types; Cluster 1 dominated by *Pinus wallichiana* & *Quercus semicarpifolia*, cluster 2 were dominated by sub-tropical vegetation; *Boehmeria macrophylla* & *Macropanax fragrans*, cluster 3 was dominated by *Betula utilis* & *Rosa sericea*, Cluster 4 is dominated by *Tsuga dumosa* & *Alnus nepalensis*, while cluster 5 is dominated by *Abies densa* & *Ribes himalense*, finally cluster 6, 7, 8, & 9 is dominated by broad-leaved species; *Schima wallichii*, *Engelhardtia spicata*, *Lithocarpus pachyphyllus*, *Taxus baccata*, *Acer campbelli*, *Rhododendron grande*, *Persea clarkeana*, & *Quercus lamellosa* respectively. Which is similar to the vegetation types classified in (Forest Types of Bhutan, 2022).

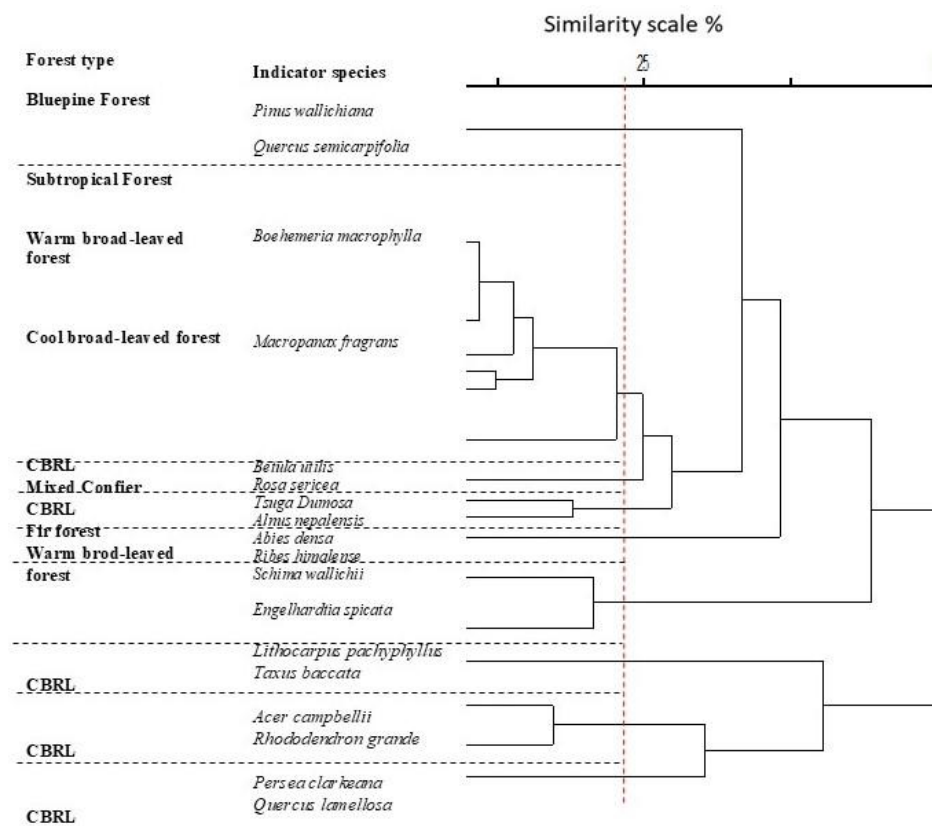


Figure 7: Cluster dendrogram of vegetation types using Sorensen Method.

2.3.1.1.1. Forest structure and species diversity.

Of the 11 Gewogs, the Bongo Gewog has the highest sampling plots (60) and shares the three gewogs (Getana, Phuentsholing, & Samphelling) with minimum sampling plots (6) each. The maximum Diameter at Breast Height (DBH) was recorded in Dungna Gewog with 200 cm and tallest tree in Chapcha and Metakha (40m). However, in Bongo Gewog, there is notable abundance of trees in the DBH (Diameter at Breast Height) class ranging from 21-40 cm, with a height class predominantly in the 6-10 m range as shown in Figure 8. This suggests the presence of a relatively young forest stand within these two Gewogs.



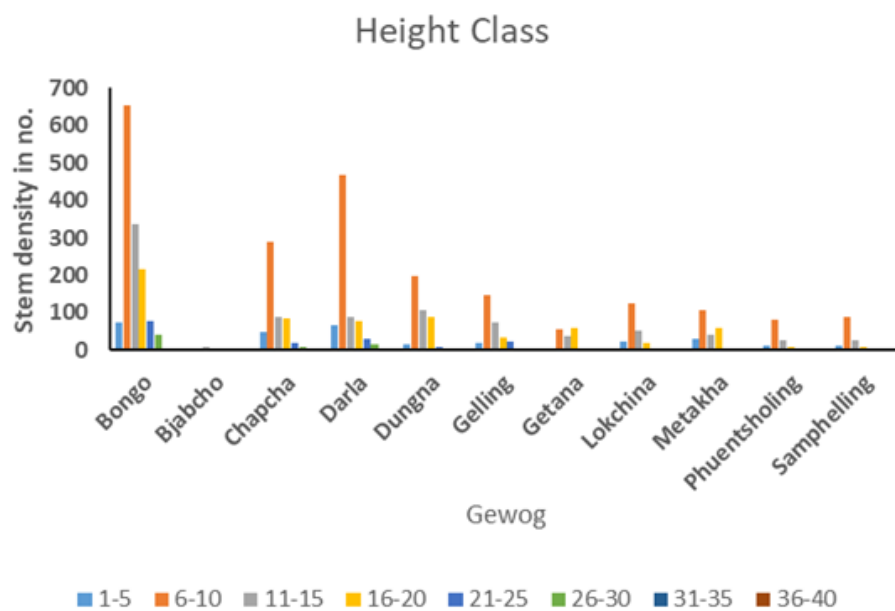
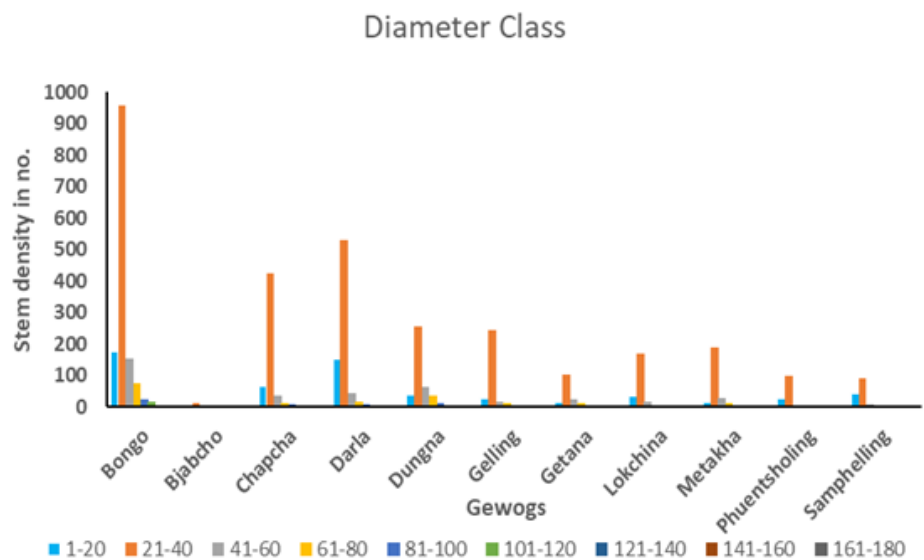


Figure 8: a) Diameter class in each Gewogs. b) Height Class in each Gewog

Similarly, Darla Gewog demonstrates a greater diversity of forest species, as indicated by its Shannon-Weiner diversity index ($H' = 2.56$), followed closely by Bongo Gewog ($H' = 2.47$), wherein the Shannon index takes into account the relative abundance of each species and provides significant information on the rarity and abundance of species in the community (Tshering & Wangchuck, 2023)

Besides the species of vegetation recorded from sampling plots, there are some of the trees, bamboo, and orchid species through opportunistic sightings. The trees found are: *Alcimandra cathcartii*, *Benthamidia capitata*, *Garuga pinata*, *pterygota alata*, & *Lagerstroemia parviflora*. Some of the conservational significant orchid species found

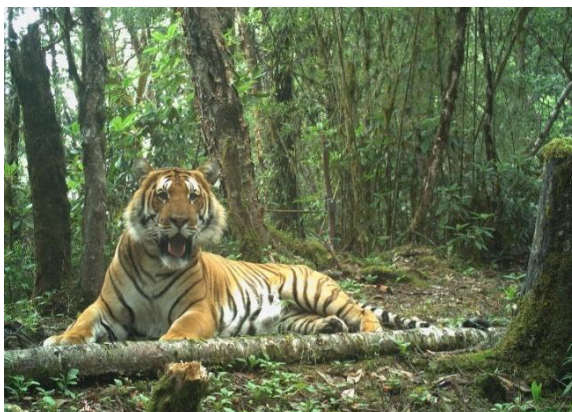


are; *Paphiopedilum farrieanum* (Lady slipper), *Papilionanthe uniflora*, *Spathoglottis ixioides*, & *Spathoglottis jetsuniae*. Bamboos found are *Chimnobambusa callosa* (Kanti bans (lh)), *Cephalostachyum latifolium* (Pishima(Kheng)), *Dendrocalamus sikkimensis* (Zang(Dzo)), *Drepanotachyum anallatum*, *Dendrocalamus hamiltonii*, *Himalayacalamus falconeri*, *Pseudostachyum polymorphum*, & *Yushania maling* (Maling) (Baseline Biodiversity Report, 2021).

2.3.1.2. Faunal composition

2.3.1.2.1. Mammal

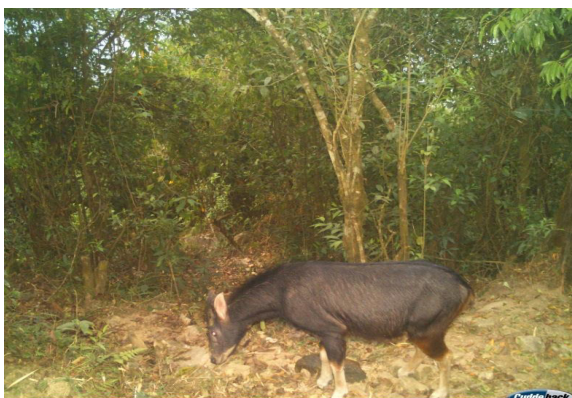
There are 29 species of mammals, excluding bat species. Some of the threatened species as per the International Union for Conservation of Nature (IUCN) red list are *Ailurus fulgens*, *Capricornis sumatraensis*, *Cuon alpinus*, *Elephas maximus*, *Neofelis nebulosa*, *Panthera pardus*, *Panthera tigris*, *Ursus thibetanus* (BBR, 2021) and *Panthera uncia* recently discovered by(Dorji et al., 2024). The overall mammal species richness across the division is more towards the south-eastern and northern parts of the division.



Royal Bengal Tiger (*Panthera tigris*)



Asian elephant (*Elephas maximus*)



Himalayan Serow (*Capricornis sumatraensis*)



Red panda (*Ailurus fulgens*)

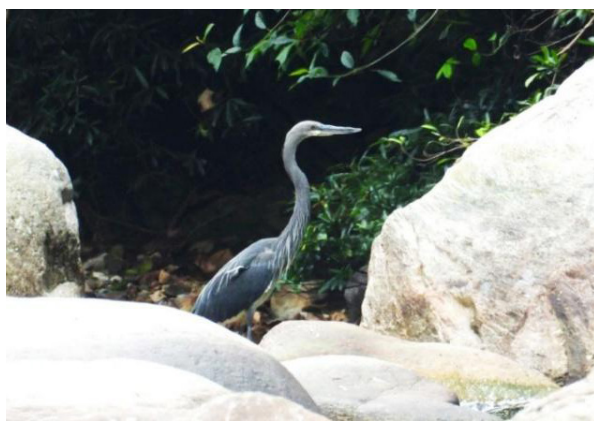
A handwritten signature in black ink, consisting of several loops and a long horizontal stroke extending to the right.

2.3.1.2.2. Bats

Bats are one of the mammals from the order Chiroptera. As per the Baseline Biodiversity Report, 2021 reported that DFO, Gedu has recorded 10 species of bats, and the Chukha Dzongkhag is one hotspots of bats(Tshering et al., 2020).

2.3.1.2.3. Avifauna

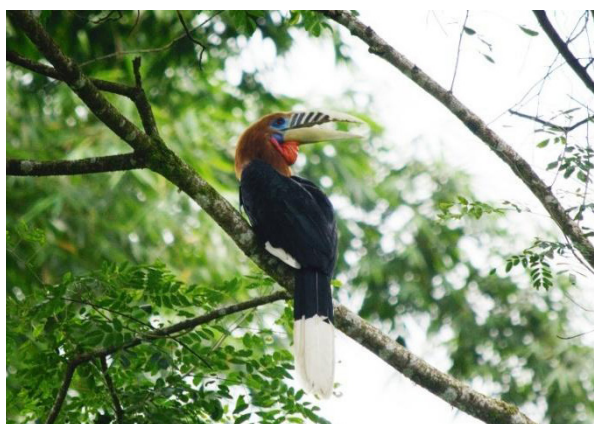
Likewise, the avifauna survey recorded 247 species belonging to 61 families in all the transects surveyed with one bird species under totally protected species (White-bellied Heron) listed in Schedule I of Forest and Nature Conservation Act (FNCA), 2023 and in global context, there are two Endangered (EN) species (Pallas's Fish-Eagle & Steppe Eagle) and 8 Vulnerable (VU) species (Great Hornbill, Wreathed Hornbill, Rufous-necked Hornbill, Beautiful Nuthatch, Chestnut-breasted Partridge, Dark-rumped Swift & River Tern).



White-bellied Heron (*Ardia insignis*)



Great Hornbill (*Buceros bicornis*)



Rufous-necked Hornbill
(*Aceros nepalensis*)



Yellow-rumped Honeyguide
(*Indicator xanthonotus*)



2.3.2. Aquatic Ecosystem

A total of 478 water sources have been surveyed (Figure 9), comprising both running water (lotic) and pond (lentic) systems. Additionally, the area is home to two aesthetically significant lakes, Shawgayla Lake and Phaktshoding Lake, which attract both local and regional tourists, enhancing its ecotourism potential.



Shawgayla lake



Phaktshoding lake

Among Bhutan's five major river systems, the Wangchu River flows through the north-central part of the DFO, while the Amo Chu River traverses its southwestern region.

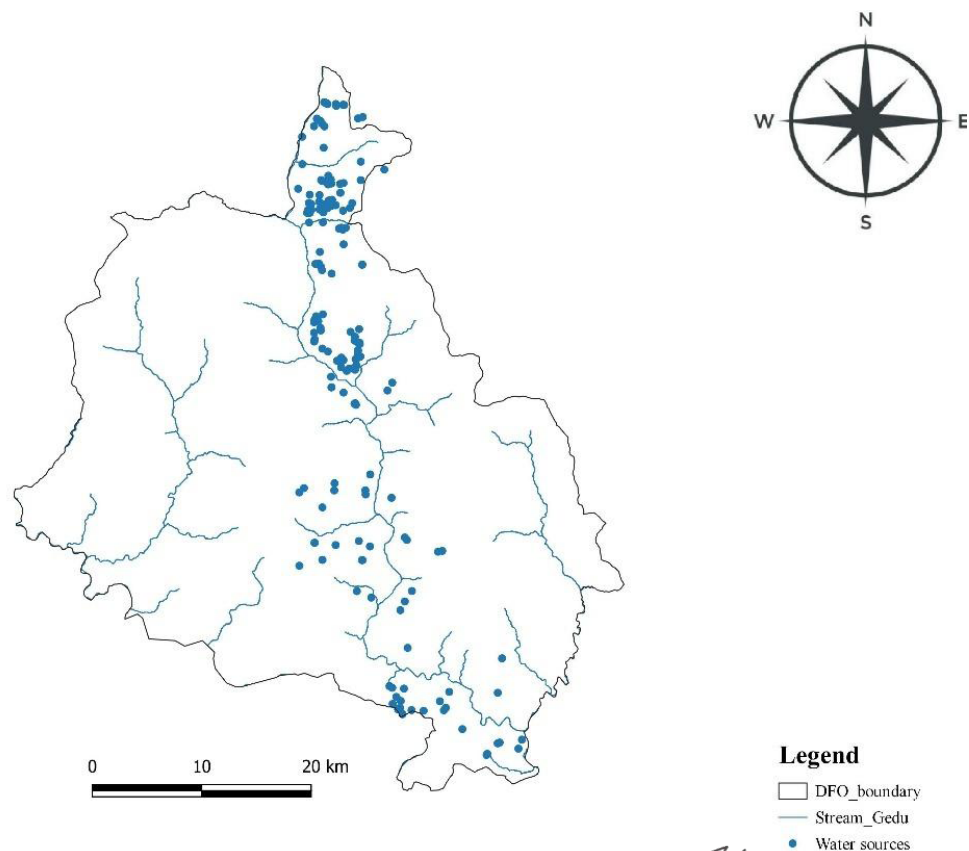


Figure 9: Water sources and river system of DFO Gedu

2.3.2.1. Fishes

There are 43 species of fishes recorded from Wangchu, Amochu, and Melumchu (Dungna) based on the Baseline Biodiversity Report, 2021.

2.3.3. Agricultural ecosystem

The majority of the communities practice livestock farming, and this serves as an essential source of food, ensuring household food security and economic stability. Commercial poultry farming and cattle rearing are more prevalent than other livestock such as pigs, goats, sheep, buffalo, etc. While Poultry farming is mostly done stall feeding, cattle are either tethered/stall feeding or allowed open grazing in fallow land and SRF land. The livestock herding practices employed by households show Tethering or stall feeding as the most prevalent method, the improved pasture is the second most common practice, while pastoral herding is notably absent. Although a small portion of the total household inhabitants under Chukha practices open grazing, it is essential for maintaining biodiversity and to encourage natural regeneration.

In addition to raising livestock, cultivation of cereal crops, fruits, and nuts is common. Maize is widely grown, followed by pulse, dhal, rice, etc. Mandarin oranges, mangoes, and areca nut trees are the leading fruit trees grown in the area. The most significant challenges to grow agriculture and horticulture crops are pests and diseases emerge as the foremost concerns among farmers, closely followed by insufficient fodder availability. Furthermore, the threat of wildlife predators poses a significant risk to livestock.

2.3.4. Others

2.3.4.1. Butterflies

A total of 162 species of butterflies have been recorded through opportunistic surveys out of 760 species documented in Bhutan (Baseline Biodiversity Report, 2021).

2.3.4.2. Herpetofauna

During the Rapid Biodiversity Survey, there were 28 species of herpetofauna and four Crustaceans recorded opportunistically as reported in Baseline Biodiversity Report, 2021. However, according to the Rapid Biodiversity Report 2023, five species of frogs with one toad and one snake.



Amolops himalayanus



Nyctimeystes infrafrrenatus

2.4. Existing Management Regimes

The existing management regimes under the Divisional Forest Office, Gedu are designed to promote sustainable forestry practices while addressing the needs of local communities. These regimes encompass a variety of strategies, including community-based forest management, which empowers local stakeholders to participate actively in the conservation and utilization of forest resources. The office implements practices such as controlled harvesting, reforestation projects, and habitat restoration to maintain biodiversity. Additionally, there is a focus on monitoring and enforcing regulations to prevent illegal logging and encroachment. By fostering collaboration between government agencies and local communities, the management regimes aim to balance ecological integrity with socio-economic development, ensuring the long-term health of the forest ecosystem. These existing Management Regimes include Forest Management Units (FMUs), Local Forest Management Areas (LFMAs), Community Forest (CFs), Private Forest (PFs), Key Biodiversity Area (KBAs), Non-wood Forest Product Group (NWFPs), Scientific Thinning Areas, and High Conservation Value (HCV) Area.

There are 56 community forests established across 11 gewogs of Chhukha Dzongkhag under the DFO to empower local communities in managing and protecting their forest resources and to promote livelihood. The Key Biodiversity area of Nampala is designated as a protected area, which allows resource allocation to local communities based on a conservation management plan.

Community forests and private forests represent two distinct approaches to forest management. Community forests are areas managed collectively by local communities, emphasizing sustainable practices that benefit both the environment and the livelihoods of community members. These forests often focus on preserving biodiversity, protecting watersheds, and providing resources like fuelwood and non-timber forest products. In contrast, private forests are owned by individuals and are typically managed for specific economic benefits, such as timber production. While private forest management may prioritize profit, it can also incorporate sustainable practices to ensure long-term productivity. Both types of forests play vital roles in environmental conservation and resource management, reflecting different values and priorities in forest stewardship. The detailed pictorial representation of management regimes is illustrated in Figure 10 below;



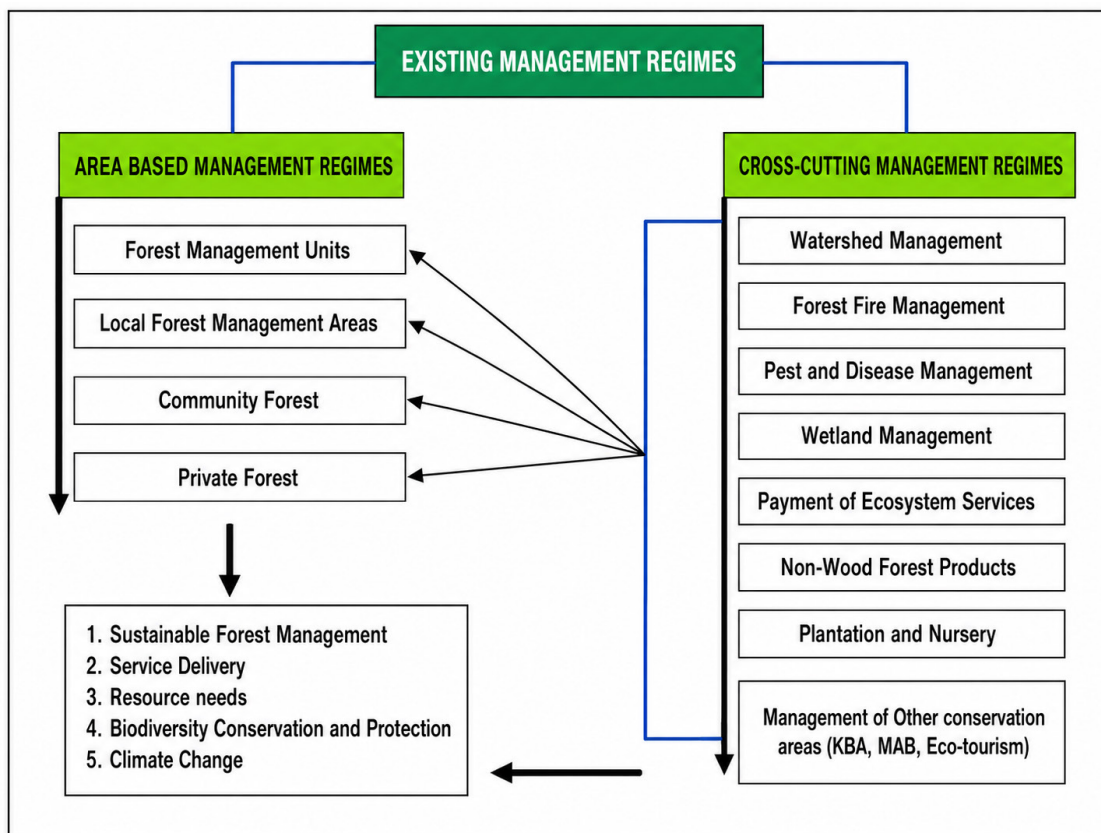


Figure 10: Thematic representation of existing management regimes

2.4.1. Area-Based Management Regimes

2.4.1.1. Forest Management Unit

The Metabchu forest management unit (Table 7), established in 2008, spans 10,676.53 hectares across the gewogs of Metakha and Gelling. Of this, 4,090.22 hectares are forested area, supporting a sustainable forestry approach. The Annual Allowable Cut (AAC) is set at 5,030 cubic meters, divided into 4,000 cubic meters for commercial use and 1,030 cubic meters for rural needs. This unit follows a 10-year management plan cycle, currently in its second plan period.

Table 7: List of Forest Management Unit

Name of Units	Gewogs	Year of Estd.	Total area (Ha)	Forested area (ha)	Annual Allowable Cut (AAC-m3)			Plan Period	Plan Cycle
					Commercial	Rural	Total		
Metabchu	Metakha & Gelling	2008	10676.53	4090.22	4000	1030	5030	10	2

2.4.1.2. Local Forest Management Area

The Getana Local Forest Management Area (LFMA), established in 2020, covers a significant portion of the Getana Gewog, with a total gewog area of 24,159.43 hectares. Under the current management plan, 4,636.9 hectares are designated for sustainable forest management as shown in Table 8. The Annual Allowable Cut (AAC) is set at 1,134 cubic meters, ensuring a balance between resource utilization and conservation. The LFMA operates within a 10-year plan period and is currently in its first plan cycle, focused on responsible forestry practices to support both local needs and environmental goals.

Table 8: List of Local Forest Management Area

Name of LFMA	Gewog	Year of Estd.	Total Gewog area (Ha)	Area Covered by Plan (Ha)	Annual Allowable Cut (AAC)-m3	Plan Period	Plan Cycle
Getana	Getana	2020	24159.43	4636.9	1134	10	1

2.4.1.3. Community Forest

The community forests across various gewogs demonstrate a strong foundation in sustainable forest management, with establishment years ranging from 2000 to 2020. These forests cover areas from as small as 8 hectares to over 250 hectares, providing local communities with resources for both commercial and subsistence use, as shown in Table 9 and Figure 11. Member participation varies widely, with some community forests involving as few as 8 members, while others engage up to 88. Most forests operate under a 10-year management plan cycle, with several forests already in their second or third cycle, reflecting long-term community involvement in forest conservation. This collective approach is helping maintain biodiversity and supporting sustainable resource use across the regions.

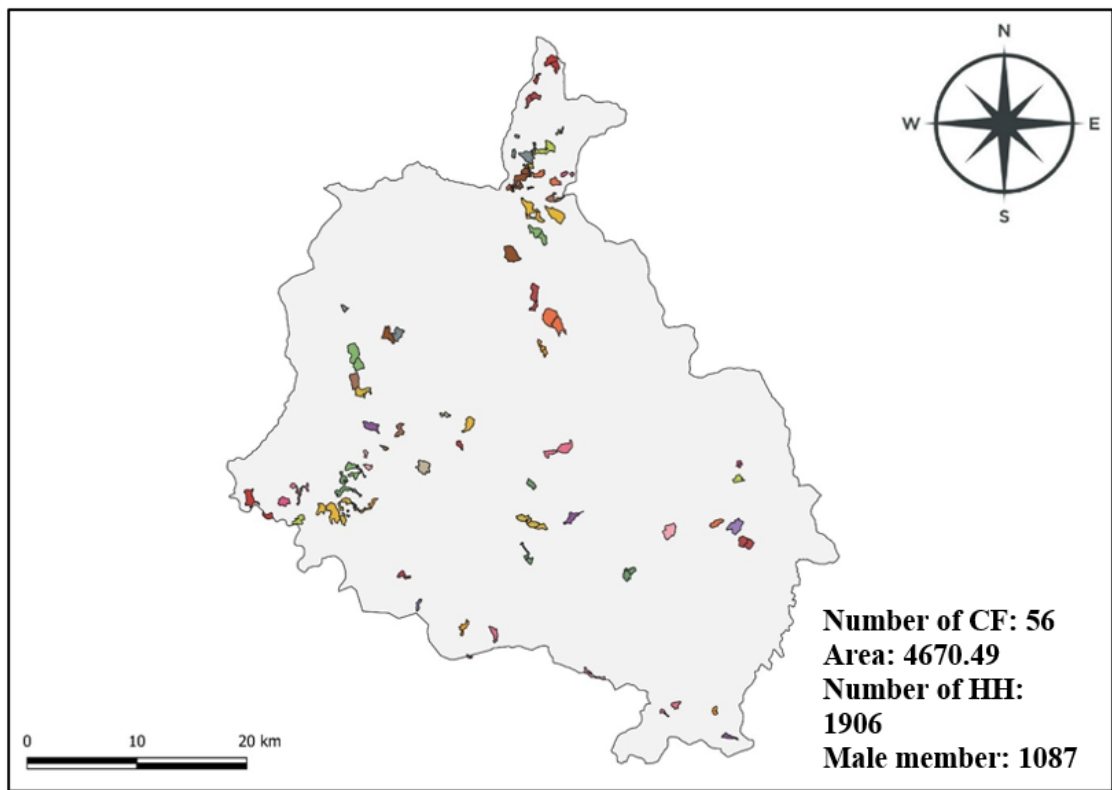


Figure 11: Community Forest under DFO

A handwritten signature or mark, possibly a stylized 'S' or 'G', located below the caption.

Table 9: List of Community Forest

Sl.No.	Name of CF	Year of Estd.	Gewog	Members		Total area	Area under forest cover (Ha)	AAC (m3)	Plan Period	Plan Cycle
				Male	Female					
1	Amalley	2013	Logchina	27	6	46.4			10	1
2	Baeyul	2000	Chapcha	3	10	36.2		34.6	10	1
3	Bjemo	2012	Chapcha	8	8	50.4		98.34	10	3
4	Bunagu	2001	Chapcha	4	20	120		31.4	10	3
5	Burkhay	2015	Samphelling	18	2	23.5			10	1
6	Chanachen Pel-joring	2017	Gelling	5	14	142.47		192	10	1
7	Chimuna	2019	Logchina	27	9	62.9		17.33	10	1
8	Chungkha Chik-thuen	2012	Bongo	40	23	106		281.32	10	2
9	Daga	2016	Getana	6	3	22		123.34	10	2
10	Damchekha	2013	Logchina	21	6	81		292.54	10	2
11	Dofam	2010	Logchina	36	10	50.8		75.06	10	1
12	Dolepchen	2017	Logchina	24	5	40		53.44	10	1
13	Dophuchen	2018	Phuentsholing	45	3	104.25		93.83	10	1
14	Drukdingsa	2013	Dungna	16	3	79		173.4	10	2
15	Dung Goen	2010	Dungna	23	15	41.78		41.76	10	2
16	Dung Ringu	2015	Dungna	11	16	94.25		404	10	1
17	Dzadokha	2013	Logchina	35	10	99		102.4	10	2
18	Gangkha Phola	2015	Chapcha	21	38	122.55		133.5	10	1
19	Gongphel	2020	Chapcha	13	26	148.7		121.01	10	1
20	Gugoen Yeshen Norbu	2017	Chapcha	5	6	16.54		28.6	10	1
21	Gyelwa Rignga	2008	Bjabchho	35	35	250		0	10	2
22	Jatsho	2013	Logchina	27	8	69		0	10	2
23	Kinga Gongphel	2016	Getana	19	13	114		76.74	10	1
24	Kuenga Jamtsho	2020	Chapcha	13	32	134.5		57.7	10	1
25	Kuenphen Dhen-dup	2010	Bongo	21	14	59		22.16	10	2
26	Lingden	2016	Phuentsholing	38	7	129.6		1618.5	10	1
27	Lobneykha	2007	Chapcha	26	59	231		93.05	10	2
28	Lomji	2014	Chapcha	5	5	27		20.1	10	1
29	Metab-Gemba	2015	Metedkha	18	12	76.76		70	10	1
30	Mondokha	2013	Dungna	16	5	20.23		29.50	10	2
31	Namgay Choeling	2016	Bongo	15	44	111		123.35	10	1
32	Norbuling	2012	Bongo	17	32	78.58		20.61	10	2
33	Patsekha Phendhey	2017	Geling	8	3	26		40.34	10	1
34	Pangu Kuenphen	2013	Matedkha	12	6	88.86		56	10	2
35	Pekarling	2017	Samphelling	30	6	36		306.40	10	1
36	Phutsa Kuen-gacholing	2019	Getana	7	12	48		47.35	10	1
37	Puensum	2013	Logchina	70	30	176		447.16	10	2
38	Rangaytung	2017	Samphelling	22	1	43.31		15	10	1
39	Rikey	2015	Samphelling	15	4	50		196.84	10	1

40	Sacha Tshogpa	2020	Chapcha	11	19	106.1		57.2	10	1
41	Samdoen	2013	Darla	14	5	42.24		140.34	10	2
42	Samdrupcholing	2020	Bongo	6	7	31.7		236.01	10	1
43	Sangay Choeling	2012	Getana	13	16	190		109.77	10	2
44	Sangkhu	2013	Darla	7	4	32.71		25.37	10	2
45	Serina	2017	Phuentsholing	26	1	193.95		129.83	10	1
46	Sheyul Draktshen	2015	Chapcha	10	9	15.47		47.4	10	1
47	Sinchula	2010	Darla	21	0	44.04		493.81	10	2
48	Sindeykha Dhoezam	2018	Geling	9	1	76.57		123.77	10	1
49	Tashicholing	2011	Bongo	17	19	41.21		71.90	10	2
50	Tashidengkha	2015	Phuentsholing	22	6	53.5		0	10	1
51	Thadra	2012	Chapcha	18	24	255		99.13	10	2
52	Tsamdrak-Metak	2015	Chapcha	8	20	76		68.62	10	1
53	Tsimakha Phunsum Tshogpa	2008	Bjabchho	17	12	115.39		0	10	2
54	Upper Saureni	2009	Darla	58	13	47.6		28.34	10	2
55	Wangkha Risum	2013	Bjabchho	6	6	53		0	10	2
56	Yanglaykha	2012	Phuentsholing	13	2	23		0	10	2

2.4.1.4. Private Forest

The private forests in Darla Gewog, established mainly between 2017 and 2018, reflect a growing interest among individual landowners in small-scale forest conservation and management. These privately managed forests vary in size, with areas ranging from 0.08 to 0.77 hectares, providing a modest but valuable contribution to local greenery and biodiversity. Though small, these forests underscore a personal commitment to conservation, promoting environmental stewardship on a micro-level in the region.

Table 10: List of Private Forests under DFO

Sl. No.	Name of the Owner	CID no.	Gewog	Thram No.	Year of Estd.	Total area (Ha)
1	Ashman Limbu	10205003787	Darla	291	2018	0.49
2	Guman Singh Rai	10205004572	Darla	1249	2018	0.72
3	Kirti Man Rai	10205004611	Darla	1575	2018	0.77
4	Karna Bdr Rai	10205004547	Darla	253	2018	0.39
5	Aita Singh Gurung	21309000446	Darla	418	2018	0.31
6	Gopal Kharka	10205005697	Darla	595	2018	0.08
7	Nima Dukpa	11309002004	Darla	452	2018	0.38
8	Kazi Man Rai	11309001923	Darla	1569	2017	0.1
9	Khem Prasad Rai	11309001918	Darla	1595	2017	0.4
10	Karna Bdr Rai	11307002296	Darla	441	2017	0.4
11	Purna Bdr Rai	11309001885	Darla	425	2017	0.4
12	Suk Rai Limbu	10205003637	Darla	1320	2018	0.15



2.4.2. Cross-Cutting Management regimes

The cross-cutting management regimes implemented across various gewogs in Chukha emphasize sustainable resource management and biodiversity conservation. A Key Biodiversity Area in Namphula-Gaytala, Getana Gewog, established in 2023, aims to protect threatened species like the tiger, Asian elephant, and red panda over a 10-year plan period. Non-wood forest product (NWFP) management groups in Samphelling and Darla focus on sustainable harvesting and income generation from bamboo, broom grass, and other NWFPs, each following specific management plans of 5 to 10 years. Additionally, the Payment for Environmental Services initiative at Burkhay CF supports water management, further enhancing ecosystem services in the region as shown in Table 11.

Table 11: List of cross-cutting management regimes under DFO

Sl. No.	Cross-cutting Management Regimes/Interventions	Name of the area-based management regimes/Location	Gewog	Year of operationalization of the cross-cutting regime	Total area under management intervention (Ha)	Key Management Interventions	Plan Period of the area-based management plan
1	Key Biodiversity Area	Namphula-Gaytala	Getana	2023	25.3	Maintain a viable population of Threatened species (Tiger, Asian elephant and Red Panda)	10 Years
2	Non-wood Forest Product Management Group	Betar	Samphelling	2014	2.02	Sustainable Management of NWFP (Bamboos & Broom) by generating income through the sale	5 Years
3	Non-wood Forest Product Management Group	Sarphu	Darla	2012	6	Sustainable Management and sale of Broom grass	10 Year
4	Payment for Environmental Services	Burkhay CF	Samphelling			Water Management	



2.5. Forest Resources and Utilization

2.5.1. Forest Resources

The following section discusses the various forest parameters under the DFO Gedu including the stem count, stem density, volume, biomass and carbon. The estimates are calculated using the forest area under the different forest types and the per ha estimates of the parameters for the different forest types as reported in the NFI report (FMID, 2023)

2.5.1.1. Forest cover by forest types

The forest cover under DFO, Gedu, is diverse, spanning several forest types and occupying a substantial portion of the region. Based on the forest types of Bhutan data, the total forest cover includes 166,001.64 hectares, which accounts for approximately 89.42% of the total land area. Among the different types, Warm Broadleaved Forests make up the largest share, covering 35.74% of the forested area. This is followed by Cool Broadleaved Forests at 20.49%, and Subtropical Forests at 13.34%. Smaller portions are occupied by Evergreen Oak Forests (13.01%), Fir Forest (7.74%), and Hemlock Forest (6.31%). Other forest types, such as Blue Pine, Spruce, and Juniper Rhododendron, each cover less than 3% of the total forest area. This distribution highlights the rich forest diversity under DFO, Gedu (Table 12).

Table 12: Forest types with detailed area and its cover percentage

Forest Types	Forest Cover (ha)	Forest Cover (%)
Subtropical Forest	22150.91	13.34
Warm Broadleaved Forest	59355.21	35.76
Evergreen Oak Forests	21607.81	13.02
Cool Broadleaved Forest	34036.05	20.50
Blue Pine Forest	3781.81	2.28
Spruce Forest	1162.75	0.70
Hemlock Forest	10473.96	6.31
Fir Forest	12853.66	7.74
Juniper Rhododendron Forest	579.48	0.35

2.5.1.2. Stem density by forest types

The tree count data by forest type, derived from Bhutan's National Forest Inventory (NFI) Volume I: State of Forest Report, reveals tree density variations across Chukha Dzongkhag's Forest ecosystems. The total tree count by the different forest type in Gedu DFO is 63.98 million trees wherein the highest tree densities are observed in Blue Pine Forests (426 trees/ha) and Evergreen Oak and Cool Broadleaved Forests (417 trees/ha each). Warm Broadleaved Forests have the largest total tree count, estimated at over 22 million trees across 59,355.21 hectares. In contrast, Juniper Rhododendron Forests have the lowest density at 269 trees per hectare, totaling approximately 155,880 trees (Table 13).

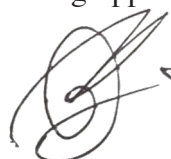


Table 13: Average stem density per hectare by forest types

Stem density by Forest types	Forest Area (Ha)	Tree count/ha	Total tree count
Subtropical Forest	22150.91	310.00	6866782.1
Warm Broadleaved Forest	59355.21	375.00	22258203.75
Evergreen Oak Forests	21607.81	417.00	9010456.77
Cool Broadleaved Forest	34036.05	417.00	14193032.85
Blue Pine Forest	3781.81	426.00	1611051.06
Spruce Forest	1162.75	401.00	466262.75
Hemlock Forest	10473.96	406.00	4252427.76
Fir Forest	12853.66	402.00	5167171.32
Juniper Rhododendron Forest	579.48	269.00	155880.12

2.5.1.3. Growing stock

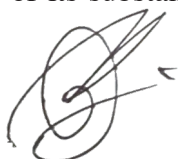
The table presents an analysis of growing stock per hectare across various forest types, highlighting the distribution of total growing stock within a specific area. The total growing stock in Gedu DFO is estimated at around 48.4 million m³. Among the forest types, Warm Broadleaved Forest exhibits the highest total growing stock of approximately 13.5 million m³, with a growing stock density of 228 m³/ha. Conversely, the Juniper Rhododendron Forest has the lowest total stock at about 58,551 m³, with a growing stock density of only 101 m³/ha. Notably, Cool Broadleaved Forest and Evergreen Oak Forest also contribute significantly, with totals of about 12.9 million m³ and 7.4 million m³, respectively, indicating a diverse and rich forest ecosystem with varying densities and volumes (Table 14).

Table 14: Growing stock per hectare by forest types

Growing Stock			
Total growing stock	48432280.94		
Growing stock by Forest types	Forest area(ha)	Growing stock/ha	total growing stock
Subtropical Forest	22150.91	160.90	3564081.42
Warm Broadleaved Forest	59355.21	228.03	13534768.54
Evergreen Oak Forests	21607.81	341.01	7368479.29
Cool Broadleaved Forest	34036.05	379.15	12904768.36
Blue Pine Forest	3781.81	209.17	791041.20
Spruce Forest	1162.75	384.84	447472.71
Hemlock Forest	10473.96	442.70	4636822.09
Fir Forest	12853.66	398.82	5126296.68
Juniper Rhododendron Forest	579.48	101.04	58550.66

2.5.1.4. Basal Area by forest types

The table illustrates the distribution of basal area across various forest types, under Gedu DFO, totalling to around 5.57 million m². Among these, the Warm Broadleaved Forest has the highest total basal area, around 1.64 million m², corresponding to a density of 27.67 m²/ha, indicative of its substantial biomass. Conversely, the Juniper Rhododen-



dron Forest records the lowest total basal area at merely 8,889 m², with a density of 15.34 m²/ha, suggesting its limited growth capacity. Additionally, the Cool Broadleaved Forest and Evergreen Oak Forest exhibit significant total basal areas of approximately 1.46 million m² and 822,609 m², respectively. This data highlights the diversity in forest structure and productivity, which is essential for understanding ecosystem dynamics and informing effective forest management practices (Table 15).

Table 15: Basal area per hectare by forest types

Basal Area			
Total basal area	5567674.50		
Basal Area by Forest types	Forest area(ha)	Basal area/ha	Total basal area
Subtropical Forest	22150.91	20.08	444790.27
Warm Broadleaved Forest	59355.21	27.67	1642358.57
Evergreen Oak Forests	21607.81	38.07	822609.15
Cool Broadleaved Forest	34036.05	42.89	1459806.15
Blue Pine Forest	3781.81	23.14	87510.97
Spruce Forest	1162.75	36.95	42963.73
Hemlock Forest	10473.96	46.51	487144.05
Fir Forest	12853.66	44.47	571602.11
Juniper Rhododendron Forest	579.48	15.34	8889.21

2.5.1.5. Biomass by forest types

The table summarizes biomass stock across various forest types, highlighting total biomass and its distribution among different pools. The overall biomass is estimated at approximately 46.40 million tonnes, which includes 34.03 million tonnes of Above Ground Biomass (AGB), 8.90 million tonnes of Below Ground Biomass (BGB), 1.08 million tonnes of Coarse Woody Debris (CWD) and 2.40 million tonnes of litter.

On a per hectare basis, the average biomass of Bhutan's forest is around 263.22 tonnes. In Gedu DFO, the Warm Broadleaved Forest is notable for having the highest biomass totals, with roughly 10.60 million tonnes of AGB and 2.76 million tonnes of BGB, indicating its high productivity. Conversely, the Juniper Rhododendron Forest exhibits the lowest biomass values, with only 0.04 million tonnes of AGB and 0.01 million tonnes of BGB. This data highlights the diversity in biomass stock across different forest types, which is crucial for assessing ecosystem health, carbon sequestration potential, and guiding conservation and management practices (Table 16).



Table 16: Biomass stock per hectare by forest types

Biomass Stock						
Pools		AGB	BGB	CWD	Litter	Total
Total Biomass (Million tonnes)		34.03	8.90	1.08	2.40	46.40
Biomass by Forest Types	Forest area(ha)	AGB	BGB	CWD	Litter	
Subtropical Forest	22150.91	2.42	0.68	0.05	0.26	3.41
Warm Broadleaved Forest	59355.21	10.60	2.76	0.31	0.72	14.39
Evergreen Oak Forests	21607.81	5.43	1.40	0.06	0.26	7.16
Cool Broadleaved Forest	34036.05	8.91	2.31	0.29	0.58	12.09
Blue Pine Forest	3781.81	0.47	0.13	0.03	0.11	0.73
Spruce Forest	1162.75	0.29	0.07	0.01	0.01	0.37
Hemlock Forest	10473.96	2.73	0.71	0.18	0.18	3.80
Fir Forest	12853.66	3.14	0.82	0.15	0.28	4.38
Juniper Rhododendron Forest	579.48	0.04	0.01	0.00	0.00	0.06

2.5.1.6. Carbon stock by forest types

The table provides an overview of carbon stock across various forest types, with a total carbon estimate of approximately 33 million tonnes. This total includes about 15.99 million tonnes of above-ground biomass (AGB), 4.18 million tonnes of below-ground biomass (BGB), 0.51 million tonnes of Coarse Woody Debris (CWD), 1.13 million tonnes of litter, and 11.21 million tonnes of Soil Organic Carbon (SOC).

Similarly, Warm Broadleaved Forest stands out with the highest carbon stock, totaling approximately 10.04 million tonnes, while the Juniper Rhododendron Forest shows the lowest at just 0.08 tonnes. This data highlights the critical role of different forest types in carbon sequestration, which is essential for climate regulation and forest management efforts (Table 17).

Table 17: Carbon stock per hectare by forest types

Carbon Stock						
Pools	AGB	BGB	CWD	Litter	SOC	Total
Total carbon (million tonnes)	15.99	4.18	0.51	1.13	11.21	33.02
Carbon (tonnes/ha)	823.72	216.3	29.21	63	675.03	1807.26
Carbon stock by Forest types	Forest area(ha)	AGB	BGB	CWD	Litter	SOC
Subtropical Forest	22150.91	1.14	0.32	0.02	0.12	0.77
Warm Broadleaved Forest	59355.21	4.98	1.30	0.15	0.34	3.27
Evergreen Oak Forests	21607.81	2.55	0.66	0.03	0.12	1.79
Cool Broadleaved Forest	34036.05	4.19	1.09	0.14	0.27	2.85
Blue Pine Forest	3781.81	0.22	0.06	0.01	0.05	0.18
Spruce Forest	1162.75	0.13	0.03	0.00	0.00	0.11
Hemlock Forest	10473.96	1.28	0.33	0.08	0.09	0.97
Fir Forest	12853.66	1.48	0.38	0.07	0.13	1.23
Juniper Rhododendron Forest	579.48	0.02	0.01	0.00	0.00	0.05



2.5.1.7. Biomass and carbon increment by forest types

The table presents the biomass and carbon increment across various forest types, highlighting significant annual increases. The total biomass increment is approximately 0.39 million tonnes, with a corresponding carbon increment of around 0.18 million tonnes.

Among the forest types, the Warm Broadleaved Forest exhibits the highest total biomass increment of about 165,601 tonnes, with a per-hectare increase of 2.79 tonnes/ha/yr. Similarly, it also demonstrates a substantial carbon increment of approximately 77,755 tonnes (Table 18). Conversely, the Juniper Rhododendron Forest shows the lowest increments, with only 336 tonnes of biomass and 156 tonnes of carbon. Other notable forest types include the Subtropical and Cool Broadleaved Forests, which also contribute significantly to biomass and carbon increments. This data underscores the crucial role of these forests in enhancing biomass and carbon storage, essential for climate change mitigation and sustainable forest management.

Table 18: Average biomass and carbon increment per hectare by forest types

Biomass Increment by Forest Types			
Forest types	Forest area (Ha)	Biomass Increment (tonnes/ha/yr)	Total increment
Subtropical Forest	22150.91	2.94	65123.68
Warm Broadleaved Forest	59355.21	2.79	165601.04
Evergreen Oak Forests	21607.81	0.77	16638.01
Cool Broadleaved Forest	34036.05	2.13	72496.79
Blue Pine Forest	3781.81	3.45	13047.24
Spruce Forest	1162.75	3.20	3720.80
Hemlock Forest	10473.96	2.44	25556.46
Fir Forest	12853.66	2.19	28149.52
Juniper Rhododendron Forest	579.48	0.58	336.10
Carbon Increment by Forest types			
Forest types	Forest area (Ha)	Carbon Increment (tonnes/ha/yr)	Total increment
Subtropical Forest	22150.90987	1.38	30568.25562
Warm Broadleaved Forest	59355.20687	1.31	77755.321
Evergreen Oak Forests	21607.80537	0.36	7778.809935
Cool Broadleaved Forest	34036.04914	1	34036.04914
Blue Pine Forest	3781.80523	1.62	6126.524473
Spruce Forest	1162.753293	1.51	1755.757472
Hemlock Forest	10473.96373	1.15	12045.05829
Fir Forest	12853.6566	1.03	13239.2663
Juniper Rhododendron Forest	579.4792315	0.27	156.4593925



2.5.1.8. Carbon Sequestration

The total carbon sequestration rate of Chhukha Dzongkhag is 3.62 tonnes CO₂ ha⁻¹ yr⁻¹ as sequestering a total of 589,573.42 tonnes CO₂ yr⁻¹ as reported in the NFI II. Accordingly, the carbon sequestration capacity for areas falling under Gedu DFO is estimated using the total forest area and the sequestration rate of the different forest types as discussed in Table 18 above. Therefore, the total carbon sequestration rate for DFO Gedu is 673,254 tonnes of CO₂ per year.

Table 19: Carbon sequestration

Area	Biomass Growth (tonnes)	Carbon Fraction	CO ₂ fraction/ equivalent	Total Carbon Sequestration (tonnes CO ₂)
Gedu DFO	390669.63	0.47	3.67	673254.00

This significant capacity for carbon uptake reflects the health and productivity of the forest ecosystems managed by the office. Effective management practices and conservation efforts have fostered an environment conducive to enhanced carbon storage, playing a vital role in climate change mitigation. The continued focus on sustainable forest management will be essential in maintaining and potentially increasing these carbon sequestration rates, benefiting both local biodiversity and global climate health.

2.5.2. Function Mapping

Figure 12 provides a thematic representation of function mapping in land and forest management. It categorizes areas into two main groups: those under existing area-based management regimes and those outside such regimes. The existing management regimes include community forests, forest management units, local forest management areas, and private forests. Additionally, it highlights areas under cross-cutting management regimes, such as payment for environmental services, management of other conservation areas (e.g., Key Biodiversity Areas, Man and Biosphere Reserves, and ecotourism), NWFP (Non-Wood Forest Product) groups, and watershed management initiatives.

For areas outside the current management regimes, the diagram divides them into two primary functions: production/utilization and protection/conservation. Production/utilization encompasses potential timber production areas (both commercial and rural), built-up areas, alpine scrubs, agricultural lands, shrubs, private registered lands, and meadows. Protection/conservation focuses on riparian reserve protection, road buffers, drinking and irrigation water source buffers, religious site buffers, landslide/erosion-prone areas, important wildlife habitats, and potential eco-tourism and recreational areas. This framework highlights the integrated approach required for sustainable management, balancing productive use and conservation priorities.



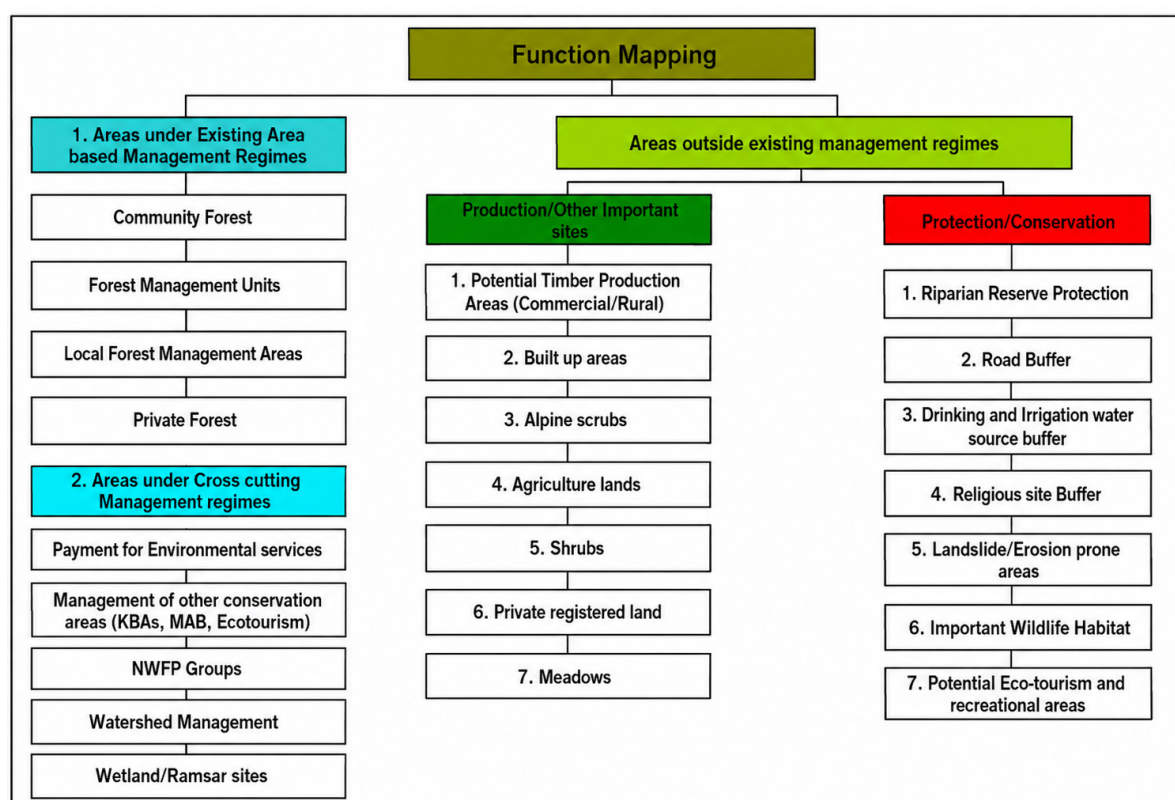
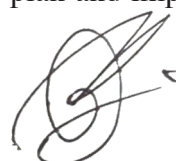


Figure 12: Thematic representation of function mapping

Forest function mapping is vital for numerous reasons, particularly its contribution to biodiversity conservation by identifying and protecting critical habitats. It supports sustainable resource management by pinpointing areas appropriate for resource extraction without compromising ecological integrity. Furthermore, this mapping preserves essential ecosystem services such as water regulation, soil stabilization, and carbon sequestration that are crucial for both environmental health and human well-being. It plays a significant role in climate change mitigation by identifying regions with high carbon storage potential and enhances disaster risk reduction by clarifying the protective functions of forests. Economically, forest function mapping fosters sustainable benefits for local communities through eco-tourism and resource harvesting, while also informing effective forest management policies and land use plans that balance ecological, social, and economic priorities. In the context of the Divisional Forest Office management plan, this mapping is especially important as it guides decision-making processes, ensures that areas not currently under management are considered, and aligns with the codes of best management practices to enhance overall forest stewardship and sustainability.

2.5.2.1. Area under existing management regimes

Under Divisional Forest Office Gedu, the existing management regimes are as follows: Key Biodiversity Areas, Non-Wood Forest Products (NWFP) Areas, Forest Management Units (FMUs), Community Forest (CF) Areas, and Scientific Thinning Areas (Figure 13). These regimes are essential for ensuring effective forest conservation and sustainable management practices. We can strategically plan and implement management



activities that promote biodiversity conservation, optimize resource use, and enhance community involvement. This approach not only facilitates the protection of critical habitats but also supports local livelihoods through sustainable practices aligned with ecological integrity.

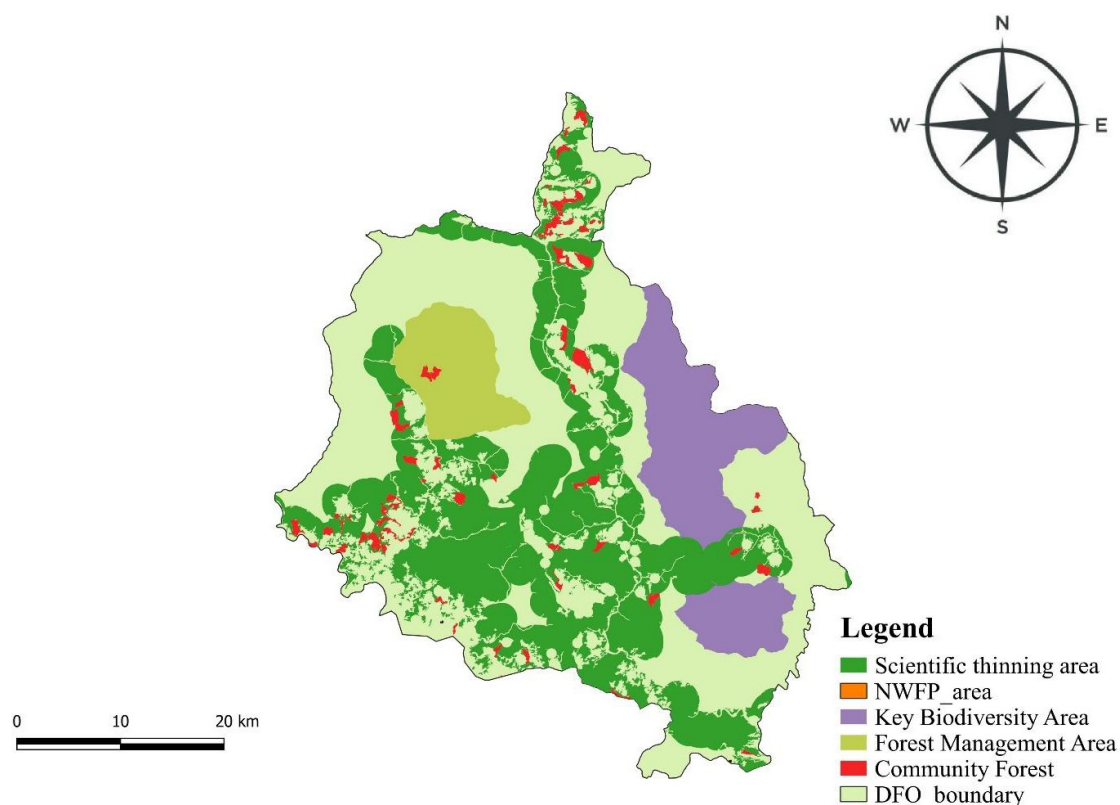


Figure 13: Area Showing Existing Management Regimes

2.5.2.2. Management circles outside existing Management Regimes

Figure 14 and Table 20 outline the area statements for the management and working circles within the Divisional Forest Office (DFO) Gedu. The total area of the division is 185,737.81 hectares, with management circles designated for various purposes. Within the management circles covering the entire area, the protection circle encompasses 18,548.96 hectares, the production circle spans 150,860.81 hectares, and the non-production circle covers 16,236.69 hectares, totaling 185,646.47 hectares. Additionally, management circles outside existing regimes include a protection circle of 13,617.09 hectares, a production circle of 147,727.27 hectares, and a non-production circle of 11,725.99 hectares, amounting to 173,070.35 hectares. This structured categorization facilitates targeted management practices, ensuring the sustainable use and conservation of forest resources in the Division.

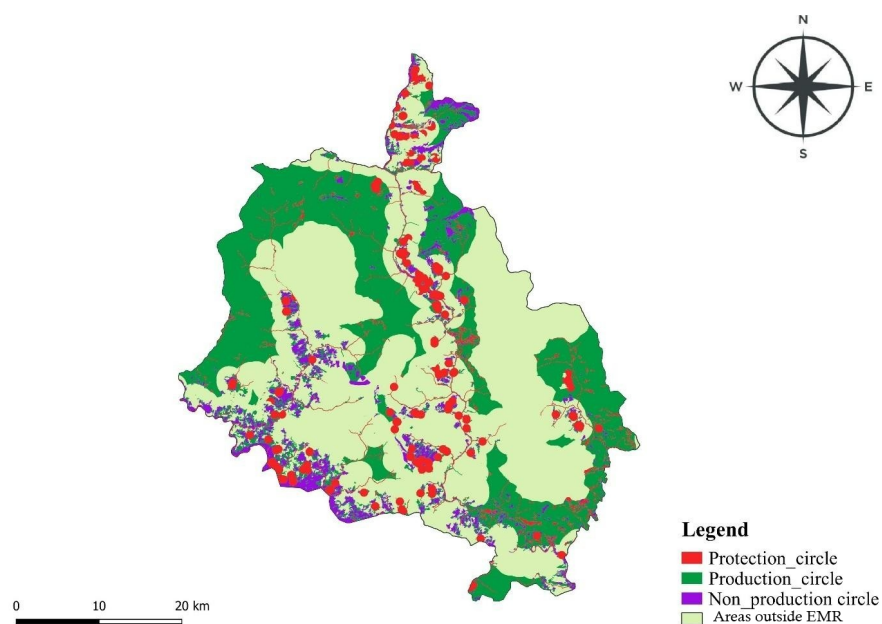


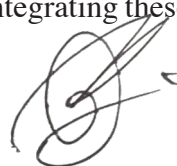
Figure 14: Management circles outside existing management regimes

Table 20: Area statement of management and working circles

Management and Working Circles	Area
Area of Division	185737.81
Management Circles for the whole area	
Protection circle	18548.96
Production circle	150860.81
Non-production	16236.69
Total	185646.47
Management circle outside existing management regimes	
Protection circle	13617.09
Production circle	147727.27
Non-production	11725.99
Total	173070.35

a) Production circle

The production area outside existing management regimes comprises various forest types, covering a total of 147,727.27 hectares (Figure 15). The forest broadly calculated as includes 3,342.31 hectares of Blue Pine, which is valued for its timber and ecological benefits; 123,859.63 hectares of Broadleaf forests, known for their biodiversity and contribution to ecosystem services; 1,116.33 hectares of Fir forests, which provide essential habitat and resources; and 19,408.99 hectares of Mixed Conifer forests, which enhance ecological resilience. The diverse composition of these forest types underscores the potential for sustainable resource management and production outside the established management areas, emphasizing the importance of integrating these regions into broader conservation and utilization strategies.



The Annual Allowable Cut (AAC) is calculated for the area identified as a potential production area using the formula:

$$AAC(m^3) = \frac{\text{Net Operable Area}}{\text{Rotation Age}} \times \left(\frac{\text{Average Volume}}{\text{ha}} \right)$$

Where:

1. Rotation age: 130 years (Rotation age: 120 years + 10 years-Regeneration period)
2. Average volume/ha is considered as 293.96 m³/ha for DFO.

The total Annual Allowable Cut (AAC) that can potentially be extracted from the production area of 147,727.27 ha is 434,259.082 cubic meters for both commercial and rural use.

b) Protection circle

The protection circles, as shown in Figure 16, were formulated within the Divisional Forest Office (DFO) Gedu and encompass several critical areas, ensuring the conservation of vital ecological functions. The Soil Protection circle spans 2,081.01 hectares and focuses on areas with slopes exceeding 45 degrees, which are crucial for preventing erosion and maintaining soil health. The Major River and Streams Buffer covers 3,078 hectares, with a designated buffer of 30 meters to safeguard water quality and aquatic ecosystems. Additionally, the Water Sources and Irrigation Buffer, measuring 37.04 hectares, also adheres to a 30-meter buffer zone to protect essential water resources. Lastly, the Cultural Protection Buffer, encompassing 8,767 hectares, is set at a 500-meter radius to preserve areas of cultural significance as tabulated in Table 20. These carefully delineated buffers play a vital role in promoting ecological integrity and protecting natural resources in the region.

Table 21: Area statement of protection circles

Sl.No	Protection circles	Area (ha)
1	Soil Protection	2081.01
2	Major rivers and streams buffer	3078
3	Water sources and irrigation buffer	37.04
4	Cultural protection buffer	8767

c) Non-production Circle

The non-production circles identified within the DFO Gedu comprise various land classes, each playing a distinct role in the region's ecological landscape. Table 22 shows an area that includes 131.81 hectares of Alpine Scrubs, which provide critical habitat for specialized flora and fauna, and 265.60 hectares of Built-Up land, reflecting human settlements and infrastructure. Cultivated agriculture occupies a significant area of 4,497.20 hectares, highlighting the importance of agricultural practices in the region. The presence of 245.03 hectares affected by landslides indicates areas requiring care-



ful management to prevent further degradation. Additionally, the non-production circles encompass 1,562.96 hectares of Meadows, which contribute to biodiversity, and 15.21 hectares of Non-Built-Up land that serve as green spaces. Rocky Outcrops, covering 236.86 hectares, provide unique habitats, while 3,473.44 hectares of Shrubs support various wildlife species. Water Bodies, totaling 770.55 hectares, are crucial for maintaining local ecosystems, and the Bhutan Board Product Limited (BBPL) Leased Area spans 1,402.34 hectares, indicating land used for specific purposes under lease agreements. Together, these diverse classes within the non-production circles contribute to the ecological integrity and sustainability of the region.

Table 22: Area statement of non-production circles

Sl.No.	Class	Area_HA
1	Alpine Scrubs	131.81
2	Built up	265.60
3	Cultivated Agriculture	4497.20
4	Landslides	245.03
5	Meadows	1562.96
6	Non-Built up	15.21
7	Rocky Outcrops	236.86
8	Shrubs	3473.44
9	Water Bodies	770.55
10	BBPL Leased Area	1402.34

2.5.3. Forest Resource Utilization

The Division is responsible for allotting forest resources to residents of 11 gewogs- Chapcha, Bongo, Bjabcho, Darla, Geling, Dungna, Metakha, Phuentsholing, Samphe-ling, and Lokchina in Chukha Dzongkhag. Given our proximity to the Indian border, we also facilitate the import and export of forest products.

2.5.3.1. Rural Timber Allotment in five years (2019-2023)

From 2019 to 2023, the division allotted a total of 20,000.87 m³ of timber across various purposes. In 2023, allocations totaled 3,639.38 m³, with the highest quantity designated for house renovation or extension (689.82 m³), followed by new house construction (860.44 m³) and firewood (980.32 m³). Notably, 945.26 m³ were allotted for other institutions, reflecting significant use in 2023. Smaller volumes were allocated for purposes like fencing posts (43.61 m³) and flag poles (10.94 m³), as shown in Table 23 and Figure 18.



Table 23: Volume of Rural Timber Allotted from 2019–2023

Sl.No.	Purpose	Year (m3)				
		2019	2020	2021	2022	2023
1	Fencing posts	78.22	267.57	47.6	14.56	43.61
2	Firewood	2006.74	1308.63	848.9	489.95	980.32
3	Flag poles	40.72	139.63	38.34	42.01	10.94
4	House Renovation or Extension	575.56	501.85	521.71	88.53	689.82
5	New Dzong Construction			106.51	0	
6	New House Construction	4938.25	842.79	1104.28	53.62	860.44
7	Other institution			0	64	945.26
8	Others	144.98	26.42	3.27	21.61	57.39
9	Other construction	26.24				51.6
	Total	9829.71	3086.89	2670.61	774.28	3639.38

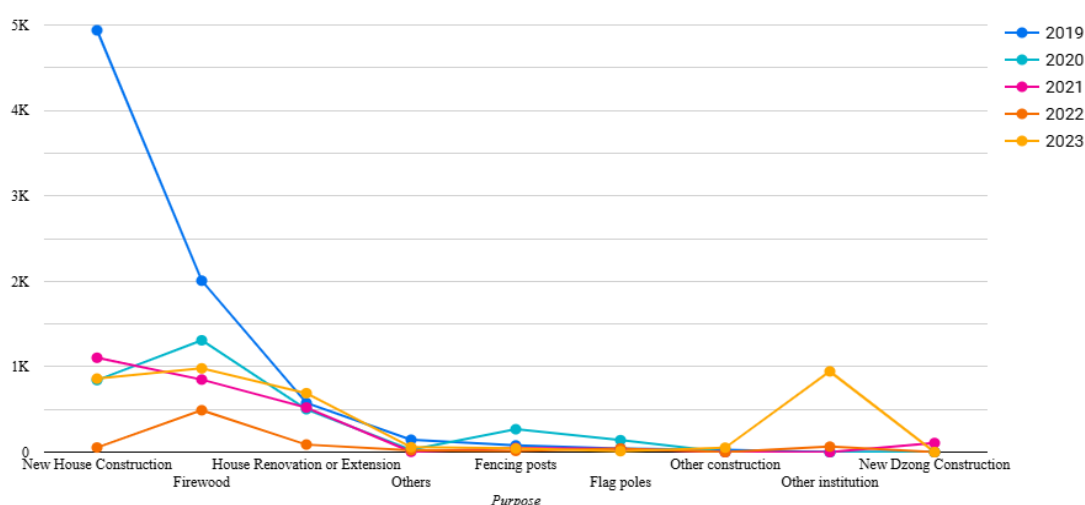
**Figure 15: Trend for allotment of rural timber in five years (2019–2023)****2.5.3.2. Commercial Timber Allotment in five years (2019–2023).**

Figure 19 shows the division has allotted a total of 20,920.36 m³ of timber for various purposes from 2019 to 2023. In 2023, 9,822.09 m³ were allotted, with the largest quantity allocated for firewood (7,971 m³), followed by timber for the Wood Based Industries (WBI) (1,438.68 m³) and flag poles (195.89 m³). Smaller quantities were allotted for purposes such as fencing posts (53.39 m³) and house renovation or extension (13.96 m³). The least timber allocation in 2023 was for handicraft use (9.49 m³).

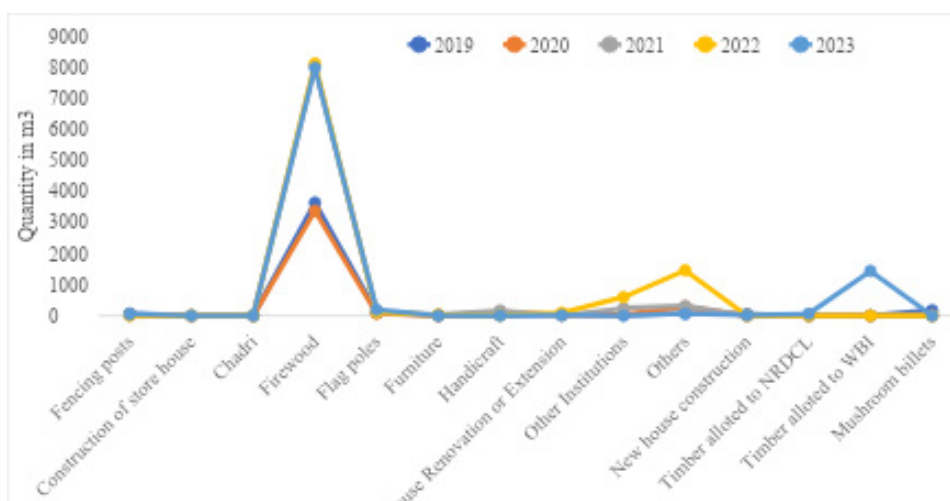


Figure 16: Trend for allotment of rural timber in five years (2019-2023)

2.5.3.3. Non-Wood Forest Product Allotment in five years (2019-2023)

The Division has allotted a diverse range of forest products for collection from 2019 to 2023, reflecting various trends over the years. Products like *Daphne* spp. (Bark) and *Rubia cordifolia* show notable increases in the collection, with *Daphne* spp. (Bark) rising sharply from 1700 kg in 2022 to 5999 kg in 2023, suggesting growing market demand for these resources. In contrast, some products have experienced significant declines; for instance, the Small Bamboo collection peaked at 19,964 units in 2020 but dropped substantially to 3,886 units by 2023, indicating a possible decrease in demand as tabulated in Table 24.

Table 24: Non-wood forest product allotted in five years (2019-2023)

Product Name	Unit of Measurement	2019	2020	2021	2022	2023
<i>Artemisia sp</i>	Kilogram	0	0	0	400	0
Bamboo chips	Truckload	0	0	0	0	1
<i>Bambusa spp.</i>	Numbers	0	0	0	0	500
<i>Calamus and Daemonorops spp.</i>	Truckload	0	0	0	0	1
<i>Calamus spp</i>	Number	0	4000	0	0	0
Cane shoot	Number	2820	800	0	210	0
Charcoal	Kilogram	0	0	0	135	2000
<i>Chimonobambusa spp.</i>	Numbers	0	0	0	0	600
<i>Daphne spp (Bark)</i>	Kilogram	4886	3480	3450	1700	5999
<i>Dendrocalamus spp.</i>	Numbers	0	0	0	0	1810
<i>Edgeworthia spp. (Bark)</i>	Kilogram.	0	0	0	400	800
<i>Juniperus spp.</i>	Truckload	2	0	1.5	2.5	3.5
Large bamboo	Number	3002	1840	3872	550	0
Leaf moulds	M3	72	88	128	24	152
Leaves of juniper (Incense)	M3	64	32	12	8	0

Pine needle	M3	32	8	32	16	24
<i>Plectocomia himalayana</i> (Patsha)	Truckload	0	0	0	0	5
<i>Rubia cordifolia</i>	Kilogram	70	10	0	0	1980
Shilajit	Kilogram	0	0	0	509	0
Small bamboo	Number	7910	19964	20114	3886	0
<i>Thysanolaena latifolia</i>	Bundle	44	0	200	0	0
Wildlings (Saplings)	Number	0	250	0	112	0
Woodburr	Number	90	0	150	0	0
<i>Yushania mailing</i>	Number	0	0	150	1700	2745
<i>Zanthoxylum armatum</i>	Kilogram	0	0	600	0	0

2.5.3.4. Surface collection allotment in five years (2019-2023)

Table 25 and Figure 20 show, between 2019 and 2023, the division effectively managed a total allocation of 3,687,401.8m³ of surface collection materials to meet both domestic and export demands. In 2020 alone, the allocated volume reached 1,089,204 m³, with the largest contributions from boulders (674,265 m³) and riverbed materials (338,691 m³). Over these five years, boulders saw the highest total allocation at 2,134,078 m³, followed closely by riverbed materials at 1,168,698 m³, primarily for export purposes. Additionally, allocations included Granular Sub-base materials(368m³) and Dolep (48m³), highlighting the division's role in utilizing a diverse range of surface materials to support infrastructure and construction needs domestically.

Table 25: Amount of surface collection product allotted in the past five years

Product	2019	2020	2021	2022	2023	Grand Total
Aggregates	0	0	0	0	12880	12880
Boulders	903576	674265	299439	160150	96648	2134078
Clay soil	244	440	292	208	176	1360
Color soil	0	56	3360	8	0	3424
Dolep	0	0	0	0	48	48
Granular Sub Base (GSB) material	0	0	0	0	368	368
Gravel	14080	4773	2704	632	2280	24469
River bed materials	0	338691	617903	134872	77232	1168698
Sand	85440	40049	33996.5	41412.3	19224	220121.8
Stone	3536	3212	4945	9078	22776	43547
Stone chips	27336	27589	7167	10267	2656	75015
Stone dust	0	49	160		1696	1905
Top soil	56	80	360	608	384	1488

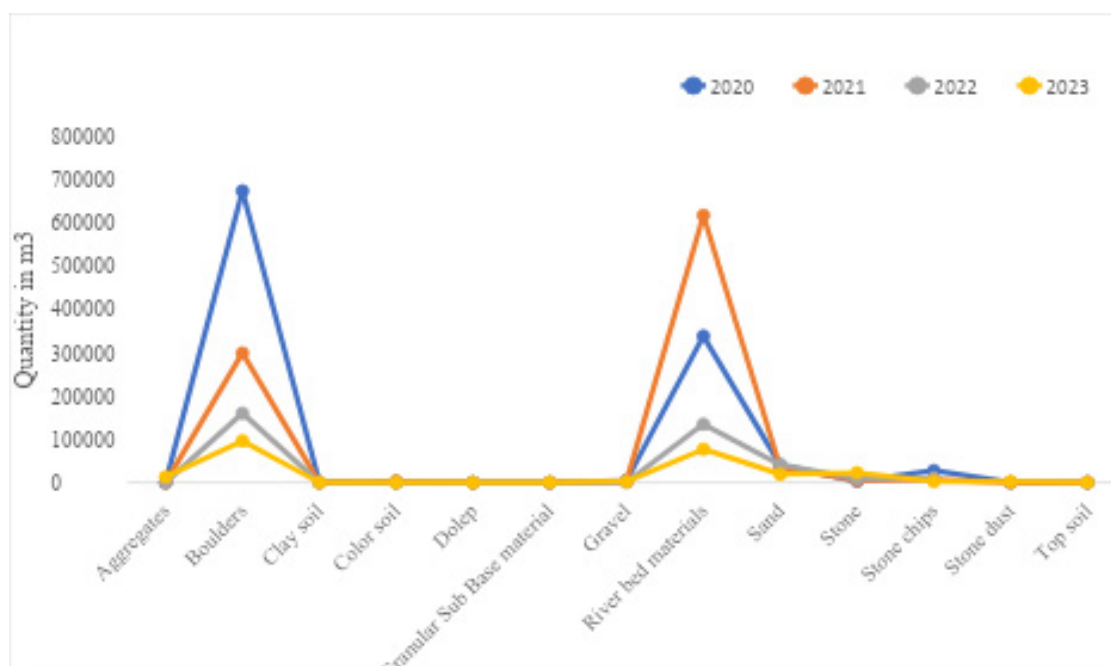


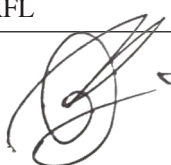
Figure 17: Trend for surface collection for five years (2019-2023)

2.5.3.5. Total SRF land allotted for developmental activities in five years (2019-2023)

Table 26 shows, between 2019 and 2023, the Division allocated a total of 1,721.34 hectares of land for various purposes. In 2023 alone, the allotment reached 385.6 hectares, with notable allocations for land acquisition by government institutions (8.93 hectares) and land leases (23.15 hectares). The construction of new farm roads contributed 10.73 hectares, while the establishment of a crushing plant utilized 9.35 hectares. Furthermore, the removal of Non-Wood Forest Products (NWFP) from registered institutional land and surface collection areas accounted for 9.41 hectares, highlighting the diverse land uses that support both infrastructure development and resource management.

Table 26: Area of SRF allotted for developmental activities in the past five year

Sl.No.	Purpose	Year (Ha)				
		2019	2020	2021	2022	2023
1	Acquiring Land User Right Certificate (URC)		0.74	0.08		1.01
2	Access road			0.74		0.01
3	Archery range	0.07		0.1	0.15	0.18
4	Chain link fencing					0.08
5	Construction of cut and cover tunnel					2.17
6	Construction of National Highway					0.14
7	Construction of new secondary national Highway construction					0.15
8	Crushing plant installation					9.35
9	Diversion of water course					0.01
10	Dredging					20.05
11	Ecotourism trail development					0.49
12	Extension of primary national highway					0.27
13	Extension of transmission line					0.61
14	Installation of Cable Crane					0.32
15	Land acquisition by Government Institution	1.9	0.62	1.46	0.68	8.93
16	Land Exchange	7.77	9.28	31.15	34.56	24.83
17	Land lease	4.69	0.78	15.49	93.49	23.15
18	Land Substitute	2.94		5.38	1.22	3.95
19	Muck dumping					0.28
20	Mining			0.3		
21	New farm road construction	764.75	4.81	9.98	25.36	10.73
22	New approach to road construction	7.12	0.1	1.2	2.8	2.35
23	New Transmission line construction	53.6	0.68	0.39	4.24	6.14
24	Realignment of transmission line					0.2
25	Religious site trail development					0.17
26	Removal of NWFP (surface collection material) from SRFL	85.78	0.03	0.78	23.13	9.28



27	Removal of NWFP (Surface collection materials) from private land				6.3	7.23
28	Removal of NWFP (surface collection materials) from registered institutional land					1.13
29	Removal of timber from registered institutional land	33.65	0.4	0.02	13.46	0.41
30	Removal of timber from SRFL					0.02
31	River mitigation					33.27
32	Stone quarry					12.01
33	Tower	2.1		0.02		1.14
34	Temporary approach road					7.39
35	Water pipeline				0.22	0.01
36	Widening of farm road					2.28
37	For Cycling trail construction			0.2		
38	Others	0.2	4.61	77.22		195.86
Total Land allotment Area		964.57	22.05	144.51	205.61	385.6

2.5.3.6. Forestry Clearance issued in SRF land allotment for developmental activities in five years (2019-2023)

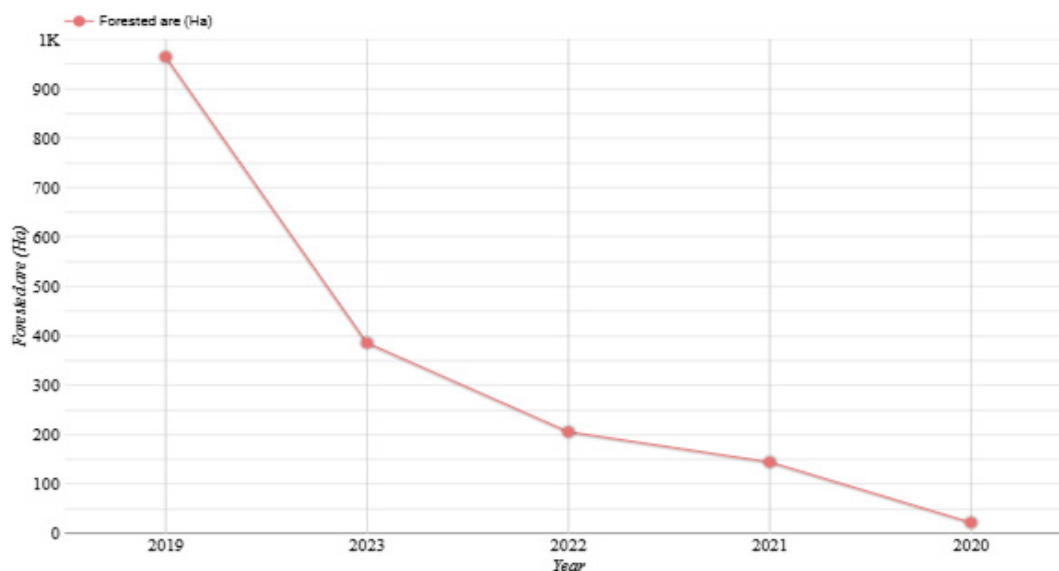


Figure 18: Trend for area of forest lost for developmental activities in past five years (2019-2023)

From 2019 to 2023, a total of 1,523.24 hectares of forested land were lost due to various developmental activities associated with land allotments from the Special Reserve Forest (SRF). In 2023, the loss was particularly significant, amounting to 302.74 hectares,

with major contributions from land acquisition by government institutions (8.93 hectares) and land exchanges (24.83 hectares). The construction of new farm roads (10.73 hectares) and the development of ecotourism trails (0.49 hectares) also contributed to this loss, as shown in Figure 21. Additionally, other activities, including the removal of timber from registered institutional lands and various road constructions, played a role in the overall impact on the forested area. This data underscores the ongoing challenges of balancing development needs with forest conservation efforts.

2.5.3.7. SRF land destroyed by Forest Fires in five years (2019-2023)

From 2019 to 2023, the SRF land experienced minimal destruction due to forest fires, with notable impacts only in 2021 and 2023. In 2021, a significant area of 50.71 hectares was affected, while in 2023 a smaller impact of 9.97 hectares was seen. The years 2019, 2020, and 2022 recorded no destruction from fires, indicating periods of stability for the forest ecosystem, as shown in Table 27 and Figure 22. Overall, a total of 60.68 hectares of SRF land was destroyed by forest fires over these five years, highlighting the variability and sporadic nature of fire-related damage in these years.

Table 27: Area lost to forest fire

Year	2019	2020	2021	2022	2023	Total
Area Destroyed	0	0	50.71	0	9.97	60.68

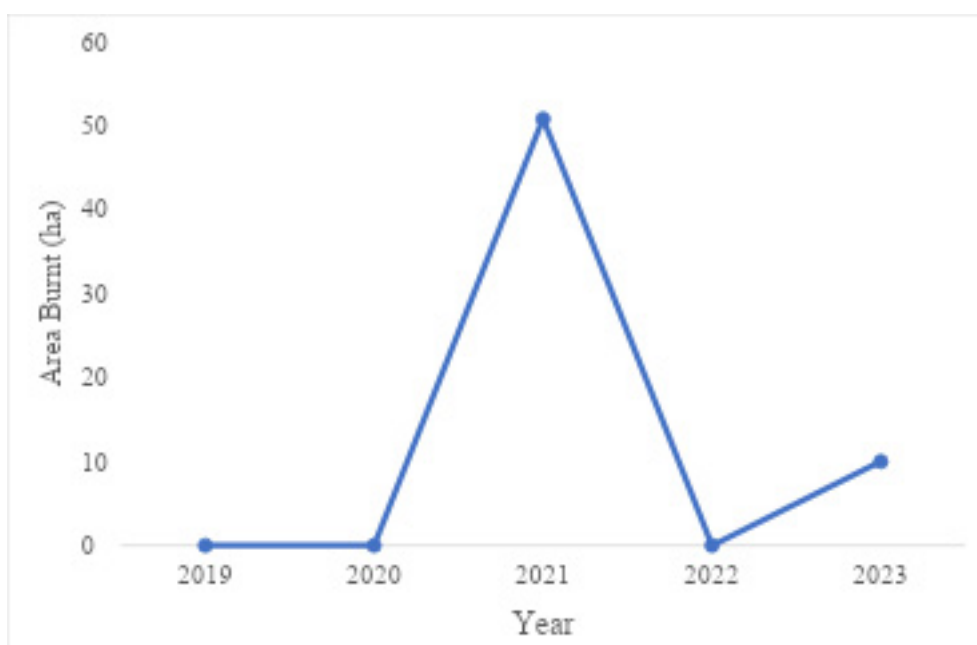


Figure 19: Area lost to forest fire in the past five years (2019-2023)

2.5.3.8. Wood-Based Industries

Wood-based industries are crucial for supplying sawn timber and finished wood products to meet the demands of both local populations and commercial activities (Table 28). Currently, there are 42 wood-based industries in operation, with the majority, 23

of them, located in Phuntsholing. This concentration allows Phuntsholing to act as a hub for the wood industry, enabling efficient distribution to surrounding areas and facilitating export operations. The presence of these industries also provides employment opportunities, fostering local economic growth and enhancing skill development within the community.

Table 28: List of Wood-based Industries under DFO

SN	Name	License no	Location	Category	Type
1	Aha Furniture	2009393	Sampheling/Bh-alujora	Secondary	Furniture Unit
2	Arun Wood Furniture	CRC10420	Darla	Primary	Furniture Unit
3	Bhutan Board Products Limited	2000565	Darla	Secondary	Particle Board Factory
4	Bhutan Furniture & Manufacturing Unit	2008623	Phuentsholing Throm	Secondary	Furniture Unit
5	Bhutan Wood Panel Industry	2000512	Phuntsholing Throm	Secondary	Furniture Unit
6	Chhoethreng Chudrung(Sixteen Garlands of Offering)	2010777	Sampheling/Bh-alujora	Primary	Incense Manufacturing Unit
7	Chhundu Timber Industry	2000508	Phuntsholing Throm	Secondary	Furniture Unit
8	Choda Furniture House	2014724	Phuntsholing	Secondary	Furniture Unit
9	Choda Integrated Wood-based Industry	2015173	Phuntsholing	Secondary	Paper Factory
10	Dapa and Phob Production	CRCO14340	Bjachho	Primary	Wood Handicraft Units
11	DMC Wood stye	36101	Darla	Primary	Furniture Unit
12	Dragon's Edge Furnishing	2015749	Phuntsholing	Primary	Furniture Unit
13	Gaayang Furniture Crafting	2012350	Phuntsholing	Secondary	Furniture Unit
14	Global Woods And Lumber	2016038	Phuntsholing Throm	Primary	Wood Joinery
15	Green Wood Manufacturing	2012495	Phuntsholing Throm	Primary	Ply wood factory
16	Gyaltshen Drezim Incense Unit	CRC2285	Darla	Primary	Incense Manufacturing Unit
17	H & k Company Private Limited	2000531	Phuntsholing Throm	Secondary	Furniture Unit
18	Himalaya Veneer Wood Unit	2016026	Phuntsholing Throm	Primary	Veneer factory
19	Jamyang Furniture	2009995	Phuntsholing Throm	Secondary	Furniture Unit
20	Jigme Sawmill and furniture	2000536	Phuentsholing Throm	Secondary	Stationary sawmill
21	Karma Steel & Wood Industry	2000550	Phuentsholing Throm	Secondary	Furniture Unit



22	KB Furniture	CRC6551	Darla	Primary	Furniture Unit
23	Khenphen Furniture	2012326	Chapcha	Primary	Furniture Unit
24	Kinzang Choden Incense Making	CRC4906	Phuntsholing Throm	Primary	Incense Manufacturing Unit
25	Kuenzang Rangdol Enterprise	CRC2455	Phuntsholing	Primary	Incense Manufacturing Unit
26	MB Furniture House	CRC10870	Bongo	Primary	Furniture Unit
27	Menrig-Yee-Thro-Incense	CRC7380	Phuntsholing	Primary	Incense Manufacturing Unit
28	Namgay Rinchen Sang	CRC11956	Phuntsholing	Secondary	Incense Manufacturing Unit
29	Namgay Wood Industry	2000544	Phuntsholing Throm	Primary	Stationary sawmill
30	Namkha Kuenphen furniture Unit.	2010809	Bjagchhog	Primary	Furniture Unit
31	ORJ Sublime Furniture	CRC4391	Dungna	Primary	Furniture Unit
32	Panang Furniture house	2010142	Bjachho	Primary	Furniture Unit
33	Phuntsho Timber Industry	2000537	Phuntsholing Throm	Primary	Stationary sawmill
34	Sha Karma Wood Based Industry	2014948	Phuntsholing	Secondary	Furniture Unit
35	Sonam Wood works	49000131	Bjacho	Secondary	Wood Handicraft Units
36	Staples & Jattu Sawmill	2007495	Phuntsholing Throm	Primary	Stationary sawmill
37	Staples & Jattu Wood Industry	2000627	Phuntsholing Throm	Primary	Furniture Unit
38	Tashi Sawmil	2000521	Phuntsholing Throm	Secondary	Furniture Unit
39	Tashi L Furniture House	CRC1380	Darla	Primary	Furniture Unit
40	Tempa Furniture Unit	2011540	Chapcha	Primary	Furniture Unit
41	Tshimakothi Nala Furniture	10716	Bjabchu	Primary	Furniture Unit
42	Wangda Furniture House	2008307	Bjagchhog	Primary	Furniture Unit

2.6. Local People and Livelihood

2.6.1. Demography

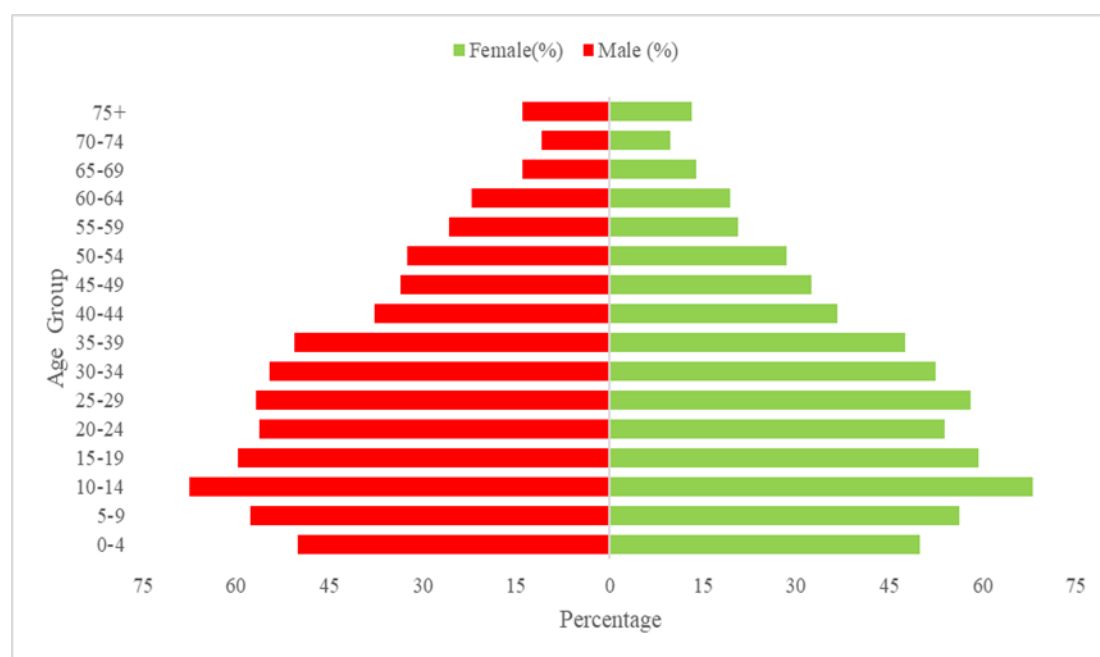
The Division encompasses a population of 33,445 individuals across 11 gewogs, as estimated by the Population and Housing Census of Bhutan (PHCB) in 2017 and the socio-economic survey conducted in 2023. The male population slightly exceeds the female population, with a sex ratio of 51.01 males to 48.99 females. The population density within the DFO, Gedu is 17 people per square kilometer. Among the gewogs, Darla has the highest population, while Metakha has the lowest of all (Table 29).



Table 29: Sex ratios in each Gewogs

Sl. No.	Gewog	Male	Female	Total
1	Bjabchho	1523	1364	2887
2	Bongo	1758	1905	3663
3	Chapcha	1377	1280	2657
4	Darla	3798	3706	7504
5	Doongna	554	537	1091
6	Gelling	853	756	1609
7	Getena	392	428	820
8	Loggchina	1386	1308	2694
9	Metakha	322	335	657
10	Phuentsholing	2991	2795	5786
11	Samphelling	2106	1971	4077
Grand Total		17060	16358	33445

The population is primarily comprised of youths ranging from 10 to 14 years old, with the next largest demographic being those aged 15 to 19, as indicated in Figure 23.

**Figure 20: Ratios of age groups under DFO**

The data was collected from 1026 households, out of 5127 households, which is 20% of the total households. Out of 1026 respondents, 35.56% (n=366) were female and 64.43% (n=663) were male. The family members of the households had a majority of productive citizens who were between the ages of 30 and 40 years old, followed by youths below 20 years (Figure 24).



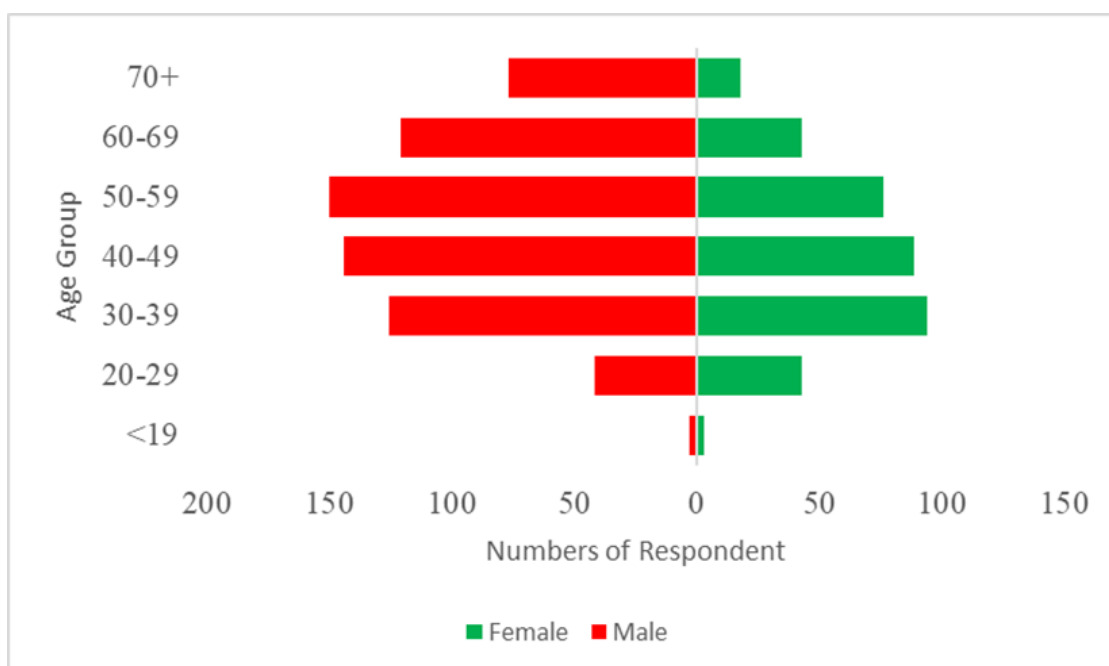


Figure 21: Ratios of age groups for respondents

2.6.2. Annual Household Income

The annual income of the household was categorized into 13 different categories. Communities living inside the Divisional Forest Office earn an average of Nu. 75312.79 for various sources of income annually, as shown in Table 30.

Table 30: Average Amount of income earned from different sectors

Category of Income	Mean	Sum	SD
Agriculture	53476.27253	223103009	103849.6415
Beekeeping	9017.431193	982900	11340.19273
Business	182252.6495	134684708	452001.1189
Horticulture	58308.24871	90494402	113183.579
House Rent	136666.6667	410000	110604.4002
labor wage	53449.72331	73600269	74801.40161
Livestock	57872.07382	177956627	159862.89
Mushroom farming	55460.86957	1275600	78814.50454
Other sources	143896.001	280597202	479502.4039
Sale of NWFP	40587.48344	155591.46	6128710
Sale of timber from Pvt registered land	104583.3333	627500	109378.4333
Tourism	145625	2330000	160425.2162
Vegetable	27500	17677.67	55000

2.6.3 Annual Household Expense

The annual expenses of the household were categorized under 12 different categories. Communities living inside the Divisional Forest Office were spending an average of Nu. 53285.96 for various categories of expenses annually (Table 31).

Table 31: Average amount of expenses for different sectors

Category of expenses	Mean	Sum	SD
Agriculture	47622.73	3492600	150274.8
Bee Keeping	300	300	0
Business	82521.74	1898000	51485.1
Education expenditure	39299.03	2475839	45153.93
Horticulture	9083.33	109000	15199.93
House construction and renovation	272772.7	12002000	638481.2
Household utilities	43397.51	9677644	47602.64
Labour Wage	14031.25	449000	11306.53
Leisure and Pilgrimage	48958.33	1175000	82621.44
Livestock	43814.29	3680400	78264.32
NWFP Collection and related cost	5250	10500	6717.514
Rituals	32380.63	10297040	32380.63

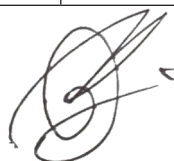
2.6.3.b Agriculture

2.6.3.1b. Landholding

Under the jurisdiction of DFO Gedu, landholding categories include Chuzhing (wet-land), Kamzhing (dry land), and orchards. The largest expanse of dry land is found in Darla Gewog, totalling 159.3 acres, while the smallest is in Getana Gewog, comprising 25.01 acres. Similarly, wetlands are most abundant in Darla Gewog, covering 557.6 acres, and least in Dungna Gewog, with only 3.4 acres. The collective land ownership of local communities amounts to 920.88 acres. In terms of orchard land, Darla Gewog boasts the highest acreage at 2.18 acres, while Gelling, Getana, and Samphelling Gewogs have the least at 0.42 acres each. Across all 11 Gewogs, Darla Gewog holds the most landholding categories at 31.85%, whereas Dungna Gewog has the least at 1.66% (Table 31).

Table 32: Composition of landholding types across Gewogs in acres

Gewogs	Chhuzhing	Kamshing	Orchard	Grand Total	Percentage (%)
Bjachho	114	27.332	0.84	142.172	6.2971605
Bongo	261.1	106.486	1.26	368.846	16.33713
Chapchha	79.6	59.166	1.26	140.026	6.2021087
Darla	557.6	159.292	2.18	719.072	31.849533
Dungna	3.4	34.114		37.514	1.6615907



Geling	9.7	31.94	0.42	42.06	1.8629447
Getana	41.2	25.01	0.42	66.63	2.9512126
Lokchina	16.2	70.83		87.03	3.8547807
Metakha	41	16.288	1.26	58.548	2.5932402
Phuentsholing	237.6	147.42	1.68	386.7	17.127929
Sampheling	136.2	72.498	0.42	209.118	9.2623696
Grand Total	1497.6	750.376	9.74	2257.716	100

2.6.3.2b Types of crops grown

Communities living inside Division jurisdiction are growing 11 varieties of cereal crops, including others. Maize is one of the most abundantly grown cereal crops, followed by pulses and millet (Figure 25).

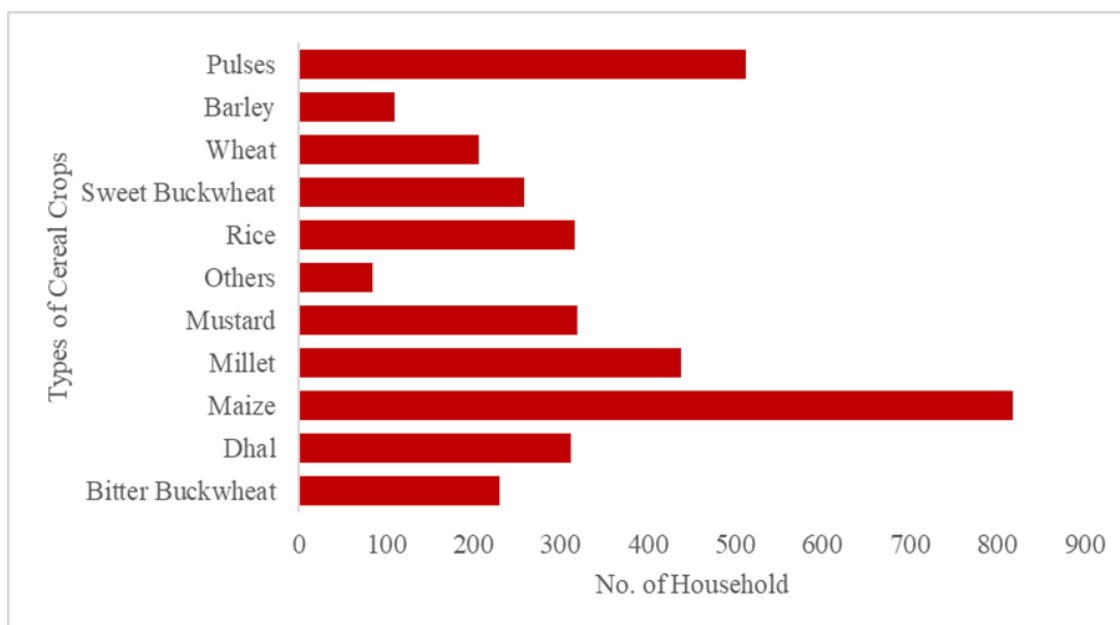


Figure 22: Varieties of cereal crops grown by the household.

Barley, Bitter Buckwheat, Maize, Millet, Mustard, Pulses, Rice, Sweet Buckwheat, and Wheat are grown by all the communities, and maize is the most preferred cereal crop for the communities living in Darla and Phuentsholing gewog. Pulses are growing most prominently in Darla and Phuentsholing Gewog. (Figure 26).

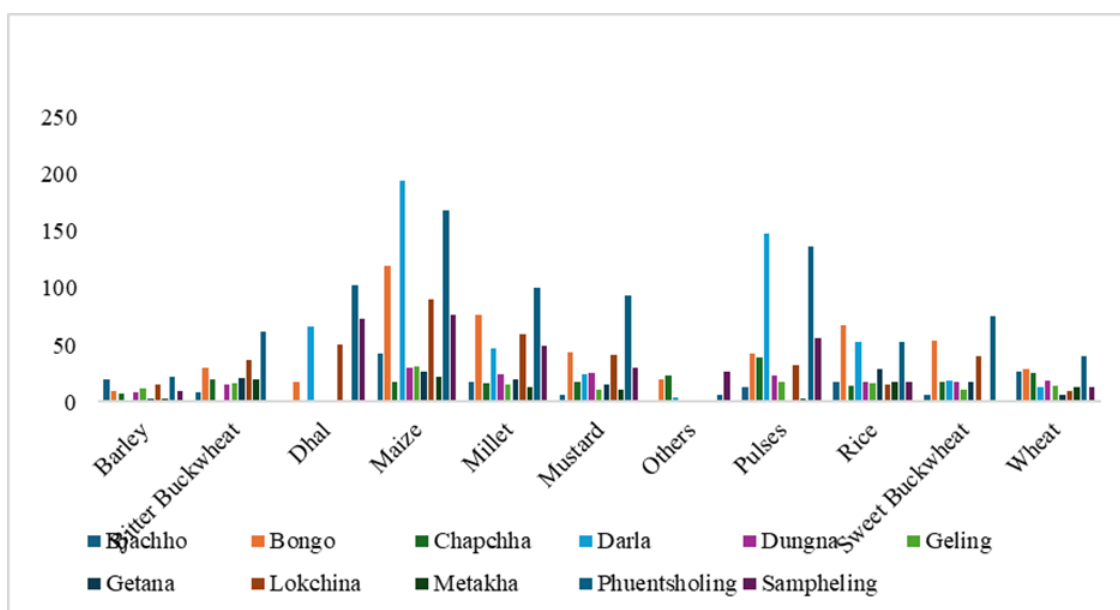


Figure 23: Varieties of cereal crops grown by the communities in each gewog.

The cash income of the local communities is supplemented by 22 varieties of cash crops. Among these, the top three cash crops are Banana, Cardamom, and Chilli (Figure 27)

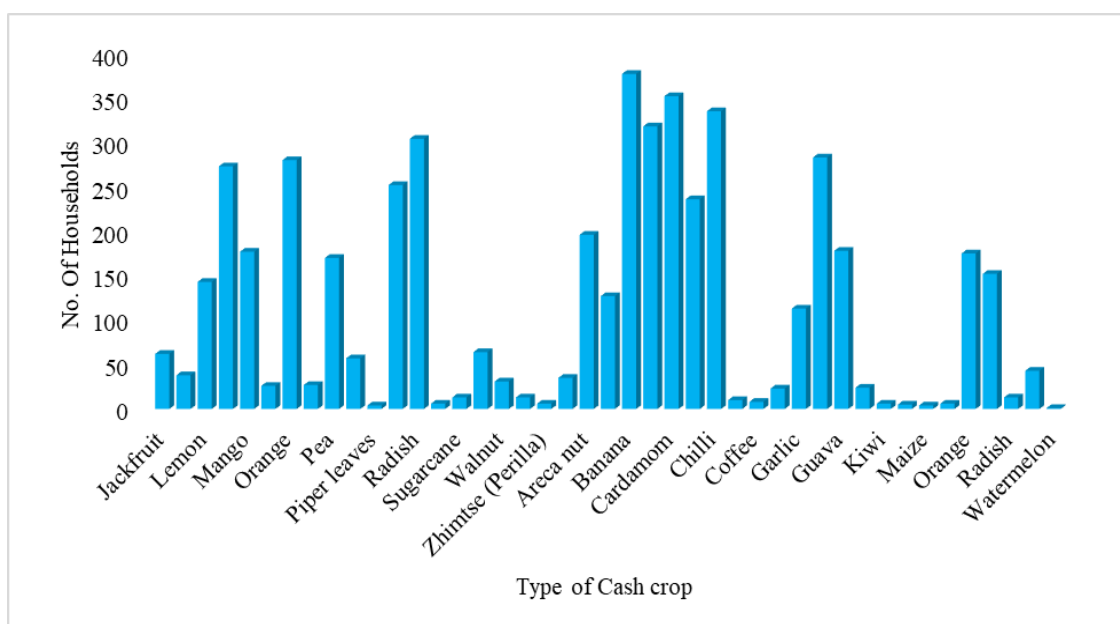


Figure 24: Varieties of cash crops grown by the communities.

All the households are growing either variety of vegetables among the 24 varieties of vegetables grown by the communities. Among the varieties of vegetables grown, the top three of the household are growing Sag (Spinach) (n=205), Crow's beak (n=173) and Pumpkin (n=162). Phuentsholing gewog has the highest vegetable cultivation composition of the household with 20.3% followed by Darla Gewog with 18.5% and Bongo gewog with 15.7% (Table 32).

Table 33: Varieties of vegetable(n) crops grown by the communities

Types of Vegetables	Gewogs										
	Bjachh	Bongo	Chapchha	Darla	Dungna	Geling	Getana	Lokchina	Metakha	Phuentsholing	Sampheling
Asparagus	5	13	9	3	2	1	2	3			
Beans	47	116	56	139	23	26	29	84	16	161	75
Bittergourd		44	2	13		7	20	73		109	39
Boottlegourd		1		21		1	1	29		71	27
Brinjal	10	83	13	40	11	10	28	73	4	103	43
Broccoli	37	86	24	106	25	22	23	75	9	126	47
Cabbage	45	107	51	131	37	26	28	77	21	133	61
Carrot	35	65	65	36	27	25	17	49	1	76	47
Cauliflower	36	104	36	119	30	24	29	74	10	129	51
Chayote		26	8	155	3	11	19	14		115	1
Chilli	49	126	81	173	35	30	30	87	22	161	86
Crows											
beak(Olachoto)	15	70	38	113	18	21	17	13		47	11
Ginger	5	98		41	19	13	28	85	4	140	53
Onion	36	97	20	90	26	17	27	70	5	94	46
Pea	10	28	41	70	22	13	7	17	2	63	20
Potato	45	100	81	161	33	28	29	78	17	111	55
Pumkin	38	112	33	155	27	22	30	88	13	162	72
Radish	40	115	65	158	26	29	29	63	15	116	64
Sag	47	135	66	205	32	35	30	90	21	172	88
Tomato	24	101	19	93	23	17	26	69	3	103	60
Turnip	32	63	44	4	28	23	17	13	1	35	9
Coriander	16	62	31	58	22	13	26	60		94	56
Cucumber	43	118	30	144	25	19	30	78	15	133	54
Garlic	13	91	13	80	27	24	24	62	2	89	40

2.6.4. Livestock

2.6.4.1 Livestock types and populations

Farmers raise a diverse array of livestock, encompassing 17 types. Among these, poultry reigns supreme, with 209 households engaged in its rearing, and the maximum number of livestock kept by a household is 2000 in a poultry farm. In contrast to the prevalence of poultry, local breeds of cattle are favored over improved breeds within the community. Additionally, two households are involved in fishery activities, and only one household reported rearing rabbits (Table 33).

Table 34: Livestock types and numbers raised by the farmers.

Livestock Types	Household (No)	Livestock numbers
Brown Swiss	2	5
Buffalo	2	9
Cat	193	291
Dog	69	96
Duck	8	21
Fishery	2	2
Goat	59	448
Horse	2	2
Jersey	71	292
Local cattle breed	102	518
Local Chickens	17	137
Mithun	5	54
Ox	3	6
Pig	20	108

Poultry	209	6777
Rabbit	1	2
Sheep	4	19

Note: The numbers represent livestock reported by sampled households during the survey.

2.6.4.2 Livestock Tending Options

Livestock management practices play a crucial role in determining the conflict between their livestock with the wildlife of their neighbor (Tshering & Thinley, 2017). Across the region, farmers engage in six distinct livestock management methods. Predominantly, tethering or stall feeding is the preferred practice, followed closely by herding in open forest areas. Furthermore, farmers often utilize improvised pasture lands within their private land. While all six methods are observed across gewogs, pastoral herding practice is absent in Getana Gewog (Figure 28).

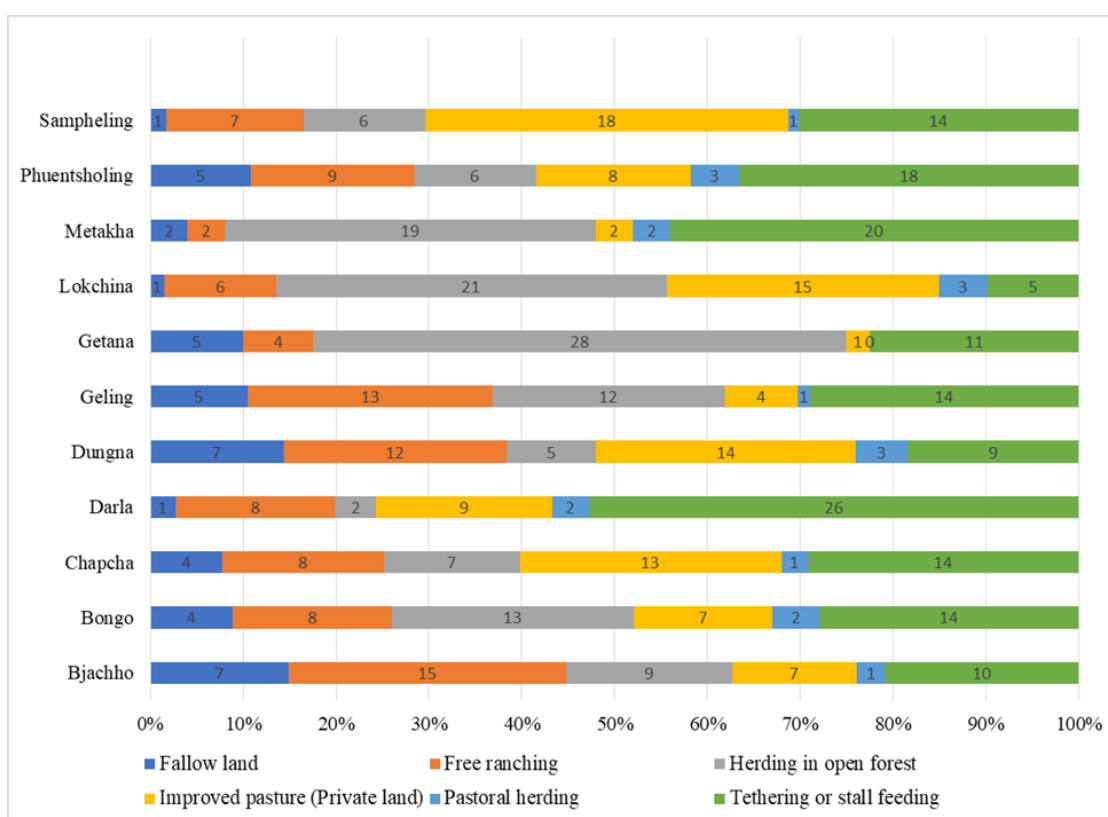


Figure 25: Livestock tending types practiced by the communities in each Gewogs.

2.6.4.3. Importance of livestock to the household

Livestock rearing among farmers serves multiple purposes, primarily centered on organic manure production to enhance agricultural yields. Additionally, livestock contribute significantly to diversifying food sources and generating supplementary income for households. Moreover, they play essential roles in field ploughing, breeding, and transportation activities. All Gewogs except Chapcha utilize livestock for field ploughing, indicating its widespread importance in agricultural practices. Furthermore, livestock

serves as a crucial means of transportation in several Gewogs, namely Dungna, Geling, Getana, Phuntsholing, and Sampheling (Table 35).

Table 35: Importance of Livestock to the communities

Importance	Bja-chho	Bon-go	Chap-chha	Dar-la	Dung-na	Ge-ling	Get-ana	Lok-china	Me-takha	P/ling	Sam-pheling	All Ge-wogs
Breeding bull	1	6		9	2	1	6			1	2	28
Draught power	3	19		23	8	5	13	55	6	25	8	165
Manure	35	66	39	168	30	30	18	81	13	160	76	716
Source of food	30	69	10	174	25	32	17	67	22	136	76	658
Source of income	33	65	21	164	35	29	16	79	18	150	80	690
Transportation					1	3	2	6		2	10	24

2.6.4.4. Livestock Farming Challenges

Local communities of Division's jurisdiction identify challenges associated with livestock rearing, with eight categories. Predominantly, pests and diseases emerge as the foremost concerns among farmers, closely followed by insufficient fodder availability. Furthermore, the threat of wildlife predators poses a significant risk to livestock. Specifically, farmers in Darla, Bongo, Sampheling, Getana, and Phuntsholing gewogs confront substantial hurdles related to pests and diseases. And those in Bjachho, Chapcha, Dungna, Geling, Lokchina, and Metakha grapple predominantly with the scarcity of grazing land and fodder (Figure 29).

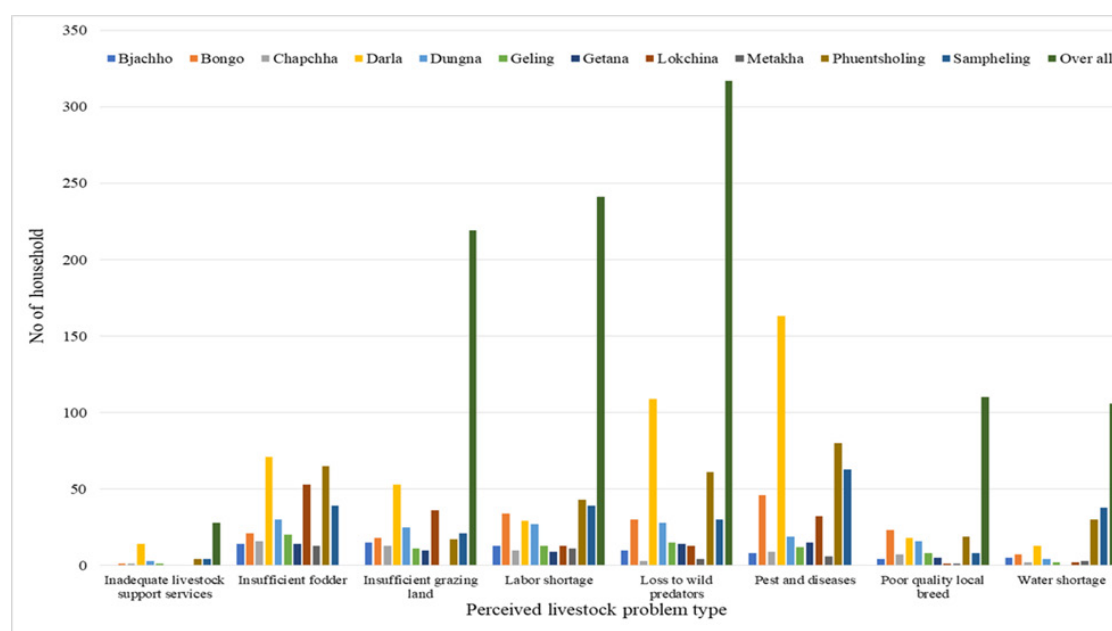


Figure 26: Perceived livestock rearing problems by the communities

2.6.5. Forest Resources use by communities

2.6.5.1. Forest Resources availability trend

Farmers were asked about their perception of the trend of Eleven (11) types of forest resources that they depend on. The majority of the farmers believe that all these forest resources that they depend on are decreasing over the years and very few believe that it is increasing, with no change or the same. Interestingly, opinions are varied regarding the availability of fuelwoods, indicating a mixed outlook within the community. Nonetheless, there is a consensus among farmers that wild vegetable resources have experienced a decline over the years, highlighting a notable trend in resource depletion. (Figure 30)

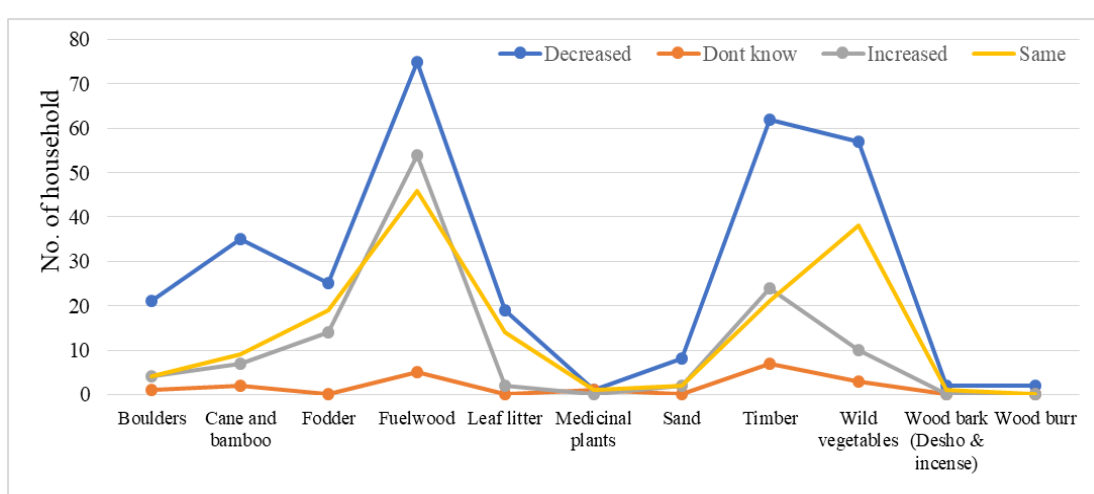


Figure 27: Perceived trend of forest resources collected by the communities

2.6.5.2. Types of forest resources collected

Within the jurisdiction of the DFO, local communities engage in the collection of 11 types of forest resources. Among these fuel woods, it represents the primary resource gathered, closely trailed by timber extraction. Additionally, there is a significant prevalence of wild vegetable collection within the community. However, the collection of wood burr is less common, with only two households reporting this activity. (Table 36).

Table 36: Varieties of forest resources collected by the communities

Types of Forest	Bja-chho	Bon-go	Chap-chha	Dar-la	Dung-na	Geling	Get-ana	Lok-china	Me-takha	Phuent-sholing	Sam-phe-ling
Boulders	0	3	1	24	0	0	1	1	1	0	1
Cane and bamboo	0	7	0	11	1	1	2	3	1	17	15
Fodder	3	1	0	17	5	0	1	4	1	22	10
Fuelwood	8	27	10	89	16	2	3	5	4	30	23
Leaf litter	8	4	13	0	1	3	3	0	1	4	0



Medicinal plants	0	1	0	1	0	0	0	0	0	0	1
Sand	0	1	0	8	0	0	0	0	3	0	0
Timber	1	15	42	18	6	1	2	28	1	12	15
Wild vegetables	2	17	2	21	1	5	9	6	6	30	15
Wood bark (Desho & incense)	0	1	0	2	0	0	0	0	0	0	0
Wood burr	0	0	1	0	0	0	0	0	0	0	1

2.7 Human Wildlife Conflict

2.7.1. Livestock depredation by wild predators

Although human-wildlife conflict has been a major issue worldwide, a perfect solution to address the problem hasn't emerged yet (Sharma et al., 2021). Likewise, the people of Chukha Dzongkhag are facing challenges as they struggle to protect their crops and livestock from wildlife.

Over the last three years, from the year 2021 to 2023, the people of Chukha lost a total of 184 numbers of livestock of 10 different types to 11 different types of wild predators. The highest livestock depredation was observed in the year 2022 ($n = 84$) and the least in the year 2021 ($n = 39$) (Figure 31)

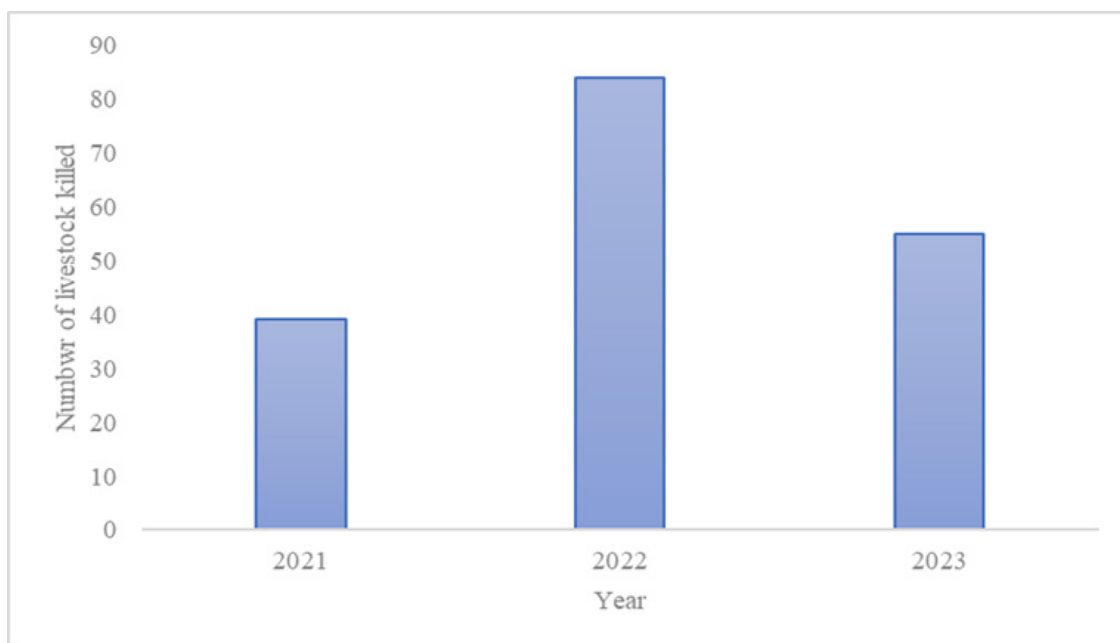


Figure 28: Number of livestock killed in the last three years

Among 10 different types of livestock lost to wild predators, the Local breed cattle ($n = 64$) were depredated the highest, followed by Goat ($n = 47$) and Dog ($n = 1$) the least. Figure 32 and Table 37 indicate that the major livestock depredation was contributed by Dhole ($n = 56$), followed by Himalayan Black Bear ($n = 38$).



Table 37: Livestock depredation by wild predators

Category	Frequency	Percent
Dog	1	.5
Sheep	1	.5
Brown Swiss	2	1.1
Cat	2	1.1
Pig	4	2.2
Mithun	8	4.3
Jersey	22	12.0
Poultry	33	17.9
Goat	47	25.5
Local breed cattle	64	34.8
Total	184	100.0

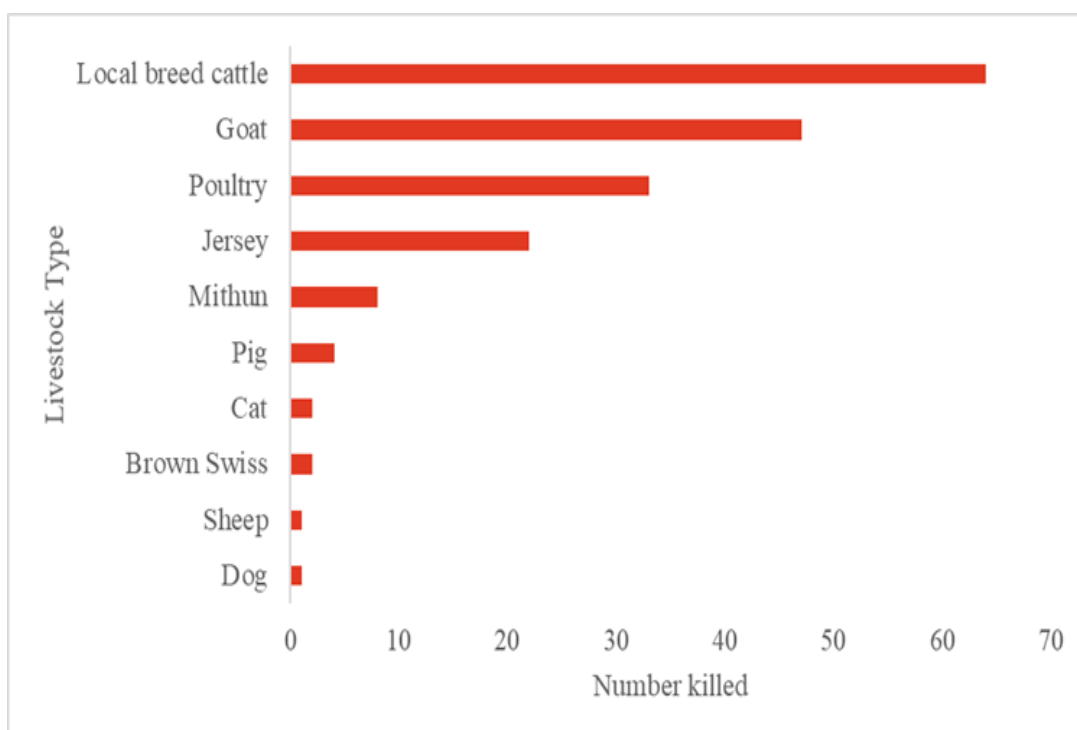


Figure 29: Types of Livestock killed by wild predators



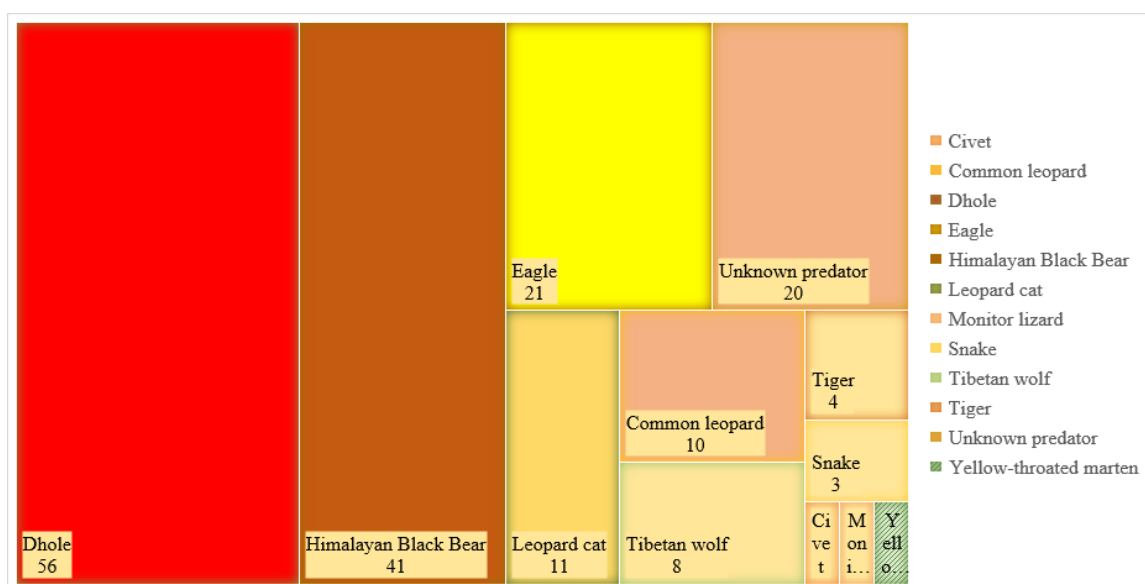


Figure 30: Types of wild predators raiding livestock

Livestock	Civet	Common leopard	Dhole	Eagle	Himalayan Black Bear	Leopard cat	Monitor lizard	Snake	Tibetan wolf	Tiger	Yellow-throated marten
Brown swiss									2		
Cat						1					
Dog										1	
Goat		8	5		20	5		3			
Jersey			11		3						
Local breed cattle	1	2	32		10				6	3	
Mithun			7								
Pig				1	1						
Poultry				20	4	3	1				1
Sheep			1			1					
Grand Total	1	10	56	21	38	10	1	3	8	4	1

Table 38: Types of wild predators against the livestock

When examining livestock predation by age, as presented in Table 39, it is evident that the majority of killed livestock were adults ($n=95$), whereas young livestock under the age of two were less frequently killed ($n=35$). This could be because most of the milking cow is kept tethered at home and are not sent to the forest for foraging. Moreover, most of the time, calves are tethered at home.

Additionally, the findings suggest that Dholes, Himalayan Black Bears, and Eagles rank as the top three wild predators contributing significantly to major livestock depreda-

tion. However, the data also reveals instances of livestock depredation occurring without clear identification of the actual predators involved.

Table 39: The age category that wild predators depredate

Livestock	Adult	Heifer (3-4)	Young (0-2)
Civet	1		
Common leopard	5	3	2
Dhole	25	23	8
Eagle	13	3	5
Himalayan Black Bear	22	10	6
Leopard cat	5	2	3
Monitor lizard			1
Snake	2	1	
Tibetan wolf	4	1	3
Tiger	2	1	1
Unknown predator	18	4	9
Yellow-throated marten			1

Figure 34 presented below shows the frequencies of livestock depredation occurring in different places. It is evident that livestock depredation commonly occurs in the forest (50%) followed by 29% in the premises of human dwellings.

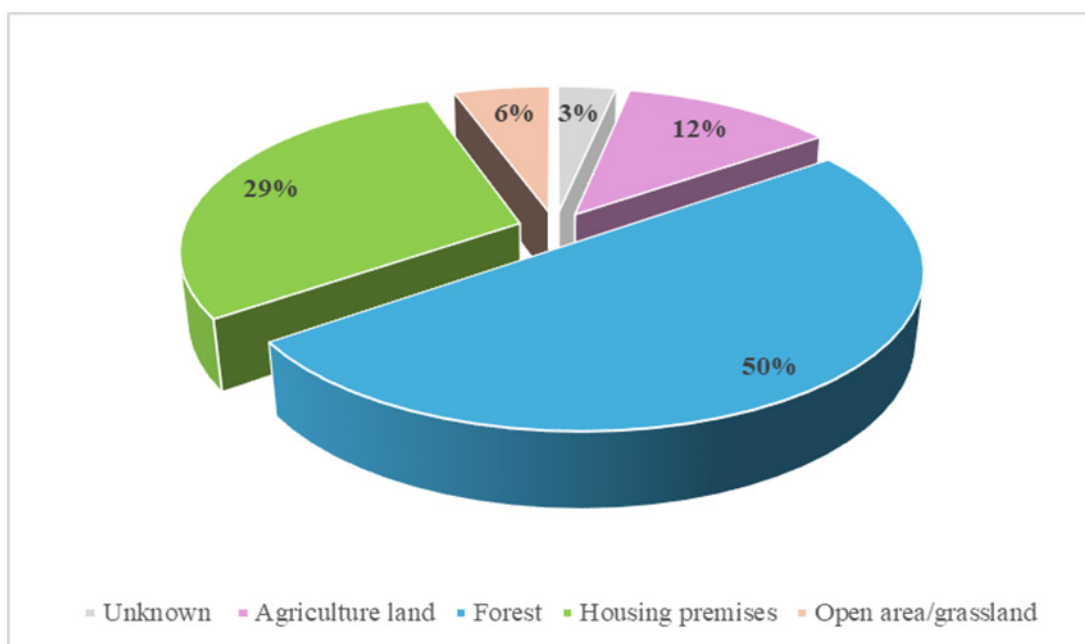


Figure 31: Places of livestock killed

When analyzing the financial losses incurred by farmers due to wild predators, the results reveal that the highest financial loss amounted to Nu. 149,375/-, while the least amount recorded was Nu. 1500/-. Table 40 suggests that the financial impact on farmers



varies depending on the breed and type of livestock, signifying that the highest number of livestock lost does not necessarily explain the significant financial loss of the farmer. Notably, breeds such as Mithun and Brown Swiss, being improved cattle breeds, experience a substantial impact on the financial stability of farmers when lost to wild predators. Furthermore, Table 40 shows that although Dhole has been the topmost problematic wild predator with the highest number of livestock kills, the financial losses attributed to Dhole are significantly lower than those caused by common leopards. As a result, this finding indicates that large wild predators lead to considerable financial losses for farmers.

Table 40: Amount of estimated loss incurred per incidence in Ngultrum.

Predator	No. of livestock	Estimated lost (Avg.Nu)
Common leopard	10	86520
Unknown predator	31	73652
Tibetan wolf	8	44750
Dhole	56	43036
Himalayan Black Bear	38	22132
Tiger	4	17875
Leopard cat	10	14350
Snake	3	5333
Civet	1	5000
Eagle	21	3136
Monitor lizard	1	3000
Yellow-throated marten	1	2500
Grand Total	184	38395

Table 41: Number of livestock and estimated amount lost

Livestock Type	No. of Livestock	Estimated lost (Avg.Nu)
Mithun	8	149375
Brown Swiss	2	70000
Local breed cattle	64	48938
Jersey	22	35273
Goat	47	32568
Sheep	2	27500
Pig	4	27375
Cat	2	5000
Poultry	32	3595
Dog	1	1500
Grand Total	184	38395



2.7.2. Crop damage by Wild animals

It is evident that besides livestock losses, farmers have to bear the losses of crop damage caused by wild animals. Figure 35 presented below shows 11 most common wild animals that damage crops. The wild pig, Macaque, and Porcupine are recorded as the most common and three most problematic wild animals that damage the crops while crop damage by Rabbit is negligible in Chukha.

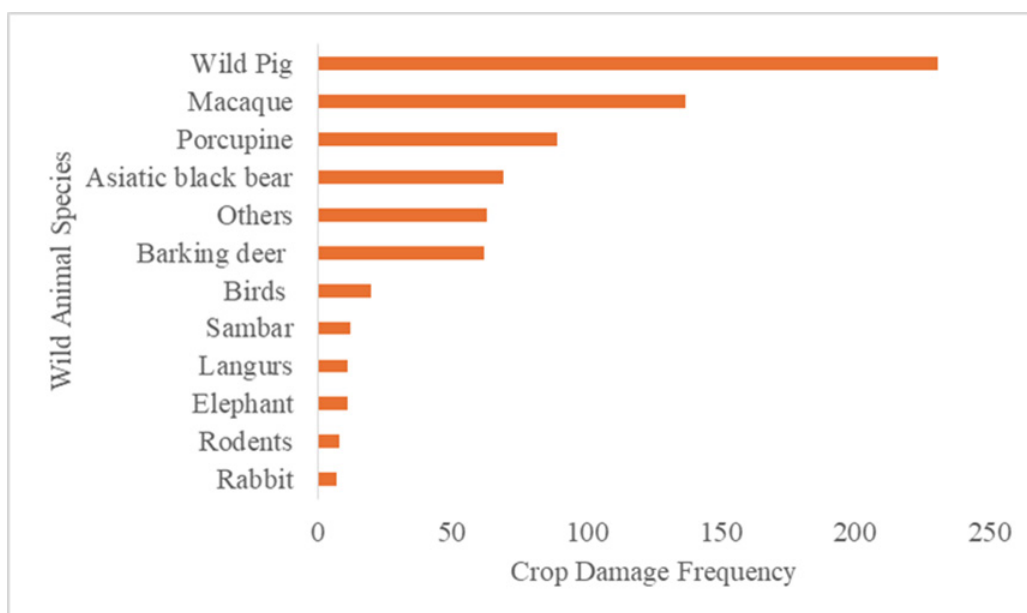


Figure 32: Species of wild animals damaging crops

Out of 11 Gewogs in Chukha Dzongkhag, Darla Gewog has reported the highest number of crop damage, while crop damage in Metakha Gewog is comparatively low (Figure 36). The people of Darla Gewog perceived that their crops were damaged more by the wild animals, and the number of samples taken from Darla Gewog is comparatively more than that of Metakha Gewog.

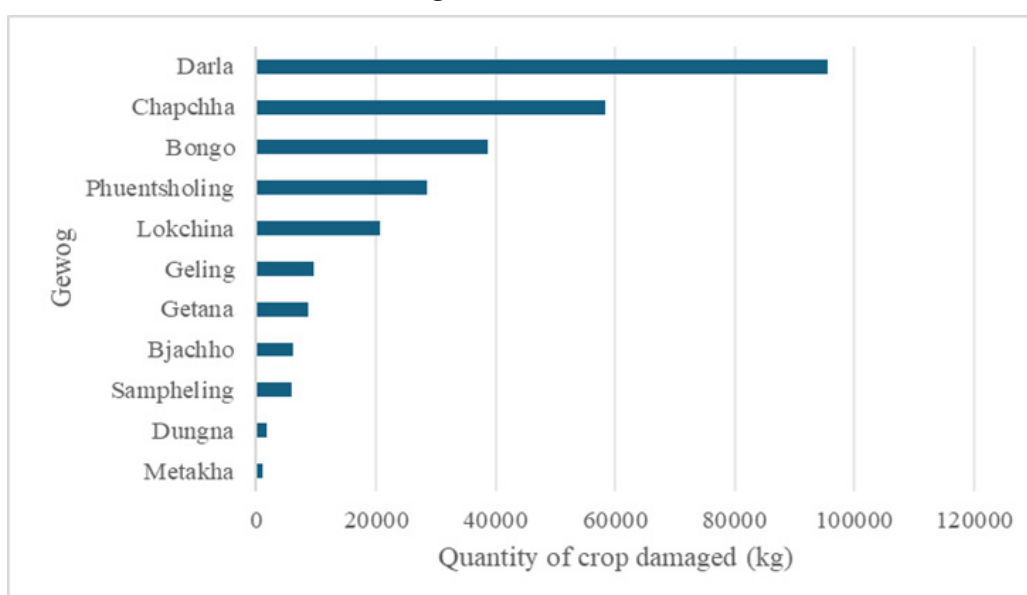


Figure 33: Quantity of crops lost to wild animals per Gewog

There are 10 common categories of crops recorded that are damaged by wild animals. A total quantity of 274339.18 kgs with a monetary value of Nu. 10202355/- crops were damaged by wild animals. The Maize with the highest quantity of 120895.82 kg, amounting to a Nu. 1887291/- was damaged by wild animals, though only 930 kg of Bitter Buckwheat was lost to wild animals (Figure 37).

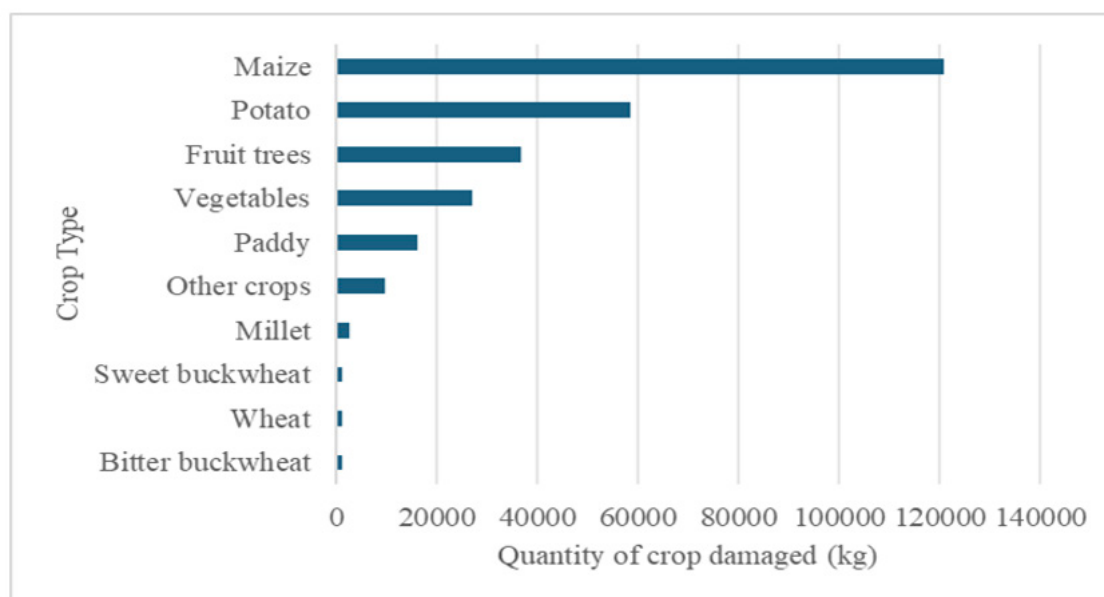


Figure 34: Amount lost to the wild animals

2.7.3 Human-wildlife Conflict Interventions

To mitigate the impact of human-wildlife conflict, DFO Gedu has implemented multiple interventions within its jurisdiction, such as;

- Periodic advocacy programs with local communities, schools, commuters and relevant institutions.
- Solar electric fencing are provided to the rural communities.
- Solar lighting and communication gadgets are provided to migratory herders.
- Enrichment of wildlife habitats (Grasslands and Waterholes)
- Rapid Response Team (RRT) Formation of HWC incidences

Among the 11 gewogs under DFO Gedu, Metakha and Samphelling have been identified as HWC hotspots, with highest number of incidents of human-wildlife conflict. A Human-Wildlife Conflict to Coexistence (C2C) Strategy has been developed for these two gewogs, and interventions will be implemented separately in line with the strategy. The assessment will be carried out to evaluate the effectiveness of the HWC interventions implemented in the two identified hotspot gewogs.

2.8. Climate Change and its impacts

2.8.1. Climate Vulnerability (CVCA)

2.8.1.1. Exposure

Bhutan is also exposed to climate change and its associated hazards, like the rest of the world. It is projected that heatwaves and droughts are going to increase in Bhutan and will severely affect rural communities of Bhutan (World Bank Group and Asian Development Bank, 2021).

Similarly, exposure vulnerability was analyzed for Chukha Dzongkhag. It is measured based on the six indicators. All indicators showed a positive relation, indicating that every Gewog has been experiencing an extreme temperature, rainfall seasonality, occurrence of extreme events, and the impact of respective indicators.

The exposure-index map (Figure 38) presented below suggests that out of 11 Gewogs, Dungna and Sampheling Gewogs are more exposed to climate vulnerability, while Log-china and Geling are least exposed. The absolute values of model weights revealed that rainfall seasonality impact contributed the most to the overall exposure index, followed by rainfall seasonality, while extreme temperature contributed the least. (Table 42)

Table 42: Weights and significance of indicators on exposure and sensitivity

Exposure Indicator	Weight	Std. Err	Z=- Value	Sig. (P-Value)
Extreme Temperature	1.000			
Extreme Temperature Impact Types	3.050	0.199	15.324	0.000
Rainfall Seasonality	4.057	0.246	16.483	0.000
Rainfall Seasonality Impact Types	6.845	0.416	16.439	0.000
Extreme Events	2.377	0.161	14.798	0.000
Extreme Event Types	3.111	0.208	4.966	0.000
Sensitivity Indicator	Weight	Std. Err	Z - Value	Sig. (P-Value)
Crop Yield	1.000			
Pests and Diseases	2.724	0.322	8.459	0.000
Invasive Weeds	6.259	0.732	8.548	0.000
Invasive Weeds Occurrence	6.081	0.706	8.612	0.000
Drinking Water	0.599	0.101	5.929	0.000
Irrigation Water	0.382	0.081	4.713	0.000
Forest Cover	0.945	0.164	5.770	0.000
Forest Composition	0.943	0.169	5.593	0.000
Wildlife Population	0.023	0.098	0.237	0.812
Vector-Borne Diseases	-0.475	0.105	-4.521	0.000
Water-Borne Diseases	-0.634	0.111	-5.721	0.000
Family Fatality	0.120	0.026	4.671	0.000
Pastureland	0.348	0.082	4.273	0.000
Infrastructure Impacts	0.930	0.129	7.196	0.000

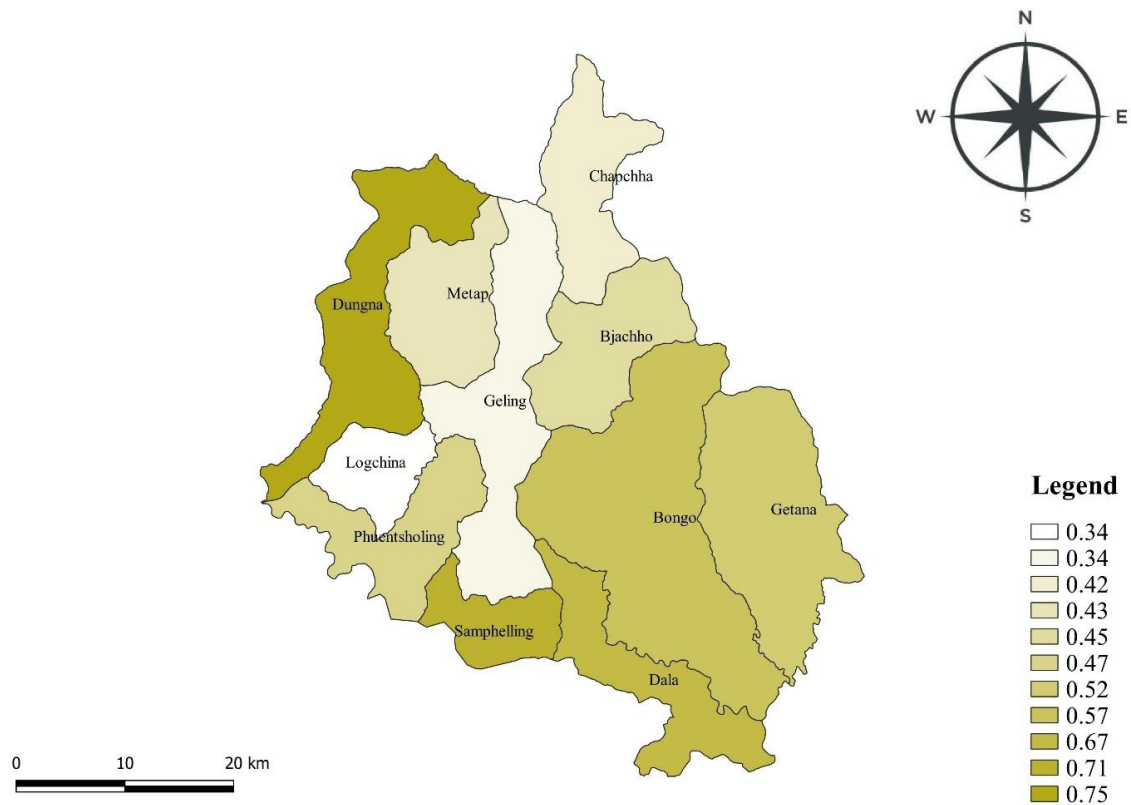


Figure 35: The normalized exposure index score map of DFO, Gedu. Higher index values indicate higher exposure and vice versa.

2.8.1.2. Sensitivity

Components were considered as a summation of thirteen indicators. All indicators contributed positively to sensitivity, though some wildlife populations were not significant ($P > 0.001$). The weightage contribution of pests and Diseases to the sensitivity index was higher compared with other indicators. The family members affected due to infrastructure impacts contributed less to the overall sensitivity index. There are reports of crop loss due to unusual outbreaks of pests and diseases, erratic rainfalls, windstorms, hailstorms, droughts, and flash floods annually in the country (Chhogyel et al., 2020).

Issues concerning Pests and diseases, Invasive weed occurrence, and crop yield were listed as the main contributors to sensitivity for all the Gewogs under Chhukha Dzongkhag. These were the top three sensitive indicators with scores of 6.259, 6.081, and 1, respectively, for all Gewogs. Generally, in all the Gewogs, Pests and diseases are reported to be the main cause of sensitivity, especially to crops. Similarly, pests and Diseases constitute 95% of farmers facing challenges in the country, as reported in Kuensel (Poudel, 2023). Moreover, (Deutsch et al., 2018) reported that insect pests caused a substantial reduction in the yield of the three staple food grains (rice, maize, and wheat), and it's projected to increase by 10 to 25% per degree of the Global Surface temperature.

Among all the Gewogs, Darla was found to have the highest sensitivity with an index score of 0.53, as compared with the least sensitive Metakha having a score of 0.28 (Figure 39). The subsequent sensitive Gewogs are Logchina and Chapcha with 0.48 and 0.47, respectively.



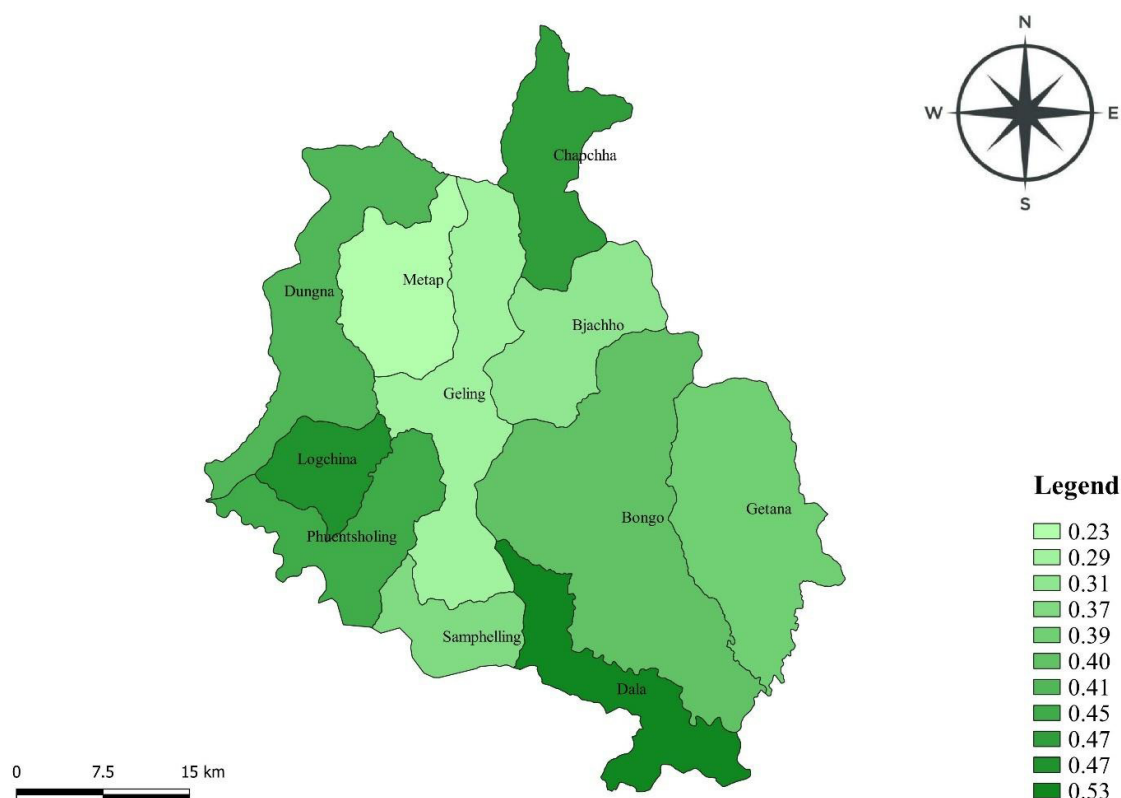


Figure 36: The normalized sensitivity index score map of the DFO, Gedu. Higher index values indicate higher sensitivity and vice versa.

2.8.1.3. Adaptive Capacity

Table 43 represents the weights of each indicator to adaptive capacity. Compared with household-head literacy, indicators such as community group membership types, Community Group memberships, vocational skills, forest produce types, and access to household facilities contributed more to the adaptive capacity index. All indicators of adaptive capacity have significant contributions to the adaptive capacity against climate change, except forest status and wetland status ($P > 0.001$), which may be due to the absence of wetlands within the study area.

Table 43: Weights and significance of indicators for adaptive capacity.

Adaptive Capacity Indicator	Weight	Std. Err	Z - Value	Sig. (P - P-Value)
Human Asset				
Literacy of Household Head	1.000			
Vocational Skills	2.776	0.679	4.087	0.000
Gender of Household Head	0.503	0.239	2.106	0.035
Climate Awareness	0.432	0.140	3.088	0.002
Waste Awareness	1.788	0.572	3.125	0.002
Social Asset				
Community Group Membership	15.974	3.645	4.382	0.000

Community Group Membership Types	20.746	4.745	4.372	0.000
Natural Asset				
Forest Status	0.036	0.366	0.098	0.922
Wetland Status	-0.383	0.313	-1.224	0.221
Forest Produce Type	2.413	0.631	3.826	0.000
Landholding	0.952	0.254	3.749	0.000
Water Availability	1.756	0.522	3.365	0.001
Alternative Water Sources	1.693	0.442	3.833	0.000
Financial Asset				
Food Self-Sufficiency	1.919	0.516	3.717	0.000
Credit Access	2.127	0.532	3.999	0.000
Savings	1.218	0.331	3.675	0.000
Physical Asset				
Access to Facilities	1.704	0.509	3.349	0.001
Access to Household Facilities	2.185	0.522	4.185	0.000
Road Access and Conditions	0.710	0.336	2.115	0.034
Communication Medium Types	0.917	0.311	2.953	0.003

On a scale of 0 to 1, the normalized score of adaptive capacity does not show large variations. Dungna Gewog scored the highest, in terms of adaptive capacity index, followed by Bjacho, Logchina, Chapcha, and Metapkha (Figure 40). The community of Dungna feels that it can adapt more to climate change

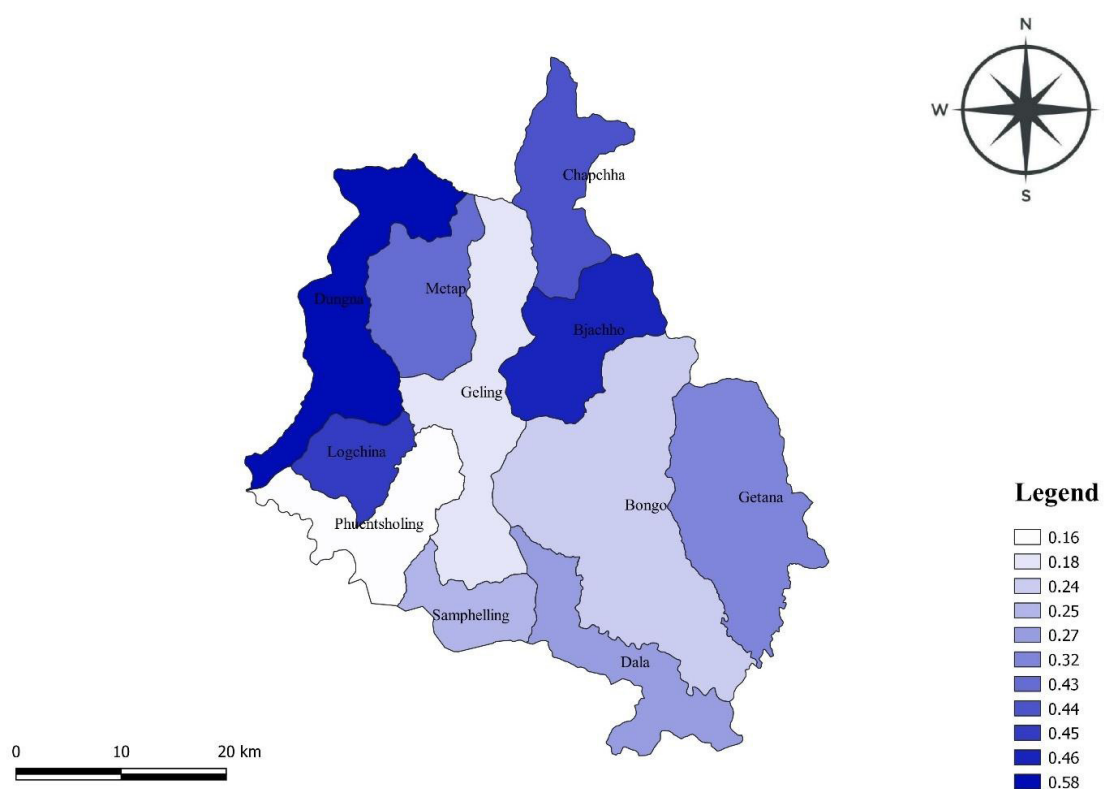


Figure 37: The normalized adaptive capacity index score map of DFO Gedu. Higher index values indicate higher adaptive capacity and vice-versa.

2.8.1.4 Vulnerability Index

Overall vulnerability is calculated by the subtraction of the sum of exposure and sensitivity from the adaptive capacity. The vulnerability index scores of the gewogs of DFO, Gedu, are presented in Table 44 and Figure 41. Gewogs with higher negative scores on the vulnerability index are more vulnerable. However, a positive score of the vulnerability index does not indicate that those gewogs are not vulnerable, but are only less vulnerable.

Table 44: Exposure, sensitivity, adaptive capacity and vulnerability index scores of the gewogs of DFO, Gedu

GewogName	Vulnerability	Exposure	Sensitivity	Adaptive_capacity
Bjachho	-0.31489997	0.45237	0.31226	0.449735479
Bongo	-0.73732273	0.57603	0.40137	0.240084167
Chapchha	-0.46214462	0.42591	0.47796	0.441728605
Dala	-0.93243807	0.674	0.53286	0.274420753
Dungna	-0.59078433	0.75651	0.41503	0.580751558
Geling	-0.44678602	0.34038	0.29083	0.184426396
Getana	-0.59294847	0.5234	0.39551	0.32596319
Logchina	-0.37205239	0.34035	0.47941	0.447703114
Metap	-0.24347227	0.43918	0.23813	0.433841253
Phuntsholing	-0.77233879	0.47463	0.45961	0.161901812
Samphelling	-0.8381992	0.71816	0.37726	0.257215423

According to the vulnerability index value, Darla Gewogs is the most vulnerable as well as sensitive with a score of -0.932 and 0.532 followed by Bjabcho the least with a value of -0.314. Phuntsholing has the lowest adaptive capacity while its vulnerability index stands at third position just after Darla and Samphelling. While Dungna is shown to have the greatest exposure value of 0.756, the gewog also has the highest adaptive capacity of 0.580 rendering it less vulnerable. Samphelling gewog stands at second in terms of both the vulnerability as well as exposure index while the adaptive capacity lies at the fourth lowest depicting its vulnerability. Bjabcho gewog has the highest adaptive capacity with the least vulnerability index, making it the least vulnerable amongst the gewogs.

A study on flood vulnerability assessment for the districts of Bhutan by (Tempa, 2022) found that the frequency of flood events in Bhutan has increased by threefold in recent years. The study ranked Chhukha, Punakha, Sarpang, and Trashigang Dzongkhags as more vulnerable with a higher flood vulnerability index, which is coherent with the present findings.

Asian Development Bank (ADB)'s climate Risk country profile-Bhutan, conducted in 2021, states that the majority of Bhutan's agricultural land and infrastructure is located along drainage basins that are highly exposed to flooding, particularly riverine flooding caused by heavy monsoon rains and glacial melt.



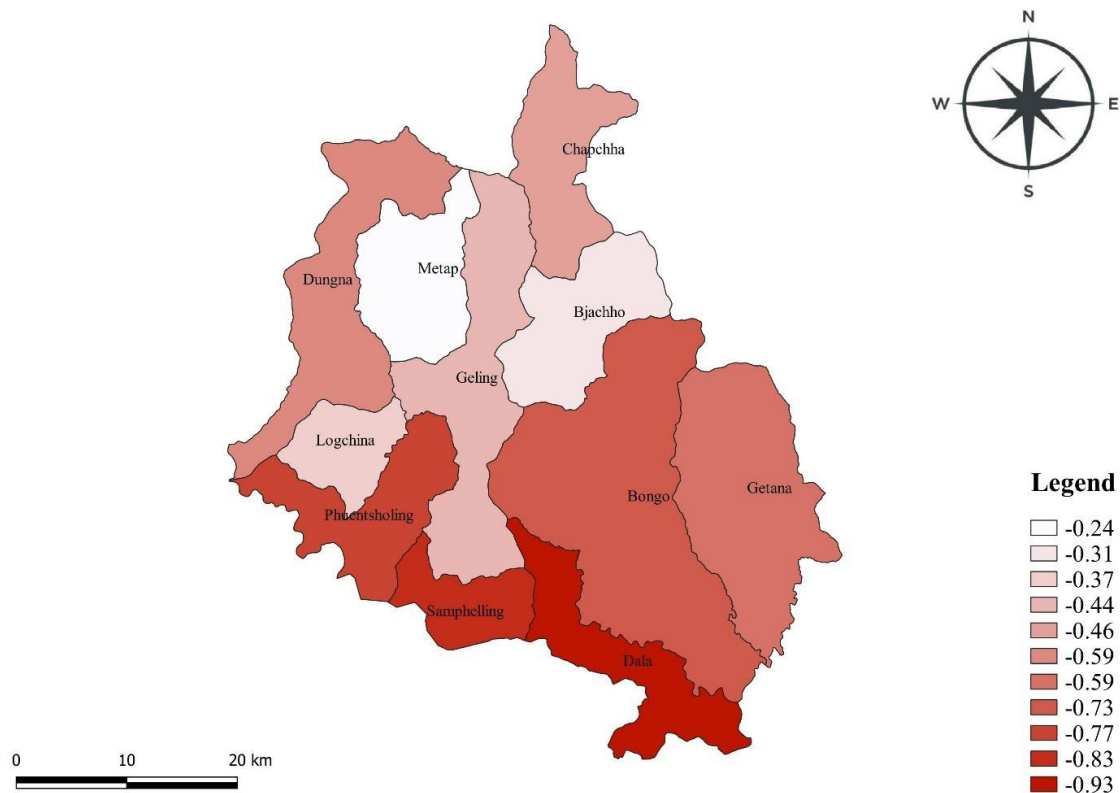


Figure 38: Vulnerability index map of DFO, Gedu

2.8.1.5. Impacts and coping mechanisms

A study by Chhogyel & Kumar (2018) supports that Bhutan has been experiencing impacts of climate change such as crop loss, outbreaks of pests and diseases, erratic rain-falls, storms, and flash floods. They also stressed that agricultural production is going to be an uphill task should investment not be poured into research on climate-resilient farming technologies.

The common impacts observed are a decline in crop production, an increase in scarcity of water both for drinking and irrigation, a rise in pest and disease outbreaks, and the death of cattle due to the combined effects. Water scarcity has also impacted personal sanitation and hygiene. Scantier resources from climate change have often led to conflicts among the communities.

Since farmers cultivate for self-consumption and also to sell the surplus to earn income for their livelihood, with the dip in production due to climatic factors, making up for the livelihood through seasonal off-farm activities, viz., working at construction sites, is also explored. In rare and desperate cases, a few have resorted to selling off their assets and properties to sustain their livelihood and support the education of their children.

Farmers think and hope that aid and support in all forms by the government and Non-Governmental Organizations (NGOs) would contribute much to enable prevail over the losses and damages due to the adversaries of climate change.

As for the gewogs under DFO, to combat the setbacks brought about by climate change, the following are some of the measures adopted by the communities from support mostly coordinated by the gewog administration in collaboration with relevant agencies.

2.8.1.6. Forest Carbon Sequestration and Climate Change Mitigation

Forests managed by DFO, sequester around 183461.51 tonnes each year. This strong carbon uptake helps mitigate climate change by reducing greenhouse gases. Effective management and conservation have maintained healthy, productive forests, and continued sustainable practices will be key to enhancing carbon storage while supporting biodiversity.

2.9. High Conservation Value Areas (HCVA)

2.9.1. HCV Concept Overview

“An HCV is a biological, ecological, social, or cultural value of outstanding significance or critical importance”. High Conservation Value (HCV) was first introduced in 1998 by the Forest Stewardship Council (FSC), an international non-profit multi-stakeholder organization established in 1993. The organization promotes responsible management of world forests and acts as a global forest certification scheme. The purpose of its inception was to use it as a tool and framework to protect important environmental, social, and cultural values within forest production landscapes, with 6 HCV categories (Figure 42) and global definitions.

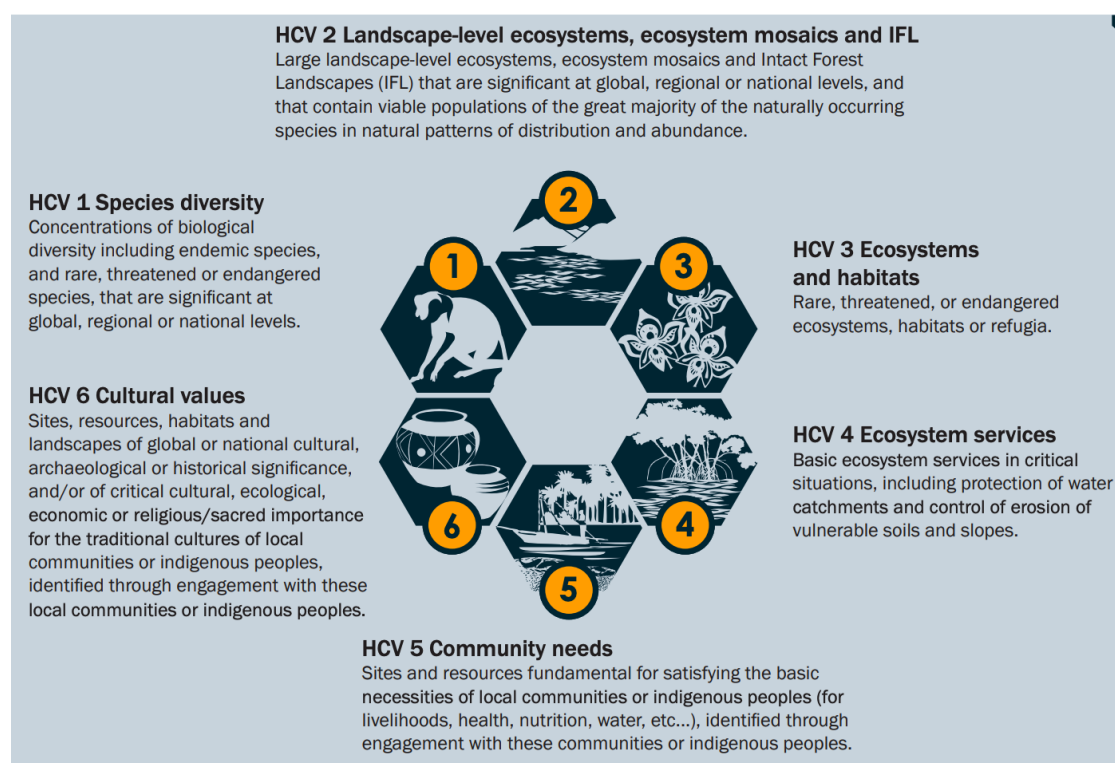


Figure 39: Six Categories of High Conservation Value Area

Since then, the scope has widened from ‘HCV Forest’ to ‘HCV Areas’, acknowledging:

- That these values apply across all landscapes to include both forest and non-forest ecosystems.
- The objective is to take management actions which maintain (or enhance) the conservation values themselves.



The HCV approach is widely adapted within voluntary certification schemes, notably in forestry and agriculture, forms part of corporate sustainability commitments and policies, and is increasingly recognised in national or regional policy. The government and people of Bhutan recognize the environmental, social, and cultural values in the development process and accordingly place top priority on the protection of the cultural and natural heritage, including supporting community needs. The HCVs, as a holistic approach, can further complement and strengthen these efforts and initiatives of the country. Therefore, recognizing the benefits of the HCV approach, it was introduced in 2020 in Bhutan by WWF through the Living Landscapes Program of the International Climate Initiative (IKI) project.

2.9.2. HCVA in Divisional Forest Office, Gedu

The Divisional Forest Gedu has identified the Tumdra Ney with an area of 206.4ha under Darla Gewog, Chhukha Dzongkhag as the HCV Category 6, which is classified as the Cultural Values. It is located on the extreme border with India.

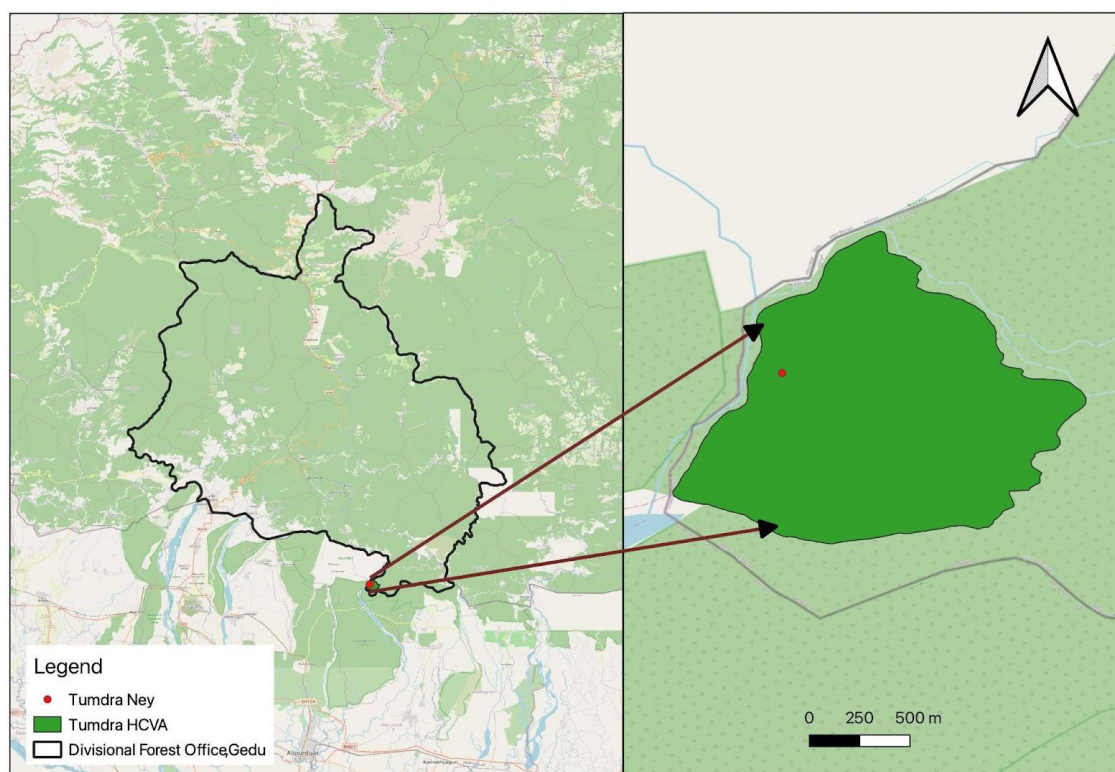


Figure 40: Map showing the location of Tumdra HCVA.

2.9.3. Significance of HCVA

The Ney holds significant contributions from numerous holy saints, including Jetsen Drelma, Guru Rinpoche, and Thang Thong Gyalpo. However, the most important aspect of the Ney is the Ney of Aum A KA ZA TI, or Aum Kangchim. Aum Kangchim's full body print can be seen on a rock, and history states that Terton Drukdra Dorji discovered and revealed a relic, a statue of Aum Kangchim, which is currently housed at Dokhachu Goenpa under Chapcha gewog. Aum Kangchim is also revered as a god of wealth, be-

stowing blessings of wealth and happiness. Consequently, thousands of people visit the holy site annually during the holy event Shivratri (A Hindu Festival celebrated annually in honour of the deity Shiva). From a Hindu perspective, the Ney is a holy site associated with Goddess Saraswati (Lhamo Yangchen Lhamo), Chumo Ganga (Matey Ganga), and Tshodha Langpo. It is also regarded as the place where the paths to hell and heaven are determined.

Another significant part of Tumdra Amey Ney is the Dhuthrey (cremation ground), located above the current Lhakhang. This cremation ground is considered one of the eight most sacred Dhuthreys globally, as revealed in the biography of Drupthop Thang Thong Gyalpo, who established the current Tumdra Amey Ney.

2.9.4 Screening and Identification of the HCVA

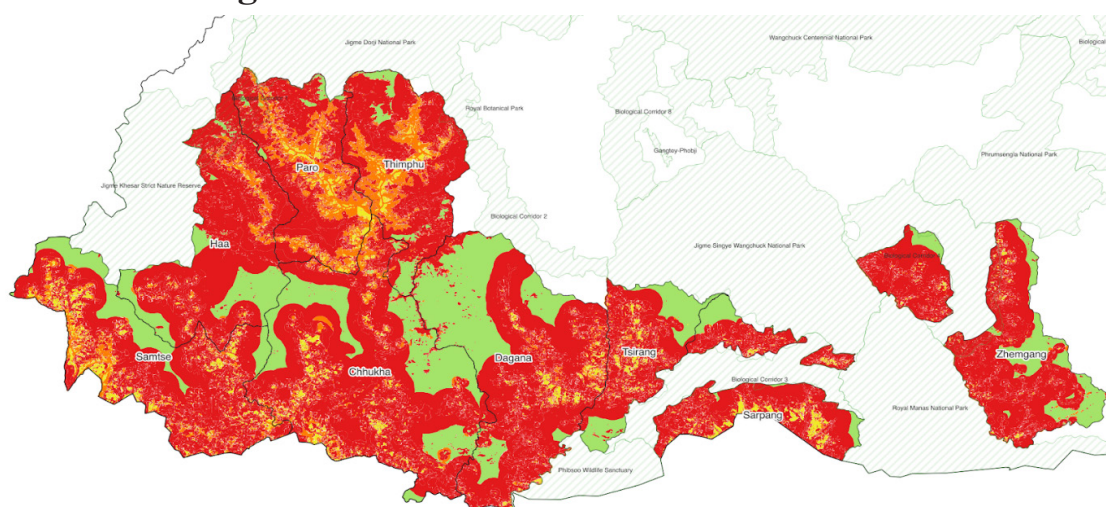


Figure 41: Summary Map of all Priority 1 (red), Priority 2 (green), Priority 3 (orange) and Priority 4 (yellow) areas in the IKI landscape.

The HCV Screening has revealed that High Conservation Values (HCV) are present across nearly the entire IKI landscape, spanning a variety of forest and non-forest ecosystems. To designate HCV Management Areas within this broader landscape, careful selection must be made, considering the data collected, consultation, HCV screening guides, and, most importantly, using the HCV National Interpretation as a reference.

For the Divisional Forest Office, Gedu, the HCV Management Site was selected with the following criteria:

Priority was given to Priority 2 areas, which have a high likelihood of containing HCVs.

Priority 1 areas were not selected, as nearly the entire division falls within this category.

The priority 2 areas within the Division's jurisdiction are quite manageable, considering the management and monitoring of the HCV and the capacity of the Division.



2.9.5. Threats and Strategic Approach to Mitigate the Threat

Table 45: List of high-ranking threats on HCVs

Potential threats	Affected HCVs
Diminish Sanctity of the Ney (Future) (Rapid Urbanization, Modernization, and Commercialization)	HCV 6: Cultural sites
Waste pollution (Existing & Future)	
Landslide (Existing and Future)	
Wildfire (Future)	
Illegal Fishing (Existing and Future)	

Rapid urbanization, modernization, and commercialization are projected to diminish the sanctity of Tumdra Ney in the future, undermining its cultural and spiritual significance. If existing waste pollution is not effectively managed, it is likely to worsen, leading to further environmental degradation. The area is currently vulnerable to landslides, a threat that could intensify with deforestation and climate change. Additionally, the risk of wildfires is expected to increase due to evolving climate conditions and human activities. Illegal fishing, already an ongoing issue, could continue to escalate, posing a significant threat to both the aquatic ecosystems and the religious significance of the sacred site near Tumdra Ney. To protect the area's unique value, immediate and sustained conservation efforts are essential.

2.9.6. Strategic Approaches to Mitigate Threats

Table 46: List of Strategic Approaches that can Mitigate Potential Threat in the Selected HCV Management Area

Potential Threats	Proposed strategic approach
Diminish Sanctity of the Ney (Future) (Rapid Urbanization, Modernization, and Commercialization)	Advocate and manage visitors
Waste pollution (Existing & Future)	Manage Waste
Landslide (Existing and Future)	Initiate and implement Nature Based Solutions (NBs)
Wildfire (Future)	Integrated fire management
Illegal Fishing (Existing and Future)	Sustainable Livelihoods; Institutional & HR Capacity

Advocate and manage visitors: conduct educational campaigns and develop visitor management plans to raise awareness about the cultural and spiritual significance of Tumdra Ney, ensuring that tourism and development do not erode its sanctity.

Manage waste: Implement effective waste management systems to minimize pollution and preserve environmental integrity. Key activities include conducting advocacy pro-

grams on proper waste management practices and installing clear waste management signage to guide visitors and local communities.

Initiate and implement Nature-Based Solutions (NBS): Implement measures such as reforestation, slope stabilization, and habitat restoration to reduce landslide risks and strengthen landscape resilience. Key activities include establishing buffer plantations in erosion-prone areas and engaging local communities in tree planting and slope management.

Integrated fire management: Develop and implement comprehensive wildfire management strategies that prioritize awareness and education on wildfire prevention, along with measures such as controlled burns, creation of firebreaks, and active community participation to reduce future wildfire risks.

Sustainable Livelihoods; Institutional & HR Capacity: Strengthen local communities by promoting sustainable fishing practices and enhancing their skills and knowledge. Conduct regular fishing patrols and use posters, signboards, and social media to raise awareness of fishing rules and penalties. This approach also focuses on building institutional capacity to monitor and enforce regulations effectively, reducing illegal fishing activities while preserving the ecological and religious significance of Tumdra Ney.

2.9.7. Management and Monitoring of HCVA

The HCVA Management and Monitoring is developed as per “Guidelines for Management and Monitoring Guidelines of High Conservation Value Area, 2024” developed for Bhutan.

Where HCV Screening has indicated Priority 1 areas, the highest level of response for management is warranted to maintain and enhance HCVs. This is because there is a high likelihood of HCV being present, but they face a higher level/s of threat that can impact the HCV’s future presence in the landscape. This is an active response that involves reducing threats and should involve most resources available at the DFO level for managing HCVs. In areas where there is a high likelihood of HCV presence but a lower level of threats (Priority 2), a preventative response is warranted to ‘prevent’ threats from emerging in the future and thus potentially impact HCVs present. Where HCV has a lower likelihood of presence, but threats remain high (Priority 3), a precautionary response is preferred. This can include checking for HCV absence before any development or land change occurs, and then enforcing regulations and best management practices in development areas. Low priority areas (Priority 4) do not require an urgent response (but may be managed with habitat restoration in the future).



Table 47: Response framework for Priority Areas produced by HCV Screening

Threat level to HCVs	Probability of HCV Presence	
	Lower Probability	Higher Probability
Higher threat	Priority 3 (Low HCV Probability & High Threat) Precautionary Response	Priority 1 (High HCV Probability & High Threat) Active Response
Lower threat	Priority 4 (Low HCV Probability & Low Threat) Secondary Response	Priority 2 (High HCV Probability & Low Threat) Preventative Response

Management of HCVA is included under Chapter 5: Management Prescription, Implementation Plan including budget is in Chapter 6: Implementation Plan and Financial Outlay. The Monitoring plan for HCVA is included under Chapter 7 Monitoring and Evaluation.

2.9.8. Management of Transboundary issues

Tumdra Ney lies along the international border with India, and its High Conservation Values are influenced by cross-border activities, particularly during peak pilgrimage periods such as Shivratri. Transboundary challenges include waste pollution, unmanaged visitor movement, and associated environmental degradation. To address these issues, the management plan will incorporate transboundary considerations through improved waste management measures (such as installation of waste collection points, awareness signage, and periodic clean-up campaigns), advocacy on responsible visitor behavior, and coordination with relevant local authorities, religious institutions, and communities. These measures aim to maintain the environmental integrity, cultural sanctity, and spiritual significance of Tumdra.



Chapter 3: Threats and Challenges

3.1. Threats

The Division is also challenged by various threats, and a proper understanding of these threats has been crucial for planning appropriate measures for future interventions. This management plan has incorporated ten major threats that demand immediate management interventions. A detailed conceptual model of threats and their conservation strategies is shown in Figure 45.

Threats were analyzed and identified based on the data collected through the SMART Tool, High Conservation Value Area (HCVA) report, and Baseline Biodiversity Report, 2021, of the Divisional Forest Office, Gedu. Based on the scope¹, severity², and irreversibility³ of damages caused by a threat, threats were ranked Low, Medium, High, and Very High using Miradi software where Low indicating likely to occur, slightly affect a target ecosystem, and easily reversible from damages caused while Very High indicating a threat being pervasive, potential of destroying or eliminating a target ecosystem and cannot reverse from damages caused shown in figure 46. As per the threat ranking analysis, Divisional Forest Office, Gedu is confronted with a high level of threats and accordingly, to address these threats, specific management prescriptions and strategies are developed in this plan.

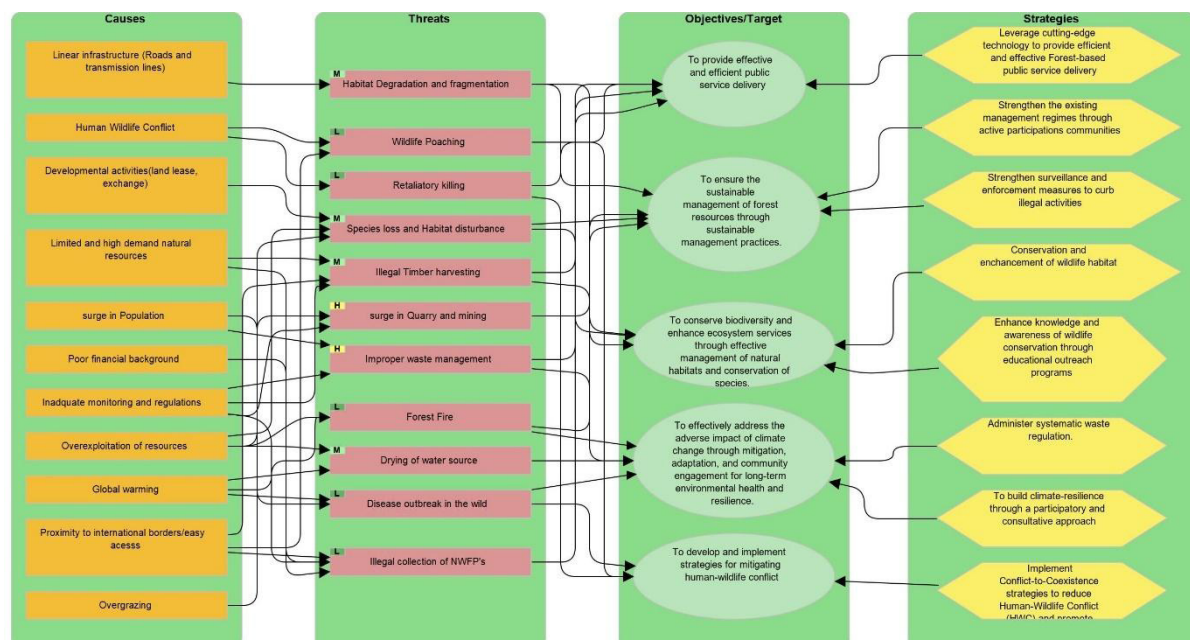


Figure 42: Conceptual model for conservation for DFO



Threats \ Targets	To ensure th...	To effectively address the adverse impact of climate change through m...	To provide effec...	To develop and L...	Summary Threat Rating
surge in Quarry and mining	Very High				High
Improper waste management		Very High			High
Illegal collection of NWFPs			Low		Low
Forest Fire	Low	Low			Low
Drying of water source		High			Medium
Disease outbreak in the wild		Low		Low	Low
Wildlife Poaching				Low	Low
Retaliatory killing			Low	Low	Low
Habitat Disturbance, Degradation and fragmentation	Medium				Medium
Illegal Timber harvesting			Low		Medium
Summary Target Ratings:	High	High	Low	Low	Overall Project Rating: High

Figure 43: Threat ratings of DFO

- **Scope:** Most commonly defined spatially as the proportion of the target that reasonably be expected given the continuation of current circumstances and trend.
- **Severity:** Level of damage to the target from the threat that can be reasonably be expected given the current circumstances and tread.
- **Irreversibility:** The degree to which the effects of a threat can be reversed and the target affected by the threat restored.

Details of the individual threat

1. Surge in quarry and mining

Mineral resources are national treasures and trade of mineral resources contribute significantly to the country's GDP. According to (Drukpa et al., 2019), mineral resources in the Himalayas are generally known for huge reserves of industrial minerals and construction stones, gravel, and sand. Accordingly, the Bhutanese Himalayas harbor dolomite, limestone, quartzite, gypsum, talc, marble, graphite, ironstone or low-grade iron ore, calc-tufa, clay, fuel mineral coal, slate and construction stones, gravels and sand, which form an important raw material for the domestic mineral-based industries.

Driven by the rich mineral resources and proximity to the export gateway to India, Bangladesh, and Nepal, Divisional Forest Office, Gedu witnesses a significant volume of forest loss due to an increasing number of quarries and mining. Currently, there are six quartzite mining, one talc mining, and nine stone quarries operating under the Divisional Forest Office, Gedu, which has contributed to forest cover loss of 220.52 acres, and a few are in the pipeline for approval.

As per the conceptual threat ranking, the severity of the threat of quarry and mining to sustainable forest management is ranked as Very High without scope to reverse the damages caused to the forest ecosystem.

2. Improper waste management

Driven by rapid industrialization and urbanization, Bhutan is concerned with adverse health and environmental impacts due to growing waste management issues. As per the National Waste Inventory Survey (NWIS), 2019, Bhutan generates 172.6 metric tonnes (MT) of solid waste per day, with the largest share contributed by household waste with 47.34% followed by commercial units with 39.9%.

In the past, the waste problem was usually confined to big cities, but due to an increase in population and easy access with improved road networks, the waste problem is now experienced in the outskirts of towns and urban cities. Similarly, in Chukha, mounting waste has also impacted the Chukha hydropower along Wangchu and Tumdra Ney in Shachaphu. Additionally, Phuntsholing in the south is heavily burdened by growing waste issues, as it serves as Bhutan's main commercial and industrial center, with the highest flow of people crossing the border.

Consequently, the threat of improper waste management is ranked as Very High in terms of its impact on effectively addressing the adverse impact of climate change through mitigating and adaptation for long-term environmental health and resilience.

3. Illegal collection of NWFPs

According to the Food and Agriculture Organization (FAO), "Non-Wood Forest Products (NWFPs) consist of goods of biological origin other than wood, as well as services derived from forests and allied land uses". NWFPs are a major natural commodity for rural livelihood, and 69% of Bhutanese living in rural areas heavily depend on NWFPs for their livelihood (Gurung, 2017). There are many NWFPs in Bhutan, ranging from medicinal and aromatic plants, wild vegetables, mushrooms, incense, dyes, gums, fruits, essential oils, fibres, ferns, cane, and bamboo (Figure 47)

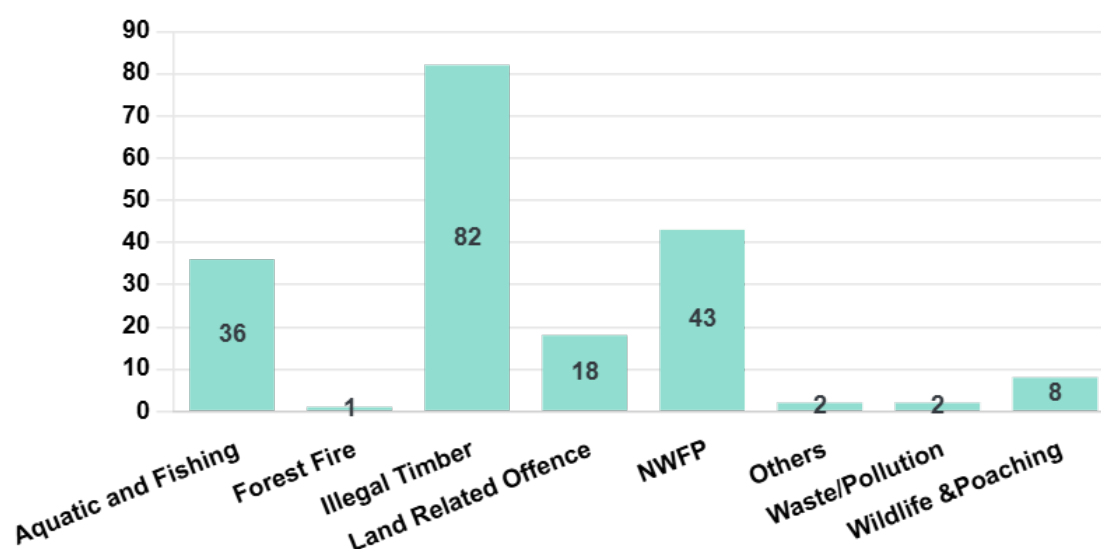


Figure 4: Number of illegal incidents in 2023-2024



Influenced by market demand, high economic incentives, and to avoid legal procedures, people usually resort to illegal harvesting. The Division recorded 43 instances of illegal activities related to NWFP as of 2024. However, illegal collection of NWFPs is perceived as less critical and less prominent relative to illegal harvesting of timber. Accordingly, the threat of illegal collection of NWFPs is ranked Low as per the Miradi conceptual model. The damages caused due to collection of NWFPs are limited to a specific area and the damages caused due to illegal collection can potentially be restored in due course, given the change in current circumstances or trend of illegal collection.

4. Forest fire

Since conifer and mixed conifer forests are generally prone to forest fire, an area dominated by such forest types is normally challenged with the risk of forest fire in the winter season. However, Chukha Dzongkhag is largely dominated by broadleaved forest with 73.11% while conifer (14.97%) is confined to Chapcha Gewog in the north and accordingly Chapcha Gewog observes a greater number of forest fires. Although forest fire is both man-made and natural, of the 10 forest fire incidents recorded from 2022 to 2024 in Chapcha, 5 were caused by agricultural debris burning. Nevertheless, recognizing the frequency and impact on the ecosystem, the threat of forest fire is ranked Low as per the conceptual model.



5. Drying of water source

Bhutan has set a national target to achieve 24/7 access to safe drinking water by 2023. However, a survey conducted by the Department of Forests and Park Services (DoFPs) in 2019, found that more than 1856 (25.1%) of 7399 were found drying up, while 69 (0.9%) have completely dried in Bhutan. Similarly, 66 water sources in Chukha Dzongkhag were found drying up. In Chukha, drying of the water source is generally attributed to landslides and forest degradation.

6. Disease outbreak in the wild

Disease outbreak in the wild is a great concern for conservation in Bhutan. Bhutan observed bark beetle infestation in 2016 in Haa valley on fir forest, and mass death of fir trees was observed. However, despite the effort to record forest pests and diseases by

DoFPs, the status and extent of forest pests and diseases in Bhutan are still unknown. Similarly, the forest pest and disease outbreak in the forest of Chukha is still in the documentation stage, and accordingly, as there are no records on problems related to disease outbreaks in Chukha, the threat ranking is also indicated as low as per the Miradi conceptual model.

7. Illegal timber harvesting

Illegal harvesting of timber poses severe threats to biodiversity, forest ecosystems, and communities that depend on forest resources. Despite the stringent regulation and enforcement, driven by increased wood demand in construction and related industries, illegal timber harvesting is the most prominent offense reported by the Divisional Forest Office in Gedu, standing out as the highest among recorded violations. Nationally, such activities undermine Bhutan's extensive conservation efforts, as the illegal timber trade not only impacts forest cover but also disrupts local ecosystems and biodiversity.

8. Retaliatory killing

Retaliatory killing refers to the reactionary killing or act of illegal killing of wild animals in response to perceived threats or harm to livestock, crops, and human safety. This killing usually occurs after damage to the property of the affected individual. Retaliatory killing significantly contributes to species loss and the disruption of local ecosystems. The retaliatory killing usually arises from human-wildlife conflict. However, retaliatory killings usually remain unreported, and determination of the precise number of wild animals lost to retaliatory killing is not known. Although the determination of the severity of threats to the ecosystem is difficult, in regard to achieving resolution to human-wildlife conflict, retaliatory killing is ranked low in the conceptual model.

9. Habitat Disturbance, Degradation and Fragmentation

Habitat disturbance, degradation, and fragmentation due to infrastructure development, agriculture expansion, and growing human-wildlife interactions are a major threat to biodiversity conservation and forest resource management under DFO, Gedu. Construction of linear infrastructure, such as roads and transmission lines, disrupts the ecosystem and isolates wildlife populations, impacting the conservation of wild species. Two of the hydropower plants of Bhutan are located under the jurisdiction of the Division and have major transmission lines for domestic and inter-dzongkhag. Developmental activities such as Gewog Road or farm road, telecommunications tower constructions, and transmission line construction and maintenance are a major threat to the species' survival and migration. This results in the deterioration and loss of habitats for wild animals and forest resources management.

10. Wildlife Poaching

Wildlife poaching is a critical threat to biodiversity and forest resource management, endangering species like the tiger and musk deer, whose loss has a negative impact on the ecosystem balance and reduction in biodiversity. Driven by the market demand for



parts of wild animals, poaching can result in the loss of species, impact conservation efforts, and also impact the ecological roles of seed dispersal and population dynamics in the food chain. Snares and traps, especially targeting musk deer, pheasants, and bears, are often encountered during the planned SMART patrolling and regular service delivery, surveys, and monitoring by foresters, indicating the presence of wildlife poaching. The evidence of snares and traps is often found in remote areas and along the border areas, targeting species of higher value, which also indicates that the poacher's network operates mostly in remote and border areas. This is often challenging for the foresters in terms of monitoring and apprehending poachers due to remoteness and difficult terrain.

3.2. Challenges

I. Balancing Conservation and Development

It is difficult to balance conservation and development as both have opposing objectives. Conservation focuses on protecting ecosystems and species, whereas development seeks to improve infrastructure and living conditions, which often leads to pollution, deforestation, and biodiversity loss. Growing populations and economic pressures exacerbate these conflicts, especially in areas where people depend on natural resources for their livelihoods. Around the world, particularly, developing countries prioritize economic development over environmental conservation to combat poverty and improve livelihood. However, Bhutan's constitution requires 60% of its land to remain covered by forests at all times, but there is enormous pressure from the socioeconomic development aspect. Additionally, Chukha Dzongkhag acts as an economic route that connects the central and western parts of Bhutan by the Thimphu Phuntsholing National Highway Road. Simultaneously, major industries, quarries, and mining were established in Chukha Dzongkhag and several projects are in the pipeline for approval. Achieving equilibrium necessitates cooperative policies that support eco-friendly infrastructure, renewable energy, and sustainable practices, guaranteeing that conservation and economic objectives coincide to benefit communities and the environment.

II. Mobility (Farm Road)

The improvement of farm road networking in Chukha Dzongkhag is detrimental to conservation efforts since more road access results in higher rates of habitat fragmentation and deforestation. The construction and expansion of farm roads in Chukha Dzongkhag, essential for connecting remote communities, often cut through forested areas, disturbing ecosystems and making them vulnerable to illegal logging and poaching. However, Chukha Dzongkhag is located in a monsoon-receiving landscape, and deteriorating farm roads are susceptible to major landslides and soil erosion, causing further damage to forest ecosystems. On the other hand, rural development depends on farm roads, but they also make previously remote locations more accessible to people, which encourages excessive resource extraction by people. Road networks must be carefully planned to address issues, incorporating ecologically friendly building methods and community-based forest management to strike a balance between the objectives of sustainable resources management and protection.



III. Inadequate Public Services Facilities

Generally, conservation efforts are severely hindered by inadequate public service infrastructure, especially in isolated or ecologically sensitive areas where access to basic services is limited. Similarly, in Chukha Dzongkhag, basic infrastructure and equipment such as field offices, reliable internet, and transportation remain inadequate. Although the area is connected by farm roads and other modern facilities, these are still at an early stage of development. Any lacking service facilities will create gaps to support local communities involved in conservation activities, including service delivery on time. It not only leads to lower community engagement but also reduces conservation efforts as people prioritize immediate needs over conservation efforts. Additionally, the absence of essential facilities in remote locations also limits the presence of enforcement personnel, monitoring teams, and conservation professionals, which will eventually reduce the efficiency and effectiveness of conservation efforts and service delivery to the public in the long term. To enhance and strengthen the conservation and management effort, it is crucial to invest in public service infrastructure, particularly in remote locations that support both local communities and conservation goals. It will foster community engagement in the sustainable management of natural resources under Chukha Dzongkhag.

IV. Inadequate Human Resources

The scarcity of Human resources of technical personnel is a significant challenge for the implementation of sustainable conservation efforts in Chukha Dzongkhag. It restricts the use of efficient monitoring, enforcement of regulation and policy, and sustainable management techniques in the field. At the same time, conservation efforts require a workforce with technical knowledge in biodiversity assessment, forest management, and community outreach, yet many conservation programs face staffing shortages or lack adequately trained personnel. The execution of projects, including restoration, timely data collecting on the health of the forest, and routine patrols against illicit activity, is all hampered by a shortage of technical personnel. Moreover, insufficient human resources can strain existing staff, leading to burnout and decreased effectiveness. Addressing this challenge requires investment in capacity-building, including training programs, incentives to attract skilled professionals, and partnerships with local communities to support conservation objectives.

V. Porosity of border (illegal collection of forest resources)

The porosity of the borders of Chukha dzongkhag as it shares its south border with India, presents a significant challenge to forest resource conservation, as it enables the illegal collection and trafficking of forest resources such as timber, wildlife, and medicinal plants. The unregulated cross-border access not only allows smugglers and poachers to exploit natural resources but also causes land fragmentation, habitat degradation, and biodiversity loss. Limited enforcement capacity along vast border areas, especially the international border, further complicates monitoring efforts, making it difficult to detect and prevent illegal activities. As a result, it will undermine the conservation efforts that threaten the local ecosystems by depleting natural resources unsustainably, which are vital for both environmental conservation and the livelihood of people. Strengthening border surveillance, enhancing cross-border cooperation with counterparts, and involving local communities and relevant agencies in conservation and reporting efforts are crucial steps to mitigate these challenges and protect forest resources effectively.



Chapter 4: Management Prescription

4.1. Management prescriptions of DFO

Based on the threats analyzed and their underlying causes, management interventions have been strategized in three key areas: Services, Technical, and Institutional, aligned with each objective of the plan. Services focuses on delivering efficient forest services to the public, Technical involves managing interventions for the natural habitats of wild-life, and Institutional covers infrastructure development to address these threats.

In total, there are eight strategies targeting five objectives, supported by 39 activities aimed at addressing the specific threats and challenges within the DFO areas.

Objective 1: To provide effective and efficient public service delivery.

Strategy 1.1: Leverage cutting-edge technology to provide efficient and effective Forest-based public service delivery

- Action 1.1.1: Provide timely online forestry services through the G2C and OFS systems.
- Action 1.1.2: Provide professional-based capacity building under DFO to have efficient service delivery including technical staff.
- Action 1.1.3: To conduct awareness on the Forest and Nature Conservation Rules and regulations, and the Act, 2023, and its amendments to the public of all genders through various platforms.
- Action 1.1.4: Equip field staff by procuring essential ICT equipment, survey tools, and office structure maintenance to support their effectiveness in the field.
- Action 1.1.5: Procurement of safety gears for the prevention of occupational hazards

Objective 2: To ensure the sustainable management of forest resources through sustainable management practices.

Strategy 2.1: Strengthen the existing management regimes through active participation of communities.

- Action 2.1.1: Annual monitoring and evaluation of existing LFMP, CFMP, Scientific Thinning area, BMG and NWFPMP
- Action 2.1.2: Preparation of annual operational plan of FMU.
- Action 2.1.3: Revision of existing LFMA, CF, FMU and NWFP management plan.
- Action 2.1.4: Encourage and facilitate development of ecotourism products in CFMG area through active participation of local communities.
- Action 2.1.5: Carry out Bhutan METT+ evaluation
- Action 2.1.6: Carry out biodiversity monitoring in six permanent grids annually
- Action 2.1.7: Carry out forest inventory as a part of the nationwide forest inventory survey every ten years.

Strategy 2.2. Strengthen surveillance and enforcement measures to curb illegal activities.



- Action 2.2.1: Conduct Surveillance and Monitoring (SMART tool and drone)
- Action 2.2.2: Engagement of women in legal enforcement and awareness
- Action 2.2.3: Facilitate legal settlement of cases, including levying fines and penalties in accordance with rules and regulations.
- Action 2.2.4: Study on trends of forest degradation as a result of Illegal timber Extraction under the Divisional Forest Office

Objective 3: To conserve biodiversity and enhance ecosystem services through effective management of natural habitats and conservation of species.

Strategy 3.1: Conservation and enhancement of wildlife habitat.

- Action 3.1.1. Initiate the Agro-forestry program in relevant gewog.
- Action 3.1.2. Habitat enrichment through development of waterholes, mineral licks and plantation of wild fruit trees.
- Action 3.1.3. Installation of camera traps to study animal presence, absence, abundance and diversity.
- Action 3.1.4. Upgrade and manage existing forest nursery facilities.
- Action 3.1.5. Carry out tiger population surveys as a part of the nationwide tiger population revalidation surveys every five years.
- Action 3.1.6. Determine the population of snow leopard and its prey as a part of the Nation-wide Snow Leopard Survey using structured, grid-based camera trap surveys.
- Action 3.1.7. Determine the population of snow leopard and its prey as a part of the Nation-wide Snow Leopard Survey using structured, grid-based camera trap surveys.
- Action 3.1.8. Conduct eDNA survey as a part of the nationwide eDNA survey.

Strategy 3.2: Enhance knowledge and awareness of wildlife conservation through educational outreach programs

- Action 3.2.1: Develop conservation educational materials and Workshops with schools on Biodiversity Conservation (WBH, Beautiful Nuthatch, Tiger, snow leopard, Hornbills.
- Action 3.2.2: Publication of pictorial guides (orchids, butterflies, birds, herpetofauna, and mammals) and leveraging digital platforms for wider dissemination
- Action 3.2.3: Installation of information boards and signage in the strategic locations

Objective 4: To effectively address the adverse impact of climate change through mitigation, adaptation, and community engagement for long-term environmental health and resilience.

Strategy 4.1: Administer systematic waste regulation.

- Action 4.1.1: Waste management monitoring and capacity building through workshops and campaigns in State Reserved Forest Land
- Action 4.1.2: Install signage and information boards at strategic locations.

Strategy 4.2: To build climate-resilience through a participatory and consultative approach.



- Action 4.2.1: Facilitate establishment of new CF
- Action 4.2.2: Creation of new plantation (Avenue plantation)
- Action 4.2.3: Maintenance of existing plantation
- Action 4.2.4: Implement Nature-Based Solutions for revival of dried water source and degraded area (Eg., Kezari top).
- Action 4.2.5: Assessment of potential ecotourism sites and development of new products (e.g., recreational areas, treks, and trails).

Objective 5: To develop and implement strategies for mitigating human-wildlife conflict.

Strategy 5.1: Implement Conflict-to-Coexistence strategies to reduce Human-Wildlife Conflict (HWC) and promote sustainable solutions, while enhancing wildlife rescue and rehabilitation efforts.

- Action 5.1.1: Conduct awareness sessions and experience-sharing discussions with youth, women and community leaders to gather their perspectives on HWC (local mitigation measures) and to develop impactful mitigation measures.
- Action 5.1.2: Procurement of wildlife rescue equipment, including Dan-inject projectiles with accessories and immobilization drugs.
- Action 5.1.3: Conduct regular updates of the hotspot map and distribution data to highlight the spatial-temporal characteristics of conflicts, allowing for a better understanding of HWC patterns and trends.
- Action 5.1.4: Establish a Quick Response Team (QRT) in each gewog to address human-wildlife conflict (HWC)
- Action 5.1.5: Assess the effectiveness of Human-Wildlife Conflict (HWC) interventions in two identified hotspot gewogs.

4.2. Management Prescriptions for HCVA as per the indicative Management Plan framework for HCVA

The overarching goal of HCV management in Priority 2 areas is to prevent threats from emerging, achieved through preventive measures like patrolling. HCV Screening predicts that Priority 2 areas are currently not at risk from threats. Therefore, the following preventive actions are considered to mitigate the emergence of threats in area High Conservation Value Management Area (HCVMA). The strategy, outcomes, outputs and activity are also outlined for plan's operational and to assess future implementation of management plans.



Table 48: Indicative Management Plan Framework for HCVA

Strategy	Outcomes	Outputs	Activity
Advocate and manage visitors	Sanctity of the Ney Main-tained	Culturally appropriate signages and information boards developed	Develop and install culturally appropriate signages and information boards.
	Sanctity advocated	Awareness and advocacy programs conducted	Conduct HCV awareness and advocacy programs for staff, visitors, schools, local communities, and tour operators.
Manage Waste	Transboundary waste impacts reduce	Transboundary coordination and clean-up programs conducted	Conduct transboundary waste management and joint clean-up campaigns in coordination with local authorities, religious institutions, and communities during peak pilgrimage periods
	Waste reduced	Advocacy on waste management conducted	Conduct advocacy programs on waste management
	Facilities installed	Waste management facilities installed	Install waste management facilities
Initiate and implement Nature-Based Solutions (NBs)	Soil erosion reduced	Buffer plantations established	Establish buffer plantations in erosion-prone areas.
		Community engaged in tree planting and slope management	Engage local communities in tree planting and slope management.
Integrated fire management	Forest fire prevented	Awareness on wildfire prevention enhanced	Awareness and education on wildfire prevention.
Sustainable livelihood	Protection and Enforcement strengthened	Fishing patrolling conducted	Conduct fishing patrolling
		Awareness on fishing rules and penalties enhanced	Use posters, signboards, and social media to highlight rules and penalties

4.3 Gender Mainstreaming

Gender mainstreaming involves examining the roles and relationships between genders in various aspects of conservation, including policy-making, research, resource management, access to resources, division of labour, socio-cultural gender perception, and community engagement. All DFOs understand that this approach recognizes that gender dynamics influence how individuals interact with their environment, access resources, and participate in decision-making processes. As such, integrating gender considerations into conservation efforts is a fundamental step toward achieving equitable and sustainable outcomes of the DFO management plan.

The "Gender Analysis, Gender Mainstreaming Strategy and Gender Action Plan" 2019 has indicated that in order to mainstream gender into the DFO management plans, adequate budget allocation is needed (indicative budget in relation to gender mainstreaming is provided in the Gender Action Plan). The report recommends the need to involve women's organizations both at national and local level to enhance gender mainstreaming, building capacity of project team, enhancing skill development at local level for nature-based product diversification, identification of alternative livelihood and incentives for participation and support to Community Forest Management Group (CFMG). Integrating the above recommendations within the overall structure of the DFO management plan is supposed to ensure gender aspects are addressed.

In addition, the following are some important outcomes that are generally accepted if gender integration, specifically women are considered:

1. **Diverse Knowledge and Perspectives:** Women and men often possess distinct knowledge about local ecosystems, resources, and species. Incorporating this diverse knowledge can lead to more comprehensive and accurate conservation strategies. Therefore, women's participation would be considered of utmost significance when planning and implementing biodiversity action plans.
2. **Resource Management:** Women frequently play key roles in natural resource management, including agriculture, water collection, and fuelwood collection. As a result, women's involvement in the management of forest resources in the CF and State Reserved Forest (SRF) would be encouraged.
3. **Empowerment:** The Division shall empower women by providing them with opportunities to actively engage in decision-making processes related to conservation and land management.
4. **Equitable Benefits:** Ensure gender equity in conservation initiatives and promote fair distribution of benefits and resources, preventing potential gender-based disparities.

4.4. Environmental and Social Safeguards (ESS)

The Environmental and Social Safeguards (ESS) system is designed to identify and manage potential negative environmental or social impacts associated with various actions. Through screening these actions, the ESS enables early detection of issues that could adversely affect the environment or communities. This proactive approach facili-



tates the development of suitable measures to avoid, minimize, or compensate for negative impacts, ensuring that actions are both environmentally and socially responsible.

A key aspect of the ESS is its role in monitoring the implementation and effectiveness of mitigation measures. This involves continuous oversight to confirm that the measures are working as intended and addressing any unforeseen impacts that may arise during the execution of management prescriptions. Integrating these safeguards ensures that environmental and social considerations are incorporated at every stage, resulting in more comprehensive and effective management strategies. Additionally, the ESS has been incorporated into the actions of the management prescription, with a formulated financial outlay to support its implementation.

4.4.1 Grievance Redressal Mechanism

This Grievance Redress Mechanism (GRM), for the purpose of receiving and responding to the any grievances arises from the implementation of the activities planned for DFO, Gedu and addressing the grievances in timely and effective manner helps in resolving the issues for improved mutual understanding and coordination, strengthen accountability and provides a foundation for increased collaboration, that ensures successful and impactful implementation of the activities.

The grievances can be raised by any stakeholder, community, group or an individual person who may be negatively affected (herein as affected parties) by the activities implemented or planned in this plan, and this mechanism shall not be retaliation against those who report complaints. The Grievances shall be processed through the following channels and processes;

1. Receive -The grievance shall be raised through phone calls, emails and mail of of DFO, Gedu:

Divisional Forest Office, Gedu

Email ID: divisionalforestofficegedu@gmail.com

Telephone no: Telephone: 05-282310

OR

you may raise through any of the Range Officers under this Division or through Chief Forestry Officer.

2. The complaints or grievances should include the following information;

- Full details of the complainant, including name, address and contact information,
- Full documents and evidence including any other relevant information which will support investigations to resolve the complaint,
- Any earlier actions taken, if any, to resolve the problem, including contact with DFO, Gedu,
- Proposed solution, if you see and have any
- Whether confidentiality is requested (stating the reason).



3. The complaint or grievance can be filed either in English or Dzongkha. The complaint review process involves;

- **Step 1:** Grievance/Complaint Team will assess the eligibility of the complaint and provide a response accordingly, within 10 working days after receiving the complaint.
- **Step 2:** If the complaint is eligible, the Grievance/Complaint Team will come up with a plan and define a timeframe to investigate the complaint. The team will then communicate this information to the complainant within 10 working days.
- **Step 3:** The team will then investigate the matter, with additional technical support as needed, including support from the Head Offices. Based on the results, the team will then work with the affected parties to develop and implement an action plan and a timeframe of steps required to resolve any issues identified.
- **Step 4:** A summary of the complaint raised, actions taken, conclusions drawn, follow-up plan and timeframe for completion will be documented and communicated as agreed between the parties. The complaint/grievance team will facilitate support to further clarify, assess, and resolve issues raised as needed including, if appropriate, engaging input from outside experts.

If the grievances or complaints are not resolved at the level of the Division Complaint Resolution committee, such grievances will be escalated to the Department Level Grievance Committee to address them.

The Grievances/Complaint Resolution Committees for DFO, Gedu comprises of following members;

1. Chief Forestry Officer (CFO), Chairperson
2. The Section Heads, Members
3. The Concern Range Officer, Member Secretary



Chapter 5:

Implementation Plan and Financial Outlay

5.1. Implementation Plan and Financial Outlay of DFO

Table 49: Implementation framework

Objectives	Strategies	Action	Year along with budget outlay (Nu. in million)										Total Budget Re-quired	Re-remarks
			I	II	III	IV	V	VI	VII	VIII	IX	X		
1. To provide effective and efficient public service delivery	1.1. Leverage cutting-edge technology to provide efficient and effective Forest-based public service delivery	1.1.1. Provide timely online forestry services through the G2C and OFS systems.												
		1.1.2. Provide professional-based capacity building under DFO to have efficient service delivery including technical staff	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	5	Considering the future potential inflation
		1.1.3. To conduct awareness on the Forest and Nature Conservation Rules and regulations, and the Act, 2023, and its amendments to the public of all genders through various platforms.	0.3		0.3		0.3			0.3		0.3	1.5	
		1.1.4. Equip field staff by procuring essential ICT equipment, survey tools, and office structure maintenance to support their effectiveness in the field.	5			5.5				6			16.5	including pool vehicle maintenance and fuels.

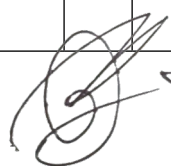
		1.1.5 Procurement of safety gears for the prevention of occupational hazards		0.5		0.5		0.5		0.5		0.5	2.5	
2. To ensure the sustainable management of forest resources through sustainable management practices	2.1. Strengthen the existing management regimes through active participation of communities.	2.1.1. Annual monitoring and evaluation of existing LFMP, CFMP, Scientific Thinning area and NWFPMP	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	6	Personal emoluments
		2.1.2. Preparation of annual operational plan of FMU	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	2	
		2.1.3. Revision of existing LFMA, CF, FMU and NWFP management plan.	0.3	0.3	0.3	0.5	0.3	0.3	0.3	0.3	0.3	0.3	3.2	Revision of FMU in 2028
		2.1.4. Encourage and development of ecotourism products in CFMG area through active participation of local communities.		0.5	0.5	0.5							1.5	
		2.1.5. Carry out Bhutan METT+ evaluation	0.1		0.1								0.2	
		2.1.6. Carryout biodiversity monitoring in six permanent grids annually	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.6	
		2.1.7. Carry out forest inventory as a part of the nationwide forest inventory survey every ten years.								5.65			5.65	
	2.2. Strengthen surveillance and enforcement measures to curb illegal activities	2.2.1. Conduct Surveillance and Monitoring (SMART tool and drone)	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	9	
		2.2.2. Engagement of women in legal enforcement and awareness	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	1.5	

		2.2.3. Facilitate legal settlement of cases, including levying fines and penalties in accordance with rules and regulations.	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.5	TADA for especially during the legal proceedings
		2.2.4: Study on the trends of forest degradation as a result of illegal timber extraction under DFO			0.5					0.5				1	
3. To conserve biodiversity and enhance ecosystem services through effective management of natural habitats and conservation of species.	3.1. Conservation and enhancement of wildlife habitat	3.1.1. Initiate the agro-forestry program in relevant gewog		1	1	1	1							4	
		3.1.2. Habitat enrichment through development of waterholes, mineral licks and plantation of wild fruit trees		0.45		0.45		0.45		0.45		0.45		2.25	
		3.1.3. Installation of camera traps to study animal presence, absence, abundance and diversity					2.6					2		4.6	
		3.1.4. Upgrade and manage existing forest nursery facilities	0.8		0.8		0.8		0.8		0.8			4	
		3.1.5. Carry out tiger population survey as a part of the nationwide tiger population revalidation surveys every five years.			1.25					1.45				2.7	
		3.1.6. Determine the population of snow leopard and its prey as a part of the Nation-wide Snow Leopard Survey using structured, grid-based camera trap surveys.				2.5					2.5			5.0	



		3.1.7. Determine the population or abundance of Musk Deer as a part of the nationwide survey.		0.365									0.365	
		3.1.8. Conduct eDNA survey as a part of the nationwide eDNA survey.		0.225										
	3.2. Enhance knowledge and awareness of wildlife conservation through educational outreach programs	3.2.1. Develop conservation educational materials and Workshops with schools on Biodiversity Conservation (WBH, Beautiful Nuthatch, Tiger, snow leopard, Hornbills).	0.2	0.2	0.2	0.2	0.2	0.2		0.2	0.2	0.2	1.8	
		3.2.2. Publication of pictorial guides (orchids, butterflies, birds, herpetofauna, and mammals) and leveraging digital platforms for wider dissemination.	0.1	0.1	0.1	0.1	0.1	0.1		0.1	0.1	0.1	0.9	
		3.2.3. Installation of information boards and signage in the strategic locations	0.2			0.2				0.2			0.6	
4. To effectively address the adverse impact of climate change through mitigation, adaptation, and community engagement for long-term environmental health and resilience.	4.1. Administer systematic waste regulation.	4.1.1. Waste management monitoring and capacity building through workshops and campaigns in State Reserved Forest Land	0.05		0.05		0.05		0.05		0.05		0.25	

		4.1.2. Install signage and information boards at strategic locations.	0.3				0.5						0.8	
	4.2. To build climate-resilience through a participatory and consultative approach	4.2.1. Facilitate establishment of new CF		0.5								0.5		
		4.2.2. Creation of new plantation (Avenue plantation)		0.4			0.4				0.4	1.2		
		4.2.3. Maintenance of existing plantation	0.5	0.5	0.5	0.5	0.5	0.5		0.5	0.5	0.5	4.5	
		4.2.4. Implement Nature Based Solutions for revival of dried water source and degraded area (Eg., Kezari top)			1.5						0.5	2		
		4.2.5. Assessment of potential ecotourism sites and development of new products (e.g., recreational areas, treks, and trails).	0.5				0.1				0.1	0.7		
5. To develop and implement strategies for mitigating human-wildlife conflict	5.1. Implement Conflict-to-Co-existence strategies to reduce Human-Wildlife Conflict (HWC) and promote sustainable solutions, while enhancing wildlife rescue and rehabilitation efforts	5.1.1. Conduct awareness sessions and experience-sharing discussions with youth, women and community leaders to gather their perspectives on HWC (local mitigation measures) and to develop impactful mitigation measures.	0.3			0.3					0.3	0.9		
		5.1.2. Procurement of wildlife rescue equipment, including Dan-inject projectiles with accessories and immobilization drugs.	0.5		0.5		0.5					1.5		



		5.1.3. Conduct regular updates of the hotspot map and distribution data to highlight the spatial-temporal characteristics of conflicts, allowing for a better understanding of HWC patterns and trends.		0.5			0.5			0.5		0.5	2	
		5.1.4. Establish a Quick Response Team (QRT) in each gewog to address human-wildlife conflict (HWC)	0.7				0.7				0.7		2.1	capacity building and TADA as admissible
		5.1.5. Assess the effectiveness of Human-Wildlife Conflict (HWC) interventions in two identified hotspot gewogs	0.4											



5.2. Implementation Plan and Financial Outlay for High Conservation Value Area

Table 50: Implementation framework for HCVA

Strategy	Outcomes	Outputs	Activity	Location	Time-frame	Budget (Nu. Mn)
Advocate and manage visitors	Sanctity of the Ney Maintained	Culturally appropriate signages and information boards developed	Develop and install culturally appropriate signages and information boards.	Tumdra	2nd year	0.2
	Sanctity advocated	Awareness and advocacy programs conducted	Conduct HCV awareness and advocacy programs for staff, visitors, schools, local communities, and tour operators.	Tumdra	2nd year	0.3
Manage Waste	Transboundary waste impacts reduce	Transboundary coordination and clean-up programs conducted	Conduct transboundary waste management and joint clean-up campaigns in coordination with local authorities, religious institutions, and communities during peak pilgrimage periods	Tumdra	3rd, 4th, 5th & 9th Year	0.
	Waste reduced	Advocacy on waste management conducted	Conduct advocacy programs on waste management	Tumdra	2nd year	0.1
	Facilities installed	Waste management facilities installed	Install waste management facilities	Tumdra	2nd year	0.2
Initiate and implement Nature Based Solutions (NBs)	Soil erosion reduced	Buffer plantations established	Establish buffer plantations in erosion-prone areas.	Tumdra	3rd Year	0.4
		Community engaged in tree planting and slope management	Engage local communities in tree planting and slope management.	Tumdra	3rd year	0.3
Integrated fire management	Forest fire prevented	Awareness on wildfire prevention enhanced	Awareness and education on wildfire prevention.	Tumdra	2nd year	0.2
Sustainable livelihood	Protection and Enforcement strengthened	Fishing patrolling conducted	Conduct fishing patrolling	Tumdra	3rd, 4th, 5th & 9th Year	0.4
		Awareness on fishing rules and penalties enhanced	Use posters, signboards, and social media to highlight rules and penalties	Tumdra	3rd Year	0.4

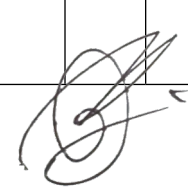
Chapter 6: Monitoring and Evaluation Framework

6.1. Monitoring and Evaluation Framework for DFO

Table 51: Monitoring and Evaluation Framework

Objectives	Action	Output Indicator	Unit	Base-line	Yearly Target									
					I	II	III	IV	V	VI	VII	VIII	IX	X
1. To provide effective and efficient public service delivery	1.1.1. Provide timely online forestry services through the G2C and OFS systems.	Online Forestry Service provided within Turn Around Time	days	15	10	10	7	7	7	6	6	5	5	5
	1.1.2. Provide professional-based capacity building under DFO to have efficient service delivery including technical staff	Number of professional-based capacity building for efficient service delivery	Number	1	1	1	1	1	1	1	1	1	1	1
	1.1.3. To conduct awareness on the Forest and Nature Conservation Rules and regulations, and Act, 2023 and its amendment to the public of all genders through various platforms.	Number of awareness programs conducted through various platforms including vulnerable communities	Number	1	1		1		1		1		1	
	1.1.4. Equip field staff by procuring essential ICT equipment, survey tools and office structure maintenance to support their effectiveness in the field.	Items of field equipment (Densitometer, Laptops, Diameter tape, hypsometer, Camera trap), Office maintenance (Range and Beat Office)	Items		3			2				1		
	1.1.5 Procurement of safety field gear for prevention of occupational safety	Number of items procured	Item			1		1		1		1		1

2.To ensure the sustainable management of forest resources through holistic management planning and community engagement	2.1.1. Annual monitoring and evaluation of existing LFMP, CFMP, Scientific Thinning area and NWFPMP	Number of management regimes monitored	Number	65	65	65	66	66	66	66	66	67	67	67
	2.1.2. Preparation of annual operational plan of FMU	Number of OP prepared	Number	1	1	1	1	1	1	1	1	1	1	1
	2.1.3. Revision of existing LFMA, CF, FMU and NWFP management plan.	Number of management regimes revised	Number	19	19	20	25	26	26	25	27	25	28	30
	2.1.4. Encourage and facilitate development of ecotourism products in CFMG area through active participation of local communities	Number of CFMG taking the initiative to develop the ecotourism products	Number	0		6	6	6						
	2.1.5. Carry out Bhutan METT+ evaluation	Number of midterm and final METT+ conducted	Number	0	1		1							
	2.1.6. Carry out biodiversity monitoring in six permanent grids annually	Number of Grid monitored	Number	6	1	1	1	1	1	1	1	1	1	1
	2.1.7. Carry out forest inventory as a part of the nationwide forest inventory survey every ten years.	Number of forest inventories conducted as part of nationwide NFI	Number	1								1		
	2.2.1. Conduct Surveillance and Monitoring (SMART tool and drone)	Number of patrols conducted	Number	60	60	60	60	60	55	55	55	50	50	50
	2.2.2. Engagement of women in legal enforcement and awareness	Number of trainings conducted	Number	0	1	1	1	1	1	20	1	1	1	1
	2.2.3. Facilitate legal settlement of cases, including levying fines and penalties in accordance with rules and regulations.	Number of offences apprehended and cases settled	Number	78										
	2.2.4. Study on trends of forest degradation of as a result of illegal timber extraction under DFO	Number of reports produced	Number	0			1					1		



3. To conserve biodiversity and ecosystem services through effective management of natural habitats	3.1.1. Initiate the agro-forestry program in relevant gewog	Number of agroforestry established	Number	0		1	1	1	1					
	3.1.2. Habitat enrichment through development of waterholes, salt licks and plantation of wild fruit trees	Number of water holes, salt licks and plantations improved and planted	Number	1	1		1		1		1		1	
	3.1.3. Installation of camera traps to study animal presence, absence, abundance and diversity	Number of Report produced	Number	1					1					1
	3.1.4. Upgrade and manage existing forest nursery facilities	Number of existing nurseries upgraded	Number	1	1		1		1		1		1	
	3.1.5. Carry out tiger population survey as a part of the nationwide tiger population revalidation surveys every five years	Number of tiger population surveys conducted	Number	1			1					1		
	3.1.6. Determine the population of snow leopard and its prey as a part of the Nation-wide Snow Leopard Survey using structured, grid-based camera trap surveys.	Number of snow leopard population surveys conducted	Number	0				1					1	
	3.1.7. Determine the population or abundance of Musk Deer as a part of the nationwide survey.	Number of Musk deer population surveys conducted	Number			1								
	3.1.8. Conduct eDNA survey as a part of the nationwide eDNA survey.	Number of eDNA survey conducted	Number	1		1								
	3.2.1. Develop conservation educational materials and Workshops with schools on Biodiversity Conservation (WBH, Beautiful Nuthatch, Tiger, snow leopard, Hornbills)	Number of workshops conducted	Number	1	1	1	1	1	1	1		1	1	1



	3.2.2. Publication of pictorial guides (orchids, butterflies, birds, herpetofauna, and mammals) and leveraging digital platforms for wider dissemination.	Number of pictorial guides published	Number		1	1	1	1	1	1		1	1	1
	3.2.3. Installation of information boards and signage in the strategic locations	Number of signage installed	Number	0	1			1				1		
4. To effectively address the adverse impact of climate change through mitigation, adaptation, and community engagement for long-term environmental health and resilience.	4.1.1. Waste management monitoring and capacity building through workshops and campaigns in State Reserved Forest Land	Number of times monitored.	Number	1		1		1		1		1		1
	4.1.2. Install signages and information boards at strategic locations.	Number of signages and information boards successfully installed.	Number	1	2	3	0	0	0	0	0	2	2	2
	4.2.1. Facilitate the establishment of new CF	Number of new CF established	Number	0	0	1	0	0	0	0	0	0	0	0
	4.2.2. Creation of new plantation (Avenue plantation)	Area brought under avenue plantation	Acre	0		1	0	0	0	1	0	0	0	1
	4.2.3. Maintenance of existing plantation	Area of existing plantation maintained	Acre	4	4	4	4	4	0	0	0	0	0	0
	4.2.4. Implement Nature-Based Solutions for revival of dried water source and degraded area (Eg., Kezari top)	Number of NBS conducted	Number	0			1					1		
	4.2.5. Assessment of potential ecotourism sites and development of new products (e.g., recreational areas, treks, and trails).	Number of assessments conducted	Number	2	2				1					1

5. To build climate-resilience through a participatory and consultative approach	5.1.1. Conduct awareness sessions and experience-sharing discussions with youth, women and community leaders to gather their perspectives on HWC (local mitigation measures) and to develop impactful mitigation measures.	Number of awareness sessions and experience-sharing discussions conducted with youth, women, and community leaders to gather perspectives on Human-Wildlife Conflict (HWC) and identify impactful local mitigation measures	Number	1	1		1		1		1			
	5.1.2. Procurement of wildlife rescue equipment, including Dan-inject projectiles with accessories and immobilization drugs.	Number of rescue equipment procured	Number	0	1		1		1					
	5.1.3. Conduct regular updates of the hotspot map and distribution data to highlight the spatial-temporal characteristics of conflicts, allowing for a better understanding of HWC patterns and trends.	Number of hotspot maps produced	Number	0		1			1			1		1
	5.1.4. Establish a Quick Response Team (QRT) in each gewog to address human-wildlife conflict (HWC)	Number of QRT formed/established	Number	2	5					4				
	5.1.5. Assess the effectiveness of Human-Wildlife Conflict (HWC) interventions in two identified hotspot gewogs	Number of assessments conducted	Number	1	1									



6.2. Monitoring and Evaluation of High Conservation Value Area

Table 52: Monitoring and Evaluation framework for HCVA

Strategy	Outcomes	Outputs	Activity	Location	Time-frame	Budget (Nu. Mn)	Indicator	Target
Advocate and manage visitors	Sanctity of the Ney Maintained	Culturally appropriate signages and information boards developed	Develop and install culturally appropriate signages and information boards.	Tumdra	2nd year	0.2	Number of signages	3
	Sanctity advocated	Awareness and advocacy programs conducted	Conduct awareness and advocacy programs for visitors, schools, local residents, and tour operators about Ney.	Tumdra	2nd year	0.3	Number of awareness meetings	1
Manage Waste	Transboundary waste impacts reduce	Transboundary coordination and clean-up programs conducted	Conduct transboundary waste management and joint clean-up campaigns in coordination with local authorities, religious institutions, and communities during peak pilgrimage periods		3rd, 4th, 5th & 9th Year	0.8	Number of transboundary coordination and clean-up programs	4
	Waste reduced	Advocacy on waste management conducted	Conduct advocacy programs on waste management	Tumdra	2nd year	0.1	Number of advocacy programs	1
	Signages installed	Waste management signages installed	Install waste management signages	Tumdra	2nd year	0.2	Number of signage	3
Initiate and implement Nature-Based Solutions (NBs)	Soil erosion reduced	Buffer plantations established	Establish buffer plantations in erosion-prone areas.	Tumdra	3rd Year	0.4	Number of seedlings planted	50
		Community engaged in tree planting and slope management	Engage local communities in tree planting and slope management.	Tumdra	3rd year	0.3	Number of trees planted	50
Integrated fire management	Forest fire prevented	Awareness on wildfire prevention enhanced	Awareness and education on wildfire prevention.	Tumdra	2nd year	0.2	Number of awareness programs	1
Sustainable livelihood	Protection and Enforcement strengthened	Fishing patrolling conducted	Conduct fishing patrolling	Tumdra	3rd, 4th, 5th & 9th Year	0.4	Number of patrolling events	4
		Awareness on fishing rules and penalties enhanced	Use posters, signboards, and social media to highlight rules and penalties	Tumdra	3rd Year	0.4	Number of awareness materials produced	1

Chapter 7. Stakeholder consultation and endorsement

7.1 Stakeholder consultation

The DFO Gedu has identified all local government officials of 11 Gewogs under Chhukha Dzongkhag, Dzongkhag Land Sector, Dzongkhag Agriculture Sector, Dzongkhag Live-stock Sector and Environmental Sector as the relevant stakeholders of DFO. Moreover, BBPL, NRDC, UWIFoRT, Darla and CFS were also identified and held a consultation meeting on 15th November 2024.

Consultation and endorsement DFO management Plan

Upon incorporating all the comments and feedback raised by the undersigned stakeholders, the Divisional Forest Management Plan is hereby endorsed on 15/11/2024.

Sl. No	Name	Designation	Office	Signature
1	Tham Bdr. Rai	Gup	Logchina	
2	Khem Raj Limbu	Offtg. Gup (Mangmi)	Samphelling	
3	Rinchen Dorji	Gup	Darla	
4	Dhodo	CDAO	Tshimasham	
5	Pema Wangmo	GAO	Getana	
6	Chimi Wangmo	GAO	Metakha	
7	Dorji Lhendup	GAO	Bjabcho	
8	Kipchu	GAO	Samphelling	
9	Karma Tshewang	Environment Officer	Chukha	
10	Ugyen Samdrup	Mangmi (Offtg. Gup)	Bjabchoe	
11	Tashi Dargay	CSE/Offtg. Gup	Dungna	
12	Kuenzang Gyelmo	Asst. Land Record Registrar	Chukha Dzongkhag	
13	Gembo Dorji	Offtg. GAO	Lokchina	
14	Sherab Lhamo	GAO	Phuntsholing	
15	Chenga Lhamo	GAO	Darla	
16	Tashi Yangzom	GAO	Dungna	
17	Sonam Wangmo	GAO	Geling	
18	Tshering Wangdi	CSE/Offtg. Gup	Bongo	
19	Dendup Tshewang	CSE/Offtg. Gup	Getana	
20	Wangchuk	CSE/Offtg. Gup	Phuntsholing	
21	Lham Wangdi	CSE/Offtg. Gup	Chapcha	
22	Yoesel Thinley Tashi	Manager	BBPL, Darla	
23	Sherab Tenzin	Chief Livestock Officer	Chhukha Dzongkhag	
24	Kinley Dorji	Gup	Geling	
25	Karma	Dy. Chief Forestry Officer	UWIFORT, Darla	
26	Nawang Denden	Regional Manager, NRDC	Phuntsholing	

27 Doji Gyeltshen Accountant, CFS

7.2 Finalization and Endorsement of the DFO Management Plan

The management plan shall be finalized by the concerned Divisional Forest Office. The draft plan shall be reviewed by the Forest Monitoring and Information Division and subsequently endorsed by the Technical Advisory Committee (TAC) of the Department. The technically reviewed and endorsed Plan will then be recommended for approval to the Ministry by the head of the Department. The Head of the Ministry will approve the plan for implementation.

Annexure I: Annual Operational Plan

Framework for Annual Operational Plan for Division Forest Office						
<i>*The Annual Operational Plan for the Division Forest Office shall be prepared and submitted to.....latest by 31 July</i>						
Name of the office:						
Plan Period:						(Seal and sign)
Prepared by and date:						
Verified by and date:						
Recommended by and date:						
Approved by and date:						
REVIEW OF THE PREVIOUS YEARS' PLAN						
I. a. SUMMARY OF THE PLAN						
No. of Planned activities	Status of the activities (in Nos.)					
	Achieved		On-going		Not Implemented	
I. b. DETAILED REVIEW OF THE PLANNED ACTIVITIES						
Activities	Target with unit	Budget utilization status (%)	Brief report on the progress of the activities	Remarks (Justification/ reasoning if not completed or not implemented)		
II. ANNUAL OPERATIONAL PLAN SCHEDULE						
II.a. DETAILS OF THE PLANNED ACTIVITIES						
Output Indicator as per the management plan/ APA	Activities	Target with Unit	Time-line	Budget (in Nu. (m))	Fund Source	Specify location, if relevant
Program 1: Nature Conservation						

Program II: Forest Resource Planning and Management						
Program III: Forest Monitoring and Information						
Program IV: Administration and Direction						
Program I shall include, but not limited to: surveys, research, HWC management, Habitat Management, watershed & wetland protection, ecotourism & Nature recreation, waste management, wildlife rescue & rehabilitation.						
Program II shall include, but not be limited to: LFMA plan preparation, NWFP, CF, Plantation, timber allocation and monitoring.						
Program III shall include, but not be limited to; patrolling, forest offence compounding/prosecution, forestry clearances, pest & disease surveillance, and forest fire management.						
Program IV shall include, but not be limited to; Division Forest Office management plan preparation, work planning, coordination meetings, administrative and accounting activities, monitoring and evaluation, and data management.						
<i>*Note: Activities such as Awareness, capacity building, etc, to be tagged with respective program activities.</i>						

Annexure II: Bhutan METT+ FORM

	Name, affiliation, and contact details for the person responsible for completing the Bhutan METT + (email, etc.)				
	Date assessment carried out				
	Name of Protected Area/Forest Division				
	WDPA site code (codes can be searched for on: www.protectedplanet.net/)				
	Designation	National	IUCN Category National Category (to be list based on site needs-CF, WFMU, LFMPs)	International (see below)	
	Location of protected Area/Forest Division (province and, if possible, map reference)				
	Date of establishment (dd/mm/yyyy)				
	Ownership details (please tick)	SRFL	Private	Community	Other
	Management Authority				
	Size of the Protected Area/ Forest Division(sq.km)				
	Number of staff		Permanent	Temporary (same):	
	Annual Budget (Nu)-excluding staff salary costs		Current budget (operational costs, e.g., staff costs):	Capital budget (infrastructure development, etc.):	
	What are the main values for which the area is designated				
	List the two primary protected area /forest division management objectives				
	Management objective 1				
	Management objective 2				
	Number of people involved in completing the assessment				
	Including: (highlight where appropriate)	Forest Division Manager	Forest Division staff	Other Forest Division	NGO
				Agency staff	
			Local community	Donors	External experts
	Please note if the assessment was carried out in association with a particular project, on behalf of an organization or donor				

	Information on International Designations (where applicable)				
	UNESCO World Heritage site				
	Date listed	Site name		Site area	
	Criteria for designation (i.e., criteria i to x)				
	Statement of Outstanding Universal Value				
	Ramsar site				
	Date listed	Site Name and number		Site area	
	Criteria for Designation & ecological character (see Ramsar Information Sheet)				
	UNESCO Man and Biosphere Reserves				
	Date listed	Site name		Site area	
				Total:	
				Core:	
				Buffer:	
				Transition:	
	Criteria for designation				
	Fulfilment of three functions of MAB (conservation, development and logistic support)				
	Please list other designations and any supporting information below				
	Name:		Detail:		
	Name:		Detail:		
	Name:		Detail:		
Protected Area/ Forest Division Threats: Assessment Sheet 1					
In the assessment below, threats should be:					
Ranked as of high significance if they are seriously degrading values; medium if they are having some negative impact and low if they are present but not seriously impacting values. Not applicable (N/A) is selected when the threat is either not present or not applicable in the forest Division.					
Note that threats ranked as of medium and high significance can be assessed in more detail using Assessment Sheet 2					
Assessed at three levels:					
1. Current threat: in which case a 'C' is put in either the High, Medium or Low box					
2. Potential threat: in which case a 'P' is put in either the High, Medium or Low box					
3. Issues: In which case an 'I' is put in either the High, Medium or Low Box					
Each threat identified could have both a current threat assessment (e.g. assessed as low) and potential threat (e.g. assessed as medium). The category of 'issues' has been added because some management issues may not be strictly regarded as threats but need constant management intervention to ensure they do not become a threat. For example, plants collected for medicinal use could be a management issue; or a current or potential threat if management activities are not effective in controlling the collection levels or processes.					
Guidance in making the assessment					

Unlike many other countries in the region (and worldwide), the level of threats is fairly low at present in Bhutan, and thus what might be considered of high threat here may not be at anything like the same scale as in other countries. Guidance in what is meant by the categories high, medium, and low threats in a Bhutanese context has thus been developed for threats marked ** (see Annexure 1). Threat categories with specific guidance are marked by a *.						
Specific guidance on assessing threats in the Bhutanese context is also given in boxes below each threat.						
1. Residential and commercial development within a protected area/ forest division						
Threats from human settlements or other non-agricultural land uses with a substantial footprint						
High	Medium	Low	N/A		Assessment Methods/ Guide Note	
				1.1 Housing and settlement	Could be based on built-up areas from LULC 2016 in relation to the Total Divisions area	
				1.2 Commercial and industrial areas	Extent of industrial areas to the total areas of the FDs	
				1.3 Tourism and recreation infrastructure	Based on the presence or absence of Tourism plans, facilities, and services existing within the FDs	
2. Agriculture and aquaculture within a protected area/forest division						
Threats from farming and grazing as a result of agricultural expansion and intensification, including silviculture and aquaculture						
High	Medium	Low	N/A		Assessment Methods/ Guide Note	
				2.1 Annual and perennial non-timber crop cultivation		
				2.1a Medicinal plant cultivation*	No quantification in this section for an assessment	
				2.2 Wood and pulp plantations		
				2.2a Community forestry		

				2.2b Private forestry (e.g., planting of exotic species)	
				2.3 Livestock farming and grazing**	Based on the % area impacted by the presence of livestock Division area
				2.3a Land encroachment for agriculture	
				2.3b Land lease of government reserve land for commercial farming	Land lease area record from DLLC (Dzongkhag land leasing committee), which can be based on actual land leased with LUC (land user certificate)
				2.4 Freshwater aquaculture	
Threat 2.1a Medical plant cultivation: Note that the collection of species from the wild is covered in threat 5.2					
3. Energy production and mining within a protected area/ forest division					
Threats from the production of non-biological resources					
High	Medium	Low	N/A		Assessment Methods/ Guide Note
				3.1 Oil and gas drilling	Not relevant
				3.2 Mining and quarrying**	Area of mines and quarry (in % of to total area of DFO)
				3.3 Energy generation, including from hydro-power dams*	Impact-based or area covered/ utilized for hydro-power dams, residents, channels, power houses, etc...
3.3 Energy generation, including HEP: This question looks specifically at threats within the Forest Division. Most of the hydropower developments in Bhutan are outside protected areas, but distant HEP systems can still impact the Forest Division; the impact of such threats is covered in threat 7.2.					

4. Transportation and service corridors within a protected area/forest division					
Threats from long, narrow transport corridors and the vehicles that use them, including associated wildlife mortality					
High	Medium	Low	N/A		Assessment Methods/ Guide Note
				4.1 Roads and railroads (include road-killed animals) **	Number of species killed along the roads or likely to occur
				4.2 Utility and service lines (e.g., electricity cable lines, telephone lines) ***	Could be minimal impacts along flight paths (Druk air, Tashi air, Helicopter>..), particularly due to noise
				4.3 Flight paths*	
4.2 Utility and service lines: Given the pace of infrastructure development in Bhutan (e.g., high tension cables, service centres, etc), it was felt that this threat should consider both impacts in the Forest Division and in the buffer zones.					
4.3 Flight paths: It should be stressed that this threat is considering flight paths of aeroplanes, hot air balloons, gliders etc, not the flight paths of birds					
5. Biological resource use and harm within a protected area /forest division					
Threats from consumptive use of “wild” biological resources, including both deliberate and unintentional harvesting effects; also persecution or control of specific species (note this includes hunting and killing of animals)					
High	Medium	Low	N/A		Assessment Methods/ Guide Note
				5.1 Hunting, killing and collecting terrestrial animals (including killing of animals as a result of human/ wildlife conflict)	No need to fill this section
				5.1a Human wildlife conflict**	Record of HWC in respective forest Divisions
				5.1b Wildlife Poaching**	

				5.2 Gathering terrestrial plants or plant products (non-timber)	
				5.2a Mushrooms**	
				5.2b Plant species for medicinal use**	
				5.2c Plant species for food**	
				5.3 Illegal logging and timber harvesting**	
				5.3a Legal logging and timber harvesting**	
				5.4 Fishing and harvesting aquatic resources	Date from the Illegal fishing record, as well as the fishery groups established
6. Human intrusions and disturbance within a protected area /forest division					
Threats from human activities that alter, destroy, or disturb habitats and species associated with non-consumptive uses of biological resources					
High	Medium	Low	N/A		Assessment Methods/ Guide Note
				6.1 Recreational activities and tourism	No rating
				6.1a Unmanaged ecotourism**	
				6.2 War, civil unrest and military exercises*	

				6.3 Research, education and other work-related activities in forest divisions	
				6.4 Activities of FD Managers (e.g., construction or vehicle use, artificial watering points and dams)	
				6.5 Deliberate vandalism or destructive activities	
6.2 War, civil unrest and military exercises: In the case of Bhutan war and civil unrest should include intrusion of political insurgency from across the border					
7. Natural system modifications					
Threats from other actions that convert or degrade habitat or change the way the ecosystem functions					
High	Medium	Low	N/A		Assessment Methods/ Guide Note
				7.1 Fire and fire suppression (including arson) **	Impacts on FD from activities carried out in the adjoining divisions/ parks/State
				7.2 Dams, hydrological modification and water management/ use ***	
				7.3a Increased fragmentation within the forest division	

				7.3b Isolation from other natural habitats (e.g., deforestation, dams without effective aquatic wildlife passages)	
				7.3c Other 'edge effects' on protected area values	
				7.3d Loss of keystone species (e.g., top predators, pollinators, etc)	
Whereas threat 3 looked at the impacts of infrastructure development in the Forest Division, threat 7 looks at impacts that may occur from developments far away from the actual protected area. As noted above, most of the hydropower developments in Bhutan are outside protected areas, but distant HEP systems can still impact on the Forest Division. Threat 7.2 should record impacts on habitat or changes in the way the ecosystem functions, such as changing water flow patterns.					
8. Invasive and other problematic species and genes					
Threats from terrestrial and aquatic non-native and native plants, animals, pathogens/microbes or genetic materials that have or are predicted to have harmful effects on biodiversity following introduction, spread and/or increase					
High	Medium	Low	N/A		Assessment Methods/ Guide Note
				8.1a Invasive non-native/ alien plants (weeds)	
				8.1b Invasive non-native/ alien animals	
				8.1c Invasive non-native/ alien fresh- water fish	

				8.1d Pathogens (non-native or native but creating new/ increased problems)	Consider diseases here
				8.2 Introduced genetic material (e.g., genetically modified organisms)	
9. Pollution entering or generated within a protected area /forest division					
Threats from the introduction of exotic and/or excess materials or energy from point and non-point sources					
High	Medium	Low	N/A		
				9.1 Household sewage and urban wastewater	
				9.1a Sewage and wastewater from protected area facilities (e.g., toilets, hotels, etc)	
				9.2 Industrial, mining and military effluents and discharges (e.g. poor water quality discharge from dams, e.g. unnatural temperatures, de-oxygenated, and other pollution)	
				9.3 Agricultural and forestry effluents (e.g., excess fertilizers or pesticides)	

				9.4 Garbage and solid waste**	
				9.5 Air-borne pollutants	
				9.6 Excess energy (e.g., heat pollution, lights, etc)	
10. Geological events					
Geological events may be part of natural disturbance regimes in many ecosystems. But they can be a threat if a species or habitat is damaged and has lost its resilience and is vulnerable to disturbance. Management capacity to respond to some of these changes may be limited.					
High	Medium	Low	N/A		Assessment Methods/ Guide Note
				10.1 Volcanoes	Not really relevant
				10.2 Earthquakes/Tsunamis	Based on the history of Earthquake damages/ records from the dzongkhag disaster management
				10.3 Avalanches/ Landslides	Map out landslide areas within the Division and compare to the total area of the Division, as well as take into consideration the severity of impacts from landslides in adjoining areas
				10.4 Erosion and siltation/ deposition (e.g., shoreline or riverbed changes)	
11. Climate change and severe weather					
Threats from long-term climatic changes, which may be linked to global warming and other severe climatic/weather events outside of the natural range of variation					
High	Medium	Low	N/A		Assessment Methods/ Guide Note
				11.1 Habitat shifting and alteration	

				11.2 Droughts	Based on weather data from NCHMS for assessment rather than the social data collection for uniformity
				11.3 Temperature extremes	
				11.4 Storms and flooding	
12. Specific cultural and social threats					
High	Medium	Low	N/A		Assessment Methods/ Guide Note
				12.1 Loss of cultural links, traditional knowledge, and/or management practices	
				12.2 Natural deterioration of important cultural site values	
				12.3 Destruction of cultural heritage buildings, gardens, sites, etc	

Protected Area /Forest Division Threats: Assessment Sheet 2

As the severity and impact of threats in Bhutan are expected to increase over the next few years, in part due to infrastructure development and the relative ease of access/communications that new roads and mobile phone coverage are allowing, the Bhutan METT+ includes a more detailed assessment of major threats.

The assessment form allows a more detailed assessment of the current or potential threats identified as having medium or high significance in Assessment Sheet 2

1. Specify threat: Housing and settlement

Threat (specific if current or potential):

Impact of threat		Management response
Extent: Describe the extent of the impact under one of the three descriptors given below	Severity: Describe how severe the impact is under one of the three descriptors given below	Action: What actions are planned or have been taken place to manage the threat
A: Small section of the site (5-10%):	A: Minor impact:	
B: Several areas of the site (11-50%):	B: Major impact but not continuous:	
C: Most of the site (51-100%):	C: Major continuous impact:	

2. Specify threat: Commercial and industrial areas

Threat (specific if current or potential):

Impact of threat		Management response
Extent: Describe the extent of the impact under one of the three descriptors given below	Severity: Describe how severe the impact is under one of the three descriptors given below	Action: What actions are planned or have been taken place to manage the threat
A: Small section of the site (5-10%):	A: Minor impact:	
B: Several areas of the site (11-50%):	B: Major impact but not continuous:	
C: Most of the site (51-100%):	C: Major continuous impact:	

3. Specify threat: Tourism and recreation infrastructure

Threat (specific if current or potential):

Impact of threat		Management response
Extent: Describe the extent of the impact under one of the three descriptors given below	Severity: Describe how severe the impact is under one of the three descriptors given below	Action: What actions are planned or have been taken place to manage the threat

A: Small section of the site (5-10%):	A: Minor impact:	
B: Several areas of the site (11-50%):	B: Major impact but not continuous:	
C: Most of the site (51-100%):	C: Major continuous impact:	
4. Specify threat: Wood and pulp plantations		
Threat (specific if current or potential):		
Impact of threat		Management response
Extent: Describe the extent of the impact under one of the three descriptors given below	Severity: Describe how severe the impact is under one of the three descriptors given below	Action: What actions are planned or have been taken place to manage the threat
A: Small section of the site (5-10%):	A: Minor impact:	
B: Several areas of the site (11-50%):	B: Major impact but not continuous:	
C: Most of the site (51-100%):	C: Major continuous impact:	
5. Specify threat: Community forestry		
Threat (specific if current or potential):		
Impact of threat		Management response
Extent: Describe the extent of the impact under one of the three descriptors given below	Severity: Describe how severe the impact is under one of the three descriptors given below	Action: What actions are planned or have been taken place to manage the threat
A: Small section of the site (5-10%):	A: Minor impact:	
B: Several areas of the site (11-50%):	B: Major impact but not continuous:	
C: Most of the site (51-100%):	C: Major continuous impact:	
6. Specify threat: Livestock farming and grazing		
Threat (specific if current or potential):		
Impact of threat		Management response
Extent: Describe the extent of the impact under one of the three descriptors given below	Severity: Describe how severe the impact is under one of the three descriptors given below	Action: What actions are planned or have been taken place to manage the threat

A: Small section of the site (5-10%):	A: Minor impact:	
B: Several areas of the site (11-50%):	B: Major impact but not continuous:	
C: Most of the site (51-100%):	C: Major continuous impact:	
7. Specify threat: Land encroachment for agriculture		
Threat (specific if current or potential):		
Impact of threat		Management response
Extent: Describe the extent of the impact under one of the three descriptors given below	Severity: Describe how severe the impact is under one of the three descriptors given below	Action: What actions are planned or have been taken place to manage the threat
A: Small section of the site (5-10%):	A: Minor impact:	
B: Several areas of the site (11-50%):	B: Major impact but not continuous:	
C: Most of the site (51-100%):	C: Major continuous impact:	
8. Specify threat: Land lease of government reserve land for commercial farming		
Threat (specific if current or potential):		
Impact of threat		Management response
Extent: Describe the extent of the impact under one of the three descriptors given below	Severity: Describe how severe the impact is under one of the three descriptors given below	Action: What actions are planned or have been taken place to manage the threat
A: Small section of the site (5-10%):	A: Minor impact:	
B: Several areas of the site (11-50%):	B: Major impact but not continuous:	
C: Most of the site (51-100%):	C: Major continuous impact:	
9. Specify threat: Energy generation, including from hydropower dams*		
Threat (specific if current or potential):		
Impact of threat		Management response
Extent: Describe the extent of the impact under one of the three descriptors given below	Severity: Describe how severe the impact is under one of the three descriptors given below	Action: What actions are planned or have been taken place to manage the threat
A: Small section of the site (5-10%):	A: Minor impact:	

B: Several areas of the site (11-50%):	B: Major impact but not continuous	
C: Most of the site (51-100%):	C: Major continuous impact:	
10. Specify threat: Roads and railroads (include road-killed animals) **		
Threat (specific if current or potential):		
Impact of threat		Management response
Extent: Describe the extent of the impact under one of the three descriptors given below	Severity: Describe how severe the impact is under one of the three descriptors given below	Action: What actions are planned or have taken place to manage the threat
A: Small section of the site (5-10%):	A: Minor impact:	
B: Several areas of the site (11-50%):	B: Major impact but not continuous:	
C: Most of the site (51-100%):	C: Major continuous impact:	
11. Specify threat: Utility and service lines (e.g., electricity cable lines, telephone lines) */**		
Threat (specific if current or potential):		
Impact of threat		Management response
Extent: Describe the extent of the impact under one of the three descriptors given below	Severity: Describe how severe the impact is under one of the three descriptors given below	Action: What actions are planned or have taken place to manage the threat
A: Small section of the site (5-10%):	A: Minor impact:	
B: Several areas of the site (11-50%):	B: Major impact but not continuous:	
C: Most of the site (51-100%):	C: Major continuous impact:	
12. Specify threat: Human Wildlife Conflict		
Threat (specific if current or potential):		
Impact of threat		Management response
Extent: Describe the extent of the impact under one of the three descriptors given below	Severity: Describe how severe the impact is under one of the three descriptors given below	Action: What actions are planned or have taken place to manage the threat
A: Small section of the site (5-10%):	A: Minor impact:	

B: Several areas of the site (11-50%):	B: Major impact but not continuous:	
C: Most of the site (51-100%):	C: Major continuous impact:	
13. Specify threat: Wildlife Poaching**		
Threat (specific if current or potential):		
Impact of threat		Management response
Extent: Describe the extent of the impact under one of the three descriptors given below	Severity: Describe how severe the impact is under one of the three descriptors given below	Action: What actions are planned or have taken place to manage the threat
A: Small section of the site (5-10%):	A: Minor impact:	
B: Several areas of the site (11-50%):	B: Major impact but not continuous:	
C: Most of the site (51-100%):	C: Major continuous impact:	
14. Specify threat: Plant species for medicinal use**		
Threat (specific if current or potential):		
Impact of threat		Management response
Extent: Describe the extent of the impact under one of the three descriptors given below	Severity: Describe how severe the impact is under one of the three descriptors given below	Action: What actions are planned or have been taken place to manage the threat
A: Small section of the site (5-10%):	A: Minor impact:	
B: Several areas of the site (11-50%):	B: Major impact but not continuous:	
C: Most of the site (51-100%):	C: Major continuous impact:	
15. Specify threat: Plant species for food**		
Threat (specific if current or potential):		
Impact of threat		Management response
Extent: Describe the extent of the impact under one of the three descriptors given below	Severity: Describe how severe the impact is under one of the three descriptors given below	Action: What actions are planned or have been taken place to manage the threat
A: Small section of the site (5-10%):	A: Minor impact:	
B: Several areas of the site (11-50%):	B: Major impact but not continuous:	

C: Most of the site (51-100%):	C: Major continuous impact:	
16. Specify threat: Illegal logging and timber harvesting**		
Threat (specific if current or potential):		
Impact of threat		Management response
Extent: Describe the extent of the impact under one of the three descriptors given below	Severity: Describe how severe the impact is under one of the three descriptors given below	Action: What actions are planned or have been taken place to manage the threat
A: Small section of the site (5-10%):	A: Minor impact:	
B: Several areas of the site (11-50%):	B: Major impact but not continuous:	
C: Most of the site (51-100%):	C: Major continuous impact:	
17. Specify threat: Legal logging and timber harvesting**		
Threat (specific if current or potential):		
Impact of threat		Management response
Extent: Describe the extent of the impact under one of the three descriptors given below	Severity: Describe how severe the impact is under one of the three descriptors given below	Action: What actions are planned or have been taken place to manage the threat
A: Small section of the site (5-10%):	A: Minor impact:	
B: Several areas of the site (11-50%):	B: Major impact but not continuous:	
C: Most of the site (51-100%):	C: Major continuous impact:	
18. Specify threat: Fishing and harvesting aquatic resources		
Threat (specific if current or potential):		
Impact of threat		Management response
Extent: Describe the extent of the impact under one of the three descriptors given below	Severity: Describe how severe the impact is under one of the three descriptors given below	Action: What actions are planned or have been taken place to manage the threat
A: Small section of the site (5-10%):	A: Minor impact:	
B: Several areas of the site (11-50%):	B: Major impact but not continuous:	
C: Most of the site (51-100%):	C: Major continuous impact:	

19. Specify threat: Garbage and solid waste**		
Threat (specific if current or potential):		
Impact of threat		Management response
Extent: Describe the extent of the impact under one of the three descriptors given below	Severity: Describe how severe the impact is under one of the three descriptors given below	Action: What actions are planned or have been taken place to manage the threat
A: Small section of the site (5-10%):	A: Minor impact:	
B: Several areas of the site (11-50%):	B: Major impact but not continuous:	
C: Most of the site (51-100%):	C: Major continuous impact:	
20. Specify threat: Earthquakes		
Threat (specific if current or potential):		
Impact of threat		Management response
Extent: Describe the extent of the impact under one of the three descriptors given below	Severity: Describe how severe the impact is under one of the three descriptors given below	Action: What actions are planned or have been taken place to manage the threat
A: Small section of the site (5-10%):	A: Minor impact:	
B: Several areas of the site (11-50%):	B: Major impact but not continuous:	
C: Most of the site (51-100%):	C: Major continuous impact:	
21. Specify threat: Landslides		
Threat (specific if current or potential):		
Impact of threat		Management response
Extent: Describe the extent of the impact under one of the three descriptors given below	Severity: Describe how severe the impact is under one of the three descriptors given below	Action: What actions are planned or have been taken place to manage the threat
A: Small section of the site (5-10%):	A: Minor impact:	
B: Several areas of the site (11-50%):	B: Major impact but not continuous:	
C: Most of the site (51-100%):	C: Major continuous impact:	

22. Specify threat: Erosion and siltation/ deposition (e.g., shoreline or riverbed changes)		
Threat (specific if current or potential):		
Impact of threat		Management response
Extent: Describe the extent of the impact under one of the three descriptors given below	Severity: Describe how severe the impact is under one of the three descriptors given below	Action: What actions are planned or have been taken place to manage the threat
A: Small section of the site (5-10%):	A: Minor impact:	
B: Several areas of the site (11-50%):	B: Major impact but not continuous:	
C: Most of the site (51-100%):	C: Major continuous impact:	
23. Specify threat: Storms and flooding		
Threat (specific if current or potential):		
Impact of threat		Management response
Extent: Describe the extent of the impact under one of the three descriptors given below	Severity: Describe how severe the impact is under one of the three descriptors given below	Action: What actions are planned or have been taken place to manage the threat
A: Small section of the site (5-10%):	A: Minor impact:	
B: Several areas of the site (11-50%):	B: Major impact but not continuous:	
C: Most of the site (51-100%):	C: Major continuous impact:	
23. Specify threat: Loss of cultural links, traditional knowledge and/or management practices		
Threat (specific if current or potential):		
Impact of threat		Management response
Extent: Describe the extent of the impact under one of the three descriptors given below	Severity: Describe how severe the impact is under one of the three descriptors given below	Action: What actions are planned or have been taken place to manage the threat
A: Small section of the site (5-10%):	A: Minor impact:	
B: Several areas of the site (11-50%):	B: Major impact but not continuous:	
C: Most of the site (51-100%):	C: Major continuous impact:	

24. Specify threat: Natural deterioration of important cultural site values		
Threat (specific if current or potential):		
Impact of threat		Management response
Extent: Describe the extent of the impact under one of the three descriptors given below	Severity: Describe how severe the impact is under one of the three descriptors given below	Action: What actions are planned or have been taken place to manage the threat
A: Small section of the site (5-10%):	A: Minor impact:	
B: Several areas of the site (11-50%):	B: Major impact but not continuous:	
C: Most of the site (51-100%):	C: Major continuous impact:	
23. Specify threat: Storms and flooding		
Threat (specific if current or potential):		
Impact of threat		Management response
Extent: Describe the extent of the impact under one of the three descriptors given below	Severity: Describe how severe the impact is under one of the three descriptors given below	Action: What actions are planned or have been taken place to manage the threat
A: Small section of the site (5-10%):	A: Minor impact:	
B: Several areas of the site (11-50%):	B: Major impact but not continuous:	
C: Most of the site (51-100%):	C: Major continuous impact:	
23. Specify threat: Loss of cultural links, traditional knowledge and/or management practices		
Threat (specific if current or potential):		
Impact of threat		Management response
Extent: Describe the extent of the impact under one of the three descriptors given below	Severity: Describe how severe the impact is under one of the three descriptors given below	Action: What actions are planned or have been taken place to manage the threat
A: Small section of the site (5-10%):	A: Minor impact:	
B: Several areas of the site (11-50%):	B: Major impact but not continuous:	
C: Most of the site (51-100%):	C: Major continuous impact:	

24. Specify threat: Natural deterioration of important cultural site values		
Threat (specific if current or potential):		
Impact of threat		Management response
Extent: Describe the extent of the impact under one of the three descriptors given below	Severity: Describe how severe the impact is under one of the three descriptors given below	Action: What actions are planned or have been taken place to manage the threat
A: Small section of the site (5-10%):	A: Minor impact:	
B: Several areas of the site (11-50%):	B: Major impact but not continuous:	
C: Most of the site (51-100%):	C: Major continuous impact:	

Protected Area /Forest Division Management Activities: Assessment Sheet 3	
Please tick the two critical management activities currently undertaken in the protected area	Comment/Explanation
☐ Law enforcement and surveillance	
☐ Promoting sustainable resource use	
☐ Working with local communities	
☐ Education and awareness	
☐ Demarcation and zoning	
☐ Monitoring	
☐ Research	
☐ Management planning	
☐ Ecotourism	
☐ Building institutional and governance capacity	
☐ Species management	
☐ Infrastructure development	
☐ Fundraising	
☐ Restoration	
☐ Fire management	
☐ Resolving tenure problems	
☐ Human-wildlife conflict management	
☐ Alien species control	
☐ External communication and publicity	
☐ Equipment and facilities	
☐ Improving habitat	
☐ Species (re) introduction/control / breeding	
☐ Working with regional authorities	
☐ Other	

Protected Area / Forest Division Management Effectiveness: Assessment					
Issue	Criteria	Score: Tick only one box per question		Comment/Explanation	Next steps
1. Legal status	The protected area/forest division is not gazetted/covenanted	0			
Does the protected area/forest division have legal status (or in the case of private reserves is covered by a covenant or similar)?	There is agreement that the protected area/Forest Division should be gazetted/covenanted but the process has not yet begun	1			
	The protected area /Forest Division is in the process of being gazetted/covenanted but the process is still incomplete (includes sites designated under international conventions, such as Ramsar, or local/traditional law such as community conserved areas, which do not yet have national legal status or covenant)	2			
	The protected area/Forest Division has been formally gazetted/covenanted	3			
Context					
2. Protected area/forest division regulations	There are no regulations for controlling land use and activities in the protected area /forest division	0			
Are appropriate regulations in place to control land use and activities (e.g., hunting)?	Some regulations for controlling land use and activities in the protected area / Forest Division exist but there are major weaknesses	1			
	Regulations for controlling land use and activities in the protected area / Forest Division exist but there are some weaknesses or gaps	2			
	Regulations for controlling inappropriate land use and activities in the protected area/ Forest Division exists and provides an excellent basis for management	3			
Planning					
3. Law enforcement	The staff have no effective capacity/resources to enforce protected/forest division area legislation and regulations	0			
Can staff (i.e. those with responsibility for managing the site) enforce the protected area / Forest Division rule well enough?	There are major deficiencies in staff capacity/resources to enforce protected area/ forest division legislation and regulations (e.g. lack of skills, no patrol budget, lack of institutional support)	1			
	The staff have acceptable capacity/resources to enforce protected area legislation and regulations but some deficiencies remain	2			
	The staff have excellent capacity/resources to enforce the protected area/forest division legislation and regulations	3			
Input					

4. Protected area/ forest division objectives Is management undertaken ac- cording to agreed objectives? Planning	No firm objectives have been agreed for the protected area/forest division	0			
	The protected area/forest division has agreed objectives, but is not managed according to these objectives	1			
	The protected area/forest division has agreed objectives, but is only partially managed according to these objectives	2			
	The protected area/forest division has agreed objectives and is managed to meet these objectives	3			
5. Protected area/ forest division design Is the protected area/forest divi- sion the right size and shape to meet the objectives (protect species, habitats, ecologi- cal processes and water catchments of key conservation con- cern, resource utilization) Planning	Inadequacies in protected area/forest di- vision design mean achieving the major objectives of the protected area is very difficult	0			
	Inadequacies in protected area/forest division design mean that achievement of major objectives is difficult but some mitigating actions are being taken (e.g. agreements with adjacent land owners for wildlife corridors or introduction of appropriate catchment management)	1			
	Protected area/forest division design is not significantly constraining achieve- ment of objectives, but could be im- proved (e.g. with respect to larger scale ecological processes)	2			
	Protected area/forest division design helps achievement of objectives; it is ap- propriate for species and habitat conser- vation; and maintains ecological process- es such as surface and groundwater flows at a catchment scale, natural disturbance patterns, etc.	3			
6. Protected/for- est division area boundary demar- cation Is the boundary known and demar- cated? Process	The boundary of the protected area/forest division is not known by the manage- ment authority or local residents/neigh- bouring land users	0			
	The boundary of the protected area/forest division is known by the management authority but is not known by local resi- dents/neighbouring land users	1			
	The boundary of the protected area/forest division is known by both the manage- ment authority and local residents/neigh- bouring land users but is not appropriate- ly demarcated	2			
	The boundary of the protected area/forest division is known by the management authority and local residents/neigh- bouring land users and is appropriately demarcated	3			

7. Management plan	There is no management plan for the protected area/forest division	0			
Is there a management plan and is it being implemented?	A management plan is being prepared or has been prepared but is not being implemented	1			
	A management plan exists but it is only being partially implemented because of funding constraints or other problems	2			
	A management plan exists and is being implemented	3			
Planning					
Bhutan METT+: If a management plan is just running out and there is a process underway to redo the plan this is equivalent to score 3: a management plan exists					
<i>Additional points: Planning</i>					
7a. Planning process	The planning process allows adequate opportunity for key stakeholders to influence the management plan	1			
7b. Planning process	There is an established schedule and process for periodic review and updating of the management plan	1			
7c. Planning process	The results of monitoring, research and evaluation are routinely incorporated into planning	1			
8. Regular work plan	No regular work plan exists	0			
Is there a regular work plan and is it being implemented?	A regular work plan exists but few of the activities are implemented	1			
	A regular work plan exists and many activities are implemented	2			
	A regular work plan exists and all activities are implemented	3			
Planning/Outputs					
9. Resource inventory	There is little or no information available on the resource (critical habitats, species (flora & fauna), growing stocks and cultural values) of the protected area/forest division	0			
Do you have enough information to manage the area?	Information on the resource (critical habitats, species (flora & fauna), growing stocks and cultural values) of the protected area/forest division not sufficient to support planning and decision making	1			
	Information on the resource (critical habitats, species (flora & fauna), growing stocks and cultural values) of the protected area/forest division is sufficient for most key areas of planning and decision making	2			
	Information on the resource (critical habitats, species (flora & fauna), growing stocks and cultural values) of the protected area/forest division sufficient for all areas of planning and decision making	3			
Input					

10. Protection systems	Protection systems (patrols, permits, etc) do not exist or are not effective in controlling access/resource use	0			
Are systems in place to control access/resource use in the protected area/ forest division?	Protection systems are only partially effective in controlling access/resource use	1			
	Protection systems are moderately effective in controlling access/resource use	2			
Process/Outcome	Protection systems are largely or wholly effective in controlling access/ resource use	3			
11. Research	There is no survey or research work taking place in the protected area/ forest division	0			
Is there a programme of management-oriented survey and research work?	There is some survey and research work but it is not directed towards the needs of protected area/forest division management	1			
Process	There is some survey and research work that is at least partly directed towards the needs of protected area/forest division management	2			
	There is a comprehensive, integrated programme of survey and research work, which is relevant to management needs	3			
12. Resource management	Active resource management is not being undertaken	0			
Is active resource management being undertaken?	Very few of the requirements for active management of critical habitats, species, ecological processes, cultural values and sustainable resource production are being implemented	1			
Process	Many of the requirements for active management of critical habitats, species, ecological processes, cultural values and sustainable resource production are being implemented but some key issues are not being addressed	2			
	Requirements for active management of critical habitats, species, ecological processes, cultural values and sustainable resource production are being substantially or fully implemented	3			
12a: Management of NTFPs	A management plan exists for the management of all major non-timber forest products actively collected within the protected area/forest division	1			

12b: Management of medicinal plants	A management plan exists for the management of all major medicinal plants actively collected within the protected area/forest division	1			
12c: Management of other conservation areas (OCAs)	A management plan exists for all Other conservation areas (OCAs) within the protected area/forest division	1			
Bhutan METT+: consideration of this question includes issues relating to land leasing					
13. Staff numbers	There are no staff	0			
Are there enough people employed to manage the protected area forest division?	Staff numbers are inadequate for critical management activities	1			
	Staff numbers are below the optimum level for critical management activities	2			
	Staff numbers are adequate for the management needs of the protected area/forest division	3			
Inputs					
14. Staff training	Staff lack the skills needed for protected area/forest division management	0			
Are staff adequately trained to fulfil management objectives?	Staff training and skills are low relative to the needs of the protected area /forest division	1			
	Staff training and skills are adequate, but could be further improved to fully achieve the objectives of management	2			
	Staff training and skills are aligned with the management needs of the protected area / forest division	3			
Inputs/Process					
15. Current budget	There is no budget for the management of the protected area/forest division	0			
Is the current budget sufficient?	The available budget is inadequate for basic management needs and presents a serious constraint on the capacity to manage	1			
	The available budget is acceptable but could be further improved to fully achieve effective management	2			
	The available budget is sufficient and meets the full management needs of the protected area/forest division	3			
Inputs					
Bhutan METT+: Budgets in Bhutan are divided by capital budget (infrastructure development, etc) and current budget (operational costs, e.g., staff costs). Consideration of both budgets should be made when answering question 15 (and 16 and 17). The comment/explanation column should be used to detail specific issues concerning budget allocations, etc.					

16. Security of budget Is the budget secure? Inputs	There is no secure budget for the protected area/forest division and management is wholly reliant on outside or highly variable funding	0			
	There is very little secure budget and the protected area/forest division could not function adequately without outside funding	1			
	There is a reasonably secure core budget for regular operation of the protected area/forest division but many innovations and initiatives are reliant on outside funding	2			
	There is a secure budget for the protected area/ forest division and its management needs	3			
17. Management of budget Is the budget managed to meet critical management needs? Process	Budget management is very poor and significantly undermines effectiveness (e.g. late release of budget in financial year)	0			
	Budget management is poor and constrains effectiveness	1			
	Budget management is good and actions are prioritised when funds are inadequate to meet management needs	2			
	Budget management is excellent and meets management needs	3			
18. Equipment Is equipment sufficient for management needs? Input	There are little or no equipment and facilities for management needs	0			
	There are some equipment and facilities but these are inadequate for most management needs	1			
	There are equipment and facilities, but still some gaps that constrain management	2			
	There are adequate equipment and facilities	3			
Bhutan METT+: Most protected areas cover large areas, there are thus likely to be differences in equipment availability in park/ division headquarters and guard posts around the park. Question 18 should consider equipment across the whole protected area/forest division and specific concerns regarding availability should be included in the comment/explanation and next steps column					
19. Maintenance of equipment Is equipment adequately maintained? Process	There is little or no maintenance of equipment and facilities	0			
	There is some ad hoc maintenance of equipment and facilities	1			
	There is basic maintenance of equipment and facilities	2			
	Equipment and facilities are well-maintained	3			

20. Education and awareness	There is no education and awareness programme	0			
Is there a planned education programme linked to the objectives and needs?	There is a limited and ad hoc education and awareness programme	1			
	There is an education and awareness programme but it only partly meets needs and could be improved	2			
	There is an appropriate and fully implemented education and awareness programme	3			
Process					
21. Planning for land and water use	Adjacent land and water use planning does not take into account the needs of the protected area/forest division and activities/policies are detrimental to the survival of the area	0			
Does land and water use planning outside the protected area/forest division, recognise the protected area/forest division and aid the achievement of objectives?	Adjacent land and water use planning does not take into account the long-term needs of the protected area/forest division, but activities are not detrimental the area	1			
	Adjacent land and water use planning partially takes into account the long-term needs of the protected area/forest division	2			
	Adjacent land and water use planning fully takes into account the long-term needs of the protected area/forest division	3			
Planning					
Bhutan METT +: This question is specific to activities outside of the protected area/forest division. EIA's are supposed to take place for any developments. Issues in Bhutan include hydropower, transmission lines and mining.					
<i>Additional points: Land and water planning</i>					
21a: Land and water planning for habitat conservation	Planning and management in the catchment or landscape containing the protected area/forest division incorporates provision for adequate environmental conditions (e.g. volume, quality and timing of water flow, air pollution levels, etc) to sustain relevant habitats	1			
21b: Land and water planning for connectivity	Management of corridors linking the protected area/forest division provides for wildlife passage to key habitats outside the protected area (e.g., to allow migratory fish to travel between freshwater spawning sites and the sea, or to allow animal migration)	1			
21c: Land and water planning for ecosystem services and species conservation	Planning addresses ecosystem-specific needs and/or the needs of particular species of concern at an ecosystem scale (e.g. volume, quality and timing of freshwater flow to sustain particular species, fire management to maintain grassland habitats etc.)	1			

22. State and commercial neighbours	There is no contact between managers and neighbouring official or corporate land and water users	0			
Is there co-operation with adjacent land and water users?	There is contact between managers and neighbouring official or corporate land and water users but little or no cooperation	1			
Process	There is contact between managers and neighbouring official or corporate land and water users, but only some co-operation	2			
	There is regular contact between managers and neighbouring officials or corporate land and water users, and substantial co-operation on management	3			
22a: State and commercial neighbours	There is regular contact and substantial cooperation with any hydropower developers and operators whose operations impact protected area /forest division management	1			
22b: State and commercial neighbours	There is regular contact and substantial cooperation with any developers and operators of linear infrastructure (e.g. transmission lines and/or roads) whose operations impact protected area/forest division management	1			
22c: State and commercial neighbours	Where the protected area/forest division provides important natural resources for commercial operations (e.g. municipal water companies or hydropower operators), payments for ecological services agreements are in place	1			
23. Local communities	Local communities have no input into decisions relating to the management of the protected area/forest division	0			
Do local communities resident or near the protected area/ forest division have input to management decisions?	Local communities have some input into discussions relating to management but no direct role in management	1			
	Local communities directly contribute to some relevant decisions relating to management but their involvement could be improved	2			
Process	Local communities directly participate in all relevant decisions relating to management, e.g. co-management	3			
Additional points Local communities					
23a: Impact on communities	There is open communication and trust between local people, stakeholders and protected area/forest division managers	1			

23b: Impact on communities	Programmes to enhance community welfare, while conserving protected area/forest division resources, are being implemented	1			
23c: Impact on communities	Local people actively support the protected area/forest division	1			
24. Economic benefit	The protected area/forest division does not deliver any economic benefits to local communities	0			
Is the protected area/forest division providing economic benefits to local communities, e.g. income, employment, payment for environmental services?	Potential economic benefits are recognised and plans to realise these are being developed	1			
	There is some flow of economic benefits to local communities	2			
	There is a major flow of economic benefits to local communities from activities associated with the protected area/forest division	3			
Outcomes					
25. Monitoring and evaluation	There is no monitoring and evaluation in the protected area/forest division	0			
Are management activities monitored against performance?	There is some ad hoc monitoring and evaluation, but no overall strategy and/or no regular collection of results	1			
	There is an agreed and implemented monitoring and evaluation system but results do not feed back into management	2			
	A good monitoring and evaluation system exists, is well implemented and used in adaptive management	3			
Planning/Process					
26. Visitor facilities	There are no visitor facilities and services despite an identified need	0			
Are visitor facilities adequate?	Visitor facilities and services are inappropriate for current levels of visitation	1			
	Visitor facilities and services are adequate for current levels of visitation but could be improved	2			
	Visitor facilities and services are excellent for current levels of visitation	3			
Outputs					

27. Commercial tourism operators	There is little or no contact between managers and tourism operators using the protected area/forest division	0			
Do commercial tour operators contribute to protected area/forest division management?	There is contact between managers and tourism operators but this is largely confined to administrative or regulatory matters	1			
	There is limited co-operation between managers and tourism operators to enhance visitor experiences and maintain protected area/forest division values	2			
	There is good co-operation between managers and tourism operators to enhance visitor experiences and maintain protected area/forest division values	3			
28. Fees	Although fees are theoretically applied, they are not collected	0			
If fees (e.g. entry fees) are applied, do they help protected area/forest division management?	Fees are collected, but make no contribution to the protected area/forest division or its environs	1			
	Fees are collected, and make some contribution to the protected area/forest division and its environs	2			
	Fees are collected and make a substantial contribution to the protected area/forest division and its environs	3			
29. Fines	There are no fines, or fines are theoretically applied but are seldom or never collected	0			
If fines (e.g. poaching fines) are applied, do they help protected area management?	Fines are collected, but make no direct contribution to the protected area/forest division or its environs	1			
	Fines are collected, and make some contribution to the protected area/forest division and its environs	2			
	Fines are collected and make a substantial contribution to the protected area/forest division and its environs	3			
Bhutan METT +: The term “protected area or its environs” can include incentive schemes such as payments to informers of poachers					

30. Condition of biodiversity and ecological values What is the condition of the important biodiversity values of the protected area/ forest division as compared to when it was first designated? Outcomes	Many biodiversity and ecological values are being severely degraded	0			
	Some biodiversity and ecological values are being severely degraded	1			
	Some biodiversity and ecological values are being partially degraded but the most important values have not been significantly impacted	2			
	Biodiversity and ecological values are predominantly intact	3			
Additional Points: Condition of values					
30a: Condition of biodiversity values	The assessment of the condition of biodiversity and ecological values is based on research and/or monitoring	1			
30b: Condition of biodiversity values	Specific management programmes are being implemented to address threats to biodiversity and ecological values	1			
30c: Condition of biodiversity values	Activities to maintain key biodiversity and ecological values are a routine part of protected area/forest division management	1			
Bhutan METT + questions					
31. Condition of cultural values What is the condition of the important cultural values of the protected area/ forest division as compared to when it was first designated? Outcomes	Many cultural values are being severely degraded	0			
	Some cultural values are being severely degraded	1			
	Some cultural values are being partially degraded but the most important values have not been significantly impacted	2			
	Cultural values are predominantly intact	3			

32. Access How accessible is the protected area/forest division? Planning / Process	Staff are unable to move around the protected area/forest division and thus much of the protected area/ forest division is inaccessible throughout the year	0			
	There are significant restrictions on the ability of staff to move around the protected area/forest division throughout the year (e.g. in the rainy season) and thus much of the protected area/ forest division (e.g. over 50 % of the area) is inaccessible some or all of the year	1			
	Staff are able to move relatively easily around the protected area/forest division and thus most of the protected area/forest division is accessible, although some areas (e.g. less than 50 % of the area) remain inaccessible some or all of the year	2			
	Staff are able to move easily around the whole protected area/forest division and the majority of the protected area/forest division is fully accessible	3			
33. Neighbouring protected areas/forest division Is there co-operation with adjoining protected areas/ forest division (national and international)? Process	There is no contact between managers of adjoining protected areas/forest division on issues which impact protected area/forest division management effectiveness	0			
	There is limited contact between managers of adjoining protected areas/forest division but little cooperation on issues which impact protected area/ forest division management effectiveness	1			
	There is contact between managers of adjoining protected areas/forest division and some cooperation on protected area/forest division management effectiveness	2			
	There is regular contact between managers of adjoining protected areas/forest division and full cooperation on ensuring management effectiveness	3			

34. Is the protected area/ forest division being consciously managed to adapt to climate change? Planning	There have been no efforts to consider	0			
	Some initial thought has taken place about likely impacts of climate change, but this has yet to be translated into management plans	1			
	Limited plans have been drawn up about how to adapt management to predicted climate change, which may or may not be being implemented	2			
	Detailed plans have been drawn up about how to adapt management to predicted climate change, and these are already being implemented	3			
35. Is the protected area/forest division being consciously managed to prevent carbon loss and to encourage further carbon capture? Process	Carbon storage and carbon dioxide capture has not been considered in management of the protected area/ forest division		0		
	Carbon storage and carbon dioxide capture has been considered in general terms, but has not yet been significantly reflected in management		1		
	There are active measures in place to reduce carbon loss from the protected area/forest division, but no conscious measures to increase carbon dioxide capture	2			
	There are active measures in place both to reduce carbon loss from the protected area/ forest division and to increase carbon dioxide capture		3		

Protected Area / Forest Division Outcome Baseline: Assessment Sheet 5	
For this assessment to be completed a list of core indicators needs to be developed. Once indicators have been agreed then the form below should be completed for each indicator from each protected area / forest division thus providing a summary of the baseline data available. An initial list of indicators was developed in the METT workshops[1].	
Indicator	
Baseline data	Summary of data (e.g. number of species, vegetation cover etc)
Date: 2018-2021	
Data: 2015-2018	
Data: 2010-2015	
Data: 2000-2009	
Data: Pre-2000	
Data in preparation	
Data collection planned	
No data collection	
Additional notes	
[1] See: Wildlife Conservation Division and Equilibrium Research (2015). Management Effectiveness of Protected Areas in Bhutan: A training session and initial assessment of five protected areas. Thimphu, Bhutan and Bristol, UK	

Annexure I					
The guidance provided below should be considered when filling in the threat assessment (Assessment Sheet 1). The guidance has been developed to describe threat levels specific to Bhutan and will help ensure equivalence across the assessments of all protected areas in the country. (Threats assessed as of high significance can be assessed in more detail using Assessment Sheet 2). Where specific numbers are provided (as in human wildlife conflict) the indicator should be assessed against actual monitoring data, if available, or expert opinion if not. Generally, if expert opinion indicates a high threat a management action suggested in Assessment Sheet 2 would likely be to develop monitoring.					
Threat (question number)	Indicators	High	Medium	Low	Assessment methods/Guide Note
Livestock farming and grazing (2.3)	Evidence of degradation	Grazing is causing major degradation, e.g. loss/reduction of species covering over more than 25% of the FD.	Grazing is causing minor degradation, e.g. loss/reduction of species covering between 11-24% of the FD.	Grazing is causing minor degradation, e.g. loss/reduction of species covering over less than 10% of the FD.	Assesment Method (uniform for all IKI landscape DFOs). % area impacted by presence of livestock to the total DFO area
		And/or	And/or	And/or	
		Negative impact such as absence of natural regeneration, invasion by invasive species and impact of migratory cattle/sedentary ranching (herding in one location) are prevalent.	Some evidence of negative impact such as absence of natural regeneration, invasion by invasive species and some evidence of impact of migratory cattle/sedentary ranching (herding in one location) are prevalent.	No evidence of negative impacts such as absence of natural regeneration, invasion by invasive species and no evidence of impact of migratory cattle/sedentary ranching (herding in one location) are prevalent.	
Extraction of minerals, quarries, etc (3.2)	Evidence of impact including potential threat	2 or more mines inside the protected area and no proper guidelines for mining operations	1 mine inside the protected area with no proper guidelines for mining operations	Mining takes place, but is managed under strict mining guidelines	Measure in % in relation to the total area of the respective DFOs
		And/or			
		Mines in core zone			
		And/or			
		Open cast mines			

Road construction (4.1)	Evidence of impact of highway(Road) building	Evidence of major impacts on habitats and species through road building, widening and spill-over extends to over 15 metres width either side of the road/ beyond the right of way in over 50% of road construction in the park.	Evidence of major impacts on habitats and species through road building, widening and spill-over extends to over 15 metres width either side of the road beyond the right of way in less than 50% of the park.	Evidence of major impacts on habitats and species through road building, widening and spill-over extends to less than 15 metres width either side of the road beyond the right of way in over 25% of the park	Consider GC and Farm roads for assessment, rather than just Highway
		And/or	And/or		
		No evidence of restoration; thus the road construction has led to fragmentation of park/ habitat.	Limited evidence of restoration; thus the road construction has lead to fragmentation of park/ habitat.		
		And/or	And/or		
		The road construction cuts through the entire park including the core zone. There is negative impact on streams/rivers used by wildlife, regulations related to noise control are followed.	The road construction cuts through some parts of the park (excluding the core zone which if impacted is seen as high threat) and there is negative impact on streams/ rivers used by wildlife, regulations related to noise control followed but not effective		
Power Transmission Lines (4.2)	Evidence of Impact Forest fire caused by faulty transmission lines Frequency of unnatural fires	Over 2 forest fires within the last 5 years caused by faulty transmission lines	1-2 forest fires within the last 5 years caused by faulty transmission lines	There is some evidence of impacts on habitats and species in the immediate area of the transmission lines	

		And/or	And/or		
		There is major evidence of impacts on habitats and species in the immediate area of the transmission lines	There is evidence of impacts on habitats and species in the immediate area of the transmission lines		
Human Wildlife Conflicts (5.1a)	Number of conflicts Protected species killed Human life lost/ serious, life-changing injury	Within the last 5 years:	Within the last 5 years:	Within the last 5 years:	
		Any deaths or suspected deaths of tiger, snow leopard or elephant	Any deaths or suspected deaths of 5 or more species (other than tiger, snow leopard or elephant which are considered as high threat) listed in the Forest and Nature Conservation Act	Less than 5 deaths or suspected deaths of species (other than tiger, snow leopard or elephant which are considered as high threat) listed in the Forest and Nature Conservation Act	No need to consider natural deaths for this assessment
		And/or	And/or	And/or	
		Any recorded deaths or life-changing injury (e.g. loss of limbs which impacts livelihoods)	Records of 5 or more injuries (not life changing)	Less than 5 records of injuries (not life-changing)	
		And/or	And/or	And/or	
		50 or more live-stock depredations annually	25-50	less than 25	by number for Yak/cattle/goat/sheep & horse, and by the number of cases for poultry
		Loss of 50% of annual crops at the household level	Loss of 25-49% of annual crops at a household level	Loss of less than 25% of annual crops at the household level	
		And/or	And/or	And/or	
		Complete destruction of permanent infrastructure	Major damage to permanent infrastructure	Minor damage to permanent and temporary infrastructure	
Wildlife Poaching (5.1 b)	Number of wild animals lost (schedule I and II of fauna) Number of poachers arrested Number of poaching evidences (camps, traps, snares)	Evidence of poaching of at more than one, Schedule I(Fauna) and >25 of schedule II listed fauna and flora.	Evidence of poaching of at least one totally protected wild fauna and 15-24 of schedule II listed fauna and flora of schedule I and II.	No evidence of poaching of schedule list I fauna and less than 15 numbers of poaching of schedule list II of both flora and fauna.	Based on the data maintained in FIRMS, SMART Patrol and records of wildlife poaching and fines realised with DFO

		And/or	And/or	And/or	
		15 + poachers arrested	6 – 10 poachers arrested	<5 poachers arrested	
		And/or	And/or	And/or	
		50 + poaching evidence (camps, traps, snares)	11 – 30 poaching evidence (camps, traps, snares)	<10 poaching evidences (camps, traps, snares)	
NWFP Collection (5.2 a,b,c)	Evidence of species at serious risk	Widespread (over 50% of the area of the species collected) shows evidence of any of the below:	Widespread (between 25- 49% of the area of the species collected) shows evidence of any of the below:	Some concern about species and/or habitat decline	
		- Whole plant up-rooting	- Whole plant up-rooting	And/or	
		- Thriving market/ demand and absence of management plan/ regulations	- Thriving market/ demand and absence of management plan/ regulations	Unreliable data on species ecology is available	
		- No reliable data on the resilience of species	- No reliable data on the resilience of species		
Illegal Timber Felling (5.3)	Evidence of degradation	Evidence of major impacts on habitats and species through illegal forest operations has impacted up to 10% of the park area over last 5 years	Evidence of major impacts on habitats and species through illegal forest operations has impacted up to between 5 -9% of the park area over last 5 years	Evidence of major impacts on habitats and species through illegal forest operations has impacted less than 5% of the park area over 5 last years	Based on the offence cases registered and illegal timber felling site areas.
Legal Timber Felling (5.3a)	Evidence of Degradation	Evidence of major impacts on habitats and species through illegal forest operation has impacted up to 10% of the park area over last 5 years	Evidence of major impacts on habitats and species through illegal forest operation has impacted up to between 5-9% of the park area over last 5 years	Evidence of major impacts on habitats and species through illegal forest operation has impacted up to less than 5% of the park area over last 10 years	Based on areas of forest degraded due to legal timber logging in different management regimes, leased areas, and developmental activities
Unmanaged ecotourism (6.1a)	Evidence of impact	No ecotourism plan for the protected area	Ecotourism plan exists for the protected area but there are no proper facilities for tourists and/or control over where tourists travel (e.g. in core areas)	Ecotourism Plan exists but is not effectively implemented or monitored	
		and			
		No proper facilities or control over tourist travelling in the designated conservation areas (e.g. in core zones)			

Forest Fires (7.1)	Evidence of degradation	Evidence of major impacts on habitats and species through unnatural fire occurrences (arson, accident etc) fire has impacted > 10% of the park area over the last 5 years.	Evidence of major impacts on habitats and species through unnatural fire occurrences (arson, accident etc) fire has impacted up 5-10% of the park area over the last five years.	Evidence of major impacts on habitats and species through unnatural fire occurrences – (arson, accident etc) fire has impacted less than 5% of the park area over the last five years.	Consider fire burnt time/duration in the assessment
				Impacts to consider include:	
		Impacts to consider include:	Impacts to consider include:	· Fires burn for several days and response time is long	
		· Fires burn for several days and response time is long	· Fires burn for several days and response time is long	· No. of fires in the same locality	
		· No. of fires in the same locality	· No. of fires in the same locality		
Hydro Power (7.2)	Evidence of Impact Loss of habitat of water birds	Evidence of some impacts on habitats including:	Evidence of impacts on habitats including one or few of the following	Minor impacts of road construction and some evidence of mitigation/restoration despite EIA and Environmentally Friendly Road Construction Guidelines reportedly being followed	
		· Designated conservation areas		And/or	
		· Endangered species	Only limited evidence of restoration/mitigation	Presence of interventions in place but unclear if these are functional	
		· Flight path.			
		· Exceeding 50 meters on either sides of transmission lines	EMP and Environmentally Friendly Road Construction Guidelines are being followed in some but not all sites		
		· No evidence of mitigation/restoration			

		· EMP prescriptions not followed/complied	Presence of fish migratory ladders(Related interventions-proposed) but not properly designed & functional		
			Habitat restoration programmes in place but not functional		
Solid Waste (9.4)	Evidence of Impact Enforcement/compliance of rules	Major presence of non- biodegradable waste	Presence of non-biodegradable waste but being collected	There is no evidence of impacts on habitats	
		And/or	And/or	And/or	
		Evidence of deaths caused by consumption of wastes by wildlife	Some evidence of deaths caused by consumption of wastes by wildlife	Compliance of rules adequately	
		And/or	And/or		
		Spillage of waste into rivers/streams	Some evidence of spillage of waste into rivers/streams		
		And/or	And/or		
		No enforcement/compliance of rules	Some level of enforcement/ compliance of rules		

Reference

- Baseline Biodiversity Report. (2021). Baseline Biodiversity Report.
- Chhogyel, N., & Kumar, L. (2018). Climate change and potential impacts on agriculture in Bhutan: A discussion of pertinent issues. *Agriculture & Food Security*, 7(1), 79. <https://doi.org/10.1186/s40066-018-0229-6>
- Chhogyel, N., Kumar, L., Bajgai, Y., & Sadeeka Jayasinghe, L. (2020). Prediction of Bhutan's ecological distribution of rice (*Oryza sativa* L.) under the impact of climate change through maximum entropy modelling. *The Journal of Agricultural Science*, 158(1–2), 25–37. <https://doi.org/10.1017/S0021859620000350>
- Deutsch, C. A., Tewksbury, J. J., Tigchelaar, M., Battisti, D. S., Merrill, S. C., Huey, R. B., & Naylor, R. L. (2018). Increase in crop losses to insect pests in a warming climate. <https://doi.org/10.1126/science.aat3466>
- Dorji, R., Letro, Yangden, S., Dendup, P., Dhendup, T., & Lhamo, Y. (2024). Rare and unusual snow leopard encounters in the broadleaf forest of the Bhutanese Himalayas. *Snow Leopard Reports*, 3, 13–20. <https://doi.org/10.56510/slr.v3.24118>
- Drukpa, D., Chophel, K., Tenzin, T., Gyeltshen, J., Duba, K., Yoezer, N., Sharma, D. R., & Dendup, S. (Eds.). (2019). *Geosciences and Mining Journal*.
- Forest Types of Bhutan, D. (2022). *Forest Types of Bhutan*. <https://www.dofps.gov.bt/reports/>
- Gurung, T. R. (Ed.). (2017). *Community-based Non-Wood Forest Product Enterprise: A Sustainable Business Model*. SAARC Agriculture Centre.
- Poudel, Y. K. (2023). Pests, diseases constitute 95% of farming challenges. *Kuensel Online*. <https://kuenselonline.com/pests-diseases-constitute-95-of-farming-challenges/>
- Sharma, P., Chettri, N., & Wangchuk, K. (2021). Human–wildlife conflict in the roof of the world: Understanding multidimensional perspectives through a systematic review. *Ecology and Evolution*, 11(17), 11569–11586. <https://doi.org/10.1002/ece3.7980>
- Tempa, K. (2022). District flood vulnerability assessment using analytic hierarchy process (AHP) with historical flood events in Bhutan. *PLOS ONE*, 17(6), e0270467.
- Tshering, K., & Thinley, P. (2017). *Pastoralism*, 7(1), 5. <https://doi.org/10.1186/s13570-017-0077-1>
- Tshering, N., & Wangchuck, K. (2023). Phytodiversity Estimation of High-Altitude Pastureland above Yonphula, Kanglung Gewog, Trashigang Dzongkhag. *Sherub Doenme*, 16, 34–47. <https://doi.org/https://doi.org/10.17102/sherubdoenme.16.2023.03>
- Tshering, S., Gurung, D. B., Sherub, K., Dookia, S., Dorji, K., & Choephyel, P. (2020). Bat (Mammalia: Chiroptera) diversity, dominance, and richness in the southwestern region of Bhutan with three new records for the country. *Journal of Threatened Taxa*, 12(1), 15114–15128. <https://doi.org/10.11609/jott.4986.12.1.15114-15128>

