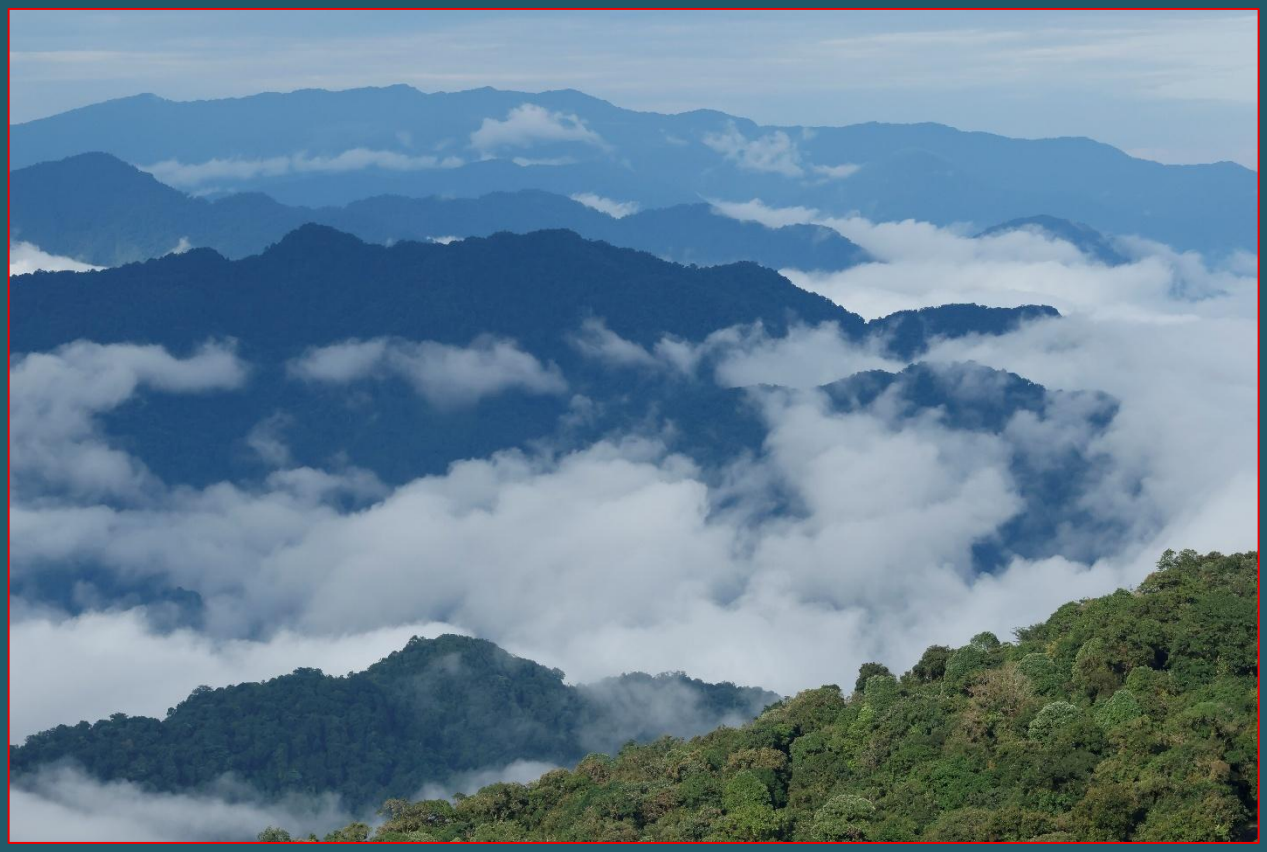
Divisional Forest Office Management Plan



(Jan 2026-Dec 2036)

Divisional Forest Office, Sarpang
Department of Forest and Park Services
Ministry of Energy and Natural Resources
Royal Government of Bhutan

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Divisional Forest Office Management Plan

Approval sheet

Period of the Plan
This Plan is valid for the period of 10 years from January 2026 to December 2036.

Submitted for approval:

Chief Forestry Officer
Divisional Forest Office, Sarpang.
Date:

Technically reviewed & recommended for approval: **Recommended for approval:**

Chief Forestry Officer

Forest Resources Planning & Management Division
Date: .....

Director

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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 states that at least 60 percent of the country's land area be maintained under forest cover 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. Considering 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 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!
Karma Tenzin
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, Sarpang. 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. Wangdi, Senior Forestry Officer, 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.

Phub Dhendup
Chief Forestry Officer
Divisional Forest Office, Sarpang

List of common Acronyms

AAC	Annual allowable cut
ACCESS	Accelerating Trade and Transport in Eastern South Asia
AGB	Above Ground Biomass
BC	Biological Corridor
BFL	Bhutan For Life
BGB	Below Ground Biomass
CF	Community Forest/Community Forestry
CFMG	Community Forest Management Group
CFMP	Community Forest Management Plan
CFO	Chief Forestry Officer
CWD	Course Wood Debris
cft	Cubic foot/feet
DFO	Divisional Forest Offices
DoFPS	Department of Forests and Park Services
FIRMS	Forest Information Reporting and Management System
FMU	Forest Management Unit
FNCA	Forest and Nature Conservation Act, 2023
FNCRR	Forest and Nature Conservation Rules & Regulations, 2023
FRPMD	Forest Resources Planning and Management Division
GMC	Gelephu Mindfulness City
GIS	Geographic Information System
GPS	Global Positioning System
ha	Hectare
HCVA	High Conservation Value Area
HWC	Human Wildlife Conflict
IKI	International Climate Initiative
KBA	Key Biodiversity Areas
LFMA	Local Forest Management Area
LFMP	Local Forest Management Plan
LG	Local Government
LULC	Land Use and Land Cover
m^3	Cubic meter
METT	Management Effectiveness Tracking Tool
MoENR	Ministry of Energy and Natural Resources
MoE	Margin of Error
NFI	National Forestry Inventory
Nu.	Ngultrum
NWFP	Non-Wood Forest Products
PA	Forest Divisionss
RBM	Riverbed Materials
RGoB	Royal Government of Bhutan
SMART	Spatial Monitoring and Reporting Tool
SRF	State Reserve Forest
TAC	Technical Advisory Committee
CVCA	Climate Vulnerability and Capacity Assessment

Executive Summary

Brief Overview of Division

Divisional Forest Office, Sarpang, was established in 1959 as Bhutan's second Territorial Forest Division. It administers 988.52 km² of forests strategically positioned between Jigme Singye Wangchuck National Park, Royal Manas National Park, Phibsoo Wildlife Sanctuary, and the Indian state of Assam. With elevations ranging from 140 to 3,440 meters, the division encompasses subtropical, warm broadleaved, and cool broadleaved forests, which together constitute 83.41 percent of its total area.

National Significance

The Management Plan represents a key initiative for sustainable forest management while upholding Bhutan's constitutional mandate to maintain 60 percent forest cover and carbon neutrality. A budget of Nu. 123.403 million is proposed over ten years to establish the Divisional Forest Office, Sarpang, as a model division for integrated conservation and development.

Strategic Alignment with National Priorities

The Management Plan aligns closely with Bhutan's national priorities and constitutional obligations. It directly supports Article 5 of the Constitution by ensuring the maintenance of 83.41 percent forest cover in Sarpang Division, serving 44,067 citizens across ten gewogs. The framework also embodies the principles of Gross National Happiness by integrating environmental conservation, cultural preservation, good governance, and sustainable socio-economic development through participatory forest management. In addition, the Division contributes to Bhutan's global climate commitments by sequestering an estimated 3.85 million tonnes of carbon annually, reinforcing the nation's pledge to remain carbon negative and advancing the Intended Nationally Determined Contributions under the Paris Agreement.

KEY ACHIEVEMENTS AND STRATEGIC ASSETS

The Division has made significant progress in biodiversity conservation. It safeguards more than 770 plant species and 48 mammal species, including flagship species such as *Panthera tigris* (Tiger), *Elephas maximus* (Asian Elephant), and *Ailurus fulgens* (Red Panda), along with 215 bird species. The Division provides critical ecosystem services through the annual sequestration of 558,484 tonnes of CO_2 equivalent, directly supporting Bhutan's national climate goals. It manages 407.7 km² of Biological Corridor-03, ensuring vital landscape connectivity between Jigme Singye Wangchuck National Park, Phibsoo Wildlife Sanctuary, and Royal Manas National Park. In addition, the Division oversees the Chudzom–Pristine Mountain Forest Ecosystem, a 45 km² High Conservation Value Area (HCV-II) located at the tri-junction of Tsirang, Sarpang, and Jigme Singye Wangchuck National Park, which conserves intact mountain and cloud forests while

providing habitat for endangered species including tigers, red pandas, Asiatic black bears, and clouded leopards.

Community participation and sustainable livelihood development form another strategic strength of the Division. Twenty-four community forests covering 3,290.74 hectares empower local communities as custodians of forest resources, complemented by five Local Forest Management Areas covering **19,430.1** hectares that operate under scientifically guided management frameworks. Livelihood diversification has been promoted through nine Non-Wood Forest Product groups managing 36 species, including bamboo, medicinal plants, and honey, thereby providing sustainable income opportunities. This integrated approach supports households dependent on agriculture (36 percent) and livestock (22 percent), strengthens forest-based livelihoods, and demonstrates the Division's model of ecosystem-based management that contributes to biodiversity protection, climate change mitigation, and community empowerment while upholding national environmental objectives.

GELEPHU MINDFULNESS CITY SYNERGY

The Division's strategic location within the Gelephu Mindfulness City Special Administrative Region (GMC-SAR) positions it as the ecological foundation of the nation's most significant sustainable development initiative. The Division plays a critical role in providing ecological data and insights, technical feedback, and policy recommendations to guide decision-making processes. It also bears responsibility for safeguarding ecological integrity and ensuring that the natural environment is maintained in a pristine condition for transition to GMC-SAR management.

The management framework adopts an integrated approach to conservation and resource management, with a strong emphasis on participatory processes. This includes biodiversity conservation, sustainable resource allocation, climate change mitigation, and systematic management of human–wildlife conflict. Through this holistic approach, the Division strengthens the ecological foundations of the GMC-SAR while ensuring that national conservation priorities remain aligned with long-term development objectives.

CLIMATE-SMART MANAGEMENT FRAMEWORK

The management plan adopts a climate-smart approach to forest governance by integrating climate science with practical conservation strategies. The framework is structured around adaptation, mitigation, technological innovation, nature-based solutions, and resilient governance.

I. Climate Adaptation Strategies

The Division has undertaken a comprehensive climate vulnerability assessment and identified Dekiling Gewog as most vulnerable (-0.78 index) and Samtenling Gewog as most resilient (-0.61 index), thereby guiding targeted adaptation interventions. Water security has been prioritized, with assessments showing depletion in 47.5 percent of 282

water sources. Interventions include Payment for Ecosystem Services (PES) programs and watershed restoration. Biological Corridor-03 serves as a species migration corridor, facilitating climate-induced movements between Forest Divisionss and maintaining genetic diversity. The Division also manages ecosystem transitions across an elevation gradient of 140 to 3,440 meters, providing natural climate refugia and adaptation pathways.

II. Climate Mitigation Excellence

The Division contributes significantly to climate mitigation through an annual carbon sequestration of 3.85 million tonnes. The High Conservation Value (HCV) framework ensures the protection of intact forest landscapes that provide maximum carbon storage and climate regulation services. Community-based Forest management further prevents deforestation while enhancing carbon stocks through sustainable practices.

III. Climate-Smart Technologies and Innovations

Advanced monitoring and response systems strengthen the Division's capacity to address climate-related forest disturbances. SMART patrolling integrates AI-powered surveillance, drone technology, and real-time monitoring. Digital forest monitoring uses GIS and satellite applications to track forest health, carbon dynamics, and climate impacts. Biodiversity Monitoring Grids (BMG) function as precision conservation tools, providing early warning for climate-induced ecosystem changes.

IV. Nature-Based Climate Solutions

The Division addresses ecosystem resilience through targeted interventions. Invasive species management focuses on climate-sensitive species such as *Lantana camara, Chromolaena odorata,* and *Mikania micrantha*. Wetland and watershed restoration enhances water security and adaptation capacity. Agroforestry integration within community forests combines mitigation benefits with livelihood support through sustainable use of resources.

V. Climate-Resilient Governance

The framework emphasizes governance mechanisms that integrate climate considerations into forest management. Community-centered adaptation ensures that local knowledge complements scientific approaches for context-specific solutions. Multi-stakeholder coordination aligns efforts of government institutions, communities, and development partners for coherent climate action. Adaptive management protocols based on continuous monitoring and evaluation enable timely responses to emerging climate-related challenges.

IMPLEMENTATION FRAMEWORK

The management plan is anchored on eight strategic objectives that collectively strengthen sustainable forest governance and climate resilience. These include

promoting sustainable forest management to enhance biodiversity conservation and ecosystem service delivery, advancing climate action through mitigation and adaptation measures, and fostering ecotourism development as a means of generating sustainable revenue. Research and education are prioritized to ensure evidence-based policy implementation, while resource monitoring is strengthened through improved enforcement and compliance systems. Human–wildlife conflict is addressed through effective mitigation strategies that support coexistence, and service delivery is enhanced to improve efficiency and revenue generation. Finally, institutional and human resource capacities are strengthened to ensure the effective execution of management priorities.

Human–wildlife conflict represents a critical challenge, with peak crop damage recorded at 304.71 acres in 2018, significantly affecting rural livelihoods. To address this, Nu. 75 million has been allocated for conflict mitigation interventions, including the establishment of 75 kilometers of chain-link fencing with solar and electric systems, the deployment of Quick Response Teams in all affected gewogs, and habitat enrichment across 25 hectares. Climate vulnerability further compounds management challenges, with 47.5 percent of water sources showing signs of depletion. In response, a Payment for Ecosystem Services (PES) program has been initiated in collaboration with Gelephu Thromde to secure watershed protection and long-term water security. Transboundary security risks linked to the porous India–Bhutan border also require attention, as they facilitate wildlife trafficking. The Division's strategy includes enhanced surveillance technologies, such as drones and AI-enabled cameras, complemented by strengthened intelligence networks.

The financial framework of the plan provides for a total budget outlay of Nu. 123.403 million over ten years, supplemented by an additional Nu. 2.2 million earmarked for High Conservation Value (HCV) management. Funding will be mobilized from Bhutan for Life (BFL) and IKI projects, the World Bank ACCESS Project, and contributions from the Royal Government of Bhutan (RGoB). In addition, the Division is projected to generate Nu. 3.5 million annually through sustainable forest product utilization. The plan also seeks to integrate climate finance by accessing international mechanisms, leveraging proven outcomes in carbon sequestration and biodiversity conservation.

ECONOMIC BENEFITS

The management plan also contributes to local and national economies. Direct revenue streams are generated from sustainable timber allotments, yielding approximately Nu. 2 million annually, alongside sustainable utilization of non-wood forest products. Ecotourism development, particularly through birding trails and cultural sites, is projected to expand as a reliable source of income. Non-Wood Forest Product (NWFP) marketing further enhances community livelihoods, with bamboo, honey, and medicinal plants contributing significantly to household economies. In addition to direct revenues,

ecosystem service values provide broader economic and strategic benefits. Carbon credits derived from annual sequestration hold potential for international market engagement. Watershed services safeguard downstream communities and the Gelephu Mindfulness City, while global recognition of Bhutan's biodiversity conservation strengthens the nation's environmental brand and enhances opportunities for international cooperation.

INTERNATIONAL POSITIONING

This plan consolidates Bhutan's global reputation as the world's only carbon-negative country, thereby reinforcing its leadership role in international climate negotiations and strengthening its eligibility for climate finance. The integration of artificial intelligence, drone surveillance, and digital monitoring systems demonstrates Bhutan's commitment to conservation technology and positions the country as a regional leader capable of attracting international partnerships and investment. The management plan further operationalizes the Gross National Happiness (GNH) philosophy through community-centered approaches, offering a model for sustainable development that balances environmental integrity with socio-economic well-being. In addition, the adoption of international High Conservation Value (HCV) standards establishes a best-practice framework for landscape-level conservation, providing a replicable model that ensures ecological protection while addressing community needs.

CONCLUSION

The Management Plan represents more than forest management - it embodies our national values of environmental stewardship, community empowerment, and mindful development. With Nu. 123.403 million strategically invested over ten years, this climate-smart initiative positions Bhutan to strengthen our environmental leadership while supporting rural livelihoods and advancing the Gelephu Mindfulness City vision.

The plan's innovative integration of HCV frameworks, climate-smart technologies, and community-based management creates a model for 21st -century conservation that addresses both local needs and global climate challenges. Through scientific rigor, traditional knowledge integration, and cutting-edge monitoring systems, this initiative demonstrates how small nations can lead in global environmental governance. The plan's success will reinforce Bhutan's global reputation as a conservation leader and provide a replicable model for sustainable development that honors our constitutional commitments while preparing for future challenges. By combining High Conservation Value protection with climate-smart management, we establish a new paradigm for forest governance that serves both people and planet.

Key Facts of DFO Sarpang

Forest statistics			
Sl. No.	**Particulars**	**Units**	**Value**
1	**Total Forest Area**	ha	98,852
2	**Forest Cover Percent**	%	83.45
	Warm Broadleaved Forest	ha	43,315.20
	Subtropical Forest	ha	31,057.40
	Cool Broadleaved Forest	ha	6,691.74
	Evergreen Oak Forest	ha	1,244.94
3	**Basal area per hectare**		
	Warm Broadleaved Forest	m2/ha	27.67
	Subtropical Forest	m2/ha	20.08
	Cool Broadleaved Forest	m2/ha	42.89
	Evergreen Oak Forest	m2/ha	38.07
	Hemlock Forest	m2/ha	46.51
	Fir Forest	m2/ha	44.47
	Spruce Forest	m2/ha	36.95
4	**Growing stock per hectare**		
	Warm Broadleaved Forest	(m^3 ha^{-1})	228.03
	Subtropical Forest	(m^3 ha^{-1})	160.9
	Cool Broadleaved Forest	(m^3 ha^{-1})	379.15
	Evergreen Oak Forest	(m^3 ha^{-1})	341.01
	Hemlock Forest	(m^3 ha^{-1})	442.7
	Fir Forest	(m^3 ha^{-1})	398.82
	Spruce Forest	(m^3 ha^{-1})	384.84
5	**Forest Carbon stock**		
	Warm Broadleaved Forest	(t ha^{-1})	169.1
	Subtropical Forest	(t ha^{-1})	106.97
	Cool Broadleaved Forest	(t ha^{-1})	250.79
	Evergreen Oak Forest	(t ha^{-1})	238.35
	Hemlock Forest	(t ha^{-1})	263.21
	Fir Forest	(t ha^{-1})	255.72
	Spruce Forest	(t ha^{-1})	240.86
Protected Areas			
6	Biological Corridors	ha	40769

7	High Conservation Value Area	ha	4500
Sustainable Forest Management Regimes			
8	Total area of Community Forest	ha	3290.744
9	No.of CFs	No.	24
10	Local Forest Management Area	ha	165,230.00
11	No.of LFMPS	No.	5
12	NWFP Groups	No.	9
Wood-based industries			
13	Wood-based industries	No.	36
Field Offices			
14	Divisional Forest Office	No.	1
15	Divisional Range Office	No.	2
16	Divisional Beat Office	No.	2
17	Southern Wildlife Rescue and Rehabitation Centre	No.	1

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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 are 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 on sustainable utilization. Though scientific management of our forest resources based on the principles of sustainability has long been practiced, it has become even more imperative than ever before considering the changing climate and its impacts. Today, climate change and its impacts have widely affected many countries. Bhutan by virtue of being 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, to conserve the country's natural resources and to prevent degradation of the ecosystem, a minimum of 60% of Bhutan's total land shall be maintained under forest cover for all time.

Department of Forests and Park Services as the custodian of the 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 divisional jurisdiction is guided by the principles of sustainability, it is even more important to be scientific along with long term divisional goals and objectives. It is also equally important to review and evaluate such goals and objectives on a periodic basis. Therefore, to do so a comprehensive and holistic Divisional 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 Divisional Forest Office, Sarpang.

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 neutral 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.

1.2.2 Overview of sustainable forest management

Bhutan is internationally recognized for its commitment to environmental conservation and sustainable development, guided by the national philosophy of Gross National Happiness (GNH). Sustainable Forest Management (SFM) is central to this vision, ensuring a balance between ecological, economic, and social benefits derived from forest resources. The Forest and Nature Conservation Act (FNCA) 2023 and the Forest and Nature Conservation Rules and Regulations (FNCRR) 2023 provide the legal foundation for conservation, utilization, and management, while the National Forest Policy 2011 mandates the maintenance of at least 60 percent forest cover, a target Bhutan has consistently exceeded.

Divisional Forest Office, Sarpang, established in 1959 as the second forest division in the country, has progressively evolved in mandate and practice. While initially focused on resource protection and timber regulation, the Division has transitioned to holistic management approaches grounded in forest inventory, community engagement, and contemporary SFM principles. Presently, the Division maintains 83.41 percent forest cover (excluding scrubland), encompassing diverse forest types such as Subtropical, Warm Broadleaved, Evergreen Oak and Cool Broadleaved forests. The Division supports an average tree density of 356 trees per hectare and sapling density of 157 per hectare, reflecting both ecological richness and the need for careful stewardship (NFI, 2022).

The Division's achievements show its leadership in participatory management and conservation. Key milestones include the establishment of five Local Forest Management Areas (19,430.1) hectares), 24 community forests (3,290.74 hectares), and the support of five private forests covering 0.692 hectares. Nine Non-Wood Forest Product (NWFP) groups actively manage bamboo, honey, medicinal plants, and other species, generating local income while safeguarding biodiversity.

Human–wildlife conflict remains a significant challenge, with peak crop damage of 304.71 acres recorded in 2018, severely impacting rural livelihoods. To address this, Nu. 75 million has been allocated for mitigation measures that include 75 kilometers of chain-

link fencing with solar and electric systems, Quick Response Teams established in all affected gewogs, and habitat enrichment across 25 hectares. Climate vulnerability is another concern, with 47.5 percent of water sources showing signs of depletion. In response, a Payment for Ecosystem Services (PES) program has been initiated with Gelephu Thromde to safeguard watersheds and ensure long-term water security.

Transboundary security risks also shape the Division's priorities. The porous India–Bhutan border increases the risk of wildlife trafficking, requiring enhanced surveillance systems and intelligence networks. To counter this, the Division deploys drone technology, AI-enabled cameras, and collaborative enforcement mechanisms to strengthen monitoring and reduce illegal activities.

The Division also contributes substantially to Bhutan's economic development. Sustainable timber allotments generate approximately Nu. 2 million annually, complemented by ecotourism development through birding trails and cultural sites. Community-based NWFP marketing further diversifies local incomes, with bamboo, honey, and medicinal plants providing direct benefits to households. Beyond direct revenues, ecosystem services deliver broader economic value. Carbon sequestration offers potential access to international carbon markets, watershed protection supports downstream communities and the Gelephu Mindfulness City, and global recognition of Bhutan's biodiversity reinforces the country's environmental brand.

Through these integrated approaches, sustainable forest management is aligned with climate action, economic development, and cultural preservation, while contributing to Bhutan's position as the world's only carbon-negative country.

1.3. Policies and legislation

1.3.1 National Forest Policy (1974 & 2011)

The National Forest Policy (NFP) of Bhutan has evolved over time to address the country's conservation goals and changing forest management needs. The first policy, introduced in 1974, emphasized maintaining a minimum of 60% forest cover, an objective later enshrined in Bhutan's Constitution. It laid the foundation for the current Forest Divisions system by establishing one national park and four wildlife sanctuaries. Alongside conservation and afforestation programs, the 1974 policy highlighted the need for investments, research, and publicity in the forestry sector.

The National Forest Policy 2011 was developed to adapt to evolving forest governance. Since 1957, the approach transitioned from "free access" to "almost no access," and finally to "managed access." The 2011 policy applied scientific management approaches to forest and biodiversity resources, aiming to benefit people without compromising conservation values or the constitutional mandate of maintaining 60% forest cover. It also emphasized sustainable forest management, participatory governance, environmentally friendly technologies, and efficient resource utilization to

support private sector and rural community development. This progression reflects Bhutan's commitment to balancing conservation with sustainable development through adaptive forest policies.

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

The Bhutan Forest Act 1969, the first legislation passed by the National Assembly of Bhutan, nationalized all land without permanent, heritable, and transferable rights, defining it as forest. It provided directives regarding forest rights, uses, royalties, and penalties. This Act was repealed and replaced by the FNCA of Bhutan in 1995.

The FNCA 1995 introduced requirements for management plans aimed at both forest production and protection, while emphasizing community and social forestry. It encouraged community and individual participation and established the legal basis for management restrictions, forest planning, and function mapping.

The most recent revision of the FNCA, in 2023, addresses emerging conservation challenges while balancing Bhutan's developmental needs. This revision harmonized obsolete sections and introduced mechanisms for payment for ecosystem services, ensuring a modernized approach to forest and nature conservation that reflects contemporary environmental and economic priorities.

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

The FNCRR have evolved significantly since their introduction in 2000 to align with the FNCA 1995. Initially, the FNCR provided a framework for managing State Reserved Forests (SRF), including Community Forests (CF), while conserving wildlife, soil, water, and related natural resources. The 2006 revision expanded on these provisions, introducing management plans for Forest Divisionss (PAs), Forest Management Units (FMUs), and Non-Wood Forest Products (NWFP). Over the years, amendments reflected changing circumstances, such as the revised rural timber allotment program and the integration of Rules on Biological Corridors (BC) in 2017.

The latest revision in 2023 builds on this foundation, incorporating the mandates of the FNCA 2023. Key updates include the deletion of the chapter on surface collection of sand and stone, transferring that responsibility to the Department of Geology and Mines. Additionally, the 2023 rules emphasize streamlining public service delivery through online platforms and refining provisions to enhance governance and resource management. This evolution highlights Bhutan's ongoing commitment to sustainability and efficient public services.

1.3.4 Land Lease Rules and Regulations of Bhutan 2018

The Land Lease Rules and Regulations of Bhutan 2018 implement the provision of the Land Act of Bhutan (LA) 2007 and necessitates the requirement of forestry clearance for issuance of lease of SRF land. Further, it strongly discourages and forbids lease of land

registered under government institutions and areas which are under different management namely designated parks, Nature Reserve, PA, BC, Buffer Zones, CF, Critical Watershed, Wetland, High Risk Zones, Nyes (religious sites & important monuments) and Restricted Zones. However, the Secretariat can make exemptions for only those critical infrastructures of national importance and public need under only 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 unique protection of plant varieties. It also authorizes the implementation of the access and benefit-sharing regime to derive additional benefits in a fair and equitable manner.

1.3.6 Land Act of Bhutan 2007

The LA 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 to the State and convert to leasehold uses with management plans giving preference to previous rights 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, 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 Forest Divisionss.

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 Ministry of Energy and Natural Resources (MoENR) to ensure prevention and management of waste.

1.3.9. Climate Change Policy of Bhutan, 2020

Bhutan adopted this policy to guide coordinated climate action while remaining carbon neutral. It addresses risks such as GLOFs, erratic rainfall, landslides, and droughts. The policy provides a framework for mitigation, adaptation, stakeholder participation, and mobilization of international finance, technology, and capacity support.

1.3.10. Nationally Determined Contribution (NDC), 2021

Bhutan's second NDC, launched in June 2021, reaffirmed carbon neutrality and introduced sector-specific Low Emission Development Strategies (LEDS). It outlined mitigation and adaptation roadmaps and sought enhanced international support. The

NDC builds on the first pledge of 2009 by providing detailed strategies for decoupling growth from emissions.

1.3.11. National Adaptation Plan (NAP), 2023

The NAP offers a long-term framework to integrate adaptation into development planning. Supported by GCF, UNDP, and partners, it prioritizes resilience in agriculture, forestry, water, health, energy, and infrastructure. It strengthens coordination, data systems, and financing while aligning with the 2020 Climate Change Policy and the 2021 NDC.

1.3.11. National Adaptation Plan (NAP), 2023

The NAP offers a long-term framework to integrate adaptation into development planning. Supported by GCF, UNDP, and partners, it prioritizes resilience in agriculture, forestry, water, health, energy, and infrastructure. It strengthens coordination, data systems, and financing while aligning with the 2020 Climate Change Policy and the 2021 NDC.

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 provide 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 sustainable forest ecosystem 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 sustain the Sarpang community's and Gelephu Mindfulness City's demand on forests and natural resources by integrating ecological balance, social well-being, and economic goals through responsible development, biodiversity conservation, and cultural heritage preservation.

1.4.4 Objectives

The objectives of this management plan are:

1. *To promote sustainable and inclusive forest management practices that enhance biodiversity conservation, maintain ecosystem services, and strengthen ecological resilience while actively involving all genders in biodiversity conservation and ensuring long-term environmental and socio-economic benefits.*
2. *To implement climate change mitigation and adaptation strategies through sustainable practices, integrating climate-resilient green infrastructure, while fostering community engagement to enhance resilience, reduce vulnerabilities, and promote sustainable development.*
3. *To develop and promote ecotourism and recreational activities that conserve natural resources, support local livelihoods, and enhance visitor experiences while ensuring environmental sustainability and cultural preservation.*
4. *To advance research, education, and policy implementation for sustainable forest management, fostering biodiversity conservation, ecosystem resilience, and socio-economic development.*
5. *To strengthen resource monitoring, assessment, and enforcement mechanisms to ensure sustainable utilization, conservation of natural resources, and compliance with environmental regulations.*
6. *To implement effective HWC mitigation strategies and enhance rescue operations to promote coexistence, safeguard communities, and conserve wildlife populations.*
7. *To enhance public service delivery and revenue generation by implementing strategic initiatives and fostering innovative solutions that ensure efficiency, sustainability, and stakeholder satisfactions.*
8. *To strengthen the capacity of forestry officials and stakeholders for improved service delivery.*

CHAPTER 2: Current Status

2.1 Boundary and Area

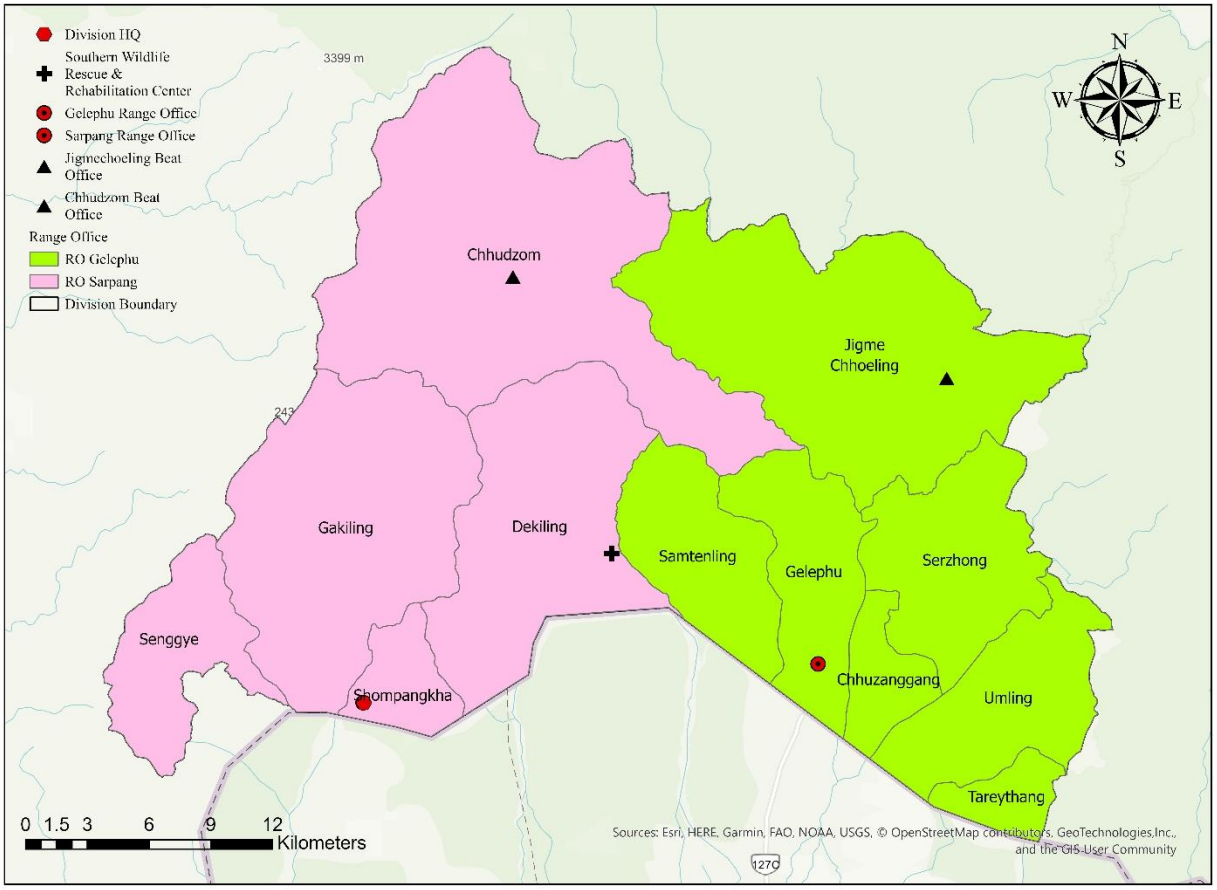

Figure 1: Map of Divisional Forest Office, Sarpang showing jurisdictions of Range Offices

DFO Sarpang, is located between 26.80° N - 27.15° N and 90.14° E - 90.64° E and is located in south-central Bhutan within an altitudinal range of 140 – 3,440 m. It has total area of 988.52 km² including 407.7 km² of Biological Corridor 03 (BC-03) linking RMNP, PWS, and JSWNP. The Division shares its southern border with Assam, India, and the Royal Manas National Park (RMNP) to the East. To the West, it borders Phibsoo Wildlife Sanctuary (PWS) and DFO Tsirang, while in the North it adjoins Jigme Singye Wangchuck National Park (JSWNP).

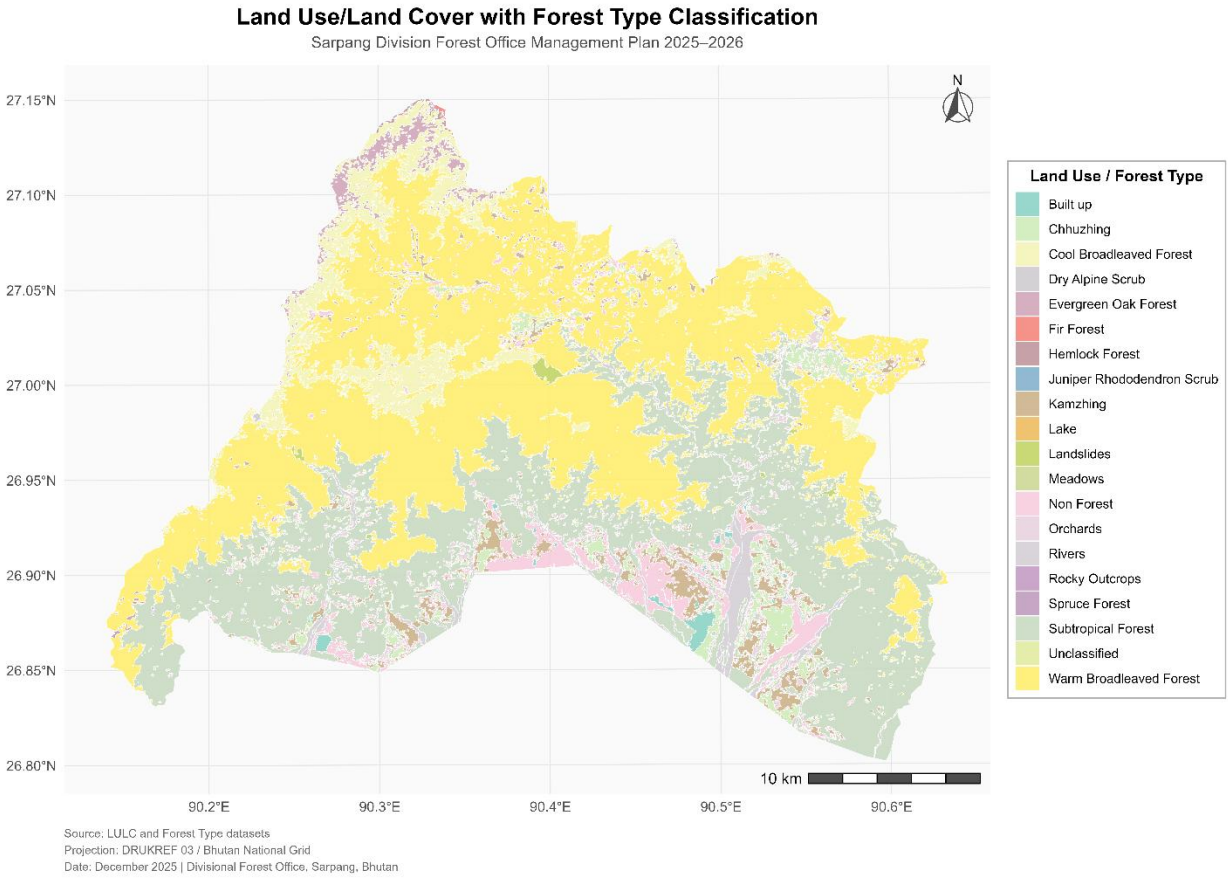

Figure 2: Land-use and Land-cover categories in DFO Sarpang

Table 1: Landcover and Land-use categories

Land-use Types	**Area_ha**	**Percentage**
Warm Broadleaved Forest	43315.20	43.81
Subtropical Forest	31057.44	31.42
Cool Broadleaved Forest	6691.74	6.77
Non-Forest	5378.32	5.44
Kamzhing	3693.60	3.74
Chhuzhing	2945.23	2.98
Rivers	2403.55	2.43
Evergreen Oak Forest	1244.94	1.26
Orchards	1036.52	1.05
Built up	450.41	0.46
Landslides	390.62	0.40
Hemlock Forest	86.79	0.09

Rocky Outcrops	61.50	0.06
Fir Forest	35.27	0.04
Dry Alpine Scrub	26.54	0.03
Spruce Forest	23.83	0.02
Meadows	4.44	0.00
Juniper Rhododendron Scrub	3.29	0.00
Lake	2.27	0.00
Total	**98851.50**	**100.00**

2.2 Administration

2.2.1 Administrative Set up

DFO Sarpang is headed by a Chief Forestry Officer and administers two Range Offices located in Gelephu and Sarpang. Each Range Office supervises one Beat Office, with Jigmechoeling under the Gelephu Range and Chhudzom under the Sarpang Range. The Division provides forestry services across 10 of the 12 gewogs within its jurisdiction, while Umling and Tareythang gewogs are managed by Royal Manas National Park (RMNP). The Sarpang Range oversees five gewogs, namely Gakiling, Shompangkha, Dekiling, Senggye, and Chhudzom, while the Gelephu Range administers Samtenling, Gelephu, Serzhong, Chhuzanggang, and Jigme Chhoeling.

The Division is staffed with 59 personnel, including 49 technical and 10 non-technical members, who collectively implement forest conservation, management, and service delivery mandates.

A specialized facility under the Division is the Southern Wildlife Rescue and Rehabilitation Centre (SWRRC), established in 2017 at Jigmeling, Dekiling Gewog, at an elevation of 402 meters. The Centre spans 15 acres and plays a vital role in the rescue, treatment, and rehabilitation of wildlife affected by human–wildlife conflict, road accidents, and related threats. It currently houses 22 gharials and 4 crocodiles, serving both conservation and educational purposes. The Centre also contributes to ecotourism development and supports conservation awareness initiatives.

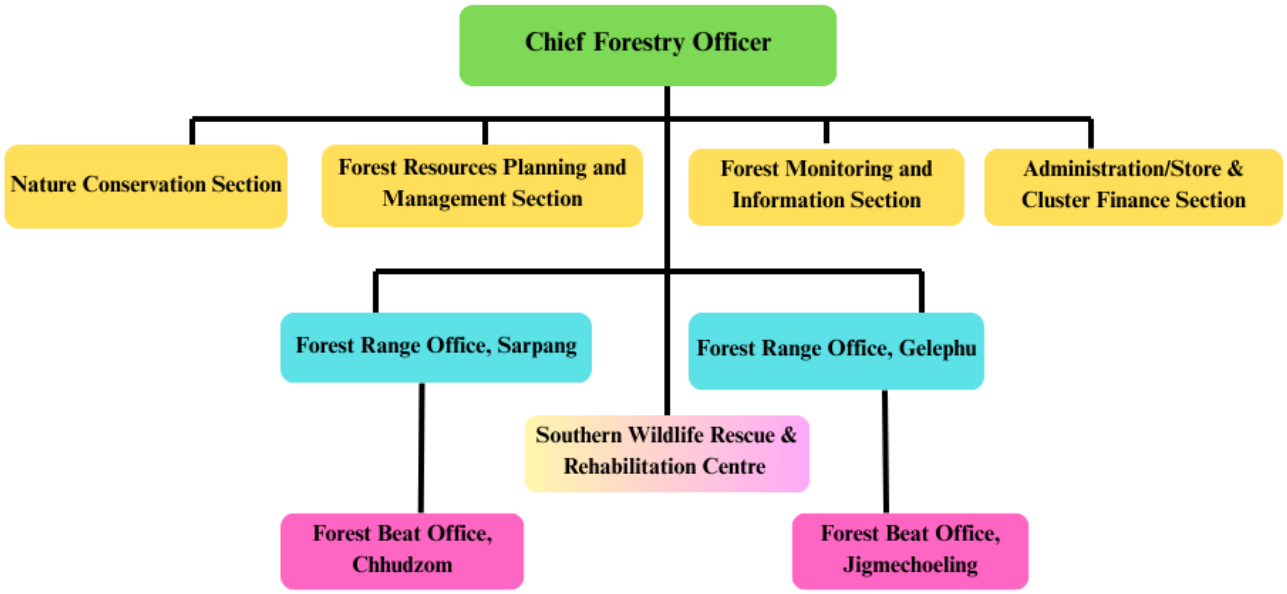

Figure 3: Organogram of Divisional Forest Office, Sarpang

2.2.2 Mandates

To conserve and manage the biodiversity and forest resources within its domain, ensuring the sustainable use of natural assets in harmony with the mission and vision of the DoFPS.

Sections:

1. **Administration and Store Section:** Manages annual operational plans, budgets, procurement, personnel, and administrative matters while liaising with relevant organizations.
2. **Nature Conservation Section:** Provides guidance on managing Forest Divisionss, biodiversity surveys, human-wildlife conflict mitigation, conservation programs, and ecotourism promotion.
3. **Forest Resources Planning and Management Section:** Implements scientific forest management, supports community forestry, allocates timber and NWFPs, manages forest pests, and oversees reforestation and afforestation programs.
4. **Forest Monitoring and Information Section:** Conduct Forest inventories, manages online forestry services (OFS), monitors plantations and industries, and maintains resource information systems.

The Division's integrated approach ensures efficient resource utilization, biodiversity conservation, and sustainable forest management.

2.2. 3 Human Resource

Figure 4: Staffs of DFO-Sarpang

Table 2: HR Strength and Requirement of Division

Position Title	Position Level	Approved Strength	Existing Strength	Additional requirement
Chief Forestry Officer	**P1A**	1	1	0
Forestry Officer	**P4A**	6	5	1
Veterinary Officer	**P4A**	1	0	1
Asst. Forester	**S3**	42	42	0
ADM	**S5A**	1	1	0
Driver	**S5/O1/Contract**	-	3	0
ESP/GSP		6	6	0

2.2.4 Budget and Revenue

Budget

The Division's budget is dominated by personnel emoluments, which accounted for over three-quarters of allocations based on budget figures from 2020-2024, while conservation, monitoring, and operations received smaller but essential shares. Despite slight adjustments over the years, the imbalance between budget and revenue remains

large, with expenditure far exceeding income, leaving the Division reliant on central government support.

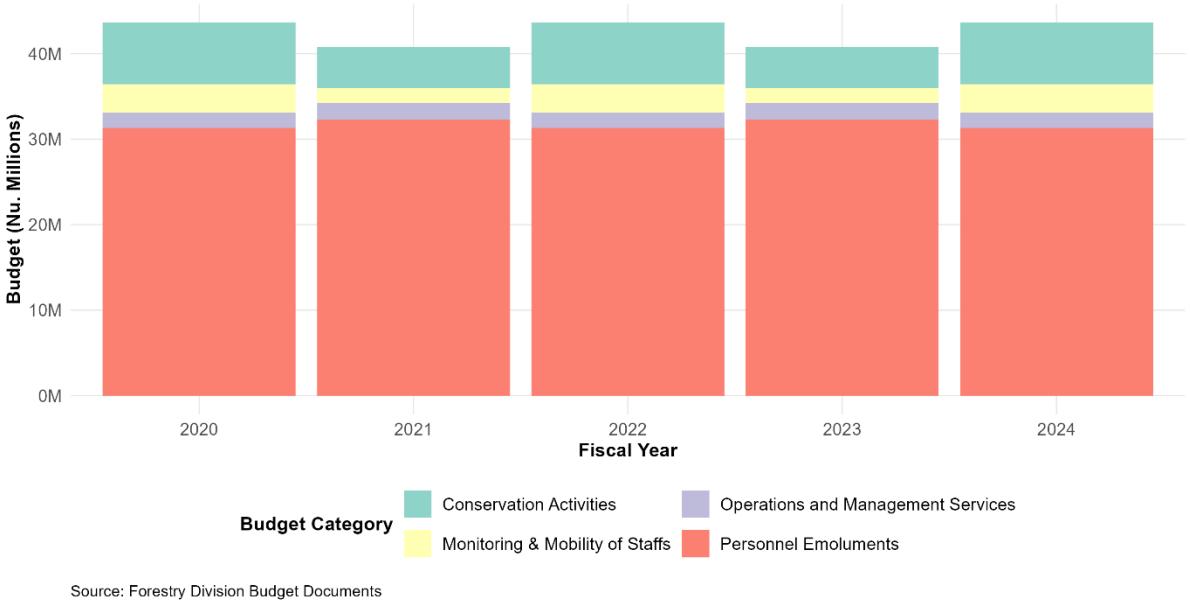

Figure 5: Budget distribution by category

Revenue

From 2020 to 2024, the Division's revenue showed marked fluctuations, with fines, penalties, permits, and compensation forming the main sources until 2023, followed by a sharp increase in non-wood forest products (NWFPs) in 2024 that transformed the overall revenue structure. Looking ahead, projections for 2025–2029 reveal two possible trajectories: a flat linear trend stabilizing around Nu. 2.5–3 million annually, and a compound growth model indicating steady expansion that could surpass Nu. 5 million by 2029. These patterns point to both volatility and growth potential, stressing the importance of diversifying income streams, strengthening compliance, and scaling up NWFP markets to secure long-term financial sustainability.

Figure 6: Revenue composition by major forest products, showing top five revenue sources between 2020 and 2024.

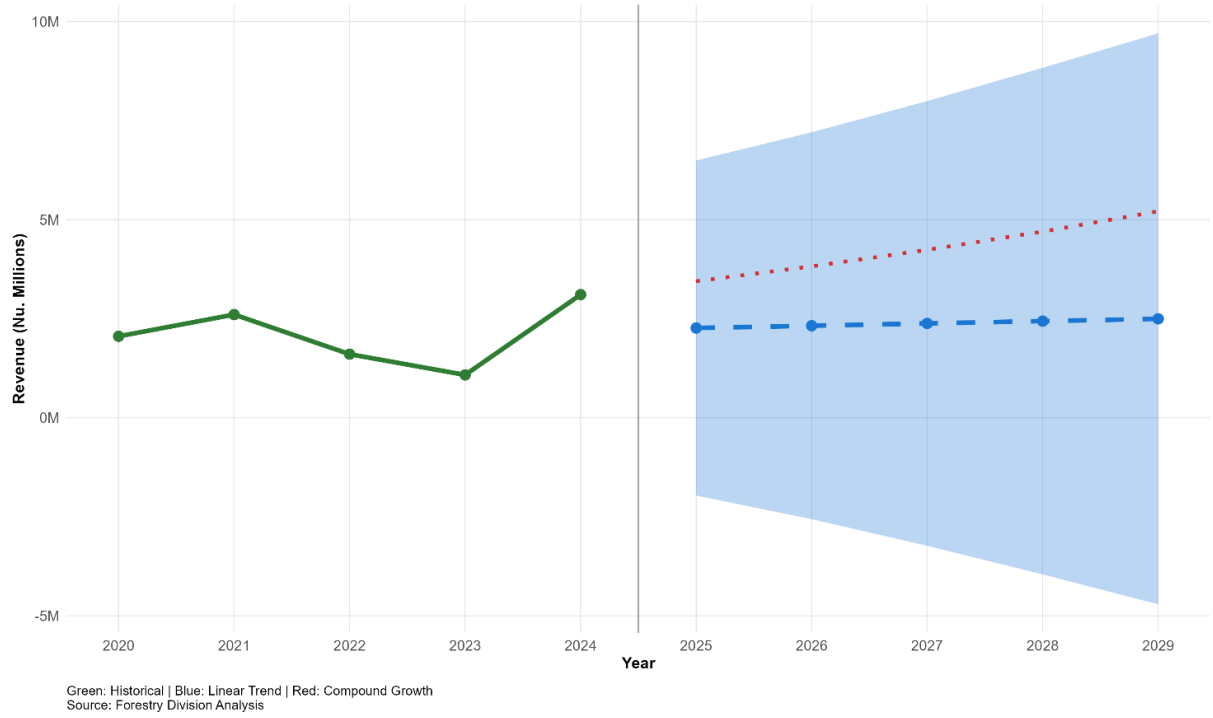

Figure 7: Revenue projections for 2025–2029 based on historical performance and forecast models.

2.3 Biodiversity Conservation

The Divisional Forest Office (DFO), Sarpang plays a critical role in conserving biodiversity within one of Bhutan's most ecologically diverse and wildlife-rich landscapes. The division encompasses a mosaic of forest, aquatic, and agricultural ecosystems, including subtropical and warm broadleaved forests, riverine systems, wetlands, and agro-ecosystems that support a wide range of flora and fauna, including several nationally and globally significant species.

Biodiversity conservation efforts in DFO Sarpang focus on habitat protection, ecological monitoring, and sustainable forest management. Key activities include forest integrity assessments, biodiversity baseline surveys, invasive species monitoring and control, and protection of High Conservation Value (HCV) areas. The division also supports wildlife conservation through anti-poaching patrols, habitat restoration, and collaboration with Forest Divisionss and biological corridors to maintain landscape connectivity.

Community-based conservation forms an integral component of biodiversity management in Sarpang. The division works closely with local communities, community forests, and gewog administrations to promote sustainable resource use, reduce human–wildlife conflict, and strengthen stewardship of natural resources. These efforts are aligned with national conservation policies, the Forest and Nature Conservation Act and Rules, and Bhutan's broader commitments to biodiversity conservation and climate resilience.

2.3.1 Flora Composition

The floral diversity in this region can be attributed to its climatic and topographic variations. Recent surveys documented 260 tree species, 110 shrubs, 27 climbers and vines, 17 bamboo species, 23 cane and related species, 195 herbs, 67 orchids, and 69 fern and sporophyte species, along with lichen, bryophyte, and grass groups. Altogether, the flora checklist accounts for more than 770 species across diverse families and genera, reflecting the ecological richness of the area. The flora shows strong affinities with the Assam plains, with dominant tree species such as *Macaranga denticulata*, *Albizia lebbeck*, Alnus nepalensis*,* Schima wallichii*, and* Altingia excelsa, while *Shorea robusta* and *Tectona grandis* occur in plantation areas. Shrubs include *Bridelia micrantha*, *Chloranthus elatior*, and *Clerodendrum chinense*, while deciduous shrubs such as *Boehmeria glomerulifera* and *Buddleja davidii* are also prevalent. Ground vegetation is represented by perennial herbs like *Ageratum houstonianum* and *Colocasia esculenta*, along with annuals such as *Bidens pilosa* and *Digitaria ciliaris*. This diversity is structured across three major forest types: subtropical forests, warm broadleaved forests, and cool broadleaved forests, underscoring the ecological importance of the Division for species conservation and habitat management.

1. **Sub-Tropical Forest**: Dominated by species like *Pterospermum acerifolium*, *Gmelina arborea*, and *Shorea robusta*, these forests form dense jungles on slopes and riverbanks.

Figure 8: Subtropical Forest

2. **Warm Broadleaved Forest**: It features a mix of evergreen and deciduous species like *Albizia lebbeck* and *Schima wallichii*, with indicator species such as *Castanopsis hystrix*.

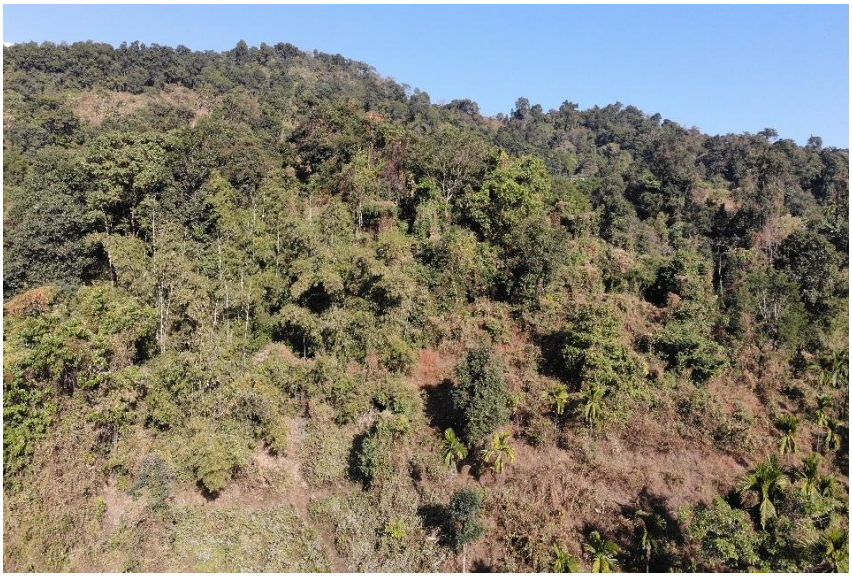

Figure 9: Warm broadleaved Forest

3. **Cool Broadleaved Forest**: Characterized by broad-leaved species like *Alnus nepalensis* and *Acer campbellii*, it is ecologically linked to Oak Forests.

Figure 10: Cool Broadleaved Forest

Table 3: Percentage of Area Covered by Different Forest Types

Forest Types	Area coverage (%)
Cool Broadleaved Forest	6.77
Evergreen Oak Forest	1.26
Fir Forest	0.04
Hemlock Forest	0.09
Juniper Rhododendron Scrub	0.003
Dry Alpine Scrub***	0.03
Non-Forest	16.56
Spruce Forest	0.02
Subtropical Forest	31.42
Warm Broadleaved Forest	43.82
Total Area	**100**

**** Dry alpine scrub seems to be non-existent under the jurisdiction of DFO Sarpang. However, the national land use shapefiles indicate its presence.*

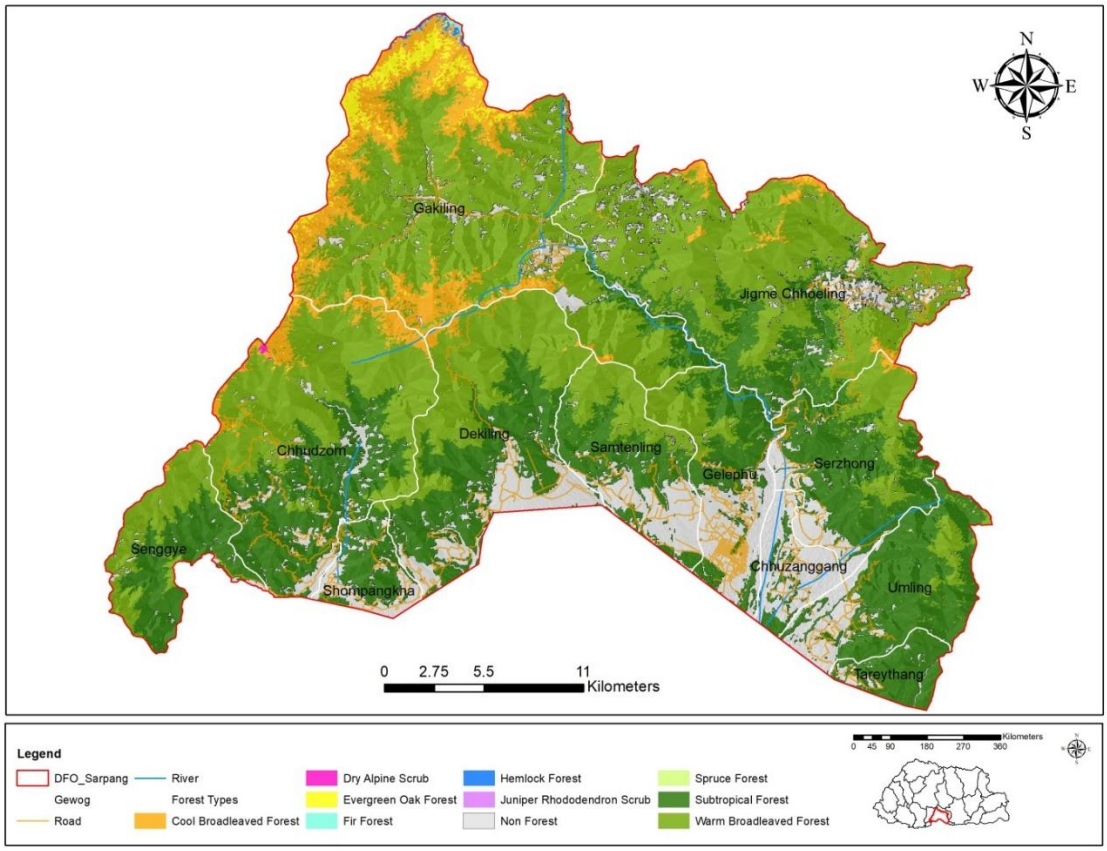

Figure 11: Forest Type Map of DFO Sarpang

2.3.2 Fauna Composition

In total 48 mammal species, such as herbivores like Asiatic elephants, Gaur, Sambar deer, barking deer, and wild pigs are recorded from DFO Sarpang, alongside carnivores like Bengal tigers, common leopards, wild dogs, and others. Critically endangered species such as the Chinese Pangolin is also present. A total of 215 bird species, with 34 reptiles, 15 amphibians 54 fish species. However, significant research gaps exist on bats, aquatic biodiversity (macroinvertebrates, zooplankton, phytoplankton) and terrestrial insect diversity. These understudied taxa, critical for ecological roles and bioindication, require focused research to generate baseline data.

Figure 12: Faunal Diversity of DFO-Sarpang

2.3.3 Wetland and Riverine Ecosystem

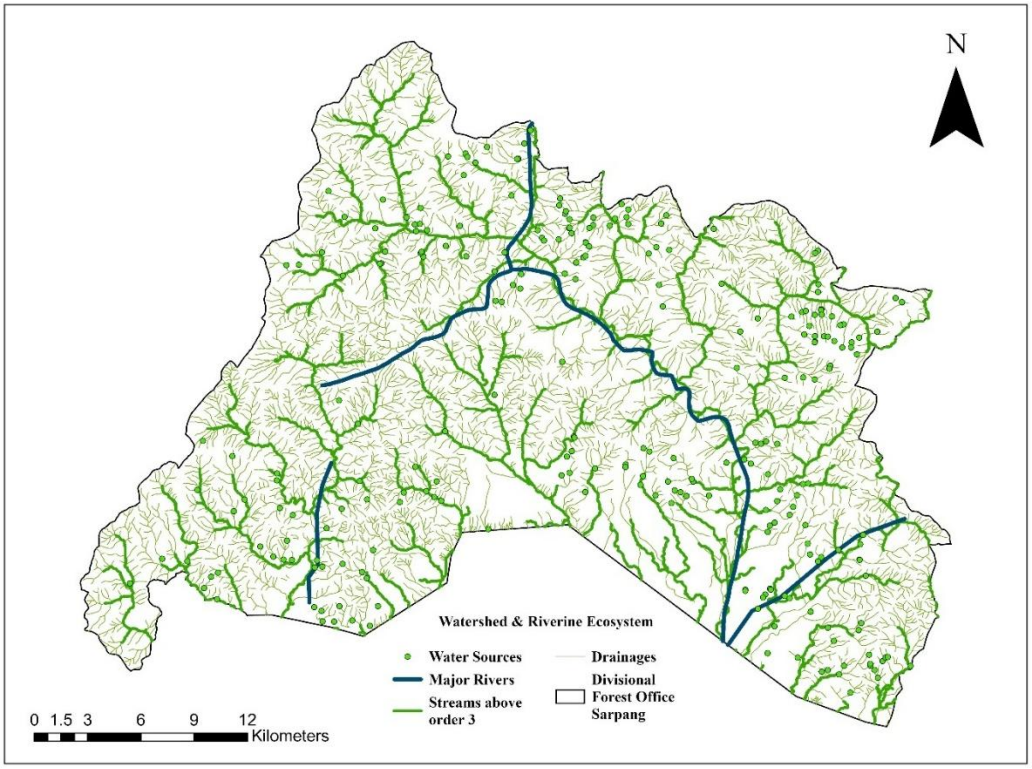

Figure 13: Watershed and Riverine Ecosystem of Sarpang, showing major rivers, streams above third order, and mapped water sources

Sarpang is endowed with a dense network of rivers, streams, and water sources that form its vital wetland and riverine ecosystems. The district is traversed by major rivers such as the Sarpangkhola, Maokhola, and Bhalukhola, Tharwarkhola which drain into the Brahmaputra basin. Numerous perennial and seasonal streams above third order branch across the landscape, supported by more than 200 mapped water sources scattered throughout the division.

These ecosystems sustain biodiversity and serve as ecological corridors linking forests, farmlands, and human settlements. They provide breeding and feeding habitats for aquatic life, migratory birds, and large mammals such as elephants and deer. The rivers and streams also underpin local livelihoods by supplying irrigation, drinking water, and fisheries, while wetlands regulate floods, recharge groundwater, and maintain water quality. The map shows the extensive hydrological network, with major rivers highlighted in blue, stream orders delineated in green, and water sources marked as distinct nodes. This network underpins Sarpang's watershed functions and is central to both ecological integrity and community well-being.

Key challenges include sand and stone extraction, encroachment, pollution from expanding settlements, and climate-driven hazards such as flash floods. Protecting ared

managing these ecosystems is critical for sustaining biodiversity, water security, and resilience against climate impacts in Sarpang.

2.3.4 Agricultural Systems

Most households in Sarpang practice livestock farming, which is vital for food security and income stability (SES Report 2024). Commercial poultry and cattle rearing dominate, while pigs, goats, sheep, and buffaloes are less common. Poultry is mainly stall-fed, whereas cattle are either stall-fed, tethered, or allowed limited grazing on fallow and SRF lands. Tethering and stall feeding are the most widespread practices, followed by improved pasture development, with no pastoral herding recorded. Though only a small share of households practices open grazing, it remains important for biodiversity and natural regeneration (SES Report 2024). Alongside livestock, communities cultivate maize, millet, pulses, rice, and other cereals, as well as fruits and nuts, with mandarin oranges, mangoes, and areca nuts being most common. Crop production faces challenges such as pests and diseases, wildlife depredation, lack of irrigation, and issues like erratic rainfall, soil erosion, and poor market access (SES Report 2024).

Human-wildlife conflict is a major concern, particularly with Asian elephants and wild pigs damaging crops and property. DFO Sarpang has introduced several mitigation measures, with electric fencing being the most preferred by communities (SES Report 2024). Forest dependency remains high, primarily for timber extraction, firewood, and fodder collection, highlighting the strong link between local livelihoods and forest resources (SES Report 2024).

Figure 14 : Different farming practices in Sarpang

2.4. Existing Management Regimes

DFO Sarpang, oversees 35 area-based and 13 cross-cutting management regimes, including BC-03, Local Forest Management Areas (LFMAs), Community Forest Management Groups (CFMGs), private forests (PFs), plantation sites, High Conservation Value (HCV) areas, and Non-Wood Forest Products (NWFP) management groups. BC-03 allows resource allocation to local communities through a conservation management plan, ensuring sustainable use. LFMAs, established in four gewogs, address local resource needs, with plans to expand to remaining gewogs. CFMGs promote community ownership, enabling resource allocation based on scientific management plans. Private forest registration encourages sustainable cultivation, while the Payment for Ecosystem Services (PES) program in the Pelrithang Khatoe Raidara-Lhayul watershed fosters collaboration between upstream and downstream communities for water resource protection. HCV areas conserve intact and cloud forests, and nine NWFP groups support sustainable resource use and income generation for communities. Challenges include inadequate monitoring, inconsistent implementation, limited budgets, and ineffective execution of plans. Addressing these requires stronger accountability, regular monitoring, and targeted studies to identify and resolve implementation barriers.

2.4.1 Area Based Management Regimes.

2.4.1.1 Biological Corridor-03

BC-03 covers 407.69 sq. km, with a length of 57.68 km and a width of 27.47 km, connecting JSWNP, PWS and RMNP. Approximately 84.48% of BC-03 lies within the jurisdiction of the DFO Sarpang, while 15.52% overlaps with the DFO Tsirang. Geographically, BC-03 is located between 6.84°N to 27.07°N latitude and 90.16°E to 90.55°E longitude, with an altitudinal range of 348 to 2,477 masl. an altitudinal range of 353 to 2,360 masl. The corridor features sub-tropical, warm broadleaved, cool broadleaved, evergreen oak forest and dry alpine scrub, providing crucial habitats for wildlife and supporting gene flow. Its 10-year Conservation Management Plan aims to secure habitats that facilitate species migration between core areas while addressing the resource needs of resident communities, ensuring sustainable conservation.

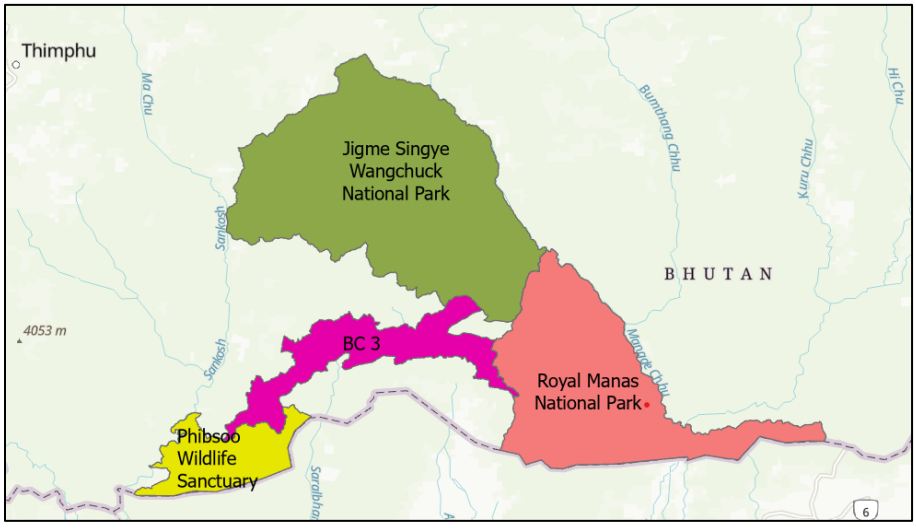

Figure 15: Map of Biological Corridor 03

2.4.1.2 Local Forest Management Area

Table 4: Details of Local Forest Management Area under DFO Sarpang.

Sl.no.	Name of LFMA	Dzongkhag	Gewog	Year of Establishment	Total Gewog Area(ha)	Area Covered by the plan(ha)	Annual Allowable Cut (AAC)-m3	Area Covered %	Plan Cycle
1	Chhudzom	Sarpang	Chhudzom	2020	23200	6208.47	1968	26.76	2020-2030
2	Dekiling	Sarpang	Dekiling	2019	11300	2378.5	5976	21.05	2019-2029
3	Gakiling	Sarpang	Gakiling	2019	78500	2297.5	1587	2.93	2019-2029
4	Shompangkha	Sarpang	Shompangkha	2019	2100	1536.7	438	73.2	2019-2029
5	Jigmechoeling	Sarpang	Jigmechoeling	2025	50130	7009.2	4393	14	2025-2035

2.4.1.3 Community Forest

Table 5: Details of Community Forest under DFO Sarpang.

Sl.no.	Name of Community Forest	Dzongkhag	Gewog	Year of Establishment	Members		Total Area(ha)	Annual Allowable Cut (Nos)	Plan Cycle	Plan Period
					Male	Female				
1	Lhayul	Sarpang	Chhudzom	2009	78	15	382.67	628	2	2019-2029
2	Phuntshopelri	Sarpang	Senggye	2009	31	28	97.48	180	2	2019-2029
3	Yargaythang	Sarpang	Senggye	2013	41	17	91.26	34	2	2023-2033
4	Norbugang	Sarpang	Senggye	2009	32	11	103	17	2	2019-2029
5	Pakheygang	Sarpang	Shompangkha	2013	24	4	53.26	34	2	2023-2033
6	Rigsumgang	Sarpang	Shompangkha	2009	33	4	77.8	41	2	2019-2029

7	Bumpaling	Sarpang	Dekiling	2019	65	34	232.02	41	1	2019-2029
8	Dungkarling	Sarpang	Samtenling	2015	66	29	359.484	43	1	2015-2025
9	Pema Yoezer	Sarpang	Samtenling	2011	34	23	110	0	2	2022-2032
10	Gakiling	Sarpang	Gakiling	2013	43	11	133.74	13	2	2023-2033
11	Gaselo	Sarpang	Gakiling	2010	26	7	39.5	11	2	2020-2030
12	Gyelsey	Sarpang	Gakiling	2016	25	1	134.25	66	1	2016-2026
13	Relangthang	Sarpang	Gakiling	2009	48	2	98	35	2	2019-2029
14	Lhaling	Sarpang	Gakiling	2008	30	3	75.5	41	2	2018-2028
15	Lothuen	Sarpang	Gakiling	2018	13	3	123.6	8	1	2018-2028
16	Reteypani	Sarpang	Gakiling	2016	46	8	322	117	1	2016-2026
17	Sangkhey	Sarpang	Gakiling	2019	40	9	168.4	164	1	2019-2029
18	Rai Dangra	Sarpang	Gelephu	2013	18	13	91.55	123	2	2023-2033
19	Chhuzanggang	Sarpang	Chhuzanggang	2019	22	9	173	0	1	2019-2029
20	Thongjabi-Yuelin g	Sarpang	Chhuzanggang	2020	14	16	72.4	0	1	2020-2030
21	Samkhara	Sarpang	Jigme Choeling	2013	25	7	120	14	2	2023-2033
22	Serbugang	Sarpang	Jigme Choeling	2013	10	3	47.7	8	2	2023-2033
23	Tsangchu	Sarpang	Jigme Choeling	2006	14	3	40.47	41	2	2016-2026
24	Lungsigang	Sarpang	Jigme Choeling	2012	27	7	143.66	13	2	2022-2032

2.4.1.4 Private Forest

Table 6: Details Private Forest registered under DFO Sarpang.

Sl. #	Name of Owner	Dzongkhag	Gewog	Year of Establishment	Total Area(ha)
1	Kinley Penjor	Sarpang	Gelephu	12-01-2020	0.065
2	Lal Bdr Rai	Sarpang	Gelephu	06-01-2021	0.259
3	Dechen	Sarpang	Gelephu	06-01-2021	0.202
4	Thinley Zangmo	Sarpang	Gelephu	12-01-2021	0.065
5	Tshering Yangchen	Sarpang	Gelephu	12-01-2021	0.101

2.4.2. Cross-Cutting Management Regimes

2.4.2.1. Plantations

Table 7: Established Plantations under DFO Sarpang.

Type	Category	Plantation Date	Area(ha)	Dzongkhag	Gewog
Enrichment plantation	Mixed plantation	01-06-2018	5	Sarpang	Dekiling
National Significant Plantation	Monoculture	04-06-2019	2	Sarpang	Gakiling

2.4.2.2. Payment for Ecosystem Services

Table 8: Payment for Ecosystem Services

Management Regimes	Location	Dzongkhag	Gewog	Year of operation	Area (ha)	PES Type	Key Management Interventions**	Plan Period
Payment for Ecosystem Services	Pelrithang Khatoe Raidara-Lhayul watershed management group	Sarpang	Gelephu	2023	491.84	Direct payment schemes	Establish 100m buffer zones, restore degraded areas with native species, prevent illegal extraction, clear streams regularly, limit grazing, maintain structures, and restrict timber and boulder removal.	Established in 2023 – (This agreement shall be amended on mutatis mutandis)

2.4.2.3: High Conservation Value Area

Table 9: High Conservation Value Area of DFO Sarpang.

Management Regimes	Location	Dzongkhag	Gewog	Year of operation	Area (ha)	Key Management Interventions	Plan Period
High Conservation Value Area	Chudzom-Pristine Mountain Forest Ecosystem	Sarpang	Chhudzom	Proposed 2024	4500	Conservation of Pristine and cloud forests	2024-2034

2.4.2.4: NWFP Management Group

Table 10: Details of NWFP Management groups under DFO Sarpang.

Sl.no.	Name of NWFP group	Year of formation	Dzongkhag	Gewog
1	Bumpa Shingmin Dulen Tshopa	01-01-2016	Sarpang	Chhudzom
2	Doringphu NWFP Management and Marketing Group	01-01-2014	Sarpang	Jigmechholing
3	Lower Muga Bamboo Shoot harvesting and marketing	01-09-2019	Sarpang	Gakiling
4	Pemaling Pagshing Tshopa	01-09-2019	Sarpang	Shershong
5	Rateypani Soft Broom Management and Marketing Group	01-01-2015	Sarpang	Gakiling
6	Sangkha NWFP Group	01-01-2015	Sarpang	Gakiling
7	Shawali Bamboo & NWFP	01-09-2019	Sarpang	Shompangkha
8	Tashiling Shingmin Dulen and Tsongdrel Tshogpa	01-01-2022	Sarpang	Jigmechholing
9	Thuendrel NWFP Management &Marketing Group	01-09-2014	Sarpang	Jigmechholing

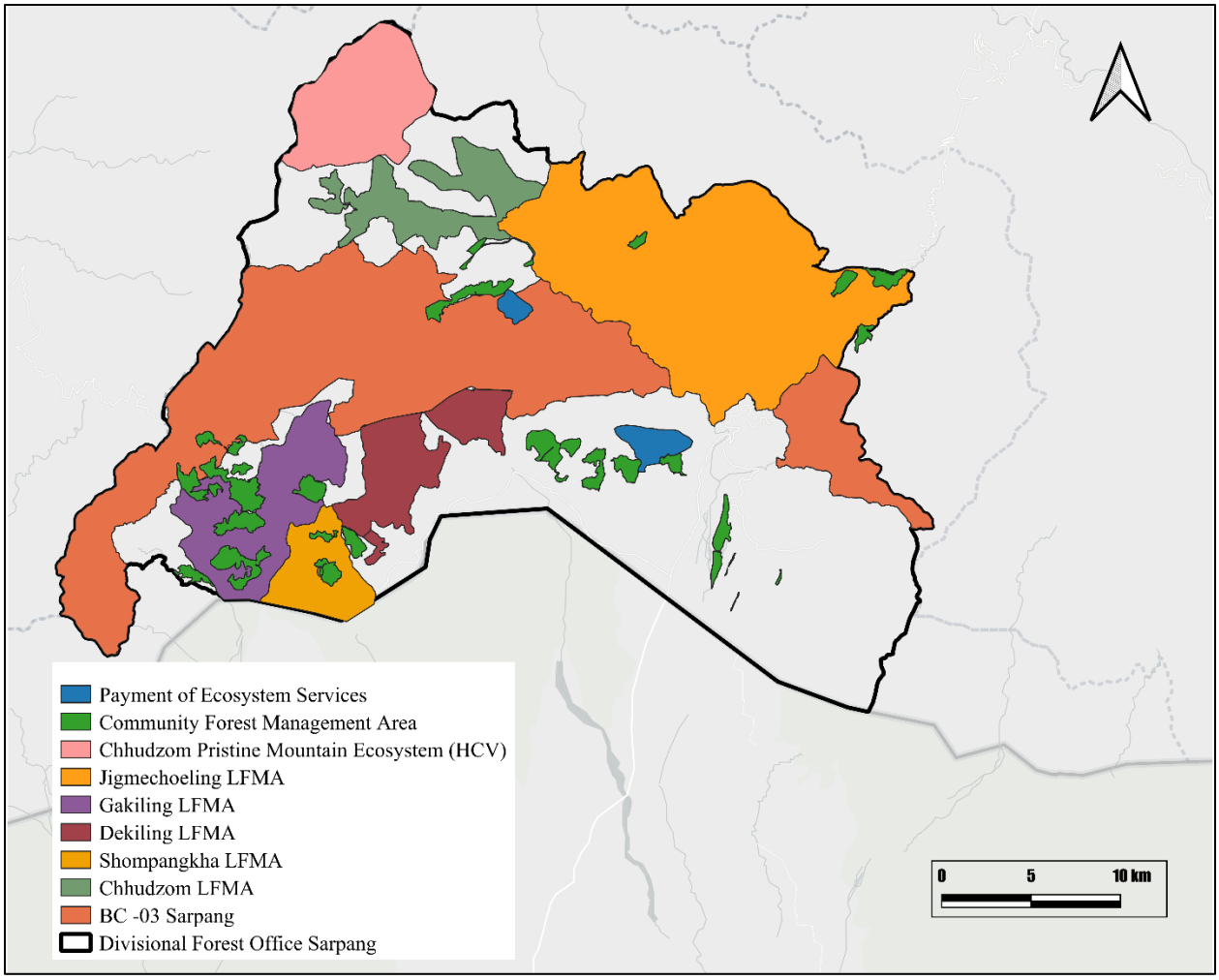

Figure 16: Map of Existing Management Regimes in Sarpang

2.5. Forest Resources and Utilization

2.5.1 Forest Resources

2.5.1.1. Forest Structure and Carbon Stocks

The forests exhibit high variability in structure, regeneration, and carbon stocks across forest types. Warm broadleaved forests dominate in terms of extent (43,315 ha) and contribute most significantly to forest resources, followed by subtropical forests (31,057 ha). The total tree population is estimated at 29.2 million individuals, with warm broadleaved forests alone accounting for 16.2 million trees (Table 10). Subtropical forests contribute 9.6 million trees, while cool broadleaved forests support 2.8 million trees despite their smaller extent, reflecting high tree density. The Divisional Forest Office, Sarpang covers a total area of 98,852 ha, of which 82,485 ha (83.45%) is under forest cover.

Table 11: Stem Density by forest type

Forest Type	Area (ha)	Cover %	Tree Density (No. ha^{-1})	Total Tree Count (million)
Warm Broadleaved Forest	43,315.20	43.82	375	16.24
Subtropical Forest	31,057.40	31.42	310	9.63
Cool Broadleaved Forest	6,691.74	6.77	417	2.79
Evergreen Oak Forest	1,244.94	1.26	417	0.52
Hemlock Forest	86.79	0.09	406	0.04
Fir Forest	35.27	0.04	402	0.01
Spruce Forest	23.83	0.02	401	0.01
Grand Total	**82,485.00**	**83.44**	**—**	**29.24**

Basal area distribution underscores the structural dominance of broadleaved forests, with a total basal area of 2.16 million m² across all forest types (Table 11). Warm broadleaved forests contribute the largest share (1.20 million m²), followed by subtropical forests (0.62 million m²) and cool broadleaved forests (0.29 million m²). Evergreen oak forests, though spatially restricted, maintain relatively high basal area values, highlighting their ecological significance. Growing stock estimates indicate that Sarpang holds 17.9 million m³ of standing timber volume (Table 12). Of this, 9.9 million m³ is concentrated in warm broadleaved forests, while subtropical forests account for 5.0 million m³ and cool broadleaved forests 2.5 million m³. These patterns confirm that warm broadleaved and subtropical forests are the principal providers of timber resources in the district.

Table 12: Basal area per ha and total basal area by forest type

Forest Type	Area (ha)	Basal Area per ha (m^2)	Total Basal Area (million m^2)
Warm Broadleaved Forest	43,315.20	27.67	1.198
Subtropical Forest	31,057.40	20.08	0.623
Cool Broadleaved Forest	6,691.74	42.89	0.287
Evergreen Oak Forest	1,244.94	38.07	0.047
Hemlock Forest	86.79	46.51	0.004
Fir Forest	35.27	44.47	0.002
Spruce Forest	23.83	36.95	0.001
Grand Total	**82,485.00**	**—**	**2.162**

Table 13: Growing stock by forest type

Forest Type	Area (ha)	Volume (m^3 ha^{-1})	Total Growing Stock (million m^3)
Warm Broadleaved Forest	43,315.20	228.03	9.88
Subtropical Forest	31,057.40	160.9	5
Cool Broadleaved Forest	6,691.74	379.15	2.54
Evergreen Oak Forest	1,244.94	341.01	0.42
Hemlock Forest	86.79	442.7	0.04
Fir Forest	35.27	398.82	0.01
Spruce Forest	23.83	384.84	0.01
Grand Total	**82,485.00**	**—**	**17.9**

Regeneration dynamics demonstrate strong recruitment potential in broadleaved forests. Warm broadleaved forests contain 31.0 million unestablished and 22.6 million established regenerants, while subtropical forests support 20.0 million and 25.0 million, respectively (Table 13). Evergreen oak forests also show robust regeneration despite limited area, whereas conifer types such as fir, spruce, and hemlock contribute minimally to regeneration due to their restricted distribution.

Carbon stock assessments indicate that forests in DFO- Sarpang store approximately 12.7 million tonnes of carbon (Table 5). Warm broadleaved forests account for the majority (7.3 million tonnes), followed by subtropical forests (3.3 million tonnes). When separated by pool, the largest contributions arise from aboveground biomass (6.2 million tonnes) and soil organic carbon (4.1 million tonnes), with smaller shares in belowground biomass, coarse woody debris, and litter (Table 6). These results underscore the crucial role of broadleaved forests in sustaining carbon storage and Bhutan's carbon neutrality commitments.

Table 14: Regeneration by forest type

Forest Type	Area (ha)	Unestablished Regeneration (No. ha^{-1})	Total Unestablished (million)	Established Regeneration (No. ha^{-1})	Total Established (million)
Warm Broadleaved Forest	43,315.20	715	30.97	521	22.57
Subtropical Forest	31,057.40	643	19.98	805	24.99
Cool Broadleaved Forest	6,691.74	699	4.68	539	3.61
Evergreen Oak Forest	1,244.94	919	1.14	892	1.11
Spruce Forest	23.83	701	0.02	403	0.01
Grand Total	**82,485.00**	**—**	**56.79**	**—**	**52.29**

Table 15: Total carbon density and carbon stock by forest type

Forest Type	Area (ha)	Total Carbon Density (t ha^{-1})	Total Carbon Stock (million t)
Warm Broadleaved Forest	43,315.20	169.1	7.33
Subtropical Forest	31,057.40	106.97	3.32
Cool Broadleaved Forest	6,691.74	250.79	1.68
Evergreen Oak Forest	1,244.94	238.35	0.3
Hemlock Forest	86.79	263.21	0.02
Fir Forest	35.27	255.72	0.01
Spruce Forest	23.83	240.86	0.01
Grand Total	**82,485.00**	**—**	**12.67**

Note: *The unit-level data(ha^{-1}) are sourced from the National Forest Inventory (NFI) Report 2022, while the area estimates were derived from the Forest Type Map after clipping to the divisional boundary.*

2.5.1.2 Globally Threatened Species

With 83.41% forest cover, DFO Sarpang hosts rich biodiversity, including globally threatened species. Conserving these species is vital to maintain ecological balance and prevent cascading disruptions. Conservation efforts should prioritize both high-risk species and those of least concern to ensure long-term ecosystem health and resilience.

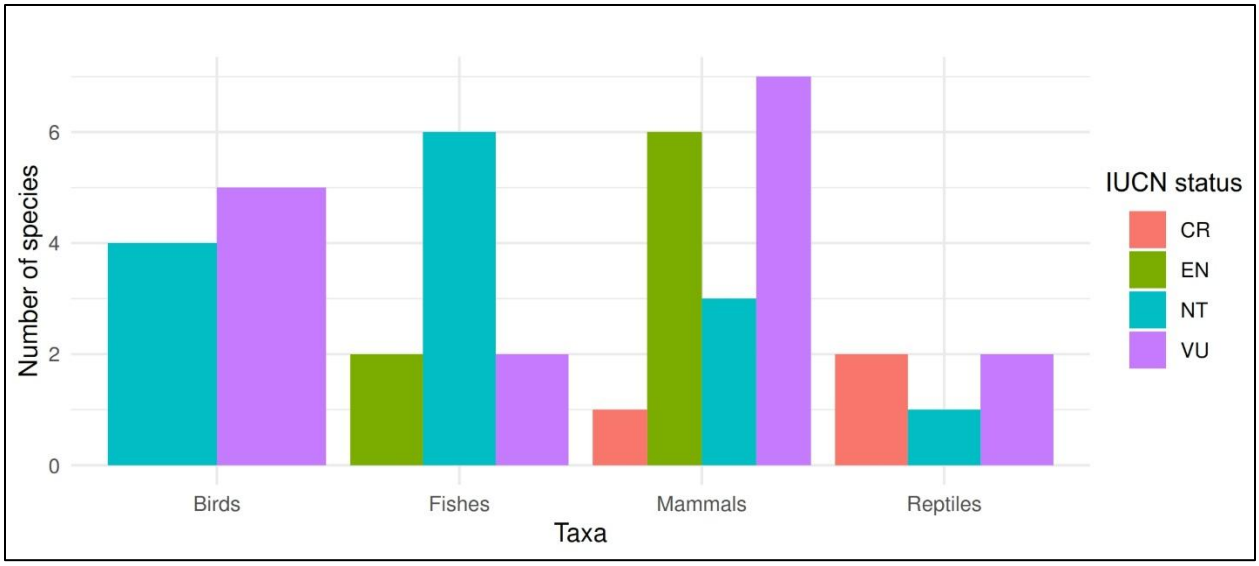

Figure 17: Showing the globally threatened taxa in DFO, Sarpang. CR-Critically Endangered, EN-Endangered, NT-Near Threatened and VU-Vulnerable

Mammals

Figure 18: A group of Asian elephants (Elephas maximus) herding near roads in Gelephu.

Among the 46 mammal species recorded in the DFO Sarpang, 17 species are globally threatened species: one in Critically Endangered (CR), six are Endangered (EN), seven are Vulnerable (VU) and three are Near Threatened (NT).

Birds

Figure 19: Grey-headed Lapwing(left) and Kingfisher (right)

As of March 2025, the DFO Sarpang has documented 215 bird species. Among these, five species are categorized as VU and four as NT

Plants

Figure 20: Dendrobium nobile

The rapid biodiversity assessment (2023) and NFI (2022) recorded 637 flowering plant species in DFO Sarpang, including herbs, orchids, canes, and grasses. Notable species such as agarwood (*Aquilaria malaccensis*) and orchids *Paphiopedilum fairrieanum* and *Gastrochilus calceolaris* are all classified as CR with Teak (*Tectona grandis*) listed as EN by IUCN.

Fishes

Figure 21: Choclate Masheer

The DFO Sarpang has documented 54 fish species across 11 families as of June 2024. These species are distributed from the warm waters in the south to the cold waters in the north. Among the 54 recorded species, four are listed in the IUCN red list as shown in table 25 with another six as NT.

Table 16: Showing the IUCN red list species of fishes in DFO, Sarpang

Sl. #	Common Name	Scientific Name	IUCN Status
1	Golden Mahseer	*Tor putitora*	Endangered
2	Wagur	*Clarias magur*	Endangered
3	Snow Trout (Asla)	*Schizothorax richardsonii*	Vulnerable
4	Eurasian Carp	*Cyprinus carpio*	Vulnerable

Reptiles

As of June 2024, the DFO Sarpang has recorded 34 reptile species. Among these, the Elongated Tortoise and Gharial are classified as CR on the IUCN Red List. However, the Gharial is not recorded in the wild; it is housed in an enclosure at the SWRRC in Jigmeling. Additionally, the Burmese Python and King Cobra are categorized as VU.

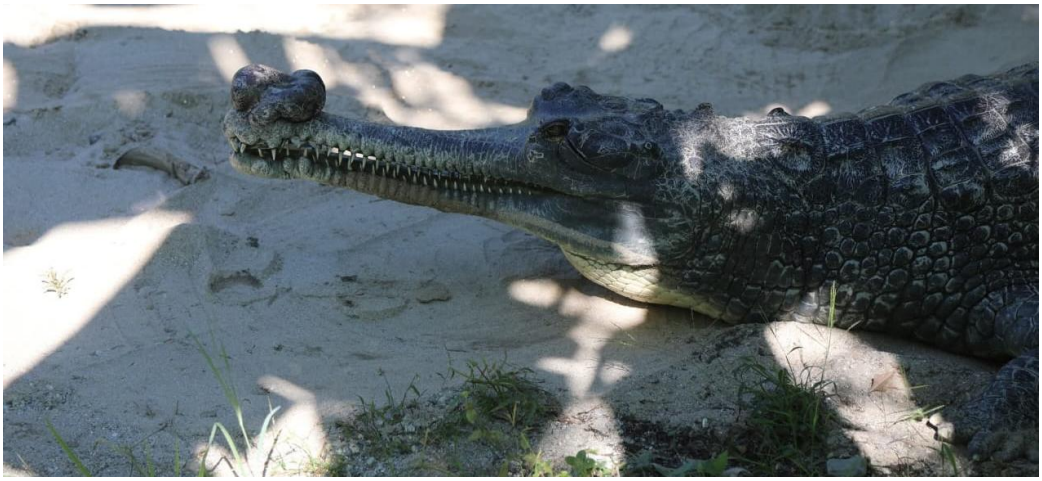

Figure 22: Gharial in Southern Wildlife Rescue and Rehabilitation Centre

Habitat suitability Modelling for flagship species

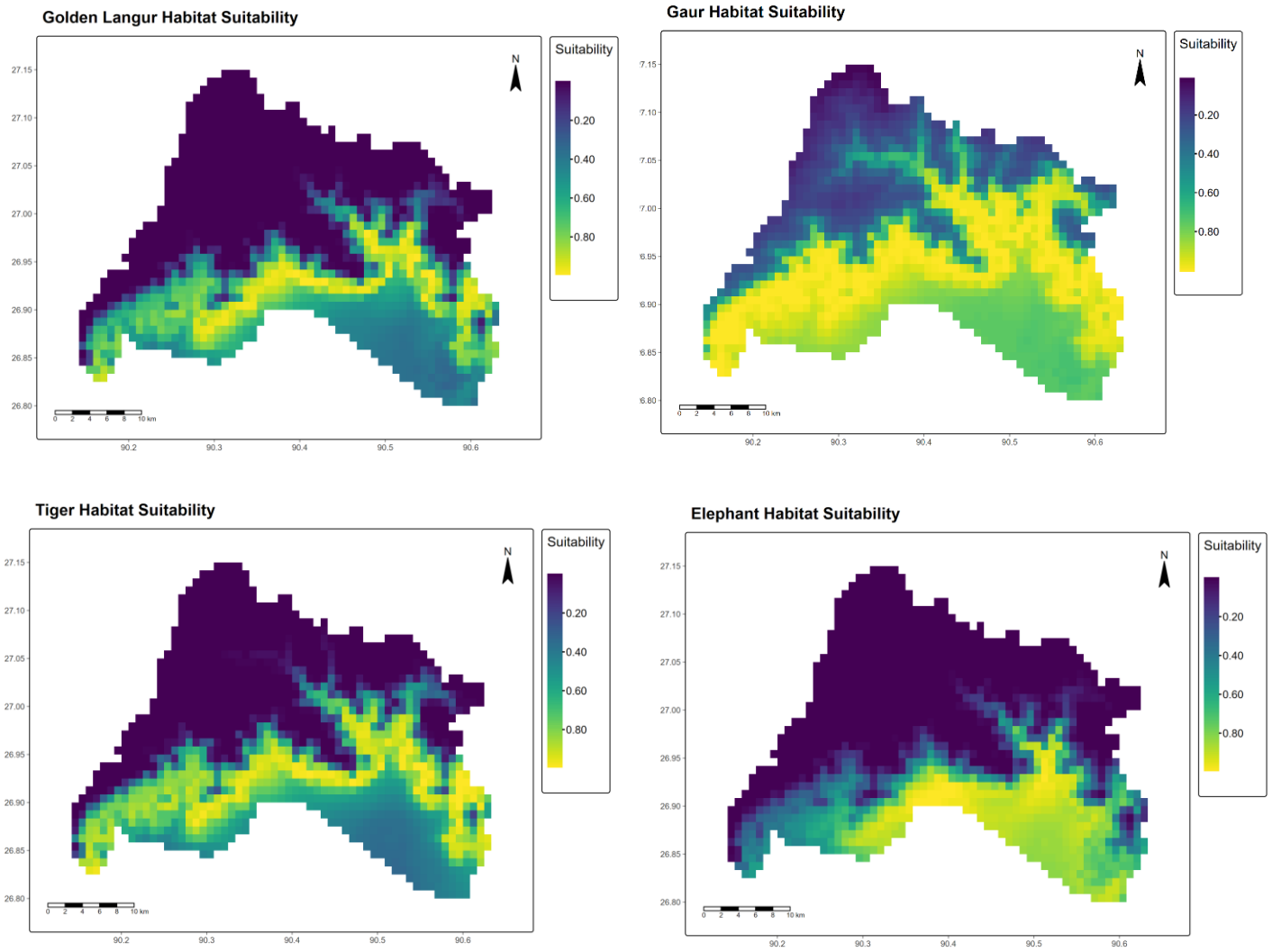

Figure 23: Spatial distribution of habitat suitability for Golden Langur, Gaur, Tiger, and Elephant, highlighting priority conservation zones and overlapping suitable habitats across the study landscape.

2.5.2 Function Mapping

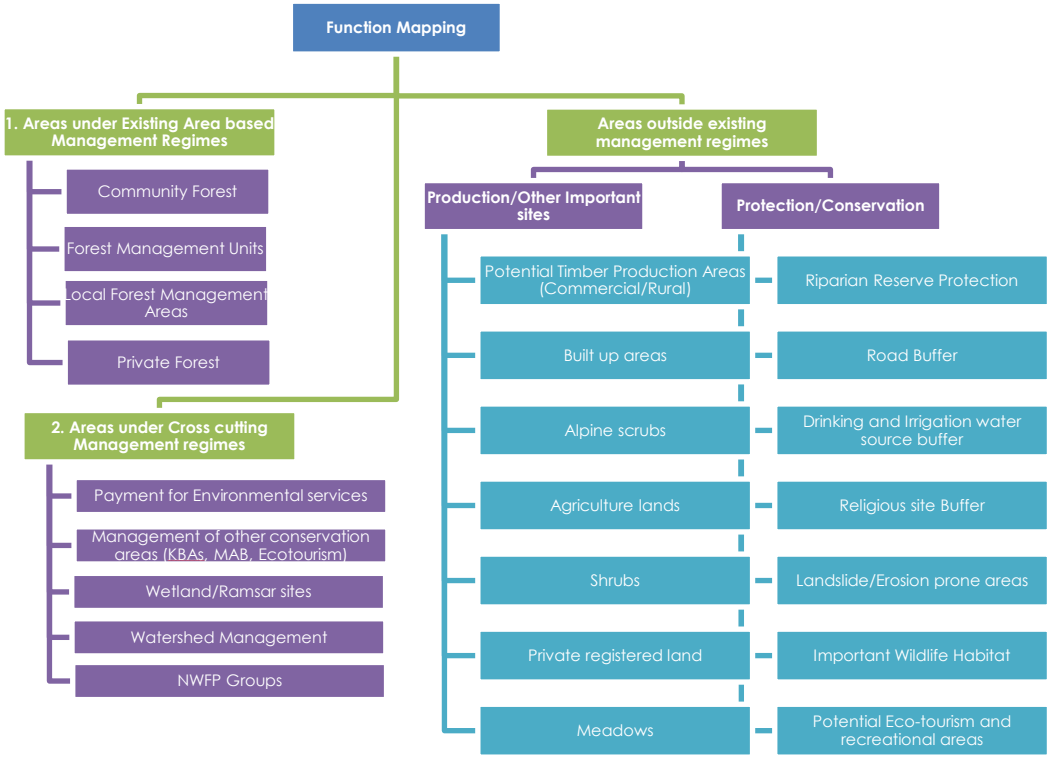

Figure 24: Thematic representation of function mapping

Forest function mapping is crucial for several reasons. It plays a vital role in biodiversity conservation by identifying and protecting critical habitats. It supports sustainable resource management by pinpointing areas for resource extraction without harming ecological integrity. By maintaining essential ecosystem services like water regulation, soil stabilization, and carbon sequestration, function mapping ensures environmental health and human well-being. It aids in climate change mitigation by identifying high carbon storage areas and enhances disaster risk reduction by understanding protective forest functions. Economically, it promotes sustainable benefits for local communities through eco-tourism and harvesting. Accurate mapping guides effective forest management policies and land use plans, balancing ecological, social, and economic needs. It also fosters community involvement, incorporating local knowledge for better stewardship. Additionally, it supports global environmental goals, such as the United Nations

Sustainable Development Goals (SDGs), by promoting sustainable management and conservation. Overall, forest function mapping ensures sustainable use, conservation of resources, and provision of economic and social benefits. Areas not currently under existing management regimes are considered for function mapping. This process is conducted in accordance with the codes of best management practices.

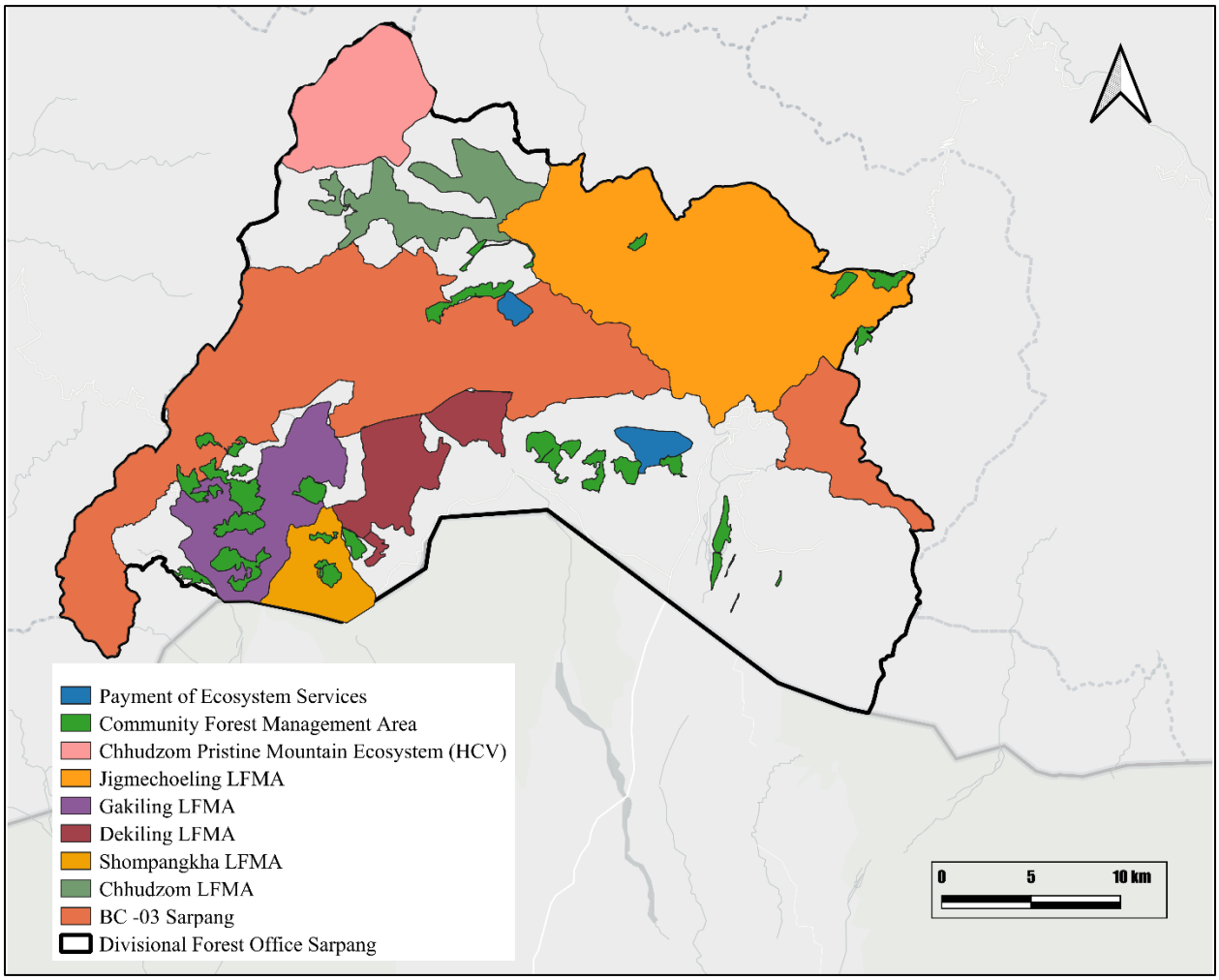

Figure 25: Map of Existing Management Regimes in Sarpang

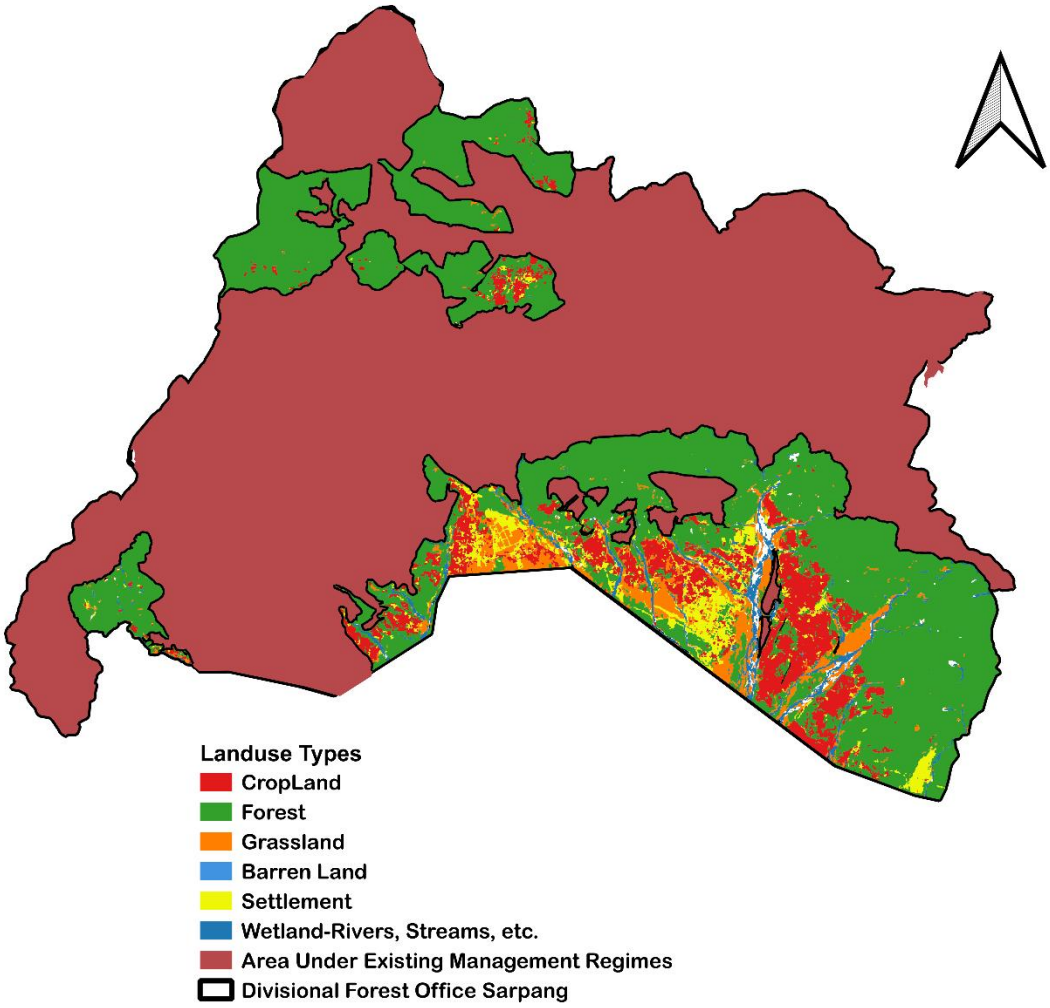

Figure 26: Areas outside Existing Management Regimes

Table 17: Area statistics of Different Functions

Functions		Area (Ha)
Area under Existing Management Regime (EMR)		65367.66
Area outside Existing Management Regime *(33,484.34 ha)*	Production Functions	14617.946
	Protection Functions	10976.294
	Social Functions	7890.1
	Total Area	**98852**

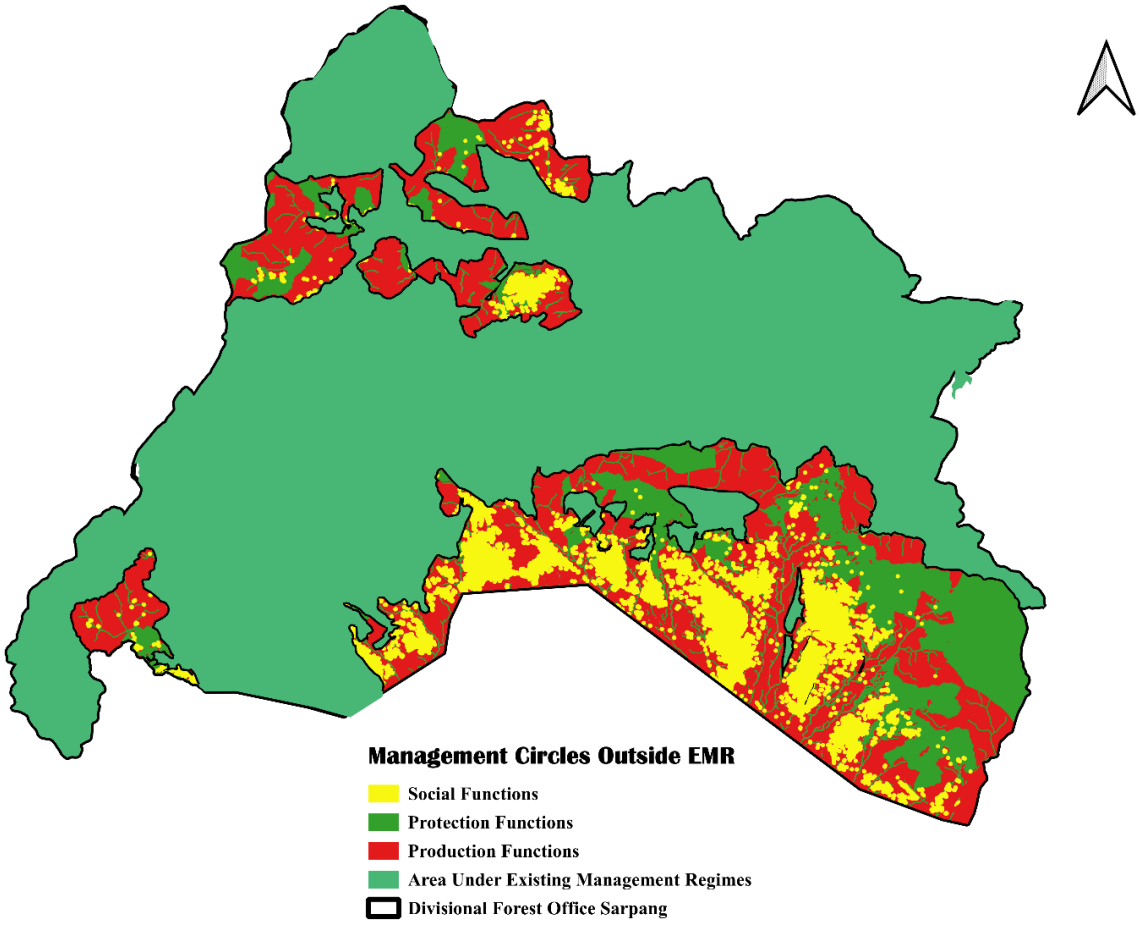

Figure 27: Management Circles Outside Existing Management Regimes

Annual Allowable Cut (AAC)

To ensure a conservative and precautionary approach to forest management, **30% of the total identified production area was excluded** from harvesting considerations. This adjustment accounts for operational constraints, ecological sensitivities, and management uncertainties.

The AAC was calculated using the standard formula:

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

Parameters used:

- Total identified production area: **14,617.946 ha**
- Safety deduction: **30%**
- Net operable area considered:

$$14{,}617.946 \times 0.70 = 10{,}232.56 \text{ ha}$$

- Average volume: **276.17 m³/ha**
- Rotation age: **130 years** (120-year rotation period plus 10-year regeneration period)

Calculation:

$$10{,}232.56 \times 276.17 = 2{,}825{,}835.12 \text{ m}^3$$

$$\frac{2{,}825{,}835.12}{130} = 21{,}737.19 \text{ m}^3\text{/year}$$

Result:

The adjusted Annual Allowable Cut (AAC), after deducting 30% of the total area for precautionary management, is estimated at **21,737.19 m³ per year**. This figure represents a sustainable and risk-averse harvesting level suitable for both commercial and rural timber requirements.

2.5.3 Forest Resource Utilization

DFO Sarpang oversees the allotment of forest resources to the public in 10 gewogs of Sarpang Dzongkhag and facilitates the export and import of forest products. Below is a condensed overview of key activities:

Table 18: Forest products allotted to public, import & export facilitated in the fiscal year 2023-2025 (March).

Sl. #	Resources Allotted	Quantity	Remarks
1	Commercial Timber	12,692.06 m^3	Includes Dzong, Lhakhang, and urban house construction. Exported: 7,092.19 m^3; Domestic: 5,599.87 m^3.
2	Rural Timber	5000 m^3	For new houses (267 trees for 30 applicants) and renovation (261 trees for 88 applicants) & other constructions (32 trees for 32 applicants).
3	Particle Board	5,178 pcs	Export: 4,703 pcs; Domestic: 475 pcs.
4	Firewood	17,036.43 m^3	Rural: 9,752 m^3; Commercial: 7,284.43 m^3. Chhudzom gewog (5,344 m^3 for 668 applicants).
5	Bamboo	180,574 pcs	Imported: 72,412 pcs; Domestic: 108,1622 pcs

Notes: (m^3: cubic meter, nos: numbers, pcs: pieces).

Wood-Based Industries and Community Forests

- **Primary Industries**: 36 wood-based industries established for value addition.
- **Community Forests (CFs)**: 24 CFs, with 16 CFs having surplus timber for industry supply.
- **Local Forest Management Areas (LFMAs)**: Four approved plans with timber production and supply detailed for Chhudzom, Dekiling, Gakiling, and Shompangkha gewogs.

Non-Wood Forest Products (NWFPs)

Nine community groups manage and market 36 NWFP species, including bamboo, soft broom, and stingless bee honey. These are *Strobilanthus falciddifolius, Docynia indica, Phyllanthus emblica, Rhus javanica, Viscum articulatum, Stingless bees honey, Poranopsis paniculata, Entada rheedii, Paris polyphylla, Tupistra nutans, Dioscorea villosa, Swertia Chirayta, Pueraria spp, Zanthoxylum bungeanum, Persea gamblei, Choerospondia axillaris, Persea fructifera, Wallichia densiflora, Piper mullesua, Banana blossom, Piper betleoides, Piper longum, Litsea cubeba, Plectocomia himalayana (shoot), Dendrocalamus hamiltonii (shoot), Nasturtium officinale, Diplazium esculentum, Rubia cordifolia, Bamboo poles, and Thysanolaena latifolia*.

Figure 28: Fiddlehead fern (left) and Plectocomia himalayana (shoot) -Right

2.6. Local People and Livelihood

2.6.1 Demography and Social Structure

The statistical yearbook (SYB) 2023, reported a population of 44,067 (excluding Umling and Tareythang gewogs) under DFO Sarpang. The rural population has a slightly higher male ratio (1.091 miles per female). Gelephu gewog has the largest population (6,457), while Senggye gewog has the smallest (1,080). About 30% of the population, or 13,010 individuals, reside in the urban areas of Gelephu and Sarpang.

Figure 29: Community members gather at a bustling local market in Sarpang, lined with stalls covered in blue tarpaulin

Dekiling gewog has the most households, while Jigme Chhoeling has the highest population. Singgye gewog has the lowest in both categories. With 33% of the population under 15 years and a median age of 24, the area has a high child dependency ratio (21.61) and a low old-age dependency ratio (6.59), emphasizing the need for youth programs and education. Population growth is moderate, requiring sustainable resources and infrastructure planning. Healthcare trends are positive, but efforts to reduce under-five mortality remain essential. The average household size is 4, reflecting a shift to nuclear families. Almost all households have access to improved drinking water and sanitation. While literacy rates are high, gender disparities persist, especially with male-headed households at 72.7%.

Table 19: Population statistics of DFO Sarpang (source: population and housing census of Bhutan, 2005 & 2017).

Gewog	No. of h/holds	No. of Chewogs	Male	Female	Total Population
Chhudzom	637	5	1460	1204	2664
Chhuzanggang	625	5	1262	1237	2499
Dekiling	1164	5	3290	2690	5980
Gakiling	539	5	1105	1020	2125
Gelephu	1027	5	3314	3143	6457
Jigme Chhoeling	698	5	1743	1515	3258
Samtenling	467	5	1456	1345	2801
Senggye	287	5	569	511	1080
Serzhong	407	5	1285	1422	2707
Shompangkha	414	5	757	729	1486
Gelephu Thromde	—	—	5146	4712	9858
Sarpang Town	—	—	—	—	3152

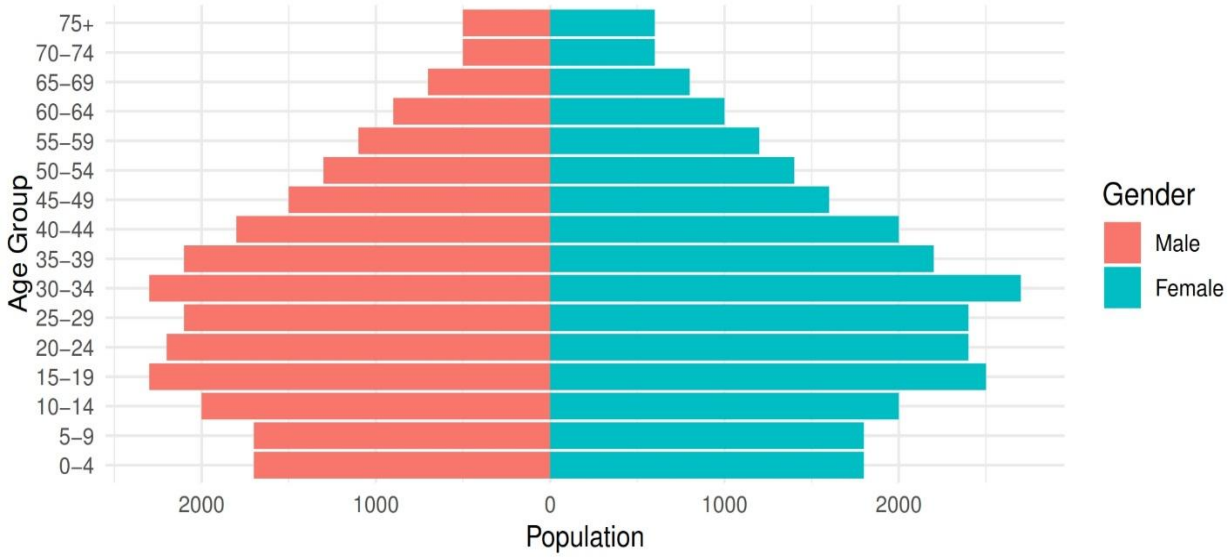

Figure 30: Distribution of population according to age group and gender (excluding Umling and Tareythang gewog)

2.6.2 Literacy

Amongst the gewogs under the jurisdiction of DFO Sarpang, Gakiling has comparatively more percentage of people with literacy followed by

Shompangkha, Dekiling and Gelephu. Conversely, Serzhong gewog has a higher percentage of illiterate individuals followed by Chhuzanggang and Samtenling.

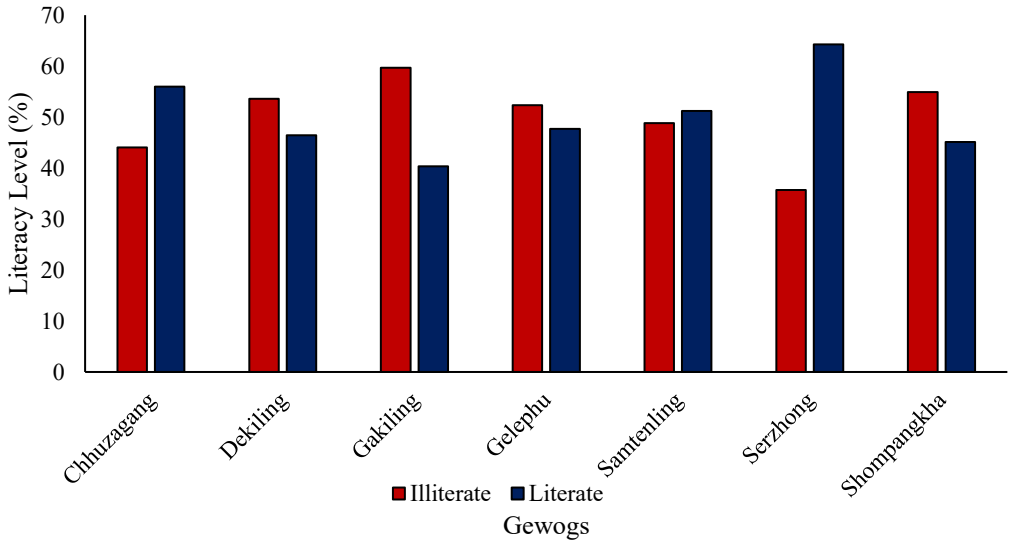

Figure 31: Literacy Level of the head of households in Gewogs.

2.6.3 Livelihood

Livelihoods primarily rely on agriculture (36%), livestock (22%), and other sources such as wages, remittances, and subsidies (39%).

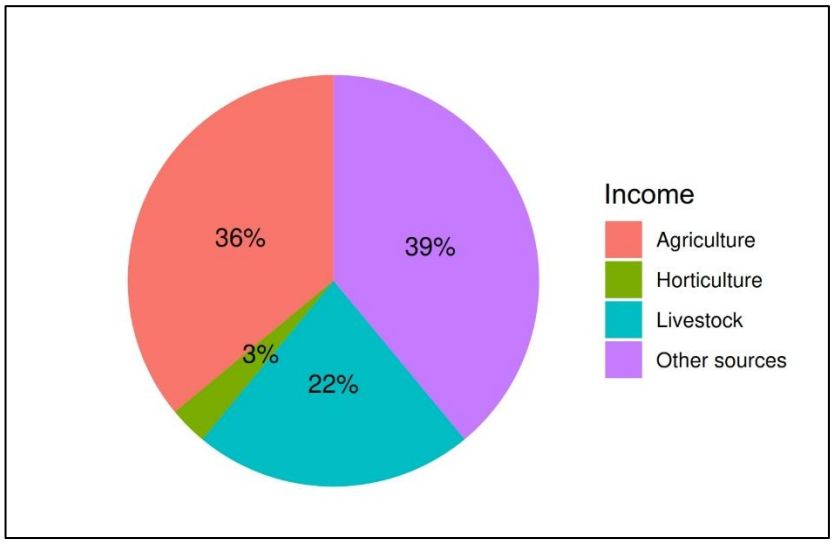

Figure 32: Sources of Income for the resident communities under DFO Sarpang

This reliance on traditional practices makes communities vulnerable to economic shocks, climate change, and market instability. Limited diversification, with horticulture playing a minor role, further increases vulnerability.

2.6.4 Livestock Management

Livestock plays a significant role in household income, with poultry (n=44,870) and cattle (n=8,279) being the most common animals. Challenges include depredation by wildlife (dholes and civets), pastureland degradation due to invasive weeds, and fodder shortages. These issues affect feed security and livestock health, necessitating sustainable management practices (SES,2022).

Table 20: Livestock Population by Types, (2014-2022)

Types of Livestock	Population
Cattle	8279
Buffalo	20
Equine	26
Pig	240
Poultry	44870
Sheep	57
Goat	741

2.6.5 Agriculture Challenges

Agriculture, focused on maize and paddy, faces several constraints:

- Crop depredation by wild pigs and elephants.
- Pests and diseases (e.g., chili blight, cabbage moth).
- Limited irrigation and erratic rainfall.
- Soil health concerns impact productivity.

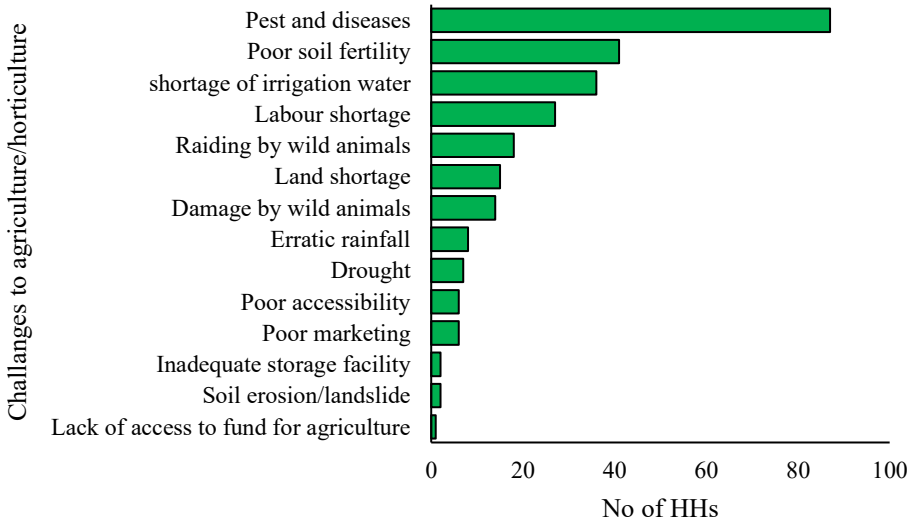

Figure 33: Challenges to agriculture/horticulture

2.6.6 Agricultural Land Use

Land use in Sarpang is dominated by Chhuzhing (wetland for paddy, 67%), followed by Kamzhing (dryland, 22%), orchards (6%), and other uses (5%). Arecanut is extensively cultivated in Sarpang, with over 1.5 million trees and the highest production of 4,853.23 metric tonnes (MT). Mandarin followed with a production of 2,100 MT and a high yield of 37 kg per tree. Pear recorded the highest yield at 37.8 kg per tree, while mango and banana contributed moderately with 35.24 MT and 275.63 MT, respectively (Annual Dzongkhag Statistics, 2023).

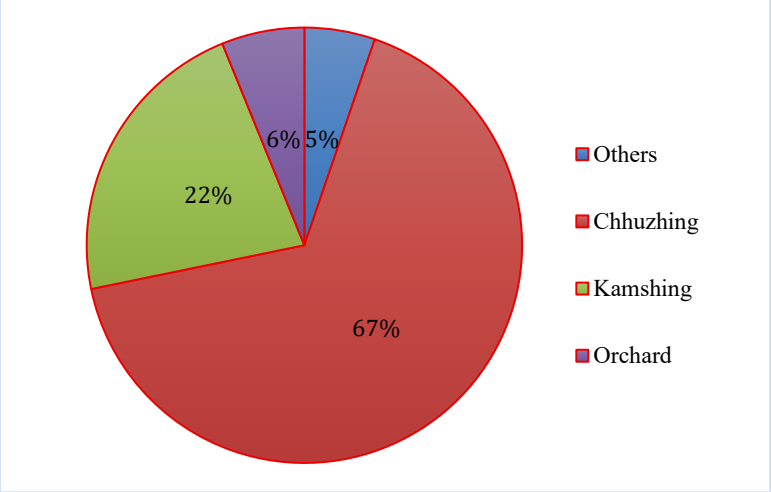

Figure 34: Land-use Categories

2.6.7 Ethnobotanical Practices

Traditional knowledge of plant species for treating ailments, such as *Pteris biaurita* for wounds and *Bombax ceiba* for livestock poisoning, plays a vital role in the community. *Azadirachta indica* as organic pesticide, *Moringa oleifera*, green tea including treating wounds, pain, ulcers, liver disease, heart disease, cancer, and inflammation. Yams (*Dioscorea species*) are commonly consumed, *Terminalia chebula* and *Terminalia bellirica* to treat common cold, *Emblica officinale* and *Gmelina arborea* bark used in treating diarrhea, *Plumbago zeylanica* roots used to treat muscle sprains, *Periploca calophylla* to treat bone related illness, *Rumex nepalensis* treating stomachaches, skin irritations, wounds, and infections, *Psidium guajava* for treating gastrointestinal issues, *Drymaria cordata* to treat common cold, *Nasturtium officinale* eaten as salad, *Artemisia myriantha* as antiseptic, antimicrobial, anti-inflammatory, and insect repellent, but limited research threatens the conservation of this knowledge, which is held by older generations.

Figure 35: Moringa oleifera (left) & Drymaria cordata (right)

2.6.8 Ecotourism Potential

Figure 36: Paddy fields with pristine forest ecosystems in background

Sarpang's proximity to three Forest Divisionss JSWNP, RMNP and PWS offers significant ecotourism potential. Key sites include Gelephu Tsachhu and cultural sites like Rani Dunga, Dolkhola Mandir and Kharkhola. Areas like Darachu, Ranibagan, and Jigme Chhoeling hold great potential for birders and wildlife photographers. These locations are home to some of the rarest and most sought-after species, including the Beautiful

Nuthatch, Hornbills, Wren-babblers, Parrotbills, Broadbills, and Owls. Current ecotourism infrastructure is limited, and initiatives such as the SWRRC need replication. Proper documentation and promotion of biodiversity and cultural knowledge are critical.

2.7. Human-wildlife Conflict (HWC)

HWC is a pressing issue, particularly crop depredation by elephants and wild pigs, and livestock depredation by common leopards, wild dogs and civets. Major challenges include:

- **Crop damage:** Highest in 2018 (304.71 acres), with areca nut, paddy, and maize being primary targets.
- **Human casualties:** Sporadic incidents from 2017–2024, with the highest fatalities in 2024.
- **Livestock depredation:** Notable cases involve Asian black bears and common leopard.
- **Property damage**: Highest in 2024 involving Asian elephants.

Figure 37: Crop and property damaged by elephants

DFO-Sarpang implemented multiple measures to address human–wildlife conflict (HWC). The process began with a rapid assessment to establish baselines and design the Human–Elephant Conflict (HEC) SAFE Strategy (2022–2028) for Gelephu, Samtenling, and Shompangkha Gewogs. The strategy was informed by a detailed questionnaire survey that examined spatial and temporal patterns of conflict events, the social characteristics of victims, and the severity of impacts. To improve understanding of elephant behavior, literate farmers were trained as citizen scientists to record seasonal movement patterns using the Epicollect5 mobile application. Field inventories also identified palatable plant species for elephants to guide habitat management.

Habitat restoration and enrichment formed a core component of mitigation. Interventions included planting banana and bamboo, creating and maintaining waterholes, and clearing invasive species across 69 hectares under the SAFE "wildlife and people" concept. Waterholes and salt licks across Sarpang Dzongkhag were surveyed and mapped to improve resource availability and reduce elephant movement into settlements.

To prevent animal intrusions, existing electric fences were assessed, redesigned, and realigned in consultation with communities. An additional 27.5 kilometers of fencing was installed at the three pilot sites. Smart deterrent technologies were introduced, including 30 Passive Infrared (PIR) sensors and two pairs of AIR ANIDERS (Animal Intrusion Detection and Repellent System). These provided non-harmful detection and deterrence against wildlife entering farmlands.

Three Quick Response Teams (QRTs), one in each Gewog, were established and equipped with extension kits (rain gear, boots, torches). Terms of reference were developed to ensure structured operations. These teams were tasked with responding rapidly to incidents, managing crowds, and conducting awareness programs.

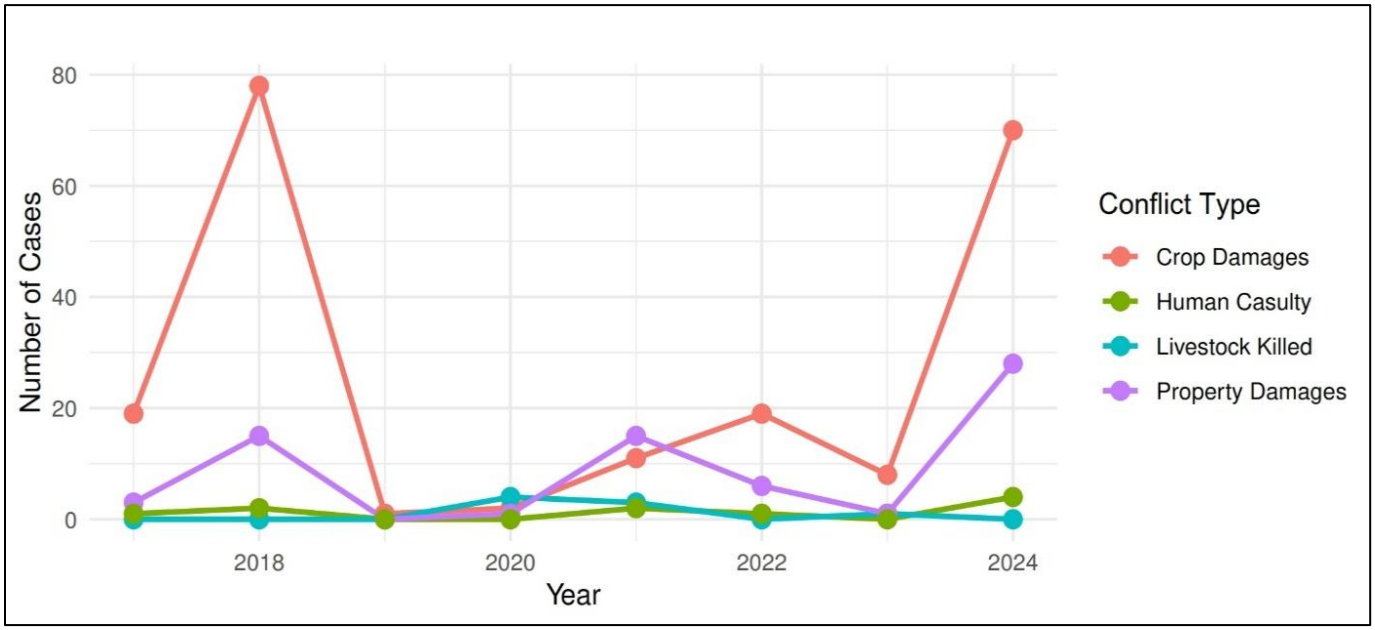

Figure 38: Human-Elephant Conflict trend for 8 years (SMART Data)

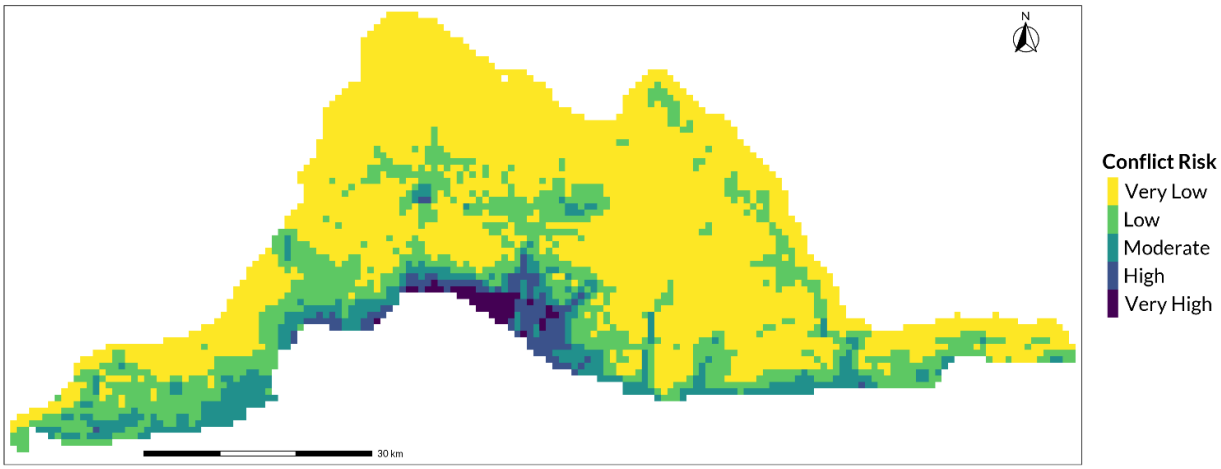

Figure 39: Hotspot mapping of Human Elephant Conflict Areas

Pictures of Mitigation Measures Implemented

Figure 40: Animal intrusion detection and repellent system (ANIDERS).

Figure 41: Installation of Electric Fencing as mitigation measures to reduce HEC

Figure 42: Habitat Management activities such as Waterhole restoration, palatable species plantation, enhance elephants' natural habitat.

2.7.1. Conflict to Co-existence (C2C) Strategy for Human–Wildlife Conflict (HWC)

The Conflict to Co-existence (C2C) strategy for Dekiling and Gakiling Gewogs was developed based on conflict hotspot mapping. The proposed interventions are:

1. Livelihood and Assets Protection

- Install, maintain, and upgrade combined chain-link and electric fencing across all chiwogs.
- Establish regular monitoring systems and local by-laws to ensure sustainability.
- Explore ecotourism opportunities to diversify income and strengthen local economies.

2. People's Safety and Capacity Building

- Train Quick Response Team (QRT) members and forestry staff in human–elephant conflict (HEC) response.
- Develop and implement Standard Operating Procedures (SoPs) to safeguard both people and elephants.
- Strengthening QRTs by providing essential field gear and logistical support.

3. Habitat Enrichment

- Plant fodder and palatable species to meet wildlife forage needs.
- Control invasive species to maintain ecological balance.
- Create water-holes to reduce wildlife dependency on agricultural areas.

4. Cross-Cutting Interventions

- Conduct awareness programs on HWC management for communities, local leaders, and institutions.
- Monitor and study the effectiveness of mitigation strategies to refine future approaches.
- Standardize and implement SoPs and awareness programs across all chiwogs.

Figure 43: SAFE Strategy developed, and Quick Response Team formed in Gewogs

2.8. Climate Change and its impacts

2.8.1. Carbon Sequestration Capacity of DFO-Sarpang

Carbon stock assessments indicate that Sarpang forests store approximately 12.7 million tonnes of carbon (Table 5). Warm broadleaved forests account for the majority (7.3 million tonnes), followed by subtropical forests (3.3 million tonnes). When separated by pool, the largest contributions arise from aboveground biomass (6.2 million tonnes) and soil organic carbon (4.1 million tonnes), with smaller shares in belowground biomass, coarse woody debris, and litter (Table 6). These results underscore the crucial role of broadleaved forests in sustaining carbon storage and Bhutan's carbon neutrality commitments.

2.8.2. Temperature

Sarpang has a subtropical climate. Summers are hot and humid. Winters are mild. Rain peaks from May to September and drops from November to February. Mean annual temperature is about 22.4°C, with monthly means near 18.6°C in the coolest months and 26.2°C in the warmest months. Temperatures rise from February, peak in August, then fall toward December. The daily range is widest from February to May and narrows in June to August. Lowlands stay warmer throughout the year, while higher ridges remain cooler. The current baseline temperature map shows higher average annual temperatures along southern and eastern valley floors and cooler conditions along the central ridge and the northern edge. The SSP_{245} temperature map keeps the same pattern, with warmth concentrated in the south and east. Based on SSP-245, there is a change of 3.2 degrees Celsius in the highest and lowest annual mean temperatures between the current and future projections.

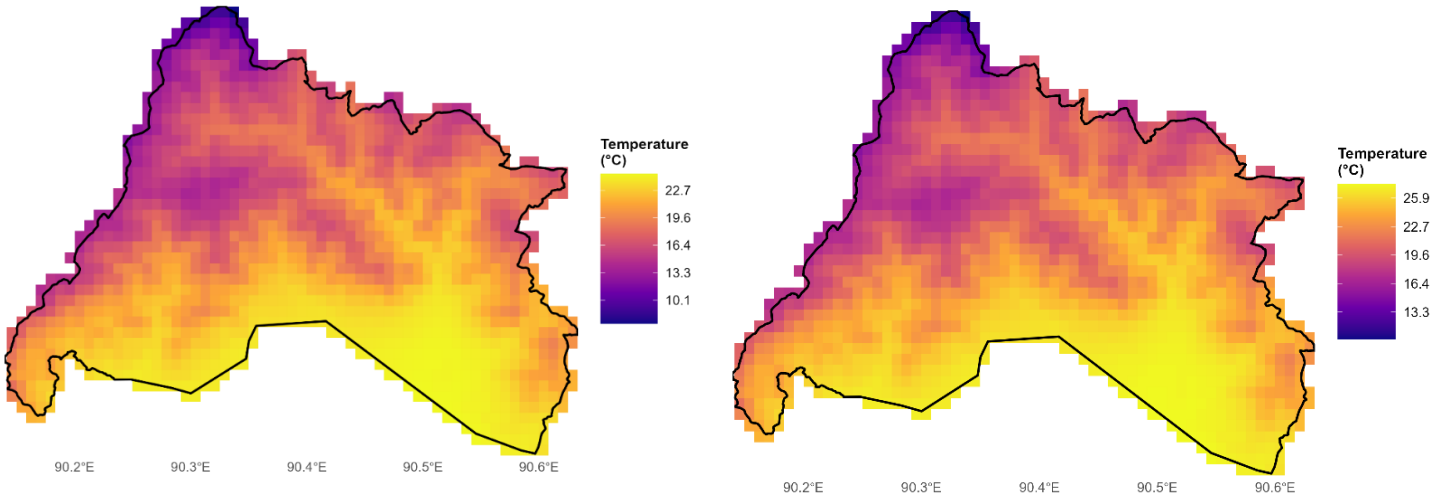

Figure 44: Map showing Current Mean Annual Temperature (BIO1) and Projected Future Mean Temperature (BIO1-SSP245).

2.8.3. Precipitation

Rainfall follows a clear monsoon cycle. Totals climb in April, peak in July and August, then fall after September. Peak months often exceed 500 mm. January and February are the driest months. The current annual precipitation map (BIO12) shows highest precipitation in the southern belt and southeast, with a steady decline toward interior ridges in the north. The BIO12 SSP245 precipitation map preserves this structure, showing that topography continues to control rainfall distribution. Based on SSP-245, there is a change of 1200 mm in the highest mean annual precipitation between the current and future projections.

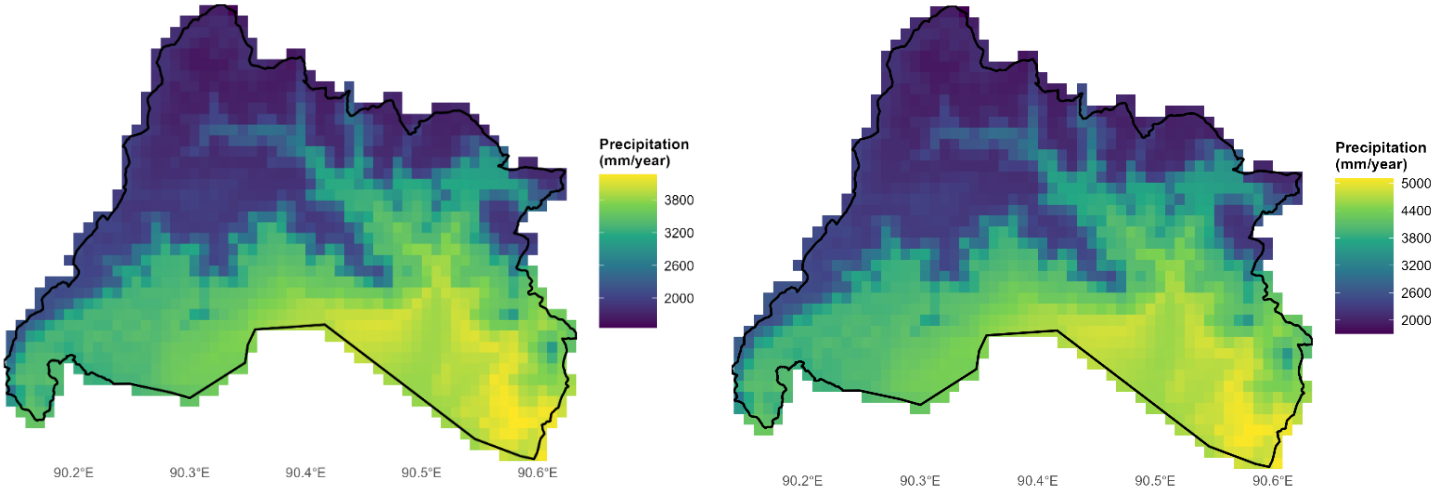

Figure 45: Map showing Current Mean Annual Precipitation (BIO12) and Projected Future Mean Temperature (BIO12-SSP245).

2.8.4. Topographic Features

Topographic characteristics largely shape the temperature and precipitation patterns described previously. Elevation increases steadily from the low-lying southern plains to the dissected west–east ridgeline, with steep slopes most prominent on the mid-slopes and gentler terrain along the valley floors. Aspect further influences climate: south and southwest slopes receive more sunlight, resulting in warmer and drier conditions, while north and northeast slopes remain cooler and more humid. Effective management should be informed by these maps and patterns. Water-intensive crops and plantations are best suited to cooler aspects and mid-elevation zones. Maintaining perennial cover on steep slopes helps to minimize erosion. It is essential to strengthen drainage systems, culverts, and landslide control measures on steep areas in advance of the monsoon season. In lowland farms, strategies to manage heat stress should be prioritized during the hot months from May to August. Additionally, water storage should be emphasized for the drier period from January to March, especially in higher elevation and north-facing areas.

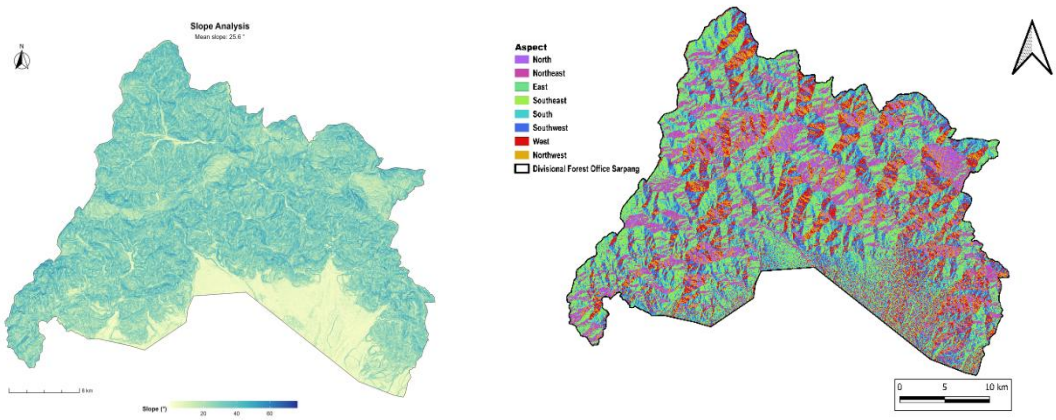

Figure 46: Map of DFO -Sarpang showing Slope and Aspect derived from DEM-Digital Elevation Model

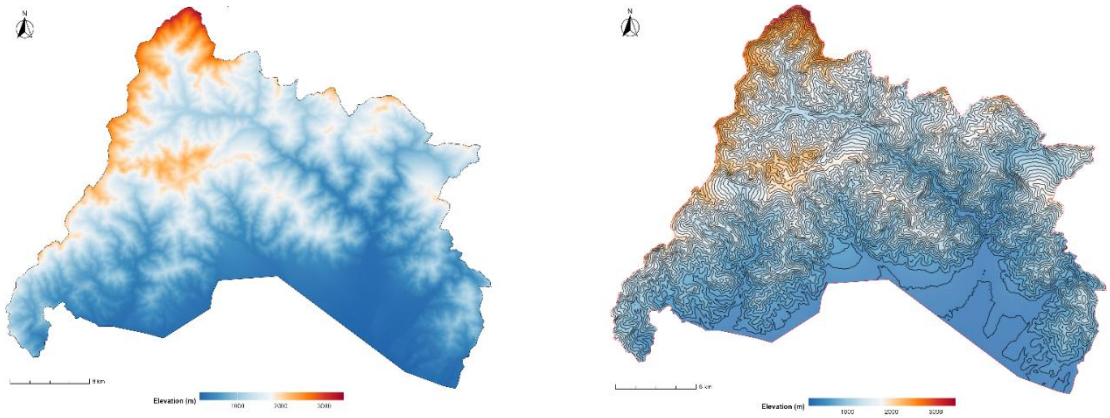

Figure 47: Map of DFO -Sarpang showing elevation and Contours derived from DEM

2.8.5. Vulnerability to Climate Change

The Climate Change Vulnerability and Capacity Assessment (CVCA, 2022) identified highly vulnerable forests along the southern and eastern edges of Sarpang, showing a fragmented pattern interspersed with patches of low vulnerability (Figure 44). This indicates that edge effects, driven by human activity, land use change, and exposure to climatic extremes, strongly influence forest vulnerability in these areas (Dantas de Paula et al., 2016). Several isolated patches of high vulnerability were also observed in central and northern Sarpang, likely linked to fragmented forest cover and proximity to settlements (Thakur et al., 2021). Globally, land use changes, forest fragmentation, and anthropogenic pressures are recognized as major drivers of forest vulnerability (Roshani et al., 2022). By contrast, the most forested areas of Sarpang, especially in central and western regions, were less vulnerable. The presence of large, contiguous forest tracts and favorable climatic conditions appear to enhance resilience in these landscapes (NEC, 2019).

Community vulnerability and adaptive capacity to climate change were also assessed. The vulnerability index scores of the gewogs are presented in Table 20 and Figure 45. Gewogs with higher negative index scores were found to be more vulnerable. A lower score does not imply absence of vulnerability, but rather a comparatively lower level of risk.

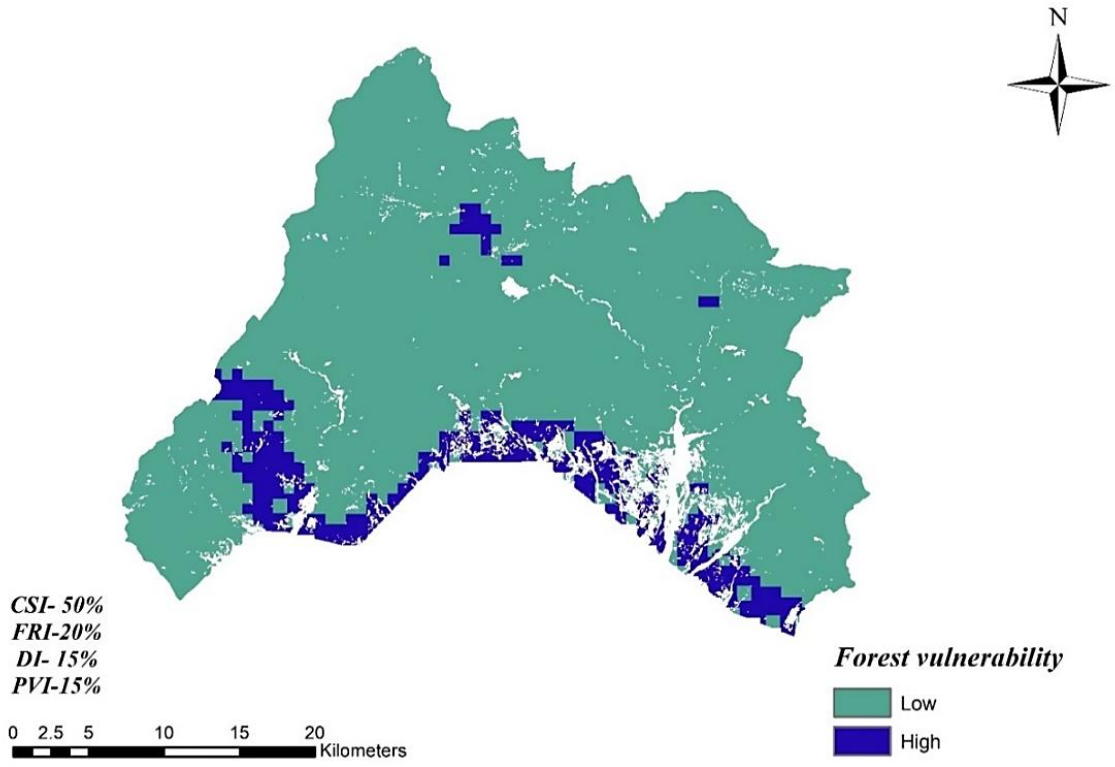

Figure 48: Forest vulnerability to Climate Change

Table 21: Exposure, sensitivity, adaptive capacity, and vulnerability index scores of the Forest Divisionss.

Gewog	Vulnerability	Exposure	Sensitivity	Adaptive capacity
Chhuzagang	-0.71	0.26	0.54	0.09
Dekiling	-0.78	0.47	0.46	0.14
Gakiling	-0.67	0.53	0.49	0.36
Gelephu	-0.68	0.32	0.45	0.08
Samtenling	-0.61	0.32	0.47	0.17
Serzhong	-0.69	0.33	0.48	0.11
Shompangkha	-0.74	0.48	0.48	0.22

Note: The Lower Index shows High Vulnerability.

Dekiling gewog is identified to be the most vulnerable, with the lowest vulnerability index of -0.78. In contrast, Samtenling gewog is identified as least vulnerable, with an index of -0.61. The higher vulnerability of Dekiling gewog is attributed to its lower adaptive capacity, higher exposure, and higher sensitivity to climate change. Concurrently, a similar index was observed for Shompangkha gewog as the second most vulnerable gewog under Sarpang division. However, Samtenling gewog is less vulnerable compared to the rest of the gewogs due to higher adaptive capacity, lower sensitivity and lower exposure. The difference in the vulnerability index between gewogs is small, indicating that the difference in the index is not significant.

The gewogs falling inside BC-03 are assessed during climate vulnerability assessments of Forest Divisionss in Bhutan. The results are as given in table 21. The results are referenced from CVCA report of Forest Divisionss in Bhutan, 2021.

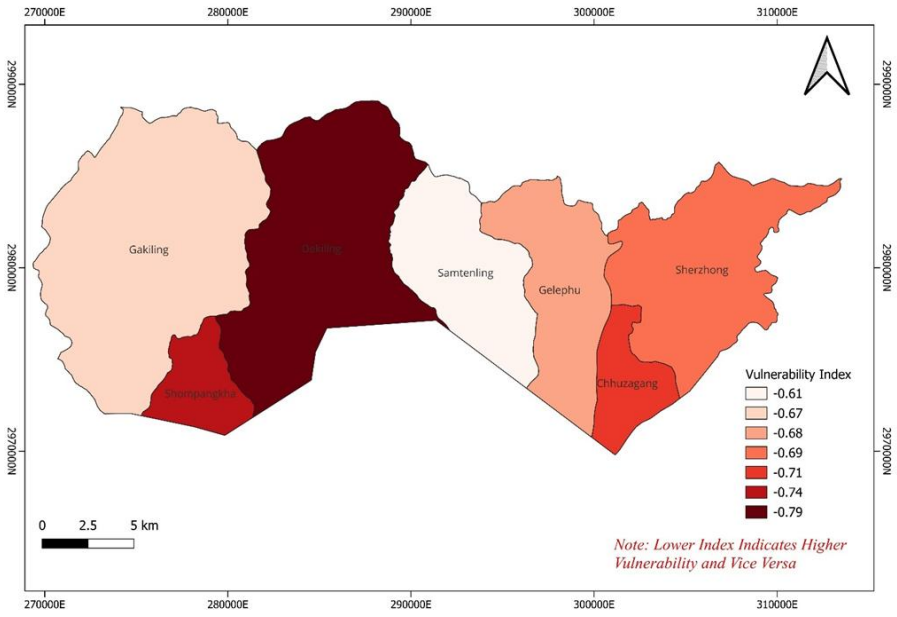

Figure 49: Vulnerability index map of gewogs outside of protected areas in DFO, Sarpang

Table 22: Vulnerability Index of gewogs under falling under Biological Corridor and neighboring PAs in Sarpang derived from CVCA report of PAs published in 2021.

Gewog	PAs	Exposure	Sensitivity	Adaptive Capacity	Vulnerability Index
Chhudzom	BC-03	0.18	0.23	0.45	0.03
Jigme Chhoeling	BC-03	0.19	0.26	0.57	0.12
Umling	RMNP	0.25	0.17	0.77	0.35
Senggey	BC-03/PWS	0.25	0.25	0.87	0.38
Tareythang	RMNP	0.26	0.26	0.26	0.26

2.8.3 Adaptation/mitigation measures adopted.

The CVCA survey (2022) found that households are adopting diverse strategies to cope with climate change, reflecting both resourcefulness and resilience. Common agricultural adaptations include switching to heat-resistant crops, practicing conservation agriculture, and investing in irrigation and rainwater harvesting. In livestock management, households are selecting heat-tolerant breeds, shifting grazing areas, and improving pasture management. Water security is addressed through wells, pipes, dams, and tanks. Economic diversification, such as small business ventures, asset sales, and external support, provides additional coping options. Land management practices to reduce soil erosion and landslides, fencing to protect grazing areas, and conservation of landscapes and ecosystem services are also applied. Despite these measures, the CVCA survey noted persistent challenges, including limited resources, knowledge gaps, and weak governance support for household adaptation.

2.8.6. Water Resources

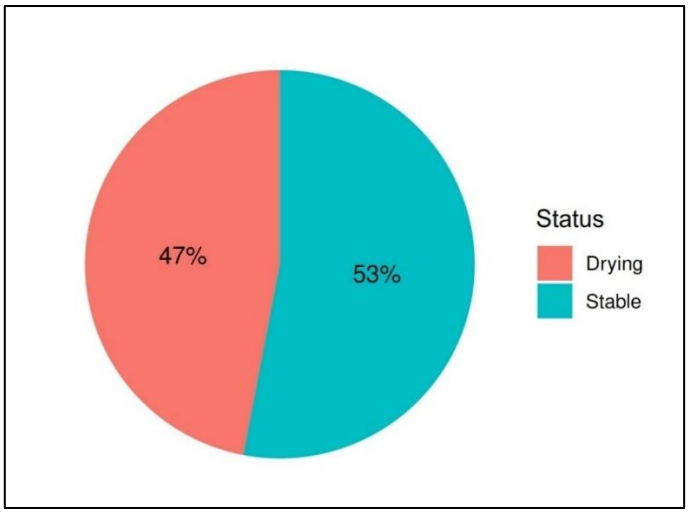

Figure 50: Status of water sources in Sarpang Dzongkhag.

Sarpang Dzongkhag relies on 282 water sources across its 12 gewogs, with the highest number located in Jigmechholing gewog (n=90), followed by Chhudzom gewog (n=47). Of these, 134

water sources (47.5%) are in a drying-up state, while the remaining 148 sources are stable and show no signs of depletion (Water Source Assessment Report, 2020). This trend raises concerns about water security and highlights the need for sustainable water management strategies.

Figure 51: Waterfall flowing into a rocky stream surrounded by dense forest in Sarpang, Bhutan.

2.8.6.1 Types of Water Sources

Most water sources in Sarpang are springs (53.2%), followed by streams (39.4%). Other sources (7.4%) include rivers, small lakes, ponds, and marshes, which contribute marginally to the overall water supply. Springs and streams serve as critical resources for communities, especially in rural areas where access to alternative sources is limited (Water Source Assessment Report, 2020).

2.9. High Conservation Value Areas (HCVAs)

2.9.1. Background and Approach

The High Conservation Value (HCV) concept, introduced by the Forest Stewardship Council in 1998, provides a framework for protecting critical environmental, social, and cultural values in forest landscapes. The approach follows three steps: identification, management, and monitoring. Identification focuses on mapping biodiversity, ecosystem services, and culturally important areas through scientific and community input. Management then applies tailored strategies such as conservation zoning, restoration, and sustainable use, while monitoring ensures effectiveness, tracks threats, and strengthens accountability. The six HCV categories cover species diversity, landscape ecosystems, rare habitats, ecosystem services, community needs, and cultural values.

Application in Bhutan

Bhutan applies the HCV approach beyond Forest Divisionss to guide land-use planning, strengthen inter-ministerial coordination, and safeguard cultural and ecological values. It supports Divisional Forest Offices in sustainable forest management by integrating local identification of conservation values, threat assessments, and management measures. This broad application helps align national development with conservation priorities while embedding safeguards at the landscape scale.

2.8.2. Approaches Applied in Developing HCV Management and Monitoring Plans

Under the IKI Living Landscapes project, HCV Screening was conducted in 2023 to identify and prioritize HCV areas. Screening, based on six HCV categories, evaluates presence and threats at the landscape scale, exposing information gaps and directing management resources. Areas were classified into four priorities: Priority 1 (high HCV probability, high threat) requiring active management; Priority 2 (high probability, low threat) needing preventative measures; Priority 3 (low probability, high threat) calling for precautionary responses; and Priority 4 (low probability, low threat) requiring only secondary responses. Complementary use of the Conservation Standards framework ensured structured monitoring protocols, with workshops in Thimphu helping refine strategies for each priority level.

Screening Process and Selection of HCVA

For the Divisional Forest Office, Sarpang, the primary focus was on Priority 2 areas. These regions, characterized by a high probability of HCV presence and relatively manageable threats, were chosen for their suitability for effective conservation efforts. In contrast, Priority 1 areas were excluded, as most of the division fell under this category, making them too extensive to manage efficiently.

The selected Priority 2 management areas were also strategically located near neighboring Forest Divisionss, serving as a conservation buffer that enhances the ecological connectivity and overall effectiveness of the protected zones. By choosing areas with fewer resident communities, the DFO could more easily plan and implement appropriate management actions without significant social disruptions. In sum, this targeted selection allowed the DFO to concentrate its resources on regions where conservation efforts could be both practical and impactful.

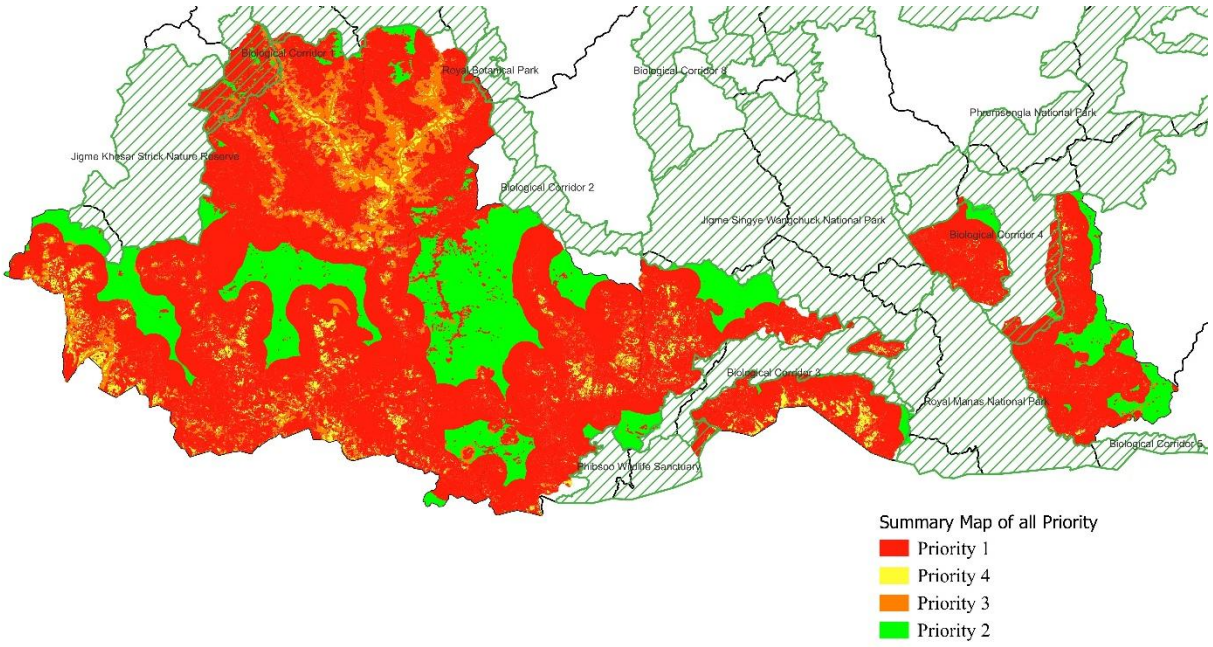

Figure 52: Summary Map of all Priority for consideration as HCV in IKI landscape

2.9.3. Chudzom-Pristine Mountain Forest Ecosystem: A High Conservation Value Area in Sarpang

The Chudzom-Pristine Mountain Forest Ecosystem in Sarpang has been designated as a High Conservation Value (HCV) area due to its exceptional ecological significance. It falls under **HCV category II**. Spanning approximately 45 square kilometers in northern Chudzom Gewog, this critical conservation zone lies at the tri-boundary of the Tsirang Forest Division, Sarpang Forest Division, and Jigme Singye Wangchuck National Park.

Figure 53: Photographic Evidence of Intact Forest and Climate Forest in Chhudzom

The ecosystem consists of intact forest landscapes and cloud forests, both of which play a crucial role in maintaining biodiversity and ecological stability. Intact forest landscapes provide relatively undisturbed habitats, supporting diverse flora and fauna while facilitating essential ecological processes such as carbon sequestration.

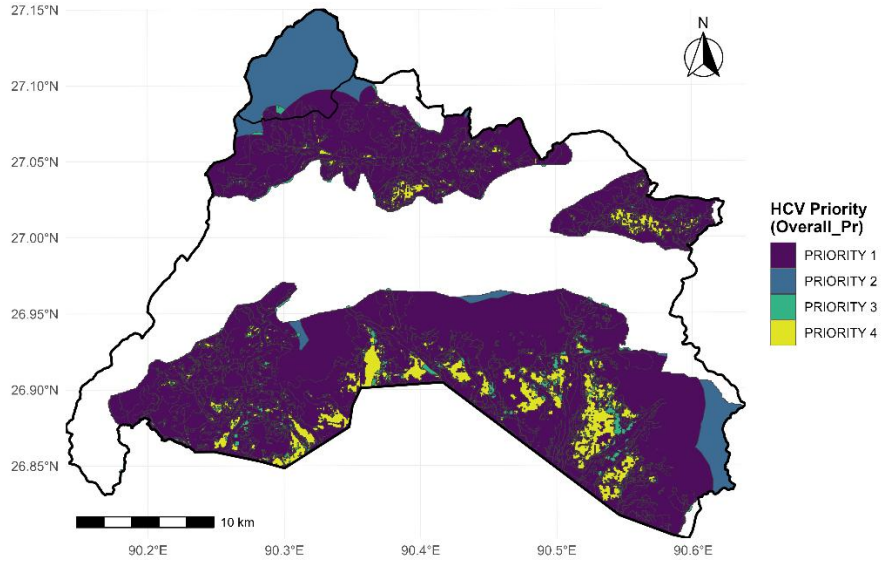

Figure 54: Summary Map of all Priority areas in Divisional Forest Office, Sarpang Jurisdiction.

Meanwhile, cloud forests, characterized by persistent low-level cloud cover, harbor specialized species adapted to cool, moist conditions, thereby enhancing regional biodiversity. The co-occurrence of these ecosystems, as confirmed through suitability analysis, strongly supports the designation of this area as an HCV. Additionally, the presence of indicator species such as tigers (*Panthera tigris*), red pandas (*Ailurus fulgens*), and black bears (*Ursus thibetanus*) underscores their ecological importance. These species not only highlight the area's biodiversity richness but also indicate the overall health of the ecosystem. The primary conservation objective for this HCV designation is to protect critical habitats and ensure the long-term survival of threatened species while maintaining ecological integrity. This initiative contributes to global conservation efforts by supporting climate regulation, biodiversity conservation, and sustainable resource management. The protection of this area is integral to preserving valuable ecosystem services, reinforcing the need for continued conservation and sustainable management efforts.

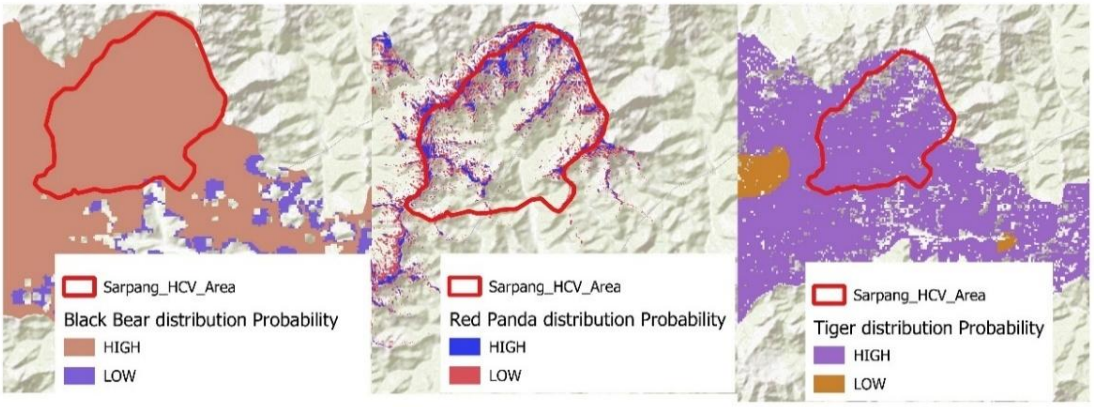

Figure 55: Red Panda, Tiger, Black Bear, Clouded Leopard distribution in HCV

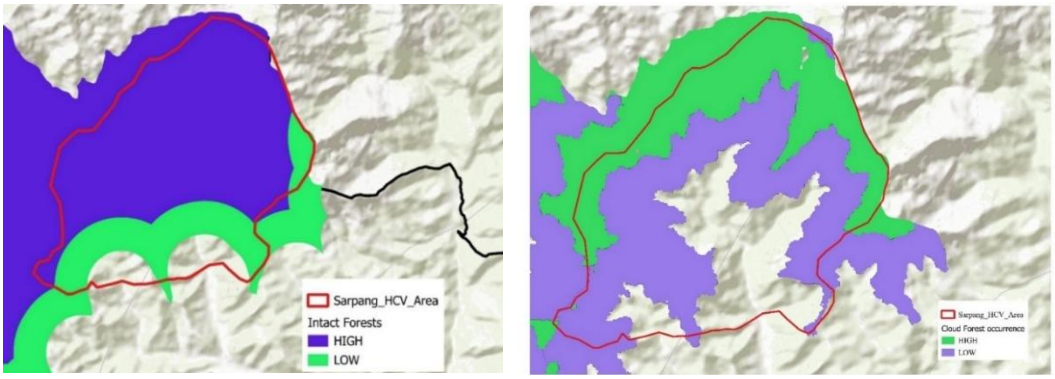

Figure 56: Intact Forests: Purple high probability of presence, Brown low probability of presence, white – absent & Cloud Forest: Green high probability of presence, Brown: low probability of presence, white – absent.

2.9.4. Management and Monitoring for Priority 2 Areas

Priority 2 areas identified through HCV Screening are currently at low risk, so the focus is on preventing future threats through proactive measures such as patrolling. Key High Conservation Values in these areas include species diversity (red panda, tiger, black bear, and clouded leopard), intact forest ecosystems, and rare ecosystems like cloud forests. These species face challenges from habitat loss, poaching, and human-wildlife conflict, requiring continued protection of habitats and anti-poaching interventions. Intact forests provide biodiversity corridors, carbon storage, and watershed services, while cloud forests support endemic species, regulate local climates, and secure freshwater. Conservation in Priority 2 areas emphasizes community participation, sustainable land management, and ecotourism to protect ecological integrity while also supporting local livelihoods.

2.9.5. Potential Threats that may emerge in future

Table 23. List of high-ranking threats on HCVs

Potential Threats	Affected HCVs
Illegal Logging	HCV 1 – Tiger, Red Panda & Blackbear HCV 2 - Landscape scale mosaics (Intact Forest Lands) HCV 3 - Rare ecosystems (Cloud Forest)
Poaching	HCV 1 - Tiger, Black Bear and Red Panda
Wildlife-Human Conflict / Reprisal killing	HCV1 – Tiger and Black Bear
Pests and Diseases	HCV 2 - Landscape scale mosaics (Intact Forest Lands) HCV 3 - Rare ecosystems (Cloud Forest), Refugia)

Illegal Logging, Poaching, Wildlife-Human Conflict/Reprisal Killing, and Pests and Diseases pose significant threats to Bhutan's forests. Illegal logging undermines efforts to maintain forest cover and biodiversity, leading to habitat loss and ecosystem degradation. Poaching disrupts delicate ecological balances by targeting endangered species, while wildlife-human conflict and reprisal killings endanger both wildlife and local communities. Additionally, pests and diseases can devastate forest ecosystems, affecting plant health and biodiversity. These challenges highlight the urgent need for robust enforcement of conservation laws, community engagement in wildlife management, and proactive measures to prevent and mitigate forest threats in Bhutan.

2.9.6. Strategic Approaches to mitigate threats

Table 24: List of Strategic Approaches that can Mitigate Potential Threat in the Selected HCV Management Area

Potential Threat	Proposed Strategic Approach
Illegal Logging	Sustainable Livelihoods; Institutional & HR Capacity
Poaching,	Sustainable Livelihoods; Institutional & HR Capacity
Reprisal killing due to Human Wildlife Conflict	Human Wildlife Conflict Mitigation
Pest and diseases	Institutional & HR Capacity

Addressing potential threats such as illegal logging and poaching requires a dual approach: offering sustainable livelihood opportunities to communities to reduce dependence on illicit activities and enhancing institutional and human resource capacity through strengthened law enforcement, improved surveillance, and increased patrols. Human-wildlife conflict can be mitigated by implementing practical solutions like wildlife corridors, electric fencing, and early warning systems, alongside compensation schemes or insurance programs to support affected farmers. To combat pests and diseases, it is vital to build capacity within forestry and agricultural departments for monitoring and control through targeted training and infrastructure, while promoting agroforestry practices and crop diversification to bolster ecosystem resilience and reduce vulnerability.

CHAPTER 3: Threat and challenges

3.1 Threat Rating

Threats \ Targets	To promote s...	To enhance p...	To implemen...	To advance r...	To develop ...	To strength...	To impleme...	To streng...	Summary Threat R...
Slow Adoption of Technology and Outdated		Medium							Low
Unskilled and Poorly Equipped Workforce								Medium	Low
Lack of Monitoring and Evaluation						Medium			Low
Inadequate Research and Innovation				Low					Low
Human-Wildlife Conflict (HWC)							High		Medium
Poor Waste Management					Medium				Low
Drying up of Water sources			Medium						Low
Climate Change	Not Specif...		Medium						Low
Habitat destruction & fragmentation			Not Spec...						Not Specified
Invasive Species	Low								Low
Mining, dredging & Quarrying	Low				Low				Low
Illegal Activities (fishing, poaching, logging, trade)	Medium								Low
Landslides & Flash Floods	Medium								Low
Agricultural land expansion	Medium								Low
Pest & Diseses	Medium								Low
Summary Target Ratings:	Medium	Low	Medium	Low	Low	Low	Medium	Low	**Overall Project Rating** Medium

Figure 57: Ranking of threats impacting management target and objectives

We identified key threats such as illegal activities, HWC, invasive species, climate change, drying water sources, pests, diseases, mining, habitat destruction, and agricultural expansion. These threats were analyzed using Miradi software for their impact on objectives like sustainable forestry, public service efficiency, climate change adaptation, research, infrastructure, resource monitoring, and conflict mitigation.

Most threats have a medium impact, with climate change showing very high impact on adaptation efforts and HWC significantly affecting conflict mitigation and rescue operations. While invasive species and illegal trade show lower impact, challenges like habitat destruction and water scarcity pose medium to high threats across targets.

Opportunities exist for strategic interventions, particularly in enhancing public service efficiency, resource management, and innovative revenue generation. However, targeted efforts are crucial for highly impacted areas like conflict mitigation and climate adaptation, indicating scope for improvement in environmental and wildlife management. The overall threat rating is medium, underscoring manageable challenges with potential for sustainable solutions.

3.1.1 Threats in Details

Landslides

Figure 58: Landslides at Chhudzom

Sarpang Dzongkhag faces recurrent landslides and flashfloods triggered by intense monsoons, fragile geological formations, and increasing anthropogenic activities. Major landslides, such as those in Ossay and Lhayul, have led to severe land degradation, habitat destruction, disruption of transportation routes, and displacement of local communities. These hazards not only threaten lives and livelihoods but also undermine agricultural productivity and infrastructure stability. The Landslide Susceptibility Index indicates that large areas of Sarpang are highly prone to landslides, emphasizing the urgent need for targeted risk reduction measures. Ecological restoration, land reclamation, slope stabilization, and improved watershed management are critical interventions to enhance resilience. Strengthening community preparedness, integrating early warning systems, and adopting climate-smart land use planning will further reduce vulnerability to these recurring disasters.

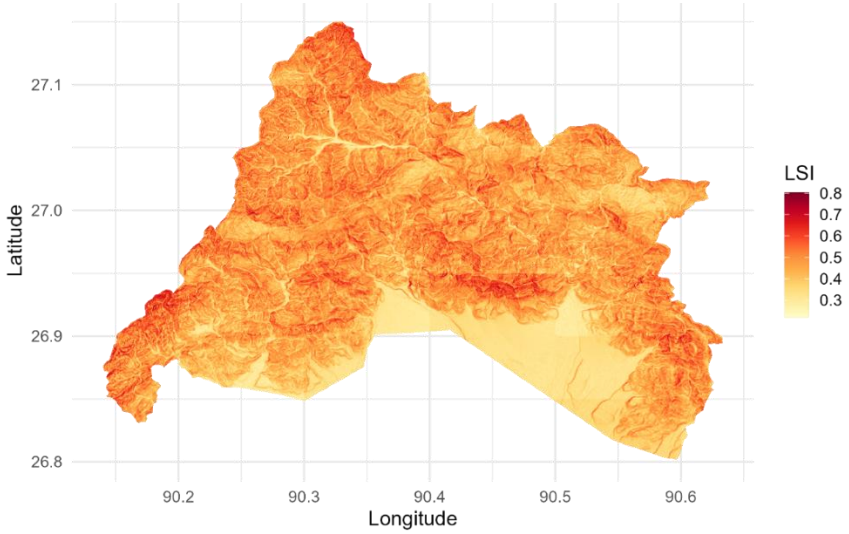

Figure 59: Landslide Susceptibility Index of DFO-Sarpang.

Flashfloods

Sarpang has faced repeated flash floods, notably in 1996 and July 2016, when heavy monsoon rains caused rivers to overflow, washing away Sarpang town, destroying shops, farmland, and roads, and displacing families. The floods result from intense rainfall, steep terrain, and converging tributaries, with climate change increasing their frequency and severity. To reduce risks, structural measures such as gabion walls and riprap are now being built along major rivers.

Figure 60: Flashfloods washaway old Sarpang town

Invasive species

Figure 61: Invasive Species-Lantana camara

Invasive plants (e.g., *Chromolaena odorata, Mikania micrantha*) and exotic species like *Leucaena leucocephala* and *Lantana camara* threaten biodiversity and agriculture. Control strategies include mechanical removal, biological control, and awareness campaigns, with caution against herbicides to minimize ecological harm.

Habitat destruction and fragmentation

Developmental activities like road construction, power transmission lines and mobile towers disrupt habitats and wildlife, emphasizing the need for sustainable planning to mitigate biodiversity loss.

Figure 62: Construction of access roads leads to destruction of habitats and biodiversity loss.

Encroachment of SRF land for Agricultural

Forest clearing for agriculture, particularly cardamom and mandarin cultivation, fragments habitats, increases HWC, and exacerbates water demand, impacting wetlands and biodiversity.

Figure 63: Encroachment of SRF Land for Agriculture

Quarrying, dredging and mining

Stone quarries and riverbed dredging degrade ecosystems, alter river courses, and increase landslide risks.

Figure 64: River-bed Materials dredging

Drying water sources

Climate change, deforestation, and developmental activities are drying water sources, causing seasonal water scarcity. Sustainable water management and conservation of recharge areas are urgently needed.

Figure 65: Inventory of Drying water sources

Illegal activities

Illegal logging, poaching, and fishing threaten biodiversity. Sarpang's porous border with India facilitates illegal wildlife trade and resource extraction. Strengthening monitoring, intelligence networks, transboundary coordination, and advanced technology is critical to combat poaching and trafficking.

Figure 66: Evidence of Illegal activities -Poaching and Illegal Felling

Human-wildlife Conflict

Conflicts with elephants and other wildlife result in crop damage, property loss, and fatalities. Mitigation measures include electric fencing, and community awareness to reduce retaliatory killings.

Figure 67: Crop and property damaged by elephants

Climate change

Climate change impacts, such as altered rainfall and drying water sources, exacerbating habitat degradation, floods and species loss. Proactive strategies, including conservation and reforestation, are essential.

Figure 68: Extreme events-floods -due to heavy erratic rainfall

Pest and Disease

Pests and wildlife diseases pose significant risks to ecosystems. Integrated pest management and early monitoring are vital to prevent outbreaks and maintain biodiversity.

Figure 69: Forest Pest

3.1.2. Challenges

Slow Adoption of Technology and Outdated Policies

The Division faces challenges in service delivery due to the slow adoption of new technologies and outdated policies. This hampers innovation, reduces stakeholder satisfaction, and impacts on the efficiency of revenue generation. Weak enforcement mechanisms further exacerbate issues related to resource monitoring, leading to ineffective management of forest resources and insufficient compliance with environmental regulations.

Unskilled and Poorly Equipped Workforce

The workforce in the division is often unskilled and poorly equipped, affecting the quality of forestry services and stakeholder engagement. This lack of technical expertise and resources compromises monitoring efforts, weakens enforcement of conservation laws, and leads to inefficient management of forest resources. The inability to effectively implement policies and strategies results in gaps in biodiversity conservation and ecosystem resilience.

Lack of Monitoring and Evaluation

Division struggles with insufficient monitoring and evaluation systems for forest resources, policies, and plans. Without systematic tracking, the effectiveness of conservation efforts is compromised, leading to mismanagement of resources. The absence of robust assessment mechanisms hinders the ability to gauge progress, undermining the enforcement of sustainable forestry practices and further threatening forest health and biodiversity.

Inadequate Research and Innovation

Research and innovation in forestry sector are limited, hindering the development of evidence-based policies for sustainable forest management. The lack of scientific research impedes the ability to address emerging environmental challenges, affecting biodiversity conservation and ecosystem resilience. Moreover, without innovative forestry practices, the region struggles to adapt to climate change and harness socio-economic benefits from sustainable forest management.

CHAPTER 4: Management Prescription

The Management Plan for January 2026 to December 2035 provides a comprehensive framework for sustainable management, conservation, and use of forest resources. It adopts an integrated approach to address environmental and social challenges while promoting resilience and equity. A core feature of the plan is the Threat Analysis, which highlights major risks to forest ecosystems such as habitat degradation, climate change, and human pressures. This analysis guides targeted interventions to reduce threats and secure biodiversity

The objectives, strategies and action are as follows:

Objective 1: To promote sustainable forest management practices that enhance biodiversity conservation, maintain ecosystem services, and support ecological resilience for long-term environmental and socio-economic benefits.

Strategy 1.1: Develop and monitor integrated forest management plans (CFMPs, NWFPMPs, LFMPs).

- ✓ Action 1.1.1: Mid-Term Evaluation and Revision of Existing CF Management Plan
- ✓ Action 1.1.2: Mid-Term Evaluation of Approved LFMP
- ✓ Action 1.1.3: Prepare Local Forest Management Area Plan
- ✓ Action 1.1.4: Maintenance of DFO nursery at Naharani (Shawali)
- ✓ Action 1.1.5: Plantation of High-Value NWFP and Timber Species in CF
- ✓ Action 1.1.6: Revision of Approved LFMP

Strategy 1.2: Secure the Integrity of Biological Corridors and High Conservation Value Areas (HCVAs) through effective Conservation Management Plan.

- ✓ Action 1.2.1: Awareness of Biological Corridor and HCV to Communities
- ✓ Action 1.2.2: Assessment of Bamboo Diversity and Stock in SRF and Settlement Areas
- ✓ Action 1.2.3: Conduct feasibility study on conservation of potential sites of cultural and ecological significance with involvement of different stakeholders
- ✓ Action 1.2.4: Issuance of permits and marking of trees according to set limits in plans

Strategy 1.3: Secure a Sustainable Future for Water Resources and Critical Ecosystems by Implementing a Comprehensive Strategy to Protect, Restore, and Manage Wetlands, Marshes, and Their Water Sources.

- ✓ Action 1.3.1: Assess the status of waterholes in Sarpang
- ✓ Action 1.3.2.: Revival of lakes at Gaychhu and Darachhu.

Objective 2: To implement climate change mitigation and adaptation strategies through sustainable practices while fostering community engagement to enhance resilience, reduce vulnerabilities, and promote sustainable development.

Strategy 2.1: Prevent and Mitigate the Spread of Invasive Species.

- ✓ Action 2.1.1: Carry out an inventory of three invasive species (*Lantana camara, Chromolaena odorata, Mikania micrantha)* and design and implement appropriate measures to prevent their spread

Strategy 2.2: Mitigate Climate Change Through the Implementation of Plantations (Avenue, Reforestation, and Afforestation).

- ✓ Action 2.2.1: Plantation of high Value Tree Species in Barren Areas within SRFL and CF Areas
- ✓ Action 2.2.2: Annual Plantation Maintenance

Strategy 2.3: Incentivize the Protection and Restoration of Vital Ecosystem Services through a Robust Payment for Ecosystem Services (PES) Program.

- ✓ Action 2.3.1: Revival of Dried Waterholes
- ✓ Action 2.3.2: Implementation of Bio-engineering Works in Eroded Lands within the Watershed Area

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Objective 3: To develop and promote ecotourism and recreational activities that conserve natural resources, support local livelihoods, and enhance visitor experiences while ensuring environmental sustainability and cultural preservation.

Strategy 3.1: Generate Economic Opportunities and Enhance Community Livelihoods through the identification and development of sustainable ecotourism and recreation sites.

- o Action 3.1.1: Developing a Birding Trail at Darachhu focusing on species like the Beautiful Nuthatch, Rufous-necked Hornbill, Parrotbills, Laughingthrushes, and Wren Babblers.
- o Action 3.1.2: Develop and maintain the existing trail to Kharkhola Guru Rinpoche's Nye under Chhudzom Geog and Goendra Dhagap Dzong at Gakiling gewog
- o Action 3.1.3: Revival of the mule track between Sarpang and Tsirang.

Objective 4: To advance research, education, and policy implementation for sustainable forest management, fostering biodiversity conservation, ecosystem resilience, and socio-economic development.

Strategy 4.1: Enhance knowledge on wild edible and flowering plants.

- ✓ Action 4.1.1: Conduct inventory of wild edible and flowering plants

Strategy 4.2: Manage wildlife habitat and enhance knowledge on species distribution.

- ✓ Action 4.2.1: Document current habitat conditions and species distributions to establish a reference point for monitoring changes over time
- ✓ Action 4.2.2: Establish Biodiversity Monitoring Grids (BMG) representing different habitat types and geographical regions
- ✓ Action 4.2.3: Management/Restoration of Degraded Grassland

Strategy 4.3: Empower Communities through Targeted Educational Outreach.

- ✓ Action 4.3.1: Conduct Research on Ethnobotanical Practices in Sarpang
- ✓ Action 4.3.2: Conduct Awareness on Forest Rules and Regulations in All 10 gewogs
- ✓ Action 4.3.3: Provide Awareness on Online Forestry Services in All 10 gewogs

- ✓ Action 4.3.4: Training Sessions for Executive Members of NWFP and CF Groups on Wood Volume Calculation and NWFP Processing

Strategy 4.4: Participate and Contribute to Nationwide Species Surveys (Centrally Coordinated by Department

- ✓ 4.4.1. Tiger population revalidation survey, eDNA-based nationwide biodiversity survey, Musk deer population/abundance survey, National Forest Inventory

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Objective 5: To strengthen resource monitoring, assessment, and enforcement mechanisms to ensure sustainable utilization, conservation of natural resources, and compliance with environmental regulations.

Strategy 5.1: Maximize the Effectiveness of Management Regimes Through Regular Monitoring and Evaluation.

- ✓ Action 5.1.1: Conduct Annual Monitoring of LFMPs
- ✓ Action 5.1.2: Conduct Annual Monitoring of CFMPs NWFP & WBIs
- ✓ Action 5.1.3: Conduct Monitoring of allotted Rural House Building Timbers
- ✓ Action 5.1.4: Conduct Awareness on Online Forestry Services (FIRMS/OFS/G2C/SDSS) for Staffs
- ✓ Action 5.1.5: Prepare Annual Facts and Figures Using FIRMS, OFS, and SMART Connect

Strategy 5.2: Implement a Strategic Approach to Patrolling and Reporting: Enhance SMART Patrolling and Ensure Effective Data Collection and Analysis.

- ✓ Action 5.2.1: Conduct Long-Range Patrolling Using SMART Connect in BC-03
- ✓ Action 5.2.2: Procurement of Communication Equipment (Handsets, Electronic Visual Display Equipment, night vision telescope)
- ✓ Action 5.2.3: Identify Key Areas and Conduct SMART Patrolling Using Data from SMARTs and Camera Trapping Data

Strategy 5.3: Strengthen Wildlife Law Enforcement and Intelligence Gathering to Combat Illegal Activities and Protect Wildlife.

- ✓ Action 5.3.1: Procurement of Modern Surveillance Technologies such as Drones to Monitor Wildlife Populations and Detect Illegal Activities
- ✓ Action 5.3.2: Capacity Building and Training on Identification of Wildlife Products

Strategy 5.4: Implement Robust Biodiversity Monitoring Strategies to Track Habitat Loss and Degradation Driven by Climate Change and Human Activities.

- ✓ Action 5.4.1: Develop Intelligence Networks and Partnerships with Informants, Local Communities, and International Agencies
- ✓ Action 5.4.2: Coordinate Meetings/Workshops for Transboundary Cooperation
- ✓ Action 5.4.3: Capacity Building Through Botanical Surveys and Workshops to Enhance Knowledge of Forestry Staff

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Objective 6: To implement effective human-wildlife conflict strategies and enhance rescue operations to promote coexistence, safeguard communities, and conserve wildlife populations.

Strategy 6.1: Implement Conflict 2 Coexistence Strategies to Reduce Human-Wildlife Conflict and Foster Sustainable Solutions.

- ✓ Action 6.1.1: Restoration of Natural Waterholes & Natural Mineral licks
- ✓ Action 6.1.2: Habitat Enrichment Plantation
- ✓ Action 6.1.3: Strengthening Quick Response Teams (QRT)
- ✓ Action 6.1.4: Delineation of Elephant Movement Corridors
- ✓ Action 6.1.5: Development of Elephant Movement Corridor Management Plan
- ✓ Action 6.1.6: Awareness and Advocacy on Conservation to Community (C2C)
- ✓ Action 6.1.7: Installation of Chain Link Fencing (Solar/Electric Line on Top) in Feasible Locations
- ✓ Action 6.1.8: Train staff and collect data on HWC to develop C2C strategy plan
- ✓ Action 6.1.9: Develop C2C Strategy for Dekiling and Gakiling gewog
- ✓ Action 6.1.10: Community awareness on storage and post-harvest practices
- ✓ Action 6.1.11: Develop HWC co-habitation strategy for entire Sarpang dzongkhag
- ✓ Action 6.1.12: Attend HEC complaints both during day and night

Strategy 6.2: Strengthen Wildlife Rescue and Rehabilitation Activities to Ensure the Well-being of Animals in Need.

- ✓ Action 6.2.1: Conduct refresher course on handling and management of injured wild animals
- ✓ Action 6.2.2: Procure additional field equipment and gear such as tents, gloves, uniform, sleeping bags, mats, torches, field boots, first AID kits & GPS
- ✓ Action 6.2.3: Procure rescue cage
- ✓ Action 6.2.4: Replace dart gun
- ✓ Action 6.2.5: Procure/replenish tranquilizing and reversal drugs
- ✓ Action 6.2.6: Improve SWRRC infrastructure (Blacktopping roads and developing picnic spots)
- ✓ Action 6.2.7: Carry out landscaping work at SWRRC to beautify the centre

Strategy 6.3: Strengthen Scientific Knowledge on HWC: Invest in Research to Understand the Nature, Causes, and Extent of Human-Wildlife Conflict.

- ✓ Action 6.3.1: Conduct ecological study on conflict animals involved in Human-Wildlife Conflict (HWC).
- ✓ Action 6.3.2: Study the impact of management interventions implemented.

Objective 7: To enhance public service delivery and revenue generation by implementing strategic initiatives and fostering innovative solutions that ensure efficiency, sustainability, and stakeholder satisfaction.

Strategy 7.1: Strengthen Service Delivery by Investing in Premium Infrastructures, Enhancing Mobility, Equipping & building Capacity of staff.

- ✓ Action 7.1.1: Purchase laptops with high specifications to facilitate timely online services from any location
- ✓ Action 7.1.2: Procure AI camera traps (AI powered trail guard)
- ✓ Action 7.1.3: Procurement of diameter tape, GPS handset, Hypsometer, range finder, densitometer
- ✓ Action 7.1.4: Improve high-speed internet access to strengthen online facilities
- ✓ Action 7.1.5: Provide training in GIS applications, enterprise development to the DFO staff
- ✓ Action 7.1.6: Provide training on the updated SMART version to staff
- ✓ Action 7.1.7: Maintain existing offices and staff quarters under DFO Sarpang (Range Office, Sarpang/Gelephu)
- ✓ Action 7.1.8: Maintenance of SWRRC (buildings, ponds, and toilets)
- ✓ Action 7.1.9: Conduct awareness and education on waste management for the public under DFO Sarpang
- ✓ Action 7.1.10: Conservation awareness and communication network development in schools
- ✓ Action 7.1.11: Conduct Rescue and Survival training to field staff
- ✓ Action 7.1.12: Train CFMF/NWFP group members on enterprise development

Strategy 7.2: Maximize Revenue Generation from Forestry Resources Through Effective and Sustainable Management Practices.

- ✓ Action 7.2.1: Generate revenue through timber allotment (royalty, marking fee, service charges)
- ✓ Action 7.2.2: Generate revenue through other forestry services (forest clearance, registration and renewal of power chain and other wood-based industries)
- ✓ Action 7.2.3: Generate revenue from fee collection from visitors at SWRRC, Jigmeling

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Objective 8: To strengthen the capacity of forestry officials and stakeholders for improved service delivery.

Strategy 8.1: Disciplined manpower to improve service delivery.

Action 8.1.1. Refresher course of uniform code of conduct, weapon Handling and drills.

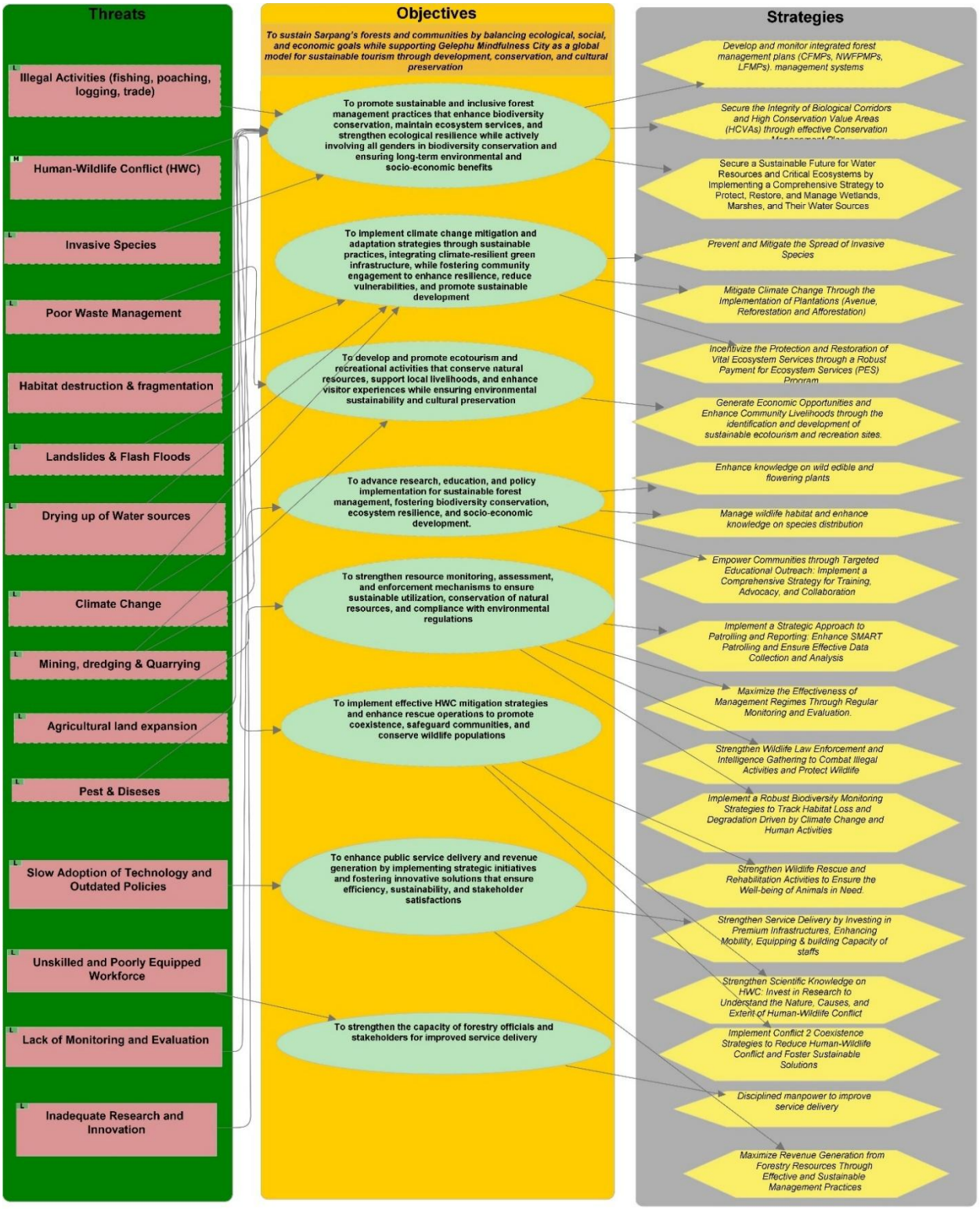

Figure 70: Conceptual model DFO management plan to achieve objectives and overcome threats and challenges.

4.1. Gender Mainstreaming for Management Interventions

The plan incorporates a robust **Gender Mainstreaming Framework**, recognizing the pivotal role of gender equity in forest management. By promoting inclusivity and empowering marginalized groups, it aims to create a more just and participatory governance structure. Adhering to the Gender Mainstreaming Guideline, this plan aims to identify and address the distinct needs and priorities of men, women, and youth fostering inclusivity and long-term sustainability.

Table 25: HCV Key Strategies

Key Strategies	Details
Adherence to Guidelines	Strict compliance with the Gender Mainstreaming Guideline for all phases of plan preparation.
Needs Assessment	Identification of diverse priorities, constraints, and contributions of women, men, and youth.
Equitable Participation	Inclusion of all genders in consultations, decision-making, and capacity-building activities.
Leadership Opportunities	Promote women's roles in decision-making and leadership platforms.
Capacity Building	Organize gender-awareness workshops and develop skills for sustainable livelihoods.
Monitoring and Evaluation	Regular tracking of gender-specific outcomes and progress reports.

4.2. Environmental and Social Safeguards

Furthermore, the plan embeds an **Environmental and Social Safeguarding Strategy** to uphold ethical and sustainable practices. This ensures that developmental activities align with environmental preservation and the well-being of local communities. It focuses on mitigating risks while maximizing ecological and community benefits.

Key Components:

1. ***Screening and Risk Mitigation:***
   - ✓ Assess risks from activities like invasive species removal, grazing management, and habitat restoration.
   - ✓ Implement preventive measures, such as biodiversity monitoring and reforestation in critical areas.
2. **Community Engagement:**
   - ✓ Collaborate with local communities to address concerns related to land use and resource allocation.
   - ✓ Develop guidelines for equitable access to resources during PES implementation and watershed management.

3. **Monitoring and Adaptation:**
    - ✓ Conduct periodic evaluations of activities, such as firewood collection monitoring and pest management in High Conservation Value Areas (HCVAs).
    - ✓ Adjust strategies based on monitoring data and stakeholder feedback.
4. **Sustainable Livelihoods:**
    - ✓ Promote sustainable practices, such as bamboo cultivation and NWFP commercialization, to reduce reliance on forest resources.
    - ✓ Develop ecotourism opportunities, such as campsite management, to diversify income streams for local communities.
5. **Compliance and Transparency:**
    - ✓ Maintain alignment with the ESS Framework through regular documentation and reporting on interventions.
6. **Stakeholder Consultation and Grievance Redress Mechanism (GRM)**
    - ✓ Implement a structured, ongoing consultation process involving local communities, civil society organizations, government agencies, and technical experts.
    - ✓ Design and operationalize a responsive Grievance Redress Mechanism (GRM) that is culturally appropriate, gender-sensitive, and accessible to all stakeholders.
    - ✓ Ensure timely resolution of complaints related to project impacts, with clear escalation procedures and independent oversight where necessary.
7. **Occupational Health and Safety (OHS)**
    - ✓ Enforce strict occupational health and safety protocols for all project personnel, contractors, and community workers.
    - ✓ Provide training in safe handling of equipment, fire management, chemical use (e.g., in pest control), and emergency response procedures.
    - ✓ Conduct regular safety audits and risk assessments at project sites, particularly in high-risk activities such as tree planting, trail construction, and controlled burns.
    - ✓ Ensure availability of personal protective equipment (PPE) and access to first aid and medical support.

Table 26: Implementation Strategies for Gender mainstreaming and Environmental and Social Safeguards

Management Interventions	Gender Mainstreaming	Environmental and Social Safeguards
Agroforestry Programs	Train women in agroforestry techniques to boost participation	Mitigate soil erosion; monitor ecosystem resilience

PES Implementation	Ensure women's inclusion in planning and benefit-sharing	Prevent overexploitation; protect water sources
SMART Patrolling	Include female staff in patrolling teams	Track wildlife movement; prevent poaching and illegal trade
NWFP Development	Provide training to women on processing and marketing NWFPs	Monitor sustainable harvest; promote equitable benefit-sharing
Ecotourism Projects	Engage women in campsite management and tourism activities	Implement eco-friendly infrastructure; reduce waste impact
Biodiversity Surveys	Include female staff in Surveys	Track habitat loss and fragmentations
Community Forest Management	Provide training to women on processing and marketing of forest products	Monitor sustainable harvest; promote equitable benefit-sharing

Together, these elements reflect an integrated and forward-thinking vision for forest management, emphasizing conservation, resilience, and social equity over the next decade.

CHAPTER 5: Implementation Plan and Financial Outlay

5.1 DFO Management and Operational Plan

The 10-year strategic plan for SFM aims to achieve a holistic approach to forest conservation and resource management. It prioritizes community involvement and participation in activities ranging from biodiversity protection and resource allocation to climate change mitigation and HWC resolution. The plan encompasses a wide range of initiatives including mid-term evaluations of existing forest management plans, establishing new community forests, promoting bamboo as a sustainable building material, protecting water sources, and implementing a PES program. Furthermore, the plan emphasizes data-driven decision-making, enhanced enforcement through SMART patrolling, and robust public service delivery through infrastructure development and staff training. Most of the proposed activities within the plan have budget commitments either from BFL/IKI or ACCESS project funded by World Bank within Gelephu Mindfulness City. With a total budget of Nu. **123.403** million over ten years, this comprehensive plan aims to secure the long-term sustainability of Sarpang's forest ecosystems and the livelihoods of its communities.

Table 27: Implementation framework

Objectives	Strategies	Action	Year along with budget outlay (Nu.in million)										Remarks
			I	II	III	IV	V	VI	VII	VIII	IX	X	
1. To promote sustainable forest management practices that enhance biodiversity conservation, maintain ecosystem services, and support ecological resilience for	1.1. Develop and monitor integrated forest management plans (CFMPs, NWFPMPs, LFMPs). management systems	1.1.1. Conduct Revision of Existing CF Management Plan		0.2		0.2			0.24		0.36		Conduct Mid-Term Evaluation and Phase-Wise Revision of 25 CFs
		1.1.2. Conduct Revision of Approved LFMP	0.7	0.2			0.2	0.2					Conduct Mid-Term Evaluation of Four Established LFMPs
		1.1.3. Prepare Local Forest Management Area Plan	0.7										Prepare New LFMAs in Jigme Chhoeling, Serzhong gewog, Senggye, Gelephu, and Samtenling gewogs

long-term environmental and socio-economic benefits		1.1.4. Conduct maintenance of DFO nursery at Naharani (Shawali)	0.15										At Shawali
		1.1.5. Establish Plantation of High-Value NWFP and Timber Species in CF			0.5				0.5				Create One Nursery and Supply High-Value Timber and NWFP to Potential CFs and Private Individuals
		1.1.6. Revision of Approved LFMP	0.5	0.5	0.5	0.5							Revise LFMP of Gakiling, Dekiling, Shompangkha, and Chhudzom gewogs
	1.2. Secure the Integrity of Biological Corridors and High Conservation Value Areas (HCVAs) through effective Conservation Management Plan	1.2.1. Awareness of Biological Corridor and HCV to Communities	0.5					0.5					Awareness on BC3 to Public of Senggye, Gakiling, Shompangkha, Dekiling, and Jigme Chhoeling, and HCV to Chhudzom gewog.
		1.2.2. Assessment of Bamboo Diversity and Stock in SRF and Settlement Areas	1	1									
		1.2.3. Conduct feasibility Study on conservation of Potential sites of cultural and ecological		0.8									With involvement of relevant stakeholders

		significance with Involvement of Different Stakeholders											
		1.2.4. Issuance of Permits and Marking of Trees According to Set Limits in Plans											Marking and Allotment of Timber, Firewood, Poles, Mushroom Billets, and NWFP Resources to Public of 10 gewogs
	1.3. Secure a Sustainable Future for Water Resources and Critical Ecosystems by Implementing a Comprehensive Strategy to Protect, Restore, and Manage Wetlands, Marshes, and Their Water Sources	1.3.1. Revival of lakes at Gaychhu			2								The lakes are suggested for revival by Shompangkha by Gakiling Gup citing its importance as water source for Sarpang -chhu
		1.3.2. Assess status of waterholes in Sarpang			0.3				0.3				In Senggye, Gakiling, Shompangkha, Dekiling, Gelephu, Samtenling, Serzhong and Chhuzanggang.
2. To implement climate change mitigation and adaptation strategies through sustainable practices while	2.1.Prevent and Mitigate the Spread of Invasive Species	2.1.1. Carry Out an Inventory of three invasive species (*Lantana camara, Chromolaena odorata, Mikania micrantha*) and Design and implement	0.8	0.5						0.4			A comprehensive inventory of invasive species will be conducted across all gewogs, followed by the design of

fostering community engagement to enhance resilience, reduce vulnerabilities, and promote sustainable development		Appropriate Measures to Prevent Their Spread											appropriate measures.
	2.2. Mitigate Climate Change Through the Implementation of Plantations (Avenue, Reforestation and Afforestation)	2.2.1. Plantation of Valuable Tree Species in Barren Areas within SRFL and CF Areas	0.3		0.3		0.3		0.3		0.3		Identify and Select Barren Areas in SRFL and CF. Prepare Estimates According to Plantation Norms and Standards. Implement Plantation Activities Accordingly
		2.2.2. Annual Plantation Maintenance		0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	
	2.3. Incentivize the Protection and Restoration of Vital Ecosystem Services through a Robust Payment for Ecosystem Services (PES) Program.	2.3.1. Revival of Dried Waterholes/lakes		1		1		1					Identify Dry Lakes and Waterholes in the Recharge Area. Prepare Estimates and Implement Revival Works (Phulahari, Daraytsho and Raidara).
		2.3.2. Implementation of Bio-engineering Works in Eroded Lands within the Watershed Area	0.6		0.6		0.6		0.6		0.6		Site Selection, Prepare Estimates, and Implement the Activity (Shatikhari)
3. To develop and promote ecotourism and recreational	3.1.Generate Economic Opportunities and Enhance	3.1.1. Developing a Birding Trail at Darachhu Focusing on Species like the Beautiful Nuthatch,			0.9				0.5				1.Site Selection and Planning (identify key area & map the trial). 2. Consultation

activities that conserve natural resources, support local livelihoods, and enhance visitor experiences while ensuring environmental sustainability and cultural preservation.	Community Livelihoods through the identification and development of sustainable ecotourism and recreation sites.	Rufous-necked Hornbill, Parrotbills, Laughingthrushes, and Wren Babblers.												meeting with local government & community. 3. Community involvement (Youth groups/local community). 4. Infrastructure development (Trial construction, resting places, hides, waste bins & signage). 5. Training of youths/local community people for identifying the plants and birds. 6. Marketing and promotion with the media to highlight the birding trail and its benefits to the community 7. Revenue plough back mechanism in place.
		3.1.2. Revival of the mule track between Sarpang and Tsirang						2						Suggested for revival by Gakiling Gup citing its historical significance and potential converting

													into Hiking trial in future.
		3.1.3. Develop and Maintain the Existing Trail to Kharkhola Guru Rinpoche's Nye under Chhudzom Geog and Goendra Dhagap Dzong at Gakiling gewog.				0.5				0.3			1. Consultation with local community and local government. 2. Maintain the existing footpath (slopes and steps). 3. Place eco-friendly dustbins & sinages along the trail.4. Conduct tree planting rituals (Involving different stakeholders).
4. To advance research, education, and policy implementation for sustainable forest management, fostering biodiversity conservation, ecosystem resilience, and socio-economic development	4.1. Enhance knowledge on wild edible and flowering plants	4.1.1. Conduct inventory of wild edible and flowering plants			0.1								DFO Sarpang
	4.2. Manage wildlife habitat and enhance knowledge on species distribution	4.2.1. Document Current Habitat Conditions and Species Distributions to Establish a Reference Point for Monitoring Changes Over Time		0.5						0.5			Elephants, Golden Langur, Red Panda and Tiger
		4.2.2. Establish Biodiversity Monitoring Grids (BMG) Representing Different Habitat Types and Geographical Regions	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.06	Range Office, Sarpang & Gelephu

		4.2.3. Assess the potential habitat restoration sites		0.2		0.2			0.2		0.2		
	4.3. Empower Communities through Targeted Educational Outreach: Implement a Comprehensive Strategy for Training, Advocacy, and Collaboration.	4.3.1. Conduct Research on Ethnobotanical Practices in Sarpang						0.5					Conduct Studies in 10 gewogs Considering Heterogeneous Communities
		4.3.2. Conduct Awareness on Forest Rules and Regulations in All 10 gewogs		0.6			0.6			0.6			
		4.3.3. Provide Awareness on Online Forestry Services in All 10 gewogs				0.5					0.5		
		4.3.4. Conduct Training for Executive Members of NWFP and CF Groups on Wood Volume Calculation and NWFP Processing		0.4					0.4				
	4.4.-Participate and Contribute to Nationwide Species Surveys (Centrally Coordinated by Department	4.4.1. Tiger population revalidation survey, eDNA-based nationwide biodiversity survey, Musk deer population/abundance survey, National Forest Inventory											

5. To strengthen resource monitoring, assessment, and enforcement mechanisms to ensure sustainable utilization, conservation of natural resources, and compliance with environmental regulations	5.1. Maximize the Effectiveness of Management Regimes Through Regular Monitoring and Evaluation.	5.1.1. Conduct Annual Monitoring of LFMPs	0.1	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	Chhudzom, Dekiling, Gakiling, Shomphangkha
		5.1.2. Conduct Annual Monitoring of CFMPs NWFP & WBIs	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	Annual Monitoring of 24 CFs and Nine NWFPs in 10 gewogs
		5.1.3. Conduct Monitoring of allotted Rural House Building Timbers	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	All gewogs
		5.1.4. Conduct Awareness on Online Forestry Services (FIRMS/OFS/G2C/SDSS) for Staffs	0.2							0.25			
		5.1.5. Prepare Annual Facts and Figures Using FIRMS, OFS, and SMART Connect	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	
	5.2. Implement a Strategic Approach to Patrolling and Reporting: Enhance SMART Patrolling and Ensure Effective Data Collection and Analysis	5.2.1. Conduct SMART Patrolling/Drone patrolling Using SMART Connect in BC-03 and other parts of Division prone to illegal activities.	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	BC-03 and areas prone to illegal activities in the division
		5.2.2. Procurement of Communication Equipment (Handsets, Electronic Visual Display		0.4							0.4		Range Office, Sarpang & Gelephu

		Equipment, night vision telescope)											
		5.2.3. Identify Key Areas and Conduct SMART Patrolling Using Data from SMARTs and Camera Trapping Data	0.35	0.4	0.35	0.35	0.4	0.4	0.35	0.35	0.35	0.35	Devnidhap, Gadwal, Darachu, Dhap, Shinkhari Dangra, Simkharka,
	5.3.Strengthening Wildlife Law Enforcement and Intelligence Gathering to Combat Illegal Activities and Protect Wildlife	5.3.1. Procurement of Modern Surveillance Technologies such as Drones to Monitor Wildlife Populations and Detect Illegal Activities			0.8				0.8				Range Office, Sarpang & Gelephu
		5.3.2. Capacity Building and Training on Identification of Wildlife Products		0.4	0.4	0.4			0.4	0.4	0.4		
	5.4. Implement Robust Biodiversity Monitoring Strategies to Track Habitat Loss and Degradation Driven by Climate Change and Human Activities	5.4.1. Develop Intelligence Networks and Partnerships with Informants, Local Communities, and International Agencies	0.3		0.3			0.3		0.3		0.3	All gewogs
		5.4.2. Coordinate Meetings/Workshops for Transboundary Cooperation	0.3				0.3				0.3		Gelephu and Ranikuta Range, Sarpang and Ultapani Range
		5.4.3. Capacity Building Through Botanical Surveys and Workshops		0.5									Range Office, Sarpang & Gelephu

		to Enhance Knowledge of Forestry Staff											
6. To implement effective human-wildlife conflict mitigation strategies and enhance rescue operations to promote coexistence, safeguard communities, and conserve wildlife populations	6.1. Implement Conflict 2 Coexistence Strategies to Reduce Human-Wildlife Conflict and Foster Sustainable Solutions.	6.1.1. Restoration of Natural Waterholes & Natural Mineral licks	0.1			0.1			0.1			0.1	Clear sediments and debris from choked waterholes (Gopi Dara), construct embankments for water retention, and clean Mineral licks (Tinbandhi).
		6.1.2. Habitat Enrichment Plantation		0.3		0.35		0.4		0.4		0.4	Clear unpalatable vegetation, plant fodder and fruit trees, shrubs, and herbs.
		6.1.3. Strengthening Quick Response Teams (QRT)		0.3			0.4			0.4		0.4	Train staff/community on the latest quick response mechanism and equip them with necessary gear.
		6.1.4. Delineation of Elephant Movement Corridors					0.5						Demarcate safe movement corridors for elephants.
		6.1.5. Development of Elephant Movement Corridor Management Plan			0.2								Conduct RBS survey along elephant trails and develop a plan to manage

													elephant population.
		6.1.6. Awareness and Advocacy on Conservation to Community (C2C)	0.3										Raise awareness and advocate for a paradigm shift from conflict to coexistence.
		6.1.7. Installation of Chain Link Fencing (Solar/Electric Line on Top) in Feasible Locations			10			11			12		Construct chain-linked fencing with solar/electric lines on top rows in feasible locations.
		6.1.8. Train staff and collect data on HWC to develop C2C strategy plan	0.279										All Staff
		6.1.9. Develop C2C Strategy for Dekiling and Gakiling gewog	0.279										Dekiling and Gakiling gewog
		6.1.10. Community awareness on storage and post-harvest practices		0.8									Elephant affected areas
		6.1.11. Develop HWC co-habitation strategy for entire Sarpang dzongkhag	0.315										
		6.1.12.Attend HEC complaints both during day and night											To reduce HWC

	6.2.Strengthen Wildlife Rescue and Rehabilitation Activities to Ensure the Well-being of Animals in Need.	6.2.1.Conduct a refresher course on handling and management of injured wild animals.		0.1		0.1		0.1		0.1		0.1	Training program
		6..2.2.Procure additional field equipment and gear such as tents, gloves, uniform, sleeping bags, mats, torches, field boots, first AID kits & GPS				0.35			0.35				Including SWRRC ESP staff
		6.2.3.Procure rescue cage for Wildlife Rescue and Rehabilitation		0.3				0.3					Procurement
		6.2.4. Replace dart gun Wildlife Rescue Operation			0.2				0.3				Procurement
		6.2.5. Procure/replenish tranquilizing and reversal drugs			0.3		0.3		0.3		0.3		Procurement
		6.2.6. Improve SWRRC infrastructure (Blacktopping roads and developing picnic spots)				5			0.5				Construction
		6.2.7. Carry out landscaping work at SWRRC to beautify the centre					0.9						Construction
	6.3. Strengthen Scientific Knowledge on	6.3.1. Conduct ecological study on conflict animals involved		0.5						0.6			Elephants and Common Leopard

	HWC: Invest in Research to Understand the Nature, Causes, and Extent of Human-Wildlife Conflict.	in Human-Wildlife Conflict (HWC).											
		6.3.2. Study the impact of management interventions implemented.						0.3				0.3	Shompangkha, Samtenling and Gelephu
7. To enhance public service delivery and revenue generation by implementing strategic initiatives and fostering innovative solutions that ensure efficiency, sustainability, and stakeholder satisfaction	7.1. Strengthening Service Delivery by Investing in Premium Infrastructures, Enhancing Mobility, Equipping & Building Capacity of staffs	7.1.1. Purchase laptops with high specifications to facilitate timely online services from any location.		0.3		0.3		0.3		0.3		0.3	Issue 25 laptops to technical staff under DFO Sarpang who were not previously provided with desktops/laptops.
		7.1.1. Procure AI camera traps (AI powered trail guard)				1.42							DFO Sarpang
		7.1.2. Procurement of diameter tape, GPS handset, Hypsometer, range finder, densitometer				0.5			0.5			0.5	For tree surveys in GMC
		7.1.3. Improve high-speed internet access to strengthen online facilities			1.2								Provide unlimited internet packages for 5 offices (1 Division Office, 2 Range Offices, 2 Beat Offices).
		7.1.4. Provide training on GIS applications,			0.4			0.4			0.4		Conduct GIS applications training for all 48 staff

		enterprise development to the DFO staff											members under DFO Sarpang.
		7.1.5. Provide training in the updated SMART version for staff.		0.2			0.2			0.2			Provide training on the updated SMART version to all 48 technical staff members to keep them abreast of the latest SMART version.
		7.1.6. Maintain existing offices and staff quarters under DFO Sarpang (Range Office, Sarapang/Gelephu).			1.5				1.5				
		7.1.7. Maintenance of SWRRC (buildings, ponds, and toilets)			0.5	0.8		0.5			0.5		Construction
		7.1.8. Conduct awareness and education on waste management for the public under DFO Sarpang.				0.6						0.6	Conduct an education and awareness program in 10 gewogs under DFO Sarpang, targeting participants from at least 25 literate communities. This includes lunch and refreshments for 35 participants (including staff) for 2

													days per gewog, plus staff per diem for 3 days.
		7..1.9. Conservation awareness and communication network development in schools		0.05		0.06							
		7.1.10. Conduct Rescue and Survival training to field staffs		0.6			0.6			0.6			
		7.1.11. Train CFMF/NWFP group members on enterprise development			0.8				0.8				
	7.2.Maximize Revenue Generation from Forestry Resources Through Effective and Sustainable Management Practices.	7.2.1. Generate revenue through timber allotment (royalty, marking fee, service charges).											Generate revenue from Rural/Commercial timbers allotment (Royalty, permit fees, marking fees, Service charges)
		7.2.2. Generate revenue through other forestry services (forest clearance, registration and renewal of power chain and other wood-based industries).											Generate revene from RHBT allotment (Royalty, permit fees, marking fees, Service charges)

		7.2.3. Generate revenue from fee collection from visitors at SWRRC, Jigmeling.											Generate revene from RHBT allotment (Royalty, permit fees, marking fees, Service charges)
8. To strengthen the capacity of forestry officials and stakeholders for improved service delivery	8.1. Disciplined manpower to improve service delivery	8.1.1. Refresher course of uniform code of conduct, weapon handling and drills	0.05										
		Total Yearly Budget (in Millions Nu.)	**8.703**	**12.18**	**23.28**	**14.36**	**6.43**	**19.33**	**10.07**	**6.83**	**17.74**	**4.48**	
		Total Budget (in Millions Nu.)	**123.403**										

5.2. HCV Management and Operational Plan

The overarching goal of HCV management in Priority 2 areas is to prevent the emergence of threats through proactive measures such as patrolling. HCV screening indicates that these areas are not currently at risk. To maintain this status, the following preventive actions are proposed for the HCVMA. The total budget allocated for HCV management is Nu. 2.2 million.

Table 28: Management and Operational Plan

Strategy	Outcomes	Output Indicators	Activities (As per Management Plan)	Budget (Million Nu.)	Location
Preventive Management of Priority 2 Areas	Forest areas remain intact without significant emerging threats	**Outcome/Thematic Area: Nature Conservation**			HCVA
		Knowledge of faunal diversity enhanced	Conduct biodiversity monitoring for flora (Tiger, Red Panda, Black Bear)	0.5	
			Conduct biodiversity monitoring for flora species	0.5	
		Outcome/Thematic Area: Forest Resource Management			
		Timber harvested sustainably	Determine volume of timber extracted from HCV area	0	
		Outcome/Thematic Area: Forest Protection and Enforcement			
		Protection & enforcement strengthened	SMART patrolling to combat illegal felling and poaching	0.5	
			Conduct Forest Integrity Assessment	0.3	
		Outcome/Thematic Area: Administration and Direction			
		Staff capacity improved	Conduct training (SMART, biodiversity survey, HWC management)	0.2	
		Equipment & infra enhanced	Procure SMART tools, GPS, cameras	0.2	
			Total Budget	**2.2**	

CHAPTER 6: Monitoring and Evaluation

6.1 DFO Management Monitoring and Evaluation

The 10-year strategic plan for SFM in Sarpang Bhutan, outlines a phased approach to achieving conservation and community development goals. The first year focuses on establishing a strong foundation, with mid-term evaluations of forest management plans, invasive species inventories, and community awareness campaigns. Years 2-5 see a continuation and expansion of these activities, with a focus on annual monitoring programs, new forest establishment, bamboo promotion, and strengthening wildlife law enforcement. Years 6-10 emphasize sustainability and community empowerment, with ongoing monitoring, completion of plan revisions, and a focus on research and enterprise development. Through a detailed roadmap and measurable targets, the plan ensures consistent progress towards achieving a sustainable future for Sarpang's forests and communities.

Table 29: Monitoring and Evaluation Framework

Objectives	Action	Output Indicator	Unit	Baseline	Yearly Target									
					I	II	III	IV	V	VI	VII	VIII	IX	X
1. To promote sustainable forest management practices that enhance biodiversity conservation, maintain ecosystem services, and support ecological resilience for long-term environmental	1.1.1. Conduct Mid-Term Evaluation and Revision of Existing CF Management Plan	Evaluation Report	Nos.	2		5		5			5		5	
	1.1.2. Conduct Mid-Term Evaluation of Approved LFMP	Monitoring Report	Nos.	0	3	1				3	1			
	1.1.3. Prepare Local Forest Management Area Plan	Plan document	Nos.	4	1									
	1.1.4. Conduct maintenance of DFO	Report	Nos.	0		1	1	1	1	1	1	1	1	1

and socio-economic benefits	nursery at Naharani (Shawali)													
	1.1.5. Establish Plantation of High-Value NWFP and Timber Species in CF	Number of CF	Nos.	0			2				2			
	1.1.6. Revision of Approved LFMP	Plan document	Nos.	4	1	1	1	1						
	1.2.1. Awareness of Biological Corridor and HCV to Communities	No. of gewogs covered	Nos.	2	2					2				
	1.2.2. Assessment of Bamboo Diversity and Stock in SRF and Settlement Areas	Survey report	Nos.	0	1	1								
	1.2.3. Conduct feasibility Study on conservation of Potential sites of cultural and ecological significance with Involvement of Different Stakeholders	Report	Nos.	0		1								

	1.2.4. Issuance of Permits and Marking of Trees According to Set Limits in Plans	No. of plans which in permits are given as per the plans	Nos.	28	20	20	20	20	20	20	20	20	20	20
	1.3.1. Revival of lakes at Gaychhu and Darachhu.	No. of lakes revived	Nos.	1						1				1
	1.3.2. Assess status of waterholes in Sarpang	Report and geo-coordinates produced	Nos.	1			1				1			
2. To implement climate change mitigation and adaptation strategies through sustainable practices while fostering community engagement to enhance resilience, reduce vulnerabilities, and promote	2.1.1. Carry Out an Inventory of three invasive species (*Lantana camara, Chromolaena odorata, Mikania micrantha*) and Design and implement Appropriate Measures to Prevent Their Spread	Nos. of inventory and preventive measures for 3 invasive species conducted	Nos.	0	1	1						1		
	2.2.1. Plantation of Valuable Tree Species in Barren Areas within SRFL and CF Areas	Area under afforestation and reforestation	Ha	7		5	5	10	10	15	15	20	20	25
	2.2.2. Annual Plantation Maintenance	Area	Ha	7		2		3		2				

sustainable development	2.3.1. Revival of Dried Waterholes/lakes	No. of waterholes & Mineral licks restored	Nos.	2	1		1		1		1		1		
3. To develop and promote ecotourism and recreational activities that conserve natural resources, support local livelihoods, and enhance visitor experiences while ensuring environmental sustainability and cultural preservation	2.3.2. Implementation of Bio-engineering Works in Eroded Lands within the Watershed Area	Nos. of watershed area implement with bio-engineering works	Nos.	0			1				1				
	3.1.1. Developing a Birding Trail at Darachhu Focusing on Species like the Beautiful Nuthatch, Rufous-necked Hornbill, Parrotbills, Laughingthrushes, and Wren Babblers.	1. Increase the number of birdwatchers in Darachhu Birding Trail. 2. Frequency of sighting Target Bird Species along birding trial.	Nos.	1							1				
	3.1.2. Revival of the mule track between Sarpang and Tsirang	Track enhanced with basic infrastructures and mapping done to enciuarge hiking	Nos.	0				1				1			
4. To advance research, education, and policy implementation for sustainable forest management,	3.1.3. Develop and Maintain the Existing Trail to Kharkhola Guru Rinpoche's Nye under Chhudzom Geog and Goendra Dhagap Dzong at Gakiling gewog.	No. of trails developed/improved	Nos.	0			1								

fostering biodiversity conservation, ecosystem resilience, and socio-economic development	2.1.1. Conduct inventory of wild edible and flowering plants	Report	Nos.	0		1						1	1	
	4.2.1. Document Current Habitat Conditions and Species Distributions to Establish a Reference Point for Monitoring Changes Over Time i	Report	Nos.	0	1	1	1	1	1	1	1	1	1	1
	4.2.2. Establish Biodiversity Monitoring Grids (BMG) Representing Different Habitat Types and Geographical Regions	Nos. of BMG monitored	Nos.	3	3	3	3	3	3	3	3	3	3	3
	4.2.3. Assess the potential habitat restoration sites	Report	Nos.	0					1					
	4.3.1. Conduct Research on Ethnobotanical Practices in Sarpang	Report	Nos.	0				1						
	4.3.2. Conduct Awareness on Forest Rules and Regulations in All 10 gewogs	Gewogs covered	Nos.	10		10		10			10			

	4.3.3. Provide Awareness on Online Forestry Services in All 10 gewogs	Gewogs covered	Nos.	10				10					10		
	4.3.4. Conduct Training for Executive Members of NWFP and CF Groups on Wood Volume Calculation and NWFP Processing	No. of trainings provided	Nos.	1		1					1				
	4.4.1. Tiger population revalidation survey, eDNA-based nationwide biodiversity survey, Musk deer population/abundance survey, National Forest Inventory	No. of Grids/Study Sites Survey	Nos.	40											
5. To strengthen resource monitoring, assessment, and enforcement mechanisms to ensure sustainable utilization, conservation of natural resources,	5.1.1. Conduct Annual Monitoring of LFMPs	No. of LFMP plans monitored	Nos.	4	4	5	5	5	5	5	5	5	5	5	5
	5.1.2.Conduct Annual Monitoring of CFMPs NWFP & WBIs	No. of CFs, NWFPMGs & WBIs monitored	Nos.	44	44	44	44	44	44	44	44	44	44	44	44
	5.1.3. Conduct Monitoring of allotted Rural House Building Timbers	No. of gewogs monitored	Nos.	10	10	10	10	10	10	10	10	10	10	10	10

and compliance with environmental regulations	5.1.4. Conduct Awareness on Online Forestry Services (FIRMS/OFS/G2C/SDSS) for Staffs	No of staffs trained	Nos.	48	48							48		
	5.1.5. Prepare Annual Facts and Figures Using FIRMS, OFS, and SMART Connect	Annual Report	Nos.	1	1	1	1	1	1	1	1	1	1	1
	5.2.1. Conduct SMART Patrolling/Drone patrolling Using SMART Connect in BC-03 and other parts of Division prone to illegal activities.	No. of patrolling conducted	Nos.	4	4	4	4	4	4	4	4	4	4	4
	5.2.2. Procurement of Communication Equipment (Handsets, Electronic Visual Display Equipment, night vision telescope)	No. of equipment purchased	Nos.	25		13							12	
	5.2.3. Identify Key Areas and Conduct SMART Patrolling Using Data from SMARTs and Camera Trapping Data	No. of patrolling conducted	Nos.	50	3	3	3	3	3	3	3	3	3	3

	5.3.1.Procurement of Modern Surveillance Technologies such as Drones to Monitor Wildlife Populations and Detect Illegal Activities	No. of equipment purchased	Nos.	2 Drones			4				3			
	5.3.2.Capacity Building and Training on Identification of Wildlife Products	No. of staff trained	Nos.	30		5	5	5			5	5	5	
	5.4.1.Develop Intelligence Networks and Partnerships with Informants, Local Communities, and International Agencies	No. of Networks formed	Nos.	10	1		1			1		1		1
	5.4.2. Coordinate Meetings/Workshops for Transboundary Cooperation	No. of workshops organised	Nos.	0	1				1				1	
	5.4.3.Capacity Building Through Botanical Surveys and Workshops to Enhance Knowledge of Forestry Staff	No. of staff trained	Nos.	48		48								

6. To implement effective human-wildlife conflict mitigation strategies and enhance rescue operations to promote coexistence, safeguard communities, and conserve wildlife populations	6.1.1. Restoration of Natural Waterholes & Natural Mineral licks	No. of waterholes & Mineral licks restored	Nos.	16	4			4			4			4
	6.1.2. Habitat Enrichment Plantation	Area enriched	Ha	25		5		5		5		5		5
	6.1.3. Strengthening Quick Response Teams (QRT)	No. of QRTs	Nos.	3		3			3			3		3
	6.1.4. Delineation of Elephant Movement Corridors	Well delineated Corriodor for movement of elephant in all gewogs	Nos.	0					10					
	6.1.5. Development of Elephant Movement Corridor Management Plan	Plan document	Nos.	0			1							
	6.1.6. Awareness and Advocacy on Conservation to Community (C2C)	No. of gewogs covered	Nos.	2	2									
	6.1.7.Installation of Chain Link Fencing (Solar/Electric Line on Top) in Feasible Locations	Length of Fencing in Km	15 km	0			25			25			25	

	6.1.8. Train staff and collect data on HWC to develop C2C strategy plan	No. of staffs trained	Nos.	0	48									
	6.1.9. Develop C2C Strategy for Dekiling and Gakiling gewog	C2C strategy document	Nos.	1	1									
	6.1.10. Community awareness on storage and post-harvest practices	No. of gewogs	Nos.	8		8								
	6.1.11.Develop HWC co-habitation strategy for entire Sarpang dzongkhag	Strategy document	Nos.	0	1									
	6.1.12.Attend HEC complaints both during day and night	No. of complaints attended	Nos.	100	1	1	1	1	1	1	1	1	1	1
	6.2.1.Conduct a refresher course on handling and management of injured wild animals.	No. of staff trained	Nos.	48		48		48		48		48		48
	6..2.2.Procure additional field equipment and gear such as tents, gloves, uniform, sleeping bags,	No. of staff equipped	Nos.	48				27			27			

	mats, torches, field boots, first AID kits & GPS														
	6.2.3.Procure rescue cage for Wildlife Rescue and Rehabilitation	No. of equipment procured	Nos.	2		3				3					
	6.2.4. Replace dart gun Wildlife Rescue Operation	No. of equipment purchased	Nos.	2			1				1				
	6.2.5. Procure/replenish tranquilizing and reversal drugs	Set of equipment purchased	Set	NA			1		1		1		1		
	6.2.6. Improve SWRRC infrastructure (Blacktopping roads and developing picnic spots)	Length of road blacktopped and Area developed	Road (km) & Area (ha)	Road-(7 Km)/ Area-(5 ha)			Road				Picnic spot				
	6.2.7.Carry out landscaping work at SWRRC to beautify the centre	Area developed	Area (ha)	10					10						
	6.3.1.Conduct ecological study on conflict animals involved in Human-Wildlife Conflict (HWC).	Report	Nos.	0		1						1			

	6.3.2.Study the impact of management interventions implemented.	Report	Nos.	0						1				1
7. Public Service Enhancement and Revenue Generation through Strategic Initiatives and Innovative Solutions	7.1.1.Purchase laptops with high specifications to facilitate timely online services from any location.	No. of Staffs equipped with new laptops for enhanced Online Forest Services	Nos.	10		5		5		5		5		5
	7.1.1. Procure AI camera traps (AI powered trail guard)	No. of camera traps	Nos.	0			25							
	7.1.2. Procurement of diameter tape, GPS handset, Hypsometer, range finder, densitometer	No. of equipment purchased	Nos.	0				5			5			5
	7.1.3. Improve high-speed internet access to strengthen online facilities	All Offices connected with high-speed internet without interruption	Nos.	5			5							
	7.1.4. Provide training on GIS applications, enterprise development to the DFO staff	No. of staff trained	Nos.	48			48			48			48	

	7.1.5.Provide training in the updated SMART version for staff.	No. of staff trained	Nos.	48		48			48			48		
	7.1.6. Maintain existing offices and staff quarters under DFO Sarpang (Range Office, Sarapang/Gelephu).	No. of Infrastructures maintained	Nos.	5			7				7			
	7.1.7.Maintenance of SWRRC (buildings, ponds, and toilets)	No. of Infrastructures maintained	Nos.	12			5	4		5			4	
	7.1.8. Conduct awareness and education on waste management for the public under DFO Sarpang.	No. gewogs	Nos.	10				10						10
	7..1.9. Conservation awareness and communication network development in schools	No. of schools involved	Nos.	0		2		2						
	7.1.10. Conduct Rescue and Survival training to field staffs	No. of staff trained	Nos.	48		48			48			48		

	7.1.11. Train CFMF/NWFP group members on enterprise development	No. of trainings provided	Nos.	1			1				1				
	7.2.1. Generate revenue through timber allotment (royalty, marking fee, service charges).	Amount generated in millions Nu.	Nu	1.74	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5
	7.2.2. Generate revenue through other forestry services (forest clearance, registration and renewal of power chain and other wood-based industries).	Amount generated in millions Nu.	Nu	1.39	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5
	7.2.3. Generate revenue from fee collection from visitors at SWRRC, Jigmeling.	Amount generated in millions Nu.	Nu	0.3	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2
8. To strengthen the capacity of forestry officials and stakeholders for improved service delivery	8.1.1. Refresher course of uniform code of conduct, weapon handling and drills	Training report	Nos.	4	1									

6.2. HCV Monitoring Plan

Table 30: HCV Monitoring Plan

Output Indicators	Activities (As per Management Plan)	Measurement Unit	Lead	Collaborators	Baseline	Target for Plan Period	Achievement %	Data/Information Source	Reason for Non-Fulfilment of Target	Observation by Monitoring Team	Recommendations
Outcome/Thematic Area: Nature Conservation											
Knowledge of faunal diversity enhanced	Conduct biodiversity monitoring for flora (Tiger, Red Panda, Black Bear)	Area monitored in Km^2	DFO	UWIFoRT, WWF Bhutan	2	13.5	–	Camera trap, sign survey reports			
	Conduct biodiversity monitoring for flora species	Area monitored in Km^2	DFO	UWIFoRT, WWF Bhutan	2	13.5		Flora Survey			
Outcome/Thematic Area: Forest Resource Management											
Timber harvested sustainably	Determine volume of timber extracted from HCV area	Volume of timber	DFO	DoFPS HQ				OFS, FIRMS, SMART			

		in cft									
Outcome/Thematic Area: Forest Protection and Enforcement											
Protection & enforcement strengthened	SMART patrolling to combat illegal felling and poaching	Patrols /year	DFO	Rangers, Local communities	4	4 patrols		SMART patrol reports			
	Conduct Forest Intergrity Assessment	No. of reports	DFO	DoFPS HQ	0	1					
Outcome/Thematic Area: Administration and Direction											
Staff capacity improved	Conduct training (SMART, biodiversity survey, HWC management)	Nos.	DFO	DoFPS, WWF, UWIFoRT	40	30 staff trained		Training reports			
Equipment & infra enhanced	Procure SMART tools, GPS, cameras	Nos.	DFO	DoFPS HQ	10	20 items		Procurement records			

CHAPTER 7. Stakeholder consultation and endorsement

7.1 Stakeholder Engagement Plan

The Stakeholder Engagement Plan identified and consulted all relevant stakeholders and rights holders within the division's jurisdiction. By structuring engagement on proposed interventions and restrictions, the plan-built collaboration, ownership, and accountability, thereby supporting the effectiveness and long-term sustainability of the management initiatives.

7.2 Identification of Stakeholders

DFO Sarpang identified local government authorities, including the Gup, Mang Mi, Tshogpas, other local government officials, and local communities.

7.2.1 Consultation Process

- **Meetings/Workshops:** Presented and clarified the proposed management interventions.
- **Detailed Discussions:** Discussed restrictions and prohibitions to gather feedback and address concerns.
- **Regular Updates:** Kept stakeholders informed and involved through follow-up sessions.
- **Documentation:** Documented all stakeholder inputs and suggestions for incorporation into the final plan.

Figure 71: Stakeholder Consultation Meeting with Gups, relevant officials from RNR officials from Dzongkhag.

7.3 Stakeholder Mapping

A comprehensive stakeholder mapping was conducted to ensure that all relevant parties were identified and included in the consultation process.

Table 31: Roles and Responsibilities of Stakeholders

Stakeholders	Roles/Responsibilities	Interests/Expectations	Influence	Interest	Engagement Strategy
Local Communities	Protecting resources, benefiting from conservation efforts	Employment, resource access, improved livelihoods	Low	High	Regular communication, participatory decision-making
Local Government Authorities (Gup, Mang Mi & Tshogpa)	Policy enforcement, providing support	Compliance with regulations, achieving conservation goals	High	High	Frequent meetings, strategic updates
Technical Advisory Committee (TAC) of Department	Reviewing technical aspects of the management plan and providing expert recommendations	Technically sound and feasible management plans	High	High	Formal reviews, collaborative workshops, endorsements
Forest Resource Planning and Management Division	Reviewing and refining management plans; providing technical support	Well-developed, actionable, and sustainable management strategies	High	High	Detailed reviews, collaboration with field teams, iterative feedback
Divisional Forest Office, Sarpang	Coordinating stakeholder engagement, leading implementation of management plans	Effective and inclusive stakeholder participation, successful implementation of plans	High	High	Lead consultations, ensure regular updates, monitor and report progress

7.4 Roles and Responsibilities

- DFO Sarpang: Lead the identification of stakeholders and coordinate the consultation meetings.
- Local Authorities: Participate in discussions, provide feedback, and help disseminate information to the broader community.
- FRPMD: Review of the draft management plan.
- Technical Advisory Committee (TAC): Endorse the technically reviewed plan.
- Local Authorities: Participate in discussions and provide feedback and Suggestions.

7.5 Monitoring and Reporting

Regular monitoring and reporting mechanisms will be implemented to track the progress of stakeholder engagement activities and ensure that stakeholder inputs are effectively addressed. Successful stakeholder engagement is essential for the effective implementation of the management plan. By actively involving key local authorities and maintaining open communication, the plan aims to foster a collaborative and sustainable approach to forest management.

7.6. Adaptive Management Approach

The Management Plan follows an adaptive management framework, allowing for adjustments based on monitoring results, stakeholder feedback, and emerging challenges. This approach ensures that interventions remain relevant, effective, and responsive to ecological and socio-economic changes throughout the plan period.

7.6. Finalization and Endorsement of the DFO Management Plan

The inputs from all the stakeholders were incorporated into the Management Interventions, and minutes of consultation meeting were added as annexures. The DFO Management Plan was finalized by the concerned Division Forest Office. The plan was reviewed by FRPMD and subsequently endorsed by the Technical Advisory Committee (TAC) of the Department. The technically reviewed and endorsed plan was then recommended for approval by the Ministry by the head of the Department. The Head of the Ministry approved the plan for implementation.

Annexure I: Annual Operational Plan

Ia. REVIEW OF THE PREVIOUS YEAR'S PLAN

Framework for Annual Operational Plan for Division Forest Office				
Name of the office:				(Seal and sign)
Prepared by and date:				
Verified by and date:				
Recommended by and date:				
Approved by and date:				
I. REVIEW OF THE PREVIOUS YEAR'S PLAN				
1a. SUMMARY OF THE PLAN				
No. of Planned activities	Status of the activities (in Nos.)			
	Achieved	On-going	Not Implemented	
1b. 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)

Ib. ANNUAL OPERATIONAL PLAN SCHEDULE (For the new FY)

II. ANNUAL OPERATIONAL PLAN SCHEDULE (For the new FY)						
IIa. DETAILS OF THE PLANNED ACTIVITIES						
Output Indicator as per the management plan/APA	Activities	Target with Unit	Timeline	Budget (in Nu.)	Fund Source	Specify location, if relevant
Program I: Nature Conservation Section						

Program II: Forest Resources Planning & Management Section						
Program III: Forest Monitoring & Information Section						
Program IV: Administration and Direction						
1 "Program I shall include but not limited to: Surveys in respect to BD, CF management, habitat management, watershed/land protection, eco-tourism/tourism, recreation, waste management, environmental impact assessment, LFM/S plan operation, timber allocation and monitoring"						
2 "Program II shall include but not limited to: PF/ Silviculture, NWFP management, plantation, forest improvement initiatives, CF management, NWFP management, plantation, firewood clearance, past & diseases surveillance, forest fire management"						
4 "Program IV shall include but not limited to: patrolling, forest offence compounding, prosecution, forest record maintenance, OFS, G2C						
5 "Program V shall include but not limited to: Budgeting, annual plan preparation, work planning, coordination, coordination meetings, administrative and accounting activities, monitoring"						
"Note: Activities such as awareness campaign, Park management to be tagged/placed with respective program activities"						

Annexure II: Biodiversity Checklist of DFO Sarpang

1. Mammals

Sl. #	Scientific name	Common/Local name	Family	status
1	*Paguma larvata*	Himalayan Plam Civet, Bja zig (Dzo)	Viverridae	LC
2	*Catopuna temmincki*	Asiatic Golden Cat	Felidae	NT
3	*Muntiacus muntjak*	Barking Deer, Kasha (Dzo)	Cervidae	LC
4	*Capriconis sumatraensis*	Himalayan Serow, Jha (Dzo)	Cervidae	VU
5	*Sus scrofa*	Wild Pig, Rephag (Dzo)	Suidae	LC
6	*Felis bengalensis*	Leopard Cat, Bjazig (Dzo)	Felidae	LC
7	*Cervus unicolor*	Sambar, Shaw (Dzo)	Cervidae	VU
8	*Felis marmorata*	Marbled Cat	Felidae	VU
9	*Ursus tibetanus laniger*	Himalayan black Bear, Dhom (Dzo)	Ursidae	VU
10	*Panthera tigris*	Tiger, Tag (Dzo)	Felidae	EN
11	*Hysterix brachyura*	Himalayan Crestless Purcopine, Bjithru (Dzo)	Hystricidae	LC
12	*Wiverra zibetha*	Large Indian Civet, Bjazig (Dzo)	Viverridae	LC
13	*Herpestes edvardsii*	Common Mangoose, Neuli (Dzo)	Herpestidae	LC
14	*Martes foina*	Stone Marten, Shing Sam (Dzo)	Mustelinae	LC
15	*Trachypithecus geei*	Golden Langur, Chakarsergidogchen (Dzo)	Cercopithecidae	EN
16	*Apodemus syvatics*	Wood Mouse, Jise (Dzo)	Muridae	DD
17	*Bos gaurus*	Gaur, Relang (Dzo)	Bovidae	VU
18	*Ratufa bicolor*	Malayan Giant Squirrel	Pteromyidae	NT
19	*Macaca assamensis*	Assamese macaque, Cha (Dzo)	Primatae	NT
20	*Neofelis nebulosa*	Clouded leopard, Gung (Dzo)	Felideae	VU
21	*Cuon alpinus primaevus*	Wild dog, Phaw (Dzo)	Canideae	EN
22	*Panthera pardus*	Common leopard, Zig (Dzo)	Felidae	VU
23	*Elephas maximus*	Asian Elephant, Lamchey (Dzo)	Elephantidae	EN
24	*Herpestes urva*	Crab Eating Mongoose	Herpestidae	LC
25	*Macaca mulata*	Rhesus Macaque, Pcha (Dzo), Pra (Kheng)	Primatidae	LC
26	*Viverricula indica*	Small Indian Civet, Bjazig (Dzo)	Viverridae	LC
27	*Lepus nigricollis*	Black Napped Hare/Indian Hare	Leporidae	LC

28	*Callosciurus erythraeaus*	Red-Bellied squirrel/Pallas's Squirrel	Pteromyidae	LC
29	*Funambulus pennati*	Five Stripe Palm Squirrel, Tortorla (Dzo)	Pteromyidae	LC
30	*Petaurista petaurista*	Red Giant Flying Squirrel, Tortorla (Dzo)	Pteromyidae	LC
31	*Callosciurus pygerythrus*	Hoary Bellied Squirrel, Tortorla (Dzo)	Pteromyidae	LC
32	*Aonynx cinerea*	Small Clawed Otter, Sam (Dzo)	Mustelidae	LC
33	*Lutra lutra*	Common Otter, Saam (Dzo), Samu (Shar)	Mustelidae	LC
34	*Herpestes javanicus*	Small Indian Mongoose	Herpestidae	LC
35	*Martes flavigula*	Yellow-throated marten, Acho Nayne (Dzo)	Mustelidae	LC
36	*Atherurus macrourus*	Asiatic brush-tailed porcupine, Bjithue (Dzo)	Hystricidae	LC
37	*Manis pentadactyla*	Chinese Pangolin	Manidae	CR
38	*Prionodon pardiclor*	Spotted Linsang	Prionodontidae	LC
39	*Nemorhaedus goral*	Goral, Bjara (Dzo)	Bovidae	LC
40	*Mustela kathiah*	Yellow-bellied Weasel	Mustelidae	LC
41	*Mus musculus*	House mouse, Bjitse (Dzo)	Muridae	LC
42	*Vandeleuria oleracea*	Long-tailed Climbing Mouse, Bjitse (Dzo)	Muridae	LC
43	*Ailurus fulgens*	Red Panda, Acho Dongka (Dzo)	Ailuridae	EN
44	*Rattus sikkimensis*	Sikkim Rat, Bjitse (Dzo)	Muridae	LC
45	*Axis porcinus*	Hog Deer, Kasha (Dzo)	Cervidae	EN
46	*Paradoxurus hermaphroditus*	Asian/Common Palm Civet, Bjazig (Dzo)	Viverridae	LC
47	*Melogale moschata*	Chinese Ferret Badger	Mustelidae	LC
48	*Felis chaus*	Jungle Cat	Felidae	LC

2. Birds

Sl. #	***Scientific Name***	**Common Name**	**Family**	**Status**
1	*Ibidorhyncha struthersii*	Ibisbill	Ibidorhynchidae	LC
2	*Oriolus traillii*	Maroon Oriole	Orieolidae	LC
3	*Riparia riparia*	Sand Martin	Hirundinidae	LC
4	*Saxicola ferreus*	Grey Bushchat	Muscicapidae	LC

5	*Aceros nepalensis*	Rufous-necked Hornbill	Bucerotidae	VU
6	*Acridotheres fuscus*	Jungle Myna	Sturnidae	LC
7	*Acridotheres grandis*	Great Myna	Sturnidae	LC
8	*Acridotheres tristis*	Common Myna	Sturnidae	LC
9	*Actitis hypoleucos*	Common Sandpiper	Scolopacidae	LC
10	*Alaudala raytal*	Sand Lark	Alaudidae	LC
11	*Alcedo atthis*	Common Kingfisher	Alcedinidae	LC
12	*Amaurornis phoenicurus*	White-breasted Waterhen	Raliidae	LC
13	*Anas crecca*	Common Teal	Anatidae	LC
14	*Anas platyrhynchos*	Mallard	Anatidae	LC
15	*Anthracoceros albirostris*	Oriental Pied Hornbill	Bucerotidae	LC
16	*Anthus hodgsoni*	Olive-backed Pipit	Motacillidae	LC
17	*Anthus richardi*	Richard's Pipit	Motacillidae	LC
18	*Anthus rufulus*	Paddyfield Pipit	Motacillidae	LC
19	*Aquila nipalensis*	Steppe Eagle	Accipitridae	LC
20	*Ardeola grayii*	Indian Pond Heron	Ardeolae	LC
21	*Artamus fuscus*	Ashy Woodswallow	Artamidae	LC
22	*Aviceda leuphotes*	Black Baza	Accipitridae	LC
23	*Bubulcus ibis*	Cattle Egret	Ardeidae	LC
24	*Buceros bicornis*	Great Hornbill	Bucerotidae	VU
25	*Burhinus indicus*	Indian Thick-knee	Bucerotidae	LC
26	*Burhinus oedicnemus*	Eurasian Thick-knee	Bucerotidae	LC
27	*Buteo refectus*	Himalayan Buzzard	Accipitridae	LC
28	*Butorides striata*	Striated Heron	Ardeolae	LC
29	*Calandrella brachydactlya*	Greater Short-toed Lark	Alaudidae	LC
30	*Caprimulgus macrurus*	Large-tailed Nightjar	Caprimulgidae	LC
31	*Centropus sinensis*	Greater Coucal	Cuculidae	LC
32	*Ceryle rudis*	Pied Kingfisher	Alcedinidae	LC
33	*Charadrius dubius*	Little Ringed Plover	Charadriidae	LC
34	*Charadrius placidus*	Long-billed Plover	Charadriidae	LC
35	*Chelidorhynx hypoxantha*	Yellow-bellied Fairy- Fantail	Rhipiduridae	LC
36	*Chloropsis aurifrons*	Golden-fronted Leafbird	Chloropseidae	LC
37	*Cinclus pallasii*	Brown Dipper	Cinclidae	LC

38	*Columba livia*	Rock Pigeon	Columbidae	LC
39	*Copsychus saularis*	Oriental Magpie-robin	Muscicapidae	LC
40	*Coracias benghalensis*	Indian Roller	Coraciidae	LC
41	*Coracina macei*	Large Cuckooshrike	Coraciidae	LC
42	*Coracina melaschistos*	Black-winged Cuckooshrike	Cuculidae	LC
43	*Corvus levaillantii*	Eastern Jungle Crow	Corvidae	LC
44	*Cuculus micropterus*	Indian Cuckoo	Cuculidae	LC
45	*Culicicapa ceylonensis*	Grey-headed Canary-Flycatcher	Muscicapidae	LC
46	*Cyornis rubeculoides*	Blue-throated Flycatcher	Muscicapidae	LC
47	*Dendrocitta vagabunda*	Rufous Treepie	Corvidae	LC
48	*Dendrocopos canicapillus*	Grey-capped Woodpecker	Picidae	LC
49	*Dendrocopos macei*	Fulvous-breasted Woodpecker	Picidae	LC
50	*Dicrurus hottentottus*	Hair-crested Drongo	Dicruridae	LC
51	*Dicrurus leucophaeus*	Ashy Drongo	Dicruridae	LC
52	*Dicrurus macrocercus*	Black Drongo	Dicruridae	LC
53	*Dicrurus paradiseus*	Greater Racket-tailed Drongo	Dicruridae	LC
54	*Dicrurus remifer*	Lesser Racket-tailed Drongo	Dicruridae	LC
55	*Dinopium shorii*	Himalayan Flameback	Picidae	LC
56	*Ducula aenea*	Green Imperial-pigeon	Columbidae	LC
57	*Ducula badia*	Mountain Imperial-pigeon	Columbidae	LC
58	*Parus monticolus*	Green-backed Tit	Paridae	LC
59	*Passer domesticus*	House Sparrow	Passeridae	LC
60	*Passer montanus*	Eurasian Tree Sparrow	Passeridae	LC
61	*Pavo cristatus*	Indian Peafowl	Phasianidae	LC
62	*Pericrocotus speciosus*	Scarlet Minivet	Campephagidae	LC
63	*Pernis ptilorhynchus*	Oriental Honey Buzzard	Accipitridae	LC
64	*Phaenicophaeus tristis*	Green-billed Malkoha	Cuculidae	LC
65	*Phalacrocorax carbo*	Great Cormorant	Phalacrocoracidae	LC
66	*Phoenicurus auroreus*	Daurian Redstart	Muscicapidae	LC
67	*Phoenicurus fuliginosus*	Plumbeous Redstart	Muscicapidae	LC
68	*Phoenicurus hodgsoni*	Hodgson's Redstart	Muscicapidae	LC
69	*Rhyticeros undulatus*	Wreathed Hornbill	Bucerotidae	VU

70	*Leptoptilos javanicus*	Lesser Adjuntant	Ciconiidae	VU
71	*Hypsipetes leucocephalus*	Black bulbul	Pycnonotidae	LC
72	*Ketupa flavipes*	Tawny Fish Owl	Strigidae	LC
73	*Megalaima australis*	Blue-eared Barbet	Ramphastidae	LC
74	*Megalamia haemacephala*	Coppersmith Barbet	Ramphastidae	LC
75	*Myophonus caeruleus*	Blue Whistling-thrush	Muscicapidae	LC
76	*Ninox scutulata*	Brown Hawk Owl	Strigidae	LC
77	*Pandion haliaetus*	Osprey	Pandionidae	LC
78	*Psilopogon asiaticus*	Blue-throated Barbet	Megalaimidae	LC
79	*Psittacula alexandri*	Red-breasted Parakeet	Ramphastidae	LC
80	*Psittacula eupatria*	Alexandrine Parakeet	Ramphastidae	LC
81	*Pycnonotus cafer*	Red-vented Bulbul	Pycnonotidae	LC
82	*Psilopogon lineatus*	Lineated Barbet	Megalaimidae	LC
83	*Psilopogon virens*	Great Barbet	Megalaimidae	LC
84	*Pycnonotus flaviventris*	Black-crested Bulbul	Pycnonotidae	LC
85	*Turdoides striata*	Jungle Babbler	Leiothrichidae	LC
86	*Vanellus duvaucelii*	River Lapwing	Charadriidae	NT
87	*Vanellus indicus*	Red-wattled Lapwing	Charadriidae	LC
88	*Upupa epops*	Eurasian Hoppoe	Upupidae	LC
89	*Lophura leucomelanos*	Kalig Pheasant	Phasianidae	LC
90	*Gallus gallus*	Red Junglefowl	Phasianidae	LC
91	*Arboroplila torqueola*	Hill Patriage	Phasianidae	LC
92	*Paradoxornis ruficeps*	White-breasted Parrotbill	Timaliidae	LC
93	*Actinodura nipalensis*	Hoary-throated Barwing	Leiothrichidae	LC
94	*Pellorneum ruficeps*	Puff-throated Babbler	Pellorneidae	LC
95	*Tephrodornis virgatus*	Large Woodshrike	Vangidae	LC
96	*Microcarbo niger*	Little Cormorant	Phalacrocoracidae	LC
97	*Heterophasia picaoides*	Long-tailed Sibia	Leiothrichidae	LC
98	*Sasia ochracea*	White-browed Piculet	Picidae	LC
99	*Cettia castaneocoronata*	Chestnut-headed Tesia	Cettiidae	LC
100	*Tesia olivea*	Slaty-bellied Tesia	Cettiidae	LC
101	*Tringa glareola*	Wood Sandpiper	Scolopacidae	LC
102	*Tringa nebularia*	Common Greenshank	Scolopacidae	LC

103	*Dendrocygna javanica*	Lesser Whistling Duck	Anatidae	LC
104	*Picus chlorolophus*	Lesser Yellownape	Picidae	LC
105	*Sitta formosa*	Beautiful Nuthatch	Sittidae	VU
106	*Otus sunia*	Oriental Scop Owl	Strigidae	LC
107	*Ninox scutulata*	Brown Hawk-owl	Strigidae	LC
108	*Ploceus philippinus*	Baya Weaver	Ploceidae	LC
109	*Cecropis daurica*	Red-rumped Swallow	Hirundinidae	LC
110	*Tragopan satyra*	Satyr Tragopan	Phasianidae	NT
111	*Nettapus coromandelianus*	Cotton Pygmy Goose	Anatidae	LC
112	*Ciconia nigra*	Black Stork	Ciconiidae	LC
113	*Polyplectron bicalcaratum*	Grey peacock-pheasant	Phasianidae	LC
114	*Macropygia unchall*	Barred Cuckoo Dove	Columbidae	LC
115	*Chalcophaps indica*	Asian Emerald Dove	Columbidae	LC
116	*Indicator xanthonotus*	Yellow-rumped Honeyguide	Indicatoridae	NT
117	*Aethopyga siparaja*	Crimson Sunbird	Nectariniidae	LC
118	*Aethopyga ignicauda*	Fire-tailed Sunbird	Nectariniidae	LC
119	*Schoeniparus cinereus*	Yellow-throated Fulvetta	Pellorneidae	LC
120	*Tarsiger hyperythrus*	Rufous-breasted Bush Robin	Muscicapidae	LC
121	*Muscicapa sibirica*	Dark-sided Flycatcher	Muscicapidae	LC
122	*Niltava macgrigoriae*	Small Nitava	Muscicapidae	LC
123	*Merops leschenaulti*	Chestnut-headed Bee-eater	Meropidae	LC
124	*Dicrurus bracteatus*	Spangled Drongo	Dicruridae	LC
125	*Hydrornis nipalensis*	Blue-naped Pitta	Pittidae	LC
126	*Streptopelia tranquebarica*	Red Collared Dove	Columbidae	LC
127	*Microhierax caerulescens*	Collared Falconet	Falconidae	LC
128	*Napothera malacoptila*	Long-billed Wren-babbler	Pellorneidae	LC
129	*Phyllergates cucullatus*	Mountain Tailorbird	Cettiidae	LC
130	*Pernis ptilorhynchus*	Crested Honey Buzzard	Accipitridae	LC
131	*Carpodacus sipahi*	Scarlet Finch	Fringillidae	LC
132	*Gallinago solitaria*	Solitary Snipe	Scolopacidae	LC
133	*Saxicola maurus*	Siberan Stonechat	Muscicapidae	LC
134	*Lonchura striata*	White-rumped Munia	Estrildidae	LC
135	*Esacus recurvirostris*	Great Thick-knee	Burhinidae	NT

136	*Trochalopteron imbricatum*	Bhutan Laughingthrush	Leiothrichidae	LC
137	*Liocichla phoenicea*	Red-faced Liocichla	Leiothrichidae	LC
138	*Motacilla maderaspatensis*	White-browed Wagtail	Motacillidae	LC
139	*Pterorhinus ruficollis*	Rufous-necked Laughingthrush	Leiothrichidae	LC
140	*Pycnonotus jocosus*	Red-whiskered Bulbul	Pycnonotidae	LC
141	*Dicrurus aeneus*	Bronzed Drongo	Dicruridae	LC
142	*Minla ignotincta*	Red-tailed Minla	Leiothrichidae	LC
143	*Harpactes erythrocephalus*	Red-headed Trogon	Trogonidae	LC
144	*Schoeniparus castaneceps*	Rufous-winged Fulvetta	Pellorneidae	LC
145	*Phylloscopus castaniceps*	Chestnut-crowned Warbler	Phylloscopidae	LC
146	*Phylloscopus maculipennis*	Ashy-throated Warbler	Phylloscopidae	LC
147	*Arundinax aedon*	Thick-billed Warbler	Acrocephalidae	LC
148	*Lanius schach*	Long-tailed Shrike	Laniidae	LC
149	*Lanius tephronotus*	Grey-backed Shrike	Laniidae	LC
150	*Pteruthius melanotis*	Black-eared Shrike Babbler	Vireonida	LC
151	*Stachyris nigriceps*	Grey-throated Babbler	Timaliidae	LC
152	*Cyanoderma chrysaeum*	Golden Babbler	Timaliidae	LC
153	*Pomatorhinus ferruginosus*	Black-crowned Scimitar Babbler	Timaliidae	LC
154	*Phylloscopus fuscatus*	Dusky Warbler	Phylloscopidae	LC
155	*Ixos mcclellandii*	Mountain Bulbul	Pycnonotidae	LC
156	*Alcurus striatus*	Striated Bulbul	Pycnonotidae	LC
157	*Hemixos flavala*	Ashy Bulbul	Pycnonotidae	LC
158	*Phylloscopus poliogenys*	Grey-cheeked Warbler	Phylloscopidae	LC
159	*Phoenicurus leucocephalus*	White-capped Redstart	Muscicapidae	LC
160	*Motacilla alba*	White Wagtail	Motacillidae	LC
161	*Enicurus schistaceus*	Slaty-backed Forktail	Muscicapidae	LC
162	*Enicurus maculatus*	Spotted Forktail	Muscicapidae	LC
163	*Enicurus scouleri*	Little Forktail	Muscicapidae	LC
164	*Orthotomus sutorius*	Common Tailorbird	Cisticolidae	LC
165	*Monticola solitarius*	Blue Rockthrush	Muscicapidae	LC
166	*Monticola rufiventris*	Chestnut-bellied Rockthrush	Muscicapidae	LC
167	*Yuhina flavicollis*	Whiskered Yuhina	Zosteropidae	LC
168	*Yuhina nigrimenta*	Black-chinned Yuhina	Zosteropidae	LC

169	*Staphida castaniceps*	Striated Yuhina	Zosteropidae	LC
170	*Yuhina bakeri*	White-napped Yuhina	Zosteropidae	LC
171	*Erpornis zantholeuca*	White-bellied Erpornis	Zosteropidae	LC
172	*Oriolus xanthornus*	Black-hooded Oriole	Oriolidae	LC
173	*Chrysocolaptes guttacristatus*	Greater Flameback	Picidae	LC
174	*Psilopogon franklinii*	Golden-throated Barbet	Megalaimidae	LC
175	*Tephrodornis pondicerianus*	Common Woodshrike	Vangidae	LC
176	*Cyanoderma ruficeps*	Rufous-capped Babbler	Timaliidae	LC
177	*Ficedula strophiata*	Rufous-gorgeted Flycatcher	Muscicapidae	LC
178	*Certhia nipalensis*	Rusty-flanked Treecreeper	Certhiidae	LC
179	*Actinodura egertoni*	Rusty-fronted Barwing	Leiothrichida	LC
180	*Picumnus innominatu*	Speckled Piculet	Picidae	LC
181	*Spilopelia chinensis*	Spotted Dove	Columbidae	LC
182	*Athene brama*	Spotted Owlet	Strigidae	LC
183	*Garrulax leucolophus*	White-crested Laughingthrush	Leiothrichida	LC
184	*Grammatoptila striata*	Striated Laughingthrush	Leiothrichida	LC
185	*Treron sphenurus*	Wedge-tailed Green Pigeon	Columbidae	LC
186	*Sitta himalayensis*	White-tailed Nuthatch	Sittidae	LC
187	*Abroscopus superciliaris*	Yellow-bellied Warbler	Cettiidae	LC
188	*Machlolophus spilonotus*	Yellow-cheeked Tit	Paridae	LC
189	*Alcippe nipalensis*	Nepal Fulvatta	Alcippeidae	LC
190	*Delichon nipalense*	Nepal House Martin	Hirundinidae	LC
191	*Nyctyornis athertoni*	Blue-bearded Beeater	Meropidae	LC
192	*Streptopelia orientalis*	Oriental Turtle Dove	Columbidae	LC
193	*Blythipicus pyrrhotis*	Bay Woodpecker	Picidae	LC
194	*Picus canus*	Grey-headed Woodpecker	Picidae	LC
195	*Taenioptynx brodiei*	Collared Owlet	Strigidae	LC
196	*Phylloscopus xanthoschistos*	Grey-hooded Warbler	Phylloscopidae	LC
197	*Cissa chinensis*	Common Green Magpie	Corvidae	LC
198	*Falco tinnunculus*	Common Kestrel	Falconidae	LC
199	*Yungipicus canicapillus*	Grey-capped Pygmy Woodpecker	Picidae	LC
200	*Pericrocotus solaris*	Grey-chinned Minivet	Campephagidae	LC

201	*Dicaeum minullum*	Plain Flowerpecker	Dicaeidae	LC
202	*Heterophasia capistrata*	Rufous Sibia	Leiothrichida	LC
203	*Prinia crinigera*	Striated Prinia	Cisticolidae	LC
204	*Rhipidura albicollis*	White-throated Fantail	Rhipiduridae	LC
205	*Prinia atrogularis*	Black-throated Prinia	Cisticolidae	LC
206	*Psarisomus dalhousiae*	Long-tailed Broadbill	Eurylaimidae	LC
207	*Pericrocotus ethologus*	Long-tailed Minivet	Campephagidae	LC
208	*Nisaetus nipalensis*	Mountain Hawk Eagle	Accipitridae	LC
209	*Niltava sundara*	Rufous-bellied Niltava	Muscicapoidea	LC
210	*Chloropsis hardwickii*	Orange-bellied Leafbird	Chloropseidae	LC
211	*Leiothrix argentauris*	Sliver-eared Mesia	Timaliidae	LC
212	*Calliope calliope*	Siberian Rubythroat	Muscicapoidea	LC
213	*Phoenicurus ochruros*	Black Redstart	Muscicapoidea	LC
214	*Motacilla citreola*	Citrine wagtail	Motacillidae	LC
215	*Pterorhinus pectoralis*	Greater Necklaced Laughingthrush	Leiothrichidae	LC

3. Plants

3.1 Trees

#	***Species***	**Family**	#	***Species***	**Family**
1	*Acer oblongum*	Aceraceae	131	*knema tenuinervia*	Myristicacea
2	*Acer sterculiaceum*	Aceraceae	132	*Kydia calycina*	Malvaceae
3	*Acer thomsonii*	Aceraceae	133	*Lagerstroemia hirsuta*	Lythraceae
4	*Acrocarpus fraxinifolius*	Leguminosae	134	*Lagerstroemia parviflora*	Lythraceae
5	*Acronychia pedunculata*	Rutaceae	135	*Lagerstroemia speciosa*	Lythraceae
6	*Actinodaphne obovata*	Lauraceae	136	*Lasianthus spp*	Rubiaceae
7	*Adina cordifolia*	Rubiaceae	137	*Leea indica*	Leeaceae
8	*Adinandra griffithii*	Pentaphylacaceae	138	*Litchi chinensis*	Sapindaceae
9	*Aglaia spectabilis*	Meliaceae	139	*Lithocarpus elegans*	Fagaceae
10	*Ailanthus grandis*	Simaroubaceae	140	*Lithocarpus fenestratus*	Fagaceae
11	*Ailanthus integrifolia*	Simaroubaceae	141	*Lithocarpus spp*	Fagaceae
12	*Alangium chinense*	Alangiaceae	142	*Litsea cubeba*	Lauraceae

13	*Albizia chinensis*	Leguminosae	143	*Litsea monopetala*	Lauraceae
14	*Albizia julibrissin*	Leguminosae	144	*Litsea nilagirica*	Lauraceae
15	*Albizia lebbeck*	Leguminosae	145	*Litsea spp*	Lauraceae
16	*Albizia lucida*	Fabaceae	146	*Macaranga denticulata*	Euphorbiaceae
17	*Albizia procera*	Fabaceae	147	*Macaranga indica*	Euphorbiaceae
18	*Albizia procera*	Leguminosae	148	*Macaranga peltata*	Euphorbiaceae
19	*Albizia spp*	Fabaceae	149	*Macropanax dispermus*	Araliaceae
20	*Alnus nepalensis*	Betulaceae	150	*Macropanax fragrans*	Araliaceae
21	*Alstonia scholaris*	Apocynaceae	151	*Macropanax undulatus*	Araliaceae
22	*Altingia excelsa*	Hamamelidaceae	152	*Magnolia champaca*	Magnoliaceae
23	*Anthocephalus cadamba*	Rubiaceae	153	*Magnolia hodgsonii*	Magnoliaceae
24	*Aphanamixis polystachya*	Meliaceae	154	*Mallotus nudiflorus*	Euphorbiaceae
25	*Aquilaria malaccensis*	Thymelaeaceae	155	*Mallotus philippensis*	Euphorbiaceae
26	*Artocarpus heterophyllus*	Moraceae	156	*Mangifera indica*	Anacardiaceae
27	*Artocarpus lacucha*	Moraceae	157	*Mangifera sylvatica*	Anacardiaceae
28	*Artocarpus spp*	Moraceae	158	*Mangifera spp*	Anacardiaceae
29	*Baccaurea ramiflora*	Euphorbiaceae	159	*Melia azedarach*	Meliaceae
30	*Balakata baccata*	Myrsinaceae	160	*Mesua ferrea*	Calophyllaceae
31	*Bauhinia glabrifolia*	Leguminosae	161	*Michelia champaca*	Magnoliaceae
32	*Bauhinia purpurea*	Leguminosae	162	*Michelia doltsopa*	Magnoliaceae
33	*Bauhinia variegata*	Fabaceae	163	*Michelia spp*	Magnoliaceae
34	*Beilschmiedia gammieana*	Lauraceae	164	*Miliusa macrocarpa*	Annonaceae
35	*Beilschmiedia roxburghiana*	Lauraceae	165	*Mitrephora harai*	Annonaceae
36	*Betula alnoides*	Betulaceae	166	*Monoon longifolium*	Annonaceae
37	*Bischofia javanica*	Bischofiaceae	167	*Monoon simiarum*	Annonaceae
38	*Bombax ceiba*	Bombacaceae	168	*Moringa oleifera*	Moringaceae
39	*Brassaiopsis hainla*	Araliaceae	169	*Morus australis*	Moraceae
40	*Bridelia retusa*	Euphorbiaceae	170	*Morus laevigata*	Moraceae
41	*Butea Monosperma*	Leguminosae	171	*Morus macroura*	Moraceae
42	*Callicarpa arborea*	Verbenaceae	172	*Myrica esculenta*	Myricaceae
43	*Camphora officinarum*	Lauraceae	173	*Myrsine seguinii*	Primulaceae

44	*Canarium strictum*	Burseraceae	174	*Myrsine semiserrata*	Myrsinaceae
45	*Carallia brachiata*	Rhizophoraceae	175	*Neocinnamomum caudatum*	Lauraceae
46	*Careya arborea*	Lecythidaceae	176	*Neolamarckia cadamba*	Rubiaceae
47	*Carpinus viminea*	Betulaceae	177	*Neolitsea cassia*	Lauraceae
48	*Caryota urens*	Arecaceae(Palmae)	178	*Nyssa javanica*	Nyssaceae
49	*Cassia fistula*	Leguminosae	179	*Oroxylum indicum*	Bignoniaceae
50	*Cassia javanica*	Leguminosae	180	*Oroxylum spp*	Bignoniaceae
51	*Castanopsis hystrix*	Fagaceae	181	*Osmanthus suavis*	Oleaceae
52	*Castanopsis indica*	Fagaceae	182	*Ostodes paniculata*	Euphorbiaceae
53	*Castanopsis tribuloides*	Fagaceae	183	*Pentapanax spp*	Araliaceae
54	*Cedrela odorata*	Meliaceae	184	*Persea caerulea*	Lauraceae
55	*Celtis australis*	Cannabaceae	185	*Persea clarkeana*	Lauraceae
56	*Celtis tetrandra*	Ulmaceae	186	*Persea fructifera*	Lauraceae
57	*Chisocheton cumingianus*	Meliaceae	187	*Persea spp*	Lauraceae
58	*Choerospondias axillaris*	Anacardiaceae	188	*Phlogacanthus thyrsiformis*	Acanthaceae
59	*Chukrasia tabularis*	Meliaceae	189	*Phoebe attenuata*	Lauraceae
60	*Cinnamomum bejolghota*	Lauraceae	190	*Phoebe lanceolata*	Lauraceae
61	*Cinnamomum glanduliferum*	Lauraceae	191	*Phoebe spp*	Lauraceae
62	*Cinnamomum glaucescens*	Lauraceae	192	*Phyllanthus emblica*	Euphorbiaceae
63	*Cinnamomum spp*	Lauraceae	193	*Podocarpus neriifolius*	Podocarpaceae
64	*Cinnamomum virum*	Lauraceae	194	*Polyalthia simiarum*	Annonaceae
65	*Cordia dichotoma*	Boraginaceae	195	*Populus gamblei*	Salicaceae
66	*Cordia myxa*	Boraginaceae	196	*Populus glauca*	Salicaceae
67	*Cordia obliqua*	Boraginaceae	197	*Premna bengalensis*	Verbenaceae
68	*Crateva adansonii*	Capparaceae	198	*Premna latifolia*	Lamiaceae
69	*Crateva religiosa*	Capparaceae	199	*Prunus cerasoides*	Rosaceae
70	*cryptocarya amygdalina*	Lauraceae	200	*Pterospermum acerifolium*	Sterculiaceae
71	*Cryptocarya bhutanica*	Lauraceae	201	*Pterygota alata*	Sterculiaceae

72	*Cupressus cashmeriana*	Cupressaceae	202	*Quercus glauca*	Fagaceae
73	*Dalbergia sissoo*	Leguminosae	203	*Quercus griffithii*	Fagaceae
74	*Delonix regia*	Leguminosae	204	*Quercus lamellosa*	Fagaceae
75	*Dendrocnide excelsa*	Urticaceae	205	*Reevesia pubescens*	Sterculiaceae
76	*Dendrocnide sinuata*	Urticaceae	206	*Rhododendron arboreum*	Ericaceae
77	*Dillenia indica*	Dilleniaceae	207	*Rhus hookeri*	Anacardiaceae
78	*Dillenia pentagyna*	Dilleniaceae	208	*Rhus succedanea*	Anacardiaceae
79	*Diploknema butyracea*	Sapotaceae	209	*Samanea saman*	Leguminosae
80	*Docynia indica*	Rosaceae	210	*Sapindus rarak*	Sapindaceae
81	*Drimycarpus racemosus*	Anacardiaceae	211	*Sapium baccatum*	Euphorbiaceae
82	*Drypetes indica*	Putranjivaceae	212	*Sapium insigne*	Euphorbiaceae
83	*Duabanga grandiflora*	Sonneratiaceae	213	*Saraca asoca*	Fabaceae
84	*Echinocarpus tomentosus*	Elaeocarpaceae	214	*Sarcosperma arboreum*	Sarcospermataceae
85	*Ehretia acuminata*	Boraginaceae	215	*Saurauja nepaulensis*	Actinidiaceae
86	*Ehretia laevis*	Boraginaceae	216	*Schima wallichii*	Theaceae
87	*Elaeocarpus angustifolius*	Elaeocarpaceae	217	*Senegalia catechu*	Fabaceae
88	*Elaeocarpus dasycarpus*	Elaeocarpaceae	218	*Shorea robusta*	Dipterocarpaceae
89	*Elaeocarpus decipiens*	Elaeocarpaceae	219	*Sigesbeckia orientalis*	Compositae
90	*Elaeocarpus lanceifolius*	Elaeocarpaceae	220	*Spondias mangifera*	Anacardiaceae
91	*Elaeocarpus sikkimensis*	Elaeocarpaceae	221	*Spondias pinnata*	Anacardiaceae
92	*Engelhardia spicata*	Juglandaceae	222	*Sterculia colorata*	Malvaceae
93	*Erythrina arborescens*	Fabaceae	223	*Sterculia villosa*	Sterculiaceae
94	*Erythrina arborescens*	Leguminosae	224	*Stereospermum chelonoides*	Bignoniaceae
95	*Erythrina stricta*	Leguminosae	225	*Stereospermum personatum*	Bignoniaceae
96	*Erythrina variegata*	Fabaceae	226	*Stereospermum suaveolens*	Bignoniaceae
97	*Eucalyptus spp*	Myrtaceae	227	*Stereospermum tetragonum*	Bignoniaceae
98	*Eurya cavinervis*	Theaceae	228	*Symplocos glomerata*	Symplocaceae
99	*Eurya cerasifolia*	Theaceae	229	*Symplocos lucida*	Symplocaceae
100	*Exbucklandia populnea*	Hamamelidaceae	230	*Symplocos sumuntia*	Symplocaceae

101	*Ficus altissima*	Moraceae	231	*Syzygium claviflorum*	Myrtaceae
102	*Ficus auriculata*	Moraceae	232	*Syzygium cumini*	Myrtaceae
103	*Ficus benghalensis*	Moraceae	233	*Syzygium formosa*	Myrtaceae
104	*Ficus benjamina*	Moraceae	234	*Syzygium formosum*	Myrtaceae
105	*Ficus elastica*	Moraceae	235	*Syzygium operculatum*	Myrtaceae
106	*Ficus hispida*	Moraceae	236	*Syzygium spp*	Myrtaceae
107	*Ficus neriifolia*	Moraceae	237	*Syzygium tetragonum*	Myrtaceae
108	*Ficus nervosa*	Moraceae	238	*Tamarindus indica*	Fabaceae
109	*Ficus racemosa*	Moraceae	239	*Tectona grandis*	Verbenaceae
110	*Ficus religiosa*	Moraceae	240	*Terminalia alata*	Combretaceae
111	*Ficus roxburghii*	Moraceae	241	*Terminalia arjuna*	Combretaceae
112	*Ficus semicordata*	Moraceae	242	*Terminalia bellirica*	Combretaceae
113	*Ficus spp*	Moraceae	243	*Terminalia catappa*	Combretaceae
114	*Ficus virens*	Moraceae	244	*Terminalia chebula*	Combretaceae
115	*Fraxinus floribunda*	Oleaceae	245	*Terminalia elliptica*	Combretaceae
116	*Garuga pinnata*	Burseraceae	246	*Terminalia microcarpa*	Combretaceae
117	*Glochidion acuminatum*	Euphorbiaceae	247	*Terminalia myriocarpa*	Combretaceae
118	*Glochidion heyneanum*	Phyllanthaceae	248	*Terminalia spp*	Combretaceae
119	*Glochidion spp*	Phyllanthaceae	249	*Tetradium fraxinifolium*	Rutaceae
120	*Gmelina arborea*	Verbenaceae	250	*Tetrameles nudiflora*	Datiscaceae
121	*Greenwayodendron suaveolens*	Annonaceae	251	*Toona ciliata*	Meliaceae
122	*Grevillea robusta*	Proteaceae	252	*Toona spp*	Meliaceae
123	*Grewia asiatica*	Malvaceae	253	*Trevesia palmata*	Araliaceae
124	*Gynocardia odorata*	Flacourtiaceae	254	*Trewia nudiflora*	Euphorbiaceae
125	*Helicia nilagirica*	Proteaceae	255	*Vitex heterophylla*	Lamiaceae
126	*Heteropanax fragrans*	Araliaceae	256	*Vitex pinnata*	Lamiaceae
127	*Heynea trijuga*	Meliaceae	257	*Wrightia arborea*	Apocynaceae
128	*Holarrhena pubescens*	Apocynaceae	258	*Zanthoxylum acanthopodium*	Rutaceae
129	*Horsfieldia kingii*	Myristicacea	259	*Zanthoxylum rhetsa*	Rutaceae
130	*Hovenia dulcis*	Rhamnaceae	260	*Ziziphus mauritiana*	Rhamnaceae

3.2 Shrubs

Sl. #	Evergreen Shrubs	Family	Sl. #	Decidous Shrubs	Family
1	*Amblyanthopsis bhotanica*	Primulaceae	1	*Baliospermum polyandrum*	Euphorbiaceae
2	*Benkara sinensis*	Commelinaceae	2	*Benkara fasciculata*	Commelinaceae
3	*Boehmeria platyphylla*	Urticaceae	3	*Blumea aromatica*	Compositae
4	*Bridelia micrantha*	Euphorbiaceae	4	*Boehmeria cylindrica*	Urticaceae
5	*Bridelia mollis*	Euphorbiaceae	5	*Boehmeria glomerulifera*	Urticaceae
6	*Bridelia retusa*	Euphorbiaceae	6	*Boehmeria himiltoniana*	Urticaceae
7	*Capparis indica*	Capparaceae	7	*Boehmeria macrophylla*	Urticaceae
8	*Chloranthus elatior*	Chloranthaceae	8	*Buddleja davidii*	Buddlejaceae
9	*Clerodendrum chinense*	Verbenaceae	9	*Catunaregam spinosa*	Rubiaceae
10	*Clerodendrum japonicum*	Verbenaceae	10	*Caesalpinia decapetala*	Leguminosae
11	*Combretum alfredii*	Combretaceae	11	*Capparis bodinieri*	Capparaceae
12	*Croton caudatus*	Euphorbiaceae	12	*Capparis tenera*	Capparaceae
13	*Daphne bhoula*	Thymelaeaceae	13	*Citrus medica*	Rutaceae
14	*Dichroa febrifuga*	Hydrangeaceae	14	*Clerodendrum colebrookianum*	Verbenaceae
15	*Edgeworthia gardneri*	Thymelaeaceae	15	*Crateva religiosa*	Crassulaceae
16	*Elsholtzia blanda*	Labiatae	16	*Debregeasia longifolia*	Urticaceae
17	*Elsholtzia fruticosa*	Labiatae	17	*Debregeasia wallichiana*	Urticaceae
18	*Eriobotrya dubia*	Rosaceae	18	*Elastostema platyphyllum*	Elaeocarpaceae
19	*Eurya acuminata*	Theaceae	19	*Elatostema acuminata*	Elatinaceae
20	*Ficus cyrtophylla*	Moraceae	20	*Elatostema lenolatum*	Urticaceae
21	*Goniothalamus sesquipedalis*	Asclepiadaceae	21	*Elatostema lineolatum*	Urticaceae
22	*Grewia eriocarpa*	Tiliaceae	22	*Flueggea virosa*	Euphorbiaceae
23	*Hedyostis scandens*	Zingiberaceae	23	*Gomphostemma parviflorum*	Labiatae
24	*Justicia santapaui*	Acanthaceae	24	*Hedychium deceptum*	Zingiberaceae
25	*Leea indica*	Leeaceae	25	*Hedychium spicatum*	Zingiberaceae
26	*lepisanthes rubiginosa*	Opiliaceae	26	*Hydrangea febrifuga*	Hydrangeaceae
27	*Lepisanthes senegalensis*	Sapindaceae	27	*Indigofera dosua*	Leguminosae

28	*Leucosceptrum canum*	Labiatae	28	*Jusminum dispermum*	Cupressaceae
29	*Libistonia rotundifolia*	Caprifoliaceae	29	*Koenigia mollis*	Polygonaceae
30	*Maesa chisia*	Myrsinaceae	30	*Lantana camara*	Verbenaceae
31	*Maesa indica*	Myrsinaceae	31	*Leea asiatica*	Leeaceae
32	*Magnolia pterocarpa*	Myrsinaceae	32	*Mallotus philippinensis*	Euphorbiaceae
33	*Measa Indica*	Scrophulariaceae	33	*Maoutia puya*	Urticaceae
34	*Melastoma malabathricum*	Gentianaceae	34	*Oreocnide rubescens*	Urticaceae
35	*Mitrephora harai*	Annonaceae	35	*Oxyspora paniculata*	Melastomataceae
36	*Molineria capitulata*	Hypoxidaceae	36	*Phrynium pubinerve*	Marantaceae
37	*Murraya koenigii*	Rutaceae	37	*Piptanthus nepalensis*	Leguminosae
38	*Murraya paniculata*	Rutaceae	38	*Pouzolzia sanguinea*	Urticaceae
39	*Mussaenda roxburghii*	Musaceae	39	*Pseudostachyum polymorphum*	Gramineae
40	*Osbeckia stellata*	Melastomataceae	40	*Rhus acuminata*	Commelinaceae
41	*Osteodes paniculata*	Umbelliferae	41	*Rubus ellipticus*	Rosaceae
42	*Pandanus furcatus*	Pandanaceae	42	*Rubus panniculata*	Rosaceae
43	*Pandanus nepalensis*	Pandanaceae	43	*Rubus spp*	Rosaceae
44	*Pavetta Indica*	Passifloraceae	44	*Saurauia armata*	Actinidiaceae
45	*Pavia indica*	Rubiaceae	45	*Trema micrantha*	Umbelliferae
46	*Phlogacanthus pubinervius*	Acanthaceae	46	*Vibernum spp*	Scrophulariaceae
47	*Phlogacanthus thyrsiformis*	Acanthaceae			
48	*Phlogacanthus vitellinus*	Acanthaceae			
49	*Piper mullesua*	Piperaceae			
50	*Piper pedicilatum*	Piperaceae			
51	*Pseudocaryopteris panniculata*	Acanthaceae			
52	*Psilanthus bengalensis*	Rubiaceae			
53	*Psychotria nervosa*	Rubiaceae			
54	*Sarcoclamys pulcherrima*	Urticaceae			
55	*Schefflera spp*	Araliaceae			
56	*Strobilanthes capitata*	Acanthaceae			

57	*Strobilanthes cellosa*	Acanthaceae			
58	*Strobilanthes echinata*	Acanthaceae			
59	*Strobilanthes exsertia*	Acanthaceae			
60	*Strobilanthes spp*	Acanthaceae			
61	*Tabernaemontana divaricata*	Apocynaceae			
62	*Thysanolaena latifolia*	Gesneriaceae			
63	*Trevesia palmata*	Araliaceae			
64	*Xanthozylum bungeanum*	Compositae			

3.3 Herbs

Sl. #	Perennial herbs	Family	Sl. #	Annual Herbs	Family
1	*Alpinia malaccensis*	Zingiberaceae	1	*Achyranthes bidentata*	Amaranthaceae
2	*Ageratum houstonianum*	Compositae	2	*Acmella uliginosa*	Compositae
3	*Alocasia flemingia*	Araceae	3	*Ageratinum conizodes*	Compositae
4	*Arisaema flavum*	Araceae	4	*Ageratum houstonianum*	Compositae
5	*Amblyanthopsis bhotanica*	Amaranthaceae	5	*Ageratum houstonianum*	Compositae
6	*Amischotolype hispida*	Myrsinaceae	6	*Amaranthus blitum*	Leguminosae
7	*Arisaema concinnum*	Araceae	7	*Amaranthus spinosus*	Amaranthaceae
8	*Arisaema tortuosum*	Araceae	8	*Amaranthus viridis*	Amaranthaceae
9	*Arisaema serratum*	Araceae	9	*Ardisia crenata*	Myrsinaceae
10	*Blastus cochinchinensis*	Bixaceae	10	*Ageratina Adenophora*	Compositae
11	*Arisaema speciosum*	Araceae	11	*Bidens Pilosa*	Compositae
12	*Arisaema utile*	Araceae	12	*Capsella bursa*	Capparaceae
13	*Artimesia nilagirica*	Gramineae	13	*Chenopodium album*	Chenopodiaceae
14	*Artemisia absinthium*	Annonaceae	14	*Commelina benghalensis*	Commelinaceae
15	*Benkara fasciculata*	Commelinaceae	15	*Commelina hasskarlii*	Commelinaceae
16	*Artimesia vulgaris*	Gramineae	16	*Commelina maculate*	Commelinaceae
17	*Bacopa monieri*	Compositae	17	*Conyza canadensis*	Compositae
18	*Asystasia macrocarpa*	Acanthaceae	18	*Cyanthillium cinereum*	Compositae

19	*Boehemeria macrophylla*	Hydrocharitaceae	19	*Cynoglossum furcatum*	Boraginaceae
20	*Bacopa monieri*	Compositae	20	*Axonopus compressus*	Gramineae
21	*Baka Kanay-LN*	Scrophulariaceae	21	*Digitaria ciliaris*	Gramineae
22	*Baliospermum polyandrum*	Euphorbiaceae	22	*Eleusine indica*	Gramineae
23	*Begonia annulate*	Begoniaceae	23	*Euphorbia indica*	Euphorbiaceae
24	*Begonia dioica*	Begoniaceae	24	*Galium aparine*	Rubiaceae
25	*Begonia palmata*	Begoniaceae	25	*Geranium mole*	Geraniaceae
26	*Blumea aromatica*	Compositae	26	*Impatiens arguta*	Balsaminaceae
27	*Boehmeria glomerulifera*	Urticaceae	27	*Impatiens exilis*	Balsaminaceae
28	*Boehmeria cylindrica*	Urticaceae	28	*Impatiens radiata*	Balsaminaceae
29	*Boehmeria platyphylla*	Urticaceae	29	*Lactuca dissecta*	Compositae
30	*Boehmeria himiltoniana*	Urticaceae	30	*Lobelia nicotianifolia*	Campanulaceae
31	*Boehmeria nivea*	Urticaceae	31	*Lobelia nummularia*	Campanulaceae
32	*Brugmansia sauveolens*	Simaroubaceae	32	*Maoutia puya*	Urticaceae
33	*Curcuma heyneana*	Zingiberaceae	33	*Perennial herbs:*	Campanulaceae
34	*Brachiaria romasa*	Nyctaginaceae	34	*Perilla frutescens*	Labiatae
35	*Brachiaria subquadripara*	Nyctaginaceae	35	*Persicaria barbata*	Polygonaceae
36	*Brachiaria subquadripara*	Nyctaginaceae	36	*Persicaria chinensis*	Polygonaceae
37	*Cautleya spicata*	Zingiberaceae	37	*Persicaria maculosa*	Polygonaceae
38	*Cheilocostus speciosus*	Rubiaceae	38	*Persicaria nepalensis*	Polygonaceae
39	*Chloranthus elatior*	Chloranthaceae	39	*Persicaria runcinate*	Polygonaceae
40	*Chloranthus spicatus*	Chloranthaceae	40	*Polypogon fugax*	Gramineae
41	*Citrus medica*	Rutaceae	41	*Pseudognaphalium affine*	Compositae
42	*Colocasia esculenta*	Araceae	42	*Pseudoploymorph stachy*	Compositae
43	*Benkara sienensis*	Commelinaceae	43	*Ranunculus hispidus*	Ranunculaceae
44	*Costus speciosus*	Costaceae	44	*Raphanus raphanistrum*	Cruciferae
45	*Curcuma aromatica*	Zingiberaceae	45	*Setaria megaphylla*	Gramineae
46	*Cyathula prostrata*	Amaranthaceae	46	*Setaria palmifolia*	Gramineae
47	*Caesalpinia decapetala*	Leguminosae	47	*Sida acuta*	Malvaceae
48	*Desmodium triflorum*	Leguminosae	48	*Siegesbeckia orientalis*	Malvaceae
49	*Cynodon dactylon*	Gramineae	49	*Solanum nigrum*	Solanaceae

50	*Dichrocephala integrifolia*	Compositae	50	*Solanum spp*	Solanaceae
51	*Dichrocephala integrifolia*	Compositae	51	*Solunum erianthum*	Compositae
52	*Dischidia nummularia*	Asclepiadaceae	52	*Solunum khasinum*	Compositae
53	*Discorea divercata*	Asclepiadaceae	53	*Solunum torvum*	Compositae
54	*Elastestema platyphyllum*	Elaeocarpaceae	54	*Solunum viarum*	Compositae
55	*Elastestema stewardii*	Elaeocarpaceae	55	*Swertia chirata*	Gentianaceae
56	*Elastostema acuminata*	Elaeocarpaceae	56	*Urena lobata*	Malvaceae
57	*Elatostema lineolatum*	Urticaceae			
58	*Elatostema sessile*	Urticaceae			
59	*Elsholtzia blanda*	Labiatae			
60	*Elsholtzia fruticosa*	Labiatae			
61	*Elsholtzia regulosa*	Labiatae			
62	*Echornia cordifolia*	Gramineae			
63	*Elstetoema lenolatum*	Labiatae			
64	*Flemingia macrophylla*	Leguminosae			
65	*Floscopa scandens*	Commelinaceae			
66	*Fragaria nubicola*	Rosaceae			
67	*Geum aleppicum*	Rosaceae			
68	*Geum urbanum*	Rosaceae			
69	*Girardina diversifolia*	Rosaceae			
70	*Globba racemosa*	Zingiberaceae			
71	*Gomphostemma parviflorum*	Labiatae			
72	*Gynura divaricata*	Compositae			
73	*Hedychium coronarium*	Zingiberaceae			
74	*Hedychium deceptum*	Zingiberaceae			
75	*Hedychium spicatum*	Zingiberaceae			
76	*Hedychium thyrsiforme*	Zingiberaceae			
77	*Houttuynia cordata*	Saururaceae			
78	*Hydrocotyle javanica*	Umbelliferae			
79	*Imperata cylindrica*	Gramineae			
80	*Isoglossa collina*	Acanthaceae			
81	*Justicia santapaui*	Acanthaceae			

82	*Koenigia mollis*	Polygonaceae			
83	*Laportea bulbifera*	Verbenaceae			
84	*Laportea bulbifera*	Verbenaceae			
85	*Lysimachia congestiflora*	Primulaceae			
86	*Maranta arundinacea*	Urticaceae			
87	*Marrubium vulgare*	Urticaceae			
88	*Melinis minutiflora*	Gramineae			
89	*Mentha spicata*	Labiatae			
90	*Mikania micrantha*	Compositae			
91	*Molineria capitulata*	Hypoxidaceae			
92	*Nelsonia canescens*	Rosaceae			
93	*Ophiopogon japonicus*	Convallariaceae			
94	*Oplismenus burmannii*	Gramineae			
95	*Oplismenus hirtellus*	Gramineae			
96	*Oplismenus undulatifolious*	Gramineae			
97	*Oxalis corniculata*	Oxalidaceae			
98	*Oxalis corymbosa*	Oxalidaceae			
99	*Oxyspora paniculata*	Melastomataceae			
100	*Palisota Hiruta*	Ranunculaceae			
101	*Paspalum conjugatum*	Gramineae			
102	*Paspalum pasloides*	Gramineae			
103	*Peliosanthes macrophylla*	Convallariaceae			
104	*Pellionia radicans*	Convallariaceae			
105	*Pennisetum clandestinum*	Gramineae			
106	*Phryma leptostachya*	Phrymaceae			
107	*Phrynium placentarium*	Marantaceae			
108	*Phrynium pubinerve*	Marantaceae			
109	*Pilea bracteosa*	Urticaceae			
110	*Pilea pumila*	Urticaceae			
111	*Piper betleoides*	Piperaceae			
112	*Piper betleoides*	Piperaceae			
113	*Piper longum*	Piperaceae			
114	*Piper longum*	Piperaceae			

115	*Piper mullesua*	Piperaceae			
116	*Piper nigrum*	Piperaceae			
117	*Piper pedicilatum*	Piperaceae			
118	*Piper peduloides*	Piperaceae			
119	*Plantago major*	Plantaginaceae			
120	*Plectranthus spp*	Labiatae			
121	*Pliea bractosa*	Umbelliferae			
122	*Pogostemon amaranthoides*	Labiatae			
123	*Pollia hasskarlii*	Commelinaceae			
124	*Potentilla indica*	Rosaceae			
125	*Pouzolzia hirta*	Urticaceae			
126	*Pouzolzia sanguinea*	Urticaceae			
127	*Rubia cordifolia*	Gramineae			
128	*Rumex nepalensis*	Polygonaceae			
129	*Sajesbeckia orientalis*	Alismataceae			
130	*Salvia coerulea*	Labiatae			
131	*Solanum anguivi*	Solanaceae			
132	*Solanum spp*	Solanaceae			
133	*Strobilanthes crispa*	Acanthaceae			
134	*Strobilanthes cusia*	Acanthaceae			
135	*Strobilanthes penstemonoides*	Acanthaceae			
136	*Strobilanthes spp*	Acanthaceae			
137	*Strobilanthus exserta*	Acanthaceae			
138	*Thysanolaena latifolia*	Gesneriaceae			
139	*Urtica dioica*	Urticaceae			

3.4 Ferns and Vines

	Sporophytes/Ferns			Climber & Vines species	
Sl. #	**Species**	**Family**	**Sl. #**	**Species**	**Family**
1	*Dennstaedtia appendiculata*	Dennstaedtiaceae	1	*Rubia cordifolia*	Rubiaceae
2	*Davallia assamica*	Davalliaceae	2	*Piper betleoides*	Piperaceae
3	*Microlepia speluncae*	Dennstaedtiaceae	3	*Tetrastigma paniculata*	Vitaceae
4	*Diplazium esculentum*	Athyriaceae	4	*Flemingia macrophylla*	Fabaceae
5	*Polystichum nepalense*	Dryopteridaceae	5	*Piper spp.*	Piperaceae
6	*Drynaria spp.*	Polypodiaceae	6	*Mikania micrantha*	Asteraceae
7	*Selaginella monospora*	Selaginellaceae	7	*Smilax ferox*	Liliaceae
8	*Tectaria polymorpha*	Tectariaceae	8	*Gynostemma pentaphyllum*	Cucurbitaceae
9	*Tectaria morata*	Tectariaceae	9	*Rubus paniculata*	Rosaceae
10	*Pteris normalis*	Pteridaceae	10	*Jasminum dispermum*	Oleaceae
11	*Arachniodes foeniculaceum*	Dryopteridaceae	11	*Lycopodium spp*	Lycopodiaceae
12	*Pteris wallichiana*	Pteridaceae	12	*Aristolochia pentaphylla*	Aristolochiaceae
13	*Asplenium obscurum*	Aspleniaceae	13	*Rhaphidophora spp.*	Araceae
14	*Pteridium revolutum*	Dennstaedtiaceae	14	*Tetrastigma obtectum*	Vitaceae
15	*Asplenium obliquissimum*	Aspleniaceae	15	*Tetrastigma rumicispermum*	Vitaceae
16	*leptochilus pedunculatus*	Polypodiaceae	16	*Stephania japonica*	Menispermaceae
17	*Asplenium amoenum*	Aspleniaceae	17	*Piper longum*	Piperaceae
18	*Thelypteris papilio*	Thelypteridaceae	18	*Paederia cruddasiana*	Rubiaceae
19	*Pteris pellucens*	Pteridaceae	19	*Smilax perfoliata*	Liliaceae
20	*Thelypteris procera*	Thelypteridaceae	20	*Aristolochia macrophylla*	Aristolochiaceae
21	*Polystichum bolbitis*	Dryopteridaceae	21	*Tinospora cordifolia*	Menispermaceae
22	*Diplazium spp 2*	Athyriaceae	22	*Thunbergia grandiflora*	Acanthaceae
23	*Tectaria ingens*	Tectariaceae	23	*Rhaphidophora decursiva*	Araceae
24	*Bolbitis angustipinna*	Dryopteridaceae	24	*Parthenocissus quinquefolia*	Vitaceae
25	*Microlepia platyphylla*	Dennstaedtiaceae	25	*Argyreia nervosa*	Convolvulaceae
26	*Pteris cretica*	Pteridaceae	26	*Tetrastigma spp.*	Vitaceae

27	*Thelypteris nudata*	Thelypteridaceae	27	*Mikania cordata*	Asteraceae
28	*Polystichium tsus-simense*	Dryopteridaceae			
29	*Microlepia setosa*	Dennstaedtiaceae			
30	*Pteris biaurita*	Pteridaceae			
31	*Angiopteris evecta*	Marattiaceae			
32	*Polystichum semi fertile*	Dryopteridaceae			
33	*Asplenium cheilosorum*	Aspleniaceae			
34	*Monachosorum henryi*	Dennstaedtiaceae			
35	*Odontosoria chinensis*	Lindsaeaceae			
36	*Thelypteris erubescens*	Thelypteridaceae			
37	*Nephrolepis cordifolia*	Nephrolepidaceae			
38	*Cyathea spinulosa*	Cyatheaceae			
39	*Microsorum cuspidatum*	Polypodiaceae			
40	*Asplenium lanciniodes*	Aspleniaceae			
41	*Dryopteris gamblei*	Dryopteridaceae			
42	*Dipteris wallichii*	Dipteridaceae			
43	*Thelypteris lakhimpurensis*	Thelypteridaceae			
44	*Dicranopteris taiwanensis*	Gleicheniaceae			
45	*Pteris spinescens*	Pteridaceae			
46	*Bolbitis appendiculata*	Dryopteridaceae			
47	*Coniogramme pubescens*	Pteridaceae			
48	*Diplazium sikkimense*	Athyriaceae			
49	*Polystichum punctatum*	Dryopteridaceae			
50	*Angiopteris spp.*	Marattiaceae			
51	*Diplazium javanicum*	Athyriaceae			
52	*Diplazium spp.3*	Athyriaceae			
53	*Microlepia rhomboidea*	Dennstaedtiaceae			
54	*Dryopteris spp.*	Dryopteridaceae			
55	*Dryopteris sparsa*	Dryopteridaceae			
56	*Polypodiodes amoena*	Polypodiaceae			
57	*Dryopteris juxtaposita*	Dryopteridaceae			
58	*Dennstaedtia zeylanica*	Dennstaedtiaceae			

59	*Diplopterygium giganteum*	Gleicheniaceae			
60	*Diplazium himalayense*	Athyriaceae			
61	*Macrothelypteris ornata*	Thelypteridaceae			
62	*Pteridium Aquilinum*	Dennstaedtiaceae			
63	*Polypodium glycyrrhiza*	Polypodiaceae			
64	*Pakau pennigera*	Thelypteridaceae			
65	*Cyathea dregei*	Cyatheaceae			
66	*Aglaomorpha coronans*	Polypodiaceae			
67	*Arthromeris wallichiana*	Polypodiaceae			
68	*Blechnopsis orientalis*	Blechnaceae			
69	*Pteris scabririgens*	Pteridaceae			

3.5 Orchids

Sl. #	Scientific name	Family	Conservation Status
1	*Paphiopedilum fairrieanum*	Orchidaceae	CR
2	*Cheirostylis sherriffii*	Orchidaceae	CR
3	*Liparis cordifolia*	Orchidaceae	LC
4	*Liparis bistriata*	Orchidaceae	Not assessed (NA)
5	*Liparis cespitosa*	Orchidaceae	NA
6	*Liparis viridiflora*	Orchidaceae	NA
7	*Malaxis ophrydis*	Orchidaceae	NA
8	*Oberonia acaulis*	Orchidaceae	NA
9	*Oberonia mucronata*	Orchidaceae	NA
10	*Oberonia pachyrachis*	Orchidaceae	NA
11	*Cymbidium aloifolium*	Orchidaceae	NA
12	*Cymbidium devonianum*	Orchidaceae	NA
13	*Cymbidium mastersii*	Orchidaceae	NA
14	*Calanthe biloba*	Orchidaceae	NA
15	*Calanthe plantaginea*	Orchidaceae	NA
16	*Phaius flavus*	Orchidaceae	NA
17	*Arundina graminifolia*	Orchidaceae	NA
18	*Thunia alba*	Orchidaceae	NA

19	*Thunia alba var bracteata*	Orchidaceae	NA
20	*Coelogyne fuscescens var fuscecens*	Orchidaceae	NA
21	*Coelogyne flacida*	Orchidaceae	NA
22	*Coelogyne corymbosa*	Orchidaceae	NA
23	*Coelogyne nitida*	Orchidaceae	NA
24	*Coelogyne barbata*	Orchidaceae	NA
25	*Coelogyne stricta*	Orchidaceae	NA
26	*Neogyna gardneriana*	Orchidaceae	NA
27	*Panisea demissa*	Orchidaceae	NA
28	*Pholidota articulate*	Orchidaceae	NA
29	*Pholidota imbricata*	Orchidaceae	NA
30	*Pholidota pallida*	Orchidaceae	NA
31	*Pleione maculate*	Orchidaceae	NA
32	*Agrostopphyllum brevipes*	Orchidaceae	NA
33	*Eria carinata*	Orchidaceae	NA
34	*Eria lasiopetala*	Orchidaceae	NA
35	*Eria paniculata Lindley*	Orchidaceae	NA
36	*Eria stricta Lindley*	Orchidaceae	NA
37	*Trichotosia dasyphylla*	Orchidaceae	NA
38	*Dendrobium densiflorum*	Orchidaceae	NA
39	*Dendrobium jenkinsii*	Orchidaceae	NA
40	*Dendrobium aphyllum*	Orchidaceae	LC
41	*Dendrobium chrysanthum*	Orchidaceae	NA
42	*Dendrobium moschatum*	Orchidaceae	NA
43	*Dendrobium ruckeri*	Orchidaceae	NA
44	*Dendrobium transparens*	Orchidaceae	NA
45	*Dendrobium cathcartii*	Orchidaceae	NA
46	*Epigenium navicularis*	Orchidaceae	NA
47	*Epigenium rotundatum*	Orchidaceae	NA
48	*Flickingeria fugax*	Orchidaceae	NA
49	*Bulbophyllum odoratissimum*	Orchidaceae	NA
50	*Bulbophyllum thomsonii*	Orchidaceae	NA
51	*Bulbophyllum helenae*	Orchidaceae	NA

52	*Ione bicolor*	Orchidaceae	NA
53	*Acampe papillosa*	Orchidaceae	NA
54	*Aerides odoratum*	Orchidaceae	NA
55	*Aerides multiflorum*	Orchidaceae	NA
56	*Ascocentrum ampullaceum*	Orchidaceae	NA
57	*Chiloschista parishii*	Orchidaceae	NA
58	*Esmeralda cathcartii*	Orchidaceae	NA
59	*Gastrochilus calceolaris*	Orchidaceae	CR
60	*Gastrochilus inconspicuous*	Orchidaceae	NA
61	*Pteroceras teres*	Orchidaceae	NA
62	*Rhynchostylis retusa*	Orchidaceae	NA
63	*Smitinandia mocrantha*	Orchidaceae	NA
64	*Vanda cristata Lindley*	Orchidaceae	NA
65	*Vinda griffithii Lindley*	Orchidaceae	NA
66	*Vinda testacea*	Orchidaceae	NA
67	*Galeola falconeri*	Orchidaceae	NA

3.6 Bamboo

#	Name of species	Common name	Family
1	*Bambusa allamii*	Mugi bans (Nep)	Poaceae
2	*Bambusa balcooa*	Balcooa (Nep), Female bamboo	Poaceae
3	*Bambusa clavata*	Chilli bans (Nep)	Poaceae
4	*Bambusa multiplex*	Chinese bamboo	Poaceae
5	*Bambusa nutans*	Mal bans (Nep), Pakshing(Dzo)	Poaceae
6	*Bambusa tulda*	NA	Poaceae
7	*Dendrocalamus hamiltronii*	Choya bans (Nep)	Poaceae
8	*Dendrocalamus sikkimensis*	Balu bans (Nep), Demchar (Shar)	Poaceae
9	*Melocanna baccifera*	NA	Poaceae
10	*Cephalostachyum capitatum*	Philim Bans (Nep)	Poaceae
11	*Cephalostachyum latifolium*	Philim bans (Nep)	Poaceae
12	*Pseudostachyum polymorphum*	NA	Poaceae
13	*Bambusa bambos*	NA	Poaceae
14	*Drepanostachyum intermedium*	Phalsho(Shar)	Poaceae

15	*Neomicrocalamus andropogonifolius*	Ringshu (Shar)	Poaceae
16	*Chiminobambusa callosa*	Rashi (Shar)	Poaceae
17	*Bambusa valgaris*	Yellow bamboo (common name)	Poaceae
18	*Bambusa ventricosa*	Buddha belly bamboo	Poaceae
19	*Dendrocalamus strictus*	Kolkata bamboo or male bamboo	Poaceae
20	*Bambusa cacharensis*	Slender weaver bamboo	Poaceae
21	*Schizostachyum brachycladum*	Bali bamboo	Poaceae
22	*Ampelocalamus patellaris*	NA	Poaceae
23	*Himalayacalamus hookerianus*	Blue bamboo	Poaceae
24	*Yushenia sp*		
25	*Bambusa pallida*	Bijuli bans(L)	Poaceae

4. Reptiles

Sl. #	Common name	Scientific name	Family	Conservation Status
1	Yellow-speckled Wolf Snake	*Lycodon jara*	Colubridae	LC
2	Banded Krait	*Bungarus fasciatus*	Elapidae	LC
3	Bengal Monitor Lizard	*Varanus bengalensis*	Varanidae	NT
4	Bengalese Kukri Snake	*Oligodon dorsalis*	Colubridae	LC
5	Bronze Mabuya	*Eutropis macularia*	Scincidae	LC
6	Brooke's House Gecko	*Hemidactylus brookii*	Gekkonidae	LC
7	Burmese Rock Python	*Python bivittatus*	Pythonidae	VU
8	Cantor's Black-headed Snake	*Sibynophis sagittarius*	Colubridae	LC
9	Chequered Keelback	*Fowlea piscator*	Colubridae	LC
10	Common BronzeBack	*Dendrelaphis tristis*	Colubridae	LC
11	Common House Gecko	*Hemidactylus frenatus*	Gekkonidae	LC
12	Common Mock Viper	*Psammodynastes pulverulentus*	Colubridae	LC
13	Montane Slug-eating Snake	*Pareas monticola*	Pareidae	LC
14	Changeable Lizard	*Calotes versicolor*	Agamidae	LC
15	Elongated Tortoise	*Indotestudo elongata*	Testudinoidea	CR

16	Green Pitviper	*Trimeresurus sp.*	Viperidae	LC
17	Indian Cobra	*Naja naja*	Elapidae	LC
18	Indian Forest Skink	*Sphenomorphus indicus*	Scincidae	LC
19	Fox Gecko	*Hemidactylus garnotii*	Gekkonidae	LC
20	Jerdon's Forest Lizard	*Calotes jerdoni*	Agamidae	LC
21	Khasi Hills bent-toed gecko	*Cyrtodactylus khasiensis*	Gekkonidae	LC
22	Monocled Cobra	*Naja kaouthia*	Elapidae	LC
23	Ornate Flying Snake	*Chrysopelea ornata*	Colubridae	LC
24	Copper-head Trinket Snake	*Coelognathus radiatus*	Colubridae	LC
25	Reticulated Python	*Malayopython reticulatus)*	Pythonidae	LC
26	Western Russel's Viper	*Daboia russelii*	Viperidae	LC
27	Striped Grass Mabuya	*Eutropis dissimilis*	Scincidae	LC
28	Variegated Mountain Lizard	*Japalura variegata*	Agamadae	LC
29	White-lipped Tree viper	*Trimeresurus albolabris*	Viperidae	LC
30	Saltwater Crocodile	*Crocodylus porosus*	Crocodylidae	LC
31	Gharial	*Gavialis gangeticus*	Gavialidae	CR
32	Zaw's Wolf Snake	*Lycodon zawi*	Colubridae	LC
33	King Cobra	*Ophiophagus hannah*	Elapidae	VU
34	Common Trinket Snake	*Coelognathus helena*	Colubridae	LC

5. Amphibians

Sl. #	Scientific name	Common name	Family	Conservation status
1	*Megophrysparva sp*	NA	Megophryidae	LC
2	*Bufo melanostictus.*	Marble toad	Bufonidae	LC
3	*Amolops marinoratus*	Marbled sucker frog	Ranidae	LC
4	*Euphlyctis cyanophlyctis*	Indian Skipping frogs	Ranidae	LC
5	*Hoplobatrachus tigerinus*	Indian Bull Frog	Ranidae	LC
6	*Fejervarya cf limnocharis*	Asian Grass Frog	Ranidae	LC
7	*Rana (Sylvirana)*	Gunther's Amoy Frog,	Ranidae	LC
8	*Leptrobrachum bompu*	Eastern Spadefoot Toad	Magophryidae	LC
9	*Nanorana leibigii*	Himalayan Bull frog	Dicroglossidae	LC
10	*Amolops assamensis*	Assamese cascade frog	Ranidae	LC

11	*Hoplobatrachus crassus*	Jerdon's bull frogs	Dicroglossidae	LC
12	*Duttaphrynus melanostictus*	Common Asian toad	Bufonidae	LC
13	*Sylvirana leptoglossa*	Assamese forest frog	Ranidae	LC
14	*Rhacophorus maximus*	Large tree frog	Rhacophoridae	LC
15	*Bufo bufo*	European toad	Bufonidae	LC

6. Fishes

#	Scientific Name	Common Name	Family	Status
1	*Anguilla bengalensis*	Indian Molted Eel (Eng), Raja Bam (Lho)	Anguillidae	NT
2	*Aspidoparia morar*	Aspidoparia (Eng)	Cyprinidae	LC
3	*Bangana dero*	Boga Labeo (Eng), Gardhi (Lho)	Cyprinidae	LC
4	*Labeo dyochecus*	Mung-nga (Kheng), Ghardhi (Lho)	Cyprinidae	LC
5	*Labeo pangusio*	Ghardhi (Lho)	Cyprinidae	NT
6	*Tor putitora*	Golden Masheer (Eng), Serngya (Dzo)	Cyprinidae	EN
7	*Devario aquipinnatus*	Bhitte (Lho)	Danionidae	LC
8	*Danio dangila*	Bhitte (Lho)	Danionidae	LC
9	*Danio rerio*	Zebra Daneo (Eng), Bhitte (Lho)	Danionidae	LC
10	*Esomus dandricus*	Flying Barb (Eng)	Danionidae	LC
11	*Barilius barna*	Barna Bharil (Eng)	Danionidae	LC
12	*Barilius bendelisis*	Fageta (Lho)	Danionidae	LC
13	*Barilius vagra*	Lam Faketa (Lho)	Danionidae	LC
14	*Cyprinion semiplotus*	Chepti (Lho), Patala (Dzo)	Cyprinidae	LC
15	*Chagunius chagunio*	Chaguni (Eng)	Cyprinidae	LC
16	*Neolissochilus hexagonolepis*	Copper/Chocolate Masher (Eng), Katla (Lho)	Cyprinidae	NT
17	*Garra annandalei*	Stone Roller (Eng), Budhuna (Lho)	Cyprinidae	LC
18	*Garra gotyla*	Stone Roller (Eng), Budhuna (Lho)	Cyprinidae	LC
19	*Garra arupi*	Stone Roller (Eng), Budhuna (Lho)	Cyprinidae	LC
20	*Garra birostri*	Stone Roller (Eng), Budhuna (Lho)	Cyprinidae	LC
21	*Garra lissorhynchu*	Stone Roller (Eng), Budhuna (Lho)	Cyprinidae	LC
22	*Rajamas bola*	Indian Trout (Eng)	Danionidae	LC
23	*Crossocheilus latius*	Minor Carp (Eng)	Cyprinidae	LC
24	*Puntius chonchonius*	Sidra (Lho)	Cyprinidae	LC
25	*Schizothorax richardsonii*	Snow Trout (Eng), Asala (Lho)	Cyprinidae	VU

26	*Balitora brucie*	Gray's Stone Loach (Eng)	Balitoridae	NT
27	*Psilorhynchus balitora*	Balitora Minnow (Eng)	Psilorhynchidae	LC
28	*Psilorhyncus homaloptera*	Minnow (Eng)	Psilorhynchidae	LC
29	*Lepidocephalichthys guntea*	Guntea Loach (Eng)	Cobitidae	LC
30	*Botia almorhae*	Almoirha Loach (Eng)	Botiidae	LC
31	*Botia lohachata*	Tiger Loach (Eng)	Botiidae	LC
32	*Pangio apoda*	Pangio Catfish (Eng)	Cobitidae	NA
33	*Aborichthys elongatus*	Gadera (Lho)	Nemacheilidae	LC
34	*Acanthocobitis botia*	Molted Loach (Eng)	Nemacheilidae	LC
35	*Schistura devdebi*	Gadera (Lho)	Nemacheilidae	NT
36	*Schistura inglisi*	Gadera (Lho)	Nemacheilidae	VU
37	*Schistura scaturigina*	Gadera (Lho)	Nemacheilidae	LC
38	*Clupisoma garua*	Catfish (Eng)	Ailiidae	LC
39	*Mystus vittatus*	Stripped Dwarf Catfish (Eng)	Bagridae	LC
40	*Batasio merianiensis*	Chilne Macha (Lho)	Bagridae	NA
41	*Pseudolaguvia shawi*	Painted Catfish (Eng)	Erethistidae	LC
42	*Amblyceps laticeps*	Lulee (Lho)	Amblycipitidae	LC
43	*Glyptothorax cavia*	Catfish (Eng), Kabre (Lho)	Sisoridae	LC
44	*Glyptothorax striatus*	Catfish (Eng), Kabre (Lho)	Sisoridae	NT
45	*Pseudocheneis sulcatus*	Sucker Throat Catfish (Eng)	Sisoridae	LC
46	*Parachiloglanis hodgartii*	Torrent Catfish (Eng)	Sisoridae	LC
47	*Olyra longicaudata*	Himalayan Olyra (Eng)	Bagridae	LC
48	*Pterocryptis barakensis*	Lulee Catfish (Eng), Lulee (Lho)	Siluridae	EN
49	*Xenentodon cancila*	Freshwater Garfish (Eng)	Belonidae	LC
50	*Macrognathus pancalus*	Indian Spiny Eel (Eng)	Mastacembelidae	LC
51	*Mastacembelus armatus*	Zig-zag Eel (Eng), Chuche Bam (lho)	Mastacembelidae	LC
52	*Channa gachua*	Snakehead (Eng), Hilay (Lho), Borka (Kheng)	Channidae	LC
53	*Channa punctata*	Snakehead (Eng), Hilay (Lho), Borka (Kheng)	Channidae	LC
54	*Badis badis*	Latey Macha (Lho)	Badidae	LC

7. Butterflies

Sl. #	Family name	Common name	Scientific name	Conservation status
1	Hesperiidae	Tiger Hopper	*Ochus subvittatus*	LC
2	Hesperiidae	Coon	*Sancus fuligo*	LC
3	Hesperiidae	Orange Tail Awl	*Bibasis sena*	LC
4	Hesperiidae	Restricted Demon	*Notocrypta curvifascia*	LC
5	Hesperiidae	Small Banded Swift	*Pelopidas mathias*	LC
6	Hesperiidae	Common Spotted Flat	*Calaenorrhinus leucocera*	LC
7	Lycenidae	Pale Grass Blue	*Pseudozizeeria maha*	LC
8	Lycenidae	Metallic Cerulean	*Jamides alecto*	LC
9	Lycenidae	Large Hedge Blue	*Celastrina huegelii*	LC
10	Lycenidae	Indian cupid	*Everest lacturnus*	LC
11	Lycenidae	Purple Sapphire	*Heliophorus epicles*	LC
12	Lycenidae	Banded Line Blue	*Prosotas aluta coelestis*	LC
13	Lycenidae	Western centaur oak blue	*Arhopala pseudocentaurus*	LC
14	Lycenidae	Common Tit	*Hypolycaena erylus*	LC
15	Lycenidae	Club Sliver Line	*Spindasis syama*	LC
16	Lycenidae	Yamfly	*Laxura atymnus*	LC
17	Lycenidae	Line blue	*Nacaduba kurava*	LC
18	Lycenidae	Royal chocolate	*Remelana jangala*	LC
19	Lycenidae	Common quaker	*Neopithecops zalmora*	LC
20	Lycenidae	Lesser Grass blue	*Zizina otis*	LC
21	Nymphalidae	Autumn leaf	*Doleschallia bisalides*	LC
22	Nymphalidae	Banded tree brown	*Lethe verma*	LC
23	Nymphalidae	Blue Tiger	*Tirumala limniace*	LC
24	Nymphalidae	Branded tree brown	*Lethe confuse*	LC
25	Nymphalidae	Bright eye Bushbrown	*Mycalesis nicotia*	LC
26	Nymphalidae	Brown King Crow	*Euploea klugii*	LC
27	Nymphalidae	Chestnut tiger	*Parantica sita*	LC
28	Nymphalidae	Chocolate pansy	*Jinonia Iphita*	LC
29	Nymphalidae	Chocolate Tiger	*Parantica melaneus*	LC
30	Nymphalidae	Colour sergeant	*Athyma nefte*	LC

31	Nymphalidae	Common Bushbrown	*Mycalesis perseus*	LC
32	Nymphalidae	Common crow	*Euploea core*	LC
33	Nymphalidae	Common Evening brown	*Melannitis leda*	LC
34	Nymphalidae	Common fivering	*Ypthima baldus*	LC
35	Nymphalidae	Common lascar	*Pantoporia hordina*	LC
36	Nymphalidae	Common Nawab	*Polyura atsamus*	LC
37	Nymphalidae	Common pamfly	*Elymnias hypernestra*	LC
38	Nymphalidae	Common sailer	*Neptis hyla*	LC
39	Nymphalidae	Dark Archduke	*Lexias dirtea*	LC
40	Nymphalidae	Dark Banded Bushbrown	*Mycalesis mineus*	LC
41	Nymphalidae	Glassy Tiger	*Parantica algea*	LC
42	Nymphalidae	Great Eggfly	*Hypolimnas bonila*	LC
43	Nymphalidae	Great Nawab	*Polyura eduamippus*	LC
44	Nymphalidae	Green commondore	*Sumalia daraxa*	LC
45	Nymphalidae	Grey count	*Taneaecia lipidae*	LC
46	Nymphalidae	Indian tortoise shell	*Aglasis cashmeriensis*	LC
47	Nymphalidae	Large Yoeman	*Cirrochroa aoris*	LC
48	Nymphalidae	Lemon pansy	*Junonia lemonias*	LC
49	Nymphalidae	Long brown Bushbrown	*Mycalesis visala*	LC
50	Nymphalidae	Nigger	*Orsotrioena medus*	LC
51	Nymphalidae	Orange oak leaf	*Kallima inachus*	LC
52	Nymphalidae	Peacock Pansy	*Junonia almanac*	LC
53	Nymphalidae	Streaked Baron	*Euthalia alpheda*	LC
54	Nymphalidae	Striped, Blue Crow	*Euploea mulciber*	LC
55	Nymphalidae	Striped tiger	*Danaus genutia*	LC
56	Nymphalidae	White Edge Blue Baron	*Euthalia phemius*	LC
57	Nymphalidae	White bar Bush brown	*Mycalesis anaxias*	LC
58	Papilionadae	Common birdwing	*Thoides helena*	LC
59	Papilionadae	Common blue bottle	*Graphium sarpedon*	LC
60	Papilionadae	Common mormon	*Papilio polytes*	LC
61	Papilionadae	Common peacock	*Papilio crino*	LC
62	Papilionadae	Common windmill	*Artophaneura polyeuctes*	LC

63	Papilionadae	Great mormon	*Papilio memnon*	LC
64	Papilionadae	Red Helen	*Papilio helenus*	LC
65	Papilionadae	Spot Swordtail	*Graphium normius*	LC
66	Papilionadae	Yellow Helen	*Papilio nephelus*	LC
67	Pieridae	Chocolate albastross	*Appias lyncida*	LC
68	Pieridae	Common Emigrant	*Catopsilia pomona*	LC
69	Pieridae	Common Grass Yellow	*Euerma hecabe*	LC
70	Pieridae	Common gull	*Cepora nerissa*	LC
71	Pieridae	Great Orange tip	*Hebomonia glaucippe*	LC
72	Pieridae	Indian cabbage white	*Pieris canidia*	LC
73	Pieridae	Large Cabbage White	*Pieris brassicae*	LC
74	Pieridae	Plain Puffin	*Appias indra*	LC
75	Pieridae	Psyche	*Leptosia nina*	LC
76	Pieridae	Red base Jezebel	*Delias pasithoe*	LC
77	Pieridae	Tree Yellow	*Gandaca harina*	LC
78	Pieridae	Yellow orange tip	*Ixias pyrene*	LC
79	Roinidae	Punchenello	*Zemeros flegyas*	LC

8. Canes and Palms

Sl.#	Species	Family	Type
1	*Calamus acanthospathus*	Arecaceae (Palmae)	Cane
2	*Calamus erectus*	Arecaceae (Palmae)	Cane
3	*Calamus flagellum*	Arecaceae (Palmae)	Cane
4	*Calamus tenuis*	Arecaceae (Palmae)	Cane
5	*Plectocomia himalayana*	Arecaceae(Palmae)	Cane
6	*Calamus latifolius*	Arecaceae(Palmae)	Cane
7	*Cryota urens*	Arecaceae(Palmae)	Palm
8	*Trachycarpus fortunei*	Arecaceae(Palmae)	Palm
9	*Phoenix acaulis*	Arecaceae(Palmae)	Palm
10	*Calamus leptospadix*	Arecaceae(Palmae)	Cane
11	*Daemonorops jenkinsiana*	Arecaceae(Palmae)	Cane
12	*Wallichia disticha*	Arecaceae (Palmae)	Palm
13	*Wallichia oblongifolia*	Areceaceae(Palmae)	Palm

Annexure III: Minutes of Stakeholder Consultation Meeting

|Stakeholder Consultation on the DFO Sarpang Conservation Management Plan|

Date: 06-08/04/2025

Meeting Minutes

Attendees:

1. Gups/Representative-12 Gewogs
2. Dzongkhag Livestock Officer
3. Dzongkhag Beautification Officer
4. Dzongkhag Environment Officer
5. Chief Forestry Officer
6. Gelephu and Sarpang Range Officers
7. Planners- Forestry Officials

Notes

The Chief Forestry Officer (CFO) chaired the meeting. In his address to the Gups and all participants, he highlighted key issues related to biodiversity and conservation management in Sarpang, along with updates on the ongoing activities undertaken by the Division. The CFO warmly welcomed all participants and encouraged them to share their feedback and concerns during the meeting. He emphasised the importance of consultation and the value of stakeholder feedback in effective conservation planning and implementation.

Background and current status

Key Issues Discussed

- ☐ Gakiling Gup expressed several concerns related to water resources. These included:
  1. The need for effective management of water sources,
  2. The revival of lakes and water sources in other gewogs, such as Gaychhu Lake and Darachhu Lake, highlights their importance as critical water sources for Sarpang, and
  3. The revival of the mule track between Sarpang and Tsirang.
- ☐ He also expressed his appreciation for the water source revival works undertaken by the Divisional Forest Office, Sarpang.
- ☐ In response, Mr. Pema Dendup stated that water source management now falls under the mandate of the Department of Water. However, he assured that the concerns would be noted and that strategies for effective water management would be explored.

- ☐ Singye Gup sought clarification on the objective of revenue generation and emphasized the need to protect forests and natural resources for future development projects. He also highlighted the importance of preserving trees in Sarpang in light of the Gelephu Mindfulness City (GMC) initiative.
- ☐ In response, Mr. Pema Dendup (Dy, CFO) explained that revenue generation is primarily achieved through fees from service delivery, as well as fines and penalties imposed on defaulters. He assured that forest resources will be preserved to support the GMC project.
- ☐ Taraythang Gup raised concerns regarding human-wildlife conflicts (HWC) and inquired about the possibility of compensation for victims. He also stressed the need for continued support for Community Forests (CF) and Private Forests (PF).
- ☐ In response, the Chief Forestry Officer shared that a compensation scheme had been initiated in Sarpang in the past but was discontinued due to policy changes. However, a National Compensation Scheme is now being initiated by the Department of Forests and Park Services (DoFPS).
- ☐ Shompangkha Gup raised clarification about the location and names of eco-tourism sites, especially Ranidru. He expressed the need for preservation of important religious sites such as Hati Drunga–Sarpangkhola, Balaypoti Drunga–Risumgang, and Jugay Drunga–Risumgang.
- ☐ Gakiling Gup clarified that Rani Drunga is located on the Jachhu side and emphasized its importance as a religious site.

Discussion on Implementation Plan

Objective 1: To promote sustainable forest management practices that enhance biodiversity conservation, maintain ecosystem services, and support ecological resilience for long-term environmental and socio-economic benefits.

Objective 2: To implement climate change mitigation and adaptation strategies through sustainable practices while fostering community engagement to enhance resilience, reduce vulnerabilities, and promote sustainable development.

Discussions:

- ☐ Taraythang Gup emphasized the need for managing watershed areas within the gewogs and carrying out bio-engineering works in flood- and landslide-prone areas.
- ☐ Dekiling Administrative Officer mentioned that the bamboo assessment activity is scheduled for the 3rd and 7th years.
- ☐ Dzongkhag Beautification Officer inquired about the preventive measures being taken to control invasive species.
- ☐ Chhudzom Gup- raised concerns about the Chhudzom Landslide and expressed that mitigation and intervention strategies are essential as it will have an impact on the whole

Gelephu region. CFO acknowledged that it is very important and will explore possibilities to initiate mitigation strategies.

Objective 3: To develop and promote ecotourism and recreational activities that conserve natural resources, support local livelihoods, and enhance visitor experiences while ensuring environmental sustainability and cultural preservation.

Discussions:

- ☐ 1. Goendra Dhagam- to be renamed as Goendra Dhagap Dzong

Objective 4: To advance research, education, and policy implementation for sustainable forest management, fostering biodiversity conservation, ecosystem resilience, and socio-economic development.

Discussions

- ☐ 1. Shompangkha Gup highlighted the negative impact of scattered settlements on biodiversity conservation and suggested the possibility of resettling such communities to suitable areas near other prominent settlements within State Forest Reserve (SFR) lands. This suggestion was supported by Chhudzom Gup.
- ☐ In response, the Chief Forestry Officer acknowledged that while the idea has merit, however, implementing such an initiative would require considerable time. Mr. Pema Dendup Dy. CFO added that the inhabitants of these areas hold inheritance rights, making it difficult to initiate resettlement. He further clarified that such activities are generally not undertaken even within Protected Areas due to these legal and social constraints.

Objective 5: To strengthen resource monitoring, assessment, and enforcement mechanisms to ensure sustainable utilization, conservation of natural resources, and compliance with environmental regulations.

Discussions:

- ☐ 1. Shompangkha Gup share the information on the availability of drones and drone flights to local leaders, so that leaders have the right information at the right time.

Objective 6: To implement effective human-wildlife conflict mitigation strategies and enhance rescue operations to promote coexistence, safeguard communities, and conserve wildlife populations.

Discussions:

☐ 1. Taraythang Gup emphasized the importance of crop insurance schemes to address the impacts of human-wildlife conflicts (HWC) on farmers.

☐ 2. Dekiling Adm highlighted the need for additional services, such as health and veterinary care for people and livestock, as incentives to support communities affected by HWC.

☐ Gelephu Gup proposed the development of a mobile application to collect HWC data. In response, the Chief Forestry Officer mentioned the availability of an EpiCollect form that was previously developed for collecting such information.

Chhudzom Gup once again suggested that people in far-flung areas should be resettled to areas with prominent settlements. This initiative will reduce impacts on biodiversity. He also shared that the electric dryer is being piloted in Chhudzom. He expressed that the inhabitants of Chhudzom who have lands in scattered areas are willing to resettle and will have inheritance issues.

#	Name	Gender	CID #	Designation	Office	6/4/2025	7/4/2025	8/4/2025
1	Pema Dendup	M	10712001147	DCFO	DFO Sarpang			
2	Phub Dhendup	M	11912002157	CFO	DFO, Sarpang			
3	Jigme	male	11605000333	Gup	Gangay Gewog			
4	Cheti Wangmo	Female	11514006906	AEO	Sarpang DZO.			
5	Naina S Tamang	Male	11809001570	DLO	Sarpang DZO			
6	Kuenley Pajor	M	11306003940	GAO	Dekiling			
7	Kesang Tshering	M	11302000017	Gup	C/gewog			
8	Rinchen Mim	male	11312002263	mangmi	Sershong Gewog			
9	Kumar Tamang	male	11308000041	Gup	Jigmechoeling Gewog.			
10	SANGAY TENZIN	"	11315001202	"	Umling Gewog.			
11	Sur Bdr Yonzan	"	11311000693	Gup	Singhi			
12	Bishnu Prasad Rai	Male	[illegible]	Gup	Chuzagang			
13	Karma Gyamtsho	male	10906000613	SFR-I	Sarpang Range			
14.	Pema Dorji Tamang	Male	11803001661	Offtg. DAO	Dzo. HQ.			
22	Kesang Dorji	M	11410000101	SFR	DFO Sarpang			
23	Wangdi	M	10207001856	FO	"			

Annexure IV: Baseline METT+ Assessment

Divisional Forest Area Management Effectiveness: Assessment					
Issue	**Criteria**	**Score: Tick only one box per question**		**Comment/Explanation**	**Next steps**
1. Legal status Does the Forest Divisions/forest division have legal status (or in the case of private reserves is covered by a covenant or similar)? Context	The Forest Divisions/forest division is not gazetted/covenanted	0		Based on information on "Achievement of Sarpang division" book written in 1987 and chronological history of DFOs under Sarpang division	Preparation of DFO management plan for next 10 years.
	There is agreement that the Forest Divisions should be gazetted/covenanted but the process has not yet begun	1			
	The Forest Divisions is in the process of being gazetted/covenanted but the process is still incomplete (including sites designated under international conventions, such as Ramsar, or local/traditional law such as community conserved areas, which do not yet	2			

	have national legal status or covenant)				
	The Forest Divisions has been formally gazetted/covenanted	3	3.00		
2. Forest Divisions/forest division regulations Are appropriate regulations in place to control land use and activities (e.g. hunting)? Planning	There are no regulations for controlling land use and activities in the Forest Divisions	0		1. Private land are not demarcated appropriately with boundary pegs as required in annexure 18b of FNCRR, 2017	To collaborate with NLCS and make mandatory for land owners to fix boundary pegs
	Some regulations for controlling land use and activities in the Forest Divisions exist but there are major weaknesses	1			
	Regulations for controlling land use and activities in the Forest Divisions exist but there are some weaknesses or gaps	2	2.00		
	Regulations for controlling inappropriate land use and activities in the Forest Divisions exist and provide an excellent basis for management	3			

3. Law enforcement Can staff (i.e. those with responsibility for managing the site) enforce Forest Divisions rules well enough? Input	The staff have no effective capacity/resources to enforce protected/forest division area legislation and regulations	0		1. lack law enforcement knowledge, 2. Interpretation of rules and regulation vary individually. 3. FNCRR, 2017 lacks rules that need to be dealt on the ground such as penalties for NWFP and other small animals	1. Need more training/capacity building on law enforcements. 2. Frequent changes in rules of FNCRR need to be sensitized thoroughly to field staff. 3. Rules on dealing with NWFP and small animal related offences should be discussed and covered in FNCRR.
	There are major deficiencies in staff capacity/resources to enforce Forest Divisions/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 Forest Divisions legislation and regulations but some deficiencies remain	2	2.00		
	The staff have excellent capacity/resources to enforce Forest Divisions/forest division legislation and regulations	3			

4. Forest Divisions/forest division objectives Is management undertaken according to agreed objectives? Planning	No firm objectives have been agreed for the Forest Divisions/forest division	0		Divisional Forest Office, Sarpang has agreed objectives that are aligned to objectives of DoFPS	Provision for objectives are kept open in align to annual APA.
	The Forest Divisions/forest division has agreed objectives, but is not managed according to these objectives	1			
	The Forest Divisions/forest division has agreed objectives, but is only partially managed according to these objectives	2	2.00		
	The Forest Divisions/forest division has agreed objectives and is managed to meet these objectives	3			
5. Forest Divisions/forest division design Is the Forest Divisions/forest division the right size and shape to meet	Inadequacies in Forest Divisions/forest division design mean achieving the major objectives of the Forest Divisions is very difficult	0		1. It has been designed according to the Dzongkhag Administrative boundary	Depends on national policies
	Inadequacies in Forest Divisions/forest division	1			

the objectives (protect species, habitats, ecological processes and water catchments of key conservation concern, resource utilization) Planning	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)				
	Forest Divisions/forest division design is not significantly constraining achievement of objectives, but could be improved (e.g. with respect to larger scale ecological processes)	2			
	Forest Divisions/forest division design helps achievement of objectives; it is appropriate for species and habitat conservation; and maintains ecological processes such as surface and groundwater flows at	3	3.00		

	a catchment scale, natural disturbance patterns etc				
6. Forest Divisions boundary demarcation Is the boundary known and demarcated? Process	The boundary of the Forest Divisions/forest division is not known by the management authority or local residents/neighbouring land users	0		1. The boundary of the forest division is known to both management authority and local but not demarcated physically or given textual description of the boundaries (like in BCs)	1. Demarcation on textual description of the boundary need to be carried out. 2. Division need to install pillars along the boundaries.
	The boundary of the Forest Divisions/forest division is known by the management authority but is not known by local residents/neighbouring land users	1			
	The boundary of the Forest Divisions/forest division is known by both the management authority and local residents/neighbouring land users but is not appropriately demarcated	2	2.00		
	The boundary of the Forest Divisions is known by the management authority	3			

	and local residents/neighbouring land users and is appropriately demarcated				
7. Management plan Is there a management plan and is it being implemented? Planning	There is no management plan for the Forest Divisions/forest division	0	0.00	1. No management plan of Division till date	1. IKI project will initiate on the development of DFO management plan latest by 2028
	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			
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					
Additional points: *Planning*					
7a. Planning process	The planning process allows adequate opportunity for key	1	0.00		

	stakeholders to influence the management plan				
7b. Planning process	There is an established schedule and process for periodic review and updating of the management plan	1	0.00		
7c. Planning process	The results of monitoring, research and evaluation are routinely incorporated into planning	1	0.00		
8. Regular work plan Is there a regular work plan and is it being implemented Planning/Outputs	No regular work plan exists	0		1. Work plans are submitted and activities implemented as per APA of division.	1. As per APA of the division
	A regular work plan exists but few of the activities are implemented	1			
	A regular work plan exists and many activities are implemented	2	2.00		
	A regular work plan exists and all activities are implemented	3			
9. Resource inventory	There is little or no information available on the resources (Eg. Growing	0		1. Not much focus is provided to collect holistic data on all critical habitats, species,	1. Rapid biodiversity assessment on all necessary

Do you have enough information to manage the area? Input	stock, critical habitats, species, ecological processes, and cultural values in FD area.			ecological processes and so on. However, few pockets of areas under Division has been carried out with biodiversity assessment that provides just enough information to understand general view but not to that extend where everything can be shared in detail.	aspects need to be conducted under division.
	Information on critical habitats, species, ecological processes and cultural values of forest division is not sufficient to support planning and decision making.	1	1.00		
	Information on critical habitats, species, ecological processes and cultural values of forest division is sufficient for most key areas of planning and decision making.	2			
	Information on critical habitats, species, ecological processes and cultural values of forest division is sufficient to support all areas of planning and decision making.	3			

10. Protection systems Are systems in place to control access/resource use in the forest division? Process/Outcome	Protection systems (patrols, permits etc) do not exist or are not effective in controlling access/resource use	0		1. Effective monitoring and scientific management of resources utilization is in place but doesn't cover whole division 2. Timely monitoring and evaluation is carried out	1.Need to have scientific management planning for whole divisions
	Protection systems are only partially effective in controlling access/resource use	1			
	Protection systems are moderately effective in controlling access/resource use	2	2.00		
	Protection systems are largely or wholly effective in controlling access/ resource use	3			
11. Research Is there a programme of management-orientated survey and research work?	There is no survey or research work taking place in the Forest Divisions	0		1. Project-based surveys (HWC, HEC, BFL, Flagship program) are being carried out.	1. Upcoming survey (NFI, Tiger survey and IKI project) will be carried out.
	There is some survey and research work, but it is not directed towards the needs of forest division management	1			

Process	There is some survey and research work which is at least partly directed towards the needs of forest division management	2	2.00		
	There is a comprehensive, integrated programme of survey and research work, which is relevant to management needs	3			
12. Resource management Is active resource management being undertaken? Process	Active resource management is not being undertaken	0		1. Scientific management plans are developed (CF/PF/LFMP/NWFP). 2. Timely monitoring and evaluation is carried out.	1. Develop scientific management plan for whole Division. 2. Revise the existing management plan (CF/PF/LFMP/NWFP).
	Very few of the requirements for active management of critical habitats, species, ecological processes, cultural values and sustainable resource production are being implemented	1			
	Many of the requirements for active management of critical habitats, species, ecological processes, cultural values and	2	2.00		

	sustainable resource production are being implemented but some key issues are not being addressed				
	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 Forest Divisions	1	1.00	1. Management plans for Bamboo, Chirata, broom, Majito are in place.	1. Need to formulate plans for pipla and cane.
12b: Management of medicinal plants	A management plan exists for the management of all major medicinal plants actively collected within the Forest Divisions	1	1.00	1. Chirata is medicinal plant and there is plan	1. To conduct resource assessment survey for medicinal plant species.

12c: Management of Other conservation areas (OCAs)	A management plan exists for all Other conservation areas (OCAs) within the Forest Divisions/forest division	1	1.00	Plans for CF are in place	
Bhutan METT+: consideration of this question includes issues relating to land leasing					
13. Staff numbers Are there enough people employed to manage the Forest Divisions? Inputs	There are no staff	0		1. Considering the work load (Covid duty, projects, HEC, border patrolling), number of staffs are not adequate.	1. Requirement for additional staff.
	Staff numbers are inadequate for critical management activities	1	1.00		
	Staff numbers are below optimum level for critical management activities	2			
	Staff numbers are adequate for the management needs of the Forest Divisions	3			
14. Staff training Are staff adequately trained to fulfil management objectives?	Staff lack the skills needed for Forest Divisions management	0		1. Only few officials are being trained.	1. Capacity building is required.
	Staff training and skills are low relative to the needs of the Forest Divisions	1	1.00		

Inputs/Process	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 Forest Divisions	3			
15. Current budget Is the current budget sufficient? Inputs	There is no budget for management of the Forest Divisions	0		1. Adequate budget for operational cost and service delivery.	1. Additional budget is required to carry out frequent patrolling, monitoring, awareness program and development of more management plans.
	The available budget is inadequate for basic management needs and presents a serious constraint to the capacity to manage	1			
	The available budget is acceptable but could be further improved to fully achieve effective management	2	2.00		
	The available budget is sufficient and meets the full	3			

	management needs of the Forest Divisions				
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 Forest Divisions/forest division and management is wholly reliant on outside or highly variable funding	0		1. Adequate RGoB budget including funding support from projects such as HEC, BFL, IKI, GEF exist.	1. Continue the existing project funding support to upscale/upgrade for effective management of Division.
	There is very little secure budget and the Forest Divisions/forest division could not function adequately without outside funding	1			
	There is a reasonably secure core budget for regular operation of the Forest Divisions/forest division but many innovations and initiatives are reliant on outside funding	2	2.00		

	There is a secure budget for the Forest Divisions/ 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		1. Budget have been utilized as per BUP and utilization is more than 95 percent annualy.	1. Need to utilize budget to achive 100 percent.
	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	2.00		
	Budget management is excellent and meets management needs	3			
18. Equipment Is equipment sufficient for management	There are little or no equipment and facilities for management needs	0		1. Basic field gears and office equipments are not edequate.	2. Need to have more financial support to meet the requirement.
	There are some equipment and facilities but these are	1			

needs? Input	inadequate for most management needs				
	There are equipment and facilities, but still some gaps that constrain management	2	2.00		
	There are adequate equipment and facilities	3			
Bhutan METT+: Most Forest Divisionss cover large areas, there are thus likely to be differences in equipment availability in park headquarters and guard posts around the park. Question 18 should consider equipment across the whole Forest Divisions 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		1. There are budget for maintenence of office equipments and pool vehicles.	1. Maintenance budget for staff quarter, office, plantations are required.
	There is some *ad hoc* maintenance of equipment and facilities	1			
	There is basic maintenance of equipment and facilities	2	2.00		
	Equipment and facilities are well maintained	3			
20. Education and awareness	There is no education and awareness programme	0		1. Awareness program on waste management and	1. Other forestry related awareness program is

Is there a planned education programme linked to the objectives and needs? Process	There is a limited and *ad hoc* education and awareness programme	1		fixiation of signboard are carried out.	required to carry out for effective management and conservation.
	There is an education and awareness programme but it only partly meets needs and could be improved	2	2.00		
	There is an appropriate and fully implemented education and awareness programme	3			
21. Planning for land and water use Does land and water use planning outside the Forest Divisions/forest division recognise the Forest Divisions/forest division and aid the achievement of objectives? Planning	Adjacent land and water use planning does not take into account the needs of the Forest Divisions/forest division and activities/policies are detrimental to the survival of the area	0		1. No concrete ideas about the land and water used outside the Division.	1. Need collaboration with agencies out side/adjacent to have clear picture on land and water use in order to achieve Division's objectives?
	Adjacent land and water use planning does not takes into account the long term needs of the Forest Divisions/forest division, but activities are not detrimental the area	1	1.00		

	Adjacent land and water use planning partially takes into account the long term needs of the Forest Divisions/forest division	2			
	Adjacent land and water use planning fully takes into account the long term needs of the Forest Divisions/forest division	3			
Bhutan METT +: This question is specific to activities <u>outside</u> of the Forest Divisions. EIA's are supposed to take place for any developments. Issues in Bhutan include hydropower, transmission lines and mining.					
Additional points: Land and water planning					
21a: Land and water planning for habitat conservation	Planning and management in the catchment or landscape containing the Forest Divisions/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	1.00	1. Restoration works such as enhancement of saltlicks, waterholes, enrichment plantation and scientific thinning of forest are carried out.	1. More of such activities need to be implemented.

21b: Land and water planning for connectivity	Management of corridors linking the Forest Divisions/forest division provides for wildlife passage to key habitats outside the Forest Divisions (e.g. to allow migratory fish to travel between freshwater spawning sites and the sea, or to allow animal migration)	1	1.00	1. Biological corridor connecting major portion of Division exists.	1. Need to develop management plan and implement.
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	0.00	1. No land and water plans for ecosystem services and species conservation.	1. Explore, assess and identify species and ecosystem services that needs to be conserve. This shall provide baseline data.
22. State and commercial neighbours Is there co-operation	There is no contact between managers and neighbouring official or corporate land and water users	0		1. Currently Sarpang and Moa river is diverted to the convenience of water users in India. 2. Timely monitoring is carried out.	N/A

with adjacent land and water users? Process	There is contact between managers and neighbouring official or corporate land and water users but little or no cooperation	1			
	There is contact between managers and neighbouring official or corporate land and water users, but only some co-operation	2	2.00		
	There is regular contact between managers and neighbouring official 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 Forest Divisions management	1	0.00	1. No hydropower instituted inside Division	N/A

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 Forest Divisions management	1	1.00	1. Construction of transmission towers and installation of transmission lines (Mangde, Basochu and PHPA) inside Division.	N/A
22c: State and commercial neighbours	Where the Forest Divisions/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	0.00	1. No payment of ecological services are in place	1. PES is initiated 2. More of payment based on ecological services need to be initiated
23. Local communities Do local communities resident or near the Forest Divisions/forest division have input to	Local communities have no input into decisions relating to the management of the Forest Divisions/forest division	0		1. Local communities participate in management plannigs such as CF, LFMP, PF, HEC, HWC etc.	1. To encourage more local communities to participate
	Local communities have some input into discussions relating to management	1	**1.00**		

management decisions? Process	but no direct role in management				
	Local communities directly contribute to some relevant decisions relating to management but their involvement could be improved	2			
	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 Forest Divisions/forest division managers	1	1.00	1. Relevant subjects of forestry activities and services are being communicated with the local people.	1. Need to initiate easy accessibility for the people living in far flung villages by having BEAT offices wherever necessary.
23b: Impact on communities	Programmes to enhance community welfare, while conserving Forest Divisions/forest division	1	1.00	1. Establishment of CF, PF, NWFP, awareness, trainings and subsidized rate on resources use for local people	1. re-initiate compensation for crop damage and livestock killings by wild animals

	resources, are being implemented				
23c: Impact on communities	Local people actively support the Forest Divisions/forest division	1	1.00	1. Local people follows and adhere to FNCRR, 2017	1. Awareness to local people on FNCRR, 2017 need to be made in order to sensitize their role in conservation.
24. Economic benefit Is the Forest Divisions/forest division providing economic benefits to local communities, e.g. income, employment, payment for environmental services? Outcomes	The Forest Divisions/forest division does not deliver any economic benefits to local communities	0		1. CFMG members benefits from sale of surplus timber 2. NWFP group members can collect forest products and generate income.	
	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	2.00		
	There is a major flow of economic benefits to local communities from activities associated with the Forest Divisions/forest division	3			

25. Monitoring and evaluation Are management activities monitored against performance? Planning/Process	There is no monitoring and evaluation in the Forest Divisions/forest division	0		1. Monitoring and evaluation is carried out when ever necessary	1. Prescribed monitoring and evaluation format/schedule need to be developed accordingly to have effective output/performance.
	There is some *ad hoc* monitoring and evaluation, but no overall strategy and/or no regular collection of results	1	1.00		
	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			
26. Visitor facilities Are visitor facilities adequate? Outputs	There are no visitor facilities and services despite an identified need	0	0.00	1. No visitor facilities and services are instituted in division	1. Need to convert Southern Wildlife Rescue and Rehabilitation Centre into visitor facilities for education and recreational purposes.
	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			
27. Commercial tourism operators Do commercial tour operators contribute to Forest Divisions/forest division management? Process	There is little or no contact between managers and tourism operators using the Forest Divisions/forest division	0	0.00	1. No commercial tour operators based in division	1. Need to initiated ecotourism activities inside division as there are few potential sites.
	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 Forest Divisions values	2			
	There is good co-operation between managers and	3			

	tourism operators to enhance visitor experiences, and maintain Forest Divisions/forest division values				
28. Fees If fees (e.g. entry fees) are applied, do they help Forest Divisions/forest division management? Inputs/Process	Although fees are theoretically applied, they are not collected	0	0.00	1. N/A	1. N/A
	Fees are collected, but make no contribution to the Forest Divisions/forest division or its environs	1			
	Fees are collected, and make some contribution to the Forest Divisions/forest division and its environs	2			
	Fees are collected and make a substantial contribution to the Forest Divisions/forest division and its environs	3			
29. Fines If fines (e.g. poaching fines) are	There are no fines, or fines are theoretically applied but are seldom or never collected	0		1. All fines are being deposited directly as revenue to the government	1. N/A

applied, do they help Forest Divisions management? Inputs/Process	Fines are collected, but make no direct contribution to the Forest Divisions/forest division or its environs	1	1.00		
	Fines are collected, and make some contribution to the Forest Divisions/forest division and its environs	2			
	Fines are collected and make a substantial contribution to the Forest Divisions/forest division and its environs	3			
Bhutan METT +: The term "Forest Divisions 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 Forest Divisions as compared to when it was first designated?	Many biodiversity and ecological values are being severely degraded	0		1. Occurrence of landslide at Moagaon, Chudzom, Ossay/box cutting, Jigmecholing and Aieslip, Shershong.	1. Need to initiate land mangement campaign. 2. Plantation
	Some biodiversity and ecological values are being severely degraded	1			
	Some biodiversity and ecological values are being partially degraded	2	2.00		

Outcomes	but the most important values have not been significantly impacted				
	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	0.00	1. Based on occular	1. Detailed study need to be conducted in order to provide right intervention.
30b: Condition of biodiversity values	Specific management programmes are being implemented to address threats to biodiversity and ecological values	1	1.00	1. CF, LFMP, PF are instituted including water sources assessment and intervention etc.	1. Need to assess, identifiy and institute more management programes accordingly
30c: Condition of biodiversity values	Activities to maintain key biodiversity and ecological values are a routine part of Forest Divisions/forest division management	1	1.00	1. Projects to enhance habitat of key animals such as tiger and elephants are being implemented 2. Survey by camera traps are carried out to assess the wildlife and quantify individual species.	1. Need to implement more of such projects to maintain key animals such as asiatic golden cats, clouded leopards, hornbill, red panda and golden langurs.

Bhutan METT + questions					
31. Condition of cultural values What is the condition of the important cultural values of the Forest Divisions/forest division as compared to when it was first designated? Outcomes	Many cultural values are being severely degraded	0		1. All the culture values are predominately intact	1. Make awareness to the local people in order to preserve the culture values. 2. Initiate documentation of culture values to retain authentication. 3. Eco-trails introduction to display importance of existing cultural values inside division.
	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	3.00		
32. Access How accessible is the Forest Divisions/forest division? Planning / Process	Staff are unable to move around the Forest Divisions/forest division and thus much of the Forest Divisions is inaccessible throughout the year	0		1. Major portion of the Division is accessible except during monsoon seasons.	
	There are significant restrictions on the ability of staff to move around the Forest Divisions/forest division throughout the year (e.g. in the rainy season) and thus much of	1			

	the Forest Divisions (e.g. over 50 % of the area) is inaccessible some or all of the year				
	Staff are able to move relatively easily around the Forest Divisions and thus most of the Forest Divisions/forest division is accessible, although some areas (e.g. less than 50 % of the area) remain inaccessible some or all of the year	2	2.00		
	Staff are able to move easily around the whole Forest Divisions/forest division and the majority of the Forest Divisions is fully accessible	3			
33. Neighbouring Forest Divisionss/forest division Is there co-operation with adjoining Forest	There is no contact between managers of adjoining Forest Divisionss/forest division on issues which impact Forest Divisions/forest division management effectiveness	0		1. Communication between Indian counterparts and meetings are carried out to enhance law enforcement and survelliance	1. Frequent communication and meetings with Indian counterparts should be conducted to maximize conservation effectiveness.

Divisionss/forest division (national and international)? Process	There is limited contact between managers of adjoining Forest Divisionss/forest division but little cooperation on issues which impact Forest Divisions management effectiveness	1			
	There is contact between managers of adjoining Forest Divisionss/forest division and some cooperation on Forest Divisions/forest division management effectiveness	2	2.00		
	There is regular contact between managers of adjoining Forest Divisionss/forest division and full cooperation on ensuring management effectiveness	3			
34. Is the Forest Divisions/forest division being consciously	There have been no efforts to consider adaptation to climate change in management	0			

managed to adapt to climate change? Planning	Some initial thought has taken place about likely impacts of climate change, but this has yet to be translated into management plans	1	1.00	1. DFO mgmt, Watershed , PES and BC-3 mgmt programs are initiated to counter climate change risks	1. The management plans for the DFO, BC-3, Watershed and PES will be developed so as to input correct intervention and management strategies for efficient conservation that can adapt to climate change.
	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 Forest Divisions/forest division being consciously managed to prevent carbon loss and to	Carbon storage and carbon dioxide capture has not been considered in management of the Forest Divisions/forest division	0		1. No management has included carbon loss and carbon capture	1. Implementation of NFI will assess carbon loss and carbon capture which can be accordingly utilized for inclusion in management plan

encourage further carbon capture? Process	Carbon storage and carbon dioxide capture has been considered in general terms, but has not yet been significantly reflected in management	1	1.00		
	There are active measures in place to reduce carbon loss from the Forest Divisions/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 Forest Divisions/forest division and to increase carbon dioxide capture				
			67.00		
	METT+ score: 52.84%		**54.47**		

Annexure IV: Midterm Internal METT+ Assessment

Issue	Criteria	Score: Only one box/answer per question		Comment/Explanation	Next steps
1. Legal status Does the Forest Division have legal status (or in the case of private reserves is covered by a covenant or similar)? Context	The Forest Division is not gazetted/covenanted	0		The Forest Division has been formally gazetted/covenanted under Department of Forests and Park Services, Ministry of Energy and Natural Resources since 1959.	
	There is agreement that the Forest Division should be gazetted/covenanted but the process has not yet begun	1			
	The 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 Forest Division has been formally gazetted/covenanted	3	**3**		

2. Forest Division regulations Are appropriate regulations in place to control land use and activities (e.g. hunting)? Planning	There are no regulations for controlling land use and activities in the Forest Division	0		The division has shape files for demarcation of boundaries for 24 Community forests, four local forest area management areas, four Non wood forest products management areas and biological corridor.	Sensitization workshops need to do to conducted to residents along with awareness programs.
	Some regulations for controlling land use and activities in the Forest Division exist but these are major weaknesses	1			
	Regulations for controlling land use and activities in the Forest Division exist but there are some weaknesses or gaps	2			
	Regulations for controlling inappropriate land use and activities in the Forest Division exist and provide an excellent basis for management	3	**3**		
3. Law enforcement Can staff (i.e. those with responsibility for managing the site) enforce Forest Division rules well enough?	The staff have no effective capacity/resources to enforce Forest Division legislation and regulations	0		Only a few technical staff are trained in legal proceedings.	More technical staff need to be trained and refreshed from time to time in legal procedures.
	There are major deficiencies in staff capacity/resources to enforce Forest Division legislation and regulations (e.g. lack of	1			

Input	skills, no patrol budget, lack of institutional support)				
	The staff have acceptable resources to enforce Forest Division legislation and regulations, but some deficiencies remain	2	**2**		
	The staff have excellent resources to enforce Forest Division legislation and regulations	3			
4. Forest Division objectives Is management undertaken according to agreed objectives? Planning	No firm objectives have been agreed for the Forest Division	0		Annual work plans of individuals staffs are drawn up based on divisions objectives. Further, project proposals are also developed aligning to the DFO management plan and submitted to funding organizations.	The management plan of other managements regimes like CFs, NWFPs, LFMPs, BC should be periodically reviewed to meet Division objectives.
	The Forest Division has agreed objectives, but is not managed according to these objectives	1			
	The Forest Division has agreed objectives, but is only partially managed according to these objectives	2			
	The Forest Division has agreed objectives and is managed to meet these objectives	3	**3**		
5. Forest Division design	Inadequacies in Forest Division design mean achieving the	0		The current management plans are focused on	Inclusive plans encompassing water

Is the Forest Division the right size and shape to protect species, habitats, ecological processes and water catchments of key conservation concern? Planning	major objectives of the Forest Division is very difficult			conservation and management of flora and fauna species only.	catchment management need to be developed in future.
	Inadequacies in Forest Division design mean that achievement of major objectives is difficult, but some mitigating actions are being taken (e.g. agreements with adjacent landowners for wildlife corridors or introduction of appropriate catchment management)	1			
	Forest Division design is not significantly constraining achievement of objectives, but could be improved (e.g. with respect to larger scale ecological processes)	2	**2**		
	Forest Division design helps achievement of objectives; it is appropriate for species and habitat conservation; and maintains ecological processes such as surface and groundwater flows at a catchment scale, natural disturbance patterns etc	3			

6. Forest Division boundary demarcation Is the boundary known and demarcated? Process	The boundary of the Forest Division is not known by the management authority or local residents/neighboring land users	0		Boundary demarcation of any management area is not based on natural features. Poly lines drawn on maps served as boundary lines and facies difficulties to be understood by communities.	Need to initiate boundary demarcation and sensitization programs needs to do to educate the local residents and other relevant stakeholders.
	The boundary of the Forest Division is known by the management authority but is not known by local residents/neighboring land users	1			
	The boundary of the Forest Division is known by both the management authority and local residents/neighboring land users but is not appropriately demarcated	2	**2**		
	The boundary of the Forest Division is known by the management authority and local residents/neighboring land users and is appropriately demarcated	3			
7. Management plan	There is no management plan for the Forest Division	0			

Is there a management plan and is it being implemented? Planning	A management plan is being prepared or has been prepared but is not being implemented	1		All CF, LFMP, NWFP, BC and DFO plan implemented effectively.	Timely revision and monitoring of the management plans
	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	**3**		
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					
Additional points: *Planning*					
7a. Planning process	The planning process allows adequate opportunity for key stakeholders to influence the management plan	2	**2**	Plans are developed with full participation of communities.	
7b. Planning process	There are an established schedule and process for periodic review and updating of the management plan	3	**3**	Conduct annual monitoring of management plans by DFO Sarpang. Mid-term evaluation and final evaluation is conducted by FMID, Thimphu.	
7c. Planning process	The results of monitoring, research and evaluation are	1			

	routinely incorporated into planning				
8. Regular work plan Is there a regular work plan and is it being implemented Planning/Outputs	No regular work plan exists	3		Besides implementation of activities planned in individual workplan, staff of DFO Sarpang are also engaged in ad hoc activities of Gelephu Mindfulness City.	
	A regular work plan exists but few of the activities are implemented	2			
	A regular work plan exists and many activities are implemented	3	**3**		GMC plan related to forestry sector needs to be incorporated into AWP of Sarpang Division.
	A regular work plan exists and all activities are implemented	3			
9. Resource inventory Do you have enough information to manage the area? Input	There is little or no information available on the critical habitats, species and cultural values of the Forest Division	0		The Division has enough documented information on wildlife habitat, flora and fauna species distribution and cultural site.	Documentation through survey and field assessment needs to be continued for enrichment of information.
	Information on the critical habitats, species, ecological processes and cultural values of the Forest Division is not sufficient to support planning and decision making	1			

	Information on the critical habitats, species, ecological processes and cultural values of the Forest Division is sufficient for most key areas of planning and decision making	2			
	Information on the critical habitats, species, ecological processes and cultural values of the Forest Division is sufficient to support all areas of planning and decision making	3	**3**		
10. Protection systems Are systems in place to control access/resource use in the Forest Division? Process/Outcome	Protection systems (patrols, permits etc) do not exist or are not effective in controlling access/resource use	0		Although the division is able to minimize major illegal activities, season-based illegal activities occur in small scale.	There is need to increase intensity of patrolling to achieve conservation goals.
	Protection systems are only partially effective in controlling access/resource use	1			
	Protection systems are moderately effective in controlling access/resource use	2	**2**		
	Protection systems are largely or wholly effective in controlling access/ resource use	3			

11. Research Is there a programmed of management-orientated survey and research work? Process	There is no survey or research work taking place in the Forest Division	0		The division conduct research as well as issue permit for conduct of research activities inside division area to individuals.	Need to continue research as per GMC requirement.
	There is some survey and research work, but it is not directed towards the needs of Forest Division management	1			
	There is some survey and research work which is at least partly directed towards the needs of Forest Division management	2			
	There is a comprehensive, integrated programme of survey and research work, which is relevant to management needs	3	**3**		
12. Resource management Is active resource management being undertaken? Process	Active resource management is not being undertaken	0		Harvesting of Natural Resources is strictly based on LFMP, CFMP, NWFPs, the area is also guided by DFO Plan. BC-03 Plan	Need to increase availability of preferred timber and NWFPs species through plantation and initiation of private forest.
	Very few of the requirements for active management of critical habitats, species, ecological processes, cultural values and sustainable resource production (where relevant) are being implemented	1			

	Many of the requirements for active management of critical habitats, species, ecological processes, cultural values and sustainable resource production (where relevant) are being implemented but some key issues are not being addressed	2	**2**		
	Requirements for active management of critical habitats, species, ecological processes, cultural values and sustainable resource production (where relevant) 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 Forest Division	1	**1**	There are eight community groups formed for the management of Non wood forest products under the Division.	
12b: Management of medicinal plants	A management plan exists for the management of all major medicinal plants actively collected within the Forest Division	1	**1**	The management of medicinal plants is guided by Non wood forest product management and marketing plan.	

12c: Management of timber	A management plan exists for all major areas where timber products are managed within the Forest Division	1	**1**	Whole division area is under management regime (CF, LFMP and DFO plan)	
Bhutan METT+: consideration of this question includes issues relating to land leasing					
13. Staff numbers Are there enough people employed to manage the Forest Division? Inputs	There are no staff	0		The division has enough manpower with 49 technical staff to implement activities in the field.	
	Staff numbers are inadequate for critical management activities	1			
	Staff numbers are below optimum level for critical management activities	2			
	Staff numbers are adequate for the management needs of the Forest Division	3	**3**		
14. Staff training Are staff adequately trained to fulfil management objectives? Inputs/Process	Staff lack the skills needed for Forest Division management	0		All the staff are trained at UWIFoRT with funding support from IKI and BFL Projects. Still then some lacks critical skills	
	Staff training and skills are low relative to the needs of the Forest Division	1			
	Staff training and skills are adequate, but could be further improved to fully achieve the objectives of management	2	**2**		

	Staff training and skills are aligned with the management needs of the Forest Division	3			
15. Current budget Is the current budget sufficient? Inputs	There is no budget for management of the Forest Division	0		Current budget is sufficient to meet only prioritized activities but not enough to support activities prioritized by community.	Need to coordinate with the Gewogs to address the gap.
	The available budget is inadequate for basic management needs and presents a serious constraint to the capacity to manage	1			
	The available budget is acceptable but could be further improved to fully achieve effective management	2	**2**		
	The available budget is sufficient and meets the full management needs of the Forest Division	3			
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?	There is no secure budget for the Forest Division and management is wholly reliant on	0		Only Current Budget is secured but Capital Budget	

Inputs	outside or highly variable funding			has to be proposed to Projects fundings.	
	There is very little secure budget, and the Forest Division could not function adequately without outside funding	1			
	There is a reasonably secure core budget for regular operation of the Forest Division, but many innovations and initiatives are reliant on outside funding	2	**2**		
	There is a secure budget for the 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		Annual Budget meeting is conducted for effective management; activities are prioritized based on the available budget.	
	Budget management is poor and constrains effectiveness	1			
	Budget management is good and actions are prioritized when	2			

	funds are inadequate to meet management needs				
	Budget management is excellent and meets management needs	3	**3**		
18. Equipment Is equipment sufficient for management needs? Input	There are little or no equipment and facilities for management needs	0		Office equipment's such as laptops, desktops and other field equipment are limited impedes to progress of work.	There is a strong need for the supply of laptops and field equipment to individual staff for self-learning and effective delivery of public services.
	There are some equipment and facilities but these are inadequate for most management needs	1	**1**		
	There are equipment and facilities, but still some gaps that constrain management	2			
	There are adequate equipment and facilities	3			
Bhutan METT+: Most Forest Divisions cover large areas; there are thus likely to be differences in equipment availability in park headquarters and guard posts around the park. Question 18 should consider equipment across the whole Forest Division and specific concerns re availability should be included in the comment/explanation and next steps column.					
19. Maintenance of equipment	There is little or no maintenance of equipment and facilities	0			Need to prioritized provision of secured

Is equipment adequately maintained? Process	There is some *ad hoc* maintenance of equipment and facilities	1		Only limited funds are approved for the maintenance of properties.	fund to enable the division to carry out timely maintenance of equipment.
	There is basic maintenance of equipment and facilities	2	**2**		
	Equipment and facilities are well maintained	3			
20. Education and awareness Is there a planned education programme linked to the objectives and needs? Process	There is no education and awareness programme	0		Awareness and education programs on Forestry rules and regulations are being conducted for the public annually	Need to give awareness on effective utilization of forest resources and economic opportunities.
	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	**2**		
	There is an appropriate and fully implemented education and awareness programme	3			
21. Planning for land and water use Does land and water	Adjacent land and water use planning does not take into account the needs of the Forest Division and activities/policies	0		This is checked and balanced with need for forestry	

use planning outside the Forest Division recognise the Forest Division and aid the achievement of objectives? Planning	are detrimental to the survival of the area			clearance for the developmental activities.	
	Adjacent land and water use planning does not takes into account the long term needs of the 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 Forest Division	2	**2**		
	Adjacent land and water use planning fully takes into account the long term needs of the Forest Division	3			
Bhutan METT +: This question is specific to activities <u>outside</u> of the Forest Division. EIA's are supposed to take place for any developments. Issues in Bhutan include hydropower, transmission lines and mining.					
Additional points: Land and water planning					
21a: Land and water planning for habitat conservation	Planning and management in the catchment or landscape containing the Forest Division incorporates provision for adequate environmental conditions (e.g. volume, quality and timing of water flow, air	1	**0**		

	pollution levels etc) to sustain relevant habitats				
21b: Land and water planning for connectivity	Management of corridors linking the Forest Division provides for wildlife passage to key habitats outside the Forest Division (e.g. to allow migratory fish to travel between freshwater spawning sites and the sea, or to allow animal migration)	1	**1**	BC-3 created for migration of wildlife between Phibsoo wildlife Sanctuary, Jigme Singye Wangchuck National Park and Royal Manas National Park. Further, streams are well protected and maintained for migration of aquatic animals.	
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 savannah habitats etc.)	1	**1**	Refrain from marking fruit bearing trees which serve as food source for wildlife. Keep surveillance on outbreak of fire in sal forest and grass land developed on river side.	
22. State and commercial neighbours Is there co-operation with adjacent land and water users?	There is no contact between managers and neighbouring official or corporate land and water users	0		Maintains contact between managers but no direct influence of water user.	
	There is contact between managers and neighbouring official or corporate land and	1	**1**		

Process	water users but little or no cooperation				
	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 official 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 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 Forest Division management	1	**1**	Bhutan power corporation and Department of Surface Transport ensure to carry out work only after obtaining forestry clearance.	

22c: State and commercial neighbours	Where the 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	**0**	Payment for Environmental Services initiated with Raidara community and Gelephu Thromde but not yet approved.	
23. Local communities Do local communities resident or near the Forest Division have input to management decisions? Process	Local communities have no input into decisions relating to the management of the Forest Division	0		Forest management regimes are initiated only after consultation with communities.	
	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	**2**		
	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 Forest Division managers	1	**0**	Few individuals from communities repeatedly engaged into illegal activities despite of multiple awareness campaign.	
23b: Impact on communities	Programmes to enhance community welfare, while conserving Forest Division resources, are being implemented	1	**1**	Nationwide compensation scheme is being initiated centrally by the government.	
23c: Impact on communities	Local people actively support the Forest Division	1	**0**	Few individuals from communities repeatedly engaged into illegal activities despite of multiple awareness campaign.	
24. Economic benefit Is the Forest Division providing economic benefits to local communities, e.g. income, employment, payment for environmental services?	The Forest Division does not deliver any economic benefits to local communities	0		CF and NWFPs management are able to make income from sales of forest produce.	
	Potential economic benefits are recognized and plans to realize these are being developed	1			
	There is some flow of economic benefits to local communities	2	**2**		

Outcomes	There is a major flow of economic benefits to local communities from activities associated with the Forest Division	3			
25. Monitoring and evaluation Are management activities monitored against performance? Planning/Process	There is no monitoring and evaluation in the Forest Division	0		Forest management regimes like CF, NWFP management and LFMA are monitored at divisional level annually and midterm and final evaluation is done by the Forest Management and Information Division(national level).	
	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	**3**		
26. Visitor facilities Are visitor facilities	There are no visitor facilities and services despite an identified need	0		This pertains to facilities at Southern Wildlife Rescue and Rehabilitation Center (SWRRC)	

adequate? Outputs	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	**2**		
	Visitor facilities and services are excellent for current levels of visitation	3			
27. Commercial tourism operators Do commercial tour operators contribute to Forest Division management? Process	There is little or no contact between managers and tourism operators using the Forest Division	0	**0**	There is no contact between managers and tourism operators using the Forest Division	
	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 Forest Division values	2			
	There is good co-operation between managers and tourism	3			

	operators to enhance visitor experiences, and maintain Forest Division values				
28. Fees If fees (e.g. entry fees) are applied, do they help Forest Division management? Inputs/Process	Although fees are theoretically applied, they are not collected	0		Entry fee at Southern Wildlife Rescue and Rehabilitation Center.	
	Fees are collected, but make no contribution to the Forest Division or its environs	1	**1**		
	Fees are collected, and make some contribution to the Forest Division and its environs	2			
	Fees are collected and make a substantial contribution to the Forest Division and its environs	3			
29. Fines If fines (e.g. poaching fines) are applied, do they help Forest Division management? Inputs/Process	There are no fines, or fines are theoretically applied but are seldom or never collected	0		Sarpang and Gelephu range collects fines from offenders and directly deposits as Government Revenue Account.	
	Fines are collected, but make no direct contribution to the Forest Division or its environs	1	**1**		
	Fines are collected, and make some contribution to the Forest Division and its environs	2			

	Fines are collected and make a substantial contribution to the Forest Division and its environs	3			
Bhutan METT +: The term "Forest Division 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 Forest Division as compared to when it was first designated? Outcomes	Many biodiversity and ecological values are being severely degraded	0		Farm roads and new alignment of national highway construction seem to have minor repercussion on biodiversity and ecological value.	
	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	**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	**1**	Done annually and submit report to the head quarter, Thimphu.	
30b: Condition of biodiversity values	Specific management programmes are being	1	**1**	Forest areas were brought under different management	

	implemented to address threats to biodiversity and ecological values			regimes. Further, carry our habitat improvement for elephant. Also carry out plannation in open areas to create suitable habitate.	
30c: Condition of biodiversity values	Activities to maintain key biodiversity and ecological values are a routine part of Forest Division management	1	**1**	To safeguard biodiversity and ecological values, regular patrolling, monitoring and surveys are conducted by the division.	
Bhutan METT + questions					
31. Condition of cultural values What is the condition of the important cultural values of the Forest Division/forest division as compared to when it was first designated? Outcomes	Many cultural values are being severely degraded	0		Globalization, social media and modern work culture has degraded traditional culture in the area. The younger generation prefer flexibility over strict traditions.	
	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	**2**		
	Cultural values are predominantly intact	3			
32. Access How accessible is the	Staff are unable to move around the Forest Division and thus much of the Forest Division	0		Division area is accessible during winter months. However, during summer	

Forest Division? Planning / Process	is inaccessible throughout the year			months, movement to all areas is restricted due to swollen stream.	
	There are significant restrictions on the ability of staff to move around the Forest Division throughout the year (e.g. in the rainy season) and thus much of the 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 Forest Division and thus most of the Forest Division is accessible, although some areas (e.g. less than 50 % of the area) remain inaccessible some or all of the year	2	**2**		
	Staff are able to move easily around the whole Forest Division and the majority of the Forest Division is fully accessible	3			
33. Neighbouring Forest Divisions Is there co-operation with adjoining Forest	There is no contact between managers of adjoining Forest Divisions on issues which impact Forest Division management effectiveness	0		Main regular contact with neighboring forest offices like Phibsoo Wildlife Sanctuary, Royal Manas National Park	

Divisions (national and international)? Process	There is limited contact between managers of adjoining Forest Divisions but little cooperation on issues which impact Forest Division management effectiveness	1		and Divisional Forest Office, Tsirang.	
	There is contact between managers of adjoining Forest Divisions and some cooperation on Forest Division management effectiveness	2	**2**		
	There is regular contact between managers of adjoining Forest Divisions and full cooperation on ensuring management effectiveness	3			
34. Is the Forest Division being consciously managed to adapt to climate change? Planning	There have been no efforts to consider adaptation to climate change in management	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	**2**	Plans and adaptation strategies (CVCA plans for BC and division) are developed to address the issues but not implemented due to budget constraints.	Need to provide funds for implementation.
	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 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 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	**1**	The amount of carbon sequestered by division, CF are calculated but limited activities are initiated to reduce carbon loss. Eg. Plantation are initiated in small scale by the division and Cf groups.	Need to remove lesser preferred timber tree species and plant valuable ones.
	There are active measures in place to reduce carbon loss from the Forest Division, but no	2			

	conscious measures to increase carbon dioxide capture				
	There are active measures in place both to reduce carbon loss from the Forest Division and to increase carbon dioxide capture	3			
			88	123	
			METT+ score:	**71.54471545**	

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