TSIRANG

Divisional Forest Office Management Plan

(January 2026 – December 2035)

Divisional Forest Office, Tsirang

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

WWF

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Approval Sheet

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

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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 mandates that at least 60 percent of the country's land area be maintained under forest cover for all time. Bhutan has further reinforced its global environmental leadership by committing to remain carbon neutral at the 15th Conference of Parties to the UNFCCC in 2009, a pledge reaffirmed through its Intended Nationally Determined Contribution submitted in 2015 under the Paris Agreement.

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

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

Tashi Ɖelek!

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

Abbreviations

AAC ..... Annual Allowable Cut
AGB ..... Above Ground Biomass
BC ..... Biological Corridor
BGB ..... Below Ground Biomass
CF ..... Community Forest
CFMG ..... Community Forest Management Group
CFMP ..... Community Forest Management Plan
CFO ..... Chief Forestry Officer
CVCA ..... Climate vulnerability and Capacity Assessment
cft ..... Cubic feet
DFO ..... Divisional Forest Office
DoFPS ..... Department of Forests and Park Services
EN ..... Endangered
FIRMS ..... Forest Information Reporting and Management System
FMID ..... Forest Monitoring and Information system
FNCA ..... Forest and Nature Conservation Act
FNCRR ..... Forest and Nature Conservation Rules & Regulations
FPED ..... Forest Protection and Enforcement Division
FRPMD .... Forest Resources planniing and Management Division
GIS ..... Gewog graphic Information System
GPS ..... Global Positioning System
G2C ..... Government to Citizen
Ha ..... Hectare
HCVA ..... High Conservation Value Area
HWC ..... Human Wildlife Conflict
IKI ..... International Climate Initiative
IUCN ..... International Union for Conservation of Nature
KBA ..... Key Biodiversity Area
LFMA ..... Local Forest Management Area
LG ..... Local Government
LULC ..... Land Use and Land Cover
m3 ..... Cubic meter
METT ..... Management Effectiveness Tracking Tool
MoENR .... Ministry of Energy & Natural Resources Agriculture and Forests
NCD ..... Nature Conservation Division
NCHM ..... National Center for Hydrology and Meteorology
NFI ..... National Forestry Inventory
NRDCL .... Natural Resources Development Corporation Limited

NWFP.....Non-Wood Forest Produce
OP.....Operational Plan
PA.....Protected Areas
RBM .....River Bed Materials
RGoB .....Royal Government of Bhutan
RNR.....Renewable Natural Resources
SMART ....Spatial Monitoring and Reporting Tool
SRF .....State Reserve Forest
TAC.....Technical Advisory Committee

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Executive Summary

The Divisional Forest Office (DFO) Management Plan (January 2026–December 2035), Tsirang provides a comprehensive strategic framework to guide sustainable forest management, biodiversity conservation, and service delivery within Tsirang Dzongkhag over the next ten years. The plan is developed in line with the Constitution of the Kingdom of Bhutan, national forest and environmental policies, and international commitments, particularly Bhutan's mandate to maintain at least 60 percent forest cover and remain carbon neutral for all time.

Tsirang Dzongkhag covers an area of approximately 637.83 km^2, with forest cover accounting for about 87 percent of the total land area. The Dzongkhag exhibits wide altitudinal variation ranging from about 250 masl to over 3,000 masl, supporting diverse forest ecosystems dominated by warm and cool broadleaved forests. The landscape is ecologically significant as it forms part of Biological Corridor–3, linking Phibsoo Wildlife Sanctuary, Royal Manas National Park, and Jigme Singye Wangchuck National Park. The area harbors rich biodiversity, including several globally threatened and flagship species such as the Royal Bengal Tiger, Asian Elephant, Golden Langur, Red Panda, and Rufous-necked Hornbill.

The Management Plan assesses the current status of forest resources, biodiversity, socio-economic conditions, institutional capacity, and existing management regimes including Forest Management Units, Community Forests, Local Forest Management Areas, and Private Forests. It also highlights key challenges facing the division, such as climate change impacts, drying water sources, human–wildlife conflict, forest fires, invasive species, illegal activities, waste pollution, and institutional capacity constraints.

Based on these assessments, the plan outlines clear vision, mission, objectives, and strategic interventions focused on sustainable forest resource management, conservation of High Conservation Value Areas (HCVAs), watershed and springshed management, habitat restoration, climate resilience, and livelihood enhancement. Special emphasis is placed on mitigating human–wildlife conflict, strengthening community participation, promoting gender mainstreaming, ensuring environmental and social safeguards, and improving public service delivery through institutional strengthening and capacity development.

The Management Plan provides detailed management prescriptions, implementation arrangements, and a phased financial outlay to ensure effective execution over the plan period. A robust monitoring and evaluation framework is incorporated to track progress, assess outcomes, and support adaptive management. The plan has been developed through extensive stakeholder consultations to ensure ownership, alignment, and institutional endorsement.

Overall, the DFO Tsirang Management Plan serves as a strategic and operational guide to balance conservation and sustainable use of forest resources, enhance ecosystem resilience, support local livelihoods, and contribute meaningfully to national and global environmental goals.

Key facts of Tsirang Forest Division

Sl.No.	Forest statistics		
1	Total Forest Area	ha	55694.05
2	Forest Cover Percent	%	87.21
3	Broadleaved forest	%	65.27
		ha	41679.12
4	Conifer forest	%	3.65
		Ha	2333.73
5	Basal area per hectare	m2/ha	25.15
6	Growing stock per hectare	m3	188.71
7	Biomass stock per hectare (AGB, BGB, DoM)	t/ha	336.16
Protected Areas			
1	Biological Corridors	ha	6327.34
		No.	1
2	Key Biodiversity Areas	ha	6022
		No.	1
3	High Conservation Value Area	ha	2335
		No.	1
Sustainable Forest Management Regimes			
1	Total area of Community Forest	ha	11490.62
	Total Community Forest	No.	49
2	Total household involved in CF	No.	3025
3	Local Forest Management Area	ha	9447.50
		No.	6
4	NWFP Groups	ha	739.86
		No.	3
Wood-based industries			
1	Wood-based industries	No.	2
Field Division and field offices			
1	Divisional Forest Office	No.	1
2	Range Office	No.	3
3	Beat Office	No.	1

Chapter 1: Background

1.1 Background

Bhutan, despite its small size, has earned global recognition for its environmental conservation leadership and its achievement as a carbon-negative country in the 21st century. The intact natural resources that we have today is a testimony to the farsighted conservative visions of our successive monarchs and the sound environment conservation policies of the country. However, over the years the forest management policies have undergone significant changes from that of more conservation focused to sustainable utilization of forest resources. Though scientific management of our forest resources based on the principles of sustainability has long been practiced, it has become even more imperative than ever before in light of the changing climate and its impacts. Today climate change and its impacts has widely affected many countries. Bhutan being located in a most fragile mountainous ecosystem is even more poised to the impacts of climate change. Thus, Bhutan is one of the few countries in the world that enshrines forest and environmental conservation aspects in its Constitution. Article 5 of the Constitution of the Kingdom of Bhutan mandates the conservation of the country's natural resources and the prevention of ecosystem degradation, requiring that at least sixty percent of Bhutan's total land area be maintained under forest cover for all time.

As the custodian of forest resources at the Dzongkhag level, the Divisional Forest Office plays a vital role in conserving and protecting natural forests, while also delivering essential forestry services to the people of the country. It ensures effective implementation of the environmental policies inline with the national commitment to remain carbon neutral and maintain minimum if 60% forest cover for all times to come. While the management of forest resources within the divisional jurisdiction is guided by the fundamental principles of sustainability, it is equally essential that such management is grounded in scientific approaches aligned with long-term divisional goals and objectives. Regular review and evaluation of these goals and objectives are therefore critical to ensure their continued relevance and effectiveness.

Accordingly, the formulation of a comprehensive and holistic Divisional Forest Management Plan with a time-bound vision, mission, objectives, and goals is imperative. This Management Plan shall serve as an overarching scientific framework for the systematic and sustainable management of forest resources within the jurisdiction of Tsirang Forest Division.

1.2 History and Significance

The history and significance is broadly described in the following chapter under importance of forests & overview of sustainable forest management below:

1.2.1 Importance of Forests

The Article 5 of the Constitution of the kingdom of Bhutan (2008) 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 RGOB has made an international commitment to remain carbon neutral for all times to come.

1.2.2 Overview of the Sustainable Forest Management

Bhutan, a small Himalayan kingdom uniquely situated between the Palearctic realm in the north and the Indo-Malayan region in the south, is renowned for its rich biodiversity and commitment to environmental conservation. The country's approach to sustainable forest management has evolved over the decades, balancing ecological conservation without compromising the development of the people. Sustainable forest management in Bhutan closely integrates with the country's broader development policies. The Gross National Happiness (GNH) framework, which guides Bhutan's development philosophy, places a strong emphasis on environmental conservation. This unique approach ensures that economic development does not come at the expense of ecological sustainability. Bhutan's dedication to environmental conservation is deeply rooted in its cultural and spiritual values. Traditionally, Bhutanese society has revered nature, viewing forests as sacred spaces. This respect for the environment is reflected in the country's policy framework and conservation efforts. Later in 1952, the Royal Government of Bhutan established the Department of Forests (DoF) and accordingly enacted the first Forest Act of Bhutan in 1969 marking the beginning of formal forest management. This institution was tasked with managing and protecting the country's vast forest resources, which cover approximately 70% of the geographical area. Subsequently, the first National Forest Policy was formulated in 1974 which later updated into National Forest Policy 2011, emphasizing on the sustainable use and conservation of natural resources. The policy aimed to maintain ecological balance, protect watersheds, and support rural livelihoods.

Following this, the Forest and Nature Conservation Act of 1995 was enacted to provid a comprehensive legal framework for forest management and conservation through people's participation, particularly in the form of community forestry and private forestry. The act empowers the local communities to sustainably manage and utilize forest resources thereby enhancing both conservation outcomes and local livelihoods. Furthermore, Bhutan has been proactive in addressing climate change through sustainable forest management and the country remains firmly committed to maintaining its carbon-neutral status and has pledged to keep more than 60% of its land area under forest cover. These national efforts are further strengthened through Bhutan's engagement with international initiatives such as the United Nations Framework Convention on Climate Change (UNFCCC) and the REDD+ (Reducing Emissions from Deforestation and Forest Degradation) mechanism. Therefore, Bhutan's history of sustainable forest management reflects a deep-rooted respect for nature and a steadfast commitment to balancing socio-economic development with ecological preservation. Through progressive policies, active community participation, and robust international cooperation, Bhutan continues to set a global example in sustainable forest management, ensuring that its forests remain an integral part of its natural heritage and a cornerstone of its development strategy.

1.3 Policies and legislations

1.3.1 National Forest Policy 2011

The National Forest Policy 2011, was formulated to keep up with changing times and the evolving concepts of forest management governing the State Reserve Forest Land (SRFL). Since 1957, Forest governance has transitioned from a regime of providing "free access" to "almost no access" and ultimately to a system of "managed access" aimed at balancing conservation approach with sustainable utilization.

The policy broadly stipulates the application of scientific management approaches to all of Bhutan's forest and biodiversity resources for the benefit of present and future generations, without compromising conservation values or the constitutional mandate of maintaining a minimum of 60 percent forest cover in perpetuity. Furthermore, it encourages the development of forest-based industries to ensure the efficient utilization and responsible marketing of natural resources, while promoting the participation of the private sector and rural communities. Some of the key features of the policy include a science-based and participatory approach to forest governance and sustainable forest management, with particular emphasis on the adoption of efficient and environmentally friendly technologies for value addition and the minimization of waste.

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

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

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

The FNCA 1995 was revised in the year 2023 to address the emerging conservation issues without compromising development needs of the country and the people. Besides harmonizing obsolete sections and subsections, the FNCA 2023 formulated a mechanism for payment for ecosystem services.

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

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

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

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

1.3.4 Land Lease Rules and Regulations of Bhutan 2018

The Land Lease Rules and Regulations of Bhutan 2018 implements the provision of the Land Act of Bhutan 2007 and necessitates the requirement of forestry clearance for issuance of lease of SRF Land. Further, it strongly discourages and prohibits 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 Sui Generis 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 Land Act of Bhutan 2007 provides for the leasing of state land for economic and various other activities. All *Tsamdro* (grazing land) and *Sokshing* (forest land for collection of leaf litter) rights shall revert back 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, so as to independently regulate and promote sustainable development in an equitable manner. The Act also calls for conservation and protection of wetlands, alpine regions, watersheds, and other vulnerable ecosystems in addition to the existing protected areas.

1.3.8 Waste Prevention and Management Act of Bhutan 2009

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

1.3.9 Climate Change Policy of the Kingdom Bhutan, 2020

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

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

1.3.10 Nationally Determined Contribution, 2021

Bhutan's 2nd NDC was officially launched on June 5, 2021, coinciding with World Environment Day and ahead of COP26.It reaffirms Bhutan's pledge to remain carbon neutral, and outlines enhanced mitigation measures via sector-specific Low Emission Development Strategies (LEDS) and updates to the National REDD+ Strategy and Action Plan. Bhutan's 2nd NDC advances LEDS across multiple sectors to decouple development from emissions. It also highlights key sector specific adaptation and mitigation measures and initiatives that will be taken by Bhutan. In presenting the second NDC, Bhutan maintains the commitment to remain carbon-neutral where emission of

greenhouse gases will not exceed carbon sequestration by our forests and sinks as first pledged in 2009 and reaffirmed in the first NDC. At the same time, Bhutan calls on the international community to continue and enhance the support for Bhutan's efforts to mitigate and adapt to climate change. While Bhutan's first NDC covered broad priority action areas, the second NDC further enhanced our actions by elaborating priority mitigation actions in the form of LEDS, roadmaps and strategies.

1.3.11 National Adaption Plan of the Kingdom of Bhutan, 2023

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

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

1.3.12 Water Act of Bhutan, 2011

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

1.3.13 Mines and Mineral Act of Bhutan 1995 and Regulation

The Mines and Minerals Act of 1995 provides the legal framework for the exploration, extraction, management, and conservation of mineral resources in Bhutan. It recognizes minerals as a state-owned resource and aims to ensure their sustainable utilization while safeguarding the environment and supporting national development. The Act establishes licensing and permit systems for prospecting, mining, and processing of minerals, defines the roles and responsibilities of regulatory authorities, and sets out procedures for revenue collection, royalty payments, and enforcement of compliance. The Mines and Min-

erals 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.

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 Vision

1.4.1 Vision

Contribute to sustaining and conserving a thriving forest ecosystem, contributing to the progress and prosperity of local communities.

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

The Divisional Forest Office, Tsirang assures that the forest resources serve the long-term needs of local communities through promotion of sustainable management, utili-

zation and protection of forest resources and contribute to the national mandate of 60% forest cover in all times to come.

1.4.4 Objectives

The objective of this management plan are as follows:

- To protect biodiversity and ecosystem services through strategic habitats conservation and climate resilience.
- To ensure sustainable management and utilization of natural resources.
- To provide effective public service delivery to avail forestry products and carryout monitoring and enforcement mechanisms.
- To enhance capacity development to foster health, diversity, and productivity of natural resources.
- To mitigate human-wildlife conflicts and enhancement of livelihoods.

Chapter 2: Current Status

2.1 Boundary and Area

Tsirang Dzongkhag is located between latitudes of 27 o 11' 58.695" and 27 o 48' 59.985" N and longitudes of 90o 20' 57.754" E and 90 o 20' 23.315" E in the southern central part of Bhutan and shares its boundaries with Wangdue, Dagana and Sarpang Dzongkhag.

Administratively, the dzongkhag comprises several gewogs and chiwogs, with Damphu serving as the dzongkhag headquarters. The strategic location of Tsirang, along with its agricultural potential and improving infrastructure, plays an important role in regional development while also presenting challenges related to land use, human–wildlife conflict, and sustainable natural resource management.

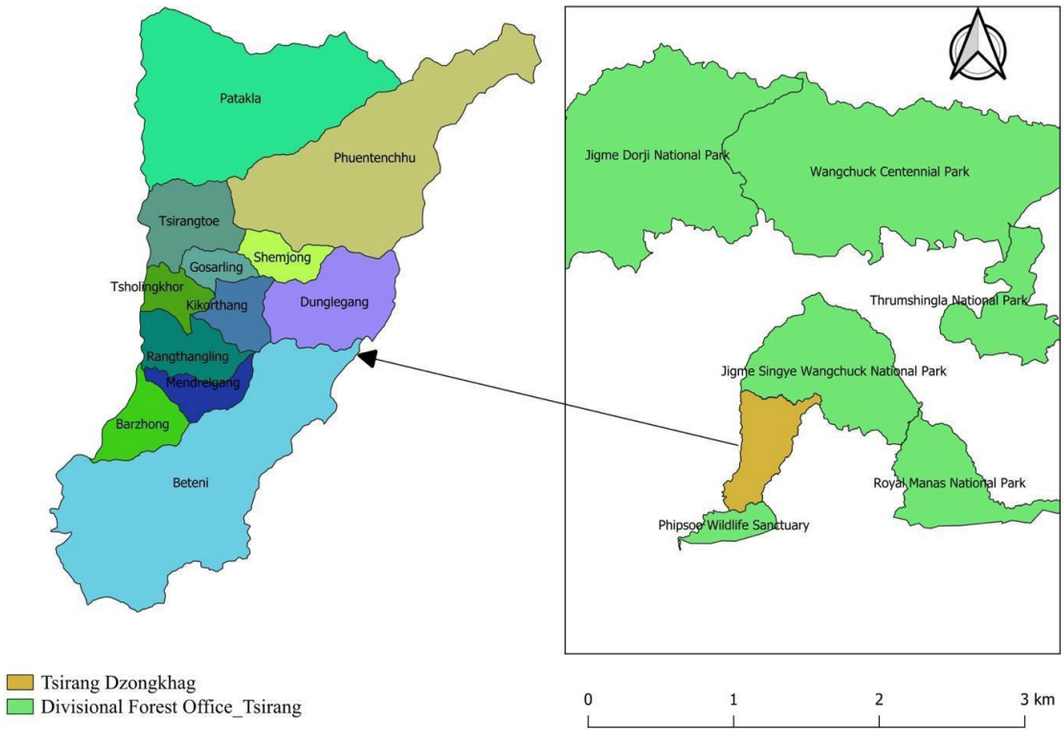


Figure 1: Bhutan map showing the entire 12 gewogs under Tsirang Dzongkhag and HQ location.

The dzongkhag sprawls across 637.83 km2 with varying altitude from 250 masl to 4000 masl. Topographically, it is dominated with gentle slopes and milder climatic conditions. The dzongkhag is also known for its rich biodiversity providing the biological

corridor (BC-03) connectivity between Phibsoo Wildlife Sanctuary in the south, Royal Manas National Park (RMNP) in the east and Jigme Singye Wangchuck National Park (JSWNP) in the north. One of Bhutan's longest rivers, the Punatsangchhu or Sunkosh river flows through the district. The Dzongkhag has 12 gewogs and 101 villages with a population density of 37.2 per sq. km (www.tsirang.gov.bt).

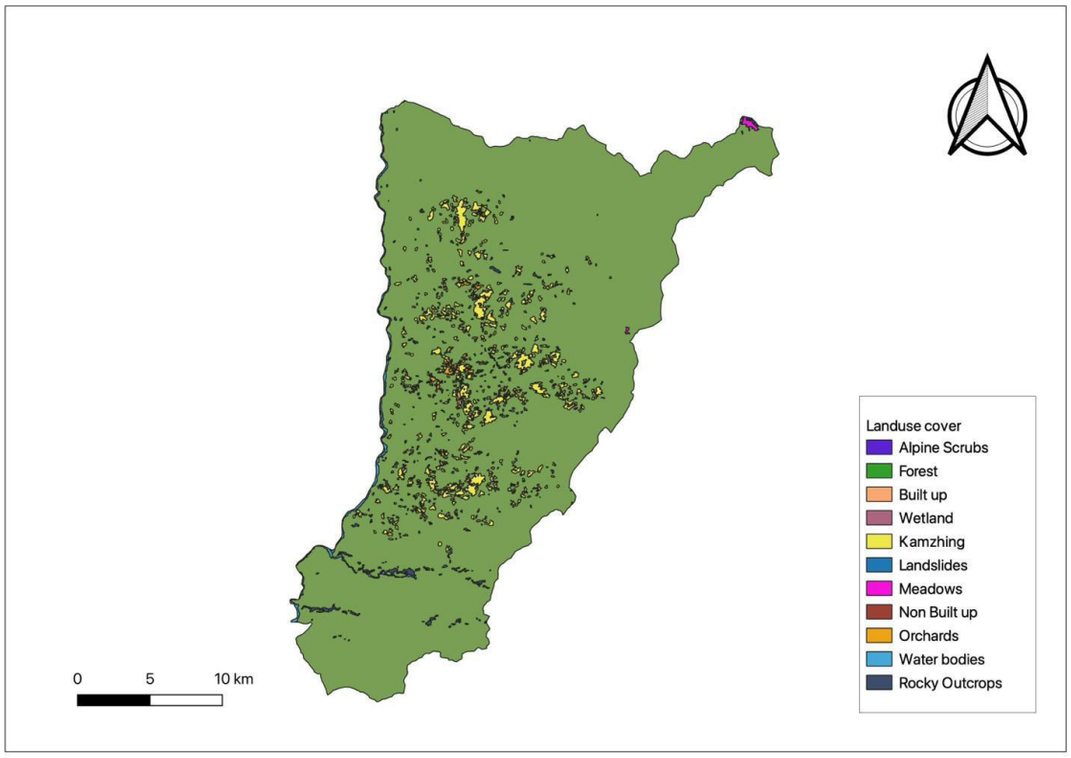


Figure 2: Map showing the land use cover map of Tsirang Dzongkhag.

As shown in Table 10, the forest area of the Dzongkhag is classified into eleven major forest types, ranging from sub-tropical forests in the southern region to alpine scrub in the northern parts. Among the classified forest types, Warm Broadleaved Forests constitute the largest share, covering 47.26 percent of the total forest area, followed by Sub-Tropical Forests (17.18 percent), Cool Broadleaved Forests (13.28 percent), Evergreen Oak Forests (4.73 percent), and Fir Forests (2.07 percent). Other forest types, including Chir Pine, Blue Pine, Hemlock, Spruce, and Juniper–Rhododendron forests, each account for less than one percent of the total forest area.

Table 1: Showing the overall forest cover by forest type in Tsirang Dzongkhag.

Forest Types	Forest Cover (ha)	Forest Cover (%)
Subtropical Forest	10971.74	17.18
Chir Pine Forest	640.44	1.00
Warm Broadleaved Forest	30180.15	47.26
Evergreen Oak Forests	3020.63	4.73
Cool Broadleaved Forest	8478.34	13.28
Blue Pine Forest	75.51	0.12
Spruce Forest	216.95	0.34
Hemlock Forest	717.04	1.12
Fir Forest	1324.23	2.07
Juniper Rhododendron Forest	61.84	0.10
Dry Alpine Scrub	7.18	0.01
Total	**55694.05**	**87.21**

2.2 Administration

2.2.1 Administrative Set up

Based on the legal provision of Forest & Nature Conservation Act (1969) and National Forest Policy (1974), the Tsirang Forest Division was established in 1988 to provide forestry services to the people of Tsirang and Dagana Dzongkhag. Initially, the division covered 12 gewogs of Tsirang Dzongkhag and 14 gewogs of Dagana Dzongkhag. However, with the establishment of the Dagana Division, jurisdiction under the dzongkhag was transferred to the new division in November 2016. The Divisional Headquarters is located above the Tsirang–Thimphu National Highway under Kilkhorthang Gewog and was constructed on approximately 9.8 acres of forested land. Under the Chief Forestry Officer, the Tsirang Forest Division is supported by four main sections, namely the Nature Conservation Section (NCS), Forest Resource Planning and Management Section (FRMPS), Forest Information and Management Section (FIRMS), and the Administration Section. These sections are further supported by three Range Offices and one Forest Beat Office (Figure 3).

In terms of jurisdiction, the Tsirang Range oversees six gewogs, namely Kilkhorthang, Goserling, Tsholingkhar, Rangthaling, Dunglagang, and Semjong. The Tsirangtoe Range manages Tsirangtoe, Phuntenchhu, and Sergithang gewogs, while the Mendrelgang Range covers Mendrelgang, Patshaling, and Barshong gewogs. With the devolution of powers to the Range level and in order to enhance efficient public service delivery, the Beat Offices of Mendrelgang and Tsirangtoe were upgraded to full-fledged Range Offices in October 2020. Although two Forest Checkposts at Sunkosh and Damphu were operational in the past, they were subsequently lifted in 2023 in accordance with directives issued by the Department.

Figure 3: Showing the Organizational structure of Tsirang Forest Division.

2.2.2 Mandates

The mandate of the Divisional Forest Tsirang is:

- To preserve the natural ecological balance by contributing at least 60% of the country under tree cover in all times to come.
- To sustain the health, diversity, and productivity of the natural resources to meet the needs of present and future generations.
- To implement forest policies, acts and rules for sustainable management of the country's forests.
- Enhance protection and conservation of our pristine environment through public participation.
- Enhance protected and conservation area management in Key Biodiversity Area (KBA), High Conservation Value Area (HCVA)and BC-3.
- Ensuring persistence of wild flora and fauna including periodic threats (forest fire, pest and disease, invasive species, etc.) monitoring and management.
- Conservation of key floral and faunal species both inside and outside the protected area network.
- Improve the service delivery to the local communities by expanding the staff HR capacity and leveraging ICT services.
- Management of forest outside forest management units through Local Forest Management and Community Forestry programs.
- Provide forestry clearance services for various development activities.
- Climate resilience of forest improved through afforestation/reforestation for improved soil and water management.
- Minimize forest and wildlife offenses through active/SMART patrolling (Compliance monitoring-relook-include WBIs).
- Promote and practice good silviculture management practices for sustainable management of the forest resources.

- Enhance the utilization of NWFP through management plans, group formations and nature-based enterprises.
- Ensure adequate and rational supply of timber to communities/Institutions.
- Represent the department as a focal agency in the region (relook)
- Minimize Human-wildlife Conflict through various strategies and interventions.
- Diversify conservation initiatives to maximize economic returns.
- Collecting forestry data and maintaining data repositories.
- Conduct periodic forest integrity assessment/National Forest Inventory/ Biodiversity Grid Monitoring.

2.2.3 Human Resource

The Division Forest office is equipped with 32 technical staff consisting of four PMC (Professional and management level), eleven SS level and 17 S level supported by an administrative assistant, 3 ESP and a driver. Currently there are four female technical staff including two female non-technical in the. Division. As depicted in Figure 4, there are 15 employees (46.87%) with a basic certificate followed by 9 Bachelors (28.12 %), 4 diplomas (12.5 %) and 3 Masters (9.3 %).

Accordingly, the division provides forestry services to 12 gewogs of Tsirang Dzongkhag through three Range offices namely Tsirang, Tsirangtoe and Mendrelgang; and one Beat Offices at Sergithang (Figure 4). Despite the committed workforce, the division is short of eight technical staffs owing to the recent transfer. With the advancement of technology and most of the forestry services are catered online, there is opportunity to leverage ICT and upgradation of knowledge and skills of forestry staff at par with other sectors.

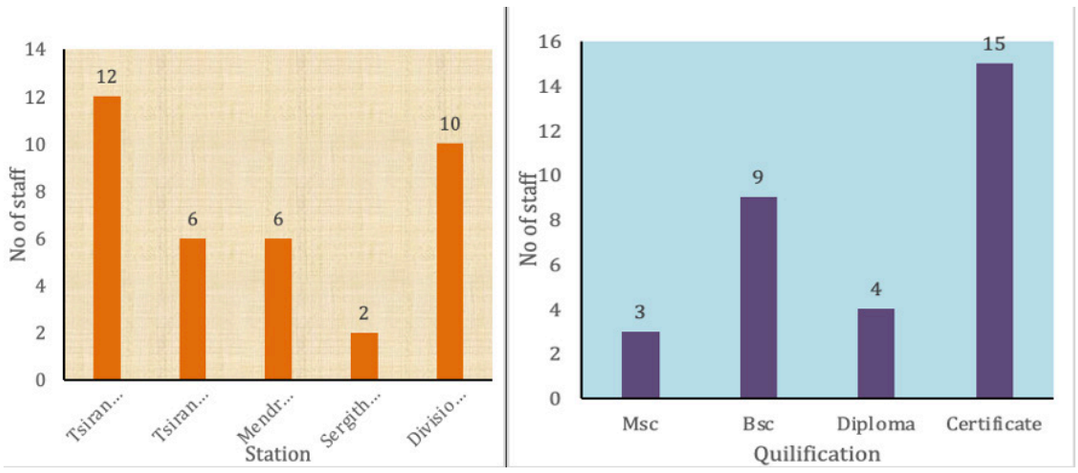


Figure 4: Graph showing no. of in station wise and human resources qualification.

2.2.4 Infrastructure

The Division is centrally located and operates from a two-storey office building at Damphu. The office infrastructure supports administrative, technical, and coordination functions of the Division. The Division owns a total land area of 9.8 acres, registered under Thram No. 125, comprising Plot Nos. DP-130 and DP-131. Within the Division

campus, the Tsirang Range Office is also situated. The Range office is responsible for forest resource management, monitoring, and delivery of forestry-related services to six gewogs: Kikorthang, Rangthaling, Tsholingkhar, Gosaling, Dunglagang, and Semjong. A separate one-storey office building within the campus provides adequate working space and operational facilities for the Range staff, enabling effective service delivery and implementation of forestry programs.

To enhance public forestry service delivery in the three gewogs of Mendrelgang, Barshong, and Patshaling, the existing Mendrelgang Beat Office was upgraded to a full-fledged Range Office with effect from October 2020. However, due to inadequate office space in the existing facility, it became necessary to establish improved infrastructure to ensure efficient and effective public service delivery. Accordingly, a new one-storey office building-cum-residence was constructed at Pemashong, Mendrelgang Gewog, with financial support from Bhutan for Life (BFL) during the Fiscal Year 2023–2024. The new facility has strengthened administrative capacity, enhanced staff accommodation, and improved accessibility of forestry services to the communities within the three gewogs.

With effect from October 2020, the Tsirangtoe Range Office has been providing forestry services to the gewogs of Sergithang, Phuntenchu, and Tsirangtoe. The present office building was originally constructed in 2014 as a Beat Office, designed to accommodate limited staff. However, following its upgrade to a full-fledged Range Office, the existing infrastructure has become insufficient to meet the increased administrative and operational responsibilities. To ensure efficient and effective public service delivery, there is a need to extend and upgrade the current office infrastructure to provide adequate working space and facilities.

In addition, the Division operates a Beat Office at Sergithang to support forest resource management and public service delivery within its jurisdiction. To facilitate effective field mobility and transportation, the Division is equipped with one pool vehicle and three motorbikes.

2.2.5 Budget and Revenue

The Divisional Forest Office, Tsirang contributes in revenue generation through the collection of royalties from general forest produce, timber, firewood, non-wood forest products (NWFPs), as well as fines and penalties. The revenue collection records for the past eight years (2019–2023) by three ranges is shown in Table 2 below.

Table 2. Revenue generation status from three Range Offices under Tsirang Forest Division.

Name of Office	Revenue generation							
	2019-2020	2020-2021	2021-2022	2022-2023	2023-2024	2024-2025	2025-2026	2025-2026
Tsirang Range	1,767,718	709,652	314,479	273,340	561,399	673,678	808,413	970,095
Mendrelgang Range	-	43,052	72,328	54,723	982,223	65,667	78,800	94,560
Tsirangtoe Range	-	66,992	28,541	97,456	359,005	430,806	516,967	620,360
Total	**1,767,718**	**819,696**	**415,348**	**475,375**	**1,018,627**	**1,170,151**	**1,404,180**	**1,685,015**

***The reward paid is not included since it is not part of revenue.*

From 2021 onwards, revenue generation across all three Ranges has shown a steady upward trend. With the implementation of scientific thinning practices, the Division is expected to significantly enhance its contribution to the national exchequer.

2.3 Biodiversity conservation

The Divisional Forest Office (DFO), Tsirang is mandated to conserve the pristine biological diversity within its jurisdiction through sustainable forest management, protection of forest ecosystems, and safeguarding of associated biological resources. The Division centers its management approach on maintaining ecological integrity, ensuring sustainable utilization of forest resources, and promoting long-term conservation of flora and fauna. Through regulatory enforcement, habitat protection, biodiversity monitoring, and community engagement, the DFO works to balance conservation objectives with socio-economic needs. This chapter presents a comprehensive overview of the richness, composition, and distribution of plant and animal species across the Division.

Owing to its wide ecological range and altitudinal gradients, Tsirang Dzongkhag supports diverse ecosystems marked by high ecological complexity and a rich assemblage of flora, fauna, and avifauna. The varied habitats provide ideal conditions for several keystone and flagship species, including the Royal Bengal Tiger (*Panthera tigris*), Asian Elephant (*Elephas maximus*), Clouded Leopard (*Neofelis nebulosa*), Golden Langur (*Trachypithecus geei*), Asiatic Wild Dog/Dhole (*Cuon alpinus*), Asiatic Black Bear (*Ursus thibetanus*), Red Panda (*Ailurus fulgens*), and Gaur (*Bos gaurus*). The district also records the presence of globally threatened species such as the Chinese Pangolin (*Manis pentadactyla*).

The region supports a remarkable avian diversity, with 265 recorded bird species, comprising both aquatic and terrestrial birds. Among these, eight species are globally threatened and one critically endangered (CR). These includes the White-bellied Heron (*Ardea insignis*); four vulnerable (VU) species, Rufous-necked Hornbill (*Aceros nipalensis*), Great Hornbill (*Buceros bicornis*), and Beautiful Nuthatch (*Sitta formosa*); and four near-threatened (NT) species viz. Himalayan Vulture (*Gyps himalayensis*), River Lapwing (*Vanellus duvaucelii*), Satyr Tragopan (*Tragopan satyra*), and Lesser Adjutant (*Leptoptilos javanicus*).

Forest composition within DFO Tsirang is predominantly subtropical broadleaf forest, including both warm and cool broadleaf types. Lower elevations are characterised by species such as *Duabanga grandiflora, Terminalia myriocarpa, Toona ciliata, Altingia excelsa, Schima wallichii, Ailanthus grandis*, whereas, the mid-altitude are dominated with *Alnus* and *Mecaranga* species. The higher elevation supports mainly cool broadleaf forest dominated with Oak (*Quercus lamellosa*), *Castanopsis species, Persea fructifera,* and *Beilschmiedia sikkimensis.*

2.3.1 Forest Ecosystems

Tsirang District is predominantly characterized by three major ecosystem types: forest ecosystems, agroecosystems, and freshwater ecosystems. The forest ecosystem primarily comprises broadleaf forests and chirpine forests. The agroecosystem includes cash crop orchards, chhuzhing (wetland agriculture), and commercial farming areas. The freshwater ecosystem consists of rivers, streams, and associated irrigation systems that support both natural habitats and agricultural activities.

Among these, the forest ecosystem plays a particularly critical role in maintaining ecological balance. Forests regulate the hydrological cycle by influencing rainfall patterns, groundwater recharge, and stream flow. They stabilize soils, prevent erosion, moderate local and regional climate, and serve as vital habitats for diverse wildlife species. In addition to their ecological importance, forests provide essential goods and services, including timber, non-wood forest products, food resources, and medicinal plants. They support complex food chains and food webs by providing shelter and sustenance to a wide range of flora and fauna.

2.3.1.1 Floral composition

Based on the Rapid Biodiversity Assessment, a total of 55 families and 140 tree species were recorded in 10 grids under Tsirang Forest division and they are classified into five major life forms consisting of conifer, evergreen trees, evergreen shrubs, deciduous trees and deciduous shrubs. It was observed the area is mainly dominated by the Evergreen trees and Deciduous trees. The most dominant tree species found are *Altingia excelsa, Alnus nepalensis, Schima wallichii, Beilschemedia spp, castanopsis spp, Bridelia retusa Boehmeria regulosa, Cinnamomum verum, Helicia nilagirica, Elaeocarpus spp, Eurya spp, Gordonia, Litsea spp* and *Mallotus philippinensis.*

While the deciduous species mainly comprises of *Acer campbellii, Albezia procera, Bauhinia purpurea,Bombax ceiba, Caseria glomerata, Gmelia arborea, Ficus spp, Quercus lamellossa, Prunus cerasoides, Sterculia villosa, Terminalia myriocarpa* and *Morus species*.

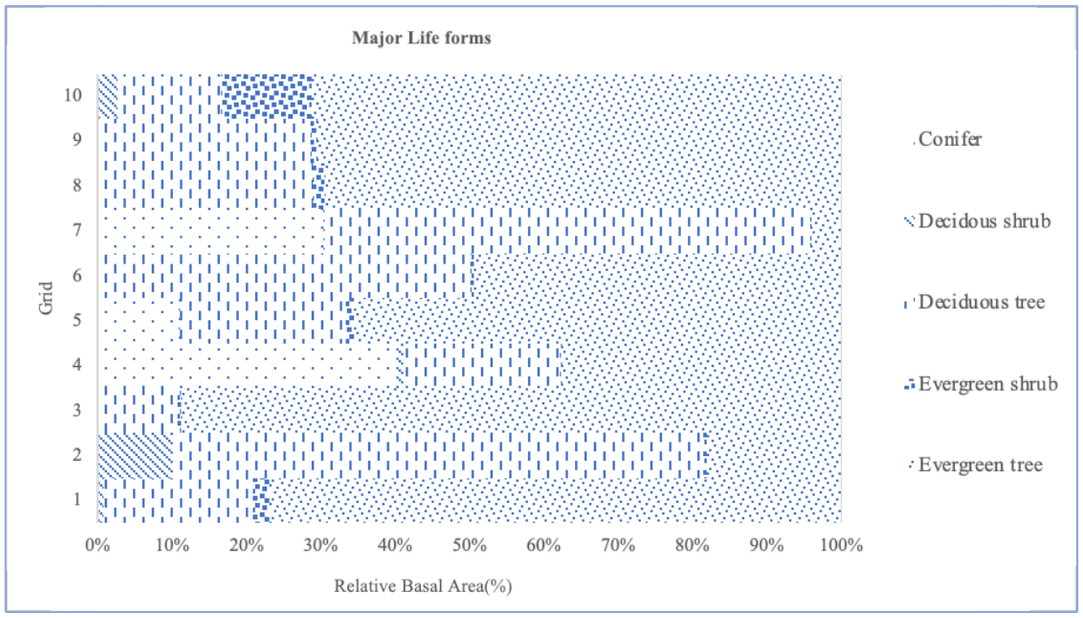


Figure 5: Distribution of major life forms of tree layers.

Floral species diversity and richness

Generally, species diversity is one of the most important indices used to evaluate ecosystem rich ecosystems with high species diversity has a large value(H') while an ecosystem with low value (H') will have low species diversity (Sobuj and Rahman, 2011; Deka et al..,2012). Species diversity also provides important information about rarity

and communities of species in a community and import indices used for evaluation of ecosystems. The highest diversity was recorded in the grid no. 6 with the diversity(H') 2.56 at elevation of 1511m and the lowest diversity was recorded in the grid no. 1 with diversity(H') at an elevation of 1223 m 1(Figure 2). A study conducted by Rao (1990) stated that tree species diversity decreased with increased disturbance. Plots with a few dominant species were found in plot no.2,3 and 9. Rao et al. (1990) reported a decline of tree species diversity due to anthropogenic activities in sub-tropical wet hill broad-leaved forest Meghalaya, India. But a study conducted by Danwal et al. (2012) stated that the diversity of Himalaya is severely threatened by natural and anthropogenic disturbance. It was also recorded that anthropogenic activities affect growth and distribution of species along the gradients.

According to Sagar and Singh (2004) this forest is structurally complex plant communities and its main characteristic feature is their high species richness. The highest species richness observed in Grid 6 at 1511m with 32 number of tree species and the lowest was recorded in grid no.9 with 9 tree species. The maximum DBH was recorded in the grid no. 3 with a DBH of 170cm and the maximum height of the trees was recorded in the grid no. 8 with a tree height of 80cm.

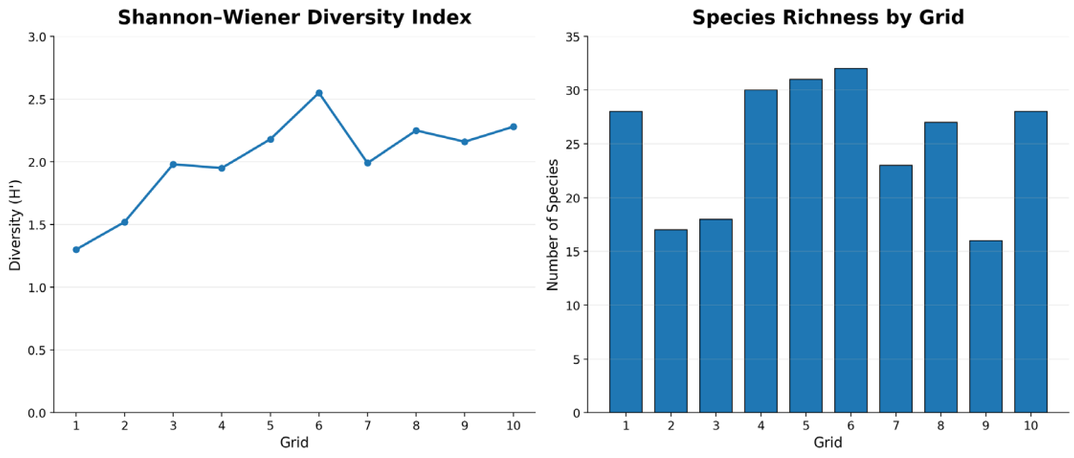


Figure 6: Showing species diversity and richness of the study site.

Regeneration status

Regeneration of the trees observed in 34 plots and only six plots were not recorded with tree regeneration. A total 124 regeneration were recorded from 34 species of trees. The regeneration was dominated by *Symplocaceae, Fagaceae, Lauraceae* and *Theaceae* families. *Symplocus lucida* (19.83%) was the highest regeneration recorded followed by *Castanopsis hystrix* (9.91%) and *Mallotus philippinensis* species (4.95%).

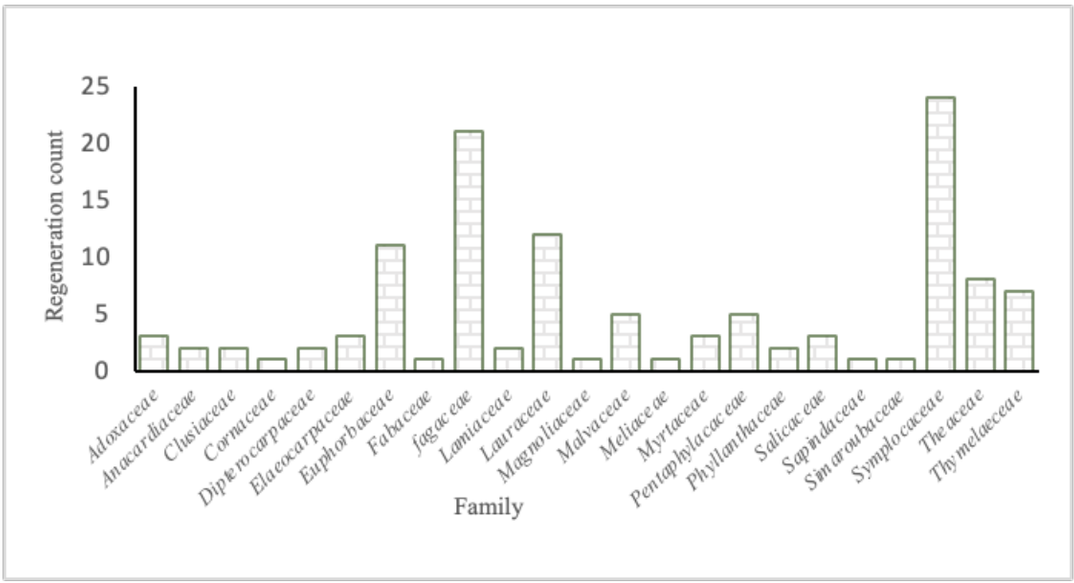


Figure 7: Showing regenerations status of trees across the family

The height class of regeneration was found distributed without significant differences in the height classes. Among 129 regenerations 62 regenerations were found to be between the height class of 1 to 20 cm followed by 44 regenerations in height class >50 cm and 23 regenerations in height class of 20 to 40 cm.

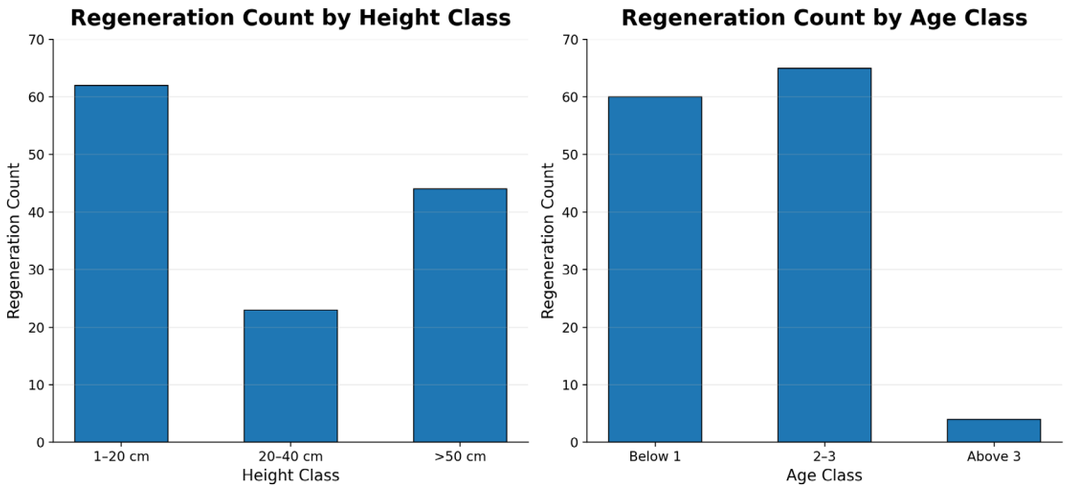


Figure 8: Regeneration height and age composition

Epiphytes species

Epiphytes species were recorded in all 10 grids enumeration plots. A total of 20 species of Epiphytes species was recorded during the RBA survey. The most dominant Epiphytes found was the *Dendrobium* species followed by *Raphidophodra grandis, Piper spp, Cymbidium spp* and *Bulbophyllum spp.*

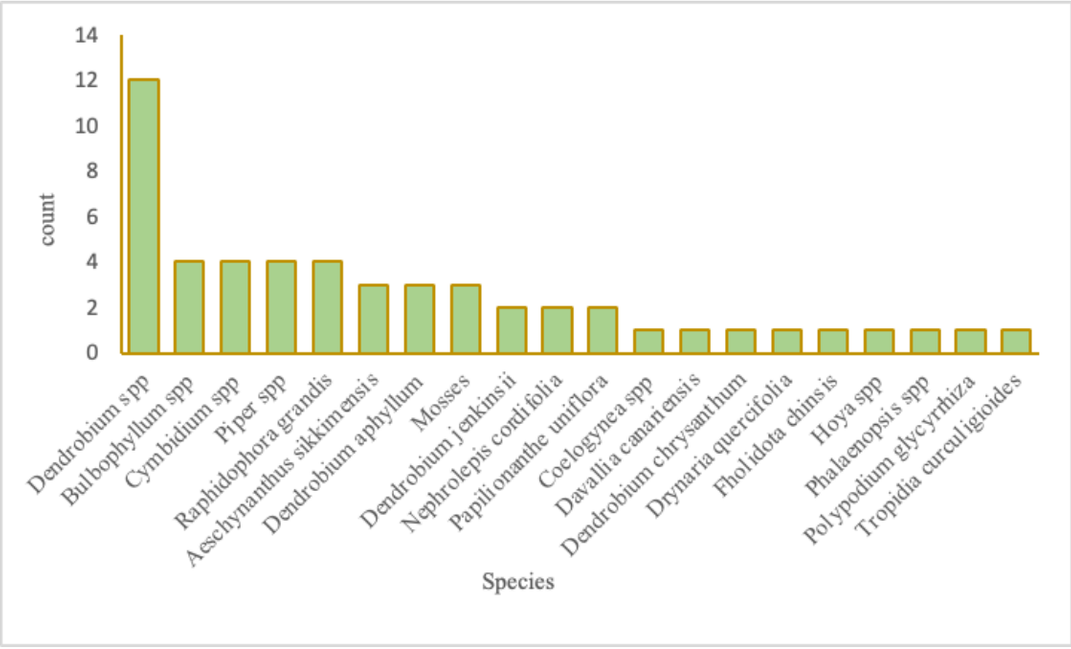


Figure 9: Epiphytes species in study area

Herbaceous Species

The presence of herbs was recorded in all Grids. A total of 65 species of ground vegetation species were recorded to 34 families. The ground vegetation plants were classified into seven categories with highest herb species (43%) followed by shrubs, ferns, grasses and least with bamboo (1%).

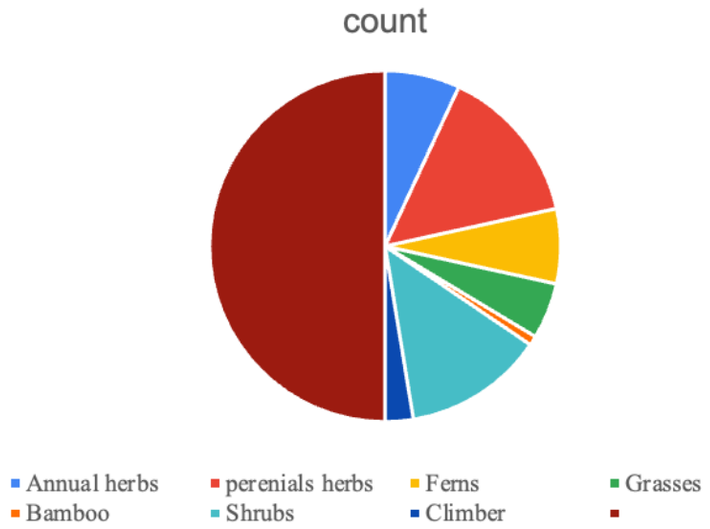


Figure 10: Distribution of major life forms of ground layer.

Wetland resources and watershed catchments of Tsirang

The Tsirang Forest Division conducted a mapping of water sources and watershed assessments across 12 gewogs in March 2021 with technical and funding support from the Watershed Management Division (WMD). According to the watershed report

(2021), Dzongkhag has four major sub-river basins: Burichu, Chancheychu, Ratekhola, and Kalikhola. These sub-basins eventually drain into the Punatsangchhu River Basin (Sunkosh), forming one of Bhutan's major river basins. Additionally, the Dzongkhag has recorded 306 water sources, 29 streams, and 4 rivers. There are also 5 perennial lakes located in various gewogs: Darachu Lake in Patsaling, Seti Pokhari, Sukey Pokhari, Kali Pokhari in Kilkhorthang, Nil-pokhari in Semjong, Dhap Pokhari in Phuntenchhu, and Tashipang Pokhari in Mendrelgang. However, most of these lakes have dried up, and some are still in the process of drying. These hilltop lakes have historically served as primary recharge areas for downstream springs, streams, and rivers, which are vital drinking and irrigation water sources for Tsirang Dzongkhag.

Furthermore, an assessment report also indicates that Tsirang Dzongkhag has recorded 306 water sources(N). Of these, 2% (n = 5 sources) have already dried up, 17% (n = 53 sources) are drying up, and 81% (n = 248 sources) remain intact (see Figure No 6.). Therefore, the Division, in collaboration with relevant organizations, must identify the villages and gewogs which have water issues (drinking and irrigation) or currently drying water sources and then carry out a comprehensive Hydrogeological assessment. Based on this assessment, design springshed management interventions followed by the implementation of springshed management interventions.

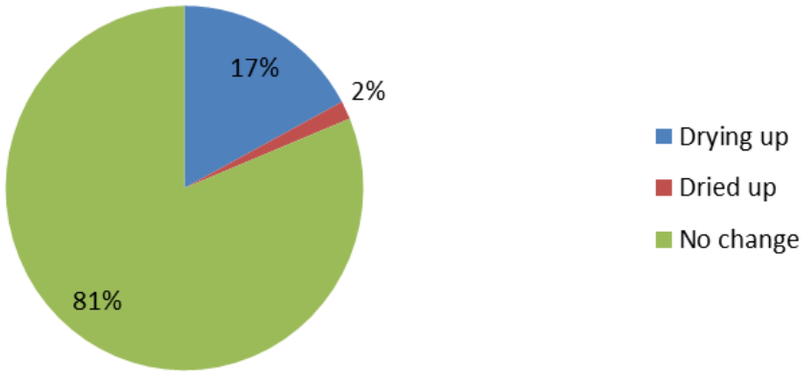


Figure 11: Status of water sources under Tsirang.

Unlike other Dzongkhag, Tsirang landscape has numerous lakes perched at the hilltop that feeds the downstream streams and springs and most of the existing lakes require revival efforts based on the Springshed protocols authored by Shresthra et al. (2021). These revival activities will not only safeguards drinking and irrigation water for downstream settlements, but also serve as crucial water sources for numerous wildlife species, including rare and globally threatened fauna.

2.3.1.2 Faunal composition

Mammals

Mammal species are integral to ecosystems, offering numerous ecological, cultural, and economic benefits. Their conservation and protection are essential for the well-being of our planet and its inhabitants (Wangchuk et al., 2003).

The camera trap data were used for studying mammal diversity status. The study was car-

ried out as a part of the National Tiger Survey from 25th February to 9th June 2022 with overall duration or trap nights of 134 days. Camera traps were installed at 26 stations and the average camera trap station spacing was 3.5 km with minimum of 1.2 km and maximum of 5.7 km. The overall camera trap effort accounts for 2099 days.

The camera trap survey revealed that Tsirang has recorded 30 species of mammals totaling to overall recorded species of 37 within DFO-Tsirang jurisdiction which comprises Endangered, Near Threatened, Vulnerable and Least Concern with one Data Deficient. Tsirang houses habitat to keystone species such as Royal Bengal Tiger (*Panthara tigris*), Asian elephant (*Elephas maximus*), clouded leopard (*Neofelis nebulosa*), Golden Langur (*Trachypithecus geei*), Asiatic wild dog- dhole (*Cuon alpinus*), Himalayan black bear (*Ursus thibetanus laniger*), Red Panda (*Ailurus fulgens*) and gaur (*Bos gaurus*). Critically endangered species such as Chinese pangolin (*Manis pentadactyla*) and Rufous-Necked hornbill (*Aceros nepalensis*) are also found in Tsirang.

2.3.1.3 Avifaunal diversity

Ten number rapid biodiversity assessment grids were laid under the Tsirang forest jurisdiction for the rapid biodiversity survey and similarly forty transects covering about 1000 m length in each transects were used for the bird counting. Wherever possible old walking trails and roads were used as transects for the survey. During the survey, about 139 bird species belonging to 51 families were recorded from forty transects which were allocated in all forest types (subtropical forest, Warm broad-leaved forest, chirpine forest and cool broad-leaved forest) present in the area. A total of 1352 bird individuals were counted for the whole survey. However, based on the information derived from secondary sources like KBA, assessment and other survey reports, the DFO Tsirang has 265 bird species, including both water and terrestrial birds. These records are supplemented by RBA surveys and secondary data collected from forestry services, field tours, social media, and scientific journals. Among these bird species, the area serves as an important habitat for eight IUCN globally threatened bird species.

The highest number of bird species recorded are from *Muscicapidae* (170 nos), *Pycnonotidae* (120 nos), *Leiothrichidae* (103 nos), *Dicruridae* (102 nos.). Nine species each from *Artamidae, Laniidae, Meropidae* and *Paridae* families. While two species from the *Acrocephalidae, Cuculidae, Dicaeidae* and *Motacillidae* families.

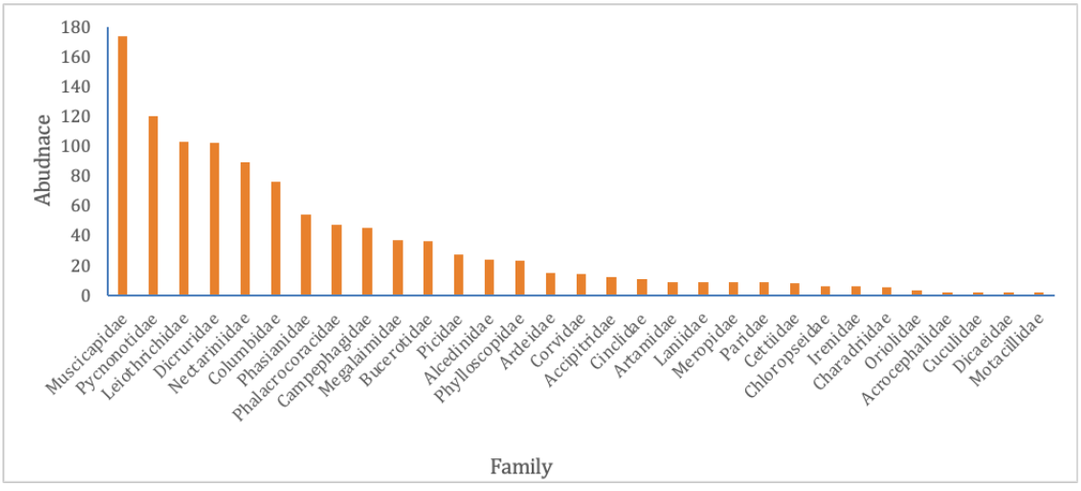


Figure 12: Bird diversity in Study area

2.3.1.4 Aquatic Ecosystem

Fish diversity

The Tsirang Forest Division has recorded 28 fish species during the recent survey from eight major streams (Burichhu, Larichhu, Changchay, Rateykhola, Khorsaneykhola, Kalikhola, Dhaneseykhola and Betenikhola) and Punatsangchhu river within the jurisdiction of its three Range Offices. Three additional species (*Anguilla bengalensis, Pseudecheneis sulcata* and *Labeo pangusia*) were later recorded by a team of foresters during the aquatic biodiversity assessment conducted for the Dhanesey Modal Rehabilitation Program in 2025 under the Mendrelgang Range.

Among the recorded species, *Schizothorax richardsonii* which is locally known as "Asala" was the most abundant (n = 182), followed by *Neolissochilus hexagonalepsis* (n = 143) and *Garra arupi* (n = 53). In contrast, *Labeo pangusia, Garra gotyla, Garra quadratirostris* and *Anguilla bengalensis* (n = 1) were the least abundant fish species within the jurisdiction of Tsirang district (Figure 13).

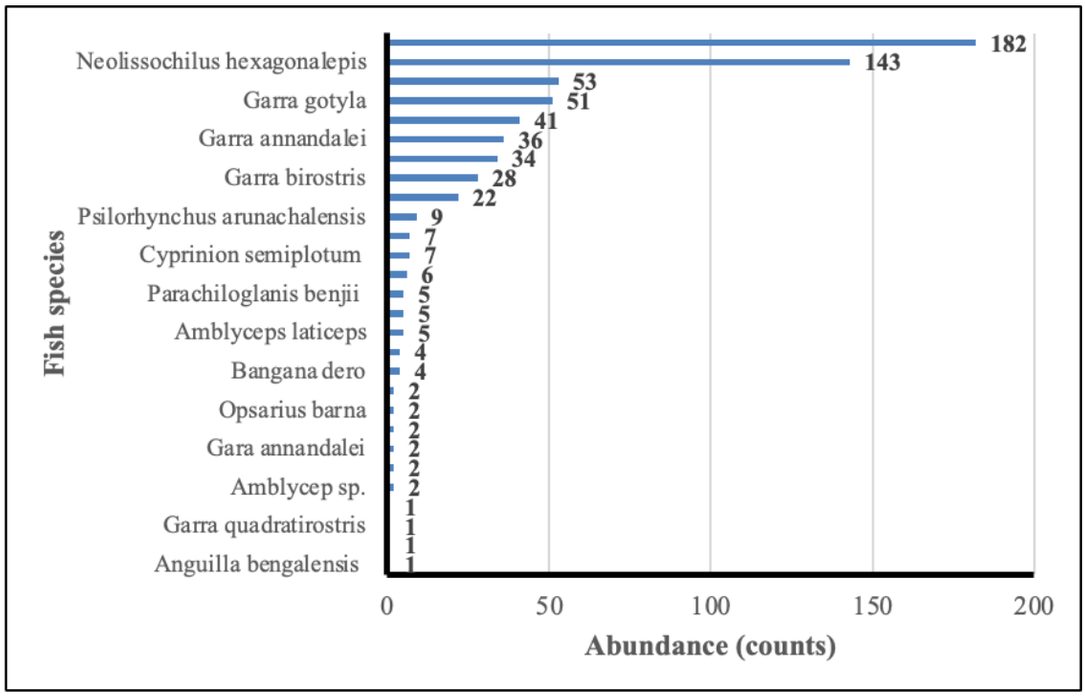


Figure 13: Showing fish diversity in Tsirang.

2.4 Existing Management Regimes

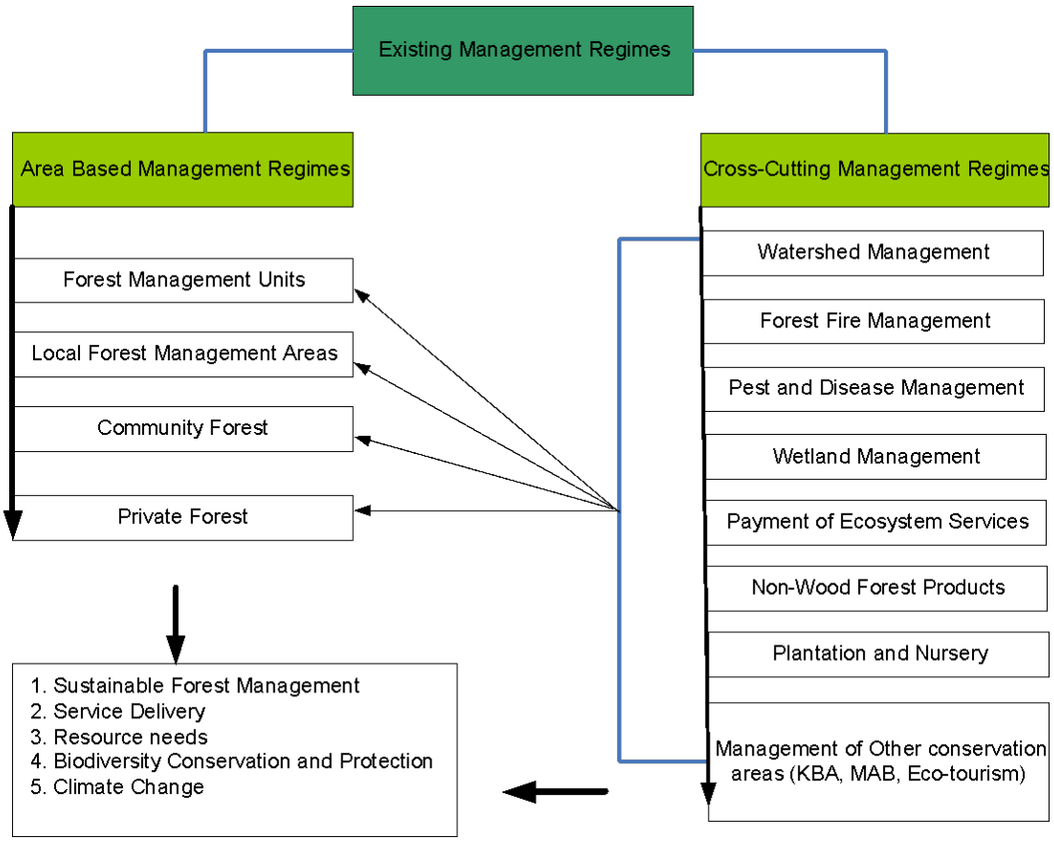


Figure 14: Thematic representation of existing management regimes

2.4.1 Area Based Management Regimes

2.4.1.1. Local Forest Management Area

Tsirang Division has 5 approved local forest Management plans, covering an area of 9447.50 ha which is approximately 15 % of the total Gewog geographical area of the Dzongkhag. Basically, the LFMAs contribute towards sustainable utilization and management of forest resources outside other fmanagement regimes. List of all the LFMAs with relevant information is indicated in the table below.

Table 3: Showing the LFMP area in Tsirang

Local Forest Management area								
Name of LFMA	Dzong-khag	Gewog	Year of establish-ment	Total Ge-wog area (_ha)	Area cov-ered by the plan (_ha)	Annual allowable cut (ACC)-m^3	Plan period	Plan cycle
LFMP	Tsirang	Dunglagang	2019	4611	1645.5	762	2019-2029	10
LFMP	Tsirang	Phungten-chu	2018	13647.42	1891.92	2569	2018-2028	10
LFMP	Tsirang	Kikorthang	2017	1771.42	553.20	123	2017-2027	10
LFMP	Tsirang	Semjong	2020	1457.06	149.20	201	2020-2030	10
LFMP	Tsirang	Sergithang	2020	13664.77	5207.68	2646	2020-2030	10
			Total	**21396,61**	**9447.50**	**6301**		

2.4.1.2. Community Forest

The division established 49 community forests in Tsirang managing natural resources within the vicinity of settlement. Community forests act in significant roles to maintain sustainable management of forest resources through enhancing livelihood of local communities. In addition, the forest resource requirement for the CFMG is mostly met from the approved CFs, and in case if the resource is insufficient, their requirement is met from SRF land. Further, the community forests in this division were encouraged to promote value addition programs such as production of NWFP and NTFP by the CFMG members through proper marketing linkages. `

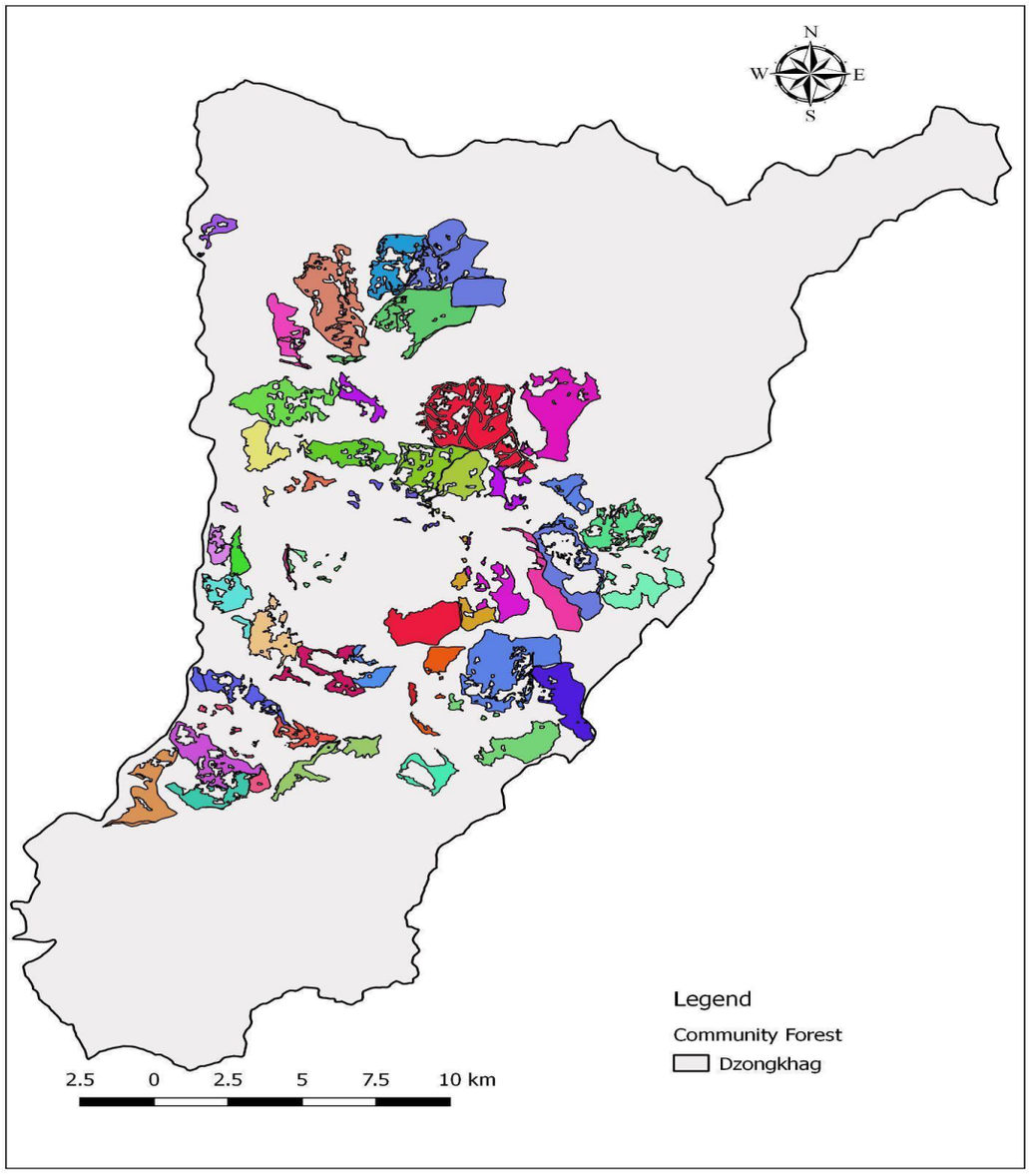


Figure 15: Map showing CFs location in Tsirang Dzongkhag.

2.4.1.3. Private Forest

As of 30th June 2024, there are 9 private forests registered with the Divisional Forest Office, Tsirang which covers 2.92 hectares of land. Private forests play an important role in protecting and conserving their private registered land to meet the forest resource needs of the individual household and other community as well. The private forest can further strengthen and promote through plantation of desirable, high value, commercial timber species and other fruit trees for the benefits of local communities. In this division, most of the land owners have planted commercial timber species such as *Tectona grandis* (Teak), *Cupressus corneyana* (Tsenden), *Michelia doltshopa* (Champ), *Juglans regia* (walnut).

2.4.2 Cross Cutting Management Regimes

The division has cross cutting management regimes such as Non-wood Forest Product Management Group, Payment for Ecosystem Services (PES), Forest Fire Management Group, Plantation and Nursery Management, Key Biodiversity Species Management, High Conservation Value area Management and Ecotourism Product Management through various plan and strategy to ensure better wildlife conservation and forest resources management.

2.4.2.1 Biological Corridor

BC-3 has an area of 407.69 km2 with an approximate length of 57.68 km and width of 27.47 km. BC-3 connects Jigme Singye Wangchuck National Park, Phibsoo Wildlife Sanctuary and Royal Manas National Park. It shares an area of 6329.20 ha (63.29 sq km) with Divisional Forest Office, Tsirang which is 15.52% of the BC-3 area. Rest 84.48% of BC-3 area falls inside Divisional Forest Office, Sarpang. The BC area in Tsirang falls in two Gewogs namely Dunglagang with 1062 ha (_2.60%) and Patshaling Gewog with 5267 ha (12.92 %).

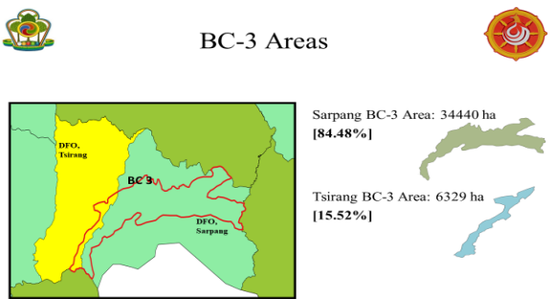


Figure 16: Map showing of BC-3

Table 4: Showing Biological corridor details in Tsirang

Division	Gewog	Area (ha)	Percentage
Tsirang	Dunglagang	1062	2.60%
Tsirang	Patshaling	5267	12.92%
	Total	**6329 ha**	**15.52%**

Table no 5: Showing Cross Cutting Management Regimes/Interventions

Cross Cutting Management Regimes/Interventions									
Sl.No.	**Cross Cutting Management Regimes/Interventions**	**Cross Cutting Management Regimes/Interventions**	**Dzongkhag**	**Gewog**	**Name to the area-based management regimes / Location***	**Total area under management intervention (ha)**	**Area covered by the area-based plan (ha)**	**Key Management Interventions ****	**Plan Period to the area-based management plan**
4	Payment for Ecosystem Services	Thakhorling & Khuchi Darachu Watershed Management Group	Tsirang	Patshaling	Payment for Ecosystem Services (PES), Thakhorling & Khuchi	1535	389.93	Water sources protection, plantation, cleaning water sources & control illegal felling	2019-2029
5	Non-wood Forest Products	Serzhong-Menchu, Batasey & Tashiling NWFP Group	Tsirang	Phuntengchu, Semjong & Kilkhorthang	Non-wood Forest Product Management & Marketing	739.86	739.86	Sustainable management of NWFP & enhance livelihood	2020-2025
6	Forest Fire management	Interagency Forest Fire Coordination Groups (IFFCG)	Tsirang	12 gewogs	Standard Operating Procedure(SOP)	-	-	Timely, efficient & effective forest firefighting action	2021-2030
7	Plantation and Nursery	Normal plantation	Tsirang	8 gewogs	Normal plantation	295		Maintenance & silviculture thinning	
		CF plantation	Tsirang	12 gewogs	CF plantation	96		Maintenance & silviculture thinning	
		Nursery	Tsirang	Kilkhorthang	Nursery	0.3		Seed collection and seedling production	
8	Key Biodiversity Area	Waklaytar-Balwani KBA action plan	Tsirang	Rangthangling, Tsirangtoe, Barzhong, Tsholingkhar	Key Biodiversity Area protection and conservation	6022	6022	Conservation of golden Masher & WBH	2023-2033
9	Eco-tourism and recreational area	Sunkosh hot stone bath & eco-track	Tsirang	Tsholingkhar	Community based ecotourism product management	-	-	Hot stone bath, eco-trail, camp site & homestay	-
10	High Conservation Value Area	Cloud Forest Darachu- Norjangsa	Tsirang	Patshaling, Rangthaling, Kikorthang, Dunglagang	Ecosystem and Habitat	2335	2335	Cloud Forest	2024-2034

2.4.2.2 Nursery and plantation

Tsirang Forest Division has a central nursery located at the Division compound that covers 0.5 hectares. Annually the Division raised both ornamental and commercial timber species to meet the seedlings' demand for various types of plantation namely community plantations, normal afforestation plantations, avenue and institutional plantations. Some of the seedlings raised are *Michelia doltsopha, Gmelina arborea, Terminalia myriocarpa, Ziziphus bodhensis, Camalia chinensis, Jacaranda, Rhododendron, Cupressus corneyana, Percia fructifera, Phoebe attenuata,* and bamboo species.

Figure 17: Showing the Nursery of Divisional Office

The Division, through different stakeholders and agencies, has been creating both normal and CF plantations at various locations under Tsirang Dzongkhag. As of June 2024, a total of 729 acres (295 hectares) of normal plantations were created in barren and degraded state-reserved forest (SRF)land and 237 acres (96 hectares) of Community Forests area were reforested. The objective of these plantations is to make availability of valuable/ commercial species to meet the future constructional timber requirement for the rural and urban communities. Some of the timber species planted in the plantation sites are *Techtona grandis, Gmelina arborea, Michelia doltsopha, Terminalia myriocarpa*, constructional bamboo, *Percia fructifera, Phoebe attenuata, Cupressus corneyana* and *Juglans regia* etc.

2.4.2.3 Forest fire (Interagency Forest Fire Coordination Group)

Currently, firefighters lack a common coordinated system for command and control for incident management planning during forest fire incidents. In the absence of reliable incident management planning, all concerned agencies often fail to coordinate effective suppression responses and also are exposed to unnecessary safety concerns. The IFFCG and local communities will contribute to fight forest fires. The response to forest fire incidence in Tsirang requires a proper incident management system taking into consideration coordination, effective response mobilization and putting firefighter's safety

first. The proper system describes and defines the responsibilities for all the stakeholders standard operational flow from the Chairperson down through the entire IFFCG Focals were developed to implement the activity.

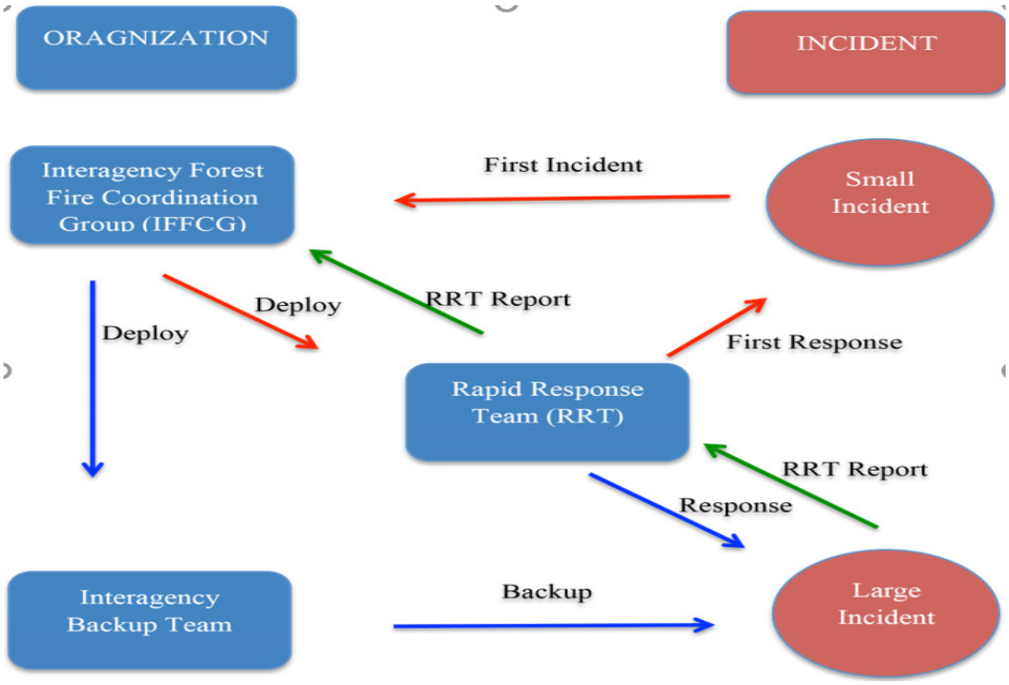


Figure 18: Incident coordination system during forest fire

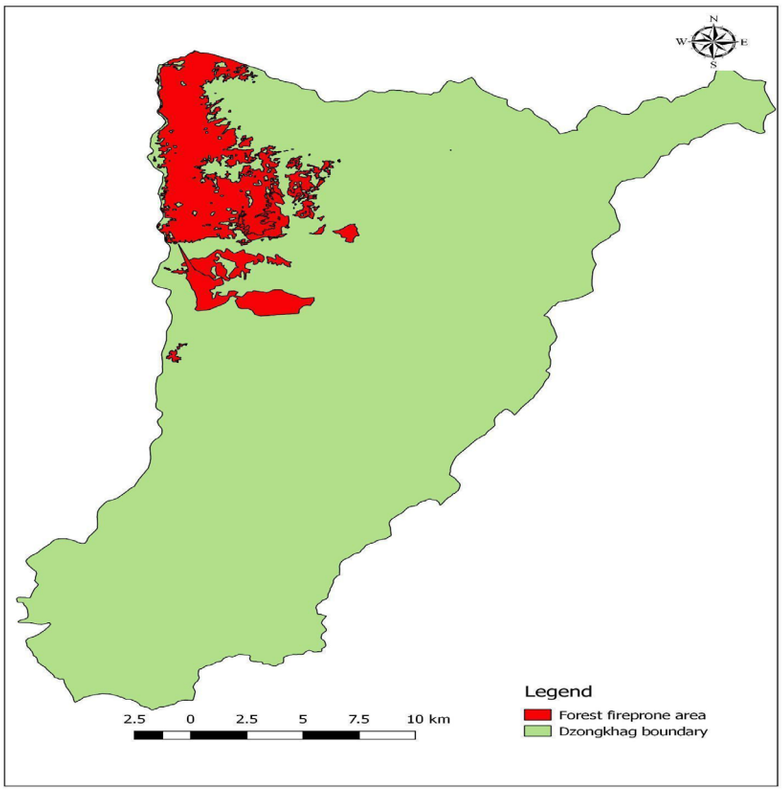


Figure 19: Showing the forest fire prone area

DFO Tsirang, areas with chirpine forests and Gewogs located at lower altitudes are at risk of forest fires and are categorized as forest fire-prone areas. The Gewogs at risk are Sergithang, Tsirangtoed, and Tsholingkhar.

2.4.2.4 Non-Wood Forest Products (NWFP)

The Divisional Forest Office, Tsirang established three NWFP Management and Marketing Groups. Serzhong and Menchuna NWFP Management group was formed in the year 2021 in Puntengchu gewog under Tsirang Dzongkhag. The group has an area of 731.79 ha (1807.52) acres of NWFP resources in State Reserved Forest Land, benefitting 20 households. The main focused NWPF species are such as cane, bamboo, mushroom and other medicinal plants. Batasey NWFP management group was established in the year 2022 under Kilkhorthang Gewog. The NWFP group is located about 2.5 kms away from Damphu town. The group has a total area of 4.20 acres of SRF land management by 12 households.

The main objective of the group is to manage and utilization of broom grass enhancing cash income opportunities for the local community. Further, Tashiling NWFP management group was initiated and established under Semjong gewog to manage and utilize broom grass to enhance income generation to group members in the year 2020. The group has an area of 15 acres of SRF land managed by 20 households.

Table 6: Record of NWFP groups approved under this division

Sl No	Name of CF	Dzongkhag	Gewog	Year of Creation	Area (ha)	CF Member		Total member
						M	F	
1	Serzhong/Menchuna NWFP	Tsirang	Phuentenchu	August 2021	731.79	24	4	28
2	Batasey NWFP Mgt. & Marketing Group	Tsirang	Kilkhorthang	2011	2	7	5	12
3	Tashiling Sarikagthab Deytshen	Tsirang	Semjong	2020	6.07	14	6	20

2.4.2.5 Key Biodiversity Area

The Waklaytar-Balwani KBA is one of the most suitable and prime habitats for White-bellied Heron (WBH). The WBH is categorized as a critically endangered species under the IUCN Red List of threatened species. The Heron is found to feed on fish species in this freshwater river ecosystem of Sunkosh/Punatsangchu river and its tributaries. During the population survey of WBH 2022, the highest count of WBH in the wild was recorded from Wakleytar bridge to Balwani zone. A total count of seven individuals including two breeding pairs were recorded in the area and out of 3 total active nest sites, 2 are found in this KBA (RSPN, 2022). Knowing its distribution and preferred feeding site indicates that the area is the most preferable habitat for WBH. In this regard, conservation of WBH and its habitat management is necessary as they are indicators of our freshwater ecosystem.

Waklaytar-Balwani Key Biodiversity Area site is located 20 km drive from Damphu, Tsirang District Headquarter. This KBA shares its boundary with Dagana Dzongkhag jurisdiction as the other side of the river stretch falls under Dagana. This KBA runs through six Gewogs of Tsirang viz. Sergithang, Tsirangtoe, Tsholingkhar, Rangthaling, Mendrelgang and Barshong Gewogs. The area is rich in biodiversity and prime habitat for WBH, Golden Mahseer and many threatened riverine species.

The KBA has an area of 6.22 Sq.km covering from the Waklaytar bridge to Kalikhola confluence (Balwani) ranging altitude from 250 m.a.s.l to 580 m.a.s.l. This KBA site meets both the criteria of Administrative Criterion for KBA management and Scientific Criterion set in KBA Standards of the IUCN. This KBA falls under A1a Threatened Species and B1 Individual geographically restricted species of the scientific criterion set in KBA standards of IUCN. This KBA meets all the Administrative criteria for KBA Management.

2.4.2.6 Payment for Ecosystem services (PES)

The Thakhorling and Khuchi Darachhu Watershed Management Group was officially established in the year 2019 as Payment for Ecosystem Services (PES). The main goal and objective of initiating such a management group is to protect the water sources or watershed areas by local communities to ensure sustainable drinking water supply to Damphu water users in return the water users shall make payment annually as per the agreement signed. However, the service provider (Local communities) should implement the activities such as protecting water source, cleaning of water tank, plantation and monitor the illegal extraction of forest resources within the identified watershed areas. Further, the intermediates (Forest Division, Dzongkhag Administration, Tsirang, Municipal Office, Damphu and Thromdey Thuemi) shall conduct monitoring of Payment for Ecosystem services twice in a year (i.e June & December) to ensure sustainable supply of water to service users.Figure 24: Map showing the location of Pawkhola & Khuchi Darachu PES

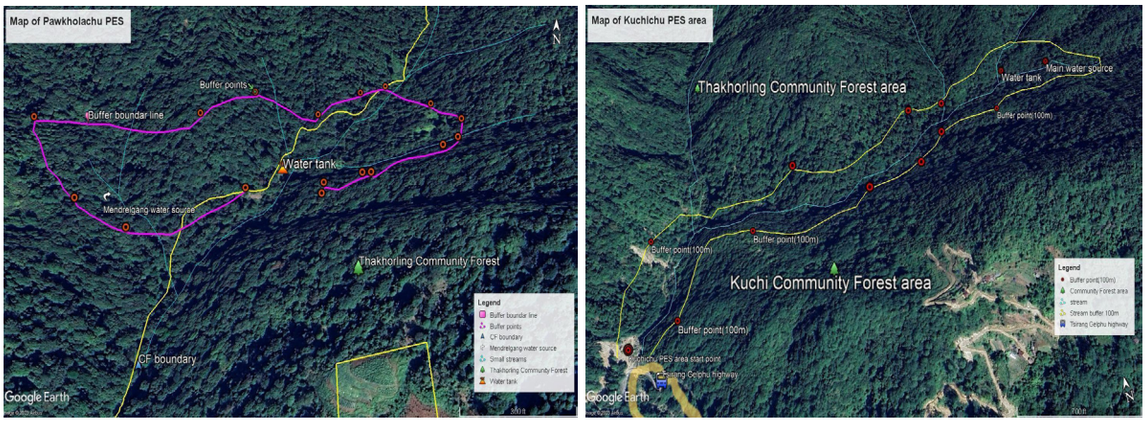


Fig 20: Map showing the location of PES

2.4.2.7 Ecotourism

Tsirang Forest Division, in collaboration with the Local Government (LG) Organization, particularly the Dzongkhag Administration, has developed the first Community-based Eco-tourism Amenities at Sunkosh under the district with funding support from the Asian Forestry Cooperation (AFoCO) and the Royal Society for the Protection of Nature (RSPN) in 2023. Devithan Community Forest Management Group provides serene habitat for the

White-bellied Heron (WBH) conservation, potential rafting and water birding site, healing effect of hotstone bath, experience cultural diversity, and significant contribution for 28 households of Sunkosh and Nimazor Chiwog under Rangthaling Gewog and other business community in the area. The Dzongkhag administration and Divisional Forest Office, Tsirang with support from RSPN has formulated this SOP and by-laws for the sustainable management of the amenities through providing a sense of ownership and generation of income for Devithan CFMG and the local communities. The eco-tourism amenities consequently handed over to the Devithan Community Forest Management Groups (CFMG) for sustainable management and income generation on 5th February, 2024.

Figure 21: Images showing the Community-based Ecotourism Amenities of Sunkosh.

2.5 Forest Resources and Utilization

2.5.1 Forest Resources

2.5.1.1 Forest cover by Forest type

The forest areas are further segregated into different forest types in Table 8. Warm Broadleaved Forest dominates the forest cover in Tsirang that accounts to 47.27% of the total forested area. This is followed by Sub-tropical Forests (17.18%), Cool Broadleaved Forest (13.28%), Evergreen Oak Forests (4.73%) and Fir Forest (2.07%). Other forest types, such as Chir Pine, Blue Pine, Hemlock, Spruce, and Juniper Rhododendron have forest cover less than 1% of the total forest area. The total forest area is estimated to be 87.21 % (55686.87 ha) of the total land area while the remaining 12.79 % (8164.87 ha) of the total land area is estimated to be the non-forest area. .

Table 7: Total land area by forest

1. Forest cover	
Forest Cover (ha)	**Forest Cover (%)**
55686.87	87.21%

Table 8: Overall forest cover by forest type in Tsirang Dzongkhag.

Forest Types	Forest Cover (ha)	Forest Cover (%)
Subtropical Forest	10971.74	17.18
Chir Pine Forest	640.44	1.00
Warm Broadleaved Forest	30180.15	47.27
Evergreen Oak Forests	3020.63	4.73
Cool Broadleaved Forest	8478.34	13.28
Blue Pine Forest	75.51	0.12
Spruce Forest	216.95	0.34
Hemlock Forest	717.04	1.12
Fir Forest	1324.23	2.07
Juniper Rhododendron Forest	61.84	0.10
Total	**55686.87**	**87.21**

2.5.1.2 Stem density by forest type

Tree density in the different forest types of Bhutan ranges from 254 to 426 trees per ha with a total tree count 20.64 million for forest under Tsirang DFO. Table 9 shows the warm broadleaved forest dominates the tree count (11317555.24 trees), followed by Cool broadleaved forest (3535465.90 trees) in the Division. However, the total tree count is lowest in Blue Pine Forest (32167.26 trees) unlike other forest types in the district.

Table 9: Stem density by forest type

Tree count by Forest types	Forest Area (Ha)	Tree count/ha	Total tree count
Subtropical Forest	10971.74	310.00	3401239.28
Chir Pine Forest	640.44	254.00	162671.38
Warm Broadleaved Forest	30180.15	375.00	11317555.24
Evergreen Oak Forests	3020.63	417.00	1259603.32
Cool Broadleaved Forest	8478.34	417.00	3535465.90
Blue Pine Forest	75.51	426.00	32167.26
Spruce Forest	216.95	401.00	86998.31
Hemlock Forest	717.04	406.00	291119.64
Fir Forest	1324.23	402.00	532342.44
Juniper Rhododendron Forest	61.84	269.00	16633.94
Total	**55686.87**	**3677.00**	**20635796.69**

Source: NFI (2023) Volume I page No. 38, Table No.4.11

2.5.1.3 Growing stock by forest type

In Tsirang Dzongkhag, the average growing stock is 188.71 m3 per hectare. For Tsirang DFO, the total growing stock by forest type is 13917943.66 m3. According to the data, Hemlock forests have the highest growing stock per hectare (442.70 m3/ha), while Juniper-Rhododendron forests have the lowest (101.04 m3/ha). However, in terms of total growing stock, Warm Broadleaved forests dominate (6881979 m3) all other forest types, as indicated in Table 10.

Table 10: Growing stocks of respective forest types of Tsirang Divisional Forest Office

Growing stock by Forest types	Forest area(ha)	Growing stock/ha	Total growing stock
Subtropical Forest	10971.74	160.9	1765352.97
Chir Pine Forest	640.44	116.93	74886.65
Warm Broadleaved Forest	30180.15	228.03	6881979.60
Evergreen Oak Forests	3020.63	341.01	1030065.04
Cool Broadleaved Forest	8478.34	379.15	3214562.61
Blue Pine Forest	75.51	209.17	15794.43
Spruce Forest	216.95	384.84	83491.04
Hemlock Forest	717.04	442.7	317433.61
Fir Forest	1324.23	398.82	528129.41
Juniper Rhododendron Forest	61.84	101.04	6248.31
Total	**55686.87**	**13917943.66**	

Source: NFI (2023), Vol. I, page No.63, Table No.6.6.

2.5.1.4 Basal Area/ha

Meanwhile, the basal area ranges from 15.14 to 46.51 m^2/ha for the different forest types in Bhutan. This is used to estimate the total basal area in the forest. Accordingly, for the DFO, the total basal area is estimated at 1646675 m2 based on the forest area under different forest types in the DFO.

Table 11: Table showing the total Basal area in the DFO by forest type

Total basal area	1646675.42	Basal area/ha	Total basal area(m2)
Basal Area by Forest types	Forest area(ha)		
Subtropical Forest	10971.74	20.08	220312.53
Chir Pine Forest	640.44	15.14	9696.24
Warm Broadleaved Forest	30180.15	27.67	835084.67
Evergreen Oak Forests	3020.63	38.07	114995.44
Cool Broadleaved Forest	8478.34	42.89	363635.81
Blue Pine Forest	75.51	23.14	1747.30
Spruce Forest	216.95	36.95	8016.43
Hemlock Forest	717.04	46.51	33349.69
Fir Forest	1324.23	44.47	58888.73
Juniper Rhododendron Forest	61.84	15.34	948.57
Total	**55686.87**	**310.26**	**1646675.**

Source: basal area density derived from NFI (2023), Vol.II.

The table shows that basal area /ha was the highest for Hemlock Forest (46.51 m^2/ha) while Chirpine Forest has the lowest (15.14 m^2/ha). However, in the case of total basal area, Warm Broadleaved Forest was the highest (835084.67 m^2) and Juniper Rhododendron Forest has the lowest (948.57 m^2) as shown in Table No.11.

2.5.1.5 Biomass stock by forest type

The biomass density of Bhutan's forest is 195.55 tonne/ha. For Tsirang DFO, the total biomass of 13.91 million tonnes is estimated using the biomass density of the different carbon pool; Above Ground Biomass (AGB), Below Ground Biomass (BGB), Coarse woody debris (CWD) and Litter, by forest type.

Table 12: Table showing the biomass by forest type

Pools		AGB	BGB	CWD	Litter	Total
Total Biomass (Million tonnes)		10205708.22	2681919.23	296714.92	730413.99	13914756.35
Biomass by Forest types	**Forest area(ha)**	**AGB**	**BGB**	**CWD**	**Litter**	**Total**
Subtropical Forest	10971.74	1197126.40	338252.38	25235.00	127491.62	1688105.40
Chir Pine Forest	640.44	62856.56	17938.60	2241.54	10573.66	93610.36
Warm Broadleaved Forest	30180.15	5387855.40	1403828.17	159049.39	367594.23	7318327.18
Evergreen Oak Forests	3020.63	759291.43	196270.06	8820.24	36519.42	1000901.14
Cool Broadleaved Forest	8478.34	2220669.79	575226.88	72065.89	143283.95	3011246.51
Blue Pine Forest	75.51	9347.11	2566.01	501.39	2207.16	14621.67
Spruce Forest	216.95	53320.25	13673.08	1368.95	993.63	69355.92
Hemlock Forest	717.04	186957.43	48431.81	12282.90	12462.16	260134.29
Fir Forest	1324.23	323516.39	84385.95	15043.25	28775.52	451721.11
Juniper Rhododendron Forest	61.84	4767.46	1346.30	106.36	512.65	6732.78
Total Biomass (tonnes)	**55686.87**	**10205708.22**	**2681919.23**	**296714.92**	**730413.99**	**13914756.35**

2.5.1.6 Forest Carbon stocks

Tsirang DFO has a total carbon stock of 9.78 million tonnes. Table 13 shows the carbon stock of Tsirang DFO estimated using the forest carbon density in different pools by forest types.

Table 13: showing the carbon stock by forest type

Total carbon (tonnes)	**9783704.01**						
Carbon stock by Forest types	**Forest area(ha)**	**AGB**	**BGB**	**CWD**	**Litter**	**SOC**	**Total**
Subtropical Forest	10971.74	562630.83	158980.51	11849.48	59905.7	380280.51	1173647.03
Chir Pine Forest	640.44	29543.5	8428.19	1050.32	4969.81	17150.98	61142.81
Warm Broadleaved Forest	30180.15	2532416.39	659738.08	74846.77	172932.26	1663831.67	5103765.17
Evergreen Oak Forests	3020.63	356857.23	92250.04	4138.26	17157.18	249564.45	719967.16
Cool Broadleaved Forest	8478.34	1043683.65	270374.26	33828.58	67318.02	710993.59	2126198.11
Blue Pine Forest	75.51	4393.17	1205.89	235.59	1037.51	3572.38	10444.54
Spruce Forest	216.95	25059.89	6426.06	644.34	468.61	19655.67	52254.58
Hemlock Forest	717.04	87873.25	22766.02	5772.17	5858.22	66469.61	188739.27
Fir Forest	1324.23	152048.09	39660.69	7071.39	13533.63	126331.54	338645.34
Juniper Rhododendron Forest	61.84	2240.46	632.62	50.09	241.18	5735.66	8900.01
Total carbon (tonnes)	**4796746.46**	**1260462.37**	**139487**	**343422.12**	**3243586.06**	**9783704.01**	

2.5.1.6 Biomass and Carbon Increment

The periodic annual biomass and carbon increment for forest under Tsirang DFO is 0.14 and 0.06 million tonnes respectively.

Table 14: Showing the biomass increment by forest type

8. Biomass and carbon increment			
	Biomass	**Carbon**	
Average Increment	3.45	1.62	
Biomass increment by Forest Types			
Forest types	**Forest area (Ha)**	**Biomass Increment (tonnes/ha/yr)**	**Total increment**
Subtropical Forest	10971.74	2.94	32256.91
Chir Pine Forest	640.44	1.84	1178.41
Warm Broadleaved Forest	30180.15	2.79	84202.61
Evergreen Oak Forests	3020.63	0.77	2325.89
Cool Broadleaved Forest	8478.34	2.13	18058.85
Blue Pine Forest	75.51	3.45	260.51
Spruce Forest	216.95	3.20	694.25
Hemlock Forest	717.04	2.44	1749.59
Fir Forest	1324.23	2.19	2900.07
Juniper Rhododendron Forest	61.84	0.58	35.87
Total	**55686.87**	**22.33**	**143662.96**

2.5.1.7 Carbon Increment by forest types

Carbon Increment by Forest types	**Forest area (Ha)**	**Carbon Increment (tonnes/ha/yr)**	**Total increment**
Subtropical Forest	10971.74	1.38	15141.00
Chir Pine Forest	640.44	0.86	550.78
Warm Broadleaved Forest	30180.15	1.31	39535.99
Evergreen Oak Forests	3020.63	0.36	1087.43
Cool Broadleaved Forest	8478.34	1.00	8478.34
Blue Pine Forest	75.51	1.62	122.33
Spruce Forest	216.95	1.51	327.60
Hemlock Forest	717.04	1.15	824.60
Fir Forest	1324.23	1.03	1363.96
Juniper Rhododendron Forest	61.84	0.27	16.70
Total	**55686.87**	**10.49**	**67448.72**

2.5.1.8 Carbon Sequestration

The total carbon sequestration rate of Tsirang Dzongkhag is 5.95 tonnes CO2 ha-1 yr-1 sequestering 323,456.18 tonnes CO2 annually as reported in the NFI II.

However, the carbon sequestration capacity for forests under Tsirang DFO is estimated using the biomass growth for the DFO using the sequestration rate of the different forest types as discussed in Table 14 above. Therefore, the total carbon sequestration rate for DFO Tsirang is 67448.72 tonnes.

Table 15: Total carbon sequestration under Tsirang DFO

Area	Biomass Growth (tonnes)	Carbon Fraction	CO2 fraction/ equivalent	Total Carbon Sequestration (tonnes CO2)
Tsirang DFO	143662.95	0.47	3.67	247579.15

This significant capacity for carbon uptake reflects the health and productivity of the forest ecosystems. Effective management practices and conservation efforts have fostered the forest to enhance carbon storage, playing a vital role in mitigating climate change. Thus, continued focus on sustainable forest management is essential in maintaining and potentially increasing these carbon sequestration rates, benefiting both local biodiversity and global climate health.

2.5.2 Function Mapping

Forest function mapping is an essential tool for sustainable forest management, providing significant ecological, social, and economic benefits. It identifies critical habitats for biodiversity conservation, designates areas suitable for sustainable resource use, and protects vital ecosystem services such as water regulation, soil stabilization, and carbon sequestration. By identifying regions with high carbon storage potential, it supports climate change mitigation and enhances disaster risk reduction by clarifying the protective roles of forests. Economically, it fosters sustainable livelihoods through ecotourism and resource harvesting while guiding effective forest management policies and land use planning. Within the Divisional Forest Office's management plan, forest function mapping ensures informed decision-making, incorporates unmanaged areas, and aligns with best practices to promote forest stewardship and long-term sustainability.

Areas under Existing Management Regimes

Management regimes such as Key Biodiversity Areas (KBA), Non-Wood Forest Product (NWFP) collection zones, Community Forests (CFs), Local Forest Management Areas (LFMA), and Scientific Thinning Areas are vital for effective forest conservation and sustainable management. By strategically planning and implementing these regimes,the Divisional Forest Office (DFO) can enhance biodiversity conservation, optimize resource utilization, and foster active community participation. This integrated approach ensures the protection of critical habitats while supporting local livelihoods through sustainable practices that uphold ecological integrity.

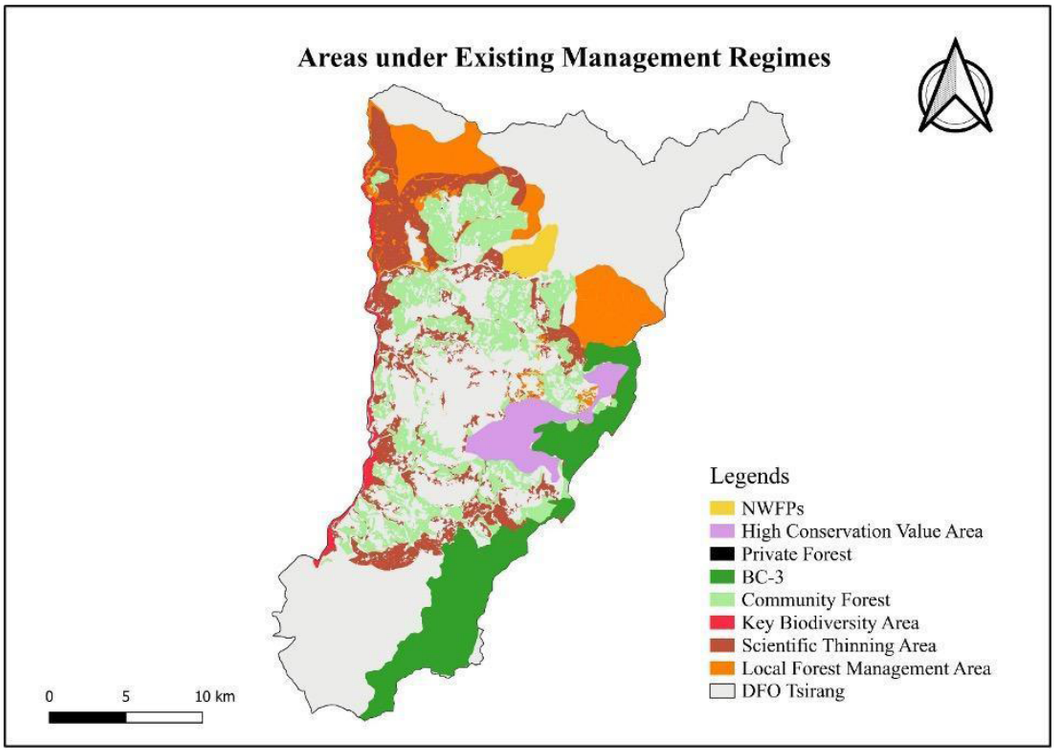


Fig 22: Area under existing management regimes

Sl. No	Existing Management Regimes	Area (ha)
1	Key Biodiversity Area (KBA)	621.474
2	Community Forest (CF)	10349
3	Local Forest Management Area (LFMA)	9120.287
4	Scientific Thinning	8812.092
5	Private Forest	2.89
6	Biological Corridor-3 (BC-3)	7757.026
7	High Conservation Value Area (HCVA)	2330.55
8	Non-wood Forest Products (NWFP)	739.565

Management Circles outside Existing Management Regimes

The figure and table provide an overview of the area statements for the management and working circles within the DFO, Tsirang. The division encompasses a total area of 63,783.4208 hectares, with specific management circles allocated for various purposes. Within the management circles covering the entire area, the protection circle encompasses 7530.769 hectares, the production circle spans 50887.91 hectares, and the non-production circle covers 5372.656 hectares, totaling 63791.335 hectares. Additionally, management circles outside existing regimes include a protection circle of 1546.772hectares, a production circle of 20209.29 hectares, and a non-production circle of 1018.039 hectares, amounting to 22774.101 hectares. This structured categorization facilitates targeted management practices, ensuring the sustainable use and conservation of forest resources in DFO, Tsirang.

Management and Working Circles	Area (ha)
Area of Division	63,783.4208
Management Circles for whole area	
Protection circle	7530.769
Production circle	50887.91
Non-production	5372.656
Total	**63791.335**
Management circle outside existing management regimes	
Protection circle	1546.772
Production circle	20209.29
Non-production	1018.039
Total	**22774.101**
EMR	**39,732.884**

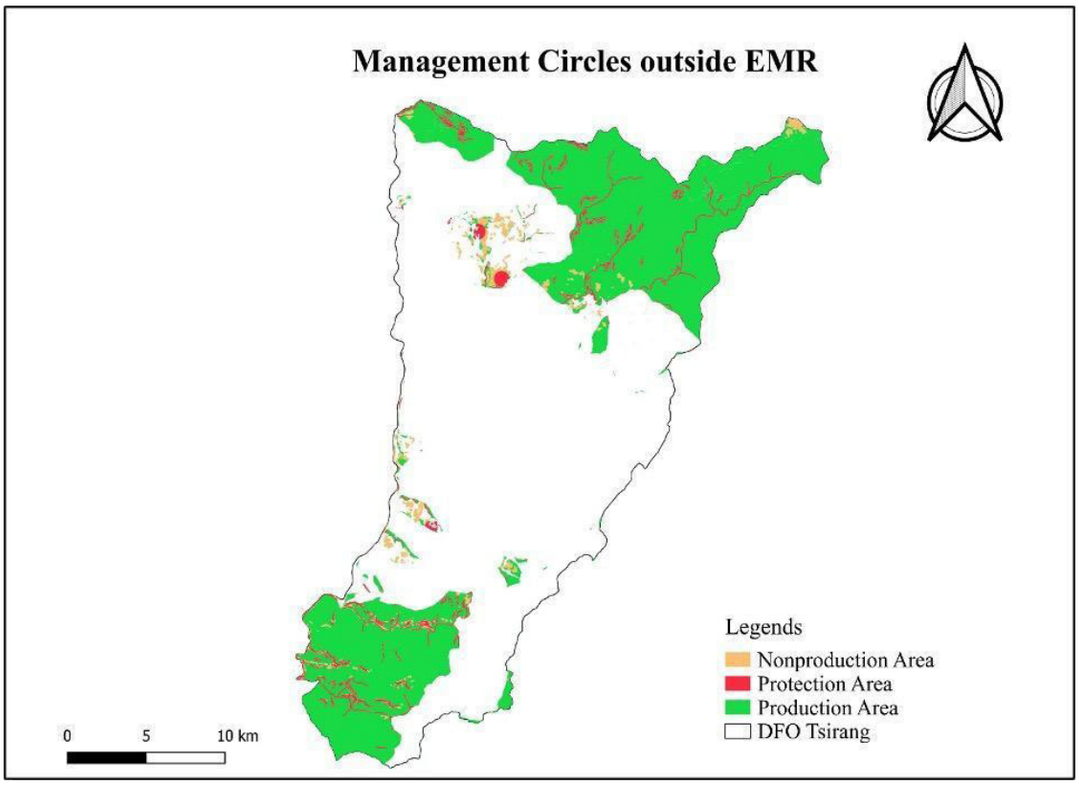


Fig 23: Management circles outside existing management regimes

Production Circle

The production area outside existing management regimes comprises various forest types, covering a total of 20209.29 hectares. The diverse composition of these forest types underscores the potential for sustainable resource management and production outside the established management areas, emphasizing the importance of integrating these regions into broader conservation and utilization strategies.

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

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

Where:

1. Rotation age: 130 years (Rotation age: 120 years + 10 years-Regeneration period)
2. Average volume/ha is considered as 275.80 m3/ha for DFO, Tsirang.

The total Annual Allowable Cut (AAC) that can potentially be extracted from the production area of 20209.29 ha is 30012.34/year.

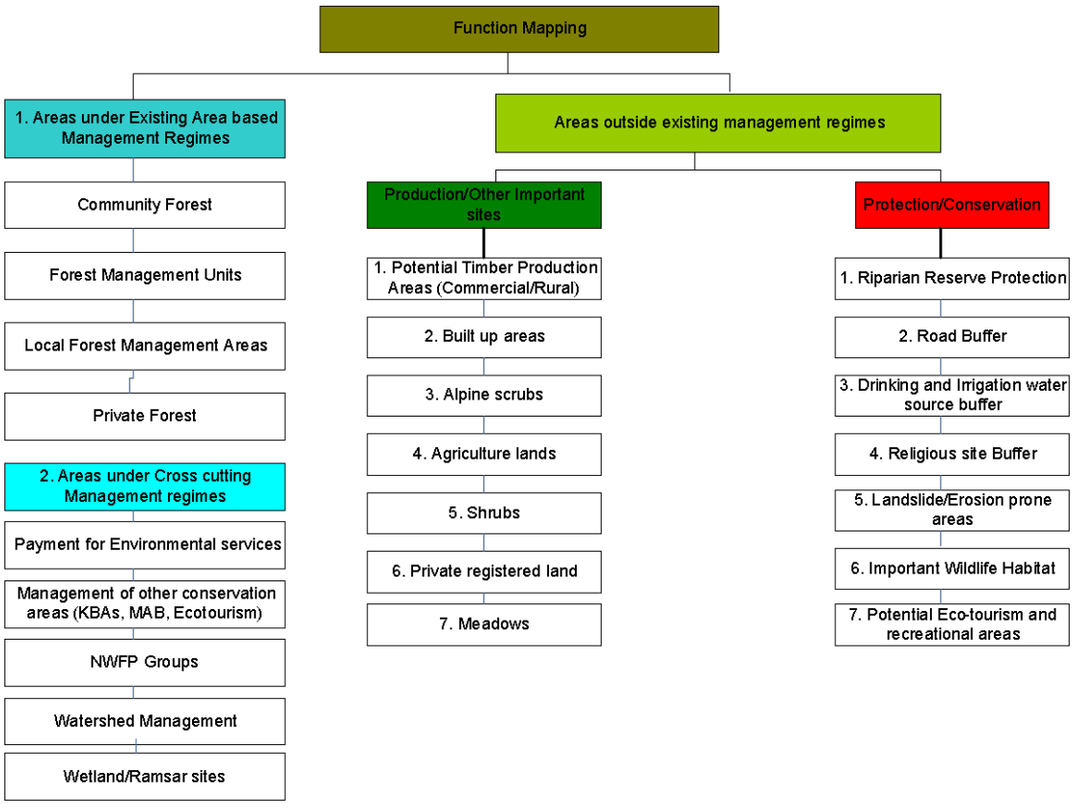


Figure 24: Thematic representation of function mapping

2.5.3 Forest Resource Utilization

The Divisional Forest Office, Tsirang provides diverse public services to cater the needs of the urban and rural communities. The forest resources utilization includes rural house building timbers, commercial timbers, fire woods, post and poles, sand and stones, Non wood forest like leaf moulds, top soil, cane and bamboo, mushroom billet, fiddle heads etc. As per the record, annually Division allot 1163.86m3 of commercial timber (standing volume), 500.47 m3 of rural timber (standing volume),and 210 m3 of NWFP (clay

soil, leaf moulds, top soil) and 2636 m3 or metric tonnes of sand, stones, gravels and boulders. The detailed information on utilization trend of the forest resources within the divisional jurisdiction is indicated in Table 2 below.

Also there is one Briquette manufacturing unit, one handicraft unit, two stationary sawmill and seven furniture units in Tsirang that provides forestry products to various stakeholders. The Forest resources are also met from 49 community forests, private registered land removal, 3 NWFP groups.

Information about the Forest Resources Utilization under the division

Sl.No	Information required	Unit	Time span	Remarks
1	Volume of commercial timber allotted	Standing volume (1163.86m3)	Annual	Logs/poles: 481.95m3 Firewood: 648m3 Poles/post: 33.91m3 Timber allotted on realizing commercial royalty. The information must be segregated based on purposes like Dzong and Lhakhang Constructions, nationally important projects, urban house construction.etc.
2	Volume of rural timber allotted	Standing volume (500.47 m3)	Annual	Drashing: 450.57m3 Cham: 1.9m3 Firewood: 48m3 Timber allotted on realizing subsidized royalty. The information must be segregated based on purposes like New House Construction, Renovation, Cowshed construction, extension, firewood allotment, Dzongs and Lhakhang construction..etc
3	Quantity of NWFPs alloted	Unit based on products (210 m3)	Annual	Clay soil 8 m3 leaf moulds 2m3 Top soil 200 m3 To be segregated species wise or product types
4	Quantity of sand ans stone alloted	2636 m3 or metric tonnes	Annual	Gravels 2096 m3 Sand 132 m3 Stone 192 m3 Boulder 216 m3

5	Total SRF land allotted for developmental activities	Area (45.66 ha)	Annual	Purpose Approach Road Archery Range Land Exchange Farm Roadm Lease Land Tower construction Land substitute Water pipeline alignment Road widening Others	Area 3.53 ha 0.05ha 7.41 ha 14.41 hac 2.23 ha 1.16 ha 10.98 ha 0.44 ha 3.51 ha 1.94 ha
				This includes SRF land allotted for farm road, approach roads, transmission lines, land substitute, land exchange, land lease, land allocated for project developments. etc	
6	Total forest area lost from SRF land allotted for developmental activities	Area (45.66 ha)	Annual	This is the total forest area lost from SRF land allotment under sl.no 5.	
7	SRF land destroyed by Forest Fires	Area (ha)	Annual	SRF land destroyed by forest fire	
8	SRF land affected by pest and diseases	Area (0 ha)	Annual	SRF land destroyed by pest and diseases	

2.6 Local People and Livelihood

2.6.1 Demography

The total area of Tsirang is 639 square km and has a population of 24,073(male 12,384, female 11,659) with a population density of 37.2 per sq. km (www.tsirang.gov.bt). The altitude of Tsirang ranges from 250 masl to 3000 masl. Tsirang is noted for its gentle slopes and mild climates. Tsirang Dzongkhag comprises 12 Gewogs, 60 Chiwogs, 101 villages and 4418 households. The Kikorthang Gewog has the maximum number of households (524HH) and Barshong Gewog has the least number of households (225 HH).

Table 16: Showing Gewog-wise Households Information under Tsirang Dzongkhag.

Sl No	Name of Gewogs	Number of Households
1	Patshaling	296
2	Barshong	225
3	Mendrelgang	435
4	Rangthaling	394
5	Tsholingkhar	421
6	Gosaling	434
7	Kikorthang	524
8	Dunglagang	411
9	Semjong	309
10	Tsirangtoe	348
11	Phungtenchu	321
12	Sergithang	300
	Total households	**4418**

Based on the SES data generated from the 889 households surveyed (20% sampling of total 4418 households) during the socio-economic survey in 12 Gewogs of Tsirang Dzongkhag where 595 were male respondents and 294 were female respondents. From the analysis, it is learned that about 80 % of the households are headed by males whereas only 20% of the households are headed by female gender in Tsirang.

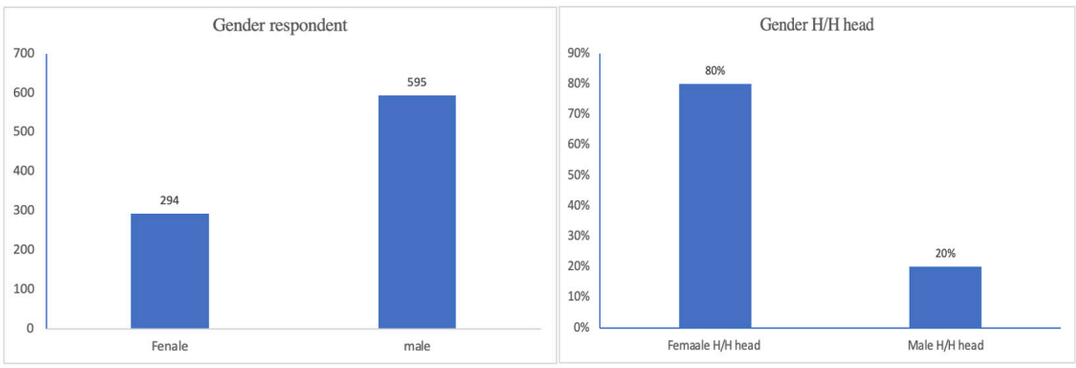


Figure 25: Information on household headed by male & female

2.6.2 Literacy

The survey also suggested the education level of heads of the households varied from illiterate to PhD level. About 55. % (488 hh heads) of rural household heads are illiterate and 45% (401 hh heads) are illiterate, amongst the literate about 28 % have the education of primary level, 6.41% with middle secondary level, 3.71% NFE, 1.125% Masters, 1.125% Bachelors, 0.112 % PhD and 3.49% with the Higher Secondary level.

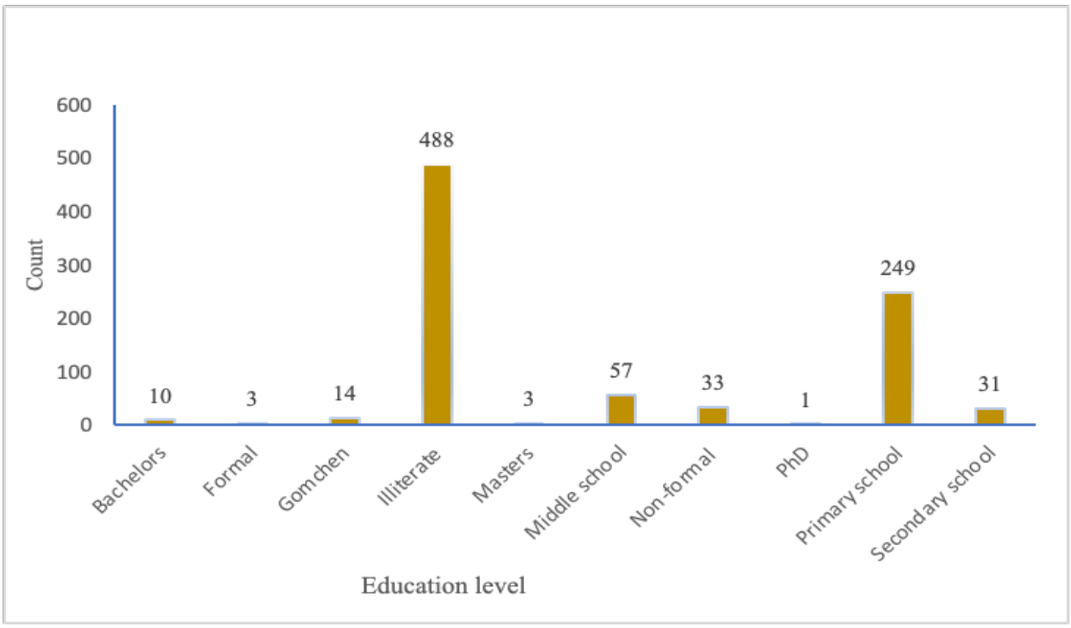


Figure 26: Level of education of respondents.

The data suggest that the majority of households (58%) possess permanent houses either constructed with stone or mud wall houses. A small number of houses in rural areas are constructed with cement concrete (18 %) and the rest 24 % of the houses are semi-permanent structures/Ekrawall and 3% of the houses are temporary huts.

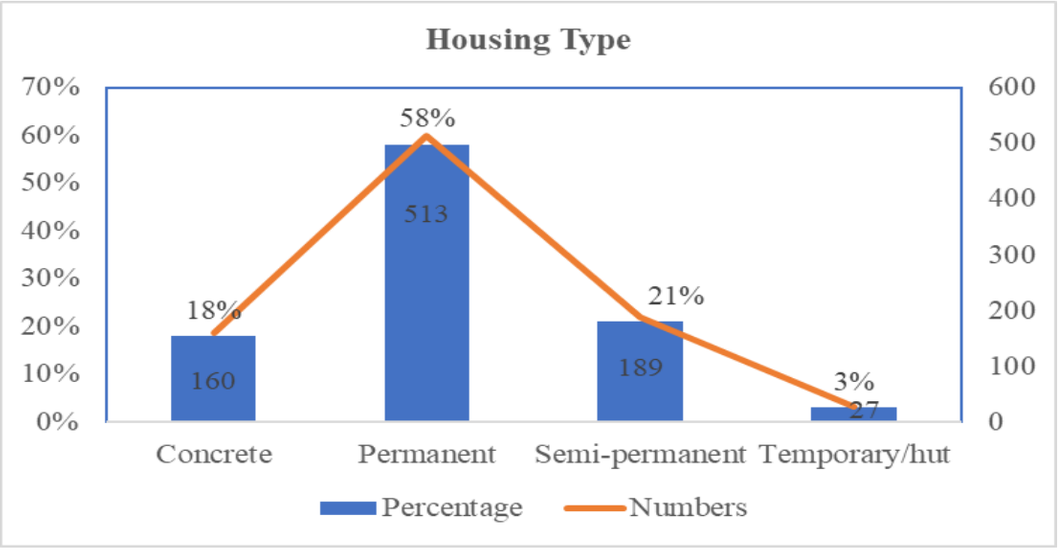


Figure 27: Housing type with numbers and percentage of respondents

2.6.3 Landholding

Of the total area of 639 sq.km, Tsirang Dzongkhag has 5704.65 hectares of land under cultivation (agriculture) which is around 9.03 % of the total area (www.tsirang.gov.bt). The built-up area consisting of a town, road, buildings etc is approximately 69.85 ha (0.11%) and water bodies which consist of rivers, streams, lakes, ponds etc are of 432.34 ha (0.68%). The record maintained by the Tsirang Dzongkhag administration, the agricultural land is about 5704.65 hectares, the dryland is about 12,596 acres, 6917 acres of wetland, and 995 acres of orchards

2.6.4 Agriculture and Income

The SES data analysis shows people of Tsirang grow both cash and food crops for livelihood and income generation. Food crops like paddy, maize, millet, buckwheat are grown and cash crops like potato, beans, cabbage, broccoli, peas, better guard, spinach, radish etc are widely grown in Tsirang. The people also have oranges, cardamom, and other fruit trees on their farms both for self-consumption and commercial purposes. The income of households varies from Nu. 50,000 to Nu.100,000. About 74% of the farmers earn an annual income of Nu. 0-50,000 , 11% of the households earn income between Nu. 51,000- 100,000 and the rest 15% of the household earn an annual income of above Nu.100,000.

Table 17: Showing the household incomes level of the respondents.

Sl no	Income level (Nu)	No of Households respondents	Respondents (%)
1	0-50,000	660	74%
2	51,000-100,000	96	11%
3	Above 100,000	133	15%

Livestock farming is another important income generation and livelihood activity of the community in Tsirang. As per the statistics maintained by the National Statistical Bureau, Tsirang Dzongkhag has around 214,655 livestock. As per the statistics, Tsirang has the highest number of poultry with 82,730 no followed by cattle with 12,340 and goat with 8994 numbers. The least population is equine (horses). Source: https://www.nsb.gov.bt/livestock-statistics-report. The Tsirang Dzongkhag is one of the main Dzongkhag which produces and supplies livestock products to other Dzongkhag, some of the key livestock products are eggs, pork and chicken.

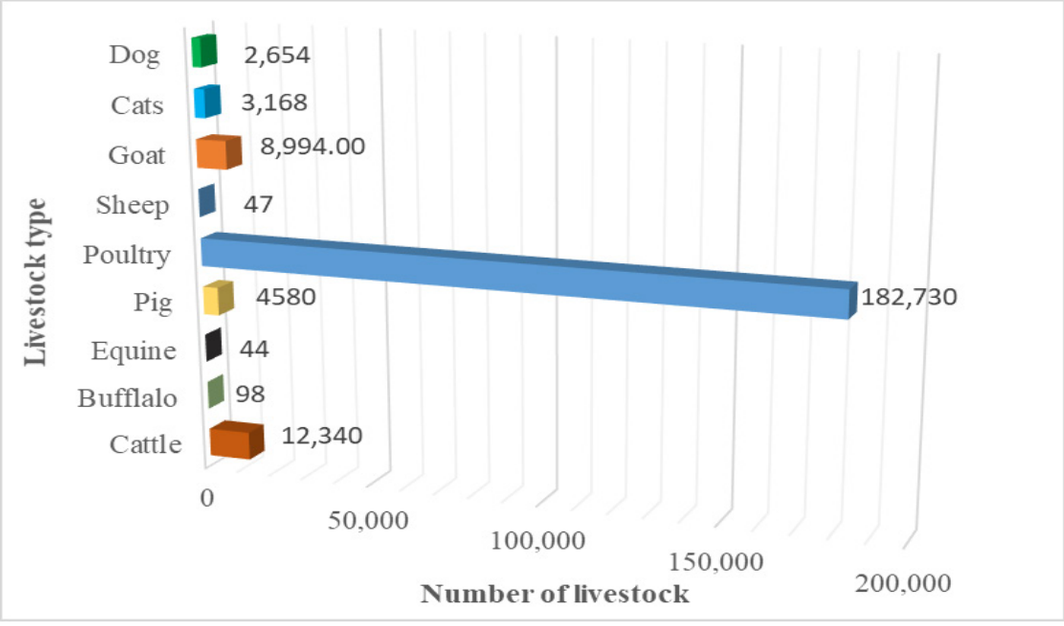


Figure 28: Information about the numbers and types of livestock breeds.

2.7 Human Wildlife Conflict

Human wildlife conflict has been the most emerging issue in Bhutan and most where wildlife and rural communities live near to it are impacted due to HWC incidents. HWC is a worldwide issue that often causes serious economic and social losses by preying on livestock, causing damage to property, human injury or death and crop depredation by wild animals resulting in people and animal conflicts over living space and food.

Human-wildlife conflict (HWC) occurs when wildlife poses a direct threat to human lives, livelihoods, or safety, and when humans negatively impact wildlife and their habitats. This conflict is a significant issue globally, affecting both rural and urban areas. It can lead to economic losses, physical harm, and even fatalities, as well as endangering the survival of various wildlife species.

The Conflict-to-Coexistence (C2C) strategy for Dunglagang and Patsaling Gewogs is developed to ensure targeted and effective interventions. The strategy focuses on protecting livelihoods and assets through improved fencing systems, community monitoring, and alternative income opportunities such as ecotourism. It emphasizes people's safety by strengthening Quick Response Teams, building capacity of frontline staff, and implementing clear Standard Operating Procedures for human–elephant conflict response. Habitat enrichment measures, including fodder plantation, invasive species control, and waterhole creation, aim to reduce wildlife pressure on farmlands. Cross-cutting actions such as awareness programs, monitoring of mitigation effectiveness, and standardization of SoPs across all chiwogs support long-term sustainability and coexistence between communities and wildlife

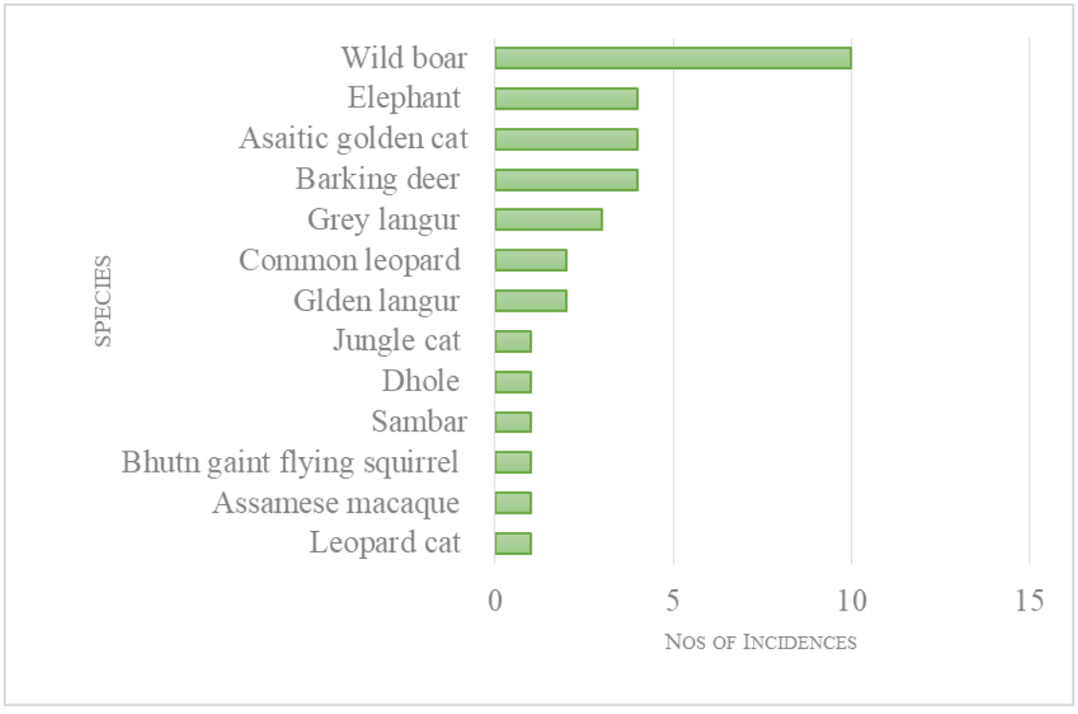


Figure 29: Graph showing the HWC incidence from 2023-2024.

2.7.1 HWC incidences

According to the data collected through the Nature Conservation Section via Epicollect and SMART, there were a total of 35 incidents (N). The species with the highest number of incidents was the wild boar (n = 10), followed by the elephant, barking deer, and Asiatic golden cat, each with 4 incidents (n = 4). Other species, including the jungle cat, dhole, sambar, Bhutan giant flying squirrel, Assamese macaque, and leopard cat, each had 1 incident (n = 1) as shown in figure 33.

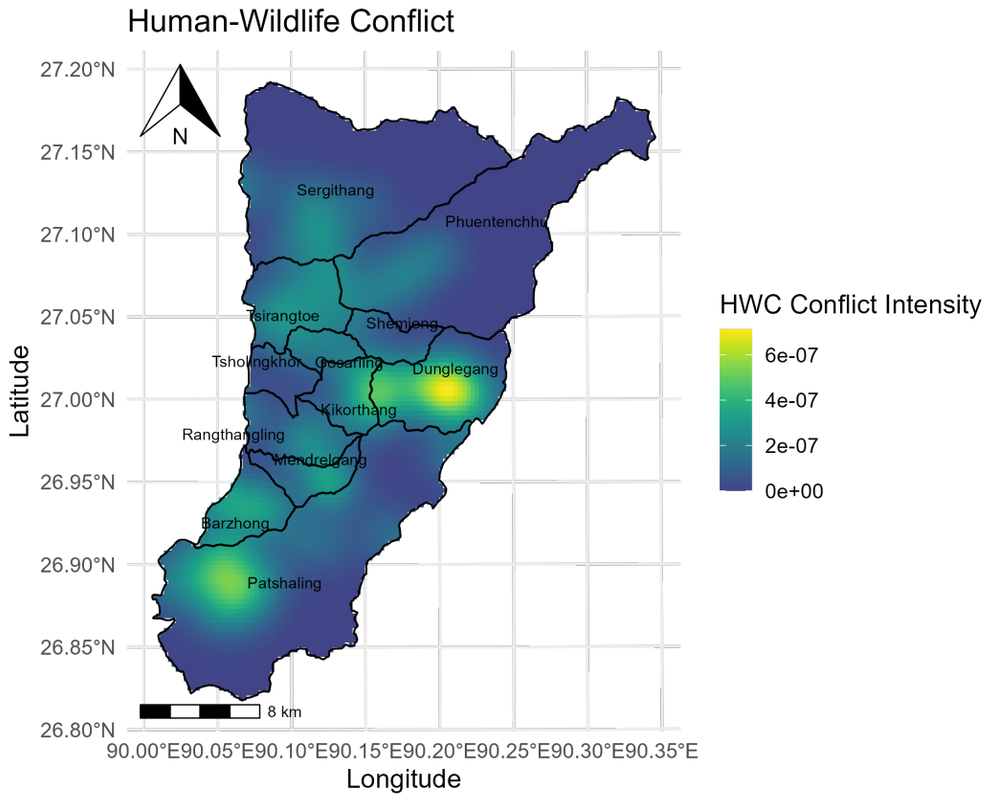


Figure 30: Showing the HWC hotspot map

Based on the map and data output, the highest number of HWC cases occurred in the Patshaling Gewog, with 25 incidents caused by elephants. Dunglagang followed with 18 cases involving various wildlife: Bear predation on livestock, wild boar, barking deer and porcupine damaging maize, cardamon and vegetables, golden langur eating chili leaves and dal. Sergithang Gewog reported with 8 cases of mostly wildboar damaging the crops. The data on HWC was limited since SMART was primarily used for service deliveries, and most wildlife incidents were not recorded.

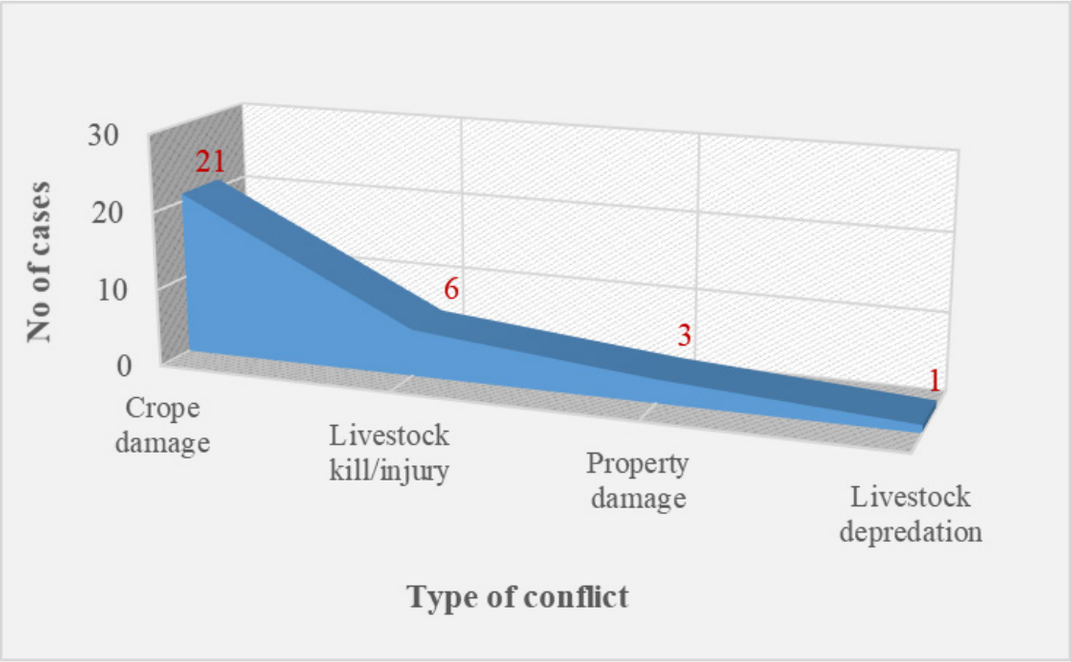


Figure 31: Line graph showing the types of Human-wildlife conflicts

2.7.2 Conflict type

The graph in (figure 19) illustrates the various types of Human-Wildlife Conflict (HWC) incidents that occurred in Tsirang district, categorized by the nature of the conflict. The total number of cases recorded is 31. The second most common type of conflict involves livestock being killed or injured, with 6 reported cases. This points to a notable threat to the livelihood of farmers who rely on livestock for their income and sustenance. There are 3 cases of property damage, which may include destruction of buildings, fences, or other infrastructure. Although less frequent, these incidents can still have a considerable economic impact on affected households. The least common type of conflict is livestock depredation, with only 1 case reported. While infrequent, such incidents can cause fear and anxiety among local residents and contribute to negative perceptions of wildlife. Overall, the graph highlights the distribution of HWC cases in Tsirang district, emphasizing that crop damage is the predominant issue. The data suggests that mitigation efforts should prioritize protecting crops to reduce the most common type of conflict. Additionally, strategies to safeguard livestock and property, although less frequent, should not be overlooked to ensure comprehensive conflict management.

2.7.3 Livestock depredation

The survey from Community Vulnerability and Capacity Assessment (CVCA) suggested that an increase in forest cover, decrease in predator species, abandoned agriculture land, abundant prey, habitat loss/habitat degradation, human disturbance, grazing pressure, range shift, climate change etc as probable causes of HWC in the districts.

As per the CVCA data, a total of 115 (N) livestock have been predicted by wild predators in the last three years in Tsirang. Amongst the domestic animals killed, poultry was

at the top listing that includes (n=46) followed by goat (n= 30) and local breeds (n=21). Some of the predators that killed domestic animals and possess human-wildlife conflicts are common leopards, leopard cats, wild dogs, black bears, civet cats, eagles, unknown predators, and others.

2.7.4 Crop damage

The survey reveals that wild animals cause damage to crops and lead to difficulties in farming agricultural crops in the villages. The crops damaged by wild animals are tabulated in the table below: Wild pig has been the most problematic animal, followed by deer and monkey that affect farming in Tsirang.

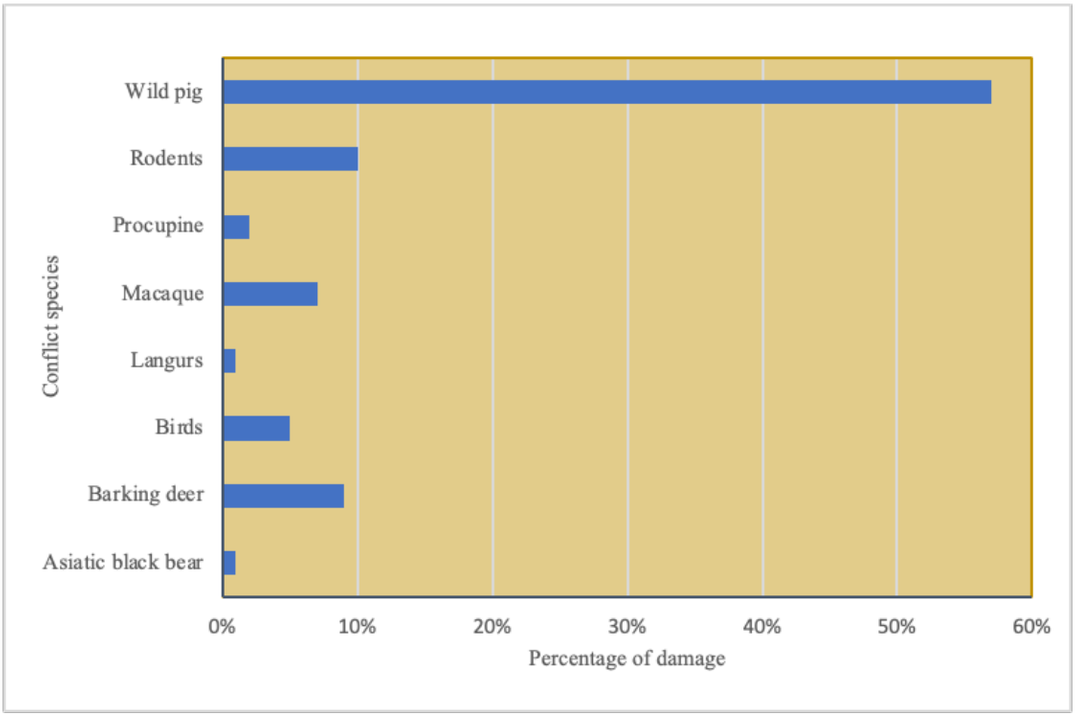


Figure 32: Showing of HWC incident

2.7.5 Mitigation measures

As a part of human-wildlife conflict mitigation measures, about 21.5% of the respondents proposed chain link fence as the most effective HWC mitigation measure, followed by Electric fencing with 16.5 %, 12 % of the respondents feel net fencing/wooden fencing/bamboo fencing, and about 5.7 % suggested seeking help from the concerned offices like forest, agriculture and Gewog administration. About 1.8 % of the respondents suggested awareness and advocacy to curb the HWC issues.

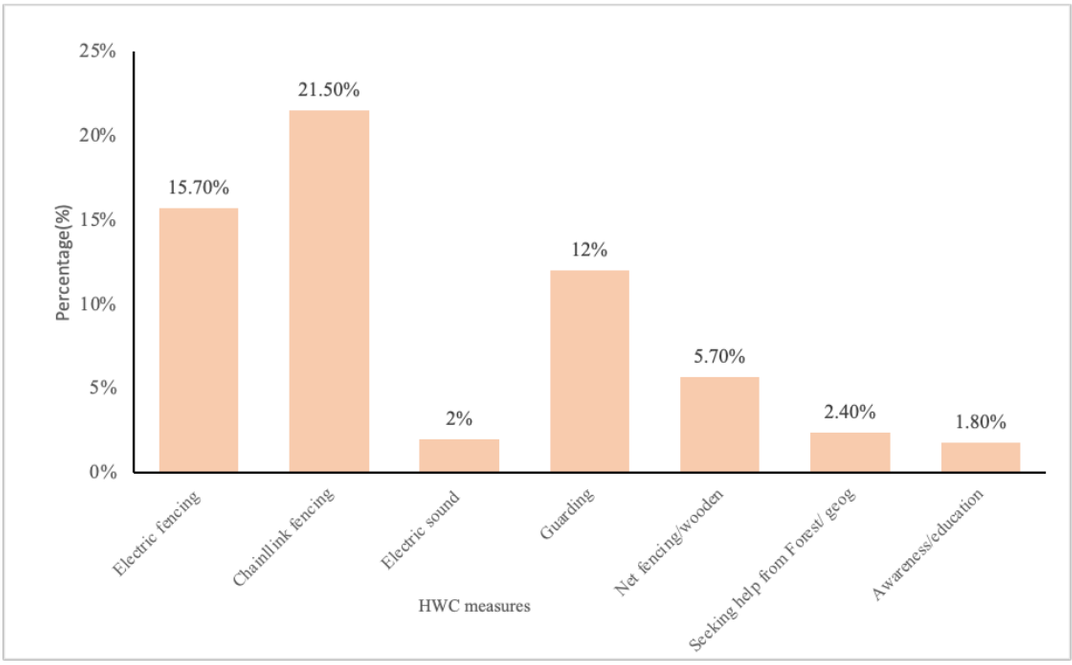


Figure 33: Implementation of HWC mitigation measure

2.8 Climate Change and its impacts

2.8.1 Climate conditions in the Area

The contribution of Extreme temperature impact types, rainfall seasonality, rainfall seasonality impact types, and extreme event types to the overall exposure index was more compared with the contribution of temperature extremes. The absolute values of model weights revealed that rainfall seasonality impact types(6.84) contributed the most to the overall exposure index followed by rainfall seasonality(4.05), extreme temperature impacts(3.05) and extreme events(2.33).

Rainfall seasonality was ever present, prominent and devastating natural hazard in the region due to erratic patterns of rainfall. Rainfall seasonality can be defined as the irregular distribution of rainfall during a normal year. This irregular distribution means that most of the rainfall occurs in specific months. Rainfall seasonality affects the soil and vegetation in the area. The annual distribution of rainfall can explain the vegetation distribution and composition and the sensitivity of the soil to erosion process. Sergithang Gewog has the highest exposure followed by Mendrelgang and Patsaling. Phuentechu Gewog has comparatively lower exposure (Figure 10). The indicator like temperature extremes, increased occurrence rainfall, Rainfall seasonality impact types has exposure index in the region.

The water borne disease and vector borne disease showed much significance as the sensitivity index was negative. Among all the Gewog, Tsholingkhar goeg have highest sensitivity with index score of of 0.77, as compared with the least sensitive Dunglagang having score of 0.05 (figure 11) The subsequent sensitive Gewogs are Patsaling and Mendrelgang Gewog, The crop yield, pest and diseases, invasive species and invasive weeds occurrence were listed as high sensitivity indicator for all Gewogs.

The indicators of social assets such as Community membership, community membership type showed comparatively higher contribution to adaptive capacity index. This may be attributed to the presence of the Communityforest group, livestock dairy group and Agriculture group like vegetable, water and road group. Most indicators had no significant contribution to the overall adaptive capacity index,however, the insignificant indicators were not dropped since the model performance was robust (P< 0.001).

The normalized score of adaptive capacity does not show large variations. Shemjong Gewog scored the highest, in terms of adaptive capacity index, followed by Tsholingkhar, Sergithang and Barshong Gewogs(Figure 12). Gosarling, Mendrelgang and Tsirangtoe Gewogs had lower adaptive capacity to adapt to climate change. For Shemjong Community Forest group, community forest group type and forest produce type and credit access contributed more to the adaptive capacity.

Table 18. Vulnerability indices of communities to climate change under DFO, Tsirang

Gewog	Vulnerability	Exposure	Sensitivity	Adaptive_capacity
Barshong	-0.04	0.53	0.10	0.59
Dunglagang	0.13	0.37	0.05	0.55
Gosarling	-0.41	0.48	0.18	0.25
Kikhorthang	-0.18	0.50	0.23	0.55
Mendrelgang	-0.73	0.78	0.40	0.45
Patshaling	-0.62	0.76	0.50	0.64
Phuentenchhu	-0.30	0.36	0.32	0.38
Rangthangling	-0.14	0.46	0.23	0.56
Semjong	-0.04	0.58	0.14	0.68
Sergithang	-0.80	0.89	0.50	0.59
Tsholingkhar	-0.83	0.69	0.77	0.63
Tsirangtoe	-0.22	0.39	0.28	0.45

According to the value of the vulnerability index, Rangthaling, Kilkhorthang, Tsirangtoe, Tsholingkhar, Sergithang, Mendrelgang, Patsaling and Gosaling Gewog was found to be most vulnerable with low vulnerability index score and only Dunglagang has the highest index of 0.13. Gosarling had the lower adaptive capacity while Tsholingkhar had highest exposure and Sergithang Gewog had the highest sensitivity. With the lowest adaptive capacity, Kilkhorthang is the second most vulnerable Gewog.

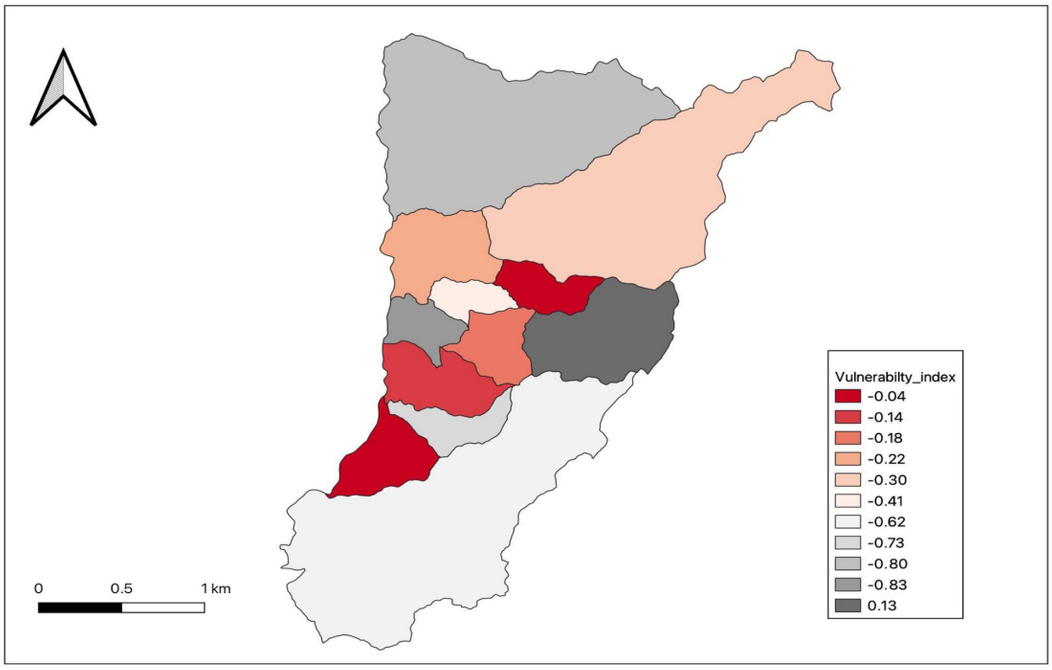


Fig 34: Showing vulnerability index of DFO Tsirang

2.8.2 Trend of climate parameters

The graph shows the trend of average annual rainfall between 2014 and 2023. Rainfall fluctuated considerably over the period, peaking at around 160 mm in both 2016 and 2020. The lowest rainfall was recorded in 2022 at about 85 mm, followed by a slight recovery in 2023 to around 110 mm. Overall, the data indicates high variability in annual rainfall with no consistent upward or downward trend, suggesting irregular precipitation patterns across the years.

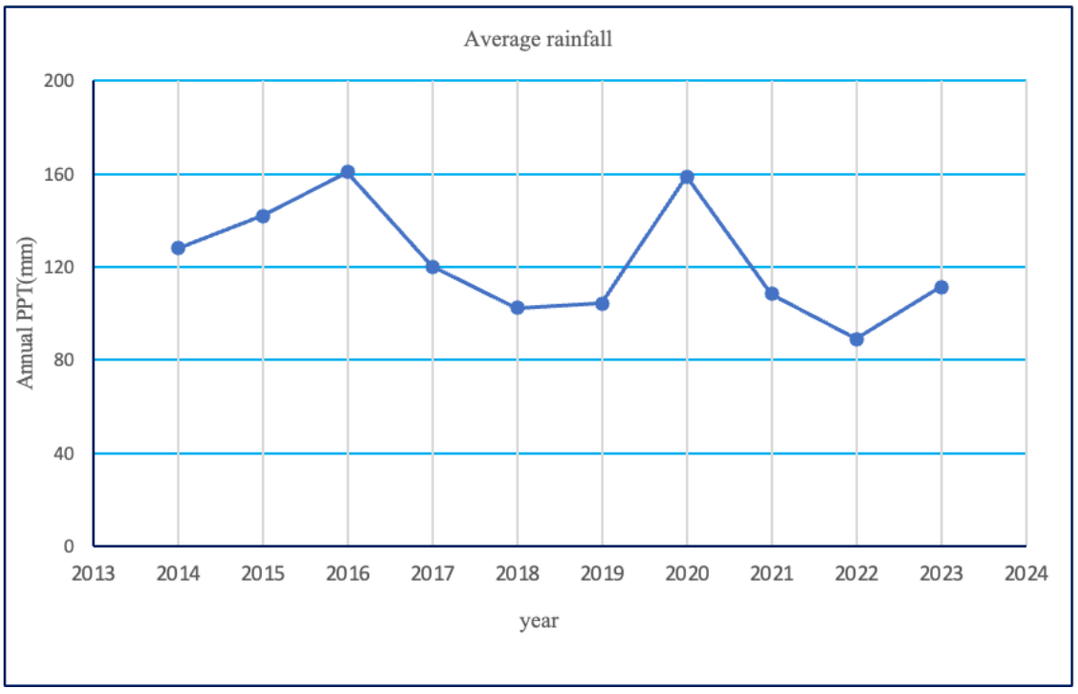


Figure 35: Average rainfall in Tsirang

WorldClim version 2.1 released in January 2020 contains average monthly climatic gridded data (in GeoTiff format) for the period 1970-2000 available under four spatial resolutions, between 30 seconds (~ 1km2) to 10 minutes (~340 km2). We used 30 seconds resolution for this study to yield maximum accuracy.

The graph illustrates the average maximum and minimum temperatures from 2014 to 2023. The maximum temperature remained relatively stable over the years, fluctuating between 22°C and 26°C without any major upward trend. In contrast, the minimum temperature (orange line) showed a consistent range of 13–15°C until 2022, followed by a sharp rise in 2023 to nearly 19°C. This indicates that while daytime temperatures have remained steady, nighttime temperatures increased significantly in 2023, suggesting a warming shift that could be linked to broader climatic changes.

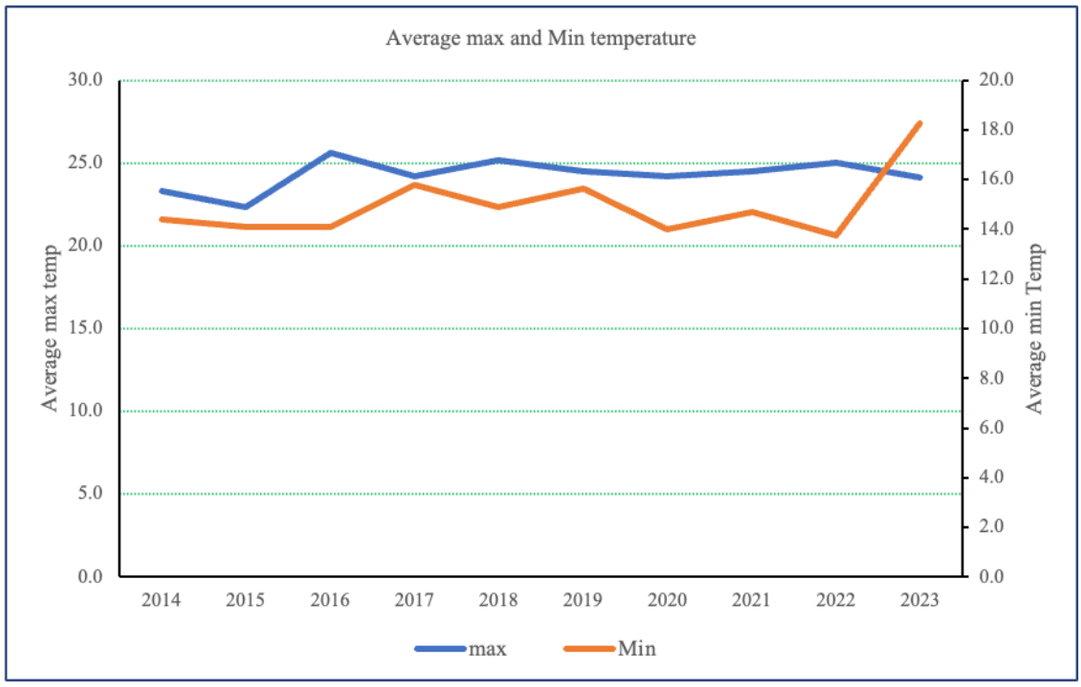


Figure 36: Line graph showing the Max and min temperature for the last ten years.

2.8.3 Impacts of climate on vegetation and wildlife.

The earth is now about 1.1 C warmer than it was in the 1800s based on current projections, global temperature will rise by 2.7C by the end of the century. Its impossible to predict exactly how long-term shifts in temperature and weather patterns will affect our planet's fragile, deeply entwined ecosystems. Changes in one of area influence changes in other areas and animals will feel the impact. Some of the biggest climate-driven threats for wildlife include:

Habitat loss: Rising temperatures affect vegetation, food sources, access to water and much more. Ecosystems may become uninhabitable for certain animals, forcing wildlife to migrate outside of their usual patterns in search of food and livable conditions, while causing other animals to die off.

Natural disasters: Already today we face a fivefold increase, compared to 30 years ago, in climate and weather-related natural disasters such as droughts, erratic rainfall, flash-floods and landslides. These disasters cause catastrophic loss of life and habitat for people and wildlife.

Human-wildlife conflict: Climate change intensifies human-wildlife conflict through habitat loss and extreme climate events, forcing people and wildlife to share increasingly crowded spaces. As ecosystems change, people and wildlife roam farther in search of food, water and resources. Human-wildlife conflict often results in devastating impact for the animals affected. 2.9 High Conservation Value Areas (HCVA)

2.9 HCVA Overview

The Concept of High Conservation value (HCV) was first developed in 1997 and later introduced in 1998 by the Forest Stewardship Council (FSC) an international non-profit multi stakeholder organization for identifying and managing environmental and social values in forest landscapes. The primary aim of the HCV approach is to maintain and protect important environmental, social and cultural values. The HCV approach is widely adapted within voluntary certification schemes, notably in forest and agriculture, forms part of corporate sustainability commitments and policies, and is increasingly recognized in national or regional policy. The HCV as a holistic approach can further complement and strengthen these efforts and initiatives of the country. Therefore, recognizing the benefits of the HCV approach, it was introduced in 2020 in Bhutan by WWF through the living landscapes program of the international climate initiative IKI project. An HCV is a biological, ecological, social or cultural value of outstanding significance or critical importance. **The six categories of HCV are:**

- **HCV 1:** Species Diversity: Concentration of biological diversity including endemic species, and rare, threatened or endangered (RTE) species that are significant at global, regional or national levels.
- **HCV2:** Landscape level ecosystems and mosaics:Large Landscape-level ecosystems, ecosystem mosaics and intact forest, Landscape (IFLs) that are significant at global, regional or national levels, and that contain viable populations of the great majority of the naturally occurring species in natural patterns of distribution and abundance.
- **HCV 3:** Ecosystems and habitats: HCV 3 includes ecosystems, habitats or refugia of special importance because of their rarity or the level of threat that they face or their rare or unique species composition or other characteristics. An ecosystem that can be qualified as naturally rare or that were once widespread but have become rare due to anthropogenic impacts or are rapidly declining due to current or proposed development.
- **HCV 4:** Ecosystem services: Basics ecosystem services in critical situations including protection of water catchments and control of erosion of vulnerable soils and slopes. Ecosystem services are the benefits people obtain from ecosystems such as provisioning services such as food and water, regulating services such as regulation of floods, reducing impacts of glacial lake outburst, land degradation and diseases, cultural services (spiritual and religious benefits) and supporting services such as soil formation and nutrient cycling.

- **HCV 5:** Community needs: Sites and resources fundamental for satisfying the basic necessities of local communities or indigenous peoples (for livelihoods, health, nutrition, water), identified through engagement with these communities or indigenous people.
- **HCV 6:** Cultural values: Sites, resources, habitats and landscape of global or national cultural, archaeological or historical significance, and/or of critical cultural, ecological, economic or religious/scared importance for the traditional cultures of local communities or indigenous people, identified through engagement with these local communities and indigenous people.

2.9.1 HCVA in Tsirang DFO

The National Interpretation for Identification of High Conservation Value in Bhutan, 2022 has been used as reference to identify HCVA within DFO, Tsirang jurisdiction to understand and interpret the different categories of HCV and its context to Bhutan and in particular to Tsirang. Based on the HCV categories, the Division Forest Office, Tsirang has identified five potential HCVA as per the NI and based on secondary data available with Division. For the purpose of prioritizing and identification of HCVA amongst the identified 5 HCVs, the identified categories of HCV along with certain description of each sites were then shared to the field staff of this Office for further discussion and brainstorming before finalization. After a series of discussion and meetings, the Darachu-Norjangsa Cloud Zone Forest, which is a HCV 3 area, has been identified as the prioritized HCV area for Divisional Forest Office, Tsirang.

The identified HCV area of the Division has an area of 2335 hectares covering the upper part of four Gewogs namely Dunglagang, Patsaling, Kilhorthang and Rangthaling Gewog. The Darachu-Norjansa cloud forest landscape occupy upper most catchment for water sources originating from pristine environment being located at the outer ridge with dense oak (*Quercus spp*) and *Castanopsis spp, Percea fructifera, Michelia doltsopa, Beilschmiedia spp* and *Daphniphyllum* species.

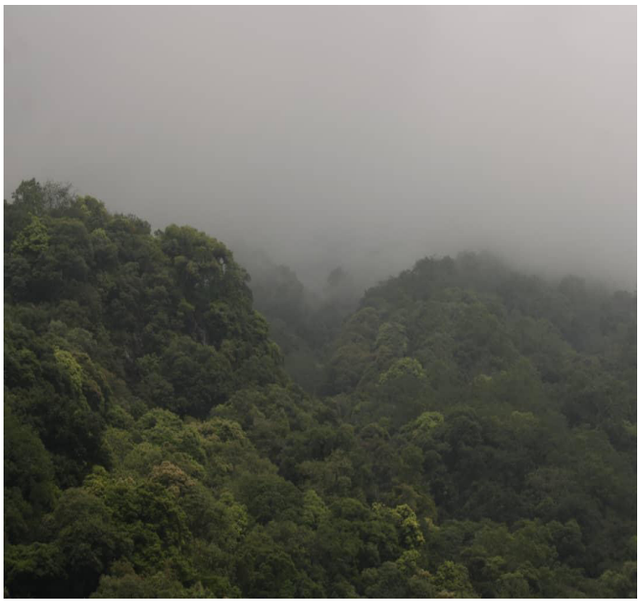


Figure 37: showing the image of High Conservation Value Area

2.9.2 Significance of HCV

The Darachu- Norjangsa Cloud Forest landscape remains under cloud cover for about 7 to 8 months and the landscape predominantly remains humid throughout the year. This area serves as a lifeline for the downstream communities providing continuous flow of water in the form of streams and springs. The important streams originating from this landscapes are Tindovani-chu, Utari-Chu, Khortsani-khola,Majuwa-chu, Pawkhola, Khuchi-khola, Beteni-Chu, Kalikhola-chu and Kalingchu serving as water source for communities of 8 Gewogs which includes Gewog of Dunglagang, Kilkhorthang, Mendrelgang, Barshong, Patsaling, Rangthaling, Tsholingkhar andGosarling. It also serves as only water source for Damphu Throm

Some part of this landscape also forms part of the Biological Corridor (BC-3) connecting Phibsoo Wildlife Sanctuary, Royal Manas National Park and Jigme Singye Wangchuck National Park. It provides critical habitats for Royal Bengal Tiger, Golden Languar, Himalaya Black Bear, Clouded Leopard, Gaur, Common Leopard, Asian Elephant, Serrow, Barking Deer and Samber. The threatened bird species such as Rufous-necked Hornbill, Great Hornbill also found in this cloud forest. Apart from water, cloud forests provide numerous benefits to human beings: timber, firewood, building materials, medicinal plants, wild fruits and honey. Several highly valued tropical timber trees are harvested from these forests. Cloud forests also play an important role in climate modulation, carbon sequestration and preventing landslides. They are culturally important with many ethnic groups acting as their 'shepherds'.

2.9.3 Screening and Identification of the HCVA

HCVs screening was conducted to identify priority areas for HCV management and monitoring. This screening process, developed by the HCV Resource Network (HCVRN), involved desktop analysis using the National Interpretation for identification of HCVs in Bhutan (2022) and the data for presence of HCVs and threats. A workshop held in Thimphu (24th - 28th April, 2023) documented appropriate monitoring and threat prevention to HCVAs.

The HCVRN toolkit outlines six key steps (figure below) in the screening process, which are used to identify and prioritise areas with significant conservation value. This process aims to enhance biodiversity conservation, safeguard ecosystems and promote local community well-being. The screening process was supported by global HCVN specialists, in consultation with the DoFPS, participated by IKI Task Force members and field focal of the nine DFOs.

Following the national level screening result, the DFO, Tsirang has carried out field validation with staff, and further stakeholder consultation with the Local Government representatives, officials from government institutions, and public of the six chiwogs of Dunglagang and Patshaling Gewogs. Thus, the Division prioritized and finalized Darachu- Norjansa as HCV area, which is categorized under HCV 3 due to its essential role in providing Irrigation and drinking water facilities to Damphu town and communities of six Gewogs.

2.9.4 Threats and Strategic Approach to Mitigate the Threat

Although the High conservation Value Areas have significant benefits, the Darachu-Norjangsa Cloud Forests has existing, emerging and potential threats that need specific approach to mitigate the threats. As per the HCV screening summary of priority areas and threats ranking, the Darachu-Norjansa cloud forest HCV area falls under priority 1(High HCV probability and high threat) where the management intervention is needed. Some of the threats identified are:

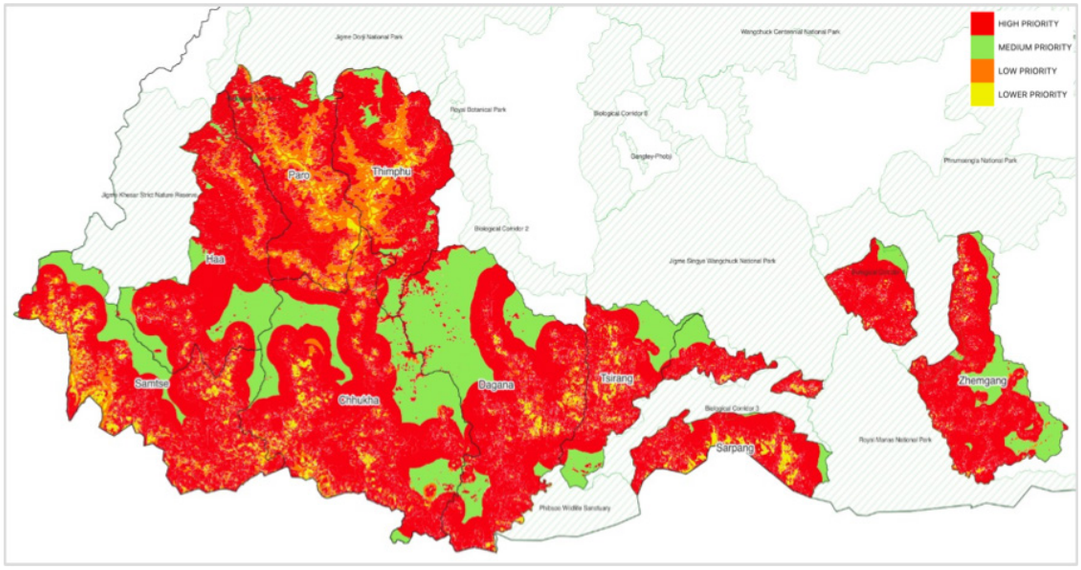


Figure 38: Priority map of IKI living landscape

Table 19: High Conservation Value threats

Significant threats	Proposed strategic approach
Illegal logging	Sustainable livelihoods Institutional and HR capacity
Poaching	Sustainable livelihoods Institutional and HR capacity
Retaliatory killing due to Human Wild-life Conflict (HWC)	Human Wildlife mitigation
Unsustainable harvesting of NWFPs	Sustainable livelihoods Institutional and HR capacity
Pest and Diseases	Institutional and HR capacity
Invasive weeds	Institutional and HR capacity
Waste and pollution	Institutional and HR capacity
Climate change	Institutional and HR capacity

2.9.5 Management and Monitoring of HCVA

Maintaining HCV does not necessarily require setting aside strict conservation areas, but rather managing the impacts from threats that would undermine the long term viability or persistence of identified conservation value. Therefore, following the identification of the HCV in an area, appropriate management prescriptions should be put in place based on an analysis of threats. Monitoring informs whether the management actions are effective and the management regime should be established based on the management objectives of the management plan. The key purpose of monitoring is to ensure that the current management practices are effectively maintained.

The HCVA Management and Monitoring is developed as per Guidelines for Management and Monitoring Guidelines of High Conservation Value Area in Bhutan (2024), where HCV screening has indicated Priority 1 areas, the highest level of response for management is warranted to maintain and enhance HCVs. This is because there is a high likelihood of HCV being present, but they face a higher level of threat that can impact the HCV's future presence in the landscape. This is an active response that involves reducing threats and should involve most resources available at the DFO level for managing HCVs. In areas where there is a high likelihood of HCV presence but lower level of threats (Priority 2), a preventative response is warranted to 'prevent' threats from emerging in the future and thus potentially impact HCVs present. Where HCV has a lower likelihood of presence, but threats remain high (Priority 3), a precautionary response is preferred. This can include checking for HCV absence before any development or land change occurs, and then enforcing regulations and best management practices in development areas. Low priority areas (Priority 4) do not require an urgent response (but may be managed with habitat restoration in the future).

Chapter 3: Threat and challenges

3.1 Threats

The threats analysis forms an integral part of conservation action and planning and management. once threats are identified, threats ranking prioritizes different strategic interventions. Using the Miradi threat ranking principle, the various threats identified were ranked based on a score of three dimensions of scope, severity and irreversibility using point absolute scale of Low, Medium, High and Very High, culminating into an overall threat rating. The overall threat assessment for the Divisional Forest Office was ranked High (table 14). The drying water sources and depletion was found to be the highest threat, the only threat falling under the High category. The threats of forest fire, forest resources depletion, habitat destruction, human wildlife conflict, Illegal activities and landslides are some of the threats ranked as Medium. And the GLOFs, invasive species and pests and diseases are ranked as Low category.

Threats ranking table

Threats \ Targets	Effective public service delivery, m...	Biodiversity and ecosystem se...	Capacity development to fost...	Human wildlife conflict and enh...	Sustainable forest managment a...	Summary Threat Rating
Drying of water source and depletion of watershed		High			High	High
Forest fire	Medium		Medium			Medium
Forest resource depletion	Medium				Medium	Medium
GLOFs		Low				Low
Habitat Destruction		Medium		Medium	Medium	Medium
Human wildlife Conflict	Medium			High		Medium
Illegal activities	Medium		Medium			Medium
Invasive weeds			Medium			Low
Land slide and erosion				Medium	Medium	Medium
Pest and Diseases			Low	Medium		Low
Summary Target Ratings:	Medium	Medium	Medium	Medium	Medium	Overall Project Rating: High

3.1.1 Drying water sources and depletion of watershed

The drying of water sources and depletion of watersheds as high-risk threats for Tsirang highlights the need for comprehensive action plans to address water security. As these issues directly affect agriculture, livelihoods, and local communities, they are crucial areas that require attention from both government and local stakeholders. The drying and depletion of water sources in Tsirang were due to over exploitation of forest resources and developmental activities such as construction of roads, electricity lines, infrastructure, irrigational channels, forest fire, flood, landslide, removal timber and other illegal forest resources (Watershed pipeline survey, 2023). Such challenges can be mitigated through

proactive management, sustainable practices, and climate change adaptation strategies, these risks can be mitigated to ensure long-term water availability for the region. Effective management of watersheds is critical to restoring and preserving water resources. This involves a holistic approach to land and water management, focusing on the entire watershed, including reforestation, controlling soil erosion, and protecting natural habitats that support water retention. Encouraging agroforestry (the integration of trees and crops) and conservation agriculture (minimizing soil disturbance, maintaining ground cover) can help improve water retention in soil, reduce evaporation, and prevent soil erosion.

Depletion of watersheds can be restored through large-scale reforestation and afforestation efforts. Trees play a critical role in maintaining water cycles by capturing rainfall, reducing surface runoff, and preventing soil erosion. Collaborative reforestation projects involving local communities can also generate livelihoods and foster a sense of ownership over natural resources. Further, the comprehensive approach that combines sustainable water management practices, climate change adaptation strategies, and active community involvement is essential for addressing these risks. By investing in infrastructure, enhancing agricultural practices, protecting forests, and promoting awareness, Tsirang can ensure that its water resources remain available for future generations. The concerned agencies, local communities, and the other development partners must work together to build a resilient and water-secure future for the region.

3.1.2 Habitat Destruction

Habitat destruction is one of the threats to conservation of flora and fauna. The main cause of habitat destruction and fragmentation is mainly due to various development activities in the Dzongkhag. Although these developmental activities play an important role for the socio-economic development of the country and marketing of farm produce to the rural communities, these activities in the form of national highways, chiwog connectivity farm roads, pipelines, irrigation channels, rural electrification low voltage transmission lines, etc will directly impact biodiversity due to forest degradation and habitat destruction. As per the record maintained with the Division has shown that a total of 45.66 ha of forested land were lost to various developmental activities over the period of three years (2020-2024).

Besides these, a certain part of the Punatsangchhu basin which falls under the jurisdiction of Tsirang Forest Division has served as a prime breeding habitat for Critically endangered birds (*Ardea Insignis*) where slight human disturbances in the form of agriculture farming, NWFPs collection, firewood and driftwood collection, sand and stone extraction have causes significant disturbances to WBH habitat. For instance, freshwater river systems are very sensitive to human disturbance (Bird Life International, 2021). Likewise, illegal resource extraction by local communities who reside adjoining the forest area posed a threat and led to gradual destruction of roosting, feeding and nesting sites.

Furthermore, Black mountain-Dagachhu-Phibsboro landscape is crucial and prime seasonal migratory routes for charismatic and iconic species (Bengal Tiger). However, expanding cardamom plantation and future inter-dzongkhag road connection from Chhudzom gewog in Sarpang and Dunglagang gewog in Tsirang has foreseen threats which will not only cut off the landscape connectivity of the seasonal migratory routes of the tiger, but also disturb the sink and source dynamic of the flagship species in the

region. As such, it is important that only low-ecological and environmental impact roads and development activities are implemented with stringent monitoring by the concerned agencies to ensure environmental development in the Dzongkhag.

The Darachu-Norjangsa cloud forest landscape serves as a water tower for eight Gewogs, including Damphu Municipality and Gelephu Mindfulness City. This area is one of the primary recharge zones for the river ecosystems of Tsirang and Sarpang districts, which are part of Gelephu Mindfulness City. The intact water towers provide a continuous flow of water (for drinking and irrigation) in the form of streams and springs, benefiting the downstream communities and ensuring their socio-livelihoods development. Therefore, the allocation of timber from the cloud forest and the seasonal tiger migratory landscape must be regulated to safeguard these recharge areas and water towers, ensuring sustainable management of the watershed landscape.

3.1.3 Illegal activities (Logging, fishing, hunting and poaching)

Tsirang Forest Division encounters various threats and challenges in conserving and protecting natural resources due to various illegal activities. Wildlife hunting and poaching is one of the leading drivers of biodiversity loss. For mammals, birds and some other species groups, it is the biggest threat. This risk is compounded by growing markets for wildlife trade: luxury foods, pets and medicinal remedies. In fact, some of the world's most charismatic species have already gone extinct as a result of wildlife trade. Besides, it has clear environmental implications, as this illegal activity negatively affects ecosystems and livelihood of local communities. Similarly, in Bhutan owing to the rich wildlife diversity and porous international borders, the wildlife poaching and its illegal trades are becoming rampant which would bring both unforeseen environmental and social impact in the long run.

Tsirang serve as a secure habitat for most of the globally threatened species such as Royal Bengal tiger (*Panthera tigris*), Asiatic elephants (*Elephas maximus*), Guar (*Bos guarus*), Golden Langur (*Trachypithecus geei*) and Himalayan black bear (*Ursus thibetanus laniger*). Moreover, other wildlife species such as Wild Boar (*Sus scrofa*), Barking Deer (*Muntiacus muntjak*) and Sambar (*Rusa unicolor*) were hunted illegally for meat. Due to this, most of the poachers targeted those iconic keystone species for economic gain and there were many incidences of illegal wildlife poaching and resource extraction evidenced during the Rapid Biodiversity Assessment (RBA).

The illegal activities include timber extraction, timber misuse, fishing, hunting and poaching. As per the record, the Division has encountered 9 cases of illegal timber extractions, 15 cases of illegal fishing, 5 cases of NWFP collection, and 3 cases of setting forest fires. One of the notable illegal activities is fishing and timber extraction. High levels of fishing directly impact aquatic life and the survival of the White Bellied Heron as it solely depends on the fish population in the riverine ecosystem. The illegal fishing using electrocution, poisoning, and other fishing gear is becoming very rampant in the main Sunkosh River basin and its tributaries

Similarly, mass illegal logging directly poses threats to available natural resources and depletion of timber resources. Due to regular rural and commercial timber allotment, the valuable timber species are depleted in Tsirang and illegal timber extraction in the form of logging and felling further adds to the deterioration.

Table 20: Showing the illegal activities detected in Tsirang

Sl No	Illegal activities	Nos of incidences
1	Illegal timber extraction	9
2	Misuse of timber	1
3	Illegal fishing	15
4	Illegal non wood collection	5
5	Forest fire	3

Owing to this, regular monitoring, patrolling and supervision of these threats is crucial for the effective conservation and protection of biodiversity in the Dzongkhag.

3.1.4 Human Wildlife Conflict

The main causes of the Human Wildlife Conflict are habitat loss and fragmentation and crop damage. As the global human population continues with developmental activities resulting in habitat loss and fragmentation that drives the wildlife out of their natural habitats, conflicts are bound to happen. In some cases, people who suffer crop loss to wildlife implicate their livelihood and household food security. Some farmers lose their entire crops overnight from wildlife raids which generate resentment among local communities towards wildlife conservation. The survey reveals that wild animals cause damage to crops and lead to difficulties in farming agricultural crops in the villages. The crops damaged by wild animals were wild boar, the most problematic animal, followed by deer and monkey that affect farming in Tsirang.

As retaliation measures, people set traps and other measures within the periphery of their agriculture field to prevent wild animal raiding crops which could have a minor impact on wildlife. However, such a situation could be overcome through other mitigation measures like electric fencing, chain link fencing, alma fencing and advocacy programs on wildlife conservation and its coexistence.

3.1.5 Forest Resources depletions

Forests are home to a vast array of plant and animal species. Forests provide timber for construction, paper, and furniture, as well as non-timber products like fruits, nuts, resins, and medicinal plants. It provides us ecological services such as air purification, flood regulation, and climate stabilization. Many indigenous and local communities rely on forests for their livelihoods, including food, medicine, and shelter. When forests are cleared, the habitats of these species are destroyed, leading to loss of biodiversity. Some species may become endangered or extinct as a result. The primary cause of the forest resource depletion is Deforestation. Deforestation reduces the availability of these valuable resources over time. Deforestation disrupts this cycle, leading to reduced water availability and increased sedimentation in rivers and streams. Deforestation accelerates forest resource depletion by disrupting ecological balance, reducing the availability of renewable and non-renewable resources, and exacerbating environmental challenges like climate change and soil erosion. Sustainable forest management practices are essential to mitigate these impacts.

The grazing is another cause of the forest resource depletion. The livestock grazing in SRF land leads to depletion of palatable species either by browsing or through trampling. The forest resource assessment within the Tsirang Dzongkhag shows absence of valuable timber species like *Michelia doltshpha*, while other non-palatable species such as *Symplocus* found in abundance. Grazing in forest land by local herds leads to scarcity of grasses for the wild animals which further leads to crop depredation by wild animals in settlement area. The cattle grazing also leads to spread of invasive weeds into the state reserve forest land.

Livestock farming is one of the key livelihood incomes generating activity within the Tsirang. The socio-economic survey & Dzongkhag statistics (www.tsirang.gov.bt) that Tsirang Dzongkhag has 214,655 livestock population out of which 85.13% is poultry, 5.75% cattle and 4.19% is goat population.

3.1.6 Landslide and erosion

Development activities play an important role for the socio-economic development of the country and marketing of farm produce to the rural communities. Development activities include national highways, chiwog connectivity, farm roads, access road construction for reaching construction materials for transmission lines, drinking water pipelines, irrigation water channels, rural electrification low voltage transmission lines, etc which will directly impact biodiversity conservation and natural resource management.

The Division, over the last three years, has lost 45.66 ha of forest land to various developmental activities. The development activities are critical for the socio-economic progress of the country and for enhancing rural livelihoods, the trade-off with biodiversity conservation and natural resource management needs careful consideration.

While development activities in Tsirang Division contribute significantly to socio-economic advancement by improving infrastructure and market access for rural communities, the associated loss of 45.66 hectares of forest land poses a significant environmental challenge. A careful balance must be struck between development and conservation to ensure that the benefits of infrastructure and rural development are not undermined by the long-term environmental costs. By adopting sustainable development practices, promoting biodiversity conservation, and investing in ecosystem restoration, Tsirang can work toward achieving both socio-economic development and environmental sustainability.

Table 21: Showing the forested land acquired for developmental activities

Sl no	Development activities	Area lost (ha)
1	Approach road	3.53
2	Archery Range	0.05
3	Land Exchange	7.41
4	Farm road	14.41
5	Land lease	2.23
6	Tower construction (Telecom/T-Cell)	1.16
7	Land substitute	10.98
8	Road widening	3.51
9	Pipelines/irrigation	0.44
10	Others	1.94
	Total	**45.66**

The Tsirang Forest Division, although has minimal infrastructure and built-up areas falling inside the jurisdiction. A major portion of the infrastructure development/ built up area is covers by Gewog connectivity road and Sarpang Tsirang National Highway (53 km). The PHPA II KV 400 transmission line which passes through from Relangthang Sergithang to Norjangsa, Dunglagang covering 25 km distance.

Since all these developmental activities fall inside the Division jurisdiction, certain potential negative impacts would be foreseen to biodiversity. The impacts can be mainly in the form of resource extraction, pollution from approach /farm road, vehicle emissions, and anthropogenic disturbances to wildlife and other natural resources. Due to farm road construction works happening at a higher pace, there is likely to have landslide and erosion triggered by these development activities.

3.1.7 Climate change (Extreme events, Natural calamities, landslide and Floods, Pest and disease)

Broad trends in global climatic patterns, including rising mean temperatures and changes in precipitation levels, are evident. According to the Intergovernmental Panel on Climate Change (IPCC, 2007), the mountains of Asia are likely to experience more extreme and variable weather due to a changing climate. Mountain ecosystems and their biodiversity are particularly vulnerable to the impacts of climate change. Furthermore, climate projections indicate that the tree line in Bhutan will shift northward and upward along the mountains, encroaching into alpine scrubs and meadows (Lhendup et al., 2012). Additionally, mobile animals, such as wildlife species, are also highly sensitive to climate change and experience significant range shifts, which are especially common in the Himalayan region. For instance, species like the gaur and the Indian pond heron, which are typically sighted in subtropical forests, have been observed in alpine regions such as Jigme Khesar Strict Nature Reserve (2019) and Jigme Dorji National Park in Gasa Dzongkhag. Similarly, Mongar et al. (2024) recently recorded the subtropical bird species Lesser Adjutant in the Tsirang Forest Division. This clearly indicates that wildlife biodiversity has experienced range shifts due to changing climatic conditions across the Bhutan Himalayan landscapes.

According to the CVCA survey report by the Tsirang Forest Division (2023), climate change manifests as erratic rainfall, drought, extreme weather events, and extreme temperatures. The survey also noted changes in weather patterns, such as irregular rainfall, snowfall, and outbreaks of pests and diseases. Additionally, Tsirang dzongkhag is situated in a transitional zone where warm air from the Indian foothill plains meets cold air from temperate regions, causing mixed weather events with unusual rainfall and temperatures. This makes the area prone to rapid pest and disease outbreaks, forest fires and other natural disasters such as flash flood, landslide and hailstorm etc.

On the other hand, the Watershed Management Division (2021) identified climate change as one of the main drivers of drying water sources in Bhutan. Similarly, the Tsirang Forest Division recorded 306 water sources, of which 2% (n = 5 sources) have already dried up, 17% (n = 53 sources) are drying up, mainly due to climate change. Therefore, it is essential to build resilience against these changes through proactive measures, appropriate strategies, and conservation actions to protect the vulnerable communities in the region.

3.1.8 Pollution and Waste

Tsirang is also one of the areas with minor pollution to the natural environment from a large number of small-scale cottage industries established in various locations. On the other hand, the indiscriminate littering of the environment is becoming the most challenging task for conservationists to control despite numerous measures being put in place. Trash goes along with the people wherever they go like trekking, picnic, pilgrimage, town, institutions and along the highways. Pollution and waste have both direct and indirect impacts on wildlife habitats, behavior, and reproduction. For example, scavenging animals may inhabit areas near landfills, abandoning their natural habitats due to the availability of food. Hazardous chemicals from pollution can contaminate the natural environment, killing microorganisms that are essential for maintaining nutrients for biodiversity. Additionally, the leaching of pollutants into rivers can alter aquatic life habitats and spread harmful chemicals to humans when the contaminated water is used for home and agricultural purposes.

Thus, need to initiate waste management programs such as waste management campaigns in all the three ranges continuously by adopting trash-in trash-out measures, incentivize those institutions, agencies and local groups who actively participate in waste management campaigns and encourage waste segregations through use of improvised waste bins by local institutions such schools, agencies, businessman and monasteries in Tsirang Dzongkhag. Approximately, the quantity of waste generated around 500 to 600 kgs of degradable and biodegradable waste based on the annual waste report of Divisional Forest Office, Tsirang.

3.1.9 Invasive species

Invasive/alien species are a major cause of the decline in native biodiversity in both terrestrial and aquatic ecosystems (Kopp, 2010). Towards the end of the 20th century, 12 species of fish were introduced in Bhutan (Gurung, 2018) and in the last decade, invasive plant species such as *Lantana camera, Chromolaena odoratum, Micania micarantha* and *Ageratina adeniphora* have invaded forest surpassing palatable and native species.

These invasive plants including *Lantana camara, Chromolaena odoratum, Micania micrantha, ,Parthenium hysterophorus, Tithonia diversifolia* and *Ageratina adeniphora* were recorded in Tsirang. The *Chromolaena odaratum* and *Micania micrantha* are mostly prevalent in lower elevation areas of Barshong, Mendrelgang, Rangthaling, Tsholingkhar Patshaling, Gosaling, Tsirangtoe and Sergithang Gewog. Similarly, higher elevation area of Patshaling, Rangthaling, Kikorthang, Dunglagang and Phungtenchu Gewog have recorded *Agerantina adeniphora*. There is also evidence that exotic species such as *Leucaenia leucocephala* and clover planted in the private sector registered as fodder species which could spread to the SRF land and invade local environments becoming invasive in nature.

Besides ecological impacts, invasive species can also cause socio-economic and livelihood implications as this may lead to reduced yields due to invasive plants. If no intervention is taken, the invasive weeds will take over and the local endemic species will be threatened or wiped out completely in the given environment. Therefore, there is a need to come up with strategy and control guidelines for control of invasive weeds within the

SRF land within Tsirang. The control measures like manual removal of invasive plants/ weeds; mechanical method, using mechanical devices such as small tractor, dozer, etc.; and Bio-control measure like application of parasite which feeds on these invasive plants, can clearly be spelt out, while application of herbicides may lead to ecological and environmental damages.

3.1.10 Forest Fire

Forest fire is one of the threats identified during the public consultation meeting and socio-economic survey. The causes are due to changes in land use and climate change, which contribute to the increase in forest fires. It was found that the average forest fire risk is highest during the months of October to March, which are also the dry seasons with low precipitation. Forest fires are caused by a combination of natural and anthropogenic factors. The greatest impacts on forest fire occurrence were altitude, temperature, slope, and wind speed. Forest fire risk varies with weather conditions, especially at low altitudes.

In the context of the DFO Tsirang, areas with chirpine forests and Gewogs located at lower altitudes are at risk of forest fires and are categorized as forest fire-prone areas. The Gewogs at risk are Sergithang, Tsirangtoed, and Tsholingkhar. Forest fires can affect vegetation cover, structure, density, diversity, composition, and productivity. The burning of dead and living organic matter in the soil directly influences soil properties, which support the growth of green forage for fauna. Forest fires can have a severe effect on the habitat degradation of key biodiversity such as tigers, golden langurs, red pandas, and WBH, potentially leading to a permanent shift in their habitat due to the fire hazard apart from loss of property and lives.In Tsirang, forest fires are destroying around 4 to 5 hectares of chirpine forest annually. To minimize this threat, timely advocacy and awareness programs for local communities in forest fire-prone areas is the most effective measure to reduce the occurrence of forest fires.

3.1.11 GLOFs

Due to climate change, GLOFs are considered as one of the most important threats to freshwater biodiversity as rivers fed with glaciers and glaciers lakes are more sensitive to climate change. With increase in temperature, these glaciers are retreating at faster rate causing flooding downstream. The glaciers lake outburst floods cause turbidity and pose threat to fish population and food scarcity to White-billed Heron and important bird species feeding on fishes. The floods caused by GLOFs also lead to changing course of the river and simultaneously destroying shallow feeding habitats. Further, flash floods due to GLOFs in the main Punatsangchhu also affected the lives and properties of local communities residing within the flood hazard zone of the low lying river basin.

3.2 Challenges

3.2.1 Insufficient Equipment and Mobility facilities

The lack of adequate and modern equipment significantly reduces the effectiveness of monitoring, enforcement, and habitat management operations, thereby creating major challenges for the implementation of sustainable forest management practices. This technological gap restricts the ability of forest managers to track illegal activities, manage ecological threats, and maintain the health of forest ecosystems. The problem is further compounded by poor transportation infrastructure and limited mobility options, which make it difficult to reach remote forest areas. As a result, timely interventions are delayed, biodiversity conservation efforts are weakened, and opportunities for meaningful community participation in conservation activities are diminished.

3.2.2 Institutional Capacity Constraints

Human resource limitations represent another critical barrier to effective forest management. This skills gap makes it difficult to respond proactively to emerging challenges, such as strengthening climate resilience, conserving biodiversity, and managing increasing pressures on forest resources. Furthermore, the limited workforce is frequently overburdened, which leads to delays in project implementation, weakens the enforcement of forest regulations, and reduces the quality of engagement with local communities and stakeholders. These inefficiencies undermine the timely execution of conservation initiatives and diminish the overall impact of resource management strategies. Taken together, these constraints significantly weaken the capacity of the Divisional Forest Office (DFO) to deliver on its mandate of safeguarding forest sustainability, protecting ecosystem integrity, and supporting the long-term well-being of dependent communities.

3.2.3 Harmonizing Conservation and Development

The increasing population pressure, combined with the rapid pace of development, poses considerable challenges in achieving a balance between environmental conservation and economic growth. The continuous expansion of infrastructure and urban settlements further intensifies these pressures, making it more difficult to reconcile development priorities with conservation objectives. Within this context, the Division carries a critical responsibility to carefully regulate and manage forestry clearances. Each clearance must be guided by caution, comprehensive impact assessments, and sound judgment to minimize potential risks, including pollution, deforestation, and the loss of biodiversity. Striking an effective balance between development needs and ecological sustainability is therefore essential to ensuring the long-term health of the Division's forests and the communities that depend on them.

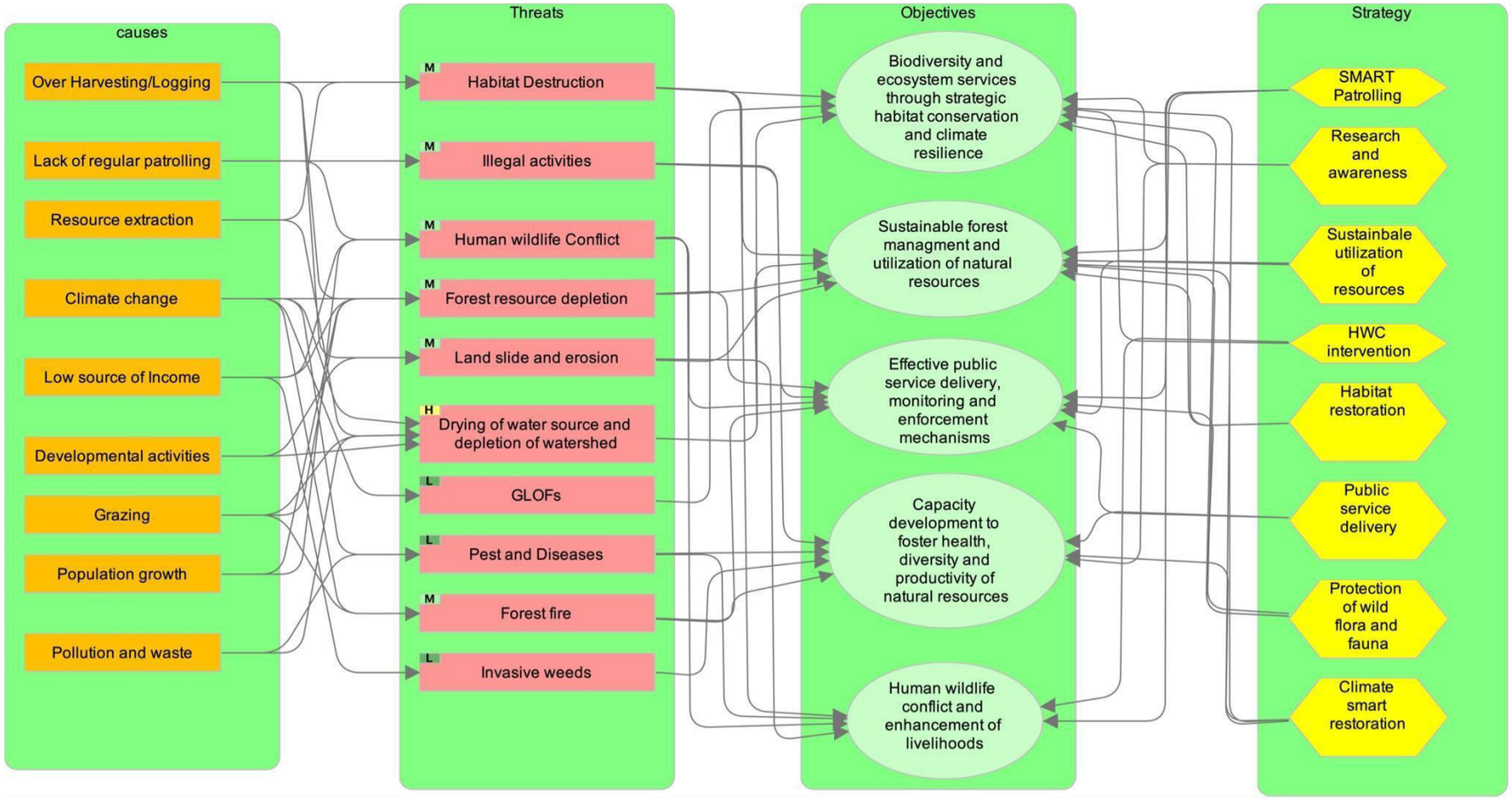


Figure 39: Conceptual model for implementation of strategies

Chapter 4: Management Prescription

The management prescriptions are defined based on the overall goal of the plan to achieve and maintain better habitat, species conservation and enhanced social livelihood. These strategies and activities are identified based on analysis of threats, conservation challenges, and opportunities and are expected to solve problems or overcome the barriers that prevent us from achieving the objectives and subsequently the goals.

4.1 Services

The services for management of land, timber, and associated resources is crucial for ensuring the sustainable use of natural resources and the well-being of rural communities. The management prescriptions related to land-lease, *kidu* land, land substitution, and rural timber are particularly important for balancing community needs with sustainable land and resource management. These services are vital for rural development, local livelihoods, and the preservation of natural resources.

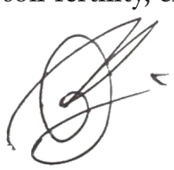
Timber is a crucial resource in rural areas, particularly for construction, heating, and other livelihood-related needs. Proper management of rural timber resources is essential to ensure that the forests remain healthy and provide for future generations while meeting the immediate needs of local communities.

The management of land-lease, *kidu* land, land substitution, and rural timber in Tsirang requires an integrated and sustainable approach. This involves clear legal frameworks, active community participation, environmental assessments, and long-term monitoring to ensure that natural resources are used responsibly and that the livelihoods of rural communities are benefited. By combining sustainable land use practices with community empowerment, DFO, Tsirang can protect its natural resources while promoting economic growth and social well-being.

4.2 Technical prescription (Forest & Wildlife Management)

In Tsirang, Bhutan, the Technical Prescription for Forest and Wildlife Management would encompass a range of strategies focused on sustainable forest management, biodiversity conservation, and the protection of ecosystem services. These prescriptions are vital in preserving Tsirang's unique forest ecosystems while ensuring that they contribute to the economic, cultural, and ecological well-being of the region. Here's a breakdown of these key areas. Biodiversity conservation is key to maintaining the ecological balance and health of the ecosystem. Bhutan is known for its rich biodiversity, and Tsirang's forests are home to a variety of species, some of which may be threatened or endemic.

Ecosystem services refer to the benefits people derive from the natural environment, such as clean air, water, soil fertility, climate regulation, and recreational opportunities.



Tsirang's forests and wildlife contribute significantly to these services, which are essential for both human well-being and biodiversity conservation.

The forest and wildlife management prescriptions for Tsirang, Bhutan, should be comprehensive, focusing on sustainable forest management, biodiversity conservation, and the protection of ecosystem services. This integrated approach ensures that the region's natural resources are preserved for future generations while simultaneously supporting the livelihoods of local communities. By emphasizing community involvement, scientific monitoring, and climate resilience, these strategies will contribute to a sustainable, healthy environment in Tsirang.

4.3 Institutions (Human resources and infrastructure)

The effective management of human resources is essential for the successful implementation of forest, wildlife, land management, and rural development initiatives. DFO, Tsirang involved in human resources development focused on training, capacity-building, and providing technical expertise to ensure efficient execution of management prescriptions. Infrastructure development is also essential for supporting human resources management to deliver efficient public services and biodiversity conservation activities. Further, develop human resources, build necessary infrastructure, and supply equipment to improve both the quality of life and the sustainability of natural resources in the region.

4.4 Management prescription of HCVA

Strategy	Outcome	output	Activity
Ensure conservation of protection of flora and fauna	Nature conservation	Knowledge on faunal biodiversity	Conduct periodic assessment and monitoring of biodiversity
Sustainable management of resources	Forest resources management	Regular water quality monitoring.	Conduct periodic assessment of water quality in PES area (Kuchi & Thakorling)
		NWFPs resource management	Establish community-based management and monitoring groups for NWFPs
Enhance integrated approach in conservation and development	Integrated conservation and development	Conservation awareness and education strengthened	Conduct education and awareness program on HWC
			Study tour program
		Land pollution minimized	Conduct regular monitoring and compliance monitoring/
Enhance protection and enforcement	Forest protection and enforcement	Communities advocate on waste management	Awareness on waste Management and pollution
		Protection and enforcement strengthen	Conduct SMART patrol
		Prevalent pest and diseases identified and mitigation	Awareness and campaign on uprooting of invasive species

4.5: Management prescription for DFO

Table 22: Showing Management prescriptions

Objective I	**Protect biodiversity and ecosystem services through strategic habitat conservation and climate resilience**
Objective II	**Sustainable forest management and utilization of natural resources**
Objective III	**Effective public service delivery, monitoring and enforcement mechanisms**
Objectives IV	**Capacity development to foster health, diversity and productivity of natural resources**
Objective V	**Human wildlife conflict and enhancement of livelihoods**
Objective 1: Protect biodiversity and ecosystem services through strategic habitat conservation and climate resilience	
Strategy 1.1: Implement SMART patrolling	
Action 1.1.1. Conduct SMART patrolling, compliance monitoring, and enforcement measures	
Action 1.1.2 Conduct drone patrolling	
Action 1.1.2. Equip all the field offices with patrolling tools and field gears such as GPS, laptops, camera-traps, smartphones, drones, digital cameras, handset and repeater & field gears.	
Strategy 1.2. Protection of wild flora and fauna species	
Action 1.2.1. Conduct periodic vegetation surveys (trees, shrubs and herbs including epiphytes, orchids, fungus species.	
Action 1.2.2. Conduct periodic camera trapping and monitoring of fauna species	
Action 1.2.3. Conduct of Tiger population survey	
Action 1.2.4. Conduct of Musk deer population survey	
Action 1.2.5 Conduct fish and other aquatic diversity assessment in the Division	
Action 1.2.6 Carry out assessment of herpetofauna in the Division	
Action 1.2.7 Conduct assessment of other texa within the Division jurisdiction.	
Action 1.2.8 Conduct assessment of NTFP/NWFP species within the Division	
Action 1.2.9 Carry out annual Biodiversity Monitoring Grids survey in BC area	
Action 1.2.10 Carry out the Golden Langur population assessment survey	
Strategy 1.3. Climate-smart restoration-resilient	
Action 1.3.1. Implement climate Smart restoration plantation within the degraded and/ watershed area	
Action 1.3.2. Inventory the invasive species and adopt control measures	
Action 1.3.3. Revival of lake and carry out protection of watershed catchment areas.	

Action 1.3.4. Development of nursery and production of seedlings for creation and maintenance of plantation.
Action1.3.5 Carry out soil conservation and restoration works affected by development activities to prevent soil erosion and landslides.
Strategy 1.4: Enhance research and awareness
Action 1.4.1. Installation of signages and information boards at strategic location
Action 1.4.2. Distribution and mapping of key species
Action 1.4.3. Awareness and advocacy on forest fire, waste management, importance of biodiversity conservation, impacts & adaptation of climate change and water resource management to local communities, citizen science group and students
Action 1.4.4. Awareness and advocacy on rules and regulations, FNCA-2023, Forest policy and regulations/guidelines
Action 1.4.5. Awareness and advocacy on grievance redressal mechanism, gender mainstreaming, ESS & ESMP
Objective 2: Sustainable forest management and utilization of natural resources
Strategy 2.1: Ensure sustainable utilization of forest resources
Action 2.1.1. Allocation of RHBT and commercial timbers on sustainable basis
Action 2.1.2. Prepare and implement NWFPs management and marketing plans to ensure sustainability in management and utilization of NWFP resources
Action 2.1.3. Prepare, implementation and revise Local Forest Management Plans
Action 2.1.4. Prepare, implement and revise existing Community Forest Management plans.
Action 2.1.5. Prepare action plan for district-wide scientific thinning plan and implementation of the thinning plan.
Action 2.1.6. Carry out forest inventory in the identified NFI grids of the Division.
Action 2.1.7 Develop a business plan and SOP of CFs and NWFP management groups.
Action 2.1.8. Creation of fire line and prescribed burning in forest fire risk areas to reduce fire hazards.
Action 2.1.9. Strengthen the existing Community-based Ecotourism groups through various capacity development programs.
Objective 3: Effective public service delivery, monitoring and enforcement mechanism.
Strategy 3.1: Ensure effective delivery of public services
Action 3.1.1. Review and process allocation of rural house building, firewood allocation, fencing post, flag post and commercial timbers
Action 3.1.2. Review and process allocation of timbers for other construction, Dzongs, Lhakhang renovation, bridge construction
Action 3.1.3. Review and process allocation of NWFPs,
Action 3.1.4. Review and process forestry clearance for development activities (farm road, transmission line, irrigation channels, telephones line etc

Action 3.1.5. Review and process allotment of SRF land for Satshap, Kidu, new allotment, land leasing, commercial farming
Action 3.1.6. Review and process clearance for removal of forest produce from private registered land
3.2: Enhance monitoring and Enforcement
Action 3.2.1 Conduct annual monitoring of forest management regimes (plantation, CFs, NWFP, LFMP, BC, HCVA, KBA & etc
Action 3.2.2. Conduct mid-term review and final evaluation of the management plan.
Action 3.2.3. Conduct compliance monitoring on the allocation of rural house building timber, commercial timbers and WBIs.
Action 3.2.4. Conduct compliance monitoring of development activities to prevent illegal activities
Action 3.2.7. Strengthen Interagency Forest Fire Coordination Group (IFFCG)and formation of rapid response team (RRT) at Gewog level.
Action 3.2.9 Assessment of management area effectiveness of DFO using Bhutan METT+.
Objective 4: Capacity development to foster health, diversity and productivity of natural resources
Strategy 4.1: Capacity development and enhancement
Action 4.1.1. Conduct staff capacity building on advanced technology (GIS, Drone technology and application, OFS, G2C, SDSS, SW map, Computer Application, FIRMS, BIRMS and field accessories etc.)
Action 4.1.2. Provide training on scientific thinning and cable line survey.
Action 4.1.3. Conduct hands-on training on wildlife rescue and handling.
Action 4.1.4. SMART connect training
Action 4.1.5. Provide wood value addition, product diversification skills and capacity development to CFs and NWFP Management groups.
Action 1.4.6. Update and create awareness on latest G2C, OFS and other online forestry services to LGs and local communities.
Action 4.1.7. Provide training on effective record keeping and Governance in the CFs and NWFP groups.
Action 4.1.8. Capacity building for field staff in managing Human Wildlife Conflicts.
Action 4.1.9. Capacity building for field staff in Nursery and Plantation management.
Action 4.1.10. Capacity building on forest fire fighting and management.
Action 4.1.11. Capacity building on scientific paper and technical report writing.
Strategy 4.2. Health, diversity, and productivity of natural resources
Action 4.2.1. Conduct socio-economic survey for assessment of natural recourses
Action 4.2.2. Strengthen and implement PES for drinking and irrigation water between Service providers and beneficiaries.

Action 4.2.3. Conduct wetland inventory on the spatial extent and distribution wetlands with the Division.
Action 4.2.4 Maintenance of existing plantation sites.
Action 4.2.5. Plantation of high value and commercial timber species in CF & SRF land.
Action 4.2.6 Carry out annual CFs & NWFP management group workshops and develop marketing plans & strategies for selected high-economically valued forestry products.
Objective 5: To mitigate human wildlife conflict and enhancement of livelihoods
Strategy 5.1: Human wildlife conflict intervention strategies
Action 5.1.1. Identify the HWC hotspot area.
Action 5.1.2. Formation of a Community-based Quick Response Team (QRT) in high HWC areas.
Action 5.1.3. Advocacy and awareness of HWC to local communities, schools and LG members.
Action 5.1.4 Purchase tranquilizing guns, tranquilizer (drugs), projectiles and drug storing equipment for rescue of sick, injured wildlife species and conflicting species.
Strategy 5.2 Habitat restoration, protection and management
Action 5.2.1. Creation of grassland /and foraging landscape for herbivores
Action 5.1.2. Carry out enrichment plantation, fruit trees, bamboo, bananas, and NWFP in wildlife habitats
Action 5.1.3 Assessment and management of Mineral licks, snags and waterholes in the Division

4.6 Gender Mainstreaming

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

The "Gender Analysis, Gender Mainstreaming Strategy and Gender Action Plan" 2019 has indicated that in order to mainstream gender into the DFO management plans, adequate budget allocation is needed (indicative budget in relation to gender mainstreaming is provided in the Gender Action Plan). The report recommends the need to involve women's organizations both at national and local level to enhance gender mainstreaming, building capacity of project team, enhancing skill development at local level for nature-based product diversification, identification of alternative livelihood and incentives for participation and support to CFMG. Integrating the above recommendations within the overall structure of the DFO management plan is supposed to ensure gender aspects are addressed. The comprehensive approach will not only promote gender equality but

also contribute to sustainable forest management and enhance community resilience.

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

1. Diverse Knowledge and Perspectives: Women and men often possess distinct knowledge about local ecosystems, resources, and species. Incorporating this diverse knowledge can lead to more comprehensive and accurate conservation strategies. Therefore, women participation would be considered of utmost significance when planning and implementing biodiversity action plans.
2. Resource Management: Women frequently play key roles in natural resource management, including agriculture, water collection, and fuelwood collection. As a result, women involvement in the management of forest resources in the CF and SRF would be encouraged.
3. Empowerment: The Division shall empower women by providing them with opportunities to actively engage in decision-making processes related to conservation and land management.
4. Equitable Benefits: Ensure gender equity in conservation initiatives and promotes fair distribution of benefits and resources, preventing potential gender-based disparities.
5. Enhanced Community Resilience: Integrating women into conservation efforts can enhance community resilience to environmental changes and stressors. Women often take on unique roles in their households and communities, and their involvement can lead to more robust adaptive strategies that benefit entire communities.
6. Long-Term Sustainability: Empowering women in conservation fosters long-term commitment and sustainable practices as women often prioritize the health of their communities and the environment. Their participation can ensure that conservation efforts are maintained and adapted over time, contributing to the overall success of biodiversity initiatives.
7. Promotion of Gender-Sensitive Practices: Encouraging gender integration in conservation initiatives promotes the development of gender-sensitive practices that acknowledge and address the different roles, responsibilities, and challenges faced by men and women in resource management. This can lead to more equitable and effective conservation strategies.

By recognizing and actively incorporating the contributions and perspectives of women, conservation strategies can be more holistic, effective, and sustainable, ultimately benefiting both biodiversity and the local communities.

4.7 Environment and Social Safeguards (ESS)

The Environmental and Social Safeguards (ESS) system is designed to identify and manage potential negative environmental and social impacts associated with various actions. By screening these actions, the ESS enables the early detection of issues that could adversely affect the environment or communities. This proactive approach allows for the development of appropriate measures to avoid, minimize, or compensate for negative impacts, ensuring that actions are both environmentally and socially responsible.

A crucial aspect of the ESS is its role in monitoring the implementation and effectiveness of mitigation measures. This entails continuous oversight to ensure that these measures are functioning as intended and to address any unforeseen impacts that may arise during the execution of management prescriptions. By integrating these safeguards, environmental and social considerations are incorporated at every stage, leading to more comprehensive and effective management strategies. Furthermore, the ESS has been integrated into the actions of the management prescription, accompanied by a formulated financial outlay to support its implementation.

Chapter 5: Implementation Plan and Financial Outlay

The Tsirang forest Division will be the lead agency for the implementation of this Division Forest management plan with technical support from Department of forest and Park services in collaboration with other stakeholders like Dzongkhag, LG members and local communities. All activities such as surveys, plantations, monitoring, surveillance and community-based activities will be implemented by the field offices (Tsirangtoe, Mendrelgang and Tsirang Range) in close coordination with the Division Forest office. While implementing the plans, the DFO implementation framework will be followed.

This DFO plan is developed for a plan period of ten years from July 2024-June 2034. The development of the plan is guided by the National Forest Policy 2011 and the 13th Five Year Plan of the Ministry of Agriculture and Forests. The plan is also guided by the DoFPs milestones that will extend until 2032.Over the next ten years, the Division Forest office and the stakeholders will implement 15 key actions and will incur an estimated cost of Nu. 10.815 million.

The major portion of funding for this ten-year conservation action plan will be from WWF/IKI project as most of the activities are aligned with 13 FYP and BFL plan. However, funding from other donors like WWF, BTFEC, IKI, GEF, UNDP, Tarayana foundation and other international donors will be sourced.

5.1 Implementation and financial out lay of DFO

Objectives (This are the broad long term goals that the division wants to achieve)	Strategies (These are the methods and plans designed to achieve the objective)	Action (These are list of activities to achieve the objectives)	Year along with budget outlay(Nu.in Million)										Remarks
			I	II	III	IV	V	VI	VII	VIII	IX	X	
1 Protect biodiversity and ecosystem services through strategic habitat conservation and climate resilience	1.1Implement SMART patrolling & zero poaching strategy	1.1.1Conduct SMART patrolling, compliance monitoring and enforcement measures	0.750	0.750	0.750	0.750	0.750	0.750	0.750	0.750	0.750	0.750	Potential donors
		1.1.1 Conduct drone patrolling	0.100	0.100	0.100	0.100	0.100	0.100	0.100	0.100	0.100	0.100	
		1.1.2. Equip all the field offices with patrolling tools and field gears such as GPS, laptops, camera-traps, smartphones, drones and digital cameras.		0.500				0.500					Potential donors
	1.2 Protection of wild flora and fauna species to maintain a viable population	1.2.1 Conduct periodic vegetation surveys (trees, shrubs and herbs including epiphytes and orchids)					0.600					0.600	

		1.2.2 Conduct periodic camera trapping and monitoring of fauna species			0.600			0.600			0.600		Potential donors
		1.2.3 Conduct of Tiger population survey					1.00					1.00	
		1.2.4 Conduct of Musk deer population survey				0.500					0.500		
		1.2.5 Conduct of eDNA survey			o.300				0.340				
		1.2.8 Conduct fish and other aquatic assessment in the Division					0.400						Potential donors
		1.2.9 Carry out assessment of herpetofauna in the Division		0.250				0.250				0.250	
		1.2.10 Conduct assessment of other taxa in the Division jurisdiction.						0.350					
		1.2.11 Conduct assessment of NWFP species within Division			0.400								
		1.2.12 Carry out the Golden Langur population survey	0.400							0.400			

	1.3 Promote climate smart – resilient restoration	1.3.1 Implement nature-based solution within the degraded land	0.250	0.250	0.250	0.250	0.250	0.250	0.250	0.250	0.250	0.250	
		1.3.2 Inventory the invasive species and adopt control measures			0.300			0.300			0.300		
		1.3.3 Revival of lake and carry out protection of watershed catchment areas		0.300			0.300					0.300	Potential donors
		1.3.4 Development of nursery and production of seedlings for creation and maintenance of plantation	0.300	0.300	0.300	0.300	0.300	0.300	0.300	0.300	0.300	0.300	
		1.3.5 Carry out soil conservation and ecosystem restoration works to prevent soil erosion and landslides			0.500				0.500				
	1.4 Enhance research and awareness program	1.4.1 Installation of signages and information boards at strategic locations		0.050			0.050			0.050		0.050	
		1.4.2 Documentation and mapping of key species		0.300					0.300				

		1.4.3 Awareness and advocacy on forest fire, climate change and water resource management to local communities, citizen science group and students		0.150		0.150		0.150		0.150		0.150	Potential donors
		1.4.4 Awareness raising and action campaign on waste management	0.250		0.250		0.250		0.250			0.250	
		1.4.5 Awareness & advocacy on rules and regulation, FNCA 2023, Forest Policy and regulations/guidelines		0.200		0.200			0.200			0.200	Potential donors
		1.4.5 Awareness and advocacy grievance redressal mechanism, gender mainstreaming, ESS & ESMP						0.300					
2. Sustainable Forest management and utilization of natural resources	2.1Ensure sustainable utilization of forest resources strategy	2.1.1 Allocation of RHBT and commercial timbers on sustainable basis (Professional service)	0.100	0.100	0.100	0.100	0.100	0.100	0.100	0.100	0.100	0.100	

		2.1.2 Prepare and implement NWFPs management and marketing plans to ensure sustainability in management and utilization of NWFP resources	0.050		0.050		0.050		0.050		0.050		
		2.1.3 Prepare, implementation and revise Local Forest Management Plans		0.300		0.300		0.300		0.300		0.300	
		2.1.4 Prepare, implement and revise existing Community Forest management plans.	0.400		0.400		0.400		0.400		0.400		
		2.1.5 Prepare action plan for district-wide scientific thinning plan and implementation of the thinning plan		0.300		0.300		0.300		0.300			
		2.1.6 Carry out forest inventory in the identified NFI grids of the Division.					2.00					2.00	
		2.1.7 Develop a business plan and SOP of CFs and NWFP management groups.		0.150		0.150			0.150		0.150		

		2.1.8 Creation of fire line and prescribed burning in fire risk areas to reduce fire hazards	0.150	0.150	0.150	0.150	0.150	0.150	0.150	0.150	0.150	0.150	Potential donors
		2.1.9 Strengthen the existing Community-based Ecotourism groups.		0.150		0.150			0.150			0.150	
3.Public service delivery	3.1 Enhance monitoring and Enforcement	3.1.1 Conduct annual monitoring of forest management regimes (plantation, CFs, NWFP, LFMA, BC, HCVA, KBA & etc	0.450	0.450	0.450	0.450	0.450	0.450	0.450	0.450	0.450	0.450	Potential donors
		3.1.2 Conduct mid-term review and final evaluation of the management plans		0.250		0.250	5			0.250		0.250	
		3.1.3 Conduct compliance monitoring on the allocation of rural house building and commercial timbers and WBIs.	0.150	0.150	0.150	0.150	0.150	0.150	0.150	0.150	0.150	0.150	
		3.1.4 Conduct monitoring of development activities to prevent illegal activity	0.150		0.150			0.150			0.150		FRPMS
		3.1.5 Strengthen Interagency Forest fire coordination Group (IFFCG) and formation of rapid response team	0.100	0.100	0.100	0.100	-.100	0.100	0.100	0.100	0.100	0.100	Potential donors

		3.1.6Assessment of management area effectiveness of DFO using Bhutan METT+					0.100					0.100	NCS
4.Capacity development to foster health, diversity and productivity of natural resources	4.1 Capacity development and enhancement	4.1.1 Conduct staff capacity building on advance technology (QGIS, Drone, OFS, G2C, SW map, computer application,-FIRMS,BIRMS)		0.250		0.250			0.250			0.250	Potential donors
		4.1.2 Provide training on scientific thinning and cable line survey			0.150				0.150				
		4.1.3 Conduct hands on training on wildlife rescue and handling		0.200			0.200				0.200		
		4.1.4 SMART connect training			0.200				0.200			0.200	Potential donors
		4.1.5 Provide value addition, product diversification skills and capacity development to CFs & NWFP management groups.		0.400			0.400			0.400		0.400	
		4.1.6 Update and create awareness on latest G2C, OFS and other online forestry services to LG and local communities			0.250					0.250			

		4.1.7 Provide training on effective record keeping and governance in CFs and NWFP groups		0.200				0.200				Potential donors
		4.1.8 Capacity building for staff in managing Human Wildlife conflicts.		0.150							0.150	
		4.1.9 Capacity building for staff in Nursery and plantation		0.150			0.150				0.150	
		4.1.10 Capacity building for forest fire fighting and management	0.150						0.150			Potential donors
		4.1.11 Capacity building on scientific paper and technical report writing		0.200						0.200		
	4.2 Health, diversity and productivity of natural resources	4.2.1 Conduct socio-economic survey for assessment of natural resources utilization	0.500									0.500
		4.2.2 Monitoring of PES scheme (kuchi & Thakorling)			0.200						0.200	
		4.2.3 Conduct wetland inventory on the spatial extent and distribution wetlands with the Division		0.250			0.250			0.250		
		4.2.4 Maintenance of existing plantation		0.400			0.400			0.400		Potential donors

		4.2.5 Plantation of high value and commercial timber	0.600		0.600		0.600		0.600			0.600	
		4.2.6 Carry out annual CFs and NWFP management group workshops and develop marketing plans and strategies for high economically valued forestry products.		0.500			0.500				0.500		
5.To mitigate human wildlife conflict and enhancement of livelihoods	5.1 Human wildlife conflict intervention and strategies	5.1.1 Identify the HWC hotspot area	0.400				0.400				0.400		Potential donors
		5.1.2 Formation of Community-based Quick Response Team (QRT) in high HWC areas.			0.300				0.350			0.350	Potential donors
		5.1.3 Advocacy and awareness of HWC to local communities, schools and LG members.		0.300			0.300			0.300			
		5.1.4 Purchase tranquilizing dart guns, drugs and drug storing equipment for rescue of sick or injured wildlife species.	0.350					0.350					Potential donors

	5.2 Habitat restoration, protection and management	5.2.1 Creation of grassland /and foraging landscape for herbivores	0.250			0.250			0.250			0.250	
		5.2.2 Carry out enrichment plantation, fruit trees, bamboo, bananas and NWFP in wildlife habitats		0.300			0.300			0.300		0.300	Potential donors
		5.2.3 Assessment and management of mineral lick, snags and waterholes in the Division	0.250			0.250					0.250		Potential donors
G. Total (Nu. 78.04 million for ten years)			**6.1**	**8.5**	**6.7**	**5.1**	**15.8**	**6.1**	**6.64**	**5.9**	**6.35**	**10.8**	

5.2 Implementation and financial outlay of HCVA

Strategy	Outcome	Output	Activity	Location	Time frame	Budget
Ensure conservation of protection of flora and fauna	Nature conservation	Knowledge on faunal biodiversity	Conduct periodic assessment and monitoring of biodiversity	HCV area	Annual	0.750
Sustainable management of resources	Forest resources management	Regular water quality monitoring.	Conduct periodic assessment of water quality in PES area (Kuchi & Thakorling)	Patsaling	Annual	0.500
		NWFPs resource management	Establish community-based management and monitoring groups for NWFPs.	Kilkhortang, Dunglagang & Patsaling	Jan &Feb,2026	0.400
Enhance integrated approach in conservation and development	Integrated conservation and development	Conservation awareness and education strengthened	Conduct education and awareness program on HWC	Kilkhortang, Dunglagang & Patsaling	Oct, 2027	0.300
			Study tour program	Communities of HCVA area	Dec,2028	0.900
		Land pollution minimized	Conduct regular monitoring and compliance monitoring/	HCVA area	July, 2028	0.200
Institutional & HR capacity	Forest protection and enforcement	CFMGs advocate on waste management	Awareness on waste Management and pollution	HCV area	Dec,2026 & 2028	0.300
		Protection and enforcement strengthen	Conduct SMART patrol	Kilkhortang, Dunglagang & Patsaling	Dec 2029	0.500
		Prevalent pest and diseases identified and mitigation	Awareness and campaign on uprooting of invasive species	HCVA area	Sept,2029	0.300

Chapter 6: Monitoring and Evaluation

The plan activities monitoring will be done by the Division office, Tsirang in collaboration with the Department of Forest and park services. Progress will be monitored by Division office based on the annual report submitted by field Ranges and the compiled report will be sent to DoFPs. Mid-term plan review will be carried out towards the end of the fifth year plan period. The M&E table will be used for monitoring and evaluation using indicators provided.

Table 23: Monitoring and Evaluation for DFO management plan

Objectives	Action	Indicators	Baseline	unit	Yearly Target									
					I	II	III	IV	V	VI	VII	VIII	IX	X
Protect Biodiversity and ecosystem services through strategic habitat conservation and climate resilience	Conduct SMART patrolling, compliance monitoring and enforcement measures	No of staff engaged in patrolling	1	report										
	Conduct drone patrolling	No of drone patrolling conducted	0	nos										
	Equip all the field offices with additional patrolling and intelligence gadgets and materials, such as GPS, laptops, camera-traps, hand held radio sets and smartphones, drones and digital cameras.	No of field equipments and accessories procured and issued to concern field offices	0	nos										
	Conduct periodic vegetation surveys (trees, shrubs and herbs including epiphytes, orchids, fungus species.	No. of publication	1	report										
	Conduct periodic camera trapping and monitoring of fauna species	No. of publication	1	report										
	Conduct of Tiger population survey	Population estimate of Tiger	1	report										

	Conduct of Musk deer survey	Population estimate of Musk deer	0	report											
	Conduct of eDNA survey	No. of survey conducted	0	report											
	Conduct fish and other aquatic diversity assessment in the Division	No. of survey condcuted	1	report											
	Carry out assessment of herpetofauna in the Division	No. of survey conducted	0	report											
	Conduct assessment of other texa within Division jurisdiction.	No. of survey conducted	0	report											
	Conduct assessment of NWFP species within the Division	No. of publication	0	report											
	Carry out the golden Langur population survey	No. of publication	1	report											
	Implement Nature based solution within the degraded land	No. of acreage	1	Ha											
	Inventory the invasive species and adopt doable control measures	Area managed for invasive species	0	Ac											
	Revival of lake and carry out protection of watershed catchment areas	Area bought under protection	0	Ac											

	Development of Nursery and protection of seedlings for creation and maintenance of plantation	Nursery established and maintan	1	no										
	Carry out soil conservation and restoration works affected by development to prevent soil erosion and landslides	No of acres completed	0	Ac										
	Installation of signages and information boards at strategic locations	Number of signages and information boards installed	5	nos										
	Distribution and mapping of key species	No.of survey conducted	0	report										
	Awareness and advocacy on forest fire, waste management, importance of biodiversity conservation, impacts & adaptation of climate change and water resource management to local communities, citizen science group and students	no of staff trained on FF	0	No										
	Awareness raising and action campaign on waste management	Nos . of training condcuted	1	time										

	Awareness and advocacy on rules and regulations, FNCA 2023, forest policy and regulations/ guidelines	No of staff on rules and regulations	1	time										
	Awareness and advocacy on grievance redressal mechanism, gender mainstreaming, ESSP & ESMP	No of chiwog trained on Gender	5	chiwog										
2. To promote sustainable management and utilization of forestry and biological resources..	Allocation of RHBT and commercial timbers on sustainable basis	No of cfts/m3 of timber/logs been allotted RHBT & commercials purposes	1	report										
	Prepare and implement NWFPs management and marketing plans to ensure sustainability in management and utilization of NWFP resources	No. of NWFP management groups revise or newly created	3	report										
	Prepare, implementation and revise Local Forest Management Plans	No. of LFMP revise or newly created	1	report										
	Prepare, implement and revise existing Community Forest management plans.	No. of plan revise or newly created CFMP	5	report										
	Prepare action plan for district wide scientific thinning plan and implementation of the thinning plan.	No of plan revised	1	plan										

	Carry out forest inventory in the identified NFI grids of the Division	No of NFI inventory carried out	1	report										
	Develop a business plan and SoP of CFs and NWFP management group	No of plan and SoP develop	1	report										
	Creation of fireline and prescribed burning in forest fire risk area to reduce fire hazards	no fo fireline prepared	0	acre										
	Strengthen the existing Community-based Eco-tourism groups through various capacity development programs.													
3. Effective public service delivery, monitoring and enforcement mechanism.	Review and process allocation of rural building, firewood allocation, fencing post,flag post and commercial timbers.	No of applicant approved	50	applicant										
	review and process allocation of timbers for other construction, Dzongs, Lhakhang renovation and bridge construction	No of application processed	100	applicant										
	Review and process allocation of NWFPs	No of applicant processed	20	applicant										

	Review and process forestry clearance for development activities (farm road, transmission line, irrigation channels, telephones line etc	No of application processed												
	Review and process clearance for removal of forest produce from private registered land	No of applicant processed												
	Conduct annual monitoring of forest management regimes (plantation, CFs NWFPs, LGMP, BC,HCVA, KBA and etc)	No of CF monitored	49	CF										
	Conduct mid-term review and final evaluation of the management plan.	No of midterm review done	25	CF										
	Conduct compliance monitoring on the allocation of rural house building timber, commercial timbers and WBIs.	Times of monitoring carried out	1	time										
	Conduct compliance monitoring of development activities to prevent illegal activities	Times of monitoring carried out												

	Strengthen Interagency Forest Fire Coordination Group (IFFCG) and formation of rapid response team (RRT) at Gewog level.	No of RRT formed	3	groups										
	Assessment of management area effectiveness of DFO using Bhutan METT+.	No of assessment carried out	1	time										
4.Capacity development to foster health, diversity and productivity of natural resources	Conduct staff capacity building on advanced technology (GIS, Drone technology and application, OFS, G2C, SDSS, SW map, Computer Application, FIRMS, BIRMS and field accessories etc.)	No staff trained	0											
	Provide training on scientific thinning and cable line survey.	No of staff trained	0											
	Conduct hands-on training on wildlife rescue and handling.	No of staff trained	0											
	SMART connect training	No of staff trained	32	staff										
	Provide wood value addition, product diversification skills and capacity development to CFs and NWFP Management groups.	No of staff trained	0	nos										

	Update and create awareness on latest G2C, OFS and other online forestry services to LGs and local communities.	No of staff trained	0											
	Provide training on effective record keeping and Governance in the CFs and NWFP groups.	No of groups trained	49	CF										
	Capacity building for field staff in managing Human Wildlife Conflicts.	No of staff trained	0	staff										
	Capacity building for field staff in Nursery and Plantation management.	No of staff trained	0											
	Capacity building on forest fire fighting and management.	No of staff trained	0											
	Capacity building on scientific paper and technical report writing.	No of staff trained	0											
	Conduct socio-economic for assessment of natural resources utilization	No of survey conducted	1	report										
	Monitoring of PES scheme (Kuchi & Thakorling)	No of PES scheme	1	scheme										

	Conduct wetland inventory on the spatial extent and distribution wetlands with the Division.	No of inventory done	0											
	Maintenance of existing plantation sites.	No of plantation maintenance carried out	2	acres										
	Plantation of high value and commercial timber species in CF & SRF land.	No of plantation done	0	acre										
	Carry out annual CFs & NWFP management group workshops and develop marketing plans & strategies for selected high-economically valued forestry products.	Times of CF workshop conducted	0	times										
To mitigate human-wildlife conflict and enhancement	Identify the HWC hotspot area and facilitate in supplying electric fencing and improvised chainlinks.	No of HWC hotspot identified & report	1	report										
	Formation of Community-based Quick Response Team (QRT) in high HWC areas.	No. of QRT group formed	3	QRT										
	Advocacy and awareness of HWC to local communities, schools and LG members.	No. of staffs attended the in-house training	0	nos										

	Purchase tranquilizing guns, tranquilizer (drugs), projectiles and drug storing equipment for rescue of sick or injured wildlife species.	No of equipments procured	0	nos										
	Creation of grassland / and foraging landscape for herbivores.	No of grassland created	0	Ac										
	Carry out enrichment plantation, fruit trees, bamboo, bananas, and NWFP in wildlife habitats	No of plantation done	0											
	Assessment and management of mineral licks, snags and waterholes in the Division	No of salt lick created	1	no										

Chapter 7: Stakeholder consultation and endorsement

7.1 Stakeholder consultation

The DFOs shall identify all the relevant stakeholders and rights holders in their divisional jurisdiction. Consultation meetings on the proposed management interventions and also on the restrictions and prohibitions shall be carried out thoroughly to avoid future complications.

Identification of Stakeholders

Tsirang Divisional Forest Office, has identified local government authorities, including the Dzongkhag administration officials and Gewog officials including Gup, Adm, Mangmi, Tshogpas, local government officials and local communities.

Consultation Process

The stakeholder consultation process is essential for gathering diverse perspectives, building consensus, and ensuring that a project or policy considers the needs of all relevant parties. The consultation process during stakeholder meetings is designed to ensure that all relevant parties or stakeholders have the opportunity to contribute their perspectives, concerns, and suggestions regarding a specific project, policy, or issue.

Meetings/Workshop: Conduct meetings with stakeholders introducing the objectives, agenda, and expected outcomes. and then Present and clarify the proposed management interventions. Discuss restrictions and prohibitions to gather feedback and address concerns

Documentation: Document all inputs, questions, and concerns raised by stakeholders. Summarize and confirm stakeholder input during the meeting to ensure understanding and accuracy.

Post-Consultation Activities: Review and analyze the feedback to identify common themes, concerns, and suggestions. and Compile a summary report that outlines the key points discussed, decisions made, and next steps. Share this with stakeholders for transparency. Plan follow-up meetings or communications to address unresolved issues or provide updates on progress.

Stakeholder Mapping

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

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

7.2 Finalization and Endorsement of the DFO Management Plan

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

Annexure I: Annual Operational Plan

Ia. Review of the Previous Year's Plan

Framework for Annual Operational Plan for Division Forest Office				
Name of the office:	DFO-Tsirang			(Seal and sign)
Prepared by and date:	DFO-Tsirang			
Verified by and date:	Tshering Wangchuk			
Recommended by and date:	Phuntsho Tobgay			
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
23	23	NA	NA	
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)
Conduct SMART patrolling, compliance monitoring, and enforcement measures	1 Nos	100%	SMART Patrolling: three long-range SMART patrols conducted three range office	
BMG monitoring	3 Nos	100%	Biodiversity Assessment: Vegetation, mammals and bird diversity assessed in biological corridor (4 grids) data collected via EpiCollect.	
Construction of Range Office	1 No	100%	Completed construction of one number of New Range office under Mendrelgang Gewog with fund support from BFL	

CF and NWFPs plan revision	3 No	100%	CF and NWFPs: Two community Forests and one NWFPs plan revised. Draft plan prepared and submitted	
Draft DFO management plan developed and submitted for review	1 Nos	100%	Draft DFO management plan for DFO Tsirang developed	
Number of CFMPs evaluated, monitored.	49 Nos	NA	Annual Monitoring of Community Forests (CF): Monitoring of 49 CFs completed, and report submitted.	
Number of NWFPS management plans evaluated.	3 Nos	NA	Non-Wood Forest Products (NWFP) Management Plans: Monitoring of 3 NWFP management plans completed, and report submitted.	
Number of LFMPs surveyed	1 Nos	100%	LFMP plan surveyed: conducted LFMP resource assessment and plan drafted.	
Ecotourism product developed	1 Nos	NA	Sunkosh ecotourism products: Eco trail, Hotspot bath, eco lodge amenities developed at Devithan CF with support from AFFCOo project	
Volume of concessional timber allotment	M3	NA	5133.73m3 of timber allocated.	
Commercial timber allotment	M3	NA	2859 m3 of timber allotted	
NWFPs (bamboo)	Nos	NA	3275 nos. of bamboo pole allotted	
The area of the plantation monitored and maintained	27 Ha	100%	Plantation Maintenance: Weeding and maintenance completed for 27 hectares of plantation area.	
No. of QRT formed	3 Nos	100%	Three Quick Response Teams (ORTs) group formed (Patsaling toed, Pangthang and Tsakaling village).	

TAT for which forestry clearances for various activities issued and forest resources utilization services processed	7 days	NA	Clearance Issuance: Clearances issued within 5 days.	
No. of Household Surveyed for CVCA/Socio-Economic Survey	70 Nos	100%	Socio-economic Survey and Climate Vulnerability Assessment: Completed for 890 households across 10 gewogs; report to be published by June.	

Annexure II: Annual plan of operation

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	Develop a C2C strategy for two gewogs.	1 Nos	Feb-march	0.7	WWF-IKI	Dunglagang and Patsaling
	Monitor biodiversity monitoring grids.	1 Nos	Feb	0.06	BFL	Identified BMG
	Stakeholder consultation meeting	1 No	March	2.09	WWF, IKI	12 Gewogs
	Conduct periodic HCV monitoring and evaluation	1 No	March	0.07	WWF, IKI	
	Conduct IFFCG coordination meeting	1 No	February	0.01	WWF, IKI	IKI focal and FRPMS
Program II: Forest Resources Planning & Management Section	NWFPs plan revision	1 Nos	March	0.06	BFL	
	CF mid-term review	4 Nos	December- feb	NA		
	CF annual monitoring and evaluation	49 nos	Nov-Dec	0.45		
	PES monitoring and evaluation	1 No	June and December	NA		Kuchukhola and pawkhola
	Waste management and cleaning	12 times	Jan-Dec	NA		

	Orchid propagation and cultivation	1 No	July-June	0.79		Daragoan community forest women's group
	NWFPs group meeting	1 Nos	December	0.05		
	Scientific thinning	7 Ha	April-June	0.40	BFL	
Program III: Forest Monitoring & Information Section	Conduct long range SMART patrolling conducted to reduce forestry and wildlife offences	3 Nos	Feb-march	0.42	BFL	3 Range offices
	In-house training on SMART and SMART Connect data model v6 at DFO level	1 No	April-June	1.04	WWF,IKI	SMART FOCAL
	Carry out annual monitoring of plantations	1 No	Jan-June	0.10	RGOB	
	1000 hectares of new plantation created	34 hac	june-july	2.62	UNEP	
	Nursery Management and seedling production	5000 nos	Jan-June	0.06	BFL	
	Maintain existing plantations	1 No	Jan-Dec	1.25	BFL	
	10 hectares mass bamboo plantation	4 sites	April-june		BES/ RGOB	
Program IV: Administration and Direction	Construct new infrastructures	1 No	Jan-Nov	1.129	BFL	
	Conduct uniform code of conduct training	1 No	July-Sep	0.05	BFL	
	Carry out maintenance of existing infrastructures	1 No	July -Dec	0.9	BFL	

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Annexure III: List of Mammals

Sl. No	Common Names	Scientific Names	Family	Order	Conservation status
1	Barking Deer	*Muntiacus muntjak*	Cervidae	Artiodactyla	LC
2	Himalayan Black Bear	*Ursus thibetanus laniger*	Ursidae	Carnivora	VU
3	Himalayan Palm Civet	*Paradoxurus larvata*	Viverridae	Carnivora	LC
4	Large Indian Civet	*Viverra zibethe*	Viverridae	Carnivora	LC
5	Gaur	*Bos gaurus*	Bovidae	Artiodactyla	VU
6	Golden Langur	*Trachypithecus geei*	Cercopithecidae	Primates	EN
7	Yellow-throated Marten	*Martes flavigula*	Mustelidae	Carnivora	LC
8	Assamese Macaque	*Macaca assamensis*	Cercopithecide	Primates	NT
9	Himalayan Serow	*Antelope thar*	Bovidae	Artiodactyla	LC
10	Tiger	*Tigiris tigris*	Felidae	Carnivora	EN
11	Asian Elephant	*Elephas maximas*	Elephantidae	Proboscidea	EN
11	Marbled Cat	*Pardofelis marmorata*	Felidae	Carnivora	NT
13	Himalayan crestless porcupine	*Hystrix brachyura*	Hystricidae	Rodentia	LC
14	Hoary-Bellied Squirrel	*Callosciurus pygerythrus*	Sciurdae	Rodentia	LC
15	Smooth-coated otter	*Lutrogale perspicillata*	Mustelidae	Carnivora	VU
16	Himalayan Goral	*Naemorhedus goral*	Bovidae	Artiodactyla	NT
17	Wild Boar	*Sus scrofa*	Suidae	Artiodactyla	LC
18	Grey langur	*Trachypithecus pileatus*	Cercopithecide	Primates	VU
19	Sambar	*Rusa unicolor*	Cervidae	Artiodactyla	VU
20	Asiatic Golden Cat	*Catopuma temminckii*	Felidae	Carnivora	NT
21	Clouded Leopard	*Felis macrocelis*	Felidae	Carnivora	VU
22	Dhole	*Cuon alpinus*	Canidae	Carnivora	EN
23	Leopard cat	*Prionailurus bengalensis*	Felidae	Carnivora	LC
24	Chinese Pangolin	*Manis pentadactyla*	Manidae	Pholidota	CR

25	Rat	*Rattus rattus*	Muridae	Rodentia	LC
26	Malayan Giant Squirrel	*Ratufa indica*	Sciurdae	Rodentia	LC
26	Musk Deer	*Moschus moschiferus*	Moschidae	Artiodactyla	EN
27	Spotted Linsang	*Prionodon pardicolor*	Pronodontidae	Carnivora	LC
28	Bat	*Acerodon jubatus*		Chiroptera	NT
29	Common Leopard	*Panthera pardus*	Felidae	Carnivora	VU
30	Giant Flying Squirrel	*Glaucomys sabrinus*	Sciurdae	Rodentia	CR
31	Himalayan Striped Squirrel	*Tamiops mcclellandii*	Sciurdae	Rodentia	LC
32	Yellow_bellied Weasel	*Mustela kathiah*	Mustelidae	Carnivora	LC
33	Red Panda	*Ailurus fulgens*	Ailuridae	Carnivora	EN
34	Short-Tailed Mole	*Euroscaptor micrura*	Talpidae	Rodentia	LC

Annexure IV: List of Birds

Sl. No	Common Name	Scientific Name	Family	Categorization	IUCN status
1	Rufous-throated Partridge	*Arborophila rufogularis*	Phasianidae	C	LC
2	Red Junglefowl	*Gallus gallus*	Phasianidae	C	LC
3	Indian Peafowl	*Pavo cristatus*	Phasianidae	R	LC
4	Kalij Pheasant	*Lophura leucomelanos*	Phasianidae	C	LC
5	Great Cormorant	*Phalacrocorax carbo*	Phalacrocoracidae	O	LC
6	Little Cormorant	*Microcarbo niger*	Phalacrocoracidae	R	LC
7	Black-crowned Night Heron	*Nycticorax nycticorax*	Ardeidae	R	LC
8	White-bellied Heron	*Ardea insignis*	Ardeidae	R	CR
9	Little Egret	*Egretta garzetta*	Ardeidae	R	LC
10	Oriental Honey-buzzard	*Pernis ptilorhynchus*	Accipitridae	O	LC
11	Jerdon's Baza	*Aviceda jerdoni*	Accipitridae	O	LC
12	Crested Serpent-Eagle	*Spilornis cheela*	Accipitridae	O	LC
13	Black Eagle	*Ictinaetus malaiensis*	Accipitridae	O	LC
14	Besra	*Accipiter virgatus*	Accipitridae	O	LC
15	Eurasian Sparrowhawk	*Accipiter nisus*	Accipitridae	O	LC
16	Common Buzzard	*Buteo buteo*	Accipitridae	O	LC
17	Slaty-breasted Rail	*Gallirallus striatus*	Rallidae	R	LC
18	Black-tailed Crake	*Zapornia bicolor*	Rallidae	C	LC
19	Barred Buttonquail	*Turnix suscitator*	Turnicidae	O	LC
20	River Lapwing	*Vanellus duvaucelii*	Charadriidae	C	NT
21	Red-watted Lapwing	*Vanelleus indicus*	Charadriidae	R	LC
22	Rock Pigeon	*Columba livia*	Columbidae	A	LC
23	Oriental Turtle-Dove	*Streptopelia orientalis*	Columbidae	A	LC
24	Spotted Dove	*Streptopelia chinensis*	Columbidae	A	LC
25	Barred Cuckoo-Dove	*Macropygia unchall*	Columbidae	A	LC
26	Wedge-tailed Green Pigeon	*Treron sphenurus*	Columbidae	A	LC
27	Mountain Imperial Pigeon	*Ducula badia*	Columbidae	O	LC

28	Asian Koel	*Eudynamys scolopaceus*	Cuculidae	R	LC
29	Green-billed Malkoha	*Phaenicophaeus tristis*	Cuculidae	O	LC
30	Chestnut-winged Cuckoo	*Clamator coromandus*	Cuculidae	O	LC
31	Plaintive Cuckoo	*Cacomantis merulinus*	Cuculidae	O	LC
32	Large HawkCuckoo	*Hierococcyx sparverioides*	Cuculidae	O	LC
33	Lesser Cuckoo	*Cuculus poliocephalus*	Cuculidae	O	LC
34	Indian Cuckoo	*Cuculus micropterus*	Cuculidae	R	LC
35	Himalayan Cuckoo	*Cuculus saturates*	Cuculidae	R	LC
36	Common Cuckoo	*Cuculus canorus*	Cuculidae	R	LC
37	Lesser Coucal	*Centropus bengalensis*	Cuculidae	O	LC
38	Mountain Scops-Owl	*Otus spilocephalus*	Strigidae	O	LC
39	Collared Scops-Owl	*Otus lettia*	Strigidae	O	LC
40	Brown Wood Owl	*Strix leptogrammica*	Strigidae	R	LC
41	Collared Owlet	*Glaucidium brodiei*	Strigidae	O	LC
42	Asian Barred Owlet	*Glaucidium cuculoides*	Strigidae	O	LC
43	Jungle Owlet	*Glaucidium radiatum*	Strigidae	R	LC
44	Spotted Owlet	*Athene brama*	Strigidae	R	LC
45	Tawny Fish Owl	*Ketupa flavipes*	Strigidae	R	LC
46	Grey Nightjar	*Caprimulgus indicus*	Caprimulgidae	O	LC
47	White-throated Needletail	*Hirundapus caudacutus*	Apodidae	O	LC
48	House Swift	*Apus nipalensis*	Apodidae	O	LC
49	Himalayan Swiftlet	*Aerodramus brevirostris*	Apodidae	O	LC
50	Blyth's Swift	*Apus leuconyx*	Apodidae	O	NE
51	Red-headed Trogon	*Harpactes erythrocephalus*	Trogonidae	O	LC
52	Eurasian Hoopoe	*Upupa epops*	Upupidae	O	LC
53	Great Hornbill	*Buceros bicornis*	Bucerotidae	C	VU
54	Rufous-necked Hornbill	*Aceros nipalensis*	Bucerotidae	R	VU
55	White-throated Kingfisher	*Halcyon smyrnensis*	Alcedinidae	O	LC
56	Crested Kingfisher	*Megaceryle lugubris*	Alcedinidae	O	LC
57	Pied Kingfisher	*Ceryle rudis*	Alcedinidae	R	LC

58	Blue-bearded Bee-eater	*Nyctyornis athertoni*	Meropidae	O	LC
59	Great Barbet	*Psilopogon virens*	Megalaimidae	C	LC
60	Golden-throated Barbet	*Psilopogon franklinii*	Megalaimidae	O	LC
61	Blue-throated Barbet	*Psilopogon asiaticus*	Megalaimidae	C	LC
62	Speckled Piculet	*Picumnus innominatus*	Picidae	O	LC
63	White-browed Piculet	*Sasia ochracea*	Picidae	O	LC
64	Grey-capped Pygmy Woodpecker	*Dendrocopos canicapillus*	Picidae	O	LC
65	Fulvous-breasted Woodpecker	*Dendrocopos macei*	Picidae	O	LC
66	Lesser Yellownape	*Picus chlorolophus*	Picidae	O	LC
67	Greater Yellownape	*Picus flavinucha*	Picidae	O	LC
68	Grey-headed Woodpecker	*Picus canus*	Picidae	C	LC
69	Rufous Woodpecker	*Micropternus brachyurus*	Picidae	O	LC
70	Greater Flameback	*Chrysocolaptes guttacristatus*	Picidae	O	LC
71	Bay Woodpecker	*Blythipicus pyrrhotis*	Picidae	O	LC
72	Eurasian Kestrel	*Falco tinnunculus*	Folconidae	O	LC
73	Long-tailed Broadbill	*Psarisomus dalhousiae*	Eurylaimidae	O	LC
74	Blue-naped Pitta	*Hydrornis nipalensis*	Pittidae	O	LC
75	Large Woodshrike	*Tephrodornis virgatus*	Tephrodornithidae	O	LC
76	Bar-winged Flycatcher-shrike	*Hemipus picatus*	Tephrodornithidae	O	LC
77	Ashy Woodswallow	*Artamus fuscus*	Artamidae	O	LC
78	Common Iora	*Aegithina tiphia*	Aegithinidae	O	LC
79	Gray-chinned Minivet	*Pericrocotus solaris*	Campephagidae	O	LC
80	Long-tailed Minivet	*Pericrocotus ethologus*	Campephagidae	O	LC
81	Scarlet Minivet	*Pericrocotus speciosus*	Campephagidae	C	LC
82	Short-billed Minivet	*Pericrocotus brevirostis*	Campephagidae	O	LC

83	Large Cuck-ooshrike	*Coracina macei*	Cam-pephagidae	O	LC
84	Black-winged Cuckooshrike	*Lalage melaschistos*	Cam-pephagidae	O	LC
85	Brown Shrike	*Lanius cristatus*	Laniidae	R	LC
86	Long-tailed Shrike	*Lanius schach*	Laniidae	C	LC
87	Gray-backed Shrike	*Lanius tephronotus*	Laniidae	O	LC
88	Blyth's Shrike-Babbler	*Pteruthius aeralatus*	Vireonidae	O	LC
89	White-bellied Erpornis	*Erpornis zantholeuca*	Vireonidae	O	LC
90	Slender-billed Oriole	*Oriolus tenuirostris*	Oriolidae	R	LC
91	Maroon Oriole	*Oriolus traillii*	Oriolidae	O	LC
92	Black Drongo	*Dicrurus macrocercus*	Dicruridae	R	LC
93	Ashy Drongo	*Dicrurus leucophaeus*	Dicruridae	A	LC
94	Bronzed Drongo	*Dicrurus aeneus*	Dicruridae	O	LC
95	Greater Rack-et-tailed Drongo	*Dicrurus paradiseus*	Dicruridae	O	LC
96	Lesser Rack-et-tailed Drongo	*Dicrurus remifer*	Dicruridae	O	LC
97	Hair-crested Drongo	*Dicrurus hottentottus*	Dicruridae	O	LC
98	White-throated Fantail	*Rhipidura albicollis*	Rhipiduridae	O	LC
99	Common Green-Magpie	*Cissa chinensis*	Corvidae	O	LC
100	Grey Treepie	*Dendrocitta formosae*	Corvidae	C	LC
101	Barn Swallow	*Hirundo rustica*	Hirrundini-dae	C	LC
102	Nepal House Martin	*Delichon nepalensis*	Hirrundini-dae	O	LC
103	Red-rumped Swallow	*Cecropis daurica*	Hirrundini-dae	C	LC
104	Yellow-bellied Fairy-Fantail	*Chelidorhynx hypoxan-tha*	Stenostiridae	C	LC
105	Grey-headed Ca-nary-Flycatcher	*Culicicapa ceylonensis*	Stenostiridae	C	LC
106	Sultan Tit	*Melanochlora sultanea*	Paridae	O	LC
107	Green-backed Tit	*Parus monticolus*	Paridae	C	LC
108	Yellow-cheeked Tit	*Machlolophus spilonotus*	Paridae	O	LC
109	Black-throated Tit	*Aegithalos concinnus*	Aegithalidae	O	LC

110	Beautiful Nuthatch	*Sitta formosa*	Sittidae	R	VU
111	Chestnut-bellied Nuthatch	*Sitta cinnamoventris*	Sittidae	O	LC
112	Velvet-fronted Nuthatch	*Sitta frontalis*	Sittidae	R	LC
113	White-tailed Nuthatch	*Sitta himalayensis*	Sittidae	O	LC
114	Wall Creeper	*Tichodroma muraria*	Tichodromidae,	R	LC
115	Hodgson's Treecreeper	*Certhia hodgsoni*	Certhiidae	O	LC
116	Brown Dipper	*Cinclus pallasii*	Cinclidae	O	LC
117	Striated Bulbul	*Pycnonotus striatus*	Pycnonotidae	O	LC
118	Black-crested Bulbul	*Pycnonotus flaviventris*	Pycnonotidae	O	LC
119	Red-vented Bulbul	*Pycnonotus cafer*	Pycnonotidae	A	LC
120	White-throated Bulbul	*Alophoixus flaveolus*	Pycnonotidae	O	LC
121	Black Bulbul	*Hypsipetes leucocephalus*	Pycnonotidae	C	LC
122	Ashy Bulbul	*Hemixos flavala*	Pycnonotidae	C	LC
123	Mountain Bulbul	*Ixos mcclellandii*	Pycnonotidae	O	LC
124	Chestnut-headed Tesia	*Cettia castaneocoronata*	Cettiidae	C	LC
125	Black-faced Warbler	*Abroscopus schisticeps*	Cettiidae	O	LC
126	Brownish-flanked Bush Warbler	*Horornis fortipes*	Cettiidae	O	LC
127	Aberrant Bush Warbler	*Horornis flavolivaceus*	Cettiidae	O	LC
128	Dusky Warbler	*Phylloscopus fuscatus*	Cettiidae	O	LC
129	Hume's Bush warbler	*Cettia brunnescens*	Cettiidae	O	LC
130	Tickell's Leaf Warbler	*Phylloscopus affinis*	Cettiidae	C	LC
131	Ashy-throated Warbler	*Phylloscopus maculipennis*	Cettiidae	O	LC
132	Yellow-browed Warbler	*Phylloscopus inornatus*	Cettiidae	O	LC
133	Smoky Warbler	*Phylloscopus fuliventer*	Phylloscopidae	O	LC

134	Greenish Warbler	*Phylloscopus trochiloides*	Phylloscopidae	O	LC
135	Western Crowned Warbler	*Phylloscopus occipital*	Phylloscopidae	O	LC
136	Yellow-vented Warbler	*Phylloscopus cantator*	Phylloscopidae	O	LC
137	Gray-hooded Warbler	*Phylloscopus xanthoschistos*	Phylloscopidae	C	LC
138	Golden-spectacled Warbler	*Seicercus burkii*	Phylloscopidae	O	LC
139	Whistler's Warbler	*Seicercus whistleri*	Phylloscopidae	O	LC
140	White-spectacled Warbler	*Seicercus affinis*	Phylloscopidae	O	LC
141	Chestnut-crowned Warbler	*Seicercus castaniceps*	Phylloscopidae	O	LC
142	Pale-rumped warbler	*Phylloscopus chloronotus*	Phylloscopidae	O	LC
143	Brown Bush Warbler	*Locustella luteoventris*	Locustellidae	O	LC
144	Common Tailorbird	*Orthotomus sutorius*	Cisticolidae	C	LC
145	Striated Prinia	*Prinia crinigera*	Cisticolidae	O	LC
146	Rufescent Prinia	*Prinia rufescens*	Cisticolidae	O	LC
147	Grey-breasted Prinia	*Prinia hodgsonii*	Cisticolidae	O	LC
148	Jungle Prinia	*Prinia sylvatica*	Cisticolidae	O	LC
149	White-browed Fulvetta	*Fulvetta vinipectus*	Slyviidae	O	LC
150	Greater Rufous-headed Parrotbill	*Psittiparus bakeri*	Slyviidae	O	LC
151	Lesser Rufous-headed Parrotbill	*Chleuasicus atrosuperciliaris*	Slyviidae	O	LC
152	Striated Yuhina	*Yuhina castaniceps*	Zosteropidae	O	LC
153	Stripe-throated Yuhina	*Yuhina gularis*	Zosteropidae	O	LC
154	Whiskered Yuhina	*Yuhina flavicollis*	Zosteropidae	C	LC
155	Rufous-vented Yuhina	*Yuhina occipitalis*	Zosteropidae	O	LC
156	Black-chinned Yuhina	*Yuhina nigrimenta*	Zosteropidae	O	LC
157	Oriental (Indian) White-eye	*Zosterops palpebrosus*	Zosteropidae	C	LC

158	Rufous-vented Yuhina	*Yuhina occipitalis*	Zosteropidae	O	LC
159	Puff-throated Babbler	*Pellorneum ruficeps*	Pellorneidae	O	LC
160	Golden Babbler	*Cyanoderma chrysaeum*	Timaliidae	R	LC
161	Rufous-capped Babbler	*Cyanoderma ruficeps*	Timaliidae	O	LC
162	White-browed Scimitar-babbler	*Pomatorhinus schisticeps*	Timaliidae	O	LC
163	Rusty-cheeked Scimitar-babbler	*Megapomatorhinus erythrogenys*	Timaliidae	C	LC
164	Coral-billed Scimitar-babbler	*Pomatorhinus ferrugi-nosus*	Timaliidae	R	LC
165	Streak-breasted Scimitar-babbler	*Pomatorhinus ruficollis*	Timaliidae	R	LC
166	Gray-throated Babbler	*Stachyris nigriceps*	Timaliidae	O	LC
167	Scaly-breasted Wren-babbler	*Pnoepyga albiventer*	Pnoepygidae	R	LC
168	Long-billed Wren-babbler	*Rimator malacoptilus*	Pellorneidae	R	LC
169	Yellow-throated Fulvetta	*Schoeniparus cinereus*	Pellorneidae	O	LC
170	Rufous-winged Fulvetta	*Schoeniparus castaneceps*	Pellorneidae	O	LC
171	Rufous-winged Fulvetta	*Schoeniparus castaneceps*	Pellorneidae	O	LC
172	Nepal Fulvetta	*Alcippe nipalensis*	Pellorneidae	O	LC
173	Striated Laughingthrush	*Grammatoptila striata*	Leiothrichidae	C	LC
174	White-crested Laughingthrush	*Garrulax leucolophus*	Leiothrichidae	A	LC
175	Lesser Necklaced Laughingthrush	*Garrulax monileger*	Leiothrichidae	O	LC
176	White-throated Laughingthrush	*Pterorhinus albogularis*	Leiothrichidae	O	LC
177	Grey-sided Laughingthrush	*Pterorhinus caerulatus*	Leiothrichidae	R	LC
178	Bhutan Laughingthrush	*Trochalopteron imbricatum*	Leiothrichidae	O	LC
179	Blue-winged Laughingthrush	*Trochalopteron squamatum*	Leiothrichidae	O	LC
180	Chestnut-crowned Laughingthrush	*Trochalopteron erythrocephalum*	Leiothrichidae	O	LC
181	Rufous-chinned Laughing Thrush	*Ianthocincla rufogularis*	Leiothrichidae	O	LC

182	Rufous Sibia	*Heterophasia capistrata*	Leiothrichidae	C	LC
183	Silver-eared Mesia	*Leiothrix argentauris*	Leiothrichidae	C	LC
184	Red-billed Leiothrix	*Leiothrix lutea*	Leiothrichidae	C	LC
185	Red-tailed Minla	*Minla ignotincta*	Leiothrichidae	C	LC
186	Rusty-fronted Barwing	*Actinodura egertoni*	Leiothrichidae	C	LC
187	Blue-winged Minla	*Actinodura cyanouroptera*	Leiothrichidae	C	LC
188	Chestnut-tailed Minla	*Actinodura strigula*	Leiothrichidae	O	LC
189	Long-tailed Sibia	*Heterophasiapicaoides*	Leiothrichidae	R	LC
190	Red-faced Liocichla	*Liocichla phoenicea*	Leiothrichidae	O	LC
191	Asian Brown Flycatcher	*Muscicapa dauurica*	Muscicapidae	O	LC
192	Dark-sided Flycatcher	*Muscicapa sibirica*	Muscicapidae	O	LC
193	Slaty-backed Flycatcher	*Ficedula erithacus*	Muscicapidae	O	LC
194	Ferruginous Flycatcher	*Muscicapa ferruginea*	Muscicapidae	R	LC
195	Oriental Magpie-Robin	*Copsychus saularis*	Muscicapidae	A	LC
196	Blue-throated Flycatcher	*Cyornis rubeculoides*	Muscicapidae	O	LC
197	Large Niltava	*Niltava grandis*	Muscicapidae	O	LC
198	Small Niltava	*Niltava macgrigoriae*	Muscicapidae	O	LC
199	Rufous-bellied Niltava	*Niltava sundara*	Muscicapidae	O	LC
200	Verditer Flycatcher	*Eumyias thalassinus*	Muscicapidae	C	LC
201	Pale Blue Flycatcher	*Cyornis unicolor*	Muscicapidae	R	LC
202	Blue Whistling-Thrush	*Myophonus caeruleus*	Muscicapidae	A	LC
203	Spotted Forktail	*Enicurus maculatus*	Muscicapidae	O	LC
204	Slaty-backed Forktail	*Enicurus schistaceus*	Muscicapidae	C	LC

205	Siberian Rubythroat	*Calliope calliope*	Muscicapidae	R	LC
206	Himalayan Bluetail	*Tarsiger rufilatus*	Muscicapidae	O	LC
207	Indian Bush Robin	*Larvivora brunnea*	Muscicapidae	R	LC
208	Rufous-breasted Bush-Robin	*Tarsiger hyperythrus*	Muscicapidae	R	LC
209	Slaty-blue Flycatcher	*Ficedula tricolor*	Muscicapidae	O	LC
210	Rufous-gorgeted Flycatcher	*Ficedula strophiata*	Muscicapidae	O	LC
211	Sapphire Flycatcher	*Ficedula sapphira*	Muscicapidae	R	LC
212	Little Pied Flycatcher	*Ficedula westermanni*	Muscicapidae	O	LC
213	Ultramarine Flycatcher	*Ficedula superciliaris*	Muscicapidae	O	LC
214	Taiga Flycatcher	*Ficedula albicilla*	Muscicapidae	O	LC
215	Red-breasted Flycatcher	*Ficedula parva*	Muscicapidae	R	LC
216	Blue-fronted Redstart	*Phoenicurus frontalis*	Muscicapidae	O	LC
217	Plumbeous Redstart	*Phoenicurus fuliginosus*	Muscicapidae	C	LC
218	White-capped Redstart	*Phoenicurus leucocephalus*	Muscicapidae	C	LC
219	Hodgson's Redstart	*Phoenicurus hodgsoni*	Muscicapidae	O	LC
220	Black Redstart	*Phoenicurus ochruros*	Muscicapidae	R	LC
221	White-winged Redstart	*Phoenicurus erythrogastrus*	Muscicapidae	R	LC
222	Chestnut-bellied Rock-Thrush	*Monticola rufiventris*	Muscicapidae	O	LC
223	Blue-capped Rock-Thrush	*Monticola cinclorhynchus*	Muscicapidae	O	LC
224	Siberian Stonechat	*Saxicola maurus*	Muscicapidae	O	LC
225	Grey Bushchat	*Saxicola ferreus*	Muscicapidae	C	LC
226	Lesser Shortwing	*Brachypteryx leucophris*	Muscicapidae	R	LC
227	Eye-browed Thrush	*Turdus obscurus*	Turdidae	R	LC

228	Orange-headed Thrush	*Geokichla citrina*	Turdidae	O	LC
229	Tickell's Thrush	*Turdus unicolor*	Turdidae	C	LC
230	Gray-winged Blackbird	*Turdus boulboul*	Turdidae	O	LC
231	Black-throated Thrush	*Turdus atrogularis*	Turdidae	O	LC
232	Scaly Thrush	*Zoothera dauma*	Turdidae	O	LC
233	Chestnut-tailed Starling	*Sturnia malabarica*	Sturnidae	C	LC
234	Common Myna	*Acridotheres tristis*	Sturnidae	A	LC
235	Great Myna	*Acridotheres grandis*	Sturnidae	O	LC
236	Golden-fronted Leafbird	*Chloropsis aurifrons*	Chloropseidae	O	LC
237	Orange-bellied Leafbird	*Chloropsis hardwickii*	Chloropseidae	O	LC
238	Fire-breasted Flowerpecker	*Dicaeum ignipectus*	Dicaeidae	C	LC
239	Black-throated Sunbird	*Aethopyga saturate*	Nectariniidae	O	LC
240	Green-tailed Sunbird	*Aethopyga nipalensis*	Nectariniidae	C	LC
241	Crimson Sunbird	*Aethopyga siparaja*	Nectariniidae	C	LC
242	Streaked Spiderhunter	*Arachnothera magna*	Nectariniidae	C	LC
243	Rufous-breasted Accentor	*Prunella strophiata*	Prunellidae	O	LC
244	Grey Wagtail	*Motacilla cinerea*	Motacillidae	C	LC
245	White Wagtail	*Motacilla alba*	Motacillidae	C	LC
246	White browed Wagtail	*Motacilla madraspatensis*	Motacillidae	O	LC
247	Olive-backed Pipit	*Anthus hodgsoni*	Motacillidae	A	LC
248	Crested Bunting	*Melophus lathami*	Emberizidae	O	LC
249	Yellow-breasted Greenfinch	*Chloris spinoides*	Fringillidae	O	LC
250	Tibetan Serin	*Spinus thibetanus*	Fringillidae	R	LC
251	Common Rosefinch	*Carpodacus erythrinus*	Fringillidae	O	LC
252	House Sparrow	*Passer domesticus*	Passeridae	O	LC
253	Russet Sparrow	*Passer rutilans*	Passeridae	C	LC
254	Eurasian Tree Sparrow	*Passer montanus*	Passeridae	A	LC

255	White-rumped Munia	*Lonchura striata*	Estrildidae	O	LC
256	Scaly-breasted Munia	*Lonchura punctulata*	Estrildidae	C	LC
257	Plum-headed Parakeet	*Psittaculacyanocephala*	Psittaculidae	R	LC
258	Slaty-headed Parakeet	*Psittacula Himalayana*	Psittaculidae	R	LC
259	Lesser Adjutant	*Leptoptilos javanicus*	Ciconiidae	R	NT
260	Satyr tragopan	*Tragopan satyra*	Phasianidae	R	NT
261	Himalayan Monal	*Lophophorus sclateri*	Phasianidae	R	LC
262	Pheasant-tailed Jacana	*Hydrophasianus chiurgus*	Jacanidae	R	LC
263	Himalayan griffon vulture	*Gyps himalayensis*	Accipitridae	R	NT
264	Great crested grebe	*Podiceps cristatus*	podicipedidae	R	LC
265	Brown-headed Gull	*Chroicocephalus brunnicephalus*	Laridae	C	LC

Annexure V: List of Normal Plantation records of Tsirang

Sl #	Gewog	Location	Area in Acre	Year of Creation	Species	Remark
1	Barsong	Sallari	4.94	2020	Melia and Neem	NOP
2	Dunglagang	Lalikharka	29.65	2017	Tsenden, Champ, Guli, Angarey	PHPA II
3	Kikhortahng	U. Bokrey	25	2011	Tsenden, Champ	BTFC
4	Kikhortahng	U. Salami	20	2012	Tsenden, Champ, Angarey	RGoB
5	Kikhortahng	Nigaley	12.5	2013	Champ, Tsenden	RGoB
6	Kikhorthang	Majuwa	12.35	2012	Tsenden	BTFC
7	Kikhorthang	Majuwa	4.94	2013	Tsenden and Champ	BTFC
8	Kikorthang	Damphu	9.88	2015	Champ, Tsenden	RGoB
9	Kikorthang	Damphu	29.65	2016	Champ, Guli, Panisaj	PHPA II
10	Kikorthang	Bhalaypothi Dhunga	14.82	2017	Champ, Tsenden	PHPA II
11	Mendregang	Riserboo	16.06	2014	Tsenden & Champ	RGoB
12	Patshaling	Darachu	49.42	2015	Tsenden, Champ	PHPA II
13	Patshaling	Darachu	29.99	2016	Champ, Walnut, Guli, Cupressus	PHPA II
14	Patshaling	Bontouley	74.13	2016	Champ, Cupressus, Guli, walnut	PHPA II
15	Phungtenchu	Phaladay	30.31	2024	Teak, Gamari	BFL
16	Sergithang	Sirutar	49.42	2015	Teak, Gamari	PHPA II
	Sergithang	Jitpaltar	11.11	2024	Teak & Bamboo	RSPN
	Sergithang	Waklaytar	26.19		Teak & Bamboo	BFL
17	Tsirangtoe	Bagtar	69	2017	Teak, Bamboo	PHPA II
17	Tsirangtoe	Tsirangtoe	49.42	2017	Champ, Panisaj, Guli, Tsenden	PHPA II
18	Tsirangtoe	Rickydara	61.78	2018	Teak, Champ	PHPAII
19	Tsirangtoe	Daragaon	49.42	2018	Teak, Champ	PHPAII
20	Tsirangtoe	Gairigaon	49.42	2018	Teak, Champ	PHPAII
	Total		**279.04**	**acres**		

Annexure VI: List of Community Plantation in Tsirang

Sl No	Gewog	Name of CF	Location	Area (ha)	Year of creation	Species	Remark
1	Barsong	Norbuchholing	Setikhola	4.95	2018	Teak, Panisaj	PHPAII
2	Barsong	Norbubangzoe	Gangtokha	2.47	2018	Guli, Tsenden	PHPAII
3	Barsong	Himalayan	Subbagaon	4.94	2019	Champ, walnut, angarey	REDD+
4	Barsong	Thuenpaphunsum	Gomdendara	4.94	2019	Champ, walnut, angarey	REDD+
5	Barsong	Norbuchoeling	Toesang	2.47	2019	Teak, Gamari, Panisaj	PHPA II
6	Barsong	Norbubangzoe	Gangtokha	2.47	2019	Champ, Walnut, Tsenden	PHPA II
7	Barsong	Chunikhang Gongphel	Chunikhang	4.94	2019	Champ, walnut, Tsenden	PHPA II
8	Barsong	Norbubangzoe	Dharakhop	4.94	2020	Teak, Saj, Gamari	PHPA II
9	Barsong	Himalayan	Salari	4.94	2020	Teak, Gamari	PHPA II
10	Barsong	Norbuchoeling	Toedsang	4.94	2020	Teak, Saj, Gamari	PHPA II
11	Barsong	Himalayan	Salari	7.41	2020	Teak, Saj, Gamari	RSPN
12	Dunglagang	Pemaling	Lhamoilium	4.94	2018	Champ, Angarey, Tsenden	PHPAII
13	Dunglagang	Khorsaney	Kherithang	4.94	2019	Champ, Guli, Tsenden	PHPA II
14	Dunglagang	Norzangsa	Tindobaney	4.94	2019	Tsenden, Guli	PHPA/ KEC
15	Dunglagang	Dangreybue	Lhamaoilum/ Dangreybu	4.94	2020	Champ, Angarey and Saj	PHPA II
16	Dunglagang	Hatidengini	Hatidunga	4.94	2022	Champ, Panisaj	AFOCO
17	Gosaling	Phendeling	Phunsumgang	2.47	2018	Teak, Guli	PHPAII
18	Gosaling	Norbphunsum	Dzamlingthang	2.47	2018	Teak, champ	PHPAII
19	Gosaling	Phendeling	Phensumgang	2.47	2019	Teak, Gamari, Champ	PHPA II
20	Gosaling	Normuling	Pemathang	2.47	2019	Teak, Gamari, Champ	PHPA II
21	Gosaling	Norbuphunsum	Chanchey	2.47	2020	Teak, Champ, Saj	PHPA II

22	Kikorthang	Phunsum	Gobreychok	2.47	2018	Champ, Tsenden	PHPAII
23	Mendrelgang	Chirphen	Samshingarden	4.94	2018	Champ, Angarey (kawla), Walnut	PHPAII
24	Mendrelgang	Riserboo	Dupi Drangra	4.94	2018	Champ, Angarey(angarey), Walnut	PHPAII
25	Mendrelgang	Zamlingnorzay	Zamlingzur	4.94	2018	Teak, , panisaj	PHPAII
26	Mendrelgang	Chirphen	Manipakha	4.94	2019	Champ, walnut, Tsenden	PHPA II
27	Mendrelgang	Riserboo	Oyssey	4.94	2019	Angarey,-Champ, walnut, Tsenden	PHPA II
28	Mendrelgang	Zamling Norjay	Zamlingzur	4.94	2020	Champ, Saj, Teak	PHPA II
29	Patshaling	Pangthang	Rumdalay	4.94	2019	champ, panisaj, angarey	REDD+
30	Patshaling	Kuchi darachu	Bontouley	4.94	2019	Champ, Guli, Tsenden, Pipli	PHPAII
31	Patshaling	Yarkay	Autharay	4.94	2019	Champ, Angarey	PHPAII
32	Patshaling	Thakorling	Thakorling	4.94	2019	Angarey,-Champ, walnut, Tsenden	PHPA II
33	Patshaling	Bulkay	Labsedara	4.94	2020	Champ, Tsenden	PHPA II
34	Patshaling	Tsakaling Norjay	Alay	4.94	2020	Champ, Saj	PHPA II
35	Phungtenchu	Phunthogchen	Chapri Pakha	4.94	2018	Champ, Tsenden	PHPAII
36	Phungtenchu	Phenthogchen	Chapripakha	4.94	2019	Champ, Angarey, Guli	PHPAII
37	Rabgthaling	Devithan	Sunkosh	2.47	2018	Teak, Gamari	PHPAII
38	Rangthaling	Sunchop	Karighai	2.47	2020	Champ, Gamari	PHPA II
39	Rangthaling	Devithan	Subbagaon	2.47	2020	Teak, Saj, Gamari	RSPN
40	Rangthangling	Daragaon	Dodey Dangra	2.47	2019	Champ, Guli, Tsenden	PHPA II
41	Rangthangling	Devithan	Sunkosh	2.47	2019	Teak, gamari	PHPA II
42	Rangthangling	Sunchop	Charimthang	2.47	2019	Champ, Guli, Gamari	PHPA II
43	Semjong	Yulsum	Kamarater	4.94	2018	Champ, Tsenden, Panisaj	PHPAII

44	Semjong	Dangreygoan	Dangreygoan	4.94	2018	Tsenden, Champ	PHPAII
45	Semjong	Chortengang	Mathlo Kokrey	2.47	2019	Champ, Tsenden, Panisaj	PHPA II
46	Sergithang	Samding	Tempa Jhori	4.94	2018	Teak, Du-abanga, panisaj	PHPAII
47	Sergithang	Norbuphunsum	Tharay	4.94	2018	Teak, kawla	PHPAII
48	Sergithang	Samdrup	Newatar	4.94	2019	Saj, Alnus	PHPAII
49	Sergithang	Phuentshog	Khairayni pani	4.94	2019	Teak, Panisaj	PHPA II
50	Sergithang	Norbu Phunsum	Kami Dunga	2.47	2019	Teak, Panisaj	PHPA II
51	Sergithang	Drashingang	Dhajay dara	2.47	2019	Teak, Panisaj	PHPA II
52	Sergithang	Drashinggang	Yeshigairo	2.47	2020	Teak, Saj, Gamari	PHPA II
53	Sergithang	Omchu	Sirisaygairo	2.47	2020	Teak, Saj, Gamari	PHPA II
54	Sergithang	Samding	Horangay	2.47	2020	Teak, Saj, Gamari	PHPA II
55	Tsholingkhar	Lungsigang	Daldalay	4.94	2019	Teak and Bamboo	REDD+
56	Tsirangtoe	Gpngpheling	Kabelzhing	4.94	2019	Teak, Gamari	PHPAII
46	Tsirangtoe	Yongdrachen	Masaney	4.94	2019	Teak, Gamari	PHPA II
47	Tsirangtoe	Chithuen	Tonsinang	4.94	2020	Tsenden, Champ	PHPA II
	Grand total			**237.13**	**Acres**		

Annexure VII: List of CFs in Tsirang

Name of Community Forest	Year of establishment	Dzongkhag	Gewog	Members		Total Area in Ha	Area under Forest Cover (Ha)	Annual Allowable Cut (AAC)-Cubic meter	Plan Period	Plan Cycle
				Male	Female					
Yuelsum Community Forest	2018	Tsirang	Semjong	52	14	99.40	99.4	38.65	2018-2028	10
Menjong Community Forest	2019	Tsirang	Phuentenchu	52	4	517.94	285.09	348.63	2019-2029	10
Dangraygang Community Forest	2015	Tsirang	Semjong	57	9	236.63	236.63	46.35	2015-2025	10
Phenthogchen Community Forest	2019	Tsirang	Phuentenchu	132	24	504.38	358.25	229.68	2019-2029	10
Tashiding Community Forest	2020	Tsirang	Semjong	83	15	147.43	134.00	88.52	2020-2029	10
Zomnya Community Forest	2020	Tsirang	Tsirangtoe	91	24	553.75	368.37	746.2	2020-2030	10
Youngdragchen Community Forest	2017	Tsirang	Tsirangtoe	25	8	115.3	115.3	185.59	2017-2027	10
Chortengang Community Forest	2013	Tsirang	Semjong	36	8	265.3	265.3	59.29	2013-2022	10
Chithuen Community Forest	2017	Tsirang	Tsirangtoe	29	13	253.65	253.65	333.61	2017-2027	10
Gongpheling Community Forest	2018	Tsirang	Tsirangtoe	51	6	220.79	220.79	308.77	2018-2028	10
Omchu Community Forest	2019	Tsirang	Sergithang	44	7	670	251	200.02	2019-2029	10
Dhajay Community Forest	2012	Tsirang	Rangthangling	58	17	104.74	104.74	104.93	2022-2032	10

Devithan Community Forest	2011	Tsirang	Rangthangling	18	10	124.55	124.55	28.3	2021-2031	10
Sungchop Community Forest	2008	Tsirang	Rangthangling	63	10	178.26	178.26	8.55	2018-2028	10
Daragoan Community Forest	2017	Tsirang	Rangthangling	22	13	100.38	100.38	10.5	2017-2027	10
Nimazor Community Forest	2019	Tsirang	Rangthangling	93	15	208	208	4717.62	2019-2029	10
Norbu Phuentshum Community Forest	2016	Tsirang	Sergithang	17	3	207.85	207.85	243.63	2016-2026	10
Phuentshog Community Forest	2013	Tsirang	Sergithang	14	4	72.83	72.83	72.14	2013-2023	10
Samding Community Forest	2012	Tsirang	Sergithang	79	6	498.74	498.74	247.04	2012-2022	10
Samdrup Community Forest	2020	Tsirang	Sergithang	106	26	562.88	422.95	905.52	2020-2029	10
Drashigang Community Forest	2022	Tsirang	Sergithang	17	9	334.22	132.56	280.6	2022-2032	10
Jangchuling Community Forest	2009	Tsirang	Tsholingkhar	80		63.50	63.50	32.88	2019-2029	10
Lungsigang Community Foresy	2018	Tsirang	Tsholingkhar	18	5	77.80	77.80	36.30	2018-2028	10
Kalingchu Community Forest	2021	Tsirang	Tsholingkhar	23	6	15.98	15.98	2.68	2021-2031	10
Lhasoelthang Community Forest	2012	Tsirang	Tsholingkhar	40	31	65.76	65.76	31.55	2022-2032	10
Phendenling Community Forest	2019	Tsirang	Gosaling	28	5	94.5	81.9	107.51	2019-2029	10
Reserboo Community Forest	2022	Tsirang	Mendrelgang	53	10	115	115	2,900.40	2022-2-32	10
Phunsum Community Forest	2018	Tsirang	Kilkhorthang	181	55	301.65	301.65	1100	2018-2028	10

Zamling Norzay Community Forest	2022	Tsirang	Mendrelgang	31	8	145.66	146	3,012	2022-2032	10
Khorsaney Community Forest	2011	Tsirang	Dunglagang	72	9	260.4	260.4	144.44	2021-2031	10
Norbu Puensum Community Forest	2017	Tsirang	Gosaling	35	9	58.38	58.38	477.56	2017-2027	10
Chirphen Community Forest	2021	Tsirang	Mendrelgang	49	21	160	160	4,003	2021-2030	10
Dangreybu Community Forest	2020	Tsirang	Dunglagang	53	14	126	126	74	2020-2030	10
Norbuangzoe Community Forest.	2009	Tsirang	Barshong	42	4	135	135	95.2	2009-2019	10
Pemaling Community Forest	2018	Tsirang	Dunglagang	78	20	297.85	297.85	400	2018-2028	10
Norbugang Community Forest	2018	Tsirang	Dunglagang	50	8	196.66	196.66	300	2018-2028	10
Norjangsa Community Forest	2017	Tsirang	Dunglagang	35	10	218.17	218.17	280	2017-2027	10
Haathi Degeni Community Forest	2020	Tsirang	Dunglagang	18	2	196.66	196.66	220	2020-2030	10
Norbuling Community Forest	2023	Tsirang	Gosaling	24	6	85.11	73	100	2022-2032	10
Norbuchoeling community Forest.	2013	Tsirang	Barshong	32	3	83.89	83.89	185.12	2013-2023	10
Chunyekhang gongphel com. forest.	2018	Tsirang	Barshong	39	8	125.18	125.18	274.04	2018-2028	10
Himalayan community Forest	2018	Tsirang	Barshong	30	6	104.78	104.78	57.96	2018-2028	10
Thuenpapuensum community Forest	2018	Tsirang	Barshong	43	11	115.32	115.32	104.93	2018-2028	10
Yarkey Community Forest	2007	Tsirang	Patshaling	75	15	257.68	257.68	1739.93	2018-2028	10

Chhuzomsa Community Forest	2009	Tsirang	Patshaling	49	20	270.7	225.4	220.76	2019-2029	10
TsakalingNorzay Community Forest	2018	Tsirang	Patshaling	9	11	80.44	80.44	192.83	2018-2028	10
KhuchibDarachu Community Forest	2018	Tsirang	Patshaling	18	12	111.28	111.28	280.96	2018-2028	10
Gadhenjong Community Forest	2013	Tsirang	Patshaling	46	19	120.67	120.67	443.84	2013-2023	10
Thakorling Community Forest	2013	Tsirang	Patshaling	50	12	160.91	160.91	269.91	2013-2023	10
						11490.62	**9740.64**			

Annexure VIII: Private forest in Tsirang

Name of Owner	CID No	Details of Private Forest								
		Name of Private Forest	Dzongkhag	Gewog	Thram No	Year of establishment	Total area (ha)	Area under Forest (ha)	Annual Allowable Cut (AAC)-Cubic meter	Plan Period
Pratap Singh Rai	11802001807	Khopikharka	Tsirang	Patshaling	141	28/10/2015	0.48	0.28		28/10/2025
Tula Dhoj Subbha	11809001834	Salleri	Tsirang	Rangthangling	441	9/4/2018	0.20	0		9/4/2028
Harka Bdr. Limbu	11809001799	Rupidrangra	Tsirang	Rangthangling	222	26/2/2019	0.24	0		26/2/2029
Shashi Maya Subbha	11809001838	Salleri	Tsirang	Rangthangling	440	9/4/2018	0.20	0		9/4/2028
Lal Bdr Wakley	11804000993	Hareybotey	Tsirang	Gosarling	33	17/11/2021	0.30	0		17/11/2031
Bal Bdr. subbha	11807001393	Pataley	Tsirang	Sergithang	439	25/5/2022	0.38	0		25/5/2032
Tashi Drukpa	11807000038	Dego-Chabsa	Tsirang	Sergithang	17	14/9/2022	0.48	0		14/9/2032
Jhulendara Neopany	11804000570	Khayenebari	Tsirang	Gosarling	179	01/03/2022	0.44	0		01/03/2032
Rupnarayan Neopany	10311002373	Gharbari	Tsirang	Gosarling	187	08/03/2023	0.20	0		08/03/2033

Annexure IX: Bhutan METT+ form DFO,Tsirang

Name, affiliation and contact details for the person responsible for completing the Bhutan METT + (email etc.)			Tshering Wangchuk, Sr.FR tsheringwanghcuk@moenr.gov.bt, 17631833	
Date assessment carried out			21th August 2021	
Name of Forest Division			DFO,Tsirang	
WDPA site code (codes can be searched for on: www.protectedplanet.net/)				
Designations	National		IUCN Category National Category (to list based on site needs-CF, WFMU, LFMPs)	International (see below)
Location of protected area (province and if possible map reference)			South-Central Bhutan	
Date of establishment (dd/mm/yyyy)			1989	
Ownership details (please tick)	SRFL	Private	Community	Other
Management Authority	Divisional Forest Office			
Size of forest divison (sq.km)	637.83 sq.km			
Number of staff	Technical-32, Non-technical-1, (F-4, M-28)		Temporary (same): 3 (M-1, F-2)	
Annual budget (Nu) – excluding staff salary costs		Current budget (operational costs, e.g. staff costs):	Capital budget (infrastructure development etc): 2.34m	
What are the main values for which the area is designated				
List the two primary protected area management objectives				
Management objective 1		1.Sustinable management and utilization of Forest resources		

Management objective 2		2. To protect and conservation of flora and fauna		
No. of people involved in completing assessment			30	
Including: (highlight where appropriate)	FD Manaer 1	FD staff 32	Other FD	NGO
			agency staff	
	Local community	Donors	External experts	Other
Please note if assessment was carried out in association with a particular project, on behalf of an organisation or donor.				
Information on International Designations (where applicable)				
UNESCO World Heritage site				
Date listed	Site name		Site area	
Criteria for designation				
(i.e. criteria i to x)				
Statement of Outstanding Universal Value				
Ramsar site				
Date listed	Site name and number		Site area	
Criteria for Designation & ecological character (see Ramsar Information Sheet)				
UNESCO Man and Biosphere Reserves				
Date listed	Site name		Site area	
			Total:	
			Core:	
			Buffer:	
			Transition:	
Criteria for designation				
Fulfilment of three functions of MAB (conservation, development and logistic support.)				
Please list other designations and any supporting information below				
Name: BC3	Detail:			
Name:	Detail:			
Name:	Detail:			

Forest Division Threats: Assessment Sheet 1

In the assessment below threats should be:

Ranked as of **high** significance if they are seriously degrading values; **medium** if they are having some negative impact and **low** if they are present but not seriously impacting values. **Not applicable** (N/A) is selected when the threat is either not present or not applicable in the protected area.

Note that threats ranked as of medium and high significance can be assessed in more detail using Assessment Sheet 2.

·Assessed at three levels:

1. **Current threat:** in which case a 'C' is put in either the High, Medium or Low box
2. **Potential threat:** in which case a 'P' is put in either the High, Medium or Low box
3. **Issues:** in which case an 'I' is put in either the High, Medium or Low box

Each threat identified could have both a current threat assessment (e.g. assessed as low) and a potential threat (e.g. assessed as medium). The category of 'issues' has been added because some management issues may not be strictly regarded as threats but need constant management intervention to ensure they do not become a threat. For example, plants collected for medicinal use could be a management issue; or a current or potential threat if management activities are not effective in controlling the collection levels or processes.

Guidance in making the assessment

Unlike many other countries in the region (and worldwide) the level of threats are fairly low at present in Bhutan and thus what might be considered of high threat here, may not be at anything like the same scale as in other countries. Guidance in what is meant by the categories high, medium and low threats in a Bhutanese context has thus been developed for threats marked ** (see Annexe 1). **Threat categories with specific guidance are marked by a *.**

Specific guidance on assessing threats in the Bhutanese context are also given in boxes below each threat.

1. Residential and commercial development within a protected area/ forest division

Threats from human settlements or other non-agricultural land uses with a substantial footprint

High	Medium	Low	N/A				
		p		1.1 Housing and settlement			

		p		1.2 Commercial and industrial areas			
				1.3 Tourism and recreation infrastructure			
2. Agriculture and aquaculture within a protected area/ forest division							
Threats from farming and grazing as a result of agricultural expansion and intensification, including silviculture, mariculture and aquaculture							
High	Medium	Low	N/A				
			N/A	2.1 Annual and perennial non-timber crop cultivation			
			N/A	2.1a Medicinal plant cultivation*			
				2.2 Wood and pulp plantations			
		P		2.2a Community forestry			
		P		2.2b Private forestry (e.g. planting of exotic species)			
	c	P		2.3 Livestock farming and grazing**			
	c	p		2.3a Land encroachment for agriculture			
	p	c		2.3b Land lease of government reserve land for commercial farming			
		c/p		2.4 Freshwater aquaculture			
Threat 2.1a Medicinal plant cultivation: Note that the collection of species from the wild is covered in threat 5.2							
3. Energy production and mining within a protected area/ forest division							
Threats from production of non-biological resources							
High	Medium	Low	N/A				
			N/A	3.1 Oil and gas drilling			
		p		3.2 Mining and quarrying**			
		p		3.3 Energy generation, including from hydropower dams*			

3.3 Energy generation including HEP: This question looks specifically at threats within protected areas. Most of the hydropower developments in Bhutan are outside protected areas but distant HEP systems can still impact on the protected area, the impact of such threats is covered in threat 7.2.							
4. Transportation and service corridors within a protected area/ forest division							
Threats from long narrow transport corridors and the vehicles that use them including associated wildlife mortality							
High	Medium	Low	N/A				
		c/p		4.1 Roads and railroads (include road-killed animals)**			
		c/p		4.2 Utility and service lines (e.g. electricity cable lines, telephone lines)*/**			
			N/A	4.3 Flight paths*			
4.2 Utility and service lines: Given the pace of infrastructure development in Bhutan (e.g. high tension cables, service centres etc) it was felt this threat should consider both impacts in the protected area and in the buffer zones.							
4.3 Flight paths: It should be stressed that this threat is considering flight paths of aeroplanes, hot air balloons, gliders etc, not the flight paths of birds							
5. Biological resource use and harm within a protected area/ forest division							
Threats from consumptive use of "wild" biological resources including both deliberate and unintentional harvesting effects; also persecution or control of specific species (note this includes hunting and killing of animals)							
High	Medium	Low	N/A				
		c/p		5.1 Hunting, killing and collecting terrestrial animals (including killing of animals as a result of human/wildlife conflict)			
				5.1a Human wildlife conflict**			
		c		5.1b Wildlife Poaching**			
		c		5.2 Gathering terrestrial plants or plant products (non-timber)			
		c		5.2a Mushrooms**			
		c		5.2b Plant species for medicinal use**			

		c		5.2c Plant species for food**			
		c		5.3 Illegal logging and timber harvesting**			
		c		5.3a Legal logging and timber harvesting**			
		c		5.4 Fishing and harvesting aquatic resources			
6. Human intrusions and disturbance within a protected area/ forest division							
Threats from human activities that alter, destroy or disturb habitats and species associated with non-consumptive uses of biological resources							
High	Medium	Low	N/A				
		p		6.1 Recreational activities and tourism			
		p		6.1a Unmanaged ecotourism**			
			N/A	6.2 War, civil unrest and military exercises*			
				6.3 Research, education and other work-related activities in forest divisions			
		p		6.4 Activities of FD Managers (e.g. construction or vehicle use, artificial watering points and dams)			
		p		6.5 Deliberate vandalism or destructive activities			
6.2 War, civil unrest and military exercises: in the case of Bhutan war and civil unrest should include intrusion of political insurgency from across the border							
7. Natural system modifications							
Threats from other actions that convert or degrade habitat or change the way the ecosystem functions							
High	Medium	Low	N/A				
		c/p	NA	7.1 Fire and fire suppression (including arson)**			

		c/p		7.2 Dams, hydrological modification and water management/use*/**			
		P		7.3a Increased fragmentation within forest division			
		P		7.3b Isolation from other natural habitat (e.g. deforestation, dams without effective aquatic wildlife passages)			
		P	NA	7.3c Other 'edge effects' on protected area values			
		p		7.3d Loss of keystone species (e.g. top predators, pollinators etc)			
Whereas threat 3 looked at impacts of infrastructure development in protected areas, threat 7 looks at impacts which may occur from developments far away from the actually protected area. As noted above most of the hydropower developments in Bhutan are outside protected areas but distant HEP systems can still impact on the protected area. Threat 7.2 should record impacts on habitat or changes in the way the ecosystem functions, such as changing water flow patterns.							
8. Invasive and other problematic species and genes							
Threats from terrestrial and aquatic non-native and native plants, animals, pathogens/microbes or genetic materials that have or are predicted to have harmful effects on biodiversity following introduction, spread and/or increase							
High	Medium	Low	N/A				
	p	c		8.1a Invasive non-native/alien plants (weeds)			
			na	8.1b Invasive non-native/alien animals			
		p	na	8.1c Invasive non-native/alien freshwater fish			
		c	na	8.1d Pathogens (non-native or native but creating new/increased problems)			
			na	8.2 Introduced genetic material (e.g. genetically modified organisms)			

9. Pollution entering or generated within protected area/forest division							
Threats from introduction of exotic and/or excess materials or energy from point and non-point sources							
High	Medium	Low	N/A				
		c		9.1 Household sewage and urban waste water			
			N/A	9.1a Sewage and waste water from protected area facilities (e.g. toilets, hotels etc)			
		p		9.2 Industrial, mining and military effluents and discharges (e.g. poor water quality discharge from dams, e.g. unnatural temperatures, de-oxygenated, other pollution)			
		c		9.3 Agricultural and forestry effluents (e.g. excess fertilizers or pesticides)			
	p	c		9.4 Garbage and solid waste**			
		p		9.5 Air-borne pollutants			
			na	9.6 Excess energy (e.g. heat pollution, lights etc)			
10. Geological events							
Geological events may be part of natural disturbance regimes in many ecosystems. But they can be a threat if a species or habitat is damaged and has lost its resilience and is vulnerable to disturbance. Management capacity to respond to some of these changes may be limited.							
High	Medium	Low	N/A				
			N/A	10.1 Volcanoes			
		c		10.2 Earthquakes/Tsunamis			
		c/p		10.3 Avalanches/ Landslides			
		c		10.4 Erosion and siltation/ deposition (e.g. shoreline or riverbed changes)			

11. Climate change and severe weather							
Threats from long-term climatic changes which may be linked to global warming and other severe climatic/weather events outside of the natural range of variation							
High	Medium	Low	N/A				
		p		11.1 Habitat shifting and alteration			
		P	na	11.2 Droughts			
		P	na	11.3 Temperature extremes			
		p		11.4 Storms and flooding			
12. Specific cultural and social threats							
High	Medium	Low	N/A				
		c		12.1 Loss of cultural links, traditional knowledge and/or management practices			
		c		12.2 Natural deterioration of important cultural site values			
		c		12.3 Destruction of cultural heritage buildings, gardens, sites etc			

Protected Area Threats: Assessment Sheet 2

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

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

1. Specify threat: Garbage and waste

Threat (specific if current or potential): p

Impact of threat		**Management response**
Extent: Describe the extent of the impact under one of the three descriptors given below	Severity: Describe how severe the impact under one of the three descriptors given below	Action: What actions are planned or have taken place to manage the threat
A: Small section of the site (5-10%):	A: Minor impact:	planning ativities: 1. awareness campgain on waste. 2. Placing of signboard on strategic areas. 3. Distrubution of waste bin. 4.Monitoring and Law enforcment.
B: Several areas of the site (11-50%):	B: Major impact but not continuous:	
C: Most of the site (51-100%):	C: Major continuous impact:	

2. Specify threat: Livestock farming and Grazing

Threat (specific if current or potential): p

Impact of threat		**Management response**
Extent: Describe the extent of the impact under one of the three descriptors given below	Severity: Describe how severe the impact under one of the three descriptors given below	Action: What actions are planned or have taken place to manage the threat
A: Small section of the site (5-10%):	A: Minor impact:	planning ativities: 1. Improve pasture land 2. Rasing of improved breed of cattles. 3. stall feeding
B: Several areas of the site (11-50%):	B: Major impact but not continuous:	
C: Most of the site (51-100%):	C: Major continuous impact:	

3. Specify threat: Land encroachment for agriculture		
Threat (specific if current or potential): p		
Impact of threat		**Management response**
Extent: Describe the extent of the impact under one of the three descriptors given below	Severity: Describe how severe the impact under one of the three descriptors given below	Action: What actions are planned or have taken place to manage the threat
A: Small section of the site (5-10%):	A: Minor impact:	1. Awareness and timely monitoring. 2.Implementation of rules and regulations.
B: Several areas of the site (11-50%):	B: Major impact but not continuous:	
C: Most of the site (51-100%):	C: Major continuous impact:	
4. Specify threat: Land lease of government land for commercial farming		
Threat (specific if current or potential): p		
Impact of threat		**Management response**
Extent: Describe the extent of the impact under one of the three descriptors given below	Severity: Describe how severe the impact under one of the three descriptors given below	Action: What actions are planned or have taken place to manage the threat
A: Small section of the site (5-10%):	A: Minor impact:	Regular compliance monitoring
B: Several areas of the site (11-50%):	B: Major impact but not continuous:	
C: Most of the site (51-100%):	C: Major continuous impact:	

5. Specify threat: Human wildlife conflict		
Threat (specific if current or potential): p		
Impact of threat		**Management response**
Extent: Describe the extent of the impact under one of the three descriptors given below	Severity: Describe how severe the impact under one of the three descriptors given below	Action: What actions are planned or have taken place to manage the threat
A: Small section of the site (5-10%):	A: Minor impact:	planning ativities: 1. Installation of electric fencing, planting of fruit trees, creation of water holes and salt licks.
B: Several areas of the site (11-50%):	B: Major impact but not continuous:	
C: Most of the site (51-100%):	C: Major continuous impact:	
6. Specify threat: Wildlife poaching		
Threat (specific if current or potential): p		
Impact of threat		**Management response**
Extent: Describe the extent of the impact under one of the three descriptors given below	Severity: Describe how severe the impact under one of the three descriptors given below	Action: What actions are planned or have taken place to manage the threat
A: Small section of the site (5-10%):	A: Minor impact:	1. Anitpoaching 2. SMART patrolling 3. awarenes on FNCRR,2017
B: Several areas of the site (11-50%):	B: Major impact but not continuous:	
C: Most of the site (51-100%):	C: Major continuous impact:	

7. Specify threat: Invasive non-native species		
Threat (specific if current or potential): p		
Impact of threat		**Management response**
Extent: Describe the extent of the impact under one of the three descriptors given below	Severity: Describe how severe the impact under one of the three descriptors given below	Action: What actions are planned or have taken place to manage the threat
A: Small section of the site (5-10%):	A: Minor impact:	1. Uprooting of the plants before seeds dispersal. Uprooting campagain.
B: Several areas of the site (11-50%):	B: Major impact but not continuous:	
C: Most of the site (51-100%):	C: Major continuous impact:	

Protected Areas Management Activities: Assessment Sheet 3

Please tick the two critical management activities currently undertaken in the protected area	Comment/Explanation
Law enforcement and surveillance	1. SMART Patrolling, Night patrolling, fishing patrolling and highway patrolling 2. Monitoring and evaluation 3. Apprehension and compounding of offence 4. Antipoaching.
Promoting sustainable resource use	1. Maintain to AAC of CF and LFMP 2.prepare plan for management regimes 3. plantation in CF and SRF land 4. application of silviculture activities 5.public service dilevery.

Protected Area Management Effectiveness: Assessment

Issue	Criteria	Score: Tick only one box per question		Comment/ Explanation	Next steps
1. Legal status Does the protected area/forest division have legal status (or in the case of private reserves is covered by a covenant or similar)? Context	The protected area/forest division is not gazetted/covenanted	0		TFD was started in year 1988 but officially gazetted in year 1989 and has maintained chronological order of DFO.	
	There is agreement that the protected area should be gazetted/ covenanted but the process has not yet begun	1			
	The protected area is in the process of being gazetted/covenanted but the process is still incomplete (includes sites designated under international conventions, such as Ramsar, or local/traditional law such as community conserved areas, which do not yet have national legal status or covenant)	2			
	The protected area has been formally gazetted/covenanted	3	3		
2. Protected area/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 protected area /forest division	0		Inaccess to NLC data and staff shortage in monitoring	

	Some regulations for controlling land use and activities in the protected area exist but there are major weaknesses	1			
	Regulations for controlling land use and activities in the protected area exist but there are some weaknesses or gaps	2	2		
	Regulations for controlling inappropriate land use and activities in the protected area exist and provide an excellent basis for management	3			
3. Law enforcement Can staff (i.e. those with responsibility for managing the site) enforce protected area rules well enough? Input	The staff have no effective capacity/resources to enforce protected/ forest division area legislation and regulations	0		Lack of travel budget and indequate capacity of field staff and no uniform in interpretation and implementation of the rules	
	There are major deficiencies in staff capacity/resources to enforce protected area/forest division legislation and regulations (e.g. lack of skills, no patrol budget, lack of institutional support)	1	1		
	The staff have acceptable capacity/ resources to enforce protected area legislation and regulations but some deficiencies remain	2			
	The staff have excellent capacity/ resources to enforce protected area/ forest division legislation and regulations	3			

4. Protected area/forest division objectives Is management undertaken according to agreed objectives? Planning	No firm objectives have been agreed for the protected area/forest division	0		APA ,IWPand 12th five year plan are in line with Division objectives.	
	The protected area/forest division has agreed objectives, but is not managed according to these objectives	1			
	The protected area/forest division has agreed objectives, but is only partially managed according to these objectives	2			
	The protected area/forest division has agreed objectives and is managed to meet these objectives	3	3		
5. Protected area/forest division design Is the protected area/forest division the right size and shape to meet the objectives (protect species, habitats, ecological processes and water catchments of key conservation concern, resource utilization) Planning	Inadequacies in protected area/forest division design mean achieving the major objectives of the protected area is very difficult	0		FD area is suitable for biodiversity habitat and few key species like tiger. The site is proposed for KBA site. Interms of resource utilization	Awareness programme, advocacy and consultation meeting needs to be initiated
	Inadequacies in protected area/ forest division design mean that achievement of major objectives is difficult but some mitigating actions are being taken (e.g. agreements with adjacent land owners for wildlife corridors or introduction of appropriate catchment management)	1			
	Protected area/forest division design is not significantly constraining achievement of objectives, but could be improved (e.g. with respect to larger scale ecological processes)	2	2		

	Protected area/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. Protected/forest division area boundary demarcation Is the boundary known and demarcated? Process	The boundary of the protected area/ forest division is not known by the management authority or local residents/neighbouring land users	0		The boundary is known by local communities, management authorities and but in few areas not demarcated properly.	Need to provide awareness to local people on the boundary of Division Office
	The boundary of the protected area/ forest division is known by the management authority but is not known by local residents/neighbouring land users	1			
	The boundary of the protected area/ forest division is known by both the management authority and local residents/neighbouring land users but is not appropriately demarcated	2	2		
	The boundary of the protected area is known by the management authority and local residents/neighbouring land users and is appropriately demarcated	3			

7. Management plan Is there a management plan and is it being implemented? Planning	There is no management plan for the protected area/forest division	0	0	Different management plan regimes are in pocket but no DFO management plan as of now (give 0)	All management plans will be incorporated in the DFO plan for better management of the Division
	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 stakeholders to influence the management plan	1	0	No overall DFO management plan	To be included for DFO mgt plan preparation
7b. Planning process	There is an established schedule and process for periodic review and updating of the management plan	1	0	No overall DFO management plan	To be included for DFO mgt plan preparation
7c. Planning process	The results of monitoring, research and evaluation are routinely incorporated into planning	1	0	No overall DFO management plan	To be included for DFO mgt plan preparation

8. Regular work plan Is there a regular work plan and is it being implemented Planning/Outputs	No regular work plan exists	0		The annual work plan of the Division are prepared as per the APA,IWP and approved budget and being implemented	
	A regular work plan exists but few of the activities are implemented	1			
	A regular work plan exists and many activities are implemented	2			
	A regular work plan exists and all activities are implemented	3	3		
9. Resource inventory Do you have enough information to manage the area? Input	There is little or no information available on the resource (critical habitats, species(flora & fauna), growing stocks and cultural values) of the protected area/forest division	0		FD has not sufficient Information to support planning and descion making, but few information on(fish,WBH, birds, orchids,mammals, NFI) and Resource inventory for CF and 5 LFMA.	The Division office will be frequent updating the new findings/new addition of species to the already exisiting biodiversity data base
	Information on the resource (critical habitats, species(flora & fauna), growing stocks and cultural values) of the protected area/forest division / not sufficient to support planning and decision making	1	1		
	Information on the resource (critical habitats, species(flora & fauna), growing stocks and cultural values) of the protected area/forest division / sufficient for most key areas of planning and decision making	2			
	Information on the resource (critical habitats, species(flora & fauna), growing stocks and cultural values) of the protected area/forest division / sufficient for all areas of planning and decision making	3			

10. Protection systems Are systems in place to control access/resource use in the protected area? Process/Outcome	Protection systems (patrols, permits etc) do not exist or are not effective in controlling access/resource use	0		Monitoring resource utilization and Issuue of permits was done for all resource allocation. Frequent and time to time monitoring/Patrolling is done to prevent illegal.	
	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 programme of management-orientated survey and research work? Process	There is no survey or research work taking place in the protected area	0		Few survey/research on Fish, White bellied heron, Birds,orchids done	
	There is some survey and research work but it is not directed towards the needs of protected area management	1			
	There is some survey and research work which is at least partly directed towards the needs of protected area management	2	2		
	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		Management plan of CF,PES,LFMA are in place for resource use.	
	Very few of the requirements for active management of critical habitats, species, ecological processes, cultural values and sustainable resource production are being implemented	1	1		
	Many of the requirements for active management of critical habitats, species, ecological processes, cultural values and sustainable resource production are being implemented but some key issues are not being addressed	2			
	Requirements for active management of critical habitats, species, ecological processes, cultural values and sustainable resource production are being substantially or fully implemented	3			
12a: Management of NTFPs	A management plan exists for the management of all major non timber forest products actively collected within the protected area	1	1	2 NWFPs managemnt plan, Broom grass plan	
12b: Management of medicinal plants	A management plan exists for the management of all major medicinal plants actively collected within the protected area	1	0		
12c: Management of Other conservation areas (OCAs)	A management plan exists for all Other conservation areas (OCAs) within the protected area/forest division	1	1	CF plans ,NWFP, LFMP plan, BC 3 plan is being developed in colloboration with sarpang Division.	

Bhutan METT+: consideration of this question includes issues relating to land leasing					
13. Staff numbers Are there enough people employed to manage the protected area? Inputs	There are no staff	0		current staffs strenght is enough but lack of staff with adequate knowelede, skillss and qulification.	
	Staff numbers are inadequate for critical management activities	1			
	Staff numbers are below optimum level for critical management activities	2	2		
	Staff numbers are adequate for the management needs of the protected area	3			
14. Staff training Are staff adequately trained to fulfil management objectives? Inputs/Process	Staff lack the skills needed for protected area management	0		All staff are forestry proffessional but need improve capacity in some field like resource managemnt,wildlife,research and Gis appplication.	
	Staff training and skills are low relative to the needs of the protected area	1	1		
	Staff training and skills are adequate, but could be further improved to fully achieve the objectives of management	2			
	Staff training and skills are aligned with the management needs of the protected area	3			

15. Current budget Is the current budget sufficient? Inputs	There is no budget for management of the protected area	0		Current alloted budget is to sufficient to meet opertional cost of the Division.	
	The available budget is inadequate for basic management needs and presents a serious constraint to the capacity to manage	1	1		
	The available budget is acceptable but could be further improved to fully achieve effective management	2			
	The available budget is sufficient and meets the full management needs of the protected area	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? Inputs	There is no secure budget for the protected area/forest division and management is wholly reliant on outside or highly variable funding	0		Only limited RGOB budget is secured due to covid pandemic situation.	
	There is very little secure budget and the protected area/forest division could not function adequately without outside funding	1	1		
	There is a reasonably secure core budget for regular operation of the protected area/forest division but many innovations and initiatives are reliant on outside funding	2			
	There is a secure budget for the protected area/ forest division and its management needs	3			

17. Management of budget Is the budget managed to meet critical management needs? Process	Budget management is very poor and significantly undermines effectiveness (e.g. late release of budget in financial year)	0		Budget is managed well enough accroding to the plan and activities of the Division	
	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		
	Budget management is excellent and meets management needs	3			
18. Equipment Is equipment sufficient for management needs? Input	There are little or no equipment and facilities for management needs	0		Old and outdated equipmenst, computers,accessories are available in FD	
	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 protected areas 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 protected area and specific concerns regarding availability should be included in the comment/explanation and next steps column					
19. Maintenance of equipment Is equipment adequately maintained? Process	There is little or no maintenance of equipment and facilities	0		There is little or no budget for maintenace of equipment.	
	There is some ad hoc maintenance of equipment and facilities	1	1		
	There is basic maintenance of equipment and facilities	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		There is no alloted budget for education and awraeness program, however Division carry-out education and awareness whenever platform available.	More advocacy and education programs needs to be be conducted to provide right information on the objectives and needs of the office (eg. awareness programs on snake bites can be conducted to school students so that they in turn help/support forest division in protecting snakes)
	There is a limited and ad hoc education and awareness programme	1	1		
	There is an education and awareness programme but it only partly meets needs and could be improved	2			
	There is an appropriate and fully implemented education and awareness programme	3			

21. Planning for land and water use Does land and water use planning outside the protected area/forest division recognise the protected area/forest division and aid the achievement of objectives? Planning	Adjacent land and water use planning does not take into account the needs of the protected area/forest division and activities/policies are detrimental to the survival of the area	0		Although there is no local level, land and water use planning, however these component are incorportated in FNCRR,2017 for implemnetation of water and land program.	
	Adjacent land and water use planning does not takes into account the long term needs of the protected area/forest division, but activities are not detrimental the area	1			
	Adjacent land and water use planning partially takes into account the long term needs of the protected area/forest division	2	2		
	Adjacent land and water use planning fully takes into account the long term needs of the protected area/forest division	3			
Bhutan METT +: This question is specific to activities outside of the protected area. 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 protected area/forest division incorporates provision for adequate environmental conditions (e.g. volume, quality and timing of water flow, air pollution levels etc) to sustain relevant habitats	1	1	restoration activities were carried out for habitat conservation(waterholes, saltlicks, and enrichment plantations), PES for drinking water source of Poakhola furmulized	Plans to conduct the Hydrogeological mapping Wangdigang-Dechugang Watershed in this financial year 2021-2022

21b: Land and water planning for connectivity	Management of corridors linking the protected area/forest division provides for wildlife passage to key habitats outside the protected area (e.g. to allow migratory fish to travel between freshwater spawning sites and the sea, or to allow animal migration)	1	1	around 16 % of BC 3 falls within Tsirang and it allows safe passage and movement of wild animals between from PWS, RMNP and JSWNP. For safe breeding and habitat protection, fishing in Sunkosh river is not permitted within the main river and within 100 meters at the confluence	
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	1	1.5 acres low land grassland created at Katlaychu at Tsakaling, Patshaling Geog.	
22. State and commercial neighbours Is there co-operation with adjacent land and water users? Process	There is no contact between managers and neighbouring official or corporate land and water users	0		Payment of environment services for poakhola between the beneficiaries (Thakorling and KUCHI CF) and water users (Damphu municipality- Tsirang Dzongkhag) , Tsirang Forest Division plays work of intermediatory. For other land and water issues, Division laise with Dzongkhag(land, environment, Agri and livestock), Geog, Regional offices on regular basis	

	There is contact between managers and neighbouring official or corporate land and water users but little or no cooperation	1	1		
	There is contact between managers and neighbouring official or corporate land and water users, but only some co-operation	2	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 protected area management	1	1	Chanchey mini hydrol existed since 1980s but located outside the protected area. Division is in regular contact with BPC, Dzongkhag & Geog on regular basis	
22b: State and commercial neighbours	There is regular contact and substantial cooperation with any developers and operators of linear infrastructure (e.g. transmission lines and/or roads) whose operations impact protected area management	1	1	Division coordinate on regular basis to BPC, DOR, Geog and Dzongkhag with regards to developmental activities such small and cottage industries, transmission line , telecom tower, farm road, surface collection and other development activities	

22c: State and commercial neighbours	Where the protected area/forest division provides important natural resources for commercial operations (e.g. municipal water companies or hydropower operators) payments for ecological services agreements are in place	1	1	PES for Poakhola drinking water is formulized in 2020 between, Dzongkhag (Damphu Municipality) and CFMGs (Thakorling & Kuchi Darachu)	
23. Local communities Do local communities resident or near the protected area/forest division have input to management decisions? Process	Local communities have no input into decisions relating to the management of the protected area/ forest division	0		Local communities and local leaders contribute during management decisions(CF,NWFPs, LFMP,PES), People respect and abide rules and regulations	More of awareness program to be conducted
	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			
	Local communities directly participate in all relevant decisions relating to management, e.g. co-management	3	3		
Additional points Local communities					

23a: Impact on communities	There is open communication and trust between local people, stakeholders and protected area/forest division managers	1	1	Division carries out regular updates to LGs on FNCRR, forest and wildlife conservation	
23b: Impact on communities	Programmes to enhance community welfare, while conserving protected area/forest division resources, are being implemented	1	1	Established CF and NWFP group,LMFA and training to enhance peoples knowledge(pickle making, furiniture and broom grass development	
23c: Impact on communities	Local people actively support the protected area/forest division	1	1	Local people abides existing rules and regulations	Awareness programs to be conducted
24. Economic benefit Is the protected area/forest division providing economic benefits to local communities, e.g. income, employment, payment for environmental services? Outcomes	The protected area/forest division does not deliver any economic benefits to local communities	0		sale of Timber from CF, NWFPs and payment for PES	Capacity building/trainings needs to be conducted
	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		
	There is a major flow of economic benefits to local communities from activities associated with the protected area/forest division	3			

25. Monitoring and evaluation Are management activities monitored against performance?	There is no monitoring and evaluation in the protected area/forest division	0		All APA works that are implemented are monitored and evaluated, evidence based results achieved. Similarly, works implemented by CFMG(Commuity forest) as per management plan are also monitored and evaluated from time to time	The result of M&E will be analysed on an annual basis and used for the improvement of management interventions
Planning/Process	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	2		
	A good monitoring and evaluation system exists, is well implemented and used in adaptive management	3			
26. Visitor facilities Are visitor facilities adequate?	There are no visitor facilities and services despite an identified need	0		Visitors have opportunity to visit heritage forest, Tsirangtoe, bamboo model house, Damphu, bamboo furniture unit run by Dhajay CF	
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 protected area/ forest division management? Process	There is little or no contact between managers and tourism operators using the protected area/forest division	0	0	N/A	
	There is contact between managers and tourism operators but this is largely confined to administrative or regulatory matters	1			
	There is limited co-operation between managers and tourism operators to enhance visitor experiences and maintain protected area values	2			
	There is good co-operation between managers and tourism operators to enhance visitor experiences, and maintain protected area/forest division values	3			
28. Fees If fees (e.g. entry fees) are applied, do they help protected area/forest division management? Inputs/Process	Although fees are theoretically applied, they are not collected	0	0		
	Fees are collected, but make no contribution to the protected area/ forest division or its environs	1			
	Fees are collected, and make some contribution to the protected area/ forest division and its environs	2			
	Fees are collected and make a substantial contribution to the protected area/forest division and its environs	3			

29. Fines If fines (e.g. poaching fines) are applied, do they help protected area management? Inputs/Process	There are no fines, or fines are theoretically applied but are seldom or never collected	0		fines deposited to revenue of the government, Fines levied on waste management can be used for advocacy	
	Fines are collected, but make no direct contribution to the protected area/forest division or its environs	1			
	Fines are collected, and make some contribution to the protected area/ forest division and its environs	2	2		
	Fines are collected and make a substantial contribution to the protected area/forest division and its environs	3			
Bhutan METT +: The term "protected area or its environs" can include incentive schemes such as payments to informers of poachers					
30. Condition of biodiversity and ecological values What is the condition of the important biodiversity values of the protected area as compared to when it was first designated? Outcomes	Many biodiversity and ecological values are being severely degraded	0		Most of the biodiversity and ecological values are intact , however, there is threat to WBH population as there is habitat fragmentation in upper basin.	
	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		
30b: Condition of biodiversity values	Specific management programmes are being implemented to address threats to biodiversity and ecological values	1			
30c: Condition of biodiversity values	Activities to maintain key biodiversity and ecological values are a routine part of protected area/forest division management	1	1	BC 3 is functional and Division implements numbers of activity to enhance biodiversity conservation such as water hole and salt licks improvement, SMART patrolling etc,	
Bhutan METT + questions					
31. Condition of cultural values What is the condition of the important cultural values of the protected area/forest division as compared to when it was first designated? Outcomes	Many cultural values are being severely degraded	0		most cultures values are intact but few are degraded(old walking trials, Dzongs)	Interventions such as video documentary or pictorial book on traditional knowldge/ management practices may be done
	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 protected area/forest division? Planning / Process	Staff are unable to move around the protected area/forest division and thus much of the protected area is inaccessible throughout the year	0		Most of the Division area is accessible and only few are not due to the cliffs and other natural barriers.	
	There are significant restrictions on the ability of staff to move around the protected area/forest division throughout the year (e.g. in the rainy season) and thus much of the protected area (e.g. over 50 % of the area) is inaccessible some or all of the year	1			
	Staff are able to move relatively easily around the protected area and thus most of the protected area/forest division is accessible, although some areas (e.g. less than 50 % of the area) remain inaccessible some or all of the year	2	2		
	Staff are able to move easily around the whole protected area/forest division and the majority of the protected area is fully accessible	3			

33. Neighbouring protected areas/forest division Is there co-operation with adjoining protected areas/ forest division (national and international)? Process	There is no contact between managers of adjoining protected areas/ forest division on issues which impact protected area/forest division management effectiveness	0		BC 3 shares with sarpang division , around 83% of itsareas falls in sarpang and 17 % falls under Tsirang Division. The Division exchange information and have close contact with Sarpang Forest Diviison, Phibsoo wild life sanctuary, and JSWNP	
	There is limited contact between managers of adjoining protected areas/forest division but little cooperation on issues which impact protected area management effectiveness	1			
	There is contact between managers of adjoining protected areas/forest division and some cooperation on protected area/forest division management effectiveness	2	2		
	There is regular contact between managers of adjoining protected areas/forest division and full cooperation on ensuring management effectiveness	3			
34. Is the protected area/forest division being consciously managed to adapt to climate change? Planning	There have been no efforts to consider 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	many plantation activities are undertaken in SRF land and CF to combact climate change, watershed areas are protected, no commercial activity allowed within 30 meters from water source	
	Detailed plans have been drawn up about how to adapt management to predicted climate change, and these are already being implemented	3			
35. Is the protected area/forest division being consciously managed to prevent carbon loss and to encourage further carbon capture? Process	Carbon storage and carbon dioxide capture has not been considered in management of the protected area/ forest division	0			
	Carbon storage and carbon dioxide capture has been considered in general terms, but has not yet been significantly reflected in management	1			
	There are active measures in place to reduce carbon loss from the protected area/forest division, but no conscious measures to increase carbon dioxide capture	2	2	Division implement numerous plantation activities such as plantation in barren and degraded areas, plantation in community forests which will act as sink for co2 emmission	
	There are active measures in place both to reduce carbon loss from the protected area/forest division and to increase carbon dioxide capture	3			
		123	**72**		
		58.53%			

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