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1. EXECUTIVE SUMMARY

Background on this audit

Preservation of environment is one of the four pillars of Gross National Happiness, the development philosophy of Bhutan. Bhutan's commitment in protecting and preserving the fragile mountain ecosystems and its natural forests is enshrined in the Constitution of the Kingdom of Bhutan. Article 5.3 of the Constitution stipulates as *'The Government shall ensure that, in order to conserve the country's natural resources and to prevent degradation of the ecosystem, a minimum of sixty percent of Bhutan's total land shall be maintained under forest cover for all time.'*

Article 1.12 further stipulates as *'The rights over mineral resources, rivers, lakes and forest shall vest in the State and are the properties of the State, which shall be regulated by law'.*

Article 25.1 of the Constitution of the Kingdom of Bhutan and Section 3 of the Audit Act of Bhutan 2006 state that, *"There shall be a Royal Audit Authority to audit and report on the economy, efficiency, and effectiveness in the use of public resources".*

In line with this important constitutional responsibility and importance of forest eco-system and sustainable forest management, the RAA conducted the performance audit of forest with special focus on the National Forest Inventory, forest fires and watershed management activities on our assessment of the risks related to sustainable forest management in Bhutan.

Why RAA conducted this audit?

Existence of strong legislation and policies has significantly contributed in preserving our forests. However, forests have certain inherent risks such as the risks of forest fire and risk associated with reduced water quality which have adverse impact on the sustainable management of forests. While many controls were in place particularly due to existence of strong legislations and policies, there were inadequacies in certain controls. Accordingly, the audit was conducted with the following objectives:

(i) To assess whether the Department of Forest and Park Services has maintained the forest inventory as per type of vegetation, growing stock, description of stands, etc.; and

(ii) To understand the rigour and adequacy of strategies implemented by the Department to manage forest fires and destruction of water quality risks.

For the purpose of audit, the activities of the Forest Resources Management Division (FRMD), Forests Protection and Enforcement Division (FRED) and Watershed Management Division (WMD) under

the Department of Forests & Park Services (DoF&PS) were reviewed. Though the National Environment Commission, the autonomous agency under the Royal Government of Bhutan is a lead and regulatory agency for overall coordination of water resources in Bhutan, only the watershed management activities of the WMD were reviewed. The activities of WMD are critical for sustainable national economy which is largely depended on electricity and agriculture which in turn are highly reliant on the state and condition of the country's watersheds, watershed management and planning.

What RAA found?

Due to farsighted and visionary leadership of successive monarchs, Bhutan is very much in the forefront in preserving the pristine environment. Environmental preservation has always remained a top priority for Bhutan. Bhutan's forest eco-system is still very much intact despite increasing pressure from rapid developmental activities. Indeed the initiatives and achievements made in preserving forest eco-system are commendable. Royal Government's efforts and initiatives in preserving the environment have received global attention and recognition. Bhutan is a recipient of many international awards.

Notwithstanding the achievements and accomplishments, the RAA observed certain inadequacies where improvements are desirable as briefly outlined below:

- The Department needs specific reporting and monitoring mechanism to check on the trend of the Constitutional requirement of sixty percent forest cover for all times to come.
- The Department is still in the process of formulation of the National Forest Inventory (NFI) which should be the primary basis for any informed decision-makings and prudent operations of forestry functions.
- There are as high as 43% of Government Reserved Forest (GRF) outside formal management purview.
- The coordination between the Department and other related agencies was found generally inadequate, which may impede smooth reporting and monitoring of activities.
- The forest in Bhutan is characterized by densely populated trees, which inherently exposes to risks of forest fires and poor habitat for big wildlife. Therefore, interventions such as carefully planned thinning programme are needed.
- The different Divisions under the Department of Forests and Park Services have their own independent set of information structure

and system. Thus the existing information system is scattered over different divisions and units, affecting real-time decision-making and effective delivery of services. It also exhibits lack of consistency, duplication, and existence of multiple channels of information disseminations.

- ✘ The forest fires are reportedly one of the main drivers of forest degradation in Bhutan. Incidences of forest fires are also more common around settlements indicating its causes to be generally man-made which beckons for requirement of extensive public awareness on its negative impact as well as of stricter enforcement and penalties. The Department also lacks reliable information on the incidences of forest fires to assist informed decision-making and appropriate interventions.
- ✘ The activities under watershed management are diverse with many stakeholders including National Environment Commission Secretariat as lead and regulatory agency and Watershed Management Division with responsibilities and activities spread across many agencies and users. In such complex network and intricacies in activities, a coherent and well coordinated approach is required to enhance accountability and effective delivery of services which was found to be inadequate.
- ✘ National Watershed Inventory Database is a fundamental input for preparation of management plans particularly for vulnerable and critical watersheds as well as for effective decision making. It transpired that such a database was in the process of preparation.

What RAA recommends?

Based on the review and resultant findings, the RAA offered certain recommendations with an attempt to address the identified deficiencies and weaknesses. Some of the recommendations provided are:

- ✪ The appropriate authority should clearly designate the responsible agency to uphold the Constitutional responsibilities of maintaining sixty percent forest cover. The responsible agency so designated should institute specific reporting and monitoring requirements to monitor changes and uphold the wisdom of Constitution in perpetuity.
- ✪ The Department should expedite development of the National Forest Inventory as it forms the fundamental inputs for informed decision-makings and prudent operations of forestry functions.

- The Department should expedite preparation of formal management plans for those GRF which currently do not have one to ensure sustainable management of forests.
- Proper mechanism of coordination and communication should be established between the related agencies to facilitate smooth flow of information and enhance effective delivery of services.
- The Department may explore the prospect of forest thinning in areas where thinning may be necessary, particularly in forests designated for commercial timber harvesting and fire prone area.
- The Department may initiate integration of information system which currently is being scattered over different divisions and units. Information integration would allow easy access and thus assist real-time decision-making, and also help to resolve duplication and inconsistencies in information.
- The Department should also maintain updated database on incidences of forest fires around the country. The information would allow making appropriate interventions. There may also be a requirement of extensive public awareness on the negative impact of forest fires as it constitutes one of the main drivers of forest degradation in Bhutan.
- The water resources development and management should be done in an integrated mode for long-term sustainability. Sustained flow of water of good quality depends on the integrity of the watershed. Therefore, it is paramount that institutional coordination and linkages mechanism should be promoted with clear line of communication and responsibilities established so as to have the required watershed management inventory in place.

Conclusion

The RAA attributed shortcomings in the operations of system to inadequate reporting and monitoring, lack of proper dissemination of information and resource-sharing, inadequate planning and coordination amongst various stakeholders. There were also several constraints, problems and weaknesses in the administrative arrangements and functioning of institutions involved in carrying out the responsibility of managing forests sustainably. Progress of some of the programs, like formulation of the National Forest Inventory, full inventory of watershed in the country are also severally affected by financial and human resource constraints.

2. INTRODUCTION

Background

Bhutan's forest is primarily characterized by composition of almost 100% naturally regenerated forest, of which 13% constitutes primary forests[1]. The plantation forest accounts a very negligible proportion. In terms of types of forest according to the classification of Land Cover Mapping Project (LCMP) 2010, the forest is predominately covered by broadleaf forest accounting for 62.43% of the forest cover. The conifer forest (including mixed conifer forest) constitutes 36.41%. Of which, Blue Pine and Chir Pine Forests account for 2.95% and 3.97% respectively of the forest cover.

The forest in Bhutan has multi-faceted functions, both in ecological and socio-economic functions. According to FAO's Global Forest Resources Assessment, Country Report, Bhutan (2010), the primary function of forests in Bhutan is designated for protection and conservation, constituting 45.8% and 27.2% respectively of the total forest area, followed by production function (15.9%) and others (11.1%). The forests play an important role in soil and water protection, in which Bhutan's economy is heavily dependent upon, especially on water for hydropower generation. Besides, it also plays a vital role in carbon sequestration function which benefit transcends transboundary. Though the share of forestry and logging sector to country's GDP is constantly reducing, recording a marginal contribution of 3.5%[2] only, its importance is directly linked to sustained flow of water as inputs for hydroelectric power generation. Hydropower sector is the largest contributor to the country's exchequer, contributing 19.3% to GDP in 2009, which is expected to grow further in the succeeding years. Therefore, proper management of forest and its watershed is paramount for the sustainability of this vital source of income for the country.

Environmental Policies

Bhutan's environment is largely intact and its forests mostly pristine which can be attributed to far-sighted leadership, traditional values, small population and strong political commitment. Bhutan's dedication and commitment in protecting and preserving the fragile mountain ecosystems and its natural forests is clearly spelt in the Constitution of the Kingdom of Bhutan which provides that a minimum of sixty percent of Bhutan's total land shall be maintained under forest cover for all time. The ownership of natural resources of the Kingdom is also vested in the State. The *'Conservation of Environment'* is one of the four pillars supporting Bhutan's development philosophy of Gross National Happiness (GNH).

[1] FAO's Global Forest Resources Assessment 2010
[2] Statistical Year Book of Bhutan 2011

Recognizing the importance of forests, many environment policies were also drawn up as early as 1960s. The Forest Act 1969, National Forest Policy 1974 were two of the earliest legislation and policy statements for environmental conservation. The Forest Act (1969) is being repealed by the Nature and Forest Conservation Act in 1995. The National Forest Policy is also currently being reviewed which is now in the final stage, awaiting government's approval. The new forest policy is expected to define more precisely the priorities and functions of implementing agencies and also provide necessary legal framework for the department for intelligent and sustainable management of the fragile forest resources.

The government has also banned the export of timbers, despite Bhutan endowed with wealth of forest covering 80.89% of its total land area, indicating its environment conservation policy in true spirit.

Significant Achievements in Forestry Sector

Bhutan has made notable achievements in terms of conservation of its natural environment. While the success in its environmental performance can be attributed to many responsible stakeholders and its visionary leaders and their commitment to conservation policy, the DoF&PS had its own larger role contributing to major successes. Some noteworthy achievements in Forestry Sector, indicating a policy of sustainable forest management are:

1. The extent of forest cover (including shrub forests) which is the key indicator for the health of a country's natural environment exhibited significant increment from 72.5% in 1995 to 80.89% in 2010[3]. While the increased proportion is partly attributed to a change in its international boundary which reduced by about 4.38% over the period, there is also an actual increase in the forest cover from 29,045 sq. km in 1995 to 31,058.17 sq. km in 2010. Bhutan ranked second in terms of proportion of forest cover to its land area amongst the countries in Asia[4]. However, with change in its statistic of land area, corrected to its actual reported size of 38,394 sq. km, Bhutan is expected to top amongst the countries in Asia in terms of proportion of forest cover to its land area.
2. Bhutan is able to designate 51.44% of its total land area as protected areas, accounting for 19,703.57 sq. km (including 3,307.14 sq. km of biological corridors) as exhibited in **Appendix IV**. Bhutan has five National Parks, four Wildlife Sanctuaries and one Strict Nature Reserve.

[3] Bhutan Land Cover Assessment 2010
[4] FAO's Global Forest Resources Assessment 2010

3. To ensure sustained yield in perpetuity, providing social and economic benefits and maintaining environmental stability, the logging activities are carried out by the authorized agency, the Natural Resources Development Corporation Limited (NRDCL) from the Department identified Forest Management Units (FMUs). All FMUs have management plans for its scientific management drawn up by the Department and approved by the Ministry of Agriculture & Forests. Currently, there are seventeen FMUs and five Working Schemes in operations, covering the area of 168,031.43 Ha and 6,102.48 Ha respectively as exhibited in **Appendix V**.

4. To incorporate community participation in management, conservation and sustainable utilization of forests resources, the Community Forestry was established with endorsement of the Nature and Forest Conservation Act (1995). Currently, there are 315 Community Forests extending over an area of 36,231 Ha and benefitting over 14,103 households as exhibited in **Appendix VI**.

5. The biodiversity in Bhutan is outstanding with more than 5,600 species of vascular plants, over 600 species of birds and 190 species of mammals of which 14 species of birds and 26 species of mammals are featured in the World Conservation Union's Red List of Threatened Species. The rich biodiversity of Bhutan includes more than 120 species of butterflies, 28 of which are endemic to the Eastern Himalayas, and as many as 750 plant species endemic to the Eastern Himalayas[5].

6. Bhutan ensures its commitment to integrate the principles of sustainable development into its policies and programmes and reverse the loss of environmental resources as stated in one of the Millennium Development Goals.[6]

International Recognitions and Awards

The Convention on Biological Diversity (CBD) ranks Bhutan in the top ten percent of the world's countries with the greatest species diversity (species richness per unit area). It has been designated as one of the ten Biodiversity Hotspots in the world and the centre of 221 Global Endemic Bird Areas. Many ecologists believe that Bhutan represents the last best chance for the conservation of biodiversity in the Eastern Himalayas, a region of critical importance.[7]

Many prestigious international recognitions and awards have also been awarded to His Majesty, the Fourth King Jigme Singye Wangchuck and Bhutan for exemplary leadership in the field of environmental

[5] IV National Report to the Convention on Biological Diversity, Bhutan 2009
[6] Goal 7, Millennium Development Goals of Bhutan
[7] Forest Resources of Bhutan, Country Report 2000

conservation. In addition to the title *'Champions of the Earth'* in 2005 by United Nations Environment Programme (UNEP) and *'J. Paul Getty Award for Conservation Leadership'* by the World Wildlife Fund (WWF), His Majesty was also inducted into the *'Kyoto Earth Hall of Fame'* in February 2011. The Kyoto Earth Hall of Fame is an award to honor in perpetuity, the achievements of those who have made outstanding contribution to conservation of the global environment. This year too, Bhutan was amongst the nominees for *'The Future Policy Award 2011'* by the World Future Council for its constitutional commitment to maintain 60% forest cover for all times.

Bhutan's commitment to protection and conservation of environment is also evident from being signatory to twelve Multilateral Environmental Agreements, including the UNFCCC.

3. FINDINGS

The findings as detailed below are based on the audit methodology used as described in **Appendix II** and **Appendix III**. The audit opinions were primarily inferred from the documents and information made available, and observations in the field by the audit team.

3.1 PLANNING & COORDINATION

3.1.1 Clarity on the strategy to meet the Constitutional requirement

As provided in the Forest and Nature Conservation Act of Bhutan 1995, the Department of Forest & Park Services defines forest as *"any land and water body, whether or not under vegetative cover, in which no person has acquired a permanent and transferable right of use and occupancy, whether such land is located inside or outside the forest boundary pillars, and includes land registered in a person's name as Tsamdrog (grazing land) or Sokshing (woodlot for collection of leaf litter)".*

The Department also provides a technical definition for forest as *"land with trees spanning more than 0.5 hectares with trees higher than 5 meters and a canopy cover of more than 10 percent."* It does not include land that is predominantly under agricultural or urban land use.

Each definition would yield varying level of forest cover and other implicated forestry statistics thereby necessitating different policies, conservation strategies, intensity of commercial timber extraction, and other necessary interventions. Therefore, the Department should have clarity in its strategy aimed at upholding the Constitutional requirement and to fetch proper direction and focus. Ambiguity may allow the Department to mark forests or non-forests at its convenience. Clarity is imperative in achieving the wisdom enshrined in the Article 5.3 of the Constitution of the Kingdom of Bhutan which stipulates that *"The Government shall ensure that, in order to conserve the country's natural resources and to prevent degradation of the ecosystem, a minimum of sixty percent of Bhutan's total land shall be maintained under forest cover for all time."*

> *Perspectives on the interpretation of the Constitutional requirement should be clear so as to have a focused direction towards achieving the wisdom of Constitution in perpetuity.*

Further, in order to gauge the fulfillment of sixty percent forest requirement as enshrined in the Constitution, it is essential to have up-to-date forestry inventory, periodic reporting and monitoring.

Currently, the only available information as provided in the Bhutan Land Cover Assessment 2010 (LCMP 2010) of the National Soil Services Centre (NSSC) and Policy and Planning Division (PPD) of the Ministry of Agriculture & Forests provides for forest cover statistics as 80.89%. While the forest cover at present is in its comfortable position from all standards, it may be imperative to dwell on future strategies with designated responsible agency, and establishment of specific reporting and monitoring requirement to uphold the wisdom of Constitution.

3.1.2 Forest Inventory – a fundamental input for decision-making on forest related issues

Forest inventory is an accounting of trees and their related characteristics of interest over a well-defined land area. Forest inventory seeks to enumerate the population of trees within a forest and ascertain other information, such as their volume, age class, description of stands, growth and species composition, etc.

The NFI is a fundamental input for informed decision makings and prudent operations of forestry functions.

The periodic National Forest Inventory (NFI) is a fundamental input for informed decision-makings and prudent operations of forestry functions. Some of the benefits of having NFI include, amongst others:

a) To check on the requirement of maintaining 60% forest cover as mandated by the Constitution.

b) The inventory will facilitate accurate computation and administration of total annual allowable cut (AAC) i.e., monitoring of total quantity of timber removed from forests annually.

c) To generate reliable and consistent reports (local, regional, national) of information on forest volume, age class, vegetation type, growing stock, dominant species, biodiversity, biomass, etc.

d) Ensure development of sound forest policies and effective forest conservation strategies to address emerging issues.

e) Produce basic resource data for prudent operations of other forestry functions and monitoring changes.

The NFI will help to state whether Bhutan is gaining or losing forest cover and species, how quickly trees are growing, dying and being removed, how much timber should be harvested from given forest area, and how the biodiversity level and vegetation type is changing over time, etc. Recognizing the usefulness of the NFI, the National Forest

Policy of Bhutan 2010 (Draft) also underscores the need to carry out and update the NFI periodically.

Though the Department has completed most of the preparatory phase of NFI for Bhutan, much of the activities are still underway requiring huge fund. The Department has estimated fund requirement of Nu. 252 million to complete the entire project of NFI. However, as against the total required budget, the Department could secure only around ten percent of the requirement. Therefore, completion of the NFI activities as scheduled appears a daunting task attributed to lack of technical capacity, resource constraints, both in terms of human and capital. It may therefore be imperative to expedite the activities through prioritization of resources and accelerating conducive efforts by the responsible authority.

3.1.3 Government Reserve Forest outside formal management regimes

The Department is given responsibility for managing Government Reserved Forests (GRF), and for regulating the production, protection, transport and trade of timber, other forest produce and wildlife, whether or not located in GRF, and as provided by rules for community or private forestry where responsibility for regulating a particular type

Table 3.1: GRF with or without formal management regimes

Sl. No.	Management Regimes	Forest Cover (in sq.km)	Total Area (in sq.km)	% forest cover to whole
1	Working Schemes	743.98	782.21	3
2	FMU	3,074.25	3607.13	11
3	Community Forestry	252.78	287.25	1
4	Protected Areas & BC	11,341.38	19,161.86	42
Total GRF under formal Management Regimes		**15,412.39**	**23,838.45**	**57**
GRF outside formal management regimes		**11,622.97**	**11,622.97**	**43**
Total Forest Cover		**27,035.36**	**27,035.36**	**100**

Source: Based on LCMP 2010 and FRMD, MoAF

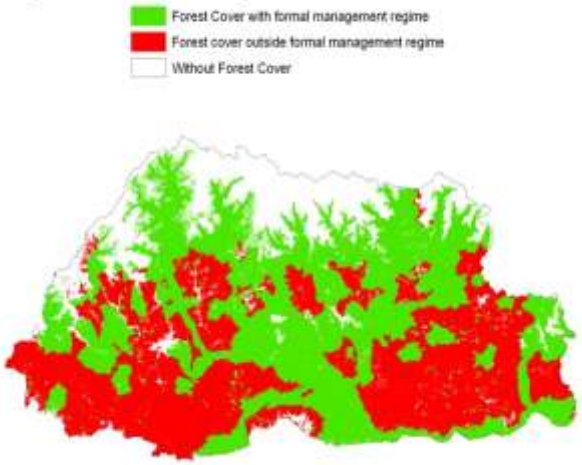
of minor forest produce has been given to another agency or department of the Royal Government[8]. The Act also defines the need for management plans for the management of forests, wildlife and related natural resources of Bhutan.

[8] Chapter II, Forest and Nature Conservation Act of Bhutan (1995)

A management plan is an indispensable tool for planning sustainable forest management operations. It states objectives clearly so that everyone involved in managing the forest is working towards the same end. A management plan provides the basis of future plans and activities clear and available to all.[9]

Forests within formal management regimes are subject to management that encompasses the administrative, legal, scientific, technical, economic, social and environmental aspects of the conservation, use of forests and forest regulation. The GRF that comes under the purview of formal management regimes include protected areas, FMUs and working schemes and community forestry, constituting 57% of forest cover. However, the remaining 43% of forests as computed in **Table 3.1** do not have a formal management plan. The computation of forest cover with or without formal management regimes was done based on the spatial data obtained from the NSSC, MoAF and the FRMD, MoAF using Geographic Information System (GIS) based applications as exhibited in **Figure 3.1**.

Figure 3.1: Management Regimes of Government Reserve Forests



Though some portion of GRF without formal management plan include designated conservation areas and buffer zones with restricted activities, the rest of which should supposedly have the Local Forest Management Plans (LFMP), much of the activities are underway. Therefore, it may be imperative to expedite preparation of formal management plans for those GRF which currently do not have one. Such considerable proportion of the forest cover as indicated in the **Table 3.1** falling outside the formal management regimes is noteworthy requiring management attention for overall sustainable management of the GRF.

3.1.4 Inadequacy in coordination and monitoring

The synchronization of the efforts of different stakeholders would help to provide unity in the pursuit of goals of the organization. Proper

[9] Forest management Code of Bhutan, FRMD (2004)

coordination helps integrating various plans through mutual discussion and exchange of ideas, avoiding overlapping efforts and duplication of works.

However, the existing practice between the Department and related agencies indicated lack of effective coordination, thereby also affecting smooth reporting and monitoring of the activities. As indicated in the **Table 3.2**, there were several independent studies being carried out by different agencies depicting several conflicting information on forest cover as provided by series of land cover surveys.

Table 3.2: Forest Cover data as provided by a series of land cover surveys

Source	Agency	Image Type/Year	% Forest Cover (inclusive Shrubs)	Forest Cover (in Km^2)
PIS (1976-81)	DoF&PS	Aerial Photos: 1956-58	75.20	21,937
Negi (1983)	FAO	AP: 1978-79 Landsat: 77-78	68.70	27,682
MPFD (1991)	DoF&PS	SPOT: 1989	66.90	27,060
Atlas of Bhutan (LUPP 1995)	PPD	SPOT: 1989-90	72.40	29,045
JAFTA (2000)		Landsat TM: 1999	79.50	32,025
PPD (2006)	PPD	Landsat TM: 1999-00	81.50	31,546
TERI (2007)	DoE, MoEA	IRS-P6: 2004	72.70	28,174
LCMP (2010)	NSSC	ALOS (AVNIR-2): 2006-09	80.89	31,058

Source: Special Assignment Report, Dr. Phuntsho Namgyel (2010)

Classification methods were different between almost all surveys as the definitions and legends used to cover forest and tree spatial units.[10] The forest cover as a result of uncoordinated efforts, implicating duplicate efforts has yielded conflicting information and not depicting a clear trend and rendering difficulty to compare the figures over time.

The proper coordination was also lacking between such governments agencies as the Ministry of Agriculture & Forests and the National Land Commission. The integration of the efforts of the two agencies

[10] Special Assignment Report, Dr. Phuntsho Namgyel (2010)

would spur better regulation of the government reserved forest, water, *tseree* and wildlife resources in private registered land. The proper coordination may also help information sharing and thus bringing harmony towards achievement of common goal. It would also assist the Department to ascertain the extent and maintenance of the details of the private forestry, which currently the Department is devoid of information and inventory of the private forestry crucial for sustainable and integrated management of forests.

3.2 SUSTAINABLE MANAGEMENT OF FOREST

3.2.1 Forest Thinning Programme – a Scientific Management of Growing Stocks

The thinning of forests is best described as the selective removal of inferior stems in order to favor the growth of remaining better quality stems. Trees compete for sunlight, for moisture in the soil, for nutrients, and for space to grow. When there is too much competition, trees die, become diseased, or do not grow to their full size and quality. The process of forest thinning helps to decrease competition and foster the health of trees.

One weed a garden to maintain its health, why not the forest.

The Forest Management Code of Bhutan underscores the importance of thinning tree stands to enhance the stand stability against snowfall and storm damages, and to reap positive effect on diameter and volume increment resulting in higher production of usable timber volume. Also, from the perspective of new understanding on the concept of biodiversity, soil and water conservation highlights some usefulness of forest thinning.[11]

Photograph 3.1: Growing stocks of stands requiring thinning

Thinning forest trees is one of the basic tools of silviculture – the science and art of producing and tending a forest. However, our national forests in many instances are overcrowded with trees. Overcrowding results in growth of trees with poor form tall, thin and gangly susceptible to pests and diseases, widespread destructions from forest fires and poor habitat for big wildlife. New research indicated

[11] Special Assignment Report, Dr. Phuntsho Namgyel (2010)

thinning increases biodiversity, particularly those that are important as forage for wildlife.[12]

A few forest studies, including one done in the Feather River watershed in May 2007 and article published by California Farm Bureau Federation (April 13, 2011), show that an increase of 20 percent to 30 percent in water yield can be expected from forest thinning. The diminished canopy that results from thinning also allows greater amounts of rain to reach the forest floor, which increases the quantity of water from the watershed.[13]

However, thinning is a complex process, and knowing and understanding forest structure is critical for achieving thinning objectives. Therefore, it may not be a panacea for all situations as in the case of primary forests. In some cases, it is worth letting nature tend itself. Nevertheless, in some cases like fire prone areas and forests areas designated for commercial timber harvesting, thinning may be beneficial. Thinning systems also vary with respect to timing, strategy and intensity. Therefore, the management may carry out necessary study for applicable method, and apply thinning technique to the forest areas where thinning may be necessary.

3.3 INFORMATION MANAGEMENT SYSTEM

3.3.1 Disintegrated Information Management System

Today, information storage has shifted from manual to electronic, thereby increasingly demanding proper means of organizing, retrieving, acquiring and maintaining information. Reliable and timely information assists in informed decision-makings and help effective delivery of services. Proper integration and synchronization of information provides unity of action and helps to avoid conflicting information and duplication of efforts.

> Information is a powerful tool that gives leverage to an organization in pursuit of its goal.

However, the Divisions under the Department of Forests and Park Services maintain its own independent set of information structure and system. It was also observed that the existing information system was very limited and scattered over different divisions and units. Poor quality of information management was clearly evident from lack of consistency, duplication, existence of multiple channels of information disseminations and limited resources deployed for managing and improving information systems.

[12] Special Assignment Report, Dr. Phuntsho Namgyel (2010)
[13] Pine Management influences the Southern Water Resources, Ursic (1974)

Currently, each individual Division under the Department maintains its own information depot. For instance, Forest Resource Management Division (FRMD) maintains Information Management System and Forestry Information Database, Nature Recreation and Eco-tourism Division (NRED) maintains MS Access based system, Social Forestry Division (SFD) maintains Community Forestry System, Forest Protection and Enforcement Division (FPED) maintains BhuFED Database System, and Wildlife Conservation Division (WCD) also maintains such similar system.

This practice of maintaining independent data information encourages duplication of work and human efforts, incomplete and varied information storage and loss of focus. Duplication of work is evident from forest fire data maintained both by the FRMD and Forest Fire Management Section. Further, in few cases, it was observed that forest fire database maintained by the FRMD does not correspond to the data maintained by the FFMS, FPED. For example, in 2008, FFMS record shows 38 incidents of forests fires with 9,281.73 acres of forests destroyed by fire and FRMD data show 13 incidents of forests fires with just 1,055.00 acres destroyed by fire. Furthermore, neither of the records depicted complete cases of forests fires.

Also, information recorded in the system maintained by the FRMD relating to timber removal and supply, wildlife depredation, afforestation, forest offences, seedling supply, private forest plantation, and forest fire are not updated, resulting to retrieval of inconsistent information from different sources. In most cases, records were available only from year 2006, and no records were available for the year 2011, indicating that information was not judiciously fed in the system. Besides, annual forest statistics report and other necessary information were also not readily available.

3.4 FOREST FIRES MANAGEMENT

3.4.1 Forests Fires – one of the main drivers of forest degradation

Forests play a vital role in sustaining rural livelihoods and food subsistence, both of which are major source of income for the people and the most important natural wealth of the country. Further, forests in Bhutan are vital for maintaining the sustainability of hydropower industry, which is the main source of national revenue and also for maintaining geologically fragile mountain ecosystem. However, the forest fires menace are a severe disturbance to the forest ecosystem which result in destruction of biomass and loss of flora and fauna.[14] The UNCCD, Reference Guide for Rio Convention confirms repeated

[14] Feasibility of REDD+ in Bhutan, Noord, Hans Van (2010)

forests fires leading to gradual degeneration into a barren area and complete destruction of the associated species which eventually result in a degradation of the ecosystem.

In Bhutan, incidences of forest fires are reported every year around the country, destroying substantial area of forests as exhibited in **Table 3.3**.

Table 3.3: Forest Fires incidences in Bhutan

Year	Areas Affected [ha]	Nos. of Fire Incidents
1992-1993	29,182.37	84
1993-1994	2,240.78	36
1994-1995	19,627.72	56
1995-1996	10,812.10	62
1996-1997	9,853.32	48
1997-1998	6,487.28	72
1998-1999	13,535.95	112
1999-2000	13,455.33	104
2000-2001	9,325.68	81
2001-2002	5,857.66	64
2002-2003	2,170.39	46
2003-2004	1,084.48	40
2004-2005	3,186.20	67
2005-2006	7,832.27	37
2006-2007	22,512.29	47
2007-2008	2,566.89	10
Total	**159,730.71**	**966**

Source: Global Forest Resource Assessment 2010, Country Report, Bhutan

Analysis of its incidences revealed that the forest fires generally occur around the settlements area as exhibited in **Figure 3.2**, indicating forest fires are mainly man-made than the natural causes. Almost every year, around dry winter season, forest fires occur around the capital city, Thimphu as shown in the **Figure 3.2** (incidences occurred in early 2011). The information as reflected in the figure were collected by the audit team on their site visits to the forest fires affected areas, which was then analyzed and projected on the raster image of Google Earth using GIS based application.

Figure 3.2: Incidences of forest fires more prone around settlements

The occurrences of forest fires around the settlements also indicate negligence and requiring extensive public awareness on its negative impact as well as of stricter enforcement and penalties. Forests fires are a recurrent and widespread phenomenon in the country implicating requirement of adequate surveillances by the Departments. However, the RAA also acknowledges some of the commendable efforts of the Department in battling the risks of forest fires despite challenges confronted inherent to the country's landscapes and limited human resources.

3.4.2 Formulation of National Fire Management Strategy

Bhutan has been experiencing wildfire disasters quite a number of times. Currently, the Department lacks strategic frameworks, and confronts a challenge in realizing the need for financial, manpower (fire fighters), awareness raising, development of plans and programmes to cope with wildfire disasters in the country.

The National Fire Management strategy is imperative as it may initiate to develop and strengthen necessary policy and provide options and opportunities to engage and mobilize local communities, civil societies, and government and non-government organizations in prevention and suppression of wildfire disasters. The strategy may also enable facilitating settings to explore all possible donors including national, international, bi-lateral, multi-lateral for financial, technical and other

resource support. Besides, the strategy may also outline approach for wise use of fires ecosystem management and livelihoods of the local people. The strategy should consider complete, practical and feasible spectrum of fire management activities to provide the management proper directions. The strategy, in nutshell, should be able to mitigate losses of forest coverage, properties, human lives, biodiversity, species, environment and ecosystem.

Moreover, the Forest Fire Rescue plan and preparedness procedure shouldn't be ignored in developing the National Fire Management strategy. Preparedness is a continuous cycle of planning, managing, organizing, training, equipping, manning, exercising, monitoring, and improvement activities to ensure effective coordination, execution and enhancement of capabilities of concerned organization to prevent, protect against, respond to, recover from, create resources and mitigate the effects of forest fire. It is crucial to develop plans of action carefully to manage and counter the risks and take action to build the necessary capabilities needed to implement such plans. Above all, when human lives are at stake, emphasis is desired in mobilization of core emergency services such as police, ambulance medical crew and other services like evacuation procedures that ensure public safety and health. Thus it is important to synchronize the activities of all relevant stakeholders and enable efficient coordination of rescue work. Incorporation of such rescue plan and preparedness procedures in the National Fire Management Strategy may also be of use in event of emergencies. However, such strategic document is still under process of formulation, and may need a renewed effort to expedite the processes, incorporating all the essential requirements in the Strategy.

3.4.3 Inadequacy in information of forest fire incidences

Information is a base data and useful tool for forests fires management and appropriate decision-making. It helps to produce reports with necessary analyses for reporting of forests fires (number of fires, area burned, fire causes, type of species burned, fire suppression parameters, etc.), at various temporal (single day, month, calendar year, fiscal year or multi-year) and spatial (local, regional, national) scales. The inventory gives a snapshot view of forests fires situations and may provide basis for establishing necessary policy, measures, regulations and other management interventions. Biomass statistic may help to identify areas susceptible to fires and anticipate the intensity of fires in the given area if the fire occurs.

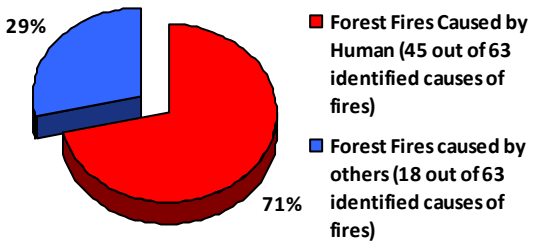
Currently, the FFMS maintains forests fires records haphazardly, recording only data reported by some field divisions, and records only for the period from 2007-08 to 2010-11. The records prior to 2007-08 were either not available or maintained. On analysis of the records made available by the FFMS, it was observed that:

Photograph 3.2: Burnt tree stands

a) Of the total reported incidences of 207 forest fires around the country, approximately 30.92% of fire incidents lack information as areas destroyed by fire. In absence of such vital information, the account of forest loss by forests fires may not capture true and accurate information.

b) 144 incidences of forest fires, accounting for 71.43% of the recorded fire incidents have no identified causes of forest fires. Such a massive incidence of forest fires without identified causes indicates poor enforcements and monitoring.

Figure 3.3: Causes of Forest Fires



c) Of the 63 identified causes of forest fires incidents, 71% as depicted in **Figure 3.3** indicate that majority of the incidences were inflicted by human. Some cases of forest fires, especially in the eastern part of the country are recorded to be set deliberately for growth of pastures or commercially valuable lemon grasses. Such practices should be monitored strictly and discouraged through some alternative interventions.

d) Some of the fire incidences were not recorded. The most noticeable unrecorded fire incidences include forest fire below Sangaygang, above Changangkha and Zilukha as exhibited in the **Figure 3.2**.

The complete recording of information is crucial for precise and proper reporting of fire information.

e) Number of recorded fire cases also lack detail information as type of vegetation (forest species), burnt area and date of fire outbreak. Such information would be vital for informed decision-making and for appropriate interventions.

In light of the above facts, there is a need to institute a system to ensure real-time reporting of information to assist management for appropriate decision-making and effective monitoring. While it is encouraging to understand that the Department is initiating reporting of incidences of forest fires through data base format using mail facilities, it may further explore the technology of real-time reporting.

3.4.4 Aftermath activities of forest fires

Generally, the forests fires are threat to forests cover and their biodiversity, leading to degeneration of forests. Experts in forest fires also argue that controlled fires serve an important function in maintaining the health of certain ecosystems, and can be used as a land management tool. Some trees species like adult chirpines are resistant to certain intensity of fires and at times dependent on the heat of fire in order to open up their seed cones for regeneration.

Photograph 3.3: Reforestation in fire burnt forest area

While such insights indicate the positive aspect of forest fires for certain type of vegetations, generally, the aftermath of forest fires are the dead stands requiring immediate intervention from the management for carefully considered reforestation. However, on site visit of forest fires affected areas

Photograph 3.4: Burnt trees used as flag poles

around the capital, the audit team observed that no significant activities were initiated to make good the losses of forest cover. Though it was encouraging to note plantation activities in area above Changangkha Lhakhang by the MoAF and Japan International Cooperation Agency (JICA), and plantation in area below Sangaygang by Amankora, no remedial activities were carried out in an area above Samazingkha. The Department also allowed the community to remove the burnt stands to be used as flag posts, making the utmost use of dead stands.

Aftermath management approach is an integral element of fire management. The FFMS is currently, involved in assessment of physical destruction in terms of areas burnt which was not recorded completely as discussed above **(3.4.3)**. The FFMS also assess vegetation type destroyed and causes of fires. No other information concerning fire implications, impacts or losses were maintained. It may be important to examine the effects of fires such as physical destruction, change in vegetations, biological diversity, effects on soil and watershed, change in biomass stocks, intense fire destroying habitat and pushing animals to find new areas which may upset the local balance and ultimately result in the loss of wildlife, high carbon dioxide levels, loss of fruit-trees resulting in overall decline in animal species that rely on fruits for food, etc.

3.4.5 Inadequate fire-fighting equipment and gears

The Department has taken commendable efforts and initiatives to mitigate risks of forest fires to the degradation of forests.

Amongst others, it has taken initiatives to mobilize volunteers, and provided the basic skills and techniques in fighting forest fires. It has also introduced toll free call number **'211'** to report any forest fires related offences. However, the strategies lack its effectiveness and might need revisiting and revitalizing to ensure its effectiveness through reduction of incidences and effective combating.

Photograph 3.5: Volunteers trained on combating forest fires

The current rudimentary practice of suppression of forest fires exposes fire fighters to risks of injury. Reducing risk to firefighters and the public should form the priority in every fire management activity. Presently, some of the fire fighters are not properly equipped with necessary safety gears, except for some volunteers. These equipments shall not only protect the fire fighters but also serve as an encouragement or push factor towards fire suppression.

The **Photograph 3.6** displays the firefighters suppressing the fire without proper fire fighting gears. It may also be necessary to have specialized equipment to combat fires of high intensity and magnitude.

Photograph 3.6: Forest officials and volunteers battling forest fires

Army & local volunteers fighting fire with brushes (tree branches) and home implement

Fire fighters using tree branches to suppress the fire

Picture courtesy: IFFN No. 32

3.5 WATERSHED MANAGEMENT

3.5.1 Lack of synergy between the DoF&PS and the National Environment Commission

Watersheds systems are life supporting and there is a deep interrelationship with human activities. As such maintaining and protecting watersheds remain highly essential for a robust economy, conserving environmental resources and ensuring a good quality of life. Given that Bhutan's two most important sectors in the national economy – electricity and agriculture are highly reliant on the state and condition of the country's watersheds, watershed management and planning assumes enormous significance.[15]

Recognizing the importance of watershed management, in 2002, the Watershed Management Section was created under the Social Forestry Division, DoF&PS which later in 2009, was upgraded to Watershed Management Division (WMD). During the same year (2002), the National Environment Commission Secretariat (NECS) was designated as the lead and regulatory agency for overall coordination of water resources in Bhutan. However, the two agencies apparently lacked

[15] Existing Good Practices of Sustainable Consumption and Production in Bhutan, NECS (2010)

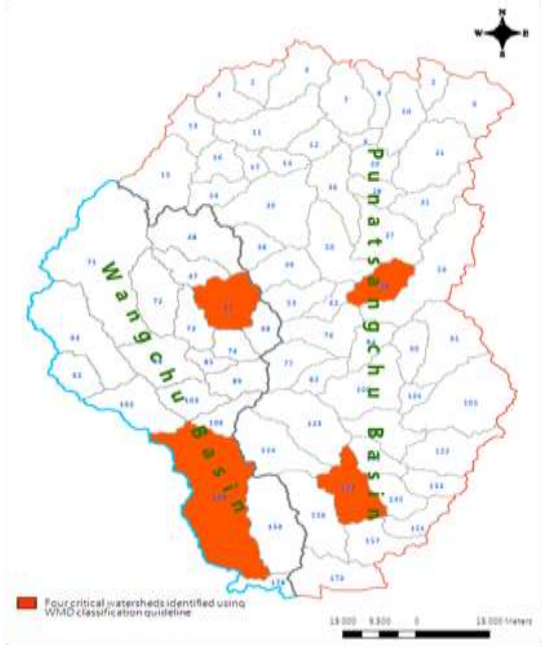
strong cohesion impeding effective delivery of its services. Watershed management at the national level has also suffered largely due to the fact that no proper coordination amongst the agencies was in existence. The responsibilities were spread across many agencies and users depending on their relevancy to a particular watershed region or area that fall along the line of their work. The complex network created confusions, overlap responsibilities and at times causing responsibilities to be overlooked. The management attributes primarily on human resources and financial constraints and the complexity of planning and implementing activities that required involvement of multi-disciplinary actors and agencies for not having complete watershed inventory in place.

Therefore, it is paramount that institutional coordination and linkages mechanism should be promoted with clear line of communication and responsibilities established.

3.5.2 Absence of National Watershed Database impede informed decision-making

One of the important functional responsibilities of the Watershed Management Division (WMD) is to plan, coordinate and monitor nation-wide watershed management activities. Its functions include assessing watershed areas and classifying them in terms of vulnerability and criticality. It is also expected to maintain and update watershed inventory within a national watershed database under policy framework issued by the National Environment Commission Secretariat (NECS). However, there are reportedly no specific policy framework on watershed management **(for details, refer the comments of the Department under Appendix I)**.

Figure 3.4: Critical Watershed in *Punatsangchu* and *Wangchu*



A detailed national watershed database would allow many stakeholders to use the data for making important decisions related to the particular watershed region or area. It would also serve as the baseline data for many future studies and researches related to watersheds or water resources in Bhutan.

The WMD has identified seven major river basins in Bhutan. The 'Guideline for Classification of Watershed' has been developed by WMD which is used for assessments and scorings to categorize watersheds into three classes i.e., Critical, Normal and Pristine. The two river basins namely, Wang-Chu and Puna-Tsang-Chu river basins have been completed with four critical watersheds identified. Management plans for these four identified watersheds are scheduled to be ready before the end of the 10th FYP.

However, there is still a long way for national watershed inventory database to be in place which would be the fundamental input for preparation of management plans for vulnerable and critical watersheds. Many activities that are vital to the protection and preservation of watersheds and measures that ensure good management practices in the regions or areas were hampered due to lack of primary information. The WMD attributes its staggering progress to shortage of human resources, limited technical competency of personnel in the required professions and adequate financial support.

3.5.3 Lack of management plans delay subsequent watershed management activities and programmes

The WMD should prepare best practice guidelines for participatory, consultative and integrated planning and implementation approaches related to watershed management. These guidelines are expected to protect watersheds, regulate human activities in the areas, improve and enhance quality and quantity of water resources.

The WMD having completed its rapid assessments and classifications of watersheds in Wang Chu & Puna Tsang Chu river basins has identified four vulnerable and critical watersheds. However, management plans for these four vulnerable and critical watersheds are still not formulated. Due to lack of management plans, many anticipated guidelines that would help streamline the activities of communities in the locality, set up community institutions as well as coordinate programmes with other relevant agencies to maintain and improve water resources in the watershed regions are also subsequently hampered. This may further lead to delay in integrating important watershed objectives and plans into the regular planning and budgeting processes of other central agencies, dzongkhags and gewogs, thus impairing effective integration of watershed activities into the mainstream activities of the implementing agencies.

3.5.4 No gap analysis and/or performance evaluation done for watershed management activities and programmes

The WMD is responsible for carrying out timely gap analysis and monitoring and evaluating the performances of watershed management activities and programmes. Analyses done at regular intervals are expected to indicate both good and bad management issues and gaps for further improvements and rectification. Being the agency responsible for development of guidelines and frameworks for the management of watersheds, they are also responsible to monitor and evaluate performances of activities that are expected to improve not just water's quality and quantity but also to improve livelihoods of communities upstream and the beneficiaries downstream.

Currently, the only watershed management related activities under process are the rapid assessments and initial studies to obtain status of the current situations in watershed regions being assessed. Thus, the lack of availability of any prior data on watersheds is a hindrance to conduct even a basic gap analysis.

The information from the National Forest Inventory (NFI) would give insights on various types of changes in the vegetation, land cover and watersheds that would supplement WMD's own information collection and help steer decisions relevant to watershed management activities. However, the NFI itself is under the process. Therefore, it may also be prudent to align the activities of the WMD alongside the exercises of the NFI, so that there is a required cohesion and smooth sharing of information between the two divisions.

4. RECOMMENDATIONS

Based on the audit observations discussed above, the RAA recommends following course of actions:

4.1 A clear strategy should be instituted for a focused direction towards achieving the wisdom of Constitution in perpetuity

Authority, responsibility, and accountability for realization and administration of constitutional requirement of maintaining a minimum of sixty percent forest cover has to be drawn clearly. While it may be the sacred responsibility of every citizen to contribute to the protection of our natural environment, there should be a designated authority to monitor and ensure that the constitutional requirements are respected. Therefore, the appropriate authority need to designate appropriate focal agency/agencies, with specific reporting and monitoring requirement to steer clear-cut strategy and uphold the wisdom of Constitution (Article 5.3) in perpetuity.

4.2 The National Forest Inventory formulation process should be expedited

The DoF&PS should expedite development of the National Forest Inventory (NFI) as it forms the fundamental inputs for informed decision-makings and prudent operations of forestry functions. The responsible authority should also facilitate prioritization of resources to accelerate completion of the NFI as it assumes activity of critical importance for sustainable management of country's forests and ecological services.

The periodically updated NFI would provide with accurate information/inputs for informed decision-makings and to monitor changes in the status of forests.

4.3 Forests outside formal management regimes should be brought under management regimes for sustainably managing GRF

The considerable proportion (43%) of the forests is outside the formal management regimes. These forests must be brought under management regimes and should have formal management plans to ensure sustainable management of the GRF.

A management plan is an indispensable tool for planning sustainable forest management operations. The GRF which is currently outside the formal management regimes should also be brought under the management regime through preparation of Local Forest Management Plan which subjects the forests to administrative, legal, scientific,

technical, economic, social and observe environmental aspects of the conservation, use of forests and forest regulation.

4.4 Proper coordination amongst the agencies should be initiated to bring harmony towards achievement of common goal

Proper mechanism of coordination and communication should be established between the related agencies to facilitate smooth flow of information and enhance effective delivery of services.

The Department needs to initiate action and encourage coordination amongst organizations and various sections/divisions of the organization to bring about fusion and integration of the efforts of different stakeholders to leverage pursuit of goals. The effective coordination would help avoiding conflicting information such as on forest cover, etc. and enhance effective reporting and monitoring activities. The proper coordination should also be established between such agencies as the Ministry of Agriculture & Forests and the National Land Commission. It would assist the Department to ascertain the extent and maintenance of the details of the private forestry, which currently the Department is devoid of information and inventory of the private forestry crucial for sustainable and integrated management of forest.

4.5 The Department should explore the prospect of forest thinning

The prospect of forest thinning in Bhutan should be explored and thinning technique applied in forest areas where thinning may be necessary, particularly in forests areas designated for commercial timber harvesting and fire prone areas.

The Forest Management Code of Bhutan and experts acknowledge that thinning process foster the health of trees. However, thinning is a complex process, and knowing and understanding forest structure is critical to determine timing, strategy and intensity of thinning systems. Only carefully planned thinning interventions would yield objective results.

4.6 The Department may initiate integration of information management system to assist real-time decision-making

The Department may initiate integration of information system which currently is being scattered over different divisions and units. Information integration would allow easy access and thus assist real-

time decision-making, and also help to resolve duplication and inconsistencies and conflicting information.

The information should be made accessible through single portal rather than each individual Division maintaining its own information depot. A single information dissemination point will help to escape from unnecessary collection and compilation of information, and wastage of time.

4.7 The updated records and document on incidences of forest fires should be maintained and also expedite formulation of the National Fire Management Strategy

The Department should maintain updated database on incidences of forest fires around the country. The information on forest fire incidences is a base data and useful tool for forests fires management and appropriate interventions. The Department is short of complete information on the incidences of forest fires and therefore, the Department should institute a system to ensure real-time reporting and documentation to ensure complete recording of fire incidences. There may also be a requirement of extensive public awareness on the negative impact of forest fires as it constitutes one of the main drivers of forest degradation in Bhutan.

The Department should also expedite formulation of the National Fire Management Strategy which is currently under process with renewed effort, incorporating all the essential requirements in the Strategy.

4.8 Proper coordination and linkages mechanism should be established between the DoF&PS and the NECS

The water resources development and management should be done in an integrated mode for long-term sustainability. Sustained flow of water of good quality depends on the integrity of the watershed. Therefore, it is essential that the two agencies, WMD, DoF&PS and the National Environment Commission Secretariat (NECS) should establish institutional coordination and linkages mechanism to promote clear line of communication and responsibilities in pursuit of common goals.

The proper coordination would allow two agencies to work in harmony and avoid possible duplications and overlapping of functions. It would also assist them to complement and supplement their individual efforts, and help to smoothen some of the constraints and challenges faced by

the two agencies in areas of human resources and technical competency.

4.9 A national watershed inventory database should be in place for making key decisions in the management of watershed

The primary information from a national watershed inventory is the critical input to set in motion the many activities that are vital to the protection, preservation and management of watersheds. The WMD must accelerate to complete a nation wide survey and have a national watershed inventory database ready at its earliest. This will also ensure that delayed activities and programmes dependent on the watershed management master plans to accelerate without hindrance.

4.10 Timely monitoring and evaluations must be done to ensure proactive interventions

The WMD is responsible for carrying out timely gap analysis and monitoring and evaluating the performances of watershed management activities and programmes. Analyses done at regular intervals are expected to indicate both good and bad management issues and gaps for further improvements and rectification. However, attributed to lack of availability of any prior data on watersheds and its inventory, a gap analysis is a succeeding exercise only after pre-requirement activities are undertaken. Therefore, the WMD should first expedite its activities under process of rapid assessments and initial studies to obtain status of the current situations in watershed regions being assessed.

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ROYAL GOVERNMENT OF BHUTAN
MINISTRY OF AGRICULTURE AND FORESTS
DEPARTMENT OF FORESTS AND PARK SERVICES
FOREST RESOURCES DEVELOPMENT DIVISION
THIMPHU: BHUTAN

"Sustaining Forest Resources for Present and Future Generations"

No.FRDD/18(d)/2011-2012/ 335

10 November 2011

To,
Sr. Deputy Auditor general
Department of Performance and commercial Audit

Subject: Submitting comments on the Environmental Audit report on National Forest Inventory.

Sir,

With since apologies for the delay in furnishing the comments on the Environmental reports within the deadline, we would like to submit the comments/views/recommendations of the department for consideration and necessary revision in the Environmental Audit report before being presented at the parliament.

If deemed necessary, a meeting may be convened on a suitable date. We request our views to be considered and be incorporated in the report and also be given the opportunity to view the final draft please.

Enclosed; Comments on the environmental audit report from the department.

Thanking you

Yours sincerely,

(Gopal Mahat)
Offtg. Director
Department of Forests and Park Services

40533
10/11/2011

Inventory and Data Section, FRDD. PO Box # 751 Phone: +975-02-327723, 324653 Fax: +975-02-322560

AUDIT MANDATE, SCOPE, CRITERIA & METHODOLOGY

Audit Mandate

Article 25.1 of the Constitution of the Kingdom of Bhutan and Chapter 1 (Section 3) of the Audit Act of Bhutan 2006 state that ***"There shall be a Royal Audit Authority to audit and report on the economy, efficiency and effectiveness in the use of public resources".*** The Audit Act also empowers the RAA to carry out special audits and any other form of audits that the Auditor General may consider significant and necessary. In line with this important constitutional responsibility, the RAA is required to audit and report on the functions and operations of the Government Agencies and other organizations and recommend measures to improve their economy, efficiency, and effectiveness in the use of public resources.

Audit Objectives

The audit is conducted with following two specific objectives:

i) To assess whether the Department of Forest and Park Services has maintained the forest inventory as per type of vegetation, growing stock, description of stands, etc.; and

ii) To understand the rigour and adequacy of strategies implemented by the Department to manage forest fires and destruction of water quality risks.

Audit Scope

The assessment of risks related to the sustainable forest management in Bhutan indicated reduced water quality and the forest loss of power in restraining water, managing water and protecting land to prevent floods, and the forest fires as one of the main drivers of forest degradation. Accordingly, the risks were mapped in context to the National Forest Inventory which was then chosen as a subject of audit, with focus on the identified risks.

Therefore, the audit was carried out on the activities of the Forest Resources Management Division, Forests Protection and Enforcement Division and Watershed Management Division under the Department of Forests and Park Services. Amongst others, the activities of the Divisions related to the national forest inventory, watershed management and forest fires were reviewed in perspectives to the sustainable management of forests in Bhutan.

Methodology

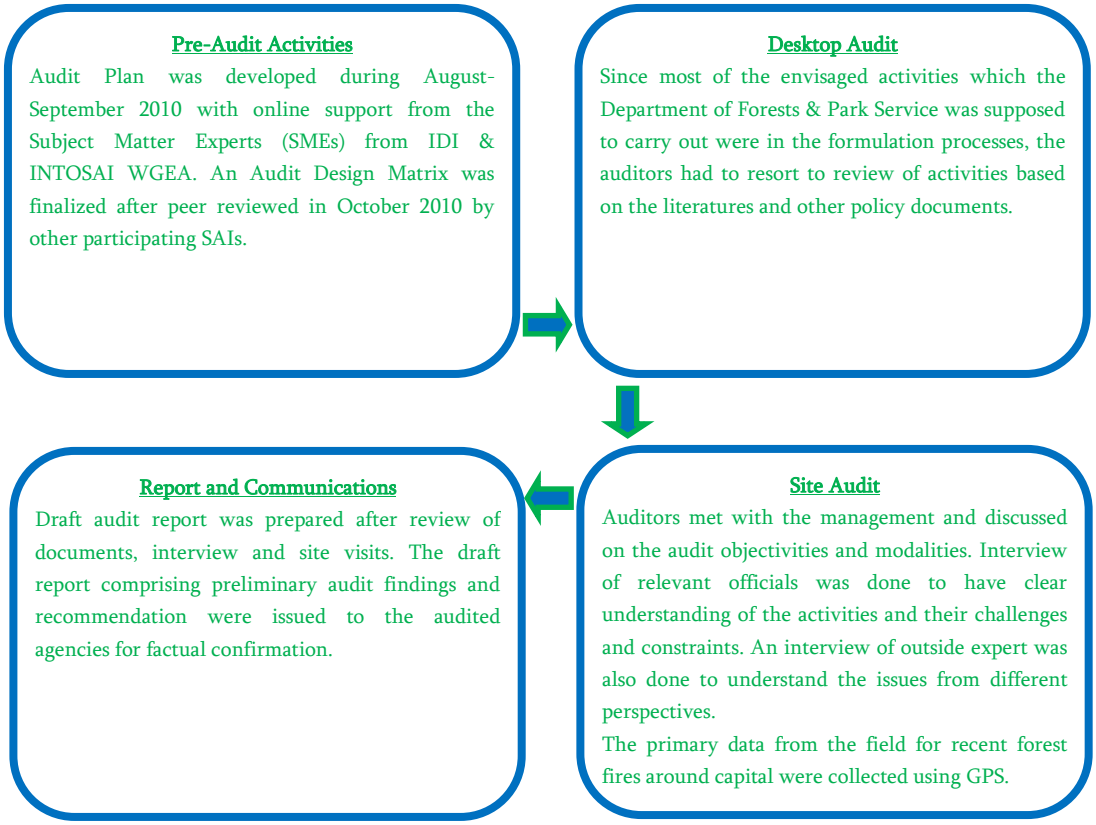
As the national forest inventory of Bhutan is still in its infancy stage of development, the audit team reviewed its adequacy based on document review. The team engaged various methodologies in order to obtain and gather information, analyze data gathered and draw conclusions. The team interviewed many of the department's officials, experts on forests and related issues to gather

opinions of the management and experts. The literatures, policy documents and studies carried out by individuals and professional bodies were reviewed to garner insights and information regarding sustainable management of forests.

The team also gathered primary data, especially on areas destroyed by recent forest fires around the capital to corroborate the findings on forest fires. For the purpose, GPS and GIS were used to collect and analyse data. Primarily due to lack of information and records, the team resorted for audit procedures mainly on interviews and literature review of secondary data, and physical observation, wherever applicable.

Study Design

The audit was conducted based on the Audit Design Matrix (refer Appendix II) prepared during the audit planning stage. The complete cycle of the audit is summarized in four phases as below:



Appendix III

AUDIT DESIGN MATRIX

Name of SAI: Royal Audit Authority, Bhutan

Audit Topic: National Forest Inventory

Researchable Question (s) (RQ)	Sub Researchable Question (s) (SRQ)	Audit Criteria	Audit Evidence (information Required and Sources)	Audit Methodology	Limitation	What This Analysis Will Likely Allow Auditors to Say
1	2	3	4	5	6	7
1. To assess whether the Department has maintained the forest inventory as per type of vegetation, growing stock, description of stands, etc.						
1.1 Does the Department maintain the forest inventory?	1.1.1 Does the Department maintain the forest inventory as per type of vegetation, growing stock, description of stands, etc.?	1.1.1.1 Area of forest and other wooded land during certain period should be classified according to forest and vegetation type, ownership structure, age structure and origin of forest. 1.1.1.2 Total volume of the growing stock, mean volume of the growing stock and age structure/diameter distribution on forest land during certain period should be classified according to forest and vegetation type, site classes, ownership structure and origin of forest. 1.1.1.3 The Department should prepare management plan for each type of forestry inventory.	a. State of forest reports produced by IDS. *(Source: Annual Forestry Statistics, IDS, FRMD)* b. Management Plan.	**a. Data Collection:** 1.1.1.1 Collect state of forest report from Inventory and Data Section (IDS), FRMD; 1.1.1.2 Ask the Department if all of the type of forestry (private, community, FMUs, protected areas, others) have the detail inventory of growing stock, description of stands, etc.; 1.1.1.3 Obtain digitized map for each classification of forestry from GIS Section, FRMD; 1.1.1.4 Obtain the management plan for each type of forestry; 1.1.1.5 Obtain annual forestry statistics booklet from Forest Information Management System, FRMD. 1.1.1.6 Using GPS, select sample data from FMUs to see the reported inventory in particular location. **b. Data Analysis:** • Examine the management plan of FMUs to see the detail description of inventory. • Compare the information provided by the audited agencies with the data gathered by using GPS from the field.	**Data Reliability:** • The information may not be readily available, and the data provided may be obsolete. • The possibility of drawing wrong conclusion while comparing the data provided by the audited agency with our own output (GPS/GIS).	• We can conclude whether the detail inventory showing growing stock, description of stands, age of stands, health of forest, etc. is maintained or not. • If detail inventory is not maintained, it will allow us to recommend for such measures for prudent forest management. • If maintained, we can present digitized map of each type of inventory. • We can conclude the extent of correctness of the information on the inventories provided by the audited agency.

Researchable Question (s) (RQ)	Sub Researchable Question (s) (SRQ)	Audit Criteria	Audit Evidence (information Required and Sources)	Audit Methodology	Limitation	What This Analysis Will Likely Allow Auditors to Say
1	2	3	4	5	6	7
	1.1.2 Is the national forest inventory carried out regularly to collect data on the current status of forest resources?	1.1.2.1 Area of forest and other wooded land during certain period should be classified according to forest and vegetation type, ownership structure, age structure, origin of forest, etc. 1.1.2.2 Total volume of the growing stock, mean volume of the growing stock and age structure/diameter distribution on forest land during certain period should be classified according to forest and vegetation type, site classes, ownership structure, origin of forest etc. 1.1.2.3 IDS should produce state of forest reports including land use and monitoring changes. 1.1.2.4 National forest inventory (NFI) should be carried out and updated periodically to enhance knowledge about the overall forest resources, biodiversity and ecosystem health across the country and to guide strategic investment and decisions. 1.1.2.5 There should be flexible provisions for such inventories to include information not previously	a. State of forest reports produced by IDS. ***(Source: Annual Forestry Statistics, IDS, FRMD)*** b. Annual Forestry statistics booklet.	**a. Data Collection:** 1.1.2.1 Collect state of forest report from Inventory and Data Section, FRMD; 1.1.2.2 Obtain annual forestry statistics booklet from Forest Information Management System, FRMD. **b. Data Analysis:** • Examine if the inventory is carried out regularly and accordingly updated.	**Data Reliability:** • The information may not be readily available, and the data provided may be obsolete.	• We can conclude whether the detail inventory is carried out regularly and accordingly updated. • If detail inventory is not carried out regularly, it will allow us to recommend measures to institute for conducting periodic inventory.

Researchable Question (s) (RQ)	Sub Researchable Question (s) (SRQ)	Audit Criteria	Audit Evidence (information Required and Sources)	Audit Methodology	Limitation	What This Analysis Will Likely Allow Auditors to Say
1	2	3	4	5	6	7
		covered.				
	1.1.3 Does the Department carry out monitoring and supervision?	1.1.3.1 IDS should produce state of forest reports including land use and monitoring changes. 1.1.3.2 IDS should conduct periodical field checks for quality and quantity control of FMU inventory.	a. Monitoring and Supervision Report. ***(Source: Annual Forestry Statistics, IDS, FRMD)*** b. State of forest report.	**a. Data Collection:** 1.1.3.1 Collect state of forest report from Inventory and Data Section, FRMD; 1.1.3.2 Monitoring and Supervision Report will be obtained from FRMD. **b. Data Analysis:** • Examine the Reports to see whether the proper monitoring and supervision activities were carried out and the actions taken for any reported deficiency.	**Data Reliability:** • The information may not be readily available, and the data provided may be obsolete.	•We can conclude whether the Department conducts monitoring and supervision or not.
1.2 What is the proportionate area coverage of private forestry, community forestry, forest management units, protected areas and others?		1.2.1.1 The GRF should be at least 60% of the total area of Bhutan. ***(Source: Constitution of the Kingdom of Bhutan)*** 1.2.1.2 There should be a management plan for each type of forestry. ***(Source: Forest Management Code of Bhutan(FMCB)***	• Statistics on area coverage of private forestry, community forestry, forest management units, protected areas and others and digitized map (IDS). ***(Source: Annual Forestry Statistics, FRMD)*** • Management Plan for each type of forestry ***(Source: Department of Forestry & Park Services)***	**a. Data Collection:** 1.2.1.1 Collect statistics on area coverage of each type of forestry from Inventory and Data Section (IDS), FRMD; 1.2.1.2 Digitize map for each type of forestry will be obtained from GIS Section, FRMD; 1.2.1.3 Forest boundary demarcation for the entire country will be obtained from Demarcation Section, FRMD; 1.2.1.4 Obtain annual forestry statistics booklet from Forest Information Management System, FRMD. 1.2.1.5 Obtain management plan for each type of forestry from concerned division. **b. Data Analysis:** • We will compute actual and percentage coverage of each type of forestry that constitute GRF.	**Data Reliability:** • The information may not be readily available, and the data provided may be obsolete. • The audited agencies may be reluctant to provide data and information because of its confidentiality.	• We can conclude what proportion of each type of forestry constitutes GRF. • We can present digitize map of each type of forestry. • We can conclude the extent of meeting the constitutional requirement of 60% of forest coverage. • We will be able to say whether there is a separate management plan for each type of forestry.

Researchable Question (s) (RQ)	Sub Researchable Question (s) (SRQ)	Audit Criteria	Audit Evidence (information Required and Sources)	Audit Methodology	Limitation	What This Analysis Will Likely Allow Auditors to Say
1	2	3	4	5	6	7
				• Find out if management plans is prepared in accordance with the accepted norms of environmental concerns		
2. To understand the adequacy and effectiveness of strategies implemented by the Department to manage forest fires and destruction of water quality risks.						
2.1 Did the Department develop a National Fire Management Strategy?	2.1.1 What are the prevention measures for forest fires instituted by the Department?	2.1.1.1 Forest Fires Management Section (FFMS), FPED should develop a National Fire Management Strategy. 2.1.1.2 FFMS should organize pre-fire related activities like awareness programmes, linkages with stakeholders, etc. 2.1.1.3 Department should have adequate resources like fire fighting equipments/ gears, transportation and communication facilities, etc. 2.1.1.4 FFMS should impart training programmes for field staffs and relevant stakeholders especially on fire combating, prevention and control. (backstopping – Fire Fighting Training manual – TOT) 2.1.1.5 Guidelines – orchard debris	a. National Forest Fire Management Strategy **(Source: FFMS, FPED)** b. Records on pre-fire related activities like awareness programmes, linkages with stakeholders, etc. and the statement for expenditures incurred **(Source: FFMS, FPED)**. c. Inventory of fire fighting equipments/gears, transportation and communication facilities, etc. **(Source: FFMS, FPED)**	**a. Data Collection:** 2.1.1.1 Obtain document on National Forest Fire Management Strategy from FFMS; 2.1.1.2 Obtain records on pre-fire related activities like awareness programmes, linkages with stakeholders, etc. and the statement for expenditures incurred from FFMS; 2.1.1.3 Obtain inventory of fire fighting equipments/gears, transportation and communication facilities, etc. from FFMS; 2.1.1.4 Visit site of most prone area of forest fires and interview concerned officials and community. **b. Data Analysis:** • Find out if National Forest Management Strategy is implementable, and it has lead to reduction in incidence of forest fires. • Acknowledge any pre-related activities to prevent forest fires. • Check the adequacy of forest fires equipments/gears.	**Data Reliability:** The information may not be readily available, and the information provided may be obsolete data.	• We can say whether the Department has prepared a Forest Fires Management Strategy. • We can say whether the Department conducts any pre-fire related activities for prevention. • We can also comment on the adequacy/suitability of the fire-fighting equipments/gears. • We can say whether the Department imparts any training programmes for field staffs and relevant stakeholders.

Appendix III

Researchable Question (s) (RQ)	Sub Researchable Question (s) (SRQ)	Audit Criteria	Audit Evidence (information Required and Sources)	Audit Methodology	Limitation	What This Analysis Will Likely Allow Auditors to Say
1	2	3	4	5	6	7
	2.1.2 What are the combating and controlling strategies of forest fires?	2.1.2.1 FFMS should coordinate fire combating during incidences and mobilizing resources like man power and equipments.	a. National Forest Fire Management Strategy **(Source: FFMS, FPED)**	**a. Data Collection:** 2.1.2.1 FFMS should coordinate fire combating during incidences and mobilizing resources like man power, equipments, etc. 2.1.2.2 Obtain document on National Forest Fire Management Strategy from FFMS; **b. Data Analysis:** • We will review National Forest Fire Management Strategy to see its effectiveness.	**Data Reliability:** The information may not be readily available, and the information provided may be obsolete data.	• We can say whether the Forest Fires Management Strategy was prepared in consideration of vegetation and incidence of fires. • We can also establish the reasons for forest fires and ineffectiveness of mitigating strategies.
	2.1.3 Does the Department maintain the data on incidence of forest fires area-wise?	2.1.3.1 FFMS should maintain and analyze data on forest fire of the country and propose appropriate measures to minimize forest fires incidences.	a. Area-wise data on incidence of forest fires **(Source: FFMS, FPED)**	**a. Data Collection:** 2.1.3.1 Obtain area-wise data on incidence of forest fires from FFMS; 2.1.3.2 Obtain map from the FFMS indicating forest fires risky zone. 2.1.3.3 Visit site of most prone area of forest fires and interview concerned officials and community. **b. Data Analysis:** • We will check the data on incidence of fires in the country, and ensure that fire mitigating strategies is concentrated on fire prone areas.	**Data Reliability:** The information may not be readily available, and the information provided may be obsolete data.	• We can assess the effectiveness of the mitigating strategies through decrease in incidence of fires. • We can recommend mitigating strategies to be more focused on forest fires prone zone and according to vegetation type. • We can present data on incidence of fires district-wise, and also a map indicating forest fires risky zone.
2.2 Does the Department plan, coordinate and monitor nation-wide watershed management	2.2.1 Does the Department assess watershed area and classify it in terms of vulnerability and criticality.	2.2.1.1 WMD should plan, coordinate and monitor nation-wide watershed management activities; 2.2.1.2 WMD should assess watershed area and classify it in terms of vulnerability and criticality; and	a. Reports on watershed assessment and classification in terms of vulnerability and criticality. b. Management Plan of	**a. Data Collection:** 2.2.1.1. Obtain reports on watershed assessment and classification of national watershed from WMD; 2.2.1.2. Obtain map of critical and vulnerable watershed area from WMD; and 2.2.1.3. Visit site of vulnerable and	**Data Reliability:** The information may not be readily available, and the information provided may be obsolete data.	• We can say whether the Department plan, coordinate and monitor nation-wide watershed management activities through proper and effective management plan – concentrating the activities towards more vulnerable and critical watershed area.

Researchable Question (s) (RQ)	Sub Researchable Question (s) (SRQ)	Audit Criteria	Audit Evidence (information Required and Sources)	Audit Methodology	Limitation	What This Analysis Will Likely Allow Auditors to Say
1	2	3	4	5	6	7
activities?		2.2.1.3 WMD should update watershed inventory within a national watershed database.	vulnerable and critical watershed area. **(Source: WMD)** c. Map of watershed area **(Source: WMD)**	critical watershed area and interview concerned officials and community. **b. Data Analysis:** • We will check the reports on watershed assessment and classification to ensure it is prepared as required. • We will check the watershed inventory to assess whether the mitigating strategies are more focused on critical and vulnerable areas.		•We can present data on critical and vulnerable watershed area and also a map indicating forest vulnerable zone. • We can say whether the Department maintains and update watershed inventory within national watershed database. •We can recommend mitigating strategies to be more focused on critical and vulnerable watershed area.
	2.2.2 Does the Department prepare best practice guidelines for participatory, consultative and integrated planning & implementation approaches related to watershed management?	2.2.2.1 WMD should prepare best practice guidelines for participatory, consultative and integrated planning and implementation approaches related to watershed management.	a. Guidelines for watershed management**(Source: WMD)**	**a. Data Collection:** 2.2.2.1 Obtain guidelines for watershed management from WMD. **b. Data Analysis:** • We will review the guidelines and see its implementation status.		•We can say whether the required guidelines are prepared or not. • We can also establish the status of implementation of the guidelines, and recommend measures to improve.
	2.2.3 Does the Department conduct gap analysis of watershed management activities on a regular basis?	2.2.3.1 WMD should conduct gap analysis of watershed management activities on a regular basis.	a. Gap analysis report of watershed management activities **(Source: WMD)**	**a. Data Collection:** 2.2.3.1 Obtain gap analysis report from WMD. **b. Data Analysis:** • We will review the gap analysis report and check the adequacy of remedial action taken to protect watershed area.		• We can say whether the required gap analysis report is prepared or not. • We can report on the performance of any watershed program. • We can also recommend measures to improve the reported gap.
	2.2.4 Does the Department monitor & evaluate performance of watershed	2.2.4.1 WMD should monitor and evaluate performance of watershed program.	a. Monitoring & Evaluation (M&E) report **(Source: WMD)**	**a. Data Collection:** 2.2.4.1 Obtain M&E report from WMD. **b. Data Analysis:** • We will review the M&E report and		• We can conclude whether the Department's monitors and evaluates on the performance of watershed management programme.

Appendix III

Researchable Question (s) (RQ)	Sub Researchable Question (s) (SRQ)	Audit Criteria	Audit Evidence (information Required and Sources)	Audit Methodology	Limitation	What This Analysis Will Likely Allow Auditors to Say
1	2	3	4	5	6	7
	program?			evaluate performance of watershed program.		
	2.2.5 Were the operations of watershed management area done as per the management plan?	2.2.5.1 WMD should report to the Ministry on the progress and achievement on watershed management objectives.	a. Progress report submitted to the Ministry **(Source: Progress Report, WMD)**	**a. Data Collection:** 2.2.5.1 Obtain progress report on the achievement of the watershed management objectives; 2.2.5.2 Visit critical and vulnerable watershed area site. **b. Data Analysis:** • Compare the management plans with actual site conditions, and determine reasons for deviation, if any.		• We would know the extent of implementation of management plans, and the reasons for non-conformity to the plans, if any. • We can establish on the progress of watershed management objectives.

Prepared By: *Tashi Tobgay (Team Leader)*
Tashi Lhamo (Team Member)
Tenzin Chhoedup (Team Member)
Chimé Dorji (Team Member)

Approved By:

Hon'ble Auditor General of Bhutan
Royal Audit Authority

Appendix IV

List of Protected Areas and Biological Corridors in Bhutan:

Sl. No.	Protected Areas	Notification Year	Gazettement	Dzongkhags	Total Area (Sq. Km)
1	Wangchuck Centennial Park	2008	2008	Gasa, Wangdue, Bumthang, Trongsa & Lhuntse	4914.00
2	Jigme Dorji National Park	1993	1995	Punakha, Gasa, Thimphu, Paro	4316.00
3	Jigme Singye Wangchuck National Park	1993	1995	Trongsa, Wangdue, Sarpang, Tsirang & Zhemgang	1730.00
4	Royal Manas National Park	1993	1995	Sarpang, Zhemgang	1057.00
5	Thrumshingla National Park	1993	1999	Bumthang, Lhuntse, Monggar & Zhemgang	905.05
6	Sakten Wildlife Sanctuary	1993		Trashigang, Samdrup Jongkhar	740.60
7	Bomdelling Wildlife Sanctuary	1993	1995	Trashi Yangtse, Lhuntse & Monggar	1520.61
8	Phibsoo Wildlife Sanctuary	1993		Sarpang, Dagana	268.93
9	Khaling Wildlife Sanctuary	1993		Samdrup Jongkhar	334.73
10	Toorsa Strict Nature Reserve	1993		Haa	609.51
11	Biological Corridors	1999	Oct 1999	Haa, Paro, Thimphu, Punakha, Wangdue, Sarpang, Tsirang, Trongsa, Zhemgang, Bumthang, Monggar, Lhuntse, Trashigang, Samdrup Jongkhar	3307.14
12	Others – Botanical Park, Lamperi	2004	2004		47.00

Percentage covered by Protected Areas	42.71
Percentage covered by Biological Corridors	8.61
Percentage of Conservation Areas	0.12
Total percent of Protected Areas & Biological Corridors	**51.44**

Forest Management Units & Working Schemes 2011

List of Forest Management Units:

Sl. No.	Name of Forest Management Units	Dzongkhag	Area (Ha)	Area (Sq. Km.)
1	Rongmanchu FMU	Lhuntse	6403.007286	64.030073
2	Chendebji FMU	Trongsa	9704.132555	97.041326
3	Korila FMU	Monggar	13835.532841	138.355328
4	Bitekha FMU	Haa	7350.121833	73.501218
5	Gogona FMU	Wangduephodrang	7852.495576	78.524956
6	Wangdigang FMU	Zhemgang	9333.86086	93.338609
7	Haa-East FMU	Haa	7122.095358	71.220954
8	Chamgang-Helela FMU	Thimphu	4696.176828	46.961768
9	Gidakom FMU	Thimphu	10948.477543	109.484775
10	Paro-Zonglela FMU	Paro	16152.176698	161.521767
11	Dongdi Chu FMU	Trashi Yangtse	4814.169662	48.141697
12	Dawathang FMU	Bumthang	17534.547475	175.345475
13	Khotokha FMU	Wangduephodrang	9377.306874	93.773069
14	Khaling-Kharungla FMU	Trashigang	10077.99797	100.77998
15	Karshong FMU	Bumthang	4693.598444	46.935984
16	Lingmethang FMU	Monggar	10567.671423	105.676714
17	Lonchu FMU		12568.247687	125.682477

Note: *FMU is a geographic area of Government Reserved Forest designated for scientific Management.*

List of Working Schemes:

Sl. No.	Name of Working Scheme	Dzongkhag	Area (Ha)	Area (Sq. Km.)
1	Malaya Working Scheme	Zhemgang	585.369931	5.853699
2	Kikhar Working Scheme	Zhemgang	2461.199192	24.611992
3	Tseza Working Scheme	Dagana	2266.154425	22.661544
4	Uruk Working Scheme	Bumthang	281.171822	2.811718
5	Zangling Working Scheme	Bumthang	508.580383	5.085804

Appendix VI

List of Community Forests:

Sl. No.	Name of CF	Dzongkhag	Gewog	Total CF Area	Approval Date/Year
1	Dozam (II plan)	Mongar	Drametse	300	1996
2	Dagor Phenday	Pemagetshel	Shumar	64	2009
3	Yakpugang	Mongar	Mongar	260	2001
4	Ngangney	Lhuentse	Jarrey	10	2002
5	Dongdongma	Pemagetshel	Dungmin	27.8	2008
6	Namtongphu	Trashiyangtse	Jamkhar	13	2002
7	Masangdaza	Mongar	Saling	87	2002
8	Joensham Lamdoksa	Trashigang	Khaling	132	2002
9	Ompuri	Samdrupjongkhar	Orong	98	2003
10	Merculing	Lhuentse	Gangzur	71	2003
11	Tshokpethang	Lhuentse	Menbee	48	2003
12	Lekcha	Lhuentse	Khoma	18	2003
13	Tsapay	Haa	Usue	95	2003
14	Shambayung	Bumthang	Tang	46	2003
15	Siptangzur	Bumthang	Ura	75	2003
16	Gakey	Lhuentse	Jarrey	58	2004
17	Lobneykha	Chukha	Chapcha	195	2004
18	Willing	Trongsa	Nubi	29.52	2004
19	Tshangkha	Trongsa	Tshangkha	42.54	2004
20	Norzin Choling	Zhemgang	Ngala	105.4	2004
21	Yoesel Pelri	Zhemgang	Nangkhor	42.91	2004
22	Pipla management plan	Zhemgang	Nangkhor	38.28	2004
23	Lamjithang	Wangdue Phodrang	Tshedtsho	240	2004
24	Dunglkarling	Sarpang	Bhur	115	2004
25	Zhasela	Lhuentse	Menji	33.48	2005
26	Chalibadeb	Lhuentse	Tshengkhar	26.8	2005
27	Woku Damchi	Punakha	Kabjisa	75.5	2005
28	Lumsum	Punakha	Limbukha	60	2005
29	Yargay	Punakha	Limbukha	15	2005
30	Mangi Zingkha	Punakha	Talo	41.34	2005
31	Khubji	Punakha	Shangana	21.3	2005
32	Norbuling	Trashigang	Bartsham	47.5	2006
33	Samdrup	Tsirang	Patale	528.64	2006
34	Bali	Punakha	Chubu	37.6	2006
35	Sangtseree	Zhemgang	Phangkhar	14.76	2006
36	Masepokto	Wangdue Phodrang	Gase Tsho-Gom	21	2006
37	Kumbu	Wangdue Phodrang	Gangtey	43	2006
38	Tshang chhu	Sarpang	Jigmecholing	44	2006
39	Bepam	Trashigang	Udzorong	317.25	2007
40	Chirata	Samdrupjongkhar	Lauri	1455	2007

Sl. No.	Name of CF	Dzongkhag	Gewog	Total CF Area	Approval Date/Year
41	Shashangphola	Trashiyangtse	Khamdang	9.48	2007
42	Wamanang	Trashiyangtse	Bumdeling	321.4	2007
43	Yemina	Gasa	Khamey	72	2007
44	Tsentog	Paro	tsento	87.25	2007
45	Gongpheling	Tsirang	Tsirang toe	77	2007
46	Tashi Phuntshog-Jong	Punakha	Guma	60.82	2007
47	Kuenphen	Punakha	Tewang	55.64	2007
48	Serigang	Punakha	Kabjisa	22.5	2007
49	Tsephu	Punakha	Tewang	35	2007
50	Puensum	Punakha	Talo	106.7	2007
51	Thoenkey	Punakha	Limbukha	90.4	2007
52	Samcholing	Trongsa	Drakteng	632	2007
53	Monpa CF for cane & bamboo	Trongsa	Langthel	599	2007
54	Bjoka Gongphel Tserzo Tshogpa	Zhemgang	Bjoka	636	2007
55	Ganju	Wangdue Phodrang	Nyesho	20	2007
56	Lhekhebji	Wangdue Phodrang	Kashi	25.9	2007
57	Buruk	Samtse	Dorokha	33.6	2007
58	Khariphu Rigsum	Thimphu	Mewang	103	2008
59	Kirney	Samtse	Changmari	85	2008
60	Pangshing	Bumthang	Tang	38.36	2008
61	Tashi Wangchey	Thimphu	Geney	55.4	2008
62	Zanglungkha	Thimphu	Geney	83.12	2008
63	Gayzor	Pemagetshel	Zobel	70	2001
64	Kuencham	Punakha	Kabjisa	36	2008
65	Bumpaling	Sarpang	Dekiling	136	2008
66	Phuensum	Tsirang	Kikhorthang	293	2008
67	Jonphu Tashi Yoebar	Trashigang	Phongmey	230	2008
68	Udzorong	Trashigang	Udzorong	450	2008
69	Dumsidara	Samtse	Pagli	54.38	2008
70	Dzongthung Phendeyling	Trashigang	Bartsham	63.8	2008
71	Urphu	Trashigang	Radhi	170	2008
72	Khawar Jingzhi Sungchop	Pemagetshel	Khar	158	2009
73	Nanglam pipla management plan	Pemagetshel	Norbugang,Dechenling & Chorkhorling	299	2008
74	Jeri Dorjiling	Trashigang	Khaling	90	2008
75	Sharmidung	Trashigang	Radhi	30.16	2008
76	Tsimakha Phunsum Tshokpa	Chukha	Bjabcho	57	2008
77	Gyelwaringa	Chukha	Bjabcho	235	2008
78	Nagor CF for cane & yula	Mongar	Silambi	130.7	2008
79	Wamakhar CF	Mongar	Chali	235	2008
80	Yuelsum	Tsirang	Shamjong	53.2	2008
81	Yarkey	Tsirang	Beteni	128	2008

Appendix VI

Sl. No.	Name of CF	Dzongkhag	Gewog	Total CF Area	Approval Date/Year
82	Norbugang	Tsirang	Dunglagang	96.6	2008
83	Sungchop CF	Tsirang	Rangthangling	80.2	2008
84	Phentog	Punakha	Limbukha	66.15	2008
85	Dadogoenpa CF	Punakha	Shelingana	46.7	2008
86	Shari	Haa	Samar	125	2008
87	Shingyer Phuensum	Bumthang	Ura	87.87	2008
88	Pakpay	Samtse	Tendu	62.72	2008
89	RangzhenKuenhen	Gasa	Khatoe	102.18	2008
90	Tsekakha	Punakha	Dzomi	59.53	2008
91	Kuenga Jamtsho	Chukha	Chapcha	92.5	2008
92	Nemjo	Paro	Lungyni	280	2008
93	Jaba Lingshi	Paro	Naja	70.8	2008
94	Dagophu	Paro	Lamgong	84	2008
95	Chubjakha	Paro	Hungrel	195.5	2008
96	Mangkong	Lhuentse	Dungkar	41.2	2008
97	Lakhu	Punakha	Guma	88.8	2008
98	Samdrup Choling	Sarpang	Umling	42.8	2008
99	Phadi Shongru	Trashiyangtse	Ramjar	91.3	2008
100	Lhaling	Sarpang	Hilley	75.5	2008
101	Aaja (Illicium Griffithi)	Mongar	Sherimung	408.59	2008
102	Phenden	Trashigang	Bidung	38	2008
103	Lunsegang	Tsirang	Tsholingkhar	59.5	2008
104	Lentshongree	Trashiyangtse	Tomijangsa	64.76	2008
105	Singkemaney	Trashiyangtse	Yallang	97.4	2008
106	Jachungcholing	Trashigang	Kangpara	100	2008
107	Phuensum	Mongar	Drameste	757.7	2008
108	Pendeling	Paro	Wangchang	160	2008
109	Mongnangkhola	Trashigang	Khaling	105	2008
110	Thongphu	Trashigang	Galling	106	2008
111	Thunglam	Dagana	Tshangkha	110.5	2008
112	Choekhor	Thimphu	Kawang	44.74	2008
113	Wongbaab	Punakha	Limbu	112.7	2008
114	Pagli "C"	Samtse	Pagli	23.4	2008
115	Chuzagang	Sarpang	Chuzagang	30.35	2008
116	Gyensa	Haa	Bjee	29	2008
117	Yangthang	Haa	Bjee	135	2008
118	Geney	Thimphu	Geney	857.5	2008
119	Sarcha	Chukha	Chapcha	58.9	2009
120	Gongphel Nagtshel	Chukha	Chapcha	0	2009
121	Majuwa	Samtse	Ugentse	33	2009
122	Tabug Yargay	Lhuentse	Menbi	52.7	2009

Sl. No.	Name of CF	Dzongkhag	Gewog	Total CF Area	Approval Date/Year
123	Baeyul	Chukha	Chapcha	23	2009
124	Tamshing	Bumthang	Chokhor	58.15	2009
125	Botaykharka	Samtse	Ugentse	46	2009
126	Galing Drongdey	Zhemgang	Ngala	84.14	2009
127	Genrab Chituen	Gasa	Khamae	54.89	2009
128	Samdrupcholing	Chukha	Bongo	31.7	2009
129	Phrub	Haa	Esue	61.09	2009
130	Tag-Drong Kib Puensum	Haa	Esue	82	2009
131	Batsho	Haa	Esue	31.41	2009
132	Gyelgong Tserzo	Mongar	Silambi	254	2009
133	Dogsel	Wangdue Phodrang	Phobjikha	74.86	2009
134	Bulkey	Tsirang	Beteni	129.1	2009
135	Jangchubling	Tsirang	Tsholingkhar	63.5	2009
136	Pemaling	Tsirang	Dunglagang	124.8	2009
137	Norbubangzee	Tsirang	Barshong	79.83	2009
138	Tashichholing	Zhemgang	Nangkhor	79.93	2009
139	Rangjung	Pemagetshel	Shumar	56	2008
140	Hongtsho Tashi Pelkhel Drongdey Nagtshel	Thimphu	Chang	59.25	2009
141	Zamzar	Paro	Tsentog	138.3	2009
142	Thuenpa Puenzhi	Dagana	Drujaygang	111.37	2009
143	Phuensum Pelri Drondey Nagtshel	Zhemgang	Nangkhor	50.32	2009
144	Tangsibji	Trongsa	Tangsibji	288.64	2009
145	Nabji	Trongsa	Korphu	117.3	2009
146	Metangzor	Trashigang	Samkhar	68	2009
147	Thongja	Trashigang	Thrimshing	159	2009
148	Drupkhang Choling	Trashigang	Lumang	63	2009
149	Lhasey Tshangkha	Trashigang	bartsham	55	2009
150	Phuensum Phenday	Trashigang	Bidung	28	2009
151	Drupchu Wang	Trashigang	Yangyner	230	2009
152	Kuenzang Choeling	Trashigang	Shongphu	110	2009
153	Kosphu Phendey	Trashigang	Lumang	231	2009
154	Dunkarcholling	Trashigang	Kanglung	288.5	2009
155	Phuenthog Chen	Tsirang	Tsholingkhar	68	2009
156	Phunsumtse	Samdrupjongkhar	Martshala	99	2009
157	Upper Saurani	Chukha	Darla	47.6	2009
158	Mayphu Shekpashing	Samdrupjongkhar	Orong	132	2009
159	Domphu Phendey	Samdrupjongkhar	Deothang	134.9	2009
160	Rekhey Kuenphen	Samdrupjongkhar	Deothang	134.9	2009
161	Tashithang	Sarpang	Umling	45.88	2009
162	Gayser Trashicholinh	Sarpang	Tarathang	115.4	2009
163	Norbugang	Sarpang	Singye	103	2009

Appendix VI

Sl. No.	Name of CF	Dzongkhag	Gewog	Total CF Area	Approval Date/Year
164	Phuentshopelri	Sarpang	Singye	97.48	2009
165	Risumgang	Sarpang	Shompangkha	77.8	2009
166	Hatikharka	Samtse	Biru	56.16	2009
167	Layul	Sarpang	Doban	181.36	2009
168	Dangling	Sarpang	Umling	151.42	2009
169	Rilangthang	Sarpang	Hilley	98	2009
170	Samdrupcholing	Bumthang	Chumey	46.15	2009
171	Phuntsho Pelri	Sarpang	Singye	97.48	2009
172	Darlokha Lakey Phuntsho	Thimphu	Mewang	58	2009
173	Tashiwangyel	Thimphu	Geney	116.45	2009
174	Wangphu Choeling	Trashigang	Phongmey	691	2009
175	Yoezercholing	Trashigang	Khaling	169	2009
176	Longkhar	Trashiyangtse	Bomdeling	123.8	2009
177	Cheng	Trashiyangtse	Bomdeling	95.32	2009
178	Tsendenling	Trashigang	Kangpara	291	2009
179	Pasa Norbuling	Trashigang	Kangpara	182	2009
180	Ngar Pangkarpzur	Lhuentse	Gangzor	47.4	2009
181	Tongling Kuenphen	Lhuentse	Gangzor	36.6	2009
182	Jalang	Lhuentse	Menji	71.4	2009
183	Zhungkhar Yongchab	Lhuentse	Menbi	157.7	2009
184	Mangzhigang	Trashiyangtse	Tomijangsa	104.17	2009
185	Salibagar	Pemagetshel	Shumar	10	2002
186	Sengchiloo Dranam Phandey	Pemagetshel	Yurung	59	2009
187	Tashibee	Zhemgang	Phangkhar	58.89	2009
188	Druk Pegong	Paro	Doteng	288.5	2009
189	Bumilo Kuenohen	Wangdue Phodrang	Sephu	43.76	2009
190	Rangidara	Samtse	Lahareni	45.75	2009
191	Changshingphu	Trashiyangtse	Yallang	45.3	2009
192	Jangshing Zor	Trashiyangtse	Jamkhar	60.72	2009
193	Jomtsang	Trashigang	Udzorong	138	2009
194	Janganma	Trashigang	Phongmey	68	2009
195	Sheti	Samtse	Yoeseltse	83.4	2009
196	Lower Panbari	Samtse	Tading	65.76	2009
197	Janam Janam	Samtse	Samtse	113.74	2009
198	Pakha Gaon	Samtse	Pagli	131.45	2009
199	Namdrupcholing	Bumthang	Chumey	102.43	2009
200	Jangchey Bara	Wangdue Phodrang	Gangtey	108.65	2009
201	Pashigoma-Taina	Mongar	Sherimung	45	2010
202	Baajar	Mongar	Tsamang	120	2010
203	Yumzang Semthun	Trashigang	Sakteng	471	2010
204	Samden	Thimphu	Chang	132.5	2010

Sl. No.	Name of CF	Dzongkhag	Gewog	Total CF Area	Approval Date/Year
205	Tsendendrag	Wangdue Phodrang	Rubesa	113.51	2010
206	Taksha	Wangdue Phodrang	Daga	123.57	2010
207	Dangkhar Drongdhey	Zhemgang	Trong	154.3	2010
208	Ngoba Phensum	Paro	Lamgong	395.95	2010
209	Ugyen Dralo	Paro	Hungrel	40.08	2010
210	Rinchen Norbuling	Zhemgang	Buli	80	2010
211	Rukhubji	Wangdue Phodrang	sephu	114	2010
212	Rubesa	Wangdue Phodrang	rubesa	138	2010
213	Jigme Dorji	Gasa	Khamae	41.34	2010
214	Paniko	Gasa	Khamae	21.3	2010
215	Tshothang	Dagana	Khebisa	240	2010
216	Tashi Thoenkey	Dagana	Tseza	115	2010
217	Saeer tsho	Dagana	Gesarling	33.48	2010
218	Tashidingkha	Wangdue Phodrang	Gasetshogom	28.3	2010
219	Kuenga Duendup	Chukha	Bongo	42.54	2010
220	Chirphen	Tsirang	Mendrelgang	74	2010
221	Khatoe Tashiding	Wangdue Phodrang	Gasetshogom	50.2	2010
222	Pakhagaon	Samtse	Sipsu	28	2010
223	Goendey Kuenzom	Thimphu	Kawang	47.4	2010
224	Kushuchen	Thimphu	Kawang	36.6	2010
225	Kuenley	Punakha	Taewang	135	2010
226	Jarigang	Punakha	Shelngana	857.5	2010
227	Druk Thuenpa	Paro	Dogar	130.7	2010
228	Namchag	Dagana	Trashiding	26.8	2010
229	Khasakha	Thimphu	Mewang	71.4	2010
230	Norjin Pelba CF Plan	Punakha	chubu	58.9	2010
231	Jabtegang CF	wangdue	bjena	84.97	2010
232	Mendrelgang CF	wangdue	bjena	164	2010
233	Nimazor CF Plan	Tsirang	Rangthangling	52	2010
234	Phendaling CF Plan	tsirang	gosaling	107.89	2010
235	Jariphensum CF Plan	Paro	Lungyni	235	2010
236	Rebuktangphu CF Plan	Trashi Yangtse	Jamkhar	10	2010
237	Gawpay CF Plan	Punakha	Kabji	0	2010
238	Phajong CF Plan	Mongar	Gongdue	36	2010
239	Omchu	Tsirang	Sergithang	44	2010
240	Juka Jhelaling	Paro	Dopshari	41	2010
241	Samthang	Wangdue Phodrang	Athang	40.34	2010
242	Tshanglajong Rigsum Gongphel	Zhemgang	Trong	154	2010
243	Serchenmo	Samdrupjongkhar	Wangphu	67.8	2010
244	Lhapang	Bumthang	Tang	50	2010
245	Dechen Kinga Choeling	Bumthang	Ura	87.5	2010
246	Yurung Dranam Phandey	Pemagetshel	Yurung	74	2010

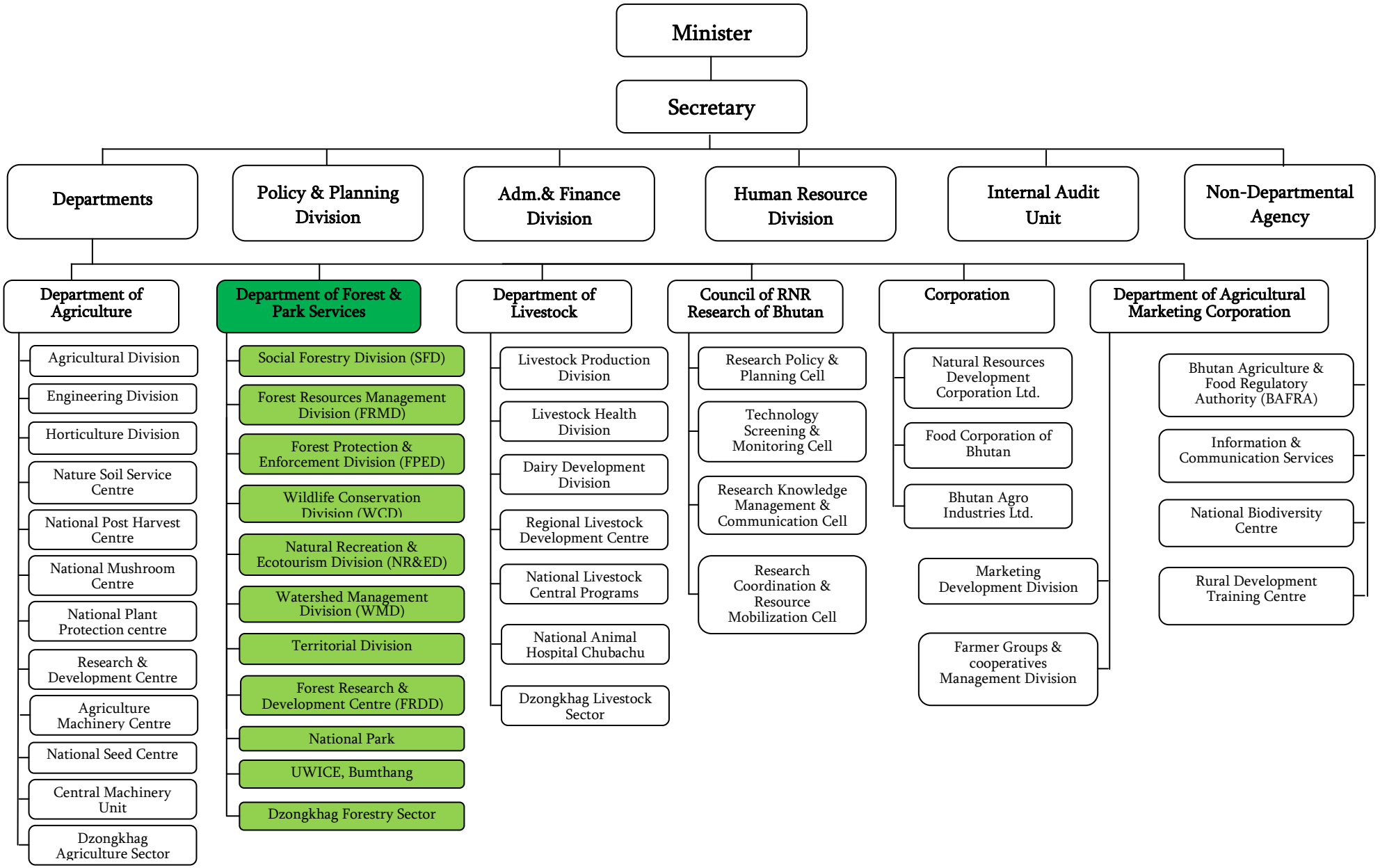
Appendix VI

Sl. No.	Name of CF	Dzongkhag	Gewog	Total CF Area	Approval Date/Year
	Gongphel				
247	Thungo	Pemagetshel	Yurung	52	2010
248	Gella Chithuen	Wangdue Phodrang	Gangtey	107.89	01 Jul 2010
249	Khendong	Samtse	Tendu	44	01 Jul 2010
250	Druk Tshenden	Paro	Wangchang	271.6	01 Jul 2010
251	Dungshipokto	Wangdue Phodrang	Gangtey	46.66	01 Jul 2010
252	Mole Thangkha	Wangdue Phodrang	Gangtey	84.97	01 Jul 2010
253	Aekor-Santana	Wangdue Phodrang	Gangtey	164	01 Jul 2010
254	Dungkarling	Samdrupjongkhar	Phuntshothang	131	01 Jul 2010
255	Ralling	Samdrupjongkhar	Pemathang	85.4	01 Jul 2010
256	Morong Gaden Phuesum	Samdrupjongkhar	Orong	78	01 Jul 2010
257	Khanduphung Gayjung Kuensphen norbuling	Samdrupjongkhar	Serthi	69	01 Jul 2010
258	Rigyel Lhuenpo	Samdrupjongkhar	Martshala	54.13	01 Jul 2010
259	Peltokha	Wangdue Phodrang	Gangtey	63.9	01 Jul 2010
260	Pangthang Kulung Chigtheun	Pemagetshel	Nanong	84	01 Jul 2010
261	Tendrelgang CF	Thimphu	Chang	30	01 Aug 2010
262	Mandi Yerjay	Pemagetshel	Chongshing	73	01 Aug 2010
263	Tongla Puensum	Mongar	Kengkhar	101	01 Aug 2010
264	Korphu Kuencham	Trongsa	Korphu	90	01 Aug 2010
265	Orphung	Mongar	Chaskhar	97.13	01 Aug 2010
266	Norbugang	Pemagatshel	Nganglam	114	01 Aug 2010
267	Gamung Dondey Gongphel	Pemagatshel	Shumar	138	01 Aug 2010
268	Tongthrom Thuendrel	Lhuentse	Metsho	28.3	01 Sep 2010
269	Jampani	Samdrupjongkhar	Langchenphu	50.2	01 Sep 2010
270	Kachu Poenzshu	Thimphu	Dagala	56	01 Oct 2010
271	June Bari	Samtse	Pagli	67.83	01 Oct 2010
272	Dung Tongsho	Wangdue	Gasetshogom	87.64	01 Oct 2010
273	Shingkhey Gaki	Wangdue	Gasetshowom	115	01 Nov 2010
274	Samden	Punakha	Toep	58	01 Nov 2010
275	Menchu	Punakha	Toep	50.12	01 Nov 2010
276	Changray	Trongsa	Drakteng	91	01 No 2010
277	Chella Kuenphen	Trongsa	Nubi	38.87	01 Nov2010
278	Peljum Kuenphen	Paro	Doteng	128.8	01 Nov 2010
279	Terzeo	Bumthang	Chhume	35.34	01 Dec 2010
280	Deo Sahara	Samtse	Chargharey	109	06 Dec 2010
281	Tshachuphu Khateo & Khamey	Punakha	Tewang	76	6th Jan 2011
282	Zomnya	Tsirang	Tsirangteo	326.23	4th Jan 2011
283	Gaseylo	Sarpang	Hilley	39.5	4th Jan 2011
284	Shari Chithuen Gaynen	Paro	Dopshari	197	3rd Jan 2011
285	Dopham	Chukha	Logchina	54	1st Jan 2011

Appendix VI

Sl. No.	Name of CF	Dzongkhag	Gewog	Total CF Area	Approval Date/Year
286	Dungkar Gakey	Mongar	Kengkhar	103	3rd Jan 2011
287	Namji	Paro	Tsentog	109	
288	Ridha	Wangdue Phodrang	Dangchu	82.6	27 Jan 2011
289	Jibdungsa	Wangdue Phodrang	Nyisho	12.92	27 Jan 2011
290	Kuenphen Dhendrup	Wangdue Phodrang	Phangyul	14.7	27 Jan 2011
291	Tshokothangka	Wangdue Phodrang	Nahi	39	02 Feb 2011
292	Busa	Wangdue Phodrang	Sephu	80	02 Feb 2011
293	Peyling-Longtey	Wangdue Phodrang	Sephu	90.83	15 Feb 2011
294	Fita	Samtse	Tendu	4.86	16 Feb 2011
295	Khorsaney	Tsirang	Dunglagang	260.4	01 Apr 2011
296	Sisingnesa	Lhuentse	Tshenkhar	62.7	01 Dec 2010
297	Khangkhu Pendenling	Paro	Wangchang	160	01 Jun 2008
298	Sankama	Mongar	Jurmey	64.4	01 Nov 2009
299	Phendhey Norbuling	Zhemgang	Buli	87	01 Mar 2010
300	Dung Goen	Chukha	Dungna	41.78	01 Aug 2010
301	Sinchula	Chukha	Darla	44.25	01 Aug 2010
302	Namay-Nichu	Paro	Tsentog	114.8	01 Apr 2011
303	Malabasay	Samtse	Samtse	71.83	01 Apr 2011
304	Eusu Phuensum Tshogpi	Wangdue Phodrang	Gangtey	250.13	01 Apr 2011
305	Tashichhoeling	Chukha	Bongo	102	01 May2011
306	Bapzur	Bumthang	Tang	61	01 May2011
307	Singey	Bumthang	Choekhor	141.64	01 May2011
308	Lhaling	Dagana	Kana	60.26	01 May2011
309	Tshenka	Haa	Bjee	52	01 May2011
310	Dorib Yarkyel	Haa	Samar	107	01 May2011
311	Devithan	Tsirang	Rangthaling	124.55	01 May2011
312	Kopchey	Samtse	Biru	55.75	01 Jun 2011
313	Kalingchu	Tsirang	Tsholingkhor	20.64	01 Jun 2011
314	Peljorling	Punakha	Baap	45	01 Jul 2011
315	Nagu	Paro	Naja	41.3	01 Jul 2011

Organizational Chart of Department of Forests & Park Services under the Ministry of Agriculture & Forests



Key Facts about Bhutan

Form of Government	:	Democratic Constitutional Monarchy
Capital	:	Thimphu
Administrative Divisions	:	20 Dzongkhag (Districts) 205 Gewogs (Blocks)
Population	:	638,407 (2009 projected)
Official Language	:	Dzongkha and English
Land Area	:	38,394 sq. km
Forest Cover	:	80.89% (LCMP 2010, including shrubs)
Meadows	:	4.10%
Agricultural Land	:	2.93%
Snow Cover	:	7.44%
Water Bodies	:	0.72%
Marshy Land	:	0.01%
Protected Areas	:	51.44%
Geographic Coordinates	:	27°30' N, 90°30' E
Climate	:	Tropical in southern plains; cool winters and hot summers in central valleys; severe winters and cool summers in the North
Terrain	:	Mostly mountainous with some fertile valleys and savanna
Natural resources	:	Timber, hydropower, gypsum, calcium carbonate
Agriculture - products	:	Rice, corn, root crops, citrus, food grains, dairy products, eggs
Industries	:	Cement, wood products, processed fruits, alcoholic beverages, calcium carbide, tourism
Environment-current issues	:	Soil erosion, forest fires, limited access to potable water
GDP (Current Price, 2009)	:	Nu. 61,223.5 million
Exchange Rates	:	Ngultrum (BTN) per US dollar - 46.70 (01.09.2011)