Participatory Zoning for Sakteng Wildlife Sanctuary

Balancing Conservation and Development Goals

Commemorating International Year of the Forests 2011; *Celebrating forests for people*

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WWF Bhutan and Sakteng Wildlife Sanctuary

With financial assistance from
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FOREWORD

Sakteng Wildlife Sanctuary, located in the far east of the country, is among the most exquisite of Bhutan's protected areas. Here we see a unique blend of rare biological and cultural richness thriving together. Aside from hosting an abundance of flora and fauna species, the park is also home to a rather unusual semi-nomadic community called the *Brokpas*, which depends highly on natural resources for its livelihood. It is also much debated that Sakteng could perhaps be a haven for the famous 'Yeti' or the abominable snowman.

This publication is a result of the successful completion of a project called 'Participatory Zoning in Sakteng Wildlife Sanctuary'. The integrated management zones and tools derived from the project will help achieve the long-term conservation plan of the park.

WWF has long been involved in conservation work in the park since the park's launch in 2003, and this marks yet another milestone achievement. We are grateful to the Critical Ecosystem Partnership Fund for providing us with the required funding support to initiate the project. We would also like to take a moment to acknowledge the efforts of the local communities, park staff and the continuous support of the Department of Forests and Park Services in making this project a success. We hope that this partnership will add another important stepping stone in the path toward environmental and cultural conservation in Bhutan.

Tashi Delek.

Kinzang Namgay
Country Representative
WWF Bhutan

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ROYAL GOVERNMENT OF BHUTAN
Ministry of Agriculture & Forests
Department of Forests & Park Services
Thimphu : Bhutan

FOREWORD

Bhutan has made impressive progress in the field of conservation. We have set aside more than half of our total land area under the Protected Area system. Given the large portion of Protected Area against small total land area, conservation efforts have not been easy. This is because of many issues and challenges facing protected area management, where we have scattered human population within the protected areas. Ever since the inception of protected area management system, we have placed high focus on Integrated Conservation and Development Programmes in National Parks and Wildlife Sanctuaries. This is to ensure people-centered protected area management, unique to our country. To overcome current and emerging challenges facing protected area management, zoning has therefore become a vital tool to divide the areas into management units to facilitate proper and effective management.

Unclear boundaries and lack of management zones lead to *ad hoc* planning of services and resource extraction. With new initiatives in the Parks such as ecotourism, community forestry, CBNRM, etc., zoning has become more necessary. Zoning of management areas will ensure effective management of protected areas and invite relevant stakeholders to partner in conservation. This will also help the much-needed legal basis required for planning, implementing, and monitoring of any activities in the protected areas, which is quite weak as of now. Although the Department issued a Zoning Framework in 2004, it lacked immediate implementation due to lack of technical expertise and budget.

I am extremely pleased to note that Sakteng Wildlife Sanctuary has implemented the long overdue Zonation exercise. I would like to congratulate the staff and commend them for their dedication and hard work in coming up with this report. This will add value to the existing Zonation Framework and encourage its implementation in other Parks.

On behalf of the Department, I would like to thank WWF Bhutan and the Critical Ecosystem Partnership Fund for technically and financially supporting the Zonation Activity in Sakteng Wildlife Sanctuary. Their inputs will go long way in the protected area management and conservation efforts in Bhutan.

Tashi Delek

Karma Dukpa
Director
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Ministry of Agriculture and Forests

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ACKNOWLEDGEMENTS

As zoning was long overdue in Bhutan's protected areas, this report will not only facilitate the proper management of Sakteng Wildlife Sanctuary (SWS) but also help guide future zoning efforts in other protected areas of Bhutan.

The management of SWS is therefore immensely grateful to the Critical Ecosystem Partnership Fund for their financial support.

We would also like to thank WWF Bhutan for continuously supporting us with adequate funds and technical expertise in the field of park management. In particular, we are grateful to: Mr. Kinzang Namgay, Country Representative; Aum Chophel D. Dayang, Director, Finance and Administration; and Mr. Kinley Gyeltshen, GIS Officer, for providing flexibilities in implementation and understanding our field issues.

We would also like to extend our appreciation to: Director, Department of Forests and Park Services; Director, SAARC Forestry Centre; Director, Ugyen Wangchuck Institute for Conservation and Environment (UWICE); and Chief Forestry Officers from the Nature, Recreation and Ecotourism Division (NRED) and Wildlife Conservation Division (WCD), for their constant support and encouragement during zoning planning and implementation. In addition, we are grateful to Mr. Phuntsho, GIS, Forest Resources Development Division (FRDD) for training our field staff which proved vital during the field exercises.

Without the support of Dasho Dzongda, Dasho Dzongrab and the sector heads of Trashigang, together with the Dasho Dungpa, geog administration and communities of Merak and Sakteng, the zoning exercise would not have been possible. Their commitment to supporting conservation activities, and partnering in all activities, has made our field work so much easier.

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1. Executive Summary

Over the last four decades, Bhutan has designated its protected areas based on scientific methods and comprehensive conservation management planning. However, with settlements scattered within and close to these protected areas, conservation efforts have not always been easy. Issues such as pressures on natural resources, human-wildlife conflict, and over-grazing have become common challenges faced by protected area management today.

In most cases, protected area boundaries have not been clearly demarcated and management intervention has not been done through proper zoning. This has led to *ad hoc* planning of services and facilities, and resource extraction often conflicting with conservation goals and rules. Although there is a strong legal basis for planning and implementation of activities, including monitoring, protected areas lack clear approved zones. Zoning will ensure proper planning and implementation of activities in respective management units, and also guarantee effective use of human resources in protected areas.

Sakteng Wildlife Sanctuary (SWS) has a unique assemblage of biological and cultural diversity, and together with pristine mixed conifer forests and alpine diversity, it has the highest diversity of Rhododendron species in the country. In addition to ecological diversity, the villages of Merak and Sakteng are also home to the semi-nomadic *Brokpas* or "men of the pastures". This uniqueness provides an excellent opportunity for SWS to integrate cultural preservation and nature conservation.

The zoning for SWS, developed in consultation with local communities, was based on available background information including: analysis of the significance of SWS, socio-economic and biodiversity surveys, resource use trends and issues, lessons from Bhutan and the world, as well as legislative and policy frameworks, among others.

The overall goal of the zoning is to: *"contribute to ecosystem contiguity, ecological connectivity and ensure species persistence within the Bhutan Biological Conservation Complex, while fulfilling the needs of the resident communities and deriving national benefits from conservation, as well as through the creation of well-defined zones and associated legislation that are ecologically sound, socially acceptable and economically viable."*

This goal will be realized through short-term and medium-term objectives. Various principles, including several non-negotiable principles, and criteria for delineating zones were developed to help guide zone development.

SWS is now divided into four types of zones:

- *Core Zones:* total protection

- *Multiple-use Zone:* sustainable utilization of natural resources
- *Buffer Zone*: extra layer of protection for SWS
- *Recreational (Overlapping) Zone*: tourist potential areas in multiple-use zones and low impact trails and sites in core zones

The process involved preliminary zoning, early stakeholder consultations, field verifications, boundary demarcation and adjustments, boundary pillar installation, and final stakeholder consultations.

The results of the zoning exercise include a revised description of SWS's boundary. Due to the need to consider and accommodate the needs of park residents, the core zones cover only 19.73% (146.08 square kilometres) of the park. Core zones are mostly in the northwest and southwest portions of the park, with core zone demarcation avoided near the international border.

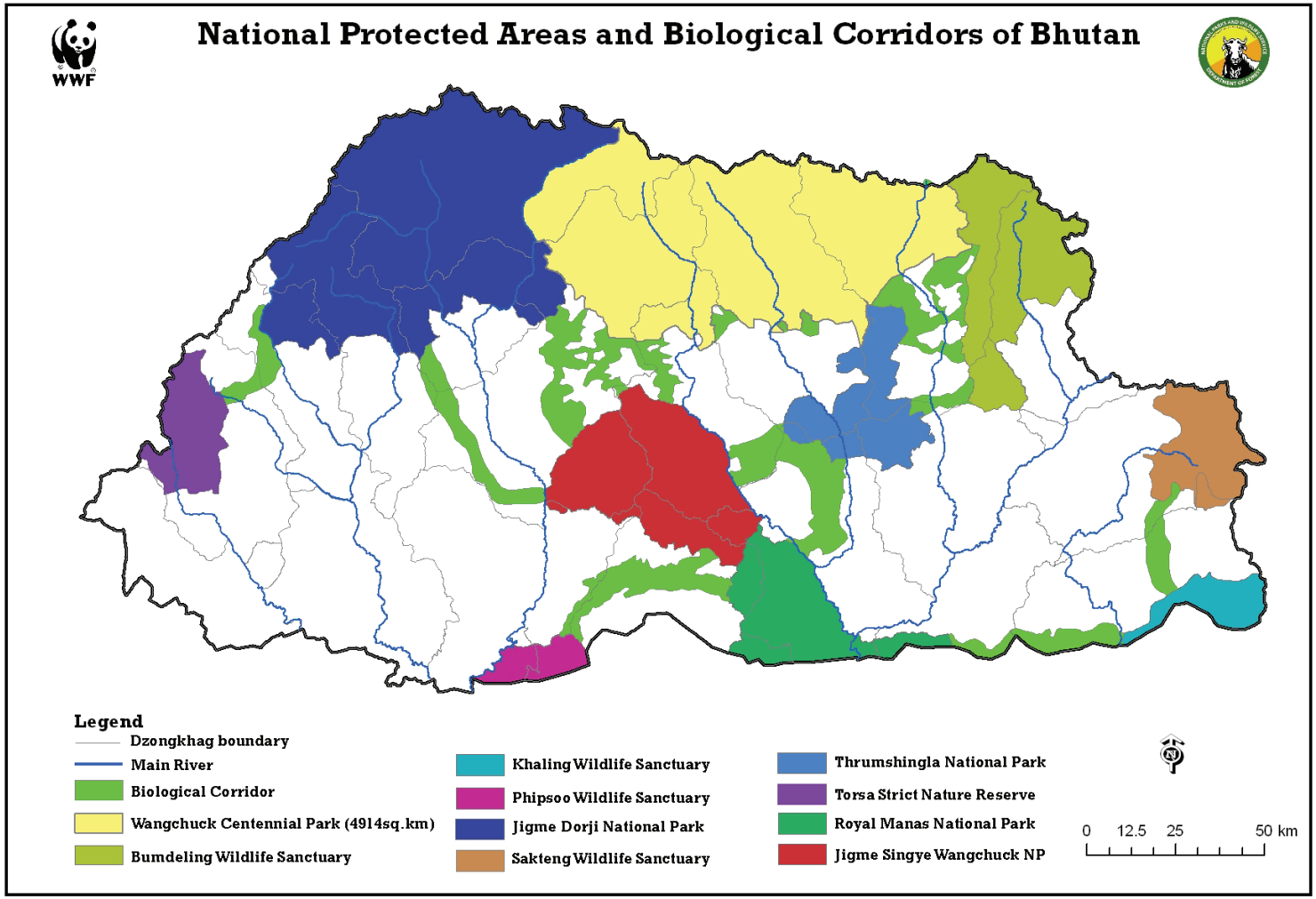
The traditional trails that traverse through core zones have been designated as low impact trails. In total, eight core zones were designated and polygonized into three clusters. Rules and regulations for the zones have been specified, referring to existing legislation, and separate by-laws have been drafted and agreed to by the communities. The resource use areas have been identified, and threats and issues discussed.

The zones are considered dynamic and will be revised over time. Inputs will include new available information through biodiversity surveys, research and other sources of information. More advanced technology and science will lead to better understanding of scientific concepts and the use of powerful tools like GIS and IT, which offer more accurate land-use maps. Policy and legislative changes will also require zoning changes to reflect the changing needs of the government and society. Stakeholder feedback and field data will be essential in revising the zones in the future.

This document recommends different management strategies in each zone. Successful implementation of this zonation plan will depend on adequate human resources and financial support from the Royal Government of Bhutan and donor agencies.

"How complex and unexpected are the checks and relations between organic beings, which have to struggle together in the same country."

Darwin


National Protected Areas and Biological Corridors of Bhutan
WWF
Legend
Dzongkhag boundary
Main River
Biological Corridor
Wangchuck Centennial Park (4914sq.km)
Bumdeling Wildlife Sanctuary
Khaling Wildlife Sanctuary
Phipsoo Wildlife Sanctuary
Jigme Dorji National Park
Sakteng Wildlife Sanctuary
Thrumshingla National Park
Torsa Strict Nature Reserve
Royal Manas National Park
Jigme Singye Wangchuck NP
0 12.5 25 50 km

2. Introduction

Bhutan has developed its system of protected area using comprehensive conservation management planning over the last four decades. The official area of the protected area system, including biological corridors, amounts to 51.32 % of Bhutan's total land cover, while the protected area alone (excluding corridors) stands at an impressive 42.71 % (NCD, 2009). This makes Bhutan the country with the largest portion of protected area in the world (MOA, 2009).

However, with settlements scattered within and close to Bhutan's protected areas, conservation efforts have not always been easy in Bhutan. The country follows a "people-centered" approach in protected areas, and communities within protected areas also enjoy rights and privileges associated with natural resources and land use. Therefore, issues including, but not limited to, pressures on natural resources, human-wildlife conflict, over-grazing, etc. are common challenges faced by protected area management today.

While considerable conservation efforts have attempted to compensate for conservation in parks through Integrated Conservation and Development Programmes (ICDPs), these are mostly project-based. Conservation has often been overtaken by economic interests in the past. In most cases, protected area boundaries have not been clearly demarcated and management intervention has not been done through zoning, which has led to *ad hoc* planning of services and facilities, and resource extraction that often conflicts with conservation goals and rules (NCD, 2009).

Although there is a strong legal basis for planning and implementation of activities, including monitoring, most protected areas lack clear approved zoning. New concepts like ecotourism, non-wood forest products (NWFP) management, and community-based natural resource management are gaining popularity, as the benefits of conservation become more apparent.

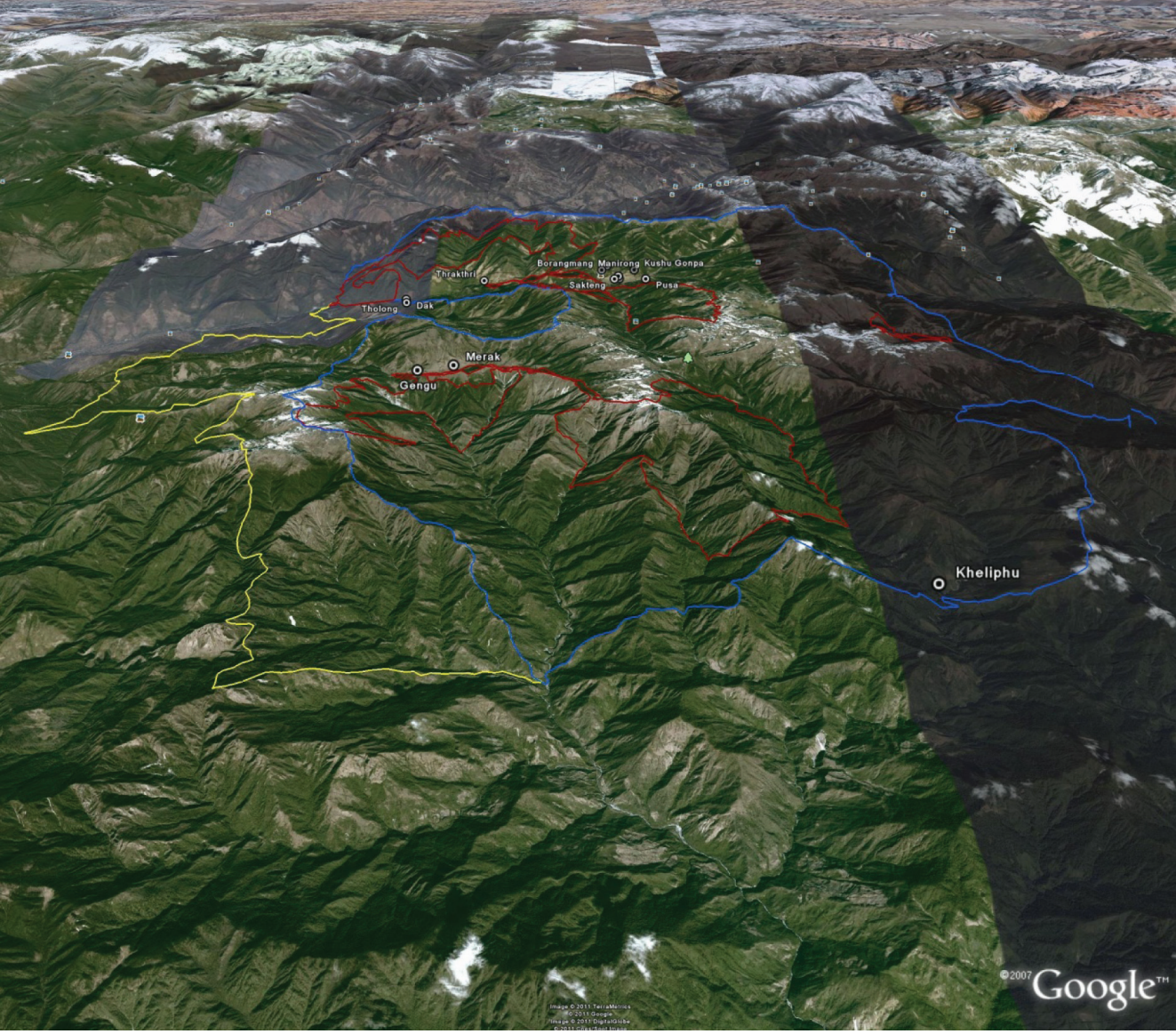
2.1. Zoning – A management tool for protected areas

With the aim to manage protected areas on a people-centered basis and address current as well as emerging issues, the zoning of protected areas into management units has become a vital and absolutely necessary tool for protected area management. Zoning will not only ensure proper planning and implementation of activities within respective management units, but also improve effective use of human resources in protected areas.

Since the contextual situation determines the process of zoning (Wangchuk,

2004), Bhutan follows a participatory approach to zoning (Tshering & Wangchuk, 2003) involving consultation with different stakeholders and tiers of governments. This approach strives to avoid conflict of interest situations in various land use categories while implementing activities through the creation of conservation zones that permit varying degrees of human intervention and use.

To balance biodiversity conservation and the needs of the people living in and around protected areas, protected areas should be zoned into core, buffer and multiple-use zones (NCD, 1996 in MOA, 2002). For marine park management that can be replicated in terrestrial parks, zoning has been considered a cornerstone of management, separating conflicting uses and determining the appropriateness of activities (Geneletti & van Duren, 2008).



"Sakteng is in its infancy as far as park development, but with so much to do and so little known about its wildlife, it is an exciting time. Hopefully, 25 years from now, Sakteng will be known as one of the world's most outstanding national parks."

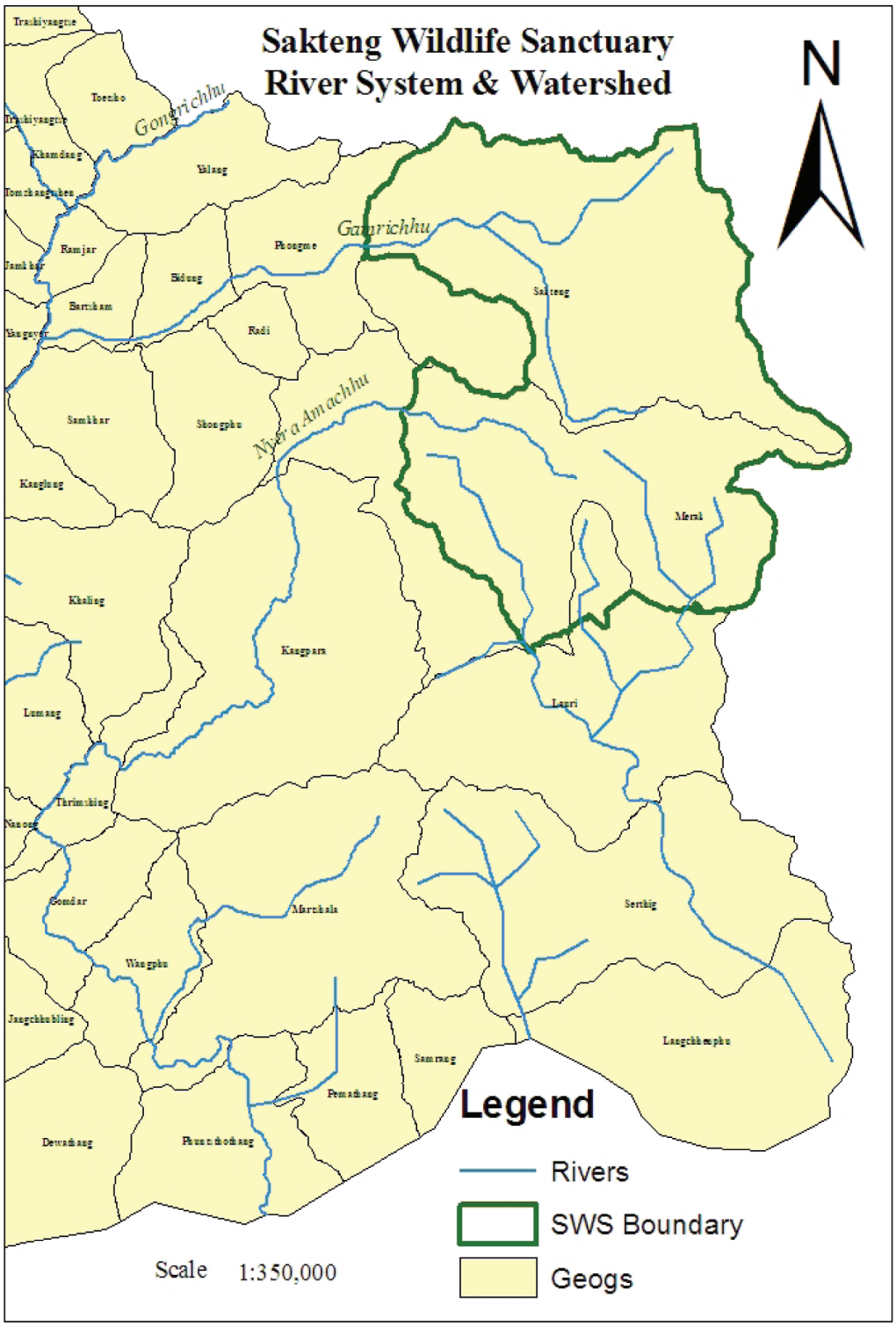
WWF 2003

3. Background

3.1 Significance of Sakteng Wildlife Sanctuary – Ecological and cultural diversity

The revision of Bhutan's protected area network that took place in 1993 focused on including a wider range of ecosystems (Wangchuk, 2008). Consequently, Sakteng Wildlife Sanctuary (SWS) was established to protect representation of the easternmost temperate ecosystems of Bhutan that harboured some endemic species (MOA, 2002) and some highly endangered species.

SWS also has a unique assemblage of biological and cultural diversity and, together with pristine mixed conifer forests and alpine diversity, it has the highest diversity of Rhododendron species in the country (WII, 2005). The sanctuary has recorded a presence of about 35 different Rhododendron species (Wangchuk, 2010) out of 46 different species found in the country (Pradhan, 1999). The park also harbours all the needle-leaved conifers found in the country, including the endemic Bhutan pine. It is home to many other endemic species of Rhododendrons as well as endangered fauna including the red panda and Himalayan monal pheasant. SWS also forms the headwaters and source of two important watersheds – Gamri and Nyerama – collectively encompassing and benefiting eleven geogs downstream.


Sakteng Wildlife Sanctuary
River System & Watershed
N
Gongrichhu
Gamrichhu
Nyera Amachhu
Trashiyangtse
Toetsho
Khamdang
Yalang
Tomzhangkhen
Ramjar
Jamkhar
Bidung
Phongme
Sakteng
Bartsham
Yangtsey
Radi
Samkhar
Shongphu
Kanglung
Merak
Khaling
Kangpara
Lumang
Lagri
Thrimshing
Nanong
Gomdar
Marchhala
Serthig
Wangphu
Jangchhubling
Samrang
Langchhenphu
Pemathang
Dewathang
Phuentshothang
Legend
Rivers
SWS Boundary
Geogs
Scale 1:350,000

Besides housing ecological diversity, the villages of Merak and Sakteng are also home to the semi-nomadic *Brokpas* or "men of the pastures". SWS therefore showcases a spectacular landscape engraved with a rich, unique culture and tradition of *Brokpas.* This uniqueness provides an excellent opportunity for SWS to integrate cultural preservation and nature conservation not available elsewhere (Wangchuk, 2008).

With visitor restrictions in the past, SWS is perhaps the only place in Bhutan with its culture and tradition still undisturbed due to limited exposure to the outside world. It is home to several historical and cultural sites, sacrosanct in the religious ancient texts of Amo Jomo and Khandro Dowa Zangmo alike. Merak and Sakteng also contain numerous temples and monasteries, as well as local deities in the mountains and lakes. Different festivals are also held throughout the year.

3.2 Socio-economic and biodiversity surveys

Initial socio-economic surveys were carried out in 2004, with subsequent surveys conducted by Dzongkhag administration and other sectors. Merak and Sakteng are two of the poorest geogs in Trashigang Dzongkhag, with the poverty rate as low as 57.86% and 40.33% respectively, compared to the Dzongkhag average of 29.3% (Trashigang Dzongkhag, 2011).

According to survey reports (Wangchuk, 2008), about 90% of the residents of Merak and Sakteng are pastoralists. Livestock is the main source of livelihood, contributing to about 83% of total household income for the region. The remainder comes from agriculture crops, as the major occupation in the smaller communities of Jeonkhar, in addition to casual labour, trade, NWFPs, etc.

Human-wildlife conflicts expose communities to crop damage and livestock depredation. While agricultural crop damage is confined mostly to Joenkhar village, a few cases exist in Sakteng and almost none in Merak. Monkeys, followed by wild pigs and a few other species, are reported to be the major nuisance for crop destruction.

As a result of conservation efforts, there has been increase in the population of predators like wild dogs, bears and leopards, hence the increase in livestock depredation cases (personal communication with local communities). Wangchuk (2008) estimates 40% livestock depredation has resulted from wild dogs alone, followed by bears. In the recent past, unattended domestic dogs in the villages are turning semi-feral and killing sheep and young yaks.

Two farm roads connecting areas near Merak and Sakteng are currently being constructed. However, these farm roads will not reach Merak and Sakteng

proper. The area was also formally opened to tourists in September, 2010. With roads soon to connect the remote villages, and ecotourism promising economic progress in the region, it will be interesting to observe the impacts over the short-term and long-term. SWS is therefore planning a detailed socio-economic survey to develop a baseline so that SWS park staff can later study the impacts and resulting changes.

With assistance from WWF Bhutan and the Nature Conservation Division of the Department of Forests, a team from the Wildlife Institute of India and staff from SWS conducted a detailed biodiversity survey in 2005. The results can be found in the report entitled, "Vegetation, Bird and Mammal Surveys in Sakteng Wildlife Sanctuary"(WII, 2005).

Specifically, the report aimed at studying the floral characteristics and vegetation patterns and status of mammals and birds in SWS. The survey confirmed 205 plant species within 10 major forest types spread over 21 forest communities. The study also confirmed 18 mammals (later increased to 24 in 2010) and 119 birds (later increased to 147 in 2010).

However, the survey was done with a limited amount time and only over select areas, even though SWS is spread over various forest communities with an altitudinal range from ~ 2,000 to 4,400 meters above sea level (masl), and vegetation ranging from Chir pine forests to alpine trees and Rhododendron krummholz. The goal is to continuously update the number of species, with the expectation that the number of species will increase in the next detailed biodiversity survey.

Protected and endemic species

SWS is home to several endemic species like Rhododendron kesangie, *R. bhutanense*, and Pinus bhutanica. The list of protected species found in the sanctuary includes: red panda, Himalayan black bear, musk deer, monal pheasants and several orchids. The details of the protected species listed under the *Forest and Nature Conservation Act of Bhutan, 1995* and the Convention on International Trade in Endangered Species (CITES) are listed in Annex 1.

Keystone species

Although no detailed studies have been carried out to determine keystone species, some predator species including wild dog and common leopard can be hypothetically considered as keystone species in SWS. This is evident due to the rising population of herbivores and increasing cases of agricultural damage as a result of a decline in the population of wild dogs in the recent past (personal communication in the field). However, wild dogs and other predator species are now growing in number due to conservation efforts. The concept of keystone species in the sanctuary needs to be studied and supported with further research, particularly on population dynamics.

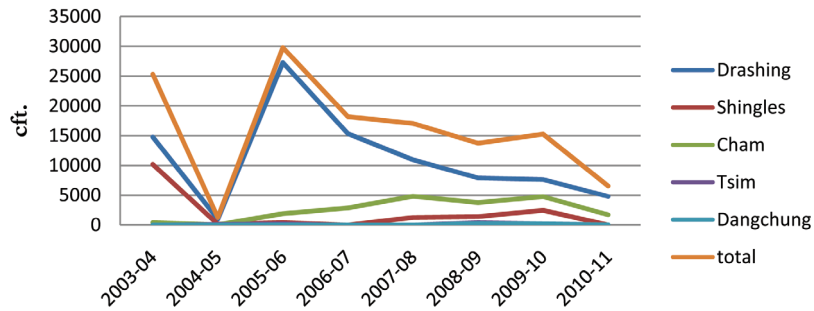
3.3 Resource use trends

Forestry legislation provides ample rights and privileges to Bhutanese citizens with respect to timber and other natural resources, including access to and subsidies for forest products, such as house building timber, firewood, NWFPs, grazing, etc. Prior to establishment of SWS, due to limited staff in Merak and Sakteng, people enjoyed almost free access to natural resources. This led to unsustainable harvesting, particularly from nearby areas, and as a result adjacent forested areas sit degraded today.

During preparation of SWS's management plan, records showed that on average eight new houses were built and 142 repaired annually, which required the harvest of 4,188 trees (Wangchuk, 2008). Considering the overgrown nature of fir trees used for shingle-roofing, it was estimated that 1000 fir trees were being harvested annually.

In 2003-04, to address this, as recommended in the management plan, 241 households in Sakteng were supplied with corrugated galvanized iron (CGI) sheets as environmentally friendly roofing substitutes, with support from WWF Bhutan and the MacArthur Foundation. The following year, the demand for shingles dropped drastically, although the houses that received CGI sheets started renovating their houses which put additional pressure on timber the first year, but overall use decreased in later years.

By establishing more stringent rules, providing better monitoring, and supplying CGI sheets, SWS could reduce its total tree use to approximately 1055 trees per year, with about 150 for shingles.



		Sakteng	Merak
3	Households	336	225
4	No. of Villages	8	4
5	Population	2072	1621

Figure 1. Rural timber supply for Sakteng geog

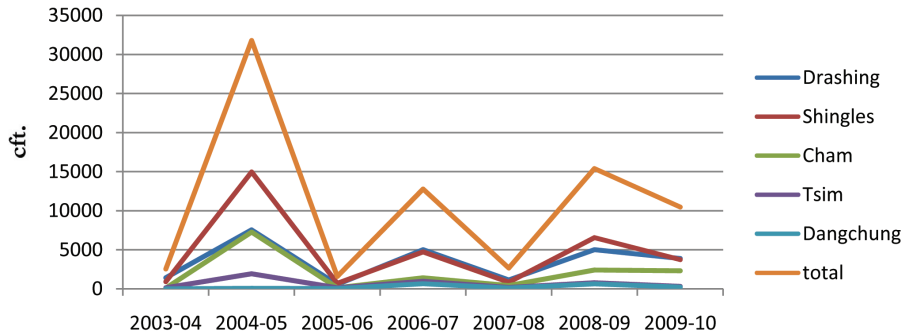


Figure 2. Rural timber supply for Merak geog

From the figures, there is a clear decreasing trend of rural timber supply, particularly in shingles used for roofing. Note that the total volume of timber allotted for rural house building in Sakteng is used for drashing; while in Merak it is used for shingles.

Given the cold weather conditions experienced throughout the year, firewood consumption is comparatively high in the region. Official records showed 323 trees being allotted for firewood in addition to 796 m3 in the form of "lops and tops", while dry firewood is collected freely from the forests (Wangchuk, 2008). Surveys also revealed that firewood collection in the vicinity has led to the degradation of forests, compounded by over-grazing and forest fires. Illegal girdling of trees to expand pastures and collect dry firewood has become a trend that has been controlled to a certain extent, but still seems to exist. However, now that the villages will soon receive electricity, it is expected that demand for firewood will drop further.

3.4 Livestock pressure

With over 90% of the population of Merak and Sakteng living as pastoralists, and livestock alone contributing to 83% of the total income (Wangchuk, 2008), there has been a trend of livestock population increasing together with the growth in human population. Over-grazing and/or double grazing pose serious threats to conservation efforts in the park. The negative impacts related to poor soil condition (WII, 2005) including: a decline of soil nutrients (Yusipang, 2004, in Wangchuk, 2007); lack of adequate forest regeneration; and competition with

wild herbivores, among others. Merak and Sakteng alone contribute to about 58% of the total livestock population of the eight geogs of Gamri watershed. Over-grazing and degradation of forests by livestock have been identified as the root causes of problems facing the Gamri watershed (Wangchuk et al., 2009). The indirect impacts are seen through the lopping of trees and illegal girdling of trees to create open patches to expand grazing lands.

While the livestock population increases, there has been a decrease in grazing lands which are grazed beyond their carrying capacity. As per the studies carried out by the Renewable National Resources Research Centre (RNR-RC) in Yusipang in 2009, per capita livestock population, in terms of its carrying capacity and available grazing land, is much higher than the national average. This is also the case in other regions of Bhutan, where areas grazed by yaks for a long period of time end up with a deteriorated level of quality of grasslands and substantial reduction of carrying capacity.

Also with continuous grazing of some areas - where cattle from lower geogs take over grazing lands after the higher geogs have left - no rest period is provided for the regeneration of grasses (Wangchuk et al., 2009). Girdling of trees by communities for expansion of grazing land remains a serious concern, which, coupled with fir dieback and deliberate fires, results in the replacement of fir forests by Juniper and Rhododendrons.

From observations and verbal communication with some key informants, SWS has also learnt that these communities take pride in having a huge cattle population, while in reality the quality of the herd is generally poor. Timely intervention is therefore required by all relevant stakeholders to ensure quality livestock and pasture, as well as appropriate management of both biodiversity and the watershed together with better control of illegal activities such as girdling and deliberate fires.

3.5 Concept of zoning - International and Bhutanese context

Zoning is a common planning and management tool used worldwide in marine, terrestrial and provincial parks. The concept involves dividing areas into homogenous units of management based on different functions and values corresponding to the goals and objectives of a particular park. While protected areas are primarily intended to conserve biological diversity, park objectives are now increasingly focusing on human well-being and socio-economic benefits (WPC, 2003 in Naughton, 2007). Therefore, projects that initiate participatory zoning are gaining popularity in their attempt to find balance between conservation and development goals (Naughton, 2007).

While the concept of zoning aims to balance conservation and economic development goals among diverse groups of stakeholders, tradeoffs are inevitable, although integration may also be possible (Robinson & Redford, 2004). Since park management and planning encounter problems in the selection of appropriate frameworks and indicators, setting a zoning scheme is arguably the most relevant process in park planning (Geneletti & van Duren, 2008). With the concept of ecotourism becoming increasingly important in many protected areas of the world, zoning is an appropriate tool not only to delineate areas for multiple-use but also to educate visitors on conservation areas.

Interestingly, many zoning programs are popular and common in marine park management, with limited literature available on terrestrial parks (Geneletti & van Duren, 2008). Marine parks have effectively used zoning as a key management tool, particularly dividing management areas into protection of key habitats, breeding sites, fishing, tourism opportunities, etc. For example, in the Great Barrier Reef Marine Park (Kelleher, 1983), a zoning plan has been very effective in planning and managing the park, by dividing the marine park into different zones with varying degrees of control over human activity and levels of protection for the natural environment. Kelleher describes that this zoning plan, which is in line with IUCN and UNESCO criteria, has been successful and could be applied elsewhere in the world with adequate public and government commitment to conservation and biodiversity protection.

UNESCO's Man and Biosphere Programme (MAB) recommends appropriate zoning for bioregional planning schemes to integrate conservation and development, and to also achieve integrated management of land, fresh and marine waters, and living resources. It also identifies the need to maintain flexibility at the national level but with the intention of effectively combining conservation, sustainable use of resources and knowledge generation through integrated zonation and collaborative management. Wangchuk (2004) also notes the process of zoning is best determined by contextual situations and emphasizes participatory consultations involving various levels of government and stakeholders in Bhutan's case.

Although protected area management has been underway for several years in Bhutan, comprehensive management through zoning has not been implemented except in the case of Bumdeling Wildlife Sanctuary (BWS), where some zoning work has been initiated (NCD, 2009). Several protected area conservation management plans contain specified zones, but their designation varies without uniformity. Many plans consider these zones preliminary and indicate the need for review.

Many protected area implementers also lack clarity on their zones and their criteria, which suggests the need for more knowledge and capacity building on the subject, starting with a seminar on zoning schemes for Bhutan (FRDD & UWICE, 2010).

In Bumdeling Wildlife Sanctuary (BWS) (NCD, 2001), although clear zones have been identified, there are options to make modifications based on new information and knowledge. While BWS was gazetted to protect representative areas of the mid- and high altitude ecosystems of eastern Bhutan, broad-leaved forests which are mid-altitude ecosystems remain greatly underrepresented. The zoning exercises within SWS's management plan faced problems relating to incomplete information and unreliable land use maps, among others.

Piet van der poel (2003) carried out a critical analysis of basic zoning done in different protected areas in Bhutan. The approaches used for zoning differed across all parks, from simple approaches using basic available maps to referring to existing legislation. Some of the constraints highlighted in the analysis included: incomplete information; biodiversity surveys conducted under limited sample plots; and unreliable land use maps. Development of a zoning policy has been recommended to provide uniform procedures that ensure implementation is followed in a similar fashion in each of Bhutan's protected areas (van der poel, 2003).

3.6 Legislative framework

3.6.1 Ministry/Department notifications

The protected area system and gazettement notification (MOA, 1993; MOA, 1994) specify five zones (Core, Enclave, Administrative, Multiple-use, Buffer) to meet specific objectives prescribed in management plans and to regulate their activities. The Department of Forests and Park Services reiterated the need to consider zoning a priority (NCD, 2009) and circulated guidelines for zoning.

3.6.2 Provisions in Forestry Policies, Acts and Rules

The *National Forest Policy of Bhutan* (MOAF, 2011) recommends measures to manage protected areas based on functional zones to accommodate integrated conservation and development through a variety of appropriate management regimes. The policy also encourages the promotion of nature-based tourism, regulated grazing in multiple-use and buffer zones, but not in the core zone, and other conservation and sustainable utilization of natural resources.

The *Forest and Nature Conservation Act of Bhutan* (MOA, 1995) enforces the rights

to regulate and prohibit activities in protected areas through a set of rules. Consequently, the Forest and Nature Conservation Rules of Bhutan (MOA, 2006) specify rules pertaining to zoning under Chapter VI- Protected Area Management.

3.6.3 Other Legislation

Other legislation that has some relevance to zoning includes the *Land Act* of 2007; the *Biodiversity Act* of 2003, and the *Environmental Assessment Act* of 2000.

3.6.4 *Vision and Strategy for Nature Conservation Division*

The Vision and Strategy for Nature Conservation Division (Tshering & Wangchuk, 2003) covers a comprehensive chapter on zoning protected areas. The document emphasizes zoning as a basis for defining ICDPs and sets a target to accomplish clear zoning and associated legislation by 2005. It also provides brief guidelines on potential activities for zoning and focuses on a participatory approach through the involvement of varied stakeholders.

"Sakteng Wildlife Sanctuary shall contribute to ecosystem contiguity, ecological connectivity and ensure species persistence within the Bhutan Biological Conservation Complex, while fulfilling the needs of the resident communities and deriving national benefits from conservation; as well as through the creation of well defined zones and associated legislation that are ecologically sound, socially acceptable and economically viable."

4. The Context

4.1 Goals and objectives

Long-term goal – *"Sakteng Wildlife Sanctuary shall contribute to ecosystem contiguity, ecological connectivity and ensure species persistence within the Bhutan Biological Conservation Complex, while fulfilling the needs of the resident communities and deriving national benefits from conservation, as well as through the creation of well-defined zones and associated legislation that are ecologically sound, socially acceptable and economically viable."*

This has been derived from, and can be cross-referenced to, the following;

- National Forest Policy statement – 2.5.2 (iii): *Manage Protected Areas based on functional zones to accommodate integrated conservation and development through a variety of appropriate management regimes*
- SWS Management Plan – Long-term objective no.2: *Ensure that a balance of biodiversity, sustainable utilization and cultural diversity is maintained*
- Vision and Strategy document – Target b: *Zonation and demarcated boundaries widely known and associated legislation accepted and respected by all stakeholders*

The long term goal will be met through the following medium- and short-term objectives:

Medium-term objectives (5-10 years)

- Protect biological and ecosystem diversity of SWS while ensuring a balance between biodiversity conservation, sustainable utilization of natural resources and cultural integrity of the area;
- Maintain dynamism of the zones and update from time-to-time with new information, science and changing needs of society;
- Incorporate strategies for management of different zones in conservation management plans;
- Create an enabling environment to promote ecotourism.

Short-term objectives (<5 years)

- Provide maximum protection to representative ecosystems and keystone species within SWS;

- Protect important habitats of keystone species;
- Ensure sustainable utilization of natural resources through appropriate management plans;
- Source funds and implement ICDPs to compensate for conservation and benefit communities;
- Advocate environmental education and awareness.

4.2 Principles

The following principles were considered while delineating the zones and developing management regulations (mostly adapted from Wangchuk, 2004).

- Maintain ecological stability including the stability of all representative habitats in SWS
- Maintain a viable population of wild flora and fauna
- Ensure habitat connectivity of wild flora and fauna including avifauna
- Maintain versatility of ecosystems to regenerate
- Application of good science and indigenous knowledge in aspects of planning and management of zones
- Sustainable resource management and availability

However, a few non-negotiable principles were identified that could not be compromised:

- Protect breeding and roosting areas of wild animals and birds
- Protect endemic species and/or habitat
- Protect globally-endangered species
- Ensure border security

4.3 Types of zones

Based on the situational analysis of SWS and the principles adopted, the park designed the following zones to achieve its goals and objectives:

- *Core Zones*: total protection
- *Multiple-use Zone*: sustainable utilization of natural resources

- *Buffer Zone*: extra layer of protection for the Sanctuary
- *Recreational (overlapping) Zone*: tourist potential areas in multiple-use zones and low impact trails and sites in core zones

4.4 Definition of zones

Core zone - an area with representation of all ecosystems of SWS including breeding areas for birds, animals, other life forms; diverse species of Rhododendron; presence of endemic and globally-important species; and pristine mixed conifer forest.

Multiple-use zone - area within the Sanctuary designated for the sustainable use of natural resources by its residents including pasture, without negative impact on the core zone.

Buffer zone - an area established around the Sanctuary to provide an extra layer of protection for the ecosystems in the sanctuary, and in which restricted and/or regulated use of natural resources is permitted.

4.5 Criteria for delineation of zones

4.5.1 Criteria for delineation of core zones

- Breeding area for wild animals, birds, and other forms of life
- Area with diverse species of Rhododendron
- Area with endemic and globally significant species
- Pristine mixed conifer forest tracts
- Area with high numbers of mammal evidence
- Habitat of keystone species
- Prime habitat for red panda (globally endangered mammal)
- Area undisturbed by humans
- Seasonal residency for animals/birds
- Micro ecosystem (patch ecosystem)

4.5.2 Criteria for delineation of multiple-use zone

- Resource-use area
- Individual or communal grazing areas (*Tsamdro*)
- Ecotourism and other use area
- Existing camp site
- Area having traditional rights
- Areas close to or adjoining international border

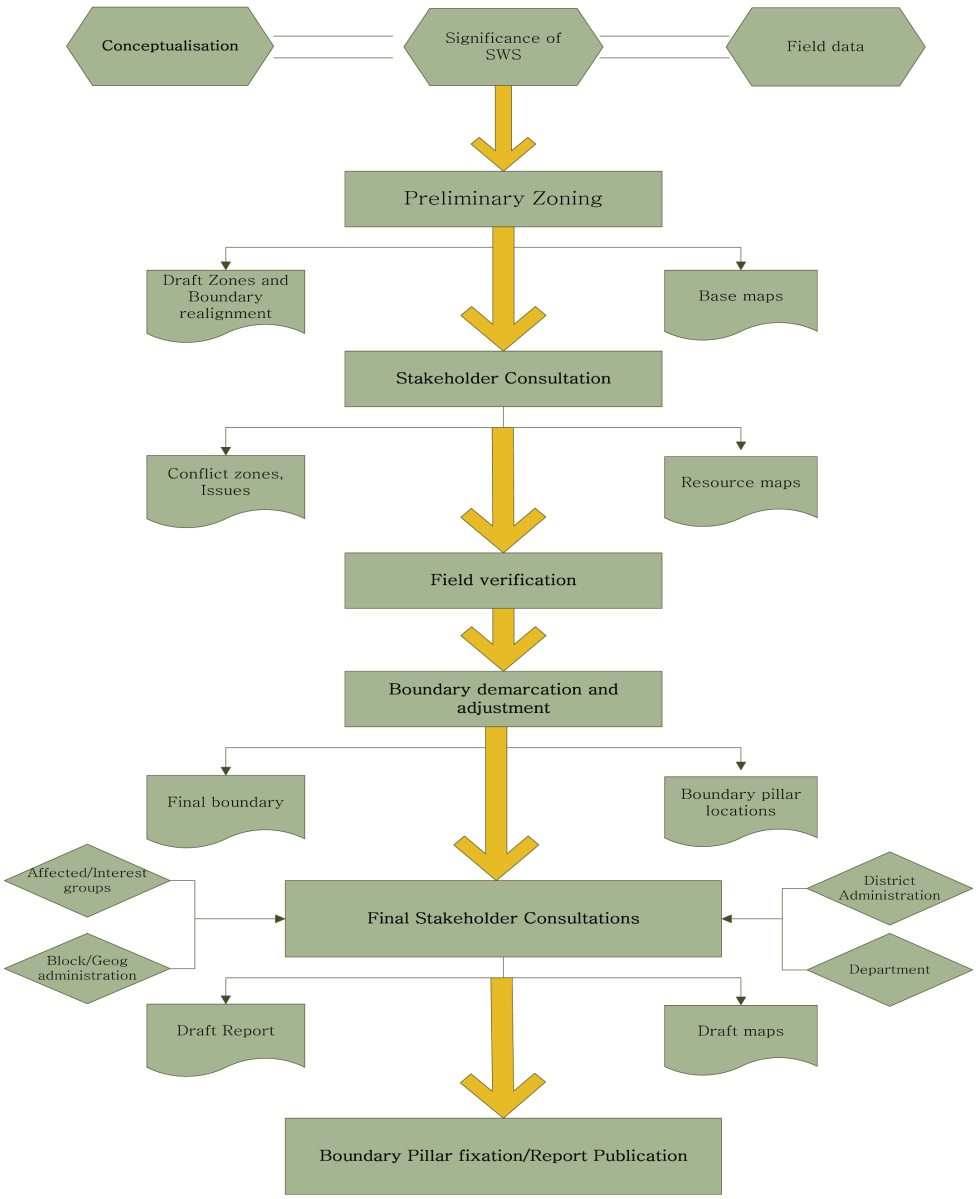
4.5.3 Criteria for delineation of buffer zone

- Important habitat outside park boundary
- Area that is likely to pose a threat to the sanctuary

- Area of scenic beauty
- Pristine ecosystem
- Special landmark
- Any other area that requires special protection

5 The Process

5.1 Approach and strategy for zoning



5.2 Preliminary zoning

Preliminary zoning was done to propose initial zones and corresponding boundaries. All existing literature on SWS and other parks including a zoning framework for Bhutan were reviewed. Information was then gathered from field staff specifically on areas containing:

- Important habitat representation
- Sightings of significant wildlife species
- Presence of salt licks
- High biodiversity
- Pristine and undisturbed environment
- Presence of endangered species
- Traditional use areas and pastures
- Rural timber marking areas

Based on the principles of zoning and the above information, boundary realignment and draft zones were proposed. Seven core zones were identified and mapped. Topography maps were used as base maps to demarcate the areas and correspondingly transferred to GIS maps.

During the preliminary exercises, it was noted that the SWS boundary does not often follow permanent topographic features such as ridges, major streams, etc. As such, it would be difficult to locate the exact boundary in the field. It was therefore proposed that, for administrative purposes and effective management, permanent features should be followed, without having to deviate from the total area.

Based on the exercises, details behind maintaining continuity of core zones needed to be discussed with the communities. Given the huge extent of human interference in the sanctuary, particularly resulting from pastures, core zones ended up being limited to fewer areas that originally proposed. As a result, several important habitats with smaller, sporadically distributed areas had to be left out from being designated as core zones.

5.3 Stakeholder consultations

Stakeholder consultations were conducted at various levels to introduce and sensitize communities on the concept of zoning, negotiate on conflicting issues, and agree on management principles. The consultations also included pre- and post-field verifications and map finalizations.

Preliminary community consultation

Consultation meetings were conducted for the residents of Merak, Sakteng, and Lauri geogs. The meetings included members from almost every household in different villages within these geogs. The main purpose of the consultation meetings was to introduce the concept, present the proposed zones and obtain feedback and consensus.

In summary, the consultation meetings covered the following aspects in detail:

- Proposed zones and boundaries: Communities were briefed on proposed zones and corresponding boundaries. Prior to that, they were sensitized on the conservation policies, protected area management, and the concept of zoning.

- Participatory resource mapping: Community participants were asked to map all the areas that were used for the extraction of various forest products, including pasture land.

- Community views and perceptions: After the presentation of core zone boundary, participants were provided with the opportunity to express their concerns and raise issues. Concerns were answered with reference to prevailing policies, regulations, and science. Specific problems unique to the areas were compiled to be discussed and negotiated during field verifications.

- Means for negotiation and discussion of conflicting issues: Conflicting issues were negotiated to balance the goals of conservation and development. It was agreed that both the parties would weigh advantages of either conservation or development in specific areas and agree to give priority to that which is more advantageous. For example, if a preliminary core zone had fewer pastures and higher biodiversity, preference would be given to designate that area into a core zone. On the other hand, if an area constituted traditional pastures with many users, they would be designated as multiple use zones at this time, but with certain restrictions.

  In all cases, communities would ensure minimal disturbances to habitat and support all conservation efforts in the areas. Where possible, resources and pastures will be replaced somewhere outside core zones. In cases where communities have to or might have to sacrifice their traditional rights for creation of core zones, ICDPs will be explored to compensate for losses resulting from conservation.

From the preliminary community consultations, pastures falling inside core zones were designated to be negotiated during field visits. In addition, with the help of participatory mapping exercises, areas used for extraction of timber, firewood, bamboo and other forest resources were identified and mapped. The communities agreed to accompany field staff to not only cooperate with them during the entire field verifications but also offer support for conservation.

Final community consultations

Final community consultations were conducted following the field verification exercises (later described in Section 5.4). Village leaders, key informants and affected communities were invited to the consultation meetings. Final core zones, boundaries and regulations were presented to stakeholder, and negotiations continued. By-laws were also drafted under close supervision by geog administration. Agreement was eventually obtained on the final zones, rules, regulations, by-laws and implementation strategies.

Consultations at Dzongkhag Administration level

At the Dzongkhag level, a half-day consultative meeting was held involving the Governor, Sector heads, and other relevant officials. During the meeting, details were presented on the concept, community participation, an implementation strategy and the need for partnerships to ensure a successful outcome. The discussions focused on sectoral approaches to developments in the Sanctuary that could help increase conservation core zones in future. The attendees also discussed potential partnerships among varied sectors and the ability of partners to assist with conservation in the area. In addition, the agenda covered a range of developmental activities including pasture development, ecotourism, NWFPs, and local enterprise development.

Consultations at Department level

Final consultations were done at the Department level involving relevant officials from the Ministry of Agriculture and Forests and its Department of Forests and Park Services. The meeting yielded fruitful recommendations on the approach and implementation of zoning. It reflected the importance of such exercises and the need to replicate a zoning approach in all protected areas in the country. One of the key recommendations was to ensure the by-laws are in line with prevailing legislation.

5.4 Field verification and boundary demarcation/adjustment

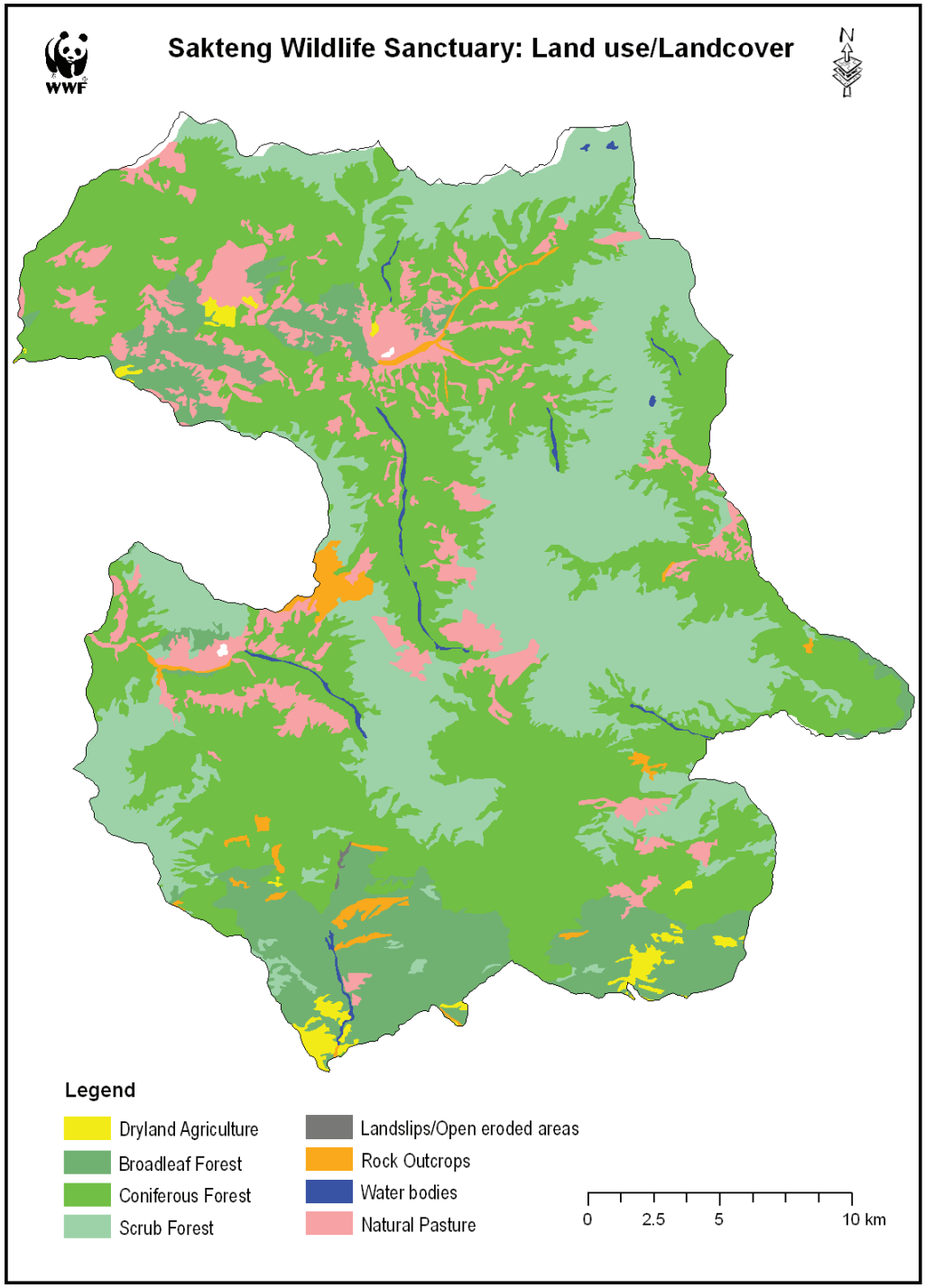
The main purpose of the field verification was to conduct physical ground-truthing. The base maps, draft zones, issues from preliminary zoning, and stakeholder consultations provided the basis of the verification. The boundaries of core zones and overall park boundaries were verified and adjusted as required. In some cases, the core zone boundary had to be changed due to

disagreement from communities. There were slight deviations made to the original park boundary, particularly so it followed prominent land features such as ridges, valleys, streams and rivers. All adjustments were done in the field on topography maps and GPS readings were taken on strategic locations.

During visits to the field, proposed locations of the boundary pillars for core zones and park boundary were also determined. Generally, pillar location was identified near settlements, trails, pastures, and places with evidence of other human interference.

Based on this field work, approximately 200 pillars were erected for core zones and the park boundary. The pillars were labeled and numbered for each zone and park boundary. Park boundary pillars were listed as PB, followed by serial numbers, e.g. PB 01, PB 02, and so on. Similarly core zone pillars were noted as CB, followed by serial numbers, e.g. CB 01, 02, and so on. A database of pillars will be maintained at the park headquarters for monitoring purposes.

Negotiations were considered difficult with communities that had pasture land within the proposed core zone. Some of the residents agreed to the proposed zoning, while many pasture owners did not. The areas from where residents extract forest resources such as timber, firewood and bamboo have been excluded from the core zone. These areas were confirmed during field verifications and mapped with the help of GPS readings.


Sakteng Wildlife Sanctuary: Land use/Landcover
WWF
N
Legend
Dryland Agriculture
Broadleaf Forest
Coniferous Forest
Scrub Forest
Landslips/Open eroded areas
Rock Outcrops
Water bodies
Natural Pasture
0
2.5
5
10 km

6. Results and Implementation Strategy

6.1 Description of SWS boundary

The park boundary starts at Ganya between the Indo-Bhutan boundary pillar numbers 337 and 336 from the north and then follows the international boundary east until Jomoringer (Darkhalemey) located between the Indo-Bhutan boundary pillar numbers 298 and 299.

From Jomoringer, the boundary follows the ridge south at 270° W and joins at the confluence of the rivers Yanglayangchung Ri and Zangthe Ri. It then continues along the Gongsangthenpo ridge till Chongshingphu top, then follows Gorphu ridge till Gorphu phodrang. From Gorphu phodrang it follows 265°W towards Taktakpa top and joins Jarong Ri, then follows the ridge of Dongdongnakpo and aligns down to 270°W until Jomo Ri.

The boundary then aligns from Jomo Ri via Khashiteng, Sakteng zor, Thonphu tse and joins Jomophodrang, Gorgorlhamo and then Nyerama chu at Jalungnang. Then it trails via Sakshum to Serphu and joins at Nyakchungla pass.

From Nyakchungla pass it follows the ridge via Nyakchung ganya, Kamajaksa and joins at Ramphunang. From Ramphunang, it follows the ridge and joins to the confluence of Richigpu and Gamri chu below Tholong village. Then it follows Gamrichu and joins at the confluence of Ganyachu and follows Ganya chu until rejoining Ganya.

6.2 Designation and description of zones

6.2.1 Core Zones

Core zones cover 19.73% (146.08 square kilometres) of the park, mostly in the northwest and southwest portions of the park. Demarcation was avoided near the international border.

Demarcation of core zones should be considered to be a continuous process whereby areas can be increased in the future with support of ICDPs. During the demarcation of core zones, the traditional rights of the residents were respected.

The traditional trails that traverse through the core zone have been designated as low impact trails. Residents can travel along the low impact trails but shall be governed by by-laws agreed to by the communities.

In total, eight core zones were designated and polygonized into three clusters as follows:

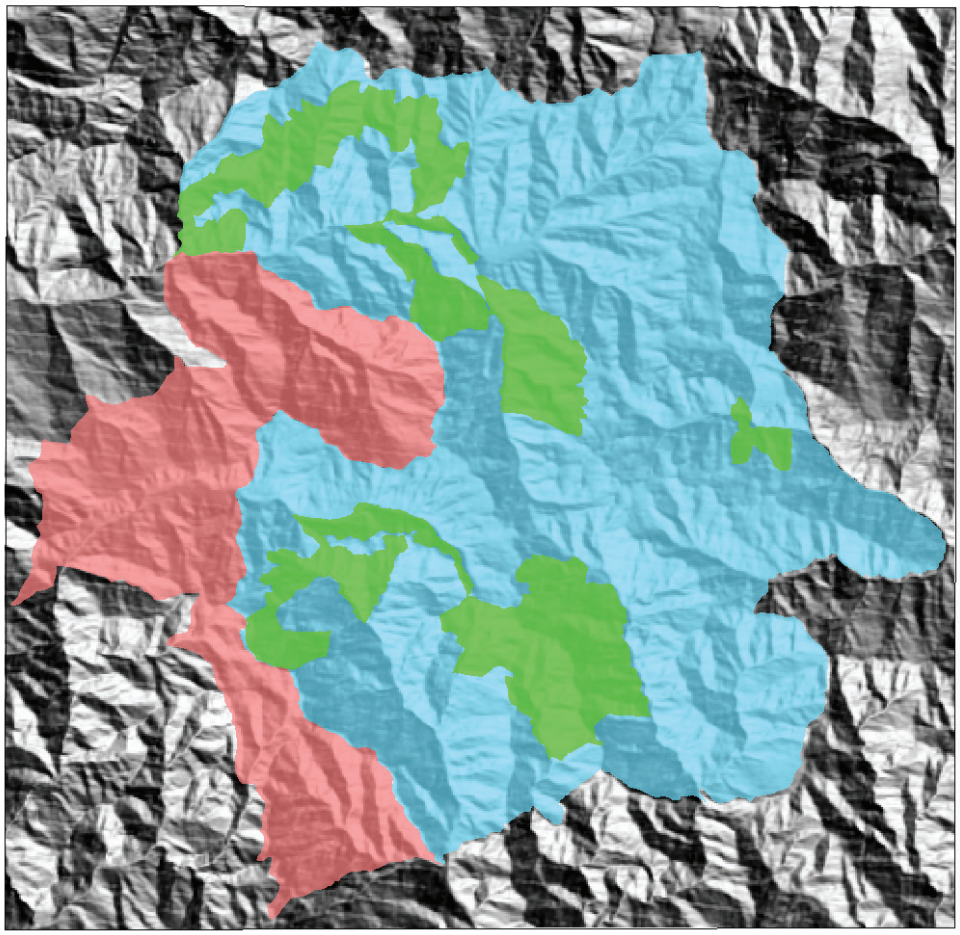
Table 1 : Core Zones

Clusters	Core zone number and name	Area (sq.km)
A	1. Yanglay-Yangchung 2. Merak 3. Jomophodrang	71.826
B	4. Dorbrok 5. Pherilock 6. Baythangtse 7. Gelong phukpa	69.533
C	8. Dalam	4.725
	Total	146.084

Table 2 : Management Zones

Zone	Area (sq. km)	% of total park area
Core zones	146.084	19.73
Multiple use zone	594.516	80.27
Total park area	740.60	100.00
Buffer zone (outside Park area)	206.374	

Sakteng Wildlife Sanctuary: Management Zones



Legend

- Core Zone
- Buffer Zone
- Sakteng Wildlife Sanctuary

0 3.75 7.5 15 km

A.1 Yanglay Yangchung Core Zone

Boundary Description: The boundary starts from Shanya to Shenden, then to Churzhugma tsamdro. From Churzhugma, it follows the ridge and joins the Yachung Rong river confluence. The river Yachungrong acts as a border that goes upward and joins a ridge called Merakgangzur. From Merakgangzur, it falls toward Tshoksumnang rong and follows downward until it joins the Jarongri. From Jarong ri, it follows upward until Nukdi ridge and then follows further upward until the base of Yakjasa. From Yakjasa it follows ridge towards Sombra and joins the river Khung Khung. The Khung Khungri is a border that follows upward until it meets and joins Riharong ridge which follows upward and joins Shanya.

Vegetation: Covers alpine to cool broadleaved forest.

Endemic Species: *Rhododendron kesangiae, Rhododendron bhutanense.*

Wild Animals: Musk Deer, Himalayan Black Bear, Red Panda (encountered less due to die back of bamboo species), Common Leopard, Goral, Serow, Barking Deer, Wild Dog, Red Fox, Assamese Macaque, Capped Langur, Mountain Pika.

Birds: Himalayan Monal, Snow Partridge, Blood Pheasant, Satyr Tragopan.

Medicinal Plants: *Meconopsis spp., Aconitum* spp., *Gentiana spp., Pedicularis spp., Rheum spp., Swertia spp., Saussurea graminifolia, Cyananthus lobatus,* etc.

Cultural Sites: Yanglay yangchung Phodrang (Gelong Yanglay yangchung).

Headwater Protection: Nyangdiruri that leads to Jomo river which benefits the people of Zangthi, Lauri geog, Serthi, Menjung geog under Samdrup Jongkhar Dzongkhag.

A.2 Merak Core Zone

Boundary Description - The boundary starts from Reharong and follows the ridge downward to Gaygo, Thershokpa, Broksar, Hrango, Tshang tshang du and joins to Nyera Ama ri. From Nyera Ama chu, it follows upward until Demaprong and then to Reharong.

Vegetation: Conifer forest.

Endemic Species: *Rhododendron kesangaie, Rhododendron bhutanense*.

Wild Animals: Goral, Serow, Barking Deer, Wild Dog, Red Fox, Assamese Macaque, Mountain Pika.

Birds: Himalayan Monal, Snow Partridge, Blood Pheasant, Satyr Tragopan.

Medicinal Plants: *Meconopsis spp., Aconitum spp., Gentiana spp., Pedicularis spp.,*

Ligularia, spp., Rheum spp., Swertia spp., Saussurea graminifolia, Cyananthus lobatus, etc.

Headwater Protection: This core zone has been designated mainly for protection of the water catchment for Nyera Ama Chhu. The core zone is just opposite of Merak village.

A.3 Jomophodrang Core Zone

Boundary Description: The boundary starts from Serkemla and follows the trail to Shingkhar until it reaches Threshokpa. From Therzhokpa, it follows an upward ridge until it reaches Muktangma, Kamchuganak, Payshung juk, Chumu dur, Dangzong nakpo until Jomo Phodrang. From Jomo phodrang, it follows a downward ridge to Jomoko Nyasa and Narnang toe zur zomsa. From there it joins Jomori until the confluence of Teyrongri where it follows upward until it joins the Thershokpa land slide.

Vegetation: Covers alpine to conifer forest.

Endemic Species: Rhododendro kesangiae, Rhodrodendron bhutanense.

Wild Animals: Musk Deer, Himalayan Black Bear, Red Panda (encountered less due to die back of bamboo species), Common Leopard (Pag Mark), Goral, Serow, Barking Deer, Wild Dog, Red Fox, Assamese Macaque, Capped Langur, Mountain Pika.

Birds: Himalayan Monal, Snow Partridge, Blood Pheasant, Satyr Tragopan.

Medicinal Plants: Meconopsis spp., Aconitum spp., Gentiana spp., Pedicularis spp., Ligularia spp., Rheum spp, Swertia spp, Saussurea graminifolia, Cyananthus lobatus, etc. As per the cultural belief of the local people, there are 108 medicinal plants available in the Jomophodrang area.

Cultural Sites: Jomopodrang is the place where the local deities (Am Jomo) of Marek and Sakteng villages are believed to be inside the Phodrang (a rocky mountain). Starting from 15th of 7th month of the Bhutanese calendar, people were allowed to visit the place until the 30th of the 9th month of the Bhutanese calendar. Many historical sites could be found along the trail towards the Phodrang.

Headwater Protection: Jomo Ri starts from the Jomophodrang where the river flows towards the Shingkhar, Khashiteng, Phajo Gonpa, Momring, Lauri, Ungthi and joins the Zangthi river which flows towards the Daifam. It is very important to protect these headwaters, as the sources have already encountered a lot of landslides and soil erosion.

B.4 Dorbrok Core Zone

Boundary Description: The boundary starts from the confluence of Marzim stream

and Bamukpa River and follows the foot trail to Damnga and Samgang until it reaches Rongjuko. From Rongjuko, it is diverted towards Dolung and meets Dorkrok (Ganya). From Dorbrok, it follows the ridge toward Bamukparong, then follows Bamukpari and ends at the confluence of Marzim.

Low Impact Trails: Marzim to Mitserteng- The main foot path from Sakteng to Merak passes through the Dorbrok core zone. There is no alternative route and the people and livestock are allowed to pass along the trail but with some restrictions as mentioned in the by-laws of the Dorbrok core zone. Another trail is from Marzim to Dam Nga, Somgang, Rongjungko, Rinzhem, Daryou, Phukthongkhar and ends in Dorbro.

Vegetation: Covers alpine to mixed conifer forest, also good growth of bamboo.

Endemic Species: *Rhododendron kesangiae*.

Wild Animals: Himalayan Black Bear, Red Panda, Goral, Serow, Barking Deer, Wild Dog, Red Fox, Mountain Pika.

Birds: Monal Pheasants, Snow Patridge, Blood Pheasant, Satyr Tragopan

Medicinal Plants: *Meconopsis spp, Aconitum spp., Gentiana spp., Ligularia spp., Swertia spp., Saussurea graminifolia, Cyananthus lobatus,* etc.

Headwater Protection: Marzim ri and other streams which are the tributaries of Bamukpa ri that joins the Gamrichu.

B.5 Pherilock Core Zone

Boundary Description: The boundary starts from the confluence of Donglojab stream and Bamukpari and then follows Donglojab stream to the top of Nakphu. From Nakphu, it follows the foot trail towards Tholong and reaches the top of Rechikpa, then follows this ridge and ends at the confluence of Broksar chu and Gamrichu below Chubateng.

Low Impact Trails: Bamukpa River to Broksartse- The trail between these two places is used by the herders of Sakteng for trespassing of livestock during the migration period. The time period when this trail can be used is mentioned in the by-laws.

Vegetation: Covers alpine to conifer forest and cool broad leaved forest.

Endemic Species: *Rhododendro kesangiae*, Bhutan pine.

Wild Animals: Musk Deer, Himalayan Black Bear, Red Panda, Common Leopard, Goral, Serow, Barking Deer, Wild Dog, Red Fox, Assamese Macaque, Capped Langur, Mountain Pika.

Birds: Himalayan Monal, Snow Partridge, Blood Pheasant, Satyr Tragopan, Kalij

Pheasants, Spotted Nut Cracker.

Headwater Protection: Tributaries of Bamukpari and Broksarri that join the Gamrichu.

B.6 Baythangtse Core Zone

Boundary Description: The core zone boundary follows the ridge starting at Sangtangsa via Baythangtse until the confluence of Bamukpa ri and Gamrichu. The boundary on the other side follows the Gamrichu until the base of Sangtangsa.

Low Impact Trails: Nazor Bridge to Kulung; Chu baap teng to Tshepchena

Vegetation: Mixed conifer forest to cool broadleaved forest.

Endemic Species: *Rhododendron kesangaie*, Bhutan pine.

Wild Animals: Goral, Serow, Barking Deer, Wild Dog, Red Fox, Assamese Macaque, Mountain Pika, Himalayan Black Bear, Common Leopard, Yellow-throated Martin.

Birds: Himalayan Monal, Snow Partridge, Blood Pheasant, Satyr Tragopan, Kalij Pheasant.

B.7 Gelong Phukpa Core Zone

Boundary Description: The boundary starts from Gelongphugpa and follows Gamrichu downstream until the confluence of Kurongri and then follows the Kuromgri until it reaches the top of Naksumteng. From Kaksumteng top it follows toward Kumorongchu until it reaches Bamdungtse. From Bamdungtse, it joins Thonphu jug and Zawangteng jug, then reaches Laitengjug and Ngopshiphodrang, then Mokang Prengsar jug to Gognagor. From Phanchenmo jug, it follows the ridge towards Tshethangtse, then through the valley toward Zampakhajuchu and from there it follows the Zampakhajuchu upward until it reaches Dolungtse. Continuing along, it follows the Dakpashisa ridge and reaches Phukpazhing. From Phukpazhing it follows the ridge towards Nangzor and reaches above Nangzor Bridge where it then follows the Nazorri and reaches Talokingkhor valley. From Talokingkhor, it follows the ridge towards Tshethangtse jug to Tshethangtse and follows the ridge downward to Mokang Tshokha chu. From there, the boundary follows the Tshokhachu upward and reaches Jabgangchu. From Jabgangchu, it follows the valley towards the top of Jabgang and joins Bainangtse. From Bainangtse, it follows Prabo stream and joins Sonachu. From Sonachu, it follows upward and reaches the top of Phukpa. From the top of Phukpa, it joins Kektong tsen. From there, it follows the ridge and reaches Serdey rongchu and joins Bamdungtse. From Bamdungtse, it joins Abedarcharsa and follows the ridge until it reaches Broksarba gag and joins Gelongphukpa.

Vegetation: Warm broadleaved forest to temperate forest

Wild Animals: Goral, Wild Dog, Capped Langur, Common Leopard, Serow, Barking Deer, Sambar, Himalayan Black Bear, Jungle Cat, Assamese Macaque, Flying Squirrel, Red Panda, Musk Deer, Yellow-throated Martin, Porcupine, and Wild Pig.

Birds: Kalij Pheasant, Himalayan Monal, Hill Partridge, Blood Pheasant, etc.

Reptiles: Black Cobra and other species

Medicinal Plants: *Aconitum spp.*, etc.

Headwater Protection: The streams under this core zone are: Ngopshi, Zawangteng, Sagang, and Androomgolamri which are the tributaries of Gamrichu.

Ponds: Mokangpresar, Aumchu, Brosarbajug and Nagala Tsho are used as drinking water sources by wild animals and therefore need protection.

C.8 Dalam Core Zone

Boundary Description: The core zone boundary starts from Thazor and follows the Dalam foot trail until it reaches the source of Donglochu where the boundary is diverted to the top of Patuchu and ends at the confluence of Patu chu and Ata ri.

Low Impact Trails: Jando to Dalam

Vegetation: Fir forests

Wild Animals: Himalayan Black Bear, Red Panda, Goral, Serow, Barking Deer, Wild Dog, Red Fox, Assamese Macaque, Mountain Pika

Birds: Himalayan Monal, Snow Partridge, Blood Pheasant, SatryTragopan, Spotted Nut Cracker

Headwater Protection: Main source of Donlochhu and Ata ri that flow to India

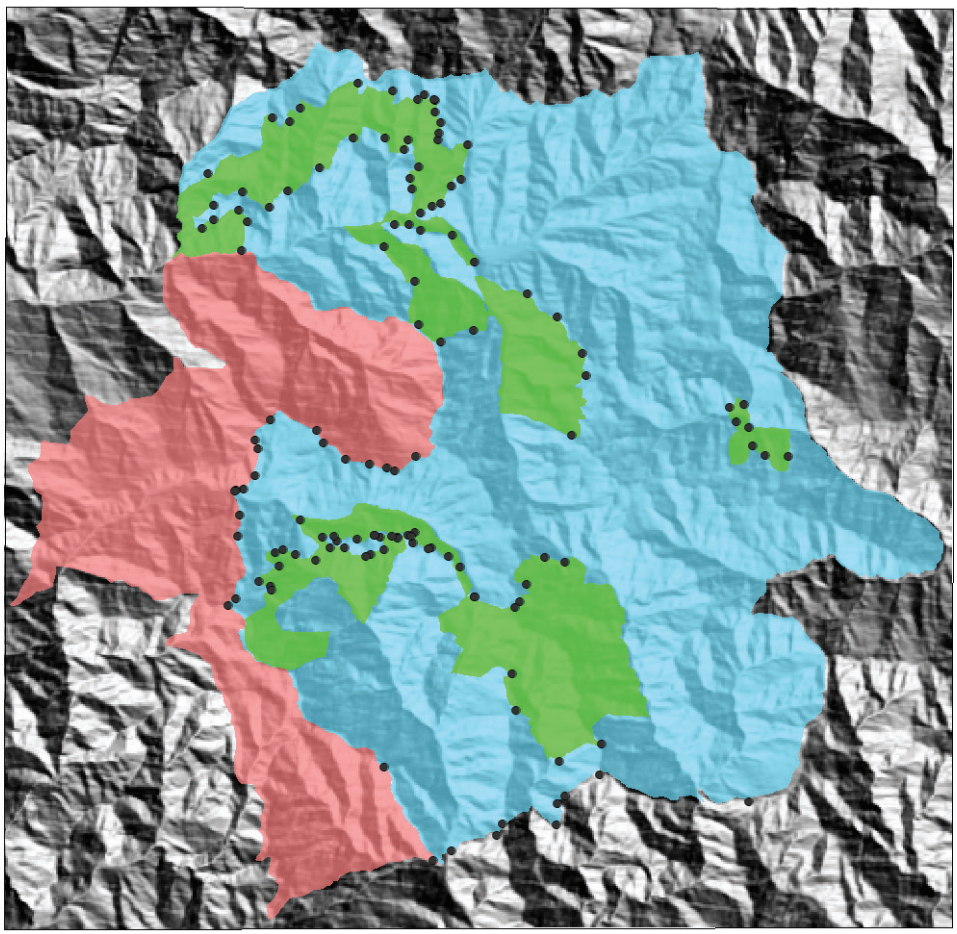
6.2.2 Multiple-use Zone

All areas within the park boundary that are not included in the core zones are considered to be within the multiple-use zone. In this zone, sustainable use of resources by park residents is allowed. Areas for timber, firewood and bamboo extraction in addition to grazing land (pastures) are included in this zone. Recreational areas would also fall in this zone, unless specified in the core zone. Some areas in the multiple-use zone have potential to be considered as a core zone in the future.

6.2.3 Buffer Zone

The buffer zone is demarcated around the park boundary, however; it is not demarcated north and east of the park boundary where the park boundary is also the international boundary with India. Portions of Merak and Sakteng geogs that are not included in the park are included in the buffer zone. The width of the buffer zone at one point stretches up to nine kilometers from the park boundary.

Sakteng Wildlife Sanctuary: Boundary Pillars



Legend

- Zonation Pillar
- Core Zone
- Buffer Zone
- Sakteng Wildlife Sanctuary

0 3.75 7.5 15 km

6.3. Rules and regulations for zones and low impact trails

6.3.1 Legal provisions

The Forest and Nature Conservation Rules of Bhutan (2006) specifies the rules pertaining to zones under Chapter VI- Protected Area Management, as per below:

Section 58 (1) (b): the procedures to be undertaken following declaration of a protected area, including the preparation and implementation of a management plan for the protected area and specification of core zones, buffer zones and other zoning within the protected area.

Section 61 (4) (a): no wildlife may be taken from any core zone;
(b) taking of wildlife within any other zone of a protected area may be permitted only in compliance with the conservation management plan for that protected area.

Section 61 (5) (a): The following activities shall be prohibited within a core zone, except by Forest Officers, and only following the determination that the activity is necessary to accomplish the objectives of nature conservation and the conservation of the protected area:

(i) any kind of construction, including motor roads, buildings, fences, or any physical structures;

(ii) settlement or cultivation;

(iii) any logging, commercial or non-commercial;

(iv) grazing by livestock except in special cases relating to traditional or other necessary local use, only after determination by the Department that such an exception shall not be a violation of the Conservation Management Plan of the protected area;

(v) collection of firewood and non-wood forest produce;

(vi) undertaking any forestry activities

6.3.2 Zoning regulations

In order to ensure proper management and protection of the zones, the following regulations, as presented in the following matrix apply to all zones in SWS:

Table 3: Activities allowed (√) or prohibited (X) in the different zones of SWS

Zone→ Activity ↓	Core zone	Multiple use zone	Buffer zone	Low impact trails	Remarks
Roads construction	X	√	√	X	Requires EIA and standards of a park road
Industry	X	√	√	X	Cottage industry, requires EIA
House construction, settlement	X	√	√	X	* No new settlements and no immigration
Cultivation	X	√	√	X	On registered land
Grazing	X	√	√	X	On registered tsamdrog (pasture) only; grazing may not violate the management plan
Pasture improvement	X	√	√	X	In registered tsamdrog and only non-aggressive species
Fuel wood, construction wood	X	√	√	X	Requires permits/ marking; along trails only fallen trees or those cut for maintenance
Forest produce, including dry wood, soil, stones, fodder, fruits, vegetables, mushrooms, leaf litter, etc.	X	√	√	X	For personal use; commercial use requires permit
Community forestry	X	√	√	X	Not in critical habitat
Logging	X	X	X/√	X	FMUs require EIA and involvement of park management
Camping	X	√	√	X	Follow regulation adopted by park management
Visitors, migrating herds	X	√	√	√	*No stopping for grazing, collecting forest products, etc.

Research	√	√	√	√	Only research contemplated in the management plan, or sanctioned by park management
Habitat management, pest control	X/√	√	√	X/√	If research indicates necessary, or to mitigate effects of natural hazards, such as fires and pests
Taking of wildlife (hunting, fishing, etc.)	X	√	√	X	Of non-protected species and only with permit
Bird watching	X	√	√	√	Requires permit from park management

6.3.3. By-laws

By-laws were drafted during the final stakeholder consultations and signed by SWS officials and individuals and/or community interest groups. These include permissible activities like transiting low impact grazing in core zones, as well as prohibited activities like collection of fresh firewood, longer duration of transit, etc. The by-laws also specify the permitted month of visit to the specific core zones. These by-laws are not reflected in this document, as these will change over time with continued negotiations.

6.4 Resource use areas

Resource use areas were identified during participatory mapping exercises to identify traditional areas used for extraction of timber, firewood and bamboo. These areas are designated under the multiple-use zone and will be supported by resource assessments and management plans such as local forest management plans, community forest management plans, etc.

Table 4: Resource use areas within Sakteng geog

Resources	Villages	Extraction Areas
House Building Timber	Sakteng & Pusa	Narong, Damnya, Borangtser, Gayling, Gotharong, Marzung, Chamshing, Zhentsamtse
	Borangmang & Borangtse	Dakpashisa, Dolo Marpo, Gengotse, Pergumjab, Lubdrang Shingjab
	Thrakthri	Drakchen Jab, Banangtse, Sona Toe, Talo, Damthengtoe, Richikpa
	Dak	Pangzhing, Kambo, Baythang Dakmo
Bamboo	Sakteng, Pusa, Borangmang & Borangtse	Bamukpa, Nyukmateng, Godrang Martang, Draphutse, Zershungma, Mardumthe, Phukshingjab
	Joenkhar	Kembatse, Drakchenjab, Dakjabchungsho, Sengbu toe, Ngagongzhing, Hangongtse, Tshokgarlog
	Dak	Kektongtse, Zojabsa, Phardakma, Nagkhag, Bamdungjug, Sengong
Firewood	Sakteng & Pusa	Balung, Gayling, Borangsha, Nyukteng, Chabchu, Zomsharong, Lokshinang, Drakshasa, Domshisa, Tsungduteng
	Tholong	Droezur, Taksajab, Nyugday, Nukteng
	Borangmang & Borangtse	Chamzhing, Threngtharong, Nyazongteng, Jabteng, Domtshang, Joshisado, Gaypukhapang
	Thrakthri	Tshogatse, Takgonpathe, Drakpzangtheng jug, Phentsarsajab, Toebadro, Drejarsajab
	Dak	Barteng Nang, Damsengteng, Samdartse, Serzhog, Chubateng, Saga ganya, Baydangwog

Table 5 : Resource use areas within Merak Geog

Resources	Villages	Extraction Areas
House Building Timber	Merak & Gengu	Serkem, Charam, Rampazor, Tongshumjab, Shusgang, Kamlung, Sakshum, Gongmanang, Tshega, Baygang, Pangzhung jab, Chumjong, Zewling Nang
	Kheliphu	Nyanglen Ruru, Pherilock, Jataksa, Tachapsa, Dungzhug, ZazupTeng
	Shingkhar	Chumotengtae, Shingkhartae
	Khashiteng	Bemrong, Shingkhartae
Firewood	Merak & Gengu	Nayou, Sendeb, Baygang, Nakarpo, Gormotse, Tseplok, Namtheng
Bamboo	Merak & Gengu	Narnyenang, Tongshumjab, Panglebdrang, Dophung Nang, Cherbaling, Shetimey, Nyugunang
	Kheliphu	Nyanglay Ruru, Jataksa, Tachapsa, Pherilock, Thromshing Zhug

Table 6 : Resource use areas within Lauri Geog

Resources	Villages	Extraction Areas
House Building Timber	Phaju Gonpa	Rashi Drangsa Toe, Youlumpatoe
	Momring & Ramjar	Taktsang, Khakartoe, Dzokhkhaduba, Drangsongmo, Zangjenmo, Tsephu, Laptsa, Ngadokpa, Deyjorum
	Dungmanma	Deytsanphu Toe, Shingmo Wog, Yadakzor, Dechenphodrang Toe, Shingmung Wog.

6.5 Threats and issues

The management plan outlines several threats and issues impacting the implementation of conservation activities in SWS. Field work included repeated visits to the core zones to consider these issues. The following issues continue to pose a serious threat to SWS's conservation activities.

1. **Girdling of trees:** Despite regular patrolling, environmental education programs and continued dialogue with the communities, girdling is a serious concern as communities continue to expand their pastures. Many old girdled trees were observed during the field visits. The trees were girdled in the periphery of the pasture land. This was done to expose the land to sun light to allow better growth of grass for cattle and to also expand the pasture land.

2. **Poaching:** With the establishment of SWS and increased patrolling, poaching has been reduced to some extent. However, a few old traps designed to kill Musk Deer and Himalayan Black Bear were found in the sanctuary during field visits.

3. **Forest fires:** Forest fires used as a tool to expand pasture land have been reduced in the park. A few instances were found in the field, but mostly they were several years old.

4. **Lopping of trees for fodder:** Due to the shortage of grasses for cattle during the winter season, herders have lopped trees in the cold broadleaved forest.

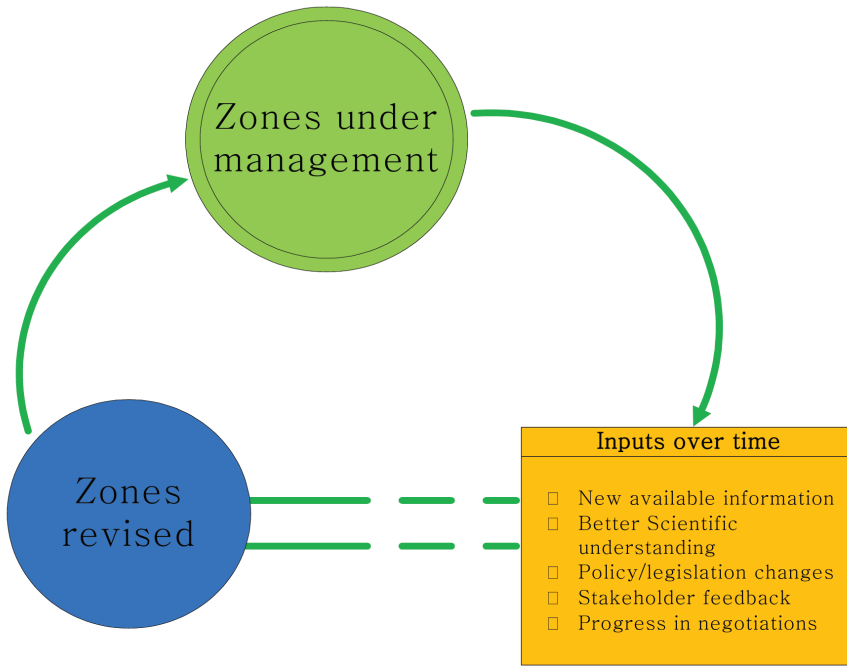
5. **Landslide and erosion:** A huge land slide was found right next to the Serkemla as the main water catchment for Jomo Ri. Landslides and soil erosion pose serious threats, especially in the Dorbrok and Pherilock core zones.

6. **Improper disposal of garbage:** Waste is a serious concern in the sanctuary, with garbage littered along the trails and at camping/transit sites.

7. **Road alignment inside the Gelongphukpa core zone:** The Department of Roads has already surveyed the farm road alignment from Rangjung to Thrakthri and the road now falls within designated core zones. The survey was carried before the designation of management zones by the park. Once the road is constructed, it will be treated as a low impact road and the extraction of forest resources from the sides of the roads will be strictly prohibited.

7 Future Management Strategies

7.1 Dynamism of the zones



The intent of zoning is to consider zones to be dynamic and revise them over time. Inputs will include new available information based on biodiversity surveys, research and other sources of information. With advanced technology and science, there will be a better understanding of scientific concepts as well as more powerful tools like GIS and IT offering better land-use maps. Policy and legislative changes will also require changes in zones to reflect the changing needs of the government and society. Stakeholder feedback and field data will be essential in making revisions to zones.

As mentioned, the percentage area of core zones is small. This can be attributed to a dependence on livestock resulting in large areas under pasture. Over time, SWS management will therefore focus on progressively increasing core zone areas while reducing dependence on livestock through other alternative sources of income. However, livestock husbandry is a part of *Brokpa* culture and cultural preservation is equally important. Therefore, alternate sources of income will aim to supplement livestock husbandry and reduce dependence on livestock, rather than completely replace it. This is also advantageous as reduced livestock populations can mean more pasture land and better forage.

Alternate sources of income will be pursued through ICDPs focusing on eco-tourism, pasture development, local enterprise (cottage industry) development, NWFP domestication and marketing, community forestry, etc.

The long-term goal is therefore geared toward increasing core zones from 19.73% to 50% while reducing livestock dependence from 83% to 50% of income.

7.2 Management strategies

Although management strategies will be dealt with in conservation management plans, this report recommends the following (not limited to) management strategies within zones as summarized in Table 7.

Table 7: Management Strategies by Zone

Management strategies	Zones	Means of implementation	Collaborators
Species/habitat conservation	All zones	Protection, research, surveys	WCD, NBC, international organizations
Sustainable biodiversity management	Multiple-use zones	Local forest management planning, community forestry, NWFP domestication and marketing	FRDD, SFD, DAMC, MoEA
Watershed management	All zones	Headwater protection, land and watershed management	WMD, NSSC, DOA, NEC
Ecotourism development	Multiple-use zones and low impact trails in core zones	Ecotourism management, planning and implementation, capacity building	NRED, TCB
Pasture development	Multiple-use zones	Large-scale pasture development, pasture leasing, fodder plants, grasses	DOL

7.3 Human resources development and capacity building

The successful implementation of zoning plans will depend on adequate human resources. At present, SWS lacks both the quality and quantity of staff to undertake activities recommended in this report and the management plan. The existing staff needs to be trained and supplemented with more staff to ease pressure, particularly with local and international border patrolling.

7.4 Financing

The Tenth Five Year Plan of the Ministry of Agriculture supports the implementation of the activities listed within MOA/23 (Nature Conservation Programme). The specific activities include: management of protected areas, ecotourism, ICDPs, biodiversity and socio-economic surveys, etc. However, the budget allocation depends on the priorities in other protected areas, particularly new ones.

WWF Bhutan has been funding SWS activities since its inception in 2003, and has committed continued financial support particularly in the areas of ecotourism, species conservation and ICDP development.

The Bhutan Trust Fund for Environmental Conservation (BTFEC) is another potential donor in the field of conservation and has also committed support. During the preparation of this document, WWF Bhutan had sourced financial support to supply alternate roofing materials (CGI sheets) to the remaining 374 households of Merak and Sakteng, together with partial funding from BTFEC.

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9. Annex 1: List of Mammals and Birds in SWS included in CITIES & Schedule-I of FNCAB 1995

Sl.No.	Scientific Name	Common Name	Class
1	*Ailurus fulgens*	Red Panda	Appendix I of CITES
2	*Capricornis/Naemorhedus sumatraensis*	Himalayan Serow	
3	*Cuon alpines*	Wild Dog	
4	*Naemorhedus goral*	Goral	
5	*Panthera pardus*	Common Leopard	
6	*Presbytis pileata/ Trachypithecus pileatus*	Capped Langur	
7	*Ursus/Selenarctos thibetanus*	Himalayan Black Bear	
8	*Bos grunniens*	Yak	
1	*Moschus chrysogaster*	Himalayan Musk Deer	Appendix I/II of CITES
1	*Felis chaus*	Jungle Cat	Appendix II of CITES
2	*Macaca assamenesis*	Assamese Macaque	
1	*Martes flavigula*	Yellow Throated Martin	Appendix III of CITES
1	*Moschus chrysogaster*	Musk Deer	FNCAB 1995, Schedule-I
2	*Lophophorus impejenus*	Monal Pheasant	
3	*Panthera pardus*	Common Leopard	
4	*Ursus/Selenarctos thibetanus*	Himalayan Black Bear	
5	*Ailurus fulgens*	Red Panda	
6	*Capricornis/Naemorhedus sumatraensis*	Serow	