TIGER ACTION PLAN FOR BHUTAN (2018-2023)

A landscape approach to tiger conservation

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Nature Conservation Division
Department of Forests and Park Services
Ministry of Agriculture and Forests

Plan Prepared by:

Tandin, Nature Conservation Division
Ugyen Penjor, Nature Conservation Division
Lhendup Tharchen, Nature Conservation Division
Tshering Tempa (PhD), Global Tiger Center
Phub Dhendup, Sarpang Forest Division
Sangay Dorji, Nature Conservation Division
Sonam Wangdi, Nature Conservation Division
Vijay Moktan, WWF Bhutan

With inputs from:
Tiger Sangay, Ugyen Wangchuck Institute for Conservation and Environmental Research
Tashi Dhendup, Ugyen Wangchuck Institute for Conservation and Environmental Research
Phuntsho Thinley (PhD), Ugyen Wangchuck Institute for Conservation and Environmental Research
Eric Wikramanayake (PhD)

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ROYAL GOVERNMENT OF BHUTAN
Ministry of Agriculture & Forests
Tashichhodzong, Thimphu : Bhutan

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FOREWORD

While rest of the world are whirling under the threat of species extinction, habitat loss and changing climate, we here in Bhutan are fortunate to have our visionary monarchs for their stewardship in environmental conservation. We propelled into the 21st century as the champion and the leader in environmental conservation in the world. Today, Bhutan is a part of global biodiversity hotspot and hotspot for wild felids.

Large carnivores are threatened throughout their range and their populations in the wild continue to decline. Just over a century ago, there were as many as 100,000 wild tigers living in Asia. Today, fewer than 3,900 tigers remain in the wild occupying a mere seven percent of their historic range. Tigers remains as Endangered on the IUCN Red List of Threatened Species for almost a half century now. Bhutan as one of the tiger range countries is critical in conserving this charismatic species in wild for perpetuity.

Globally, tigers and the landscapes they occupy plays a significant role in maintaining ecological balance and providing ecosystem and economic services. These magnificent animal occupies a special place in the culture and tradition around the world. In Bhutan, tigers are revered as symbol of strength and power associated with the religion and the culture.

I am delighted to note that this new tiger action plan will be implemented in this crucial time for tiger conservation. Globally, we are in the last quarter of the 2010 St. Petersburg Declaration on tiger population doubling and for Bhutan, it coincides with the starting of the 12th Five Year Plan and the Bhutan for Life Project implementation. I am convinced that our commitment to achieve the global goals through our local actions is clearly manifested in this action plan.

I congratulate and extend my appreciation to the Department of Forests and Park Services and others involved in the formulation of this action plan. I wish them good luck for the successful implementation of the plan.

Tashi Delek!

(Yeshey Dorji)
Minister, Ministry of Agriculture and Forests
Chairman, Global Tiger Forum

PHONE: +975-2-322482, 322129(O) FAX: +975-323153

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SECRETARY

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PREFACE

With the completion of the first Tiger Action Plan from 2006-2015, Bhutan today is a proud home to an estimated 103 tigers which shares the landscape along with other charismatic species such as snow leopards, clouded leopards, elephants and many other globally threatened species. The 2015 tiger population estimate is a massive increase from the 1998 survey which estimated about 75 tigers in the country. This increase in population is a testimony to the importance placed on environmental conservation by our benevolent leaders.

It is my pleasure to introduce the second Tiger Action Plan for Bhutan which will be implemented in the next five years from 2018-2023. I am delighted to know that the plan period is in synchrony with the 12th Five Year Plan of the Royal Government of Bhutan and also the first five year of Bhutan for Life project implementation. This gives us a huge opportunity in harmonizing the strategies and actions of these plans towards achieving the common goal within the limited resources.

As we are in the eighth year of the famous St. Petersburg Declaration of 2010 on doubling the global tiger population by 2022, this new action plan signifies our continued commitment to the declaration and will serve as a guiding document for the next five years in achieving our goals by the end of 2022.

This tiger action plan intends to address the direct threats to tigers through strengthened anti-poaching and combating illegal wildlife trade by enhancing the capacities and coordination of our rangers and law enforcement agencies. Habitat management will be carried out both inside and outside the protected areas to increase and retain the herbivore population in wild which not only lead to increase in tiger population, but also aid in reducing conflict with humans. As ensuring safety of both humans and tigers are important, addressing human-tiger conflict through preventive and adaptive mitigation measures with involvement of the local communities is an important part of this plan.

Lastly, I would like to express my sincere gratitude and congratulations to the Department of Forests and Park Services and others who were involved for their hard work and dedication in coming up with this holistic plan.

Tashi Delek!

(Rinzin Dorji)

PHONE: +975-2-322379, FAX: +975-326834

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Royal Government of Bhutan
Ministry of Agriculture and Forests
Department of Forests and Park Services
Thimphu

DIRECTOR 12th July 2018

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This document is an outcome of unwavering support and valuable contribution from many institutions and individuals. The Department of Forests and Park Services would like to sincerely thank all the Chief Forestry Officers (CFOs) and focal officers from both functional and field offices and Director, Ugyen Wangchuck Institute for Conservation and Environmental Research (UWICER) for their valuable inputs during formulation of the plan. We appreciate the commendable initiative by Nature Conservation Division in taking this task forward.

The Department gratefully acknowledge the contributions of Mr. Phub Dhendup- Sarpang Forest Division, Dr. Phuntsho Thinley, Mr. Tiger Sangay and Mr. Tashi Dhendup- UWICER, Dr. Tshering Tempa- Global Tiger Center, Mr. Vijay Moktan- WWF Bhutan, Mr. Lhendup Tharchen, Mr. Sangay Dorji, Mr. Ugyen Penjor and Mr. Tandin- NCD for their hard work in developing and shaping this plan. We also remain highly indebted to Dr. Eric Wikramanayake for his valuable feedbacks and inputs in this plan.

We would like to extend our heartfelt gratitude to the continued generosity extended by our partners in conserving and promoting our rich biodiversity and particularly tiger conservation works. In particular, we acknowledge the generous financial support provided by WWF Bhutan in development of this action plan.

Tashi Delek and Best Wishes!

(Phento Tshering)

Post Box. No. 1345 Phone: 975 (02) 323055/321185/322487, EPABX: 334458/ 334487 Fax: 322395/322836
Hot line: 211 website: www.dofps.gov.bt

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Executive Summary

With more than 71 percent of its geographic area under forest cover and over 51 percent of the country under protection, Bhutan enjoys the fruit of wise and visionary leadership of our benevolent monarchs in environmental conservation. The stringent yet dynamic conservation legislations backed by pro-environment development policies and Buddhist ethos has propelled us into the 21st century as an 'epitome' and the global leader in environment conservation. Today, Bhutan is a part of global biodiversity hotspot thus explicating our significance in the global conservation.

The tiger has been listed as Endangered on the IUCN Red List of Threatened Species since 1969. Their population in the wild plummeted from over 100,000 just a century ago to fewer than 3,900 today, occupying a mere seven percent of their historic range. In Bhutan, the establishment of Department of Forests in 1952 and enactment of Forest Act of Bhutan in 1969 initiated tiger conservation backed with legal protection. The tiger surveys of 1989, 1998 and 2015 estimated tiger population in the country with improved methods over the years. Today, Bhutan is home to estimated 103 adult tigers freely roaming between 100 and 4300 meters amsl.

Bhutan prepared and implemented the first Tiger Action Plan from 2006 to 2015 much of which were the part of the national tiger recovery program concomitant to the 2010 St. Petersburg declaration of doubling the tiger population. With the first plan expiring in 2015, a revised action plan was felt necessary to carry forward the activities in fulfilment of the commitments to global tiger recovery program and the recommendations from the national tiger survey (2014-2015). This plan is a product of substantial contribution from the field managers, relentless support from the core working group and valuable inputs from the experts and reviewers.

During the inception workshop with the field managers, threats, challenges and their drivers were identified. Major threats to tiger conservation in Bhutan are; 1. Poaching and illegal trade, 2. Prey depletion, 3. Human tiger conflict, 4. Habitat degradation and fragmentation, 5. Diseases and 6. Climate change. The strategies actions and interventions in this plan are designed to directly address the threats and challenges and its drivers.

This action plan was prepared (revised) with the vision of achieving and maintaining a viable population of tigers and their prey, coexisting in harmony with humans in an interconnected landscape. The goal of the action plan is to increase tiger population in Bhutan by 20 percent by 2022 from the 2015 baseline of 103. The goal is expected to be achieved by implementing actions under the four major objectives as listed below.

The first objective is to reduce poaching of tigers by 90 percent. Strengthening anti-poaching using SMART patrolling and zero poaching strategy is the major activity. Additionally, staff capacity, coordination amongst different agencies, infrastructure and equipment development, improving communication, awareness and advocacy and transboundary coordination are deemed important.

Habitat improvement and management is the second important objective. Habitat improvement will be achieved through enrichment plantations, salt lick and waterhole creation, management of grassland and abandoned grazing grounds. Zoning and delineating critical tiger habitats both within and outside protected areas is important for long-term survival of tigers. Developmental activities in such critical habitats should be guided by principles of smart green infrastructure. Some of the tiger habitats will be managed as per the CA|TS standards.

Human-tiger-conflict is detrimental to both humans and tigers. Conflict prevention strategies through awareness, improved livelihood opportunities, and construction of physical barriers are often helpful when supported by mitigation measures like compensation and insurance schemes. Understanding the nature of conflict and its distribution is necessary in developing future management strategies.

Tiger conservation needs to be guided by a sound scientific data and information. For that, periodic assessment of tiger population and distribution is deemed important for the long term conservation planning. Besides, information on ecology, movement and genetics are also essential. In addition, detailed study on the impact of climate change, threats from zoonotic disease and feral/stray dogs on tigers in Bhutan is felt urgent and warrants immediate action.

The plan will be implemented from July 2018 to June 2023 for the period of five years. The total estimated cost is Nu. 619.63 Million of which, majority of the fund will be financed from Royal Government of Bhutan and Bhutan for Life project while the balance fund gap will be sourced from other donors.

List of Acronyms

BTFEC	Bhutan Trust Fund for Environmental Conservation
BFL	Bhutan for Life
CDV	Canine Distemper Virus
CITES	Convention on International Trade of Endangered Species of Wild Fauna and Flora
DoFPS	Department of Forests and Park Services
DoL	Department of Livestock
FNCRR	Forest and Nature Conservation Rules and Regulations 2017
FPED	Forest Protection and Enforcement Division, DoFPS
FYP	Five Year Plan
GEF	Global Environment Facility
GTC	Global Tiger Center, Gelephu
GNHC	Gross National Happiness Commission
IUCN	International Union for Conservation of Nature
MoAF	Ministry of Agriculture and Forests
NCD	Nature Conservation Division, DoFPS
NSB	National Statistics Bureau
PA	Protected Area
RGoB	Royal Government of Bhutan
RMNP	Royal Manas National Park
SMART	Spatial Monitoring and Reporting Tool
TCP	Tiger Conservation Program
UWICER	Ugyen Wangchuck Institute for Conservation and Environmental Research, DoFPS
WWF	World Wildlife Fund

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Chapter I: Introduction

1.1. Environment conservation in Bhutan

While rest of the world are whirling under the threat of species extinction, habitat loss and fragmentation, and climate change, we here in Bhutan are fortunate to have wise and visionary monarchs for their leadership in environmental conservation. The stringent yet dynamic conservation legislations backed by environmental-friendly development policies has helped to maintain the pristine biodiversity intact. This has propelled us into the 21st century as the champion and the leader in environmental conservation in the world. Today, Bhutan is a part of biodiversity hotspot (Myers et al., 2000) and hotspot for wild felids (Tempa et al., 2013). With more than 70 percent of its geographical area under forest cover and over 51 percent of the country protected in the form of national parks and biological corridors, Bhutan is the land of pristine forests, clean water, and fresh air. It is perhaps one of the few landscapes on the earth where snow leopard (*Panthera uncia*) and tiger (*Panthera tigris)* habitat overlaps in a common landscape. Buddhist belief and ethos that respects all life forms has allowed tiger and their prey species to co-exist alongside humans and livestock (Li et al., 2013).

Environmental conservation is one of the four pillars of Bhutan's development philosophy, the Gross National Happiness. As reflected in the constitution, Bhutan is mandated to maintain at least 60 percent of its land under forest cover for all times to come. The forests interwoven with free-flowing rivers and biological corridors houses endangered royal Bengal tigers, elusive snow leopards, elegant black-necked cranes and Asiatic elephants besides many other species.

The paradox of conserving wildlands, while at the same time improving human welfare has exhorted much debate. Most countries are geared towards human welfare and socio-economic development and are experiencing profound economic growth fueled by open markets and globalization. Bhutanese society is undergoing changes in recent times as Bhutan became a constitutional democracy with increasing economic development.

In pursuit of economic development, forests are increasingly cleared for roads, hydroelectric dams, power transmission lines, mines and commercial logging. In the last 5 years, 3 mega hydro-power dams were constructed in prime tiger habitat with growing evidence of the biodiversity threats of hydropower throughout the Himalayas (Pandit & Grumbine, 2012) . While the proponents of these economic development projects claim that environmental disturbances are temporary, the scale and intensity of development is unprecedented through Bhutan's history. Therefore, the need for the conservation of our rich natural heritage is felt urgent more than ever in today's world of globalization and consumerism.

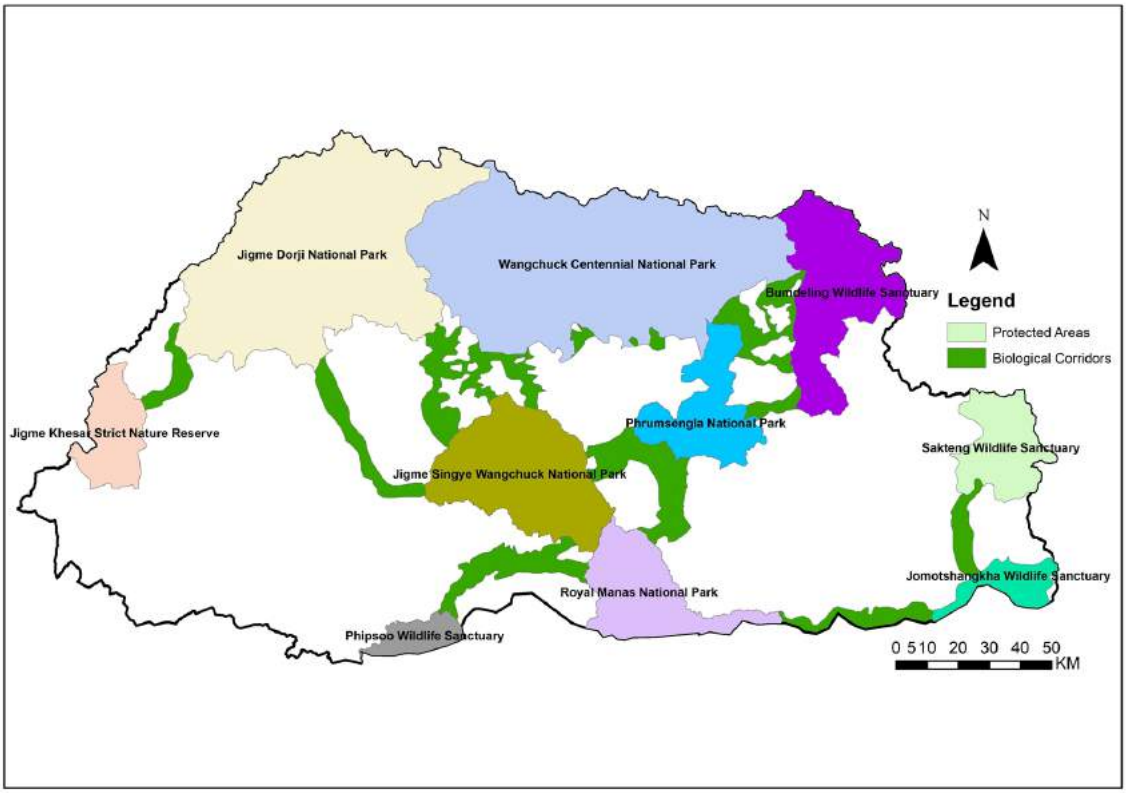


Figure 1. Map showing protected areas of Bhutan.

1.2. Global status and distribution of tigers

Large carnivores are threatened throughout their range and their populations in the wild continue to decline due to habitat loss and fragmentation, prey depletion and direct poaching for illegal trade and commerce (Ripple et al., 2014). The tiger is one of the biggest and most fearsome predators in the world. Just over a century ago, there were as many as 100,000 wild tigers living in Asia. Today, fewer than 3,900 tigers remain in the wild.

Earlier, the tiger was classified into nine subspecies, three of which (Javan, Caspian, and Bali) were considered extinct. A fourth, the south-China subspecies, is most likely extinct in the wild and existing subspecies are Bengal, Indochinese, Sumatran, Siberian, and Malayan (Goodrich et al., 2015). However, the recent taxonomic revision by the International Union for Conservation of Nature (IUCN) Cat Specialist Group has clubbed tigers into two sub species; *Panthera tigris tigris* distributed in mainland Asia, including India, Pakistan, Nepal, Bhutan, Sikkim, China, Russia, Indochina and the Malay Peninsula and *Panthera tigris sondaica* found in Sumatra and formerly Java and Bali (Kitchener et al., 2017). Tigers are listed as "Endangered" in the IUCN Red List of Threatened Species.

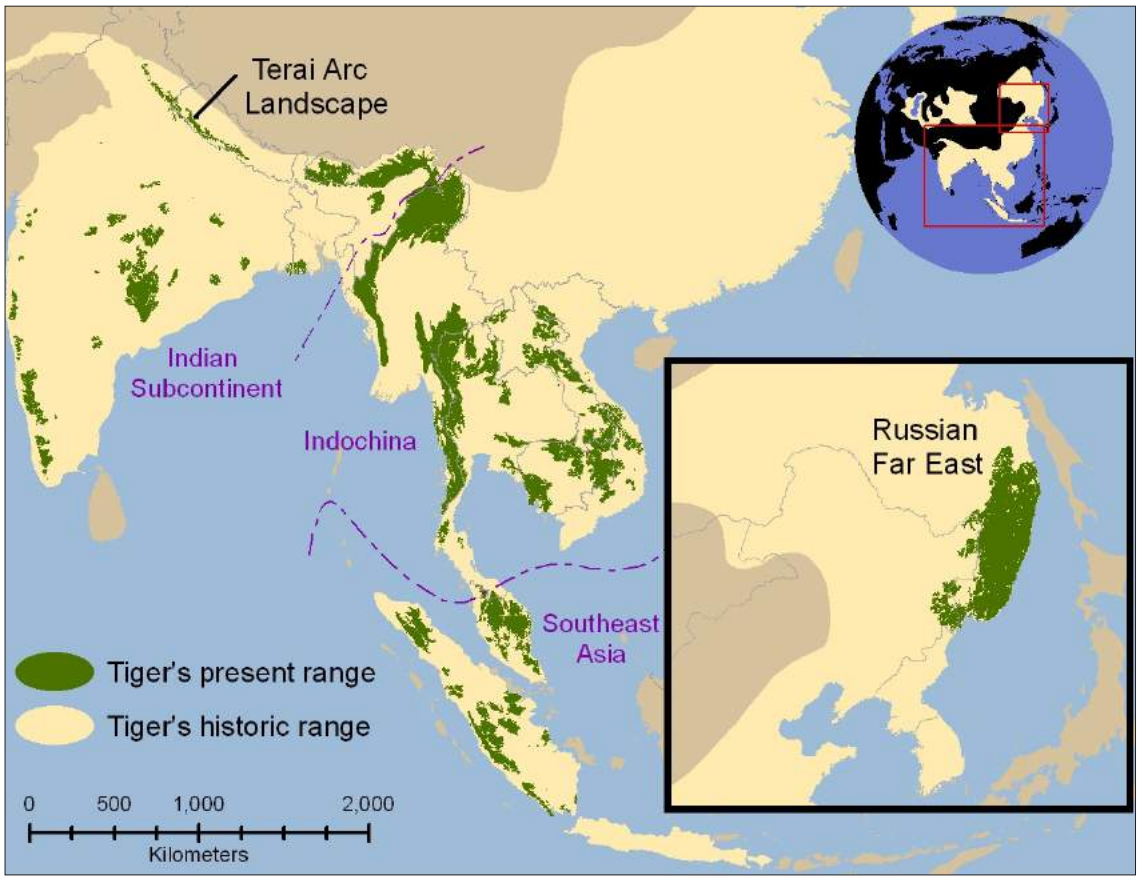


Figure 2. Historic and present distribution of tigers (Dinerstein et al., 2007)

Tigers once roamed across the Asian and Caucasian continent stretching from the south of Caspian Sea in the west to the Indonesian islands of Java and Bali. Tigers today occupy a mere seven percent of its historic range in south and southeast Asia, northeastern China and the Russian far east (Seidensticker, 2010; Dinerstein et al., 2007) in a diverse landscapes from rainforests to grasslands, savannahs to mangrove forests, and high altitude habitats of the Himalayas to the boreal forests of the Russian far east (WWF, 2016) thus displaying the testimony of ubiquity and adaptability across the range of habitat.

1.3. Tiger conservation in Bhutan

The conservation of tigers in Bhutan started with establishment of the Department of Forests in 1952. The first Forest Act of Bhutan in 1969 provided the legal protection to the tiger, the same year tigers were listed as endangered species by IUCN. This act was later replaced by the Forest and Nature Conservation Act of Bhutan 1995 and enlisting tigers under totally protected Schedule I species. The first nationwide tiger survey based on social survey and anecdotes was carried out in 1988 (Dorji & Santiapillai, 1989) and estimated about 150 tigers in Bhutan. The second nationwide tiger survey was carried out using sign survey (pug marks) from 1996 to 1998. The

result from this survey was the basis for the Tiger Conservation Strategy for the Kingdom of Bhutan was developed in 1998 (McDougal & Tshering, 1998).

In 2003, the government created the Tiger Conservation Fund to compensate livestock kills by tiger, snow leopard and common leopard. In the same year, Bhutan ratified the Convention on International Trade in Endangered Species of Wild Flora and Fauna (CITES), thus duly enforcing regulations pertaining to illicit trade of endangered species and their derivatives.

The Tiger Action Plan for the Kingdom of Bhutan (2006-2015) was developed in 2005 (NCD, 2005). This plan identified the key threats to tigers and proposed opportunities for tiger conservation, and laid down detailed planning and activities for the conservation of tiger and its habitats, including the broader plans to mitigate tiger-human conflicts through social and educational components.

Further, the Bhutan National Human-Wildlife Conflicts Management Strategy of 2008 provides specific plans to mitigate the conflicts through livestock intensification and compensation programs, and research on tiger ecology (NCD, 2008). The penalty under the Forest and Nature Conservation Rules of 2006 for killing of a tiger was revised to Nu.1 million in 2013.

The nationwide tiger survey using state of the art method (Spatial Capture-Recapture (SCR) using camera trap was conducted in 2014-2015 (DoFPS, 2015). The recent estimate of tiger population in Bhutan is 103 tigers at a density of 0.46 tigers per 100 km^2 for the whole survey area of 28,225 km^2 (DoFPS, 2015) . Tigers are distributed through the north-western, central, and south-central part of the country between the altitudinal ranges of 150 to 4,300 meters. However, they are mostly concentrated in north-western, central and south-central region. Tiger photographs and signs were also detected from areas like Bumdeling Wildlife Sanctuary, Jigme Khesar Strict Nature Reserve, Samtse Forest Division and Tashigang Forest Division from where tigers were not recorded during the nationwide tiger survey.

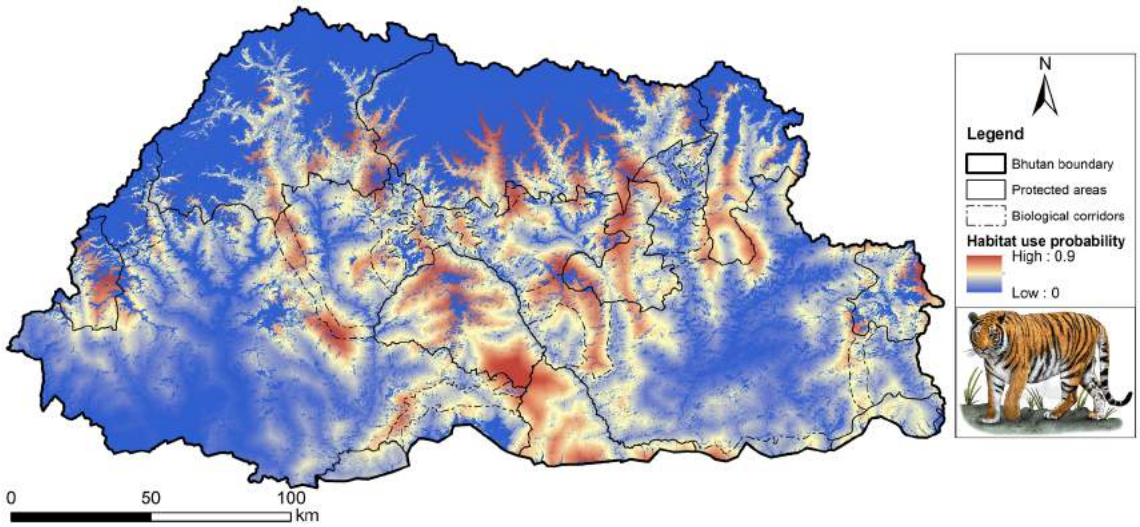


Figure 3. Tiger distribution map for Bhutan (NCD, 2018)

1.4. Rationale and progress for Tiger Action Plan revision

The Tiger Action Plan for the Kingdom of Bhutan 2005-2015, expired in 2015. Significant achievements were made by implementing this tiger action plan. To take forward the tiger conservation works to the next level in the light of new issues and challenges, the revision of old tiger action plan is felt necessary.

In 2010, the heads of the 13 Tiger Range Countries met in St. Petersburg, Russia and pledged to double the number of wild tigers by 2022. Bhutan being one of the tiger range countries has also agreed to increase its tiger population. As we are already halfway through to the St. Petersburg declaration, it is important to expedite the national tiger recovery program to achieve the global commitment. The revised tiger action plan will guide towards achieving the targets by 2022 and further strengthening the tiger conservation in Bhutan.

Also, the findings from the recent tiger survey of 2014-15 emphasizes providing protection outside of the protected areas as tigers are not confined only to the protected areas. The tiger habitat outside the protected areas are mostly engaged in forest related services delivery and do not have specific plans for any conservation activities. The survey findings also recommended zoning of suitable tiger habitats, corridor management, need to strengthen patrolling and tiger recovery and reintroduction programs.

More recently, the death of the tiger at the wildlife rescue and rehabilitation unit in Thimphu due to neuro-cysticercosis has raised concerns over the prevalence of zoonotic diseases in the wild in Bhutan. This needs to be examined and preventive and mitigation measures to be put in place.

This action plan is the product of a detailed consultative meeting with the chief forestry officers and relevant officials of the protected areas and field divisions and tiger biologists at Gelephu in November 2017 followed by the meeting of the core team at Punakha in March, 2018. With extensive reviews and inputs from the experts, the plan was approved by the Department of Forests and Park Services in July 2018.

Chapter II. Importance of tiger conservation

2.1. Ecological significance

As apex predators, large carnivores play an important role in ecosystems and provide important ecosystem services (Karanth et al., 2003; Ripple et al., 2014). Being on the top of ecosystem, tigers are considered as the umbrella species. Their presence in the food web is an indicator of the health of the ecosystem. The tiger range covers around 70 million hectares, the large majority of which is also in four biodiversity hotspots, the world's richest places in terms of plant and animal diversity: Eastern Himalayas, Indo-Burma, Western Ghats and Sundaland (Millenium Ecosystem Assessment, 2005).

In conserving tigers we also conserve some of the richest ecosystems, including habitats of some of the globally threatened species like Asian elephant, greater one-horned rhino, clouded leopards, red pandas, etc. Conservation policies and investment spurred on by interest in tigers will also benefit thousands of other species, many of which are threatened. (WWF, 2017).

In Bhutan's Jigme Dorji National Park, areas occupied by tigers were found to experience significantly fewer incidences of crop and livestock losses to ungulates and guild species compared to those without tigers (Thinley et al., 2018).

2.2. Ecosystem services

Tiger landscapes provide many ecosystem services that spill out beyond the range of the tiger. It is estimated that, on average, forests in tiger landscapes have nearly 3.5 times the amount of carbon than forest areas outside tiger landscapes (WWF, 2017).

Much of South Asia suffer from water stress which is projected to become critical in many areas by 2040, leading to local and international conflict, including political tensions. In addition, land use change, combined with agricultural intensification, has reduced water quality throughout many tiger-range countries (WWF, 2017). Tiger conservation landscapes overlap with nine globally important watersheds, covering 5.8 million km^2, which serve as water sources for agriculture, energy generation, industry and domestic use for up to 830 million people (Pienkowski et al., 2017).

In Bhutan hydropower is the leading sector in generating revenue for the government and the tiger habitats overlap with the headwaters that maintain and regulate flows to the dams. Water regulation and purification values for every hectare of forest protected in Bhutan have been estimated at over US$6,000 per year (Kubiszewski et al., 2012).

Tiger habitats, mostly forests, off-sets the effects of natural hazards such as floods, landslides, tsunamis, storm surge, erosion, droughts, fires, and hurricanes. They also conserve crop wild relatives and wild food sources (WWF, 2017).

2.3. Economic benefits

Tiger landscapes are a vital safety net for local communities by providing access to sustainable natural resources for subsistence and sale. Poor people are highly dependent on forest ecosystem

services for water, food, medicine, fuel, and fiber. It is estimated that 80 percent of the income of the rural poor in southeast Asia is derived from the local biodiversity. Tiger landscapes are repositories of herbal plant richness (WWF, 2017).

Tiger landscapes support agriculture by supplying fresh surface and ground water, protecting soil from erosion, and regulating local weather; they also enhance food security by providing a source of wild genetic material for plant breeders (WWF, 2017).

The other charismatic megafaunas living in tiger landscapes are highly attractive to tourists, creating economic opportunities for local people in the ecotourism industry. It has been estimated that global protected areas generate over US$600 billion per annum in revenue from visitors (Balmford et al., 2015). The role of tigers in tourism is important across the tiger range, although benefits are unevenly distributed (Carter & Allendorf, 2016). Ecotourism is the fast growing and most profitable segment of the tourism industry.

2.4. Cultural significance

Tigers occupy a special space in the spiritual beliefs and cultural history in Asia. Many indigenous people live in tiger habitat and preserving tigers can also preserve traditional cultures. Tiger landscapes protect sacred natural sites important to a range of faiths, and more generally, protection of the tiger plays a very important cultural role around the world.

In Bhutan, tigers are deeply rooted in the religious and cultural heritage. As early as the eighth century, Guru Padmasambhava, was believed to have flown from Singye Dzong to Taktshang (tiger's nest) monastery, riding on a tigress. Tigers are regarded as one of the four powerful animals, called the “four dignities” - *Tak* (Tiger), *Seng* (Snow lion), *Chung* (Garuda), and *Druk* (Dragon). The tiger is the third animal in sequence among the twelve Buddhist zodiac signs.

Culturally, tigers are revered as the symbol of strength and ferocity. Believing that tiger pictures can ward off evil spirits, murals with tiger paintings are often seen. Tigers are believed to be the manifestation of the local deities, and many places in Bhutan are named after the tigers.



Chapter III: Threats and Challenges

3.1. Threats

3.1.1. Poaching and the illegal trade of tiger parts and derivatives

Poaching of tigers for illegal trade is the greatest threat for the tigers' survival today across all the tiger range countries. In Bhutan, wildlife poaching in general has never been considered as a significant threat for conservation, however, not undermining the current trend of wildlife poaching. The belief that most Bhutanese are Buddhist and they will not harm other sentient being is still strongly held by many Bhutanese. Thus, we are unwilling to accept that poaching is a major threat for tigers in Bhutan.

However, the data available with the Department of Forests and Park Services (DoFPS) on tiger poaching is an ominous indication that tiger poaching is rampant in Bhutan. From 2013-2017, 17 cases involving poaching and illegal trade of tigers were recorded and prosecuted. This is almost 20% of the total tiger population in Bhutan. Many such cases would have gone undetected by the authorities. Tiger poaching incidences involving organized groups and various techniques were detected by the frontline staff.

Bhutan, due to porous border with neighboring countries, also witness poaching from across the border in some of the prime tiger habitats. Bhutan is also increasingly being used for the transportation of tiger parts and its derivatives. This is a threat not only for tigers in Bhutan, but also for the tigers in the region.

As tigers are highly territorial animal, infanticide from unrelated male/female is a common occurrence. Poaching of one dominant tiger means wiping out the whole family of that tiger. Thus, tiger poaching in Bhutan like in any other tiger range country is the main threat for the future survival.

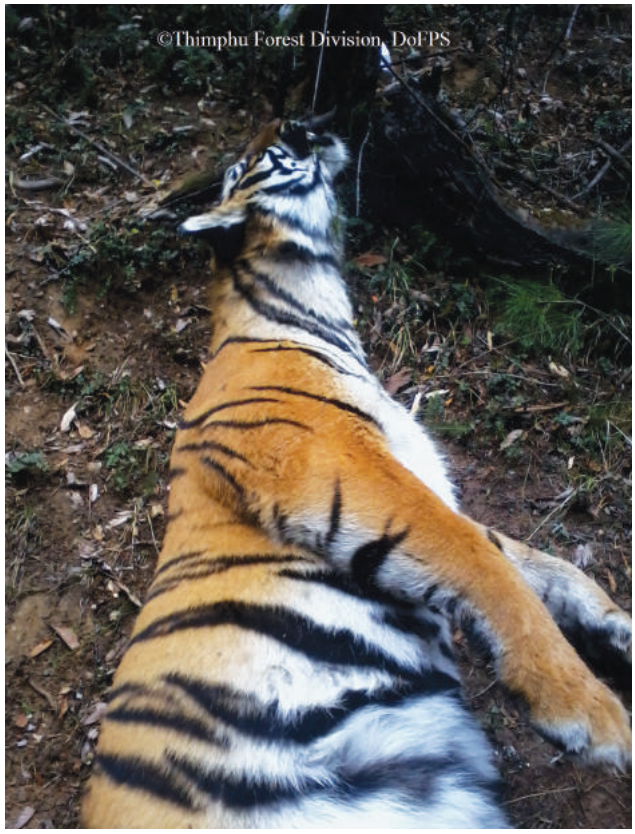
3.1.2. Prey depletion

Tiger as an obligate carnivore will invariably depend on the availability of prey species. In Bhutan, sambar deer and wild pig are the most important prey species of tiger. Livestock also contribute to large proportion of tiger diet (Wang & Macdonald, 2006) in the mid-temperate regions of Bhutan. These assemblages of tiger prey (wild and domestic) further supplemented by smaller prey such as serow, muntjac and goral enable tigers to breed and reproduce even at high elevations. However, as the number of trans-humans decreases in tiger habitats and the prey availability for tigers also decreases. Further, the loss of grazing grounds to shrubs and trees also reduce the prime habitat for wild herbivores.

Wild pigs, sambar deer and barking deer are considered as pests to the farmers and are often prosecuted and killed. Although not widespread, this is a serious threat that should be addressed immediately. Poaching from across the border for the prey species like sambar, gaur and wild pigs is also a major cause for the reduction of prey population.

3.1.3. Human-Tiger Conflict leading to retaliatory killing of tigers

Large carnivores have undergone striking declines in both population size and geographic range with 61 % of the world's large carnivore species being threatened with extinction (Ripple et al., 2014). A major driver of these declines has been persecution by humans driven by real or perceived threats to human lives and/or their livestock (Ripple et al., 2014; Dalerum et al., 2009). Such threats can prompt retaliatory and preventative killings of carnivores, causing their translocations, incur high costs for rural people, and result in negative attitudes by local people, thereby reducing support for conservation (Mc Manus et al., 2014).



A small proportion of Bhutanese households also dwell within Protected Areas and Biological Corridors. An estimated 5325 households reside inside the park, and additional 1662 households reside within the buffer of 500 meters from the parks. About 3425 households falls inside the biological corridors and additional 2748 households within the buffer of 500 meters from biological corridors. These households depend on forests for timber, fodder, fuel and non-wood forest products. For instance, in the Royal Manas National Park (RMNP), a core habitat for tigers, 62 % of households depend on forests for fuel and fodder. Farming communities are also severely impacted by human-wildlife conflict. More than 50% of the households in RMNP succumb to loss of either crops or livestock to wild animals. Poisoning of the livestock kills and setting up snares are often deployed in retaliation to the tigers.

3.1.4. Habitat degradation, fragmentation, and loss

Bhutan being a growing economy, developmental activities are taking a heavy toll on natural resources and is expected to accelerate in the coming years. As per the Annual RNR Statistics of 2016, within the last five years, Bhutan has lost 38,581 acres of State Reserve Forest to infrastructure development like power transmission lines, roads, institutions, land substitution, etc., (MoAF, 2016).

Tiger is a wide-ranging species and requires a large tract of connected landscapes with minimal human interference. Habitat fragmentation due to infrastructure development can limit the dispersal of new individuals, thereby causing bottleneck in gene flow (Mills, 2012).

Thus, securing the critical habitats for tigers and its prey will be instrumental in saving the wild tigers from local extinction.

3.1.5. Diseases

In addition to the pressure of habitat loss, poaching and retaliatory killing, a new threat to tiger populations in the wild has surfaced in the form of communicable zoonotic diseases. There is a need for long-term wildlife monitoring and health surveillance in identifying emerging threats in endangered species.

Canine distemper virus (CDV) is the second most common cause of infectious disease death in domestic dogs and is a significant viral disease of global importance in common and endangered wild carnivores. CDV has recently been identified in populations of wild tigers in Russia and India and is a significant threat to small, isolated tiger populations.

The recent incident of tiger which came close to human habitation and later captured and died at the wildlife rescue and rehabilitation unit at Taba was discovered with tapeworm cysts in the brain which is suspected to be contacted from domestic animals.

3.1.6. Climate change

Climate change is an emerging and important threat to biodiversity (Beamount et al., 2011) and is likely to affect the persistence of large, space-requiring species through habitat shift, loss, and fragmentation. Anthropogenic land and resource use changes related to climate change can also impact the survival of wildlife. Thus, climate change has to be integrated into biodiversity conservation plans (Forrest et al., 2012).

The tiger habitats in Bhutan are mostly montane habitats and these are some of the most vulnerable ecosystem to climate changes. Climate change impacts may manifest directly, such as through the physiological stress experienced when ambient summer temperatures exceed organisms' tolerance level. This would lead to shift in their ranges from productive prime lowland tiger habitats to less productive uplands. Other impacts occur indirectly through effects on interactions with other species including prey, co-predators (guild), competitors, parasites or hosts, or on a species' habitat, as well as through interactions with other putative threatening processes such as habitat loss. Erratic monsoon and extreme weather patterns may lead to failure

in agriculture crops thereby increasing the poverty of the farming communities in rural areas and increase the incidences of tiger poaching. Poverty, poaching, and wildlife trades are intricately linked to each other (Challender & MacMillan, 2014; Duffy & St John, 2013).

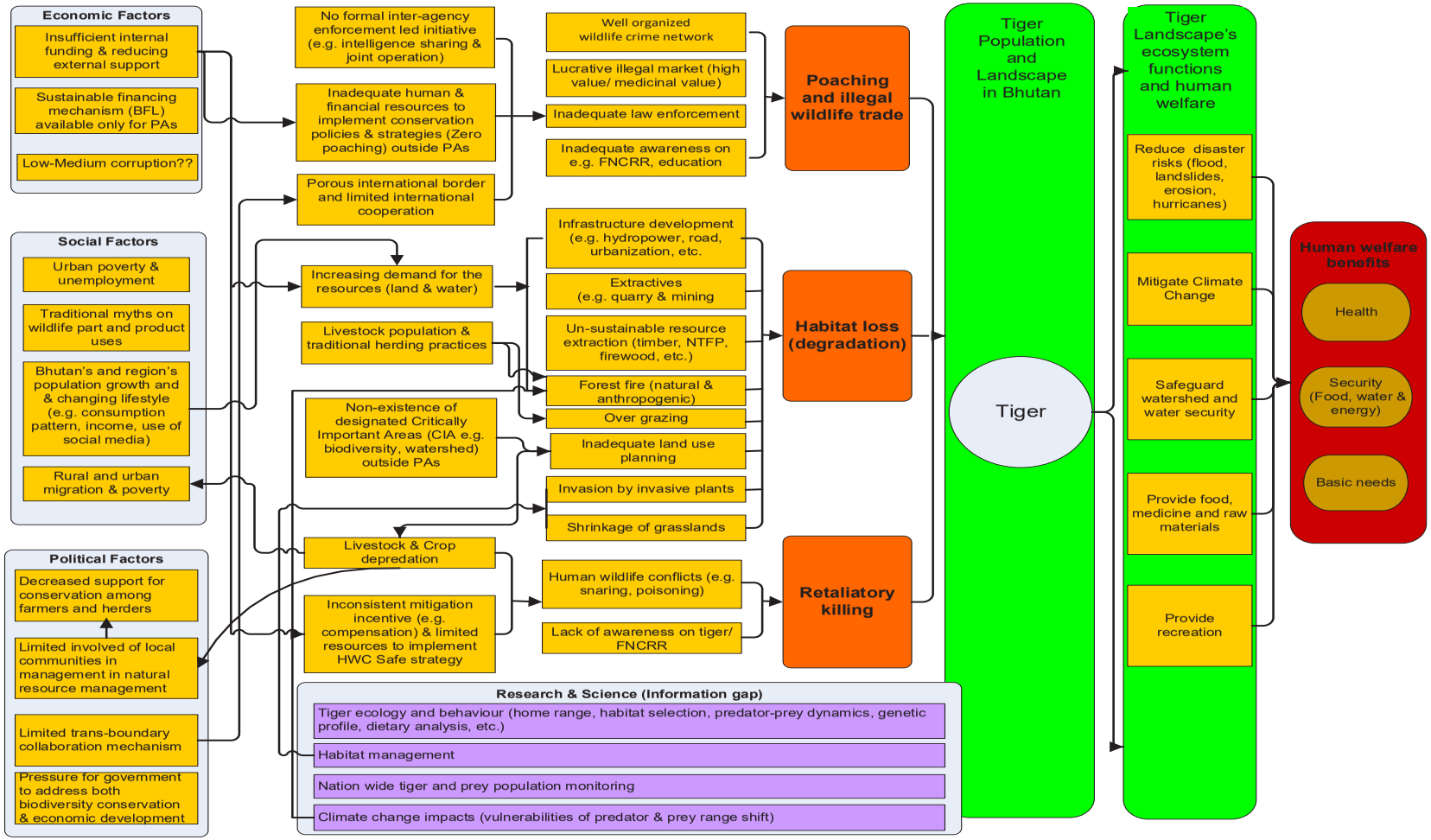
3.2. Challenges

3.2.1. Inadequate resources and capacity for tiger conservation

Studies show that fewer than 10 percent of the protected areas in tiger landscapes have highly effective management, and 20 percent have an absolute lack of management. A global study on the management effectiveness in protected areas found that 65 percent of the assessed protected areas had significant management deficiencies (GTIS, 2010).

The assessment report on the protected areas of Bhutan shows that the protected areas are managed well. However, the assessment found that effectiveness is limited by a low level of resources (both financial and technical) and due to gaps in monitoring and research data, which limits the ability to understand the impact of conservation intervention, reaction to changing conditions and undertake adaptive management to improve efficiency and effectiveness (MoAF, 2016).

Conceptual Framework on Tiger Conservation in Bhutan



Chapter IV: Action Plan

4.1. Vision, Goal and Objectives

4.1.1. Vision:

"A viable population of tigers and their prey, coexisting with humans in an interconnected landscape"

4.1.2. Goal:

By 2023 tiger population in Bhutan increased by 20 percent from the 2015 baseline through enhanced protection and improved habitat.

4.1.3. Objectives

Objective I: Reduce poaching of tigers by 90 percent at the end of plan period.

Objective II: Manage critical tiger habitats within and outside protected areas.

Objective III: Reduce human-tiger conflict.

Objective IV: Increase science based information on tiger, prey and their landscape.

4.2. Objective I: Reduce poaching of tiger by 90 percent at the end of plan period.

Rationale

Illegal killing, trade and use has been, and remains today, one of the main causes of the drastic and apparently continuing decline in the numbers of many world's most charismatic endangered species (Corlett, 2007). The DoFPS during the year 2013 and 2014 recorded 159 cases of wildlife crime and collected more than Nu.10.5 million as fines and penalties. In the last five years from 2013-2007, 17 cases involving poaching and illegal trade of tiger were recorded and prosecuted. Species such as the musk deer and the Himalayan black bear are poached for the musk and bile respectively, while tiger and common leopard are indiscriminately caught in the snares intended to trap other species or are deliberately poisoned in retaliation.

In order to tackle poaching and illegal trade of wildlife including charismatic species such as tiger and elephants, Bhutan now adopts a Zero Poaching Strategy containing six major pillars: 1) Assessment; 2) Technology; 3) Capacity; 4) Community; 5) Prosecution; and 6) Cooperation. The National Zero Poaching Strategy (2018-2023) containing a more unified anti-poaching actions is now in place for rollout at national level. The activities of this action plan will be supported by Zero Poaching Strategy for effective implementation and measurably move towards zero poaching in all the important habitats of tigers in Bhutan.

Output 1.1: Current wildlife protection in Bhutan assessed.

Action 1.1.1: Conduct protection assessment and develop poaching hotspot map, identify priority areas for enforcement and enhance SMART rollout.

Output 1.2: SMART patrol program fully implemented by all the field offices.

Action 1.2.1: Finalize setting up SMART data model & reporting requirements for Bhutan.

Action 1.2.2: Train data officers on SMART software for tactical patrolling.

Action 1.2.3: Carry out regular SMART patrolling in all field divisions.

Action 1.2.4: Develop mechanisms to share intelligence reports among the field offices.

Action 1.2.5: Develop and maintain database of patrolling and surveillance reports at the field offices and headquarter.

Action 1.2.6: Carry out refresher course and capacity building on SMART patrolling.

Output 1.3: Strengthened infrastructure and equipment support for anti-poaching effectiveness.

Action 1.3.1: Set up Forest Protection and Enforcement Unit (FPEU) in each forest division and protected areas.

Action 1.3.2: Strengthen Forest Protection and Enforcement Section under Forest Protection and Enforcement Division.

Action 1.3.3: Set up and equip guard posts in strategic locations.

Action 1.3.4: Support frontline staff with field gears to patrol remote areas.

Output 1.4: Improved communication systems for protection.

Action 1.4.1: Set up repeater for wireless communication in appropriate locations.

Action 1.4.2: Maintain and improve existing communication system.

Output 1.5: Awareness campaigns conducted on significance of tiger conservation.

Action 1.5.1: Conduct education and awareness campaigns among communities on ills of wildlife poaching.

Action 1.5.2: Organize religious discourses on the spiritual linkage of conservation and human wellbeing.

Action 1.5.3: Identify & support nature clubs in schools as ambassador of conservation.

Action 1.5.4: Observe Global Tiger Day at appropriate locations.

Output 1.6: Strengthened capacities of law enforcement divisions under MoAF.

Action 1.6.1: Strengthen and support legal services under MoAF.

Actionn1.6.2: Conduct awareness workshop on FNCRR and other relevant legislations for all the field divisions.

Action 1.6.3: Train field staff in basic enforcement skills including wildlife crime detection and prosecution.

Output 1.7: Enhanced cooperation and coordination among the law enforcement agencies.

Action 1.7.1: Conduct workshop on detection of illegal wildlife trade with law enforcement agencies.

Action 1.7.2: Develop protocols for recording and reporting of illegal wildlife trade.

Action 1.7.3: Formalize inter-agency intelligence led enforcement initiatives at national level.

Action 1.7.4: Strengthen on ground intelligence led enforcement initiatives.

Output 1.8: Strengthened transboundary cooperation on tiger conservation.

Action 1.8.1: Organize regular meetings and workshops at transboundary level to discuss issues, challenges and best practices.

Action 1.8.2: Arrange exchange visits for the forestry officials.

Action 1.8.3: Coordinate and collaborate with park official and other stakeholders from India on synchronized anti-poaching patrol, tiger monitoring and other activities.

4.3. Objective II: Manage critical tiger habitats within and outside protected areas

Rationale:

Habitat degradation and fragmentation is another primary threats to maintaining viable population of tigers and their prey in the country. Empty forest syndrome (Datta, Anand, & Naniwadekar, 2008) is the common phenomena in the mountainous landscape. A good forest cover do not necessarily translate into a good tiger habitat. Our leaders and predecessors has done extremely well in protecting the forest and securing the habitats of tigers in Bhutan.

As Bhutanese farmers abandoned the old practice of *tseri* agriculture (slash and burn agriculture practices) and trans-migratory livestock herding practice, *tseri* and grasslands are overtaken by woody shrubs and trees (Siebert & Belsky, 2014). Intermediate disturbance regimes like fires and logging trend to increase herbaceous biomass for ungulate which in turn may benefit carnivores (Hebblewhite, Munro, & Merrill , 2009). Heterogeneous habitat (mixed of grasslands and grazing ground, forests) instead of pure forests covers tend to support more of the tiger's primary prey species (Bhattarai & Kindlmann, 2012; Simcharoen et al., 2014).

Except in small pocket of RMNP, active habitat management is not being carried out in most tiger habitats in Bhutan. The existing alluvial grasslands are invaded by trees and other woody shrubs in the south. The traditional grazing ground are also increasingly being lost to trees and

woody species in the mid-temperate forests as our farmers are increasingly abandoning their old lifestyle of migratory cattle herding. Therefore, traditional grazing grounds in the temperate mid-altitudes and existing alluvial grasslands in the south should be actively managed so that it will benefit ungulate species and other large tiger prey.

Thus, to fulfil our objective of increasing tiger number in Bhutan by 20% by 2023, an active habitat improvement is critical.

Also in order to maintain ecological integrity and connectivity of Bhutan's tiger landscape, it is imperative to identify and map areas of high ecological significance like breeding/source sites; good tiger habitat under high anthropogenic threats; tiger habitat with high religious and cultural significance; and connectivity breaks and bottleneck habitat areas.

A systematic review of all the legislation, policies and plans has to be carried out in order to harmonize tiger habitat management with conflicting human land-use.

Output 2.1: Critical tiger and their prey habitats zoned and delineated within and outside the protected area network

Action 2.1.1: Identify and map critical tiger habitat for protection and management interventions.

Action 2.1.2: Conduct stakeholder consultation meeting to harmonize critical tiger habitat maps with developmental master plans.

Output 2.2: Critical tiger habitats managed as per the habitat management guidelines

Action 2.2.1: Carryout grassland management including controlled burning and weed eradication.

Action 2.2.2: Initiate habitat improvement through enrichment plantation of native palatable species and removal of invasive species.

Action2.2.3: Maintain and improve the existing cattle grazing lands (tshamdos) for wild herbivores.

Action 2.2.4: Maintain natural water holes and saltlicks and create new ones on need basis.

Output 2.3: Principles of smart-green infrastructure adopted and implemented for infrastructure development in the critical tiger habitats.

Action 2.3.1: Organize sensitization workshops on smart-green infrastructure with relevant stakeholders.

Action 2.3.2: Organize exposure trips for relevant stakeholders to understand and appreciate the features of smart-green infrastructure.

Action 2.3.3: Incorporate smart-green features in the national and local infrastructure development plans.

Action 2.3.4: Enforce and monitor smart-green features in infrastructure development in the tiger habitats.

Output 2.4: Tiger and prey habitat change and management interventions studied and monitored.

Action 2.4.1: Identify and establish permanent plots in tiger habitats at different ecological zones.

Action 2.4.2: Assess the effects of road and infrastructural developments on the habitat connectivity for tiger and prey.

Output 2.5. At least 5 tiger sites (PAs and forest divisions) managed as per CA|TS standards.

Action 2.5.1: CA|TS registration of the tiger sites.

Action 2.5.2: Field assessment of the tiger sites and propose for accreditation to CA|TS.

4.4. Objective III: Reduce human-tiger conflict

Rationale

Human–wildlife conflict is one of the most critical threats faced by many wildlife species today (Dickman, 2010). Conflict between people and felids is one of the most urgent wild cat conservation issues worldwide, yet efforts to synthesize knowledge about these conflicts have been few. The severity of conflict increases with felid species' body mass and is therefore of greatest significance for the conservation of the larger species (Inskip & Zimmermann, 2009).

In Bhutan, restrictions on the use of common grazing lands by farmers and a culture of lax livestock husbandry practices, have exacerbated the conflict (Wang & Macdonald, 2009) and eroded the Buddhist ethic of tolerance towards predator. In addition, the land-sharing ethic that characterizes the regulation of Bhutanese protected areas allows natural resource use (e.g., grazing, agriculture, and collection of non-wood forest products) within park boundaries (Wang, 2010), which increases the chances of conflicts. Accordingly, farmers in central Bhutan ranked livestock predation, together with crop damage, as the most serious threats to their livelihood, and several farmers expressed a desire to exterminate problem wildlife (Wang & Macdonald, 2006).

Output 3.1: Understood human tiger conflict scenario in Bhutan

Action 3.1.1: Carry out hotspot mapping highlighting spatio-temporal characteristics of the conflict.

Action 3.1.2: Assess social characteristics (social dynamics and tolerance level), severity and impacts of the conflict.

Action 3.1.3: Develop and maintain human- tiger conflict data base both at central and field level.

Output 3.2: Enhanced prevention of human tiger conflict in Bhutan.

Action 3.2.1: Conduct mass education and awareness on the conflict scenario and preventive measures, policy, strategy and science of human-tiger conflict in Bhutan.

Action 3.2.2: Improve livestock management through improved breeds and enhanced guarding practices.

Action 3.2.3: Install low-voltage electric fences to minimize loss of crop and cattle to wildlife.

Action 3.2.4: Establish and strengthen visitor information centers at field offices.

Output 3.3: Mitigation measures put in place in case of conflict occurrence

Action 3.3.1: Establish and strengthen HWC committee at national and community level.

Action 3.3.2: Develop a standard conflict reporting system for Bhutan.

Action 3.3.3: Develop national policy for ex-gratia payment in the event of loss of human life or injury.

Action 3.3.4: Strengthen and support the livestock insurance and compensation schemes.

Action 3.3.5: Initiate community based ecotourism in the tiger landscapes.

Action 3.3.6: Link and establish PES schemes in the tiger landscapes.

4.5. Objective IV: Increase science based information on tiger, prey and their landscape

Rationale

It is often said "you can't manage what you don't measure". A fundamental approach to effective conservation and management must be guided by rigorous science. And information generated through science-based gauge must be put into use in various formats.

Monitoring of wildlife population is one of the most important management programs that helps managers and decision makers to detect the extent and direction of wildlife population changes (Karanth et al., 2003; Mills, 2012; Oli & Mills, 2013). Targeted, or hypotheses based monitoring (Nichols & Williams , 2006) should be incorporated as part of our programs for tigers and other wildlife in Bhutan. This will not only detect the changes in the wildlife population trends, but also help identify the cause of such changes. For example, if poaching is a primary threat for tiger conservation in Bhutan, then designing monitoring protocols to detect poaching activities will provide information on the severity of poaching and its impact to tigers. This will enable managers to take appropriate management actions, rather than waiting to see the trend of

population decline and then beginning to ask if poaching or disease or other factors are the main cause of the decline.

Camera trapping has become one of the most important tools for monitoring the tiger populations. This should be carried out on regular basis in the protected areas. Such monitoring should be expended to other tiger habitat at national level every 5 years. To monitor tiger movements and fine scale resources selection and to address and prevent human wildlife conflicts, radio-telemetry studies must be conducted. Social demographics and public perception monitoring should be carried out every 5 years in the protected areas.

Output 4.1: Tiger and prey population periodically monitored using robust scientific design and analysis.

Action 4.1.1: Establish long term monitoring protocol for tigers and prey species.

Action 4.1.2: Conduct nationwide tiger population revalidation survey every five years.

Action 4.1.3: Evaluate tiger and prey distribution and produce demographic reports.

Action 4.1.4: Conduct survey on prey using standard methodology (sign surveys, distance sampling, point counts, double observation, and dung surveys).

Action 4.1.5: Strengthen national database of tigers and other wild animals.

Action 4.1.6: Train and equip tiger research and monitoring teams.

Action 4.1.7: Conduct economic valuation of tiger habitats in Bhutan.

Output 4.2: Established and strengthened information on tiger ecology and movement through study and identify important environmental and anthropogenic variables in relation to tiger habitat use and selection.

Action 4.2.1: Compile all available data and information on tigers and prey species within DoFPS.

Action 4.2.2: Conduct study to assess habitat condition for tiger and prey.

Action 4.2.3: Conduct radio collaring of tigers at different habitats to study the behavior and spatial movement ecology.

Action 4.2.4: Enhance capacity of field staff on animal handling and management.

Action 4.2.5: Perform population viability assessment of tiger and prey population using statistical and mathematical models (population projection and carrying capacity).

Action 4.2.6: Conduct dietary selection by tiger and prey species

Output 4.3: Established genetic database of tigers in Bhutan.

Action 4.3.1: Establish genetic lab to perform genetic analysis of tigers and its co-predators

Action 4.3.2: Train relevant staff on genetic analysis and profiling.

Action 4.3.3: Establish and strengthen genetic database of tigers and prey.

Action 4.3.4: Produce report on genetic profiles of tigers in Bhutan.

Output 4.4: Assess impacts of potential disturbance regimes and disasters on tiger and prey population.

Activity 4.4.1: Assess impact of climate change on tiger and prey habitats and develop adaptation plan.

Activity 4.4.2: Assess disease threat to tigers or their prey from livestock and feral animals and monitor where necessary.

Activity 4.4.3: Strengthen wildlife clinic and laboratory.

Activity 4.4.4: Assess the impact of feral dogs on wildlife population and manage dog population.

Chapter V: Plan Implementation and Monitoring

5.1. Institutional Arrangements

The plan implementation will be coordinated by NCD in collaboration with the functional divisions, UWICER, Global Tiger Center, field offices and other relevant agencies. However, the activities will be implemented by the field offices through larger landscape based projects with RGoB funding, Bhutan for Life Project (BFL) and other donor funded projects or through smaller site bases projects.

5.2. Work Plan and Budget

The major portion of funding for this five year tiger action plan is secured from the 12th FYP of the RGoB and the BFL as most of the activities are aligned. However, funding from other donors like WWF, Bhutan Trust Fund for Environmental Conservation, United Nations Development Program, Bhutan Foundation and other international donors will be sourced to cover tiger conservation works outside the protected areas where funding is not secured.

The total budget required for the implementation of the tiger action plan for the next five years is **Nu. 619.63 Million.** The majority of the budget will be met from RGoB and BFL contribution while the funding gap will be sourced from other donors.

Table 1: Work plan and budget

Vision: "A viable population of tigers and their prey, coexisting with humans in an interconnected landscape"						
Goal: By 2023 tiger population in Bhutan increased by 20 percent from the 2015 baseline through enhanced protection and improved habitat.	**(Budget in Million Ngultrums)**					
Activities	Year I 2018-19	Year II 2019-20	Year III 2020-21	Year IV 2021-22	Year V 2022-23	**Sub-Total**
Objective I: Reduce poaching of tiger by 90 percent at the end of plan period.						
Output 1.1: Current wildlife protection in Bhutan assessed.						
Action 1.1.1: Conduct protection assessment and develop poaching hotspot map, identify priority areas for enforcement and enhance SMART rollout.	3.60					3.60
Output 1.2: SMART patrol program fully implemented by all the field offices.						
Action 1.2.1: Finalize setting up SMART data model & reporting requirements for Bhutan.	0.50					0.50
Action 1.2.2: Train data officers on SMART software for tactical patrolling.	0.90					0.90
Action 1.2.3: Carry out regular SMART patrolling in all field division.	30.00	30.00	30.00	30.00	30.00	150.00
Action 1.2.4: Develop mechanisms to share intelligence reports among the field offices.	0.50					0.50
Action 1.2.5: Develop and maintain database of patrolling and surveillance reports at the field offices and headquarter.	1.00	1.00				2.00
Action 1.2.6: Carry out refresher course and capacity building on SMART patrolling.			1.50	1.50		
Output 1.3: Strengthened infrastructure and equipment support for anti-poaching effectiveness.						
Action 1.3.1: Set up Forest Protection and Enforcement Unit (FPEU) in each forest division and protected areas.	0.20					0.20
Action 1.3.2: Strengthen Forest Protection and Enforcement Section under Forest Protection and Enforcement Division.	0.50	0.50				1.00
Action 1.3.3: Set up and equip guard posts in strategic locations.	5.00	5.00	10.00	10.00	5.00	35.00
Action 1.3.4: Support frontline staff with field gears to patrol remote areas.	6.00	6.00	6.00	6.00	6.00	30.00
Output 1.4: Improved communication systems for protection.						
Action 1.4.1: Set up repeater for wireless communication in appropriate locations.	1.00	1.50	1.50	1.50	1.00	6.50

Action 1.4.2: Maintain and improve existing communication system.	1.00	1.00	1.00	1.00	1.00	5.00
Output 1.5: Awareness campaigns conducted on significance of tiger conservation.						
Action 1.5.1: Conduct education and awareness campaigns among communities on ills of wildlife poaching.	0.50	0.50	0.50	0.50	0.50	2.50
Action 1.5.2: Organize religious discourses on the spiritual linkage of conservation and human wellbeing.	0.10	0.10	0.10	0.10	0.10	0.50
Action 1.5.3: Identify & support nature club in schools as ambassador of conservation.	1.50	1.50	1.50	1.50	1.50	7.50
Action 1.5.4: Observe Global Tiger Day at appropriate locations.	0.50	0.50	0.50	0.50	0.50	2.50
Output 1.6: Strengthened capacities of law enforcement divisions under MoAF.						
Action 1.6.1: Strengthen and support legal services under MoAF	0.50	0.50				1.00
Action 1.6.2: Conduct awareness workshop on FNCRR and other relevant legislations for all the field divisions.	1.50		1.50		1.50	4.50
Action 1.6.3: Train field staff in basic enforcement skills including wildlife crime detection and prosecution.		2.00		2.00		4.00
Output 1.7: Enhanced cooperation and coordination among the law enforcement agencies.						
Action 1.7.1: Conduct workshop on detection of illegal wildlife trade with law enforcement agencies.	0.80		0.80		0.80	2.40
Action 1.7.2: Develop protocols for recording and reporting of illegal wildlife trade.	0.10					0.10
Action 1.7.3: Formalize inter-agency intelligence led enforcement initiatives at national level.	0.20					0.20
Action 1.7.4: Strengthen on ground intelligence led enforcement initiatives.	1.00	1.00	1.00	1.00	1.00	5.00
Output 1.8: Strengthened transboundary cooperation on tiger conservation.						
Action 1.8.1: Organize regular meetings and workshops at transboundary level to discuss issues, challenges and best practices.	0.40	0.40	0.40	0.40	0.40	2.00
Action 1.8.2: Arrange exchange visits for the forestry officials.		0.90			0.90	1.80
Action 1.8.3: Coordinate and collaborate with park official and other stakeholders from India on synchronized anti-poaching patrol, tiger monitoring and other activities.	0.50	0.50	0.50	0.50	0.50	2.50

Objective II - Manage critical tiger habitats within and outside protected areas.						
Output 2.1: Critical tiger and their prey habitats zoned and delineated within and outside the protected area network.						
Action 2.1.1: Identify and map critical tiger habitat for protection and management interventions.	0.80					0.80
Action 2.1.2: Conduct stakeholder consultation meeting to harmonize critical tiger habitats with developmental master plans.	0.25	0.25				0.50
Output 2.2: Critical tiger habitats managed as per the habitat management guidelines.						
Action 2.2.1: Carryout grassland management including controlled burning and weed eradication.	3.50	3.50	3.50	3.50	3.50	17.50
Action 2.2.2: Initiate habitat improvement through enrichment plantation of native palatable species and removal of invasive species.	7.00	7.00	7.00	7.00	7.00	35.00
Action2.2.3: Maintain and improve the existing cattle grazing lands (tshamdos) for wild herbivores.	4.00	4.00	4.00	4.00	4.00	20.00
Action 2.2.4: Maintain natural water holes and saltlicks and create new ones on need basis.	3.00	3.00	3.00	3.00	3.00	15.00
Output 2.3: Principles of smart-green infrastructure adopted and implemented for infrastructure development in the critical tiger habitats.						
Action 2.3.1: Organize sensitization workshops on smart-green infrastructure with relevant stakeholders.	0.50		0.50			1.00
Action 2.3.2: Organize exposure trips for relevant stakeholders to understand and appreciate the features of smart-green infrastructure.		1.00		1.00		2.00
Action 2.3.3: Incorporate smart-green features in the national and local infrastructure development plans.				0.50		0.50
Action 2.3.4: Enforce and monitor smart-green features in infrastructure development in the tiger habitats.					0.25	0.25
Output 2.4: Tiger and prey habitat change and management interventions studied and monitored.						
Action 2.4.1: Identify and establish permanent plots in tiger habitats at different ecological zones.	1.00	1.00				2.00
Action 2.4.2: Assess the effects of road and infrastructural developments on the habitat connectivity for tiger and prey.				0.20	0.20	0.40

Output 2.5. At least 5 tiger sites (PAs and forest divisions) managed as per CA|TS standards.						
Action 2.5.1: CA|TS registration of the tiger sites.	0.20	0.20	0.20	0.20	0.20	1.00
Action 2.5.2: Field assessment of the tiger sites and propose for accreditation to CA|TS.	1.00	1.00	1.00	1.00	1.00	5.00
Objective III. Reduce human-tiger conflict.						
Output 3.1: Understood human tiger conflict scenario in Bhutan.						
Action 3.1.1: Carry out hotspot mapping highlighting spatio-temporal characteristics of the conflict.	0.78					0.78
Action 3.1.2: Assess social characteristics (social dynamics and tolerance level), severity and impacts of the conflict.		0.50				0.50
Action 3.1.4: Develop and maintain human- tiger conflict data base both at central and field level.	1.00					1.00
Output 3.2: Enhanced prevention of human-tiger conflict in Bhutan						
Action 3.2.1: Conduct mass education and awareness on the conflict scenario and preventive measures, policy, strategy and science of human-tiger conflict in Bhutan.	1.00	1.00	1.00	1.00	1.00	5.00
Action 3.2.2: Improve livestock management through improved breeds and enhanced guarding practices.	3.00	3.00	3.00	3.00	3.00	15.00
Action 3.2.3: Install and maintain low-voltage electric fences to minimize loss of crop and cattle to wildlife.	2.50	2.50	2.50	2.50	2.50	12.50
Action 3.2.4: Establish and strengthen visitor information centers at field offices.	5.00	5.00	5.00	5.00	5.00	25.00
Output 3.3: Mitigation measures put in place in case of conflict occurrence.						
Action 3.3.1: Establish and strengthen HWC committee at national and community level.	1.00	1.00				2.00
Action 3.3.2: Develop a standard conflict reporting system for Bhutan.	0.20					0.20
Action 3.3.3: Develop national policy for ex-gratia payment in the event of loss of human life or injury.	3.00	3.00				6.00
Action 3.3.4: Strengthen and support the livestock insurance and compensation schemes.	5.00	5.00	5.00	5.00	5.00	25.00
Action 3.3.5: Initiate community based ecotourism in the tiger landscapes.		4.00	4.00	4.00	4.00	16.00
Action 3.3.6: Link and establish PES schemes in the tiger landscapes.			0.50	0.50	0.50	1.50

Objective IV: Increase science based information on tiger, prey and their landscape.						
Output 4.1: Tiger and prey population periodically monitored using robust scientific design and analysis.						
Action 4.1.1: Establish long term monitoring protocol for tigers and prey species.	0.20	0.20				
Action 4.1.2: Conduct nationwide tiger population revalidation survey every five years.		30.00	30.00			60.00
Action 4.1.3: Evaluate tiger and prey distribution and produce demographic reports.				1.00		1.00
Action 4.1.4: Conduct survey on prey using standard methodology (sign surveys, distance sampling, point counts, double observation, and dung surveys).		5.00	5.00			10.00
Action 4.1.5: Strengthen national database of tigers and other wild animals.			1.00	1.00		2.00
Action 4.1.6: Train and equip tiger research and monitoring teams.		4.00	4.00			8.00
Action 4.1.7: Conduct economic valuation of tiger habitats in Bhutan.				0.50	0.50	1.00
Output 4.2: Established and strengthened information on tiger ecology and movement through study and identify important environmental and anthropogenic variables in relation to tiger habitat use and selection.						
Action 4.2.1: Compile all available data and information on tigers and prey species with DoFPS.	0.20					0.20
Action 4.2.2: Conduct study to assess habitat condition for tiger and prey.		0.70	0.70			1.40
Action 4.2.3: Conduct radio collaring of tigers at different habitats to study the behavior and spatial movement ecology.	1.50		1.50	1.50		4.50
Action 4.2.4: Enhance capacity of field staff on animal handling and management.	1.50		1.50		1.50	4.50
Action 4.2.5: Perform population viability assessment of tiger and prey population using statistical and mathematical models (population projection and carrying capacity).				0.20	0.20	0.40
Action 4.2.6: Conduct dietary selection by tiger and prey species		0.50				0.50
Output 4.3: Established genetic database of tigers in Bhutan.						
Action 4.3.1: Establish genetic lab to perform genetic analysis of tigers and its co-predators	5.00	5.00	5.00			15.00
Action 4.3.2: Train relevant staff on genetic analysis and profiling.		2.00	2.00	2.00		6.00
Action 4.3.3: Establish and strengthen genetic database of tigers and prey.				1.00	1.00	2.00
Action 4.3.4: Produce report on genetic profiles of tigers in Bhutan.					0.50	0.50

Output 4.4: Assess impacts of potential disturbance regimes and disasters on tiger and prey population.						
Activity 4.4.1: Assess impact of climate change on tiger and prey habitats and develop adaptation plan.	0.50	0.50	0.50			1.50
Activity 4.4.2: Assess disease threat to tigers or their prey from livestock and feral animals and monitor where necessary.	1.00	1.00	1.00	1.00		4.00
Activity 4.4.3: Strengthen wildlife clinic and laboratory.	2.00	2.00	2.00	2.00		8.00
Activity 4.4.4: Assess the impact of feral dogs on wildlife population and manage dog population.		1.50	1.50	1.50	1.50	6.00
Grand Total						**Nu. 619.63 Million**

5.3. Monitoring and Evaluation

An annual progress report of the plan implementation will be submitted by the respective protected area and forest division to DoFPS. NCD with support from field offices and other implementing partners will monitor the annual work progress and report to DoFPS on the overall plan implementation on annual basis. Plan evaluation will be done at mid-term and at the end of the plan period by DoFPS. Plan monitoring and evaluation will be carried out as per the results framework table.

Table 2. Results Framework

Vision: "A viable population of tigers and their prey, coexisting with humans in an interconnected landscape"			
Goal: By 2023 tiger population in Bhutan increased by 20 percent from the 2015 baseline through enhanced protection and improved habitat.			
Narrative Summary	**Objectively Verifiable output Indicators**	**Means of Verification**	**Lead implementing Agency**
Objective I: Reduce poaching of tiger by 90 percent at the end of plan period.			
Output 1.1: Current wildlife protection in Bhutan assessed.	State of wildlife protection known	Assessment Report	FPED & NCD
Action 1.1.1: Conduct protection assessment and develop poaching hotspot map, identify priority areas for enforcement and enhance SMART rollout.			
Output 1.2: SMART patrol program fully implemented by all the field offices.	Protection enhanced through SMART patrolling	Patrol reports	FPED, NCD, Field Offices
Action 1.2.1: Finalize setting up SMART data model & reporting requirements for Bhutan.			
Action 1.2.2: Train data officers on SMART software for tactical patrolling.			
Action 1.2.3: Carry out regular SMART patrolling in all field divisions.			
Action 1.2.4: Develop mechanisms to share intelligence reports among the field offices.			
Action 1.2.5: Develop and maintain database of patrolling and surveillance reports at the field offices and headquarter.			
Action 1.2.6: Carry out refresher course and capacity building on SMART patrolling.			
Output 1.3: Strengthened infrastructure and equipment support for anti-poaching effectiveness.	Field offices equipped with additional infrastructure, equipment and trained staff.	Physical verification	NCD & Field Offices
Action 1.3.1: Set up Forest Protection and Enforcement Unit (FPEU) in each forest division and protected areas.			
Action 1.3.2: Strengthen Forest Protection and Enforcement Section under Forest Protection and Enforcement Division.			
Action 1.3.3: Set up and equip guard posts in strategic locations.			

Action 1.3.4: Support frontline staff with field gears to patrol remote areas.			
Output 1.4: Improved communication systems for protection.	Communication system improved	Physical verification	FPED & NCD
Action 1.4.1: Set up repeater for wireless communication in appropriate locations.			
Action 1.4.2: Maintain and improve existing communication system.			
Output 1.5: Awareness campaigns conducted on significance of tiger conservation.	Public aware of the importance of tiger conservation	Awareness materials (audio-visual, posters, etc), Reports	NCD, GTC & Field Offices
Action 1.5.1: Conduct education and awareness campaigns among communities on ills of wildlife poaching.			
Action 1.5.2: Organize religious discourses on the spiritual linkage of conservation and human wellbeing.			
Action 1.5.3: Identify & support nature club in schools as ambassador of conservation.			
Action 1.5.4: Observe Global Tiger Day at appropriate locations.			
Output 1.6: Strengthened capacities of law enforcement divisions under MoAF.	Frontline staff capable of handling wildlife cases	Training and workshop reports	NCD, FPED & Legal Services, MoAF
Action 1.6.1: Strengthen and support legal services under MoAF			
Action 1.6.2: Conduct awareness workshop on FNCRR and other relevant legislations for all the field divisions.			
Action 1.6.3: Train field staff in basic enforcement skills including wildlife crime detection and prosecution.			
Output 1.7: Enhanced cooperation and coordination among the law enforcement agencies.	Cooperation and coordination with law enforcement agencies strengthened	Workshop proceedings, Protocol Documents	NCD, FPED, RBP, RBA, BAFRA, DRC, Judiciary
Action 1.7.1: Conduct workshop on detection of illegal wildlife trade with law enforcement agencies.			
Action 1.7.2: Develop protocols for recording and reporting of illegal wildlife trade.			
Action 1.7.3: Formalize inter-agency intelligence led enforcement initiatives at national level.			
Action 1.7.4: Strengthen on ground intelligence led enforcement initiatives.			
Output 1.8: Strengthened transboundary cooperation on tiger conservation.	Strengthened transboundary tiger conservation	Meeting resolutions, Joint tiger monitoring reports	NCD, FPED, GTC & Field Divisions
Action 1.8.1: Organize regular meetings and workshops at transboundary level to discuss issues, challenges and best practices.			
Action 1.8.2: Arrange exchange visits for the forestry officials.			

Action 1.8.3: Coordinate and collaborate with park official and other stakeholders from India on synchronized anti-poaching patrol, tiger monitoring and other activities.			
Objective II - Manage critical tiger habitats within and outside protected areas			
Output 2.1: Critical tiger and their prey habitats zoned and delineated within and outside the protected area network.	Critical tiger habitats zoned both within and outside PAs	Maps available for use by the field offices	NCD & GTC
Action 2.1.1: Identify and map critical tiger habitat for protection and management interventions.			
Action 2.1.2: Conduct stakeholder consultation meeting to harmonize critical tiger habitat maps with developmental master plans.			
Output 2.2: Critical tiger habitats managed as per the habitat management guidelines.	Critical tiger habitats well managed	Progress reports	NCD, FPED & Field Divisions
Action 2.2.1: Carryout grassland management including controlled burning and weed eradication.			
Action 2.2.2: Initiate habitat improvement through enrichment plantation of native palatable species and removal of invasive species.			
Action2.2.3: Maintain and improve the existing cattle grazing lands (tshamdos) for wild herbivores.			
Action 2.2.4: Maintain natural water holes and saltlicks and create new ones on need basis.			
Output 2.3: Principles of smart-green infrastructure adopted and implemented for infrastructure development in the critical tiger habitats.	Smart green infrastructure principles adopted and implemented	Meeting resolutions, tour reports, infrastructure development plan	DoFPS, MoWHS, CDB
Action 2.3.1: Organize sensitization workshops on smart-green infrastructure with relevant stakeholders.			
Action 2.3.2: Organize exposure trips for relevant stakeholders to understand and appreciate the features of smart-green infrastructure.			
Action 2.3.3: Incorporate smart-green features in the national and local infrastructure development plans.			
Action 2.3.4: Enforce and monitor smart-green features in infrastructure development in the tiger habitats.			
Output 2.4: Tiger and prey habitat change and management interventions studied and monitored.	Habitat dynamics and impacts of interventions understood	Assessment reports, physical verifications	NCD, UWICER, GTC & Field Divisions
Action 2.4.1: Identify and establish permanent plots in tiger habitats at different ecological zones.			
Action 2.4.2: Assess the effects of road and infrastructural developments on the habitat connectivity for tiger and prey.			

Output 2.5. At least 5 tiger sites (PAs and forest divisions) managed as per CA|TS standards.	10 Tiger sited accredited and managed as per CA|TS standards	CA|TS Accreditation Certificate	NCD & Field Divisions
Action 2.5.1: CA|TS registration of the tiger sites.			
Action 2.5.2: Field assessment of the tiger sites and propose for accreditation to CA|TS.			
Objective III. Reduce human-tiger conflict.			
Output 3.1: Understood human tiger conflict scenario in Bhutan	Information on human-tiger conflict available	Maps, Assessment reports, Database	NCD, UWICER, GTC & Field Divisions
Action 3.1.1: Carry out hotspot mapping highlighting spatio-temporal characteristics of the conflict.			
Action 3.1.2: Assess social characteristics (social dynamics and tolerance level), severity and impacts of the conflict.			
Action 3.1.3: Develop and maintain human- tiger conflict data base both at central and field level.			
Output 3.2: Enhanced prevention of human-tiger conflict in Bhutan.	Human-tiger conflict prevention measures in place	Awareness materials, reports	NCD, DoL & Field Divisions
Action 3.2.1: Conduct mass education and awareness on the conflict scenario and preventive measures, policy, strategy and science of human-tiger conflict in Bhutan.			
Action 3.2.2: Improve livestock management through improved breeds and enhanced guarding practices.			
Action 3.2.3: Install and maintain low-voltage electric fences to minimize loss of crop and cattle to wildlife.			
Action 3.2.4: Establish and strengthen visitor information centers at field offices.			
Output 3.3: Mitigation measures put in place in case of conflict occurrence.	Timely response to human-tiger conflict cases	Meeting resolutions, Committee by-laws, Guideline	DoFPS (NCD, Field Divisions), DoL
Action 3.3.1: Establish and strengthen HWC committee at national and community level.			
Action 3.3.2: Develop a standard conflict reporting system for Bhutan.			
Action 3.3.3: Develop national policy for ex-gratia payment in the event of loss of human life or injury.			
Action 3.3.4: Strengthen and support the livestock insurance and compensation schemes.			

Action 3.3.5: Initiate community based ecotourism in the tiger landscapes.			
Action 3.3.6: Link and establish PES schemes in the tiger landscapes.			
Objective IV: Increase science based information on tiger, prey and their landscape.			
Output 4.1: *Tiger and prey population periodically monitored using robust scientific design and analysis.*	Information on tiger and prey population updated	Protocol document, Survey report, Training report	NCD, UWICER, GTC & Field Offices
Action 4.1.1: Establish long term monitoring protocol for tigers and prey species.			
Action 4.1.2: Conduct nationwide tiger population revalidation survey every five years.			
Action 4.1.3: Evaluate tiger and prey distribution and produce demographic reports.			
Action 4.1.4: Conduct survey on prey using standard methodology (sign surveys, distance sampling, point counts, double observation, and dung surveys).			
Action 4.1.5: Strengthen national database of tigers and other wild animals.			
Action 4.1.6: Train and equip tiger research and monitoring teams.			
Action 4.1.7: Conduct economic valuation of tiger habitats in Bhutan.			
Output 4.2: Established and strengthened information on tiger ecology and movement through study and identify important environmental and anthropogenic variables in relation to tiger habitat use and selection.	Information on tiger ecology and movement in Bhutan strengthened	Research articles, training reports	NCD, UWICER, GTC & Field Offices
Action 4.2.1: Compile all available data and information on tigers and prey species with DoFPS.			
Action 4.2.2: Conduct study to assess habitat condition for tiger and prey.			
Action 4.2.3: Conduct radio collaring of tigers at different habitats to study the behavior and spatial movement ecology.			
Action 4.2.4: Enhance capacity of field staff on animal handling and management.			
Action 4.2.5: Perform population viability assessment of tiger and prey population using statistical and mathematical models (population projection and carrying capacity).			
Action 4.2.6: Conduct dietary selection by tiger and prey specie.			
Output 4.3: Established genetic database of tigers in Bhutan.	Genetic database of Bhutanese tigers established	Training reports, Database, Report on genetic profile	NCD, UWICER, GTC & Field Offices
Action 4.3.1: Establish genetic lab to perform genetic analysis of tigers and its co-predator.			

Action 4.3.2: Train relevant staff on genetic analysis and profiling.			
Action 4.3.3: Establish and strengthen genetic database of tigers and prey.			
Action 4.3.4: Produce report on genetic profiles of tigers in Bhutan.			
Output 4.4: Assess impacts of potential disturbance regimes and disasters on tiger and prey population.	Impacts of potential disturbance regimes and disasters on tiger understood	Research articles, Assessment reports	NCD, UWICER, GTC & Field Offices
Activity 4.4.1: Assess impact of climate change on tiger and prey habitats and develop adaptation plan.			
Activity 4.4.2: Assess disease threat to tigers or their prey from livestock and feral animals and monitor where necessary.			
Activity 4.4.3: Strengthen wildlife clinic and laboratory.			
Activity 4.4.3: Assess the impact of feral dogs on wildlife population and manage dog population.			

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Nature Conservation Division
Department of Forests and Park Services
Ministry of Agriculture and Forests
Thimphu Bhutan
Tel: +975 02 325042/ 324131
Fax: +975 02 335806
Post Box # 130
www.dofps.gov.bt

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