RED PANDA CONSERVATION ACTION PLAN FOR BHUTAN (2018-2023)

"Ensuring the future of red panda landscapes through national and regional collaboration"

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NATURE CONSERVATION DIVISION
Department of Forests and Park Services
Ministry of Agriculture and Forests
Bhutan

FOREWORD

Bhutan, a small kingdom in the Himalayas with more than 71 percent forest cover, is home to many threatened flora and fauna. It is the only country committed to remain carbon neutral and is guided by the philosophy of Gross National Happiness where environmental conservation is one of the four pillars for sustainable development. It has the highest percentage of protected land in Asia, with rich forests, pristine rivers and thriving wildlife making it one of the most biodiverse regions in the world. Red panda *Ailurus fulgens* is one of the endangered species occupying this biologically diverse eco-region.

In Bhutan, red panda has been confirmed in seventeen districts including seven of the ten protected areas and eight of the nine biological corridors within the altitudinal range of 2000 to 4300 meters above sea level. With increasing temperatures and unprecedented loss of forest cover in the Himalayas, conservation of biodiversity is becoming more complex. Like many other globally threatened species, red panda is also facing increased threats from habitat fragmentation, poaching and illegal trade, inadvertent killings, and predation from feral and domestic dogs. The loss of nesting trees and bamboo in the eastern Himalayas is the major threat causing a decline in red panda populations across much of their range.

The Royal Government of Bhutan under the farsighted leadership of the monarch has put in extraordinary emphasis on biodiversity conservation while pursuing economic development. The declaration of more than 51 percent of Bhutan's land area under a protected area network with functional biological corridors is testament to this commitment. Correspondingly, the development of this important action plan will further augment and assure the strong conservation pledge of the country. The red panda conservation action plan is another breakthrough towards realizing Bhutan's commitment to conservation on biological diversity (CBD) and other important international conventions. I am sure this action plan will ensure the realization of biodiversity conservation goal of the country in harmonization with other important developmental plans and priorities.

I would like to express my sincere gratitude to all the working group members and reviewers for their tireless effort and contribution to this document which will guide and accomplish the conservation needs of the country and the region. Lastly, I wish the Department of Forests and Park Services, development and conservation partners, and local communities an effective and successful implementation of this plan.

Tashi Delek!

(Yeshey Penjor)

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

རྫུང་ཆེན།
SECRETARY

PREFACE

Today, one of the major concerns across the globe is the rapid loss of pristine environment and natural habitats leading to extinction of some species even before their ecological function is understood. Every organism plays a unique role within the environment and makes the ecosystem a self-sustaining unit. The disappearance of any species upsets nature's balance, thereby creating problems and disrupting overall ecological stability. It is in this backdrop that the surge for innovative conservation policies and programs are becoming of paramount importance particularly for developing countries to maintain balance between economic progress and ecosystem conservation.

Bhutan is situated in the heart of eastern Himalayas, which is one of the world's ten most biodiverse regions and provides water to one-fifth of the world's population. Coincidentally, the red panda *Ailurus fulgens* is endemic to these eco-regions and coexists within this important landscape with the charismatic snow leopard, tiger and other mega fauna. The Himalayas, home of the spectacular red panda with a myriad of unique flora and fauna is most sensitive to global climate change and may trigger the disappearance of pristine habitat and associated species at a faster rate.

Red panda, one of the flagship species of Himalayas, is listed as endangered in IUCN Red List of Threatened Species and included in Appendix I of CITES. It is further included under Schedule I of the Forest and Nature Conservation Act of Bhutan 1995 and enjoys adequate legal protection. Despite being a protected species, intensified anthropogenic activities including livestock grazing, illegal trade, poaching, habitat loss and degradation are exerting increased threats for their long term survival. Consequently, the action plan specific for red panda conservation is well timed and will contribute towards improving red panda status and secure its habitat against emerging threats.

This action plan focuses on conducting extensive research to understand red panda population dynamics, ecological role, socio-cultural significance, breeding behaviours and movement ecology. Furthermore, it emphasizes habitat protection and improvement, conservation education and strengthening local stewardship for red panda conservation. This plan offers a huge opportunity for better coordination among relevant organizations and institutions towards achieving species conservation and rural livelihood enhancement within limited resources.

Finally, I would like to offer my greatest appreciation to the officials who have worked tirelessly and the Department of Forests and Park Services for bringing out this important conservation action plan. I am confident that this action plan will be a guiding document to all the concerned stakeholders for conservation of red panda.
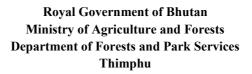
Tashi Delek!

(Rinzin Dorji)

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

DIRECTOR

ACKNOWLEDGEMENT

The red panda conservation action plan is another milestone accomplished towards realizing Bhutan's commitment to the Convention on Biological Diversity (CBD) and other important international conventions and agreements. This crucial yet timely document for fostering species conservation is the outcome of valuable contributions of many institutions and individuals. The Department of Forests and Park Services would like to offer sincere gratitude to the National Red Panda Conservation Workshop participants for their contributions leading to the formulation of the current action plan. We highly appreciate Mr. Sangay, Specialist and advisor to the Department for leading the workshop and shaping the deliberations into this document.

The Department gratefully acknowledges the concerted efforts put in by the management and staff of Sakteng Wildlife Sanctuary, from organizing the workshop to culminating outcomes into this meaningful document. In particular, Mr. Thinley Wangdi, Mr. Sonam Tobgay, Mr. Kesang Dorjee, Mr. Kumbu Dorji, Mr. Tenzin Lhendup and Mr. Sonam Wangyel of Sakteng Wildlife Sanctuary for their hard work and commitment in developing and finalizing this action plan. The Nature Conservation Division is thanked for providing timely necessary support and facilitating the endorsement of the document. We remain highly indebted to Dr. Joanne Millar from Charles Sturt University, Mr. Damber Bista from the Red Panda Network, Mr. Phurba Lhendup WWF Cambodia and Ms. Sonam Choden from WWF Bhutan for reviewing and providing valuable feedback and critical input for the betterment of the action plan. We are also grateful to Mr. Dawa from Merak for consenting to use his red panda painting on the cover page.

Without the generous and timely funding support, the workshop leading to development of this conservation action plan wouldn't have been possible, therefore, the Department would like to extend special gratitude to WWF Bhutan and the Institute for Land, Water and Society, Charles Sturt University, Australia for their much needed support.

Tashi Delek and Best Wishes,

(Lobzang Dorji)

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EXECUTIVE SUMMARY

Bhutan is situated in the heart of eastern Himalayas, which is one of the world's ten most biodiverse regions and provides water for one-fifth of the world's population. The red panda *Ailurus fulgens* coexists within this important landscape with the charismatic snow leopard, tiger and other mega fauna. The red panda is endemic to the temperate forests of the Himalayas, with the exception of a tropical forest population in Meghalaya, India. However, red panda is now globally threatened listed as endangered on IUCN red list. Global red panda population is estimated at less than 10,000 matured individuals over the entire range. The major threats to red panda are habitat loss and degradation, poaching and illegal trade, developmental activities, climate change and illegal herbal plant collection.

Occurrence of red panda in Bhutan has been confirmed in seventeen districts including seven of the ten protected areas and all eight biological corridors within the altitudinal range of 2000 to 4300 meters above sea level. Increasing developmental activities, livestock grazing and migration, subsistence agriculture and collection of non-wood forest produce are reported as major red panda conservation threats in Bhutan. In Bhutan, poaching of red panda is not reported, however, accidental killing by poachers while seeking highly prized musk deer and noticeable predation from domestic dogs are reported from the field. Dogs are known carriers of canine distemper and could lead to eradication of red panda population from the wild.

Inadequate research, lack of awareness education, paucity of specific conservation interventions and inconsistent legal provisions are some of the gaps identified for efficient red panda conservation in Bhutan in addition to threats specified earlier. Correspondingly, the action plan is prepared with the vision to conserve viable populations of red panda within its distribution range in an interconnected transboundary landscape. The goal of the action plan is to strengthen a red panda conservation program and restore its habitat through a landscape conservation approach. Extensive scientific study, habitat management, conservation outreach, strengthened law enforcement, capacity building of professional and communities, improved policy and partnership development are the implementation actions proposed to accomplish the envisaged vision and goal of the red panda conservation action plan. Priority objectives of the plan are to assess and map critical red panda habitat for strategic interventions and initiate multi-pronged actions including transboundary landscape conservation programs.

The total estimated cost is Nu. 240.60 million to be implemented for the duration of five years starting July 2018 until June 2023. The funding required for the implementation of this action plan is expected to be met by the Royal Government of Bhutan (RGoB) and Bhutan for Life (BFL) project. Additional funding need for the action plan will be sourced from potential donors both from within and outside Bhutan.

LIST OF ACRONYMS

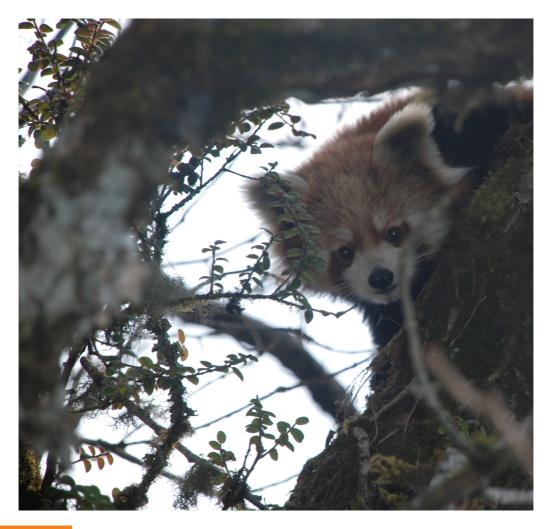|	
BFL	Bhutan for Life
BTFEC	Bhutan Trust Fund for Environmental Conservation
CDV	Canine Distemper Virus
CITES	Convention on International Trade of Endangered Species of Wild Fauna and Flora
CSU	Charles Sturt University, Australia
DoFPS	Department of Forests and Park Services
DoA	Department of Agriculture
DoL	Department of Livestock
FNCRR	Forest and Nature Conservation Rules and Regulations 2017, DoFPS
FYP	Five Year Plan
GEF	Global Environment Facility
GNHC	Gross National Happiness Commission
ICDP	Integrated Conservation Development Program
ILWS	Institute of Land, Water and Society, Australia
IUCN	International Union for Conservation of Nature
LFMP	Local Forest Management Plan
MoAF	Ministry of Agriculture and Forests, Royal Government of Bhutan
NCD	Nature Conservation Division, DoFPS
NWFP	Non-Wood Forests Product
PA	Protected Area
RPN	Red Panda Conservation Network, Nepal
RGoB	Royal Government of Bhutan
SMART	Spatial Monitoring and Reporting Tool
TraMCA	Transboundary Manas Conservation Area
UWICER	Ugyen Wangchuck Institute for Conservation and Environmental Research
WWF	World Wildlife Fund

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CHAPTER 1: BACKGROUND

1.1. Red panda ecology, global status and distribution.

Red panda *Ailurus fulgens* is a carnivore which has adapted to the herbivore way of life representing the only living species in the family of Ailuridae. Global red panda population is estimated at less than 10,000 matured individuals over the entire range countries with plausible decline over the years (Wang et al., 2008). Red panda is listed as endangered in the IUCN red list of threatened species due to the estimated decline in population and natural habitat which is projected to continue and probably intensify over coming years (Yonzon & Hunter, 1991; Choudhury, 2001 & Glatston et al., 2015).

Young leaves and shoots of the bamboo comprise the primary diet of the red panda though it also feeds on fruit, roots, succulent grasses, acorns, lichens and occasionally bird's eggs, insects and grubs (Choudhury, 2001; Yonzon & Hunter, 1991; Pradhan et al., 2001 & Thapa & Basnet, 2015). It is mostly arboreal and has specialized habitat niche requirements related to forest types, elevation, availability of fallen logs and stumps, proximity to water sources and disturbances (Yonzon & Hunter, 1991; Pradhan et al., 2001 & Wei et al., 1999). Red panda is considered as an indicator species of temperate ecosystems (Williams, 2006) and is chiefly associated with temperate forest with dense bamboo thicket understory (Yonzon & Hunter, 1991).

Red panda is distributed in the eastern Himalaya from Nepal in the west through Sikkim and Darjeeling in India, Bhutan, Myanmar and southern China in the east and with an isolated population in the Meghalaya Plateau of north-eastern India (Choudhury, 2001) (Figure 1). Mugu District in western Nepal (82°E), and Minshan Mountains and upper Min Valley of Sichuan Province, south-central China (104°E) have been the respective westernmost and easternmost distribution limits of the red panda (Choudhury, 2001). However with recent surveys its westernmost occurrence limit is further extended by 20 km west with presence of the species in Api Nampa Conservation Area (81^{0}E), the westernmost part of Nepal (Bista & Paudel, 2013).

Red panda occurs in four states of India with wide distribution in Arunachal Pradesh followed by Sikkim, Darjeeling in West Bengal and an isolated population in Meghalaya separated from a main habitat range by a zoogeographic barrier in the form of the Brahmaputra River (Choudhury, 2001). Generally, it is found in the elevation range of 2800m to 3900m (Yonzon & Hunter, 1991) although there are incidences of species sighting at the lowest elevation of 1525 m (Prater, 1965) and highest elevation of 4325m in Arunachal Pradesh (Dorjee et al., 2014). However, in the case of disjunct populations

of red panda in Meghalaya, the species is known to occur at an elevation of 700m to 1400m exceptionally in a tropical forest (Choudhury, 1997) although there is no recent incidence of red panda sighting (indirect evidence of fecal pellets) or scientific study of the species in that locality (Ghose & Dutta, 2011).

Figure 1: Distribution of Red Panda across the range countries (Source: Glatston et al. 2015)

In Nepal, estimated populations of 317 red pandas are expected within the confirmed habitat of 592.39 km² distributed across the 24 districts (Jnawali et al., 2012; Bista et al., 2016). In Bhutan, red pandas are found in elevation range between 2400m to 3700m and with recent data, the presence of the species is confirmed from 17 districts (Dorji et al., 2012) (Figure 2). Currently, red panda occurs only in the provinces of Sichuan, Yunnan and Tibet while it is extirpated from Guizhou, Gausu, Shaanxi and Qinghai provinces of China (Wei et al., 1999). Not much information is available regarding the species in Myanmar although one study revealed presence of 2900 km² potential habitat. Recent modelling by Thapa, et al. (2018) predicted 134,975 km² of red panda habitat based on 10 percentile thresholds in China (62% of total predicted habitat), Nepal (15%), Myanmar (9%), Bhutan (9%), and India (5%).

Though red panda is legally protected in all the range countries, unfortunately it's population is still unstable because of rapid fragmentation and loss of habitat resulting

from resource exploitation by ever increasing human populations and other threats such as accidental killing, illegal poaching, diseases, attack by free ranging dogs, climate change, mass flowering of bamboo, habitat encroachment and resource competition throughout the red panda habitat range. These threats have accelerated the decline in the population of red panda in the wild pushing its status to endangered category of IUCN (Glatston et al., 2015).

Figure 2: Distribution of Red Panda in Bhutan (Source: Sangay Dorji, NCD, DoFPS)

1.2. Red panda conservation in the region and Bhutan

Most of the red panda habitat falls outside the protected area across its range countries. Red panda receives highest protection under the Appendix I of CITES (Convention on International Trade in Endangered Species of Wild Fauna and Flora) which is an international agreement between governments to ensure the international trade of wildlife does not threaten their survival *(www.checklist.cites.org)*. It is also legally protected by the government of the countries within the habitat range. In India, red panda is totally protected under Schedule I of Indian Wildlife Protection Act 1972 (Ghose & Dutta, 2011) and similarly it is also protected in Nepal by National Park and Wildlife Conservation Act, 1973 which prohibits killing or capture of the species dead or alive (Bista & Paudel, 2013). In China, red panda is classified as a category II species under the Wild Animal Protection Law (Wei et al., 1999). In Bhutan, red panda is included in Schedule I species of Forest and Nature Conservation Act of Bhutan 1995 under which it receives highest legal protection. Red panda distribution significantly overlaps with the human population in Bhutan. In all the red panda range countries, hunting of the species is illegal (Glatston et al., 2015).

Besides legal protection across the habitat range, red panda habitat is managed in some areas through community participatory based conservation, which empowers community and provides sustainable livelihood benefits through community based ecotourism and ecosystem services. Further, introduction of energy efficient alternative cooking and heating devices to the communities also helps in reducing fuel wood consumption by up to 35% per household (Ghose & Dutta, 2011). Solid waste and free ranging dog populations are managed to reduce the possible impact of waste and spread of disease from dog to the red panda (Ghose et al. 2011). In Bhutan, some habitats are managed through community based conservation initiatives and implementation of integrated conservation and development programs (ICDP). Under ICDP initiatives, shingle and bamboo mat roofing are replaced with CGI sheet to reduce fir and bamboo extraction from the prime habitat of the red panda. Under the same initiatives, communities are provided with sustainable livelihood options by promoting community based ecotourism and other benefits (Dorjee, 2009).

1.3. Importance of red panda conservation

1.3.1. Ecological significance

The red panda is an indicator species for an ecosystem with the mature Eastern Himalayan Broadleaf Forest in its habitat range (Wikramanayake et al., 2001). The presence of red panda ensures the health of the forest and quality of the overall environment. It is also considered as a classic flagship species of Himalayas, one of the global conservation hotspots that provides drinking water to a large number of people (Glatston, 2011). As an ambassador species for Himalayan ecosystem, the red panda signifies the health of other wildlife such as the snow leopard, clouded leopard, the yellow-throated marten, the barking deer, the common leopard and diverse bird species that are endemic to the region. Red panda plays pivotal role in the proper functioning of the food web and ecosystem of the temperate forest in eastern Himalaya (Mallick, 2015).

1.3.2. Ecosystem services

Red panda habitat range from western Nepal to southwest China covering a huge land mass with comparatively intact forest cover. This stretch of forest directly contributes to clean air and water for millions of people. Red panda is endemic to the eastern Himalayas and prefers temperate forest for ensuring its viable population. Therefore it is considered as a suitable indicator species for monitoring the integrity of the Eastern Himalayan Broadleaf and Conifer Eco-region (Dorji et al., 2011).

1.3.3. Economic benefits

Efforts to conserve red panda will bring both direct and indirect economic benefits besides ecosystem returns. The forest guardians and underprivileged community residing inside the red panda habitat can obtain economic benefits through promoting responsible ecotourism as initiated in eastern Nepal by Red Panda Network (RPN) (Bista, 2018). Protection of watershed catchments can ensure continuous water flow for hydropower generation and clean water supply. In Bhutan, all major river systems have tributaries and catchments originating from most preferred red panda habitat. Maintaining continuous flow of water is essential for sustainable agriculture production and revenue generation (WWF, 2016).

1.3.4. Cultural significance

Red panda is the state animal of Sikkim due to its unique conservation significance and ranking of political agenda (Ziegler, et al., 2010 & Ghose & Dutta, 2011). In Bhutan, red panda is believed to be the reincarnation of the Buddhist monk linking its red fur to the red robe of the monk and their sighting in the wild is believed to bring good luck (Dorji et al., 2012).

RED PANDA CONSERVATION WORKSHOP:
ENSURING THE FUTURE OF RED PANDA LANDSCAPES THROUGH NATIONAL AND REGIONAL COLLABORATION

Organized by : Sakteng Wildlife Sanctuary, Department of Forest & Park Services
1st - 3rd May 2018, Druk Deothjung Resort, Trashigang Bhutan

CHAPTER 2: GAP ANALYSIS OF RED PANDA CONSERVATION IN BHUTAN AND TRANSBOUNDARY AREAS

2.1. Research

Although extensive studies on red panda started a few decades ago in other range countries, in Bhutan only a few studies have been carried out recently in Jigme Dorji National Park (Dorji et al. 2011), Phrumsengla National Park (Dorji et al. 2011 & Dendup et al. 2016), Jigme Singye Wangchuk National Park (Wangchuk, nd), Forest Management Unit, Selela, Haa (Tshering, 2017) and Sakteng Wildlife Sanctuary (Dorjee 2009 & Dorjee 2012). An overview paper of potential distribution was published by Dorji et al. (2012). These studies cover habitat preferences, distribution and conservation threats of red panda in Bhutan. Research on population dynamics, foraging ecology, socio-cultural significance, breeding and movement ecology of the red panda is lacking in Bhutan. There is a need for a nationwide distribution assessment and population study to update red panda information. Transboundary areas also need to be researched in terms of habitat suitability, red panda movements and threats.

2.2. Educations and awareness

Awareness and advocacy programs followed by strict law enforcement are considered the key interventions to address poaching of wildlife in the Himalayas (Thapa et al., 2018). In Nepal, the RPN has initiated and instituted a number of red panda education and awareness programs in schools and rural communities where the species is distributed and recorded. Red panda conservation ambassadors known as forest guardians are employed and red panda ecotourism packages for visitors provide economic incentives to local communities. WWF Sikkim has initiated numerous red panda conservation awareness programs such as a red panda winter tourism festival and developed an animated cartoon titled "Pockche the Red Panda" for children along with brochures and pamphlets. WWF India is also working on community based conservation initiatives aimed at red panda conservation in several districts bordering Bhutan.

However, in Bhutan, red panda conservation awareness and education has not been earnestly implemented. People in Bhutan claim to know red panda but they have misidentified it with other species of wildlife like red fox and the majority of the people have not seen red panda (Dorji et al., 2011). The only awareness program dedicated to red panda conservation was done by Jigme Dorji National Park (JDNP) in early 2000 with students of Damji Community School and was discontinued. The most recent red panda

awareness and advocacy program was organized in Merak wherein 15 students of Merak Primary School were identified as "Junior Rangers" to promote red panda conservation in the area. There is an urgent requirement to strengthen awareness education to secure red panda habitat and bolster its conservation in natural landscapes.

2.3.   Conservation programs

There is no dialogue between concerned departments and agencies for red panda conservation due to lack of coordination among relevant stakeholders. For example, overgrazing and trampling are often identified to be the main drivers of red panda habitat destruction by several authors (Dorjee, 2009; Dorji et al., 2011). However, there is no indication or record of interaction between Department of Forests and Park Services and Department of Livestock to develop a multi-pronged strategy to conserve red panda. Further, there is also no clear government policy directive for red panda conservation (https://redpandabhutan.wordpress.com). Thapa et al. (2018) also reported low conservation capacity and lack of policy implementation as one of the factors threatening red panda conservation in Himalayan regions including Nepal, India and Bhutan. Greater collaboration between governments and partners in Sikkim, Bhutan and Arunachal Pradesh is needed for transboundary research and management.

2.4.   Legal provision

In Bhutan, the species is included in Schedule I of Forest and Nature Conservation Act of Bhutan 1995 under which it receives highest legal protection. However, the Forest and Nature Conservation Rules and Regulation of Bhutan 2017 (FNCRR 2017) does not qualify red panda in the category of protected species making it more vulnerable to known threats.

CHAPTER 3: THREATS AND CHALLENGES FOR RED PANDA CONSERVATION

3.1. Threats

Red panda in Bhutan and across the border experience numerous threats in the form of habitat loss, fragmentation, inadvertent killing, illegal poaching, diseases, attack by free ranging dogs, climate change, mass dying of bamboo, encroachment and resource competition which are discussed in detail.

3.1.1. Habitat loss and degradation

The greater part of red panda habitat stretches across the eastern Himalayan region which is geopolitically surrounded by rapidly developing nations with the highest populations in the world. Growth in human population across the habitat range increases the pressure on land for housing and farming as well as increasing demand for natural resources. Various developmental activities have also destroyed potential habitat for red panda primarily through felling of trees for construction, fuel wood and expansion of settlements (Yonzon & Hunter, 1992; Dorji et al., 2011 & 2012; Thapa et al., 2018; Bista, et al., 2017). Construction of linear infrastructure contributes to habitat loss and fragmentation due to clearing of large stretches of forest and potential erosion and landslide from the exposed soil. Unfortunately the construction of new roads also opens up formerly inaccessible areas for further development leading to both legal and illegal extraction of resources in the red panda habitat areas (Choudhury, 2001 & Dorji et al., 2011).

In Bhutan, huge dependency on timber to meet the demand for construction of houses, flag poles and space heating in both urban and rural areas is a known factor leading to habitat loss (Dorji et al., 2011). The majority of rural communities in Bhutan practice agro-pastoralism (Namgay et al., 2013). Pastoralism allows domestic herds to graze freely in the forest where they trample and eat bamboos. Topographically, close to 2% of the Bhutan's area is suitable for pasture and hence grazing is usually accompanied by illegal felling, girdling, looping and extraction of bamboo for domestic use which significantly contributes to loss and degradation of the red panda habitat (Dorjee, 2009; Dorji et al., 2011 & Wangchuk, nd). Mass dying of bamboo from flowering is a temporary threat since flowering of the bamboo is a natural phenomenon although studies have revealed that dying of bamboo directly impacts the occurrence of the red panda (Dorji et al., 2012; Bista et al., 2014 & Thapa et al., 2018).

3.1.2. Poaching and illegal trade

In Bhutan, there is no reported incidence of red panda poaching and illegal trade. However, there have been a few cases of inadvertent killing where red panda is not the target species but is caught in the snares of other economically valuable species like musk deer (Dorji et al., 2011). In other range countries there is an increasing incidence of illegal poaching of the species. Red panda is generally traded for pelt, meat and also captured for the purpose of keeping as a pet. Growing demand for red panda meat and skin in China and popularity of the species as a pet in China and other Asian countries is known to make red panda more vulnerable to rampant poaching and smuggling from regions like Myanmar and Nepal from where increasing trends in poaching is reported (Glatston et al., 2015). However, a recent study carried out by TRAFFIC in China has revealed reducing demand of red panda hides which was supposed to be the major source of demand (Xu & Guan, 2018).

3.1.3. Domestic dogs and diseases

Temperate and conifer forest with bamboo thickets understory in gentle topography make an ideal grazing place for the large number of livestock owned by majority of the 73% of the Bhutanese households residing within the same altitudinal zone of red panda habitat. Herders keep dogs to guard their herds from wild predators which roam the forest freely and predate on the red panda during their encounter (Dorji et al., 2011). Increase in the population of free ranging dogs due to low coverage of mass dog sterilization in the countryside without ownership has also resulted to increased numbers of dogs entering the red panda habitat. Moreover, dogs are the known carrier of the canine distemper in case of lack of vaccination which is fatal to red panda (Bush & Roberts, 1977).

3.2. Challenges

3.2.1. Red pandas and climate change

Climate change was one of the factors why Glatston et al. (2015) recommended the status change of red panda from "threatened" to "endangered" on IUCN Red List. It was reported that limited habitat range available for red panda in eastern Himalayas will shrink faster than they can accommodate resulting into possible extinction because of climate change effects. The impact of climate change on understory bamboo species indicates positive correlation which will lead to potential shortage of food for red pandas in their habitat (Tuanmu, et al., 2013). In the entire Himalayas, the rate of warming is likely to increase with increasing altitude, at least in Bhutan, Nepal, and Himachal Pradesh (Shrestha, 2009).

3.2.2. Livelihood practice and traditional rights

Grazing in forests is the single most important source of fodder for livestock in Bhutan (Roder et al., 2002) where livestock contribute significantly to the livelihood of the rural people. As per the research in Nepal (Acharya, et al., 2018), large populations of livestock and extensive traditional grazing rights is a challenging task to monitor the impact of grazing and their associated impacts on red panda conservation.

3.2.3. Inadequate resources and capacity

Inadequate human resources and financial support are major challenges in the conservation of red panda and other species of concern in Bhutan. Frontline forestry officials are the core people involved in conservation and research of red panda in the field but there is inadequate technical competency with respect to specific species owing to their multitasking responsibilities. Further, there are limited conservation professionals with extensive knowledge and experience on conservation of red panda in Bhutan. Securing financial support is difficult except for mega fauna like tiger and snow leopard. Regular capacity building and professional skill development for frontline forestry staff and community will foster species research and conservation of red panda effectively.

CHAPTER 4: ACTION PLAN

4.1. Vision, Goals and Objectives

4.1.1. Vision:

"A viable population of red panda conserved within its distribution range in an interconnected transboundary landscape"

4.1.2. Goal:

To strengthen red panda conservation programs and restore habitat through a landscape conservation approach.

4.1.3. Objectives

Objective 1: Restore and manage critical red panda habitats within and outside protected areas.

Objective 2: Increase knowledge on red panda conservation and its habitat requirements.

Objective 3: Enhance awareness of red panda conservation and its ecological significance.

Objective 4: Maintain zero poaching and trafficking of red panda in Bhutan and reduce incidences in transboundary areas.

Objective 5: Ensure functional landscapes for red panda conservation through transboundary collaboration.

4.1.3.1. Objective 1: Restore and manage critical red panda habitats within and outside protected areas.

Rationale

Loss of habitat, fragmentation and quality deterioration is one of the major threats and challenges for red panda conservation. In Bhutan, red pandas face threats from developmental activities (e.g., road construction), the harvesting of timber, bamboo and minor forest products, livestock grazing, inefficiently managed tourism, guard dogs, and snares (for musk deer and pheasants) (Dorji et al., 2012). Extensive grazing, girdling, looping and trampling were identified as other significant threats to red panda habitat in Bhutan's protected areas (Dorjee, 2009; Dorji, 2011). Rural households in Bhutan use bamboo for roofing, thatching, fencing, baskets, arrows, containers and other handicrafts which also pose serious challenges for red panda conservation (Ministry of Agriculture, 2000). The accelerating impact of climate change will further exacerbate habitat loss in its distribution range.

ACTION PLAN

Dorji et al. (2011) reported that old growth Bhutan Fir (*Abies densa*) forest dominated by a dense cover of *Yushania* and *Arundanaria* species of bamboo with a high density of fallen logs and tree stumps at ground level; a high density of trees, dead snags, and rhododendron shrubs in the mid-storey; and locations closer to water source were highly preferred habitat for red panda. However, the temperate forests that encompass prime red panda habitat are integral to human subsistence and socio-economic development leading to an inadvertent conflict between the needs of people and red pandas. Therefore, a careful sustainable management of Bhutan's temperate forests is indispensable to accommodate the socioeconomic needs of people and the conservation goals for red pandas. The conservation strategies and programs should focus on the improvement of livelihood of the community living in and around red panda habitat.

Output 1.1: Critical red panda habitat assessed and mapped within and outside the protected area network.

Action 1.1.1: Identify and map critical red panda habitat for protection and management interventions.

Action 1.1.2: Conduct stakeholder consultation meeting with relevant stakeholders to harmonize and mainstream red panda habitats into developmental master plans.

Output 1.2: Critical red panda habitats managed as per the habitat management guidelines.

Action 1.2.1: Initiate habitat improvement through enrichment plantation of native palatable plant and bamboo species and removal of invasive species.

Action 1.2.2: Declaration of special protection zones in buffer, multiple and outside protected areas based on the critical red panda habitat maps.

Action 1.2.3: Development of Local Forest Management Plan (LFMP for timber extraction from the red panda habitats

Output 1.3: Habitat degradation reduced and degraded habitats restored for red panda conservation through integrated management approach.

Action 1.3.1: Conduct grazing capacity study to bring degraded rangeland under scientific management purview.

Action 1.3.2: Reduction of unproductive livestock through supply of improved breed to the communities residing in and around the critical red panda habitats

Action 1.3.3: Restore degraded pasture land/rangeland through planting fodder trees, bamboo species and suitable grass species for improved fodder production

Action 1.3.4: Initiate stall feeding and supply of fodder trees to intensify on-farm cattle management and offset fodder shortages.

Action 1.3.5: Initiate silvo-pasture on pilot basis in the pasture land to offset fodder shortages and intensify on-farm cattle management.

Action 1.3.6: Regulate extraction of timber and NWFPs from critical watersheds and spring sheds.

Action 1.3.7: Conduct awareness on the sustainable lopping of fodder tree species and create community nursery for fodder tree supply.

Output 1.4: Red panda conservation and community stewardship improved through alternative sustainable livelihood strategy implementation.

Action 1.4.1: Promote community based nature trails and observation points to encourage ecotourism.

Action 1.4.2: Develop diverse ecotourism products and services for visitors in close consultation with tour operators and local communities.

Action 1.4.3: Provide technical support in collaboration with Department of Agriculture to promote intensive agriculture farming.

Action 1.4.4: Initiate NWFP group networking and diversification of NWFP products for sustainable income generation.

Output 1.5: Principles of smart-green infrastructure adopted and implemented in the red panda landscapes

Action 1.5.1: Organize sensitization workshops on smart-green infrastructure with relevant stakeholders.

Action 1.5.2: Organize exposure trips for relevant stakeholders to understand and appreciate the features of smart-green infrastructure.

Action 1.5.3: Incorporate smart-green features in the local infrastructure development plans for efficient use of energy.

Action 1.5.4: Promote use of alternative source of energy in red panda landscapes.

4.1.3.2. Objective 2: Increase knowledge on red panda conservation and its habitat requirements

Rationale

Sound wildlife management starts with good research. A comprehensive understanding of wildlife interactions, distributions, populations and habitat use are essential for better management and success of conservation. Extensive research on red panda distribution,

ecology and conservation issues are carried out in other range countries. A series of workshops to discuss red panda population and habitat viability in the red panda ranges countries have been conducted; Nepal (2010), China (2012), India (2013) with additional discussion including participants from Bhutan and Myanmar, each devoted to red panda conservation planning for the different populations in each country (Jnawali et al., 2012; Wei et al., 1999, Thapa et al., 2018).

However, in Bhutan, the research related to this species is sparse and concentrated in few pocketed areas. Accurate information on available habitat, red panda population and movement ecology within the country is still lacking. Data on exact populations and its distribution is highly critical for the projection of future trend of red panda population in Bhutan. Consolidation of past research information, nationwide population assessment, breeding ecology and movement study of red panda using radio collaring is imperative for conservation planning and policy support.

Output 2.1: Research and science based information on red panda distribution, ecology and conservation issues improved and strengthened.

Action 2.1.1: Identify research gaps on red panda conservation in Bhutan

Action 2.1.2: Conduct nationwide red panda survey to understand its distribution and its population estimates.

Action 2.1.3: Conduct foraging ecology study to understand red panda food habits and its dietary compositions.

Action 2.1.4: Conduct breeding ecology study to understand courtship behavior, breeding success and fecundity.

Action 2.1.5: Conduct red panda movement ecology study to understand its movement, home range, habitat selection and activity pattern.

Action 2.1.6: Identify transboundary red panda habitat corridors and carry out threat analysis for initiating regional landscape level conservation programs with neighboring protected and conservation areas.

Action 2.1.7: Conduct study on socio-cultural and ecological significance of red panda to raise its profile and increase policy attention for conservation.

Output 2.2: Research capacity and field facilities in red panda range areas developed and strengthened.

Action 2.2.1: Equip the field offices of red panda range areas with adequate research field equipment (radio collar, GPS, camera traps, digital cameras, telescopic lens, rugged smart phones, sample collection tool kit).

Action 2.2.2: Organize research methodology, data collection and analysis trainings to field professional foresters and researchers.

Action 2.2.3: Deliver animal handling and management trainings to field foresters and researchers.

4.1.3.3. Objective 3: Enhance awareness of red panda conservation and its ecological significance.

Rationale

Poor awareness on the importance of red panda and their habitat in the range countries including Nepal, India and Bhutan has been identified as one of the threats for its survival (Thapa et al., 2018). Growing economic progress and more people migrating into urban areas is leading to a decrease in understanding and appreciation about wildlife, protected areas and conservation. Consistent awareness program is critical in ameliorating the species conservation through leveraging community support and engagement (Mbugua, 2012). Thapa et al., (2018) considered awareness and advocacy programs followed by strict law enforcement as key interventions to address poaching of wildlife in the Himalayas.

Strengthening education and awareness specific to red panda conservation will ensure the stable habitat for long-term survival of this species as well as other wildlife species in Bhutan and in the Himalayas.

Output 3.1: Awareness on red panda conservation and its ecological significance increased.

Action 3.1.1: Develop red panda awareness and education materials (posters, pamphlets, visual materials) for different stakeholders.

Action 3.1.2: Conduct periodic awareness and education programs to policy makers, tour operators, local communities and students through the concept of living classrooms

Action 3.1.3: Mobilize and engage monastic institutions in promoting red panda conservation through awareness education.

Action 3.1.4: Initiate and organize red panda festivals in red panda range areas within the country.

Action 3.1.5: Initiate and institute transboundary red panda festivals alternatively in the neighboring border states of the red panda range areas.

Output 3.2: Red panda knowledge and its conservation significance improved through development of citizen scientists and forest guardians.

Action 3.2.1: Create a group of junior rangers in schools and engage them in red panda research and conservation programs.

Action 3.2.2: Institute local forest guardians composed of both genders and engage them in red panda research and conservation programs.

Action 3.2.3: Provide hands on red panda research and awareness campaigning methodology trainings to junior rangers and local forest guardians.

Action 3.2.4: Train junior rangers and local forest guardians as nature guides to be engaged as local guides for tourists and visitors.

Action 3.2.5: Organize exposure tours and exchange visits for junior rangers and local forest guardians to successfully implement red panda projects and ecotourism areas.

4.1.3.4. Objective 4: Maintain zero poaching and trafficking incidences of red panda in the country

Rationale

Poaching and illicit trade of red panda and their body parts has been emerging as one of the most serious threats to the survival of this species. In other range countries, red pandas are increasingly killed for their furs as well as for their meat. Targeted killing of red panda for direct economic rewards are nonexistence in Bhutan, however, the species have been found trapped and killed accidentally in the snares set for other wildlife like musk deer and pheasants (Dorji et al., 2011).

Strengthening surveillance and intelligence networking, staff capacity augmentation and improving coordination among relevant enforcement agencies will ensure the effective control of poaching and illegal trade. Adoption of zero poaching strategy and national roll out of SMART patrolling in all protected areas and divisions will guarantee zero poaching incidences and thriving of red panda with other charismatic wildlife species in Bhutan, and transboundary areas.

Output 4.1: Red panda poaching and trafficking in Bhutan maintained at zero incidences.

Action 4.1.1: Strengthen surveillance and intelligence networking using junior rangers, local forest guardians, armed personnel and other relevant stakeholders.

Action 4.1.2: Implement zero poaching strategy and strengthen SMART patrolling

Action 4.1.3: Train frontline staff on basic enforcement and surveillance skills.

Action 4.1.4: Implement anti-snare campaigns involving junior rangers and local forest guardians.

Action 4.1.5: Provide patrolling safety gears for field rangers, junior rangers and local forest guardians.

Output 4.2: Red panda kill from dog depredation and disease transfer from livestock reduced to zero incidences.

Action 4.2.1: Sensitize livestock herders residing in the red panda habitat range on the importance of dog and livestock sterilization to prevent zoonotic diseases

Action 4.2.2: Assess the extent of dog population and implement control programs in collaboration with Department of Livestock.

Action 4.2.3: Implement wildlife health strategy in collaboration with relevant stakeholders.

Action 4.2.4: Carry out dog and livestock sterilization programs annually in collaboration with Department of Livestock.

Action 4.2.5: Conduct nomadic health camp to highland transhumance in the alpine areas of red panda habitat range in collaboration with health officials.

4.1.3.5. Objective 5: Ensure functional landscapes for red panda conservation through transboundary collaboration.
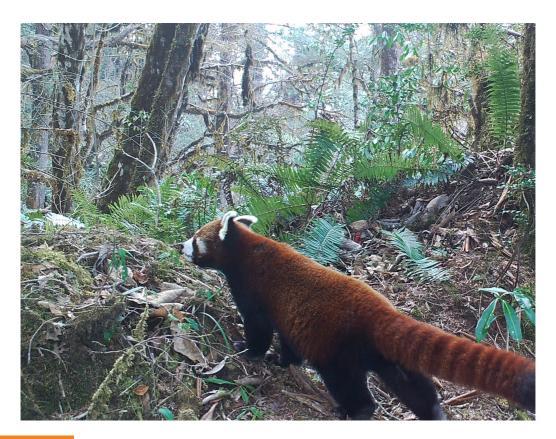
Rationale

Transboundary conservation management involving multi-level and multi-stakeholders is a new innovative approach gaining acceptance worldwide to ensure functional landscapes for species survival and benefits beyond boundaries. Transboundary conservation has gained momentum recently as a new frontier in conservation and development practice to achieve biodiversity, socioeconomic, and peace and security goals (Sandwith & Besançon, 2005). The World Park Conference in 2003 explored how to mainstream biodiversity into social and economic development at the landscape level through promoting transboundary conservation as a paradigm shift. Thapa et al. (2018) calls for the initiation of transboundary conservation efforts among the red panda range countries to secure viable populations across the border habitats.

Species and ecosystems do not follow political boundaries; therefore, the effective management of transboundary habitats and protection of species require an integrated approach that caters for better ecosystem integrity and stability. TraMCA initiated in 2011 to secure range of important wildlife habitats and better conservation of number of globally threatened species is one of the good endeavors that needs to be replicated. Such initiatives will ensure healthier coordination amongst the stakeholders and guarantee functional landscape for wildlife species and continued ecosystem services.

Output 5.1: Red panda conservation improved and strengthened by ensuring functional landscape through transboundary collaboration programs.

Action 5.1.1: Identify red panda transboundary habitat corridors and initiate transboundary conservation programs with neighboring regions and countries.

Action 5.1.2: Organize regular transboundary meetings and workshops to discuss issues, challenges and best practices of red panda conservation programs.

Action 5.1.3: Organize exchange visits for forestry officials, local communities and other relevant stakeholders to learn and share red panda conservation experiences.

Action 5.1.4: Initiate regular synchronized anti-poaching surveillance and patrolling to control illegal poaching and trafficking incidences of red panda and other wildlife species.

Action 5.1.5: Develop transboundary/regional red panda conservation action plan amongst the red panda range countries.

CHAPTER 5: PLAN IMPLEMENTATION AND MONITORING

5.1. Institutional arrangements

The plan implementation will be coordinated by NCD in collaboration with the functional divisions, UWICER, field offices and other relevant agencies. However, the field divisions and protected areas falling within the red panda habitat will take lead role in implementing the activities projected in the action plan. The implementation of research and development component of the plan will be supported by UWICER and other academic institutions within the country. In addition, the conservation partner organizations will also contribute to implement the action plan through financial and technical support. The activities will be implemented as regular RGoB financed activities or as activities under BFL project or other donor assisted projects managed centrally or by respective field office.

5.2. Work plan and budget

The total estimated cost required to implement this action plan for the duration of five years is **Nu. 240.60 million (2018-2023).** The financial resources required for the implementation of this action plan is expected to be met by the Royal Government of Bhutan and Bhutan for Life project. Additional funding needed for the action plan will be sourced from potential donors like WWF, Bhutan Trust Fund for Environmental Conservation, United Nations Development Program, Bhutan Foundation and other international donors will also be explored.

Table 1: Plan & Financial Projection

Vision: A viable population of red panda conserved within its distribution range in an interconnected transboundary landscape.

Goal: Red panda conservation program strengthened and restore its habitat through a landscape conservation approach.

Output and Actions	Year I 2019-20	Year II 2020-21	Year III 2021-22	Year IV 2022-23	Year V 2023-24	Sub-Total
Objective 1: Restore and manage critical red panda habitats within and outside protected areas.						
Output 1.1: Critical red panda habitat assessed and mapped for both within and outside protected area network						
Action 1.1.1. Identify and map critical red panda habitat for protection and management interventions.	2.00					2.00
Action 1.1.2. Conduct stakeholder consultation meeting with relevant stakeholders to harmonize and mainstream red panda habitats into developmental master plans				1.50	1.50	3.00
Output 1.2: Critical red panda habitats managed as per the habitat management guidelines						
Action 1.2.1. Initiate habitat improvement through enrichment plantation of native palatable plant and bamboo species and removal of invasive species		3.00	3.00	3.00	3.00	12.00
Action 1.2.2. Declaration of special protection zone in buffer, multiple and outside protected areas based on the critical red panda habitat maps				1.00	1.00	2.00
Action 1.2.3. Development of Local Forest Management Plan (LFMP) for timber extraction from red panda habitats	2.00	2.00	2.00			6.00
Output 1.3: Habitat degradation reduced and degraded habitats restored for red panda conservation through integrated management approach						
Action 1.3.1. Conduct grazing capacity study to bring degraded rangeland under scientific management purview	2.00					2.00

Budget in Million Ngultrum

Action						Total
Action 1.3.2. Reduction of unproductive livestock through supply of improved breed to the communities residing in and around the critical red panda habitats		3.00	3.00	3.00	3.00	12.00
Action 1.3.3. Restore degraded pasture land/rangeland through planting fodder trees, bamboo species and suitable grass species for improved fodder production		2.00	2.00	2.00	2.00	8.00
Action 1.3.4. Initiate stall feeding and supply of fodder trees to intensify on-farm cattle management and offset fodder shortages	2.00	2.00	2.00	2.00		8.00
Action 1.3.5. Initiate silvo-pasture on pilot basis in the pasture land to offset fodder shortages and intensify on-farm cattle management		2.50	2.50			5.00
Action 1.3.6. Regulate extraction of timber and NWFPs from critical watersheds and spring sheds			1.00	1.00		2.00
Action 1.3.7. Conduct awareness on the sustainable lopping of fodder tree species and create community nursery for fodder tree supply	1.00	1.00				2.00
Output 1.4: Red panda conservation and community stewardship improved through alternative sustainable livelihood strategy implementation						
Action 1.4.1. Promote community based nature trails and observation points to encourage ecotourism		1.00	1.00			2.00
Action 1.4.2. Develop diverse ecotourism products and services for visitors in close consultation with tour operators and local communities	1.50	1.50				3.00
Action 1.4.3. Provide technical support in collaboration with Department of Agriculture to provide intensive agriculture farming	1.00	1.00	1.00	1.00	1.00	5.00
Action 1.4.4. Initiate NWFP group networking and diversification of NWFP products for sustainable income generation		2.00	3.00			5.00
Output 1.5: Principles of smart-green infrastructure adopted and implemented in the red panda habitats landscapes						
Action 1.5.1. Organize sensitization workshops on smart-green infrastructure with relevant stakeholders		1.00				1.00

Action					
Action 1.5.2. Organize exposure trips for relevant stakeholders to understand and appreciate the features of smart-green infrastructure				2.00	2.00
Action 1.5.3. Incorporate smart-green features in the local infrastructure development plans for efficient use of energy		1.00	1.00	2.00	2.00
Action 1.5.4. Promote use of alternative source of energy in red panda landscapes		2.00	2.00	4.00	8.00

Objective 2: Increase knowledge on red panda conservation and its habitat requirements

Output 2.1: Research and science based information on red panda distribution, ecology and conservation issues improved and strengthened.

Action					
Action 2.1.1. Identify research gaps on red panda conservation in Bhutan	1.00				1.00
Action 2.1.2. Conduct nationwide red panda survey to understand its distribution and its population estimates.		3.00			3.00
Action 2.1.3. Conduct foraging ecology study to understand red panda food habits and its dietary compositions.			2.50		2.50
Action 2.1.4. Conduct breeding ecology study to understand courtship behavior, breeding success and fecundity.			1.00	1.00	2.00
Action 2.1.5. Conduct red panda movement ecology study to understand its movement, home range, habitat selection and activity pattern.				1.00 / 1.00	2.00
Action 2.1.6. Identify transboundary red panda habitat corridors and carry out threat analysis for initiating regional landscape level conservation programs with neighboring protected and conservation areas.		1.00	1.00		2.00
Action 2.1.7. Conduct study on socio-cultural and ecological significance of red panda to raise its profile and increase policy attention for conservation.		1.00	1.00		2.00

Activity					Total
Output 2.2: Research capacity and field facilities in red panda range areas developed and strengthened					
Action 2.2.1. Equip/furnish the field offices of red panda range areas with adequate research field equipment (radio collar, GPS, camera traps, digital cameras, telescopic lens, rugged smart phones, sample collection tool kit)	2.00	2.00	2.00		6.00
Action 2.2.2. Organize research methodology, data collection and analysis trainings to field professional foresters and researchers	1.50	1.50			3.00
Action 2.2.3. Deliver animal handling and management trainings to field foresters and researchers	1.50	1.50			3.00
Objective 3: Enhance awareness of red panda conservation and its ecological significance					
Output 3.1: Awareness on red panda conservation and its ecological significance increased					
Action 3.1.1. Develop red panda awareness and education materials (posters, pamphlets, visual materials) for different stakeholders	1.35				1.35
Action 3.1.2. Conduct periodic awareness and education programs to policy makers, tour operators, local communities and students through the concept of living classrooms	1.00		1.00	1.00	3.00
Action 3.1.3. Mobilize and engage monastic institutions in promoting red panda conservation through awareness education	1.00	1.00	1.00		3.00
Action 3.1.4. Initiate and organize red panda festivals in red panda range areas within the country		2.00	1.50		3.50
Action 3.1.5. Initiate and institute transboundary red panda festivals alternatively in the neighboring boarder states of the red panda range areas		2.00	1.50		3.50
Output 3.2: Red panda knowledge and its conservation significance improved through development of citizen scientists and forest guardians					
Action 3.2.1. Create a group of junior rangers in schools from different grades and engage them in red panda research and conservation programs	1.00				1.00

Action						
Action 3.2.2. Institute local forest guardians composed of both genders and engage them in red panda research and conservation programs	0.50	0.50				1.00
Action 3.2.3. Provide hands on red panda research and awareness campaigning methodology trainings to junior rangers and local forest guardians	1.50	1.50				3.00
Action 3.2.4. Train junior rangers and local forest guardians as nature guide to be engaged as local guide for tourists and visitors		1.50	1.50			3.00
Action 3.2.5. Organize exposure tours and exchange visits for junior rangers and local forest guardians to successfully implemented red panda projects and ecotourism areas	2.00	2.00	2.00			4.00
Objective 4: Maintain zero poaching and trafficking incidences of red panda in the country.						
Output 4.1: Red panda poaching and trafficking in the country maintained at zero incidences						
Action 4.1.1. Strengthen surveillance and intelligence networking using junior rangers, local forest guardians, armed personnel and other relevant stakeholders	1.50	1.50	1.50	1.50	1.50	7.50
Action 4.1.2. Implement zero poaching strategy and strengthen SMART patrolling	3.00	3.00	3.00	3.00	3.00	15.00
Action 4.1.3. Train frontline staffs on basic enforcement and surveillance skills	3.00	3.00				6.00
Action 4.1.4. Implement anti-snare campaigns involving junior rangers and local forest guardians	1.50	1.50	1.50	1.50	1.50	7.50
Action 4.1.5. Provide patrolling safety gears for field rangers, junior rangers and local forest guardians	6.00	6.00				12.00
Output 4.2: Red panda kill from dog depredation and disease transfer from livestock reduced to zero incidences						
Action 4.2.1. Sensitize livestock herders residing in the red panda habitat range on the importance of dog and livestock sterilization to prevent zoonotic diseases	1.50	1.50	1.50			4.50
Action 4.2.2. Assess the extent of dog population and implement control programs in collaboration with Department of Livestock officials	3.00	1.50	2.25			6.75

Action						Total
Action 4.2.3. Implement wildlife health strategy in collaboration with relevant stakeholders	1.50	1.50	1.50	1.50	1.50	7.50
Action 4.2.4. Carry out dog and livestock sterilization programs annually in collaboration with Department of Livestock officials	1.00	1.00	1.00	1.00	1.00	5.00
Action 4.2.5. Conduct nomadic health camp to highland transhumance in the alpine areas of red panda habitat range in collaboration with health officials	1.00	1.00	1.00	1.00	1.00	5.00
Objective 5: Ensure functional landscape for red panda conservation through transboundary collaboration.						
Output 5.1: Red panda conservation improved and strengthened by ensuring functional landscape through transboundary collaboration programs						
Action 5.1.1. Identify red panda transboundary habitat corridors and initiate transboundary conservation programs with neighboring regions and countries	1.00					1.00
Action 5.1.2. Organize regular transboundary meetings and workshops to discuss issues, challenges and best practices of red panda conservation programs		1.00	1.00	1.00	1.00	4.00
Action 5.1.3. Organize exchange visits for forestry officials, local communities and other relevant stakeholders to learn and share red panda conservation experiences		1.00	1.00	1.00	1.00	4.00
Action 5.1.4. Initiate regular synchronize anti-poaching surveillance and patrolling to control illegal poaching and trafficking incidences of red panda and other wildlife species		2.00	2.00	2.00	2.00	8.00
Action 5.1.5. Develop transboundary/regional red panda conservation action plan amongst the red panda range countries				1.00	1.00	2.00
Total projected budget	47.85	67	55.75	38	32	240.60

Table 2: Monitoring and Evaluation Framework

Narrative Summary	Objectively Verifiable Output Indicators	Means of Verification	Lead Implementing Agency
VISION: A viable population of red panda conserved within its distribution range in an interconnected transboundary landscape.			
GOAL: Red panda conservation program strengthened and habitat restored through a landscape conservation approach.			
Objective 1: Restore and manage critical Red panda habitats within and outside protected areas.			
Output 1.1: Critical red panda habitat assessed and mapped for both within and outside protected area network.	Entire red panda habitat mapped and demarcated	Red panda distribution map	Concerned Division/Park and NCD
Action 1.1.1: Identify and map critical Red panda habitat for protection and management interventions.			
Action 1.1.2: Conduct stakeholder consultation meeting with relevant stakeholders to harmonize and mainstream Red panda habitats into developmental master plans.			
Output 1.2: Critical red panda habitats managed as per the habitat management guidelines.	Red panda population thriving in its distribution range.	Red panda monitoring plan and area of habitat restored.	Concerned Division/Park and NCD
Action 1.2.1.Initiate habitat improvement through enrichment plantation of native palatable plant and bamboo species and removal of invasive species.			
Action 1.2.2. Declaration of special protection zone in buffer, multiple and outside protected areas based on the critical red panda habitat maps.			
Action 1.2.3. Development of Local Forest Management Plan (LFMP) for the Red panda habitats falling outside the protected areas and sustainable timber harvesting plan for protected areas.			
Output 1.3. Habitat degradation reduced and degraded habitats restored for Red panda conservation through integrated management approach.	Degraded red panda habitats identified	Area of red panda habitat restored	DoL/Concerned Division/ Park, NCD and Donor
Action 1.3.1. Conduct grazing capacity study to bring degraded rangeland under scientific management purview.			

Action 1.3.2. Reduction of unproductive livestock through supply of improved breed to the communities residing in and around the critical Red panda habitats.			
Action 1.3.3. Restore degraded pasture land/rangeland through planting fodder trees, bamboo species and suitable grass species for improved fodder production			
Action 1.3.4. Initiate stall feeding and supply of fodder trees to intensify on-farm cattle management and offset fodder shortages.			
Action 1.3.5. Initiate silvo-pasture on pilot basis in the pasture land to offset fodder shortages and intensify on-farm cattle management.			
Action 1.3.6. Regulate extraction of timber and NWFPs from critical watersheds and spring sheds.			
Action 1.3.7. Conduct awareness on the sustainable lopping of fodder tree species and create community nursery for fodder tree supply.			
Output 1.4. Red panda conservation and community stewardship improved through alternative sustainable livelihood strategy implementation.	Community participating in red panda conservation activities	Nos. of local community benefitted through ecotourism activities	Concerned Division/Park, community and Donor/DoA
Action 1.4.1. Promote community based nature trails and observation points to ecotourism.			
Action 1.4.2. Develop diverse ecotourism products and services for visitors in consultation with tour operators and local communities.			
Action 1.4.3. Provide technical support in collaboration with Department of Agriculture to promote intensive agriculture farming.			
Action 1.4.4. Initiate NWFP group networking and diversification of NWFP products for sustainable income generation.			
Output 1.5. Principles of smart-green infrastructure adopted and implemented in the Red panda landacapes.	Smart-green infrastructure in place	Percentage of natural resources consumption decreased	Concerned Division/Park, community and Donor
Action 1.5.1: Organize sensitization workshops on smart-green infrastructure with relevant stakeholders.			
Action 1.5.2. Organize exposure trips for relevant stakeholders to understand and appreciate the features of smart-green infrastructure.			
Action 1.5.3. Incorporate smart-green features in the local infrastructure development plans for efficient use of energy.			
Action 1.5.4. Promote use of alternative source of energy in red panda landscapes			

Objective 2: Increase knowledge base on Red panda conservation and its habitat ecology			
Output 2.1. Research and science based information on red panda distribution, ecology and conservation issues improved and strengthened.	Red panda ecology, habitat requirement and threat determined	Research reports and per reviewed scientific journal publications.	Concerned Division/Park, NCD, researchers community and Donor
Action 2.1.1. Identify research gaps on red panda conservation in Bhutan.			
Action 2.1.2. Conduct nationwide Red panda survey to understand its distribution and its population estimates.			
Action 2.1.3. Conduct foraging ecology study to understand Red panda food habits and its dietary compositions.			
Action 2.1.4. Conduct breeding ecology study to understand courtship behavior, breeding success and fecundity.			
Action 2.1.5. Conduct Red panda movement ecology study to understand its movement, home range, habitat selection and activity pattern.			
Action 2.1.6. Identify transboundary red panda habitat corridors and carry out threat analysis for initiating regional landscape level conservation programs with neighboring protected and conservation areas.			
Action 2.1.7. Conduct study on socio-cultural and ecological significance of red panda to raise its profile and increase policy attention for conservation.			
Output 2.2. Research capacity and field facilities in red panda range areas developed and strengthened.	Field office/staff equipped with survey and survival kits, and contemporary research methodology	Physical verification and documentary evidences	Field offices, DoFPS and donor
Action 2.2.1. Equip/furnish the field offices of Red panda range areas with adequate research field equipment (radio collar, GPS, camera traps, digital cameras, telescopic lens, rugged smart phones, sample collection tool kit).			
Action 2.2.2. Organize research methodology, data collection and analysis trainings to field professional foresters and researchers.			
Action 2.2.3. Deliver animal handling and management trainings to field foresters and researchers.			

Objective 3: Enhance awareness on Red panda conservation and its ecological significance		
Output 3.1. Awareness on red panda conservation and its ecological significance increased	Awareness among local people increased and improved policy support conservation initiatives	Concerned Division/Park, DoFPS and Donor
	Awareness tools and local festivals	
Action 3.1.1. Develop red panda awareness and education materials (posters, pamphlets, visual materials) for different stakeholders.		
Action 3.1.2. Conduct periodic awareness and education programs to policy makers, tour operators, local communities and students through the concept of living classrooms.		
Action 3.1.3. Mobilize and engage monastic institutions in promoting red panda conservation through awareness education.		
Action 3.1.4. Initiate and organize red panda festivals in red panda range areas within the country.		
Action 3.1.5. Initiate and institute transboundary red panda festivals alternatively in the neighboring boarder states of the Red panda range areas.		
Output 3.2. Red panda knowledge and its conservation significance improved through development of citizen scientists and forest guardians.	Students and local people actively participating in red panda conservation program	Concerned Division/Park, School, local people and Donor
	Nos. of students and local people participating in red panda conservation program	
Action 3.2.1. Create a group of junior rangers in schools from different grades and engage them in red panda research and conservation programs.		
Action 3.2.2. Institute local forest guardians composed of both genders and engage them in red panda research and conservation programs.		
Action 3.2.3. Provide hands on red panda research and awareness campaigning methodology trainings to junior rangers and local forest guardians.		
Action 3.2.4. Train junior rangers and local forest guardians as nature guide to be engaged as local guide for tourists and visitors.		
Action 3.2.5. Organize exposure tours and exchange visits for junior rangers and local forest guardians to successfully implemented red panda projects and ecotourism areas.		

Objective 4: Maintain poaching and trafficking incidences of red panda in the country at the current level (zero poaching incidences annually).

Output 4.1. Red panda poaching and trafficking in the country maintained at zero incidences.	Community actively participating in protection of red panda	Zero incident of red panda poaching and kill from dogs	Concerned Division/Park, School, local people and Donor
Action 4.1.1. Strengthen surveillance and intelligence networking using junior rangers, local forest guardians, armed personnel and other relevant stakeholders.			
Action 4.1.2. Implement zero poaching strategy and strengthen SMART patrolling.			
Action 4.1.3. Train frontline staff on basic enforcement and surveillance skills.			
Action 4.1.4. Implement anti-snare campaigns involving junior rangers and local forest guardians.			
Action 4.1.5. Provide patrolling safety gears for field rangers, junior rangers and local forest guardians.			
Output 4.2. Red panda kill from dog depredation and disease transfer from livestock reduced to zero incidences.	Red panda population free of feral dog invasion and zero incidences of zoonotic diseases.	Number of dogs sterilized and feral dog population reduced.	DoL/Concerned Division/ Park, and Donor
Action 4.2.1. Sensitize livestock herders residing in the red panda habitat range on the importance of dog and livestock sterilization to prevent zoonotic diseases.			
Action 4.2.2. Assess the extent of dog population and implement control programs in collaboration with Department of Livestock officials.			
Action 4.2.3. Implement Wildlife health strategy in collaboration with relevant stakeholders.			
Action 4.2.4. Carry out dog and livestock sterilization programs annually in collaboration with Department of Livestock officials.			
Action 4.2.5. Conduct nomadic health camp to highland transhumance in the alpine areas of red panda habitat range in collaboration with health officials.			

Objective 5: Ensure functional landscape for red panda conservation through transboundary collaboration.

Output 5.1. Red panda conservation improved and strengthened by ensuring functional landscape through transboundary collaboration programs.	Transboundary red panda conservation program instituted and implemented.	Transboundary landscape identified, proposal submitted and fund secured.	DoFPS concerned Division/Park, Civil Authority and Donor

Action 5.1.1. Identify red panda transboundary habitat corridors and initiate transboundary conservation programs with neighboring regions and countries.

Action 5.1.3. Organize regular transboundary meetings and workshops to discuss issues, challenges and best practices of red panda conservation programs.

Action 5.1.4. Organize exchange visits for forestry officials, local communities and other relevant stakeholders to learn and share red panda conservation experiences.

Action 5.1.5. Initiate synchronized anti-poaching surveillance and patrolling to control illegal poaching and trafficking incidences of Red panda and other wildlife species.

Action 5.1.6. Develop transboundary/regional red panda conservation action plan amongst the red panda range countries.

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