Snow Leopard Conservation Action Plan for Nepal

(2017 – 2021)

Government of Nepal
Ministry of Forests and Soil Conservation
Department of National Parks and Wildlife Conservation

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Technical Team
Mr. Gopal Prakash Bhattarai, Deputy Director General, DNPWC
Mr. Laxman Prasad Poudyal, Ecologist, DNPWC
Mrs. Madhuri Thapa Karki, Planning Officer, DoF
Mr. Bhupendra Prasad Yadav, Assistant Ecologist, DNPWC
Mr. Rishi Ranabhat, Assistant Ecologist, DNPWC
Dr. Shant Raj Jnawali, WWF Nepal
Dr. Narendra Man Babu Pradhan, BCN
Dr. Hem Sagar Baral, ZSL Nepal
Dr. Naresh Subedi, NTNC
Dr. Kanchan Thapa, WWF Nepal
Mr. Sheren Shrestha, WWF Nepal
Dr. Som Ale (Expert)
Dr. Rinjan Shrestha (Expert)

Review Team
Mr. Krishna Prasad Acharya, Director General, Department of Forest
Mr. Man Bahadur Khadka, Director General, Department of National Parks & Wildlife Conservation
Dr. Maheshwar Dhakal, Joint Secretary (Technical), Ministry of Forest and Soil Conservation
Mr. Fanindra Kharel, Former Director General, Department of Forest and Soil Conservation
Mr. Gaurishankar Timila, Former Director General, Department of Forest

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Kangchenjunga Conservation Area/DNPWC

Foreword

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Foreword

Nepal is doing its best efforts to conserve iconic and keystone species at both species and landscape level. In 2005, Government of Nepal produced the first national Snow Leopard Conservation Action Plan, 2005-2015. Over the past ten years, this document guided holistic efforts towards conservation of the endangered snow leopard in the country. It paved way, not only for enhancing our understanding of the elusive felid, but also effectively address chronic threats to the species, their prey and habitat.

This phase saw some significant milestones including pioneering satellite telemetry of individual snow leopards, successful implementation of Livestock Insurance Scheme (LIS), and most importantly increased involvement of local people in conservation.

Yet, conservation in an ever-evolving world demands long-term persistent efforts. Despite successes in pockets, threats to snow leopards and their prey from poachers, retaliatory killings in conflicts and habitat fragmentation due to unplanned development, persist even today. While there is no telling on the exact outcomes, climate change and its adverse effects are likely to aggravate the existence for snow leopard and its habitat. Despite the fact, ecotourism and high value non-timber forest products are integral part of snow leopard conservation in Nepal.

Over time, reflecting on past successes and learning from failures, strategies need to be adapted and approaches modified to reach the desired goal. The SLCAP 2005-2015 document was revised in 2012 to adapt to changing needs.

This updated version – SLCAP, 2017-2021, will continue to provide crucial guidance to carry on the good work done by the country in the past decade, supported by its people and organizations like National Trust for Nature Conservation and WWF Nepal. This document incorporates learning from the past experiences and focuses on replicating success stories on a larger scale, but also encourages innovation to address challenges facing the snow leopard and its ecosystem.

Conservation needs to be inclusive, and especially so, for wide-ranging species like the snow leopard. Accordingly, this Action Plan has been prepared based on the prevailing government policy and also feeds into global efforts as per Nepal's commitment to the Bishkek Declaration and the Global Snow Leopard & Ecosystem Protection (GSLEP) program.

I would like to thank local people and staff of the Mountain Protected areas who were involved for the successful implementation of SLCAP 2005-2015 and for the preparation of this SLCAP 2017-2021.

I sincerely thank the technical team of the Department of National Parks and Wildlife Conservation for preparing this Action Plan. I thank WWF Nepal for providing financial support for producing this document. I request all implementing partners for their support and cooperation to implement this action plan and wish them all success to ensure that snow leopards continue to thrive in Nepal's mountains.

13/Jan/2017

Man Bahadur Khadka
Director General

G. P.O. Box: 860, Kathmandu, Nepal. Tel. 4220919, 4220850, 4227926, Fax : 977-1-4227675

Acronyms and Abbreviations

ACA	Annapurna Conservation Area
ANCA	Api-Nampa Conservation Area
APO	Anti-Poaching Operation
CBAPU	Community-Based Anti-Poaching Unit
CBD	Convention on Biological Diversity
CBO	Community-Based Organization
CIB	Central Investigation Bureau
CITES	Convention on International Trade in Endangered Species of Wild Fauna and Flora
DFO	District Forest Office/Officer
DHR	Dhorpatan Hunting Reserve
DNA	Deoxyribonucleic Acid
DNPWC	Department of National Parks and Wildlife Conservation
DoF	Department of Forests
FY	Fiscal Year
GCA	Gaurishankar Conservation Area
GGN	Green Governance Nepal
GPS	Global Positioning System
GSLEP	Global Snow Leopard & Ecosystem Protection Program
GTF	Global Tiger Forum
ICIMOD	International Center for Integrated Mountain Development
IUCN	International Union for Conservation of Nature
KCA	Kangchenjunga Conservation Area
km	Kilometer
KNP	Khaptad National Park
KSL	Kailash Sacred Landscape
KSLCDI	Kailash Sacred Landscape Conservation and Development Initiative
LNP	Langtang National Park
MAP	Medicinal and Aromatic Plants
MBNP	Makalu-Barun National Park
MCA	Manaslu Conservation Area
MoFSC	Ministry of Forests and Soil Conservation
MoU	Memorandum of Understanding
MVP	Minimum Viable Population
NBSAP	National Biodiversity Strategy and Action Plan
NPWCA	National Parks and Wildlife Conservation Act
NPR	Nepalese Rupee
NSLEP	National Snow Leopard & Ecosystem Protection Priorities
NTCC	National Tiger Conservation Committee, Nepal
NTFP	Non-Timber Forest Product
NTNC	National Trust for Nature Conservation
NWCCCC	National Wildlife Crime Control Coordination Committee
PA	Protected Area
RNP	Rara National Park
SHL	Sacred Himalayan Landscape
SLCAP	Snow Leopard Conservation Action Plan
SLCC	Snow Leopard Conservation Committee
SMART	Special Monitoring and Reporting Tool
SNP	Sagarmatha National Park
SPNP	Shey-Phoksundo National Park
SAWEN	South Asia Wildlife Enforcement Network
TAR	Tibetan Autonomous Region
UAV	Unmanned Aerial Vehicle
USAID	United States Agency for International Development
WCCB	Wildlife Crime Control Bureau
WWF	World Wildlife Fund

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Executive Summary

Nepal is one of the 12 snow leopard range countries, working to secure the species along with its prey and habitat. As part of its commitment to the Global Snow Leopard and Ecosystem Partnership (GSLEP) Program, Nepal prepared the National Snow Leopard Conservation Action Plan, 2005-2015, to holistically coordinate conservation efforts. Over the period of ten years, this plan was successfully implemented by the Government of Nepal in collaboration with partner organizations and local communities.

A technical team was formed by the Department of National Parks and Wildlife Conservation to revise and update the action plan, outlining the achievements of the previous plan, identifying challenges and incorporating learning. An extensive evaluation process included reviews of literature and field reports, consultations at local to national levels, and interviews with key government officials, partner organizations and individual experts. An outcome of this evaluation, the updated Snow Leopard Conservation Action Plan, 2017-2021, guides the country in snow leopard conservation for the next five years.

This plan is divided into two broad chapters. The first chapter provides the context, and includes a background on the status of snow leopards, nationally and globally, a reflection on the implementation of the previous plan and a summary of its achievements and limitations. The earlier plan focused on generating greater community stewardship in conservation, mobilizing communities and community-based organizations in research as well as conservation. Use of cutting-edge science helped advance our understanding of the species; significant achievements included pioneering satellite telemetry with three snow leopards in Kangchenjunga Conservation Area. A nation-wide genetic analysis was also carried out. Conflict mitigation was addressed through the replication of the Livestock Insurance Scheme and upgrading policies to ensure greater benefits to victims. Efforts also continued to strengthen institutions for effective enforcement as well as to improve transboundary cooperation.

Based on these understanding, the second chapter outlines the goal, objectives and detailed implementation plan for 2017-2021. In line with the GSLEP priorities, the plan focuses on upscaling best practices in snow leopard conservation efforts, and includes five broad objectives: continue research and monitoring using cutting-edge technology; improve habitat and corridors; mitigate conflict through community engagement; reduce wildlife crimes; and, strengthen trans-boundary coordination and cooperation. The plan includes a budget of 34,65,00,000 NPR (3.15 million USD) for its implementation.

Snow leopards in Manang

Photo credit - **Tashi R. Ghale**

Chapter 1: The Context

1 Introduction

1.1 Relevance of the Action Plan Revision

Any species action plan apprises the conservation status, habitats and conservation priorities of the target species. However, situations evolve over time, with the implementation of previous conservation plan; this necessitates a periodic review for appropriate allocation of resources for effective long-term conservation.

The plan period of the existing Snow Leopard Conservation Action Plan (SLCAP) 2005-2015 has ended. The action plan was revised in 2012 to address emerging threats such as potential adverse impacts of climate change and unplanned infrastructure (including highways and village roads) in Nepal.

The revision of this modified action plan intends to review its implementation status, contemporary issues and emerging threats to the species, if any, and to recommend conservation measures to enhance the conservation of snow leopard in the country in the future.

1.2 Revision Process

The revision process was initiated with the formation of an expert technical team by the Department of National Parks and Wildlife Conservation (DNPWC). The team collected and reviewed documents and reports on snow leopard conservation in Nepal. The existing SLCAP and the National Snow Leopard and Ecosystem Protection Priorities (NSLEP) of Nepal 2014-2020 under the Global Snow Leopard and Ecosystem Protection (GSLEP) Program were critically reviewed.

Literature on snow leopard research including genetic analysis and ecological studies, field reports from Nepal's snow leopard bearing Protected Areas (PAs), as well as inputs received from national-level community consultations and field-level community consultations held in 2014, were reviewed. Additionally, key persons from relevant government institutions, conservation partner organizations, and individual experts were also consulted.

Based on the experience gained from the implementation of the existing action plan, extensive literature reviews and expert opinions, a draft SLCAP, 2017-2021 for Nepal was prepared to contribute in achieving the goal set by the Global Snow Leopard and Ecosystem Protection (GSLEP, 2013) Program. The draft action plan was independently reviewed, and then refined based on feedback received during a national workshop for wider consultations, for finalization.

1.3 Scope of the Action Plan

The preparation of the action plan is mainly guided by Nepal's Forest Policy 2071 B.S. (2015), National Biodiversity Strategy and Action Plan: 2014-2020, National Snow Leopard Recovery Plan, Bishkek Declaration, 2013, and GSLEP, 2013-2020.

The action plan will be implemented to holistically address the needs for long-term conservation of snow leopard in Nepal. It considers collaborative efforts of a wide range of stakeholders including policy and decision makers, wildlife law enforcement agencies, conservation partners, academic institutions and communities for its successful implementation.

2 Background

2.1 Global Status and Distribution

Figure 1: Global snow leopard distribution
Source: GSLEP, 2013

The snow leopard *(Panthera uncia)* is an elusive native cat of the high mountains of Central and South Asia. The species inhabits an estimated area of 1.8 million km^2 at altitudes ranging from 540 m to more than 5,000 m (GSLEP, 2013). They are found in 12 countries (Figure 1) and their current estimated global populations range from 3,921 to 6,290 (Table 1). The species is an indicator of healthy high mountain ecosystems.

Table 1: Estimated populations of snow leopards

S. No.	Range Country	Estimated Snow Leopard Population (Fox, 1994)+	Estimated Snow Leopard Population	
			Latest Available Estimates	Source
1	Afghanistan	100 – 200	100 -200 (2003)	GSLEP, 2013
2	Bhutan	100 – 200	96 (2016)	Govt. of Bhutan, 2016
3	China	2,000 - 2,500	2,000 – 2,500 (2003)	GSLEP, 2013
4	India	200 – 600	200 – 600 (1994)	GSLEP, 2013
5	Kazakhstan	180 – 200	100 -110 (2001)	GSLEP, 2013
6	Kyrgyzstan	800 - 1,400	150 – 500 (2001)	GSLEP, 2013
7	Mongolia	500 - 1,000	500 – 1,000 (2000)	GSLEP, 2013
8	Nepal	350– 500	301 – 400 (2009)	Revised SLCAP, 2012
9	Pakistan	100 – 300	200 – 420 (2003)	GSLEP, 2013
10	Russia	50 -150	70 – 90 (2012)	GSLEP, 2013
11	Tajikistan	120 – 300	180 – 220 (2003)	GSLEP, 2013
12	Uzbekistan	10 – 50	20 – 50 (2003)	GSLEP, 2013
	Total	4,510 – 7,400	3,921 – 6,290	GSLEP, 2013

Generally, snow leopard landscapes are inhabited by people who primarily depend on various forms of traditional pastoralism and agro-pastoralism. Increasing livestock and overgrazing, resulting in degradation of rangelands, increased competition between prey species and livestock, and ultimately greater conflicts and retaliatory killings is recognized as among the major threats to snow leopards in all range countries.

Increase in human habitation and large-scale infrastructure development have also degraded and fragmented wildlife habitat in the high mountains and severed genetic connectivity of snow leopard populations (GSLEP, 2013). Development of transportation network has unlocked remote areas to wildlife crimes by facilitating access and trafficking of wildlife products. Weak law enforcement, porous border and rising demands for snow leopard products at international levels are some of the threats identified in snow leopard conservation (revised SLCAP, 2012).

In view of these threats, conservation effectiveness has been limited due to inadequate resources including trained staff, equipment and finances as well as weak transboundary cooperation and low levels of awareness.

Conservation of snow leopards is inherently challenging due to the large coverage, remoteness and harshness of their habitat. Limited staff trained to deal with the needs of communities and their mobilization in conservation of snow leopards at different levels and disciplines aggravates the challenges for some range countries. Deficiency in scientific information on the snow leopard's distribution, population status, potential habitats, predator-prey relationship, and their ecology and behavior has also been a critical impediment.

In October 2013, expressed through the Bishkek declaration, the snow leopard range countries and partners committed to work collectively to identify and secure no less than 20 snow leopard landscapes across its range by 2020. The snow leopard landscape is defined as "the landscape holding at least 100 breeding age snow leopards with a support of adequate and secure prey populations, and have functional connectivity to other snow leopard landscapes, some of which are sharing international boundaries and are conserved with the local community participation". It is expected that achieving the goal of 20 'secure' snow leopard landscapes through 2020 will ensure that the snow leopard is retained as a living icon of Asia's high mountains in the future (GSLEP, 2013). In March 2015, during the first High Level Steering Committee meeting held in Bishkek, the number of landscapes was increased from 20 to 23 for more space and security of the species (GSLEP, 2015).

Since the Bishkek declaration in 2013, October 23 is celebrated annually as 'International Snow Leopard Day 'to raise awareness and flag the importance of snow leopard conservation globally. Likewise, 2015 was declared 'International Snow Leopard Year'.

2.2 National Conservation Status

2.2.1 Snow Leopard Population Status and Ecology

The snow leopard is the apex predator of the Himalayan ecosystem. They are found within and outside mountain protected areas (PAs) of Nepal (Figure 2); their presence in Rara and Khaptad National Parks is yet to be confirmed. It is estimated that a large number of snow leopards are found outside the PAs (WWF, 2009). In Nepal, the potential snow leopard habitat is estimated at almost 13,000 km^2 (Table 2).

Previously, the snow leopard range in Nepal was divided into five blocks considering putative physical barriers for movement between blocks. For instance, the Kali-Gandaki gorge, one of the deepest gorges in the world, is considered a physical barrier for snow leopard movement from east to west or vice versa.

In 2012, those blocks were administratively rearranged into three large snow leopard conservation landscapes: 1) Eastern, 2) Central, and 3) Western (Table 2).

Table 2: Snow leopard potential habitat in protected areas, blocks and landscapes

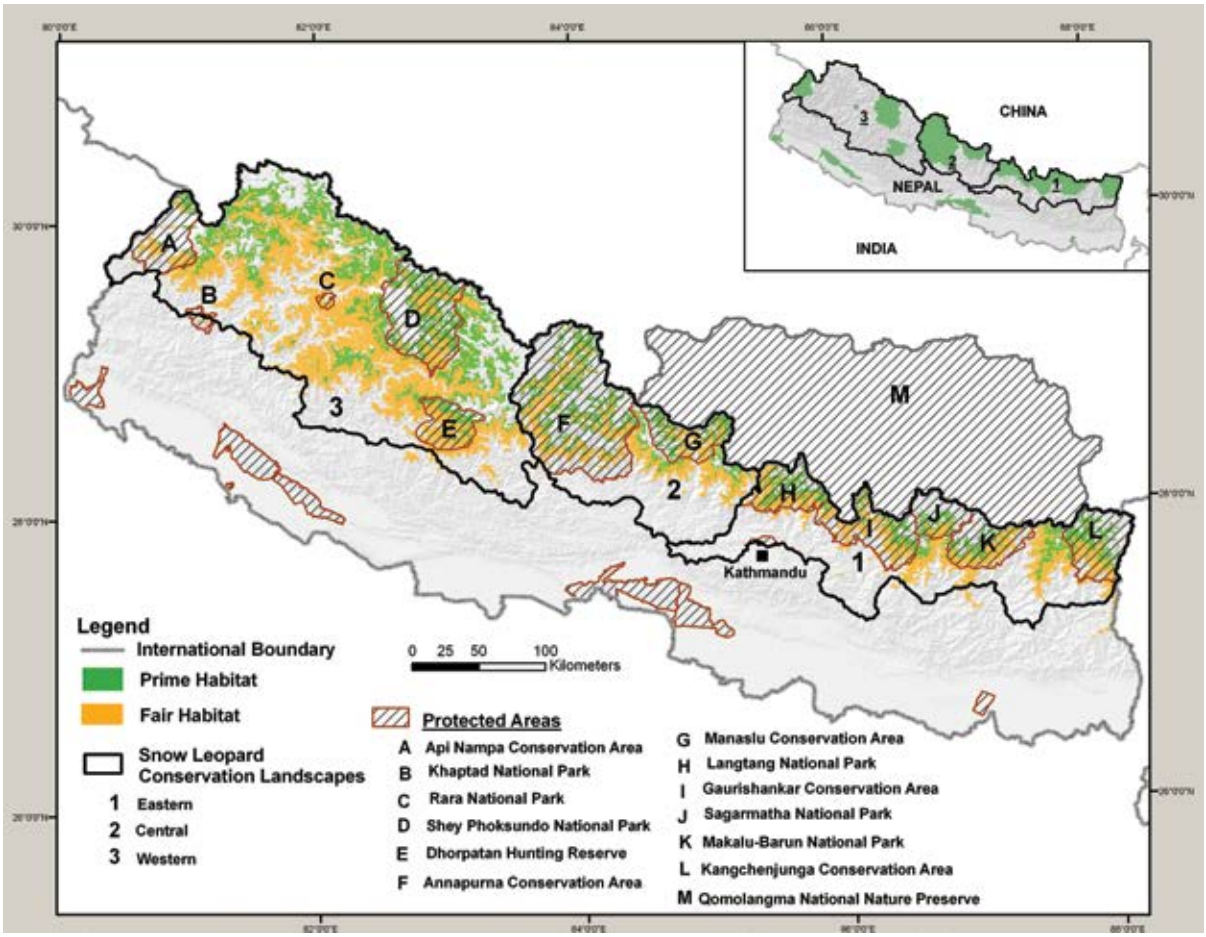
Protected Area	Core Area (km^2)	Buffer Zone (km^2)	Total Area (km^2)	Potential Habitat (km^2)	Three landscapes with estimated potential habitats (km^2)**
Kangchenjunga Conservation Area	2035	-	2035	698 (B1)	Eastern - 2900
Makalu-Barun National Park	1500	830	2330	1073 (B2)	
Sagarmatha National Park	1148	275	1423		
Gaurishankar Conservation Area	2179	-	2179	1129 (B3)	
Langtang National Park	1710	420	2130		
Manaslu Conservation Area	1663	-	1663	5470 (B4)	Central (MCA to western part of ACA) - 5470
Annapurna Conservation Area	7629	-	7629		
Dhorpatan Hunting Reserve	1325	-	1325	4445 (B5)	Western (Tschharka Pass in the east to ANCA in the west) - 4445
Shey-Phoksundo National Park	3555	1349	4904		
Rara National Park	106	198	304		
Khaptad National Park	225	216	461		
Api-Nampa Conservation Area	1903	-	1903		
Total	24978	3288	28266	12815	12815

Source: Revised SLCAP, 2012

The eastern landscape extends from Kangchenjunga Conservation Area (KCA) to Langtang National Park (LNP) in the west and includes Makalu-Barun National Park (MBNP), Sagarmatha National Park (SNP) and Gaurishankar Conservation Area (GCA). Snow leopard habitats in this landscape are fragmented, so maintaining a Minimum Viable Population (MVP) of the species here depends upon population linkage with China and India. Similarly, the central landscape extends from west of LNP including Manaslu Conservation Area (MCA) to Tscharka Pass in the western part of Annapurna Conservation Area (ACA). The western landscape - the biggest in terms of area - holds the largest population of snow leopard in Nepal. It extends from Tscharka pass to Api-Nampa Conservation Area (ANCA) in the far western part of the country, and covers Dhorpatan Hunting Reserve (DHR), Shey-Phoksundo National Park (SPNP), Rara National Park (RNP) and Khaptad National Park (KNP).

Besides PAs, adjoining forests and rangelands with sufficient prey-base, also provide suitable habitats to snow leopards. Accordingly, Mugu, Dolpa and Humla districts are expected to support good number of snow leopards (Revised SLCAP, 2012).

Figure 2: Snow leopard range in Nepal Himalayas with three landscapes



Map Source: DNPWC/WWF Nepal

Snow leopards in Nepal share their habitat with other nationally threatened species like the Tibetan gazelle (*Procapra picticaudata*), grey wolf (*Canis lupus*), wild ass (*Equus kiang*), black musk deer (*Moschus fuscus*), Himalayan musk deer (*Moschus leucogaster*), alpine musk deer (*Moschus chrysogaster*), Himalayan black bear (*Ursus thibetanus*), red panda (*Ailurus fulgens*), and Asiatic wild dog (*Cuon alpinus*). Vulnerable species like lynx (*Lynx lynx*), common leopard (*Panthera pardus fusca*) and Tibetan argali (*Ovis ammon hodgsonii*) are also found in the region. The principal prey of snow leopard, the blue sheep (*Pseudois nayaur*), and other animals like Himalayan tahr (*Hemitragus jemlahicus*), Himalayan serow (*Capricornis thar*), wild boar (*Sus scrofa*), and barking deer (*Muntiacus vaginalis*) also inhabit the area (Jnawali *et al.,* 2011). The estimated snow leopard population in Nepal ranges around 301-400 (Table 3). The estimate is based on linear relationship with sign encounter rates, which has been verified with predator-prey relationship.

The population density of snow leopard in Nepal is found to be extremely variable. For example, Langu Valley has 10-12 animals per 100 km^2, Manang has 5-7 animals per 100 km^2 and 1-5 animals per 1000 km^2 elsewhere (Jackson and Alhborn, 1990 in SLCAP, 2005-2015). The current population density found to range from 1.5 to 3.2 animals per 100 km^2, with the highest density in the western landscape (Revised SLCAP, 2012).

Table 3: Estimated snow leopard populations in three landscapes in Nepal

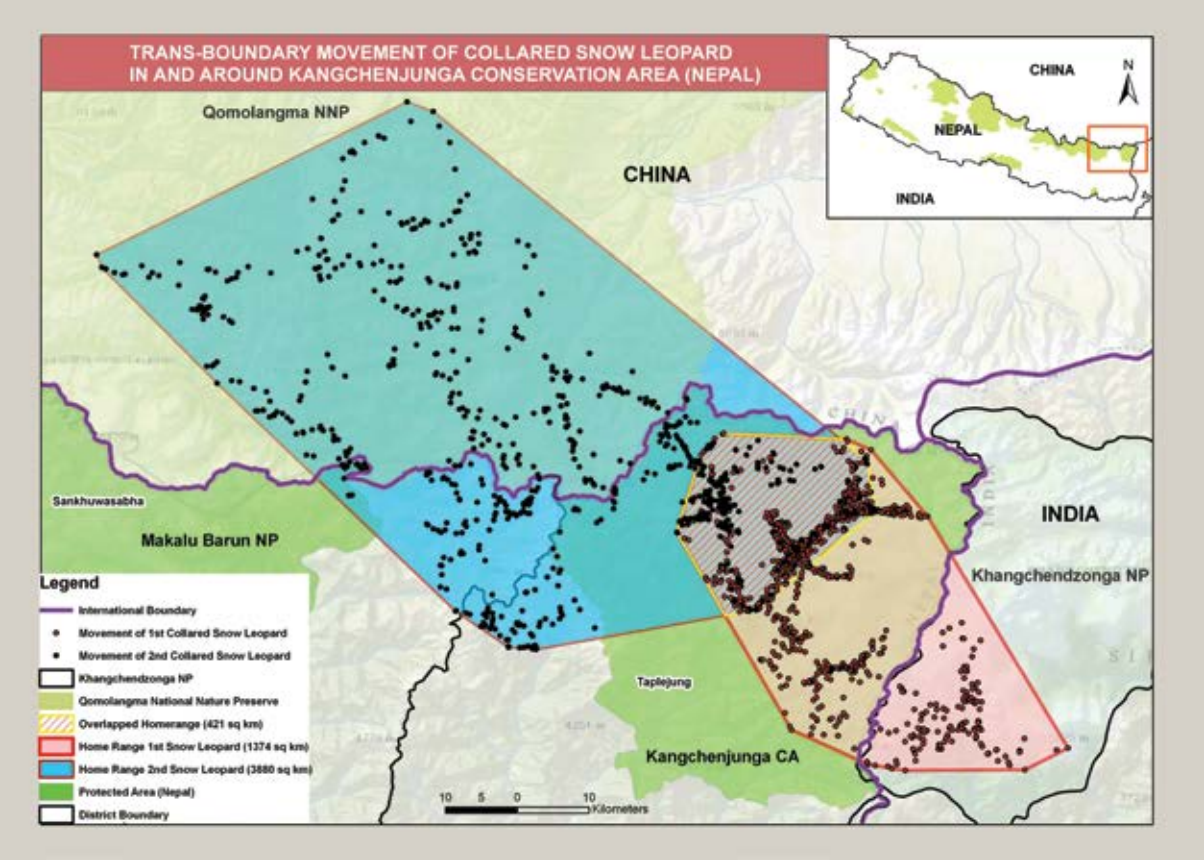
Landscapes	Protected Areas	Density/100 (km^2)	Number		
			Mean	Lower Limits	Upper Limits
Eastern	KCA	2.6	18	13	21
	SNP	1.8	4	2	5
Central	ACA & MCA	1.5	17	6	24
Western	SPNP & ANCA	3.2	319	280	349
			358	301	400

Source: WWF Nepal, 2009 in revised SLCAP (2005-2015), 2012

Several ecological and predator-prey relationships studies have been conducted during the plan period. In recent years, advanced technology such as non-invasive genetic analysis has been applied to snow leopard studies in Nepal.

The first GPS satellite radio-collared male snow leopard in KCA in November 2013 shows that this snow leopard covers a large home range of over 1000 km^2 extending to Sikkim in India (DNPWC, 2014). Similarly, the first GPS satellite-collared female snow leopard in KCA in April 2016 shows a similar trend with its movement extending into China.

Figure 3: Transboundary movement of the collared snow leopards from KCA



Source: DNPWC/WWF Nepal

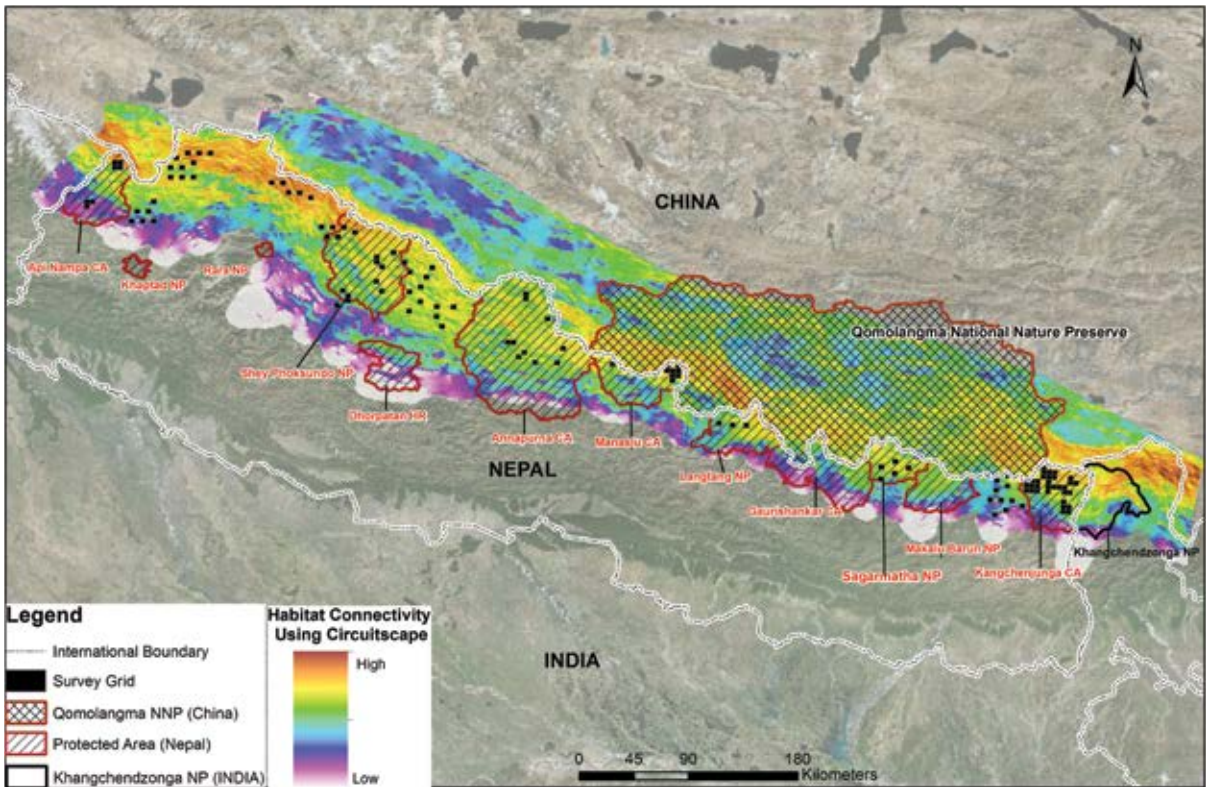
A study done in Phu valley of Manang district reveals that the snow leopards' main natural prey is blue sheep (92%), whereas their annual diet comprised 42% livestock (Wegge *et al.*, 2012). A similar study conducted in Kibber Wildlife Sanctuary, Himachal Pradesh, India contains 58% of biomass from livestock (Bagchi & Mishra, 2006; GGN, 2015). Another study conducted in SPNP shows that blue sheep and domestic sheep are the main prey with 30% and 15% occurrence in the snow leopard diet respectively. The food habits of snow leopard were found to be independent of the density of prey species; no proportional relationship between the prey density and the diet of snow leopards was found (Devkota *et al.*, 2013). In central Himalayas, snow leopard diet was found to comprise about 63% of blue sheep and 18% of livestock (Aryal *et al.*, 2014). Another study conducted in Annapurna and Manaslu reveals that the snow leopard diet contains 68% natural prey and 31% livestock. Samjung valley in Upper Mustang is found to harbor the highest density of snow leopards in the central landscape (Chetri, 2014; Thapa, 2015). It is assumed that in areas like the Phu valley where the natural prey consists largely of one species of ungulate that is already heavily killed by snow leopard will lead to increased predation on this prey species, which is eventually likely to repress numbers of both prey and predator (Wegge *et al.*, 2012).

The snow leopard and common leopard share prey species, with a dietary overlap of about 69% (Lovari *et al.*, 2013a). Since both are similar in size and have similar food habits, these species will have to contend with each other if they live in sympatry (Lovari *et al.*, 2013b). Reoccurrence of opportunistic predators such as wolf, wild dog and jackal should also be taken into consideration for conserving snow leopard and managing prey base (Subba *et al.,* 2016).

Long-term research and monitoring through genetic analysis, camera trapping and application of satellite GPS collar among others will be necessary to better understand their population dynamics and ecology for effective conservation.

It will also be crucial to identify potential corridors between the habitat blocks. Effective conservation interventions to ensure the functionality of those potential corridors will be important towards sustainable snow leopard conservation.

Figure 4: Potential connectivity across three snow leopard conservation landscapes in Nepal.



Source: DNPWC/WWF Nepal

In FY 2011/12, studies on snow leopards included 'Assessing predator-prey relationship including people interaction in the alpine habitat of KCA of Nepal Himalayas' and 'Snow leopard-prey relation: A case study from SPNP, Nepal', 'Livestock depredation by snow leopard in ANCA,' 'Snow leopard and brown bear in and outside protected areas of the Himalayan region of Nepal,' and a few on the impacts of climate change in this region (DNPWC, 2012). A presence/absence survey of snow leopards in Rolwaling Valley of GCA was done in FY 2012/13 (DNPWC, 2013).

The study conducted in Annapurna and Manaslu reveals that the snow leopard is considered as the main perpetrator with a record of 69% for human-snow leopard conflict. Snow leopards kill livestock individually but occasionally, incidences of mass killing are recorded. Mass killing of livestock by snow leopard was reported from Samjung village of Upper Mustang in ACA in November 2014 (Chetri, 2014; Thapa, 2015). In KCA, medium and small size herders with an average size of 36.6 livestock heads are more affected by livestock depredation because heavy economic loss has forced them to remove yaks from pastoralism subsequently hitting their livelihood conditions (Ikeda, 2004). Predation has led to a high rate of retaliatory killing by local communities in Humla district (Khatiwada and Ghimirey, 2009). Retaliatory killings of the species have also been reported from other parts of the country.

Poaching driven by high demand and price for their body parts in international market is another major threat to snow leopards. Incidences of seizures of illegal parts and arrest of traders from market centers like Kathmandu and Nepalgunj reveal the existence of illegal trade. Poaching of snow leopards is relatively high in ANCA and Humla district than in other parts of Nepal Himalayas (Khatiwada and Ghimirey, 2009; GGN, 2014).

2.2.2 Habitats and Prey

Over exploitation of medicinal plants and over grazing by growing number of livestock herds along with shifting traditional herding practices are considered major causes for wildlife habitat loss and degradation in rangelands in alpine zone (Miller, 1998). Climate change has also emerged as a most pervasive threat to the survival of snow leopards as approximately 30% of snow leopard habitat could be lost from the shifting of tree line chiefly along the southern edge of the Himalayas and in river valleys of the alpine zone (Forrest *et al.*, 2012). However, upper montane and sub-alpine forests will be more resilient to climate change (Thapa *et al.*, 2015).

A study done on Himalayan fir (*Abies spectabilis*) and mountain birch (*Betula utilis*) at the high altitude tree line of Manaslu region in central Nepal Himalayas, reveals that the upward shift of fir at MCA was estimated to be 2.61m/year but the upper distribution limits of birch has been stagnant in recent years although its upward migration continued up to the mid-20th century and the studied tree line is changing. Spatial and temporal variations in age structure and regeneration pattern of these two species and their species-specific response to climate indicated that the plant communities at the tree line ecotone in the Nepal Himalayas were sensitive to climate change (Liang *et al.*, 2014; Ghaire *et al.*, 2014).

Another study conducted to evaluate the impact of recent climate change on biodiversity and people in upper Mustang region in the trans-Himalayas of Nepal, shows that grasslands and forests diminished by 11% and 42% respectively from 1979 to 2009. Further, grasses and many shrub species are no longer found in abundance at higher elevations and consequently blue sheep move to forage at lower elevations where they raid crops. The movement of blue sheep attracts snow leopard from their higher-elevation habitats to lower sites, where they depredate livestock. Increased crop raiding by blue sheep and depredations of livestock by snow leopard will have adverse impacts on the livelihoods of local people (Dahal *et al.*, 2015). The remaining habitat should be protected to reduce threats from over-grazing by livestock and excessive exploitation of medicinal plants.

Landscape conservation planning approaches are recommended for snow leopard due to their extensive home range and for overall conservation of biodiversity in the region (Forrest *et al.*, 2012). In such situations, consideration should be given in managing snow leopard populations as a meta-population for long-term conservation of the species.

2.2.3 Policy, Legislation and Institution

The snow leopard is listed as 'endangered' in the IUCN Red Data Book, and as an Appendix I species in CITES, prohibiting international trade of the species. The species is included in the

protected mammals list under the National Parks and Wildlife Conservation Act, 2029 (1973) in Nepal. Nepal Biodiversity Strategy and Action Plan (NBSAP) 2014-2020 emphasizes priority actions in conserving endangered species including the snow leopard. Nepal has strong legal provisions to control wildlife crimes particularly for protected mammals. The NPWCA provisions 'a fine ranging from NPR 50,000 to NPR 1,00,000, or an imprisonment ranging from five years to 15, or both,' for offenders and accomplices convicted for illegal trade in snow leopards.

The act also has provision to reward informants with an amount up to NPR 50,000 for aiding in seizure or arrest of wildlife criminals. The government has initiated a relief scheme to help victims affected by wild animals listed in the Wildlife Damage Relief Guideline, 2069 B.S. (amendment 2072).

Effective law enforcement is crucial to control poaching and illegal trade of wildlife including snow leopards. The National Tiger Conservation Committee (NTCC), National Wildlife Crime Control Coordination Committee (NWCCCC), and Wildlife Crime Control Bureau (WCCB) and its respective district units tackle illegal wildlife trade and poaching of endangered species including snow leopards.

3 Review of the Revised Snow Leopard Conservation Action Plan 2005–2015 & Priority Areas of NSLEP 2014-2020

3.1 Implementation Status of the Snow Leopard Conservation Action Plan 2005-2015 (revised in 2012)

Two activities: i) develop and implement sustainable collection of NTFP and MAPS, and, ii) develop a snow leopard based ecotourism plan for piloting at least one site of snow leopard habitats were not implemented. Among the formation of various committees at different levels from policy to field levels, only SLCCs at KCA, LNP and SPNP came into operation. Several activities have been implemented partially limited to some protected areas only. For example, rotational grazing has been practiced in KCA and LNP, and veterinary services were provided occasionally in those protected areas. This is mostly due to limited fund and staff.

Advanced technologies such as non-invasive genetic analysis of scat, camera trapping and GPS satellite radio collaring have been applied to snow leopard studies in KCA and Annapurna-Manaslu landscapes. Several conventional type of ecological and predator-prey relationships studies have been conducted during the plan period.

Community based anti-poaching operations and monitoring of snow leopards and their prey base have been initiated with the introduction of citizen scientists (local resource persons with knowledge of snow leopard ecology and behaviour) in KCA.

In 2006, the first community based Livestock Insurance Scheme was initiated in KCA with the support of WWF Nepal to mitigate human-snow leopard conflict. For this scheme an endowment fund for herders along with the operation guideline has been established. The Wildlife Damage Relief Support Guideline, 2069 B.S. (First amendment 2072) is also under implementation.

A holistic approach has been taken to address the impacts of climate change and due consideration has been given to incorporate various smart adaptation measures in the conservation plan. Preparation and implementation of Local Adaptation Plan of Action (LAPA) has been initiated in a few mountain protected areas to reduce impacts of climate change.

3.2 Priority Areas of National Snow Leopard and Ecosystem Protection Program of Nepal

NSLEP consists of eight important areas for snow leopard conservation: i) strengthening policy and institutions, ii) managing prey and habitat, iii) controlling poaching and trade on the species, iv) engaging local communities in reducing human-wildlife conflict, v) trans-boundary management and enforcement, vi) strengthening capacity of national and local institutions, vii) addressing knowledge gap through research and monitoring, and viii) awareness and communication. The implementation of GSLEP and NSLEP will be complemented by SLCAP 2017-2021.

4 Major Conservation Efforts and Achievements

4.1 Enhancing Policy, Legislation and Institutions

4.1.1 Policy and Legislation

Nepal has been working on multiple fronts to enhance conservation efforts in the snow leopard landscape. This includes bringing in policies and guidelines that benefit nature, enhancing and adapting them to suit evolving needs, periodically.

The Forest Policy, 2071 B.S. and NBSAP, 2014-2020 A.D. stress the need for biodiversity conservation, particularly focusing on the protection of threatened and protected species of Nepal. It emphasizes on the preparation or revision and implementation of action plans for effective conservation of those species.

Accordingly, in 2015, the government amended the Wildlife Damage Relief Guideline, 2069 B.S. (First amendment 2072 B.S.) to increase the relief amount to NPR 500,000 in case of human death; likewise, relief limit for ordinary to serious injuries was increased from NPR 50,000 to NPR 100,000.

4.1.2 Institutional Development

Addressing wildlife crime is a priority in conservation. To curb wildlife crime, Nepal has established the NTCC, the NWCCCC, the WCCB at the central level which work in collaboration with WCCB district units and respective law enforcement agencies. NTCC and NWCCCC are chaired by the Prime Minister of Nepal and the Minister for Forests and Soil Conservation (MoFSC) respectively. The central WCCB is coordinated by the Director General of the DNPWC.

A total of 22 WCCB units in 24 districts (Kathmandu, Lalitpur & Bhaktapur have been considered as one unit) coordinate ground action with a number of Community-Based Anti-Poaching Units (CBAPUs) and Snow Leopard Conservation Committees (SLCC) to control poaching and illegal trade of protected species including snow leopards. The district WCCB units are headed by the Chief Conservation Officer of PAs, or DFOs in districts. These units work under the general guidance and supervision of the central WCCB coordinator. A total of 11 district-level WCCB units (Annex-3) have been formed to coordinate illegal trade control in the snow leopard habitat range of Nepal.

4.2 Landscape Approach in Snow Leopard Conservation

Conservation of wide ranging species like the snow leopard needs a landscape approach, often covering areas beyond man-made geo-political boundaries.

In 2012, the transnational Kailash Sacred Landscape (KSL) was designated covering a total area of 31,252 km^2 of north-western Nepal, China and India. Nepal covers about 42.5% of this landscape, or an area of 13,289 km^2. The KSL Conservation & Development Initiative (KSLCDI): Implementation Plan (2012-2016) and Sacred Himalayan Landscape (SHL) Strategic Plan (2006-2016) and the SHL Interim Implementation Plan (2010-2014) offer opportunities to implement landscape approach in snow leopard conservation. During this plan period, the Government of Nepal extended SHL to Kali Gandaki River in the west increasing its coverage.

A new Chitwan-Annapurna Landscape (CHAL) has been created to enhance the landscape conservation approach covering an area of 32,090 km^2. CHAL covers the rain shadow of the trans-Himalayan area and the snow-capped mountains of Annapurna, Manaslu and Langtang in the north, descending southwards through diverse topography to the mid-hills, Churia range and the flat lowlands of the Terai.

4.3 Cutting-Edge Research to Inform Conservation

Nepal carries out advanced research on snow leopards to understand ecology and behaviour of the species to aid in their conservation. During this plan period, Nepal pioneered satellite telemetry on individual snow leopards. Other than satellite-collaring, and annual population monitoring through standard camera trap methodology in KCA, non-invasive genetic analysis through scats of snow leopard populations across the Nepalese Himalayas has been carried out.

4.4 Community Engagement in Conservation

Success in conservation demands participation of local communities. With the snow leopards,

community participation is even more critical because of the remote and rugged geographical area and harsh climatic conditions, which locals are better-adapted towards.

With the introduction of conservation area and buffer zone management programs, local communities have been engaged in various conservation and community development activities. Such programs have borne mutual benefits to conservation as well as for livelihood enhancement and empowerment of communities. For conservation, this is a cost effective way to get substantial and reliable data, and ensure local ownership of the program, to nurture them as custodians for snow leopard conservation.

Some of the successful examples in community engagement are:

SLCC and Citizen Scientists in Wildlife and Habitat Monitoring

Since the formation of SLCCs in ACA and KCA, several new SLCCs have been formed in other mountain PAs including LNP, MCA and SPNP to engage local people in the conservation of iconic and other species, and their habitat and prey species (WWF, 2015). Each SLCC consists of 7-9 members, or more. Other than SLCC members, interested individuals trained as citizen scientists also aid in wildlife monitoring. Both SLCC and citizen scientists are trained in GPS handling, camera-trapping and monitoring of snow leopards and their prey.

In KCA, all SLCC members and over 20 citizen scientists have been capacitated through various skill development trainings, including operating camera-traps and data recording system (WWF, 2013, 2014, 2015; KCAMC, 2015). They are also actively involved in educating people about the importance of snow leopard conservation in and around protected areas, and aiding in snow leopard capture for GPS telemetry collaring and monitoring. A monitoring fund has been established in each SLCC in KCA. SLCC members and citizen scientists also aid in monitoring of other species including blue sheep e.g. in KCA. Similar systems can be replicated in other protected areas and district forests. SLCC members and citizen scientists also aid in habitat management activities. This includes rangeland management and improving access through trail improvement, construction and maintenance of wooden bridges and water supply improvement among others.

Community-Based Livestock Insurance Scheme

Considering the importance of livestock rearing for the livelihoods of mountain people, securing these animals have direct impact on snow leopard conservation. Accordingly, in 2006, the first community based Livestock Insurance Scheme (LIS) was initiated in KCA to mitigate human-snow leopard conflict. LIS operation guidelines were developed; an endowment fund was created and annual premium for insuring livestock was collected from owners, as per the guidelines. The endowment fund and premium are the main sources of the livestock insurance fund amounting to a total of NPR 7,100,000 till 2016 in KCA (Gurung *et al.*, 2011). A similar LIS has also been formed in ACA.

Operated by the SLCC, the fund allows quick relief to owners for livestock killed by snow leopard. Community members can also access this LIS fund as loan at low interest rates.

With the help of this scheme, retaliatory killings across the country have been reduced. Considering its success, it is anticipated that this scheme will be replicated in other snow leopard areas to address human-snow leopard conflict related to livestock depredation.

4.5 Building Awareness and Capacity

Mass awareness on the importance of preserving wildlife is critical for success and sustainability in conservation. Various conservation education, awareness campaigns and outreach programs have been conducted targeting a wide range of audiences from the grassroots level including local communities and schools, to policy and decision-making level. 'Snow Leopard Atlas, Nepal' was published in 2013 to spread awareness on the plight and status of the species. A Nepali publication titled 'Hiun Chituwa ko Samrakshan (Conservation of Snow Leopard)' has helped build awareness at the grassroots. October 23rd is celebrated as the 'International Snow Leopard Day' globally to mark the adoption of the landmark Bishkek Declaration on the conservation of this elusive cat. Other than general awareness, specific technical capacity building programs were organized for specific target groups including local communities and staff to enhance their knowledge and skills for effective conservation.

4.6 Transboundary, Regional and International Cooperation

Nepal shares international borders with China and India; habitats of individual snow leopards recorded in Nepal are known to span across one or both of these neighboring nations.

In 2010, Nepal and China signed an MoU for mutual cooperation in conserving biodiversity of the region, making provisions for regular meetings between high and senior officials of the two countries. Officials of PAs and district forests along the border also occasionally meet their counterparts to address issues at the field level.

Nepal and India hold consultative meetings regularly to share experience and discuss matters of common interest in conservation. Regional transboundary meeting is also being held with officials from the Indian state of Sikkim. Nepal has been advocating and working for transnational cooperation, through the designation and declaration of landscapes like SHL and KSL.

Regional cooperation in controlling wildlife trade is being facilitated through the South Asia Wildlife Enforcement Network (SAWEN) including eight countries (Afghanistan, Bangladesh, Bhutan, India, Maldives, Nepal, Pakistan, Sri Lanka), with its secretariat based in Nepal. SAWEN organizes various trainings, workshops and annual meetings. Efforts are on to institutionalize SAWEN and develop a regional level capacity building plan. The SAWEN focal persons meeting was organized in Nepal in November 2015.

Nepal is also a member of the GSLEP Program, an initiative of 12 snow leopard range countries for collaborative conservation and to promote snow leopard conservation globally.

Other than that, Nepal is state party/member to CITES, CBD, RAMSAR, IUCN, and GTF, showcasing its commitment for the conservation of biodiversity from local to global levels.

5 Threats

5.1. Persisting Threats

5.1.1 Loss of Prey

Illegal hunting and retaliatory killing for crop raiding continues to decrease population of blue sheep - the principal prey of the snow leopard. Loss of blue sheep to feral/guard dogs is another threat. Intensive patrolling to minimize this loss has been hindered by limited staff, inadequate field equipment and financial resources, as well as difficulties presented by the remoteness and harshness of the terrain.

5.1.2. Habitat Loss and Degradation

Rising livestock population and overgrazing by them, haphazard infrastructure development and unsustainable harvesting of medicinal plants are causing habitat loss and degradation within and around snow leopard bearing PAs. Mass collection of Yarsa gumba (*Ophiocordyceps sinensis*), a species endemic to the Himalayas and Tibetan Plateau has also adversely impacted snow leopard habitat. Rangelands are considered critical ecosystems in the Himalayas. They occupy about 60% of the Himalayan landscape (ICIMOD, 2012). These critical habitats have been affected by the intrusions of woody species in sub-alpine and alpine grasslands posing a threat to the diversity of rangelands, though this may not affect the total richness of flora (Sharma *et al.*, 2013; NBSAP, 2014).

5.1.3 Wildlife Crime

Poaching and illegal trade of snow leopard are occasionally reported from different parts of the country. Illegal wildlife trade activities are more pronounced at international borders. Effective control of illegal trade is a challenge due to porous international borders, limited intelligence network, inadequate staff, under equipped anti-poaching operations and CBAPUs in the remote mountain PAs. Opening of new trade routes to Tibet Autonomous Region (TAR), China is also likely to further complicate illegal trade control. Newly-established district WCCB units need capacity building for better functioning. Field-level transboundary meetings and information sharing must also be improved.

5.1.4 Human-Wildlife Conflict

Livestock depredation by snow leopards, and crop damage by prey species the main cause of human-wildlife conflicts in the mountain region. Heavy loss and often mass killing of livestock by snow leopards has resulted in retaliatory killings. Retrieving carcasses of wild ungulate kills of snow leopards by

people is also a source of conflict.

A relief delivery mechanism is in place. However, due to a lengthy procedure, its efficiency has been limited. Few livelihood recovery support programs to victims and their families have been implemented, but not yet at adequate levels. While efforts are on to involve communities in conservation, participation is not sufficient and people still have negative attitudes towards snow leopards in some areas.

5.2 Emerging Threats

5.2.1 Adverse Impact of Climate Change

Although it is difficult to foresee exact impacts, the mountain regions have been known to be more vulnerable to climate change related disasters. Intergovernmental Panel on Climate Change (IPCC) projects that the average annual temperature in South Asia and Tibet will increase by 3-4°C by 2080-2099 compared to historical averages from 1980-1999, while annual precipitation is expected to increase throughout this region as well. Forrest *et al.* (2012) find that about 30% of snow leopard habitat in the Himalaya may be lost due to a shifting treeline and consequent shrinking of the alpine zone, mostly along the southern edge of the range and in river valleys. Decrease in rangelands and forests at higher altitudes in Mustang district may increase crop damage and livestock depredation at lower elevations (Dahal, 2015).

5.2.2 Rapid Development of Illegal Wildlife Market Centers

International border points such as Tatopani, Kerung and Darchula in the northern part of Nepal have been identified as illegal market places. Opening of newer trade routes between China and India via Nepal, like Lipu Lek, as well as seven new trade points [Yari (Humla), Mugu (Mugu), Chhoser (Mustang), Larke (Gorkha), Lambagar (Dolakha), Kimathanka (Sankhuwasabha) and Olangchungola (Taplejung)] in Nepal-China international border can potentially increase illicit activities.

5.2.3 Unplanned Infrastructure Development

The Government of Nepal has set a goal to graduate the nation from its Least Developed Country status to Developing Country status by 2022. The government is therefore slated to increase public spending and investment in infrastructure. In a drive for growth, risks of the environment being ignored looms large. Linear infrastructures are critical for the country's growth and access to markets within and outside the country. However, this also jeopardizes natural resources through increased access and overharvesting as well as illegal trade. Likewise, hydropower generation, mining, large-scale agriculture and tourism can have adverse impacts on snow leopard habitat, if they are not planned keeping nature in mind.

6 Learning

- Community participation and their ownership of any conservation initiative are essential for long-term conservation of the species.
- Retaining dedicated staff to work in these remote harsh landscapes is difficult without adequate infrastructure, amenities, field gears and equipment and suitable incentives. Effective conservation in the mountains needs a lot more human resources and financial inputs.
- Sharing benefits from conservation related programs with communities has been very successful in generating community interests and participation in the protection of important and threatened species of flora and fauna.
- Recognition, and building capacity of citizen scientists, can be an important model in empowering local communities and developing local ownership towards conservation initiatives.
- Collaborative and concerted efforts are essential for reducing wildlife crimes and human-wildlife conflicts.
- Community-based insurance scheme for livestock depredation is practical, and can be sustainable if strengthened periodically to match growing market rates of livestock.
- Awareness among local communities about their roles and responsibilities towards the environment, and of benefits they get in return, enhances their support and participation in conservation.
- Policies and guidelines should be explicit and uniform throughout snow leopard areas to ensure impartiality and fairness.

7 Opportunities and Challenges

7.1 Transnational Landscape Conservation

The snow leopard is a wide ranging species and requires large areas for their long-term conservation.

Several mountain PAs have been established since the mid-seventies in Nepal; still, more than half of the snow leopard population is outside PAs. Landscape level conservation approach aids to maintain contiguity in snow leopard habitat covering PAs and other surrounding habitats.

Efforts are in place to protect snow leopards inside PAs as well as outside. In 2006, the transnational Sacred Himalayan Landscape was designated to initiate landscape level conservation to conserve the important biological hotspots and endangered species such as snow leopard in the eastern Himalayan region of Nepal.

Similarly, in 2012, Kailash Sacred Landscape was declared in the western part Nepal covering major snow leopard habitats in Nepal, China and India. Likewise, Chitwan-Annapurna Landscape was designated covering mountain regions in central landscape and running across the Churia and Terai along the south.

However, SHL and KSL are not contiguous, as KSL does not include the eastern end of Nepal's western snow leopard landscape. There is a need to cover this gap by either extending KSL up to Kali Gandaki River or creating a new landscape so that the integrity of the three snow leopard landscapes is maintained. Further investigation will be required to identify the potentiality of the area for landscape designation.

7.2 Enabling Policy and Institutions

National and international policies are in place to facilitate effective conservation of snow leopards. All these policies also encourage private sectors involvement in conservation for creating conservation based employment to enhance community livelihoods.

GSLEP and NSLEP are aligned on similar principles and approach for snow leopard conservation at the landscape level. However, the overarching goal to accomplish snow leopard numbers as stipulated in GSLEP can be challenging for the situation in Nepal.

Establishment of institutions like NTCC, NWCCCC, WCCB and its district units have been effective in curbing wildlife crime up to a certain extent. Still challenges persist on strengthening these institutions, particularly the district WCCB units.

Establishment of the community-based insurance scheme and government relief support have aided in mitigating human-snow leopard conflicts. However, there are opportunities to identify and address gaps, including mechanisms for quick disbursement of relief, and overcoming challenges of communication.

Certain policies will need to be implemented or modified. For instance, the KCA regulation 2064 B.S. (2008) allows sustainable harvesting of blue sheep through trophy hunting to raise resources to aid conservation efforts. However, initiating this is still a challenge due to the negative connotation associated with trophy hunting. More importantly, capacity will need to be built to ensure that this activity does not yield counter-productive impacts.

7.3 Applying Cutting-Edge Technology in Research and Monitoring

Use of advanced technology in wildlife research such as non-invasive genetic analysis, camera-trap surveys, and GPS-satellite telemetry present better opportunity to conduct ecology and behavioral studies of snow leopards, its prey and habitats. Molecular scatology analysis of snow leopards shows its potential to develop an index of snow leopard abundance, population structure, and information on sex and genetic relationships between different populations. Moreover, using other non-invasive technology for monitoring of snow leopard's prey and their habitats should be considered. Researchers and academic institutions can avail this new opportunity to pursue advanced study on impacts of climate change to snow leopards, their prey and habitats.

7.4 Promoting Nature-Based Tourism

The snow leopard is an enigmatic species and their high altitude habitats are naturally beautiful to attract visitors to the region. At present, Sagarmatha

and Langtang National Parks, and Annapurna Conservation Area are the most popular tourist destinations among the snow leopard bearing PAs in the country, making significant amount of earnings from tourism (Annex- 4). Up to 50% of such earnings go for community development in all PAs. Other protected areas also have high potential for tourism promotion. Such nature-based tourism can provide opportunities to enhance livelihoods of local communities raise awareness on the plight of snow leopard and finance management of the respective protected areas. However, development of adequate infrastructure in such remote areas presents a significant challenge. Ensuring that negative impacts associated with increased human presence and activity through tourism will also need to be considered.

7.5 Engaging Local Community in Conservation

It is well accepted that community participation is essential for sustainable and long-term conservation of biodiversity. Current management practices of Conservation Area, Buffer Zone and Community Forests provide plenty of opportunities for communities to participate in managing resources and sharing benefits accrued from them.

Local communities have experienced relief to some extent with the creation of the community-based insurance scheme and government relief support for wildlife damage. Active participation of citizen scientists in monitoring snow leopards and local people's involvement in community-based anti-poaching operations have become a successful model for community empowerment and can be replicated in other areas too.

Retaining the zeal of citizen scientists, providing periodic refreshment training to them and maintaining the community-based insurance scheme and replication of these systems in other protected areas and district forests, however, is a challenge.

There is also an opportunity to enhance focus on engaging youth in conservation. Specifically targeting youth in snow leopard bearing areas, efforts can be directed towards sensitizing them on issues of nature through formal or non-formal education, and identifying and engaging promising candidates to facilitate their development as local conservationists.

7.6 Promoting Transboundary, Regional and International Cooperation

The collaboration between the Government of Nepal and conservation partner organizations including NTNC, WWF and ICIMOD among others is effectively implementing landscape level conservation and managing protected areas for snow leopard conservation within Nepal.

Nepal is a member of GSLEP, facilitating its role in international cooperation and coordination for snow leopard conservation. Additionally, Nepal's transboundary consultative meetings with China and India at central and field levels also have provided opportunities to understand and resolve common issues of conservation. However, challenges persist on holding these consultative meetings on a regular basis and following up on progress and compliance of decisions made.

8 Principal Guiding Documents

The principal guiding documents for this plan are:

- Constitution of Nepal, 2072 B.S. (2015)
- Forest Policy, 2071 B.S. (2015)
- National Biodiversity Strategy and Action Plan, 2014-2020
- National Snow Leopard and Ecosystem Protection Priorities, 2013
- Global Snow Leopard and Ecosystem Protection Program, 2013
- National Parks and Wildlife Conservation Act, 2029 B.S. (1973)
- Forest Act, 2049 B.S. (1993)
- Environmental Act, 2053 B.S. (1997)
- Sacred Himalayan Landscape Strategy, 2005-2015
- Kailash Sacred Landscape: Conservation and Development Initiative, 2012-2016
- Protected Area Management Plans and District Forest Plans
- Wildlife Damage Relief Guideline, 2069 B.S.(2013) {(1st Amendment 2072 B.S. (2015)}
- Chitwan Annapurna Landscape (CHAL) Strategy, (2016-2025)

Chapter 2: Snow Leopard Conservation Action Plan

9 Goal

Maintain viable populations[1] in each of the three snow leopard landscapes in Nepal.

10 Objectives

10.1 Enhancing Knowledge on Snow Leopard's Ecology, their Prey and Habitats through Research and Monitoring

Rationale

Although studies have been carried out on the snow leopard, these have been conducted within PAs, and were short-term and based on conventional methods. Most of these focused on assessing snow leopard-prey relationships, livestock depredation, snow leopard and co-predators, presence/absence, and impacts of climate change on the species and their habitats in this region. Yet, available information is scant and discrete.

Over recent years, advanced technology such as non-invasive genetic analysis, camera-trap surveys and GPS-satellite telemetry has been introduced to study the target species. This has improved our understanding of the species, and has the potential to help develop an index of snow leopard abundance, population structure, and genetic relationships between different populations. When carried out systematically and covering adequate time and space, research using advanced technology will help in developing effective conservation strategies.

Reoccurrence of sympatric carnivores in snow leopard habitats provides new opportunities to study interrelationship among the predators and prey base. Besides, climate change issues are likely to gain significance in snow leopard conservation in the coming years.

Detailed long-term study of predator-prey relationships is also very necessary for long-term conservation. Statistical modeling should be carried out to understand snow leopard ecology and its interactions with biophysical parameters. A central database of snow leopards in Nepal should be established to facilitate research and conservation.

There is also a critical need to identify and assess the status of corridors and their functionality in the snow leopard landscapes. Assessment of snow leopard habitat outside PAs can help identify additional space for upgrade to PAs. For instance, Limi Valley in the western snow leopard landscape has the potential to provide secured habitat for the snow leopard and other endangered species such as wild yak, wolf and Tibetan antelope.

Information gathered from research must also be customized and disseminated to different target groups, to highlight the significance of snow leopard conservation locally, nationally and globally. This will help change the general perception and attitude of people towards snow leopards.

Outputs

- Nationwide population of snow leopards acquired through use of latest and cutting-edge science in research and monitoring;
- DNA database of snow leopards of Nepal established and updated through non-invasive genetic studies;
- Updated standard 'National Protocol for Monitoring Snow Leopard and their Prey Base in Nepal Himalayas' is in place;
- Ecological understanding on snow leopard and its prey enhanced;
- Engagement of SLCCs and citizen scientists on snow leopard conservation enhanced; and,
- Scientific outreach increased through strategic collaboration.

Actions

- Estimate nation-wide snow leopard population using cutting-edge technologies and best available science.
- Establish and update DNA database of snow leopard through non-invasive genetic analysis.
- Continue extensive monitoring of snow leopards in the eastern landscape, and initiate similar GPS-satellite telemetry research in central and western landscapes.
- Research on sympatric carnivores (wolf, common leopard, and wild dog) to understand resource competition, mainly diet and habitat use.
- Research on snow leopard use of habitats with respect to climatic and anthropogenic disturbances.

[1]At least 100 breeding age individuals

- Research on blue sheep habitat relationships and their feeding ecology, mapping their key habitats and interaction with livestock.
- Conduct study on impacts of changing traditional pastoralism system on wildlife habitats and rangeland productivity.
- Initiate study to identify critical corridors and key areas used by snow leopards.
- Conduct studies on the socio-economic and cultural drivers of human-snow leopard interactions.
- Carry out periodic monitoring of snow leopard and prey population status, and regular monitoring in important snow leopard habitat through citizen scientists, exploring best available methodologies, to evaluate and guide conservation initiatives.
- Establish permanent sampling sites/plots in snow leopard habitats for regular monitoring of the key species such as Himalayan tahr, blue sheep, marmot, and hare and status of habitat.
- Update and standardize 'National Protocol for Monitoring Snow Leopards and their Prey base in Nepal Himalayas'.
- Promote citizen scientists and build capacity to undertake snow leopard and prey study and other conservation initiatives.
- Support staff, youth and other citizens for Certificate and Diploma courses in Wildlife Management.
- Pilot drone technology to monitor snow leopard's prey and status of their habitat.
- Carry out conservation education and outreach programs extensively for community awareness.
- Create a central database of snow leopard information to aid researchers and conservationists.

10.2 Improving Habitats and Corridors

Rationale

Restoring connectivity of the PAs with habitats outside is important for maintaining integrity of snow leopard landscapes. Identifying and securing corridors is therefore critical for management of snow leopard populations through meta-population approach.

Other than fragmentation, unregulated collection of NTFP and medicinal plants (like Yarsa gumba) for commercial purpose and excessive grazing by free ranging large population of livestock are some of the major problems facing snow leopard habitat. With opening of new highways and trade routes, illegal harvesting is likely to increase. Unplanned infrastructure poses another major threat to snow leopard habitats and corridors.

All of these mandate a landscape-level conservation approach for snow leopards so as to ensure good protection and management both within and outside PAs. There are predictions through model-based research that climate change will cause loss of 30% of snow leopard habitat in the Himalayas (Forrest *et al.*, 2012). The cascading effect of habitat loss and fragmentation can isolate snow leopard population in pockets, thereby, threatening their demographic and genetic viability, causing loss of prey base due to reoccurrence of sympatric species, and changes in traditional pastoralist systems. Identification of important climate refugia and human caused stressors for snow leopard will be essential for snow leopard habitat conservation in the region.

Outputs

- Critical corridors with its functionality and climate refugia identified;
- Critical habitats including core areas and biological corridors managed with respect to anthropogenic and climatic stressors;
- Potential corridors restored with appropriate conservation interventions;
- Rangelands managed for quality forage for wild prey;
- Livestock grazing regulated in rangelands; and,
- Infrastructure status in snow leopard habitat assessed.

Actions

- Identify, inventory and map different types of habitat (rangelands, forests, wetlands etc).
- Identify important snow leopard habitats with respect to climate and human-caused stressors.
- Assess status of, and maintain wetlands.
- Continue active monitoring and scientific management of rangelands.
- Initiate valuation of ecosystem services of the snow leopard habitats.
- Intensive management of climate-resilient habitats that are susceptible to human disturbances including unsustainable harvesting of NTFPs.
- Initiate a study on impact of NTFPs collection (including *Ophiocordyceps*) in key snow leopard hotspots.

- Assess status of infrastructure and develop policy brief to reduce impacts on snow leopard habitat.
- Support studies on impacts of land use change and mega infrastructure development on snow leopard and prey base.

10.3 Mitigating Human-Snow Leopard Conflict through Community Engagement

Rationale

Mounting human-snow leopard conflict is one of the most severe threats and challenges in conservation of the species in the range countries. High number of livestock, significant temporal and spatial overlap of habitats between wild and domestic ungulates, weak conventional guarding practice and corrals, reoccurrence of opportunistic predators and even recovery of snow leopard and prey population in certain areas are some of the major reasons for increased human-wildlife conflict. The problem has been more acute due to inadequate awareness and poverty, heavy economic losses to livestock owners and farmers risks decreasing their tolerance towards wildlife, leading to retaliatory killings.

Conflicts not only threaten the survival of the species but also create antagonism against the species and restrain the relationship between protected areas and local people. There is a need to develop a better understanding of socio-ecological dynamics in managing snow leopards effectively.

Initiatives like improvement of herding systems, placement of community-based insurance schemes for livestock loss, government relief support, and involvement of citizen scientists are some of the good practices implemented in snow leopard areas in Nepal. Various livelihood enhancement programs for local communities through community development and income generating activities have been implemented to win the confidence of communities to reduce human-snow leopard conflict.

Promotion of nature-based tourism and sustainable trophy harvest schemes (mainly blue sheep) with mechanisms to channelize revenue back to local communities can be potential sources for supporting local livelihoods and snow leopard conservation initiatives. Strengthening and replication of community-based insurance scheme, and engagement of citizen scientists in regular research and monitoring is required for long-term snow leopard conservation.

Outputs

- Conflict with snow leopard reduced;
- Improved mechanism for quick and adequate relief for crop damage from prey base or livestock killed by snow leopard;
- Community-based insurance scheme for livestock depredation strengthened and extended; and,
- Community incentivized for conservation through benefits from sustainable initiatives.

Actions

- Initiate mapping spatio-temporal hotspots for human-snow leopard conflict across Nepal Himalayas.
- Conduct attitude perception assessment of local people on snow leopard across Nepal Himalayas.
- Research on the scale, extent and intensity of human-wildlife conflict, mainly focusing on snow leopards and retaliatory killings.
- Develop a human-snow leopard conflict mitigation strategy across Nepal Himalayas; explore and pilot innovative technology to reduce human-snow leopard conflict.
- Capacitate herders in managing livestock more effectively and reward best practices.
- Develop and implement integrated livestock/ rangeland management plan.
- Undertake a comprehensive study to review sustainable trophy (blue sheep) harvesting for KCA.
- Review and improve existing community-based insurance scheme and replicate it in other areas in the snow leopard landscape.
- Review and improve relief delivery mechanism.
- Provide conflict resolution and management training to staff and communities.
- Develop nature-based tourism plan for high priority mountain PAs.
- Organize campaigns to raise awareness on conservation of snow leopards.
- Provide support for effective predator-proof corrals.
- Provide support for alternative livelihoods for local communities including human-snow leopard conflict affected families.

10.4 Reducing Wildlife Crime on Snow Leopard and their Prey through Effective Law Enforcement

Rationale

Global demand for pelts and bones of threatened species like snow leopard, and prevailing global nexus of organized wildlife crime is one of the most serious threats to conservation. Use of wildlife body parts in traditional medicine, perceived sign of affluence in possessing contraband items, and changing lifestyle due to economic upliftment are among the reasons for continued wildlife crimes. Illegal trade has been facilitated by increased ease of access to remote areas. Weak surveillance due to insufficient staffing, capacity and inadequate coordination among relevant enforcement agencies and organizations, has affected effective control of illegal trade.

Newly formed coordination committees, bureaus and WCCB units at priority districts in snow leopard landscape are functional in controlling wildlife crime. APOs, CBAPUs and youth groups are engaged at the grassroots level in awareness generation and tackling wildlife crime. In Terai protected areas, SMART patrolling and UAVs have been found effective to reduce and deter wildlife poaching. Additionally, Nepal Police has formed a special branch under the Central Investigation Bureau (CIB) as Pillar-4 and their regional investigation team with special responsibility to curb wildlife crimes in Nepal. SMART patrolling and UAVs should be encouraged for surveillance in the high mountain protected areas too for reducing wildlife crime. These new institutional arrangements are found to be working effectively but needs to be strengthened for more synergy and collaborative actions to curb wildlife crime.

Outputs

- Poaching and illegal wildlife trade of snow leopard and its prey reduced substantially;
- Capacity of local and national enforcement agencies enhanced to control wildlife crime;
- Coordination among different enforcement agencies and other stakeholders enhanced; and,
- WCCB units, APOs, CBAPUs and youth mobilization strengthened in conservation of snow leopards.

Actions

- Initiate investigative study on snow leopard poaching and its illegal trade in all three snow leopard landscapes.
- Pilot cutting-edge surveillance schemes such as SMART, DNA profiling and UAVs to curb wildlife crime.
- Provide capacity building trainings (for eg. Crime Scene Investigation) to protected area and DFO staff, Nepal Police and Nepal Army engaged in curbing wildlife crime.
- Develop anti-poaching strategy and operation protocol for snow leopard protection in Nepal.
- Train relevant stakeholders on CITES implementation.
- Strengthen intelligence network (informants, information gathering, purchasing information, and communication and travel, and establishing wildlife crime database).
- Form and strengthen APOs and CBAPUs in protected areas and district forests.
- Strengthen WCCB units in all snow leopard bearing districts.
- Conduct awareness raising programs at community level related to conservation laws and wildlife crime.

10.5 Strengthening Transboundary, Regional and International Cooperation and Support

Rationale

For effective conservation, firm commitment of the government along with effective implementation of the programs and law enforcement are primary requirements. In Nepal, partners including communities at the local level, to national, regional and international stakeholders are involved in conservation. A network of common platforms has been created for close coordination and cooperation from the grassroots to the highest policy and decision-making levels, for collaborative conservation actions.

Nepal has been promoting transboundary cooperation with neighboring countries since the late nineties, for concerted efforts to control cross-border wildlife crime. Such collaboration and cooperation has been further extended to regional and global levels considering the global nature of illegal activities. Nepal has joined several international conventions and bodies such as CITES, CBD, IUCN, INTERPOL, GSLEP and SAWEN for sharing

common responsibility of conserving nationally and globally important biodiversity. Complementary conservation efforts among adjoining snow leopard range countries are also equally important for sharing best practices. There is always a need to keep these institutional associations functional and strengthened for effective collaboration and implementation of conservation initiatives.

Outputs

- Enhanced transboundary cooperation for snow leopard conservation;
- Increased regional, range country and international support for snow leopard conservation; and,
- Transboundary cooperation between Nepal, China and India enhanced to curb illegal wildlife trade.

Actions

- Organize regular meetings and sharing of meeting minutes for implementation of decisions, trainings and workshops at transboundary and regional level.
- Participate in international convention meetings, workshops and trainings.
- Facilitate collaborative trade research and monitoring across political borders.
- Initiate coordinated patrolling and illegal wildlife trade control activities along international borders between Nepal, China and India.

11 Business Plan

11.1 Institutional Arrangements

DNPWC, DoF and their field (warden office) or district forest offices, and regional forest directorates under the MoFSC shall be solely responsible for implementing the action plan. They will be assisted by all relevant stakeholders including local offices of the two departments, non-government partners, community groups including Buffer Zone and Community Forest User Groups, local management committees like the KCAMC, among others, in implementation. The Conservation Areas in snow leopard landscapes are managed under three models in KCA (Community), ACAP (NGOs) and ANCA (Government). Nepal Army deputed in the high mountain parks and hunting reserves are responsible for protecting national parks, along with various law enforcement committees including NTCC, NWCCCC and WCCBs.

The above-mentioned institutions along with project offices will be responsible for implementing the action plan in collaboration with communities and conservation partners in Nepal.

11.2 Human Resources and Infrastructure

The Government of Nepal approved new organization and management of the DNPWC in 2015. The department at present has a 'Wildlife Crime Control Unit - Investigation and Research Section' led by a senior wildlife officer. This section will facilitate the work of NTCC, NWCCCC, central WCCB and district WCCB units and other related matters of the department. The total strength of staff working in snow leopard landscapes will be doubled if the DFO, ACA, MCA and GCA staffs are added. The management capacity of DNPWC is expected to improve to a great extent after the recruitment of new staff.

Staff members in high mountains are working in extremely difficult conditions. Suitable incentives and adequate infrastructure for accommodation such as staff quarters, security posts, etc. are needed. The earthquake heavily damaged many buildings in the high mountain PAs particularly LNP, SNP, GCA, and MCA in 2015. Hence, there is a dire need to improve basic infrastructure for creating enabling environment to manage protected areas effectively. In addition, provision of sufficient field gears and communication equipment along with the opportunities for career development is essential to motivate staff working in the remote areas.

11.2.1 Capacity Enhancement

Staff of protected areas, DFOs and buffer zone institutions will require orientation and refreshment training on snow leopard conservation and management. Regular capacity enhancement will be essential to produce competent and dedicated staffs for effective management of the resources and augmentation of community livelihood. In addition, community-based organizations need to be supported for their institutional development as well for their active participation in conservation. Both DNPWC and DoF in collaboration with conservation partners will explore appropriate training opportunities for their staff in snow leopard

and prey base monitoring, habitat management, anti-poaching operation etc. Attractive packages including exposure visits, refreshment training, higher studies, rewards, proper job placement etc, will be formulated to retain trained staff.

11.2.2 Coordination

The prevailing government system will be followed for effective communication and coordination among relevant stakeholders or a mechanism as agreed for the implementation of a particular program or project will be pursued. The periodic (quarterly/trimester) and annual progress reporting from the field will be done to DNPWC and DoF, and the DNPWC will report to MoFSC. The concerned departments and field offices will have the primary responsibility to communicate, coordinate and periodically report to the concerned institutions through their channels. The central WCCB and district WCCB units will be the most appropriate institutions for sharing the information in curbing wildlife crime.

11.3 Financial Resources

A total of NPR 34,65,00,000 (~USD 3.15 million) is estimated to implement the action plan for 5 years (Annex-2). This action plan will complement the overarching goal of GSLEP and NSLEP of the country. About 30% of the budget is estimated for enhancing knowledge on snow leopard's ecology, their prey and habitats through research and monitoring, 9% for improving habitats and corridors, 31% for mitigating human-snow leopard conflict through community engagement, 24% for reducing wildlife crime through effective law enforcement, and 6% for transboundary cooperation. Approximately 15% of the total budget is allocated for the first year of implementation of the action plan, rising to a maximum of 25% in the 3rd year (mid-year of implementation of the action plan) while gradually decreasing in subsequent years (12.3.1).

The action plan's programs will be integrated to government annual programs through government annual planning process by the respective departments and field offices. It is also expected that government policy will remain conducive to conservation partners, donors, private sectors and communities for their active involvement in snow leopard conservation.

11.3.1 Summary of Indicative Budget in NPR (in, 00,000)

The indicative budget for the implementation of the action plan is estimated at USD 3.15 million. The objective wise budget estimated is presented in the table below and is expressed in NPR (in, 00,000).

S. No.	Objectives	1st Year	2nd Year	3rd Year	4th Year	5th Year	Total
1	Enhancing knowledge on snow leopard's ecology, their prey and habitats through research and monitoring	130	165	285	235	215	1,030 (30%)
2	Improving habitats and corridors	65	70	70	50	45	300 (9%)
3	Mitigating human-snow leopard conflict through community engagement	160	270	255	225	155	1,065 (31%)
4	Reducing wildlife crime on snow leopard and their prey through effective law enforcement	115	190	205	205	130	845 (24%)
5	Strengthening transboundary, regional and international cooperation	30	45	55	50	45	225 (6%)
	Total	500	740	870	765	590	3,465
	Percentage (year-wise)	15%	21%	25%	22%	17%	100%
	Grand total (1 USD @ NPR 110)	3,465 (~USD 3.15 million)					

11.3.2 Sustainable Financing

The government annual budget to DNPWC and DoF will be the major source for implementing the action plan. NTNC is expected to contribute significantly in the implementation of the action plan since three Conservation Areas are under its management. In addition, WWF Nepal, ICIMOD, ZSL Nepal and international organizations and donors will continue to support the implementation of the action plan through their ongoing or new projects. DNPWC itself and/or with conservation partners will jointly solicit proposals to international conservation organizations for funding.

12 Conservation Partner Organizations

The government will continue to engage conservation partners in the conservation of snow leopards, and create policies and environments conducive for cooperation and coordination. For conservation of snow leopards, multiple conservation partners are working with the government, including NTNC, WWF Nepal, ICIMOD, USAID and ZSL Nepal among others.

13 Monitoring and Evaluation

Authorities from each snow leopard bearing PAs and relevant DFOs in coordination with the respective project office will monitor the implementation of the plan in their respective working areas.

The project office will prepare periodic progress report to DNWPC. The DNPWC Technical Committee will review the progress report and present it to the Working Group, which is the main coordinating inter-departmental body co-chaired by the Director Generals of DNPWC and DoF. Finally, the implementation status of the action plan will be presented to the Steering Committee chaired by the Secretary of MoFSC for necessary guidance and decision. MoFSC/RFD (Regional Forest Directorate), DNPWC, DoF and conservation partner officials will carry joint monitoring of the programs implemented at least once a year and report to the Working Group.

A consolidated annual report on the implementation status of the action plan will be prepared by incorporating the progress made within the period, and shared with the concerned authorities and organizations. The monitoring and evaluation objectives, outputs and actions will be done against the indicators given in the logframe (Annex- 1).

14 Review of the Action Plan

DNPWC will take the lead in initiating review of the action plan with the support of DoF and conservation partners. The main purpose of the mid-term review will be to evaluate the implementation status of the action plan and progress in achieving the objectives and outputs, and recommend necessary changes if required. Both mid-term and final evaluation will be based on the indicators mentioned in the logframe (Annex- 1). A final evaluation will be done by a team of experts towards the end of the plan period. The updated Snow Leopard Conservation Action Plan will be prepared based on the recommendations of the final evaluation and feedbacks received from concerned agencies and experts.

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Annex 1: Logical framework of goal, objectives and indicators for SLCAP 2017-2021

Narrative summary	Objectively verifiable indicators	Means of verification	Assumptions
Goal: Maintain viable populations in each of the three snow leopard landscapes in Nepal	-No of snow leopards	-DNPWC, DoF, PAs and DFO official documents and monitoring reports-camera trapping, genetic analysis, GPS satellite telemetry, GIS map -Academic Institutions & partners' research reports -Consolidated annual progress report on SLCAP implementation	- Government support to snow leopard conservation continued -Conservation partner organizations are committed to extend cooperation -Local communities show continuing interest and participation in conservation -Conducive working environment prevails
Objective: Enhancing knowledge on snow leopard's ecology, their prey and habitats through research and monitoring	-No of studies and monitoring reports of snow leopards and their prey base and habitat	-DNPWC, PA, DoF, DFO, academic and conservation partner organizations official records -Population estimation reports -Progress reports -Annual reports -Consolidated annual progress reports on SLCAP implementation	-Government policy on snow leopard research remained as a priority -Government budget to snow leopard conservation raised -Academic institutions and conservation partner organizations support continued in research
Outputs: • Nationwide population of snow leopards acquired through use of cutting-edge technology in research and monitoring • DNA database of snow leopards established and updated through non-invasive genetic studies • Updated standard 'National Protocol for Monitoring Snow Leopard and their Prey Base in Nepal Himalayas' is in place • Ecological understanding of snow leopards, their prey and habitats enhanced • Engagement of SLCC and citizen scientists on snow leopard conservation enhanced • Scientific outreach and capacity building increased through strategic collaborations	-Systematic ecological data in all three snow leopard landscapes collected - Number of surveys of snow leopards continued through use of cutting-edge technologies -Number of individually-identified snow leopards through non-invasive genetic studies -Number of SLCCs formed and citizen scientists engaged in snow leopard conservation		

Actions:

- Estimate nationwide snow leopard population using cutting-edge technologies and best available science.
- Establish and update DNA database of snow leopards through non-invasive genetic analysis.
- Update and standardize 'National Protocol for Monitoring Snow Leopard and their Prey Base in Nepal Himalayas'.
- Continue extensive monitoring of snow leopard in eastern landscape and initiate similar GPS satellite telemetry research in central and western landscapes.
- Research on sympatric carnivores (wolf, common leopard, and wild dog) to understand resource competition mainly diet and habitat use.
- Research on snow leopard habitat use with respect to climatic and anthropogenic disturbances.
- Research on blue sheep-habitat relationships and their feeding ecology, mapping their key habitats, and their interactions with livestock.
- Conduct study on impacts of changing traditional pastoralism system on wildlife habitats and rangeland productivity.
- Pilot drone technology to monitor snow leopard's prey and status of their habitat.
- Establish permanent sampling sites/plots in snow leopard habitats for regular monitoring of the key species such as Himalayan tahr, blue sheep, marmot, and hare and status of habitat.
- Conduct studies on the socio-economic and cultural drivers of human -snow leopard interactions.
- Carry out periodic monitoring of snow leopard and prey population status to evaluate and guide conservation initiatives.
- Create a central database of snow leopards information to aid researchers and conservationists.
- Promote citizen scientists and build capacity to undertake snow leopard and their prey study and other conservation initiatives.
- Support staff, youth and other citizens for Certificate and Diploma courses in Wildlife Management.
- Carry out conservation education and outreach programs extensively for community awareness.

Objective: Improving habitats and corridors	- Number of functional corridors identified - Number of hectares of habitat managed/ protected/restored	-DNPWC, PA, DoF, DFO, conservation partner organizations' records -Progress Reports -Annual Reports -Monitoring Reports -Partner organizations' official documents and reports	
Outputs: • Critical corridors with their functionality and climate refugia identified • Potential corridors restored with appropriate conservation interventions • Critical habitat including core areas and biological corridors managed with respect to anthropogenic and climatic stressors • Rangeland managed for quality forage for wild prey • Livestock grazing regulated in rangelands • Infrastructure status in snow leopard habitats assessed	-No of corridors identified - No of corridors managed - Area of climate refugia identified - Area of critical habitat managed - Area of rangeland managed		

Actions:

- Identify, inventory and mapping of different types of habitats (rangelands, wetlands, forests, etc).
- Identify key corridors along the snow leopard habitat range in Nepal Himalayas.
- Identify important snow leopard habitats with respect to climate and human-caused stressors.
- Continue active monitoring and scientific management of rangelands.
- Assess status of, and maintain wetland habitats.
- Initiate valuation of ecosystem services of the snow leopard habitats.
- Initiate intensive management of climate- resilient habitats that are susceptible to human disturbances (including unsustainable harvesting of NTFPs).
- Initiate study on impact of NTFP collection (including Ophiocordyceps) in key snow leopard hotspots.
- Assess status of infrastructure and develop policy brief to reduce impacts on snow leopard habitat.
- Support studies on impacts of land use change and mega infrastructure development on snow leopard prey base.

Objective: Mitigating human-snow leopard conflicts through community engagement	- Zero snow leopard retaliatory killing is achieved and retained	-MoFSC, Regional Forest Directorate, DNPWC, DoF, DFO, PA and conservation partner organizations' official records -Progress Reports -Annual Reports -Monitoring Reports	-PA and DFO will have full strength of competent staff
Outputs: • Conflict with snow leopard reduced • Improved mechanism for quick and adequate relief for crop damage from prey base or livestock killed by snow leopard • Community-based insurance scheme for livestock depredation strengthened and extended • Community incentivized for conservation through benefits from sustainable initiatives	- Decrease in number of conflict cases		

Actions:

- Initiate mapping of spatio-temporal hotspots for human-snow leopard conflicts across Nepal Himalayas
- Conduct attitude perception assessment of local people in snow leopard habitat across Nepal Himalayas
- Research on the scale, extent and intensity of human-wildlife conflicts, focusing on snow leopard, their co-predators and retaliatory killings
- Develop human-snow leopard conflict mitigation strategy across Nepal Himalayas
- Explore and pilot innovative technology to reduce human-snow leopard conflicts
- Capacitate herders in managing livestock more effectively and reward best practices
- Develop and implement integrated livestock/rangeland management plan
- Undertake a comprehensive study to review sustainable trophy harvest (blue sheep) for KCA
- Review and improve existing community-based insurance scheme and replicate it in other areas across the snow leopard landscape
- Review and improve government relief delivery mechanism
- Provide conflict resolution and management training to staff and communities
- Develop nature-based tourism plan for high priority mountain PAs
- Organize campaigns to raise awareness on conservation of snow leopards
- Support for effective predator proof corrals
- Support for alternative livelihoods for local communities including snow leopard victim families

Objective: Reducing wildlife crime on snow leopard and their prey through effective law enforcement	-Populations of snow leopard and prey base increased -Decrease in trend of wildlife crime cases -Zero poaching of snow leopards	MoFSC, DNPWC, DoF, Regional Forest Directorates, DFOs and PA Offices' official records	-Constant community supports prevail in snow leopard conservation
Outputs: • Poaching and illegal wildlife trade of snow leopard and its prey reduced substantially • Capacity of local and national enforcement agencies enhanced • Coordination among different enforcement agencies and other stakeholders enhanced • WCCB Units, APOs, CBAPUs and youth mobilization in conservation of snow leopards, strengthened	-Number of cases of snow leopard and their prey poaching -Number of personnel involved in enforcement, capacitated - Number of WCCB Units, APOs and CBAPUs engaged in curbing wildlife crimes		
Actions: • Initiate investigative study on snow leopard poaching and its illegal trade in all three snow leopard landscapes. • Pilot cutting-edge surveillance schemes such as SMART, DNA profiling and UAVs to curb wildlife crime. • Provide capacity building trainings (Investigation, Scene of Crime, etc) to protected area and DFO staff, Nepal Police and Nepal Army engaged in curbing wildlife crime. • Develop anti-poaching strategy and operation protocol for snow leopard protection in Nepal. • Train relevant stakeholders in CITES implementation. • Conduct awareness raising programs at community level related to conservation laws and wildlife crime. • Strengthen intelligence network (Informants, information gathering, purchasing information, and communication and travel, and establishing wildlife crime database) • Form and strengthen APOs and CBAPUs in all protected areas and district forests. • Strengthen Wildlife Crime Control Bureau units in all snow leopard bearing districts.			

Objective: Strengthening transboundary, regional and international cooperation and support	- Number of transboundary, regional and international meetings -Increase in international funding support for snow leopard conservation		
Outputs: • Enhanced transboundary cooperation for snow leopard conservation • Increased regional, range country and international support for snow leopard conservation • Transboundary cooperation between Nepal, China and India enhanced to curb illegal trade	-Number of transboundary meetings at local and central level	MoFSC, DNPWC, DoF, DFO and PA official documents	
Actions: • Organize regular meetings and sharing of meeting minutes for implementation of decisions, trainings and workshops at transboundary and regional levels. • Participate in international convention meetings, and workshops and trainings. • Facilitate collaborative research and monitoring across political borders. • Initiate coordinated patrolling and illegal wildlife trade control activities along international borders between Nepal, China and India.			

Annex 2: Five years' Annual Indicative Budget for Snow Leopard Conservation Action Plan

Objectives/Actions	Annual Budget (NPR in 00,000)					Total
	1st Year	2nd Year	3rd Year	4th Year	5th Year	
Objective: Enhancing knowledge on snow leopard's ecology, their prey and habitats through research and monitoring						1030.00
Actions						
• Estimate nationwide snow leopard population using cutting-edge technologies and best available science; establish and update DNA database of snow leopard through non-invasive genetic analysis	10.00	30.00	70.00	70.00	30.00	210.00
• Update 'National Protocol for Monitoring Snow Leopard and their Prey base in Nepal Himalayas'; • Promote citizen scientists and build capacity to undertake snow leopard and prey study and other conservation initiatives	15.00	15.00	25.00	25.00	25.00	105.00
• Continue extensive monitoring of snow leopards in eastern landscape and initiate similar GPS satellite telemetry studies in central and western landscapes	20.00	30.00	35.00	25.00	25.00	135.00
• Research on sympatric carnivores (wolf, common leopard, wild dog and jackal) to understand resource competition mainly diet and habitat use	X	X	30.00	X	X	30.00
• Research on snow leopard habitat use with respect to climatic and anthropogenic disturbances	10.00	20.00	X	20.00	25.00	75.00
• Research on blue sheep-habitat relationships and their feeding ecology, mapping their key habitats and interaction with livestock	15.00	X	30.00	15.00	X	60.00
• Conduct study on impacts of changing traditional pastoralism system on wildlife habitats and rangelands productivity	X	X	15.00	X	X	15.00
• Pilot drone technology to monitor snow leopard's prey and status of their habitat	X	15	15	20	20	70.00
• Establish permanent sampling sites/ plots in snow leopard habitats for regular monitoring of the key species such as Himalayan tahr, blue sheep, marmot, and hare and status of habitat.	5.00	X	20.00	X	20.00	45.00
• Conduct studies on the socio-economic and cultural drivers of human - snow leopard interactions	20	X	X	X	X	20.00
• Carry out periodic monitoring of snow leopard and prey population status to evaluate and guide conservation initiatives	20.00	X	X	X	35.00	55.00
• Support staff, youth and other citizens for Certificate and Diploma in Wildlife Management courses	X	40	X	45	X	85.00

• Carry out conservation education and outreach programs extensively for community awareness	10.00	15.00	15.00	15.00	20.00	75.00
• Create a central database of snow leopard information to aid researchers and conservationists	X	X	15.00	X	X	15.00
• Capacitate local people and staff on research and monitoring of snow leopard, their prey and habitat	5.00	X	15	X	15	35.00
Sub-total	130.00	165.00	285.00	235.00	215.00	1030.00
Objective: Improving habitats and corridors						300.00
Actions						
• Identify, inventory and map different types of habitats (rangelands, wetlands, forests etc)	5.00	5.00	10.00	10.00	X	30.00
• Identify critical corridors along snow leopard habitat range in Nepal Himalayas	5.00	15.00	X	X	X	20.00
• Identify important snow leopard habitats with respect to climate and human-caused stressors	5.00	5.00	10.00	15	15	50.00
• Continue active monitoring and scientific management of rangelands	5.00	5.00	10.00	10.00	15.00	45.00
• Assess status and maintain wetlands	5.00	5.00	10.00	X	X	20.00
• Initiate valuation of ecosystem services of the snow leopard habitats	X	10.00	X	X	X	10.00
• Initiate intensive management of climate-resilient habitats that are susceptible to human disturbances including unsustainable harvesting of NTFPs	5.00	10.00	10.00	15.00	15.00	55.00
• Initiate a study on impact of NTFPs collection (including *Ophiocordyceps*) in key snow leopard hotspots	20.00	X	X	X	X	20.00
• Assess status of infrastructure and develop policy brief to reduce impacts on snow leopard habitat	15.00	15.00	X	X	X	30.00
• Support studies on impacts of land use change and mega infrastructure development on snow leopard and prey base	X	X	20.00	X	X	20.00
Sub-total	65.00	70.00	70.00	50.00	45.00	300.00

Objective: Mitigating human-snow leopard conflict through community engagement						1065.00
Actions						
• Initiate mapping spatio- temporal hotspot for human-snow leopard conflict across Nepal Himalayas	X	30.00	X	X	X	30.00
• Conduct attitude perception of local people on snow leopard across Nepal Himalayas	X	15.00	X	X	X	15,00
• Research on the scale, extent and intensity of human wildlife conflict mainly focusing on snow leopards and retaliatory killings	15.00	15.00	30.00	20.00	X	80.00
• Develop human-snow leopard conflict mitigation strategy across Nepal Himalayas; explore and pilot innovative technology to reduce human-snow leopard conflict	15.00	20.00	25.00	25.00	X	85.00
• Capacitate herders in managing livestock more effectively and reward best practices	25.00	30.00	30.00	35.00	30.00	150.00
• Develop and implement integrated livestock/rangeland management plan	10.00	25.00	30.00	20.00	20.00	105.00
• Undertake a comprehensive study to review sustainable trophy harvest plan (blue sheep) for KCA	5.00	X	X	X	10.00	15.00
• Review and improve existing community based insurance scheme and replicate it in other areas in the snow leopard landscape • Review and improve relief delivery mechanism	30.00	30.00	35.00	35.00	35.00	165.00
• Provide conflict resolution and management training to staff and communities	X	15	X	15	X	30.00
• Develop nature-based tourism plan for high priority mountain PAs	X	10.00	10.00	X	X	20.00
• Organize campaigns to raise awareness on conservation of snow leopards	10.00	20.00	25.00	20.00	20.00	95.00
• Support for alternative livelihoods for local communities including snow leopard victim families	25.00	30.00	35.00	30.00	20.00	140.00
• Support for effective predator proof corrals	25.00	30.00	35.00	25.00	20.00	135.00
Sub-total	160.00	270.00	255.00	225.00	155.00	1065.00
Objective: Reducing wildlife crime on snow leopard and their prey through effective law enforcement						845.00
Actions						
• Initiate investigative study on snow leopard poaching and illegal trade on its body parts in all three snow leopard landscapes	X	15.00	X	20	X	35.00
• Pilot cutting-edge surveillance schemes such as SMART, DNA profiling and UAVs to curb wildlife crime	30.00	45.00	55.00	50.00	30.00	210.00

• Provide capacity building trainings (Investigation, Scene of Crime, etc) to protected area and DFO staff, Nepal Police and Nepal Army engaged in curbing wildlife crime	15.00	25.00	30.00	25.00	10.00	105.00
• Develop anti-poaching strategy and operation protocol for snow leopard protection in Nepal	10.00	X	X	X	X	10.00
• Train relevant stakeholders on CITES implementation	10.00	20.00	15.00	15.00	X	60.00
• Conduct awareness raising programs at community level on conservation related laws and fighting against wildlife crime	10.00	10.00	15.00	15.00	15.00	65.00
• Strengthen intelligence network (Informants, information gathering, purchasing information and communication and travel, establishing wildlife crime database)	15.00	25.00	30.00	25.00	20.00	115.00
• Form and strengthen APOs and CBAPUs in protected areas and district forests	15.00	30.00	35.00	30.00	30.00	140.00
• Strengthen Wildlife Crime Control Bureau Units in all snow leopard bearing districts	10.00	20.00	25.00	25.00	25.00	105.00
Sub-total	115.00	190.00	205.00	205.00	130.00	845.00
Objective: Strengthening transboundary, regional and international cooperation and support						225.00
Actions						
• Organize regular meetings and sharing of meeting minutes for implementation of decisions, capacity building trainings and workshops at transboundary and regional level	10.00	20.00	20.00	15.00	10.00	75.00
• Participate in international convention meetings, workshop and training	10.00	15.00	15.00	15.00	10.00	65.00
• Facilitate collaborative trade research and monitoring across political borders	5.00	5.00	10.00	10.00	15.00	45.00
• Initiate coordinated patrolling and illegal wildlife trade control along international border between Nepal, China and India	5.00	5.00	10.00	10.00	10.00	40.00
Sub-total	30.00	45.00	55.00	50.00	45.00	225.00
Total (1 USD @ NPR 110.00)	~USD 3.15 million					3,465.00

Annex 3: List of districts with WCCB units in snow leopard region of Nepal

1. Taplejung
2. Sankhuwasabha
3. Dolakha
4. Sindhupalchok
5. Rasuwa
6. Gorkha
7. Mustang
8. Dolpa
9. Humla
10. Bajhang
11. Darchula

Annex 4: Annual income (in NPR) of snow leopard bearing protected areas

Institutions/FY	2066/067	2067/068	2068/069	2069/70	2070/71
DNPWC	10634295	12052331	49469000	47058365	47311951
KCA	981900	1468650	-	1109578	1641837.50
MBNP	1247444	1822892	412969	3820819	4242180.25
SNP	26662962	28452374	31916022	91146179	92753701.02
LNP	7688099	12065458	12790938	39160700	43750350.55
RNP	293420	434420	263656	950560	390975.50
KNP	208293	219117	728434	400652	3873387.00
SPNP	6829775	6622356	7762429	7827696	10375003.86
DHR	87003	80670	221126	432108	426952.61
ANCA	0	0	9538688	7827696	10238259.48

SLCC members carry out monitoring of blue sheep in KCA

Photo credit - WWF Nepal/Sheren Shrestha

Snow Leopard Conservation Action Plan for Nepal (2017-2021) has been prepared in collaboration with WWF Nepal.