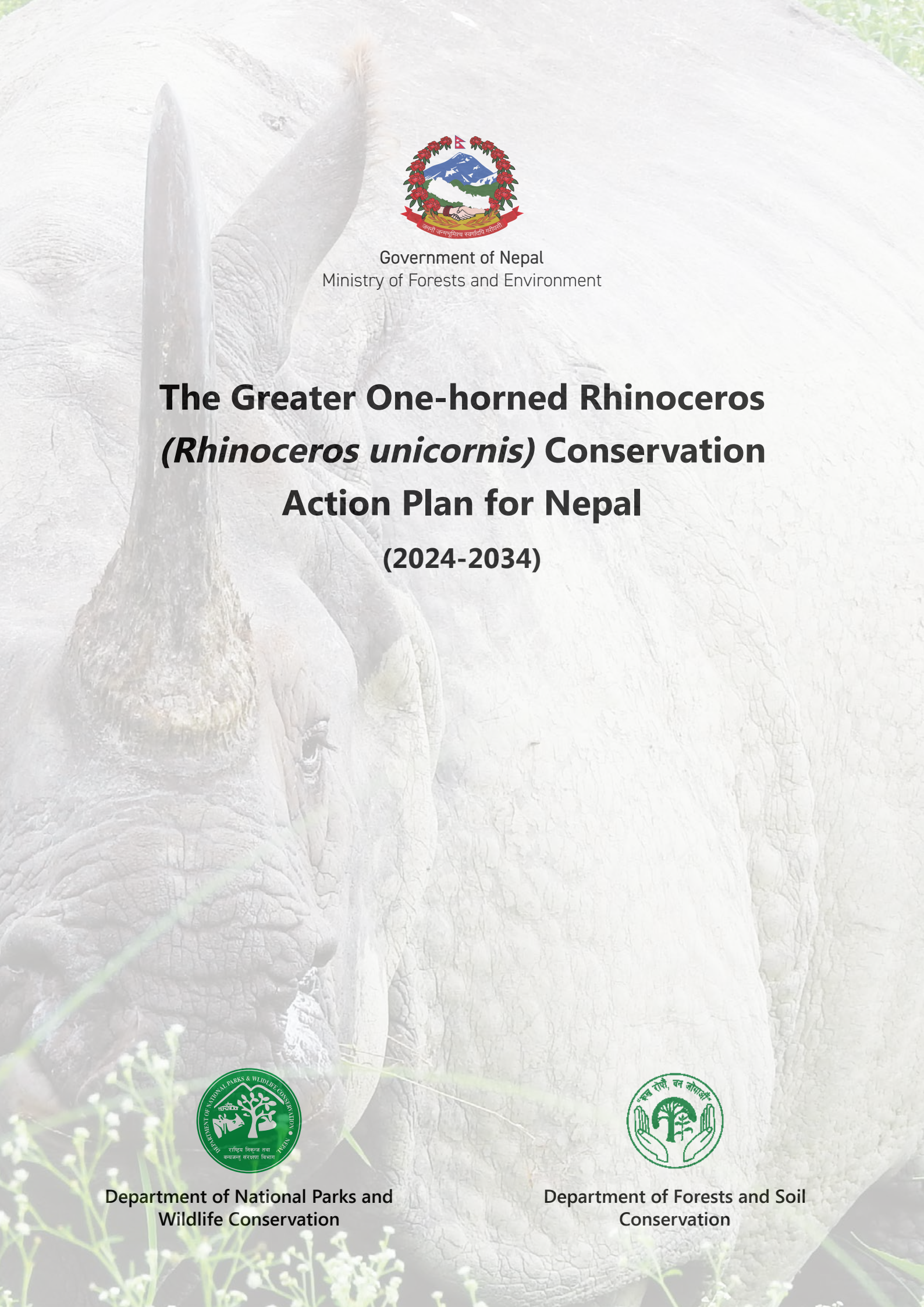
Government of Nepal
Ministry of Forests and Environment

# The Greater One-horned Rhinoceros *(Rhinoceros unicornis)* Conservation Action Plan for Nepal (2024-2034)

Department of National Parks and Wildlife Conservation

Department of Forests and Soil Conservation



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## (2024-2034)

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Ministry of Forests and Environment
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Ministry of Forest & Environment
Dept. of National Parks & Wildlife Conservation
Babarmahal, Kathmandu
2037

# Foreword

The Greater One-Horned Rhinoceros (*Rhinoceros unicornis*) is an umbrella species in the floodplain ecosystem of Tarai Arc Landscape (TAL). The population of this threatened mega herbivore is confined in Chitwan, Parsa, Bardia and Shuklaphanta National Parks in Nepal and efforts are being made to establish a rhino sanctuary in Koshi Tappu Wildlife Reserve as well. Rhino population in Nepal is continuously increasing in Nepal despite of various threats. Major threats in Nepal are poaching and illegal trade of rhino horn, invasive alien species and threats emerged from climate change and linear infrastructure development.

The first rhino conservation action plan (2006-2011) focused on holistic efforts towards improving enforcement to combat poaching and illegal trade of rhino horn. The action plan was quite successful to improve the status of rhino population in Nepal. From 2011-2017, Nepal took a significant action in rhino conservation like conducting rhino census, reintroduction of rhino in Bardia and Shuklaphanta National Parks, 4 years of zero poaching by introducing SMART patrolling in the protected areas along with community-based conservation efforts.

Furthermore, the action plan of 2017-2021 focused on strengthening national and local institutional capacity to curb the illegal trade and poaching of this endangered species. Conservation efforts was focused on rhinoceros habitat and wetlands management, human rhinoceros conflict management, community awareness and engagement and strengthening transboundary cooperation. Rhinoceros is conservation dependent species and demands substantial conservation interventions to increase the population and ensure long term survival of this charismatic creature. Emerging threats demand special strategies and actions to cope with these challenges.

I hope this new comprehensive ten year action plan (2024-2034) which has been formulated for rhinoceros conservation, drawing upon insights from previous action plans, acts, policies and strategies will oversee the conservation and sustainable management of the species. This meticulously developed action plan will improve the rhino conservation efforts to create a co-existence and harmony among the people living in the buffer zones and contribute eco-tourism and national economy in the near future.

I would like to thank all stakeholders, experts, team of Department of National Parks and Wildlife Conservation (DNPWC) and National Trust for Nature Conservation (NTNC) for their hard work to prepare this document. NTNC and Rhino Recovery Fund are thanked for extending financial support. I believe that this plan will continue to guide conservation that benefits species, ecosystem and communities and we assure continued leadership of DNPWC for impactful outcome for people and nature.

Director General

Sindhu Prasad Dhungana, PhD
Director General
2081/06/06

# Executive Summary

Rhinoceros, particularly the Rhinoceros unicornis, are considered keystone species that play a crucial role in maintaining the ecosystems within the three main Terai Protected Areas. The purpose of this Greater One-horned Rhinoceros Conservation Action Plan is to outline and detail the essential actions required for the ongoing protection, management, and conservation of the *Rhinoceros unicornis. T*he Government of Nepal has implemented numerous conservation initiatives both inside and outside protected areas to maintain the healthy population of rhinoceros.

The primary problem to safeguarding rhinoceros populations is the ongoing risks of poaching and the illegal trade for their horns. Nepal's successful poaching control efforts since 2011 have resulted in a rising rhino population trend. However, sustaining this achievement faces substantial challenges in the future. Additionally, these matters are further complicated by habitat degradation driven by climate change, anthropogenic pressure, and rapid spread of Invasive Alien Plant Species (IAPS) such as *Mikania micrantha, Chromolaena odorata, Parthenium hysterophorus, Ageratina adenophora*, and *Lantana camara* in terrestrial habitats as well as invasive species in wetlands like Water hyacinth.

Other challenges, such as the drying up of wetlands and water holes due to siltation, grasslands and other natural habitats' decline, and uncontrolled forest fires exacerbate the situation even further. Additionally, proposed large-scale infrastructure projects like the east-west railways, extension of the east-west highway in forests and protected areas within Terai-arc Landscape (TAL), postal roads, Jagatpur-Madi-Hori road, industrial estate road networks in the Barandabhar Corridor, transmission lines, and Karnali High Dam could threaten critical rhinoceros habitats. Human-rhinoceros conflicts resulting from crop damage and human disturbances also pose significant obstacles to population management. The smaller subpopulations of rhinoceroses in Bardia and Shuklaphanta National Parks require supplementation with additional individuals to ensure their viability.

Regular training should also be given to park employees to improve their skills and capacities, increasing their efficiency in wildlife conservation, including rhinoceros. In an effort to save wildlife and stop the illegal wildlife trade, Nepal is fostering comprehensive transboundary cooperation with its neighbors. Thus, effective rhino conservation in the range nations will always depend on regional and global cooperation. Likewise, financial resources have continuously shown to be a barrier to implementing successful conservation initiatives. To solve this and guarantee ongoing support for rhino conservation, a system for mobilizing funds from exchange programs needs to be established.

Conflicts among residents of buffer zones have arisen as a result of incidents involving local people being harassed and crop damage by rhinoceroses. The implementation of buffer zones through community involvement in local development will surely encourage locals to adopt a constructive attitude toward biodiversity conservation. Thus, a variety of conservation awareness campaigns need to be carried out in coordination with local non-governmental organizations, buffer zone institutions, and other relevant groups.

Threats such as disease, pollution, conflicts, and poaching have created a large number of orphaned, injured, unhealthy, and strayed individuals of rhinoceroses in the wild. Without delay, a one health approach needs to be integrated into wildlife conservation issues. To save these individuals, there is an urgent need to

establish a Rhino Sanctuary with care and re-wild facilities in Koshi Tappu Wildlife Reserve (KTWR).

Despite facing these challenges, recent improvements in rhinoceros conservation efforts in Nepal have brought optimism and a commitment to achieving even greater success in the future. In response to these obstacles, the Nepalese government through the Ministry of Forests and Environment has formulated a comprehensive action plan (2024-2034) for rhinoceros conservation. This plan draws upon insights from previous action plans, acts, and policies, including: Sixteenth National Plan, Protected Area Management Strategy (2022-2030), Forest Policy (2015), Climate related policies and National Biodiversity Strategy and Action Plan (2014-2020).

The ten-year conservation action plan for the Greater One-horned Rhinoceros (2024-2034) aims to oversee the conservation and sustainable management of at least three existing rhinoceros populations (CNP, BNP, and ShNP). Additionally, it suggests developing site-specific strategic plans for Koshi Tappu Wildlife Reserve (KTWR) and Parsa National Park. The plan also identifies potential new reintroduction sites within existing rhinoceros-bearing Protected Areas (PAs) and across lowland Nepal.

This plan delineates following six strategic objectives to achieve this principal goal:

1. Combat rhinoceros poaching and illegal trade
2. Manage rhinoceros populations
3. Secure rhinoceros habitats
4. Enhance research and monitoring
5. Manage human- rhinoceros conflicts
6. Strengthen support and cooperation: Local, National and International level

This plan further provides the details of specific outcomes prioritized for each objective, translating these conservation goals and desired results into actionable measures, measurable milestones, and achievable timelines. The ultimate measure of success or the plan's quantifiable objective is a sustained annual growth rate of rhinoceros populations in Nepal by 5.07%. The Department of National Parks and Wildlife Conservation (DNPWC), in collaboration with the Department of Forests and Soil Conservation (DoFSC) under the Ministry of Forests and Environment (MoFE) of the Government of Nepal, is responsible for executing these outlined actions. This will be done in partnership with provincial and local governments, respective rhinoceros-bearing protected areas, local stakeholders, Buffer Zone councils, and various national and international conservation organizations.

The projected budget for the next 10 years amounts to NPR 1,794,158,000 (One billion, seven hundred ninety-four million, one hundred fifty-eight thousand).

# Acronym

| | |
|---|---|
| AI | Artificial Intelligence |
| ARF | Asian Rhino Forum |
| BNP | Bardia National Park |
| BZ | Buffer zone |
| BZCF | Buffer Zone Community Forest |
| BZMCs | Buffer Zone Management Committees |
| BZUC | Buffer Zone User Committee |
| CBAPUs | Community-Based Anti-Poaching Units |
| CBD | Convention of Biological Diversity |
| CBO | Community Based Organizations |
| CCTV | Close Circuit Television |
| CFUGs | Community Forest User Groups |
| CIB | Central Investigation Bureau |
| CITES | Convention on International Trade in Endangered Species of Wild Fauna and Flora |
| CNP | Chitwan National Park |
| DCCs | District Coordination Committees |
| DFOs | Division Forest Offices |
| DNPWC | Department of National Parks and Wildlife Conservation |
| DoFSC | Department of Forests and Soil Conservation |
| EIA | Environmental Impact Assessment |
| GCF | Green Climate Fund |
| GoN | Government of Nepal |
| HRC | Human Rhino Conflict |
| HHs | Households |
| GTF | Global Tiger Forum |
| IAPS | Invasive Alien Plant Species |
| IEE | Initial Environmental Examination |
| IUCN | International Union for the Conservation of Nature |
| KNP | Kaziranga National Park |
| KTWR | Koshi Tappu Wildlife Reserve |
| LRP | Long Range Patrol |
| MoFE | Ministry of Forests and Environment |
| MoU | Memorandum of Understanding |
| MRP | Medium Range patrol |
| NBSAP | National Biodiversity Strategy and Action Plan |
| NGOs | Non-Governmental Organization |
| NTCC | National Tiger Conservation Committee |
| NTNC | National Trust for Nature Conservation |
| NWCCCC | National Wildlife Crime Control Coordination Committee |
| PAs | Protected Areas |
| PHVA | Population Habitat Viability Assessment |
| PNP | Parsa National Park |
| SAWEN | South Asia Wildlife Enforcement Network |
| ShNP | Shuklaphanta National Park |
| SRP | Short Range Patrol |
| TAL | Terai Arc Land |
| UNFCCC | United Nations Framework Convention on Climate Change |
| WCCCC | Wildlife Crime Control Coordination Committee |
| WCCB | Wildlife Crime Control Bureau |
| WWF | World Wildlife Fund |
| ZSL | Zoological Society of London |

# Contents

## Chapter I


1. Introduction....02
   - 1.1. Relevance of the action plan revision....02
   - 1.2. Revision process....02
   - 1.3. Scope of the action plan....03


## Chapter II


2. Background....06
   - 2.1. Rhinoceros and their distribution....06
     1. Global distribution of Greater One-horned rhinoceros....07
     2. National status of Greater One-horned rhinoceros and its distribution....08
   - 2.2. Rhino biology....09
   - 2.3. Habitat and diet....09
   - 2.4. Social and spatial behaviours....10
   - 2.5. Reproductive behaviour....10
   - 2.6. Population dynamics....11


## Chapter III


3. Major Conservation Efforts and Their Achievements....14
   - 3.1. Policy, legislation and institutional reforms....16
   - 3.2. Protection of rhino and its habitat....16
   - 3.3. Rhino habitat management....17
   - 3.4. Combat rhino-related crime....19
   - 3.5. Community engagement and conservation education....20
   - 3.6. Research....20
   - 3.7. National, transborder, regional, and international cooperation....21


## Chapter IV


4. Review of Rhino Conservation Action Plan 2017-2021....24
   - 4.1. Implementation status....24
   - 4.2. Lessons learned....30


## Chapter V


5. Issues, Threats, Challenges & Opportunities....32
   - 5.1. Issues....32
     1. Rhino habitats....32
     2. Wildlife crime....32
     3. Human-rhino conflicts....33
     4. Knowledge concerns....33
     5. National, international and trans-boundary cooperation....33
   - 5.2. Challenges....34
     - 5.2.1 Invasive species....34
     - 5.2.2 Human-rhino coexistence....34

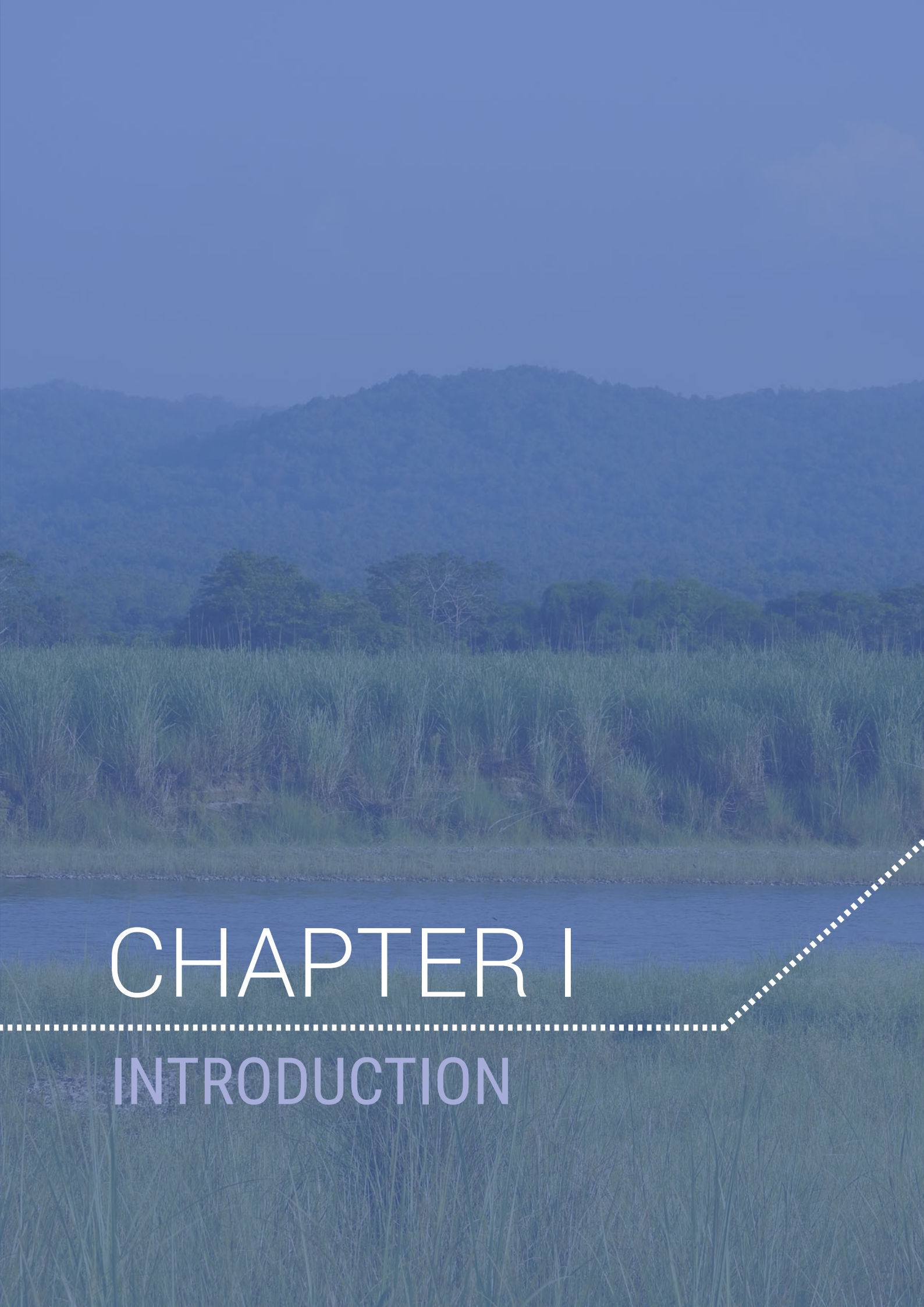
5.2.3 Small populations ..... 34
5.2.4 Population management ..... 35
5.2.5 Climate change and natural disasters ..... 35
5.2.6 Upstream development activities ..... 35
5.2.7 Other challenges ..... 35
5.3. Threats ..... 36
5.3.1 Habitat loss, fragmentation and degradation ..... 36
5.3.2 Rhino poaching and illegal trade ..... 36
5.3.3 Diseases ..... 37
5.3.5 I mpact of linear infrastructure ..... 37
5.4. Opportunities ..... 38

Chapter VI

6. The Greater One-horned Rhinoceros Conservation Action Plan (2024 – 2034) ..... 40
6.1. Goal ..... 40
6.2. Objectives ..... 40

Chapter VII

7. Plan Implementation and Monitoring ..... 56
7.1. Implementing agency ..... 56
7.2. Financial Plan ..... 56
7.3. Monitoring of the plan implementation ..... 56



# CHAPTER I

## INTRODUCTION

# 1. INTRODUCTION

## 1.1. Relevance of the action plan revision

Five years' Conservation Action Plan (2017-2021) for Nepal's Greater One-horned Rhinoceros, hereafter referred to as rhino, was successfully implemented, demonstrating efficiency in conserving the rhinoceros population in Nepal. The rhino population witnessed a remarkable growth from 408 in 2005 to 534 in 2011, marking a notable success of zero rhino poaching year in 2011. Between 2012 and 2016, considerable focus was placed on boosting anti-poaching efforts, fostering community involvement, and empowering institutional reforms that resulted in an estimated population of 645 individuals in 2015. The last census in 2021 estimated 752 individuals with a 21% growth in the past five years and a 5% annual growth rate. The highest number (694) of rhinos were recorded in Chitwan National Park (CNP), followed by 38 in Bardia National Park (BNP), 17 in Shuklaphanta National Park (ShNP), and 3 in Parsa National Park (PNP). The population has increased by 107 individuals (21%) compared to the previous count, with a naïve annual growth rate of 5.07%.

The 2024-2034 Conservation Action Plan for the Greater One-horned rhinoceros in Nepal builds upon the goals outlined in the previous Action Plan (2017-2021), which aimed to maintain a sustainable rhino population in lowland terai. The action plan has been formulated to maintain a viable rhino population by addressing the burgeoning threats and challenges to rhinoceros conservation in Nepal.

## 1.2. Revision process

The preparation of the 2024-2034 Conservation Action Plan involved a systematic process that included comprehensive literature review, expert consultations at both field and central levels, and active engagement with various stakeholders. Field level consultative workshops were held in all rhino-bearing Protected Areas (PAs), including Chitwan National Park (CNP), Bardia National Park (BNP), Parsa National Park (PNP), and Shuklaphanta National Park (ShNP). These workshops involved members from Buffer Zone Management Committees (BZMCs), Buffer Zone User Committees (BZUCs), WWF Nepal, NTNC, ZSL Nepal, as well as relevant Government entities such as PAs authorities, security units, Division Forest Offices (DFOs), local government authorities, and District Coordination Committees (DCCs).

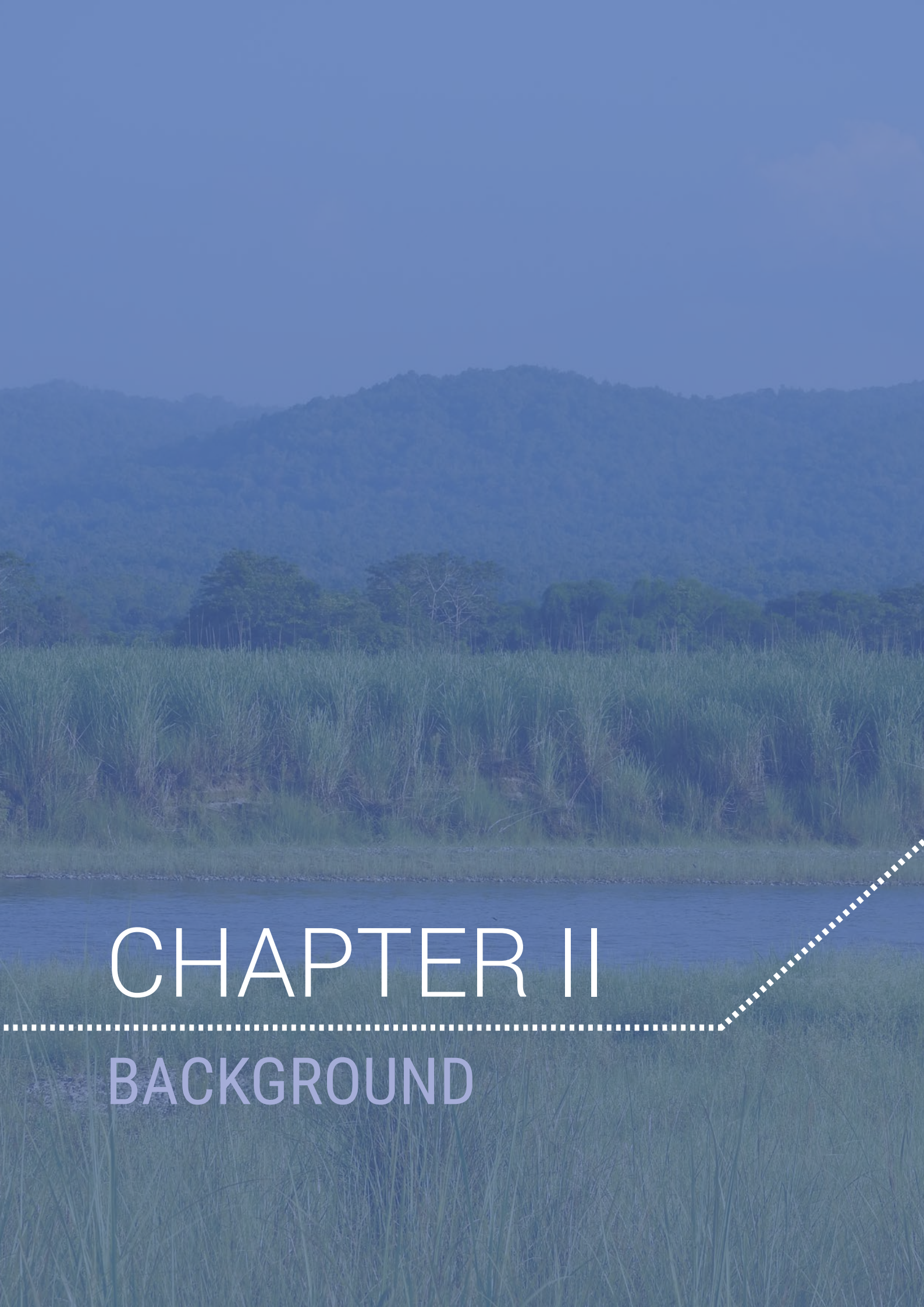
A preliminary report was prepared and shared with the working group and experts for their inputs. Subsequently, a national-level consultative workshop was held involving key stakeholders. All feedback and suggestions gathered from these consultations were incorporated to finalize the action plan. This collaborative approach ensured that the 2024-2034 Conservation Action Plan is comprehensive, inclusive, and addresses the burgeoning threats and challenges to rhinoceros conservation in Nepal effectively.


*Figure 1: Process followed for preparation of action plan*

## 1.3. Scope of the action plan

The action plan is comprised of prioritized actions outlined in the National Biodiversity Strategy and Action Plan (2014-2020), Forest Policy (2015), Forestry Sector Strategy (2016-2025), Protected Area Management Strategy (2022-2030) and management plans of rhino bearing PAs in Nepal. It will be executed across four rhino-inhabited PAs - Parsa National Park (PNP), Chitwan National Park (CNP), Bardia National Park (BNP), and Shuklaphanta National Park (ShNP) - along with their adjacent forests under respective DFOs.

The action plan is organized into seven chapters. The first chapter provides an overview, while the second chapter covers the rhino biology, its distribution, national and international status, population dynamics and context of rhino conservation. The third chapter outlines the major conservation efforts and their achievements of the previous rhino conservation action plans. Chapter four includes review of rhino conservation action plan (2017-2021) and lessons learned, the fifth chapter discusses about the issues, threats, challenges and opportunities of rhino conservation in Nepal, the chapter six presents the Greater One-horned Rhinoceros Conservation Action Plan for 2024-2034, detailing its goals, strategies, objectives, outputs, and activities. The seventh chapter covers implementation mechanisms and a monitoring plan of the action plan. Additionally, Annex 1 provides a timeline and estimated budget for activities in the four PAs and at the central level.



# CHAPTER II

## BACKGROUND

# 2. BACKGROUND

## 2.1. Rhinoceros and their distribution

The living species of rhinoceros belongs to the Rhinocerotidae family which includes four genera, five species, and eleven subspecies. However, today only five living species of rhino exist globally. Among them, three species – the Vulnerable greater one-horned rhinoceros (*Rhinoceros unicornis* Linnaeus, 1758), Critically Endangered Javan rhinoceros (*Rhinoceros sondaicus* Desmarest, 1822), and Critically Endangered Sumatran rhinoceros (*Dicerorhinus sumatrensis* (G. Fischer, 1814) are restricted to Asia, while the Critically Endangered black rhinoceros (*Diceros bicornis* (Linnaeus, 1758) and Near Threatened white rhinoceros (*Ceratotherium simum* (Burchell, 1817)) inhabit in the African continent (Figure 2).

All three Asian rhino species are currently confined to the isolated areas within PAs. The Javan rhino population is critically low with approximately 50 individuals remaining in the wild on Java Island, Indonesia. The Sumatran rhino has experienced a significant decline over the past 15 years, with its population reducing by 50% according to Amin et al. (2006). The remaining populations of this species are scattered across a few protected areas in Indonesia and Malaysia, numbering fewer than 100 individuals. Habitat loss due to human activities and rampant poaching for their horns continue to pose significant threats to the survival of both Javan and Sumatran rhinoceroses.

The Critically Endangered black rhinoceros population is currently undergoing restoration after suffering a 96% decline. In Namibia, South Africa, Kenya, Tanzania and Zimbabwe, the species

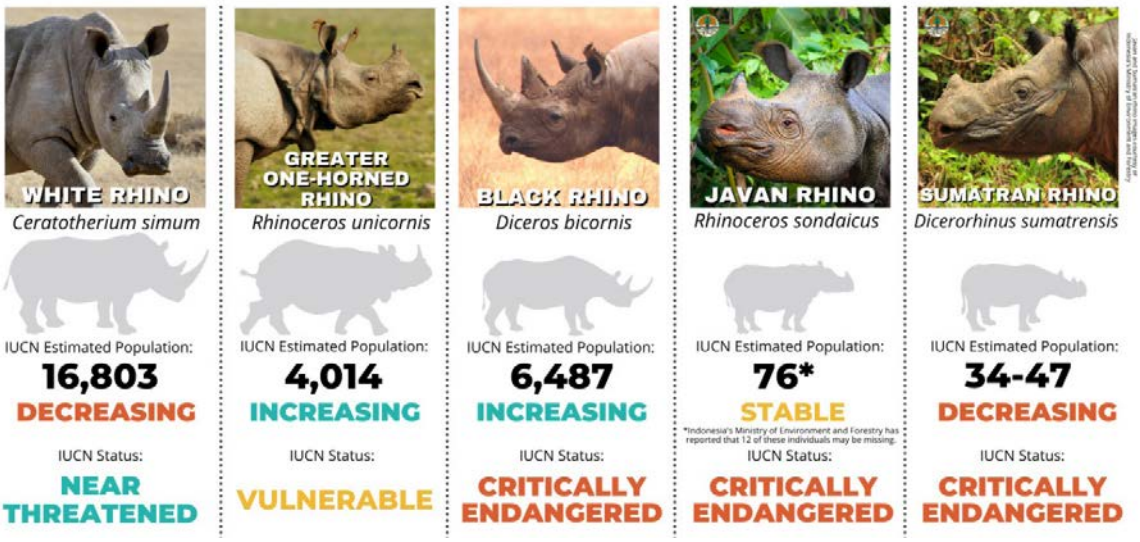



*Figure 2: Five species of rhinoceros and their current status (CITES, 2022a; IRF, 2023).*

are currently confined to small populations of fewer than twenty individuals and probably remaining a few in Malawi as well as Swaziland and Zambia. Only three subspecies of black rhinos exist in the wild today (5,055 individuals). Conversely, white rhinos are widely distributed with their population occupying Botswana, Kenya, Namibia, South Africa, Swaziland, Tanzania Uganda and Zimbabwe and smaller populations still remaining in Malawi, Mozambique and Zambia (Emslie, 2012a, 2012b). One of most notable conservation success stories would be that of saving the white rhino. The figure is now over 20000 compared to just some fifty individuals that were there in the wild at the beginning of 1900s (Amin et al., 2006). The International Union for the Conservation of Nature (IUCN) during September 2023 estimates 16,803 white rhinos in the wild, which is a 5.6% increase from 2021. Nevertheless, rhino population continues growing each year, but since 2008 there has been a dramatic rise in poaching which if not controlled poses major threat to this positive change.

As of recent estimates, there are approximately 4,014 Greater One-horned rhinoceroses living in the wild across India and Nepal (CITES, 2022a; IRF, 2023). Due to the recent recovery of rhino populations in these countries, the species has been reclassified to the vulnerable category (Ellis & Talukdar, 2019).

## 1. Global distribution of Greater One-horned rhinoceros

The Greater One-horned Rhinoceros, as the second largest among the five surviving species, historically had a much wider range across the Indian subcontinent. They inhabited areas including the basins of the Indus, Ganges, and Brahmaputra rivers, stretching from Pakistan in the west to the Indo-Burmese border in the east, encompassing southern lowlands of Nepal, Bangladesh, Bhutan, as well as some parts in Myanmar, southern China, and Indo-China (Khan et al., 1997; Robovsky & Rookmaaker, 2022). However, due to various factors such as habitat loss, land use change, human migration into the lowlands, excessive hunting, and the illegal trade of their horns, the Greater One-horned rhinoceros experienced a significant reduction in both population and range. Their populations

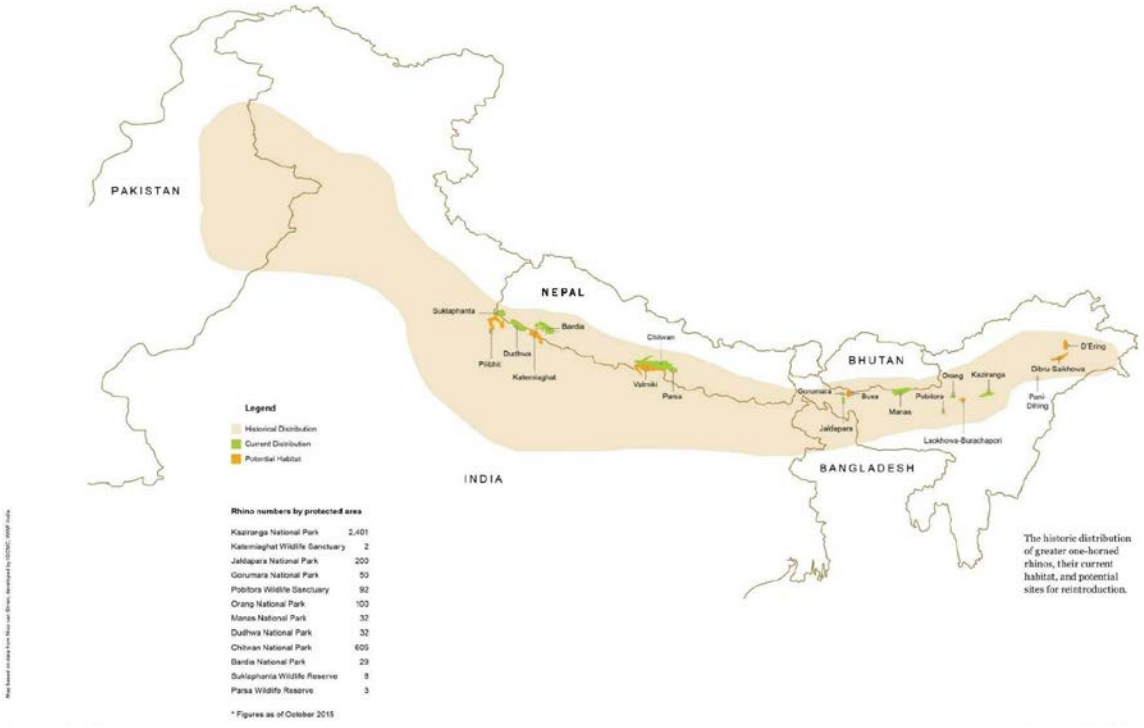



*Figure 3: Historical and present distribution of Greater One-horned rhinoceros (Source: IGCMC at WWF-India)*

were once abundant across northwestern India and Pakistan until around 1600 but disappeared shortly thereafter (Rookmaaker et al., 2016). The species faced a sharp decline during the period of 1600 to 1900, with its remaining habitat range being reduced drastically by the early 20th century, bringing it close to extinction. Conservation efforts in recent decades have led to the recovery and reclassification of this species from Endangered to Vulnerable (Ellis & Talukdar, 2019). However, ongoing threats such as habitat loss and poaching still pose challenges for their long-term survival.

During the 19th century, rhino populations were confined primarily to the terai floodplain grasslands of southern lowland Nepal and the northern and eastern regions of India, notably Uttar Pradesh, Bihar, West Bengal, and Assam. Presently, their distribution has further restricted and distributed to the isolated pockets within the PAs in Nepal and northeastern India (refer to Figure 3) (Rookmaaker et al., 2016; Thapa et al., 2013).

Beginning of the 20th century, around 200 rhinos reported in India indicating their population close to the brink of extinction (Rookmaaker et al., 2016). Within the limits of Kaziranga National Park (KNP), the population declined to fewer than 20 individuals following the prohibition of hunting in 1908 (Laurie et al., 1983). Appreciation goes to the effective conservation actions, the rhino population within KNP recovered significantly, reaching 2,613 individuals by 2022 (KNP, 2022; Sarmah, 2023). This population eventually expanded into adjacent regions including Pabitora and Orang Wildlife Sanctuaries (Talukdar, 2018). In India, the majority of the rhino population inhabit in Assam (including Kaziranga, Manas National Park, Pobitora and Orang Wildlife Sanctuary), West Bengal (including Gorumara and Jaldapara and Wildlife Sanctuaries), and a few in Uttar Pradesh (such as Dudhwa National Park and Katerniaghat Wildlife Sanctuary).

Presently, rhinos are now found only in a few PAs in India and Nepal with the global wild population is estimated to approximately 4,014 individuals across 12 PAs (IRF, 2023; Rookmaaker et al., 2016; Talukdar, 2018).

## 2. National status of Greater One-horned rhinoceros and its distribution

The Greater One-horned rhinoceros serves as an umbrella species, meaning that its conservation efforts also protect many other coexisting species. (Roberge & Angelstam, 2004). It is also regarded as a flagship species (Rookmaaker et al., 2016) and is classified as 'vulnerable' on the IUCN Red List (Ellis & Talukdar, 2019). Both India and Nepal have implemented national-level legislation to protect this species (Rookmaaker et al., 2016).

The rhino is protected under the National Parks and Wildlife Conservation Act of 1973 in Nepal, which aims to regulate hunting, poaching, and habitat destruction. This species has also been included in CITES Appendix-I since 1975. To monitor the population trends and evaluate the effectiveness of management interventions, collaborative efforts are made between various entities such as the Department of Forests and Soil Conservation (DoFSC), the Department of National Parks and Wildlife Conservation (DNPWC), organizations like the National Trust for Nature Conservation (NTNC), WWF Nepal, ZSL Nepal, and local communities. These groups conduct rhino population censuses every 4 to 5 years, ensuring that conservation efforts are adapted based on long-term trends in the species' population.

In Nepal, rhinos are confined in Chitwan, Bardia, Shuklaphanta and Parsa Nationals Parks, their Buffer Zones (BZs) and nearby forest areas (Figure 4). As of the recent national rhino count in 2021, Nepal is home to 752 rhinos, with CNP harboring the second-largest population of rhino (694 individuals), in the Indian subcontinent after India's Kaziranga National Park (2613 individuals) (CITES, 2022a; KNP, 2022). The other population is distributed in BNP (38), ShNP (17) and PNP (3) respectively. Around 9% of the rhino population is found scattered across BZs and forest corridors beyond the PAs, where local communities can also participate in their protection.

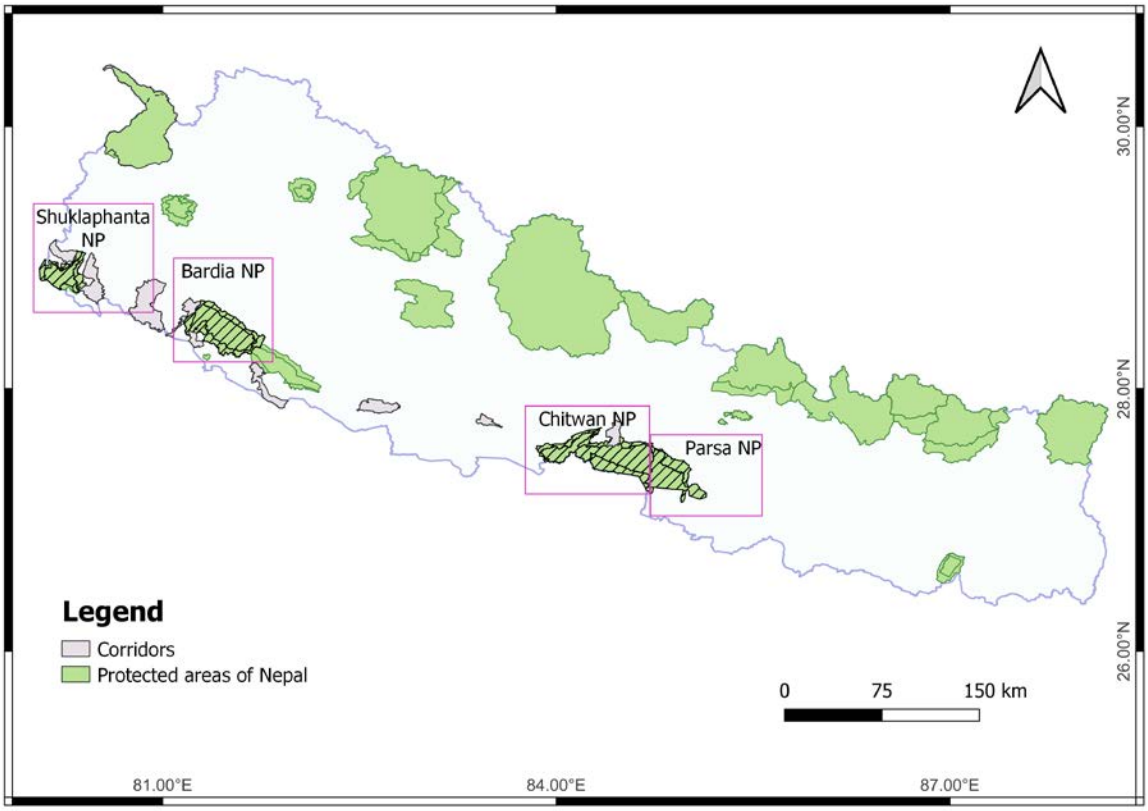



*Figure 4: Map depicting rhino bearing protected areas and forest corridors of Nepal.*

## 2.2. Rhino biology

Greater One-horned Rhinoceros are characterized by their large size and quadrupedal stature, with gray-brown skin featuring multiple folds that envelop their limbs and the hindquarters of their body. These folds exhibit a faint pinkish tint. A distinctive feature of rhinos is the presence of one horn protruding from the tip of their snout, which sets them apart from their African counterparts. Male rhinos typically surpass females in size, with adult males weighing around 2,200 kg and having a body length of 3.7 to 3.8 meters. They also exhibit more prominent neck folds than females, although this feature is less pronounced or entirely absent in females. Male adults have an average height ranging from 1.70 to 1.86 meters at the shoulder, while female adults weigh approximately 1,600 kg and have a body length of 3.1 to 3.4 meters with heights between 1.48 and 1.73 meters. Both male and female rhinos possess a single black horn with an average length of 529 millimeters and a base width of 185 millimeters, tapering towards a point. Their tails typically span 70 to 80 centimeters in length, and their average body temperature records at 37.4°C (Laurie et al., 1983).

At birth, calves of rhinos typically weigh between 40 to 81 kg and measure 0.97 to 1.22 meters in length with a shoulder height ranging from 0.56 to 0.67 meters. In the first month after birth, these calves double their initial weight, and by the end of their first year, they reach nearly ten times their original weight. During their early life stages, rhino calves lack prominent skin folds and have either small or absent horns that develop as they grow into adulthood. The average lifespan of a rhinoceros in the wild is approximately 40 years, while in captivity, they can live up to about 47 years.

## 2.3. Habitat and diet

Nepal's lowland floodplain grasslands of CNP, BNP, ShNP and PNP are the primary habitats for the Greater One-horned rhinoceros (*Rhinoceros unicornis*) (Pant et al., 2021). As a habitat

specialist, the rhino thrives in tall grasslands found in floodplains and riverine forests (Dinerstein, 2003; Laurie, 1978). Additionally, the rhinos rely on abundant waterholes for wallowing, aiding in regulating body temperature during periods of high heat (DNPWC, 2017; Talukdar, 2018). The rhinos predominantly inhabit the alluvial floodplains of sub-tropical southern lowland of Nepal, and northeast India.

The grasslands, riverine forests and wetlands along the floodplains of the lowland Terai region are the critical habitats for rhinos (Adhikari, 2015; Dinerstein, 2003; Subedi, 2012; Subedi et al., 2013). The major food plants of rhino include *Cynodon dactylon, Eragrostris tenella*, *Imperata cylindrica*, *Narenga porphyrocoma*, *Phragmites karka*, *Saccharum spontaneum*, and *Saccharum bengalensis*. This megaherbivore species in general require about 150 to 200 kilograms of food per day and spend approximately forty percent of their time in feeding (Subedi, 2012; Subedi et al., 2013). Primarily, they graze during the early morning, late afternoon, and night hours. Rhinos diet predominantly consists of grasses but they also prefer to consume a variety of other plants and their parts including flowers, fruits, twigs, branches, and grains such as rice (*Oryza sativa*), maize (*Zea mays*) and wheat (*Triticum aestivum*). Rhinos feed on grasses and low-lying leaves by curling their prehensile upper lips. Their flat molar teeth, equipped with grooves, are specifically adapted for grinding the plant matters (Laurie et al., 1983).

## 2.4. Social and spatial behaviours

Rhinos are generally solitary animals, with the exception being during their breeding season when males and females come together for mating. After successful mating, adult male rhinos typically establish distance from females using olfactory signals such as defecation and urination to mark their territories. Rhinos rely heavily on olfactory communication, so they tend to avoid areas with the presence of dung or urine from other individuals. Female rhinos maintain proximity to their calves, while male rhinos generally lead solitary lives. The lack of extensive social interactions among rhinos results in minimal competition between breeding and non-breeding males. When confronted with disturbances, they tend to flee rather than engage in direct confrontations. However, during territorial disputes, breeding males exhibit aggressive behavior through charging, clashing horns, and making lunging movements, which can lead to serious injury or death (Laurie et al., 1983).

Male rhinos have the average annual home range of 20.54 ± 6.06 $km^2$ and 10.58 ± 1.34 $km^2$ for females, with a 47% overlap in home ranges between males and a minimum of three females overlapping with a male's home range. Female home range overlaps exceed 60%, suggesting that rhino are not territorial and can coexist in a relatively small area (Subedi, 2012). Preferred habitats include tall grasslands, short grasslands, and riverine forests, but they rarely used Sal (*Shorea robusta*) forests, abundant across the Terai (Adhikari, 2015).

Rhinos are most active during early morning, late afternoon, and night hours. They can often be observed feeding or wallowing in ponds, swamps, or rivers during these times. Wallowing serves as a thermoregulation mechanism for rhinos, helping them regulate body temperature and prevent skin dehydration from prolonged sun exposure. It also acts as a natural defense against insect bites and external parasites. During the dry season when water sources are scarce, rhinos spend a significant portion of their day grazing in dense riverine forests to find food and maintain their overall health (Hutchins & Kreger, 2006; Jnawali, 1995; Laurie et al., 1983; Nowak, 1999).

## 2.5. Reproductive behaviour

Adult male and female rhinos engage in courtship before mating. The mating process involves two stages: mounting and the female dragging the male on her back. Mating can take several hours to complete. After successful mating, there is typically no additional interaction between the male and female (Hazarika & Saikia, 2010). The average inter-birth interval is 44.2 ± 3.64 months, with births occurring throughout the

year without seasonality (Subedi, 2012). Rhinos have an average gestation period of 16 months and typically give birth to a single calf at a time. It has a range weaning age is 12 to 18 months and range time to independence is 6.5 to 10 years. Female rhinos reach sexual maturity at the age of 4 to 5 years while it takes 7 to 8 years for male (Hutchins & Kreger, 2006). Rhinos exhibit specific k-selected strategies in their life cycle, including their large size, extended gestation and inter-birth periods, tendency to produce only one calf at a time, and need for extensive home ranges. These traits make them particularly vulnerable to habitat loss and unpredictable environmental events, which can increase the risk of extinction.

## 2.6. Population dynamics

The population of rhino has grown significantly since effective management interventions of population and habitats with antipoaching activities helped to save them from extirpation in the 1960s (Pant, 2022).

there were indeed 99 more rhinos in the 2008 census compared to the previous one, and the population increased by 21% from 2011 to 2015 before rising again by 17% between 2015 and 2021. A total of 752 rhinos(CNP – 694, BNP-38, ShNP- 17 and PNP-3) were reported in 2021. Over the last 56 years (from 2009 to 2021), Nepal has seen an addition of 652 new rhinos, highlighting the effectiveness of conservation initiatives for this species as well as the outcomes of enhanced habitat management and rhino protection protocols (Figure 5).

Rhino population survey conducted in 2021 provides comparative data on the distribution of sex and age (Table 1). Notably, among 694 rhinos in Chitwan, two-thirds (68.29%) of population comprised of adults while 18.01% were calves and 13.68% individuals were categorized in sub-adults. This result indicates an almost consistent and proportional increase in each age category compared to the census of 2015. Approximately 70% of these were adults, while the remaining 30% comprised calves and sub-adults. The female-to-male sex ratio was measured at 1.37, with 342 individuals assessed (Table 1). Moreover, observations indicated that about 71.84% of adult females were accompanied by calves as compared to the counts of 2015 (57%) that indicates the potentiality of further increase in population. However, over half of the population (56.48%) remained unsexed due to the considerable difficulty in identifying the sex of rhinos during brief sightings. In CNP, the highest number of rhinos were recorded from tall grassland (34.9%) followed by riverine forests (22.9%), wetland (12.0%), short grassland (11.7%) and not specified (12.2%).

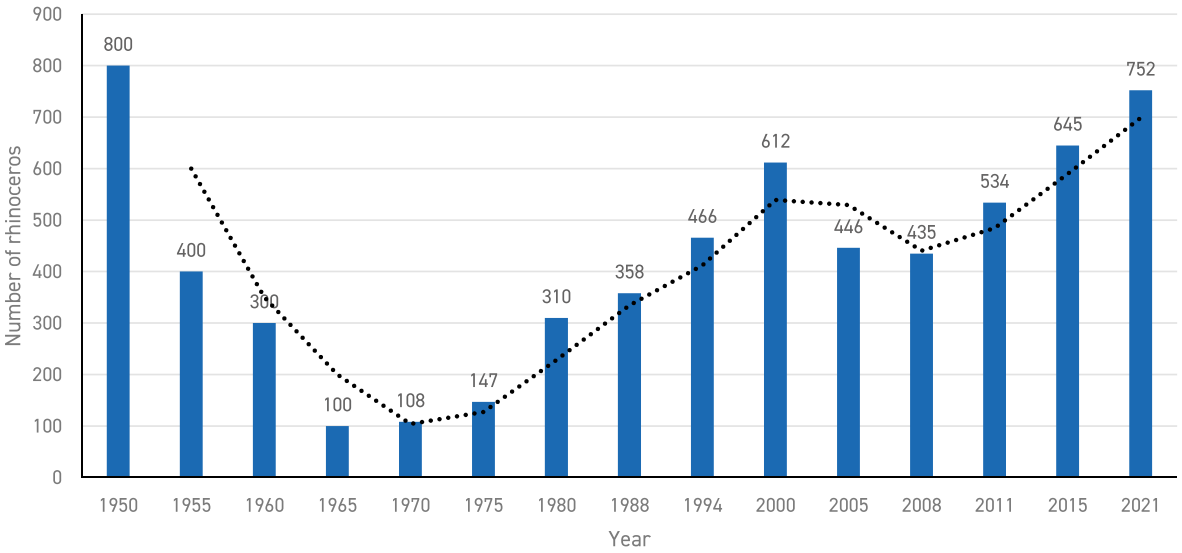


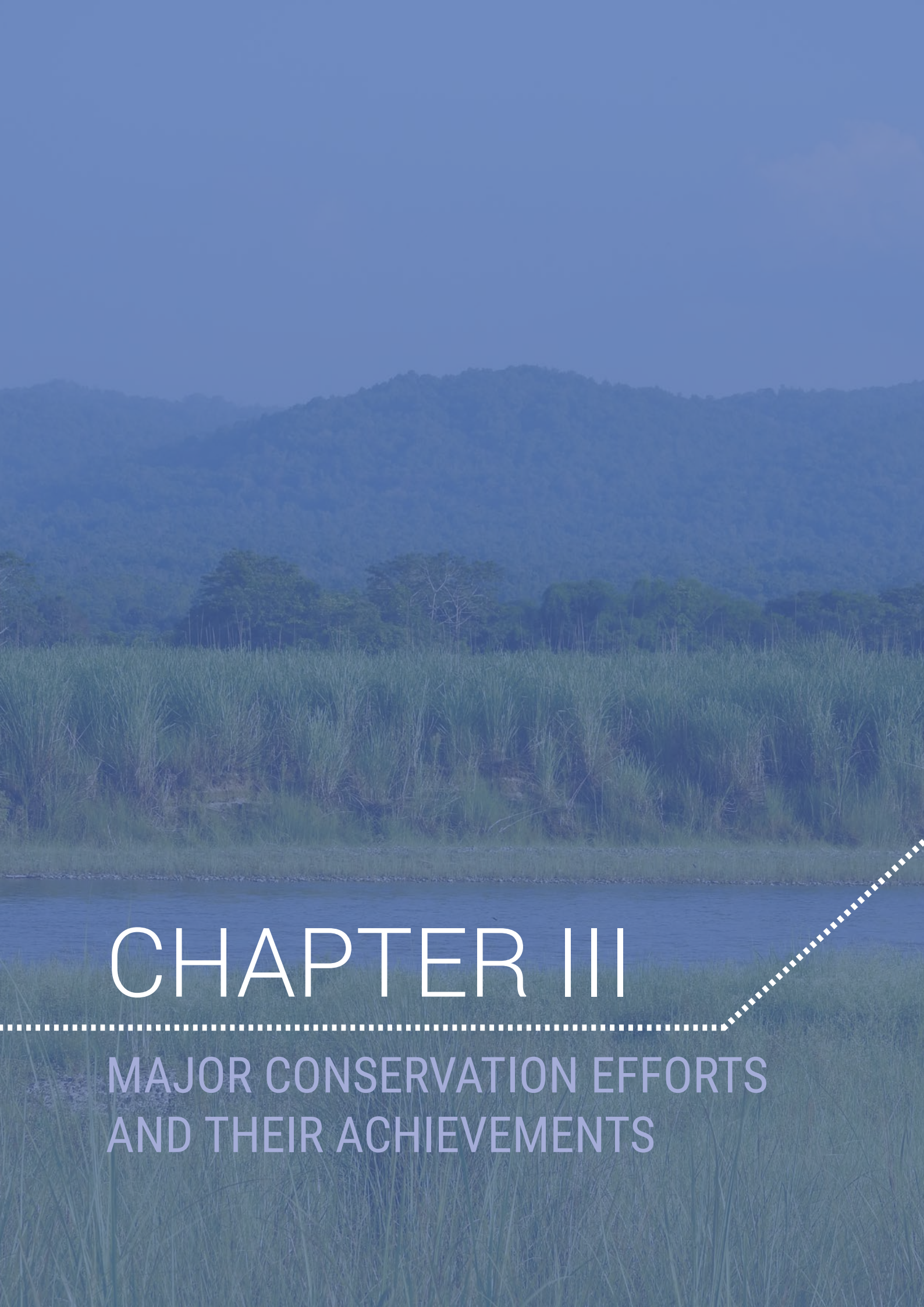

*Figure 5: Population trend of Greater One-horned Rhinoceros in Chitwan Valley and Nepal (Source: DNPWC reports)*

Most rhinos in BNP were adults, comprising 81.57%, followed by calves at 15.79% and subadults at 2.63%. The percentage of adults has increased from 68.96% to 81.57% compared to the 2015 census, while the percentage of subadult individuals has dramatically reduced. However, the percentage of calves has remained relatively stable over time. Among the sex-identified 33 rhinos, the female-male sex ratio was 1.35, which has decreased compared to 2015 (2.25). Approximately 31.57% of adult sexed females had a calf with them.

The rhino population has been found to be doubled in ShNP from 8 individuals in 2015 to 17 individuals in 2021. About 76.47% comprised of adults and 23.52% of calves while not a single sub-adult was reported during the 2021 count (DNPWC, 2021).

**Table 1: Age, sex and population estimates of greater one-horned rhinos in Nepal in 2015 and 2021**

| PAs | Sex | Count 2015 | | | | Count 2021 | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | Adult | Sub Adult | Calf | Total | Adult | Sub Adult | Calf | Total |
| Chitwan NP and surrounding areas | Female | 201 | 12 | 9 | 225 | 174 | 0 | 0 | 174 |
| | Male | 148 | 14 | 8 | 170 | 128 | 0 | 0 | 128 |
| | Unsexed | 82 | 29 | 99 | 210 | 172 | 95 | 125 | 392 |
| | **Total** | **431** | **55** | **116** | **605** | **474** | **95** | **125** | **694** |
| Bardia NP and nearby areas | Female | 9 | 0 | 0 | 9 | 19 | 0 | 0 | 19 |
| | Male | 4 | 0 | 2 | 6 | 12 | 1 | 1 | 14 |
| | Unsexed | 7 | 4 | 3 | 14 | 0 | 0 | 5 | 5 |
| | **Total** | **20** | **4** | **5** | **29** | **31** | **1** | **6** | **38** |
| Shukalphanta NP and surrounding area | Female | 3 | 0 | 0 | 3 | 4 | 0 | 0 | 4 |
| | Male | 1 | 0 | 0 | 1 | 3 | 0 | 0 | 3 |
| | Unsexed | 1 | 1 | 2 | 4 | 10 | 0 | 4 | 4 |
| | **Total** | **5** | **1** | **2** | **8** | **13** | **0** | **4** | **17** |
| Parsa National Park and surrounding areas | Female | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 1 |
| | Male | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 1 |
| | Unsexed | 3 | **0** | **0** | 3 | 0 | 0 | 1 | 1 |
| | **Total** | **3** | **0** | **0** | **3** | **3** | **0** | **0** | **3** |
| **Total Population** | | **350** | **456** | **60** | **123** | **521** | **96** | **135** | **752** |



# CHAPTER III

## MAJOR CONSERVATION EFFORTS AND THEIR ACHIEVEMENTS

# 3. MAJOR CONSERVATION EFFORTS AND THEIR ACHIEVEMENTS

Nepal has been making efforts to safeguard rhino habitats since 1846 when the first Rana Prime Minister mandated the preservation of the rhino and its habitat particularly in Chitwan Valley (Caughley, 1969). Within a span of less than ten years by early 1950s, Nepal had more than one thousand rhinos. At this time however, the government embarked on resettlement after malaria eradication campaign. This led to migration of settlers from midhills of Nepal to Terai and inner-terai including Chitwan valley which caused an increase in human population of Chitwan and substantial changes in land use patterns (Caughley, 1969). Approximately seventy percent forests inside Chitwan valley were destroyed and switched to agricultural activities as well as human settlements (Caughley, 1969; Laurie, 1978). The destruction of forests also accelerated wildlife poaching hence bringing down the number of rhinos to less than one hundred by late 1960s (Caughley, 1969; Thapa et al., 2013).

In 1961, 'Gaida Gasti', a Rhino Patrol Unit with one hundred thirty armed personnel, was established by the Government and guard posts were set up all over Chitwan to combat poaching. To prevent the extirpation of rhinos, CNP was founded in 1973 with an initial area of 544 km² and was increased to 932 km² in 1977, and further expanded to 952.63 km² in 2017 (including former settlement areas of Old Padampur). In 1975, due to the ineffectiveness of the Rhino Patrol Unit, the Government of Nepal (GoN) deployed Nepal Army to strengthen wildlife surveillance (Shah et al., 2006). The enactment of the National Parks and Wildlife Conservation Act in 1973 provided robust safeguarding for endangered and protected wildlife species, such as the rhino.

With the changed time and development, human population increased alarmingly which created enormous pressure on Park resources. In order to minimize human-wildlife conflict, the Park People Programme under United Nations Development Programme (UNDP) assistance was launched in late 1994. Based on the experience gained from the implementation of this programme, Buffer Zone Regulation was passed in 1996 and the area of 750 km² was declared as Buffer Zone (BZ) of the Park in the same year. Due to enhanced protection and management of wildlife and their habitats, including participation of local communities, the rhino population experienced a steady rise, reaching 466 individuals by 1994.

Until 1986, the only place rhino exists in Nepal was CNP. Between 1986 and 2003, 87 rhinos were translocated from Chitwan valley to build a second viable population in BNP, and an additional four rhinos were translocated to ShNP in 2003 to establish a third population in Nepal (Aryal et al., 2017; DNPWC, 2017). However, the poaching during the armed conflict periods between years of 1996-2006 led to decline in numbers of rhinos in BNP; from 67 individuals recorded during census carried out in year 2000 to only thirty-one counts by January 2007, and further declined to twenty-nine individuals by December 2015. In order to increase this number, eight more rhinos have been translocated to BNP. Altogether 104 rhinos were translocated from CNP to BNP and ShNP.

Every four to five years, rhino counts are carried out by the DNPWC, the DoFSC under the Ministry of Forests and Environment (MoFE), in cooperation with the NTNC, WWF Nepal, the ZSL Nepal , and local communities. Finding out the population status and evaluating the success of management initiatives are the goals of these evaluations. With funding from the World Wildlife

Fund (WWF) Nepal, DNPWC, the King Mahendra Trust for Nature Conservation (now the National Trust for Nature Conservation), and Resources Nepal started a rhino count in CNP in 1994 and estimated that there were 466 rhinos in the area. Similarly, 612 rhinos were counted in Nepal in 2000 according to a Rhino Count conducted in Chitwan. Together with the NTNC and WWF Nepal, DNPWC carried out another Rhino Count Program in 2005, counting 446 rhinos in Nepal. However, during the ten years of social and political conflict that followed 2000, poaching caused a major fall in the rhino population in Nepal. Between 2005 and 2008, there were 435 fewer rhinos compared to the figure in 2004. As shown in Figure 4 above, subsequent actions to prevent rhino poaching led to a gradual increase in the rhino population.

Currently, as per the rhino count 2021, there are 752 rhinos in the CNP, BNP, ShNP and PNP demonstrating effectiveness of conservation initiatives which includes implementation of rhino protection protocols, habitat management and participation of local community in the conservation.

## 3.1. Policy, legislation and institutional reforms

In 1957, "Jungalee Jiv Janthu Samrakshan Ain, 2015 BS", also referred to as the First Wildlife Protection Act was formulated so as to protect rhinos and their habitats. Similarly, in response to the rapid decline of forest areas and rhinos in Chitwan, the Government implemented conservation measures such as establishing Mahendra Deer Park (Ghimire, 2020; Kafley et al., 2015). By the early 1960s, the area west of the Chitwan Valley and south of the Rapti River had been designated as rhino sanctuaries (Adhikari et al., 1999; DNPWC, 2000). As a result, the government was forced to establish "Gainda Gasti," a rhino armed patrol unit in 1961 due to widespread poaching that caused massive reduction in the number of rhinos.

In 1973, CNP was established with an area of 544 $km^2$ with the goal of saving rhinos from extinction. The area was increased to 932 $km^2$ in 1977 and again 952.63 $km^2$ in 2017. In fact, GoN didn't pass the National Parks and Wildlife Conservation Act until 1973, and it included strict safeguards for rhinos and other endangered or protected species (GoN, 1973). Similarly, Nepali Army was deployed by the Government in 1975 after realizing the insufficiencies of the Rhino Patrol Unit to enhance animal patrol and surveillance operations (Adhikari et al., 1999). As a result, the DNPWC was established in 1980 to oversee conservation initiatives aimed at safeguarding rare and endangered wildlife, as well as a diverse range of plants and animals. In an additional attempt to improve the capability and effectiveness of rhino conservation initiatives in Nepal, DNPWC leads institutional reform initiatives. It makes it easier to carry out rhino conservation initiatives, such as habitat restoration, neighborhood-based anti-poaching patrols, and public awareness campaigns in partnership with non-governmental organizations, foreign organizations, and local communities (Acharya et al., 2020; DNPWC, 2017; Pant et al., 2020b).

In 1993, Nepal implemented the BZ concept for promoting local residents' reliance and for reducing poaching of huge animals like rhinos (Martin & Martin, 2010; Thapa & Diedrich, 2023) which had resulted in increased sense of empowerment among local communities which in turn increased the participation in the support of conservation-related activities. Similarly, numerous non-governmental organizations (NGOs) engaged in rhino conservation efforts, such as ZSL Nepal, WWF Nepal, and the NTNC (Martin & Martin, 2010; Martin et al., 2013). This park's exceptional ecological richness owned to its designation as a World Heritage Site in 1984 (DNPWC, 2019; GoN, 1973).

Together with a central Wildlife Crime Control Bureau (WCCB) and district level bureau, Nepal established the National Wildlife Crime Control Coordination Committee (NWCCCC) in November 2010. Its mandate includes ensuring effective coordination among law enforcement agencies and strengthening on-the-ground anti-poaching measures. Later in 2023, Illegal Wildlife Trade and Poaching Control Strategic Plan for Nepal (2023-2030) was prepared. Furthermore, a National Tiger Conservation Committee (NTCC) was formed with the chairmanship of Prime Minister, facilitating essential coordination among line Ministries and security agencies such as Nepal Police/Central Investigation Bureau (CIB) and Nepal Army (Acharya et al., 2020).

In January 2011, the South Asia Wildlife Enforcement Network (SAWEN) consisting Nepal, Afghanistan, Bangladesh, Bhutan, India, Maldives, and Sri Lanka, was established to combat wildlife crime collaboratively at regional level (Martin et al., 2013; Wyatt & Wyatt, 2022). According to the official record of the DNPWC from 2016, this has allowed the Nepalese police to enter criminal networks, leading to the arrest of almost 2,400 individuals under the Nepalese National Parks and Wildlife Conservation Act, 2029 (Aryal et al., 2017).

## 3.2. Protection of rhino and its habitat

Megaherbivores, particularly rhinos, have garnered global attention in recent years, with efforts made to recover many populations

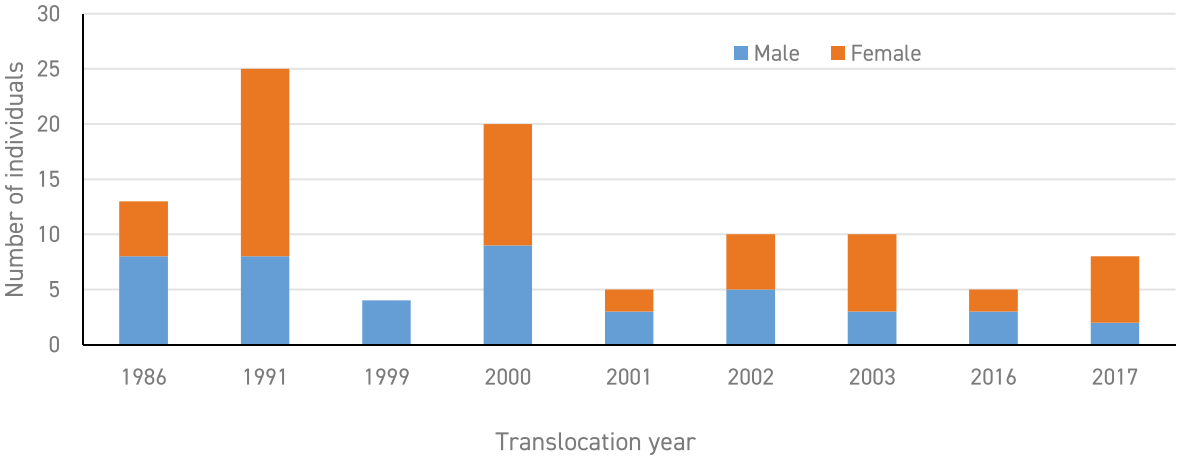



*Figure 6. Rhino translocation (CNP to BNP and ShNP) in Nepal.*

despite the increasing threat of poaching for their horns. While the population of rhinos in Nepal has grown dramatically in recent years, protecting this megafauna has proven challenging (Ghimire, 2020). Establishment and supervision of PAs, like CNP and BNP, act as vital habitats for rhino populations providing essential protection against poaching and habitat degradation through enforcement measures and community engagement initiatives (Pant, 2022; Pant et al., 2020a, 2020b). Population management is another significant conservation effort to maintain at least three viable populations of rhino in Nepal. Therefore, DNPWC practiced translocation of rhinos from large population (CNP) to small population (BNP and ShNP) (Figure 6).

There are many cases of important areas of forest land being wrongfully turned into agricultural fields and settlements, including the Bandarjhula section in the CNP buffer zone and the Khata, Karnali, Mohana-Laljhadi, and Basanta forest corridors in the western TAL. This makes management of rhinos more difficult (DNPWC, 2017). Anthropogenic pressures, including deforestation and development activities like farming and urbanization, are reducing rhino habitats outside PAs. The presence of livestock grazing in natural forests heightens pressure on rhino populations, compelling them to confine themselves entirely within PAs. This confinement within a limited PA exacerbates intra-specific competition, leading to conflicts over food, space, and mating opportunities, ultimately resulting in the direct or indirect mortality of individuals (Bhandari et al., 2022; DNPWC, 2017). Moreover, the loss of habitat connectivity can profoundly affect rhinos and the neighboring communities by escalating human-wildlife conflicts (Pun et al., 2022). So these consequences highlights the importance of habitat management especially in the developing countries where indiscriminate deforestation continues (Kafley et al., 2015).. Similarly, Nepal has also demonstrated a commitment to international cooperation and policy advocacy for rhino conservation. Active participation and multilateral conservation agreements such as the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES), which regulate the international trade of rhino products and promote cross-border collaboration in combating illegal wildlife trafficking also aid on the rhino conservation. Furthermore, National Biodiversity Strategy and Action Plan (NBSAP) can help to outline the comprehensive measures for rhinos and their habitat conservation.

## 3.3. Rhino habitat management

Rhinos are habitat specialists, they favor tall alluvial floodplain grasslands dominated by *Saccharum spontaneum* as the dominant species, as well as riverine forests on alluvial floodplains along the Himalayan foothills, where water and green vegetation are available year-round

(Pant et al., 2021). Rhinos graze primarily on tall floodplain grasslands where they mostly feed on *Saccharum spontaneum*, *Imperata cylindrica*, *Saccharum Bengalensis*, *Narenga porphyrocoma*, *Phragmites karka*, and *Cynodon dactylon* (DNPWC, 2017; Steinheim et al., 2006). During the cool season (November-February), rhinos prefer riverine forests dominated by *Trewia nudiflora*, *Etheria elliptica*, and *Bombax ceiba*, and they browse undergrowth shrubs and saplings extensively (Pun et al., 2022; Subedi, 2012). *Mikania* is the major IAPS in CNP covering most of the grasslands and riverine forest of the park with its presence above 35% of habitats of rhino. However, its coverage and distribution has been decreased comparing to previous study during rhino censuses of 2011 and 2015 indicating its naturalization (Lamichhane et al., 2014; Murphy et al., 2013). Similarly, there is also invasion of *Chromolaena odorata* in both CNP as well as PNP and Lantana in BNP and ShNP. Moreover, invasive species removal and removal of woodland invasion in the grassland habitat also help in the proper habitat management of rhino (Adhikari, 2015; Subedi, 2012). Conservation and habitat management of rhino helped its population but there are still many challenges to rhinos (Martin & Martin, 2010).

The establishment and ongoing operation of PAs, such as BNP and CNP, has greatly improved the management of rhino's habitats and provided crucial defense against poaching in Nepal (Pant, 2022). Whereas, the scenario is not same in western terai (e.g., BNP, ShNP) where the destruction and fragmentation of their natural habitat have been affecting its habitat and ecology (Talukdar & Sinha, 2013). Rhino habitats outside PAs are being reduced by anthropogenic factors such as deforestation and development activities like farming, linear infrastructures and urbanization. Large-scale linear infrastructure projects like, highways, high-transmission lines, and expansion of irrigation canals could negatively affect wildlife habitats, especially dispersal corridors. The movement of wildlife is severely impacted by East-West highways that cross vital corridors including the Barandabhar, Kamdi, and Karnali routes as well as important areas like the CNP, BNP, PNP, and ShNP. Highway accidents have resulted in the deaths of a considerable number of wild creatures, such as tigers and rhinos (Bhandari et al., 2022; Ghimire, 2020).

Maintaining and restoring suitable habitats within PAs including preserving the grasslands, wetlands, and riverine forests that rhinos

depend on for grazing, breeding, and shelter can help on the habitat management. By studying rhino behavior, food habit, habitat preferences, and population dynamics, researchers can identify key areas for habitat restoration and prioritize conservation efforts (Pant et al., 2021). Additionally, ongoing population monitoring also allows for the evaluation of the effectiveness of habitat management interventions and adaptation of strategies as needed (DNPWC, 2021). In conclusion, effective cooperation and transparency amongst the DNPWC, I/NGOs, Nepal Army, Nepal Police, community and the BZMCs are essential for the overall conservation of rhinos and their habitat (Martin, 2001; Martin & Martin, 2010; Mukherjee et al., 2020).

## 3.4. Combat rhino-related crime

Wildlife trafficking of an unprecedented scale poses a significant threat to biodiversity (Rosen & Smith, 2010). Evidence suggests that the demand for rhino horn among Asian consumers is highly inelastic, indicating that changes in the price of rhino horn do not significantly alter the quantity demanded. This inelasticity supports a perception of immense potential of profit (Blaine, 2014; Conrad, 2012) in rhino poaching, particularly among organized crime syndicates. When anti-poaching enforcement is inadequate, organized crime provides the opportunity, enabling certain community members to address these issues in their favor by resorting to the low-risk activity of poaching. This poaching quickly transforms into a supply chain dominated by organized crime syndicates (Rivalan et al., 2007).

Nepal has achieved a noteworthy success in its conservation endeavors by effectively eliminating rhino poaching incidences entirely within a four-year period. Nepalese authorities arrested 27 offenders in the period 2018 to 2021 and also identified another 47 suspects involved in rhino poaching and horn trafficking (CITES, 2022b). Through the implementation of rigorous anti-poaching measures, the population managed to recovered to approximately 600 individuals by 2000 (Thapa et al., 2013) and Nepal achieved notable success in rhino conservation in recent years, marking zero poaching of rhino in 2011, 2013, and 2014. Presently, Nepal is home to 752 rhinos thrived into three small subpopulations, exhibiting an average annual growth rate of 5.07% (DNPWC, 2021).

## 3.5. Community engagement and conservation education

The BZ concept initiated in Nepal in 1993 aimed to encourage local communities towards economic activities within designated areas rather than resorting to illegal resource exploitation within protected parks. Its secondary objective was to raise awareness among communities about wildlife conservation, emphasizing the economic benefits of preserving rhinos as key attractions for tourism. Initially, BZs were to be funded from 30-50% of revenue generated within PAs, later solidified at 50%. Although established in CNP and BNP in 1996, the concept gained momentum only around 1999. In the early years following the introduction of the BZ concept, its effectiveness in rhino protection was limited due to inadequate benefits reaching the poorest individuals (Adhikari et al., 2005).

In 2008, officials, including the Chairman of the BZMC at Chitwan NP, acknowledged that local communities had not effectively received conservation messages, and marginalized groups within the BZ were often excluded from conservation decision-making (Bhurtel, 2008). Fortunately, by 2008 and 2009, improvements were made in implementing the BZ concept, particularly concerning wildlife conservation. This enhanced community involvement has significantly contributed to the reduction of rhino poaching (Martin & Martin, 2010).

To ensure the effective and sustainable conservation of wildlife, and other natural resources, as well as to control poaching and illegal wildlife trade, various institutions, government bodies, and donor agencies engaged in national park and wildlife conservation collaborated to establish Community Based Anti-Poaching Units (CBAPUs) in their respective operational areas (DNPWC, 2017). In 2003, the formation of the Anti-Poaching Youth Awareness Committee in Nawalparasi and the launch of the APYA campaign in CNP were significant initiatives (DNPWC, 2017), demonstrating the active involvement of local communities in wildlife conservation efforts.

## 3.6. Research

Research on rhinos in Nepal covers a diverse topics. Adhikari et al. (1999) had outlined strategies to combat poaching, emphasizing the importance of anti-poaching approaches for successful rhino conservation in Chitwan valley. There are some studies related to the poaching and its impacts on rhinos in Nepal (Martin, 2004; Martin et al., 2009; Martin & Martin, 2006; Poudyal et al., 2009). Some of the studies were carried on the behavior and environment of the rhinos (Laurie, 1982; Laurie, 1978). Some of the researches were focused on their feeding habit (Dinerstein & Wemmer, 1988; Pradhan et al., 2008; Steinheim et al., 2006; Thakur et al., 2014). Many studies focused on human-rhino conflict (Acharya et al., 2016; Lamichhane et al., 2018; Sedhain & Adhikary, 2016; Studsrød & Wegge, 1995). Likewise, some of the studies devoted to conservation threats to rhino and their habitats (Aryal et al., 2017; Chanyandura, 2020; Mahatara et al., 2018; Martin, 1998; Martin, 1992, 2009; Martin & Vigne, 1996; Thapa et al., 2013). Similarly, the frequency and severity of harmful cyanobacterial blooms in wetlands are increasing due to climate change and high levels of eutrophication in freshwater sources (Moore et al., 2023).

Some of the studies also reported the problems of disease in rhino (Devkota et al., 2014; Thapa et al., 2016) and plastic consumption (Awasthi et al., 2023). Talukdar and Sinha (2013) studies challenges and opportunities of transboundary rhino conservation in India and Nepal. Dinerstein (1992) study the effects rhino on riverine forest structure in lowland Nepal. Rimal et al. (2018) and Pant et al. (2021) did the habitat suitability and threat analysis of rhino. Dinerstein and Price (1991) Study on the demography and habitat use by greater one-horned rhino in Nepal. Jnawali (1995) and Thapa et al. (2009) studied the habitat preferences of translocated rhinos in BNP and ShNP.

Kandel and Jhala (2008) study demographic structure, activity patterns, habitat use and food habits of rhino in CNP, Nepal. Subedi (2012)

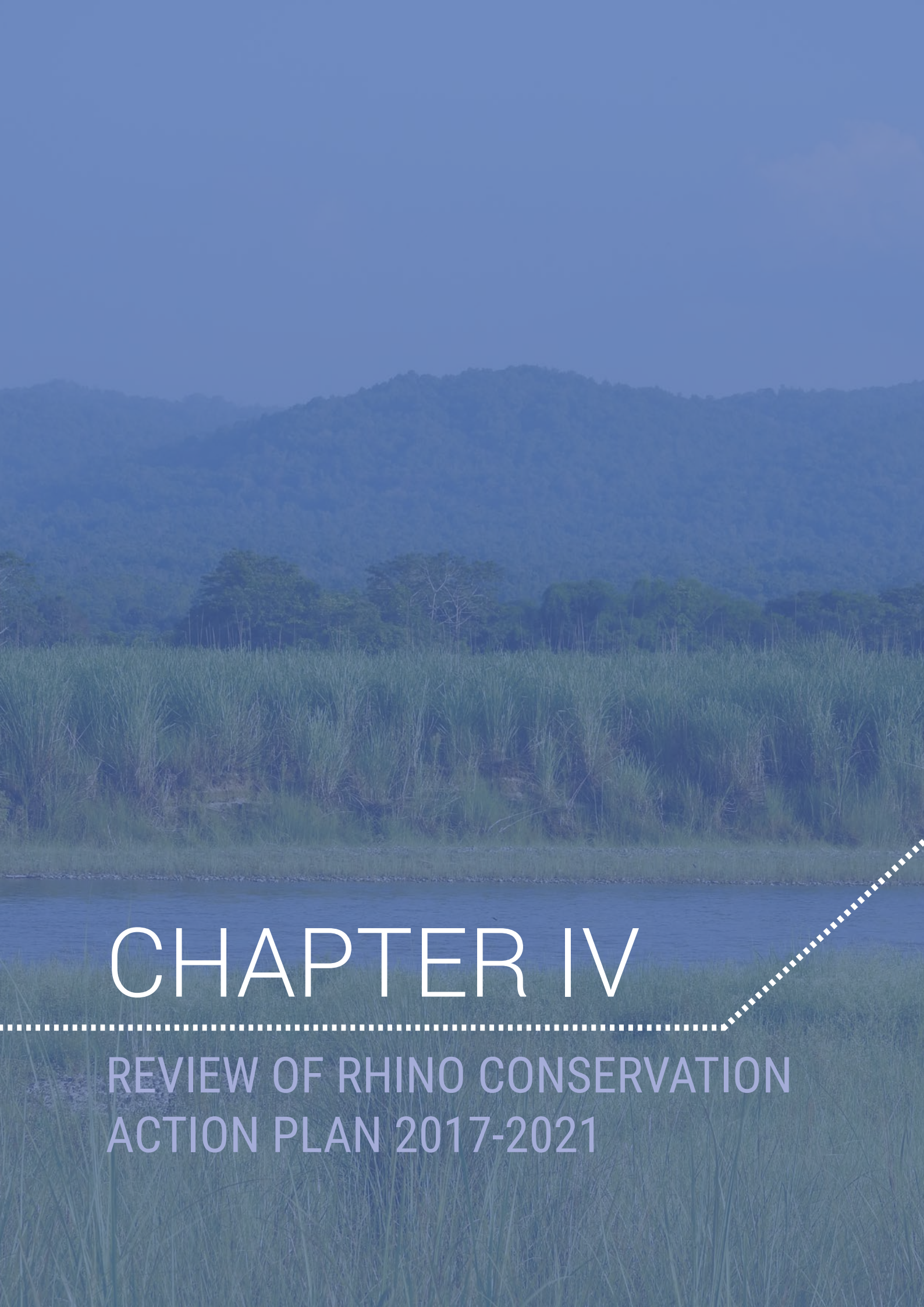
also study effect of *Mikania micrantha* on the demography, habitat use, and nutrition of rhino in CNP, Nepal. Thakur et al. (2014) did analysis of the habitat of rhino at the CNP, Nepal. Some of the studies focused on rhino population (Rothley et al., 2004; Subedi et al., 2013; Yonzon, 1994) and viability in Nepal: impact assessment of antipoaching and translocation strategies (Kafley et al., 2015). As well as Subedi et al. (2017) study demography and viability of the largest population of rhino in Nepal.

## 3.7. National, transborder, regional, and international cooperation

To protect Nepal's one-horned rhinos, cooperation at national, transboundary, regional and global levels is very necessary. The Greater One Horned Rhino Conservation Action Plan for Nepal (2017-2021) recognizes the importance of these collaborations to sustain three viable populations of rhino in the country (DNPWC, 2017). USAID funded Hariyo Ban Programme had contributed on rhino conservation by supporting strategic actions such as managing habitats, rebuilding corridors, resolving conflicts between people and rhinos, as well as setting up community-based anti-poaching squads (WWFNepal, 2021). Additionally, conservation efforts in Nepal support the protection of other species including tigers, wild water buffalo, swamp deer, musk deer, elephants, gharials, dolphins, blackbucks, blue bulls, and snow leopards as well as common leopards (WWFNepal, 2021). GoN has recently developed a transboundary rescue operation guideline for the Greater One Horned Rhino in Nepal which is aimed at returning swept rhinos during flooding seasons and also when they accidentally cross borders (DNPWC, 2022a).

The government's prominent effort lies in revitalizing large herbivore assemblages, with Hariyo Ban lending support to numerous species reintroduction programs. These efforts include the reintroduction of rhinos to BNP, blackbuck to ShNP, wild water buffalo to CNP, and swamp deer in both CNP and BNP. While the translocated rhinos in BNP show promising progress, instances of human-rhino conflict, particularly in the southern regions, have been observed. The blackbuck population reintroduced to ShNP has successfully attained a viable level (WWFNepal, 2021). Through international cooperation and support, the Government of Nepal has secured NPR 13.2 crore for addressing climate change impacts, adaptation, and mitigation efforts (GoN, 2024).

Conservation efforts for rhinos across the India-Nepal border encounter hurdles such as inadequate communication, cross-border policy and substantial expenses. However, if handled flexibly, such initiatives promise significant social, economic, and ecological advantages (Mathieu, 2022). International collaboration is imperative for the preservation of these species. The Asian Rhinos: IUCN Status, Survey and Conservation Action Plan (1997) highlights the significance of collaboration among nations especially in regard to exchange of information, research and technology needs is critical for rhino conservation. The greater one-horned rhino is categorized as vulnerable on the IUCN Red List of Threatened Species with a population estimate of about 3,500 individuals in the wild. (Janssens & Trouwborst, 2018). The CITES is a significant global agreement that controls the trafficking of endangered species and their products. This trade ban, contained in the Appendix I of CITES, outlaws interstate commercialization of rhino except under exceptional circumstances (Janssens & Trouwborst, 2018). Despite facing obstacles like weak communication and substantial expenses, transboundary rhino conservation efforts between India and Nepal hold the potential for notable social, economic, and ecological benefits if approached with adaptability.



# CHAPTER IV

## REVIEW OF RHINO CONSERVATION ACTION PLAN 2017-2021

# 4. REVIEW OF RHINO CONSERVATION ACTION PLAN 2017-2021

## 4.1. Implementation status

To maintain healthy populations in CNP, BNP, and ShNP, the Greater One-horned Rhinoceros Conservation Action Plan for 2017–2021 placed a strong emphasis on in-situ conservation initiatives. Following the conclusion of the first rhino conservation action plan (2006–2011), several conservation initiatives were carried out until early 2016, prior to the approval of the second action plan in 2017. During this time, important initiatives included the creation of important task forces like the NWCCC and WCCB, as well as steps to combat the illegal wildlife trade involving a variety of stakeholders at the field, central, and policy levels. Meanwhile, the government and other relevant parties celebrated that there had been no rhino poaching during this time. Furthermore, the SAARC countries were able to coordinate more easily for the establishment and formalization of the South Asia Wildlife Enforcement Network (SAWEN), which has its headquarters located in Nepal. Another significant achievement was the parliament's adoption of the CITES bill.

The government highlighted the impacts of climate change on threatened biodiversity and wildlife in it Sixteenth National Plan (GoN, 2024). "Protected Areas Management Strategy (2022 - 2030)" is a guiding document that aimed at safeguarding existing PAs and creating climate resilient ecosystems and self-sustaining PA management in Nepal by 2030. In 2022, GoN formulated a "Wildlife-Friendly Infrastructure Construction Directives" setting standards for wildlife-friendly infrastructure development. Similarly, DNPWC prepared a transboundary rescue operation guideline for Greater One-horned rhinoceros to rescue and protect individuals that flashed away during flooding and other reasons in the Indo-Nepal border areas. To maintain the health of wildlife, including megafauna, the government developed "National Wildlife Health Action Plan (2023-2032)" with a realization of the importance of one-health approach.

All of Nepal's rhino-bearing PAs participated in a comprehensive national rhino census in 2021, which reported a total of 752 rhinos. During 2016 and 2017, eight rhinos were translocated to the Babai Valley within BNP and five to ShNP as part of a plan agreed by the GoN to upscale the rhino numbers. The DNPWC has recently initiated internal translocation efforts aimed at managing densely populated areas within the CNP. A feasibility study in low density areas of the eastern section of CNP was undertaken.

In 2016, the government managed the stockpiling of wildlife parts as safeguard measures for wildlife. Provisions for the management of wildlife stockpiles were added to the National Parks and Wildlife Conservation Rules 1974 through an amendment. Furthermore, a protocol for managing stockpiles was authorized, and thorough inventories were carried out using barcoding. On International Biodiversity Day on May 22, 2017, the GoN arranged a symbolic assembly at CNP. More than 4,000 animal parts from 48 different species including 357 rhino horns and 67 tiger skins were burned to ash during this occasion. This event marked an important turning point in Nepal's conservation history, attended by ministers, government officials, security personnel, diplomatic representatives, members of civil society, local communities, media representatives, conservation agencies, and foreign non-governmental organizations.

Furthermore, the National Parks and Wildlife Conservation Act (1973) underwent its fifth amendment to align with Nepal's current constitution. As a goodwill gesture, the GoN decided to donate two pairs of rhinos to the People's Republic of China, aiming to contribute to the expansion of ex-situ rhino conservation efforts in the region.

A comprehensive evaluation of the progress made towards achieving these outputs is provided in Table 2.

**Table 2. Implementation status of the previous action plan 2017-2021**

| Rhino conservation actions | Not initiated | Partially achieved | Achieved | Key achievements |
|---|---|---|---|---|
| **1. Strengthen institutional capacity at national and local level to curb poaching and illegal trade of rhino** | | | | |
| Support frontline staffs for their mobility by supplying vehicles, bikes, bicycles, boats and rafts | | | | Field gears were provided to field staffs and rhino bearing Parks and security units have been equipped with vehicles, bikes, bicycles and boats for patrolling |
| Protection of rhinos and their habitat in priority areas outside PAs e.g., Gaidatar, Rautahat, Khata corridor etc | | | | |
| Support DFO staffs in rhino conservation initiatives in high priority areas outside PAs | | | | Reformation of institutional arrangements |
| Capacity building trainings and exposure visits to enforcement staff | | | | Training needs assessment undertaken followed by series of trainings for DNPWC staff, security personnel, and BZ communities |
| Skill based capacity building trainings to CBAPU members and youths involved in anti-poaching | | | | CBAPUs have been provided capacity building trainings at all the parks |
| Establishment of wildlife forensic and genetic lab to strengthen crime investigation | | | | |
| Support to CBAPUs for institutional building | | | | Provided support to mobilize Community-Based Anti-Poaching Units (CBAPUs) |
| Institutionalization of NTCC, WCCC, and SAWEN etc. (as per provision in the Act) | | | | |
| Institutionalizing WCCB both in center and at the field | | | | Establishment of WCCB units in all rhino bearing districts |

| Rhino conservation actions | Not initiated | Partially achieved | Achieved | Key achievements |
|---|---|---|---|---|
| Construction of new guard posts in strategic locations | | | | Rebuilding of guard posts damaged during a decade-long insurgency |
| Upgrade facilities in the existing guard posts | | | | |
| Community sensitization on wildlife enforcement | | | | Community people were sensitized about the consequences of involvement in poaching |
| Strengthen informant networks | | | | Established an informant networks consisting of key informants |
| Improve road network and access for effective patrolling and rhino security | | | | Road networks have been improved and efficient for patrolling |
| Standardize Android based SMART patrol and reporting system | | | | Launched android based smart patrolling in all the rhino bearing parks |
| Develop anti-poaching operational manual | | | | Anti-poaching operational manual developed |
| Networking with national and international enforcement agencies | | | | |
| Awareness and education at local level | | | | Various conservation awareness programs were organized targeting BZ institutions, tourism operators, forest and wetland dependent households, representatives of local etc. |
| **2. Minimize habitat loss, degradation and fragmentation** | | | | |
| Forest restoration in the identified priority catchments and BZs | | | | |
| Initiation to declare corridor of bottleneck nature after math of successful conservation initiatives | | | | |
| Grassland management focused to rhinos | | | | Few hectares of grasslands were managed in CNP, BNP and ShNP focusing on rhinos |
| Construction and maintenance of waterholes | | | | Additional Wetlands and Waterholes were created and existing wetlands maintained focusing on dry season |
| Fire management using the prescribed protocol | | | | |
| Develop livestock grazing management plan for BZs and critical forest corridors | | | | |

| Rhino conservation actions | Not initiated | Partially achieved | Achieved | Key achievements |
|---|---|---|---|---|
| Identify and designate appropriate sites for sand, stone and gravel extraction in the BZ | | | | The quantity of river materials have been estimated and mentioned in Park Management Plans together with the designated sites for extraction |
| Develop and implement national IAPS management strategy | | | | Still in a draft status that needs to be finalized soon |
| Prepare and implement forest encroachment evacuation and management plans for identified priority rhino habitats | | | | |
| Restore evacuated encroached rhino habitats | | | | Rhino habitats restored in Ramauli Pratappur at PNP |
| **3. Manage human rhino conflict through community engagements** | | | | |
| Establish and maintain power fences around the villages to reduce crop raiding by rhino | | | | |
| Establish long-term database on Human Rhino Conflict (HRC) and produce analytical reports to guide adaptive management like safe system approach | | | | Database maintained in scattered form |
| Educate locals on rhino behavior to avoid the risks of possible confrontation | | | | Few activities have been accomplished |
| Support alternative livelihood opportunities to prevent encounters with wild animals like rhino | | | | Livelihood improvement activities have been implemented such as skill-based training, off-season vegetable farming, support hybrid animals, bee keeping, operation of community home stays |
| Promote alternative crops in the rhino affected areas | | | | |
| Improve mechanism to extend relief support to rhino affected families instantly. | | | | |
| Special squad for strayed rhino rescue, protection and equipped with necessary equipment and logistics | | | | Rapid response team have been formed in all rhino bearing parks with limited logistical support |
| Establish orphanage or wildlife rescue center to manage problem rhino | | | | Orphanage and rescue centre for rhino has been in operation in CNP and BNP |
| Establish emergency fund for rescuing rhino in an emergency situation | | | | |

| Rhino conservation actions | Not initiated | Partially achieved | Achieved | Key achievements |
|---|---|---|---|---|
| Promote nature-based tourism to benefit the local communities | | | | Provided nature guide training to local people, support to establish home stays and construction of community culture centre |
| Support rhino affected families for education and livelihood | | | | Scholarships provided for the children of victim of rhino attack |
| Conduct trainings and exposures to local communities on rhino human co-existence | | | | Provided trainings and exposure visits for local people living close to rhino habitats |
| Strengthen BZ institutions to develop stewardship on rhino conservation | | | | Provided various institutional strengthening training to BZ institutions |
| Create community level relief funds | | | | |
| **4. Policy advocacy to safeguard prime rhino habitats from large infrastructure development and urbanization** | | | | |
| Conduct independent assessments on potential impacts of proposed large infrastructures on rhino and their key habitats | | | | |
| Develop national standards for wildlife friendly infrastructures | | | | Guidelines for wildlife friendly infrastructures development prepared and under implementation |
| Sensitize stakeholders at all levels on possible negative impacts of large infrastructures on rhino | | | | Advocacy, coordination and sensitization have been carried out regarding construction of wildlife friendly infrastructure in the PAs |
| Organize local, national and regional workshops to sensitize politicians, policy makers and donors on impacts of large infrastructures to wildlife conservation | | | | Sensitization workshops were conducted |
| Policy dialogue with politicians and high-level officials | | | | |
| **5. Strengthen support and cooperation for rhino conservation at national and international level** | | | | |
| Formalize the Memorandum of Understanding (MoU) on transboundary biodiversity conservation with India | | | | Memorandum of Understanding (MoU) regarding transboundary biodiversity conservation with India have been prepared |
| Organize periodic transboundary cooperation meeting with neighboring countries | | | | At least one meeting per anum has been conducted by all PAs |

| Rhino conservation actions | Not initiated | Partially achieved | Achieved | Key achievements |
|---|---|---|---|---|
| Organize field level transboundary meetings with Indian counterparts for rhino security across TAL in both countries | | | | Several field level meetings between India and Nepal across TAL organized |
| Initiate conservation programs complementary to each other | | | | |
| Share relevant information on conservation and illegal trade on wildlife | | | | Issues were shared with transboundary parties to minimize illegal trade on wildlife parts |
| Conduct exchange visits to share knowledge and technology | | | | Exchange visits have been done |
| Continue efforts to harness support from international community for rhino conservation | | | | |
| Conduct periodic coordination meetings, workshops, seminars and interactions at local and national level with key stakeholders | | | | Periodic coordination meetings were conducted at local and national level |
| Initiate for joint transboundary wildlife conservation efforts with India and China | | | | There were 1-2 annual dialogues between India and Nepal for transboundary issues |
| **6. Enhance research, monitoring and documentation** | | | | |
| Initiate research on ecology of rhinoceros focusing on skewed sex ratio in a population | | | | |
| Continue individual identity (ID) based rhinoceros including non-invasive genetic monitoring for small populations and population in low density areas | | | | ID based monitoring has been in operation in BNP. However, genetic monitoring for small populations is yet to be initiated |
| Continue periodic count of rhinoceros at 4 - 5 years interval | | | | Rhino count at every 4-5 years interval has been done |
| Continue research on rhino ecology and habitat dynamics | | | | Partially achieved, no such detailed study has been done |
| Keep surveillance on diseases and parasites on rhino and sympatric species | | | | Veterinary facilities in all the parks have been improved |
| Initiate research on potential adverse impacts of climate change on rhino and their habitats | | | | There are nine climate change adaptation strategies recommended by Pant et al. (2020a) |
| Research on disease prevalence on rhino e.g., Tuberculosis in rhino | | | | There are number of studies related to disease prevalence on rhino |

| Rhino conservation actions | Not initiated | Partially achieved | Achieved | Key achievements |
|---|---|---|---|---|
| Continue research on IAPS, their control and management | | | | |
| Document best practices and learning from the rhino conservation in Nepal | | | | Best practices during zero-poaching years were documented |
| Study on rhino-human conflict and possible mitigation measures | | | | Partially undertaken recommendation has been put forward towards detail and long-term studies |
| Engage academic institutions in rhino research and monitoring | | | | MOU between universities and DNPWC/NTNC signed |
| **7. Manage rhino populations in a meta-population approach** | | | | |
| Continue building on rhino population in BNP (at least 15) and ShNP (at least 10) | | | | 8 rhinos were translocated to BNP in 2017 |
| Regularly assess the sex ratio and age composition in different blocks and enrich them to enhance faster reproduction by moving male or female individuals from one site to another | | | | Age and sex ratio data obtained from rhino census but annual study yet to be done for each block |
| Feasibility study on rhino habitat suitability in KTWR | | | | Rhino habitat suitability studied and recommended for translocation |

## 4.2. Lessons learned

- Ensuring the preservation of existing rhino habitat, potential extension sites, and functional forest corridors is vital for securing large population and promoting gene flow across the landscape while safeguarding the long-term survival of the species.

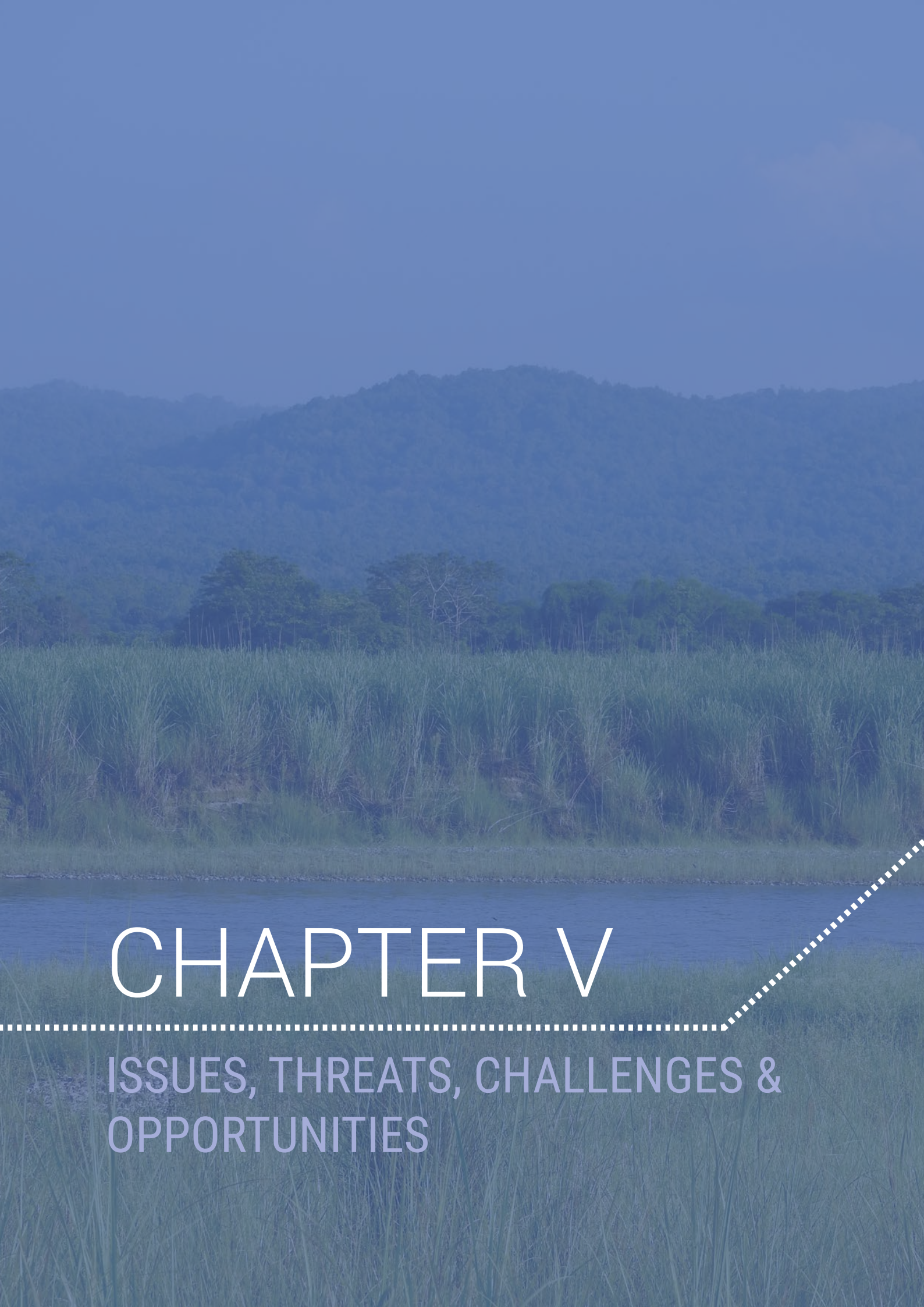
- Cooperation and collaboration among various stakeholders, along with careful conservation planning aimed at mitigating the adverse impacts of human activities on rhino populations, are important

- It is crucial to streamline the roles of communities, as well as local and provincial governments, through timely reforms in policies, laws, and institutions.

- Despite concerted efforts, the realization of management of orphan, injured, and strayed rhino was hindered by financial limitations. At least one rhino care and rewild center as a sanctuary model needs to be established in KTWR.

- Prioritizing available technology to assist in rhino and other wildlife conservation through upgrading administration, management, law enforcement, combating wildlife crime, research, and education is key.

- Encouraging the implementation of conflict mitigation strategies such as power (solar or electric) fences, mesh wire fences, trenches, providing education to local communities about rhinos and people's behavior, and promptly managing problematic wildlife are crucial steps in mitigating human-wildlife conflicts. As improved cooperation and collaboration among stakeholders have yielded more favorable outcomes recently, maintaining this approach remains crucial in reducing both wildlife crimes and human-wildlife conflicts.



# CHAPTER V

## ISSUES, THREATS, CHALLENGES & OPPORTUNITIES

# 5. ISSUES, THREATS, CHALLENGES & OPPORTUNITIES

## 5.1. Issues

### 1. Rhino habitats

- Habitat degradation is being driven by the invasion of IAPS, notably including *Mikania micrantha, Chromolaena odorata, Lantana camera*, *Cymbopogon jwarancusa* and *Parthenium hysterophorus*.
- Habitat fragmentation occurs alongside the disruption of corridors, mainly due to linear infrastructures such as roads and irrigation canals, as well as human encroachment.
- Unsustainable and/or illegal extraction of floodplain resources (boulders, gravel, and sand).
- Livestock overgrazing in the core areas (ShNP, PNP), buffer zone forests and critical corridors.
- Wetland areas, including ox-bow lakes, are experiencing desiccation and encroachment by IAPS, like Waterhyacinth and water cabbage..
- Proliferation of woody perennials in grasslands/grazing lawns of PA and corridors.
- High anthropogenic pressure in buffer zone forests and critical corridors.
- Solid waste pollution, particularly non-biodegradable materials such as plastics, in the habitats of rhino.
- Habitat alternation due to climate change.

### 2. Wildlife crime

- Inadequate network of law enforcement agencies operating at the local, district, provincial, and central levels.

- Increasing demand for rhino body parts on the international black market.
- Inadequately resourced anti-poaching units, coupled with a limited network for information gathering and intelligence.
- Challenges in mapping crime zones and collecting evidences from the forested areas.
- Difficulties in forensic investigation due to lack of reliable forensic laboratories.
- Inadequate security measures outside PAs, particularly along ecological corridors.
- Insufficient resources to park staff and WCCB units.
- Insufficient monitoring in public rights-of-way areas for the community people.
- Highly porous international borders presenting significant challenges for effective wildlife protection and crime control measures.
- Inadequate coordination with provincial governments and local levels.
- Weak surveillance at airports, customs, and international borders.

### 3. Human-rhino conflicts

- Occasional human casualties from rhinos.
- Lengthy relief fund delivery process to wildlife victims.

- Insufficient livelihood support programs for wildlife victims and their families.
- Low public understanding of rhino behavior and appropriate safety measures.
- Local community dependence on gathering forest resources within rhino habitat buffer zones and ecological corridors.
- Encounters with rhino while trespassing through their habitats.
- Irrational perceptions, knowledge gaps, and varied human behaviors towards rhinos.
- Lack of ownership of provincial as well as local governments in overall conservation initiatives of rhinos and other co-existing wildlife species.
- Low priority in addressing human-rhino conflicts.

### 4. Knowledge concerns

- Scattered data and poor understanding of rhino ecology, behaviour, demographic trends, and population dynamics to stakeholders beyond PA.
- Inadequate knowledge of the ecological role of PAs, adjoining forests and connecting corridors.
- Weak integration of scientific findings into rhino conservation policies.
- Limited involvement of researchers from academia.
- Poor understanding on human-induced impacts on rhino and their habitats.
- Limited national capabilities in forensic science and wildlife disease management.
- Inadequate insight on future climate change scenario and its potential adverse impact on rhinoceros and their habitats.

### 5. National, international and trans-boundary cooperation

- Persistent poaching and illegal wildlife trafficking across Nepal-India and Nepal-China borders.
- Irregular and insufficient high-level consultative meetings, particularly with China.

- Lack of formal intelligence and information sharing mechanism among neighboring nations.
- Inadequate collaboration and support among development agencies and conservation organizations, especially regarding the implementation of wildlife-friendly infrastructure construction directives 2023.

## 5.2. Challenges

### 5.2.1 Invasive species

- Disturbances such as fire, annual flooding, and human-mediated dispersal exacerbate the spread of invasive species like *Mikania, Lantana* and *Chromolaena* have expanded throughout all rhino-inhabited PAs (Lahkar et al., 2011).
- IAPS such as *Mikania micrantha, Lantana camera, Parthenium hysterophorus, and Chromolaena odorata* have extensively replaced native food plants, leading to a reduction in food availability.
- *Lantana,* a woody perennial invasive species, rapidly colonizes various habitats including alluvial soils, open grasslands, and forest ecosystems, posing significant challenges to native plant communities and endangered species.
- *Chromolaena* thrives in nearly all environments and hinders the growth of native vegetation (Subedi, 2012).
- The widespread presence of invasive species such as Water hyacinth (*Eichhornia crassipes*) and southern cut-grass (*Leersia hexandra*) in lowland lakes and oxbow lakes promotes sedimentation, contributing to the desiccation of wetlands and affecting critical habitats for endangered species like rhinos.

### 5.2.2 Human-rhino coexistence

- As rhino populations continue to expand, the incidence of human-wildlife conflicts is expected to intensify both within and outside PA boundaries, extending into BZ community forests and further exacerbating societal tensions in Nepal.
- Safeguarding large herbivores such as rhinos in human-dominated environments has become progressively demanding and substantial conflicts arise with local communities due to crop damage, resulting in human injuries and fatalities.
- Recent initiatives to alleviate human-wildlife conflicts, such as grassland management within PAs, implementation of solar-powered fences, and digging trenches, have demonstrated effectiveness in specific hotspot regions like Chitwan, Bardia, and the connecting corridors between them. However, according to the records of DNPWC, approximately 80% of rhino encounters with humans resulted in injury and 20% of death between 2017 and 2022.
- Incidents of retaliatory killing through poisoning and electrocution have been reported sporadically. Over the past several years, rhino deaths due to poisoning and electrocution have increased significantly (Figure 7).

### 5.2.3 Small populations

- Small populations are prone to endangerment or extirpation, prompting the initiation of conservation efforts, e.g., in Bardia and Shuklaphanta, rhino populations are notably small ($\leq$ 40 individuals in Bardia and $\leq$ 20 in Shuklaphanta), rendering them particularly susceptible to these challenges. International Union for Conservation of Nature's (IUCN) recommendation of a minimum of 50 individuals for the establishment of a viable population.
- The population habitat viability assessment (PHVA) of rhino indicate that continuous low-level poaching raises the likelihood of extirpation compared to sporadic high-level poaching incidents (Molur et al., 1995; Subedi et al., 2017).

### 5.2.4 Population management

- Managing small rhino populations requires a strategic approach to address potential threats like demographic shifts, climatic and non-climatic disasters, epidemic diseases, and genetic risks. These factors could greatly influence the long-term viability of the species.
- Relocating rhinos from a densely populated group nearer to its carrying capacity (e.g., in CNP) will be essential to sustain the smaller population above the minimum threshold of 50 individuals in BNP and ShNP, while also ensuring that the rhino population in CNP remains at its maximum level (Subedi et al., 2017).

### 5.2.5 Climate change and natural disasters

- Climate change-induced extreme weather events such as flash floods, prolonged droughts, and forest fires are expected to escalate in the foreseeable future, posing significant challenges to biodiversity conservation. Climate change is increasingly recognized as a significant challenge to biodiversity (Pant et al., 2022).
- Climate change could lead to significant transformations or alterations in wetlands, grasslands, and forest types, as well as their species compositions (Pant et al., 2021), Similarly, it can pose a threat to rhino during dry seasons due to water scarcity, potentially resulting in conflicts that cause harm and damage.
- Besides, climate change can cause significant spread of IAPS in those transitional areas. Consequently, discussions about climate-smart conservation strategies have intensified in recent years.
- Specific data on the direct effects of climate change on wildlife species within the country are scarce, it is crucial to conduct ongoing research and monitoring to assess the potential adverse impacts of climate change and other non-climatic disasters.
- The consequences can undergo well beyond the subsiding floodwaters, as grazing areas become buried under sand deposits and water sources are filled with mud (Adhikari & Shah, 2020; Pant et al., 2022).
- In Pant et al. (2020a), 21 vulnerability indicators were formulated to evaluate the susceptibility of rhinoceros to climate change in Nepal. The findings suggest that rhino in Nepal is anticipated to be moderately vulnerable to the consequences of climate change. This vulnerability is primarily attributed to the potential presence of IAPS and the occurrence of severe floods in its prime habitats of CNP.

### 5.2.6 Upstream development activities

- Heavy load of stone, sand and gravel in the downstream during flooding season due to mismanaged developmental activities in the upstream.
- Floodplain grasslands and riverine forests, notably in the eastern region of CNP, are experiencing degradation caused by the accumulation of boulders, silt, and sediment.
- Notably, 33% of the wetlands in CNP have desiccated due to silt accumulation and the natural progression of vegetation (DNPWC, 2021).

### 5.2.7 Other challenges

- In addition to natural mortality and poaching, other significant factors contributing to rhino fatalities in Nepal include electrocution, old age, tiger attacks, illness, flooding, conflicts and retaliatory killing, self-inflicted injuries and unidentified factors (8%).
- Research indicates that the incidence of rhino deaths surged between 2008 and 2018, predominantly driven by non-poaching incidents (Bhandari et al., 2022).

## 5.3. Threats

### 5.3.1 Habitat loss, fragmentation and degradation

- Presently, certain forest patches within buffer zones and forest corridors are experiencing significant encroachment which include Khata, Karnali, Mohana-Laljhadi, and Basanta forest corridors in the western TAL, as well as the Bandarjhula area of the buffer zone, where extensive forest lands have been illegally transformed into settlements and agricultural fields.
- The dykes and embankments constructed along the riverbanks between Lothar and Kumroj in Chitwan are designed to channelize Rapti river and to prevent the floodwater onto the agriculture land or settlements behind the dykes. However, they also confine the movement of rhinos in the region, as noted by Subedi et al. (2013). Similar dykes and embankments have been planned in Narayani river as well.
- The natural meandering of rivers and the inundation of floodplain areas play a crucial role in maintaining *Saccharum spontenum*-dominated tall grasslands and forming oxbow lakes, both of which are vital for rhino conservation (Dinerstein, 2003).
- It is important to note that habitat fragmentation limits the ability of new individuals to disperse, which may eventually cause inbreeding depression. As a result, habitat loss, degradation, and fragmentation threaten megafauna like tigers, elephants, and rhinoceroses not only to survive but also to grow.

### 5.3.2 Rhino poaching and illegal trade

- Poaching and illicit trafficking of rhino horn remain significant threats to their conservation across habitats, including Chitwan where between 1998 and 2023, there were 633 recorded rhino deaths with poaching accounting for nearly one-third (31%) of these mortalities.
- Poaching causes the highest number of deaths of rhinos in Nepal (Acharya et al., 2016; Bhandari et al., 2022) while poaching-related deaths varied from year to year depending upon security level, mortality rates due to other causes remained relatively constant during the same period (see Figure 7).
- Considering the global context of rhino poaching and illicit trade, coupled with Nepal's historical encounters, there remains

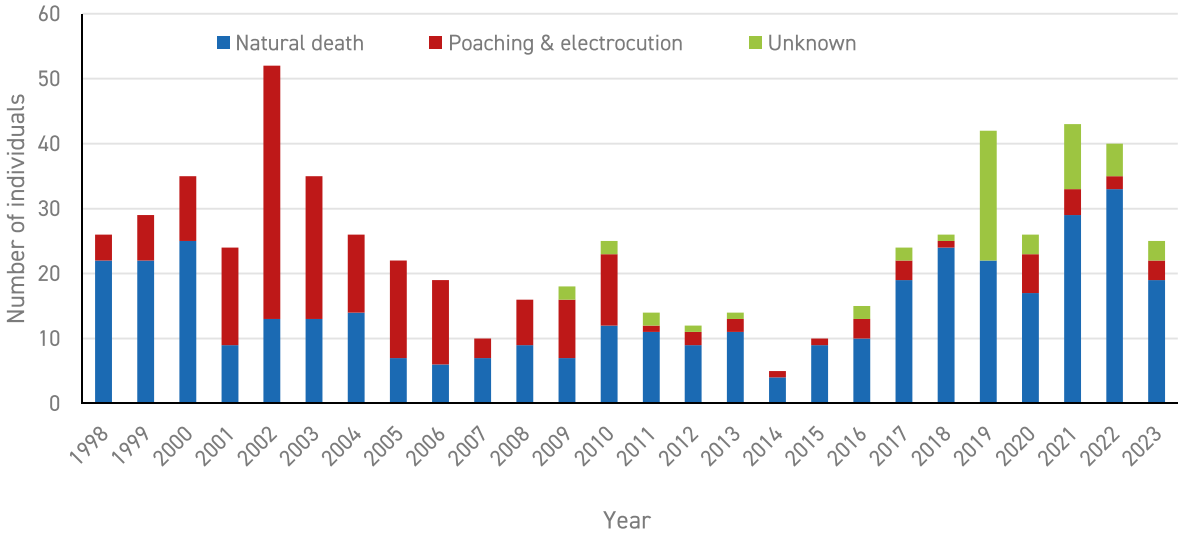



*Figure 7: Mortality trends of rhino (Rhinoceros unicornis) caused by poaching/electrocution, natural death and unknown reasons in Chitwan between 1998 and 2023.*

an impending potential for a resurgence in poaching, despite current control efforts in Nepal. Consequently, the poaching and trafficking of rhino horns are recognized as significant threats to the species, warranting the highest priority for combating wildlife crime both within Nepal and internationally.

### 5.3.3 Diseases

- Wildlife diseases have become a serious threat to rhinos, and they can also have an adverse influence on cattle and human health. (Pant et al., 2020b; Paudel et al., 2022; Peters et al., 2020; Thapa et al., 2017).
- Examining animal diseases in Nepal is crucial given the rise of diseases like tuberculosis among captive elephants and rhinos out in the wild (Peters et al., 2020).
- Prevalence of gastrointestinal parasites is also the great threat to rhino (Dhakal et al., 2022). For example, a worldwide conference on wildlife, human, and livestock health came together in Sauraha, CNP, early in 2016 to discuss strategies for dealing with diseases that affect wildlife. The 2016 conference on one health held in Chitwan proposed several key steps to tackle one health issues by capacitating frontline vet team through education and training.
- It is also a great challenge to the Government of Nepal to implement "National Wildlife Health Action Plan (2023-2032) for promoting one health approach and in a new era of treating wildlife health as a priority action (DNPWC, 2023).
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- It is also a great challenge to the Government of Nepal to implement "National Wildlife Health Action Plan (2023-2032) for promoting one health approach and in a new era of treating wildlife health as a priority action (DNPWC, 2023).

### 5.3.4 Pollution

- The uptake of plastic by rhinos poses an emerging risk to their well-being and persistence. The primary causes of plastic consumption by rhino in CNP are attributed to the presence of plastic waste within the park and the provisioning of food by tourists and local communities. For example, a recent study conducted by (Awasthi et al., 2023) has further examined and measured the presence of plastic in dung samples obtained from rhinos inhabiting floodplain grasslands and riverine forests across both the core (deep within the park) and fringe (bordering the park) zones of the park.
- The impacts of harmful cyanobacterial blooms in wetland habitat of rhino are increasing due to climate change and high levels of eutrophication in freshwater sources.
- Pesticide poisoning in the croplands adjacent to rhino bearing protected areas.
- The presence of unidentified factors contributing to rhino mortality highlights potential hidden challenges facing endangered species in Nepal (Figure 6).

### 5.3.5 Impact of linear infrastructure

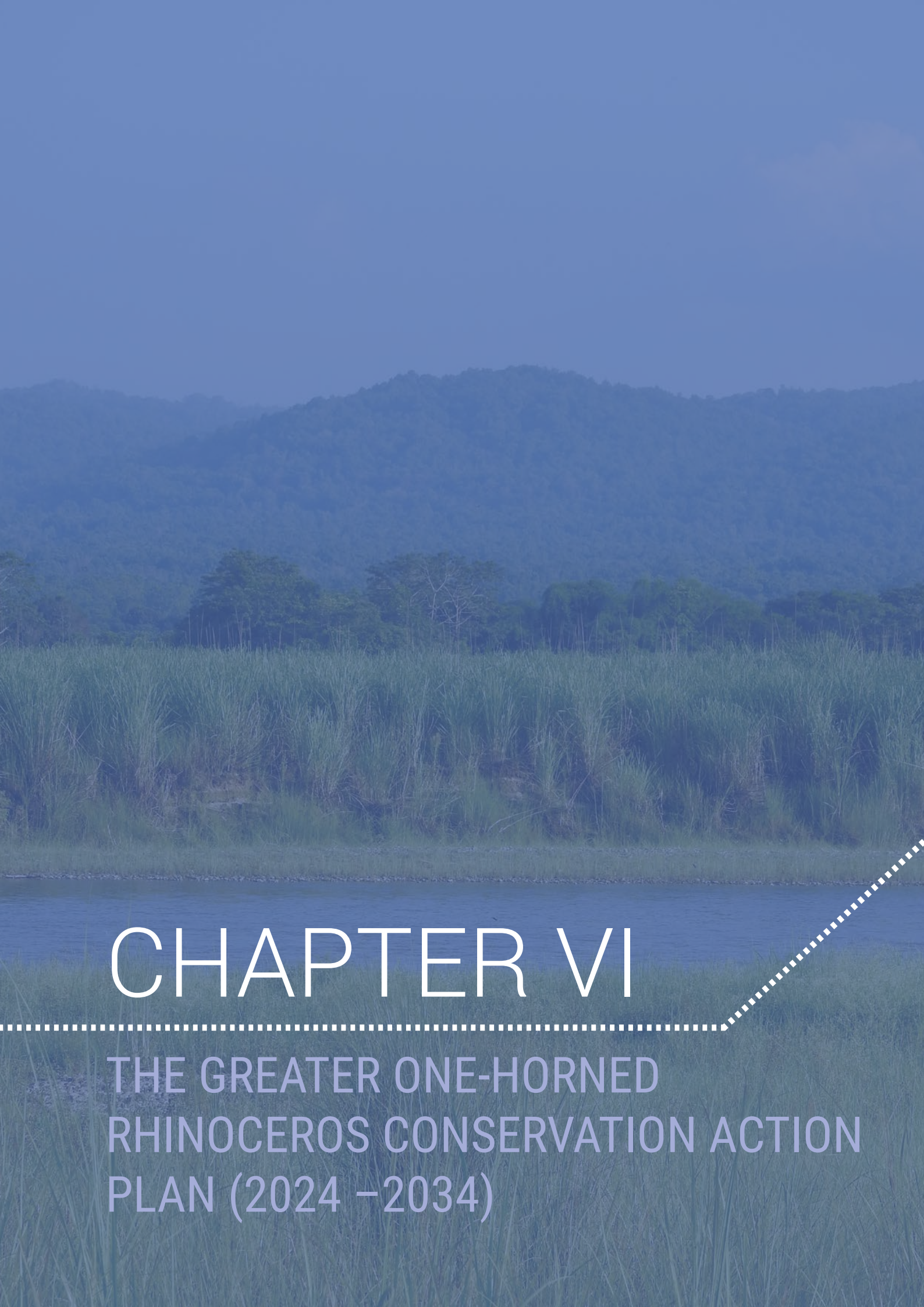
- Existing and proposed linear infrastructure projects like highways, railways, power lines, and large-scale irrigation systems can have significant negative impacts on wildlife habitats, particularly in core areas such as BNP and ShNP, critical dispersal corridors

including Barandabhar, Kamdi, and Karnali. These developments can fragment habitats and hinder the movement of endangered species like rhinos, posing challenges for their conservation and survival.

- The planned Karnali high dam and ongoing projects like the Bheri-Babai diversion and Rani Jamara irrigation are anticipated to affect rhino populations in Bardia.
- Similarly, advancement of two roads mainly Kasara-Madi-Bankatta in CNP and Bhurigaon-Telpani may result in irreversible damage.

## 5.4. Opportunities

- As keystone species, rhinos play a crucial role in shaping their habitats through activities such as digging wallows, creating paths, and grazing, which provide benefits for various other species and help maintain ecological balance and habitat functionality.
- Rhinos are often regarded as flagship species for ecotourism, attracting visitors to PAs and generating revenue for local communities and support livelihoods of the forest dependent households.
- It holds cultural significance in many societies and are often revered as symbols of strength, resilience, and nature's beauty.
- Conserving keystone species like rhinos also create ample opportunities for substantial funding support that also boosts the conservation of entire species and ecosystems.
- The rhino conservation provides opportunities for safeguarding and creating numerous ecosystem services, including water replenishment, clean air, carbon storage, and mitigation of disaster risks.
- Rhinos are vital for ecotourism, attracting visitors to PAs and generating revenue for local communities.



# CHAPTER VI

## THE GREATER ONE-HORNED RHINOCEROS CONSERVATION ACTION PLAN (2024 –2034)

# 6. THE GREATER ONE-HORNED RHINOCEROS CONSERVATION ACTION PLAN (2024 – 2034)

## 6.1. Goal

The goal of this action plan is to establish three viable populations of rhino in Chitwan, Bardia and Shuklaphanta National parks using a socio-ecological and One Health approach that promotes human-rhino coexistence for long-term conservation success.

## 6.2. Objectives

In response to the rise in rhino poaching between 2000 and 2005, despite the end of armed conflict, the Government of Nepal (GoN) established an inter-agency mechanism by implementing institutional reforms through a well-coordinated integrated security system with modern technology. Institutional set up is very important to control wildlife crime related activities. serves as the central institution to coordinate efforts with key stakeholders such as Nepal Army, Nepal Police, CIB, and local to central level non-governmental organizations in controlling wildlife crime activities. Field-level institutions or rhino bearing Protected Areas play a vital role in this regard; however, there is an insufficient human resource and focused staff dedicated to addressing wildlife crime-related issues. As a result, the NTCC was established under the chairmanship of the Prime Minister and the WCCCC came into existence under the Ministry for Forests and Environment. At the central level, the WCCB was formed under the Director General of DNPWC, consisting officials from various national security agencies and experts to combat wildlife crimes in Nepal. District-level WCCB units were also established, and the Nepal Police created a special cell with CIB to deal specifically with wildlife crime issues. Other law enforcement agencies collaborated closely with DNPWC to effectively address wildlife crimes across the country.

Furthermore, over 500 CBAPUs were established with more than 4,500 youth mobilized across strategic locations to deter illegal activities in and around PAs. The Nepal Army took on a principal role in protection efforts within PAs, boosting patrolling activities using an Android-based real-time SMART Patrol system and installing CCTV cameras in rhino habitats. Sniffer dogs underwent training and were deployed by CNP to deter wildlife crime, significantly enhancing rhino security both within and outside PAs. The Action Plan aims to reinforce ongoing efforts and develop national capabilities to address not only rhino poaching but also other wildlife-related crimes and the illicit trade of their body parts for long-term conservation success.

## Output and Actions of Objective 1

| Outputs | Actions | |
|---|---|---|
| (A) Develop relevant legislation, procedures, and guidelines for institutional strengthening and law enforcement | A1. | Implement Illegal Wildlife Trade and Poaching Control Strategic Plan for Nepal (2023-2030) for rhino-inhabited PAs and the corresponding DFOs. |
| | A2. | Develop protocols to evaluate the security situation of PAs. |
| | A3. | Undertake periodic security assessments according to the protocols. |
| | A4. | Conduct meetings to formalize the WCCB at all tiers of central, provincial and district levels. |
| | A5. | Carry out training programs to enhance the capacity for implementing CITES regulations across all administrative levels. |
| | A5 | Prepare plan for creating joint patrolling system in the leadership of Nepal Army with Nepal Police and Forest Guards. |
| | A6 | Prepare plan for the rhino conservation and management in Khata Corridor and DFO areas during night. |
| (B) Capacity development of law enforcement institutions | B1. | Provide assistance to frontline personnel for their transportation needs by supplying vehicles, motorcycles, bicycles, boats, and rafts. |
| | B2. | Study and construct forest road and fire line in Chure area of all the rhino bearing PAs to facilitate efficient patrolling. |
| | B3. | Provide support to set up a wildlife forensic and genetic laboratory to bolster crime investigation capabilities. |
| | B4. | Outbuild capacity for Long Range Patrol (LRP), Medium Range patrol (MRP), Short Range Patrol (SRP), Maha hunt, joint patrolling, sweeping operation, camping and ambush, in all the PAs. |
| | B5. | Support and mobilize CBAPUs in all the PAs. |
| | B6. | Provide support to procure information through informant networks. |
| | B7. | Support informant networks to strengthen their intelligence gathering skills. |
| | B8. | Support CFUGs outside of the PAs to safeguard rhino populations. |
| | B9. | Provide logistical support to DFOs to operate rhino conservation activities. |
| | B10. | Organize training on wildlife crime, forensic techniques, and crime scene investigation to the staffs and PAs and DFOs. |
| | B11. | Support PAs and DFOs to construct additional guard posts at strategic locations covering the gap areas. |
| | B12. | Provide support to upgrade minimum facilities in the existing guard posts. |
| | B13 | Repair and maintain existing forest roads and fire lines to facilitate efficient patrolling. |
| | B14 | Provide support to establish community based anti-poaching units in all the rhino bearing PAs including DFOs. |

| Outputs | Actions | |
|---|---|---|
| (C) Incorporate new and appropriate technology for wildlife crime control | C1. | Install GSM-enabled closed-circuit television (CCTV) cameras in sensitive areas. |
| | C2. | Install spy camera at sensitive location including in the right of ways for the public. |
| | C3. | Repair and maintain (CCTV) cameras in regular interval. |
| | C4. | Undertake android-based Real-Time SMART patrolling system in all the PAs. |
| | C5. | Recruit Remote Sensing and GIS experts in DNPWC to apply Geo-information Science in rhino conservation. |
| | C6. | Procure satellite images, updated digital layers, GPS to support application of GIS and Remote Sensing in rhino conservation. |
| | | Procure unmanned aerial vehicles (Drones) to conduct aerial surveys, track poachers, and monitor rhino populations. |
| | C7 | Provide training on Artificial Intelligence (AI)- Using AI algorithms to analyze large datasets, identify patterns, and predict potential poaching activities. |
| | C8. | Develop mobile applications for reporting and monitoring wildlife crime, encouraging public participation and awareness. |
| (D) Participatory wildlife crime control programs: Local, National, and International | D1. | Provide support to strengthen community sensitization, informant networks and educate school students about wildlife crime. |
| | D2. | Conduct workshops and trainings to enhance skills on community based anti-poaching operations for the CBAPU members. |
| | D3. | Mobilize CBAPUs under each BZUCs. |
| | D4. | Prepare a manual for anti-poaching operations. |
| | D5. | Hold frequent meetings for WCCCC, and WCCB. |
| | D5. | Establish, strengthen and institutionalize WCCB throughout the country. |
| | D6. | Undertake networking coordination among domestic and international enforcement agencies. |
| | D7. | Conduct a half-yearly interaction program among park staff, protection units, CBAPUs including all possible stakeholders. |

## Objective 2: Manage rhino populations

**Rationale**

The Greater One-horned rhino, classified as a vulnerable species, faces threats such as habitat loss, poaching for their horns, and other human-induced issues. To ensure the long-term survival of these populations, biological management strategies are essential to avoid overcrowding and inbreeding while promoting population growth and viability. Biological management involves monitoring rhino populations at a meta-population scale rather than focusing solely on individual populations, with the objective of achieving demographic and genetic goals at organizational, national, regional, or subspecies levels.

In the context of rhino conservation, the primary focus is to manage the animals, their habitats, and competing species to maintain a meta-population growth rate of at least 5% annually. This approach

aims to safeguard both the demographic health and genetic integrity of the Greater One-horned rhinoceros populations. Simultaneously, there is a commitment to safeguarding the long-term genetic health by addressing inbreeding depression and minimizing genetic drift. In the instance of CNP, western part especially the Sukibhar area has overstocked rhino numbers with 141 animals in a small area of 5.713 km², while the eastern sector is understocked (DNPWC, 2016, 2021). The populations in ShNP and BNP are comparatively smaller and require restocking to achieve the desired outcomes. In current situation, there is possibility to restock 100 plus individuals in BNP and 50 in ShNP. It is also important to extend feasibility study of KTWR and southern/ eastern part of PNP for the establishment of new population of rhinos in the eastern and central Nepal.

Managing populations of Greater One-horned rhinos includes creating plans for injured animals and orphaned calves, with the ultimate goal of reintroducing them into their natural habitat. Orphaned calves can result from various reasons such as poaching incidents or the natural death of their mothers. Straying rhinos may also be found in human settlements, farmlands, and forest patches far from PAs, making them highly vulnerable to poaching. To ensure their survival during these critical periods, it is crucial for conservation authorities to develop a well-organized management plan.

Rescuing and rewilding strayed, injured, or orphaned calves can contribute significantly to increasing the rhino population numbers, creating new tourism sites, and maintaining genetic diversity through a meta-population approach. Managing these animals in a specific site with a wild environment provides an opportunity for conducting research and gathering valuable data on rhino behavior, health, and ecology. Developing a 'Rhino Sanctuary' in KTWR can be a potential solution to address the needs of injured animals, orphaned calves, and strayed individuals.

## Output and Actions of Objective 2

| Outputs | Actions | |
|---|---|---|
| (A) Manage large population in CNP | A1. | Conduct study to analyze population dynamics of rhino in CNP. |
| | A2. | Monitor and maintain age and sex ratio distribution within various blocks of PAs periodically. |
| | A3. | Monitor rhino distribution in different parts of CNP in yearly basis. |
| | A4 | Translocate rhinos from densely populated western part to eastern part of CNP. |
| | A5 | Monitor and secure dispersed rhinos in corridor and DFO areas. |
| (B) Maintain minimum viable population in Shuklaphanta/ Bardia/ Parsa National Parks | B1. | Undertake feasibility study on rhino habitat suitability in south eastern part of PNP and ShNP . |
| | B2. | Study minimum viable population requirements and translocate rhinos from CNP to BNP and ShNP. |
| | B3. | Study and translocate rhinos to southern part of CNP-PNP complex, e.g., Sikaribas, Ramauli-Pratapur, Rambhori and Bhata area of PNP. |
| | B4. | Study and translocate rhinos from south-western part of Valmiki area and southern part of CNP-PNP complex to secure rhino population. |

| Outputs | Actions | |
|---|---|---|
| (C) Maintain healthy population of rhinos | C1. | Conduct study on the overstocking problems (e.g., self-inflicted deaths, diseases) of rhinos in the western part of CNP. |
| | C2. | Provide support to central veterinary laboratory to enhance its capabilities in detecting parasites, viral and bacterial diseases on wildlife. |
| | C3. | Provide wildlife health training to veterinary personnel including medication and treatment during rescue, safely handling and restraining animals. |
| | C4. | Carry out regular vaccination programs for livestock in the peripheral regions of rhino habitats to mitigate the transmission of diseases between rhinoceros and domestic animals. |
| (D) Manage orphaned, injured and strayed rhinos | D1 | Prepare a strategic plan and guidelines for orphaned calf, injured and strayed rhino management. |
| | D2 | Train staff and volunteers to identify, capture, transport, and release protocols for orphaned, injured and strayed rhinos. |
| | D3 | Provide a safe and comfortable shelter with adequate supplement food in rhino bearing PAs. |
| | D4 | Support to establish Rhino Emergency Rescue Fund in collaboration with relevant stakeholders including private donors. |
| | D5 | Provide support to implement "Adopt a Rhino" program to support orphaned and injured individuals. |
| | D6 | Prepare operational guidelines with required budget for Rhino Sanctuary. |
| | D7 | Collaborate with local, provincial, and federal government, wildlife conservation organizations, and experts to establish and implement Rhino Sanctuary. |
| | D8 | Develop a 'Rhino Sanctuary' in a suitable site of KTWR. |
| | D9 | Support Rhino Sanctuary with human resource, wildlife ambulance, veterinary facilities, etc. |

## Objective 3: Secure rhino habitats

**Rationale**

The ongoing loss of prime rhino habitats due to infrastructure development, human encroachment, biological invasion, climate change and agriculture remains a significant concern. Habitat degradation within core areas such as the drying of wetlands, pollution in major rivers (e.g., Narayani, Karnali), encroachment by IAPS in critical rhino habitats, and natural succession, continues to exert pressure on rhino populations. Additionally, habitat fragmentation caused by existing infrastructure like highways and irrigation canals poses a significant threat to rhino conservation in Nepal, as indicated in the studies by Talukdar (2014) and Thapa et al. (2013). There are multiple threats to the rhinoceros species, one of which is the shrinking and fragmentation of their natural habitats into isolated patches. The activities outlined in the conservation action plan are aimed at addressing these challenges. Currently, there are major infrastructure projects such as Karnali high dam, Bheri-Babai River diversion, extensive irrigation canals, highways, and railway lines that are ongoing throughout Nepal. Therefore these infrastructures must be developed with environmental considerations that will reduce their negative influences on rhino and their habitat conservation (DNPWC, 2022b). Thus, the rhino conservation action plan outlines specific activities aimed at mitigating the adverse impacts of growing threats.

## Output and Actions of Objective 3

| Outputs | Actions | |
|---|---|---|
| (A) Develop strategic plans and policies to minimize degradation, loss and fragmentation of rhino habitat | A1. | Assess suitability of rhino habitat by identifying land use and land cover changes considering present and future climate scenarios for all PAs. |
| | A2. | Study the functionality of existing corridors and connectivity. |
| | A3. | Identify prospective potential rhino habitats as well as new corridors within PAs. |
| | A4. | Undertake studies to assess the effectiveness of 'Wildlife-friendly Infrastructure Construction Directives 2022' and policies, strategies, plans and guidelines related to rhino conservation. |
| | A5. | Undertake study to control IAPS with special focus on rhino habitat. |
| | A6. | Carry out study to control grazing in the BZCF and in the biological corridors. |
| | A7. | Revise and implement IAPS Management Strategy and provide sustainable solutions. |
| | A8. | Establish experimental plots at CNP to monitor grasslands and prescribe appropriate grassland management intervention for rhino. |
| | A9. | Evacuate encroachment of rhino habitats from Bhiman in PNP, Bandarjhula of CNP and encroachment of ShNP including the biological corridors. |
| | A10 | Implement activities prescribed in the Environment Management Plan as mitigation measures recommended in the Environmental Impact Assessment (EIA) and Initial Environmental Examination (IEE) reports. |
| (B) Rehabilitated the degraded rhino habitat within core areas, buffer zones, and corridors | B1. | Carry out plantation in the upstream to conserve soil and water. |
| | B2. | Undertake bio-engineer activities in the upstream Churia region and prevent soil erosion. |
| | B3. | Coordinate with the federal Government to resettle the settlements from critical rhino habitats including eastern/ southern part of CNP (e.g., Shikaribas) and lowland regions of PNP. |
| | B4. | Provide compensation for the HHs whose house and land are shifted to secure rhino habitats. |
| | B5. | Undertake habitat restoration activities in the old settlement areas/sites. |
| | B6. | Provide support to livelihood improvement activities for the HHs who have been shifted from the potential rhino habitat or biological corridors. |
| | B7. | Undertake awareness activities through radio, FM, television and social media to control forest fire during windy season. |
| | B8. | Recruit forest fire watchers for three months to monitor the forest against forest fire. |
| | B 9 | Support CFUGs in the biological corridors to empower nature-based tourism. |

| Outputs | Actions | |
|---|---|---|
| (C) Securing wetlands | C1. | Undertake inventory, mapping of critical wetlands in all the rhino bearing PAs. |
| | C2. | Construct reservoir/waterhole/ponds in dry areas near grasslands of eastern part of CNP, BNP and PNP by using Chure stream water during high flow season. |
| | C3. | Repair and maintain existing wetlands and waterholes in PNP, CNP, BNP and ShNP. |
| | C4. | Install additional solar water pumps to replenish the water holes and upkeep existing waterholes. |
| | C5. | Prepare a strategic plan for regular water supply in Geruwa River. |
| | C6. | Open a channel for securing water in the Geruwa river. |
| | C7. | Clear and clean weeds and IAPS from wetlands and reintroduce indigenous palatable wetland plants. |
| | C8. | Conduct regular monitoring of wetlands and waterholes to assess the water quality (e.g., pollution situation, microbial activity and poisoning). |
| | C9. | Monitor agricultural lands against use of harmful pesticides in buffer zones of all the PAs and declare rhino safe zone. |
| | C10. | Provide support to empower communities in buffer zones to proficiently oversee waterways, riparian areas, and ponds. |
| | C11 | Collaborate with communities and local authorities to undertake the restoration and management of wetlands within corridors and other possible rhino habitats. |
| | C12 | Study, plan and develop climate refugia sites (e.g., raised mounts) during flash flood. |
| | C13 | Carry out a thorough inventory on PA occupied Chure range. |
| | C14 | Clear Chure stream beds for regular water flow to secure water in PNP, CNP and BNP. |
| | C15 | Conduct spatial mapping of flood-prone zones and prepare maps. |
| | C16 | Carry out study of environmental flow of river systems of rhino bearing PAs. |
| | C17 | Conduct study towards changes in hydrological patterns to assess impact of fluvial action in the floodplain ecosystem. |
| | C18 | Prepare comprehensive Chure upstream conservation plan of CNP, BNP, PNP and ShNP to secure water and maintain for regular water flow. |
| | C19 | Revise and implement strategy for river base habitats to safeguard from degradation and pollution (e.g., plastic pollution in Narayani River). |

| Outputs | Actions | |
|---|---|---|
| (D) Grassland managed and restored | D1. | Undertake inventory and spatial mapping of grasslands in all the rhino bearing PAs. |
| | D2. | Conduct spatial mapping of forest fire incidents and prepare maps. |
| | D3. | Carry out mapping of IAPS affecting rhino population. |
| | D4 | Conduct a thorough study on the impact of grassland management and IAPS control interventions. |
| | D5. | Undertake study to assess impact of burning on grassland specific species. |
| | D6. | Conduct study to assess impact of IAPS in native rhino food plant and its impact on rhino health. |
| | D7 | Carry out studies aimed at comprehending vegetation dynamics to assess changes in plant structure in different habitats. |
| | D8 | Create new grasslands by converting wood lands into grasslands. |
| | D9 | Manage grasslands by manual cutting, mechanical cutting and control burning focused to rhino conservation. |
| | D10 | Treat the IAPS by burning, cleaning, uprooting. |
| | D11 | Support livestock husbandry HHs by providing improved grass seed to produce grass in the farm. |
| | D12 | Provide support to stallfeeding to domesticated livestock. |
| | D13 | Implement activities to restore Old Padampur area that mimic with savanna as 'Padampur Phanta'. |
| (E) Mitigated the impacts of linear infrastructures on major habitats of rhino | E1. | Undertake independent assessments to evaluate the potential impacts of proposed large linear infrastructures on rhino populations and their essential habitats. |
| | E2. | Conduct regular meeting with Department of Roads, Irrigation and Railways; international financial institutions and private sector to comply to follow the Wildlife-friendly Infrastructure Construction Directives 2022'. |
| | E3. | Carry out field work with respect to provide field study report with respect to environment studies. |
| | E4. | Form strong lobby against the linear infrastructure that is supposed to fragment the rhino habitat. |
| | E5. | Raise awareness among stakeholders at every level about the potential adverse effects of large linear infrastructures on rhino populations. |
| | E6. | Organize workshops at local, national, and regional levels to educate politicians, policymakers, and donors about the implications of large linear infrastructures on wildlife conservation. |
| | E7. | Identify, design, and build wildlife-friendly flyovers or underpasses at strategic sites with the support of DoR, such as Barandabhar in CNP, PNP, and BNP. |
| | E8 | Study to declare 'No Go' and 'No Developmental Activities Zone' for securing core rhino habitats. |

## Objective 4: Enhance research and monitoring

**Rationale**

The greater one-horned rhino has been the focus of scientific research for a long time in Nepal. Several studies concerning ecology, diet, distribution, habitat suitability, impact of IAPS on rhino conservation, climate change impacts to rhinos, poisoning, and plastic pollution (Awasthi et al., 2023; Azhar et al., 2023; Dinerstein, 1992, 2003; Dinerstein & Mccracken, 1990; Dinerstein & Price, 1991; Dinerstein & Wemmer, 1988; Jnawali, 1995; Martin, 1992; Pant et al., 2020b; Subedi, 2012; Subedi et al., 2013) conducted in the past have played a vital role in formulating conservation strategies for rhino in Nepal. Nonetheless, it is still crucial to carry out current investigations and research on rhinos and their habitats due to the difficulties arose by climate change, growing human influences, and rapid environmental changes.

## Output and Actions of Objective 4

| Outputs | Actions | |
|---|---|---|
| (A) Establishment of research institutions and expansion of the capabilities of existing institutions | A1. | Provide support to operationalize the Research and Training Institute on PA and Wildlife Conservation at Lalmati, Bardia. |
| | A2. | Provide support to academic institutions to carry out studies related to rhino conservation. |
| | A3. | Prepare an updated bibliography on rhino research and conservation activities in Nepal. |
| | A4. | Develop at least one field-based research center in CNP, BNP and ShNP including forest corridors. |
| | A5. | Prepare annual plan of priority research areas and involve universities and students from Nepal in wildlife monitoring and research activities. |
| | A6. | Provide internship/short-term position (2-3/PA) to young graduates of biological sciences and involve them in periodic research and preparation/revision of management plans of PAs. |
| | A7. | Support NAST to strengthen the capabilities of the genetic laboratory to carry out genetic sequencing and forensic capacity. |
| (B) Study related to the ecology, population dynamics, conflicts, threats, and opportunities associated with rhino conservation | B1. | Conduct study to analyze population dynamics of rhino in CNP. |
| | B2. | Organize rhino counts in all the rhino bearing PAs including the forests and biological corridors of DFOs at every 4 to 5 years and prepare report. |
| | B3. | Conduct an evaluation of the viability of rhino populations and the carrying capacity of all PAs. |
| | B4. | Undertake genetic variability study between rhinos in BNP and CNP. |
| | B5. | Undertake comprehensive study of rhino-elephant interaction as both rhino and elephant populations are increasing. |
| | | Conduct a thorough inventory of rhino diseases and potential impacts of zoonotic diseases. |

| Outputs | Actions | |
|---|---|---|
| | B6. | Revise and strengthen protocols for individual identity (ID) based rhino monitoring. |
| | B7. | Prepare genetic profile of maximum possible individuals and maintain in the BCC lab |
| | B8. | Carry out study in all rhino bearing PAs to assess contribution of rhino tourism to regional economy. |
| | B9. | Undertake a study on the impacts of tourism, anthropogenic pressure, land use change, infrastructure, livestock on rhinos and their habitats. |
| | B10. | Carry out study to identify extent of impact of upstream development activities of the rhino bearing PAs. |
| | B11. | Conduct study to identify the effectiveness of corridor and connectivity on rhino conservation in Nepal. |
| | B12. | Conduct a feasibility study on the extension of habitats and corridors, e.g., Rambhori Bhata and extended areas of PNP, BNP-BaNP complex. |
| | B13. | Conduct study of potential impacts of climate change on grassland dynamics and spread of IAPS on the grasslands. |
| | B14. | Carry out research to project impact of climate change in rhinos and their habitat with at least 2050, 2100 and 2150 scenarios. |
| | B15 | Implement Wildlife Health Action Plan 2023-2032 and monitor diseases and parasites affecting rhinos and other species sharing the same habitat. |
| | B16 | Carry out study to assess potential impacts of emerging urban hubs in BZ areas – Madi, Kawaswoti, Sauraha, Gitanagar etc in Chitwan and similar in other areas. |
| (C) Capacity development on research and monitoring of rhino | C1. | Support rangers and officers for certificate/ diploma/ graduate/post-graduate courses in wildlife and habitat management at national and international institutions. |
| | C2. | Conduct training to prepare databases. |
| | C3. | Conduct trainings for CBAPUs, community members, and citizen scientists on surveying and reporting rhino movements to local forest and PAs. |
| | C4. | Provide support to enhance the capabilities of frontline staff to identify, document, and report instances of illness, disease or poor health of rhinos and other animals that share same habitats. |
| | C5 | Develop policy and involve government agencies, NGOs, and international organizations to ensure One Health principles. |
| | C6. | Organize meetings/workshops/conferences on rhino conservation at national, regional, and international levels. |

## Objective 5: Manage human-rhino conflicts

**Rationale**

Nepal faces significant challenges in managing human-rhino conflicts due to an increasing rhinoceros population. This rise in rhino numbers is expected to intensify the likelihood of conflicts. While instances of crop damage have decreased, cases involving harassment and casualties remain stable. Recent data suggests that attacks on human resulting in 20% of death and 80% of injury over the past five years (2017-2022). It is crucial to foster local stewardship in rhino conservation to ensure their long-term survival. The current mechanism of Nepal government, as outlined in the Guidelines for Wildlife Damage Relief Fund, offers compensation of around NRs 10,00,000 (~US$ 10,000) for loss of life attributed to rhino attacks. Additionally, a national-level quick relief fund, managed by the National Trust for Nature Conservation (NTNC), provides immediate assistance to victims of rhino-related incidents with subsequent reimbursement sourced from the national-level wildlife damage relief fund.

## Output and Actions of Objective 5

| Outputs | Actions | |
|---|---|---|
| (A) Novel strategies, financial frameworks, and institutional set-ups implemented to manage human-rhino conflicts (HRC) effectively | A1. | Prepare and implement the national level HWC strategy and action plan. |
| | A2. | Provide support to regulate the Wildlife Damage Relief Guidelines of 2080 to streamline claims procedures, minimize delays, and improve transparency and efficiency across all levels. |
| | A3. | Establish Wildlife Relief Endowment Fund with alignment of Wildlife Conservation Fund, Forest Development Fund, NTNC Fund, community level funds and other additional funds to strengthen one-door management strategies under DNPWC. |
| | A4. | Establish and put into operation market-driven insurance schemes for covering human, livestock, property, and crops. |
| | A5. | Provide support to formulate a strategy for promoting responsibility among individuals, private sectors, and corporations. |
| | A6. | Develop strategic plan for promoting private sector investment in nature-based tourism in PAs and BZs. |
| | A7. | Support and empower government entities and conservation partners to obtain external funding from ADB, World Bank, the Green Climate Fund (GCF), and GEF funds. |

| Outputs | Actions | |
|---|---|---|
| (B) Maintained human- rhino amity | B1. | Provide support to erect solar/electric fence to ward off rhinos coming into villages to minimize crop raiding. |
| | B2. | Organize awareness activities to inform local communities about rhino behavior and discourage them going into rhino-hotspots areas to mitigate potential risks and prevent confrontations. |
| | B3. | Prepare mobile applications and an online database to develop a comprehensive documentation of HRC and generate analytical reports to inform adaptive management strategies such as the safe system approach. |
| | B4. | Impart training to park staff and DFOs on techniques for managing and handling strayed animals, and implement a manual detailing procedures for rescuing and handling stray rhinos. |
| | B5. | Develop nature-based solution to maintain HRC below thresholds (e.g., declare no go zone in selected sites of PAs). |
| | B6. | Provide training to personnel from PAs, forest departments, local governments, CBAPUs, Community-Based Organizations (CBOs), and Rapid Response Teams on managing human-wildlife conflicts. |
| | B7 | Carry out study to assess impact of BZ fund mobilization |
| | B8 | Carry out research to investigate the scale, extent, and local variations in the intensity of rhino-human conflict, as well as potential mitigation measures. |
| | B9 | Conduct study about social and behavioral changes of local communities in rhino conservation – a comparative study between scenarios of early 1970s and now. |
| | B10 | Undertake study regarding status and impact of HWC relief support. |
| | B11 | Carry out study towards effectiveness of CBAPUs and WCCBs. |
| (C) Improved livelihoods and employment opportunities to local communities | C1. | Provide assistance for alternative livelihood opportunities to reduce interactions with rhinos. |
| | C2. | Support cultivation of alternative cash crops and the use of repellents in buffer zones and surrounding areas. |
| | C3. | Provide assistance to families affected by rhino-related issues for education, livelihood support and nature-based tourism enterprises. |
| | C4. | Provide support for alternative energy sources such as biogas, LPG gas and electric cooking stoves. |
| | C5. | Organize ecotourism initiatives to positively impact local communities. |
| | C6. | Provide soft loans or micro-credit to economically disadvantaged and marginalized individuals, including women within critical conservation sites, to invest in small-scale agricultural-biodiversity enterprises such as agro-products, handicrafts and other products. |
| | C7. | Conduct exposure visits for local communities on rhino-human coexistence. |

| Outputs | Actions | |
|---|---|---|
| (D) Strengthen capacity and awareness to mitigate HRC | D1. | Provide support to institutionalize BZ institutions to foster stewardship in rhino conservation. |
| | D2. | Coordinate initiatives and engagement activities aimed at enhancing conservation awareness among youths. |
| | D3. | Develop a training syllabus and appropriate resources for nature guides. |
| | D4. | Provide support to implement conservation awareness activities to promote behavioral change among students in schools and colleges. |
| | D5. | Organize conservation awareness initiatives focused on indigenous groups including women, students, and young individuals. |
| | D6. | Prepare a handbook on "People's Responsibility on Biodiversity Conservation" and impart in school education programs. |
| | D7. | Conduct periodic excursion for social activists, advocacy groups, and community leaders to disseminate the importance of rhino conservation. |
| | D8. | Provide support to discourage people to install electric shock wires that kill human and rhino. |

## Objective 6: Strengthen support and cooperation at local, national & international level

**Rationale**

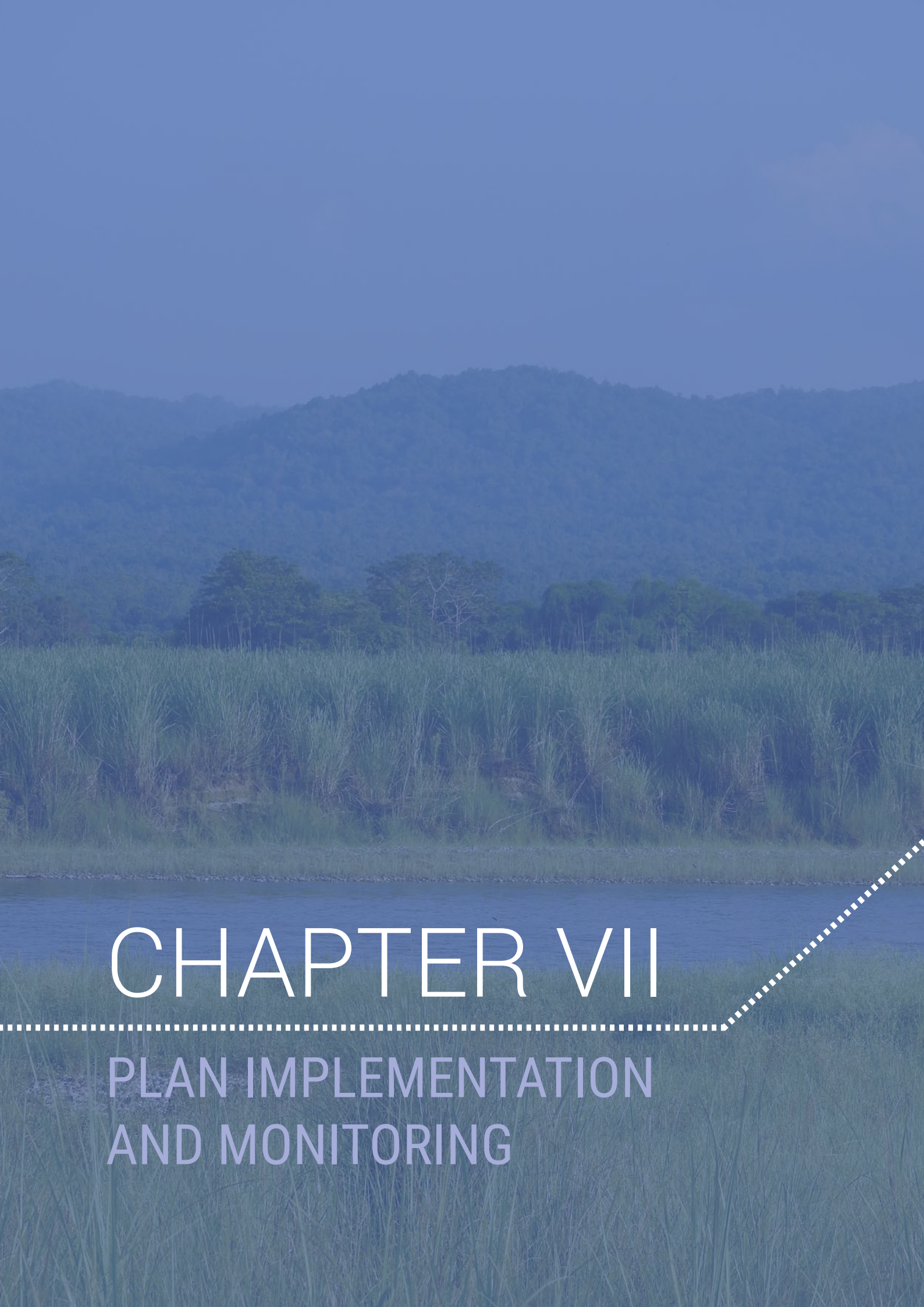
The successful restoration of Nepal's rhino population demonstrates the government's unwavering commitment to biodiversity preservation. Various conservation partners across different tiers are actively involved in executing this commendable conservation effort within the country. Nonetheless, managing PAs extends beyond mere species preservation approach; it now encompasses a comprehensive and multifaceted strategy addressing both wildlife and human aspects. Establishing close collaboration among governmental agencies, organizations, local authorities, and research institutions is imperative for ensuring the long-term persistence of rhinos and wildlife as a whole. he Department of Forests and Soil Conservation (DoFSC) plays a crucial role in overseeing forests outside PAs where rhinos inhabit. Therefore, fostering collaboration with the DoFSC is vital for safeguarding wildlife and their habitats. Additionally, many organizations are essential in fighting against poaching and illegal trade in wildlife. Rhino horns' continuous high demand in the global market poses a significant threat to their continued existence as wild animals. Addressing such transnational conservation issues necessitates trans-border cooperation.

Nepal has effectively established impactful cross-border collaborations with neighboring nations like India and China, aiming to safeguard wildlife on both sides of the borders and counter illicit wildlife trafficking. Nepal, as a signatory to various international conventions such as the World Heritage Convention, CITES, CBD, UNFCCC, Ramsar Convention, and the Global Tiger Forum (GTF), actively participates in coordination meetings with India and China at both central and field levels. Hosting events like the Third Asian Rhino Range Countries Meeting has allowed for the development of unified conservation strategies. These cross-border collaborations play a complementary role in wildlife conservation efforts and curbing illicit wildlife trade.

## Output and Actions of Objective 6

| Outputs | Actions | |
|---|---|---|
| (A) Developed coordination among local, provincial and federal governments | A1. | Organize meetings to enhance partnerships with local and provincial authorities to leverage financial resources effectively. |
| | A2. | Undertake study to initiate to propose major rivers (Koshi, Gandaki and Karnali) as River Basin PAs by coordinating with three tiers of government for the establishment. |
| | A3. | Organize workshops to pilot community-based insurance scheme by involving local government and devise a system for providing compensation to wildlife affected families. |
| | A4. | Provide free education to wildlife victim families coordinating education ministry. |
| | A5. | Organize trainings to develop capacity and establish local government partnership to manage human-wildlife conflicts safely and efficiently. |
| (B) Enhanced regional and international assistance and collaboration in rhino conservation | B1. | Sign Memoranda of Understanding (MOUs) with government, research and academic institutions. |
| | B2. | Launch mutually supportive conservation initiatives across borders for rhino conservation and share relevant information on illegal wildlife trade. |
| | B3. | Organize regular cross-border collaboration meetings with neighboring countries to address rhino security concerns across TAL. |
| | B4. | Visit sites of cross-border countries to witness the situation of HRC jointly. |
| | B5. | Provide support to enhance the capabilities of the SAWEN secretariat and organize routine programs. |
| | B6. | Undertake collaboration meetings with Interpol, Traffic, and the CITES Secretariat to combat wildlife crime. |
| | B7. | Participate meetings, seminars, workshop, conference, convention to seek assistance from the international community for rhino conservation. |
| | B8. | Organize cross-border exchange visits for PA managers, local representatives, and leaders. |
| | B9. | Carry out training programs and cross-border intelligence-sharing meetings for managers of transboundary PAs. |
| | B10 | Prepare operational plan to ensure rhino population movement in Western Terai Landscape between Nepal and India (e.g., Bardia and Katerniaghat). |
| | B11. | Hold a meeting and propose 'Asian Rhino Forum (ARF)' for a unified and long-term coordination to secure Asian rhinos from diverse challenges. |
| | B12 | Coordinate with India to exchange rhinos between Kajiranga National Park and CNP. |
| | B13 | Prepare plan to give strayed rhinos to other countries as a part of Rhino Diplomacy. |

| Outputs | Actions | |
|---|---|---|
| (C) Promote inter-sectoral coordination | C1. | Conduct periodic information sharing and sensitization workshops among all possible sectors. |
| | C2. | Organize regular meetings between development and conservation sectors to assess the impact of development plans on wildlife habitats. |
| | C3. | Organize regular meeting with infrastructure development organizations, mainly with Department of Road, Nepal Electricity Authority, Department of Electricity Development, Department of Water Resources and Irrigation, Nepal Oil Corporation, Communication Service Providers etc. |



# CHAPTER VII

## PLAN IMPLEMENTATION AND MONITORING

# 7. PLAN IMPLEMENTATION AND MONITORING

## 7.1. Implementing agency

The DNPWC and the relevant authorities responsible for overseeing PAs where rhinos inhabit will directly supervise most of the activities outlined in the action plan. The DNPWC will manage all common and principal tasks, while activities specific to individual PAs will be under the purview of respective PA management authorities, coordinating with Division of Forest offices of relevant districts. Research and studies will primarily be conducted by organizations such as NTNC, WWF Nepal/TAL, and ZSL Nepal in collaboration with DNPWC and universities. Management authorities will directly carry out routine activities, while projects' development will adhere to government regulations. During the plan's implementation, technical and external funding support from conservation partners like NTNC, WWF Nepal/TAL, ZSL Nepal, and IUCN will be sought.

## 7.2. Financial Plan

The estimated cost for executing this action plan is NPR 1,794,158,000 (One billion, seven hundred ninety-four million, one hundred fifty-eight thousand) (refer to Table 3). Funding will be obtained from diverse sources, including the government's standard budget allocation, existing conservation partners, and the remainder will be pursued from additional national and international conservation partners. A detailed breakdown of the budget is available in Annex-1.

## 7.3. Monitoring of the plan implementation

Developing detailed action steps for each activity falls beyond the scope of this action plan. Instead, annual timelines for activities have been outlined. A mid-term review of the action plan will occur during the five-year implementation period. Prior to the start of each fiscal year, responsible institutions for implementation will formulate comprehensive work plans for individual activities.

The progress of each activity's work plan will be reviewed quarterly by DNPWC, PNP, CNP, BNP and ShNP for their respective responsibilities. These implementing institutions will conduct progress assessments, inviting conservation partners to participate. There will be annual

**Table 3: Summary of estimated budget**

| Objectives | Budget (NRs. 000) | Percentage (%) |
|---|---|---|
| 1. Combat rhinoceros poaching and illegal trade | 342,729 | 19.10 |
| 2. Manage rhino populations | 382,375 | 21.31 |
| 3. Secure rhino habitats | 767,594 | 42.78 |
| 4. Enhance research and monitoring | 91,150 | 5.08 |
| 5. Manage human-rhino conflicts | 108,378 | 6.04 |
| 6. Strengthen support and cooperation: Local, National and International level | 101,933 | 5.68 |
| **Total** | **1,794,158** | **100** |

consolidation of progress reports from DNPWC, PNP, CNP, BNP and ShNP that will be reviewed at a central-level including participation from major conservation partners. This review will focus on achievements in planned activities for the fiscal year, challenges encountered during implementation, and the development of detailed work plans for the upcoming year's activities.

DNPWC will outsource a team of independent experts for mid-term and final reviews of the action plan. The findings from annual, mid-term and final reviews will be shared in national-level workshops. Please refer to Annex-2 for a detailed log frame.

# REFERENCES


Acharya, K. P., Paudel, P. K., Neupane, P. R., & Köhl, M. (2016). Human-wildlife conflicts in Nepal: patterns of human fatalities and injuries caused by large mammals. *PloS one*, *11*(9), e0161717.

Acharya, K. P., Thapa, R. K., Kuwar, K. J., Thapalia, B. P., Paudel, P. K., & Hayward, M. (2020). Policy and management actions that resulted in curbing rhinoceros poaching. *Journal of Applied Ecology*, *57*(8), 1452-1458. https://doi.org/10.1111/1365-2664.13692

Adhikari, A., & Shah, D. N. (2020). Potential Impact of Climate Change on One-Horned Rhinoceros (Rhinoceros unicornis) in Nepal. *bioRxiv*, 2020.2005. 2004.076562.

Adhikari, B., Haider, W., Gurung, O., Poudyal, M., Beadmore, B., Knowler, D., & Van Beukering, P. (2005). Economic incentives and poaching of the one-horned Indian rhinoceros in Nepal. Poverty Reduction and Environmental Management (PREM) Working Paper 05/12. Vrije University, Amsterdam. *Unpublished report*.

Adhikari, K. (2015). *Ecology, demography, conservation and management of greater one horned rhinoceros (Rhinoceros unicornis) in Chitwan National Park, Nepal* Ph. D. Thesis, Wildlife Science. India: Saurashtra University, Rajkot].

Adhikari, T., Pradhan, N., & Poudel, N. (1999). A Strategy to combat poaching in Chitwan Valley. *A report presented to Department of National Parks and Wildlife Conservation, Nepal*.

Amin, R., Okita-Ouma, B., Adcock, K., Emslie, R., Mulama, M., & Pearce-Kelly, P. (2006). An integrated management strategy for the conservation of Eastern black rhinoceros Diceros bicornis michaeli in Kenya. *International Zoo Yearbook*, *40*(1), 118-129.

Aryal, A., Acharya, K. P., Shrestha, U. B., Dhakal, M., Raubenhiemer, D., & Wright, W. (2017). Global lessons from successful rhinoceros conservation in Nepal. *Conserv Biol*, *31*(6), 1494-1497. https://doi.org/10.1111/cobi.12894

Awasthi, B., Lamichhane, B. R., & McConkey, K. R. (2023). Plastic ingestion by greater one-horned rhinos in Nepal: An emerging conservation threat. *Global Ecology and Conservation*, *46*. https://doi.org/10.1016/j.gecco.2023.e02549

Azhar, M., Saleem, M. H., Yasmeen, R., Safdar, A., Ahmad, W., Asif, M., Bokhari, A., & Aslam, I. (2023). Tuberculosis in Wild Animals a Great Threat for Wildlife Conservation and Public Health-A Review. *Journal of Wildlife and Biodiversity*, *7*(4), 1-10.

Bhandari, S., Adhikari, B., Baral, K., & Subedi, S. C. (2022). Greater one-horned rhino (Rhinoceros unicornis) mortality patterns in Nepal. *Global Ecology and Conservation*, *38*. https://doi.org/10.1016/j.gecco.2022.e02189

Bhurtel, K. (2008). Bufferzone Council should be autonomous. *Conservation Watch*, *1*(11), 3.

Blaine, S. (2014). Vietnam's Market for Rhino Horn Could Quadruple, Business Day. In.

Caughley, G. (1969). *Wildlife and recreation in the trisuli watershed and aother areas in Nepal.* .

Chanyandura, A. (2020). Local Community Participation in Rhino Conservation-Key to Conservation Success. *Research in Ecology*, *2*(3), 10-12.

CITES. (2022a). *African and Asian Rhinoceroses – Status, Conservation and Trade*. S. o. t. C. o. I. T. i. E. S. o. W. F. a. F. C. P. u. c. f. t. C. S. b. t. I. S. S. C. (IUCN SSC) African and Asian Rhino Specialist Groups and TRAFFIC.

CITES. (2022b). *Nineteenth meeting of the Conference of the Parties Panama City (Panama): Species specific matters Rhinoceros (Rhinocerotidae SPP.)*. https://cites.org/sites/default/files/documents/E-CoP19-75.pdf

Conrad, K. (2012). Trade bans: a perfect storm for poaching? *Tropical Conservation Science*, *5*(3), 245-254.

Devkota, R., Brant, S., Thapa, A., & Loker, E. (2014). Sharing schistosomes: the elephant schistosome Bivitellobilharzia nairi also infects the greater one-horned rhinoceros (Rhinoceros unicornis) in Chitwan National Park, Nepal. *Journal of helminthology*, *88*(1), 32-40.

Dinerstein, E. (1992). Effects of Rhinoceros unicornis on riverine forest structure in lowland Nepal. *Ecology*, *73*(2), 701-704.

Dinerstein, E. (2003). *The return of the unicorns: the natural history and conservation of the greater one-horned rhinoceros*. Columbia University Press.

Dinerstein, E., & Mccracken, G. F. (1990). Endangered greater one-horned rhinoceros carry high levels of genetic variation. *Conservation Biology*, *4*(4), 417-422.

Dinerstein, E., & Price, L. (1991). Demography and habitat use by greater one-horned rhinoceros in Nepal. *The Journal of Wildlife Management*, 401-411.

Dinerstein, E., & Wemmer, C. M. (1988). Fruits Rhinoceros eat: dispersal of Trewia nudiflora (Euphorbiaceae) in lowland Nepal. *Ecology*, *69*(6), 1768-1774.

DNPWC. (2000). *Rhino count 2000 initial report*. D. o. N. P. a. W. C. (DNPWC).

DNPWC. (2009). *The Status and Distribution of The Greater One-Horned Rhino in Nepal*. D. o. N. P. a. W. C. (DNPWC).

DNPWC. (2011). *The status and distribution of the greater one-horned rhino in Nepal.*

DNPWC. (2015). *The status and distribution of the greater one-horned rhino in Nepal.* .

DNPWC. (2016). *Annual progress report*.

DNPWC. (2017). *The Greater One-horned Rhinoceros Conservation Action Plan for Nepal (2017- 2021).* . Department of National Parks and Wildlife Conservation.

DNPWC. (2019). *Protected Areas of Nepal.* . Department of National Parks and Wildlife Conservation (DNPWC). Government of Nepal, Ministry of Forests and Soil Conservation.

DNPWC. (2021). *Technical Report on National Rhino Count 2021*.

DNPWC. (2022a). *Transboundary Rescue Operation of Greater One Horned Rhinoceros (An Exemplary Effort of Chitwan National Park, Chitwan, Nepal)* Department of National Parks and Wildlife Conservation.

DNPWC. (2022b). *Wildlife-friendly Infrastructure Construction Directives-2022*. Department of National Parks and Wildlife Conservation.

DNPWC. (2023). *National Wildlife Health Action Plan (2023-2032).* Department of National Parks and Wildlife Conservation.

Ellis, S., & Talukdar, B. (2019). Rhinoceros unicornis. *The IUCN Red List of Threatened Species*, 2019-2013.

Emslie, R. (2012a). Ceratotherium simum. The IUCN Red List of Threatened Species. Version 2014.3. In: Gland: IUCN.

Emslie, R. (2012b). Diceros bicornis, The IUCN Red List of Threatened Species 2012. In.

Ghimire, P. (2020). Conservation Status of Greater One-horned Rhinoceros (Rhinoceros unicornis) in Nepal: A Review of Current Efforts and Challenges. *Grassroots Journal of Natural Resources*, *3*(1), 1-14. https://doi.org/10.33002/nr2581.6853.03011

GoN. (1973). *National Park and Wildlife Conservation (NPWC) Act, 1973.* The Nepal Law Commission, Government of Nepal.

GoN. (1996). *Buffer Zone Management Rules, 2052*. Department of National Parks and Wildlife Conservation, Government of Nepal.

GoN. (2024). *Sixteenth Periodic Plan* (Vol. 2081/82-2085/86). Government of Nepal.

Hazarika, B., & Saikia, P. (2010). A study on the behaviour of Great Indian One-horned Rhino (Rhinoceros unicornis Linn.) in the Rajiv Gandhi Orang National Park, Assam, India. *NeBIO*, *1*(2), 62-74.

Hutchins, M., & Kreger, M. (2006). Rhinoceros behaviour: implications for captive management and conservation. *International Zoo Yearbook*, *40*(1), 150-173.

IRF. (2023). *State of the Rhino 2023*. I. R. Foundation.

Janssens, B., & Trouwborst, A. (2018). Rhinoceros conservation and international law: The role of wildlife treaties in averting megaherbivore extinction. *Journal of International Wildlife Law & Policy*, *21*(2-3), 146-189.

Jnawali, S. R. (1995). *Population ecology of greater one horned rhinoceros (Rhinoceros unicornis) with particular emphasis on habitat preference, food ecology and ranging behaviour of a reintroduced population in Royal Bardia National Park in Lowland Nepal* Agricultural University of Norway]. Ås, Norway.

Kafley, H., Gompper, M. E., Khadka, M., Sharma, M., Maharjan, R., & Thapaliya, B. P. (2015). Analysis of rhino (Rhinoceros unicornis)population viability in Nepal: impact assessment of antipoaching and translocation strategies. *Zoology and ecology*, *25*(4), 288-294. https://doi.org/10.1080/21658005.2015.1090118

Kandel, R., & Jhala, Y. (2008). Demographic structure, activity patterns, habitat use and food habits of Rhinoceros unicornis in Chitwan National Park, Nepal. *Journal of Bombay Natural History Society*, *105*(1), 5-13.

Khan, M. K. b. M., Foose, T. J., & van Strien, N. J. (1997). *Asian rhinos: status survey and conservation action plan* (Vol. 32). IUCN Gland.

KNP. (2022). *The Rhino Population of Kaziranga National Park in Assam Rises by 200*. Kaziranga National Park. Retrieved 4/17/2024 from https://www.kaziranga-national-park.com/blog/rhino-population-at-kaziranga/

Lahkar, B., Talukdar, B., & Sarma, P. (2011). Invasive species in grassland habitat: an ecological threat to the greater one-horned rhino (Rhinoceros unicornis). *Pachyderm*, *49*, 33-39.

Lamichhane, B., Subedi, N., Chapagain, N., Dhakal, M., Pokheral, C., Murphy, S., & Amin, R. (2014). Status of Mikania micrantha invasion in the rhino habitat of Chitwan National Park, Nepal. Proceedings of the International Conference on Invasive Alien Species Management, Chitwan, Nepal, 25-27 March 2014.,

Lamichhane, B. R., Persoon, G. A., Leirs, H., Poudel, S., Subedi, N., Pokheral, C. P., Bhattarai, S., Thapaliya, B. P., & De Iongh, H. H. (2018). Spatio-temporal patterns of attacks on human and economic losses from wildlife in Chitwan National Park, Nepal. *PloS one*, *13*(4), e0195373.

Laurie, A. (1982). Behavioural ecology of the Greater one-horned rhinoceros (Rhinoceros unicornis). *Journal of Zoology*, *196*(3), 307-341.

Laurie, W., Lang, E., & Groves, C. P. (1983). Rhinoceros unicornis. *Mammalian species*(211), 1-6.

Laurie, W. A. (1978). *The ecology of greater one-horned rhinoceros.* Cambridge University].

Mahatara, D., Rayamajhi, S., & Khanal, G. (2018). Impact of anti-poaching approaches for the success of Rhino conservation in Chitwan National Park, Nepal. *Banko Janakari*, *28*(2), 23-31.

Martin, E. (1998). Will new community development projects help rhino conservation in Nepal. *Pachyderm*, *26*, 88-99.

Martin, E. (2001). What strategies are effective for Nepal's rhino conservation: a recent case study. *Pachyderm*, *31*, 42-51.

Martin, E. (2004). Rhino poaching in Nepal during an insurgency. *Pachyderm*, *36*, 87-98.

Martin, E., & Martin, C. (2010). Enhanced community support reduces rhino poaching in Nepal. *Pachyderm*, *48*, 48-56.

Martin, E., Martin, C., & Vigne, L. (2009). Recent political disturbances in Nepal threaten rhinos: lessons to be learned. *Pachyderm*, *45*, 98-107.

Martin, E., Martin, C., & Vigne, L. (2013). Successful reduction in rhino poaching in Nepal. *Pachyderm*, *54*, 67-74.

Martin, E. B. (1992). The poisoning of rhinos and tigers in Nepal. *Oryx*, *26*(2), 82-86.

Martin, E. B. (2009). Religion, royalty and rhino conservation in Nepal. *Oryx*, *19*(1), 11-16. https://doi.org/10.1017/s0030605300019487

Martin, E. B., & Martin, C. (2006). Insurgency and poverty: recipe for rhino poaching in Nepal. *Pachyderm*, *41*, 61-73.

Martin, E. B., & Vigne, L. (1996). Nepal's rhinos-one of the greatest conservation success stories. *Pachyderm*, *21*, 10-26.

Molur, S., Sukumar, R., Seal, U., & Walker, S. (Eds.). (1995). *Population and Habitat viability assessment PHVA workshop for greater one-horned rhinoceros report*. Conservation Breeding Specialist Group.

Moore, J., Jayakumar, A., Soldatou, S., Masěk, O. e., Lawton, L. A., & Edwards, C. (2023). Nature-based solution to eliminate cyanotoxins in water using biologically enhanced biochar. *Environmental Science & Technology*, *57*(43), 16372-16385.

Mukherjee, T., Sharma, L. K., Saha, G. K., Thakur, M., & Chandra, K. (2020). Past, Present and Future: Combining habitat suitability and future landcover simulation for long-term conservation management of Indian rhino. *Sci Rep*, *10*(1), 606. https://doi.org/10.1038/s41598-020-57547-0

Murphy, S. T., Subedi, N., Jnawali, S. R., Lamichhane, B. R., Upadhyay, G. P., Kock, R., & Amin, R. (2013). Invasive mikania in Chitwan National Park, Nepal: the threat to the greater one-horned rhinoceros Rhinoceros unicornis and factors driving the invasion. *Oryx*, *47*(3), 361-368. https://doi.org/10.1017/s003060531200124x

Nowak, R. M. (1999). *Walker's Mammals of the World* (Vol. 1). JHU press.

Pant, G. (2022). *Greater One-Horned Rhinoceros (Rhinoceros Unicornis) in Nepal in the Context of Climate Change: Vulnerability Assessment and Adaptation Planning* University of Southern Queensland].

Pant, G., Maraseni, T., Apan, A., & Allen, B. L. (2020a). Climate change vulnerability of Asia's most iconic megaherbivore: greater one-horned rhinoceros (Rhinoceros unicornis). *Global Ecology and Conservation*, *23*. https://doi.org/10.1016/j.gecco.2020.e01180

Pant, G., Maraseni, T., Apan, A., & Allen, B. L. (2020b). Trends and current state of research on greater one-horned rhinoceros (Rhinoceros unicornis): A systematic review of the literature over a period of 33 years (1985-2018). *Sci Total Environ*, *710*, 136349. https://doi.org/10.1016/j.scitotenv.2019.136349

Pant, G., Maraseni, T., Apan, A., & Allen, B. L. (2021). Predicted declines in suitable habitat for greater one-horned rhinoceros (Rhinoceros unicornis) under future climate and land use change scenarios. *Ecol Evol*, *11*(24), 18288-18304. https://doi.org/10.1002/ece3.8421

Pant, G., Maraseni, T., Apan, A., & Allen, B. L. (2022). Identifying and prioritising climate change adaptation actions for greater one-horned rhinoceros (Rhinoceros unicornis) conservation in Nepal. *PeerJ*, *10*, e12795.

Paudel, P., Subedi, J. R., & Pathak, A. (2022). Prevalence of gastrointestinal parasites among greater one-horned rhino in Chitwan National Park, Nepal. *Annals of Parasitology*, *68*(1), 159-167.

Peters, H., Sadaula, A., Masters, N., & Sainsbury, A. (2020). Risks from disease caused by Mycobacterium orygis as a consequence of Greater one-horned Rhinoceros (Rhinoceros unicornis) translocation in Nepal. *Transboundary and emerging diseases*, *67*(2), 711-723.

Poudyal, M., Rothley, K., & Knowler, D. (2009). Ecological and economic analysis of poaching of the greater one-horned rhinoceros (Rhinoceros unicornis) in Nepal. *Ecological Applications*, *19*(7), 1693-1707.

Pradhan, N. M., Wegge, P., Moe, S. R., & Shrestha, A. K. (2008). Feeding ecology of two endangered sympatric megaherbivores: Asianelephant Elephas maximus and greater one-horned rhinoceros Rhinoceros unicornis in lowland Nepal. *Wildlife Biology*, *14*(1), 147-154.

Pun, S., Joshi, R., Subedi, R., Bhattarai, S., & Poudel, B. (2022). Geospatial analysis of habitat suitability for Greater One-horned Rhino Rhinoceros unicornis (Linnaeus, 1758) in Central lowlands of Nepal using MaxEnt Model. *Borneo Journal of Resource Science and Technology*, *12*(1), 166-176.

Rimal, S., Adhikari, H., & Tripathi, S. (2018). Habitat suitability and threat analysis of Greater One-horned Rhinoceros Rhinoceros unicornis Linnaeus, 1758 (Mammalia: Perissodactyla: Rhinocerotidae) in Rautahat District, Nepal. *Journal of Threatened Taxa*, *10*(8), 11999-12007.

Rivalan, P., Delmas, V., Angulo, E., Bull, L. S., Hall, R. J., Courchamp, F., Rosser, A. M., & Leader-Williams, N. (2007). Can bans stimulate wildlife trade? *Nature*, *447*(7144), 529-530.

Roberge, J. M., & Angelstam, P. (2004). Usefulness of the umbrella species concept as a conservation tool. *Conservation Biology*, *18*(1), 76-85.

Robovsky, J., & Rookmaaker, K. (2022). Rhinoceros specimens included in anatomical and morphological studies by Professor Alexander JE Cave (Perissodactyla: Rhinocerotidae). *Lynx, series nova*, *53*(1).

Rookmaaker, K., Sharma, A., Bose, J., Thapa, K., Dutta, D., Jeffries, B., Williams, A., Ghose, D., Gupta, M., & Tornikoski, S. (2016). The greater one-horned rhino: past, present and future. *WWF, Gland, Switzerland, WWF*.

Rosen, G. E., & Smith, K. F. (2010). Summarizing the evidence on the international trade in illegal wildlife. *EcoHealth*, *7*, 24-32.

Rothley, K. D., Knowler, D. J., & Poudyal, M. (2004). Population model for the greater one-horned rhinoceros (Rhinoceros unicornis) in Royal Chitwan National Park, Nepal. *IUCN*, 18.

Sarmah, B. (2023). Reinventing Nature in Kaziranga National Park: A History of Rhinoceros Conservation in Assam, 1948–1974. *Conservation and Society*, *21*(2), 133-143.

Sedhain, J., & Adhikary, A. (2016). Human-Rhino conflict: Local people's adaptation to impacts of rhino. *Journal of Forest and Livelihood*, *14*(1), 53-66.

Shah, S., Shah, R., Xu, H., Shah, S., Fujiyama, S., Bhuyan, M., & Fujita, M. (2006). Policy analysis, conservation and development of buffer zones. *How are we supporting the current population by sustainable food production?*, 103-184.

Steinheim, G., Wegge, P., Fjellstad, J. I., Jnawali, S. R., & Weladji, R. B. (2006). Dry season diets and habitat use of sympatric Asian elephants (Elephas maximus) and greater one-horned rhinoceros (Rhinocerus unicornis) in Nepal. *Journal of Zoology*, *265*(4), 377-385. https://doi.org/10.1017/s0952836905006448

Studsrød, J. E., & Wegge, P. (1995). Park-people relationships: the case of damage caused by park animals around the Royal Bardia National Park, Nepal. *Environmental Conservation*, *22*(2), 133-142.

Subedi, N. (2012). *Effect of Mikania micrantha on the demography, habitat use, and nutrition of Greater One-horned Rhinoceros in Chitwan National Park, Nepal*

Subedi, N., Jnawali, S. R., Dhakal, M., Pradhan, N. M. B., Lamichhane, B. R., Malla, S., Amin, R., & Jhala, Y. V. (2013). Population status, structure and distribution of the greater one-horned rhinoceros Rhinoceros unicornis in Nepal. *Oryx*, *47*(3), 352-360. https://doi.org/10.1017/s0030605313000562

Subedi, N., Lamichhane, B. R., Amin, R., Jnawali, S. R., & Jhala, Y. V. (2017). Demography and viability of the largest population of greater one-horned rhinoceros in Nepal. *Global Ecology and Conservation*, *12*, 241-252. https://doi.org/10.1016/j.gecco.2017.11.008

Talukdar, B. (2014). Asian Rhino Specialist Group report/Rapport du Groupe de Spécialistes du Rhinocéros d'Asie. *Pachyderm*, *55*, 20-29.

Talukdar, B., & Sinha, S. (2013). Challenges and opportunities of transboundary rhino conservation in India and Nepal. *Pachyderm*, *54*, 45-51.

Talukdar, B. K. (2018). Asian Rhino Specialist Group report/Rapport du Groupe de Spécialistes du Rhinocéros d'Asie. *Pachyderm*, *59*, 27-30.

Thakur, S., Upreti, C., & Jha, K. (2014). Nutrient analysis of grass species consumed by greater one-horned Rhinoceros (Rhinoceros unicornis) in Chitwan National Park, Nepal. *International Journal of Applied Sciences and Biotechnology*, *2*(4), 402-408.

Thapa, I., Butchart, S. H. M., Gurung, H., Stattersfield, A. J., Thomas, D. H. L., & Birch, J. C. (2014). Using information on ecosystem services in Nepal to inform biodiversity conservation and local to national decision-making. *Oryx*, *50*(1), 147-155. https://doi.org/10.1017/s0030605314000088

Thapa, J., Nakajima, C., Gairhe, K. P., Maharjan, B., Paudel, S., Shah, Y., Mikota, S. K., Kaufman, G. E., McCauley, D., & Tsubota, T. (2017). Wildlife tuberculosis: An emerging threat for conservation in South Asia. Global exposition of wildlife management,

Thapa, J., Paudel, S., Sadaula, A., Shah, Y., Maharjan, B., Kaufman, G. E., McCauley, D., Gairhe, K. P., Tsubota, T., Suzuki, Y., & Nakajima, C. (2016). Mycobacterium orygis-Associated Tuberculosis in Free-Ranging Rhinoceros, Nepal, 2015. *Emerg Infect Dis*, *22*(3), 570-572. https://doi.org/10.3201/eid2203.151929

Thapa, K., & Diedrich, A. (2023). Beyond conservation: Assessing broader development outcomes of protected areas in Nepal. *J Environ Manage*, *339*, 117890. https://doi.org/10.1016/j.jenvman.2023.117890

Thapa, K., Nepal, S., Thapa, G., Bhatta, S. R., & Wikramanayake, E. (2013). Past, present and future conservation of the greater one-horned rhinoceros Rhinoceros unicornis in Nepal. *Oryx*, *47*(3), 345-351. https://doi.org/10.1017/s0030605311001670

Thapa, K., Williams, A., Khaling, S., & Bajimaya, S. (2009). Observations on habitat preference of translocated rhinos in Bardia National Park and Suklaphanta Wildlife Reserve, Nepal. *Pachyderm*, *45*, 108-113.

WWFNepal. (2021). *Final Technical Report of the Hariyo Ban Program,*

*Phase II*. H. B. P. WWF Nepal.

Wyatt, T., & Wyatt, T. (2022). Transnational Collaborations. *Wildlife Trafficking: A Deconstruction of the Crime, Victims and Offender*s, 199-230.

Yonzon, P. (1994). *Count Rhino 1994. Report Series No. 10*. W. N. Program.

# ANNEXES

## Annex -1 The estimated budget for ten years (2024-2034) with detailed breakdown.

| SN | Actions | Unit | No. | Rate | 1st Year | 2nd Year | 3rd Year | 4th Year | 5th Year | 6th Year | 7th Year | 8th Year | 9th Year | 10th Year | Total Amount |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | **Objective 1: Combat Rhino Poaching and Illegal Trade** | | | | | | | | | | | | | | |
| 1.1 | Implement Illegal Wildlife Trade and Poaching Control Strategic Plan for Nepal (2023-2030) for rhino-inhabited PAs and the corresponding DFOs | Times | 10 | 300 | 300 | 315 | 346.5 | 345 | 360 | 360 | 360 | 360 | 360 | 360 | 3466.5 |
| 1.2 | Develop protocols to evaluate the security situation of Protected Areas (PAs) | Times | 1 | 300 | 0 | 315 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 315 |
| 1.3 | Undertake periodic security assessments according to the protocols. | Times | 5 | 250 | 250 | 0 | 0 | 262.5 | 0 | 288.75 | 0 | 287.5 | 0 | 300 | 1388.75 |
| 1.4 | Conduct meetings to formalize the WCCB at all tiers of central, provincial and district levels. | Times | 10 | 300 | 300 | 315 | 346.5 | 345 | 360 | 360 | 360 | 360 | 360 | 360 | 3466.5 |
| 1.5 | Carry out training to enhance the capacity for implementing CITES regulations across all administrative levels. | Times | 10 | 400 | 400 | 420 | 462 | 460 | 480 | 480 | 480 | 480 | 480 | 480 | 4622 |
| 1.6 | Prepare plan for creating joint patrolling system in the leadership of Nepal Army with Nepal Police, Forest Guards. | Times | 1 | 500 | 500 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 500 |
| 1.7 | Prepare plan for the rhino conservation and management in Khata Corridor and DFO areas during night. | Times | 1 | 250 | 0 | 262.5 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 262.5 |
| 1.8 | Provide assistance to frontline personnel for their transportation needs by supplying vehicles, motorcycles, bicycles, boats, and rafts. | Times | 10 | 1200 | 1200 | 1260 | 1386 | 1380 | 1440 | 1440 | 1440 | 1440 | 1440 | 1440 | 13866 |
| 1.9 | Study and construct forest road and fire line in Chure area of all the rhino bearing PAs to facilitate efficient patrolling | Times | 10 | 2000 | 2000 | 2100 | 2310 | 2300 | 2400 | 2400 | 2400 | 2400 | 2400 | 2400 | 23110 |
| 1.10 | Provide support to set up a wildlife forensic and genetic laboratory to bolster crime investigation capabilities. | No. | 2 | 1500 | 1000 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1200 | 0 | 2200 |

| SN | Actions | Unit | No. | Rate | 1st Year | 2nd Year | 3rd Year | 4th Year | 5th Year | 6th Year | 7th Year | 8th Year | 9th Year | 10th Year | Total Amount |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1.11 | Outbuild capacity for Long Range Patrol (LRP), Medium Range patrol (MRP), Short Range Patrol (SRP), Maha hunt, joint patrolling, sweeping operation, camping and ambush, in all the PAs | Times | 10 | 1000 | 1000 | 1050 | 1155 | 1150 | 1200 | 1200 | 1200 | 1200 | 1200 | 1200 | 11555 |
| 1.12 | Support and mobilize CBAPUs in all the PAs | Times | 10 | 1200 | 1200 | 1260 | 1386 | 1380 | 1440 | 1440 | 1440 | 1440 | 1440 | 1440 | 13866 |
| 1.13 | Provide support to procure information through informant networks. | Times | 10 | 750 | 750 | 787.5 | 866.25 | 862.5 | 900 | 900 | 900 | 900 | 900 | 900 | 8666.25 |
| 1.14 | Support informant networks to strengthen their intelligence gathering skills. | Times | 10 | 500 | 500 | 525 | 577.5 | 575 | 600 | 600 | 600 | 600 | 600 | 600 | 5777.5 |
| 1.15 | Support CFUGs outside of the PAs to safeguard rhino populations. | Times | 10 | 1500 | 1500 | 1575 | 1732.5 | 1725 | 1800 | 1800 | 1800 | 1800 | 1800 | 1800 | 17332.5 |
| 1.16 | Provide logistical support to DFOs to operate rhino conservation activities. | Times | 10 | 1000 | 1000 | 1050 | 1155 | 1150 | 1200 | 1200 | 1200 | 1200 | 1200 | 1200 | 11555 |
| 1.17 | Organize training on wildlife crime, forensic techniques, and crime scene investigation to the staffs and PAs and DFOs. | Times | 10 | 500 | 500 | 525 | 577.5 | 575 | 600 | 600 | 600 | 600 | 600 | 600 | 5777.5 |
| 1.18 | Support PAs and DFOs to construct additional guard posts at strategic locations to cover the gap areas. | No. | 15 | 3000 | 4500 | 4725 | 5197.5 | 5175 | 5400 | 5400 | 5400 | 5400 | 5400 | 5400 | 51997.5 |
| 1.19 | Provide support to upgrade minimum facilities in the existing guard posts. | Times | 10 | 300 | 300 | 315 | 346.5 | 345 | 360 | 360 | 360 | 360 | 360 | 360 | 3466.5 |
| 1.2 | Repair and maintain existing forest roads and fire lines to facilitate efficient patrolling. | Times | 10 | 1000 | 1000 | 1050 | 1155 | 1150 | 1200 | 1200 | 1200 | 1200 | 1200 | 1200 | 11555 |
| 1.21 | Provide support to establish community based anti-poaching units in all the rhino bearing PAs including DFOs. | Times | 10 | 1000 | 1000 | 1050 | 1155 | 1150 | 1200 | 1200 | 1200 | 1200 | 1200 | 1200 | 11555 |
| 1.22 | Install GSM-enabled CCTV cameras in sensitive areas. | No. | 150 | 50 | 750 | 787.5 | 866.25 | 862.5 | 900 | 900 | 900 | 900 | 900 | 900 | 8666.25 |
| 1.23 | Install spy camera at sensitive location including in the right of ways for the public | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 1.24 | Repair and maintain (CCTV) cameras in regular interval. | Times | 250 | 50 | 1250 | 1312.5 | 1443.75 | 1437.5 | 1500 | 1500 | 1500 | 1500 | 1500 | 1500 | 14443.75 |

| SN | Actions | Unit | No. | Rate | 1st Year | 2nd Year | 3rd Year | 4th Year | 5th Year | 6th Year | 7th Year | 8th Year | 9th Year | 10th Year | Total Amount |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1.25 | Undertake android-based Real-Time SMART patrolling system in all the PAs. | Times | 10 | 1000 | 1000 | 1050 | 1155 | 1150 | 1200 | 1200 | 1200 | 1200 | 1200 | 1200 | 11555 |
| 1.26 | Recruit Remote Sensing and GIS expert in DNPWC to apply Geo-information Science in rhino conservation. | Year | 10 | 975 | 975 | 1023.75 | 1126.13 | 1121.25 | 1170 | 1170 | 1170 | 1170 | 1170 | 1170 | 11266.125 |
| 1.27 | Procure satellite images, updated digital layers, GPS to support application of GIS and Remote Sensing in rhino conservation. | Times | 2 | 900 | 1800 | 1800 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 3600 |
| 1.28 | Procure unmanned aerial vehicles (Drones) to conduct aerial surveys, track poachers, and monitor rhino populations. | No. | 20 | 700 | 1400 | 1470 | 1617 | 1610 | 1680 | 1680 | 1680 | 1680 | 1680 | 1680 | 16177 |
| 1.29 | Provide training on Artificial Intelligence (AI)- Using AI algorithms to analyze large datasets, identify patterns, and predict potential poaching activities. | Times | 10 | 200 | 200 | 210 | 231 | 230 | 240 | 240 | 240 | 240 | 240 | 240 | 2311 |
| 1.3 | Develop mobile applications for reporting and monitoring wildlife crime, encouraging public participation and awareness. | Times | 1 | 900 | 0 | 0 | 990 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 990 |
| 1.31 | Support to strengthen community sensitization, informant networks and educate school students about wildlife crime. | Times | 10 | 1000 | 1000 | 1050 | 1155 | 1150 | 1200 | 1200 | 1200 | 1200 | 1200 | 1200 | 11555 |
| 1.32 | Conduct workshops and trainings to enhance skills on community based anti-poaching operations for the CBAPU members. | Times | 10 | 300 | 300 | 315 | 346.5 | 345 | 360 | 360 | 360 | 360 | 360 | 360 | 3466.5 |
| 1.33 | Mobilize CBAPUs under each BZUCs. | Times | 10 | 800 | 800 | 840 | 924 | 920 | 960 | 960 | 960 | 960 | 960 | 960 | 9244 |
| 1.34 | Prepare a manual for anti-poaching operations. | Times | 1 | 400 | 400 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 400 |
| 1.35 | Hold frequent meetings for WCCCC, and WCCB | Times | 10 | 500 | 500 | 525 | 577.5 | 575 | 600 | 600 | 600 | 600 | 600 | 600 | 5777.5 |
| 1.36 | Establish, strengthen and institutionalize WCCB throughout the country. | Times | 10 | 200 | 200 | 210 | 231 | 230 | 240 | 240 | 240 | 240 | 240 | 240 | 2311 |
| 1.37 | Strengthen and establish WCCB throughout the country. | No. | 20 | 500 | 1000 | 1050 | 1155 | 1150 | 1200 | 1200 | 1200 | 1200 | 1200 | 1200 | 11555 |

| SN | Actions | Unit | No. | Rate | 1st Year | 2nd Year | 3rd Year | 4th Year | 5th Year | 6th Year | 7th Year | 8th Year | 9th Year | 10th Year | Total Amount |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1.38 | Undertake networking coordination among domestic and international enforcement agencies. | Times | 10 | 800 | 800 | 840 | 924 | 920 | 960 | 960 | 960 | 960 | 960 | 960 | 9244 |
| 1.39 | Conduct half-yearly interaction program among park staff, protection units, CBAPUs including all possible stakeholders. | Times | 10 | 1200 | 1200 | 1260 | 1386 | 1380 | 1440 | 1440 | 1440 | 1440 | 1440 | 1440 | 13866 |
| | **Sub Total** | | | | **32775** | **32643.8** | **34282.9** | **33411.3** | **34590** | **34878.8** | **34590** | **34877.5** | **35790** | **34890** | **342729.13** |
| | **Objective 2: Combat Rhino Poaching and Illegal Trade** | | | | | | | | | | | | | | |
| 2.1 | Conduct study to analyze population dynamics of rhino in CNP | Times | 3 | 500 | 0 | 500 | 0 | 0 | 0 | 525 | 0 | 0 | 0 | 600 | 1625 |
| 2.2 | Monitor and maintain age and sex ratio distribution within various blocks of PAs periodically. | Times | 3 | 300 | 300 | 0 | 0 | 0 | 330 | 0 | 0 | 0 | 360 | 0 | 990 |
| 2.3 | Monitor rhino distribution in different parts of CNP in yearly basis. | Times | 3 | 200 | 0 | 200 | 0 | 0 | 240 | 0 | 0 | 240 | 0 | 0 | 680 |
| 2.4 | Translocate rhinos from densely populated western part to eastern part of CNP | Times | 10 | 1000 | 1000 | 1050 | 1155 | 1150 | 1200 | 1200 | 1200 | 1200 | 1200 | 1200 | 11555 |
| 2.5 | Monitor and secure dispersed rhinos in corridor and DFO areas. | 0 | 10 | 250 | 250 | 262.5 | 288.75 | 287.5 | 300 | 300 | 300 | 300 | 300 | 300 | 2888.75 |
| 2.6 | Undertake feasibility study on rhino habitat suitability in South eastern part of PNP and ShNP | Times | 3 | 400 | 400 | 0 | 440 | 0 | 480 | 0 | 0 | 0 | 0 | 0 | 1320 |
| 2.7 | Study minimum viable population requirements and translocate rhino from CNP to BNP and ShNP. | Times | 10 | 25000 | 25000 | 26250 | 28875 | 28750 | 30000 | 30000 | 30000 | 30000 | 30000 | 30000 | 288875 |
| 2.8 | Study and translocate rhinos to southern part of CNP-PNP complex, e.g., Sikaribas, Ramauli-Pratapur, Rambhori and Bhata area of PNP | Times | 3 | 500 | 0 | 525 | 0 | 0 | 0 | 550 | 0 | 0 | 0 | 600 | 1675 |
| 2.9 | Study and translocate rhinos from south-western part of Valmiki area and southern part of CNP-PNP complex to secure rhino population | Times | 3 | 300 | 0 | 0 | 330 | 0 | 0 | 330 | 0 | 0 | 0 | 360 | 1020 |

| SN | Actions | Unit | No. | Rate | 1st Year | 2nd Year | 3rd Year | 4th Year | 5th Year | 6th Year | 7th Year | 8th Year | 9th Year | 10th Year | Total Amount |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 2.1 | Conduct study on the overstocking problems (e.g., self-inflicted deaths, diseases) of rhinos in western part of CNP. | Times | 3 | 300 | 0 | 0 | 0 | 0 | 360 | 0 | 345 | 0 | 360 | 0 | 1065 |
| 2.11 | Provide support to central veterinary laboratory to enhance its capabilities in detecting parasites, viral and bacterial diseases on wildlife. | Times | 10 | 350 | 1166.67 | 1225 | 1347.5 | 1341.67 | 1400 | 1400 | 1400 | 1400 | 1400 | 1400 | 13480.833 |
| 2.12 | Provide wildlife health training to veterinary personnel, covering rescue techniques and methods for safely handling and restraining animals. | Times | 10 | 300 | 1000 | 333.333 | 350 | 385 | 383.333 | 400 | 400 | 400 | 400 | 400 | 4451.6667 |
| 2.13 | Carry out regular vaccination programs for livestock in the peripheral regions of rhino habitats to mitigate the transmission of diseases between rhinoceros and domestic animals. | 0 | 10 | 600 | 2000 | 666.667 | 700 | 770 | 766.667 | 800 | 800 | 800 | 800 | 800 | 8903.3333 |
| 2.14 | Prepare a strategic plan and guidelines for orphan calf and injured rhino management. | Times | 2 | 300 | 0 | 0 | 315 | 0 | 330 | 0 | 0 | 0 | 0 | 0 | 645 |
| 2.15 | Train staff and volunteers in capture, transport, and release protocols. | Times | 10 | 400 | 400 | 400 | 420 | 420 | 440 | 440 | 460 | 460 | 480 | 480 | 4400 |
| 2.16 | Provide a safe and comfortable shelter with adequate ventilation and protection from harsh weather conditions. | Times | 10 | 800 | 800 | 800 | 840 | 840 | 880 | 880 | 920 | 920 | 960 | 960 | 8800 |
| 2.17 | Support to establish Rhino Emergency Rescue Fund in collaboration with relevant stakeholders including private donors. | Times | 10 | 500 | 500 | 500 | 525 | 525 | 550 | 550 | 575 | 575 | 600 | 600 | 5500 |
| 2.18 | Provide support to implement “Adopt a Rhino” program to support orphan and injured individuals. | Times | 10 | 300 | 300 | 300 | 315 | 315 | 330 | 330 | 345 | 345 | 360 | 360 | 3300 |
| 2.19 | Prepare operational guidelines with required budget for Rhino Sanctuary. | Times | 1 | 300 | 300 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 300 |

| SN | Actions | Unit | No. | Rate | 1st Year | 2nd Year | 3rd Year | 4th Year | 5th Year | 6th Year | 7th Year | 8th Year | 9th Year | 10th Year | Total Amount |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 2.2 | Collaborate with local authorities, provincial government, and federal government, wildlife conservation organizations, and experts to construct and implement rescue center. | Times | 10 | 500 | 500 | 500 | 525 | 525 | 550 | 550 | 575 | 575 | 600 | 600 | 5500 |
| 2.21 | Develop a 'Rhino Sanctuary' in a suitable site of KTWR. | Times | 10 | 500 | 500 | 500 | 525 | 525 | 550 | 550 | 575 | 575 | 600 | 600 | 5500 |
| 2.22 | Support Rhino Sanctuary with human resource, wildlife ambulance, veterinary facilities, etc. | Times | 10 | 900 | 900 | 900 | 945 | 945 | 990 | 990 | 1035 | 1035 | 1080 | 1080 | 9900 |
| | **Sub Total** | | | | **35317** | **34913** | **37896** | **36779** | **40080** | **39795** | **38930** | **38825** | **39500** | **40340** | **382375** |
| | **Objective 3: Secure Rhino Habitats** | | | | | | | | | | | | | | |
| 3.1 | Assess suitability of rhino habitat by identifying land use and land cover changes considering present and future climate scenarios | Times | 2 | 1200 | 0 | 1260 | 0 | 0 | 0 | 0 | 1440 | 0 | 0 | 0 | 2700 |
| 3.2 | Study the functionality of existing corridors and connectivity. | Times | 2 | 800 | 800 | 0 | 0 | 0 | 0 | 0 | 0 | 880 | 0 | 0 | 1680 |
| 3.3 | Identify prospective potential rhino habitats as well as new corridors within protected areas. | Times | 3 | 600 | 600 | 0 | 660 | 0 | 0 | 0 | 0 | 0 | 720 | 0 | 1980 |
| 3.4 | Undertake studies to assess the effectiveness of Wildlife-friendly Infrastructure Construction Directives 2022 and policies, strategies, plans and guidelines related to rhino conservation. | Times | 2 | 750 | 0 | 0 | 0 | 862.5 | 0 | 0 | 0 | 0 | 0 | 900 | 1762.5 |
| 3.5 | Undertake study to control IAPS with special focus on rhino habitat. | Times | 1 | 900 | 0 | 0 | 0 | 0 | 1080 | 0 | 0 | 0 | 0 | 0 | 1080 |
| 3.6 | Carry out study to control grazing in the BZ Community Forest and in the biological corridors. | Times | 2 | 1200 | 1200 | 0 | 0 | 0 | 0 | 1440 | 0 | 0 | 0 | 0 | 2640 |
| 3.7 | Revise and implement IAPS Management Strategy and provide sustainable solutions. | Times | 1 | 300 | 0 | 315 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 315 |

| SN | Actions | Unit | No. | Rate | 1st Year | 2nd Year | 3rd Year | 4th Year | 5th Year | 6th Year | 7th Year | 8th Year | 9th Year | 10th Year | Total Amount |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 3.8 | Establish experimental plots at CNP to monitor grasslands and prescribe appropriate grassland management intervention for rhino | Times | 5 | 400 | 0 | 420 | 0 | 420 | 0 | 440 | 0 | 460 | 0 | 480 | 2220 |
| 3.9 | Evacuate encroachment of rhino habitats from Bhiman in PNP and Bandarjhula and Shikaribas of CNP including the biological corridors. | Times | 3 | 300 | 0 | 315 | 0 | 0 | 360 | 0 | 0 | 0 | 360 | 0 | 1035 |
| 3.1 | Prepare a strategic plan for regular water supply in Geruwa River. | Times | 1 | 500 | 500 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 500 |
| 3.11 | Implement activities prescribed in the Environment Management Plan as mitigation measures recommended in the Environmental Impact Assessment (EIA) and Initial Environmental Examination (IEE) reports. | Times | 10 | 1600 | 1600 | 1600 | 1680 | 1680 | 1760 | 1760 | 1840 | 1840 | 1920 | 1920 | 17600 |
| 3.12 | Carry out plantation in the upstream to conserve soil and water. | Times | 5 | 1200 | 0 | 1200 | 0 | 1260 | 0 | 1320 | 0 | 1380 | 0 | 1440 | 6600 |
| 3.13 | Coordinate with government to resettle the settlements from critical rhino habitats including eastern/southern part of CNP (e.g., Shikaribas) and lowland regions of PNP. | Times | 4 | 500 | 200 | 0 | 210 | 0 | 220 | 0 | 230 | 0 | 0 | 0 | 860 |
| 3.14 | Provide compensation for the HHs whose house and land are shifted to secure rhino habitats. | Times | 10 | 40000 | 40000 | 40000 | 42000 | 42000 | 44000 | 44000 | 46000 | 46000 | 48000 | 48000 | 440000 |
| 3.15 | Undertake habitat restoration activities in the removed settlement sites. | Times | 5 | 5000 | 5000 | 0 | 5250 | 0 | 5500 | 0 | 5750 | 0 | 6000 | 0 | 27500 |
| 3.16 | Provide support to livelihood improvement activities for the HHs who have been shifted from the potential rhino habitat or biological corridors. | Times | 10 | 3500 | 3500 | 3500 | 3675 | 3675 | 3850 | 3850 | 4025 | 4025 | 4200 | 4200 | 38500 |
| 3.17 | Undertake conservation awareness activities through radio, FM, television and social media to control forest fire during windy season. | Times | 10 | 450 | 450 | 450 | 472.5 | 472.5 | 495 | 495 | 517.5 | 517.5 | 540 | 540 | 4950 |

| SN | Actions | Unit | No. | Rate | 1st Year | 2nd Year | 3rd Year | 4th Year | 5th Year | 6th Year | 7th Year | 8th Year | 9th Year | 10th Year | Total Amount |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 3.18 | Recruit forest fire watchers for three months to monitor the forest against forest fire. | No. | 120 | 150 | 1800 | 1800 | 1890 | 1890 | 1980 | 1980 | 2070 | 2070 | 2160 | 2160 | 19800 |
| 3.19 | Support CFUGs in the biological corridors with respect to wildlife tourism. | Times | 10 | 300 | 300 | 300 | 315 | 315 | 330 | 346.5 | 345 | 345 | 360 | 360 | 3316.5 |
| 3.2 | Undertake inventory, mapping of critical wetlands in all the rhino bearing PAs | Times | 3 | 800 | 240 | 0 | 0 | 0 | 264 | 0 | 0 | 0 | 288 | 0 | 792 |
| 3.21 | Construct reservoir/waterhole/ponds in dry areas near grasslands of eastern part of CNP, BNP and PNP by using Chure stream water during high flow season. | No. | 30 | 700 | 2100 | 2100 | 2205 | 2205 | 2310 | 2425.5 | 2415 | 2415 | 2520 | 2520 | 23215.5 |
| 3.22 | Repair and maintain existing wetlands and waterholes in PNP, CNP, BNP and ShNP. | No. | 25 | 1000 | 2500 | 2500 | 2625 | 2625 | 2750 | 2887.5 | 2875 | 2875 | 3000 | 3000 | 27637.5 |
| 3.23 | Install additional solar water pumps to replenish the water holes and upkeep existing waterholes. | No. | 20 | 800 | 1600 | 1600 | 1680 | 1680 | 1760 | 1848 | 1840 | 1840 | 1920 | 1920 | 17688 |
| 3.24 | Prepare a strategic plan for regular water supply in Geruwa River. | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 3.25 | Open a channel for securing water in the Geruwa river. | Times | 10 | 300 | 300 | 300 | 315 | 315 | 330 | 346.5 | 345 | 345 | 360 | 360 | 3316.5 |
| 3.26 | Clear and clean weeds and IAPS from wetlands and reintroduce indigenous palatable wetland plants. | Times | 10 | 800 | 800 | 800 | 840 | 840 | 880 | 924 | 920 | 920 | 960 | 960 | 8844 |
| 3.27 | Conduct regular monitoring of wetlands and waterholes to assess the water quality (e.g., pollution situation, microbial activity and poisoning). | Times | 10 | 500 | 500 | 500 | 525 | 525 | 550 | 577.5 | 575 | 575 | 600 | 600 | 5527.5 |
| 3.28 | Monitor agricultural lands against use of harmful pesticides in buffer zones of all the PAs and declare rhino safe zone. | Times | 10 | 600 | 600 | 600 | 630 | 630 | 660 | 693 | 690 | 690 | 720 | 720 | 6633 |
| 3.29 | Provide support to empower communities in buffer zones to proficiently oversee waterways, riparian areas, and ponds. | Times | 10 | 500 | 500 | 500 | 525 | 525 | 550 | 577.5 | 575 | 575 | 600 | 600 | 5527.5 |

| SN | Actions | Unit | No. | Rate | 1st Year | 2nd Year | 3rd Year | 4th Year | 5th Year | 6th Year | 7th Year | 8th Year | 9th Year | 10th Year | Total Amount |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 3.3 | Collaborate with communities and local authorities to undertake the restoration and management of wetlands within corridors and other possible rhino habitats. | Times | 10 | 1000 | 1000 | 1000 | 1050 | 1050 | 1100 | 1155 | 1150 | 1150 | 1200 | 1200 | 11055 |
| 3.31 | Study, plan and develop climate refugia sites (e.g., raised mounts) during flash flood | Times | 10 | 500 | 500 | 500 | 525 | 525 | 550 | 577.5 | 575 | 575 | 600 | 600 | 5527.5 |
| 3.32 | Carry out a thorough inventory on PA occupied Chure range | Times | 2 | 500 | 0 | 0 | 0 | 525 | 0 | 0 | 0 | 0 | 0 | 600 | 1125 |
| 3.33 | Clear Chure stream beds for regular water flow to secure water in PNP, CNP and BNP | Times | 10 | 500 | 500 | 500 | 525 | 525 | 550 | 577.5 | 575 | 575 | 600 | 600 | 5527.5 |
| 3.34 | Conduct spatial mapping of flood-prone zones and prepare maps. | Times | 2 | 250 | 0 | 0 | 262.5 | 0 | 0 | 0 | 287.5 | 0 | 0 | 0 | 550 |
| 3.35 | Carry out study of environmental flow of river systems of rhino bearing PAs | Times | 3 | 300 | 0 | 300 | 0 | 0 | 330 | 0 | 0 | 345 | 0 | 0 | 975 |
| 3.36 | Conduct study towards changes in hydrological patterns to assess impact of fluvial action in the floodplain ecosystem | Times | 3 | 300 | 0 | 0 | 315 | 0 | 0 | 315 | 0 | 0 | 360 | 0 | 990 |
| 3.37 | Prepare comprehensive chure upstream conservation plan of CNP, BNP, PNP and ShNP to secure water and maintain for regular water flow | Times | 3 | 400 | 400 | 0 | 0 | 420 | 0 | 0 | 460 | 0 | 0 | 0 | 1280 |
| 3.38 | Revise and implement strategy for river base habitats to safeguard from degradation and pollution (e.g., plastic pollution in Narayani River). | Times | 10 | 250 | 250 | 250 | 262.5 | 262.5 | 275 | 288.75 | 287.5 | 287.5 | 300 | 300 | 2763.75 |
| 3.39 | Undertake study to assess impact of burning on grassland specific species | Times | 3 | 250 | 0 | 0 | 262.5 | 0 | 0 | 262.5 | 0 | 0 | 300 | 0 | 825 |
| 3.4 | Undertake inventory and spatial mapping of grasslands in all the rhino bearing PAs. | Times | 3 | 300 | 0 | 300 | 0 | 0 | 330 | 0 | 0 | 345 | 0 | 0 | 975 |
| 3.41 | Conduct spatial mapping of forest fire incidents and prepare maps. | Times | 2 | 250 | 50 | 50 | 52.5 | 52.5 | 55 | 57.75 | 57.5 | 57.5 | 60 | 60 | 552.75 |
| 3.42 | Carry out mapping of IAPS affecting rhino population. | Times | 2 | 300 | 60 | 60 | 63 | 63 | 66 | 69.3 | 69 | 69 | 72 | 72 | 663.3 |

| SN | Actions | Unit | No. | Rate | 1st Year | 2nd Year | 3rd Year | 4th Year | 5th Year | 6th Year | 7th Year | 8th Year | 9th Year | 10th Year | Total Amount |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 3.43 | Conduct a thorough study on the impact of grassland management and IAPS control interventions | Times | 2 | 350 | 0 | 350 | 0 | 0 | 0 | 0 | 402.5 | 0 | 0 | 0 | 752.5 |
| 3.44 | Undertake study to assess impact of burning on grassland specific species | Times | 2 | 250 | 250 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 300 | 0 | 550 |
| 3.45 | Conduct study to assess impact of IAPS in native rhino food plant and its impact on rhino health | Times | 2 | 300 | 0 | 300 | 0 | 0 | 0 | 315 | 0 | 0 | 0 | 0 | 615 |
| 3.46 | Carry out studies aimed at comprehending vegetation dynamics to assess changes in plant structure in different habitats | Times | 2 | 350 | 0 | 0 | 367.5 | 0 | 0 | 0 | 0 | 402.5 | 0 | 0 | 770 |
| 3.47 | Create new grasslands by converting wood lands into grasslands. | Times | 5 | 300 | 0 | 315 | 0 | 345 | 0 | 315 | 0 | 315 | 0 | 360 | 1650 |
| 3.48 | Manage grassland by manual cutting, mechanical cutting and control burning focused to rhino conservation. | Times | 10 | 1500 | 1500 | 1500 | 1575 | 1575 | 1650 | 1732.5 | 1725 | 1725 | 1800 | 1800 | 16582.5 |
| 3.49 | Treat the IAS by burning, cleaning, uprooting. | Times | 10 | 300 | 300 | 300 | 315 | 315 | 330 | 346.5 | 345 | 345 | 360 | 360 | 3316.5 |
| 3.5 | Carry out mapping of IAPS affecting rhino population. | Times | 10 | 200 | 200 | 200 | 210 | 210 | 220 | 231 | 230 | 230 | 240 | 240 | 2211 |
| 3.51 | Conduct study of potential impacts of climate change on grassland dynamics and spread of IAS on the grasslands. | Times | 4 | 200 | 266.667 | 0 | 220 | 0 | 0 | 210 | 0 | 230 | 0 | 0 | 926.66667 |
| 3.52 | Support livestock husbandry HHs by providing improved grass seed to produce grass in the farm. | Times | 10 | 400 | 400 | 400 | 420 | 420 | 440 | 462 | 460 | 460 | 480 | 480 | 4422 |
| 3.53 | Provide support to stall feeding to domesticated livestock | Times | 10 | 400 | 400 | 400 | 420 | 420 | 440 | 462 | 460 | 460 | 480 | 480 | 4422 |
| 3.54 | Implement activities to restore Old Padampur area that mimic with savanna as 'Padampur Phanta'. | Times | 5 | 1000 | 0 | 1050 | 0 | 1150 | 0 | 1050 | 0 | 1050 | 0 | 1200 | 5500 |
| 3.55 | Undertake independent assessments to evaluate the potential impacts of proposed large linear infrastructures on rhino populations and their essential habitats. | Times | 4 | 200 | 266.667 | 0 | 220 | 0 | 0 | 210 | 0 | 230 | 0 | 0 | 926.66667 |

| SN | Actions | Unit | No. | Rate | 1st Year | 2nd Year | 3rd Year | 4th Year | 5th Year | 6th Year | 7th Year | 8th Year | 9th Year | 10th Year | Total Amount |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 3.56 | Conduct regular meeting with Department of Roads, Irrigation and Railways; international financial institutions and private sector to comply to follow the Wildlife-friendly Infrastructure Construction Directives 2022'. | Times | 10 | 200 | 200 | 200 | 210 | 210 | 220 | 231 | 230 | 230 | 240 | 240 | 2211 |
| 3.57 | Carry out field work with respect to provide field study report with respect to environment studies. | Times | 5 | 250 | 0 | 262.5 | 0 | 287.5 | 0 | 262.5 | 0 | 262.5 | 0 | 300 | 1375 |
| 3.58 | Form strong lobby against the linear infrastructure that is supposed to fragment the rhino habitat. | Times | 5 | 200 | 0 | 210 | 0 | 230 | 0 | 210 | 0 | 210 | 0 | 240 | 1100 |
| 3.59 | Publish the impact of the linear infrastructure to rhino conservation in national newspapers. | Times | 10 | 150 | 150 | 150 | 157.5 | 157.5 | 165 | 173.25 | 172.5 | 172.5 | 180 | 180 | 1658.25 |
| 3.6 | Raise awareness among stakeholders at every level about the potential adverse effects of large linear infrastructures on rhino populations. | Times | 10 | 200 | 200 | 200 | 210 | 210 | 220 | 231 | 230 | 230 | 240 | 240 | 2211 |
| 3.61 | Organize workshops at local, national, and regional levels to educate politicians, policymakers, and donors about the implications of large linear infrastructures on wildlife conservation. | Times | 10 | 200 | 200 | 200 | 210 | 210 | 220 | 231 | 230 | 230 | 240 | 240 | 2211 |
| 3.62 | Identify, design, and build wildlife-friendly flyovers or underpasses at strategic sites with the support of DoR, such as Barandabhar in CNP, PNP, and BNP. | No. | 10 | 500 | 500 | 500 | 525 | 525 | 550 | 577.5 | 575 | 575 | 600 | 600 | 5527.5 |
| 3.63 | Study and declare 'No Go' and 'No Developmental Activities Zone' for securing core rhino habitats. | No. | 1 | 500 | 0 | 500 | 525 | 0 | 0 | 0 | 0 | 0 | 0 | 600 | 1625 |
| | **Sub Total** | | | | **72683.3** | **70057.5** | **74400.5** | **71608** | **77340** | **76464.6** | **80974** | **78514** | **83880** | **81672** | **767593.88** |
| | **Objective 4: Enhance Research and Monitoring** | | | | | | | | | | | | | | |

| SN | Actions | Unit | No. | Rate | 1st Year | 2nd Year | 3rd Year | 4th Year | 5th Year | 6th Year | 7th Year | 8th Year | 9th Year | 10th Year | Total Amount |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 4.1 | Provide support to operationalize the Research and Training Institute on Protected Area and Wildlife Conservation at Lalmati, Bardia. | Times | 10 | 500 | 500 | 500 | 525 | 525 | 550 | 550 | 575 | 575 | 600 | 600 | 5500 |
| 4.2 | Provide support to academic institutions to carry out studies related to rhino conservation. | Times | 10 | 400 | 400 | 400 | 420 | 420 | 440 | 440 | 460 | 460 | 480 | 480 | 4400 |
| 4.3 | Prepare an updated bibliography on rhino research and conservation activities in Nepal. | Times | 3 | 400 | 0 | 420 | 0 | 0 | 440 | 0 | 0 | 480 | 0 | 0 | 1340 |
| 4.4 | Develop at least one field-based research centers in CNP and BNP | No. | 2 | 2500 | 0 | 0 | 0 | 0 | 0 | 2750 | 0 | 3000 | 0 | 0 | 5750 |
| 4.5 | Prepare annual plan of priority research areas and involve universities and students from Nepal in wildlife monitoring and research activities. | Times | 10 | 500 | 500 | 500 | 525 | 525 | 550 | 550 | 575 | 575 | 600 | 600 | 5500 |
| 4.6 | Provide internship/short-term position (2-3/PAs) to young graduates of biological sciences and involve them in periodic research and preparation/revision of management plans of PAs. | No. | 10 | 50 | 50 | 50 | 52.5 | 52.5 | 55 | 55 | 57.5 | 57.5 | 60 | 60 | 550 |
| 4.7 | Support to strengthen the capabilities of the genetic laboratory within NAST to carry out genetic sequencing and forensic capacity. | Times | 10 | 500 | 500 | 500 | 525 | 525 | 550 | 550 | 575 | 575 | 600 | 600 | 5500 |
| 4.8 | Conduct study to analyze population dynamics of rhino in CNP | 3 | 10 | 300 | 0 | 0 | 315 | 0 | 0 | 330 | 0 | 0 | 360 | 0 | 1005 |
| 4.9 | Organize rhino counts in all the rhino bearing PAs including the forests and biological corridors of DFOs at every 4 to 5 years and prepare report. | Times | 2 | 2500 | 0 | 0 | 0 | 0 | 0 | 2750 | 0 | 0 | 3000 | 0 | 5750 |
| 4.1 | Conduct an evaluation of the viability of rhino populations and the carrying capacity of all protected areas. | Times | 2 | 350 | 0 | 0 | 367.5 | 0 | 0 | 0 | 402.5 | 0 | 0 | 0 | 770 |
| 4.11 | Undertake genetic variability study between rhinos in BNP and CNP | Times | 2 | 400 | 0 | 0 | 0 | 420 | 0 | 0 | 0 | 0 | 480 | 0 | 900 |

| SN | Actions | Unit | No. | Rate | 1st Year | 2nd Year | 3rd Year | 4th Year | 5th Year | 6th Year | 7th Year | 8th Year | 9th Year | 10th Year | Total Amount |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 4.12 | Undertake comprehensive study of rhino-elephant interaction as both rhino and elephant populations are increasing | Times | 2 | 300 | 0 | 0 | 0 | 0 | 345 | 0 | 0 | 0 | 0 | 360 | 705 |
| 4.13 | Conduct a thorough inventory of rhino diseases and potential impacts of zoonotic diseases | Times | 2 | 400 | 0 | 440 | 0 | 0 | 440 | 0 | 0 | 0 | 480 | 0 | 1360 |
| 4.14 | Revise and strengthen protocols for individual identity (ID) based rhino monitoring | Times | 3 | 250 | 0 | 0 | 0 | 262.5 | 0 | 0 | 0 | 0 | 300 | 0 | 562.5 |
| 4.15 | Prepare genetic profile of maximum possible individuals and maintain in the BCC lab | Times | 3 | 350 | 350 | 0 | 0 | 367.5 | 0 | 0 | 0 | 0 | 420 | 0 | 1137.5 |
| 4.16 | Carry out study in all rhino bearing PAs to assess contribution of rhino tourism to regional economy | Times | 4 | 400 | 400 | 0 | 0 | 460 | 0 | 0 | 460 | 0 | 0 | 480 | 1800 |
| 4.17 | Undertake a study on the impacts of tourism, anthropogenic pressure, land use change, infrastructure, livestock on rhinos and their habitats. | Times | 2 | 450 | 0 | 450 | 0 | 0 | 0 | 495 | 0 | 0 | 0 | 0 | 945 |
| 4.18 | Carry out study to identify extent of impact of upstream development activities of the rhino bearing PAs | Times | 4 | 400 | 400 | 400 | 0 | 0 | 0 | 0 | 460 | 0 | 0 | 0 | 1260 |
| 4.19 | Conduct study to identify the effectiveness of corridor and connectivity on rhino conservation in Nepal | Times | 3 | 350 | 0 | 0 | 367.5 | 0 | 0 | 0 | 402.5 | 0 | 0 | 420 | 1190 |
| 4.2 | Conduct a feasibility study on the extension of habitats and corridors, e.g., Rambhori Bhata and extended areas of PNP, BNP-BaNP complex | Times | 3 | 500 | 0 | 500 | 0 | 0 | 550 | 0 | 0 | 0 | 0 | 600 | 1650 |
| 4.21 | Conduct study of potential impacts of climate change on grassland dynamics and spread of IAPS on the grasslands. | Times | 3 | 500 | 500 | 0 | 0 | 525 | 0 | 0 | 0 | 0 | 0 | 600 | 1625 |
| 4.22 | Carry out research to project impact of climate change in rhinos and their habitat with at least 2050, 2100 and 2150 scenarios | Times | 3 | 500 | 0 | 500 | 0 | 0 | 550 | 0 | 0 | 0 | 600 | 0 | 1650 |

| SN | Actions | Unit | No. | Rate | 1st Year | 2nd Year | 3rd Year | 4th Year | 5th Year | 6th Year | 7th Year | 8th Year | 9th Year | 10th Year | Total Amount |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 4.23 | Implement Wildlife Health Action Plan 2023-2032 and monitor diseases and parasites affecting rhinos and other species sharing the same habitat. | Times | 5 | 600 | 750 | 0 | 787.5 | 0 | 825 | 0 | 862.5 | 0 | 0 | 900 | 4125 |
| 4.24 | Carry out study to assess potential impacts of emerging urban hubs in BZ areas – Madi, Kawaswoti, Sauraha, Gitanagar etc in Chitwan and similar in other areas | Times | 2 | 500 | 0 | 0 | 500 | 0 | 0 | 0 | 0 | 575 | 0 | 0 | 1075 |
| 4.25 | Support rangers and officers for certificate/ diploma/graduate/post-graduate courses in wildlife and habitat management at national and international institutions. | No. | 10 | 300 | 300 | 300 | 315 | 315 | 330 | 330 | 345 | 345 | 360 | 360 | 3300 |
| 4.26 | Conduct training to prepare databases. | Times | 5 | 500 | 500 | 0 | 525 | 0 | 550 | 0 | 575 | 0 | 600 | 0 | 2750 |
| 4.27 | Conduct trainings for CBAPUs, community members, and citizen scientists on surveying and reporting rhino movements to local forest and protected areas. | Times | 10 | 800 | 800 | 800 | 840 | 840 | 880 | 880 | 920 | 920 | 960 | 960 | 8800 |
| 4.28 | Provide support to enhance the capabilities of frontline staff to identify, document, and report instances of illness, disease or poor health of rhinos and other animals that share same habitats. | Times | 10 | 800 | 800 | 800 | 840 | 840 | 880 | 880 | 920 | 920 | 960 | 960 | 8800 |
| 4.29 | Develop policy and involve government agencies, NGOs, and international organizations to ensure One Health principles. | No. | 1 | 450 | 450 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 450 |
| 4.3 | Organize meetings/workshops/ conferences on rhino conservation at national, regional, and international levels. | Times | 10 | 1000 | 1000 | 1000 | 1050 | 1050 | 1100 | 1100 | 1150 | 1150 | 1200 | 1200 | 11000 |
| | **Sub Total** | | | | **8200** | **7560** | **7955** | **7127.5** | **9035** | **11660** | **8740** | **9632.5** | **12060** | **9180** | **91150** |
| | **Objective 5: Manage human-rhino conflict through community involvement** | | | | | | | | | | | | | | |
| 5.1 | Prepare and implement the national level HWC strategy for conflict to co-existence. | Times | 2 | 300 | 0 | 0 | 315 | 315 | 0 | 0 | 0 | 0 | 0 | 0 | 630 |

| SN | Actions | Unit | No. | Rate | 1st Year | 2nd Year | 3rd Year | 4th Year | 5th Year | 6th Year | 7th Year | 8th Year | 9th Year | 10th Year | Total Amount |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 5.2 | Provide support to regulate the Wildlife Damage Relief Guidelines of 2080 to streamline claims procedures, minimize delays, and improve transparency and efficiency across all levels. | Times | 10 | 400 | 400 | 400 | 420 | 420 | 440 | 440 | 460 | 460 | 480 | 480 | 4400 |
| 5.3 | Establish Wildlife Relief Endowment Fund with alignment of Wildlife Conservation Funds, Forest Development Fund, NTNC fund, community level funds and other additional funds to strengthen one-door management strategies under DNPWC. | Times | 10 | 800 | 800 | 800 | 840 | 840 | 880 | 880 | 920 | 920 | 960 | 960 | 8800 |
| 5.4 | Establish and put into operation market-driven insurance schemes for covering human, livestock, property, and crops. | Times | 10 | 500 | 500 | 500 | 525 | 525 | 550 | 550 | 575 | 575 | 600 | 600 | 5500 |
| 5.5 | Provide support to formulate a strategy for promoting responsibility among individuals, private sectors, and corporations. | Times | 5 | 200 | 200 | 0 | 210 | 0 | 220 | 0 | 230 | 0 | 240 | 0 | 1100 |
| 5.6 | Develop strategic plan for promoting private sector investment in nature-based tourism in PAs and BZs. | Times | 2 | 300 | 0 | 300 | 0 | 0 | 0 | 330 | 0 | 0 | 0 | 0 | 630 |
| 5.7 | Support and empower government entities and conservation partners to obtain external funding from ADB, World Bank, the Green Climate Fund (GCF), and GEF funds. | Times | 10 | 500 | 500 | 500 | 525 | 525 | 550 | 550 | 575 | 575 | 600 | 600 | 5500 |
| 5.8 | Provide support to erect solar/electric fence to ward off rhinos coming into villages to minimize crop raiding | KM | 40 | 350 | 1400 | 1400 | 1470 | 368 | 1540 | 1540 | 1610 | 1610 | 1680 | 1680 | 14298 |
| 5.9 | Organize awareness activities to inform local communities about rhino behavior and discourage them going into rhino-hotspots areas to mitigate potential risks and prevent confrontations. | Times | 10 | 200 | 200 | 200 | 210 | 210 | 220 | 220 | 230 | 230 | 240 | 240 | 2200 |

| SN | Actions | Unit | No. | Rate | 1st Year | 2nd Year | 3rd Year | 4th Year | 5th Year | 6th Year | 7th Year | 8th Year | 9th Year | 10th Year | Total Amount |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 5.1 | Prepare mobile applications and an online database to develop a comprehensive documentation of HRC and generate analytical reports to inform adaptive management strategies such as the safe system approach. | Times | 2 | 400 | 400 | 0 | 420 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 820 |
| 5.11 | Impart training to park staff and DFOs on techniques for managing and handling problematic animals and implement a manual detailing procedures for rescuing and handling stray rhinos. | Times | 10 | 400 | 400 | 400 | 420 | 420 | 440 | 440 | 460 | 460 | 480 | 480 | 4400 |
| 5.12 | Develop nature-based solution to maintain HRC below thresholds (e.g., declare no go zone in selected sites of PAs). | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 5.13 | Provide training to personnel from PAs, forest departments, local governments, Community-Based Anti-Poaching Units (CBAPUs), Community-Based Organizations (CBOs), and Rapid Response Teams on managing human-wildlife conflicts. | Times | 10 | 300 | 300 | 300 | 315 | 315 | 330 | 330 | 345 | 345 | 360 | 360 | 3300 |
| 5.14 | Carry out study to assess impact of BZ fund mobilization | Times | 3 | 300 | 0 | 300 | 0 | 0 | 0 | 330 | 0 | 0 | 0 | 360 | 990 |
| 5.15 | Carry out research to investigate the scale, extent, and local variations in the intensity of rhino-human conflict, as well as potential mitigation measures | Times | 4 | 300 | 300 | 0 | 0 | 315 | 0 | 0 | 345 | 0 | 0 | 360 | 1320 |
| 5.16 | Conduct study about social and behavioral changes of local communities in rhino conservation – a comparative study between scenarios of early 1970s and now | Times | 3 | 300 | 0 | 300 | 0 | 0 | 330 | 0 | 0 | 345 | 0 | 0 | 975 |
| 5.17 | Undertake study regarding status and impact of HWC relief support | Times | 3 | 300 | 0 | 0 | 315 | 0 | 0 | 330 | 0 | 0 | 360 | 0 | 1005 |
| 5.18 | Carry out study towards effectiveness of CBAPUs and WCCBs | Times | 2 | 300 | 0 | 0 | 0 | 315 | 0 | 0 | 0 | 0 | 0 | 360 | 675 |

| SN | Actions | Unit | No. | Rate | 1st Year | 2nd Year | 3rd Year | 4th Year | 5th Year | 6th Year | 7th Year | 8th Year | 9th Year | 10th Year | Total Amount |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 5.19 | Provide assistance for alternative livelihood opportunities to reduce interactions with rhinos. | Times | 10 | 500 | 500 | 500 | 525 | 525 | 550 | 550 | 575 | 575 | 600 | 600 | 5500 |
| 5.2 | Support cultivation of alternative cash crops and the use of repellents in buffer zones and surrounding areas. | Times | 10 | 350 | 350 | 350 | 368 | 368 | 385 | 385 | 403 | 403 | 420 | 420 | 3850 |
| 5.21 | Provide assistance to families affected by rhino-related issues for education, livelihood support and nature-based tourism enterprises. | Times | 10 | 500 | 500 | 500 | 525 | 525 | 550 | 550 | 575 | 575 | 600 | 600 | 5500 |
| 5.22 | Provide support for alternative energy sources such as biogas, LPG gas and electric cooking stoves. | Times | 10 | 500 | 500 | 500 | 525 | 525 | 550 | 550 | 575 | 575 | 600 | 600 | 5500 |
| 5.23 | Organize ecotourism initiatives to positively impact local communities. | Times | 5 | 400 | 400 | 0 | 420 | 0 | 440 | 0 | 460 | 0 | 480 | 0 | 2200 |
| 5.24 | Provide soft loans or micro-credit to economically disadvantaged and marginalized individuals, including women within critical conservation sites, to invest in small-scale agricultural-biodiversity enterprises such as agro-products, handicrafts and other products. | Times | 10 | 500 | 500 | 500 | 525 | 525 | 550 | 550 | 575 | 575 | 600 | 600 | 5500 |
| 5.25 | Conduct exposure visits for local communities on rhino-human coexistence. | Times | 10 | 400 | 400 | 400 | 420 | 420 | 440 | 440 | 460 | 460 | 480 | 480 | 4400 |
| 5.26 | Provide support to institutionalize buffer zone institutions to foster stewardship in rhino conservation. | Times | 10 | 300 | 300 | 300 | 315 | 315 | 330 | 330 | 345 | 345 | 360 | 360 | 3300 |
| 5.27 | Coordinate initiatives and engagement activities aimed at enhancing conservation awareness among youths. | Times | 10 | 200 | 200 | 200 | 210 | 210 | 220 | 220 | 230 | 230 | 240 | 240 | 2200 |
| 5.28 | Develop a training syllabus and appropriate resources for nature guides. | Times | 2 | 500 | 500 | 0 | 0 | 550 | 0 | 0 | 0 | 0 | 0 | 0 | 1050 |
| 5.29 | Provide support to implement conservation awareness activities to promote behavioral change among students in schools and colleges. | Times | 10 | 200 | 200 | 200 | 210 | 210 | 220 | 220 | 230 | 230 | 240 | 240 | 2200 |

| SN | Actions | Unit | No. | Rate | 1st Year | 2nd Year | 3rd Year | 4th Year | 5th Year | 6th Year | 7th Year | 8th Year | 9th Year | 10th Year | Total Amount |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 5.3 | Organize conservation awareness initiatives focused on indigenous groups including women, students, and young individuals. | Times | 10 | 300 | 300 | 300 | 315 | 315 | 330 | 330 | 345 | 345 | 360 | 360 | 3300 |
| 5.31 | Prepare a handbook on "People's Responsibility on Biodiversity Conservation" and impart in school education programs. | Times | 2 | 350 | 350 | 0 | 0 | 385 | 0 | 0 | 0 | 0 | 0 | 0 | 735 |
| 5.32 | Conduct periodic excursion for social activists, advocacy groups, and community leaders to disseminate the importance of rhino conservation. | Times | 10 | 500 | 500 | 500 | 525 | 525 | 550 | 550 | 575 | 575 | 600 | 600 | 5500 |
| 5.33 | Provide support to discourage people to install electric shock wires that kill both human and rhino. | Times | 10 | 100 | 100 | 100 | 105 | 105 | 110 | 110 | 115 | 115 | 120 | 120 | 1100 |
| | **Sub Total** | | | | **11000** | **9750** | **10973** | **10070** | **10725** | **10725** | **11213** | **10523** | **11700** | **11700** | **108378** |
| | **Objective 8: Strengthen support and cooperation: Local, National and International level** | | | | | | | | | | | | | | |
| 6.1 | Organize meetings to enhance partnerships with local and provincial authorities to leverage financial resources effectively. | Times | 10 | 300 | 300 | 300 | 315 | 315 | 330 | 330 | 345 | 345 | 360 | 360 | 3300 |
| 6.2 | Undertake study to initiate to propose major rivers (Koshi, Gandaki and Karnali) as River Basin Protected Areas by coordinating with three tiers of government for the establishment. | Times | 4 | 800 | 0 | 840 | 0 | 840 | 0 | 880 | 0 | 880 | 0 | 0 | 3440 |
| 6.3 | Organize workshops to pilot community-based insurance scheme by involving local government and devise a system for providing compensation to wildlife affected families. | Times | 5 | 300 | 300 | 0 | 315 | 0 | 330 | 0 | 345 | 0 | 360 | 0 | 1650 |
| 6.4 | Provide free education to wildlife victim families coordinating education ministry. | Times | 10 | 1200 | 1200 | 1200 | 1260 | 1260 | 1320 | 1320 | 1380 | 1380 | 1440 | 1440 | 13200 |

| SN | Actions | Unit | No. | Rate | 1st Year | 2nd Year | 3rd Year | 4th Year | 5th Year | 6th Year | 7th Year | 8th Year | 9th Year | 10th Year | Total Amount |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 6.5 | Organize trainings to develop capacity and establish local government partnership to manage human-wildlife conflicts safely and efficiently. | Times | 10 | 800 | 800 | 800 | 840 | 840 | 880 | 880 | 920 | 920 | 960 | 960 | 8800 |
| 6.6 | Sign Memoranda of Understanding (MOUs) with government, research and academic institutions. | Times | 4 | 700 | 700 | 0 | 735 | 0 | 0 | 0 | 735 | 0 | 770 | 0 | 2940 |
| 6.7 | Launch mutually supportive conservation initiatives across borders for rhino conservation and share relevant information on illegal wildlife trade. | Times | 10 | 900 | 900 | 900 | 945 | 945 | 990 | 990 | 1035 | 1035 | 1080 | 1080 | 9900 |
| 6.8 | Organize regular cross-border collaboration meetings with neighboring countries to address rhino security concerns across TAL. | Times | 10 | 800 | 800 | 800 | 840 | 840 | 880 | 880 | 920 | 920 | 960 | 960 | 8800 |
| 6.9 | Visit sites of cross-border countries to witness the situation of HRC jointly. | Times | 4 | 600 | 0 | 600 | 0 | 0 | 630 | 0 | 0 | 660 | 0 | 720 | 2610 |
| 6.1 | Provide support to enhance the capabilities of the SAWEN secretariat and organize routine programs. | Times | 4 | 600 | 600 | 0 | 0 | 630 | 0 | 0 | 0 | 630 | 0 | 660 | 2520 |
| 6.11 | Undertake collaboration meetings with Interpol, Traffic, and the CITES Secretariat to combat wildlife crime. | Times | 10 | 600 | 600 | 600 | 630 | 630 | 660 | 660 | 690 | 690 | 720 | 720 | 6600 |
| 6.12 | Participate meetings, seminars, workshop, conference, convention to seek assistance from the international community for rhino conservation. | Times | 10 | 800 | 800 | 800 | 840 | 840 | 880 | 880 | 920 | 920 | 960 | 960 | 8800 |
| 6.13 | Organize cross-border exchange visits for protected area managers, local representatives, and leaders. | Times | 3 | 600 | 0 | 630 | 0 | 0 | 0 | 630 | 0 | 0 | 0 | 660 | 1920 |
| 6.14 | Carry out training programs and cross-border intelligence-sharing meetings for managers of transboundary protected areas. | Times | 5 | 500 | 0 | 500 | 0 | 525 | 0 | 550 | 0 | 575 | 0 | 600 | 2750 |

| SN | Actions | Unit | No. | Rate | 1st Year | 2nd Year | 3rd Year | 4th Year | 5th Year | 6th Year | 7th Year | 8th Year | 9th Year | 10th Year | Total Amount |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 6.15 | Prepare operational plan to ensure rhino population movement in Western Terai Landscape between Nepal and India (e.g., Bardia and Katerniaghat). | No. | 1 | 400 | 0 | 0 | 420 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 420 |
| 6.16 | Hold a meeting and propose 'Asian Rhino Forum (ARF)' for a unified and long-term coordination to secure Asian rhinos from diverse challenges. | Times | 5 | 800 | 800 | 0 | 840 | 0 | 880 | 0 | 920 | 0 | 960 | 0 | 4400 |
| 6.17 | Coordinate with India to exchange rhinos between Kajiranga National Park and CNP. | Times | 5 | 500 | 500 | 0 | 525 | 0 | 550 | 0 | 575 | 0 | 600 | 0 | 2750 |
| 6.18 | Prepare plan to give strayed rhinos to other countries as a part of Rhino Diplomacy. | Times | 5 | 400 | 0 | 420 | 0 | 440 | 0 | 460 | 0 | 483 | 0 | 480 | 2283 |
| 6.19 | Conduct periodic information sharing and sensitization workshops among all possible sectors | Times | 10 | 500 | 500 | 500 | 525 | 525 | 550 | 550 | 575 | 575 | 600 | 600 | 5500 |
| 6.2 | Organize regular meetings between development and conservation sectors to assess the impact of development plans on wildlife habitats. | Times | 10 | 600 | 600 | 600 | 630 | 630 | 660 | 660 | 690 | 690 | 720 | 720 | 6600 |
| 6.21 | Organize regular meeting with infrastructure development organizations, mainly with Department of Road, Nepal Electricity Authority, Department of Electricity Development, Department of Water Resources and Irrigation, Nepal Oil Corporation, Communication Service Providers etc. | Times | 5 | 500 | 500 | 0 | 525 | 0 | 550 | 0 | 575 | 0 | 600 | 0 | 2750 |
| | **Sub Total** | | | | **9900** | **9490** | **10185** | **9260** | **10090** | **9670** | **10625** | **10703** | **11090** | **10920** | **101933** |
| | **Total** | | | | **1063875** | **169334** | **166748** | **173896** | **170265** | **181729** | **183860** | **185437** | **184374** | **192950** | **587554** |

## Annex -2 Detailed logical frame work for the plan implementation

| Objectives | Indicators | Means of Verification | Assumption/Risk |
|---|---|---|---|
| **The goal of this action plan is to strengthen three viable populations of rhino in Chitwan, Bardia and Shuklaphanta National parks through socio-ecological and one health approaches for human-rhino coexistence.** | | | |
| **Objective 1. Combat rhino poaching and illegal trade** | No. of rhino poaching reduced | APR of Rhino bearing PAs, APR of Animal hospital | Effective coordination between transboundary PAs and exchange of information among DNPWC, WCCB and CIB |
| Output (A) Strengthen policy, legislation and institutional agenda for law enforcement | No. of new legislation promulgated and revised documents on existing policies and legislation | | Adequate budget disbursed in research and study with regards to revision of policies, strategies, guidelines |
| Output (B) Capacity development of law enforcement institutions | No. of Park and Army staff trained | APR of Rhino bearing PAs, Training reports, | Adequate budget provided for capacity building |
| Output (C) Incorporate new and appropriate technology for wildlife crime control | No. of wildlife crime decreased | APR of Rhino bearing PAs, Wildlife crime reports, APR of conservation partners | Innovative technologies are introduced and made user friendly for both Park and Security personnel |
| Output (D) Participatory wildlife crime control programs: Local, National, International | No. of Park and Security personnel getting exposure to regional and international events | APR of DNPWC, APR of Rhino bearing PAs, APR of conservation Partners, workshops, proceedings of the seminars, conference etc. | Conservation partners support Park and NA to get opportunity to enhance their capacity through exposure with neighboring country, national, regional and international events |
| **Objective 2: Manage rhino populations** | Number of Rhino population increased in the rhino bearing Parks per annum | APR of DNPWC, APR of Rhino bearing PAs, APR of DoFSC, APR of Rhino bearing DFO, APR of conservation Partners (NTNC, WWF Nepal and ZSL Nepal), Rhino count report, Rhino mortality data set, Relevant literatures | Very effective protection mechanism in place specially during election, politically unrest period and during long holidays |
| Output (A) Manage large population in CNP | | | Internal translocation helps to manage crowd population |
| Output (B) Maintain minimum viable population in Shuklaphanta/Bardia/Parsa National Parks | Number of increased rhino population in ShNP, BNP and PNP | APR of Rhino bearing PAs, APR of conservation partners | No. of viable population translocated in the respective Parks and effective protection in place |

| Objectives | Indicators | Means of Verification | Assumption/Risk |
|---|---|---|---|
| Output (C) Maintain healthy population of rhinos | Number of decreased mortality rate due to health condition | APR of Rhino bearing PAs, APR of Animal hospital | Fully functional animal hospital with adequate equipment and veterinary personnel |
| (D) Managed orphan, injured and strayed rhinos | Secured orphan, injured and strayed individuals | APR of Rhino Sanctuary | Well-equipped and spaced Rhino Sanctuary for orphan, injured and strayed rhinos |
| **Objective 3: Secure rhino habitats** | | | |
| (A) Develop strategic plans and policies to minimize degradation, loss and fragmentation of rhino habitat | Strategic plans on habitat management developed for | APR of DNPWC, APR of conservation Partners, Strategic management plan on habitat management, | The strategic plan for habitat management is adopted and implemented in the Parks |
| (B) Revitalized and rehabilitated degraded rhino habitat within core areas, buffer zones, and corridors. | Area of degraded habitats restored | APR of Parks, APR of conservation Partners | Regular monitoring and evaluation of degraded habitats is in place after restoration efforts |
| (C) Securing wetlands | No. of additional wetlands created and improved | APR of Parks, APR of conservation Partners, Wetland reports, RIS reports of Ramsar sites, relevant literatures | Availability of water in the wetlands throughout the year |
| (D) Grassland managed and restored | Hectares of grassland created, restored and managed<br><br>No. of rhinos sighted on the improved grasslands | APR of Parks, APR of conservation Partners, Grassland reports, Reports on AIS, relevant literatures | Adequate budget allocated for grassland management |
| (E) Mitigated the impacts of linear infrastructures on major habitats of rhino | No. of wildlife friendly overpass, underpass and flyover developed to enable wildlife to cross through linear infrastructures | APR of DNPWC, APR of conservation Partners, Meeting minutes with infrastructure development agencies, APR of Road, Railway Electricity, Irrigation, Nepal Oil Corporation etc., APR of donor organizations and countries | The infrastructure development organizations follow the management plans of respective PAs and incorporation of EMP of environment studies |
| **Objective 4: Enhance research and monitoring** | | | |
| (A) Establishment of research institutions and expansion of the capabilities of existing institutions. | Well established research centre in place and operational | APR of DNPWC, APR of conservation Partners, and publications of research institutions | Adequate budget allocated to operationalize the research centre |

| Objectives | Indicators | Means of Verification | Assumption/Risk |
|---|---|---|---|
| (B) Study related to the ecology, population dynamics, conflicts, threats, and opportunities associated with rhino conservation | No. of studies, publications, articles on rhino conservation | APR of DNPWC, APR of conservation Partners, and publications of research institutions | Good collaboration extended among conservation partners, research and academic institutions |
| (C) Capacity development on research and monitoring of rhino | No. of staff capacitated on research and monitoring | APR of DNPWC, APR of conservation Partners, and training and monitoring reports | Significant number of staff involved in research and monitoring |
| **Objective 5: Manage human-rhino conflicts** | | | |
| (A) Novel strategies, financial frameworks, and institutional setups implemented to manage human-rhino conflicts (HRC) effectively | Hunman-Rhino conflict mitigation strategy report developed | APR of DNPWC, APR of conservation Partners, and Human-Rhino conflict mitigation strategy report | Effective and active participation of local people in the development process of Human-Rhino conflict mitigation strategy report |
| (B) Maintain HRC below thresholds | Reduced no. of Human-Rhino conflict | APR of DNPWC, APR of conservation Partners, and Human-Rhino conflict reports, articles on the newspaper, Radio and video documentary and relevant literatures, | Adequate budget allocated to maintain human-rhino amity HRC, maintained at tolerable level and Relief delivery mechanism is very effective and efficient |
| (C) Promote livelihoods and employment opportunities to local communities | A significant number of targeted hhs who are directly affected by rhino getting benefit from livelihood improvement interventions | APR of DNPWC, APR of conservation Partners, articles on the newspaper, Radio and video documentary and relevant literatures, | Local people accepting issues of HRC in positive way |
| (D) Strengthen capacity and awareness to mitigate HRC | No. of people made aware on importance of rhino conservation | APR of DNPWC, APR of conservation Partners, report on celebration of conservation days and events, | Sense of know-how and understanding about d co-existence with rhino |
| **Objective 6: Strengthen support and cooperation: Local, National and International level** | | | |
| (A) Developed coordination among local, provincial and federal governments | No. of coordination meetings with local, provincial and federal governments | APR of Parks, APR of conservation Partners, articles on newspaper, Minutes of the meetings | The legislation of the local level and provincial government harmonizes with the federal government |
| (B) Enhanced regional and international assistance and collaboration in rhino conservation | No. of regional and international funds received towards rhino conservation | APR of Parks, APR of conservation Partners, articles on newspaper, Websites of Grants and assistance | GoN, INGOs, NGOs, CBOs, Private company receive adequate grants are available for the rhino conservation |
| (C) Promote inter-sectoral coordination | No. of coordination meetings | APR of Parks, APR of conservation Partners, Minutes of the meetings | Inter and intra-governmental disputes decreased, and rhino conservation promoted |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