Gaur Conservation Action Plan for Nepal (2020-2024)

Ministry of Forests and Environment

Department of National Parks and Wildlife Conservation

Babarmahal, Kathmandu

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Cover Photo:
By Hari Bhadra Acharya in Parsa National Park.

Government of Nepal
Ministry of Forest and Environment
Department of National Parks & Wildlife Conservation

Foreword

The Government of Nepal is committed to safeguard the threatened and endangered wildlife species. Nepal Biodiversity Conservation Strategy and Action Plan (2014-2020) envisage for the preparation and implementation of species conservation action plan to effectively conserve the endangered fauna and flora of Nepal. Department of National Parks and Wildlife Conservation is responsible to prepare the species conservation action plans for some of the important species including Gaur *(Bos gaurus)*. Gaur has been poorly studied mammal in Nepal. Gaur is listed in schedule I of National Parks and Wildlife Conservation Act, 1973 and included in Appendix I of Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES). Despite being a protected species, habitat loss and degradation are prominent threats for their long term survival.

The government of Nepal has produced this first Gaur (*Bos gaurus)* Conservation Action Plan for Nepal (2020-2024) to secure the Gaur population against threats and recover in the potential habitats. This plan focuses on enhancing the understanding and knowledge on conservation status, ecology, and habitat dynamics of Gaur. It also targets to conserve and manage habitat, maintain corridors and connectivity, curbing poaching, develop local stewardship for Gaur conservation, and develop Gaur based ecotourism opportunities. Furthermore, this plan incorporates priority actions to address the threats of Gaur.

Climate change and climate-induced hazards, limited financial resources, insufficient knowledge base, habitat conservation in the area, and coordination and cooperation among the stakeholders are major challenges to the implementation of this plan. I hope continuous and coordinated effort among the three tiers of government, conservation partner, academia, and community will overcome the threat and challenges for conserving this charismatic species.

I would like to thank the technical team of the Department of National Parks and Wildlife Conservation in preparing this Action Plan, and Zoological Society of London, Nepal for providing financial support to produce this document. The Department acknowledges the effort and contribution of consultants and reviewers. I would like to acknowledge Ecologist Mr. Hari Bhadra Acharya, Assistant Ecologist Mr. Hem Raj Acharya, Assistant Management Officer Mr. Nurendra Aryal and Deputy Country representative of Zoological Society of London, Nepal Dr. Bhgwan Raj Dahal for their contribution in preparing this plan.

I am confident that the implementation of this action plan will contribute to conserve the Gaur populations and their habitat and wish all success to ensure that the Gaur population remains secure in Nepal.

2077.5.28

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Acronyms and Abbreviations

BaNP	Banke National Park
BNP	Bardia National Park
BZMC	Buffer Zone Management Committee
BZUC	Buffer Zone User Committee
CBAPU	Community-Based Anti-Poaching Unit
CBD	Convention on Biological Diversity
CFUG	Community Forest User Group
CIB	Central Investigation Bureau
CITES	Convention on International Trade in Endangered Species of Wild Fauna & Flora
CNP	Chitwan National Park
DFO	Division Forest Office
DNPWC	Department of National Parks and Wildlife Conservation
DoFSC	Department of Forests and Soil Conservation
FMD	Foot and Mouth Disease
IUCN	International Union for Conservation of Nature
KTWR	Koshi Tappu Wildlife Reserve
NBSAP	National Biodiversity Strategy and Action Plan
NGO	Non-Governmental Organization
NPWCA	National Parks and Wildlife Conservation Act
NRs	Nepalese Rupees
NTNC	National Trust for Nature Conservation
NWCCCC	National Wildlife Crime Control Coordination Committee
PNP	Parsa National Park
TAL	Terai Arc Landscape
VDC	Village Development Committee
WCCB	Wildlife Crime Control Bureau
WCCCC	Wildlife Crime Control Coordination Committee
WWF	World Wide Fund for Nature
ZSL	Zoological Society of London

Contents

Executive Summary

The Gaur (*Bos gaurus)* (Smith, 1827) is the largest extant bovine. It is native to South and Southeast Asia. In Nepal, Gaur is confined to the forests and grasslands of the Chure foothills and floodplains in Chitwan National Park (CNP) and Parsa National Park (PNP).

The Gaur is listed as Vulnerable in the IUCN Red List of Threatened Species and included in Appendix I of the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES). The species is also listed as protected species by National Parks and Wildlife Conservation Act, 1973. Few studies have been undertaken focusing on Gaur research and conservation in Nepal. The first population survey of Gaur was carried out in 1990s. Since then, periodic population monitoring has been conducted in CNP and PNP. Habitat loss, degradation, and fragmentation are the most pressing anthropogenic threats to Gaur conservation. Besides, a low level of awareness among resident communities and insufficient financial resources are also the main conservation challenges. Insufficient information, unsustainable developmental activities, climate change, and transfer of diseases from livestock are additional threats to the survival of the Gaur in Nepal. Successful conservation of Gaur will largely depend upon how the threats are addressed and the opportunity for eco-tourism is materialized.

This conservation action plan has been envisioned to maintain the Gaur population and management of its habitat. The following five objectives have been set to achieve this goal.

1. Conserve and maintain Gaur population,
2. Enhance understanding and knowledge on conservation status, ecology and habitat dynamics of Gaur,
3. Protect and manage the Gaur habitats,
4. Strengthen and extend community-based Gaur conservation interventions, and
5. Strengthen cooperation and coordination on Gaur at national and international level.

A log-frame has been developed to guide proper implementation and monitoring of this conservation action plan. The Department of National Parks and Wildlife Conservation (DNPWC) will take an overall lead in implementing this plan. The DNPWC will coordinate with concerned stakeholders and government agencies. Based on this conservation action plan, annual programs will be developed. Monitoring of progress of this plan implementation will be carried out regularly. Final review of the plan implementation will also be conducted by involving a team of independent consultants. Total budget for this five-year conservation action plan has been estimated to be NRs 5,82,00,000 (In words Five Crores and Eighty Two Lakhs only).

Unit 1
Introduction

1.1. Relevancy of Conservation Action Plan

Gaur (*Bos Gaurus)* (Smith, 1827) is the largest extant bovine native to South and Southeast Asia (Ashokkumar, M., Swaminathan, S., Nagarajan, R., Desai, A. 2011; Kamalakkannan et al. 2020; Khadka, N.B., Acharya, P., Chaudhary 1997). Gaur population has declined drastically in almost its entire geographical range primarily due to habitat loss, poaching for meat, diseases and competition for food resources (Ahrestani 2018; Duckworth, J .W., Sankar, Williams, and Samba-Kumar, N., Timmins 2016; Kamalakkannan et al. 2020; Schaller 1967). Gaur is an important prey species for large carnivores such as tiger and it symbolizes area for its wilderness. Conserving them and their habitat will ensure the ecosystem health, which is ultimately beneficial for human well-being (Imam and Kushwaha 2013).

In Nepal, the Gaur population is benefited from the conservation actions implemented for other sympatric species such as One-horned Rhinoceros and Tiger which share similar habitat. The government of Nepal has been conducting Gaur monitoring and implementing site-specific habitat management programs in Chitwan and Parsa National Parks since 1970s. Despite this, Gaur is facing threats like habitat shrink, degradation, fragmentation; poaching, and the potential threat of zoonotic disease and climate change (Jnawali et al. 2011; Khadka, N.B., Acharya, P., Chaudhary 1997). Current research, knowledge, and conservation efforts are insufficient to ensure the conservation of habitat and long-term survival of this vulnerable species. It remains to clutch the potential tourism opportunities. Limited conservation priority and insufficient financial resources, imminent challenges of climate-induced hazards continue to challenge the conservation of the species. The continuation of threats and challenges indicates the need for planned and coordinated conservation intervention. This conservation action plan aims to address the current knowledge and conservation gap through the collaborative, coordinated, and participatory conservation intervention at local, national, and trans-boundary levels.

1.2. Conservation Action Plan Development Process

A Technical Committee under the Department of National Parks and Wildlife Conservation (DNPWC) representing officials from Department of Forests and Soil Conservation (DoFSC) and conservation partners including National Trust for Nature Conservation (NTNC); World Wide Fund for Nature (WWF), Nepal; Zoological Society of London (ZSL) Nepal recommended preparing the conservation action plan of Gaur. DNPWC approved the terms of reference for the consulting services and requested ZSL Nepal to provide financial support. Consultation fees and logistic supports were provided by the ZSL Nepal.

Park officials at Chitwan and Parsa National Parks were thoroughly consulted during the plan preparation process. Consultation meetings were held with Buffer Zone Community Forest User Groups (BZCFUG), Buffer Zone Management Committees (BZUCs), and Community Forest User Group (CFUG) outside the protected areas. It was followed by consultation with concerned Divisional Forest Officer (DFOs), NTNC–Biodiversity Conservation Centre (BCC) Sauraha and Terai Arc Landscape (TAL) Program. Based on the issues and concerns raised in consultations, a draft report was prepared and shared amongst the technical committee members. After incorporation of comments and suggestions from the technical committee draft plan was shared with experts for review. The final plan has been prepared by incorporating the feedback and comments received from experts.

1.3. Scope of Conservation Action Plan

This conservation action plan has been guided by the National Biodiversity Strategy and Action Plan (NBSAP) 2014-2020. Information reported in this plan is based on the available literature, legislative provisions, recent studies, and population survey. Therefore, this plan directs all three tires of government, enforcement agencies, conservation partners, and local communities for Gaur conservation.

Historically the Gaur was distributed throughout the east of Narayani River to the Mechi River. During the last forty years, the population of the Gaur has been exterminated from eastern Nepal. Now almost the entire population in Nepal is concentrated in and around Chitwan and Parsa National Parks. Implementation of this conservation action plan will contribute to restoring the population in its historical habitat.

This conservation action plan will contribute in mitigating current and potential threats and challenges by directing future conservation efforts, priorities, and activities for the Gaur population and its habitat conservation. It also contributes for enhancing current research and knowledge. The plan will be supportive to generate financial resources for Gaur conservation.

Unit 2
Background

2.1. Description

Gaur is the largest bovine with its head and body length 2.5 m to 3.3 meter, shoulder height 1.65 to 2.25 meter (Menon 2014). Gaur bulls weigh 600-1000 kg **(**Ghosh 2002). Tail length is 70 cm to 1.05 meter and horn length is 0.6 to 1.15 meter. The coloration is dark reddish brown to almost blackish brown and there are white stocking (Nowak and Paradiso 1983). Dewlaps and the dorsal ridge are prominent distinguishing features of adult males (Ahrestani 2018).

Guar is a sexually dimorphic species, and both sexes have horns. Differences between the sexes begin to be noticeable after the age of 2 years (Ahrestani et al. 2011). Males are approximately one-fourth larger and heavier than female (Nowak and Paradiso 1983). In males the horns are larger especially at base with more outward swath and the curving is less at the tips. Adult males have pronounced muscular crest between shoulders and a large dewlap hanging between the forelegs and smaller one under the chin **(Krishnan 1972).** Adult bulls have a shiny black, short-haired pelage, except for white stockings, a gray boss between the horns, and rusty-colored hairs on the insides of the thighs and forelegs. Young bulls are dark brown like the cows. Horns of young bulls are smooth, yellow-orange in colour and tipped with black, whereas the old bulls are corrugated a dull olive in colour and sometimes frayed at the tips. Horns of males are thicker and extend outwards first before curving inward, which results in the horns on males being further apart from each other. Female horns, in contrast, extend outward a lot less, and are thus closer to one another, and have a spiral curvature that makes the horns point at each other; the inward curvature of female horns begins by the age of 2 years. Cows are considerably smaller than the bulls and their dorsal ridges and dewlaps are not prominently developed. Young calves (0–2 months) have light orange-brown body coats and do not have white stockings. Both sexes have a light brown “boss” between their horns. Horns in both sexes are black in their early stages of development and, with advancing age, begin to whiten from the base up (Ahrestani 2018). The white stockings (all 4 legs, starting just above the knee in both sexes, are white) develop from the age of 3 months. Young calves weigh about 43 kg have a light brown coat and lack the conspicuous white stockings, which do not appear until they change into a dark brown pelage at the age of about three months (Schaller 1967).

2.2. Distribution

2.2.1 Global Distribution

Gaur historically occurred throughout mainland South and Southeast Asia and Sri Lanka. At present, it is distributed in South and Southeast Asia from India to peninsular Malaysia including India, Nepal, Bhutan, Bangladesh, Myanmar, Thailand, China, Laos, Cambodia, Vietnam, and Malaysia (Ashokkumar, M., Swaminathan, S., Nagarajan, R., Desai, A. 2011; Choudhury 2002; Kamalakkannan et al. 2020). From its reported distribution in the past and present, the species have experienced dramatic range reduction with surviving population in isolated forest patches mostly inside the protected areas. The global distribution of Gaur has reduced by over 80% in the past 100 years (Ashokkumar, M., Swaminathan, S., Nagarajan, R., Desai, A. 2011).

The phylogenetic analysis using complete mitochondrial genome sequences unambiguously suggested that Gaur is the maternal ancestor of domestic Mithun. There are three distinguished sub species i.e. *B. Gaurus*

Gaurus (India and Nepal), *B. Gaurus readei* (Myanmar, Laos, Vietnam, Cambodia and Southern China) and *B. Gaurus hubbacki* (Thailand and Malaysia) (Kamalakkannan et al. 2020); Schaller 1967). Mithan *(Bos frontalis)* is believed by many scientists as a domesticated form of Gaur (Ahrestani 2018; Ghosh 2002).

Source: (Duckworth, J .W., Sankar, Williams, and Samba-Kumar, N., Timmins 2016)

Figure 1. Global distribution of Gaur.

2.2.2 National Distribution

In Nepal, Gaur is confined to the forests and grasslands of the Churia, Bhabar and floodplains. Contiguous habitat in Chitwan and Parsa National Parks and adjoining areas harbor the largest population. Gaurs were recorded in Eastern Nepal few decades ago. One Gaur bull was brought to Jawalakhel zoo from Shivagunj VDC of Jhapa District in DNPWC (1993 cited Khadka, N.B., Acharya, P., Chaudhary 1997). A small and scattered Gaur population was reported in the Trijuga forest and estimated that there were more than 100 individuals in the past (Wegge 1976 cited Khadka, N.B., Acharya, P., Chaudhary 1997). In 1997 two Gaurs

were reported in Koshi Tappu Wildlife Rserve. They were supposed to be originated from Trijuga forest and possibly 5 to 10 Gaurs were reported in Churia hills southwest of Trijuga forest which is the largest and historic forest patch in eastern Nepal (Khadka, N.B., Acharya, P., Chaudhary 1997). A study conducted by Himalayan Nature, Wild Cats Conservation Alliance and Zoological Society of London in 2018 recorded footprint of Gaur in Trijuga Forest (Shah K.B., Thapa, K.B., Poudel, H., R., Basnet, H., Gautam 2018). However, intensive survey in Churia hills of Trijuga forest by NTNC in 2018 did not detect Gaur in Trijuga.

Gaur (*Bos Gaurus*) has disappeared from the Koshi Tappu Wildlife Reserve (Chhetry and Pal 2010). The Gaur population in Nepal is separated from that in North Bengal, India by a gap of about 150 km. (Choudhury 2002).

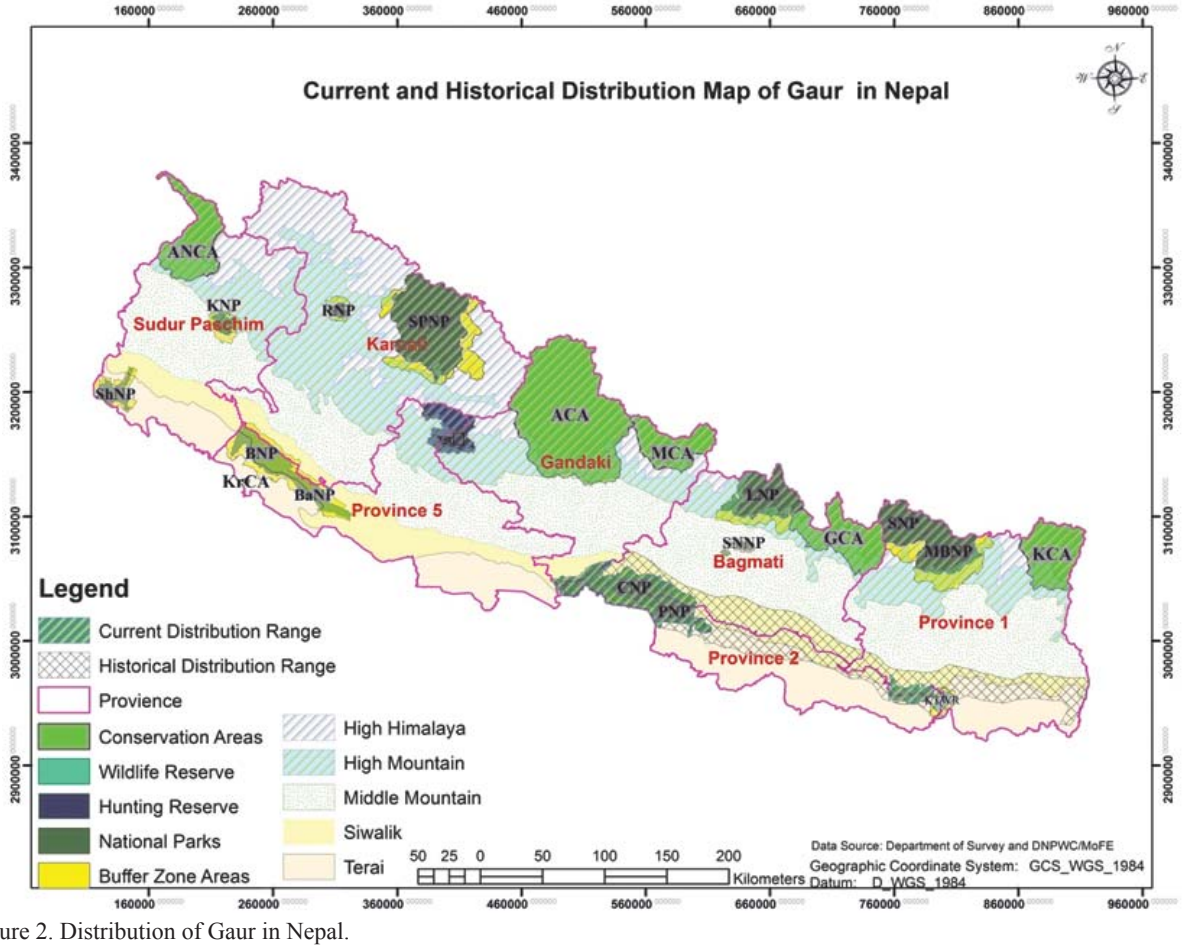

Figure 2. Distribution of Gaur in Nepal.

2.3. Habitat and Behavior

2.3.1 Habitat

Gaur habitat is characterized by large and relatively undisturbed forest tracts, hilly terrain below an elevation of 1,800 m with availability of water, and an abundance of forage in the form of coarse grasses (including bamboo), shrubs and trees (Nowak and Paradiso 1983). Although the Gaur has been described as essentially a hill animal it also occurs widely in the plains, especially in the dry season (Choudhury 2002). It avoids the floodplains of larger rivers in the rainy season. The Gaur graze in grasslands in the morning and evening, spending the hot hours of the day inside forest. Gaur prefers grazing small grassy patches along streams in the foothills, early in the morning, evening and night. Gaur probably developed the preference towards hilly terrain to offset the increasing human pressure in most of the plains (Choudhury 2002).

2.3.2 Daily Activity Cycle

Gaur shows a bimodal diurnal activity pattern in feeding with peaks in the morning and evening hours. Feeding activity is low during noon hours while they are resting. Moving was more or less uniform through-

out the day and it was more during morning and evening along with feeding than noon hours. Vigilance was observed more while feeding during morning and evening hours (Nayak and Patra 2015). A herd sometimes forages in cursory fashion at mid-day, but generally there is little activity before 17:00 hours (Schaller 1967)

2.3.3 Food Habits, Feeding and Drinking Behavior

It requires water for drinking and bathing but does not wallow (Nowak and Paradiso 1983). Most herds congregate in small area until the beginning of monsoon and then dispersed into the hill. The Gaur was found to be both grazer and browser, preferring green grasses when available, but otherwise eating coarse, dry grasses and forbs and leaves (Schaller 1967). Gaur is the generalist feeder, showing great flexibility of food habits and consumed a variety of food belonging to different species. Selection of food plant species is not as strong as compared to other ungulates. The food plants from the families of Poaceae and Fabaceae constituted nearly 50% forming the major food plant species (Nayak and Patra 2015). A field study (Chetri 2003) in Parsa National Park found Gaurs are less selective feeder than livestock and diet comprised of 36 plants (12 species of grasses, 16 species of browses and 8 species of herbs and other). Seven species of plant (5 species of grasses-*Cymbopogan sp., Imperata cylindrical, Phragmites karka, Themed asp., Vetiveria zizanoides)*; one species of browse- *Phaulopsis imbricate* and one species of herbs- *Piper longum*) are utilized comparatively more by the Gaur. Another research by same author using micro-histological analysis of fecal samples of Parsa Wildlife Reserve, Nepal has found that the diet of Gaur consisted of 49 species of plants. On average, grass comprises a major proportion (66%), followed by browse (25%) and herb and others (5%). Although Gaur consumes a variety of food plants, six plant species: four grass- *Themada sp., Phragmites karka, Imperata cylindrica* and *Vetiveria zizanoides*, and two browse – *Wendlandia exserta* and *Phaulopsis imbricata* are highly preferred (Chetri 2006).

The members of a foraging herd are typically scattered over 200 to 600 feet of terrain as each animal searches for food, moving at the rate of about 500 to 1,500 feet per hour. They are usually crowded together at a salt lick, licking the soil for as long as forty-five minutes without interruption. The Gaur drinks at least once a day during the hot season, usually in the evening (Schaller 1967)

2.3.4. Range and Movements

Gaurs generally live in herds of 5-12 animals (Menon 2014). The overall individual male home range varies from 135 to 142 km^2, and overall individual female home ranges varies from 32 to 169 km^2 (Sankar et al. 2013). Most herds remain in an area of 25–40 square km in lowland areas until the beginning of the monsoon and then dispersed into the hills (Nowak and Paradiso 1983). The extent of daily movement of a herd seemed to average about 3–5 km. During the interaction meeting with local stakeholder and officials of Chitwan National Park reported that Gaur population of Chitwan National Park is source population for the Parsa National Park and Valmiki Tiger Reserve, India.

2.3.5 Response to Predators

Observations by multiple naturalists and field biologists suggested that *B. Gaurus* depends less on sight (despite being capable of seeing at night) and more on smell and hearing to detect danger (Ahrestani 2018; Krishnan 1972). Gaurs are exceptionally alert to potential danger, and they respond to alarm signals from their own and other species with a characteristic series of sounds and gestures. The sense of smell of the Gaur is acute - the animals were able to wind at distances exceeding four hundred feet (Schaller 1967).

2.4 Population Dynamics

2.4.1. Population Size and Composition

The current population is unknown in most of the range countries, and it is also declining in all known distribution ranges. The estimated population is around 13,000 to 30,000 with approximately 85% population being present in India (Ashokkumar, M., Swaminathan, S., Nagarajan, R., Desai, A. 2011; Duckworth, J .W.,

Sankar, Williams, and Samba-Kumar, N., Timmins 2016; Jnawali et al. 2011). The entire population of *B. Gaurus* in Nepal is primarily confined to Chitwan and Parsa National Parks. Recent survey (2016) reported 473 individuals (368 in Chitwan, 105 in Parsa) and population is considered to be stable.

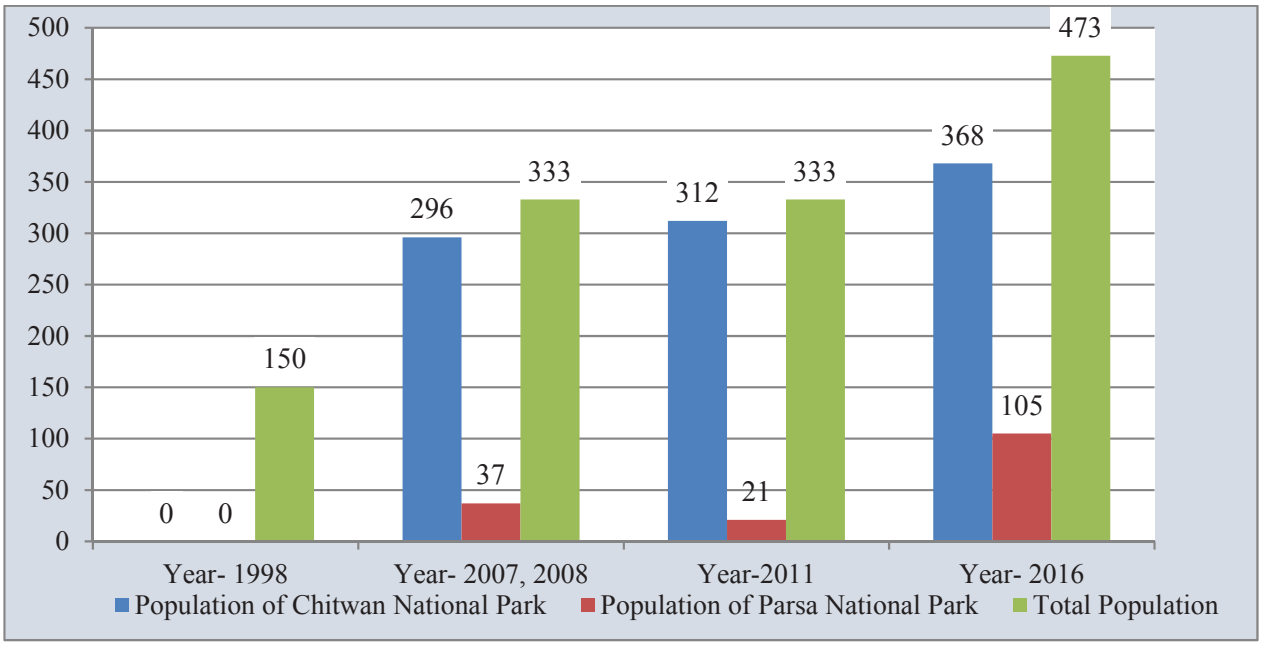

Figure 3. Population size of Gaur in CNP and PNP.

In 1998 there were 150 individual of Gaur in Chitwan National Park (Johnsingh, 1998). In 2007, a survey recorded 37 individuals in Parsa National Park and 297 in Chitwan National Park (Jnawali et al. 2011). In 2011 a combined survey of Parsa Wildlife Reserve and Chitwan National Park counted 21 and 312 individuals respectively (CNP 2013; PNP 2018). The Gaur population found in east Nepal mainly confined to Trijuga forest, Udayapur District has been nearly extirpated. The population census of 2016 showed that the Gaur population in CNP and PNP are 368 and 105 individuals in PNP respectively. Population densities in Chitwan National Park is 0.3 individuals per square kilometer in 2011 (CNP 2016). Schaller (1967) studied the population composition in 125 to 150 Gaur of Kanha valley, India and found that black bulls comprised 20 percent, brown bulls 12 percent, yearling bulls 4 percent, adult cows 39 percent, yearling cows 6 percent, and calves 19 percent. In Chitwan, out of 368 individuals, 30.7% were adult males, 39.9% adult females, 19.6% sex unknown and 9.8% Calves.

2.4.2. Rutting Season

Rutting bulls have a characteristic call. The frequency of calling and other aspects of sexual behavior reached a peak in March and April. The domesticated Gaur called as Gayal have repeated estrous cycles of about three weeks' duration throughout the year and this is probably true of the Gaur also. Some mating occurs in every month of the year.

2.4.3. Rate of Reproduction

Reproduction takes place throughout the year but in central India mating peaks during December to June, and peak calving season is in the cool months of August and September. The gestation period is 270 to 280 days and gives generally a single offspring in a litter. The calf is nursed for 9 months. Female attains sexual maturity in their second or third year of life (Ahrestani 2018; Schaller 1967)

2.4.4. Mortality

The primary cause of death of Gaur is predation by carnivores, primarily tiger. About half of the calves die before they reach the age of one year. Tigers attack adult Gaur infrequently. Longevity of the Gaur probably

exceeds that of any other sympatric hoofed animal (Schaller 1967). In Chitwan National Park 2% diet of tiger comprises of Gaur (Bhandari, Chalise, and Pokharel 2017).

Apart from predation, Rinderpest is a widespread cause of death in Gaur. The disease has been reported in Gaur from southern and central India (Anderson, 1954; Baker, 1890; Stewart, 1928). A virulent epidemic of Rinderpest killed many Gaur in the Kanha Park area in the years 1925-26. Gaur have also been reported to die from foot-and-mouth disease and anthrax (Schaller 1967) and found contained light infestations of nematodes *(Oesopha- gostomum radiatum* Rud., 1803) in the large intestine and trematodes (*Gastrothylax crumenifer Creplin,* 1847) in the rumen of autopsied carcass. Ticks *(Boophilus microplus)* were also found on two adults checked for ectoparasites.

2.5 Social Behavior

2.5.1 Herd Size and Composition

Gaur is gregarious animal containing generally 8 to 11 individuals in a single herd. In the herd, there is only a single fully matured bull. Some males lived alone or in bachelor groups. In Schaller's study area population density was about 0.6 individual per sq. km, and annual home range of herd was 78 sq. km. (Schaller 1967). A study in Chitwan National Park (Bhattarai and Kindlmann 2018) found larger group size in summer (5.81) as compared with winter (4.36) season. Sex ratio was skewed towards females. Most of the adult males were solitary, and usually they join the larger groups during mating periods. Human disturbances, predators and open habitats were the most important predictors of the social organization of Gaur.

2.5.2. Leadership

A leader was usually not evident when the members of the herd are foraging, but when they moved in single file, an adult cow led the procession in 73 percent of 41 instances recorded. Brown and black bulls led the remaining herds. The leading animal was frequently 60 to 100 feet ahead of the herd and highly alert, looking around with muzzle raised, whereas the others trudged along seemingly paying little attention to their surroundings (Schaller 1967)

2.5.3. Agonistic Behavior and Dominance

Various displays and forms of aggressive behavior are used by the Gaur to establish rights of priority to a place at a salt lick, to a cow in heat, and to other limited objectives as well as to a position in the social structure of the herd as a whole. Threatening gestures, most of which are of low intensity, consist of walking directly at the opponent perhaps with head slightly lowered and of jerking the head down and up, often accompanied by a lateral sweep of the horns. A bull holds his head low when approaching a rival, muzzle almost touching the ground and horn tips pointing forward, at the same time swinging his head and even his forequarters from side to side. Air is blown out through the nose, emitting a spectrum of sounds from gentle snuffles to violent snorts. The most striking behavior pattern of the Gaur is a lateral display in which the animal presents its impressive profile, particularly the dewlaps and dorsal ridge to an opponent. The lateral display appeared to be one of the principal means by which bulls, particularly black bulls, established their rank without actual physical contact (Schaller 1967).

2.5.4 Sexual Behavior

If the cow stands still, the bull may place his chin on her rump, an action which is often followed by an attempt to mount. Courting pairs tend to remain in or near the herd. During the long mid-day rest period, the two may lie side by side; mutual licking of head and neck are common at this time. On one occasion a black bull tended a cow away from a herd (Schaller 1967).

2.5.5 Licking

In Gaur, however, this activity is also conspicuous during courtship, with cows and bulls licking each other's necks, shoulders, and rump, occasionally for as long as ten minutes without interruption. Bulls also lick each other at times, and in five out of seven instances the subordinate animal licked one of higher rank.

2.5.6 Female-Young Relations

Cows about to give birth leave the herd and remain separated from it for about four days. Suckling was observed in calves less than six months old.

Unit 3
Major Conservation Efforts and Achievements

3.1. Legal and Institutional Mechanism

Nepal is committed to conserving biodiversity and sustainable use of its biological resources. The clause 51(g) of the constitution of Nepal mentions 'The State shall pursue the policy to conserve, promote and make sustainable use of forests, wildlife, vegetation, and biodiversity'. Moreover, as a party to the Convention on Biological Diversity (CBD), Nepal is fostering its commitment with the international community to ensure the conservation and sustainable use of biological resources. Similarly, Nepal was among the earliest signatory countries to CITES (signed in 1975). To control illegal trade of wildlife and for effective implementation of CITES, the Government of Nepal promulgated the Act to Regulate and Control International Trade in Endangered Species of Wild Fauna and Flora, 2073.

National Forest Policy 2018 and Forestry Sector Strategy (2016-2025) also aims to protect and sustainably manage forest, plant resources, wildlife, watersheds and other ecosystems as well as make them climate-resilient through an inclusive, decentralized, competitive and well-governed forestry sector providing equitable employment, income and livelihood opportunities.

National Parks and Wildlife Conservation Act (NPWCA), 2029 has made provision of declaring protected area for protection of valuable ecosystem and species. Two national parks- PNP and CNP are declared in Nepal representing Gaur's habitat. The government of Nepal has taken the highest conservation consideration by enlisting Gaur as protected species under Schedule I of NPWCA, 1973. It prohibits killing or capture of Gaur. For poaching of it, offenders will be penalized to pay NRs. five to ten lakh fines or five to fifteen years imprisonment or both.

National Parks and Wildlife Conservation Act, 2029, clause 3(c) made provision to pay relief for death, injury, loss, or damage of house and property caused by Gaur outside the protected areas and rule 36 (h) sixth amendment, 2075 stated procedure to provide relief for wildlife victims.

3.2. Habitat Management

Gaur habitats have become fragmented throughout their ranges. In Nepal, most of the known population is inside protected areas. Declaring and managing protected areas is one of the prominent conservation tools for species conservation. Parsa National Park has been declared and and further extended especially aiming to foster conservation of Tiger, Elephant, and Gaur.

In the buffer zone of protected area and outside the protected area forests are handed over to the local community as 'community forests' for management and conservation of habitats. Recently corridors have been identified and managed jointly by local community, DFO and park authority.

Management plan of Chitwan and Parsa National Park has designated special program to conserve and manage Gaur habitat. Species conservation and habitat management activities such as grassland restoration and management, waterhole construction and maintenance, fire line construction and improvement are ongoing in Chitwan and Parsa National Parks and their Buffer Zones.

3.3. Conflict Mitigation and compensation

To compensate for the loss and to provide relief funds to the affected communities, the Government of Nepal has designed a compensation policy in 2010. The policy identified seven different species causing conflict

namely elephant, tiger, rhino, snow leopard, leopard, bear, and wild buffalo. The second amendment added Gaur *(Bos Gaurus)* to the list of wildlife for compensation claimed. The victim family member of a dead person in a Gaur attack can receive NRs. 1 million as a relief amount. For major injury of a person, there is a provision of providing an amount of NRs. 200,000 (maximum) and additional costs of treatment in government hospital. Similarly, victim with minor injuries and crop loss will get up to NRs 20,000 as relief. For socioeconomic upliftment of local community, home stay and income generation activities has been conducted in buffer zones. These activities are contributing to minimize threats to Gaur and building it's stewardship for the conservation by local community.

3.4. Poaching Control

For the effective control of poaching, National Wildlife Crime Control Coordination Committee (WCCCC) and Wildlife Crime Control Bureau (WCCB) have been established at central level. Twenty-six district level WCCB and at local level community based anti-poaching units are functional to control poaching. Poaching has been mostly controlled bringing all the agencies under the WCCB. Mobilization of the National Army and local level anti-poaching units has remarkably been reducing poaching in protected areas. The conservation partners such as NTNC, WWF Nepal, and ZSL Nepal are supporting in the use of cutting-edge technology for controlling wildlife poaching.

3.5. Conservation Education and Awareness

The Government of Nepal has coordinated with Non-Governmental Organizations, International Organizations, NGOs, academia, and agencies to tap financial resources for supporting research and conservation-oriented activities. Buffer zone user committee has constructed a statue of Gaur at Sauraha in Chitwan. This has been reported as the best example of community efforts on raising awareness for Gaur conservation. DNPWC has published poster of the Gaur and distributed to the conservation agencies. The picture of this animal is printed in the postal stamp. Chitwan and Parsa National Parks have conducted conservation awareness programs and campaign in the buffer zone of respective parks.

3.6. Population Monitoring and Research

Gaur is one of the least studied species in Nepal. However, periodic population monitoring of Gaur in Chitwan and Parsa National Parks are being carried out since 1998 with latest survey in 2016. Gaur is one of the prey species for tiger and thus population monitoring research has been carried out along with carnivore population monitoring activities in Chitwan and Parsa National Parks. Individual researchers and academic institutions, Non-Governmental Organizations, and community-based organizations are involved in research and knowledge management in recent years. An attempt of radio collaring and studying Gaur ecology was planned during 1990s through NTNC but it was discontinued.

Unit 4
Conservation Threats

Gaur is at risk from multiple stressors, major of which include anthropogenic activities such as poaching, habitat fragmentation and shrinkage, over-exploitation of resources, and invasive plant species. Isolated small population with high predation risk could be another threat to its long term survival and genetic diversity of this species.

4.1. Habitat loss and Fragmentation

The ultimate cause of habitat destruction is, however, the rapid growth of the human population (Choudhury 2002). Inward migration from hills and increased human population is the major cause for the fragmentation of forest of Terai and Bhabar known as *Chare Kose Jhadi*. Land use change and development activities have also resulted in loss of habitat of the Gaur in eastern part of Nepal (Choudhury 2002). After construction of the east-west highway and resettlement program, several cities were established in Gaur's historical habitat. Other reasons for habitat fragmentation are logging, expansion of agriculture, and clearance of forest for human settlements. Due to habitat destruction and fragmentation Gaur population was isolated in the pocket area of Parsa and Chitwan National Parks. Gaur is facing food competition with domestic livestock (Jnawali et al. 2011). In the global context less than 20% of Gaur habitat area is well protected (Duckworth, J .W., Sankar, Williams, and Samba-Kumar, N., Timmins 2016).

4.2. Poaching

Poaching of Gaur for meat and horns is one of the serious threats for conservation of Gaur even in protected areas, although no systematic record is available. In Nepal, poaching cases has been recorded in Parsa National Park and buffer zone (Manahari Rural Municipality, Makwanpur) in 2018. All the suspects were arrested while distributing Gaur meat after killing. Gaur horns used for religious purpose have high price in illegal market in India. This might also prove to be threat for Gaur. Few Gaur horns were also seen at some house in Trijuga area of Udayapur district which might be the reason for local extermination of Gaur from there (Khadka, N.B., Acharya, P., Chaudhary 1997).

Socially, the consumption of Gaur meat is not accepted in Hindu culture. Some local hotels and restaurants may illegally sell Gaur meat in the name of meet of Sambar and Chittal. Most such killings go unreported. The conversion of erstwhile Hindu tribal people to Christianity has contributed in increased killings as taboo of not eating cow meat vanishes (Choudhury 2002).

4.3. Diseases

Epidemic disease such as Rinderpest has potential to cause widespread death of Gaur and reported in the past in southern and central India (Choudhury 2002). Although Foot and Mouth Disease (FMD) is the most frequent, Rinderpest has historically taken the heaviest toll (Ashokkumar, M., Swaminathan, S., Nagarajan, R., Desai, A. 2011; Duckworth, J .W., Sankar, Williams, and Samba-Kumar, N., Timmins 2016). Even in Parsa (northern part) and Chitwan National Park (southern part) problems of livestock grazing is a serious problem. Diseases transmitted from the domestic livestock such as FMD and Anthrax are regarded to be the potential threat to the Gaur population in Nepal.

4.4. Human–Gaur Conflict

Conflict between Gaur and human is not a serious conservation threat. It is mainly confined to some crop depredation, especially in the forest villages and encroachments. Because the Gaur is an extremely shy animal, large-scale raiding of crops in the fringe areas has not been reported. However, few human injury and casualties by straying Gaur into human habitations had been recorded. (Choudhury 2002)**.**

4.5. Other Threats

Forest encroachment and expanding agricultural fields in historical Gaur habitat compels to gaze the species into agricultural fields and the settlement area. Straying to human habitations and crop damage is threat especially near smaller and fragmented habitat (Ashokkumar, M., Swaminathan, S., Nagarajan, R., Desai, A. 2011). The strayed animals are caught, shot, trapped, and electrocuted occasionally.

Unit 5
Challenges and Opportunities

5.1 Challenges

5.1.1 Insufficient Awareness, Knowledge and Research

The insufficient knowledge base on ecology, population dynamics, and habitat dynamics of this species is the major gap in science based intervention for the conservation of Gaur (Ashokkumar, M., Swaminathan, S., Nagarajan, R., Desai, A. 2011). Local people are unaware about the importance of Gaur. Even policy maker and development planner over-look the ecological value of Gaur.

5.1.2 Limited Priority for Conservation

Our conservation priority has largely focused on tiger and rhino. Limited conservation priority has been placed in Gaur at both national and local level. As a result, we still know very little on ecology, behavior and conservation status of Gaur in Nepal.

5.1.3 Insufficient Financial Resources

Most Gaur range countries are developing countries with limited financial resources to commit for conservation, so fund remain one of the major constraints in Gaur conservation (Ashokkumar, M., Swaminathan, S., Nagarajan, R, Desai, A. 2011). On the other hand, economic and social incentives to preserve optimal habitats for Gaur are insufficient to overcome the perceived benefits. The secondary benefits of eco-tourism and the knowledge of the ecological value of Gaur barely overcome this which needs to be upgraded.

5.1.4. Climate Induced Hazard

Increasing climate variability is likely to result in extreme weather conditions, which includes prolonged drought conditions as well as increased floods and flash floods. Water stress could become an issue for Gaur in the dry season which brings Gaur closer to the livestock. Increased contact could transfer zoonotic diseases among wildlife, livestock, and people. Impacts of high flash floods in wildlife habitats, especially in riparian areas have been experienced in the past, grazing lawns are buried under sand depositions and water holes are filled with mud. In the long-term, rising temperatures and changes in precipitation patterns and intensity due to climate change will have an impact on vegetation types and composition. This may result in major shifts or changes in wetlands, grasslands, and forest ecosystems. More frequent and intense forest fires due to warmer ambient conditions and longer droughts could become major threat to wildlife species and their habitat. Forest fires may become more frequent and intense as temperature rises, drought period becomes longer.

5.1.5 Chure Conservation

Forest area encroachment, unplanned settlement, urbanization, and limited political commitment in conservation urgencies such as habitat restoration, maintaining connectivity and corridors are not gaining momentum in Central and Eastern Chure Landscape. Gaur's role as flagship species of central and eastern Churia landscape has been underestimated so far which could be a turning point for effective conservation of ecosystem if due priority is given to this species. Economic and social incentives to conserve Chure area which preserve optimal habitats for Gaur are insufficient to overcome the perceived benefits. The potential benefit from Gaur based tourism and conserving its habitat yet to be explored.

5.1.6 Coordination and Cooperation

Nepal has demonstrated a commendable achievement in collaboration and coordination among DNPWC, DoFSC, and Nepali Army to halt the poaching of flagship species. In changing federal structure of the country, coordination and collaboration among the three tires of government is challenging to halt threat to Gaur. Effective coordinated and collaborative efforts among security personnel, officials from provinces and district forest offices, municipalities, rural municipalities, community forest user groups and private sectors to tackle habitat destruction especially in buffer zone and outside the protected area is crucial. Collaborative effort is necessary to combat deforestation, degradation and destruction of Chure Area. To maintain the population coordination and cooperation at transboundary level is also imperative.

5.2 Opportunities

5.2.1 Gaur as Flagship Species

Gaur is charismatic and magnificent fauna. They have not been reported to involve in serious conflict with local people which makes it easier to convince the local community and involve them in the conservation. Gaur can thus serve as a flagship species for the conservation of the entire biodiversity of the tropical and Chure forest ecosystem of central and eastern Nepal. As a flagship species, they can also contribute to fundraising and developing an integrated conservation program.

5.2.2 Involvement of Local Community

Conservation interventions targeting this vulnerable species are very minimal in the majority of its habitat which is managed directly by the protected areas and their field units. Concern and interest of local people of Buffer Zone of Chitwan and Parsa National Parks can orient to the participatory Gaur conservation and enhancement of tourism benefit from it.

5.2.3 Nature-Based Ecotourism

Gaur is one of the charismatic wildlife species to observe in the wild. They, therefore, offer great opportunities for ecotourism, which can provide an extra source of income for local communities. However, this species-based tourism should be developed and promoted in a way that the footprint of tourism activities could be minimal in the long run.

5.2.4 Use of Cutting-edge Technology in Research and Monitoring

The use of cutting-edge technologies in Gaur study is lacking so far. Available remote sensing, camera trapping, satellite collaring, and non-invasive genetic analysis provides a better opportunity for understanding their habitat, ecological, behavioral, physiological, and genetics aspects of this poorly studied species.

5.2.5 Ex-situ Conservation

Gaur is extremely shy animal and difficult to make continuous observation in the field. But it seems to breed well in captivity. Captive animals would help in understanding Gaur behavior, physiology which would be used for in-situ conservation (Ashokkumar, M., Swaminathan, S., Nagarajan, R., Desai, A. 2011).

Unit 6
Gaur Conservation Action Plan for Nepal (2020-2024)

6.1. Goal

Gaur's population maintained and its habitat managed in Nepal.

6.2 Objectives

Objective 1: Conserve and Maintain Gaur Population

Rationale

Targeted killings of Gaur are negligible in Nepal but sometimes they are killed for their meat and horn. Insufficient capacity of frontline staff and inadequate coordination among relevant enforcement agencies has affected effective control of illegal trade. Nepali Army is deputed inside the National Park and Community-based Anti-Poaching Units (CBAPUs) are engaged at the grass-root level for anti-poaching tackling wildlife crime. Furthermore, Nepal police has formed a special branch under the Central Investigation Bureau (CIB) and their regional investigation team with special responsibility to curb wildlife crimes in Nepal. The anti-poaching staff should be well trained and better equipped. The poachers once caught should be dealt with severely. All unlicensed arms should be confiscated. In this context, this conservation action plan envisions to reinforce the current efforts and build the national and local capacity to combat wildlife poaching and illegal trade.

Epidemic outbreak of Rinderpest and FMD is potential threat to the Gaur population. Epidemic outbreak could be controlled by regulating illegal grazing of domestic cattle in protected areas and vaccination program in and around the Gaur habitat.

DNPWC has translocated Wild buffalo, Rhino, Black buck, Swamp dear into their suitable and historical habitat. Gaur source population is restricted in isolated area of CNP and PNP. Extension of Koshi Tappu wildlife reserve including Trijuga area and translocation of Gaur to the extended area of Koshi Tappu Wildlife Reserve will be another milestone to create meta-population in eastern Nepal.

S.N	Outputs
1.1	Capacity of and facility to law enforcement agencies enhanced.
1.2	Zero poaching of Gaur.
1.3	Secure Gaur population from disease.

S.N	Activities
1	Document and analyze the Gaur poaching cases.
2	Strengthen record-keeping systems on the poaching of Gaur.
3	Awareness campaigns on legislative provisions of Gaur related offenses.
4	Regular support to WCCB at district level.
5	Wildlife crime investigation training for investigation officer and frontline staffs.
6	Strengthen and mobilize community-based anti-poaching units.
7	Equip enforcement agencies with necessary logistics (equipment, field gears etc).
8	Re-delineation of the jurisdiction of Army post (Sikaribas area of CNP should be patrolled by Parsa NP).
10	Vaccination program on domestic cattle in Buffer Zone and inside the of Parsa and Chitwan National Parks.

Objective 2: Enhance understanding and knowledge on conservation status, ecology and habitat dynamics of Gaur.

Rationale

The IUCN red list recommended the need for detail scientific investigation to fulfill the current gaps in understanding species distribution, ecology, and biology (Duckworth, J .W., Sankar, Williams, and Samba-Kumar, N., Timmins 2016). In Nepal, previous research, population monitoring, and information from field consultation have confirmed the presence of the Gaur in Chitwan and Parsa National Parks including their Buffer Zones and Trijuga Area of Udayepur district. The recent studies did not confirm the presence of the species in its other historical range. These observations indicate the need for reassessment of population distribution, habitat, and corridors. It is the most urgent need to get an accurate estimate of Gaur population. Gaur Gaur

Study on Gaur ecological and behavioral aspects is insufficient. There has been significant progress in the technology used in ecology and behavior study of wildlife in Nepal. Besides, there has been a long gap in the study of the wild population due to massive changes in land use, species composition, socio-economics and climate in the last three decades. Therefore, new researches should be conducted to update knowledge on Gaur ecology, behavior, and impacts of such changes globally and nationally. The regular Gaur population survey should be carried out throughout the Gaur habitat in Nepal.

Some studies highlighted that Banke National Park (BaNP) and Bardiya National Park (BNP) as potential area for Gaur population through translocation and meta-population can be maintained **(Upadhyaya et al. 2018)**. Trijuga is another suitable habitat in its historical range. Further study on habitat suitability, status of threats and possibility translocation need to be carried out.

S.N	Outputs
2.1	Database on Gaur distribution, population, occupancy and its habitat dynamics enhanced.
2.2.	Understanding of habitat, ecological and behavioral aspects of Gaur improved.
2.3	Existing and potential anthropogenic threats including climate change on Gaur conservation assessed.
2.4	Ethnic, religious, traditional belief and value system of Gaur assessed.

S.N	Activities
1	Presence or absence survey of Gaur in additional potential areas in eastern Chure Bhabar.
2	Carry out the national level population survey of Gaur at 4 to 5 year interval.
3	Conduct regular Gaur monitoring every year in the Parks.
4	Identify bottlenecks, hotspots, priority areas, and site-specific conservation threats.
5	Study on habitat suitability and translocation possibility of Gaur in BaNP, BNP, KTWR, and Trijuga forest of Udayapur district.
6	Study Gaur's behavior ecology using cutting-edge technology (satellite/radio-collaring, camera trapping, and genetic analysis. etc.).
7	Study and identify persisting and potential anthropogenic threat into their entire habitat.
8	Study climate change impact on Gaur and its habitat.
9	Establish and maintain a central database system at DNPWC on Gaur's information.
10	Document ethnic, religious and traditional belief on Gaur.

Objective 3: Protect and Manage the Gaur Habitats.

Rationale

Habitat loss, quality degradation, and fragmentation are the major challenges for Gaur conservation and this issue should be seriously considered in future conservation endeavors. Drivers of habitat loss and degradation, however, vary from one place to another place. Therefore, a site-specific assessment is utmost before planning the conservation program for different areas. Also, the livelihoods of people living around Gaur habitats depend on natural resources; therefore, Gaur conservation planning should target livelihood improvement activities that link the needs of local people for conservation.

Environmental studies and its effective implementation shall be mandatory for construction of rural road and mining of stone, gravel and sand. Environmental mitigation measure and wildlife friendly infrastructure such as over pass, under pass, canopy bridge should be designed and constructed to ensure the free movement of wildlife while constructing linear infrastructures.

Landscape conservation is a successful approach in Nepal to maintain connectivity of the populations of wildlife species for their free movement. Easten-Chure conservation landscape including the area of East of Bagmati to Mechi river is another potential conservation landscape to maintain the corridor and connectivity for Chure dwelling species like Gaur.

Encroachment is another cause of habitat shrinkage and fragmentation within and outside of protected area. Major encroachment and settlement which threat the conservation of Gaur habitat should be identified. Encroachment of protected area such as Bandarjhula in Chitwan National Park Bhiman of Parsa National Park should be controlled.

Studies show that Chure is not suitable for human habitation due to high vulnerability to natural hazards, but it has been encroached rapidly by human settlement. Planned resettlement and evacuation program should be carried out into the entire Chure range.

Grazing in forest is the customary practice of Nepal's herding system. National Park and Wildlife Conservation Act, 2073 prohibit grazing inside the National Parks and Wildlife Reserves but illegal grazing still exist. Control of grazing outside the protected area is another challenge. Grazing is one of the main causes that deteriorate and degrade the habitat. Illegal grazing also creates pressure on food resource and responsible for transmission of infectious diseases to wildlife. For the control of grazing, law enforcement and collaborative effort of local government and local people is necessary.

Riverian and forest area near to the human settlement is heavily degraded by the multiple stressors. Rehabilitation and restoration of forest area is crucial for the enhancement of quality and extent of habitat for Gaur. Degradation of Chure area is another serious threat. Control of grazing, fire and plantation are tools for the restoration of degraded habitat.

Alien invasive species such as *Lantana camara, Mikania micrantha, Chromolaena odorata* degrading the forest ecosystem, *Parthenium hysterophorus* in grasslands and *Eichhornia crassipes* is serious threat on wetland ecosystem in Nepal (Shrestha, Siwakoti, and Ranjit 2017). Invasion of invasive alien species is greater problem inside and outside the protected area. Controlled burning, uprooting, disposal are some tools and technique to control the invasive alien species.

S.N	Outputs
3.1	Habitat contiguity maintained inside and outside the protected areas.
3.2	Degraded habitat restored within and outside of protected areas.
3.3	Additional potential habitat protected under appropriate conservation measures and translocate Gaur there in.

S.N	Activities
1	Prepare and implement site-specific management plan for Trijuga forest and identify Gaur movement corridors.
2	Translocation of human settlements from Shikaribas, Bandarjhula, and Bhiman.
3	Identifying and mapping of encroachment areas in major corridors of Gaur.
4	Construct waterhole within the National Park, Buffer Zone, corridor and adjoining forest areas.
5	Creation of new grassland habitat and management of existing grassland.
6	Control of invasive alien species from major grasslands and wetland sites.
7	Construction and maintenance of firelines inside the protected areas.
8	Awareness campaign on stall feeding practice.
9	Declare major Gaur habitat outside the protected areas as domestic cattle grazing free zone.
10	Extension of Koshi Tappu Wildlife Reserve.
11	Declare Trijuga forest as Forest Protection Area (FPA).
12	Translocation of Gaur from Chitwan National Park to Koshi Ttappu Wildlife Reserve and Trijuga forest.

Objective 4: Strengthen and Extend Community-based Gaur Conservation Intervention

Rationale

Some community-based Gaur conservation initiatives are being implemented around Parsa and Chitwan National Parks. Gaur based eco-tourism initiative will have great potential for ecotourism development. A community-based conservation program would be more effective in conserving Gaur and associated biodiversity in the forests outside the PAs. For this local forest user groups and their users should be given priority while implementing the conservation measures.

S.N	Outputs
4.1	Local community sensitized, trained and involved in Gaur conservation.
4.2	Gaur based tourism is taken in place.

S.N	Activities
1	Sensitize and aware local forest users, school children, and other stakeholders.
2	Internalize Gaur conservation program in operational plan of BZCF and CF adjoining to the PA.
3	Develop site-specific tourism products in identified priority areas.
4	Construction of Gaur statue in strategic areas like Amlekhjung, Subarnapur, Pratapur, and Nijgadh.
5	Promote and strengthen homestay in Pratappur, Subarnapur, Amlekhjung, and Ratanpuri of PNP
6	Develop Gaur trail (hiking, walking or cycling) in Churia region of CNP and PNP.
7	Design and construct Chitwan-Parsa tourist's Jeep safari road aligning to Gaur's habitat.

Objective 5: Strengthen Cooperation and Coordination on Gaur Conservation at National and International Level

Rationale

During the preparation of this Gaur conservation action plan it has already brought together some key stakeholders. To implement the action plan, collaboration needs to continue at the local, provincial and national levels. Also, trans-boundary cooperation with India is necessary to safeguard the Gaur population and their habitats.

S.N	Outputs
5.1	Increased collaboration for Gaur conservation at local, state and national level. level.
5.2.	Trans-boundary cooperation strengthened for Gaur conservation.

S.N	Activities
1	National level workshop on Gaur including representative from provincial, national, local government, academia, and conservation partners.
2	Form and strengthen provincial wildlife crime monitoring committee.
3	Discuss transboundary issues with Indian authority.
4	Organize experience sharing meeting among PNP, CNP and Valmiki Tiger Reserve (VTR) and concerned local authorities.

Unit 7
Plan Implementation and Monitoring

7.1 Implementing Agency

The DNPWC will take a lead role in the overall implementation of this conservation action plan and undertake the activities inside the PAs while the DoFSC will be responsible for the implementation of the activities outside the PAs. Both departments will coordinate with the state governments (Ministry of Industry, Tourism, Forest, and Environment) and local governments for the implementation of this plan. Also, the conservation partner organizations will contribute to implementing the action plan. Most of the researches and studies will be supported by IUCN, NTNC, WWF, ZSL, and Universities in partnership and coordination with DNPWC and/or DoFSC. Similarly, other research organizations and individuals will also be encouraged to support and conduct researches on Gaur conservation. Technical and financial support from these conservation partners will be acquired while implementing the plan. Besides, state and local governments, Buffer Zone Management Committees, BZUCs, CFUGs, and other Community-based Organizations, CBAPUs, security and various government and non-government agencies will also have significant contribution in the implementation of this plan.

7.2 Financial Plan

The total estimated cost for the implementation of the conservation action plan is NRs. 5,82,00,000. The fund will be managed from government regular budget, and existing conservation partners like NTNC, WWF, ZSL which are working in Gaur conservation in Nepal. The other national and international conservation organizations will be encouraged to generate additional funds for the plan implementation. Detail breakdown of the budget is presented in the Annex-2.

Objectives	Annual Budget (NPR. in 000)	Percentage
Conserve and maintain Gaur population.	5250	9.02
Enhance understanding and knowledge on conservation status, ecology and habitat dynamics of Gaur.	9600	16.49
Protect and manage the Gaur habitats.	27000	46.39
Strengthen and extend community-based Gaur conservation interventions.	13150	22.59
Strengthen stakeholder cooperation and coordination on Gaur conservation.	3200	5.50
Total Proposed Budget	58200	100.00

7.3 Monitoring and Evaluation of the Plan Implementation

The monitoring and evaluation of the implementation of this conservation action plan will be carried out regularly during the five years. The work plan will guide conservation partners for program development and implementation in the field. Monitoring of the progress will be carried out by the respective implementing partners and that will be shared during the review meetings. Also, a mid-term and final review will be conducted by involving a team of independent consultants.

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Annexes

Annex 1: Logical Framework

Narrative Summary	Indicator	Means of Verification	Assumption/Risk
Goal: Gaur's population maintained and its habitat managed in Nepal.			
Objective 1: Conserve and maintain Gaur Population.	Gaur population increased; Gaur crime related cases Decreased.	Reports of DFSC, DNPWC, Gaur survey/ monitoring reports.	Government policy remain supportive and funding source remain available to carry out research.
			Proactive participation and willingness of local communities.
Outputs			
Capacity of and facility to law enforcement agencies enhanced.	Increased number of government officials (DNPWC and DFSC staff) and security agencies involved in anti-poaching operations.	Annual reports of DFSC, DNPWC and other conservation partners.	
	Number of frontline staffs familiar with existing legal provisions related with Gaur crime increased.	Annual reports of DFSC, DNPWC and other conservation partners	
	Increased number of WCCB and logistic support provided.	Annual reports of DFSC, DNPWC and other conservation partners.	
Zero poaching of Gaur.	No. of anti-poaching operation conducted by the CBAPU.	Annual reports of DFSC, DNPWC and other conservation partners.	
	Mobilization of Nepali Army and number of operations carried out by WCCB, and District Level WCCB.	Annual reports of Nepali Army, DNPWC, DFSC, and other conservation partners.	
Reduced mortality of Gaur by disease and road accident.	Number of vaccination program on domestic cattle.	Annual reports PNP, CNP, DNPWC other conservation partners.	
	Number of wildlife friendly structure constructed in the major corridor	Annual reports PNP, CNP, DNPWC, Road Authority, other Line Agencies.	

Activities

- Document and analyze the Gaur poaching cases.
- Strengthen record-keeping systems on the poaching of Gaur.
- Awareness campaigns on legislative provisions of Gaur related offenses.
- Regular support to WCCB at district level.
- Wildlife crime investigation training for investigation officer and frontline staffs.
- Strengthen and mobilize community-based anti-poaching units.
- Equip enforcement agencies with necessary logistics (equipment, field gears etc.).
- Re-delineation of the jurisdiction of Army post (Sikaribas area of CNP should be patrolled by PNP).
- Vaccination program on domestic cattle in Buffer Zone and inside the of Parsa and Chitwan National Park.

Narrative Summary	Indicator	Means of Verification	Assumption/Risk
Objective 2: Enhance understanding and knowledge on conservation status, ecology and habitat dynamics of Gaur.	Number of census and studies on Gaur increased, improved database management system.	Number of population census, DNPWC's record of research permits granted; research reports, academic degree thesis and number of scientific papers published in peer reviewed journals.	Government policy remain supportive and funding source remain available to carry out research.
			Conservation partners including academic institutions prioritize and support research on Gaur.
Outputs			
Database on Gaur distribution, population, occupancy and its habitat dynamics enhanced.	Additional potential habitat assessed.	Research reports and papers published.	
	National Gaur population.	Population Census Report of DNPWC, research reports and papers Published.	
	National Database system at DNPWC	Annual Report of DNPWC.	
Understanding of habitat, ecological and behavioral aspects of Gaur improved.	Updated Information on daily movement/ activity pattern, home range, habitat use etc.	Research reports and papers published.	
	Increased use of cutting edge- technology in gaur research.	Research report, publication.	

Narrative Summary	Indicator	Means of Verification	Assumption/Risk
Existing and potential anthropogenic threats including climate change on Gaur conservation assessed.	Information on potential anthropogenic and other natural threats.	Research report, genetic analysis report.	
	Identified number of bottlenecks, hotspot, and priority areas.	Research report, annual reports.	
Ethnic, cultural, religious belief and values of Gaur assessed.	Documented ethnic, cultural, religious belief and values on Gaur.	Report and publication.	
Activities ▪ Presence or absence survey of Gaur in additional potential areas in eastern Chure Bhabar. ▪ Carry out the national level population survey of Gaur at 4 to 5-year interval. ▪ Conduct regular Gaur monitoring every year in the Parks. ▪ Identify bottlenecks, hotspots, priority areas, and site-specific conservation threats. ▪ Study on habitat suitability and translocation possibility of Gaur in BaNP, BNP, KTWR, and Trijuga forest of Udayapur district. ▪ Study Gaur's behavior ecology using cutting-edge technology (satellite/radio-collaring, camera trapping, and genetic analysis. etc.). ▪ Study and identify persisting and potential anthropogenic threat into their entire habitat. ▪ Study climate change impact on Gaur and its habitat. ▪ Establish and maintain a central database system at DNPWC on Gaur's information. ▪ Document ethnic, religious and traditional belief on Gaur.			

Narrative Summary	Indicator	Means of Verification	Assumption/Risk
Objective 3 Protect and manage the Gaur habitats	Area of habitat conserved through habitat restoration, strict protection regime and corridor development increased	Reports of DFSC, DNPWC, and other conservation partners	DFSC, DNPWC, conservation partners prioritize Gaur conservation;
			Socio-political and geographical situation remains conducive.
Outputs			
Habitat Contiguity maintained inside and outside the protected areas.	Site specific management plan of Trijuga forest as protection forest area	Research reports and GIS/ remote sensing based maps	
	Identified encroachment area and area of restored Gaur corridor	Project reports and annual reports of DFSC, DNPWC and other conservation partners	

Degraded habitat restored within and outside the protected area.	No. of waterholes constructed and restored, total area of grassland created and restored, No. of wetlands restored and created wetland sites, total length of fireline constructed, number of grazing free zone declared at local level, total plantation area within degraded Gaur habitat .	Project reports and annual reports of DNPWC, management plan of PNP and CNP and report of other conservation partners	
Additional potential habitat protected under stronger conservation regime and translocation of Gaur to secured habitat.	Extended area of Koshi Tappu Wildlife Reserve.	Project reports and annual reports of DFSC, DNPWC and other conservation partners	
	No. of Gaur translocated to the other secured habitat.	Project reports and annual reports of DFSC, DNPWC and other conservation partners	

Activities

- Prepare and implement site-specific management plan for Trijuga Forest and identify Gaur movement corridors.
- Translocation of human settlements from Shikaribas, Bandarjhula, and Bhiman.
- Identifying and mapping of encroachment area within Gaur historical range.
- Construct waterhole within the National Park, Buffer Zone, corridor and adjoining forest areas.
- Creation of new grassland habitat and management of existing grassland.
- Control of invasive alien species from major grassland and wetland sites.
- Construction and maintenance of firelines inside the protected areas.
- Awareness campaign on stall feeding practice.
- Declare major Gaur habitat outside the protected areas as domestic cattle grazing free zone.
- Extension of Koshi Tappu Wildlife Reserve.
- Declare Trijuga forest as protection Forest Protection Area.
- Translocation of Gaur from Chitwan National Park to Koshi Tappu Wildlife Reserve and Trijuga forest.

Narrative Summary	Indicator	Means of Verification	Assumption/Risk
Objective 4: Strengthen and extend community-based Gaur conservation intervention.	Number of local families involved in Gaur conservation increased; No. of local people benefitted from Gaur based entrepreneurship and tourism increased.	Baseline and end-line reports; Annual reports of DFSC, DNPWC and other conservation partners.	DFSC, DNPWC, conservation partners prioritize Gaur conservation.
			Socio-political and geographical situation remains conducive.
			Proactive participation and willingness of local communities.

Outputs			
Local community groups sensitized, trained, and involved in Gaur conservation.	Community based Gaur Conservation program implemented in new locations.	Project reports and annual reports of DFSC, DNPWC and other conservation partners	
	Local people's knowledge towards Gaur conservation issues.	Project monitoring/evaluation report	
	No. of training provided to local community in Gaur Conservation.	Project reports and annual reports of DFSC, DNPWC and other conservation partners	
	No. of CFUGs/ BZUGs endorsing Gaur conservation provisions increased.	Operation Plans of CFUGs/ BZUGs, project reports, annual reports of DFSC, DNPWC and other conservation partner.s	
Gaur based tourism is taken place.	No of tourism destination making Gaur as tourism product.	Project reports and annual reports of DFSC, DNPWC and other conservation partners	
	No. of families benefitted from tourism promotion increased.	Project monitoring/evaluation report	
	No. of tourists visiting for Gaur sighting increased.	Visitors record maintained in tourism promoted sites	
Activities ▪ Sensitize and aware local forest users, school children, and other stakeholders. ▪ Internalize Gaur conservation program in operational plan of BZCF and CF adjoining to the PA. ▪ Develop site-specific tourism products in identified priority areas. ▪ Construction of Gaur statue in strategic areas like Amlekhjung, Subarnapur, Pratappur, and Nijgadh. ▪ Promote and strengthen homestay in Subarnapur, Amlekhjung, and Ratanpuri around PNP. ▪ Develop Gaur trail (hiking, walking or cycling) along the Churia region of CNP and PNP. ▪ Design and construct Chitwan-Parsa tourist Jeep safari road alining to Gaur's prime habitat.			

Narrative Summary	Indicator	Means of Verification	Assumption/Risk
Objective 5: Strengthen cooperation and coordination on Gaur conservation at national and international level.	No. of meetings organized at national/ international, transboundary and state level increase; Budget being spent on Gaur research and conservation increased.	Reports of DFSC, DNPWC, and other conservation partners.	Conservation partners including government and non-government agencies equally prioritize Gaur conservation.
Outputs			
Increased collaboration for Gaur Conservation at local, province and National level.	No. of meetings organized at federal, state and local level increased.	Project reports and annual reports of DFSC, DNPWC and other conservation partners.	
	Budget allocated Gaur conservation at federal, state and local level increased.	Project reports and annual reports of DFSC, DNPWC and other conservation partners	
Transboundary cooperation and collaboration strengthen for Gaur Conservation.	No. of joint monitoring and transboundary meeting.	Project reports and annual reports of DFSC, DNPWC and other conservation partners.	
	Cooperation and funding received from International agencies increased.	Annual work plan/budget of DFSC, DNPWC and other conservation partners reports of DFSC, DNPWC and other conservation partners.	
Activities National level workshop on Gaur including representative from provincial, national, local government, academia, and conservation partners. Form and strengthen provincial wildlife crime monitoring committee. Discuss transboundary issues with Indian authority. Organize experience sharing meeting with Valmiki Tiger Reserve and concerned local authorities.			

Annex 2:

Estimated budget for 5-year plan (2020-2024)

S.N	Objectives/Activities	Annual Budget (NPR. in 000						%
		Year 1	Year 2	Year 3	Year 4	Year 5	Total	
Objective 1: Conserve and maintain Gaur Population.							**5250**	**9.02**
2.1	Document and analyze the Gaur poaching cases.	50				50	100	0.17
2.2	Strengthen record-keeping systems on the poaching of Gaur.		50				50	0.09
2.3	Awareness campaigns on legislative provisions of Gaur related offenses.		250		250		500	0.86
2.4	Regular support to WCCB at district level.	150	150	150	150	150	750	1.29
2.5	Wildlife crime investigation training for investigation officer and frontline staffs.		300		300		600	1.03
2.6	Strengthen and mobilize community-based anti-poaching units.	300	300	300	300	300	1500	2.58
2.7	Equip enforcement agencies with necessary logistics (equipment, field gears etc.).	100	100	100	100	100	500	0.86
2.8	Re-delineation of the jurisdiction of Army post (Sikaribash should be patrolled by Parsa NP).	50	50	50	50	50	250	0.43
2.9	Vaccination program on domestic cattle in buffer zone and inside the of Parsa and Chitwan National Parks.		500		500		1000	1.72
Objective 2: Enhance understanding and knowledge on conservation status, ecology and habitat dynamics of Gaur.							**9600**	**16.49**
2.1	Presence or absence survey of Gaur in additional potential areas in eastern Chure Bhabar.		500				500	0.86
2.2	Carry out the national level population survey of Gaur at 4 to 5-year interval.		1000			1000	2000	3.44
2.3	Conduct regular Gaur monitoring every year in the Parks..	500		500		500	1500	2.58
2.4	Identify bottlenecks, hotspots, priority areas, and site-specific conservation threats.		1000				1000	1.72
2.5	Study on habitat suitability and translocation possibility of Gaur in BaNP, BNP, KTWR and Trijuga forest of Udayapur district.			1000			1000	1.72
2.6	Study Gaur's behavior ecology using cutting-edge technology (satellite/radio-collaring, camera trapping, and genetic analysis. etc.).				2000		2000	3.44

S.N	Objectives/Activities	Annual Budget (NPR. in 000						%
		Year 1	Year 2	Year 3	Year 4	Year 5	Total	
2.7	Study and identify persisting and potential anthropogenic threat into their entire habitat.		500				500	0.86
2.8	Study climate change impact on Gaur and its habitat.			500			500	0.86
2.9	Establish and maintain a central database system at DNPWC on Gaur's information.		300				300	0.52
2.10	Document ethnic, religious and traditional belief on Gaur.				300		300	0.52
Objective 3: Protect and manage the Gaur habitats.							**27000**	**46.39**
3.1	Prepare and implement site-specific management plan for Trijuga Forest and identify Gaur movement corridors.		500				500	0.86
3.2	Translocation of human settlements from Shikaribas,Bandarjhula, and Bhiman.		1000				1000	1.72
3.3	Identifying and mapping of encroachment areas in major corridors of Gaur.			500			500	0.86
3.4	Construct waterhole within the National Park, Buffer Zone, corridor and adjoining forest areas.	1500	1500	1500	1500	1500	7500	12.89
3.5	Creation of new grassland habitat and management of existing grassland.	1000	1000	1000	1000	1000	5000	8.59
3.6	Control of invasive alien species from major grasslands and wetland sites.	500	500	500	500	500	2500	4.30
3.7	Construction and maintenance of firelines inside the protected areas.	1000	1000	1000	1000	1000	5000	8.59
3.8	Awareness campaign on stall feeding practice.	100	100	100	100	100	500	0.86
3.9	Declare major Gaur habitat outside the protected areas as domestic cattle grazing free zone.	100	100	100	100	100	500	0.86
3.1	Extension of Koshi Tappu Wildlife Reserve.		500				500	0.86
3.11	Declare Trijuga forest as Forest Protection Area (FPA).			1500			1500	2.58
3.12	Translocation of Gaur from Chitwan National Park to Koshi Tappu Wildlife Reserve and Trijuga forest.					2000	2000	3.44
Objective 4: Strengthen and extend community-based Gaur conservation intervention.							**13150**	**22.59**
4.1	Sensitize and aware local forest users, school children, and other stakeholders.	300	300	300	300	300	1500	2.58
4.2	Internalize Gaur conservation program in operational plan of BZCF and CF adjoining to the PA.		500		500		1000	1.72

S.N	Objectives/Activities	Annual Budget (NPR. in 000						%
		Year 1	Year 2	Year 3	Year 4	Year 5	Total	
4.4	Develop site-specific tourism products in identified priority areas.			150			150	0.26
4.5	Construction of Gaur statue in strategic areas like Amlekhjung, Subarnapur, Pratapur and Nijgadh.		500	500	500	500	2000	3.44
4.6	Promotion and strengthen homestay in Pratappur, Subarnapur, Amlekhjung, and Ratanpuri around PNP.		500	500	500	500	2000	3.44
4.7	Develop Gaur trail (hiking, walking or cycling) in Churia region of CNP and PNP.		500	500	500	500	2000	3.44
4.8	Design and construction of Chitwan-Parsa tourist trail aligning to Gaur's habitat.		3000	500	500	500	4500	7.73
Objective 5: Strengthen cooperation and coordination on Gaur conservation at national and international level							**3200**	**5.50**
5.1	National level workshop on Gaur including representative from provincial, national, local government, academia, and conservation partners.			1000			1000	1.72
5.2	Form and strengthen provincial wildlife crime monitoring committee.		300	300	300	300	1200	2.06
5.3	Discuss transboundary issues with Indian authority.	100	100	100	100	100	500	0.86
5.4	Organize experience sharing meeting among PNP, CNP and Valmiki Tiger Reserve (VTR) and concerned local authorities.	100	100	100	100	100	500	0.86
Total Proposed Budget							**58200**	**100.00**

ZSL | LET'S WORK FOR WILDLIFE

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