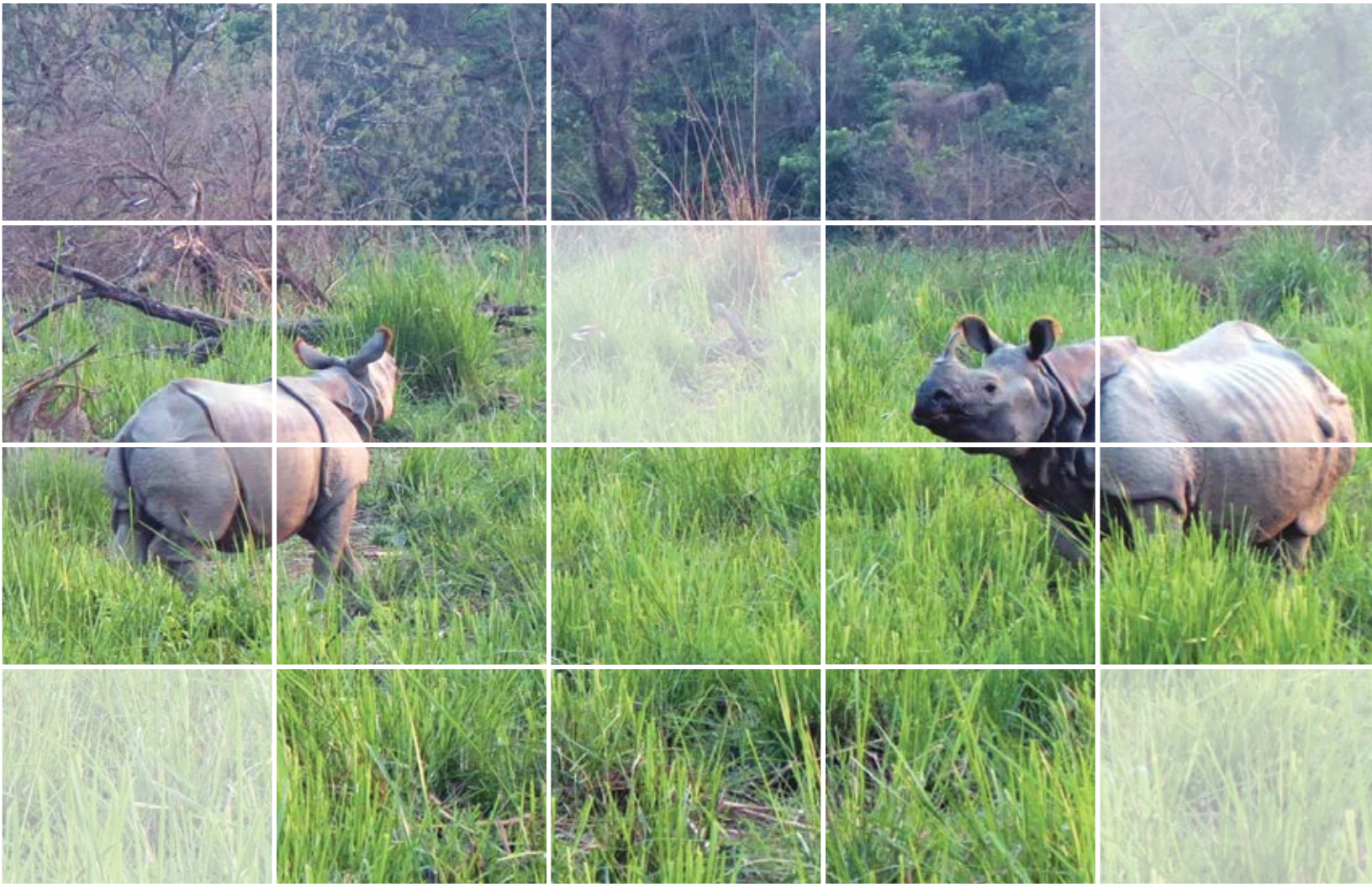
GRASSLAND HABITAT MAPPING

IN CHITWAN NATIONAL PARK



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Grassland Habitat Mapping in Chitwan National Park

About this study:

This book is the outcome of the Grassland Hanbitat Mapping Survey of Chitwan National Park (CNP) and its Buffer Zone (BZ), conducted in June-July, 2015

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FOREWORD

Chitwan National Park (CNP) is exceptionally rich in biodiversity and is a treasure house for a diverse flora and fauna which includes many endangered and threatened species. Grasslands constitute an important ecosystem in CNP that provides food, shelter and cover to many wildlife. Endangered one-horned rhino, Royal Bengal tiger, hispid hare and critically endangered Bengal florican thrive well across the grassland habitats of Chitwan National Park. Despite its ecological importance, grassland ecosystem is under severe threat. Invasion of grasslands by woody plants and invasive alien species are held responsible for the shrinkage of grassland. Attempts at management are underway by park authority. Nevertheless, the information regarding the area, extent and status of invasion of all grasslands of the park is lacking until recently.

Reliable and up-to-date information on habitats is crucial for supporting park management decisions. There is a widely acknowledged need to develop and implement a grassland habitat management strategy for the effective management of protected area. At present the knowledgebase is inadequate to achieve this. To bridge this gap, this grassland mapping was carried out in June–July of 2015 by CNP with an aim of obtaining up-to-date information about the extent, areas, invasion, threats of the grasslands of CNP and its buffer zone and guiding suitable management interventions to make them a better habitat for the wildlife. This work has developed methods and principles and establish the CNP as a model which can be followed by other protected areas.

I believe it will be useful not only to the park management authority to make better plan for the management of grasslands but also to those who are engaged in studying habitat, wildlife, biodiversity and their interlinkages, and I am confident that this will help wider circulation of information on grassland habitats of world-renowned Chitwan National Park.

I would like to acknowledge the efforts of CNP in undertaking this work and appreciate the hard work and dedication of all those staff that are involved in this work.

Hope, you will find this report useful.

.....

Krishna Prasad Acharya
Director General

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Chitwan National Park (CNP), established in 1973 as Nepal's first national park, reflects the milestone in conservation history of Nepal which is also an icon of wildlife conservation. It is renowned to have second largest population of Greater One-horned Rhinoceros in the World and prime habitat for Royal Bengal Tigers. Management of habitats for varieties of wildlife species is an indispensible part of the park management. Among various habitats, grasslands support a large number of rare and endangered grassland birds and terrestrial mammals. Mosaics of landscapes including grasslands and many other habitats are pivotal in maintaining rich biological diversity of the park. But in the last few years, it can be realized that grasslands habitat has been declining mainly due to invasion of woodlands, shrub and invasive species. For this, collecting updated information about grasslands in the park is important for planning management interventions. Thus, the initiative for mapping and study of extent, area coverage and status of grasslands habitat was taken up and the field work was conducted during June-July of 2015.

For making successful completion of grasslands habitat mapping in CNP, first of all, I express my sincere gratitude to former Chief Conservation Officer Mr. Kamal Jung Kunwar and his entire team of CNP including Hattisar staffs for their vigorous efforts in this great achievement in the field of conservation. This report is the outcome of hard work and dedication of all the park staff. I am very much thankful to Mr. Bishnu Prasad Thapaliya, Assistant Conservation Officer and Abinash Thapa Magar, Ranger for managing over all grassland survey and their contribution in preparing this valuable report to its final publication. I would like to acknowledge Mr. Pradeep Raj Joshi, Field Assistant, NTNC-SRCWP, for mapping and analysis of grassland covering GIS part. Thanks are also due to TAL Program for providing financial support to conduct this survey. Finally, I would like to express sincere gratitude to reviewers, stakeholders and conservation partners who have contributed in this report publication. I expect that this report will be a useful tool for the park authority and concerned stakeholders to make better plans for the effective management of grassland habitats of CNP in future.

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Ram Chandra Kandel
Chief Conservation Officer
Date: 2073.5.24

ACRONYMS AND ABBREVIATIONS

BF	Buffer Zone Forest
BZ	Buffer Zone
BZCF	Buffer Zone Community Forest
CNP	Chitwan National Park
DNPWC	Department of National Parks and Wildlife Conservation
GIS	Geographic Information System
GPS	Global Positioning System
Ha	Hectare
IUCN	International Union for Conservation of Nature and Natural Resources
NP	National Park
NTNC-BCC	National Trust for Nature Conservation-Biodiversity Conservation Centre
PAs	Protected Areas
SRCWP	Strengthening Regional Cooperation for Wildlife Protection in Asia
TAL	Terai Arc Landscape Program. Government of Nepal
UNESCO	United Nations Educational, Scientific and Cultural Organization
WWF	World Wildlife Fund

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EXECUTIVE SUMMARY

Grassland ecosystem is dynamic and productive ecosystem and it always has key role to provide suitable habitat of rare and threatened wildlife species. Reliable and updated information about number and extent of grasslands of Chitwan National Park was insufficient. The main objective of the study was mapping grasslands, update grassland area, find extent of coverage and also find out the major grassland pre-defined attributes. For field data collection, both core and Buffer Zone area were divided into eight survey blocks. Grasslands within each block were mapped using GPS. Field survey team walked along the perimeter of individual grasslands with GPS and major grass, shrub, invasive and tree species were also recorded.

Altogether 425 grasslands patches with a total area of 10497.2 ha (6.24% of the total area) were recorded in Chitwan National Park and its Buffer Zone. In core area, 8955.2 ha area was covered by grasslands which equals 9.6% of total core area. Similarly, in the Buffer Zone, 1541.9 ha (2.06% of total Buffer Zone area) is covered by grasslands. Themeda *(Themeda villosa)* followed by Narkat *(Arundo donax)* were prominent grass species for tall grasslands habitat above 3m whereas dubo *(Cynodon dactylon)* and Siru *(Imperata cylindrica*) covered significantly at ground level.

Most of the grasslands were found to be severely invaded by *Mikania micrantha* species. Invasion of woody vegetation and livestock grazing are main threats to the grassland habitats. Most of the grasslands in western and southern part of Chitwan National Park were found shrinking due to widespread proliferation of shrub land and woody vegetation along with natural succession. Grasslands habitat might be gradually confined to limited area if not properly managed in time. Management intervention includes regular grass cutting and uprooting trees together with controlled burning. These kinds of woody invasions can be controlled through allocation of adequate budget and effective habited management prescription. Composition of tall and short grasslands distributed into scattered patches is crucial for wildlife conservation but the grassland management is challenging as diverse species are living together in the same habitat.

1. INTRODUCTION

1.1 Background

The Chitwan National Park (CNP) was established in 1973 as the first National Park of Nepal. The park is situated in southern sub-tropical climatic region of central Nepal, covering 932 km^2 in the lowlands of the inner terai. In 1996, an area of 750 km^2 peripheral to the park was declared as a Buffer Zone which consists of forests, human settlements and private lands (DNPWC 2007). It is world renowned for its unique diversity of flora and fauna and outstanding natural features. CNP is meant for protecting the habitats of many endangered wildlife including second largest viable population of Greater One-horned Rhinoceros and prime habitat for Royal Bengal Tiger. The park comprises rich ecosystem diversity as different types of forest, wetland and grassland ecosystems are situation across the park core area and Buffer Zone as well. It preserves fragile Churiya hill in the south and lowland inner Terai valley ecosystems. UNESCO designated CNP as a World Heritage Site in 1984 under the World Heritage Convention recognizing its unique biological resources (UNESCO/IUCN-2003)

Grasslands are found in most eco-regions of the Earth. They represent potential natural vegetation which is predominantly grasses (members of the family *Gramineae* excluding bamboos), grass-like plants, and forbs. The regions where climatic and edaphic factors prohibit the growth of trees and tend to stimulate grassland formation. Unlike, the savannas and rangelands of highlands which are climatic climax communities of arid regions, grasslands of Terai are the disturbance dis-climaxes (Peet, Watkinson, Bell, & Kattel, 1999a; Lehmkuhl, 1989). The climax vegetation of the Inner Terai is Sal (*Shorea robusta*) forest, which covers some 70% of the CNP. Grasslands of CNP are classed as disturbance dis-climaxes, an outcome of indiscriminate fire and livestock grazing, or secondarily as edaphic climaxes (Lehmkuhl, 1989). Floods, fires and riverine erosion combine in a continually changing mosaic of savanna-like grasslands and riverine forests in various stages of succession (Lehmkuhl, 1989; Peet, Watkinson, Bell, & Kattel, 1999a; UNESCO, 2011). Most of these open grasslands are thus artificially maintained by the natural as well as anthropogenic disturbances (Peet, Watkinson, Bell, & Kattel, 1999a; Pokharel, 1993).

Grasslands serve as primary source of ecosystem cycle with water and nutrients and maintain biological stabilization mechanisms for soil surface. More than 50 grass species are found here including elephant grass (*Saccharum ravennae)*, Giant cane *(Arundo donax)*, Khagra reed *(Phragmites karka)* and several species of true grasses. Siru grass *(Imperata cylindrica)* and Kans (*Saccharum spontaneum)* are the dominant grass species in short grasslands which are being invaded by other coarser grass species as well as woody species. *Siru* has the highest competitive capacity among the herbs and other invaders as seedlings of trees and shrubs in the grassland ecosystem (Shrestha & Dangol, 2006). Grassland vegetation play vital role as large storehouses for carbon helping to limit global warming (White et al. 2000). Food,

shelter and space are characterized by tall grass and short grass species. Wildlife niche also depends on grasslands characterized by nesting cover for small mammals and birds, ambush cover for predators, escape cover and loafing for prey species. Grasslands support a number of rare and threatened species such as Greater One-horned Rhinoceros *(Rhinoceros unicornis)*, Royal Bengal Tiger *(Panthera tigris tigris)*, Bengal florican (*Houbaropsis bengalensis*), Hispid hare (*Caprolagus hispidus*), Gaur *(Bos gaurus)*, Asian Elephant *(Elephas maximus)*, Sloth bear *(Melursus ursinus)* and five deer species (Chital, Sambar, Hog deer Barking deer and Swamp deer). Baral (2001) listed 31 grassland birds as priority species for conservation.

CNP is one of the National Parks supporting highest abundance of tigers. Tiger density is very high in alluvial floodplain and grasslands habitat. Thus, reveals the importance of grassland to secure the enough prey base species for supporting tiger density. Park has been managing only smaller portion of grassland every year but declining of grasslands continues due to both natural and human induced disturbances. Due to the widespread habitat loss and over-exploitation of the natural resources, the grasslands are shrinking day by day (Peet *et al*. 1999).

1.2 Grassland management in CNP

Khagendramalli, Chapparchuli, Amrite, Padampur, Dumaria, Jarneli, Sukhibhar, Bhimle, Budhirapti, Buddhanagar, Kachhuwani, Ghatgain, Lamital, Devital, Botesimara, Ghangar, Gaurmachan, Icherny, Baghmara, and Khoriamuhan are the major grassland patches of CNP. Sukhibhar phanta and Padampur phanta are important grasslands habitat for threatened wild herbivores and grassland avifauna species. Similarly, Namuna grassland lying in Namuna Community Buffer Zone forest is well managed by local community. It is ecologically diverse and also established as Jatayu restaurant[1] for safe feeding sites of endangered vulture species.

Before the Park and People Programme's intervention in Dumaria Phanta, the area contained mixture of *Imperata cylindrical* and *Saccharum spontaneum* with advancing *Narenga porphyrocoma* along the lining of the open grasslands. After the intervention which was carried out to maintain *Imperata* and *Sachharum*, the entire phanta was colonised by *Narenga*. Widespread patchy distribution of *Imperata* and *sacchrum* species type of grasslands habitat is an indispensable component of park management for maintaining long term viable population of Greater one-horned rhinoceros a tiger as well as healthy grassland ecosystem. Expansion of invasive species like *Mikania* and other unwanted species are increasing significantly in important grasslands resulting in shrinkage of grassland area. Wildfires, illegal grass cutting and seasonal floods are the major issues and threats in the grassland management. To address these issues and threats, assurance of up-to-date database of grasslands about park management intervention and its impact information is vital. Periodic mapping of grasslands with updated information will help park authority for detailed planning and resource management which ultimately creates grasslands a better habitat for wildlife.

1 *Jatayu restaurant: 'restaurants' where vultures are provided with a reliable source of food that is free from veterinary drugs and agricultural chemicals (Government of Nepal 2009)*

2. OBJECTIVE

The main objective of this survey was to map out the grasslands habitat of Chitwan National Park and its Buffer Zone. The specific objectives were:

i. To update the number and extent of grasslands habitat of CNP,

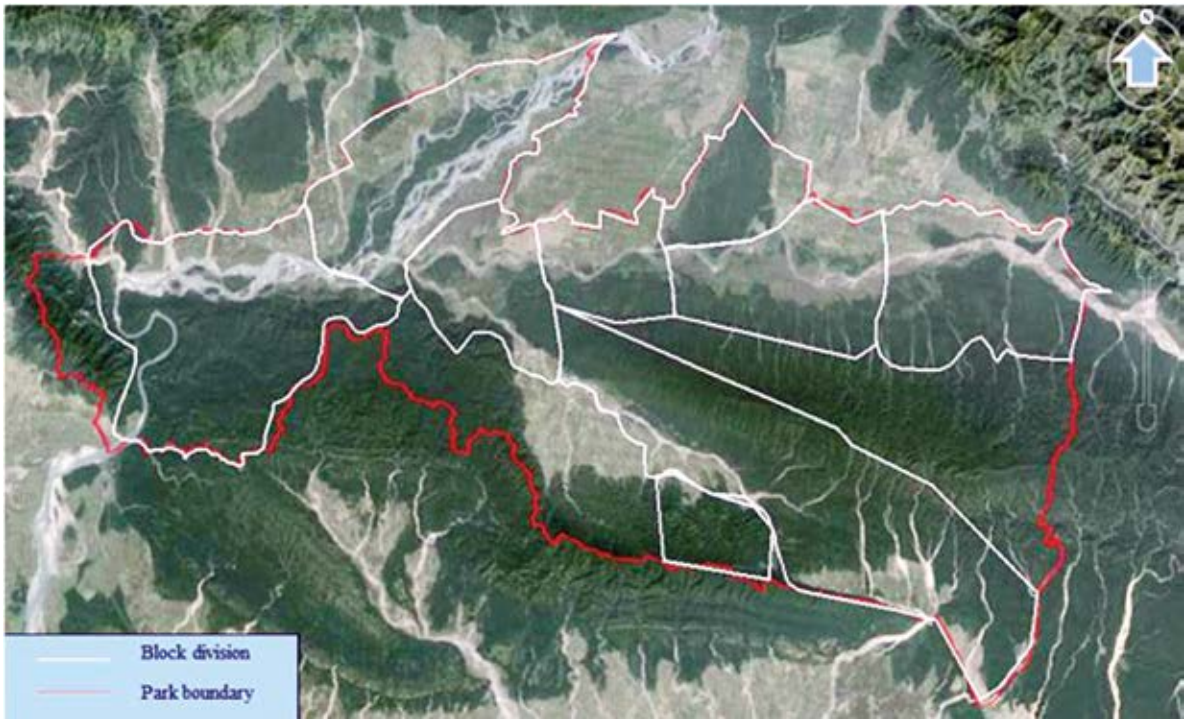
ii. To enumerate total area of grasslands habitat within CNP,

iii. To propose management prescriptions to maintain grasslands habitat in CNP

3. STUDY AREA

The CNP is located between 27° 34' to 27° 68' North latitudes and 83°87' to 84° 74' East longitudes while the Buffer Zone extends further at 27° 28' to 27°70' North latitudes and 83° 83' to 84° 77' East longitudes. It lies in the southern part of the mid-central administrative development region of the country and spans across portions of four districts namely, Chitwan, Nawalparasi, Parsa and Makawanpur. For the administration and management purposes, CNP and its Buffer zone area have been divided into four sectors; Kasara (Central), Sauraha (Eastern), Amaltari (Western) and Bagai-Madi(Southern).

With regards to the the elevation range and topography of the park, 44% of the park falls below 250m elevation and 12% of the park area falls above 500m elevation zone. The park incorporates parts of Churiya hill and the flood plains of Narayani, Rapti and Reu rivers. The grassland patches in core area of CNP and its Buffer Zone area which consist patches of Buffer Zone forest (BF) and Buffer Zone Community Forests (BCFs), were surveyed for this project.



Map 1: Study Area and Survey design

4. METHODOLOGY

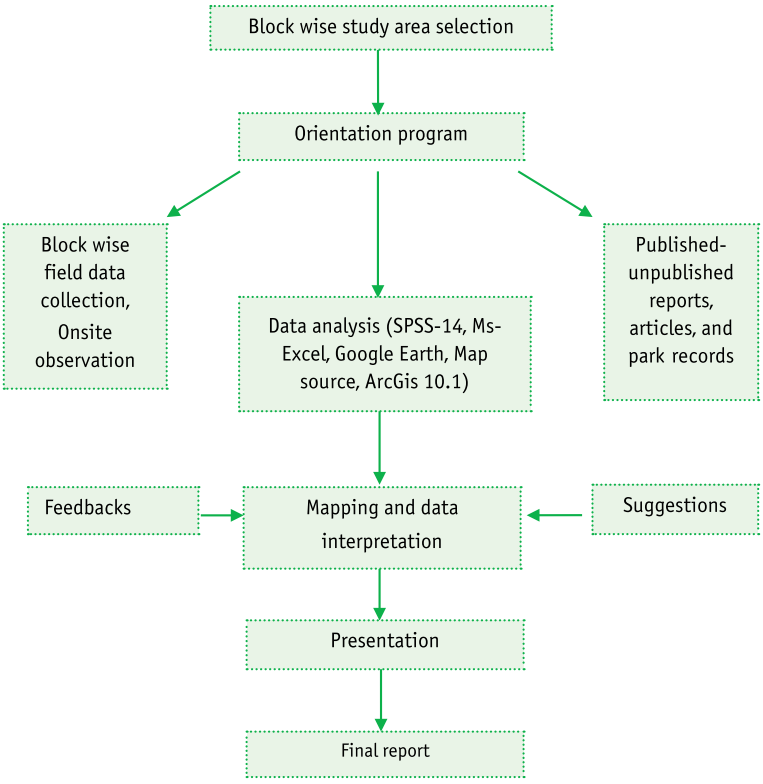


Figure 1: Flowchart of grassland habitat survey

4.1 Orientation Training

For grassland mapping, the foremost work was to find out the actual location, condition and extent of grassland in the field. Therefore, the frontline staff i.e. Rangers and Game scouts were enriched one-day orientation program on 5th June, 2015 at headquarter of CNP. Participants were provided with the equipment and stationaries required for the data collection. They were given training on recording and saving tracks in GPS, identification of important plant species and filling up the data sheets (Annex IV).

Figure 2: Orientation program of grassland survey

4.2 Group Division

In order to make ease in identifying and locating grasslands in CNP, block wise grassland mapping was done and maps were produced systematically. For field data collection, the entire CNP including Buffer Zone area was divided into eight survey blocks (A-H) from eastern to western part of CNP. Within each block, group division was done according to the associated range posts and guard posts considering access to the working area. This involved allocation of available human resource and logistics. Data collection forms were prepared and distributed to field surveyors. Rangers and Game scouts of CNP were mobilized as focal person to plan and coordinate with group members and Hattisar staff for field data collection of grasslands within their particular block (see Annex III).

4.3 Field Survey Techniques

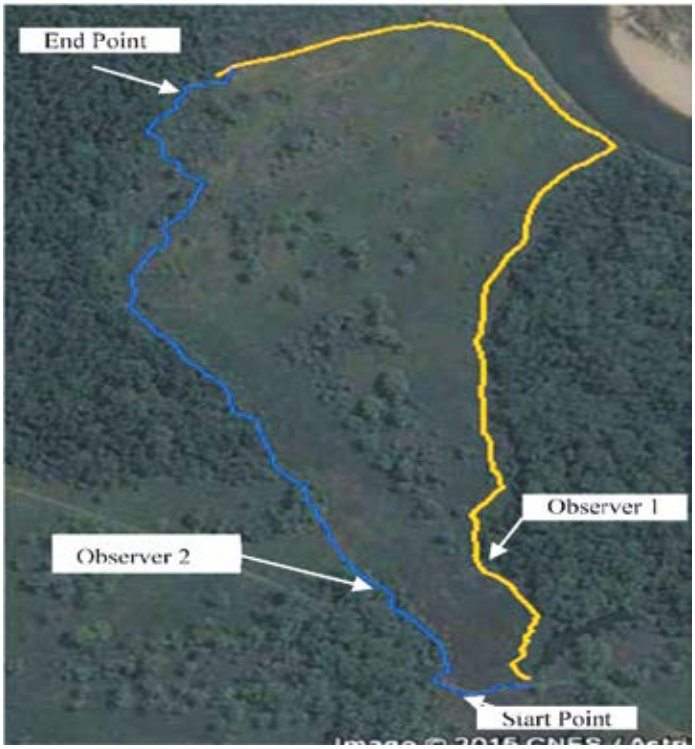
Domestic elephants were used for the data collection. When the observers reached to particular grassland, they rode on elephant back and the elephant walked along the boundary of the grasslands. The observers kept their GPS in track on mode and filled up the ancillary details on data sheets. The GPS tracks were recorded using two approaches:

1. Either a single observer moved around a small grassland, or

2. Two observers started from a same point and then they moved along the perimeter each of them in opposite directions to meet at another point of the perimeter (Map 2).

4.4 Data Collection of Grass, Shrub and Invasive species

For collecting the information on grassland type, composition and condition, categories of grass species (tall, medium, short grass) were recorded on data sheets i.e. (i) tall grass (>3 m), medium grass (1-3 m) and short grass (<1 m) by taking a sample of grass species from each grassland patches. The pre-defined attributes of grassland such as major grass, herbs, shrubs, invasive species and tree species were also recorded respectively. During the survey, dominant invasive species were recorded from each individual grassland and their distribution percentage were also enumerated based on survey blocks by ocular method.



Map 2: Map showing recording method of GPS track

Figure 3: Observer on elephant back during the survey

4.5 Data Processing and Map Analysis

After the completion of field work, data sheets and GPS were brought to the CNP headquarter for further desktop processing and data analysis. The GPS polyline tracks were downloaded or transferred to computer and trimmed using GIS, Map Source and Google Earth Imagery, 2015. These polylines were then exported to ArcMap 10.1, converted into polygon shape files, projected and areas were calculated. The spatial location of grasslands situated in both core and Buffer Zone were mapped. The contiguous grasslands lying in both core and Buffer Zone was counted as a single grassland, however, the area lying in core and Buffer Zone were calculated after spatially splitting the grassland polygons. Similarly, grassland data such as type of grass species, invasive species, shrub and major tree species were manually entered in the excel sheet and analyzed. The outputs were presented in the form of graph, tables and charts. During this period, feedbacks and suggestions from the officials from the park were reviewed for the preparation of this final report.

5. RESULTS AND DISCUSSION

5.1 Grassland Mapping and Area Calculation

The study found a total of 425 patches of grasslands habitat in Chitwan National Park and its Buffer Zone. Core area and buffer zone contained 286 and 98 grasslands patches, respectively. Similarly, 41 grasslands shared both core and buffer zones. The size ranged from 0.19 ha to 1579.88 ha. Padampur Phanta was the biggest grassland that lies in the core area of CNP with 1579.88 ha, whereas Gadesimalchaur grassland was the smallest with an area of 0.19 ha.

The study shows that total area of grassland is 10,497.2 ha which constituted about 6.24 % of grassland area in CNP and its Buffer Zone. The core area consisted 8,955.2 ha grassland which shows 9.6% of total area of CNP as grassland area. Similarly, Buffer Zone consisted 1,541.9 ha grassland area which shows about 2.06% of total Buffer Zone area and this include grasslands formed on floodplains, barren lands and inside Buffer Zone forest area. More than 45% of grassland patches have area less than 5 ha. These grassland patches, however, covered only 4.3% of the total grassland area (Table 5.2).

The detailed information about individual grassland such as name of grassland, code[1], location, nearest post, area, GPS coordinates etc. are summarised and listed respectively (History are listed in Annex II).

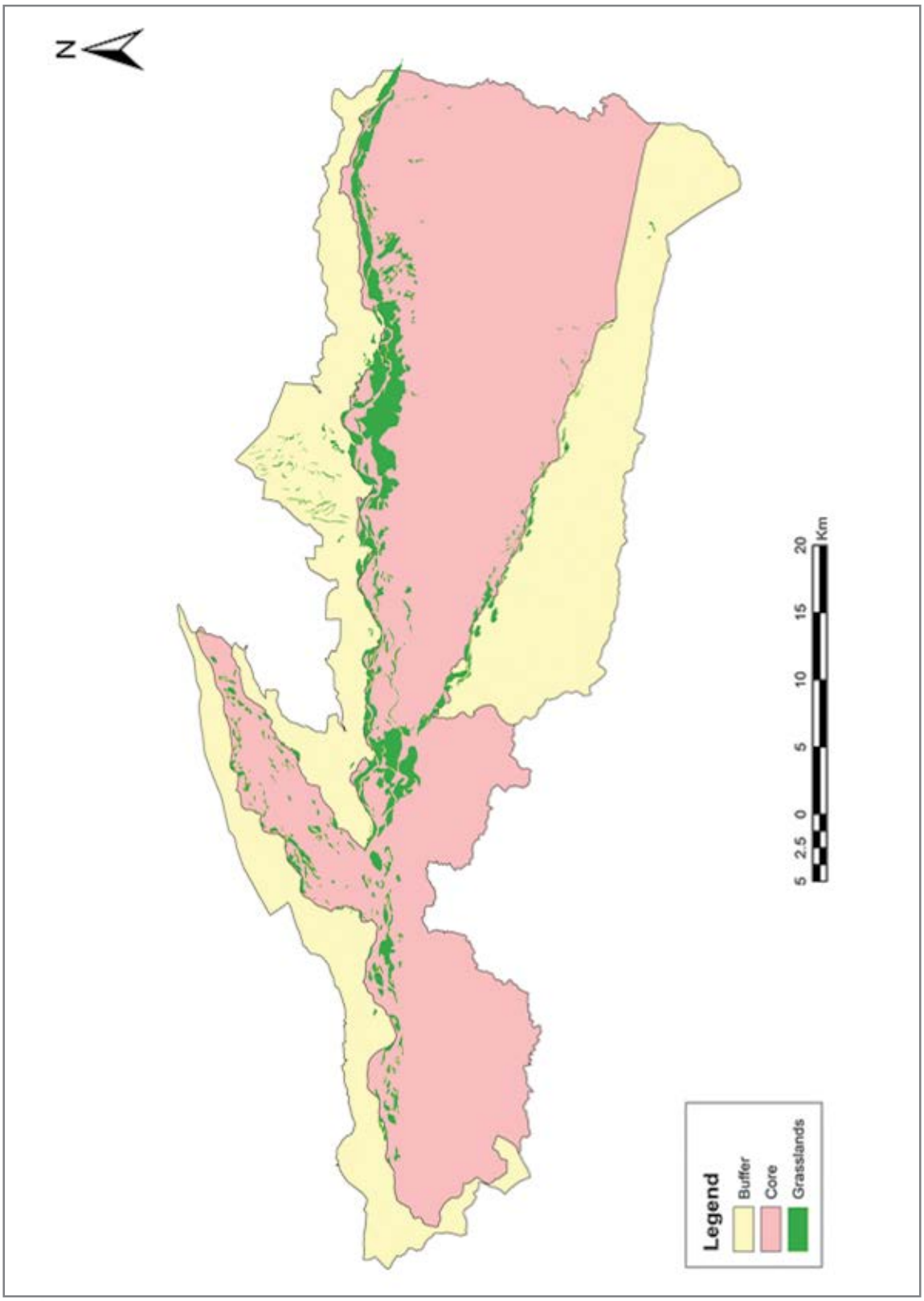
1 *Code: It is a number given to individual grasslands lying in same area as reference*

Table 5:1 Grassland coverage in and around CNP

Location	Grassland Area (Ha)	Coverage (%)	Remarks
Buffer	1541.9	2.06%	425 patches of grasslands in Core, Buffer Zone and in both Core and Buffer Zone area
Core	8955.2	9.61%	
Total	**10497.2**	**6.24%**	

Table 5:2 Number of grasslands by area category in Chitwan National Park and its Buffer Zone

Area (Ha)	No of grassland patches	Percent (%)
Less than 2.00	89	20.9
2.01 - 5.00	106	24.9
5.01-10.00	79	18.6
10.01 - 25.00	72	16.9
25.01 - 50.00	38	8.9
50.01 - 100.00	21	4.9
More than 100	20	4.7
Total	**425**	**100**



Map 3: Chitwan National Park & its Buffer Zone

The block wise grassland area and number of grassland is shown in table given below (Maps in Annex I).

Table 5:3 Table showing number and area of grassland

Block	Block extent	No. of grasslands patches	Area of grassland (ha.)
A	Pratapur-Amrite	52	1731.3
B	Amrite-Jarneli Faant	33	3349.7
C	Barandabhar Area	55	211.9
D	Jarneli Faant-kamal Tal	38	703.3
E	kamal Tal-Baghmara	29	1941.4
F	Amaltari-Gideni	108	1001.1
G	Amaltari-Tribeni	37	832.7
H	Bankatta – Thori	73	725.7
	Total	**425**	**10497.2**

5.2 Grass species

In CNP, both tall and short grasslands patches formed on dry lowland savannah, swampy area and floodplain area (phantas) are found. Within pure Sal forest, Sal-mixed forest associations and riverine forest, grasslands habitats contained various types of grass species regulated by some natural factors such as micro climate, elevation, soil condition and vegetation composition. Grass species such as Kans (*Saccharum spontaneum),* Baruwa ghans (*Saccharum bengalense), Saccharum munja,* Kush *(Desmostachya bipinnata), Saccharum narenga,* Siru ghans *(Imperata cylindrica),* Themeda *(Themeda villosa),* Narkat *(Arundo donax) and* Masino narkat *(Phragmites karka)* were found in grasslands habitat of CNP. The short grass species such as Dubo (*Cynodon dactylon*), Kuro ghans *(Chrysopogon aciculatus),* Love grass *(Erogrostis japonica),* Karaute ghans (*Leersia hexandra)* etc. were found. Themeda and Narkat species were tall grass species above 3m from the ground. Considering the dominance of species in terms of height categories, *Imperata* and *Cynodon* species were commonly found higher in proportion at ground level (<2m.) (Fig. 4). The newly formed sandbanks were found colonized by *Saccharum spontaneum* in Narayani, Rapti and Reu river floodplain area.

5.3 Other herbs and shrubs species

Other herbs and shrub species commonly consist of Bayer *(Ziziphus mauritiana),* Bader**,** Rudilo

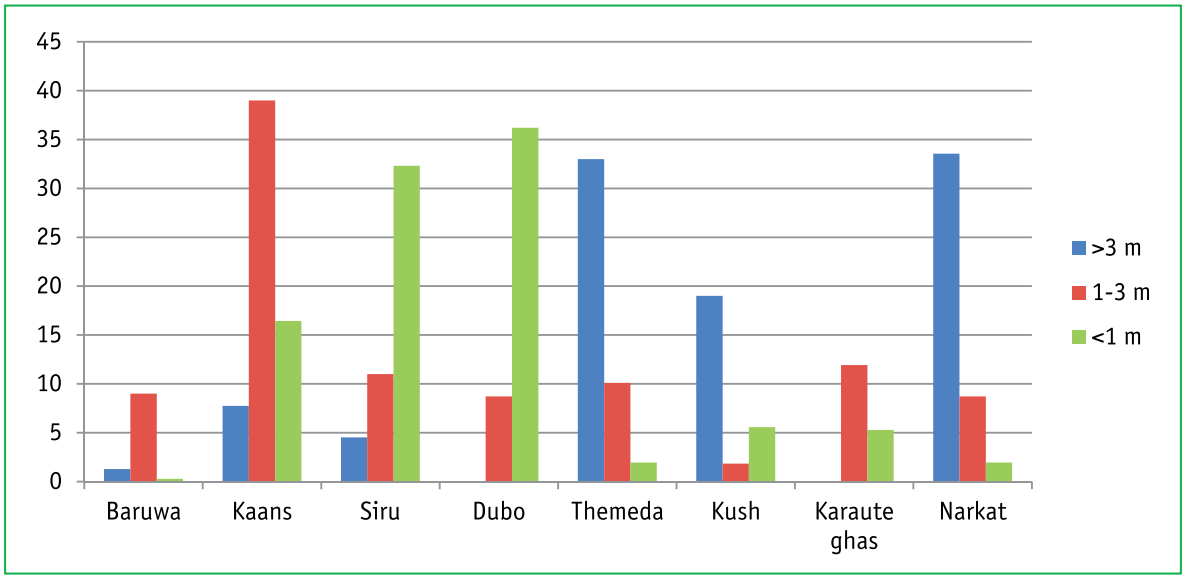


Figure 4: Distribution of grass species on grasslands of CNP (in percent)

(Pogostemon benghalensis), Sisnu *(Urtica dioica)*, Bilaune (*Maesa chisia)*, Galeni *(Leea macrophylla*), Aank *(Calotropis gigantean*), *Bet (calamus spps.)*, Pater *(Typha angustifolia)*, Lajjawati *(Mimosa pudica)*, Asare *(Murraya koenigii)*, Bhanti (*Clerodendrum viscosum)* and Pharsa (*Grewia sapida*) were found during the survey. Some species were found invading grassland by making their own territorial area. Pharsa (*Grewia sapida*) species was observed widespread on grasslands habitat particularly in block D (Jarneli phant to Kamal tal). The least observed shrub species with low coverage was Lajjawati in the grasslands of CNP *(Mimosa pudica)*. (Fig. 5)

5.4 Invasive species

Major invasive species found in CNP are *Mikania micrantha,* Kandebanmara *(Lantana camara),* Setobanmara *(Chromolaena odorata) and* Gandhe jhar (*Ageratum spps*), Tapre jhar (*Cassia tora*), Parthenium jhar *(Parthenium hysterophorus),* Bhimsenpati jhar *(Rabdosia ternifolia),* Bhiringi jhar *(Alternanthera sessilis)* and Boki jhar (*Gnaphalium purpureum)*.

Among them, most of the grasslands were found to be severely invaded by *Mikania spps.* also known

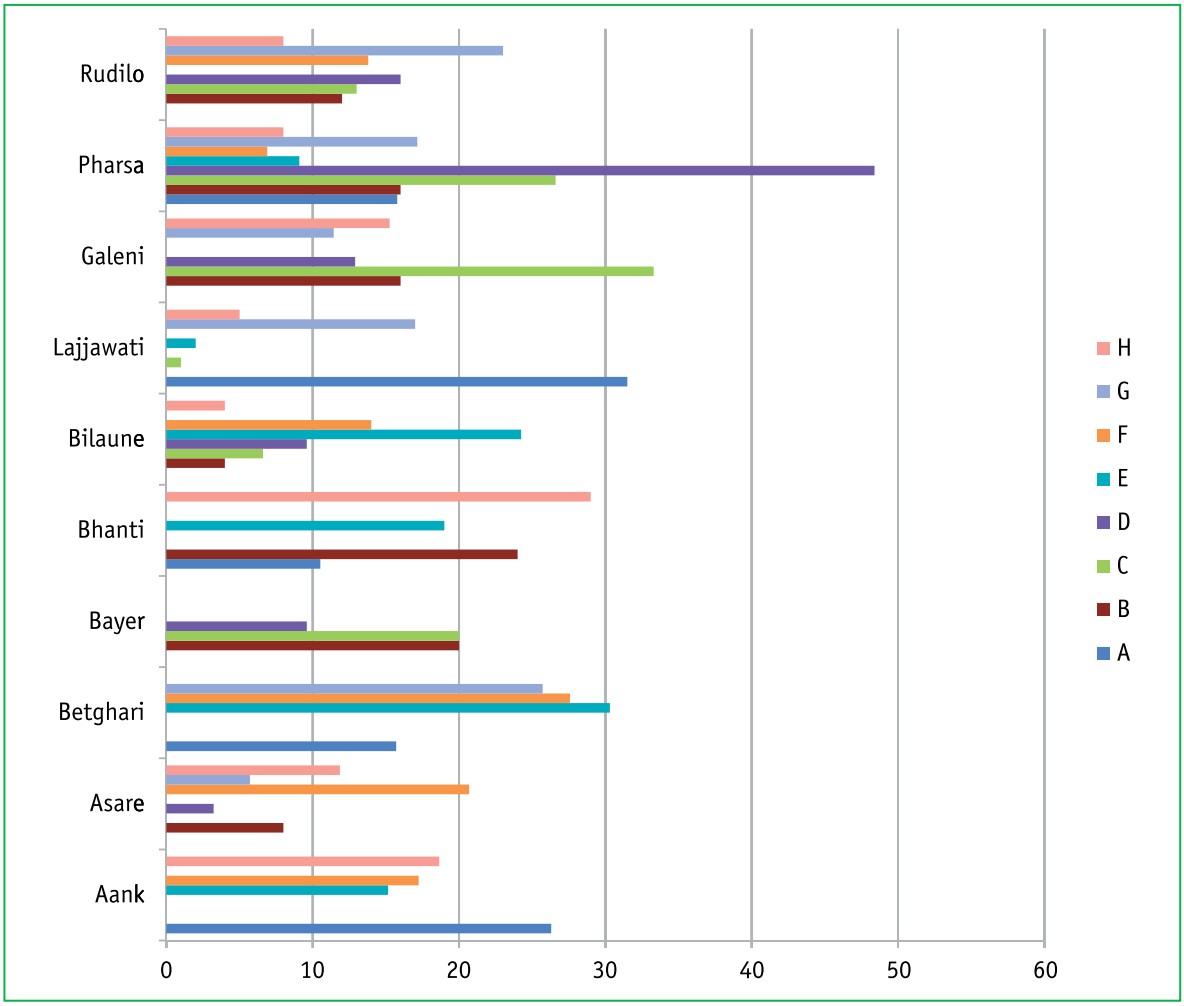


Figure 5: Blockwise distribution of shrub species (in percent)

Figure 6: Invasion of Parthenium Jhar in Amrite phanta

as Mile-a-minute weed in almost all blocks (Fig.6) *Parthenium* and *Lantana* species were also found colonizing in grasslands significantly along with *Mikania*. In block C (Barandabhar area), severe invasion of *Mikania* was observed.

5.5 Woody intrusion

In most of the floodplain areas where newly formed silt-bed, Sissou-Khayer (*Dalbergia-Acacia*) mixed riverine forests were observed to colonise at first and making favourable conditions for subsequent growth of other woody vegetation. Most of the islands and river banks of major river systems (Narayani, Rapti and Reu) of CNP were dominated by Sissou-Khayer (*Dalbergia-Acacia*) mixed riverine forest along with natural succession. Other riverine tree species such as Vellar *(Trewia nudiflora),* Simal *(Bombax cieba),* Jamun *(Syzygium cumini),* Palans *(Butea monosperma),* Kyamuna *(Syzygium operculatium),* Kutmero *(Litsea monopetala),* Sindure *(Mallotus phillipenansis)* and other associate species were found on grasslands. The conversion of grasslands habitat to shrub lands and forests is another natural cause of grassland shrinkage observed mostly in western and southern part of CNP.

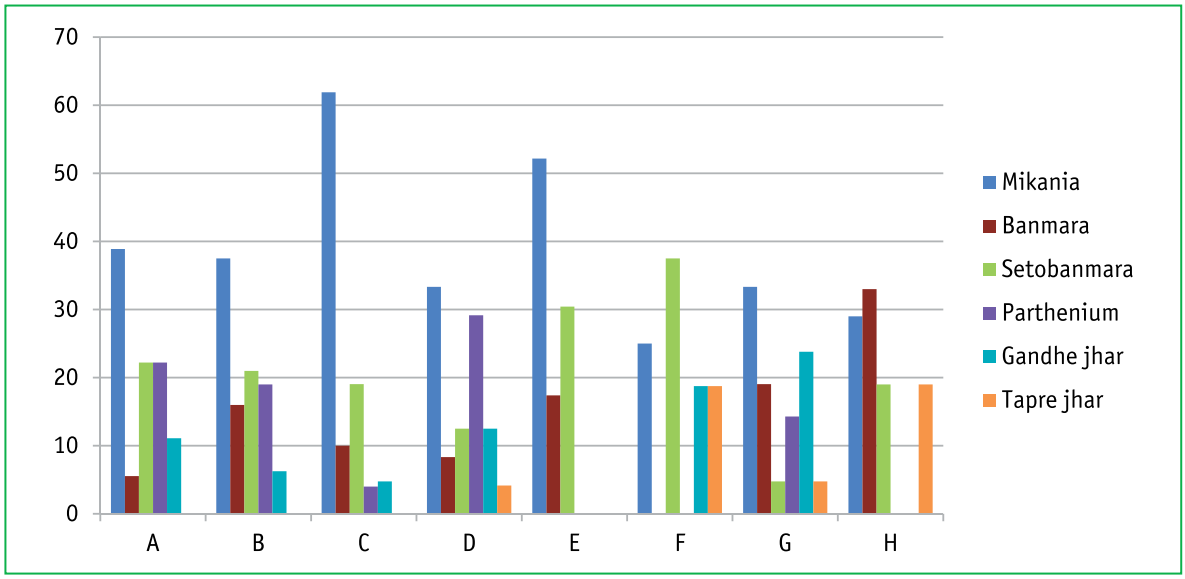


Figure 7: Block wise distribution percentage of invasive species in CNP

6. MANAGEMENT THREATS

6.1 Illegal Grass Cutting

Local people use the canes of elephant grass for construction of walls and partitions in traditional houses especially in Tharu and Bote community. Annually, CNP opens permit 3 days to local villagers for grass and thatch grass (mainly *Saccharum* and *Imperata spps.*) cutting inside park area.

Grass cutting program has somewhat helped in socioeconomic development of local community but local demand is much higher that cannot be fulfilled within that short period. Therefore, often people enter park area without permission for cutting grass to sustain feeding as staple diet of livestock. This has adversely affected the grassland ecosystem creating disturbance to wildlife.

Figure 8: People transporting grass cut from park

6.2 Flooding

CNP has three major river system i.e. Narayani, Rapti and Reu that confluence at western sector of CNP. Flooding is common during the monsoon season. Therefore, most of the grasslands along with riverine forests and grasslands remain water logged during the monsoon season. There are streams and rivers cascading down from Churiya hills of CNP carrying large loads of sediments (loose boulders, pebbles, stones) during flooding season and thus frequently change their river course over the period of time. As a result, grasslands formed on floodplain areas are dynamic.

6.3 Wildfire

Fire is a good servant, but a bad master. It has both positive and negative effects on grassland ecosystem. Early fire during cold season (December - March) is important to promote highly nutritious new sprouts of grasses but late fire during hot and dry season (April-May) can be devastating. Every year most of the region at foothills of Churiya hills, wildfire occurs which is more or less destructive in nature. Most of such fires are from anthropogenic origin. People living nearby park are dependent on grasslands for livestock feeding. People deliberately burn older grass species expecting growth of new palatable grass shoots. Sometimes, such practice has created destructive problem in the forest emerging uncontrolled wildfire. Moreover, entering park with burning materials (lighter, cigarettes), camping activities and picnic programs in Buffer Zone forest can cause wildfire during summer.

6.4 Grazing by Domestic Animals

Wild herbivores especially endangered Greater One-horned Rhinoceros and deer species (tiger prey base) depend upon quality grasslands habitat dominated by *Imperata* and *Saccharum* species. But due to uncontrolled grazing by livestock on grasslands with increasing from human settlements nearby, grasslands habitat is under threat. This can result in soil instability and shortage of foraging grass for wildlife. Though the livestock grazing could be useful from the view point of grassland management to a certain extent, grazing of domestic animals always carry the risk of the transferable diseases to wild animals.

6.5 Invasion of Alien, Shrub and Tree Species

Due to expansion of woody vegetation, alien invasive species and shrubs, grassland habitats are being confined to limited area and can result in unanticipated loss of grassland area if not managed in time. In CNP, colonization by riverine mixed forest with bushes in waterlogged grassland and also by Sal-mixed forest in grasslands distributed in foothills of Churiya hill has been seen as prominent problem in last few years. Therefore, natural succession developing woody vegetation on grasslands habitat is another threat to grassland management.

Besides above mentioned, human disturbance by over-exploitation and deterioration are also threats to grassland conservation. At this present rate, loss of important grasslands habitat of CNP can result in decline of ecosystem based diversity and several globally threatened wildlife species.

6.6 Other Threats

Grasslands are also threatened by several other reasons including infrastructure development and wetlands construction. Haphazard construction of buildings, roads etc. not only reduce and degrade the grassland habitat but also have far-reaching effects through colonization of invasive weeds and degradation of ecosystem.

Figure 9: Woody intrusion in Dabuwa phanta

7. MANAGEMENT PRESCRIPTIONS

7.1 Grass Cutting

Grass cutting is done manually by removing older and tall dense grass grown up large enough to supress short grass species that are highly preferred by grazers. For managing short (*Imperata* sps) grassland, tall grass is cut but hard to maintain due to successional effect by higher grass species. Normally, manual grass cutting is done twice or thrice a year at appropriate seasonal time. Amid the existing manual grass cutting praxis it is essential to introduce modern technology to make the grassland management more efficient and effective. Manual grass cutting, a traditional method which is suitable for small area of grassland, though up to the date it has helped the park authority to maintain the grassland; it can't assure the future of the grassland management of the park. So, with aim to manage the thousands of hectors of grassland which will be the necessity of the park in future with considering increasing animal abundance of the park, machinery innovation is critically necessary.

In the context of Buffer Zone, following the objective of Buffer Zone management and risk imposed to local communities from wildlife, irregular grass cutting by the local communities should be regulated in Buffer Zone forest. Encouraging local communities to stall feeding and qualitative livestock keeping may reduce the pressure of illegal grass cutting in the park.

7.2 Removal of Woody Vegetation

Grasslands which are far from access of management and found widespread at foothills of Churiya hill of CNP with interspersed Sal-mixed forests were likely to disappear. In most of the grasslands, pole sized trees with established seedling can be found colonizing riverine grasslands. Major grasslands such as Sukhibhar, Padampur, Kachuwani, Jarneli and Dumaria phanta which are managed regularly intend no risk of woody vegetation growth but other grasslands were observed shrinking to limited area day by day. Therefore, removal of woody vegetation along with grass cutting before development of crown foliage can be best management intervention. However, special attention should be given while removing trees by leaving some trees in the grassland as trees plays huge role in nutrient recycling and providing shade to animals. CNP can control woody intrusion on grasslands by removing or uprooting such woody species through allocation of budget and resources on annual basis for managing better grasslands habitat.

7.3 Controlled Burning and Control of Invasive Species

Controlled burning practice on grasslands in combination with grass cutting and uprooting trees is also carried out as present day management practices. It helps in accumulation of organic matter and removal of unwanted plant species enabling fertile soil profile development. This helps in growth of new palatable grass species for wild herbivores. However, the present practice of control burning should be made systematic by proper mapping of the grassland blocks, scheduling of fire in respective blocks and managing required human resources. Further, it is necessary to expand fire line networks

in appropriate grassland of park in such way that it can make compartments/blocks of grassland for fire based management strategies. To control unwanted herbs, shrubs and invasive species like *Mikania*, some biological agents (fungus) can be developed and applied by testing in designed experimental plots and intensive impact assessment. Prompt and effective enforcement of law to control grazing problem in and around park with increased awareness among locals should be prioritized. If management intervention is not appropriate for conservation of other small mammals, grassland birds and other threatened lesser fauna, such practices should be made changeable.

7.4 Research and Development

Periodic survey of grassland habitats is necessary to track changes in the extent. In managed grasslands, the species composition and other changes should be researched. The use of grasslands by wildlife species should be monitored. Based on the use of grasslands by wildlife species, the grasslands can be managed. Since grasslands are lifeline for many wild herbivores and closely lined with carnivores conservation, their management is vital to achieve park management objectives. Care should be taken when managing grasslands that houses more than one species as the management compatible for one may be incompatible for another species. Therefore, the management should be backed up by appropriate research and monitoring plan. Research and development should be made an integral part of grassland management.

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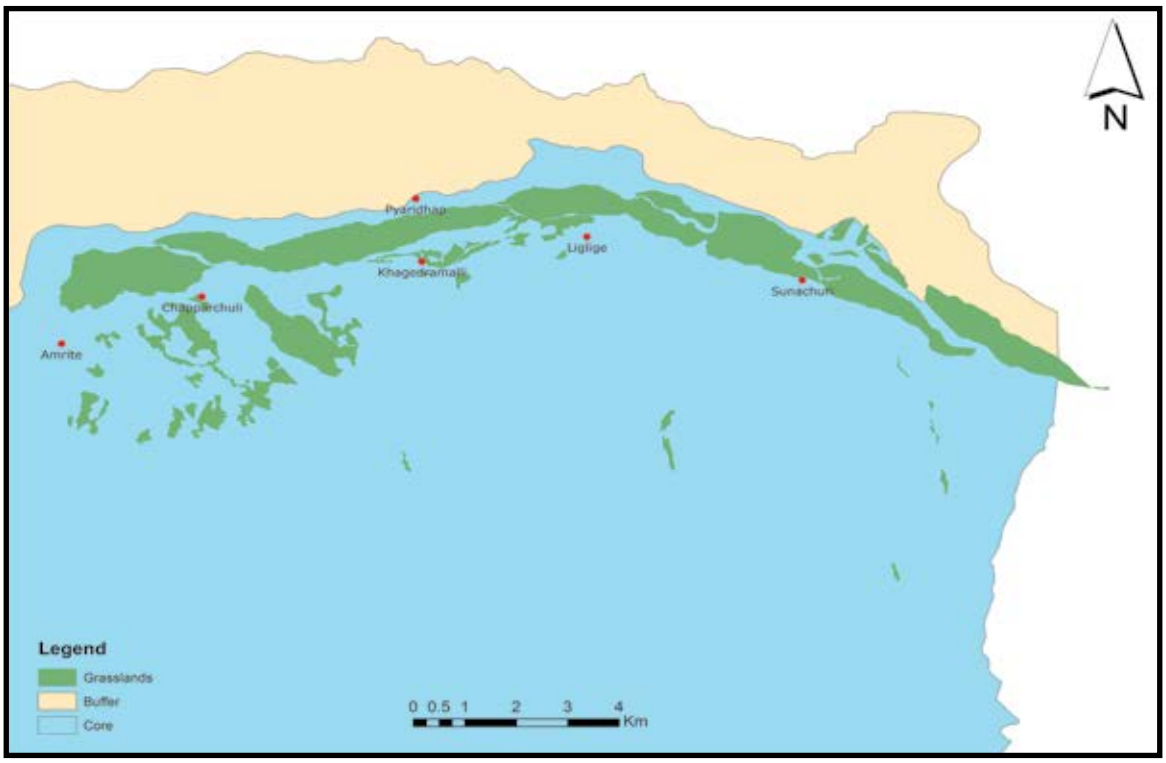
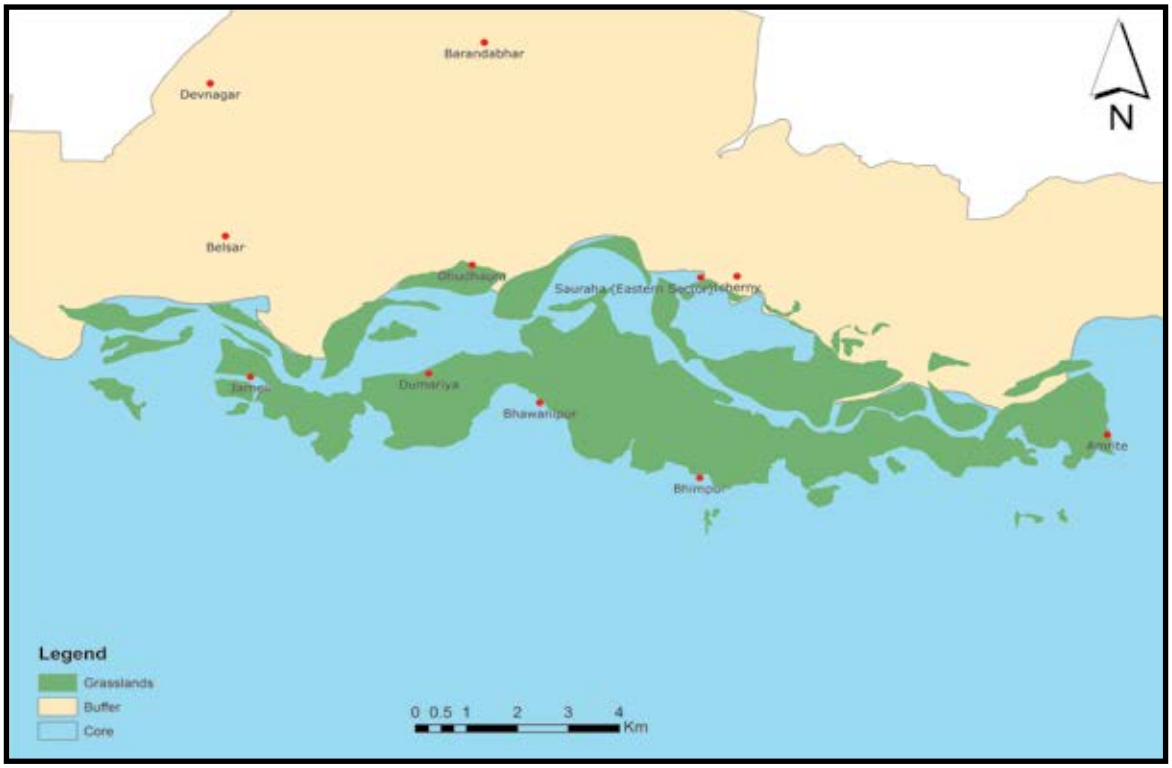
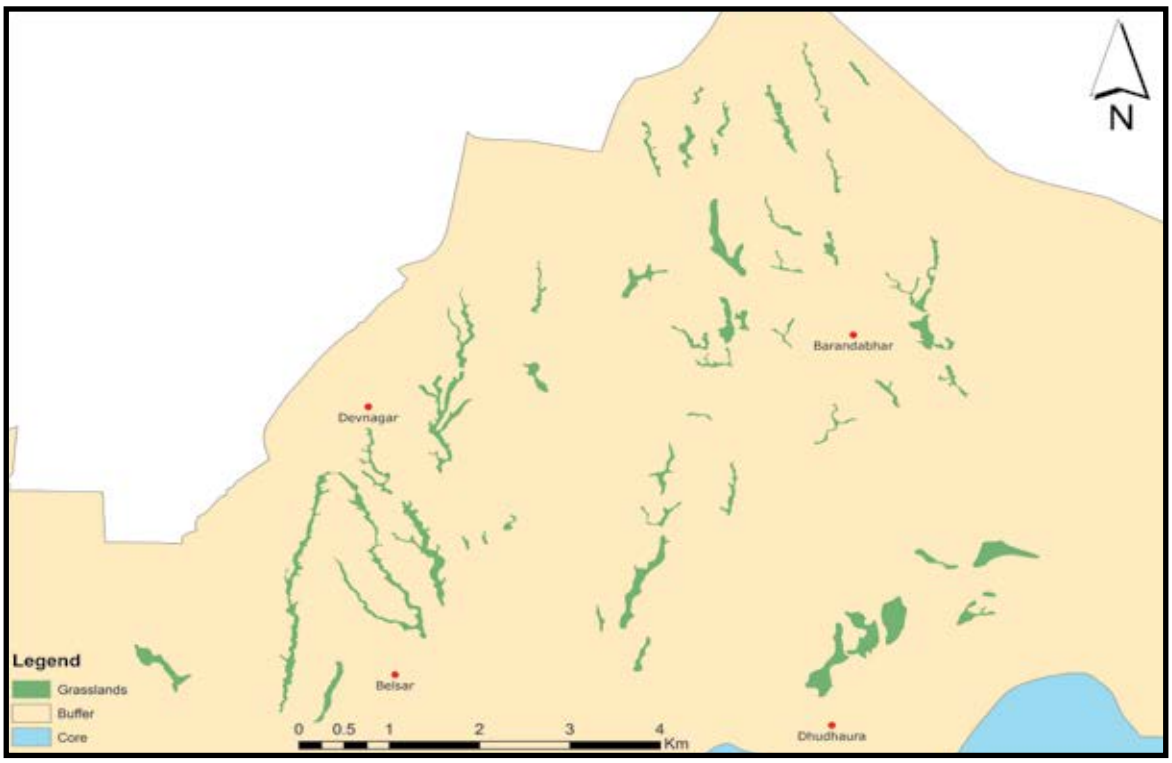
ANNEX I



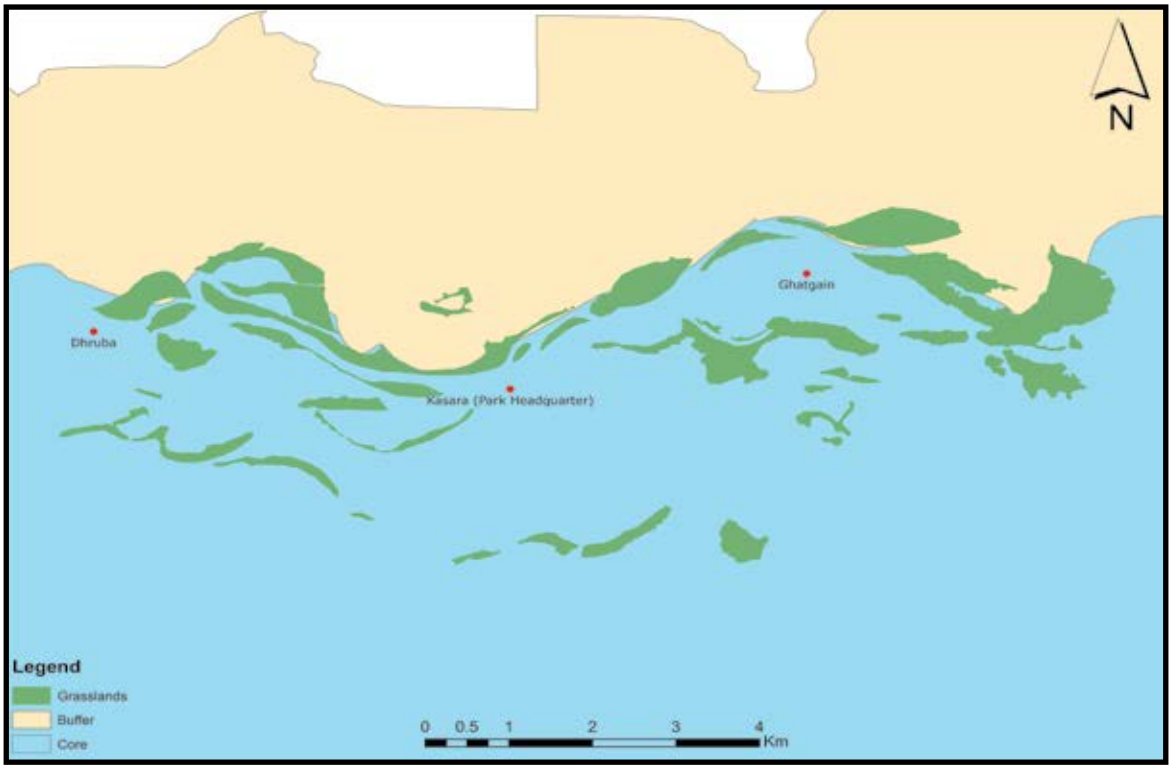
Map 4: Map showing grasslands of block A



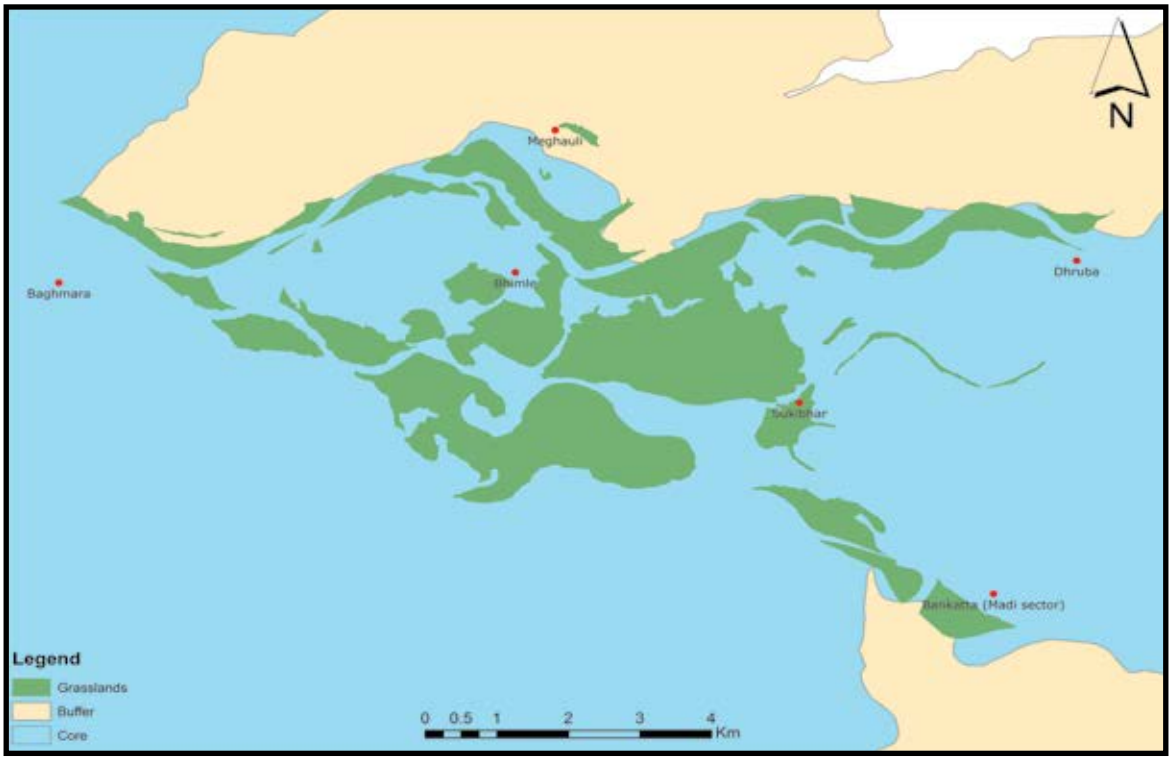
Map 5: Map showing grasslands of block B



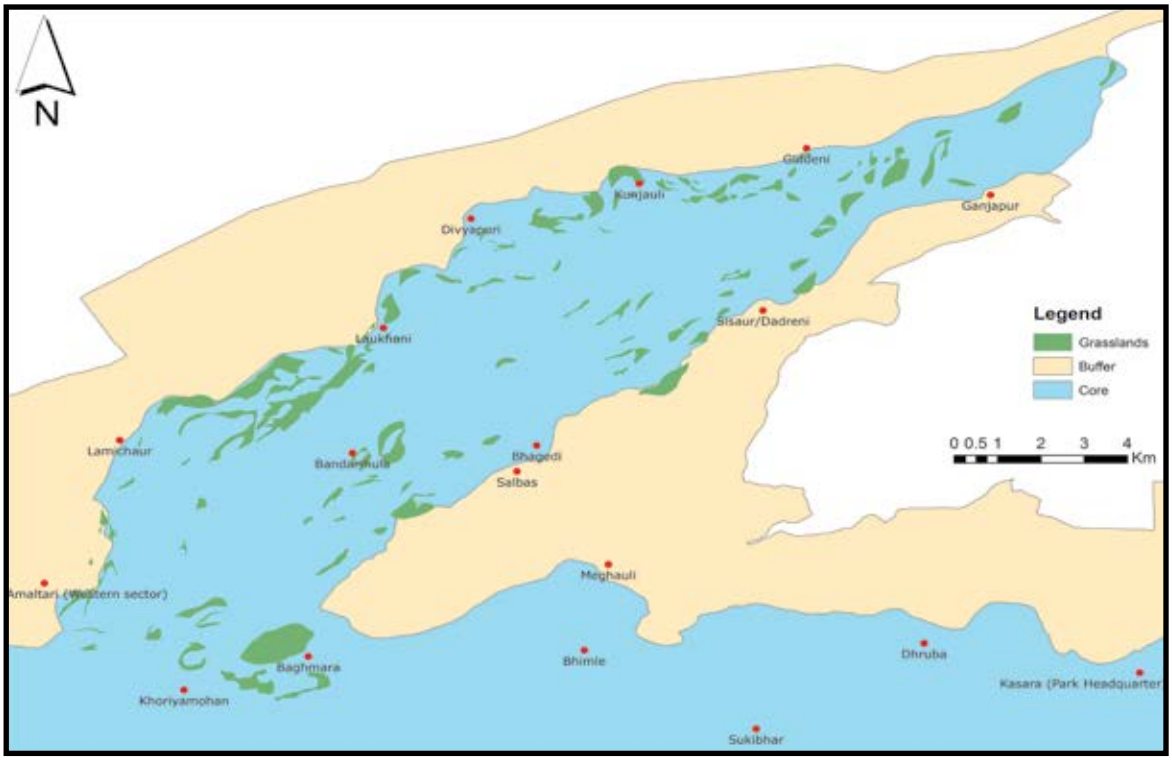
Map 6: Map showing grasslands of block C



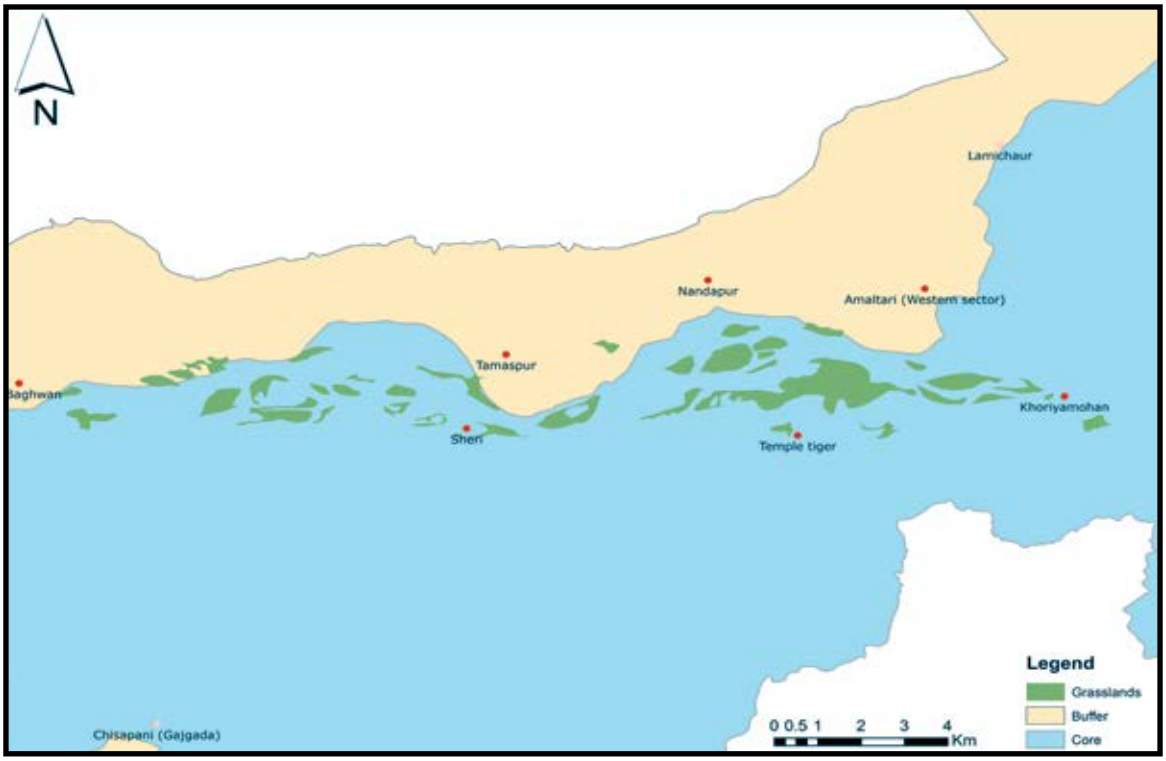
Map 7: Map showing grasslands of block D



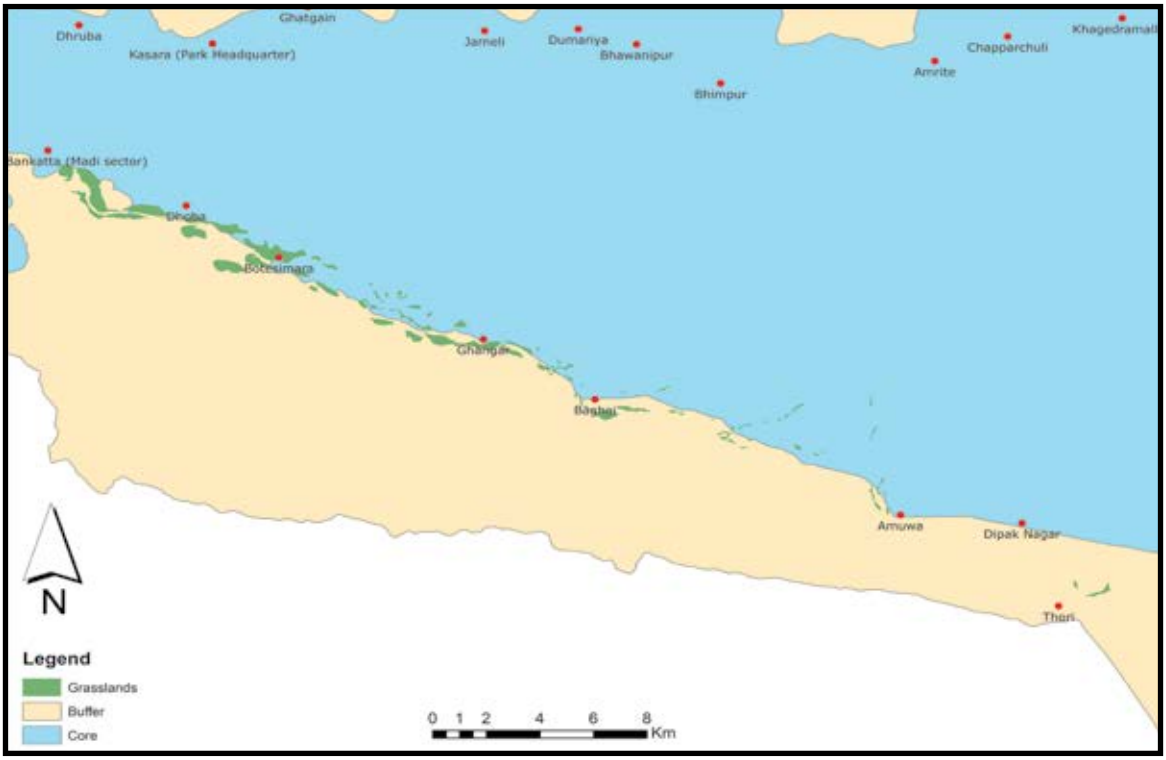
Map 8: Map showing grasslands of block E



Map 9: Map showing grasslands of block F



Map 10: Map showing grasslands of block G



Map 11: Map showing grasslands of block H

ANNEX II : DETAILS OF INDIVIDUAL GRASSLAND

S.N.	Name of Grassland	Code	Location	Nearest Post	Distance to nearest post (m)	Area (ha)	Latitude	Longitude	Remarks
1	Amaltari Bantapu		Core	Khoriyamuhan	1296.18	5.57	27.5608	84.1397	Formed on floodplain
2	Amaltari Phant		Core	Khoriyamuhan	1856.40	9.80	27.5444	84.1196	Drying up wetland
3	Amaltari Tapu Phanta		Core	Khoriyamuhan	1639.00	7.03	27.5578	84.1282	Formed on floodplain
4	Amaltarighat Phanta	1	Core	Amaltari	1953.73	2.96	27.5547	84.1149	Drying up wetland
5	Amaltarighat Phanta	2	Core	Amaltari	1854.74	5.96	27.5519	84.1037	Formed on floodplain
6	Amaltarighat Phanta	3	Core	Khoriyamuhan	1634.32	16.89	27.5638	84.1383	Formed on floodplain
7	Amrite Phanta	1	Core	Amrite	866.20	4.89	27.5373	84.5817	Existed from past
8	Amrite Phanta	2	Core	Amrite	797.59	6.25	27.5434	84.5837	Managed by park
9	Amrite Phanta	3	Core	Amrite	1203.79	21.69	27.5295	84.5808	Managed by park
10	Amrite Phanta	4	Core	Amrite	1607.05	1.69	27.5277	84.5772	Existed from past
11	Amrite Phanta	5	Core	Amrite	2003.69	5.81	27.5264	84.5618	Managed by park
12	Amrite Phanta	6	Core	Amrite	1701.61	2.91	27.5270	84.5678	Existed from past
13	Amrite Phanta	7	Core	Amrite	2485.14	4.77	27.5248	84.5901	Existed from past
14	Amrite Phanta	8	Core	Chapparchuli	2359.54	10.43	27.5275	84.5956	Existed from past
15	Amrite Phanta	9	Core	Chapparchuli	2172.33	22.82	27.5286	84.6016	Existed from past
16	Amrite Phanta	10	Core	Chapparchuli	2275.39	3.95	27.5299	84.5983	Existed from past
17	Amuwa Phanta	1	Core	Amuwa	771.49	0.84	27.3839	84.5591	Formed on floodplain
18	Amuwa Phanta	2	Core	Amuwa	3099.13	2.34	27.4061	84.5551	Formed on floodplain
19	Amuwa Phanta	3	Core	Amuwa	4401.34	1.89	27.4177	84.5542	Formed on floodplain
20	Bagai Chure Area		Core	Bagai	529.33	0.52	27.4235	84.4573	Existed from past
21	Bagai Reucheu Phant		Core	Bagai	866.47	1.89	27.4263	84.4529	Formed on floodplain
22	Bagai Uppallo Chure Phant		Core	Bagai	1102.93	0.72	27.4210	84.4711	Existed from past
23	Bagarekhola Phant		Core	Bagai	2274.09	2.28	27.4223	84.4844	Drying up wetland

S.N.	Name of Grassland	Code	Location	Nearest Post	Distance to nearest post (m)	Area (ha)	Latitude	Longitude	Remarks
24	Baghdari Phanta		Core	Amaltari	1488.20	2.01	27.5586	84.1148	Drying up wetland
25	Baghmara Phanta		Core	Baghmara	20.08	97.93	27.5554	84.1540	Drying up wetland
26	Baguwan Tapu		Core	Baguwan	650.06	7.09	27.5459	83.9282	Formed on floodplain
27	Bahapur Phanta		Core	Jarneli	695.33	46.74	27.5597	84.4056	Managed by park
28	Bandarjhulla Ghat Phanta		Core	Bandarjhula	1751.71	1.96	27.5836	84.1604	Formed on floodplain
29	Bandarjhulla Island Phanta	1	Core	Bandarjhula	895.31	6.43	27.5890	84.1656	Drying up wetland
30	Bandarjhulla Island Phanta	2	Core	Bandarjhula	815.51	4.61	27.5927	84.1727	Formed on floodplain
31	Bandarjhulla Island Phanta	3	Core	Bandarjhula	830.11	19.65	27.6000	84.1783	Formed on floodplain
32	Bandarjhulla Island Phanta	4	Core	Bandarjhula	1627.12	1.54	27.5840	84.1670	Formed on floodplain
33	Bandarjhulla Island Phanta	5	Core	Bandarjhula	753.52	16.14	27.6028	84.1773	Formed on floodplain
34	Bandarjhulla Phanta		Core	Bandarjhula	263.39	9.30	27.5979	84.1715	Formed on floodplain
35	Bardaha Island Phanta	2	Core	Bandarjhula	2068.54	3.60	27.5813	84.1753	Formed on floodplain
36	Bardaha Island Phanta	3	Core	Bandarjhula	1531.48	2.45	27.5913	84.1807	Formed on floodplain
37	Batule Phant	1	Core	Ghangar	3406.67	3.33	27.4563	84.3887	Existed from past
38	Batule Phant	2	Core	Ghangar	3362.41	1.50	27.4569	84.3917	Existed from past
39	Batule Phant	3	Core	Botesimara	3377.79	0.80	27.4608	84.3862	Existed from past
40	Belsarghat Phant		Core	Belsar	996.97	48.11	27.5606	84.4267	Drying up wetland
41	Bhalukhola Phanta		Core	Ghatgain	2367.36	17.63	27.5309	84.3581	Existed from past
42	Bhangaha Ghat		Core	Meghauli	1226.11	39.54	27.5645	84.2028	Drying up wetland
43	Bhimle Ban Phanta		Core	Bhimle	1472.35	1.84	27.5576	84.1928	Existed from past
44	Bhimle Phanta	1	Core	Bhimle	100.02	34.15	27.5520	84.2140	Existed from past
45	Bhimle Phanta	2	Core	Bhimle	414.78	20.46	27.5462	84.2069	Existed from past
46	Bhimpur Salghari		Core	Bhimpur	1326.88	5.36	27.5262	84.5057	Drying up wetland
47	Bhitri Sano Tapu		Core	Giddeni	1342.61	0.65	27.6651	84.2750	Formed on floodplain
48	Bhitri Tapu		Core	Giddeni	1530.30	3.65	27.6660	84.2776	Formed on floodplain
49	Bhorlekhola Phant	1	Core	Bagai	1374.02	3.97	27.4303	84.4526	Formed on floodplain

S.N.	Name of Grassland	Code	Location	Nearest Post	Distance to nearest post (m)	Area (ha)	Latitude	Longitude	Remarks
50	Bhorlekhola Phant	2	Core	Bagai	1562.44	1.39	27.4301	84.4485	Formed on floodplain
51	Bhorlekhola Phant	3	Core	Bagai	1694.25	1.21	27.4323	84.4494	Formed on floodplain
52	Bhosarghat Phanta		Core	Laukhani	356.19	1.67	27.6257	84.1782	Formed on floodplain
53	Bhutaha Tapu		Core	Bhutaha	2109.30	4.17	27.5490	83.9883	Formed on floodplain
54	Botesimara Reu Phant		Core	Botesimara	789.34	11.48	27.4648	84.3627	Formed on floodplain
55	Budhirapti Phanta		Core	Bhimle	723.58	119.29	27.5481	84.2173	Managed by park
56	Bulbule Phant	1	Core	Ghangar	3325.31	5.14	27.4530	84.3868	Drying up wetland
57	Chamka Phanta		Core	Khoriyamuhan	2127.49	40.44	27.5483	84.1132	Drying up wetland
58	Chapparchuli Phant	1	Core	Chapparchuli	946.47	129.26	27.5445	84.6173	Managed by park
59	Chapparchuli Phant	2	Core	Pyaridhap	1654.68	15.36	27.5502	84.6215	Managed by park
60	Chapparchuli Phant	3	Core	Chapparchuli	2373.94	15.60	27.5448	84.6248	Managed by park
61	Chapparchuli Phant	4	Core	Chapparchuli	2131.34	30.24	27.5340	84.6117	Managed by park
62	Chapparchuli Phant	5	Core	Chapparchuli	1901.40	4.32	27.5387	84.6125	Managed by park
63	Chapparchuli Phant	6	Core	Chapparchuli	2468.63	8.76	27.5292	84.6079	Existed from past
64	Chapparchuli Phant	7	Core	Chapparchuli	1645.09	4.70	27.5357	84.5989	Existed from past
65	Chapparchuli Phant	8	Core	Chapparchuli	201.15	66.70	27.5444	84.5962	Existed from past
66	Chapparchuli Phant	9	Core	Chapparchuli	60.58	4.63	27.5504	84.5998	Existed from past
67	Chapparchuli Phant	10	Core	Chapparchuli	1421.75	7.12	27.5369	84.6039	Existed from past
68	Chardhyong Phanta	1	Core	Liglige	689.15	159.60	27.5610	84.6976	Formed on floodplain
69	Chardhyong Phanta	2	Core	Khagendramalli	1119.33	179.45	27.5675	84.6698	Formed on floodplain
70	Chipleghat-Khadgauli Phanta		Core	Kasara (HQ)	758.20	22.24	27.5524	84.3140	Formed on floodplain
71	Chisapani Phanta		Core	Kasara (HQ)	1382.99	12.69	27.5472	84.3154	Existed from past
72	Dabuwa Phanta	1	Core	Amuwa	5351.23	3.11	27.4158	84.5298	Formed on floodplain
73	Dabuwa Phanta	2	Core	Bagai	5082.09	0.93	27.4078	84.5103	Formed on floodplain

S.N.	Name of Grassland	Code	Location	Nearest Post	Distance to nearest post (m)	Area (ha)	Latitude	Longitude	Remarks
74	Dabuwa Phanta	3	Core	Bagai	5230.30	1.24	27.4090	84.5127	Formed on floodplain
75	Dabuwa Phanta	4	Core	Amuwa	5579.95	0.71	27.4103	84.5193	Formed on floodplain
76	Dabuwa Phanta	5	Core	Amuwa	5309.49	0.62	27.4110	84.5238	Formed on floodplain
77	Dabuwa Phanta	6	Core	Amuwa	5284.28	1.97	27.4128	84.5268	Formed on floodplain
78	Deurali Phanta	1	Core	Amuwa	4035.62	3.08	27.4009	84.5297	Existed from past
79	Deurali Phanta	2	Core	Amuwa	3447.54	1.06	27.3982	84.5359	Existed from past
80	Deurali Phanta	3	Core	Amuwa	3383.67	0.55	27.3991	84.5383	Existed from past
81	Devitaal Phanta		Core	Khoriyamuhan	842.05	13.49	27.5388	84.1410	Drying up wetland
82	Dhajaha Phanta		Core	Sheri	1009.33	40.98	27.5409	84.0318	Drying up wetland
83	Dhaka Phanta 1	1	Core	Amaltari	1878.02	3.10	27.5808	84.1198	Existed from past
84	Dhampoos Phanta		Core	Dhruba	1085.23	108.75	27.5589	84.2702	Formed on floodplain
85	Dhruba Dakshin Phanta		Core	Dhruba	112.17	3.14	27.5454	84.2918	Existed from past
86	Dhruba Dakshin Phanta		Core	Dhruba	476.75	5.99	27.5439	84.2886	Existed from past
87	Dhruba Ghat	1	Core	Dhruba	845.87	9.95	27.5572	84.2963	Formed on floodplain
88	Dhruba Ghat	2	Core	Dhruba	483.99	18.40	27.5532	84.2979	Formed on floodplain
89	Dhruba Ghol Phanta		Core	Dhruba	395.59	17.19	27.5423	84.2994	Drying up wetland
90	Dhruba Uttar Phanta		Core	Dhruba	49.98	1.42	27.5484	84.2941	Existed from past
91	Dhupighari phant		Core	Laukhani	701.51	29.20	27.6175	84.1679	Formed on floodplain
92	Dhurba Lamiphant		Core	Dhruba	1148.86	3.26	27.5395	84.2801	Drying up wetland
93	Dibyapuri Pari Phanta		Core	Kujauli	1290.45	1.05	27.6499	84.2220	Formed on floodplain
94	Dibyapuri Phanta		Core	Kujauli	1238.60	24.92	27.6520	84.2114	Drying up wetland
95	Diyalo Tapu Phanta		Core	Ganjapur	1838.63	14.91	27.6766	84.3061	Formed on floodplain
96	Dumariya Phanta	1	Core	Dumariya	105.91	65.40	27.5559	84.4254	Managed by park
97	Dumariya Phanta	2	Core	Dumariya	777.53	163.02	27.5459	84.4366	Managed by park
98	Dumariya Phanta	3	Core	Kachhuwani	0.00	220.54	27.5470	84.4545	Managed by park
99	Dumariya Raptiside		Core	Dumariya	913.76	9.54	27.5604	84.4242	Drying up wetland

S.N.	Name of Grassland	Code	Location	Nearest Post	Distance to nearest post (m)	Area (ha)	Latitude	Longitude	Remarks
100	Gadesimalchaur	1	Core	Botesimara	1719.94	5.31	27.4670	84.3728	Existed from past
101	Gadesimalchaur	2	Core	Botesimara	2029.62	0.20	27.4642	84.3727	Existed from past
102	Gainda Ghol Phanta		Core	Botesimara	1292.82	3.68	27.4701	84.3680	Drying up wetland
103	Gainda Phanta		Core	Chapparchuli	99.14	226.71	27.5552	84.5880	Formed on floodplain
104	Gaindakhasa Phanta		Core	Temple Tiger	2062.49	18.83	27.5432	84.0538	Drying up wetland
105	Gajipur Tapu		Core	Ganjapur	1586.57	23.95	27.6632	84.2822	Formed on floodplain
106	Ganjipur Ghat		Core	Ganjapur	1641.38	3.84	27.6719	84.2922	Formed on floodplain
107	Ganjipur Phanta		Core	Ganjapur	210.82	5.96	27.6608	84.2962	Formed on floodplain
108	Ganjipur Sanotapu		Core	Ganjapur	1858.19	3.52	27.6677	84.2830	Formed on floodplain
109	Ganjipur Tapu Pahilo		Core	Ganjapur	1064.84	17.10	27.6652	84.2905	Drying up wetland
110	Gaurmachhan Phanta	2	Core	Dumariya	44.83	23.60	27.5511	84.4217	Managed by park
111	Ghagar Lami Phanta		Core	Ghangar	1925.22	8.05	27.4482	84.3979	Existed from past
112	Ghagar Phanta		Core	Ghangar	2219.75	4.61	27.4524	84.4009	Existed from past
113	Ghagar Reucheu		Core	Ghangar	1490.08	4.08	27.4447	84.4049	Formed on floodplain
114	Ghangar Upallo Phant		Core	Ghangar	2880.46	4.07	27.4567	84.3966	Existed from past
115	Ghatgain Ghat Phanta		Core	Ghatgain	1246.49	12.04	27.5654	84.3587	Formed on floodplain
116	Ghatgain Phanta	1	Core	Ghatgain	76.28	72.39	27.5538	84.3578	Managed by park
117	Ghatgain Phanta	2	Core	Ghatgain	610.67	2.12	27.5489	84.3661	Managed by park
118	Ghatgain Phanta	3	Core	Ghatgain	1293.47	1.59	27.5428	84.3679	Existed from past
119	Ghatgain Phanta	4	Core	Ghatgain	1036.21	2.07	27.5572	84.3740	Existed from past
120	Ghatgain Phanta	5	Core	Ghatgain	922.71	7.34	27.5454	84.3667	Managed by park
121	Ghol Tapu	1	Core	Giddeni	1715.22	1.45	27.6575	84.2487	Formed on floodplain
122	Ghol Tapu	2	Core	Kujauli	1811.81	3.74	27.6570	84.2463	Drying up wetland
123	Ghol Tapu	3	Core	Kujauli	1595.33	6.66	27.6594	84.2459	Drying up wetland
124	Ghol Tapu	4	Core	Kujauli	1304.74	3.88	27.6570	84.2410	Formed on floodplain
125	Ghol Tapu	5	Core	Kujauli	1132.34	0.82	27.6566	84.2385	Formed on floodplain

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126	Ghol Tapu	6	Core	Giddeni	1048.81	9.88	27.6613	84.2502	Formed on floodplain
127	Gidaha Pari Phanta	1	Core	Giddeni	1854.87	12.58	27.6507	84.2675	Existed from past
128	Gidaha Pari Phanta	2	Core	Giddeni	1587.49	13.11	27.6564	84.2733	Existed from past
129	Gidaha Tapu	1	Core	Giddeni	248.09	2.53	27.6657	84.2624	Existed from past
130	Gidaha Tapu	2	Core	Giddeni	524.96	2.48	27.6630	84.2609	Existed from past
131	Gidaha Tapu	3	Core	Giddeni	876.65	6.57	27.6600	84.2570	Existed from past
132	Gidaha Tapu	4	Core	Giddeni	1175.30	3.66	27.6575	84.2609	Existed from past
133	Gidaha Tower		Core	Giddeni	1191.47	3.31	27.6623	84.2720	Formed on floodplain
134	Golaghat Phanta		Core	Baghmara	2042.37	8.92	27.5741	84.1656	Formed on floodplain
135	Gurmi Phant	1	Core	Tamaspur	3331.26	43.01	27.5414	83.9719	Drying up wetland
136	Gurmi Phant	2	Core	Tamaspur	2520.95	34.81	27.5437	83.9593	Drying up wetland
137	Gurmi Phant	3	Core	Tamaspur	3246.57	21.24	27.5469	83.9689	Drying up wetland
138	Hardakhola Chure	1	Core	Liglige	3149.75	5.05	27.5279	84.6815	Formed on floodplain
139	Hardakhola Chure	2	Core	Liglige	3613.78	6.02	27.5217	84.6817	Formed on floodplain
140	Hardakhola Chure	3	Core	Khagendramalli	4282.92	2.23	27.5200	84.6358	Formed on floodplain
141	Hardakhola Phanta	1	Core	Khagendramalli	2556.26	34.76	27.5683	84.6832	Formed on floodplain
142	Hardakhola Phanta	2	Core	Khagendramalli	792.04	21.78	27.5649	84.6638	Formed on floodplain
143	Giddeni bagar		Core	Giddeni	1848.30	1.38	27.6659	84.2807	Formed on floodplain
144	Hattikhet Phanta		Core	Bhimpur	917.18	17.00	27.5308	84.5255	Drying up wetland
145	Hileghat Phant		Core	Bagai	4872.49	1.16	27.4078	84.5077	Existed from past
146	Jarneli Phant	1	Core	Jarneli	1021.86	9.83	27.5550	84.3783	Managed by park
147	Jarneli Phant	2	Core	Jarneli	341.38	31.79	27.5499	84.4012	Managed by park
148	Jarneli Phant	3	Core	Jarneli	625.95	3.72	27.5517	84.3853	Existed from past
149	Jarneli Phant	4	Core	Jarneli	115.62	1.77	27.5543	84.3940	Managed by park
150	Jatayu Gate Phanta		Core	Laukhani	1622.66	53.61	27.6161	84.1512	Drying up wetland
151	Jogimara Phanta		Core	Lamichaur	2983.19	1.69	27.5775	84.1345	Drying up wetland

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152	Kachhuwani Phanta	1	Core	Kachhuwani	40.59	141.41	27.5537	84.4645	Managed by park
153	Kaliban Phanta		Core	Sheri	1763.93	7.59	27.5421	83.9960	Drying up wetland
154	Kanchi Boteni Phanta		Core	Amaltari	752.31	10.97	27.5646	84.1113	Drying up wetland
155	Kasara Tappu		Core	Kasara (HQ)	289.53	2.30	27.5532	84.3344	Formed on floodplain
156	Katlekhola Chheu	1	Core	Sunachuri	1327.44	1.27	27.5380	84.7225	Formed on floodplain
157	Katlekhola Chheu	2	Core	Sunachuri	959.63	0.94	27.5308	84.7276	Formed on floodplain
158	Katlekhola Chheu	3	Core	Sunachuri	1181.00	0.30	27.5275	84.7277	Formed on floodplain
159	Katlekhola Chheu	4	Core	Sunachuri	1246.64	0.70	27.5262	84.7278	Formed on floodplain
160	Katlekhola Chheu	5	Core	Sunachuri	1306.59	0.66	27.5245	84.7287	Formed on floodplain
161	Katlekhola Chheu	6	Core	Sunachuri	1911.75	3.42	27.5163	84.7298	Formed on floodplain
162	Katlekhola Chure Phant		Core	Sunachuri	4058.97	2.33	27.4990	84.7213	Existed from past
163	Kavretaal Phanta		Core	Baghmara	489.58	18.03	27.5459	84.1600	Drying up wetland
164	Kawathis Tapu		Core	Laukhani	921.62	3.81	27.6183	84.1731	Formed on floodplain
165	Khagendramalli Phanta	1	Core	Pyaridhap	1293.42	6.63	27.5589	84.6342	Drying up wetland
166	Khagendramalli Phanta	2	Core	Khagendramalli	1373.37	8.02	27.5588	84.6403	Drying up wetland
167	Khagendramalli Phanta	3	Core	Khagendramalli	1563.03	1.20	27.5559	84.6391	Drying up wetland
168	Khagendramalli Phanta	4	Core	Khagendramalli	1057.30	10.41	27.5593	84.6439	Existed from past
169	Khagendramalli Phanta	5	Core	Khagendramalli	847.05	5.41	27.5547	84.6458	Existed from past
170	Khagendramalli Phanta	6	Core	Khagendramalli	731.36	7.02	27.5602	84.6482	Drying up wetland
171	Khagendramalli Phanta	7	Core	Khagendramalli	917.79	2.11	27.5613	84.6473	Existed from past
172	Khagendramalli Phanta	8	Core	Khagendramalli	870.39	5.92	27.5654	84.6551	Existed from past
173	Khagendramalli Phanta	9	Core	Khagendramalli	677.36	2.08	27.5594	84.6630	Drying up wetland
174	Khagendramalli Phanta	10	Core	Khagendramalli	560.67	5.99	27.5624	84.6555	Drying up wetland
175	Kharkatta Phuraut Phanta		Core	Surung Khola	294.18	422.00	27.5314	84.2235	Formed on floodplain
176	Khoriyamuhan Phanta		Core	Khoriyamuhan	0.00	29.89	27.5468	84.1481	Managed by park
177	Khoriyamuhan Tapu	1	Core	Khoriyamuhan	511.95	15.46	27.5526	84.1363	Drying up wetland

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178	Khoriyamuhan Tapu	2	Core	Khoriyamuhan	1117.83	2.03	27.5448	84.1313	Formed on floodplain
179	Khoriyamuhan Tapu	3	Core	Khoriyamuhan	1301.99	12.58	27.5470	84.1254	Formed on floodplain
180	Kolkatta Phanta		Core	Bhutaha	563.63	31.55	27.5471	84.0095	Drying up wetland
181	Krishnagar Core		Core	Ghangar	2038.89	0.83	27.4367	84.4424	Existed from past
182	Krishnasar Phanta		Core	Lamichaur	1090.54	2.80	27.5921	84.1227	Formed on floodplain
183	Kujauli Gl Phanta		Core	Giddeni	1422.96	2.06	27.6578	84.2522	Formed on floodplain
184	Kujauli Pari Phanta		Core	Kujauli	356.73	3.63	27.6564	84.2245	Formed on floodplain
185	Kujauli Phanta	2	Core	Kujauli	270.99	1.65	27.6579	84.2276	Formed on floodplain
186	Kumarbarti Phanta		Core	Divyapuri	764.82	2.17	27.6449	84.1919	Formed on floodplain
187	Kumroj Phanta		Core	Janakpur	1274.15	50.84	27.5477	84.5489	Formed on floodplain
188	Lamichaur Bhitri Phant		Core	Lamichaur	1607.40	1.27	27.5970	84.1349	Drying up wetland
189	Lamichaur Ghol Phant		Core	Lamichaur	2373.88	4.44	27.5874	84.1380	Drying up wetland
190	Lamichaur Phanta		Core	Lamichaur	608.89	1.06	27.6015	84.1254	Existed from past
191	Lamitaal Phanta	1	Core	Ghatgain	241.99	1.29	27.5551	84.3588	Drying up wetland
192	Lamitaal Phanta	2	Core	Ghatgain	686.18	1.68	27.5563	84.3546	Drying up wetland
193	Laugai Tapu	1	Core	Divyapuri	1501.37	5.42	27.6387	84.1899	Existed from past
194	Laugai Tapu	2	Core	Laukhani	1146.40	9.15	27.6394	84.1814	Drying up wetland
195	Laukhani Tapu Phanta		Core	Laukhani	253.05	17.96	27.6320	84.1775	Formed on floodplain
196	Liglige Phanta	1	Core	Liglige	1646.17	1.46	27.5631	84.7082	Formed on floodplain
197	Liglige Phanta	2	Core	Liglige	1331.75	3.64	27.5596	84.7125	Formed on floodplain
198	Liglige Phanta	5	Core	Liglige	1636.54	10.61	27.5643	84.7119	Formed on floodplain
199	Liglige Phanta	6	Core	Liglige	525.74	126.69	27.5496	84.7203	Formed on floodplain
200	Liglige Phanta	7	Core	Liglige	1101.23	4.40	27.5587	84.7074	Formed on floodplain
201	Majhuwa Tapu	1	Core	Ganjapur	3656.62	6.47	27.6857	84.3266	Drying up wetland
202	Majhuwa Tapu	2	Core	Bhutaha	2483.11	10.76	27.5463	83.9853	Formed on floodplain
203	Majorghat Phanta		Core	Kasara (HQ)	529.99	5.34	27.5556	84.3389	Formed on floodplain

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204	Materi Bagwan		Core	Baguwan	993.18	23.94	27.5399	83.9324	Existed from past
205	Mayurtika Phanta		Core	Lamichaur	1428.78	38.47	27.6037	84.1428	Drying up wetland
206	Meghauli Pari Ghat		Core	Meghauli	1043.42	14.98	27.5635	84.2153	Drying up wetland
207	Meghauliban Phanta		Core	Meghauli	619.03	1.32	27.5676	84.2213	Existed from past
208	Mutahaghol Phanta		Core	Laukhani	396.83	2.50	27.6232	84.1729	Drying up wetland
209	Namuna Ghasemaidan	2	Core	Laukhani	1649.34	13.16	27.6143	84.1570	Managed by community
210	Nandapur Tapu Phanta	1	Core	Temple Tiger	1898.26	52.70	27.5535	84.0646	Formed on floodplain
211	Nandapur Tapu Phanta	2	Core	Temple Tiger	2513.61	16.93	27.5519	84.0549	Formed on floodplain
212	Nandapur Tapu Phanta	3	Core	Temple Tiger	2141.62	17.73	27.5568	84.0734	Formed on floodplain
213	Narayani Phanta	1	Core	Divyapuri	566.17	2.50	27.6491	84.1969	Drying up wetland
214	Narayani Phanta	2	Core	Divyapuri	812.76	0.38	27.6472	84.1985	Drying up wetland
215	Narayani Phanta	3	Core	Divyapuri	1007.29	3.48	27.6462	84.2012	Formed on floodplain
216	Narayanicheu Phanta		Core	Kujauli	662.53	17.19	27.6558	84.2197	Formed on floodplain
217	Narayanipari Phanta		Core	Divyapuri	1683.55	6.38	27.6374	84.1971	Formed on floodplain
218	Niure Phanta		Core	Kasara (HQ)	536.39	10.05	27.5438	84.3199	Drying up wetland
219	Purano Gaur Machan		Core	Dumariya	639.65	6.64	27.5475	84.4224	Managed by park
220	Paanch Pandav Phanta		Core	Bankatta	669.77	32.23	27.5129	84.2633	Formed on floodplain
221	Padampur Phanta	1	Core	Bhimpur	0.00	1579.89	27.5490	84.5207	Managed by park
222	Padampur Phanta	2	Core	Bhimpur	2028.21	7.50	27.5366	84.5383	Managed by park
223	Padampur Phanta	3	Core	Bhimpur	1384.87	64.58	27.5482	84.5359	Drying up wetland
224	Pateni Sorah Phanta		Core	Amaltari	1333.29	5.12	27.5721	84.1187	Drying up wetland
225	Pyaridhap Phant		Core	Pyaridhap	435.01	329.96	27.5624	84.6234	Formed on floodplain
226	Raighat Phanta		Core	Ghangar	582.55	7.57	27.4460	84.4165	Drying up wetland
227	Rani Khola Phanta		Core	Ghatgain	543.71	4.75	27.5504	84.3698	Drying up wetland
228	Rapti Doon Phanta	1	Core	Sukhibhar	2454.31	45.25	27.5617	84.2528	Formed on floodplain
229	Reu Dhobhan Phanta		Core	Baghmara	1310.71	26.27	27.5518	84.1768	Formed on floodplain

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230	Sailimaili Phanta		Core	Temple Tiger	1503.69	9.83	27.5372	84.0964	Drying up wetland
231	Sanaghat Phanta		Core	Bhimle	1770.60	1.96	27.5582	84.1894	Formed on floodplain
232	Sano Dhampoos Phanta	1	Core	Sukhibhar	1897.14	2.63	27.5541	84.2542	Drying up wetland
233	Sano Jarneli Phant		Core	Jarneli	113.70	26.14	27.5506	84.3906	Existed from past
234	Sanosora Phanta		Core	Laukhani	909.38	2.60	27.6223	84.1660	Existed from past
235	Sheri Pari Tapu		Core	Bhutaha	3079.33	5.78	27.5466	83.9800	Drying up wetland
236	Sheri Phanta		Core	Sheri	0.00	18.01	27.5370	84.0159	Drying up wetland
237	Sheri Tapu		Core	Sheri	908.80	6.87	27.5395	84.0028	Drying up wetland
238	Sheriban Phanta		Core	Bhutaha	3085.20	5.14	27.5408	83.9809	Drying up wetland
239	Sikhrauli Tapu Phanta		Core	Giddeni	1574.01	6.04	27.6622	84.2770	Formed on floodplain
240	Simalghari Phanta		Core	Kachhuwani	1509.08	21.90	27.5621	84.4488	Formed on floodplain
241	Siraki Tapu	1	Core	Kujauli	1019.03	2.91	27.6611	84.2386	Formed on floodplain
242	Siraki Tapu	2	Core	Kujauli	1264.48	1.50	27.6593	84.2411	Drying up wetland
243	Siraki Tapu	3	Core	Kujauli	549.55	4.27	27.6602	84.2345	Drying up wetland
244	Siraki Tapu	4	Core	Kujauli	775.68	0.79	27.6607	84.2357	Formed on floodplain
245	Siraki Tapu	5	Core	Kujauli	1322.71	0.61	27.6609	84.2410	Formed on floodplain
246	Sirke Tapu	1	Core	Divyapuri	1849.60	3.07	27.6391	84.2058	Formed on floodplain
247	Sirke Tapu	2	Core	Divyapuri	2291.53	2.20	27.6418	84.2120	Formed on floodplain
248	Siswar Bich Tapu		Core	Sisawar	531.97	3.29	27.6356	84.2479	Formed on floodplain
249	Siswar Ghat Phanta		Core	Sisawar	445.35	3.04	27.6314	84.2470	Formed on floodplain
250	Siswar Pari Phanta		Core	Salbas	2582.86	5.16	27.6198	84.2013	Drying up wetland
251	Siswar Tapu	1	Core	Sisawar	1491.39	6.27	27.6260	84.2367	Drying up wetland
252	Siswar Tapu	2	Core	Sisawar	2489.29	1.52	27.6250	84.2268	Formed on floodplain
253	Siswar Tapu	3	Core	Sisawar	2348.14	10.15	27.6214	84.2272	Formed on floodplain
254	Siswar Tapu	4	Core	Sisawar	1076.19	6.87	27.6253	84.2417	Formed on floodplain
255	Siswar Tapu	6	Core	Sisawar	1101.84	2.97	27.6286	84.2397	Formed on floodplain

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256	Siswarban Phanta	1	Core	Kujauli	3073.81	3.70	27.6321	84.2162	Drying up wetland
257	Siswarban Phanta	2	Core	Sisawar	2496.53	7.82	27.6312	84.2241	Drying up wetland
258	Siswarban Phanta	3	Core	Sisawar	2047.90	4.30	27.6337	84.2303	Existed from past
259	Siswarban Tapu		Core	Sisawar	789.28	6.59	27.6396	84.2494	Drying up wetland
260	Suka Raj Phanta		Core	Bhutaha	1515.06	13.29	27.5461	83.9968	Existed from past
261	Sukhibhar Lamiphanta		Core	Sukhibhar	754.06	12.13	27.5424	84.2668	Drying up wetland
262	Sukhibhar Complex Phant		Core	Sukhibhar	55.56	514.95	27.5464	84.2393	Managed by park
263	Sukhibhar Machan Phanta		Core	Sukhibhar	65.89	44.22	27.5327	84.2527	Managed by park
264	Sukhibharcheu Phanta		Core	Sukhibhar	992.17	4.84	27.5460	84.2585	Existed from past
265	Syalbaas Pariban		Core	Sisawar	2952.29	2.13	27.6176	84.2253	Drying up wetland
266	Syalbaas Tapu Phanta	1	Core	Salbas	947.79	6.80	27.5986	84.1905	Drying up wetland
267	Syalbaas Tapu Phanta	2	Core	Salbas	711.06	5.23	27.6020	84.1984	Formed on floodplain
268	Tamor Tal Phanta	1	Core	Kasara (HQ)	1934.42	7.71	27.5308	84.3375	Drying up wetland
269	Tamor Tal Phanta	2	Core	Kasara (HQ)	2206.03	15.55	27.5321	84.3457	Drying up wetland
270	Tamor Tal Phanta	3	Core	Kasara (HQ)	2147.58	3.58	27.5293	84.3294	Drying up wetland
271	Temple Baya Phanta		Core	Amaltari	2474.22	16.38	27.5449	84.1089	Drying up wetland
272	Temple Ghat Phanta		Core	Temple Tiger	665.25	226.36	27.5470	84.0820	Drying up wetland
273	Temple Tapu Pari Phanta		Core	Temple Tiger	2643.65	16.30	27.5599	84.0670	Formed on floodplain
274	Temple Tapu Phanta	1	Core	Temple Tiger	1948.22	4.94	27.5543	84.0725	Formed on floodplain
275	Temple Tapu Phanta	2	Core	Temple Tiger	1682.55	6.05	27.5517	84.0718	Formed on floodplain
276	Temple Tiger Phanta (Mohan Khola)		Core	Temple Tiger	1.30	7.96	27.5375	84.0760	Drying up wetland
277	Thapaliyatal Phanta		Core	Kasara (HQ)	2282.78	1.18	27.5340	84.3173	Drying up wetland
278	Thapaliyatal Thulo Phanta		Core	Dhruba	1117.77	13.41	27.5392	84.3083	Drying up wetland
279	Thotari Taal Phanta		Core	Bankatta	1205.76	62.39	27.5203	84.2563	Drying up wetland

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280	Tigertops Phanta	1	Core	Bhimle	956.44	60.53	27.5457	84.1968	Existed from past
281	Tigertops Phanta	2	Core	Bhimle	1731.49	51.59	27.5453	84.1866	Formed on floodplain
282	Tigertopsghat Phanta		Core	Meghauli	549.67	127.50	27.5630	84.2203	Formed on floodplain
283	Ultikhola Phant		Core	Bhutaha	2825.87	13.63	27.5545	83.9779	Existed from past
284	Upallo Ghagar Phant		Core	Ghangar	1769.38	1.97	27.4495	84.4060	Drying up wetland
285	Upallo Siswar Tapu		Core	Sisawar	1244.26	6.26	27.6421	84.2624	Existed from past
286	Amalaghari Phanta		Buffer	Bagai	993.19	12.76	27.4149	84.4743	Formed on floodplain
287	Amilia Bagar		Buffer	Dhoba	1118.68	42.93	27.4889	84.2974	Formed on floodplain
288	Amilia Phanta		Buffer	Bankatta	1422.87	81.32	27.4953	84.2941	Formed on floodplain
289	Amuwa Phanta	3	Buffer	Amuwa	154.06	2.12	27.3773	84.5598	Formed on floodplain
290	Amuwakhola Bagar Phant		Buffer	Amuwa	453.76	3.22	27.3792	84.5565	Formed on floodplain
291	Amuwakhola Jane Bagar		Buffer	Amuwa	852.08	3.22	27.3839	84.5546	Formed on floodplain
292	Bagai Buspark Reutapu		Buffer	Bagai	370.97	1.29	27.4198	84.4551	Formed on floodplain
293	Bagai Reutapu		Buffer	Bagai	232.92	2.18	27.4178	84.4568	Formed on floodplain
294	Bagaighat	1	Buffer	Ghangar	821.39	11.77	27.4358	84.4336	Formed on floodplain
295	Bandarmude Phant		Buffer	Botesimara	1023.02	39.79	27.4671	84.3387	Formed on floodplain
296	Barandabhar	1	Buffer	Barandabhar	2758.28	1.18	27.6462	84.4664	Drying up wetland
297	Barandabhar	2	Buffer	Bishazar	704.81	2.08	27.6229	84.4345	Drying up wetland
298	Barandabhar	3	Buffer	Barandabhar	884.78	1.90	27.6303	84.4587	Existed from past
299	Barandabhar	4	Buffer	Barandabhar	1421.84	1.57	27.6354	84.4639	Existed from past
300	Barandabhar	5	Buffer	Barandabhar	748.82	9.59	27.6280	84.4531	Drying up wetland
301	Barandabhar	6	Buffer	Barandabhar	1889.91	2.75	27.6400	84.4589	Drying up wetland
302	Barandabhar	7	Buffer	Barandabhar	2414.87	1.70	27.6435	84.4578	Drying up wetland
303	Barandabhar	8	Buffer	Barandabhar	2248.44	1.61	27.6412	84.4529	Existed from past
304	Barandabhar	9	Buffer	Barandabhar	2071.22	0.69	27.6382	84.4520	Existed from past
305	Barandabhar	10	Buffer	Barandabhar	2082.05	3.00	27.6383	84.4492	Existed from past

S.N.	Name of Grassland	Code	Location	Nearest Post	Distance to nearest post (m)	Area (ha)	Latitude	Longitude	Remarks
306	Barandabhar	11	Buffer	Barandabhar	2167.44	2.37	27.6380	84.4456	Existed from past
307	Barandabhar	12	Buffer	Barandabhar	2258.74	0.71	27.6418	84.4630	Drying up wetland
308	Barandabhar	13	Buffer	Barandabhar	985.57	5.89	27.6179	84.4734	Drying up wetland
309	Barandabhar	14	Buffer	Barandabhar	1074.84	1.72	27.6114	84.4692	Drying up wetland
310	Barandabhar	15	Buffer	Bishazar	1957.46	2.41	27.6007	84.4535	Drying up wetland
311	Barandabhar	16	Buffer	Barandabhar	2507.97	1.82	27.6464	84.4616	Drying up wetland
312	Barandabhar	17	Buffer	Bishazar	1350.72	2.82	27.6029	84.4469	Drying up wetland
313	Barandabhar	18	Buffer	Bishazar	1856.71	1.92	27.5980	84.4466	Drying up wetland
314	Barandabhar	19	Buffer	Barandabhar	773.32	4.32	27.6191	84.4532	Drying up wetland
315	Barandabhar	20	Buffer	Khorshor	2062.65	9.47	27.5906	84.4448	Drying up wetland
316	Barandabhar	21	Buffer	Dhudhaura	2309.90	1.02	27.5867	84.4406	Drying up wetland
317	Barandabhar	22	Buffer	Dhudhaura	1762.82	2.09	27.5827	84.4447	Drying up wetland
318	Barandabhar	23	Buffer	Barandabhar	1176.48	1.76	27.6079	84.4639	Drying up wetland
319	Barandabhar	24	Buffer	Barandabhar	1213.08	2.30	27.6257	84.4737	Managed by community
320	Barandabhar	25	Buffer	Barandabhar	1030.02	1.82	27.6214	84.4727	Drying up wetland
321	Barandabhar	26	Buffer	Barandabhar	2718.84	0.77	27.6438	84.4503	Existed from past
322	Barandabhar	27	Buffer	Khorshor	1288.14	3.06	27.5872	84.4778	Drying up wetland
323	Barandabhar	28	Buffer	Bishazar	1045.82	2.26	27.6173	84.4497	Drying up wetland
324	Barandabhar	29	Buffer	Khorshor	1802.78	8.74	27.5938	84.4806	Drying up wetland
325	Barandabhar	30	Buffer	Khorshor	1535.49	2.34	27.5932	84.4739	Drying up wetland
326	Barandabhar	31	Buffer	Devnagar	1916.89	0.91	27.5971	84.4315	Drying up wetland
327	Barandabhar	32	Buffer	Devnagar	1803.67	0.51	27.5949	84.4271	Drying up wetland
328	Barandabhar	33	Buffer	Devnagar	1880.28	0.44	27.5955	84.4290	Drying up wetland
329	Barandabhar	34	Buffer	Devnagar	1166.62	11.71	27.5940	84.4229	Drying up wetland
330	Barandabhar	35	Buffer	Barandabhar	615.84	1.70	27.6193	84.4547	Drying up wetland
331	Barandabhar	36	Buffer	Barandabhar	196.93	1.16	27.6179	84.4589	Managed by community

S.N.	Name of Grassland	Code	Location	Nearest Post	Distance to nearest post (m)	Area (ha)	Latitude	Longitude	Remarks
332	Barandabhar	37	Buffer	Bishazar	1275.99	0.61	27.6088	84.4504	Drying up wetland
333	Barandabhar	38	Buffer	Barandabhar	577.46	2.22	27.6271	84.4635	Drying up wetland
334	Barandabhar	39	Buffer	Barandabhar	432.75	1.12	27.6255	84.4591	Drying up wetland
335	Barandabhar	40	Buffer	Barandabhar	829.62	1.71	27.6227	84.4708	Drying up wetland
336	Barandabhar	41	Buffer	Barandabhar	928.95	1.75	27.6150	84.4520	Existed from past
337	Barandabhar	41	Buffer	Barandabhar	1503.88	1.92	27.6127	84.4757	Existed from past
338	Barandabhar	42	Buffer	Khorshor	1674.33	0.64	27.5893	84.4793	Drying up wetland
339	Batulipokhari Phant		Buffer	Belsar	1218.97	6.95	27.5814	84.3969	Drying up wetland
340	Belsahar Lamo Phant		Buffer	Belsar	425.06	30.43	27.5905	84.4147	Existed from past
341	Belshar Sanophant		Buffer	Belsar	459.00	4.36	27.5786	84.4136	Existed from past
342	Bhorlekhola Dovan	1	Buffer	Bagai	1664.53	6.66	27.4299	84.4442	Formed on floodplain
343	Bhorlekhola Dovan	2	Buffer	Bagai	1506.27	0.98	27.4276	84.4468	Formed on floodplain
344	Bhutaha Phant		Buffer	Bhutaha	2497.78	8.29	27.5562	84.0396	Formed on floodplain
345	Bishazar Taal Phanta		Buffer	Bishazar	927.87	4.26	27.6236	84.4447	Drying up wetland
346	Bishhazar Ghasemaidan		Buffer	Bishazar	343.50	2.91	27.6131	84.4342	Existed from past
347	Botesimara Reu Tapu		Buffer	Botesimara	351.43	24.61	27.4691	84.3483	Formed on floodplain
348	Dabuwa Dovan		Buffer	Bagai	4506.11	6.03	27.4051	84.5050	Drying up wetland
349	Dakchinkali Ghasemaidan		Buffer	Bishazar	1030.28	5.15	27.6190	84.4268	Drying up wetland
350	Devnagar Ghasemaidan		Buffer	Devnagar	595.03	10.75	27.6091	84.4251	Existed from past
351	Devnagar Phant	2	Buffer	Devnagar	217.85	4.29	27.6036	84.4181	Drying up wetland
352	Devnagar Tallo Phant		Buffer	Devnagar	812.38	1.20	27.6038	84.4245	Existed from past
353	Dhaka Phanta	2	Buffer	Amaltari	1216.28	0.95	27.5742	84.1152	Existed from past
354	Dhaka Phanta	3	Buffer	Amaltari	1798.46	0.55	27.5813	84.1171	Drying up wetland
355	Gadeshkunja Phant		Buffer	Laukhani	0.00	2.98	27.6264	84.1725	Drying up wetland
356	Ghailaghari Cf Phant		Buffer	Kasara (HQ)	1046.51	7.63	27.5589	84.3269	Managed by community
357	Ghangar Reu Ghat		Buffer	Ghangar	2805.08	13.12	27.4469	84.3901	Formed on floodplain

S.N.	Name of Grassland	Code	Location	Nearest Post	Distance to nearest post (m)	Area (ha)	Latitude	Longitude	Remarks
358	Gopalnagar Phant		Buffer	Botesimara	1732.25	4.28	27.4590	84.3670	Formed on floodplain
359	Hilekholsa Phant		Buffer	Bagai	4147.59	0.40	27.4109	84.5010	Drying up wetland
360	Icherny Phanta		Buffer	Icherny	233.00	2.46	27.5633	84.5216	Managed by park
361	Jankauli Cf Ghasemaidan		Buffer	Icherny	399.88	7.99	27.5669	84.5175	Drying up wetland
362	Jaraykhola Dovan		Buffer	Ichha Nagar	1402.16	2.70	27.3505	84.6230	Formed on floodplain
363	Jarayokhola Bagar		Buffer	Ichha Nagar	1161.99	9.87	27.3482	84.6310	Formed on floodplain
364	Kanchiboteni Phant	2	Buffer	Amaltari	1051.91	1.33	27.5678	84.1150	Drying up wetland
365	Khorsor Phant	1	Buffer	Khorshor	3.18	10.93	27.5818	84.4632	Drying up wetland
366	Khorsor Phant	2	Buffer	Khorshor	179.78	8.92	27.5849	84.4668	Drying up wetland
367	Khorsor Phant	3	Buffer	Khorshor	551.30	9.70	27.5866	84.4698	Drying up wetland
368	Koltechaur Phanta		Buffer	Bagai	312.88	22.74	27.4132	84.4642	Formed on floodplain
369	Krishnanagar Park Phant		Buffer	Ghangar	715.86	27.00	27.4403	84.4094	Formed on floodplain
370	Kumroj Cf Phant		Buffer	Janakpur	809.01	14.11	27.5565	84.5469	Drying up wetland
371	Kumroj Phant	1	Buffer	Icherny	632.18	1.62	27.5625	84.5321	Formed on floodplain
372	Kumroj Phant	2	Buffer	Icherny	354.74	6.21	27.5607	84.5284	Drying up wetland
373	Kumroj Phant	3	Buffer	Icherny	549.61	8.29	27.5595	84.5305	Formed on floodplain
374	Kumroj Phant	4	Buffer	Icherny	950.77	3.28	27.5629	84.5356	Formed on floodplain
375	Materighat Phant		Buffer	Baghmara	1582.50	3.13	27.5595	84.1762	Formed on floodplain
376	Meghauli Phant		Buffer	Meghauli	257.38	6.28	27.5730	84.2259	Existed from past
377	Namuna Ghasemaidan	1	Buffer	Bandarjhula	1174.67	59.18	27.6081	84.1566	Managed by Namuna BCUC
378	Panikuwa Phanta		Buffer	Bagai	2676.34	3.49	27.4137	84.4887	Formed on floodplain
379	Patihani Raptibagar	1	Buffer	Ghatgain	1455.20	53.61	27.5678	84.3729	Existed from past
380	Ratenighat		Buffer	Dhoba	879.58	31.97	27.4799	84.3267	Formed on floodplain
381	Reudovan Dabuwa		Buffer	Bagai	4904.19	2.06	27.4030	84.5074	Formed on floodplain
382	Sano Gundredhaka		Buffer	Lamichaur	1811.88	4.15	27.5840	84.1179	Drying up wetland
383	Shivdwar Reu Phant		Buffer	Ghangar	1780.62	14.16	27.4415	84.4008	Formed on floodplain

S.N.	Name of Grassland	Code	Location	Nearest Post	Distance to nearest post (m)	Area (ha)	Latitude	Longitude	Remarks
384	Tiutekhola Bagar Phant		Buffer	Bagai	5336.19	1.18	27.4007	84.5114	Drying up wetland
385	Amuwa Phanta	1	Both	Amuwa	922.79	3.33	27.3866	84.5574	Formed on floodplain
386	Bagaighat Phant		Both	Ghangar	889.89	8.88	27.4375	84.4363	Formed on floodplain
387	Bankatta Phanta	1	Both	Bankatta	189.95	50.29	27.5071	84.2752	Formed on floodplain
388	Bankatta Phanta	2	Both	Bankatta	861.39	23.69	27.5017	84.2840	Formed on floodplain
389	Bardaha Island Phanta	1	Both	Salbas	1588.57	28.51	27.5866	84.1820	Drying up wetland
390	Bhorlekhola Reutapu		Both	Bagai	1373.05	2.20	27.4287	84.4483	Formed on floodplain
391	Birendra Bcf Phanta		Both	Kasara (HQ)	1233.55	38.14	27.5608	84.3469	Formed on floodplain
392	Bodrahani Phanta		Both	Sauraha	643.38	120.33	27.5722	84.4800	Formed on floodplain
393	Botesimara Simalchaur		Both	Botesimara	0.00	79.23	27.4741	84.3510	Drying up wetland
394	Brahmasthan Phanta		Both	Amaltari	1814.05	14.58	27.5599	84.0846	Formed on floodplain
395	Bulbule Phant	2	Both	Botesimara	3382.44	4.80	27.4533	84.3835	Formed on floodplain
396	Charhara Phanta		Both	Dhudhaura	972.88	94.33	27.5614	84.4457	Formed on floodplain
397	Dabuwa Salghari Phant	1	Both	Bagai	5517.36	0.71	27.4036	84.5134	Existed from past
398	Dhoba Phanta		Both	Dhoba	534.90	43.49	27.4878	84.3103	Formed on floodplain
399	Dhoba Reupari Phant		Both	Dhoba	493.04	3.54	27.4849	84.3191	Formed on floodplain
400	Dhruba Island Phanta	1	Both	Dhruba	1001.58	31.78	27.5597	84.2936	Formed on floodplain
401	Dhudhaura Phanta		Both	Dhudhaura	0.00	76.49	27.5724	84.4603	Formed on floodplain
402	Dobhan Bcf Phanta		Both	Dhruba	1355.76	15.77	27.5612	84.2881	Formed on floodplain
403	Gaurinagar Phant		Both	Botesimara	1784.45	14.82	27.4587	84.3717	Formed on floodplain
404	Gaurmachhan Phanta	1	Both	Belsar	625.49	73.68	27.5650	84.4024	Formed on floodplain
405	Hariyali Phanta	1	Both	Dhruba	1741.86	27.18	27.5636	84.3066	Drying up wetland
406	Hariyali Phanta	2	Both	Dhruba	1652.22	28.95	27.5588	84.3091	Drying up wetland
407	Janakpur Phanta		Both	Janakpur	590.70	35.09	27.5534	84.5648	Formed on floodplain
408	Krishnanagar Phant		Both	Ghangar	138.37	30.37	27.4381	84.4226	Formed on floodplain
409	Kujauli Phanta	1	Both	Kujauli	115.17	22.90	27.6623	84.2263	Formed on floodplain

S.N.	Name of Grassland	Code	Location	Nearest Post	Distance to nearest post (m)	Area (ha)	Latitude	Longitude	Remarks
410	Liglige Phanta	3	Both	Liglige	1468.29	19.89	27.5574	84.7197	Formed on floodplain
411	Liglige Phanta	4	Both	Liglige	1663.51	5.53	27.5631	84.7156	Formed on floodplain
412	Magarkot Phanta		Both	Lamichaur	1172.16	31.83	27.6102	84.1350	Existed from past
413	Materighat Phanta		Both	Baghmara	1156.22	73.47	27.5594	84.1773	Formed on floodplain
414	Namunagate Phanta		Both	Laukhani	607.81	5.45	27.6218	84.1691	Drying up wetland
415	Rapti Doon Phanta	2	Both	Sukhibhar	2706.81	40.42	27.5617	84.2639	Formed on floodplain
416	Rapti Pul Phanta		Both	Kasara (HQ)	284.14	58.56	27.5552	84.3178	Formed on floodplain
417	Rateni Ghat Phanta	1	Both	Dhoba	506.85	44.70	27.4823	84.3337	Drying up wetland
418	Sauraha Hattisar	1	Both	Sauraha	182.74	16.77	27.5701	84.5061	Drying up wetland
419	Sauraha Raptiside		Both	Sauraha	280.75	376.49	27.5565	84.5176	Existed from past
420	Siswar Ghat Daya		Both	Sisawar	932.11	13.43	27.6379	84.2638	Formed on floodplain
421	Siswar Tapu	5	Both	Sisawar	1871.01	30.52	27.6155	84.2346	Formed on floodplain
422	Sitamai Phant		Both	Jarneli	47.59	142.97	27.5594	84.3856	Drying up wetland
423	Sunachari Phanta		Both	Sunachuri	561.14	165.90	27.5436	84.7410	Existed from past
424	Tamaspur Ghat	1	Both	Tamaspur	1077.65	15.71	27.5483	83.9481	Formed on floodplain
425	Tamaspur Ghat	2	Both	Tamaspur	1515.12	27.92	27.5524	83.9578	Formed on floodplain

ANNEX III : WORK DIVISION AND LIST OF PARTICIPANTS OF GRASSLAND HABITAT SURVEY

S.N.	Block Division	Block Name	Focal Person	Group members	Hattisar
1	Pratapur-Amrite	A	Kina K.C.	Kausila Moktan, Dilli Ghimire,	Khagendrmalli Post
2	Amrite-Jarneli	B	Ram Chandra Raila	Yagya Kafle, Deepak Kumal, Nageshwor Chaudhary	Sauraha Hattisar
3	Brandabhar Area	C	Sushil Jha	Bipin Shah, Rajendra Lama, Deepak Kumal	Khorsor Hattisar, Belsahar Post
4	Jarneli Kamal Tal	D	Abinash Thapa Magar	Tham Bahadur Gurung, Sitesh Thakur, Kabindra Regmi, Sumitra Mahato, Pradeep Raj Joshi	Kasara Hattisar
5	Kamal Tal- Baghmara	E	Prakash Limbu	Tejan Lamichane, Rajamani Mahato, Prativa Kakshyapati	Meghauli Post, Sukhibhar Post
6	Amaltari-Gideni	F	Shiva Lal Gaire	Ishwori Mahato, Balaram Khadka, Gammar Singh Gurung, Shiva Bdr. Sharki	Dibyapuri Post
7	Amaltari-Tribeni	G	Laxman Mahato	Toplal Shrestha, Gammar Singh Gurung, Bhim Raj Sedhai	Lamichaur Post
8	Bankatta - Thori	H	Abinash Thapa Magar	Krishna Pariyar, Buddi Nath Lamichane, Suresh Yadav	Sukhibhar Post

ANNEX IV : DATA SHEET FORMAT

Date:.....

Chitwan National Park
Grassland Survey Data Sheet, 2072

Block Id: _____ Group No: _____ Data Collectors Name:

1) Core/Buffer Zone Name: Nearest Post Name: Approx. Distance:

History of grassland: 1) Existed from the past 2) Managed by park 3) Formed on floodplain 4) Shifting of Human Settlement 5) Drying up wetland 6) other

Name of grassland	GPS location		GPS track name/no.+	Picture No.	Seen animals
	North	East			

Details of Grass species

Grass type	Species name				Coverage (%)	Remarks
	1	2	3	other		
Tall grass(>3m)						
Medium (1-3m)						
Short grass(<3)						

Species: Dubo, Siru, Kaans, Baruwa, Kush, Narkat, Themeda....

Shrub and invasive species

	Species name				Coverage (%)	Height (m)	Remarks
	1	2	3	Others			
Invasive species							
Shrub species							

** Invasive species: Mikania, Kande banmara, Seto banmara, Parthenium, Gandhejhar, Taprejhar ....*
** Shrub species: Asare, Betghari, Rudhilo, Bayer, Galena, Lajjawati, Aank....*

Tree species detail

Tree stage	Species name					cover (%)	number	height	remarks
	1	2	3	4	Others				
Seedling									
Sapling									
Pole									
Tree									

**Seedling: <1m height, 0-3 inch dia. *Sapling: >1m height, 3-9 inch dia. *Pole:10-29 inch dia *Tree:>30 inch dia*

Is grassland managed by park?

(i) Yes if yes seems when...

(ii) No

Photo plates of Major Grasslands of CNP

Khoriyamuhan phanta

Sukhibhar phanta

Padampur phanta

Gaurmachhan phanta

Jarneli phanta

Icherni phanta

Ghatgain phanta

Dabuwa phanta

Botesimara phanta

Ghagar phanta

Some Photo Plates of Field Work

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