Status of Wetlands and Mugger Crocodile In and Around Chitwan National Park

Government of Nepal
Ministry of Forests and Soil Conservation
Department of National Parks and Wildlife Conservation
Chitwan National Park Office
Kasara, Chitwan
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Ashish Adhikari (FSU-CNP, SRCWP-NTNC)

Contributors
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Mani Ram Mahato, Boteman, CNP
Sante Bote, Boteman, CNP

* = Assistant Conservation Officer, CNP
Reliable information for management of natural resources is the basis on which all decisions with regards to conservation and protection are made. Scientific inventories are of utmost importance for management authorities in conservation of biological diversity and the protection of resources in a systematic and effective manner. On this regard I am very pleased to publish the report entitled “Status of Wetlands and Mugger Crocodile in and around Chitwan National Park”.

Chitwan National Park (CNP), a world heritage property, is the hotspot for the biodiversity conservation in Nepal. The park, which constitutes an important component of Terai Arc Landscape, is among the best managed parks in the world. It is home to 68 species of mammals, more than 576 species of birds, 49 species of reptiles and amphibians, 120 species of fishes and several species of invertebrates which has significantly contribute in ecosystem processes in the park. Despite the biological richness of species in the park, the National Park office was lacking detail information on the number of wetlands in the park, and an understanding to accurately assess the extent, pressures and degree of degradation of the same.

Wetlands are the lifeline of CNP and its biodiversity. So without wetlands we cannot imagine the CNP. It plays crucial role in biodiversity conservation. Without water, food, space and cover, the habitat itself is incomplete. Wetlands of CNP have been called “biological super systems” as they are the most productive ecosystems and support a remarkable level of biodiversity. Combined with the wetlands record, a parallel study was conducted to assess the population status and threats to mugger crocodile (Crocodylus palustris) in CNP and its buffer zone. Mugger Crocodile, listed as a vulnerable species in the IUCN Red List, is restricted to isolated populations primarily in protected areas of Chitwan and Bardia National Parks, Koshi Tappu and Shuklaphanta Wildlife Reserves.

Recognizing the importance of wetlands and realizing an urgent need to protect Mugger Crocodile in wild, CNP office conducted a quick survey of them. It is an outcome of the hard work of study team of the park. I am confident that this report will provide information for the assessment, evaluation and monitoring of wetlands and Mugger Crocodiles of CNP and will prove to be useful for policy-makers and planners in the region and elsewhere.

Acknowledgements

I express my sincere gratitude to Mr. Bed Bahadur Khadka (Assistant Conservation Officer, CNP) and his team for the untiring field study, without whom this study would not have been conducted, and Mr. Bishnu Prasad Thapaliya (Assistant Conservation Officer, CNP) for making a concluding end of preparation works of this invaluable report. I would also like to thank Mr. Baburam Lamichhane, Research Officer, NTNC-BCC, for covering the GIS part. Thanks are also due to National Trust for Nature Conservation-Biodiversity Conservation Center, for providing funds to print this report. Sincere thanks go to Shalu Adhikari, PhD, WWF Nepal, who contributed as an independent reviewer of the manuscript. My special thanks go to the reviewers; Ashish Adhikari and Pradeep Raj Joshi, SRCWP-NTNC for reviewing and helping in report publication, and to the Park Staff and to all the stakeholders who have provide their invaluable support and suggestions to prepare this document. Finally, the CNP office expresses sincere gratitude to the contributions made by Late Juthi Ram Bote in this study and expresses deepest condolences to his family on his untimely demise.

Kamal Jung Kunwar
Chief Conservation Officer
Chitwan National Park Office
## Acronyms and Abbreviations:

<table>
<thead>
<tr>
<th>Abbreviation</th>
<th>Full Form</th>
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<tbody>
<tr>
<td>BZ</td>
<td>Buffer Zone</td>
</tr>
<tr>
<td>BCF</td>
<td>Buffer Zone Community Forest</td>
</tr>
<tr>
<td>CNP</td>
<td>Chitwan National Park</td>
</tr>
<tr>
<td>FSU</td>
<td>Field Support Unit</td>
</tr>
<tr>
<td>GEF</td>
<td>Global Environment Facility</td>
</tr>
<tr>
<td>GIS</td>
<td>Geographic Information System</td>
</tr>
<tr>
<td>ha</td>
<td>Hectare</td>
</tr>
<tr>
<td>IUCN</td>
<td>International Union for Conservation of Nature and Natural Resources</td>
</tr>
<tr>
<td>NP</td>
<td>National Park</td>
</tr>
<tr>
<td>NTNC</td>
<td>National Trust for Nature Conservation</td>
</tr>
<tr>
<td>NTNC-BCC</td>
<td>National Trust for Nature Conservation-Biodiversity Conservation Center</td>
</tr>
<tr>
<td>SLM</td>
<td>Sustainable Landscape Management</td>
</tr>
<tr>
<td>SRCWP</td>
<td>Strengthening Regional Cooperation for Wildlife Protection in Asia</td>
</tr>
<tr>
<td>TAL</td>
<td>Terai Arc Landscape Program (Government of Nepal)</td>
</tr>
<tr>
<td>UNESCO</td>
<td>United Nations Educational, Scientific and Cultural Organization</td>
</tr>
<tr>
<td>WWF</td>
<td>World Wildlife Fund for Nature</td>
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PART-I

STATUS OF WETLANDS IN AND AROUND
CHITWAN NATIONAL PARK
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<td>Simara Ghol</td>
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<td>58</td>
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Wetlands are some of the most diverse and productive ecosystems which support high biodiversity. Chitwan National Park is blessed with numerous wetlands of ecological and economic importance. However, there was very limited information available about their overall bio-physical status, threats and management needs. With the above said objective, a quick survey of the wetlands of Chitwan was carried out in 2013. River and streams which also serve a crucial role for the ecosystem functioning and regulating the biodiversity of the park are not a part of the survey. A total 83 wetland sites were mapped and surveyed from Chitwan National Park and its Buffer zone. Of the total, only 58 wetlands were identified, 20 were recorded and mapped in the buffer zone and 38 in the core area. The study found that some of the wetlands were totally dry, flooded during monsoon and some washed away by the rivers. Some new wetland sites (oxbow lakes) were also recorded. Most of the wetlands lie on the floodplain area of Rapti, Reu and Narayani Rivers. From the overall assessment (based on observation) only five sites was found in excellent condition, 13 out of 21 wetland sites of buffer zone are in good condition whereas nearly half of the wetlands inside the park are in poor condition requiring immediate management interventions. The most important interventions identified from field observation for wetland management include the removal of sediments mechanically (for 26 wetlands), removal of invasive species (for 21 wetlands), construction of check dams and proper outlet for channelizing water (for 3 wetlands). More detailed and continued studies with the physiochemical analysis of water and wetland diversity is necessary to ensure the functionality of these wetlands and for the effectiveness of the management actions to be undertaken.
Status of Wetlands and Mugger Crocodile in and around Chitwan National Park

I. Introduction

Chitwan National Park (CNP) was gazetted in 1973 and designated as UNESCO’s world heritage site in 1984 on account of its outstanding universal value. The park lies in the Central Nepal with an area of 932 km² and a buffer zone of 750 km². The area represents an inner don valley in the central terai between the Siwalik hills in the south and the Mahabharat hills to the north. The park encompasses a wide diversity of habitats and species within the altitudinal range between 110 and 850m asl. Approximately 70% area is covered by Sal (Shorea robusta) forest, the remaining being grassland and riverine forests including Narayani, Rapti and Reu river systems and numerous oxbow lakes, marshes, waterholes etc. Beeshazar and its associate lakes, a wetland of international importance is also within the park.

Wetlands in Chitwan National Park (CNP) play a vital role to maintain biodiversity and also to provide a number of goods and services. Most importantly, these wetlands are a home to a variety of species of microbes, plants, insects, amphibians, reptiles, birds, fish and mammals. Wetlands have significant role for aquatic plants and animals including crocodiles, dolphin, rhinoceros, migratory birds, and turtle species. For avifauna they serve as breeding grounds, resting, roosting and feeding sites of migratory or non-migratory birds. Out of the 576 birds species found in Chitwan; 120 species are wetland dependent (Baral and Upadhay, 2006). Wetlands also have recreational, historical, scientific and cultural values. In CNP, many visitors enjoy wetlands for various activities like bird watching, boating and photographing.

Wetlands richness depends on physical status and its productivity. This inventory reveals that most of the wetlands have undergone degradation including Devital, Sheratal, Sitamai ghol, Singetal and many others. This has a direct impact on wetland depended species that have started to move outside their habitats to human settlements and thereby creating human-wildlife conflict. On the retaliation, three muggers known to have killed and one is suspected to be killed at local fish farm. The reason for the killing may be linked to the dispersal of mugger crocodile from natural wetlands into village fish ponds. More than 500 private fish ponds (300 ha) have been constructed in the Buffer Zone, this has become a potential attraction to the wetlands’ fauna. Nine juvenile muggers were rescued from the local fish farm between July 2012 to December 2012 (Khadka, 2013) and 10 muggers also rescued from 21 June 2013 to 24 December 2013.

Wetlands were intact and well known some two decades ago such as Jayamangala Ghol, Ajinger Ghol, Gaurmachan Ghol and Singe Tal which have now degraded, dried up and converted to grassland due to succession. With this scenario, it is likely that wetlands such as Devital, Marchauli Ghol may also disappear within near future if the treats are not minimized. Almost all wetlands are undergoing natural succession due to sedimentation and rapid infestation by invasive species such as water hyacinth (Jal Kumbhi, Eichornia crassipes), water cabbage (Kumbhika, Pistia stratiotes), Karauti Jhar (Leersia hexandra), Beshram (Ipomoea camea), and Reed (Narkat, Phragmites karka). Management interventions in the wetlands including sediment removal, high check-dam construction in dry season and removal of alien invasive species are being practiced by the park authority. Making wise use of different invasive species are now being practiced in the buffer zone area such as water hyacinth being used for making handicrafts, biomass for bio-gas digester and as mulch for compost making.

Realizing the limited information on wetlands of Chitwan National Park and its biodiversity, a quick assessment of wetlands was carried out. This report highlights the major findings of the condition of wetlands of Chitwan National Park and its buffer zone.
2. Objective

The main aim of this study was to provide information on the status of wetlands in and around CNP. The specific objectives were as follows:

- provide information on the current status of wetlands
- provide the physical and biological characteristics of wetlands
- prescribe management intervention for protecting wetlands
3. Methods

3.1 Wetland sites and locations

A total of 83 sites were surveyed except the river and streams which also have a crucial role for the ecosystem functioning and regulating the biodiversity of the park. The survey sites included lakes (mostly permanent) both natural and man-made, Waterhole (ponds) and others such as marshes etc. Survey was carried out in both the core area and the buffer zone of the Chitwan. Following section gives the details of the wetland sites.

3.2 Literature review and information about wetland sites

Literatures on the wetlands of CNP were reviewed. Similarly, informal interviews/discussions with the key informants having vast experience working with CNP were also carried out for the past and existing information of wetlands sites as well as their socio-cultural importance.

3.3 Data collection

Site visits and observations were carried out for each wetland site and secondary information was collected from a wide range of literature. A standard survey format (Annex -1) was developed in consultation with the related researchers and survey was carried out in December 2013.

Most of the wetlands were accessed on foot, while elephants were used to reach some inaccessible lakes, smaller natural waterholes/ghols, and swamps/marshes of CNP. Most of the information was collected by direct observation using a pair of 10x50 DPS1 OLYMPUS DPSR binoculars. Photographs were taken through Canon PowerShot 5x40 HS. GPS location of each site was recorded. Areas and perimeters were estimated with the help of Google Earth.

3.4 Wetland classification

Wetlands were categorized by visual judgement in following parameters.

<table>
<thead>
<tr>
<th>Category</th>
<th>Siltation and rate of drying up</th>
<th>Cover of invasive species</th>
</tr>
</thead>
<tbody>
<tr>
<td>Excellent</td>
<td>Very low</td>
<td>&lt;5%</td>
</tr>
<tr>
<td>Good</td>
<td>Low</td>
<td>5-25%</td>
</tr>
<tr>
<td>Fair</td>
<td>Moderate</td>
<td>25-90%</td>
</tr>
<tr>
<td>Poor</td>
<td>Heavy</td>
<td>&gt;90%</td>
</tr>
</tbody>
</table>
4. Results

From the survey, of the 83 wetlands mentioned above, few wetlands lie very close to each other and have similar characteristics and origin, which were merged together. Some wetlands in past have now converted into other habitats such as grassland, river or woodland were removed from the existing surveyed list. All the wetland sites formed by Khageri canal excluding the Bishazar was called Khageri lake complex. Thus the total number of wetland sites reduced to 58. The following table gives the summary and location of these wetland sites.

<table>
<thead>
<tr>
<th>Type of wetland</th>
<th>BZ</th>
<th>NP</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ghol</td>
<td>3</td>
<td>10</td>
<td>13</td>
</tr>
<tr>
<td>Lake</td>
<td>16</td>
<td>14</td>
<td>30</td>
</tr>
<tr>
<td>Waterhole</td>
<td>1</td>
<td>7</td>
<td>8</td>
</tr>
<tr>
<td>Other</td>
<td>7</td>
<td>7</td>
<td></td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>20</td>
<td>38</td>
<td>58</td>
</tr>
</tbody>
</table>

4.1 Accessibility to the wetlands

Two third of the wetlands are accessible through the roads whereas one third have no road access and could be reached by foot, elephant and/or boat. Average distance to the wetlands from the nearest guard post was 2.22 (± 1.67) km with maximum distance of 9km.

<table>
<thead>
<tr>
<th>Accessibly through</th>
<th>BZ</th>
<th>NP</th>
<th>Grand Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Boat</td>
<td>1</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>Vehicle</td>
<td>20</td>
<td>19</td>
<td>39</td>
</tr>
<tr>
<td>Walk</td>
<td>1</td>
<td>17</td>
<td>18</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>21</td>
<td>37</td>
<td>58</td>
</tr>
</tbody>
</table>

4.2 Area of wetlands

All the surveyed wetland sites covered an area of 255.93\(^1\) ha of which only five wetlands (Temple Tiger Ghol, Tamor Tal, Bishazar Tal, Batuli pokhari Tal and Budhi Rapti Ghol) were found to have an area more than 10 ha. There were 34 wetland sites having area more than a hectare. These wetlands (excluding rivers & streams), occupy less than 0.5% of the total park area. The value seems lower because rivers and streams were not included which have higher percentage of coverage as wetland sites.

<table>
<thead>
<tr>
<th>Wetland Area</th>
<th>Number of sites</th>
</tr>
</thead>
<tbody>
<tr>
<td>&gt; 10 ha</td>
<td>5</td>
</tr>
<tr>
<td>1-10 ha</td>
<td>29</td>
</tr>
<tr>
<td>&lt; 1 ha</td>
<td>24</td>
</tr>
</tbody>
</table>

4.3 Vegetation cover and condition of wetlands

Vegetation cover of wetlands has been the major concern. Many wetlands are infested by invasive plants and gradually undergoing loss and degradation and succession to grasslands. Out of assessed 58 wetlands, six wetlands do not have any open water surface (completely covered by the invasive species or grasses), 17 sites have less than 50% of its total area with open water. Fortunately 11 sites have 100% open water. Forty one percent of the wetland (n=58) sites have open water more than 50% with varying coverage from invasive and other plants.

\(^1\) Five out of total 58 wetlands were either almost converted into grassland or too small to calculate the areas. So the figure is applicable for 53 wetlands only. The 5 wetlands are placed in <1 ha category.
From the overall assessment of the wetlands (based on field observation), only five sites including two from buffer zone and three from core area were found in excellent condition. Many wetlands of buffer zone were in good condition (13 out of 21) whereas nearly half of the wetlands inside the park were in poor condition which requires immediate management interventions to keep it as functional wetlands. Details of each wetland site are provided in Annex.

### 4.4 Major Threats

Siltation and drying and leading to succession were found to be the major threat to the most of the wetlands in CNP. The other threats include invasive plants, fishing extraction and pollution. The other observed threats include, washing away by flood and wetland loss completely after drying.

Analysis of the threat due to invasive species found that *Mikania* was present in 38 sites followed by Water cabbage (*Pistia sps*) in 16 sites, Water hyacinth and Karaute both in 13 sites.

<table>
<thead>
<tr>
<th>Invasive species</th>
<th>Number of sites</th>
</tr>
</thead>
<tbody>
<tr>
<td><em>Mikania</em></td>
<td>38</td>
</tr>
<tr>
<td>Water hyacinth</td>
<td>13</td>
</tr>
<tr>
<td>Karaute</td>
<td>13</td>
</tr>
<tr>
<td>Water cabbage</td>
<td>16</td>
</tr>
</tbody>
</table>

### 4.5 Management Actions Required

From the field observation, the most appropriate action for the wetland management were mechanical removal of deposited sediments (26), removal of invasive species (21), check dam and outlet management (3) and water augmentation by diverting a stream (Icherny). For remaining wetlands immediate action for management is not required. The detail of the management action site wise is provided in annex.
5. Conclusion

Survey of wetlands of CNP has given much information about the status and immediate management intervention required. The study has also enhanced our knowledge and understanding on wetlands of CNP. This study helps to prescribe management actions required to protect and conserve these wetlands. This study also provides baseline information on wetlands and also helps to seek financial resources to manage these wetlands to further preventing them to being degraded and loss on the long run.

References


Site Information of Individual Wetlands
1. Bishazar Lake Photos
I. Bishazar Lake - Site Information

Recorder: B.B. Khadka
Date: 14th Dec. 2013

A. Location and general information

Name of the wetland: Bishazar Lake  Altitude: 183 m
Location: Bharandhabhar  Nearest post: Bishazari
Accessibility: Vehicle  Distance from post: 200 m

B. Physical description of the wetland

Total Area: 29.82ha.
Perimeter: 14427.39m
Depth: 10 feet
Inlet (type): Khageri canal
Outlet (type): Khageri canal
Broad habitat type: 1. Sal forest  2. Invasive species  3. Mathe
Lake condition: (Excellent/Good/Fair/Poor): Fair
Wetland management: Yes

C. Major flora and fauna observed during survey

<table>
<thead>
<tr>
<th>SN</th>
<th>Flora</th>
<th>Aquatic fauna</th>
<th>Aquatic birds</th>
<th>Birds</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Karkalo</td>
<td>Mugger Crocodile</td>
<td>Darter</td>
<td>Grey-headed Fish Eagle</td>
</tr>
<tr>
<td>2</td>
<td>Water Chestnut</td>
<td></td>
<td>Pond Heron</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Mathe</td>
<td></td>
<td>Bronze-winged Jacana</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>Unknown</td>
<td></td>
<td></td>
<td>Cormorant</td>
</tr>
</tbody>
</table>


D. Threats (High/Medium/Low/No)

a. Siltation - medium  b. Invasive species - high  c. Conversion to grasslands - high
d. Drying - medium  e. Pollution - low  f. Fishing and other extraction - low
g. Other (specify):

E. Priority actions for wetland restoration (if any)


F. Additional notes about the wetland:

Shrinking wetland area
2. Kamal Tal - Photos
2. Kamal Tal - Site Information

Recorder: B.B. Khadka Date: 31st Dec. 2013

A. Location and general information
Name of the wetland: Kamal Tal Altitude: 142 m
Location: East of Sukhibhar Nearest post: Sukhibhar
Accessibility: Vehicle Distance from post: 1km

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</table>

B. Physical description of the wetland
Total Area: 4.12 ha Area of open water (%): 25
Perimeter: 2979.93m Depth: 5 feet
Inlet (type): None Outlet (type): None
Broad habitat type: 1. Mixed forest 2. Sal forest
Specific habitat type: 1. Tall swamp grassland
Lake condition: (Excellent/Good/Fair/Poor): Fair
Wetland management: Yes

C. Major flora and fauna observed during survey

<table>
<thead>
<tr>
<th>SN</th>
<th>Flora</th>
<th>Aquatic fauna</th>
<th>Aquatic birds</th>
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<td>Bronze-winged Jacana</td>
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<td>Mathe</td>
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<tr>
<td>6</td>
<td>Badeher</td>
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</tr>
</tbody>
</table>


D. Threats (High/Medium/Low/No)
a. Siltation - medium b. Invasive species - high c. Conversion to grasslands - high
d. Drying - medium e. Pollution - no f. Fishing and other extraction - low

E. Priority actions for wetland restoration
1. Excavation of sedimentation area
2. Removal of invasive species
3. Management of outlet system
3. Budhi Rapti Ghol - Photos
3. Budhi Rapti Ghol - Site Information

Recorder: B.B. Khadka
Date: 31st Dec. 2013

A. Location and general information

| Name of the wetland: Budhi Rapti Ghol | Altitude: 131 m |
| Location: East of Bhimle | Nearest post: Bhimle |
| Accessibility: Vehicle, Walk | Distance: 2Km |

B. Physical description of the wetland

| Total Area: 14.4 ha. | Area of open water (%): 90 |
| Perimeter: 3954.2m | Depth: 15 feet |
| Inlet (type): None | Outlet (type): None |
| Broad habitat type: | 1. Riverine forest 2. Swamp grassland |
| Specific habitat type: | 1. Swamp grassland 2. Grassland meadow |
| Lake condition: (Excellent/Good/Fair/Poor): Excellent |
| Wetland management: Yes |

C. Major flora and fauna observed during survey

<table>
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<td>4</td>
<td>Neuro</td>
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<td>5</td>
<td>Non-Edible Fern</td>
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<td>Mathe</td>
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<tr>
<td>7</td>
<td>Algal floating</td>
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<tr>
<td>8</td>
<td>Unknown weeds</td>
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</tbody>
</table>


D. Threats (High/Medium/Low/No)

a. Siltation - low  
b. Invasive species - low  
c. Conversion to grasslands - medium  
d. Drying - low  
e. Pollution - no  
f. Fishing and other extraction - low

E. Priority actions for wetland restoration

1. Earth excavation at sedimentation area  
2. Removal of invasive species

F. Additional notes about the wetland:

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<td>5</td>
<td>0224931</td>
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</table>
4. Bet-ghari Tal - Photos
4. Bet-ghari Tal - Site Information

Recorder: B.B. Khadka
Date: 14th Dec. 2013

A. Location and general information
Name of the wetland: Betghari Tal     Altitude: 168 m
Location: Bharandhabhar                   Nearest post: Debnagar
Accessibility: Vehicle                Distance: 7km
Type of wetland: Lake (in present fish farming by community)
History of the wetland: Wet meadow

B. Physical description of the wetland
Total Area: 0.77ha.                                      Area of open water (%): 100
Perimeter: 505.17m                                    Depth: 6 feet
Inlet (type & no): Bharandhabhar catchment Outlet (type & no): Khageri canal
Broad habitat type:                    1. Sal forest
Specific habitat type:      1. Short grass          2. Bushes
Lake condition: (Excellent/Good/Fair/Poor): Good
Wetland management: Yes

C. Major flora and fauna observed during survey

<table>
<thead>
<tr>
<th>SN</th>
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<th>Aquatic birds</th>
<th>Birds</th>
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<td>G. headed Fish Eagle</td>
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<td>2</td>
<td>Poison Jhar</td>
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<td>Egret species</td>
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<td>3</td>
<td>Mathe</td>
<td></td>
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<td></td>
</tr>
<tr>
<td>4</td>
<td>Unknown weeds</td>
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<td></td>
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</table>

D. Threats (High/Medium/Low/No)
a. Siltation - low
b. Invasive species - low
c. Conversion to grasslands - high
d. Drying - low
e. Pollution - low
f. Fishing and other extraction - low

E. Priority actions for wetland restoration
1. Removal of invasive species
2. Regulation of water sources

F. Additional notes about the wetland:

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</table>
5. Tikauli Tal - Photos
5. Tikauli Tal - Site Information

Recorder: B.B. Khadka
Date: 13th Dec. 2013

A. Location and general information
Name of the wetland: Tikauli Tal  Altitude: 173 m
Location: Bharandhabhar  Nearest post: Bharandhabhar
Accessibility: Vehicle  Distance from post: 2 km

B. Physical description of the wetland
Total Area: 5.72ha.  Area of open water (%): 95
Perimeter: 3230.87m  Depth: 7 feet
Inlet (type & no): None  Outlet (type & no): Khageri canal
Broad habitat type: 1. Sal forest
Specific habitat type: 1. Sal forest
Lake condition: (Excellent/Good/Fair/Poor): Good
Wetland management: Yes

C. Major flora and fauna observed during survey

<table>
<thead>
<tr>
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<th>Aquatic birds</th>
<th>Birds</th>
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<td>Stork-billed Kingfisher</td>
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<tr>
<td></td>
<td></td>
<td>Crocodile</td>
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<td></td>
</tr>
<tr>
<td>2</td>
<td>Unknown weeds</td>
<td></td>
<td>Pond Heron</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td></td>
<td></td>
<td>Great Cormorant</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td></td>
<td></td>
<td>Bronze winged Jacana</td>
<td></td>
</tr>
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</table>


D. Threats (High/Medium/Low/No)
a. Siltation - low  b. Invasive species - low  c. Conversion to grasslands - high
d. Drying - low  e. Pollution - low  f. Fishing and other extraction - low

E. Priority actions for wetland restoration
1. Removal of invasive species

F. Additional notes about the wetland:

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6. Batuli Pokhari - photos
6. Batuli Pokhari - Site Information

Recorder: B.B. Khadka  Date: 12th Dec. 2013

A. Location and general information
Name of the wetland: Batuli pokhari (Reservoir)
Altitude: 156 m
Location: Bharandhabhar   Nearest post: Belsar
Accessibility: Vehicle   Distance from post: 2 km

B. Physical description of the wetland
Total Area: 20.96 ha.  Area of open water (%): 100
Perimeter: 6584.73m  Depth: 12 feet
Inlet (type & no): Khageri Irrigation canal
Outlet (type & no): None
Broad habitat type:  I. Sal forest
Specific habitat type:  I. Short grass
Lake condition: (Excellent/Good/Fair/Poor): Excellent
Wetland management: Not necessary

C. Major flora and fauna observed during survey

<table>
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<td>Pond Heron</td>
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<td>6</td>
<td></td>
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<td>Egret species</td>
</tr>
</tbody>
</table>

Major Invasive species: I. Mikania

D. Threats (High/Medium/Low/No)
- a. Siltation - low  
- b. Invasive species - low  
- c. Conversion to grasslands - low
- d. Drying - low  
- e. Pollution - low  
- f. Fishing and other extraction - low
- g. Other (specify):

E. Priority actions for wetland restoration

F. Additional notes about the wetland:
This wetland has been renovated for irrigation purposes

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7. Bob Tal - Photos
7. Bob Tal - Site Information

Recorder: B.B. Khadka
Date: 18th Dec. 2013

A. Location and general information
Name of the wetland: Bob Tal
Altitude: 175m
Location: Bharandhabhar
Nearest post: Khorsor
Accessibility: Foot, Elephant
Distance: 2km

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</table>

B. Physical description of the wetland
Total Area: 4.09ha.
Area of open water (%): 100
Perimeter: 3220.27m
Depth: 6 feet
Inlet (type & no): None
Outlet (type & no): None
Broad habitat type: 1. Sal forest
Specific habitat type: 1. Wet grass
Lake condition: (Excellent/Good/Fair/Poor): Excellent
Wetland management: Yes

C. Major flora and fauna observed during survey

<table>
<thead>
<tr>
<th>SN</th>
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<th>Aquatic birds</th>
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</table>

Major Invasive species: 1. Mikania

D. Threats (High/Medium/Low/No)
a. Siltation - low    b. Invasive species - low    c. Conversion to grasslands - medium
d. Drying - low      e. Pollution - low        f. Fishing and other extraction - low

E. Priority actions for wetland restoration
1. Excavation in sedimentation area

F. Additional notes about the wetland:
8. Century Ghol - Photos
8. Century Ghol - Site Information

Recorder: B.B. Khadka Date: 24th Dec. 2013

A. Location and general information
Name of the wetland: Century Ghol Altitude: 137m
Location: Lamichaur Nearest post: Lamichaur
Accessibility: Foot, Elephant, Vehicle Distance: 3km

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B. Physical description of the wetland
Total Area: 3.47 ha. Area of open water (%): 75
Perimeter: 4005.8m Depth: 5 feet
Inlet (type & no): None Outlet (type & no): None
Broad habitat type: 1. Riverine forest 2. Grassland swamp
Specific habitat type: 1. Grassland swamp 2. Wet meadow
Lake condition: (Excellent/Good/Fair/Poor): Good
Wetland management: Yes

C. Major flora and fauna observed during survey

<table>
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<td>Hydrilla</td>
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D. Threats (High/Medium/Low/No)
   a. Siltation - high  
   b. Invasive species - high  
   c. Conversion to grasslands - high  
   d. Drying - low  
   e. Pollution - low  
   f. Fishing and other extraction - low

E. Priority actions for wetland restoration
1. Management of outlet system  
2. Earthen Check-dam  
3. Removal of invasive weeds  
4. Removal of sedimentation

F. Additional notes about the wetland:
Wetland is severely sedimented
9. Chandi Tal - Photos
9. Chandi Tal - Site Information

Recorder: B.B. Khadka                                      Date: 15th Dec. 2013

**A. Location and general information**

Name of the wetland: Chandi Tal  Altitude: 174m
Location: Bharandhabhar  Nearest post: Debnagar
Accessibility: Vehicle  Distance from nearest post: 3 km

**B. Physical description of the wetland**

Total Area: 2.76 ha.  Area of open water (%): 90
Perimeter: 1154.96m  Depth: 7 feet
Inlet (type & no): None  Outlet (type & no): Drain
Broad habitat type:  1. Sal forest
Specific habitat type:  1. Short grass
Lake condition: (Excellent/Good/Fair/Poor): Good
Wetland management: Yes

**C. Major flora and fauna observed during survey**

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</tbody>
</table>

**D. Threats (High/Medium/Low/No)**

a. Siltation - low  b. Invasive species - low  c. Conversion to grasslands - low
d. Drying - low  e. Pollution - no  f. Fishing and other extraction - low
g. Other (specify): From recreation purposes (picnic spot)

**E. Priority actions for wetland restoration**

**F. Additional notes about the wetland:**
10. Chepang Tal - Photos
10. Chepang Tal - Site Information

Recorder: B.B. Khadka
Date: 13th Dec. 2013

A. Location and general information
Name of the wetland: Chepang Tal
Altitude: 183m
Location: Bharandhabhar
Nearest post: Bharandhabhar
Accessibility: Vehicle
Distance from nearest post: 2 km

B. Physical description of the wetland
Total Area: 1.98 ha.
Area of open water (%): 75
Perimeter: 735.87m
Depth: 5 feet
Inlet (type & no): None
Outlet (type & no): Khageri Khola
Broad habitat type: 1. Sal forest
Specific habitat type: 1. Bushes
Lake condition: (Excellent/Good/Fair/Poor): Fair
Wetland management: Yes

C. Major flora and fauna observed during survey

<table>
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<tr>
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<th>Birds</th>
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<td>Darter</td>
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<td>Unknown weeds</td>
<td>Pond Heron</td>
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<td>3</td>
<td></td>
<td></td>
<td>Great Cormorant</td>
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</tr>
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</table>


D. Threats (High/Medium/Low/No)
a. Siltation - low  
b. Invasive species - high  
c. Conversion to grasslands - low  
d. Drying - low  
e. Pollution - low  
f. Fishing and other extraction - low  
g. Other (specify): Over disturbances

E. Priority actions for wetland restoration
1. Removal of invasive species  
2. Permanent water source management

F. Additional notes about the wetland:

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</table>
III. Kalimati Tal - Photo
I. Kalimati Tal - Site Information

Recorder: B.B. Khadka

Date: 14th Dec. 2013

A. Location and general information

Name of the wetland: Kalimati Tal
Altitude: 172m
Location: Bharandhabhar
Nearest post: Debnagar
Accessibility: Vehicle, Foot
Distance: 7km

B. Physical description of the wetland

Total Area: 1.82ha.
Area of open water (%): 90
Perimeter: 1138.1m
Depth: 6 feet
Inlet (type & no): None
Outlet (type & no): Khageri canal
Broad habitat type: 1. Sal forest
Specific habitat type: 1. Short grass 2. Bushes

Lake condition: (Excellent/Good/Fair/Poor): Good
Wetland management: Yes

C. Major flora and fauna observed during survey

<table>
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</tbody>
</table>


D. Threats (High/Medium/Low/No)

a. Siltation - low
b. Invasive species - medium
   c. Conversion to grasslands - low
d. Drying - low
   e. Pollution - low
   f. Fishing and other extraction - low
g. Other (specify): Over disturbances

E. Priority actions for wetland restoration

1. Removal of invasive species
2. Regulate water flow

F. Additional notes about the wetland:
12. Kamero Matchan Ghol - Photos
12. Kamero Matchan Ghol - Site Information

Recorder: B.B. Khadka
Date: 24th Dec. 2013

A. Location and general information
Name of the wetland: Kamero Ghol Altitude: 128m
Location: Lamichaur Nearest post: Lamichaur
Accessibility: Foot, Elephant, Vehicle Distance: 2km

B. Physical description of the wetland
Total Area: 3.52 ha. Area of open water (%): 50
Perimeter: 2921.23m Depth: 12 feet
Inlet (type & no): None
Outlet (type & no): Water flow to Chilla Khola from outlet system
Broad habitat type: 1. Mixed forest
Specific habitat type: 1. Bushes
Lake condition: (Excellent/Good/Fair/Poor): Good
Wetland management: Yes

C. Major flora and fauna observed during survey

<table>
<thead>
<tr>
<th>SN</th>
<th>Flora</th>
<th>Aquatic fauna</th>
<th>Aquatic birds</th>
<th>Birds</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Karkalo</td>
<td>Lesser Adjutant</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>Ajambari</td>
<td>Pond Heron</td>
<td></td>
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</tr>
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<td>3</td>
<td>Hydrilla</td>
<td>Common Green sandpiper</td>
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<tr>
<td>4</td>
<td>Unknown weeds</td>
<td></td>
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</tr>
</tbody>
</table>

Major Invasive species: 1. Karauti jhar

D. Threats (High/Medium/Low/No)
a. Siltation - low b. Invasive species - medium c. Conversion to grasslands - high
d. Drying - low e. Pollution - low f. Fishing and other extraction - low
g. Other (specify): Over disturbances

E. Priority actions for wetland restoration (if any)
1. Increase height and length of existing check-dam of outlet
2. Earthen Check-dam in different part of Ghol

F. Additional notes about the wetland:
13. Kingfisher Tal I - Photos
I. Kingfisher Tal 1 - Site Information

Recorder: B.B. Khadka Date: 14th Dec. 2013

A. Location and general information
Name of the wetland: Kingfisher Tal - 1 Altitude: 173m
Location: Bharandhabhar Nearest post: Debnagar
Accessibility: Vehicle Distance: 1km

B. Physical description of the wetland
Total Area: 5.5ha Area of open water (%): 90
Perimeter: 3970.1m Depth: 7 feet
Inlet (type & no): None Outlet (type & no): Khageri canal
Broad habitat type: 1. Sal forest
Specific habitat type: 1. Short grass
Lake condition: (Excellent/Good/Fair/Poor): Good
Wetland management: Yes

C. Major flora and fauna observed during survey

<table>
<thead>
<tr>
<th>SN</th>
<th>Flora</th>
<th>Aquatic fauna</th>
<th>Aquatic birds</th>
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<td>Darter</td>
<td>Stork-billed Kingfisher</td>
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<tr>
<td>2</td>
<td>Lahare Grass</td>
<td></td>
<td></td>
<td>Grey-headed headed fish Eagle</td>
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<tr>
<td>3</td>
<td>Unknown weeds</td>
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<td></td>
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</tr>
</tbody>
</table>


D. Threats (High/Low/Medium/No)
4. Drying - low 5. Pollution - low 6. Fishing and other extraction - low
7. Other (specify): Over disturbances

E. Priority actions for wetland restoration (if any)
1. Removal of invasive species 2. Regulation of water sources year around

F. Additional notes about the wetland:
14. Kuchkuche Ghol - Photos
I4. Kuchkuche Ghol - Site Information

Recorder: B.B. Khadka
Date: 27th Dec. 2013

A. Location and general information
Name of the wetland: Kuchkuche Ghol    Altitude: 189m
Location: Kathar   Nearest post: Khagendramalli
Accessibility: Vehicle   Distance: 3km

B. Physical description of the wetland
Total Area: 0.028 ha   Area of open water (%): 90
Perimeter: 63.35m   Depth: 2 feet
Inlet (type & no): None   Outlet (type & no): None
Broad habitat type: 1. Mixed forest
Specific habitat type: 1. Bushes
Lake condition: (Excellent/Good/Fair/Poor): Fair
Wetland management: Yes

C. Major flora and fauna observed during survey

<table>
<thead>
<tr>
<th>SN</th>
<th>Flora</th>
<th>Aquatic fauna</th>
<th>Aquatic birds</th>
<th>Birds</th>
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<tbody>
<tr>
<td>1</td>
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</tbody>
</table>

Major Invasive species: None

D. Threats (High/Medium/Low/No)

a. Siltation - low
b. Invasive species - low
c. Conversion to grasslands - low
d. Drying - medium
e. Pollution - low
f. Fishing and other extraction - medium
g. Other (specify): Over disturbances

E. Priority actions for wetland restoration (if any)

1. Construction of concrete check-dam

F. Additional notes about the wetland:

<table>
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<tr>
<th>SN</th>
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<th>Latitude</th>
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<tr>
<td>1</td>
<td>0265151</td>
<td>3052583</td>
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</table>
15. Kumal Tal - Photos
15. Kumal Tal - Site Information

Recorder: B.B. Khadka  Date: 13\textsuperscript{th} Dec. 2013

A. Location and general information
Name of the wetland: Kumal Tal  Altitude: 168m
Location: Bharandhabhar  Nearest post: Bharandhabhar
Accessibility: Vehicle  Distance: 200m.

B. Physical description of the wetland
Total Area: 7.66 ha.  Area of open water (%): 95
Perimeter: 2317.94m  Depth: 5 feet
Inlet (type & no): None  Outlet (type & no): Khageri Khola
Broad habitat type: 1. Sal forest
Specific habitat type: 1. Swamp grassland
Lake condition: (Excellent/Good/Fair/Poor): Good
Wetland management: Yes

C. Major flora and fauna observed during survey

<table>
<thead>
<tr>
<th>SN</th>
<th>Flora</th>
<th>Aquatic fauna</th>
<th>Aquatic birds</th>
<th>Birds</th>
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<td>Darter</td>
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<td>Kodejhar</td>
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<td>Great Cormorant</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>Water Chesnut</td>
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<td>Gery Heron</td>
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<td>5</td>
<td></td>
<td></td>
<td>Lesser Adjutant</td>
<td></td>
</tr>
<tr>
<td>6</td>
<td></td>
<td></td>
<td>Open-billed Stork</td>
<td></td>
</tr>
<tr>
<td>7</td>
<td></td>
<td></td>
<td>Little Egret</td>
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<td>8</td>
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<td>Great Egret</td>
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</table>

Major Invasive species: 1. Mikania  2. Water Cabbage

D. Threats (High/Medium/Low/No)
a. Siltation - low  b. Invasive species - medium  c. Conversion to grasslands - high
d. Drying - low  e. Pollution - low  f. Fishing and other extraction - low
g. Other (specify):

E. Priority actions for wetland restoration (if any)
1. Removal of invasive species  2. Regulation of water sources year around
3. Earth excavation in siltation area

F. Additional notes about the wetland:
16. Kumrose Ghol - Photos
16. Kumrose Ghol - Site Information

Recorder: B.B. Khadka  Date: 17th Dec. 2013

A. Location and general information
Name of the wetland: Kumrose Tal  Altitude: 183m
Location: Kumrose  Nearest post: Janakpur
Accessibility: Foot, Elephant  Distance: 3km.

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<td>2</td>
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<td>3050584</td>
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</table>

B. Physical description of the wetland
Total Area: 0.10ha  Area of open water (%): Swampy Ghol
Perimeter: 200m  Depth: 2 feet
Inlet (type & no): None  Outlet (type & no): None
Broad habitat type: 1. Riverine forest
Specific habitat type: 1. Wet grass
Lake condition: (Excellent/Good/Fair/Poor): Poor
Wetland management: Yes

C. Major flora and fauna observed during survey

<table>
<thead>
<tr>
<th>SN</th>
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<th>Aquatic birds</th>
<th>Birds</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Narkat</td>
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</tbody>
</table>

Major invasive species: 1. Mikania

D. Threats (High/Medium/Low/No)
a. Siltation - high  b. Invasive species - low  c. Conversion to grasslands - high
d. Drying - high  e. Pollution - low  f. Fishing and other extraction - high
g. Other (specify): Over disturbances

E. Priority actions for wetland restoration (if any)
1. Earth excavation  2. Earthen check-dam
3. Divert some water from Rapti river to this wetland  4. Grazing control of domestic animals

F. Additional notes about the wetland:
17. Mayur Tal - photos
### 17. Mayur Tal - Site Information

**Recorder**: B.B. Khadka  
**Date**: 14th Dec. 2013

#### A. Location and general information

<table>
<thead>
<tr>
<th>Name of the wetland</th>
<th>Altitude</th>
<th>Location</th>
<th>Nearest post</th>
<th>Accessibility</th>
<th>Distance</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mayur Tal</td>
<td>178m</td>
<td>Bharandhabhar</td>
<td>Debnagar</td>
<td>Vehicle</td>
<td>9 km</td>
</tr>
</tbody>
</table>

#### B. Physical description of the wetland

- **Total Area**: 0.45 ha.  
- **Area of open water (%)**: 90  
- **Perimeter**: 621.3m  
- **Depth**: 6 feet  
- **Inlet (type & no)**: None  
- **Outlet (type & no)**: Khageri canal  
- **Broad habitat type**:  
  1. Sal forest  
- **Specific habitat type**:  
  1. Short grass  
  2. Bushes  
- **Lake condition**: Good  
- **Wetland management**: Yes

#### C. Major flora and fauna observed during survey

<table>
<thead>
<tr>
<th>SN</th>
<th>Flora</th>
<th>Aquatic fauna</th>
<th>Aquatic birds</th>
<th>Birds</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Unknown weeds</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Major Invasive species**: 1. Karauti Jhar

#### D. Threats (High/Medium/Low/No)

- **a. Siltation**: no  
- **b. Invasive species**: medium  
- **c. Conversion to grasslands**: no  
- **d. Drying**: no  
- **e. Pollution**: no  
- **f. Fishing and other extraction**: no  
- **g. Other (specify)**: Picnic groups

#### E. Priority actions for wetland restoration (if any)

1. Removal of invasive species  
2. Regulation of water sources year around

#### F. Additional notes about the wetland:

<table>
<thead>
<tr>
<th>SN</th>
<th>Longitude</th>
<th>Latitude</th>
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</thead>
<tbody>
<tr>
<td>1</td>
<td>0248856</td>
<td>3061685</td>
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</tbody>
</table>
18. Ratomate Tal - Photos
18. Ratomate Tal - Site Information

Recorder: B.B. Khadka  Date: 14th Dec. 2013

A. Location and general information
Name of the wetland: Ratomate Tal  Altitude: 152m
Location: Bharandhabhar  Nearest post: Debnagar
Accessibility: Vehicle  Distance: 5km

B. Physical description of the wetland
Total Area: 4.3 ha.  Area of open water (%): 100
Perimeter: 2296.8m  Depth: 5 feet
Inlet (type & no): None  Outlet (type & no): None
Broad habitat type:  l. Sal forest
Specific habitat type:  i. Short grass  2. Bushes
Lake condition: (Excellent/Good/Fair/Poor): Good
Wetland management: Yes

C. Major flora and fauna observed during survey

<table>
<thead>
<tr>
<th>SN</th>
<th>Flora</th>
<th>Aquatic fauna</th>
<th>Aquatic birds</th>
<th>Birds</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Unknown weeds</td>
<td>Mugger Crocodile</td>
<td>Great Cormorant</td>
<td>G. headed Fish Eagle</td>
</tr>
<tr>
<td>2</td>
<td></td>
<td></td>
<td></td>
<td>Egret species</td>
</tr>
</tbody>
</table>

Major Invasive species: 1. Mikania  2. Water Cabbage

D. Threats (High/Medium/Low/No)
- a. Siltation - low
- b. Invasive species - low
- c. Conversion to grasslands - medium
- d. Drying - low
- e. Pollution - low
- f. Fishing and other extraction - low
- g. Other (specify): Over disturbances

E. Priority actions for wetland restoration (if any)
- 1. Removal of invasive species
- 2. Regulation of water sources year around

F. Additional notes about the wetland:
19. Niure Tal - Photos

![Image of Niure Tal with trees and water body]

![Image of Niure Tal with a bench and water body]

![Image of Niure Tal with water body and trees]

Status of Wetlands and Mugger Crocodile in and around Chitwan National Park
19. Niure Tal - Site Information

Recorder: B.B. Khadka  Date: 14th Dec. 2013

A. Location and general information
Name of the wetland: Niure Tal  Altitude: 100m
Location: Bharandhabhar  Nearest post: Debnagar
Accessibility: Vehicle  Distance: 2km

B. Physical description of the wetland
Total Area: 1.82 ha.  Area of open water (%): 90
Perimeter: 1903.1m  Depth: 7 feet
Inlet (type & no): None  Outlet (type & no): Khageri canal
Broad habitat type: 1. Sal forest
Specific habitat type: 1. Short grass
Lake condition: Good
Wetland management: Yes

C. Major flora and fauna observed during survey

<table>
<thead>
<tr>
<th>SN</th>
<th>Flora</th>
<th>Aquatic fauna</th>
<th>Aquatic birds</th>
<th>Birds</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Unknown weeds</td>
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<td></td>
<td></td>
</tr>
</tbody>
</table>

Major Invasive species: 1. Mikania  2. Water Cabbage

D. Threats (High/Medium/Low/No)
a. Siltation - low  b. Invasive species - low  c. Conversion to grasslands - medium
d. Drying - low  e. Pollution - low  f. Fishing and other extraction - low
g. Other (specify): From recreation purposes (picnic spot)

E. Priority actions for wetland restoration (if any)
1. Remove of invasive species  2. Regulation of water resources year around

F. Additional notes about the wetland:

<table>
<thead>
<tr>
<th>SN</th>
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<th>Latitude</th>
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<tbody>
<tr>
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<td>3058551</td>
</tr>
</tbody>
</table>
20. Mushar Tal - Photos
20. Mushar Tal - Site Information

Recorder: B.B. Khadka
Date: 26th Dec. 2013

A. Location and general information
Name of the wetland: Mushar tal Altitude: 169m
Location: Bagmara BCF Nearest post: Sauraha
Accessibility: Vehicle Distance: 3km

B. Physical description of the wetland
Total Area: 0.30 ha. Area of open water (%): 100
Perimeter: 354.1m Depth: 5 feet
Inlet (type & no): None Outlet (type & no): None
Broad habitat type: 1. Mixed forest
Specific habitat type: 1. Bushes
Lake condition: (Excellent/Good/Fair/Poor): Good
Wetland management: Yes

C. Major flora and fauna observed during survey

<table>
<thead>
<tr>
<th>SN</th>
<th>Flora</th>
<th>Aquatic fauna</th>
<th>Aquatic birds</th>
<th>Birds</th>
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<tbody>
<tr>
<td>1</td>
<td>Niuro</td>
<td>Mugger Crocodile</td>
<td></td>
<td>Grey-headed Fish Eagle</td>
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<tr>
<td>2</td>
<td>Latre Jhar</td>
<td></td>
<td></td>
<td>Common Kingfisher</td>
</tr>
<tr>
<td>3</td>
<td>Sete Grass</td>
<td></td>
<td></td>
<td>Stork-billed Kingfisher</td>
</tr>
</tbody>
</table>

Major Invasive species 1. Mikania

D. Threats (High/Medium/Low/No)
a. Siltation - high b. Invasive species - low c. Conversion to grasslands - low
d. Drying - low e. Pollution - low f. Fishing and other extraction - low
g. Other (specify): Over disturbances

E. Priority actions for wetland restoration (if any)
1. Excavate sediments

F. Additional notes about the wetland:
21. Rapti Lok Tal - Photos
21. Rapti Lok Tal - Site Information

Recorder: B.B. Khadka          Date: 29th Dec. 2013

A. Location and general information
Name of the wetland: Rapti Lok Tal          Altitude: 190m
Location: Kathar          Nearest post: Janakpur
Accessibility: Vehicle          Distance: 2Km

B. Physical description of the wetland
Total Area: 4.01 ha          Area of open water (%): 100
Perimeter: 2539m          Depth: 10 feet
Inlet (type & no): Rapti water          Outlet (type & no): Drain
Broad habitat type: 1. Riverine forest swamp          2. Swamp grassland
Specific habitat type: 1. Narkat swamp          2. Grassland meadow
Lake condition: (Excellent/Good/Fair/Poor): Good
Wetland management: No

C. Major flora and fauna observed during survey

<table>
<thead>
<tr>
<th>SN</th>
<th>Flora</th>
<th>Aquatic fauna</th>
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<th>Birds</th>
</tr>
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<td>1</td>
<td>Red-wattled Lapwing</td>
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</tbody>
</table>

Major Invasive species: None

D. Threats (High/Medium/Low/No)
a. Siltation - low  b. Invasive species - low          c. Conversion to grasslands - low
d. Drying - low  e. Pollution - no          f. Fishing and other extraction - low
g. Other (specify): Over disturbances

E. Priority actions for wetland restoration (if any): None

F. Additional notes about the wetland:
This wetland is managed by Rapti Lok Kalyan Buffer zone community forest for aquaculture.
22. Sitamain Ghol - Photos
22. Sitamain Ghol - Site Information

Recorder: B.B. Khadka
Date: 15th Dec. 2013

A. Location and general information
Name of the wetland: Sitamain Ghol  Altitude: 177m
Location: Bharandhabhar  Nearest post: Belsar
Accessibility: Vehicle  Distance: 2 km

B. Physical description of the wetland
Total Area: 4.12ha.  Area of open water (%): 90
Perimeter: 2879.93m  Depth: 7 feet
Inlet (type & no): None  Outlet (type & no): None
Broad habitat type:  i. Sal forest
Specific habitat type:  i. Short grass  ii. Bushes
Lake condition: (Excellent/Good/Fair/Poor): Fair
Wetland management: Yes

C. Major flora and fauna observed during survey

<table>
<thead>
<tr>
<th>SN</th>
<th>Flora</th>
<th>Aquatic fauna</th>
<th>Aquatic birds</th>
<th>Birds</th>
</tr>
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<tbody>
<tr>
<td>1</td>
<td>Ajambari</td>
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<tr>
<td>2</td>
<td>Water Chesnut</td>
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</tr>
<tr>
<td>4</td>
<td>Mathe</td>
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<td></td>
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</tr>
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<td>Latare Jhar</td>
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<tr>
<td>6</td>
<td>Unknown weeds</td>
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<td></td>
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</tr>
</tbody>
</table>

Major Invasive species: 1. Karauti Jhar

D. Threats (High/Medium/Low/No)
a. Siltation - medium  b. Invasive species – medium  c. Conversion to grasslands - high
d. Drying - medium  e. Pollution - low  f. Fishing and other extract: low
g. Other (specify): From recreation purposes (from picnic spot)

E. Priority actions for wetland restoration (if any)
1. Removal of invasive species  2. Regulation of water sources year around
3. Removal of sedimentation

F. Additional notes about the wetland:

<table>
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<td>4</td>
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</table>
23. Chaperchuli Ghol - Photos
23. Chaparchuli Ghol - Site Information

Recorder: B.B. Khadka  Date: 29th Dec. 2013

A. Location and general information
Name of the wetland: Chaparchuli Ghol  Altitude: 186m
Location: Chaparchuli  Nearest post: Chaparchuli
Accessibility: Foot, Elephant  Distance: 200m

B. Physical description of the wetland
Total Area: 0.022ha  Area of open water (%): No water
Perimeter: 61.65m  Depth:
Inlet (type & no): None  Outlet (type & no): None
Broad habitat type:  1. Riverine forest
Specific habitat type:  1. Narkat
Lake condition: (Excellent/Good/Fair/Poor): Poor
Wetland management: Yes

C. Major flora and fauna observed during survey

<table>
<thead>
<tr>
<th>SN</th>
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<th>Aquatic birds</th>
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<td>3</td>
<td>Bader</td>
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<tr>
<td>4</td>
<td>Khadai</td>
<td></td>
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<tr>
<td>5</td>
<td>Unknown weeds</td>
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</tr>
</tbody>
</table>

Major Invasive species: 1. Mikania  2. Karauti jhar

D. Threats (High/Medium/Low/No)
a. Siltation - high  b. Invasive species - high  c. Conversion to grasslands - high
d. Drying - high  e. Pollution - no  f. Fishing and other extraction - low
g. Other (specify):

E. Priority actions for wetland restoration (if any)
1. Excavation of siltation area  2. Renovation of check-dam

F. Additional notes about the wetland:
24. Devi Tal - Photos
24. Devi Tal - Site Information

Recorder: B.B. Khadka
Date: 23rd Dec. 2013

A. Location and general information
Name of the wetland: Devi Tal
Altitude: 127m
Location: Khoria Muhan
Nearest post: Khoria Muhan
Accessibility: Foot, Elephant, Vehicle
Distance: 1km

B. Physical description of the wetland
Total Area: 7.56ha
Area of open water (%): 5
Perimeter: 1611.1m
Depth: 8 feet
Inlet (type & no): None
Outlet (type & no): None
Broad habitat type: Riverine forest swamp
Specific habitat type: Tall grassland swamp
Lake condition: Poor
Wetland management: Yes

C. Major flora and fauna observed during survey

<table>
<thead>
<tr>
<th>SN</th>
<th>Flora</th>
<th>Aquatic fauna</th>
<th>Aquatic birds</th>
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<tbody>
<tr>
<td>1</td>
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<td>Mugger crocodile</td>
<td>Purple Heron</td>
<td>G. headed Fish Eagle</td>
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<td>2</td>
<td>Swamp tall grass</td>
<td></td>
<td>Common Morhen</td>
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<td>3</td>
<td>Mathe</td>
<td></td>
<td>B. winged Jacana</td>
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<td>5</td>
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</tbody>
</table>


D. Threats (High/Medium/Low/No)
- a. Siltation - high
- b. Invasive species - high
- c. Conversion to grasslands - high
- d. Drying - high
- e. Pollution - no
- f. Fishing and other extraction - low
- g. Other (specify):

E. Priority actions for wetland restoration (if any)
1. Removal of invasive species
2. Divert the Hati Marura Khola through vegetative check dam

F. Additional notes about the wetland:
During monsoon season, water overflows through a gully. This gully needs to be controlled.
25. Dumariya Ghol - Photos
25. Dumariya Ghol - Site Information

Recorder: B.B. Khadka
Date: 10th Dec. 2013

A. Location and general information
Name of the wetland: Dumariya Ghol   Altitude: 147m
Location: North-west of Dumariya   Nearest post: Dumariya
Accessibility: Vehicle   Distance: 1 km

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B. Physical description of the wetland
Total Area: 0.97ha.   Area of open water (%): 100
Perimeter: 720.86m   Depth: 8 feet
Inlet (type & no): None   Outlet (type & no): None
Broad habitat type: 1. Riverine forest swamp  2. Tall grass swamp
Specific habitat type: 1. Swamp grassland
Lake condition: (Excellent/Good/Fair/Poor): Good
Wetland management: Yes

C. Major flora and fauna observed during survey

<table>
<thead>
<tr>
<th>SN</th>
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<th>Aquatic birds</th>
<th>Birds</th>
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<td>Pond Heron</td>
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<td>Darter</td>
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</table>

Major Invasive species: 1. *Mikania*

D. Threats (High/Medium/Low/No)
a. Siltation - low   b. Invasive species - low   c. Conversion to grasslands - medium
d. Drying - low   e. Pollution - no   f. Fishing and other extraction - low
g. Other (specify):

E. Priority actions for wetland restoration (if any)
1. Removal of sedimentation   2. Removal of invasive species

F. Additional notes about the wetland:
26. Gaindakhasa Ghol - Photo
26. Gainda Khasa Ghol - Site Information

Recorder: B.B. Khadka  
Date: 23rd Dec. 2013

A. Location and general information
Name of the wetland: West of Temple Tiger  
Altitude: 99m
Location: Gaindakhasa Ghol  
Nearest post: Temple Tiger
Accessibility: Foot, Elephant, Vehicle  
Distance: 3km

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</table>

B. Physical description of the wetland
Total Area: 3.83ha  
Area of open water (%): 75
Perimeter: 3999.1m  
Depth: 1-2 feet
Inlet (type & no): Kukurni Khola
Outlet (type & no): None
Broad habitat type:  
1. Mixed forest  
2. Wet meadow
Specific habitat type:  
1. Wet meadow
Lake condition: Poor
Wetland management: Yes

C. Major flora and fauna observed during survey

<table>
<thead>
<tr>
<th>SN</th>
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<th>Aquatic fauna</th>
<th>Aquatic birds</th>
<th>Birds</th>
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<tbody>
<tr>
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<td>Narkat</td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>2</td>
<td>Bader</td>
<td></td>
<td></td>
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</tr>
<tr>
<td>3</td>
<td>Tall grass</td>
<td></td>
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</tr>
</tbody>
</table>

Major Invasive species: None

D. Threats (High/Medium/Low/No)
a. Siltation - high  
b. Invasive species - no  
c. Conversion to grasslands - high  
d. Drying - high  
e. Pollution - no  
f. Fishing and other extraction - low  
g. Other (specify):

E. Priority actions for wetland restoration (if any)
1. Earthen Check-dam

F. Additional notes about the wetland:
27. Gaurmachan - Photos
27. Gaurmachan Ghol

Recorder: B.B. Khadka Date: 10th Dec. 2013

A. Location and general information
Name of the wetland: Gaurmachan Ghol Altitude: 159m
Location: Charahara. Nearest post: Dumariya
Accessibility: Vehicle Distance: 2 km

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</table>

B. Physical description of the wetland
Total Area: Area of open water (%): No water
Perimeter: Depth:
Inlet (type & no): None Outlet (type & no): None
Broad habitat type: 1. Riverine habitat 2. Wet meadow
Specific habitat type: 1. Narkat grass wet meadow
Lake condition: (Excellent/Good/Fair/Poor): Poor
Wetland management: Yes

C. Major flora and fauna observed during survey

<table>
<thead>
<tr>
<th>SN</th>
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<th>Aquatic birds</th>
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Major Invasive species: 1. *Mikania*

D. Threats (High/Medium/Low/No)
- a. Siltation - high
- b. Invasive species - high
- c. Conversion to grasslands - high
- d. Drying - high
- e. Pollution - no
- f. Fishing and other extraction - no
- g. Other (specify):

E. Priority actions for wetland restoration (if any)
- 1. Need numerous earthen check dam at different locations
- 2. Excavation of sediment
- 3. Removal of invasive species

F. Additional notes about the wetland:
28. CJL Ghol - Photos
**28. CJL Ghol - Site Information**

Recorder: B.B. Khadka  
Date: 29th Dec. 2013

### A. Location and general information

- **Name of the wetland:** CJL Ghol  
  **Altitude:** 203m  
- **Location:** CJL  
  **Nearest post:** Khagendramali  
- **Accessibility:** Foot, elephant  
  **Distance:** 2km

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<td>2</td>
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</table>

### B. Physical description of the wetland

- **Total Area:** 0.49 ha.  
  **Area of open water (%):** 10  
- **Perimeter:** 284.7m  
  **Depth:** 2 feet  
- **Inlet (type & no):** None  
  **Outlet (type & no):** None  
- **Broad habitat type:** 1. Riverine forest swamp  
  2. Sal forest  
- **Specific habitat type:** 1. Narkat swamp  
  2. Grassland meadow  
- **Lake condition:** Poor
  **Wetland management:** Yes

### C. Major flora and fauna observed during survey

<table>
<thead>
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<th>SN</th>
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<td>Jhaksi</td>
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<tr>
<td>3</td>
<td>Bader</td>
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<tr>
<td>4</td>
<td>Khadai</td>
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<td></td>
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<td>5</td>
<td>Mathe</td>
<td></td>
<td></td>
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</tr>
<tr>
<td>6</td>
<td>Unknown plants</td>
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</tbody>
</table>

- **Major Invasive species:** 1. Water Cabbage  
  2. Mikania

### D. Threats (High/Medium/Low/No)

- a. Siltation - high  
- b. Invasive species - low  
- c. Conversion to grasslands - high  
- d. Drying - high  
- e. Pollution - no  
- f. Fishing and other extraction - high  
- g. Other (specify):

### E. Priority actions for wetland restoration (if any)

1. Excavation of sediments  
2. Renovation of check-dam

### F. Additional notes about the wetland:

During CJL hotel operation ten individuals of mugger and no. of wetland dependent species were noted but after hotel shutdown, wetland degraded displacing many species.
29. Icharni Ghol Complex - I - Photos
29. Icharni Ghol Complex - I - Site Information

Recorder: B.B. Khadka Date: 17th Dec. 2013

A. Location and general information
Name of the wetland: Icharni Complex - I Altitude: 167m
Location: Icharni Nearest post: Sauraha
Accessibility: Foot, Elephant Distance: 3km

B. Physical description of the wetland
Total Area: 0.012ha Area of open water (%): <10
Perimeter: 55.05m Depth: Wet ground
Inlet (type & no): None
Outlet (type & no): None
Broad habitat type: 1. Riverine habitat 2. Wet meadow
Specific habitat type: 1. Tall grass
Lake condition: (Excellent/Good/Fair/Poor): Poor
Wetland management: Yes

C. Major flora and fauna observed during survey

<table>
<thead>
<tr>
<th>SN</th>
<th>Flora</th>
<th>Aquatic fauna</th>
<th>Aquatic birds</th>
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</table>

Major Invasive species: None

D. Threats (High/Medium/Low/No)
a. Siltation - high b. Invasive species - no c. Conversion to grasslands - high
d. Drying - high e. Pollution - no f. Fishing and other extraction - high
g. Other (specify): Over disturbances

E. Priority actions for wetland restoration (if any)
1. Earth excavation 2. Earthen check-dam required
3. Diversion of Dhungre Khola with inlet and outlet system

F. Additional notes about the wetland:
30. Bob Tal (Complex 2) Photos
30. Bob Tal (Complex 2) - Site Information

Recorder: B.B. Khadka
Date: 18th Dec. 2013

A. Location and general information
Name of the wetland: Bob Tal (Complex 1)  Altitude: 164m
Location: Bharandhabhar BZ  Nearest post: Khorsor
Accessibility: Foot, Elephant  Distance: 1km

B. Physical description of the wetland
Total Area: 0.350143  Area of open water (%): 10
Perimeter: 285.432217  Depth: 4 feet
Inlet (type & no): None  Outlet (type & no): None
Broad habitat type: 1. Sal forest swamp
Specific habitat type: 1. Wet grass  2. Wetter ground
Lake condition: (Excellent/Good/Fair/Poor): Poor
Wetland management: Yes

C. Major flora and fauna observed during survey

<table>
<thead>
<tr>
<th>SN</th>
<th>Flora</th>
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<th>Birds</th>
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<td>1</td>
<td>Niuro</td>
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</tr>
<tr>
<td>2</td>
<td>Poison weeds</td>
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<tr>
<td>3</td>
<td>Unknown weeds</td>
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</tbody>
</table>

Major Invasive species: 1. Mikania  2. Water Hyacinth

D. Threats (High/Medium/Low/No)
a. Siltation - high  b. Invasive species - high  c. Conversion to grasslands - high
d. Drying - high  e. Pollution - low  f. Fishing and other extraction - high
g. Other (specify):

E. Priority actions for wetland restoration (if any)
1. Earth excavation in sedimentation area
2. Construct check dam with proper outlet system
3. Removal of invasive species

F. Additional notes about the wetland:

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</table>
31. Kabre Tal - Photos

[Images of wetlands and crocodiles]
31. Kabre Tal - Site Information

Recorder: B.B. Khadka               Date: 22nd Dec. 2013

A. Location and general information
Name of the wetland: KabreTal        Altitude: 106m
Location: South of Bagmara           Nearest post: Bagmara
Accessibility: Foot, Elephant        Distance: 1km

A. Location and general information

B. Physical description of the wetland
Total Area: 0.54 ha.                Area of open water (%): 75
Perimeter: 521.95m                  Depth: 10 feet
Inlet (type & no): None            Outlet (type & no): None
Broad habitat type: 1. Mixed forest swamp 2. Tall grassland swamp
Specific habitat type: 1. Wet grassland swamp
Lake condition: (Excellent/Good/Fair/Poor): Good
Wetland management: Yes

C. Major flora and fauna observed during survey

<table>
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<tr>
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</tr>
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<td>1</td>
<td>Bader</td>
<td>Mugger crocodile</td>
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<td></td>
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<tr>
<td>2</td>
<td>Karkalo</td>
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<td>8</td>
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</table>

Major Invasive species: 1. Mikania

D. Threats (High/Medium/Low/No)
a. Siltation - medium  b. Invasive species - medium  c. Conversion to grasslands - high
d. Drying - low      e. Pollution - no            f. Fishing and other extraction - low
g. Other (specify):

E. Priority actions for wetland restoration (if any)
1. Removal of invasive species        2. Excavation of siltation

F. Additional notes about the wetland:
32. Khagendra Malli Ghol - Photos
32. Khagendra Malli Ghol - Site Information

Recorder: B.B. Khadka
Date: 29th Dec. 2013

A. Location and general information
Name of the wetland: Khagendramalli Ghol      Altitude: 210m
Location: Khagendramali              Nearest post: Khagendramalli
Accessibility: Foot, Elephant              Distance: 2km

B. Physical description of the wetland
Total Area: 0.6ha
Perimeter: 734.5m
Inlet (type & no): None
Outlet (type & no): None

Major Invasive species: 1. Mikania  2. Karautijhar

D. Threats (High/Medium/Low/No)
a. Siltation - medium    b. Invasive species - low    c. Conversion to grasslands - medium
d. Drying - medium       e. Pollution - no       f. Fishing and other extraction - high
g. Other (specify): about 3/4th of the water dries out in post monsoon season

E. Priority actions for wetland restoration (if any)
1. Construction of numerous check - dam       2. Earth excavation at sedimentation area
3. Removal of invasive species

F. Additional notes about the wetland:

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<td>3</td>
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</table>
33. Laguna Tal - Photos
33. Laguna Tal - Site Information

Recorder: B.B. Khadka
Date: 10th Dec. 2013

A. Location and general information

Name of the wetland: Laguna Tal Altitude: 160m
Location: West of Jarnali Nearest post: Jarneli
Accessibility: Vehicle Distance: 1 km

B. Physical description of the wetland

Total Area: 0.19 ha. Area of open water (%): 60
Perimeter: 213.4m Depth: 2 feet
Inlet (type & no): Ghol of Jarneli
Outlet (type & no): None
Broad habitat type: 1. Riverine forest swamp 2. Sal forest
Specific habitat type: 1. Tall grass swamp
Lake condition: (Excellent/Good/Fair/Poor): Poor
Wetland management: Yes

C. Major flora and fauna observed during survey

<table>
<thead>
<tr>
<th>SN</th>
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<th>Aquatic birds</th>
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<tr>
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</tr>
<tr>
<td>4</td>
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</table>

Major Invasive species: 1. Mikania

D. Threats (High/Medium/Low/No)

a. Siltation - high
b. Invasive species - low
c. Conversion to grasslands - high
d. Drying - high
e. Pollution - no
f. Fishing and other extraction - no
g. Other (specify):

E. Priority actions for wetland restoration (if any)

1. Sedimentation excavation
2. Removal of aquatic weeds and invasive species
3. Renovation of leaching point of wetland
4. Extension of high earthen check-dam

F. Additional notes about the wetland:
34. Lami Tal - Photos
34. Lami Tal - Site Information

Recorder: B.B. Khadka
Date: 9th Dec. 2013

A. Location and general information
Name of the wetland: Lami Tal
Altitude: 144m
Location: East of Kasara
Nearest post: Ghatgain
Accessibility: Vehicle
Distance: 200m

B. Physical description of the wetland
Total Area: 2.95ha.
Perimeter: 1861.9m
Depth: 10 feet
Outlet (type & no): None
Inlet (type & no): None
Broad habitat type: 1. Riverine forest
Specific habitat type: 1. Swamp
Lake condition: Fair
Wetland management: Yes

C. Major flora and fauna observed during survey

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<td>Bronze-winged Jacana</td>
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<td>Lesser Whistling Duck</td>
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</tr>
</tbody>
</table>


D. Threats (High/Medium/Low/No)
a. Siltation - medium  b. Invasive species - low
c. Conversion to grasslands - high
d. Drying - medium    e. Pollution - no
f. Fishing and other extraction - low
g. Other (specify):

E. Priority actions for wetland restoration (if any)
1. Earth excavation at sedimentation area

F. Additional notes about the wetland:
Plantation of fast growing species is urgent in this wetland for restoring breeding colony of Asian Openbill.
35. Lamo Tal - Photos
35. Lamo Tal - Site Information

Recorder: B.B. Khadka Date: 22th Dec. 2013

A. Location and general information
Name of the wetland: Lamo Tal Altitude: 120m
Location: Khoria muhan Nearest post: Khoria muhan
Accessibility: Vehicle Distance: 2km

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</table>

B. Physical description of the wetland
Total Area: 0.87 ha. Area of open water (%): 75
Perimeter: 1335.95m Depth: 6 feet
Inlet (type & no): None Outlet (type & no): None
Broad habitat type: 1. Mixed forest 2 Tall grassland swamp
Specific habitat type: 1. Tall grassland swamp 2. Wet grassland
Lake condition: (Excellent/Good/Fair/Poor): Fair
Wetland management: Yes

C. Major flora and fauna observed during survey

<table>
<thead>
<tr>
<th>SN</th>
<th>Flora</th>
<th>Aquatic fauna</th>
<th>Aquatic birds</th>
<th>Birds</th>
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<td>Mugger Crocodile</td>
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<td>2</td>
<td>Bader</td>
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</tr>
<tr>
<td>3</td>
<td>Tall Grass</td>
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</tr>
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<td>4</td>
<td>Mathe</td>
<td></td>
<td></td>
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<tr>
<td>5</td>
<td>Unknown weeds</td>
<td></td>
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</tr>
</tbody>
</table>

Major Invasive species: 1. Mikania 2. Water Cabbage

D. Threats (High/Medium/Low/No)
a. Siltation - medium b. Invasive species - medium c. Conversion to grasslands - high
d. Drying - medium e. Pollution - no f. Fishing and other extraction - low
g. Other (specify):

E. Priority actions for wetland restoration (if any)
1. Earth excavation in sedimentation area 2. Construction of strong check dam
3. Removal of invasive species

F. Additional notes about the wetland:
36. Liglige Ghol - Photos
36. Liglige Ghol - Site Information

Recorder: B.B. Khadka
Date: 28th Dec. 2013

A. Location and general information
Name of the wetland: Liglige Ghol  Altitude: 221m
Location: Liglige  Nearest post: Liglige
Accessibility: Foot, Elephant  Distance: 1km

B. Physical description of the wetland
Total Area: 1.34ha  Area of open water (%): 100
Perimeter: 1574.80m  Depth: 1 feet
Inlet (type & no): None  Outlet (type & no): None
Broad habitat type: 1. Riverine forest  2. Grassland
Specific habitat type: 1. Grassland
Lake condition: (Excellent/Good/Fair/Poor): Fair
Wetland management: Yes

C. Major flora and fauna observed during survey

<table>
<thead>
<tr>
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<th>Aquatic birds</th>
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<td></td>
<td>White-breasted Waterhen</td>
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<td>2</td>
<td>Jhaksi</td>
<td></td>
<td>Green sandpiper</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Pater</td>
<td></td>
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<tr>
<td>4</td>
<td>Unknown weeds</td>
<td></td>
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</tr>
</tbody>
</table>

Major Invasive species: 1. Mikania  2. Water Hyacinth

D. Threats (High/Medium/Low/No)
a. Siltation - medium  b. Invasive species - low  c. Conversion to grasslands - high
d. Drying - medium  e. Pollution - no  f. Fishing and other extraction - high
g. Other (specify):

E. Priority actions for wetland restoration (if any)
1. Check -dam should be construct with inlet/outlet system
2. Earth excavation from the bottom of ghol

F. Additional notes about the wetland:

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<td>3</td>
<td>0273405</td>
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</table>
37. Mayur Ghol - Photos
37. Mayur Ghol - Site Information

Recorder: B.B. Khadka

Date: 10th Dec. 2013

A. Location and general information

Name of the wetland: Mayur Ghol
Altitude: 170m.

Location: East of Dumariya
Nearest post: Dumariya

Accessibility: Vehicle
Distance: 3km

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</table>

B. Physical description of the wetland

Total Area: 
Area of open water (%): 
Perimeter: 
Depth: 
Inlet (type & no): None
Outlet (type & no): None

Broad habitat type: 
1. Grassland habitat

Specific habitat type: 
1. Saccharum grass 
2. Invasive species

Lake condition: (Excellent/Good/Fair/Poor): Poor

Wetland management: Yes

C. Major flora and fauna observed during survey

<table>
<thead>
<tr>
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<th>Aquatic fauna</th>
<th>Aquatic birds</th>
<th>Birds</th>
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<tbody>
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</tbody>
</table>

Major Invasive species: 1. Mikania

D. Threats (High/Medium/Low/No)

a. Siltation - high
b. Invasive species - low
c. Conversion to grasslands - high
d. Drying - high
e. Pollution - no
f. Fishing and other extraction - no
g. Other (specify): flooding by Rapti river

E. Priority actions for wetland restoration (if any):

Urgent renovation of wetland is necessary

F. Additional notes about the wetland:

...
38. Martchauli Ghol - Photos
38. Marchauli Ghol - Site Information

Recorder: B.B. Khadka                        Date: 17th Dec. 2013

A. Location and general information
Name of the wetland: Marchauli Ghol  Altitude: 168m
Location: Padampur          Nearest post: Sauraha
Accessibility: Foot, elephant     Distance: 3km

B. Physical description of the wetland
Total Area: 0.53 ha.                Area of open water (%):
Perimeter: 781.43m                Depth:
Inlet (type & no): None           Outlet (type & no): None
Broad habitat type:               1. Grassland habitat      2. Narkat grass
Specific habitat type:            1. Narkat Grass     2. Invasive species
Lake condition: (Excellent/Good/Fair/Poor): Poor
Wetland management: Yes

C. Major flora and fauna observed during survey

<table>
<thead>
<tr>
<th>SN</th>
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<th>Aquatic fauna</th>
<th>Aquatic birds</th>
<th>Birds</th>
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<tbody>
<tr>
<td>1</td>
<td>Narkat</td>
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</tbody>
</table>

Major Invasive species: 1. *Mikania*

D. Threats (High/Medium/Low/No)
a. Siltation - high  b. Invasive species - high  c. Conversion to grasslands - high
d. Drying - high     e. Pollution - no        f. Fishing and other extraction - low
g. Other (specify):

E. Priority actions for wetland restoration (if any)
1. Excavation of siltation area  2. Earthen vegetative check-dam

F. Additional notes about the wetland:
39. Mardi Ghol - Photos

![Photo 1]

![Photo 2]
39. Mardi Ghol - Site Information

Recorder: B.B. Khadka  Date: 25th Dec. 2013

A. Location and general information
Name of the wetland: Mardi Ghol  Altitude: 131m
Location: Bandarjhula  Nearest post: Bandarjhula
Accessibility: Foot, Elephant, Boat
Distance: 2km

B. Physical description of the wetland
Total Area: 3 ha.  Area of open water (%): 25
Perimeter: 2927.57m  Depth: 3 feet
Inlet (type & no): None  Outlet (type & no): None
Broad habitat type: 1. Riverine forest
Specific habitat type: 1. Grassland
Lake condition: (Excellent/Good/Fair/Poor): Poor
Wetland management: Yes

C. Major flora and fauna observed during survey

<table>
<thead>
<tr>
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<th>Aquatic birds</th>
<th>Birds</th>
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<td>1</td>
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<td></td>
<td>Asian Openbill</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td></td>
<td></td>
<td>Ruddy Shelduck</td>
<td></td>
</tr>
</tbody>
</table>

Major Invasive species: None

D. Threats (High/Medium/Low/No)
- a. Siltation - high
- b. Invasive species - no
- c. Conversion to grasslands - high
- d. Drying - high
- e. Pollution - no
- f. Fishing and other extraction - medium
- g. Other (specify): Affected by Narayani flood

E. Priority actions for wetland restoration (if any)
- 1. Construction of earthen Check dam at different location of ghol is needed

F. Additional notes about the wetland:
Over siltation by Narayani flood

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</tbody>
</table>
40. Munda Tal - Photos
40. Munda Tal - Site Information

Recorder: B.B. Khadka               Date: 22th Dec. 2013

A. Location and general information

Name of the wetland: Munda Tal   Altitude: 121m
Location: South of Bagmara Post   Nearest post: Bagmara
Accessibility: By vehicle         Distance: 1km

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</table>

B. Physical description of the wetland

Total Area: 1.68 ha.   Area of open water (%): 100
Perimeter: 982.5m     Depth: 13 feet
Inlet (type & no): None   Outlet (type & no): None
Broad habitat type: 1. Mixed forest
Specific habitat type: 1. Wet grassland
Lake condition: (Excellent/Good/Fair/Poor): Excellent
Wetland management: Yes

C. Major flora and fauna observed during survey

<table>
<thead>
<tr>
<th>SN</th>
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<th>Aquatic birds</th>
<th>Birds</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Bader</td>
<td>Mugger crocodile</td>
<td>Darter</td>
<td>Kingfisher Species</td>
</tr>
<tr>
<td>2</td>
<td>Unknown weeds</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Major Invasive species: 1. Mikania

D. Threats (High/Medium/Low/No)

a. Siltation - low   b. Invasive species - medium   c. Conversion to grasslands - low
d. Drying - low      e. Pollution - no              f. Fishing and other extraction - no
g. Other (specify): Outlet broken

E. Priority actions for wetland restoration (if any)

1. Maintain proper outlet system in the west part of lake

F. Additional notes about the wetland:
41. Nanda Bhauju Tal - Photos
41. Nanda Bhauju Tal - Site Information

Recorder: B.B. Khadka  
Date: 31st Dec. 2013

A. Location and general information
Name of the wetland: Nanda Bhauju Tal  
Altitude: 123m
Location: Bhimle  
Nearest post: Bhimle
Accessibility: Vehicle, Walk  
Distance: 500m

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<td>2</td>
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</table>

B. Physical description of the wetland
Total Area: 0.6ha.  
Area of open water (%): 90
Perimeter: 502.7m  
Depth: 4 feet
Inlet (type & no): None  
Outlet (type & no): Yes
Broad habitat type:  
1. Mixed forest  
2. Grassland swamp
Specific habitat type:  
1. Grassland swamp  
2. Grassland meadow
Lake condition: (Excellent/Good/Fair/Poor): Poor
Wetland management: Yes

C. Major flora and fauna observed during survey

<table>
<thead>
<tr>
<th>SN</th>
<th>Flora</th>
<th>Aquatic fauna</th>
<th>Aquatic birds</th>
<th>Birds</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Narkat</td>
<td></td>
<td>Pond Heron</td>
<td>Grey-headed Fish eagle</td>
</tr>
<tr>
<td>2</td>
<td>Jhaksi</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Bader</td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>4</td>
<td>Neuro</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>Gandhe Jhar</td>
<td></td>
<td></td>
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</tr>
<tr>
<td>6</td>
<td>Algal floating</td>
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<tr>
<td>7</td>
<td>Unknown weeds</td>
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</tr>
</tbody>
</table>

Major Invasive species: 1. Mikania

D. Threats (High/Medium/Low/No)
- a. Siltation - high  
- b. Invasive species - low  
- c. Conversion to grasslands - high  
- d. Drying - high  
- e. Pollution - no  
- f. Fishing and other extraction - medium  
- g. Other (specify): Severely sedimentation

E. Priority actions for wetland restoration (if any)
1. Earth excavation at sedimentation area  
2. Construction of earthen check dam  
3. Removal of invasive species  
4. Construction of proper outlet system

F. Additional notes about the wetland:
Wetland is gradually converting into swampy ghol/grassland due sedimentation.
42. Nandan Tal - Photos
42. Nandan Tal - Site Information

Recorder: B.B. Khadka
Date: 17th Dec. 2013

A. Location and general information
Name of the wetland: Nandan Tal     Altitude: 185m
Location: Padampur       Nearest post: Bhimpur
Accessibility: Foot, Elephant     Distance: 4km

B. Physical description of the wetland
Total Area: 0.35 ha.    Area of open water (%): 100
Perimeter: 423.3m     Depth: 6 feet
Inlet (type & no): None               Outlet (type & no): None
Broad habitat type:                1. Sal forest         2. Swamp
Specific habitat type:                1. Swamp    2. Wet grass
Lake condition: (Excellent/Good/Fair/Poor): Good
Wetland management: Yes

C. Major flora and fauna observed during survey

<table>
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<th>Aquatic birds</th>
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<td>2</td>
<td>Bader</td>
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</tr>
<tr>
<td>3</td>
<td>Kande Karkalo</td>
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<td>4</td>
<td>Beth</td>
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<td>5</td>
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</table>

Major Invasive species: 1. Mikania

D. Threats (High/Medium/Low/No)
- a. Siltation - low
- b. Invasive species - low
- c. Conversion to grasslands - high
- d. Drying - low
- e. Pollution - no
- f. Fishing and other extraction - medium
- g. Other (specify):

E. Priority actions for wetland restoration (if any)
1. Excavation of siltation
2. Earthen check-dam in different location of lake should be constructed

F. Additional notes about the wetland:

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</table>
43. Patan/Garud Tal - Photos
43. Patna/Garud Tal - Site Information

Recorder: B.B. Khadka
Date: 17th Dec. 2013

A. Location and general information
Name of the wetland: Patna/Garud Tal  
Altitude: 168m
Location: Padampur.  
Nearest post: Bhimpur
Accessibility: Foot, elephant  
Distance: 2km

B. Physical description of the wetland
Total Area: 8.8 ha.  
Area of open water (%): 40
Perimeter: 1559.4m  
Depth: 3 feet
Inlet (type & no): None  
Outlet (type & no): None
Broad habitat type: 1. Marsh
Specific habitat type: 1. Marsh
Lake condition: (Excellent/Good/Fair/Poor): Fair
Wetland management: Yes

C. Major flora and fauna observed during survey

<table>
<thead>
<tr>
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<th>Aquatic birds</th>
<th>Birds</th>
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<td></td>
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<td>Asian Openbill</td>
<td></td>
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Major Invasive species: 1. Mikania 2. Karauti jhar

D. Threats (High/Medium/Low/No)
a. Siltation - medium  
b. Invasive species - low  
c. Conversion to grasslands - high

d. Drying - medium  
e. Pollution - no  
f. Fishing and other extraction - low

g. Other (specify):

E. Priority actions for wetland restoration (if any)
1. Construction of check-dam

F. Additional notes about the wetland:
44. Chisapani (Niure) Ghol - Photos
44. Chisapani (Niure) Ghole - Site Information

Recorder: B.B. Khadka  Date: 9th Dec. 2013

**A. Location and general information**

Name of the wetland: Niure/Chisapani Ghole  Altitude: 161m
Location: West of Kasara  Nearest post: Kasara
Accessibility: Vehicle  Distance: 2km

**B. Physical description of the wetland**

Total Area: 2.28 ha.  Area of open water (%): 10
Perimeter: 822.8m  Depth: 1 feet
Inlet (type & no): None  Outlet (type & no): None
Broad habitat type:  1. Mixed forest   2. Sal forest   3. Swamp
Specific habitat type:  1. Swamp   2. Wet meadow
Lake condition: (Excellent/Good/Fair/Poor): Poor
Wetland management: Yes

**C. Major flora and fauna observed during survey**

<table>
<thead>
<tr>
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<th>Aquatic birds</th>
<th>Birds</th>
</tr>
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<td>4</td>
<td>Unknown weeds</td>
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</tbody>
</table>

Major Invasive species: 1. Mikania

**D. Threats (High/Medium/Low/No)**

a. Siltation - high  b. Invasive species - high  c. Conversion to grasslands - high
d. Drying - high  e. Pollution - no  f. Fishing and other extraction - medium
g. Other (specify):

**E. Priority actions for wetland restoration (if any)**

1. Numerous check - dam should be construct in different locations

**F. Additional notes about the wetland:**

This wetland is being converted to grassland.
45. Sapanawoti Ghol - Photos
45. Sapanawoti Ghol - Site Information

Recorder: B.B. Khadka  Date: 30th Dec. 2013

A. Location and general information
Name of the wetland: Sapanawoti Ghol  Altitude: 138m
Location: Amalia  Nearest post: Bankatta
Accessibility: Vehicle, Foot  Distance: 3Km

B. Physical description of the wetland
Total Area:  Area of open water (%): 90
Perimeter:  Depth: 1 feet
Inlet (type & no): None  Outlet (type & no): None
Broad habitat type:  1. Riverine forest swamp
Specific habitat type:  1. Swamp bushes  2. Grassland meadow
Lake condition: (Excellent/Good/Fair/Poor): Poor
Wetland management: Yes

C. Major flora and fauna observed during survey

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<tr>
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<th>Aquatic fauna</th>
<th>Aquatic birds</th>
<th>Birds</th>
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<tbody>
<tr>
<td>1</td>
<td>Karkalo</td>
<td></td>
<td>Ruddy Shelduck</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>Narkat</td>
<td></td>
<td>Red-wattled Lapwing</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Jhaksi</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>Mathe</td>
<td></td>
<td></td>
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</tr>
<tr>
<td>5</td>
<td>Unknown weeds</td>
<td></td>
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</tr>
</tbody>
</table>

Major Invasive species: 1. *Mikania*

D. Threats (High/Medium/Low/No)
a. Siltation - high  
b. Invasive species - low  
c. Conversion to grasslands - high  
d. Drying - high  
e. Pollution - medium  
f. Fishing and other extraction - high  
g. Other (specify): Over grazing and heavy anthropogenic pressure.

E. Priority actions for wetland restoration (if any)
1. Earth excavation at bottom of ghol  
2. Construction of earthen check dams  
3. Removal of weeds

F. Additional notes about the wetland:
This wetland lies near to the Amalia village, so its proper management helps for species as well as for irrigation purposes to local people.
46. Shera Tal - Photos
46. Shera Tal - Site Information

Recorder: B.B. Khadka Date: 31st Dec. 2013

A. Location and general information
Name of the wetland: Sera Tal Altitude: 134m
Location: Dhurba Nearest post: Dhurba
Accessibility: Vehicle Distance: 2km

B. Physical description of the wetland
Total Area: 5.74ha. Area of open water (%): 25
Perimeter: 4366.45m Depth: 10 feet
Inlet (type & no): None Outlet (type & no): None
Broad habitat type: 1. Mixed forest 2. Sal forest
Specific habitat type: 1. Marsh
Lake condition: (Excellent/Good/Fair/Poor): Poor
Wetland management: Yes

C. Major flora and fauna observed during survey

<table>
<thead>
<tr>
<th>SN</th>
<th>Flora</th>
<th>Aquatic fauna</th>
<th>Aquatic birds</th>
<th>Birds</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Neuro</td>
<td>Mugger Crocodile</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>Narkat</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Karkalo</td>
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<td></td>
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<td>4</td>
<td>Kande karkalo</td>
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<td></td>
</tr>
<tr>
<td>5</td>
<td>Unknown weeds</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>


D. Threats (High/Medium/Low/No)
a. Siltation - high b. Invasive species - high c. Conversion to grasslands - high
d. Drying - high e. Pollution - no f. Fishing and other extraction - medium
g. Other (specify):

E. Priority actions for wetland restoration (if any)
1. Earth excavation at sedimentation area 2. Removal of invasive species
3. Earthen check-dam at different location

F. Additional notes about the wetland:
This wetland is severely affected by Karauti Jhar and Water hyacinth needs urgent renovation.
47. Suksuke Ghol - Photos
47. Suksuke Ghol - Site Information

Recorder: B.B. Khadka  
Date: 31st Dec. 2013

A. Location and general information

Name of the wetland: Suksuke Ghol  
Altitude: 134m
Location: Sukhibhar  
Nearest post: Sukhibhar
Accessibility: On foot, by elephant  
Distance: 3km

B. Physical description of the wetland

Total Area: 3.19 ha.  
Area of open water (%): 60
Perimeter: 4780.6m  
Depth: 6 feet
Inlet (type & no): None  
Outlet (type & no): None
Broad habitat type: 1. Mixed forest  
2. Tall grass marsh
Specific habitat type: 1. Tall grass marsh  
2. Grassland meadow

Lake condition: (Excellent/Good/Fair/Poor): Good
Wetland management: Yes

C. Major flora and fauna observed during survey

<table>
<thead>
<tr>
<th>SN</th>
<th>Flora</th>
<th>Aquatic fauna</th>
<th>Aquatic birds</th>
<th>Birds</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Narkat</td>
<td>Mugger Crocodile</td>
<td>Darter</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>Bader</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Dhaddi</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>Unknown weeds</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Major Invasive species: 1. Water Cabbage  
2. Mikania

D. Threats (High/Medium/Low/No)

a. Siltation - low  
b. Invasive species - medium  
c. Conversion to grasslands - high  
d. Drying - low  
e. Pollution - no  
f. Fishing and other extraction - low  
g. Other (specify): about 40% water area is covered by water cabbage

E. Priority actions for wetland restoration (if any)

1. Earth excavation at sedimentation area  
2. Removal of invasive species

F. Additional notes about the wetland:
48. Tamor Tal - Photos
48. Tamor Tal - Site Information

Recorder: B.B. Khadka
Date: 9th Dec. 2013

A. Location and general information
Name of the wetland: Tamor Tal
Altitude: 165m
Location: South of Kasara
Nearest post: Kasara
Accessibility: Vehicle
Distance: 3km

B. Physical description of the wetland
Total Area: 14.12ha.
Area of open water (%): 60
Perimeter: 2687.8m
Depth: 8 feet
Inlet (type & no): None
Outlet (type & no): None
Broad habitat type: 1. Sal forest 2. Swamp grassland
Specific habitat type: 1. Tall grass 2. Aquatic weeds
Lake condition: (Excellent/Good/Fair/Poor): Good
Wetland management: Yes

C. Major flora and fauna observed during survey

<table>
<thead>
<tr>
<th>SN</th>
<th>Flora</th>
<th>Aquatic fauna</th>
<th>Aquatic birds</th>
<th>Birds</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Unknown weeds</td>
<td>Mugger crocodile</td>
<td>Bronze-winged Jacana</td>
<td>G.H. Fish Eagle</td>
</tr>
<tr>
<td>2</td>
<td>Water chesnut</td>
<td></td>
<td>Darter</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td></td>
<td></td>
<td>Pond Heron</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td></td>
<td></td>
<td>Common Morhen</td>
<td></td>
</tr>
</tbody>
</table>

Major Invasive species: 1. Water Cabbage

D. Threats (High/Medium/Low/No)
a. Siltation - low
b. Invasive species - high
  c. Conversion to grasslands - high
d. Drying - low
e. Pollution - no
  f. Fishing and other extraction - no
g. Other (specify):

E. Priority actions for wetland restoration (if any)
1. Removal of invasive species
2. Removal of sedimentation

F. Additional notes about the wetland:
West part of this lake is severely silted and being converted to grassland.
49. Temple tiger Ghol - Photos
49. Temple tiger Ghol - Site Information

Recorder: B.B. Khadka  Date: 23rd Dec. 2013

A. Location and general information
Name of the wetland: Temple tiger Ghol  Altitude: 123m
Location: Temple Tiger  Nearest post: Temple Tiger
Accessibility: Foot, Elephant, Vehicle  Distance: 500m

B. Physical description of the wetland
- Total Area: 8.15 ha.
- Area of open water (%): 75
- Perimeter: 3421.42
- Depth: 10 feet
- Inlet (type & no): Forest catchment water
- Outlet (type & no): No, natural flow
- Broad habitat type: 1. Riverine forest swamp  2. Tall grass swamp
- Specific habitat type: 1. Tall grassland swamp  2. Wet meadow
- Lake condition: Excellent
- Wetland management: Yes

C. Major flora and fauna observed during survey

<table>
<thead>
<tr>
<th>SN</th>
<th>Flora</th>
<th>Aquatic fauna</th>
<th>Aquatic birds</th>
<th>Birds</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Ajambari</td>
<td>Mugger Crocodile</td>
<td>Common Morhen</td>
<td>Grey-headed fish eagle</td>
</tr>
<tr>
<td>2</td>
<td>Jhaksi</td>
<td></td>
<td>Bronze-winged Jacana</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Narkat</td>
<td></td>
<td>Lesser Whistling Duck</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>Dhaddi</td>
<td></td>
<td></td>
<td>Darter</td>
</tr>
<tr>
<td>5</td>
<td>Algal float</td>
<td></td>
<td></td>
<td>Cormorant spp.</td>
</tr>
<tr>
<td>6</td>
<td>Unknown weeds</td>
<td></td>
<td></td>
<td>Heron &amp; Stork spp.</td>
</tr>
</tbody>
</table>

Major Invasive species: 1. Mikania

D. Threats (High/Medium/Low/No)
- a. Siltation - low
- b. Invasive species - low
- c. Conversion to grasslands - low
- d. Drying - low
- e. Pollution - no
- f. Fishing and other extraction - low
- g. Other (specify): South and west part of this Ghol is severely siltation by Muhan Khola

E. Priority actions for wetland restoration (if any)
1. Earthen check-dam for regular water flow
2. Removal of sedimentation
3. Divert Muhana Khola in monsoon season

F. Additional notes about the wetland:
This is very productive wetland and habitat of several types of wetland depended species as well as for flagship species of CNP.
50. Thapaliya Tal - Photo
50. Thapaliya Tal - Site Information

Recorder: B.B. Khadka  Date: 9th Dec. 2013

A. Location and general information
Name of the wetland: Thapaliya Tal  Altitude: 163m
Location: West of Kasara  Nearest post: Kasara
Accessibility: Vehicle  Distance: 3km

B. Physical description of the wetland
Total Area: 0.53 ha.  Area of open water (%): 90
Perimeter: 313.06m  Depth: 3 feet
Inlet (type & no): None  Outlet (type & no): None
Broad habitat type: 1. Sal forest  2. Swamp
Specific habitat type: 1. Swamp  2. Wet grassland
Lake condition: (Excellent/Good/Fair/Poor): Fair
Wetland management: Yes

C. Major flora and fauna observed during survey

<table>
<thead>
<tr>
<th>SN</th>
<th>Flora</th>
<th>Aquatic fauna</th>
<th>Aquatic birds</th>
<th>Birds</th>
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<tr>
<td>1</td>
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<tr>
<td>2</td>
<td>Algae</td>
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<tr>
<td>3</td>
<td>Unknown weeds</td>
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</tr>
</tbody>
</table>

Major Invasive species: None

D. Threats (High/Medium/Low/No)
a. Siltation - medium  b. Invasive species - no  c. Conversion to grasslands - medium
d. Drying - medium  e. Pollution - no  f. Fishing and other extraction - no
g. Other (specify):

E. Priority actions for wetland restoration (if any)
1. Increase depth of wetland
2. Should maintain proper outlet system

F. Additional notes about the wetland:
51. Thotari Tal - Photos

![Thotari Tal Photos 1]

![Thotari Tal Photos 2]
51. Thotari Tal - Site Information

Recorder: B.B. Khadka
Date: 31st Dec. 2013

A. Location and general information
Name of the wetland: Thotari Tal  Altitude: 134m
Location: South of Sukhibhar  Nearest post: Sukhibhar
Accessibility: By Vehicle  Distance: 1km

B. Physical description of the wetland
Total Area: 0.69 ha  Area of open water (%): 25
Perimeter: 383.27m  Depth: 3 feet
Inlet (type & no): None  Outlet (type & no): None
Broad habitat type: 1. Mixed forest  2. Sal forest
Specific habitat type: 1. Tall grassland
Lake condition: (Excellent/Good/Fair/Poor): Fair
Wetland management: Yes

C. Major flora and fauna observed during survey

<table>
<thead>
<tr>
<th>SN</th>
<th>Flora</th>
<th>Aquatic fauna</th>
<th>Aquatic birds</th>
<th>Birds</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Dhaddi</td>
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<td></td>
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</tr>
<tr>
<td>2</td>
<td>Unknown weeds</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>


D. Threats (High/Medium/Low/No)
a. Siltation - medium  b. Invasive species - high  c. Conversion to grasslands - high
d. Drying - medium  e. Pollution - no  f. Fishing and other extraction - low
g. Other (specify): water covered by water cabbage and brown algal

E. Priority actions for wetland restoration (if any)
1. Earth excavation at sedimentation area
2. Removal of water cabbage and algal floating species

F. Additional notes about the wetland:

SN Longitude Latitude
1 0228442 3048104
52. Simara Ghol - Photos
52. Simara Ghol - Site Information

Recorder: B.B. Khadka Date: 30th Dec. 2013

A. Location and general information
Name of the wetland: Simara Ghol Altitude: 143m
Location: Bote simara Nearest post: Bote simara
Accessibility: Vehicle, Walk Distance: 1Km

<table>
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<th>SN</th>
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<th>Latitude</th>
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<tr>
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<tr>
<td>2</td>
<td>0237443</td>
<td>3042130</td>
</tr>
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</table>

B. Physical description of the wetland
Total Area: Area of open water (%): 90
Perimeter: Depth: 1 feet
Inlet (type & no): None
Outlet (type & no): None

Broad habitat type: 1. Riverine forest 2. Grassland swamp 3. Bush swamp
Specific habitat type: 1. Grassland swamp 2. Grassland meadow 3. Wet meadows

Lake condition: (Excellent/Good/Fair/Poor): Poor
Wetland management: Yes

C. Major flora and fauna observed during survey

<table>
<thead>
<tr>
<th>SN</th>
<th>Flora</th>
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<th>Aquatic birds</th>
<th>Birds</th>
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<tr>
<td>1</td>
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<td>2</td>
<td>Kans</td>
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<tr>
<td>3</td>
<td>Unknown weeds</td>
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</tr>
</tbody>
</table>

Major Invasive species: 1. Mikania

D. Threats (High/Medium/Low/No)
a. Siltation - high  b. Invasive species - medium  c. Conversion to grasslands - high
d. Drying - high e. Pollution - medium f. Fishing and other extraction - high
g. Other (specify): Over grazing and heavy pressure of people.

E. Priority actions for wetland restoration (if any)
1. Earth excavation 2. Construction of earthen check dam is necessary

F. Additional notes about the wetland:
This wetland lies near to village settlements proper management helps both for wildlife and for irrigantion
53. Singhe Tal - Photos
53. Singhe Tal - Site Information

Recorder: B.B. Khadka
Date: 23rd Dec. 2013

A. Location and general information
Name of the wetland: Singhe Ghol
Altitude: 125m
Location: Saili Maile Khola
Nearest post: Saili Maile Khola
Accessibility: Foot, Elephant, Vehicle
Distance: 1km

B. Physical description of the wetland
Total Area: 5.38ha.
Area of open water (%): 5
Perimeter: 1190.74m
Depth: 2 feet
Inlet (type & no): None
Outlet (type & no): None
Broad habitat type: 1. Mixed forest 2. Sal forest 3. Swamp
Specific habitat type: 1. Swamp 2. Wet meadow grassland 3. Wetter ground
Lake condition: (Excellent/Good/Fair/Poor): Poor
Wetland management: Yes

C. Major flora and fauna observed during survey

<table>
<thead>
<tr>
<th>SN</th>
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<th>Aquatic birds</th>
<th>Birds</th>
</tr>
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<tbody>
<tr>
<td>1</td>
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<td>Mugger crocodile</td>
<td>Purple Heron</td>
<td></td>
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<tr>
<td>2</td>
<td>Bader</td>
<td></td>
<td>Black Stork</td>
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<td>3</td>
<td>Jhaksi</td>
<td></td>
<td>Woolly-necked Stork</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>Unknown weeds</td>
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<td>Lesser Adjutant Stork</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td></td>
<td></td>
<td>Green Sandpiper</td>
<td></td>
</tr>
<tr>
<td>6</td>
<td></td>
<td></td>
<td>Pond Heron</td>
<td></td>
</tr>
</tbody>
</table>


D. Threats (High/Medium/Low/No)
a. Siltation - high  
b. Invasive species - low  
c. Conversion to grasslands - high  
d. Drying - high  
e. Pollution - no  
f. Fishing and other extraction - low  
g. Other (specify):

E. Priority actions for wetland restoration (if any)
1. Construction of earthen check-dam  
2. Removal of sedimentation and invasive species

F. Additional notes about the wetland:

<table>
<thead>
<tr>
<th>SN</th>
<th>Longitude</th>
<th>Latitude</th>
</tr>
</thead>
<tbody>
<tr>
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</tr>
<tr>
<td>2</td>
<td>0213944</td>
<td>3049250</td>
</tr>
</tbody>
</table>
54. Kharkatta Ghol - Site Photos
54. Kharkatta Ghol - Site Information

Recorder: B.B. Khadka
Date: 31st Dec. 2013

A. Location and general information

Name of the wetland: Kharkatta Ghol  Altitude: 134m
Location: East of Surung Khola  Nearest post: Surung Khola
Accessibility: Foot  Distance: 2 km

B. Physical description of the wetland

Total Area: 1.58ha.  Area of open water (%): 100
Perimeter: 1259.18m  Depth: 3 feet
Inlet (type & no): None  Outlet (type & no): None
Broad habitat type:  1. Riverine swamp forest  2. Sal forest
Specific habitat type:  1. Swamp grassland
Lake condition: (Excellent/Good/Fair/Poor): Fair
Wetland management: Yes

C. Major flora and fauna observed during survey

<table>
<thead>
<tr>
<th>SN</th>
<th>Flora</th>
<th>Aquatic fauna</th>
<th>Aquatic birds</th>
<th>Birds</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Narkat</td>
<td></td>
<td>Ruddy Shelduck</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>Dhaddi</td>
<td></td>
<td>Common morhen</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Unknown weeds</td>
<td></td>
<td>Red-wattled Lapwing</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td></td>
<td></td>
<td>Green sandpiper</td>
<td></td>
</tr>
</tbody>
</table>

Major Invasive species:

D. Threats (High/Medium/Low/No)

a. Siltation - medium  
b. Invasive species - no  
c. Conversion to grasslands - high  
d. Drying - medium  
e. Pollution - no  
f. Fishing and other extraction - low  
g. Other (specify):

E. Priority actions for wetland restoration (if any)

1. Earth excavation at sedimentation area through mechanical instruments

F. Additional notes about the wetland:
55. Harabansa Ghol - Photos
55. Harabansa Ghol - Site Information

Recorder: B.B. Khadka  Date: 31st Dec. 2013

A. Location and general information
Name of the wetland: Harbansa Ghol  Altitude: 134m
Location: West of Sukhibhar  Nearest post: Sukhibhar
Accessibility: Walk  Distance: 3 km

B. Physical description of the wetland
Total Area: 3.7 ha  Area of open water (%): 10
Perimeter: 1818 m  Depth: 6 feet
Inlet (type & no): None  Outlet (type & no): None
Broad habitat type: 1. Riverine swamp  2. Sal forest
Specific habitat type: 1. Swamp grassland
Lake condition: (Excellent/Good/Fair/Poor): Fair
Wetland management: Yes

C. Major flora and fauna observed during survey

<table>
<thead>
<tr>
<th>SN</th>
<th>Flora</th>
<th>Aquatic fauna</th>
<th>Aquatic birds</th>
<th>Birds</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Narkat</td>
<td>Mugger crocodile</td>
<td>Purple heron</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>Pater</td>
<td></td>
<td>Asian Openbill</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Unknown weeds</td>
<td></td>
<td>Green Sandpiper</td>
<td></td>
</tr>
</tbody>
</table>

Major Invasive species: 1. Water hyacinth

D. Threats (High/Medium/Low/No)
a. Siltation - medium  b. Invasive species - high  c. Conversion to grasslands - high
d. Drying - medium  e. Pollution - no  f. Fishing and other extraction - high
g. Other (specify):

E. Priority actions for wetland restoration (if any)
1. Earth excavation at sedimentation area  2. Removal of invasive species

F. Additional notes about the wetland:

<table>
<thead>
<tr>
<th>SN</th>
<th>Longitude</th>
<th>Latitude</th>
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</thead>
<tbody>
<tr>
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</tbody>
</table>
56. Rapti Ghol - Photos
56. Rapti Ghol - Site Information

**Recorder:** B.B. Khadka  
**Date:** 31st Dec. 2013

### A. Location and general information

<table>
<thead>
<tr>
<th>Name of the wetland: Rapti Ghol</th>
<th>Altitude: 173m</th>
</tr>
</thead>
<tbody>
<tr>
<td>Location: Belhattha, Jagatpur</td>
<td>Nearest post: Kasara</td>
</tr>
<tr>
<td>Accessibility: Vehicle</td>
<td>Distance: 2 km</td>
</tr>
</tbody>
</table>

### B. Physical description of the wetland

<table>
<thead>
<tr>
<th>Total Area: 4.64 ha.</th>
<th>Area of open water (%): 10</th>
</tr>
</thead>
<tbody>
<tr>
<td>Perimeter: 3808.1m</td>
<td>Depth: 7 feet</td>
</tr>
<tr>
<td>Inlet (type &amp; no):</td>
<td>None</td>
</tr>
<tr>
<td>Outlet (type &amp; no):</td>
<td>None</td>
</tr>
<tr>
<td>Broad habitat type:</td>
<td>1. Riverine forest</td>
</tr>
<tr>
<td>Specific habitat type:</td>
<td>1. Grassland</td>
</tr>
<tr>
<td>Lake condition:</td>
<td>(Excellent/Good/Fair/Poor): Fair</td>
</tr>
<tr>
<td>Wetland management:</td>
<td>Yes</td>
</tr>
</tbody>
</table>

### C. Major flora and fauna observed during survey

<table>
<thead>
<tr>
<th>SN</th>
<th>Flora</th>
<th>Aquatic fauna</th>
<th>Aquatic birds</th>
<th>Birds</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Narkat Mugger Crocodile</td>
<td>Lesser Whistling-duck</td>
<td>Stork-billed Kingfisher</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>Unknown weeds</td>
<td>Bronzed-winged Jacana</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3</td>
<td></td>
<td>Common Morhen</td>
<td></td>
<td></td>
</tr>
<tr>
<td>4</td>
<td></td>
<td>Brown Crake</td>
<td></td>
<td></td>
</tr>
<tr>
<td>5</td>
<td></td>
<td>Dater</td>
<td></td>
<td></td>
</tr>
<tr>
<td>6</td>
<td></td>
<td>Heron and Egret species</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>


### D. Threats (High/Medium/Low/No)

- a. Siltation - medium
- b. Invasive species - high
- c. Conversion to grasslands - high
- d. Drying - medium
- e. Pollution - no
- f. Fishing and other extraction - medium
- g. Other (specify):

### E. Priority actions for wetland restoration (if any)

1. Removal of invasive species
2. Regulation of water sources year around

### F. Additional notes about the wetland:

<table>
<thead>
<tr>
<th>SN</th>
<th>Longitude</th>
<th>Latitude</th>
</tr>
</thead>
<tbody>
<tr>
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<td>3052059</td>
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</tr>
<tr>
<td>3</td>
<td>0234200</td>
<td>3051912</td>
</tr>
</tbody>
</table>
57. Martchauli Marsh - Photos
57. Marchauli Marsh - Site Information

Recorder: B.B. Khadka Date: 17th Dec. 2013

A. Location and general information
Name of the wetland: Marchauli marsh (new) Altitude: 163
Location: Old Padampur. Nearest post: Sauraha
Accessibility: Walk, Elephant Distance: 3km

<table>
<thead>
<tr>
<th>SN</th>
<th>Longitude</th>
<th>Latitude</th>
</tr>
</thead>
<tbody>
<tr>
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<td>3049228</td>
</tr>
<tr>
<td>2</td>
<td>0252134</td>
<td>3049228</td>
</tr>
</tbody>
</table>

B. Physical description of the wetland
Total Area: Area of open water (%): 100
Perimeter: Depth: 1 feet
Inlet (type & no): None Outlet (type & no): None
Broad habitat type: 1. Riverine habitat 2. Narkat grass swamp
Specific habitat type: 1. Wet meadow grass 2. Narkat grass swamp
Lake condition: (Excellent/Good/Fair/Poor): Poor
Wetland management: Yes

C. Major flora and fauna observed during survey

<table>
<thead>
<tr>
<th>SN</th>
<th>Flora</th>
<th>Aquatic fauna</th>
<th>Aquatic birds</th>
<th>Birds</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

D. Threats (High/Medium/Low/No)

a. Siltation - high  
b. Invasive species - Medium  
c. Conversion to grasslands - high  
d. Drying - high  
e. Pollution - no  
f. Fishing and other extraction - no  
g. Other (specify):

E. Priority actions for wetland restoration (if any)

1. Earth excavation  
2. High Earthen check-dam

F. Additional notes about the wetland:
58. Temple Tiger 2 no. Ghol - Photos
58. Temple Tiger - 2 Ghol - Site Information

Recorder: B.B. Khadka
Date: 23rd Dec. 2013

A. Location and general information
Name of the wetland: Temple tiger 2 no. Ghol        Altitude: 123m
Location: West of Saili Maile Khola           Nearest post: Saili Maile
Accessibility: Foot, Elephant, Vehicle                         Distance: 2km

<table>
<thead>
<tr>
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<th>Lat.</th>
<th>Long.</th>
</tr>
</thead>
<tbody>
<tr>
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<tr>
<td>2</td>
<td>0212928</td>
<td>3049090</td>
</tr>
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</table>

B. Physical description of the wetland
Total Area: 49.38 ha.          Area of open water (%):  60
Perimeter: 9341.2m     Depth: 5 feet
Inlet (type & no): None           Outlet (type & no):  None
Broad habitat type:          1.  Riverine forest swamp       2. Swamp grassland
Specific habitat type:       1. Swamp tall grassland   2. Meadow grassland
Lake condition: (Excellent/Good/Fair/Poor): Good
Wetland management: Yes

C. Major flora and fauna observed during survey

<table>
<thead>
<tr>
<th>SN</th>
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<th>Aquatic fauna</th>
<th>Aquatic birds</th>
<th>Birds</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Narkat</td>
<td>Common Moorhen</td>
<td>Grey -headed Fish Eagle</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>Bader</td>
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</tr>
<tr>
<td>3</td>
<td>Unknown weeds</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

D. Threats (High/Medium/Low/No)
a. Siltation - low  b. Invasive species - low  c. Conversion to grasslands - high
d. Drying - low      e. Pollution - no      f. Fishing and other extraction - low
g. Other (specify):

E. Priority actions for wetland restoration (if any)
1. Removal of sedimentation area               2. Removal of encroached tall grass

F. Additional notes about the wetland:
PART-II

POPULATION STATUS OF MUGGER CROCODILE

(Crocodylus palustris) IN CNP
<table>
<thead>
<tr>
<th>Section</th>
<th>Page No.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Executive Summary</td>
<td></td>
</tr>
<tr>
<td>1. Background</td>
<td>130</td>
</tr>
<tr>
<td>2. Objective</td>
<td>131</td>
</tr>
<tr>
<td>3. Study area</td>
<td>132</td>
</tr>
<tr>
<td>4. Methodology</td>
<td>133</td>
</tr>
<tr>
<td>5. Result and discussion</td>
<td>134</td>
</tr>
<tr>
<td>6. Conclusion</td>
<td>137</td>
</tr>
<tr>
<td>References</td>
<td>138</td>
</tr>
<tr>
<td>Glossary</td>
<td>139</td>
</tr>
<tr>
<td>Annexs</td>
<td>141</td>
</tr>
</tbody>
</table>
This Study was carried out to assess the population status and threats to mugger crocodile (*Crocodylus palustris*) in Chitwan National Park (CNP) and its Buffer Zone (BZ). The field survey was conducted in March 2014. Total 245 mugger crocodiles were recorded from Rapti River (44), Narayani River (38), lakes, marshes and waterholes of CNP (77), and BZ of CNP (86). Some sections of Narayani and Rapti rivers and some buffer zone’s wetland is facing high and diverse anthropogenic pressure. The wetlands of core area have comparatively lower anthropogenic pressure. The principal threats to the Mugger crocodile are habitat destruction, sedimentation, food shortage and seasonal fluctuation of water level. The size and depth of the lakes inside and outside are shrinking due to high rate of invasion by alien invasive species such as water hyacinth (Jal Kumbhi, *Eichornia crassipes*), water cabbage (Kumbhika, *Pistia stratiotes*), Karauti Jhar (*Leersia hexandra*) etc. Detail and regular study on water quality and wetland diversity is required to ensure the functionality of these wetlands. This also provides crucial information for timely and effective management actions. Conservation awareness program within the vicinity of CNP, private fish farm communities is necessary. Moreover, rapid response team should be established to rescue mugger crocodile entering into the fish ponds and settlement area to prevent attacks to human, economic loss of local people and retaliatory killings. Conservation and proper management of the wetlands are urgent necessity for better habitat of crocodile.
Among the 23 species of crocodylian within its 4 families, only two species, Mugger crocodile (Crocodylus palustris Lesson; hereafter mugger) and Gharial (Gavialis gangeticus) occur in Nepal. Muggers at smaller sizes often eat aquatic insects, small fish and crustaceans, and as they grow larger they tend to eat more vertebrates, including fish, turtles, birds and mammals (Wagle 2010). Mugger crocodile is a semi-aquatic, keystone and top carnivore of slow flowing freshwater ecosystem and performs a vital service in the aquatic ecosystem by distributing the nutrients throughout the water body resulting an increment in the primary production and fish population (Mulozoki 2000). Mugger crocodiles have several features that differentiate them from other crocodiles. They have the broadest snout of any member of their genus. They generally reach maturity between 1.7 and 2.6 meters between the ages of six to ten years. The Mugger is a hole-nesting species, with egg-laying taking place during the annual dry season. Females become sexually mature at approximately 1.8 - 2m body length and lay 25-30 eggs (Whitaker & Whitaker 1989). Mugger crocodile is principally restricted to the Indian subcontinent where it may be found in various freshwater habitat types including rivers, lakes, and marshes (Whitaker 1987, Whitaker & Whitaker 1989). It is listed as a vulnerable species in the IUCN Red list and is protected by law in all the countries of its occurrence (Whitaker 1987). Historically, Mugger crocodile was relatively common throughout the Terai of Nepal in marshy lakes, ponds and small rivers (Groombridge 1982).

Modification of the habitats by river disruption and damming and mortality in fisheries operations are major causes of range and population decline (McEachern 1994). Reduction of wetland areas, deposition of silt and sediments, eutrophication, deterioration of water quality, construction of dams and other anthropogenic factors are responsible for its population decline in Nepal (Shrestha 2001). Estimated 200 wild muggers in Nepal in 1993 (Andrews and McEachern 1994). Current status and threats to muggers in Nepal is poorly understood. Periodic assessment of physiochemical parameters of water is crucial to maintain functional aquatic ecosystem and understand composition, abundance and distribution of aquatic flora and fauna. Understanding the population status and identifying the threats to determine the vulnerability is foremost step to start conservation measures for a species.

### Mugger crocodile (Crocodilus palustris)

**Common Names:** Mugger, marsh crocodile, swamp crocodile

**Range:** Iran, India, Nepal, Pakistan, Sri Lanka, Bangladesh, Bhutan, Myanmar

**Principal threats:** Habitat destruction, fragmentation, and transformation, mortality due to increased fishing activities.
2. Objective

The aim of this study was to find distribution, population status and threats of mugger crocodile in Chitwan National Park and its buffer zone area.
3. Study area

The study was carried out in Chitwan National Park and its Buffer zone and its associate lakes which was listed as globally important Ramsar site in 2003 on account of its outstanding universal value. It also hosts large numbers of migratory or non-migratory birds. Chitwan National Park is one of the natural world heritage sites (UNESCO), situated in south central Nepal, covering 932 km$^2$ core and 750 km$^2$ buffer zone in the subtropical lowlands of the inner Terai (27°30’N 84°20’E). It has a subtropical monsoonal climate with relatively high humidity (2100 mm). The park has wide diversity of species and habitats within the elevation range from 110 to 850 masl. More than 70% of the park is covered by Sal (Shorea robusta) forest, about 20% covered by floodplain grasslands, 7% riverine forest and 3% includes other forests, riverbeds etc. It is habitat for about 70 species of mammals, more than 576 species of birds, 49 species of reptiles and amphibians and more than 120 species of fishes. The park is drained by three major rivers-Narayani, Rapti and Reu. The three major river systems and other more than 58 wetland sites including Bishazar lake complex (Ramsar site) in and around Chitwan National Park makes it a good habitat for many reptiles and amphibians.
The survey was conducted in the month of March, 2014. Direct observation method was used for total count of mugger crocodile. Total numbers of individual mugger crocodiles were counted in each site during peak basking time assuming that all individuals come out from water for basking. The age size classes and their habitat parameters were recorded by the experienced observer. For the observation and photographic purpose 10x50 DPSI OLYMPUS DPSR binoculars and Canon PowerShot 5x40 HS cameras were used respectively. Dugout canoes were used to conduct surveys on rivers while observation was done from vantage point or elephant back on ponds, lakes and marshes. They bask on land during day time in post winter and pre-summer month of March for longer period on sun due to mild temperature, providing high chances for sighting. The survey was conducted from 8:30 am to 11:00 am in morning and from 3:45 pm to 5:00 pm in afternoon, avoiding the midday hot sun during which they stay in water. Only directly sighted animals were recorded. Trained local youths and the citizen scientists were used for field survey in addition to the trained staff of CNP.

<table>
<thead>
<tr>
<th>Age class</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hatchling</td>
<td>&lt;30cm. (of age &lt; 1 year)</td>
</tr>
<tr>
<td>Yearling</td>
<td>&gt;30 - &lt;50cm. (of age of 1 to 2 years)</td>
</tr>
<tr>
<td>Juvenile</td>
<td>&gt;50 - &lt;125 cm. (of age of &gt;2 years)</td>
</tr>
<tr>
<td>Sub adult</td>
<td>&gt;125 - &lt;180 cm. (of age 4-10 years)</td>
</tr>
<tr>
<td>Adult</td>
<td>&gt;180 cm. (&gt;10 years)</td>
</tr>
</tbody>
</table>

(Khadka et al, 2014)
5. Result and discussion

A recent survey of wetland in CNP has recorded 58 natural wetland sites including lakes, ponds, and marshes or ghols excluding three major rivers, streams and waterholes. Muggers were recorded from 37 of these wetland sites and two rivers i.e. Rapti and Narayani including their tributaries. The muggers are found widely distributed in CNP but distribution was patchy correlating with the number and quality of the wetland sites. They are not limited only to natural wetlands, even found in the artificial pond in between rainy to winter season and eventually they get back to natural wetlands in dry season due to low availability of water, food and nesting site.

In Chitwan National Park and its Buffer zone area, a total of 245 mugger crocodiles including 171 adults, 53 sub-adults, 19 juveniles and 2 yearlings were recorded during survey. A high number of muggers (86) were recorded from the wetlands of buffer zone which makes 35% of total mugger population. In spite of our expectation, no sign of mugger could be found in Reu River.

![Map of Chitwan National Park and Mugger Crocodile distribution](image)

**Table 1: Distribution of Mugger crocodile in Chitwan National Park and Buffer zone area.**

<table>
<thead>
<tr>
<th>Site location</th>
<th>Adult</th>
<th>Sub-adult</th>
<th>Juvenile</th>
<th>Yearling</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Narayani</td>
<td>30</td>
<td>8</td>
<td>7</td>
<td></td>
<td>38</td>
</tr>
<tr>
<td>Rapti</td>
<td>29</td>
<td>8</td>
<td>3</td>
<td>2</td>
<td>44</td>
</tr>
<tr>
<td>CNP lakes</td>
<td>49</td>
<td>23</td>
<td>3</td>
<td>2</td>
<td>77</td>
</tr>
<tr>
<td>BZ lakes</td>
<td>63</td>
<td>14</td>
<td>9</td>
<td></td>
<td>86</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>171</strong></td>
<td><strong>53</strong></td>
<td><strong>19</strong></td>
<td><strong>2</strong></td>
<td><strong>245</strong></td>
</tr>
</tbody>
</table>

![Figure 1: Distribution of Mugger crocodile in Chitwan National Park and Buffer zone area.](image)
Distribution pattern of mugger crocodile

Presently in Nepal, mugger crocodile is confined in Chitwan and Bardia National Parks and Koshi Tappu and Sukhla Phanta Wildlife Reserves. The results of a 1993 survey indicated that the muggers were restricted to protected habitats in isolated populations in Mahakali, Karnali, Babai, Rapti/Narayani and Koshi (Andrews and McEachern 1994).

The number of Muggers recorded on lentic water (lakes, marshes, ponds) was much higher (66.5% of total records) than in lotic water (river/streams).

This shows the preference of mugger towards lentic ecosystem.

During this study, it was recorded that the Mugger crocodile found on rock were only adults. Logs are preferred by the sub adults and juvenile. Mugger prefers highly the stagnant muddy freshwater found mainly in core lakes and buffer zone lakes.

Unlike gharials which avoid human disturbance, Muggers are tolerant to anthropogenic pressure. Fishing and other human disturbance activities were also recorded from most of the mugger sighting places. More than two thirds of the mugger crocodile sighted place was found to be disturbed.
by the fishing activities. Highly destructive human disturbances like mining and poisoning were found at few sites (2.25%) of the Mugger sighted area.

Kumbika (*Pistia* sps.) and Jalkumbhi (*Eichornia* sps.) were major invasive species present on the places where mugger was recorded. The Narayani river habitat of mugger sighted area has not been affected by any of these invasive species while the habitats in core area lakes and Buffer zone lakes have been severely affected by these invasive species.

**Threats**

Almost all wetlands are found shrinking due to sediment deposition and dense encroachment of alien invasive species such as water hyacinth (*JalKumbhi, Eichornia crassipes*), water cabbage (*Kumbhika, Pistia stratiotes*), Karauti grass (*Leersia hexandra*), Besharm (*Ipomoea carnea*) etc. The close observation reveals that the severely affected wetlands of CNP due to these reasons are Devital, Sheratal, Sitamaighol, and Singe tal. Thus, muggers are moving outside the park to village fish ponds resulting increased retaliatory killing by local fish farmers. More than 500 private fish ponds (300 ha) are in the buffer zone/vicinity of park. These ponds are potential food source for the muggers.
6. Conclusion

This study was carried out for preparing baseline information of population status and threats to mugger crocodile (*Crocodylus palustris*) in CNP and its Buffer zone area. The study found that, the total 245 numbers of mugger crocodiles were recorded from rivers of Rapti, Narayni and lakes, marshy land and waterholes of core area of CNP and its Buffer zone areas. Out of the 245 individuals, highest 86 (35.10%) individual muggers were recorded from buffer zone followed by 77 (31.43%) individuals in core area of CNP lakes, marshy land and waterholes, and 44 (17.96%) from Rapti and 38 (15.51%) from Narayani Rivers.

The Narayani and Rapti River and some buffer zone wetland face comparatively higher anthropogenic pressure than wetlands of core area of CNP. The principal threats to the Mugger crocodile include water pollution, habitat destruction, sedimentation, food shortage and seasonal fluctuation of water level. The size and depth of the lakes inside and outside are shrinking due to dense encroachment of alien invasive species such as water hyacinth (Jal Kumbhi, *Eichornia crassipes*), water cabbage (Kumbhika, *Pistia stratiotes*), Karauti Jhar (*Leersia hexandra*) etc. Detail and continuous study of the physiochemical analysis of water and wetland diversity is required to ensure the functionality of these wetlands and the effective management actions. Effective campaigns of conservation awareness program within the vicinity of CNP, private fish farm communities and also establish mugger crocodile rescue team for the reduction of human attacks should be initiated to save its population in CNP. Under this situation, conservation and proper management of the wetlands are urgent necessity for better habitat of crocodile. Mugger crocodile is a predatory apex species in the wetland ecosystem but it has been kept in overshadowed compared with other terrestrial flagship species in conservation.
References


Whitaker, R. Whitaker, 1989. Ecological of mugger crocodile. Their ecology management and conservation. A special publication of the crocodile specialist group. IUCN Gland Switzerland


Glossary

Abundance: The number of organisms in a population
Anthropogenic: of, relating to, or resulting from the influence of human beings on nature
Bask: lie exposed to warmth and light, typically from the sun, for relaxation and pleasure
Biodiversity: The number and variety of different organisms found within a specified geographic region.
Biogas digester: A biogas digester, also known as a methane digester, is a piece of equipment which can turn organic waste into usable fuel
Composition: the combination of parts or elements that make up something
Crustacean: any of various types of animal that live in water and have a hard outer shell
Distribution: Arrangement or spatial pattern of a species over its habitat
Doon: The Doon Valley is an unusually wide, long valley within the Shivalik Hills in the Lower Himalayas
Ecosystem: a biological community of interacting organisms and their physical environment
Eutrophication: The process by which a body of water acquires a high concentration of nutrients, especially phosphates and nitrates. These typically promote excessive growth of algae. As the algae die and decompose, high levels of organic matter and the decomposing organisms deplete the water of available oxygen, causing the death of other organisms, such as fish. Eutrophication is a natural, slow-aging process for a water body, but human activity greatly speeds up the process.
Floodplain: an area of low-lying ground adjacent to a river, formed mainly of river sediments and subject to flooding
Hatchling: a young animal that has recently emerged from its egg
Invasive species: A species that is non-native to the ecosystem under consideration and whose introduction causes or is likely to cause economic or environmental harm or harm to human health
Keystone species: A keystone species is a plant or animal that plays a unique and crucial role in the way an ecosystem functions. Without keystone species, the ecosystem would be dramatically different or cease to exist altogether
Lake: A lake is a large body of water that is surrounded by land. The lake is made up of three key elements: lake basin, later water, and substances in the water.
Lake Complex: A group of many different lakes lying close to each other and having similar characteristics
Leach: To remove or remove from by the action of a liquid passing through a substance
Lentic: Pertaining to or living in still water
Marsh/Ghol: An area of low-lying land that is usually saturated with water and is dominated by herbaceous rather than woody plants
Microhabitat: A habitat that is of small or limited extent and which differs in character from some surrounding more extensive habitat
Mulch: Mulch is a layer of material applied to the surface of an area of soil. Its purpose is to conserve moisture or to improve the fertility and health of the soil
Oxbow lake: A crescent-shaped lake formed when a meander of a river or stream is cut off from the main channel
Physicochemical: Relating to physiological chemistry
Pond: A pond is a body of standing water, either natural or artificial, that is usually smaller than a lake.

Primary production: Primary production is the synthesis of new organic material from inorganic molecules such as \( \text{H}_2\text{O} \) and \( \text{CO}_2 \).

Ravine: A small narrow steep-sided valley that is larger than a gully and smaller than a canyon and that is usually worn by running water.

Relocation: To move to or establish in a new place.

Retaliatory killing: Killing, as an act of revenge.

Riverbed: The channel bottom of a stream or river.

Roost: A place where winged animals, especially birds or bats, rest or sleep; the act of doing so.

Sedimentation: The natural process in which material (such as stones and sand) is carried to the bottom of a body of water and forms a solid layer.

Siltation: Siltation is the pollution of water by fine particulate terrestrial clastic material, with a particle size dominated by silt or clay. It refers both to the increased concentration of suspended sediments, and to the increased accumulation (temporary or permanent) of fine sediments on bottoms where they are undesirable.

Succession: The gradual and orderly process of change in an ecosystem brought about by the progressive replacement of one community by another until a stable climax is established.

Swamp: A swamp is any wetland dominated by woody plants.

Vegetation cover: Percentage of ground surface covered by vegetation.

Vulnerable: Susceptible to physical or emotional attack or harm.

Vulnerable species: A vulnerable species is one which has been categorized by the International Union for Conservation of Nature as likely to become endangered unless the circumstances threatening its survival and reproduction improve.

Water augmentation: The transfer of water from one source to another for the purpose of maintaining or raising the water level of a surface water body.

Waterhole: A waterhole is a depression in the ground in which water can collect, especially one that is regularly drunk from by animals.

Wetland: A wetland is a land area that is saturated with water, either permanently or seasonally, such that it takes on the characteristics of a distinct ecosystem.

Yearling: An animal that is one year old or has not completed its second year.
Annexes
Annex - I - Survey Format

Survey of Wetland of Chitwan National Park, 2013

Site ID: Recorder (s): Date:

A. Location and general information
Name of the wetland: GPS of 4 corners Altitude
Accessibility: Distance:
Type of wetland:
History of the wetland:

B. Physical description of the wetland
Total Area Area of open water (%):
Perimeter: Depth:
Inlet (type & no): Outlet (type & no):
Broad habitat type: 1. 2. 3.
Specific habitat type: 1. 2. 3.
Lake condition (Excellent/Good/Fair/Poor):
Wetland management:

C. Major native flora and fauna

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<thead>
<tr>
<th>S.N.</th>
<th>Flora</th>
<th>Emergent/Submerged</th>
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Major Invasive species: 1. 2. 3. 4.

D. Threats (High/Medium/Low/No)
a. Siltation b. Invasive species c. Conversion to grasslands
d. Drying e. Pollution f. Fishing and other extraction
g. Other (specify):

E. Priority actions for wetland restoration (if any)
1. 2.
3. 4.

F. Additional notes about the wetland
## Annex II - The wetland list

<table>
<thead>
<tr>
<th>SN</th>
<th>Name of wetland</th>
<th>Location</th>
<th>Nearest post</th>
<th>Distance (km)</th>
<th>Accessibility</th>
<th>Type of wetland</th>
<th>History of wetland</th>
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### History of wetland
- Permanent lake
- Temporary wet meadow
- Wet meadow, developed as lake by CF
- Permanent wet meadow (oxbow origin)
- Temporary wet meadow (oxbow origin)
- Wet meadow, developed over to CF in 2007 & developed as lake by CF
- Lake
- Permanent lake
- Temporary wet meadow
- Wet meadow, developed after the construction of Khageri irrigation canal
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### Annex III

#### List of recorded Lakes/Ghols in Chitwan National Park and its Buffer Zone

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<td>58</td>
<td>Marchauli marsh *</td>
<td>Bhawanipur</td>
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</table>

* Natural succession has converted the lake into marshy grass vegetation so the area is not shown
# Smaller drain/cannel so the area is not shown
Status of Wetlands and Mugger Crocodile in and around Chitwan National Park

Annex IV

Budget

<table>
<thead>
<tr>
<th>Title</th>
<th>Amount (NRs)</th>
<th>Source</th>
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<tr>
<td>1. Study of Wetlands</td>
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<td>Terai Arc Landscape Program (TAL), Government of Nepal</td>
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<tr>
<td>2. Study of Mugger crocodile</td>
<td>3,00,000</td>
<td>National Park Project, Government of Nepal</td>
</tr>
<tr>
<td>3. Report printing</td>
<td>2,50,000</td>
<td>National Trust for Nature Conservation-Biodiversity Conservation Center (NTNC-BCC)</td>
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The study of wetlands in and around Chitwan National Park was conducted as an annual program of Terai Arc Landscape (TAL) program of Government of Nepal, and the study of population status of Muggur Crocodile in and around CNP was conducted as an annual program of Chitwan National Park.