

## Ramsar Sites

Popularly known as the 'Ramsar Convention', the Convention on Wetlands of International Importance, especially as habitats for waterfowl, is an intergovernmental treaty adopted on 2 February 1971 in the Iranian city of Ramsar on the southern shore of the Caspian Sea. In December 1987, Nepal became the 46<sup>th</sup> Contracting Party to the treaty by depositing Koshitappu Wetland Wildlife Reserve as the 384<sup>th</sup> wetland in the Convention List. The Convention on Wetlands came into force in Nepal on April 17, 1988. The three sites in Nepal designated as Wetlands of International Importance on 13 August 2003 are Beeshazar and Associated Lakes in the buffer zone of Chitwan National Park, the World Heritage site Ghodaghodi Lake area in Kailali district, and Jagadishpur Reservoir in Kapilvastu district. These sites are among the 10 wetland sites in the Terai highlighted in the 2002 Nepal Biodiversity Strategy, and recommended as meriting legal protection.

### Ghodaghodi Tal Ramsar site Background

**Area:** 2,563 ha

Ramsar Site Number 1314, and WDPA

Site code: 901298

#### Location

Main access is 100m north of the east-west highway in ward 5 of Darakhnidi VDC, Kailali district (**Annex 3**)

Kailali district, encompassing three VDCs: Darakhnidi, Ramsikharjhala, and Sandepani

Coordinates

Latitude (North)	Longitude (East)	Altitude (metre)
28° 41' 03"	80° 56' 43"	205

#### Description

The Ghodaghodi Lake area in Western Nepal was declared a Ramsar site in 2003. It consists of a large and shallow oxbow lake system with associated marshes and meadows surrounded by tropical deciduous forest on the lower slopes of the Siwaliks, the youngest mountain range of the Himalayas. There are around 13 associated lakes and ponds, and some streams separated by hillocks situated along the site's periphery.

The forest and wetlands serve as a wildlife corridor between the lowlands and the Siwalik Hills. They support critically endangered species including the Red-crowned roofed turtle (*Kachuga kachuga*), Bengal tiger (*Panthera tigris*), and Three-striped toofed turtle (*Kachuga dhongka*). Vulnerable species include the Smooth-coated otter (*Lutra perspicillata*), common otter (*Lutra lutra*), Swamp deer (*Cervus duvaucelli*), Lesser adjutant stork (*Leptotilos javanicus*), and Marsh crocodile (*Crocodylus palustris*). Endangered plant species include the Orchid (*Aerides odorata*), the religiously important and threatened Lotus (*Nelumbo nucifera*), and rare wild rice (*Hygrohiza aristata*).

The lake is fed by direct precipitation during the monsoon season, and by surface flows from the watershed area, ground water springs, and small streams. Water depth varies from 1-4m. Secchi depth transparency and high phosphor levels indicate that the lake is hypertrophic, nitrogen level eutrophic, and Chlorophyll 'A' level low (due to rich growth of macrophytes) as oligo to mesotrophic. Dissolved oxygen is low with a minimum of 3 to 5 mg/l.

The Lake is an important religious shrine dedicated to the Ghodaghodi deity. The indigenous Tharu community celebrates a traditional festival, 'Agan Panchami', in December with a cleansing dip in this holy lake. The 6,700-strong population within the site, of which 50% are migrants from adjoining hilly areas, are dependent on the lake for traditional fishing and agriculture.

The factors exerting undue pressure on the site's ecology include highway traffic at the southern edge, construction of new unplanned temples in the vicinity, over grazing, poaching and hunting, as well as illegal tree felling and smuggling of Sal (*Shorea robusta*) and Khair (*Acacia catechu*) timber, and natural eutrophication accelerated by human religious and agricultural activities.

The Department of Forests is the principal management authority of the area, and the Kailali District Forest Office manages the area. Local communities and NGOs support the conservation process by forming themselves into and operating user groups. A participatory community-centered management plan has been prepared for the conservation of the Lake area. Community-based anti-poaching operations help reduce poaching in the Lake area.

## Significance

The biological aspects of Ghodaghodi Tal Ramsar site cover species and habitat including ecosystem description, conservation, and management.

### Flora

- Ninety-eight percent (98%) of the area is dense forest and 2% pastureland
- Native aquatic plants adaptable to the unique physiological conditions of the area include the Water primrose (*Ludwigia adscendens*) and Bladderwort (*Utricularia australis*)
- The floating vegetation in the Lake provides an excellent habitat for waterhens and jacanas; the surrounding dense forest for birds of prey including the rare osprey (*Pandion haliaetus*), and kingfisher
- Biogeographically significant as representatives of the Indo Malayan realm are Sal (*Shorea robusta*) and Myrobalan trees (*Terminalia alata*)

- Threatened plant species include the endangered Orchid (*Aerides odorata*), the religiously important and threatened Lotus (*Nelumbo nucifera*), and rare wild rice (*Hygrohiza aristata*)
- The Lake has records of 388 vascular plants: five pteridophytes, 253 dicots, and 130 monocots (**Annex 1.9.17**)

### Fauna

- The fauna consists of lower risk species on the **IUCN Red List** such as the Ferruginous duck (*Aythya nyroca*), Grey-headed fish eagle (*Ichthyophaga ichthyaetus*), and Asiatic rock python (*Python molurus*); other rare species include the lizard (*Varanus flavescens*)
- Records reflect 29 fish species in the area, including the threatened *Puntius chola*, and the locally endemic Asian knifefish (*Notopterus notopterus*), and cold water fish (*Oxygaster bacaila*)
- Around 140 partly migrating bird species representing over 16% of the national avifauna inhabit the area
- Also home to an estimated 1% of the South Asian cotton teal (*Nettapus coromandelianus*) population in Nepal and supports a large population of Marsh mugger crocodiles (*Crocodylus palustris*)
- Bird species symbolic of the area include the Grey hornbill (*Ocyrceros birostris*), Eurasian eagle owl (*Bubo bubo*), Brown fish owl (*Ketupa zeylonensis*), and Osprey (*Pandion haliaetus*)
- The area supports numerous globally threatened species (IUCN 2002) including the critically endangered Red-crowned roofed turtle (*Kachuga kachuga*), Bengal tiger (*Panthera tigris*), leopard (*Panthera pardus*), Three-striped and roof turtle (*Kachuga dhongka*), the vulnerable Smooth-coated otter (*Lutra perpiscillata*), Common otter (*Lutra lutra*), Lesser adjutant stork (*Leptotilos javanicus*), and Marsh crocodile (*Crocodylus palustris*)
- A crucial point in the ecosystem as a waterhole for all kinds of wild life
- Evidence of gharials (*Gavialis gangeticus*) reported in the area (BPP 1995)
- Current checklists include species of 34 mammals, 96 birds, nine herpeto, and 23 fish (**Annex 2.27**)

## Achievements

- Preparation of a participatory community-centered conservation management plan with the joint efforts of IUCN and 'Ghodaghodi Kshetra Samrakshan Tatha Bikas Samiti' (Ghodaghodi Area Conservation and Development Committee)
- Selected as a demonstration site by IUCN-Nepal for research and monitoring
- Proposed as a conservation or bird sanctuary and wildlife reserve
- User groups have been formed through the initiative of local NGOs
- Over 16 community-based organisations are active in area
- Three wetland clubs have been formed in three local schools around Ghodaghodi Lake in 2007: Dasarath Secondary School, Sitakunda Secondary School, and Rastriya School; each club consists of 15 committee members from Grades 5 to 9

## Jagdishpur Reservoir Ramsar site

### Background

**Area** 225 ha

Ramsar site number 1315, and WDPA

Site code: 901299

### Location

10 km south of east-west highway in Ward 9 of Jagdishpur VDC, Kapilvastu district (Annex 3)

Kapilavastu district encompassing one VDC (Jagdishpur VDC)

Coordinates

Latitude (North)	Longitude (East)	Altitude (metre)
27° 35' 00"	83° 05' 00"	197

### Description

Jagdishpur Reservoir was declared a Ramsar site on 13 August 2003, and is also highlighted in the Directory of Asian Wetlands. The reservoir was constructed in the early 1970s over Jakhira Lake and agricultural land for irrigation, and is fed by the Banganga River in the Churia hills catchment area. It is surrounded by cultivated land and a few smaller lakes serving as a buffer zone for bird movement. Reservoir depth varies between 2 and 7m during the summer and winter crop plantation periods, respectively. Silt and nutrients from the inlet are deposited in the reservoir delta; the resulting reed

growth provides a secure habitat for water birds. Secchi disc and phosphorus content indicate that the water is hypertrophic, and the nitrogen concentration eutrophic. Chlorophyll 'A' content of the surface water is low (3-5 mg/l) indicating oligotrophy due to a rich macrophytes growth.

The site provides shelter for an assembly of rare and endangered species of conservation importance, including plants such as the endangered *Serpentina* (*Rauvolfia serpentina*), rare Pondweed (*Potamogeton lucens*), threatened Lotus (*Nelumbo nucifera*), and the endangered tallest flying bird species, the Sarus crane (*Grus antigone*).

Authorities in the Department of Irrigation, Kapilvastu District Office are responsible for the management of the irrigation system. The external forest area is managed by the District Forest Office with the help of the local community. Conservation measures include green belt plantations around the reservoir, maintenance of the water level by a dike and a sluice, as well as construction of an irrigation canal.

Current uses of the reservoir and adjacent areas include fishing, grazing, fuel wood and fodder collection, domestic use of the Reservoir such as for laundry, and harvesting of wetland products. The area is also popular for picnics, swimming, boating, bathing, and other forms of recreation and supplies water for irrigation in 6,200 ha of surrounding cultivated land. The water body has great potential for commercial stocking and production of fish. Surrounding areas are primarily used for farming. The site has been proposed as a designated bird sanctuary.

## Significance

Biological aspects of the Reservoir cover species and habitat, including ecosystem conservation and management.

### Flora

- The vegetation is primarily in a submerged succession stage, with patches of floating species and reed swamp formations; marsh meadows and extensive mudflats constitute the northern part the Lake
- The terrestrial vegetation along the dike is dominated by Sisoo (*Dalbergia sisoo*) and khair (*Acacia catechu*)
- Wetland vegetation consists of Morning glory (*Ipomea carnea* ssp. *fistulosa*), and cattail (*Typha angustifolia*)

- The Reservoir's aquatic vegetation is represented by extensive coverage of floating leaf species, mainly lotus (*Nelumbo nucifera*), followed by wild rice (*Hygrorhiza aristata*), and pondweed (*Potamogeton nodosus*); free floating species include Water velvet (*Azolla imbricata*) and Duckweed (*Lemna* spp.)
- Abundant submerged species include the water nymph (*Naja minor*), hydrilla (*Hydrilla verticillata*), and hornwort (*Ceratophyllum demersum*)
- Records of 16 vascular plants in the area: one pteridophyte, seven dicots, and eight monocots (**Annex 1.9.18**)

#### Fauna

- Twenty-five fish species belonging to 12 families and seven orders including the lowland Terai endemics such as *Notopterus notopterus* and *Oxygaster bacaila*, threatened species such as the *Puntius chola* as well as common species are recorded, and are prey to waders and waterbirds
- Records of 45 species of birds from the Reservoir and surroundings, including from the smaller lakes, such as Sagarhawa and Niglihawa, that serve as a buffer zone for bird movements
- The site provides vital resident, wintering, and stopover habitats for waders, other waterbirds, and small passerines; noteworthy species are Grebes (*Podiceps cristatus*, *Tachybaptus ruficollis*), cormorants (*Phalacrocorax carbo*, *Phalacrocorax niger*), herons (*Ardea* species), and egrets including the rare bittern *Ixobrychus cinensis*, storks (*Ciconia* species), ducks (*Aythya* species), and geese, terns and gulls, birds of prey; rails, coot and waterhens, Jacanas, as well as cranes and kingfishers
- Resident stork species (*Anastomus oscitans* and *Ciconia episcopus*) are recommended for protection because of their susceptibility to endangerment through impacts of human activities
- Because of its position surrounded by cultivated land and its moderate size, the site is not suitable for large mammal conservation; the area does, however have immense potential to support a small population of Smooth-coated otter (*Lutrogale perspicillata*), and other common species such as the Jungle cat (*Felis chaus*), Golden jackal (*Canis aureus*), and Indian fox (*Vulpes bengalensis*)

- Nine species of reptiles are presumed to be residents in the area; the Marsh mugger (*Crocodylus palustris*) is nonresident, entering the reservoir only during the monsoon
- The site is visited by a large number of wintering and staging waterfowls and provides excellent foraging habitat for both resident and migratory bird species
- Bird species symbolic of the area are the Falcated duck, Mallard, Tufted duck, and Red-crested pochard
- Current checklists include six mammal, 45 bird, nine herpeto and 18 fish species (**Annex 2.28**)

#### Achievements

- Sustainable wetland management strategy for wildlife and humans evaluated and approved by the Ramsar Small Grants Fund for Wetland Conservation and Wise Use in 2006 ([http://www.ramsar.org/sgf/key\\_sgf06.htm](http://www.ramsar.org/sgf/key_sgf06.htm))

### Beeshazar and Associated Lakes Ramsar site

#### Background

**Area:** 3200 ha

Ramsar site number 1313, and WDPA

Site code: 901297

#### Location

8 km south from Tikauli on the east-west highway in Gitanagar VDC (**Annex 3**)

Chitwan district encompassing two municipalities, Bharatpur and Ratnanagar, and two VDCs, Gitanagar and Bachhauli

#### Coordinates

Latitude (North)	Longitude (East)	Altitude (metre)
27° 37' 05"	84° 26' 11"	286

#### Description

Beeshazar and Associated Lakes, also known as Bishazari Tal, was declared a Ramsar site on 13 August 2003. It forms an extensive, typical oxbow lake system of the tropical Inner Terai area in Central Nepal within the buffer zone of the Chitwan National Park, a World Heritage site. Water is received from direct precipitation during the monsoon and through inflow from the Khageri irrigation canal. Lake water is supplied through the canal and the stream during the dry season. The catchment area of the Lake helps control flooding in the Khageri River, and recharges the ground water and streams.



Situated between the Mahabharat mountain range to the north and the Siwalik range to the south, this forested wetland provides excellent habitat as a waterhole and corridor for numerous endangered wildlife species that include the critically endangered White-rumped vulture (*Gyps bengalensis*), Bengal tiger (*Panthera tigris*), one-horned rhinoceros (*Rhinoceros unicornis*), and gharial (*Gavialis gangeticus*); and the vulnerable Smooth-coated otter (*Lutra perspicillata*), Sloth bear (*Melampus ursinus*), Marsh crocodile (*Crocodylus palustris*), Lesser adjutant stork (*Leptotilos javanicus*), Ferruginous duck (*Aythya nyroca*), and Band-tailed fish eagle (*Haileetus leucoryphus*).

The lake bed is situated on laterite soil. Its oligotrophic state is indicated by the low content of Chlorophyll 'A' due to the rich growth of macrophytes; this prevents the penetration of sunlight needed for photosynthesis. However, with respect to nutrient content and Sechi depth, and based on a one-time analysis during the summer season the Lake is considered to be eutrophic to hypertrophic.

The surrounding forest area is home to an estimated 100,000 people who farm and fish in the lake and surrounding areas through a grant of annual fishing contracts. A buffer zone management committee has been formed for participatory management of the area. Local NGOs, the Nepal Army, and volunteers have periodically removed invasive weeds such as water hyacinth and water chestnut manually from the water body.

## Significance

Biological aspects cover species and habitat, including ecosystem description, conservation, and management.

### Flora

- Land use patterns in the total wetlands site area include 30% open forests, 40% dense forests, 15% grass lands, and 15% pasturelands
- Sal dominated forests exist in the surrounding areas of the lake; prominent associated species include the Myrobalan (*Terminalia alata*), Silk cotton (*Bombax ceiba*), and Bot dhainyaro (*Lagerstroemia parviflora*)

- Wetland vegetation of the area includes sedge (*Cyperus* spp.), Common reed (*Phragmites karka*), and Morning glory (*Ipomea carnea* ssp. *fistulosa*)
- The aquatic vegetation is represented by extensive coverage of floating leafed species, primarily water hyacinth (*Eichhornia crassipes*), water chestnut (*Trapa quadrispinosa*), and Evening primrose (*Ludwigia adscendens*)
- Free floating species include the Water velvet (*Azolla imbricate*) and duckweed (*Lemna* spp.)
- Abundant submerged species include the Hornwort (*Ceratophyllum demersum*), Hydrilla (*Hydrilla verticillata*), and water nymph (*Najas minor*)
- The area records 37 vascular plants: one pteridophyte, 26 dicots, and 10 monocots (Annex 1.9.19)

### Fauna

- The area records 21 species of mammals, of which four are considered threatened, and one is protected
- An important waterhole for wildlife species such as the tiger, rhinoceros (*Rhinoceros unicornis*), among others
- Thirteen species of reptiles are assumed to be in the area, including two endangered species
- Records of 273 bird species of 61 families, of which 60 are wetland species
- Bird species include the Grey heron (*Ardea cinerea*), Large cormorant (*Phalacrocorax carbo*), Darter (*Anhinga melanogaster*), Stork-billed kingfisher (*Halcyon capensis*), Ferruginous duck (*Aythya nyroca*), Painted



U R Bhuju

Beeshazar Tal, Chitwan

stork (*Mycteria leucocephala*), Black-necked stork (*Ephippiorhynchus asiaticus*), Indian black vulture (*Sarcogyps calvus*), Black vulture (*Aegypius monachus*), Grey-headed fishing eagle (*Ichthyophaga ichthyaetus*), Black-bellied tern (*Sterna acuticauda*), and Great hornbill (*Buceros bicornis*)

- Records of 17 fish species in Beeshazar include the threatened *Puntius chola*, and the endemic Asian knifefish, and Common water fish (*Oxygaster bacaila*)
- The site supports an estimated 20 Marsh crocodiles (*Crocodylus palustris*), the largest number of these animals in a single group in Nepal
- Tikauli forest serves as a critical corridor and refuge for wildlife migrations from the Churia to the Mahabharat foothills
- Current checklists include 26 mammal, 271 bird, 18 herpeto and 25 fish species (**Annex 2.29**)

### Achievements

- Included in the buffer zone of Chitwan National Park in 1996
- Selected as a priority learning site for the Protected Areas Learning Network (PALNet) promoted by DNPWC, IUCN, WWF and other conservation organisations
- Local conservation organisations have mobilised significant numbers of the labour force in the area to remove aquatic weeds such as *Eichhornia crassipes*, *Trapa quadrispinosa*, and *Cyperus* species in 2004 and 2005
- Highlighted in the current Management Plan of Chitwan National Park and Buffer Zone (2006-2010)

## Koshitappu Wildlife Reserve Ramsar site

### Background

**Area** 17,500 ha

Ramsar site number 380 WDPA

Site code: 14196

### Location

2.5 km north from Jamuha on the east-west highway (east of the Sapta Koshi barrage); the headquarters of the Ramsar site is located at at Kusaha of Sunsari district (**Annex 3**)

Sunsari, Saptari, and Udaypur districts, with 16 VDCs in the buffer zone (DNPWC 2002b)

### Coordinates

Latitude (North)	Longitude (East)	Altitude (metre)
26° 33' 00" – 26° 42' 00"	86° 54' 36" – 87° 03' 36"	75-81

### Description

The Koshitappu Wildlife Reserve was designated as a Ramsar site on 17 December 1987. The Reserve is a section of the Sapta Kosi River and floodplain, of extensive mudflats, reed beds, and freshwater marshes. It is rectangular and formed by the Koshi barrage near Nepal-India border on the east-west highway.

An important staging area for water birds, the site supports several species of notable birds including the Large adjutant stork (*Leptoptilos dubius*), Pallas's fish eagle (*Haliaeetus leucoryphus*), Common golden-eye (*Bucephala clangula*) and Gull-billed tern (*Gelochelidon nilotica*). Notable mammals such as the wild water buffalo (*Bubalus arnee*), and the Gangetic dolphin (*Platanista gangetica*) inhabit the Reserve. Located in a densely populated area, the site is subjected to severe livestock grazing, and attempts by local communities to re-establish their roots in the reserve. Land use in the surrounding areas includes subsistence fishing and rice cultivation.

A buffer zone management committee has been formed with user committees and user groups from 10,693 households following the designation of buffer zone areas in 2004. A management plan has been prepared for Koshitappu Wildlife Reserve, and the buffer zone authorisation process is underway.



Rat snakes (*Elaphe obsoleta*) mating, Koshitappu Wildlife Reserve

R N Suwal

## Other priority wetland sites

Wetland sites account for only 5% of Nepal's total surface area, but contain biodiversity of immense global significance. In 1998, IUCN Nepal prepared a list of 163 wetlands of Nepal based on surveys conducted between 1993 and 1996 as well as upon secondary sources (Table 28).

Table 28. Distribution of Wetlands by Development Regions						
Wetland	FDR	MDR	WDR	CDR	EDR	Total
Lakes	40	5	17	13	3	78
Marshes	2	1	3	7	-	13
Swamps	5	-	-	-	-	5
Floodplains	15	6	10	12	10	53
Reservoirs	-	-	3	2	1	6
Canals	-	-	1	3	4	8
Total	62	12	34	37	18	163
Source: National Wetland Database, IUCN Nepal as cited in Bhandari, B. (compiled) 1998						

## Terai wetlands

The BPP in 1995 recorded that 36 of the 51 wetlands in the Terai are biologically significant, and that 10 specific sites merit legal protection. The **2002 Nepal Biodiversity Strategy** also highlighted the 10 sites meriting legal protection. Of the 10 priority wetland sites, three were designated as Ramsar sites in 2003. The remaining seven sites are Bedkot Tal, Padereni Tal, Deukhuria Tal, Rampur Tal, Nakhrodi Tal, Badhaiya Tal and Gaundahawa Tal. Details of these sites follow.

### Bedkot Tal

**Area** 5 ha

**Location**

Chhela Bagon Ward 5 of Daiji VDC,  
23 km north of Mahendranagar,  
Kanchanpur

**Coordinates**

Latitude (North)	Longitude (East)	Altitude (metre)
29° 01' 26"	80° 19' 05"	407

### Background

Bedkot Tal is a small (approximately 10m deep) freshwater lake. Before the construction of the East-West Highway, Bedkot was an important exit point to India for Nepali hill people. It is a scenic lake of exceptional genetic and ecological diversity and is situated on a hilltop in the middle of a dense Sal forest.

## Significance

### Flora

Lake vegetation is rich in plant species. The Lake is situated in the Churia/Siwalik mountain range surrounded by dense Sal forests covered by heavy growth of lianas, and dense undergrowth beneath the heavy forest canopy. Lake vegetation includes duck weeds and pond weeds *Lemna minor*, *Wolffia globosa*, and *Spirodela polyrhiza* of the free floating community; aquatic grasses and pond weeds, *Vallisneria natans*, *Zannichellia palustris*, *Hydrilla verticillata*, *Potamogeton* spp. and *Ottelia alismoides* of the submergent community; *Nymphaea stellata* and *Potamogeton* spp. of the rooted floating community; *Typha angustifolia* and *Acorus calamus* of the emergent community and *Colocasia falax*, *Ranunculus* species, *Crinum amoenum* of the surrounding marsh community. A few *Salix tetrasperma* trees are found on the Lake's northern marshy shore.

### Fauna

The surrounding forests are renown for their rich mammalian fauna, with 21 species recorded to date, including threatened species such as the Dhole (*Cuon alpinus*), a species of wild dogs; sloth bear (*Ursus ursinus*), the Asiatic black bear (*Ursus thibetanus*), Bengal fox (*Vulpes benghalensis*), and Himalayan ghoral (*Naemoredus sumatranensis*). Mammals especially dependent on wetlands are the wild ungulates: Axis deer (*Axis axis*), the Indian sambar (*Cervus unicolor*), Barking deer (*Muntias muntjak*), and predators including the tiger. The Lake is of minimal importance as a resident, staging, or wintering area for waterfowl. Of the recorded species, the goose (*Tachybaptus ruficollis*) and Black stork (*Ciconia nigra*) are noteworthy. The Lake is rich in herpetofauna, and is also thought to support a population of marsh crocodiles (*Crocodylus palustris*); two dead specimens have been collected in the past. Three species of fresh-water turtle have also been recorded.

### Padereni Tal

**Area** 15 ha

**Location**

Bani, Ward 2 of Krishnapur VDC,  
Kanchanpur district, 11 km west of Atariya

## Coordinates

Latitude (North)	Longitude (East)	Altitude (metre)
28° 51' 09"	80° 25' 32"	205

**Background**

Padereni Tal is a large, shallow eutrophic oxbow lake (1-3m deep) formed by the Donda River. It is surrounded with *Syzigium* forests and supports a small number of resident and migratory waterfowl.

**Significance****Flora**

The Lake's vegetation is not rich in species diversity, but is densely covered with free floating *Azolla imbricata* and *Pistia stratiotes*, and submerged plants *Hydrilla verticillata* and *Nymphaeoides indica*. Emergent plants are rich with marsh species such as *Schoenoplectus* spp, *Cyperus diffusus*, *Typha angustifolia*, *Oedogonium cardiacum* and *Spirogyra affinis*. The marsh community is represented by patches of Narrow leaf cattail (*Typha angustifolia*) and water vines, and knot-weed (*Polygonum*) species. The Lake is set in an area of dense Sal and moist *Syzigium* forest with thick lianas and dense undergrowth. Diversity is maintained by a large reed bed covered island (*Phragmites karka*), tall grasses (*Saccharum spontaneum*), and *Salix tetrasperma* trees.

**Fauna**

The Lake is a wintering area for sizeable numbers of various species of waterfowl and provides a staging area for many species during migration. Resident bird species include egrets *Bubulcus ibis*, *Egretta alba*, *Pseudibis papillosa*, *Ardea purpurea*, *Nettapus coromandelianus*, and *Francolinus pondicerianus*. Passage migrants and winter visitors include the *Anas penelope*, *A. crecca* and *Vanellus vanellus*. Regular visitors include the *Leptoptilus javanicus* and *Ciconia episcopus*. The wetland has a sizeable 20 ha area of grassland which provides excellent habitat for *Houbaropsis bengalensis*, *Syphotidus indica* and other grassland birds. The Lake is known to support a population of marsh crocodiles (status unknown), Monitor lizards, and pythons.

**Deukhuria Tal**

**Area** 22 ha

**Location**

Ward 7 of Dhangadi municipality area in Kailali district

## Coordinates

Latitude (North)	Longitude (East)	Altitudes (metre)
28° 42' 38"	80° 37' 32"	140

**Background**

Deukhuria Tal is a large, 1.5m shallow, eutrophic rainfed lake set in a scenic environment, a particularly good example of an oxbow ecosystem supporting an appreciable assemblage of the rare Knob-billed duck (*Sarkidiornis melanotos*), and vulnerable and endangered wildlife species.

**Significance****Flora**

Lake vegetation is not particularly rich in plant species, and is surrounded by degraded Sal forests associated with *Mallotus philippensis*, *Terminalia alata*, and *T. bellirica* on its southern side, and moist mixed *Syzigium* forest (*Syzigium cumini*, *S.jambos*, *Adina cordifolia*) on its eastern side. The Lake has some free floating plant species (*Eichornia crassipes* and *Azolla imbricata*), and submerged species like *Ceratophyllum demersum*, *Chara fragilis*, and *Hydrilla verticillata* at its margins. Emergent and marsh communities are represented by a few species of native plants that thrive in wetlands including the *Schoenoplectus mucronatus* (bog bulrush) and *Ranunculus* (Buttercups, spear worts). The surrounding forest floor and meadows comprise wetland grasses such as *Chrysopogon aciculatus*, *Cynodon dactylon*, and *Vetiveria zizanioides*. Some of the areas are cultivated.

**Fauna**

The Lake is a wintering area for sizeable numbers of numerous species of waterfowl, and provides a regular staging area for many species during migration. Resident species include the knob-billed duck (*Sarkidiornis melanotos*), Indian pond heron (*Ardeola grayii*), Little egret (*Egretta garzetta*), Bronze-winged Jacana (*Metopidius indicus*) and pheasant-tailed Tacana (*Hydrophasianus chirurgus*). Passage migrants and winter visitors include the Sea Kayak (*Anas acuta*) and a number of shorebirds. Seven species of fish have been recorded.

**Rampur Tal**

**Area** 22 ha

**Location**

7 km. south of East-West Highway in Ward 9 of Urma VDC, Kailali District.



## Coordinates

Latitude (North)	Longitude (East)	Altitude (metre)
28° 44' 41"	80° 42' 34"	160

## Background

Rampur Tal is a 0-3m shallow, eutrophic oxbow lake. The water level decreases significantly in the Lake during March and April. The site is a medium-sized complex of oxbow lakes set in a scenic environment surrounded by dense Sal forests along most of the lake shoreline.

## Significance

### Flora

Lake vegetation is medium in species diversity, and is set in an area of dense Sal forests. Associated with Sal are tree species such as the Kamala tree (*Mallotus philippensis*), 'Kadamba' in Hindi (*Adina cordifolia*), Beleric (*Terminalia bellirica*), 'Jamun' (*Syzygium cumini*), and *Terminalia alata* (common timber). The Lake is dominated by the rooted floating lotus varieties such as *Nelumbo nucifera*, *Nymphaea stellata*, *Ludwigia adscendens*; and the free floating *Trapa quadrispinosa*, *Pistia stratiotes*, *Azolla imbricate*, and *Spirodela polyrhiza*. It is also rich in submerged plants such as the *Hydrilla verticillata*, *Ceratophyllum demersum* and *Chara fragilis*. The emergent and marsh communities are represented by the *Schoenoplectus mucronatus*, *Ranunculus* species and *Isachne milliacea* species. The surrounding vegetation is rich in reed and other grass species.

### Fauna

The Lake is a wintering and staging area for a number of species of waterfowl. Resident species include the Great white egret (*Egretta alba*), *E. intermedia*, Bronze winged Jacana, and pheasant-tailed Tacana. Passage migrants and winter visitors include *Falco severus*. Seven species of fish have been recorded in the area.

## Nakhrodi Tal

Area 70 ha

### Location

5 km north of the east-west highway, in Ward 8 of Sandepani VDC, Kailali district.

## Coordinates

Latitude (North)	Longitude (East)	Altitude (metre)
28° 42' 06"	80° 57' 33"	205

## Background

Nakhrodi Tal is a large, 10m deep, eutrophic oxbow lake with an island in the middle. The Lake is surrounded by dense Sal forests, is fed by precipitation, a few springs, and inflow from Kauwa Khola canal. Average outflow discharge from the lake was estimated to be 50<sup>th</sup> l/s (3 February 1995). The lake is located some 600 metres north-east of Ghodaghodi Tal and is within the Ghodaghodi lake system cluster.

## Significance

### Flora

An oxbow lake surrounded by dry Sal forests with spiny shrubs (*Gardenia turgida*, *G. campanulata*, *Zizyphus rugosa*) representing the lower canopy level, lake vegetation is rich and dominated by *Azolla imbricate* and *Pistia stratiotes* as the Lake's free floating plant community; *Potamogeton* spp. and *Hydrilla verticillata* as submergent plant community; *Potamogeton nodosus*, *Nymphaea stellata* and *Nymphoides indica* as rooted floating community; and *Oryza rufipogon*, *Phragmites karka*, *Corchorus olitorius*, and *Aechmanthera gossypina* as the marsh community. Patches of *Salix tetrasperma* thickets are found on the northern banks of the Lake.

### Fauna

The wetland and surrounding forests are renowned for their rich mammalian fauna. Twenty-one species of mammals have been recorded in the Lake, including threatened species such as the dhole (*Cuon alpinus*), sloth bear (*Ursus ursinus*), otter (*Lutra perspicillata*, *Aonyx cinera*), and Asiatic elephant (*Elephas maximus*). Mammals present in the river especially dependent on the wetland include various wild ungulates and their predators, such as the tiger. The Lake is a wintering area for sizeable numbers of various species of waterfowl and provides a staging area for many species during migration. Resident bird species include the Indian pond heron (*Ardeola grayii*), Great white egret, and heron (*Ardea purpurea*). Passage migrants and winter visitors include swans, ducks, ducks teal (*Anas crecca*).

The Lake is rich in herpetofauna, with 12 recorded species. Incidence of crocodiles (*Crocodylus palustris* and *Gavialis gangeticus*) is presumed but has not been confirmed. Three species of fresh-water turtles have been recorded, as well as the endangered *Python*

*molurus* and monitor lizard. There is evidence of 20 species of fish including the riverine species, *Glossogobius giurus*.

### Badhaiya Tal

**Area** 105 ha

**Location**

Wards 1 and 3 of Soraka VDC of Bardia district

**Coordinates**

Latitude (North)	Longitude (East)	Altitude (metre)
28° 12' 08"	81° 30' 35"	197

### Background

Badhaiya Tal is a shallow, eutrophic rainfed lake that reaches maximum depths of 4m. The Lake is surrounded by rice fields on all sides. It is a large marshy natural depression supporting a large number of resident and wintering populations of several species of waterfowl.

### Significance

**Flora**

Lake vegetation is abundant in diverse rooted floating plants such as the lotus (*Nelumbo*), algae and yellow-green algae (*Spirogyra*, and *Vaucheria*), water primroses (*Ludwigia*), water fern (*Marsilea*), water vine (*Ipomea*), and water lily (*Nymphaea*), and marsh vegetation of weeds (*Persicaris*, *Oryza*, *Ranunculus*, and *Ipomoea*), but have limited free floating plants such as the *Pistia stratiotes* and *Azolla imbricata*; and the submerged *Chara fragilis* and emergent *Colocasia falax*. Adjacent terrestrial vegetation consisting of various meadow species such as the *Lippia nodiflora* (mud grass), *Rumex nepalensis* (broad-leafed dock), and occasional clumps of tall grasses (*Vetiveria zizanioides*, *Saccharum spontaneum*, and *Themeda arundinacea*).

**Fauna**

The Lake supports a small population of otters and a number of wild ungulates including the Spotted deer, and Indian Sambar or Sambar deer (*Cervus unicolor*) that use the lake as a waterhole. A large variety of waterfowl visit the lake, which offers an excellent foraging habitat for both resident and migratory species. Resident species include the Grey Heron (*Ardea cinerea*), Great white egret, rare birds *E. intermedia*, *E. garzetta*, and the Asian bill stork (*Anastomus*

*oscitans*). Passage migrants and winter visitors include ducks, geese, swans (*Tadorna ferruginea*), the Eurasian widgeon (*Anas Penelope*), Gadwall (*A. strepera*), a common North American duck; pintail duck (*A. acuta*), Northern shoveler duck (*A. clypeata*), Temminck's Stint (*Calidris temminckii*), a Eurasian-African migratory bird; the Great snipe (*Gallinago gallinago*), pintail snipe (*G. stenura*), Black-tailed Godwit (*Limosa limosa*), the Common redshank (*Tringa tetanus*), marsh sandpiper (*T. stagnatilis*) and wood sandpiper (*T. glareola*). Regular visitors are the Painted stork (*Mycteria leucocephala*), Woolly-necked stork (*Ciconia episcopus*), Common spoon bill (*Platalea leucorodia*), Osprey (*Pandion haliaetus*), and Sarus crane (*Grus antigone*). The Red-necked falcon (*Falco chicquera*) has been sighted and thought to breed in the area. The site is rich in herpetofauna and fish. Eight species of reptile have been reported by the local community, including the protected Monitor lizard. Seven species of fish have also been recorded in the Lake.

### Conservation measures required

A concrete dam around the Lake is needed to regulate the outflow from the seven off-takes that irrigate surrounding agricultural land. This embankment should be raised around the Lake to maintain adequate water levels in order to retain water for fisheries, irrigation, and for the enhancement of the habitat for water birds. Afforestation along some banks may reduce the impact of intrusion into this habitat.

### Gaindahawa Tal

**Area** 50 ha

**Location**

Ward 1 of Bishnupura VDC of Rupandehi district

**Coordinates**

Latitude (North)	Longitude (East)	Altitude (metre)
27° 35' 39"	83° 16' 53"	200

### Background

Gaindahawa Tal is a shallow (1-4m deep) rain fed ox-bow lake. The Lake's sources of water are an artesian well and surface discharge from the forest. During the rainy season, the Lake's water level is regulated through an irrigation intake structure. Dense forest to the west and

north, private land to the east, and forest areas and settlements to the south surround the Lake.

In 1998/99 IUCN supported the development of a conservation plan for Gairdaha Lake.

## Significance

### Flora

A number of free floating weed, grass and plant species (*Eichornia crassipes*, *Azolla imbricata*, *Pistia stratiotes* and *Spirodela polyrrhiza*), with submergent species (*Ceratophyllum demersum*, *Alisma plantago - aquatica*, *Ottelia alismoides*), rooted floating species (*Nymphaea*, *Nelumbo*, *Marsilea*, *Ipomoea* and *Ludwigia*), and emergent species (*Ipomoea*, *Carex*, *Schoenoplectus*) comprise the Lake vegetation. The marsh and terrestrial vegetation towards the embankment is dominated by Mother herbs *Vetiveria zizanioides*, *Trema* sp, *Xanthium strumarium*, *Ipomoea carnea*, *Scoraria dulcis*, and *Alternanthera sessilis*.

### Fauna

The wetland is an important waterhole for the remnant population of Blue bulls (*Boselaphus tragocamelus*). The ox-bow lake, marshes, adjacent rice fields, and forests support small resident and wintering populations of several species of waterfowl including several egret, heron (*Nettapus coromandelianus*, Sarus crane (*Grus antigone*) and shorebird species. Underwood (1989, p.516) observed 57 *Mycteria leucephala* species (Little blue heron), 20 *Platalea leucorodia* (the Common spoonbill) and 20 *Sarkidiornis melanotos* (Knob-billed duck) in January 1980. The Lake is rich in herpetofauna and fish. Incidence of 10 species of reptile including the endangered Monitor lizard is presumed. Surveillance of the Indian-eyed turtle (*Morenia petersi*) by the BPP team here in January 1995 is the first recorded sighting in Nepal.

### Conservation measures required

The local community welcomes the implementation of management schemes to improve the Lake's ecosystem. Local people claim that the hunting of birds is still prevalent. Forest clearance is causing erosion and siltation. Enhancement of the lake area and its environment by improving the regeneration of the forest and limiting the depletion of aquatic vegetation would attract birdwatchers of the Sarus crane (*Grus antigone*)

in particular, to this site. The Lumbini Development Trust has expressed interest in developing the site for conservation and recreation. A study is recommended to assess related potential for tourism.

## High-Altitude Wetlands

In 2005, DNPWC and WWF Nepal Program prepared a fact sheet of eight wetland sites including four Ramsar sites. The other four priority sites are from the high altitude region, and located within protected areas. They are the following.

### Rara Lake

Area 1061 ha

Location Rara National Park

Coordinates

Latitude (North)	Longitude (East)	Altitude (metre)
29° 31' 25" – 29° 32' 47"	82° 04' – 82° 07' 30"	2,990

### Background

Rara Lake is the largest fresh water lake in Nepal (5.1 km in length, 2.7 km wide, 167m in depth, 140 km in shoreline) and is a unique and rare example of natural wetlands in the high Himalayan biogeographic region. The Lake is rich in nutrient content and transports 1.039km<sup>3</sup> of water.

The water has coliforms, which indicates it cannot be used as drinking water without treatment. Suspended solids are higher in the outlet area (263 mg/l) compared to the lake body (<1.0 mg/l), but still substantially lower than the WHO benchmark of 1000 mg/l.

The Thakur Baba Temple is located 500m upwards near the Lake's south-east corner and is linked to a local myth about the Gods shooting an arrow to discharge the Lake's water to reduce potential damage by overflowing. The local community depends minimally on the lake for daily livelihood. The tourism base of the social economy, however, is dependent on the wetlands. Rara has not received more than 200 tourists in any given year and visitors have been on the decline since 1995.

Major threats to the wetland include:

- Overgrazing and erosion
- Unsustainable harvesting of resources including NTFPs
- Pollution due to sedimentation from adjacent hills, discharge of domestic sewage and solid waste, and uncontrolled wallowing of domestic cattle

Rara Lake is situated within the Rara National Park which is managed by the Department of National Parks and Wildlife Conservation. The Lake's buffer zone was declared in 2006. The Nepal Army has been deployed for conservation and protection activities within the Park. The area fulfills the criteria and vision of Ramsar 2006-2008.

## Significance

### Flora

- Lake margin is surrounded by reeds (*Phragmites*), bushes (*Juncus*), and sedges (*Fimbristylis*)
- Phytoplanktonic algae and aquatic plants are present in the Lake
- Leathery leaves of *Polygonum* form oily floating layers, and sessile plants (*Myriophyllum*) cover the Lake's shallow areas
- Potential endemic species in the catchments are the *Meconopsis regia* (yellow and orange Himalayan poppy), *Primula poluninii* (terrestrial,) and *Cirsium flavisquamatum* (aquatic)
- Based on availability and field assessment, the following Himalayan herbs, *Dactylorhiza hatagirea*, *Nardostachys grandiflora*, and *Neopicrorhiza scrophulariflora* were found to be the most threatened species in the area

### Fauna

- Zooplankton is relatively high in Rara Lake ( $1.62 \times 10^5$  ind/m<sup>3</sup>), which has the potential to support a moderate fish population
- Some groups of zooplankton recorded are the Chironomid larvae, aquatic insects (*Diaptomidae*), and mollusks; the Lake has a rich invertebrate aquatic fauna, predaceous water beetle (*Dytiscid*), mayfly (*Ephemeroptera*) and caddis fly larvae. Watershrimp (*Gammarus* sp.), Lumbricolid worms, snail (*Limnea* and *Planorbis*), and ram's horn (*Planorbis*) are abundant and serve as food for the snow trout and migratory wildfowl

- Of the 235 bird species recorded in the Lake, 49 species are wetland birds; most are migratory
- Of them, the Ruddy shelduck (*Tadorna ferruginea*) is said to breed in Rara Lake
- Coots (*Fulica atra*) are plentiful in the Lake, and several stay throughout the year
- Resident wetland birds such as the Eurasian woodcock (*Scolopax rusticola*), Brown dipper (*Cinclus pallasii*), Little grebe (*Tachybaptus ruficollis*) and Wood snipe (*Gallinago nemoricola*) have been recorded
- The great-crested Grebe (*Podiceps cristatus*) and Black-necked grebe (*Podiceps nigricollis*) are winter visitors presumed to be residing throughout the year round in the Lake
- The common kingfisher (*Alcedo atthis alcedinidae*), crested kingfisher (*Megaceryle lugubris*), Black-crowned night heron (*Nycticorax nycticorax*), and Great cormorant (*Phalacrocorax carbo*) are summer visitors presumed to breed in the Lake
- It is the habitat and resting site of winter visitor water birds such as the Gadwall (*Anis strepera*), Mallard (*Anas platyrhynchos*), Northern shoveler (*Anas clypeata*), common teal (*Anas crecca*), Tufted duck, common Goldeneye (*Bucephala clangula*), common merganser (a large-sized duck), common coot (*Fulica atra*), and Solitary snipe (*Gallinago solitaria solitaria*)
- Fifty Tufted ducks, 200 common coots, 85 great crested grebes, and 15 Black-necked grebes (Scott 1989), 232 representatives of five species of wetland birds were recorded in the Asian waterfowl census 1994
- The globally threatened cheer pheasant (*Catreus wallichii*) is found in the catchment area (Salleri, Lamichur, Bamichur and Rara) in the southern slope of mixed grassland, shrubs, and scattered trees
- Other globally threatened birds such as the Wood snipe (*Gallinago nemoricola*) is thought to be resident in the Lake with status Rare (5% chance-Giri 2005)
- Three endemic species of snow trout (*Schizothorax macroptthalmus*, *S. nepalensis*, *S. raraensis*) are reported in the Lake
- The endemic frog *Paa rarica* is also found in abundance here; the Smooth otter (*Lutra perspicillata*) is the most represented mammal in the Lake
- Other endangered mammals in the catchment area are the Musk deer, Red panda, and Himalayan black bear; Snow



leopards sometimes pass through the upper part of the catchment area through Chuchemara peak

### Phoksundo Wetland Series

**Area** 494 ha

**Location**

Shey Phoksundo National Park

**Coordinates**

Latitude (North)	Longitude (East)	Altitude (metre)
29° 10' 00" – 29° 15' 00"	82° 55' 00" – 83° 00' 00"	3611.5

### Background

The Phoksundo Wetland Series is a y-shaped alpine fresh water oligotrophic lake, 5.15 km in length and 800m in breadth. The water volume is 409 million m<sup>3</sup>, and discharge is 3.715 m<sup>3</sup>/sec. The Lake drains into Phoksundo River in the south, serving as a freshwater source for the people in the downstream settlements. Sources include several streams including the Sagar, Phoksundo, Chisa, Baulaha, Dekhutaichu, Jagatilumba, and Chollapu.

There are more than 20 'Chortens' (stupas) in the southern belt, and one gomba in the eastern side of the Lake where annual prayers and worship are carried out. Traditional Tibetan culture prevails in upper Dolpo; Buddhism and an ancient Tibetan religion called Bon-Po are prevalent in lower Dolpo, including Ringmo (Tsho) village.

User committees and groups have been formed under the buffer zone program. Amchi groups have been formed to regulate (Tibetan healing) farming, conservation and sustainable use of NTFPs. Local people manage camping sites and home-stay tourism.

### Significance

#### Flora

- About 155 species of flowering plants are found in the catchment
- Threatened species per the IUCN category are the *Neopicrorhiza scrophulariifolia* (VU), *Dactylorhiza hatagirea* *Dioscorea deltoidea* (CT), *Aconitum spicatum* (VU), *Nardostachys grandiflora* (VU), *Podophyllum hexandrum* (VU) and *Megacarpa polyandra* (VU); most of the species are endemic and local only to

Nepal or the Himalayan region and have no equivalent English common names

#### Fauna

- Wetland birds found in the Lake include the Red-crested pochard (*Rhodonessa rufina*), and Ruddy shelduck (*Tadorna ferruginea*)
- Other wetland birds recorded downstream are the Common moorhen (*Gallinula chloropus*), Common coot (*Fulica atra*), Eurasian wigeon (*Anas Penelope*), and Bar-headed goose (*Anser indicus*)
- Other birds dependent on the Lake's water include the Brown dipper (*Cinclus pallasii*), White-throated dipper (*Cinclus cinclus*), and White-throated redstart (*Phoenicurus schisticeps*)
- The catchment is the winter habitat of the snow leopard and musk deer

### Gosainkunda Wetland Series

**Area** 13.80 ha

**Location**

Langtang National Park

**Coordinates**

Latitude (North)	Longitude (East)	Altitude (metre)
28° 05' 00"	85° 24' 58"	4000 - 4700

### Background

Gosainkunda, with its direct reference to saints and wetlands, is an alpine freshwater oligotrophic lake series with alpine meadows, bogs, lakes/ponds, streams, and wet steep slopes creating a unique and representative wetland of high religious significance in the high Himalayan Palearctic biogeographical region. It is one of the world's highest freshwater lake systems, is an important source of water for the Trisuli River that generates 20MW electricity (from two power houses at Trishuli and Devighat). The water volume is 1.472 million m<sup>3</sup>, and discharge at outlet is 60 l/s; the inlet discharge is 35 l/s.

Hindu mythology attributes Gosainkunda as the abode of Hindu deities Lord Shiva and Goddess Gauri. Hindu scriptures, the Bhagawat and Bishnu Puran, and Hindu epics, Ramayan and Mahabharat, refer to 'Samundra Manthan' (marine exploration) which is directly related to the origin of Gosainkunda. Its holy waters are considered of particular significance during Gangadashahara and 'Janai Purnima' (sacred

thread festival) when thousands of pilgrims from Nepal and India visit the Lake.

The Gosainkunda wetland series falls within Langtang National Park and is managed by the Department of National Parks and Wildlife Conservation, Government of Nepal. The Park management has delineated the Gosainkunda area as a religious site. Animal slaughter, sacrifice, and even grazing in the upper catchment is prohibited. The Gosainkunda Area Management Committee, a registered NGO, oversees overall development and management during festivals, through which sub-committees together with lodge owners are responsible for tourism management. The 'gothalo' (herders) committees are responsible for management of the lower catchment area.

## Significance

### Flora

- About 100 species of flowering plants have been recorded from the Gosainkunda catchment area
- Also hosts endemic species of plants such as the *Meconopsis dhwojii*, *M.taylorii*, *Heracleum lallii*, *Primula aureata*, *P. sharmae*, *Pedicularis pseudoregeliana*, and *Rhododendron cowaniamum*; most of these species are local to Nepal and have no English common name equivalents as yet
- Other threatened species, mostly local to Nepal or the Himalayan region, according to IUCN category are the *Aconitum spicatum* Vulnerable; *Heracleum lallii*, Endangered; *Jurinea dolomiaea*, Near Threatened; *Meconopsis dhwojii*, Near Threatened; *Nardostachys grandiflora*, Vulnerable; *Neopicrorhiza scrophulariifolia*, Vulnerable; *Rheum australe*, Vulnerable; *Rheum moorcroftianum*, Near Threatened; and *Swertia multicaulis*, Data Deficit.
- Gosainkunda is one of the key sites for the collection of type specimens of plants for botanical purposes
- Phytoplankton 1,548 units/ml. (6 m. depth) with higher *Merismopedia* sp. followed by *Chlorobotrys* sp., *Ankistrodismus* sp., *Dinobryon* sp., *Glenodium* sp., *Aphanotheca* sp., and *Planktosphaeria* sp.

### Fauna

- Zooplankton were found 6.4x10<sup>6</sup> ind./m<sup>3</sup> (20m depth) - *Daphnia* sp. 52%, *Cyclops* sp. 35%, and *Napular* larvae of *Cyclops* 11%

- The wetland birds recorded in Gosainkunda include the Brahminy duck (*Tadorna ferruginea*), and common teal (*Anas crecca*)
- Potential wetland birds listed in the area are the Bar-headed goose (*Anser indicus*), Brahminy duck, Common teal (*Anas crecca*), Tufted duck (*Aythya fuligula*), Common merganser (*Mergus merganser*), Northern pintail (*Anas acuta*), and Brown dipper (*Cinclus pallasii*)
- Other birds dependent on water in the catchment area include the Brown dipper (*Cinclus pallasii*), White-capped water redstart (*Chaimarrornis leucocephalus*), and Plumbeous water redstart (*Rhyacornis fuliginosus*);
- The lower section of the catchment is the winter habitat of the red panda and musk deer.

## Kyangjing Wetland Series

Area 47,600 ha

### Location

Langtang National Park

### Coordinates

Latitude (North)	Longitude (East)	Altitude (metre)
28° 09' 50"	85° 26' 00"	2550

## Background

The Kyangjing wetland is an alpine fresh water river and is oligotrophic in nutrient content in its upper part. The Langsisa and Langtang glaciers are the main sources of water; discharge at outlet is 20m<sup>3</sup>/second. The clean, unpolluted and regular supply of water from the Kyangjing Valley has a high significance for the local communities of Langtang and Syafu VDCs.

The cultural and religious values of wetlands are experienced during the celebration of 'Lhoshar' as well as 'Janai Purnima' festivals. The gomba at Kyangjing is among the sites of religious significance for the Lama and Sherpa communities of Langtang VDC. According to legend, the Langsisa is a symbol of Mila Repa (Guru Padma Sambhava) who had stayed there in the form of a bull. Local people worship the bull shaped stone found in the area. People depend on the wetlands for drinking water, domestic use, grazing, agriculture and other livelihood purposes. Tourism is also dependent on the wetlands.

Major threats to the wetland include:

- Excessive use of timber, fuel wood and non-timber forest products (NTFPs);
- Physical infrastructure development such as hotels, and human induced pollution resulting from tourism;
- Poaching; and
- Overgrazing.

Langtang National Park under the DNPWC/MFSC is the legal authority of the area as governed by the National Parks and Wildlife Conservation Act 1973, and the Himalayan National Parks Regulations 1980. The upper segment of the eastern part of the wetland was identified as a Musk deer (*Moschus chrysogaster*) habitat area; the lower segment as a *Larix* (*Himalaica*) conservation area. Regulations on the use of timber and firewood have been adopted to control the use of natural resources by the influx of tourists and associated support members (almost 13,000 in 2002), in addition to the residents of the 84 local households. The area is jointly monitored by local communities, park staff and the Nepal Army. The area qualifies in the high altitude wetlands category for its biogeographic criteria as listed by Ramsar Vision 2006-2008.

## Significance

### Flora

- Most of the lakes have no aquatic vegetation except for phytoplankton and some algae, but ponds near Langtang village support a wide variety of emergent plants
- There are some *Salix* scrubs growing on the riverside in the Langtang 'Khola' (river) valley
- The Park's vegetation is composed of alpine pasture meadows and dwarf rhododendron scrubs associated with a number of medicinal and aromatic plants
- Endemic and threatened species are the *Meconopsis dhwojii*, *Zanthoxylum nepalense*, *Larix potanini* and *Carum carvi*. The *Cordyceps sinensis* (Yarcha gumba) is government protected
- Seventy-eight floral species have been recorded from the catchment

### Fauna

- Invertebrates are more numerous in the small ponds near Langtang village and Kyangjing
- Of the 345 bird species recorded in Langtang National Park (Karki and Thapa 2001), seven are wetland birds including wagtails and dippers

- Other birds recorded in the catchment areas are finches, pigeon, monal (*Lophophorus impejanus*), thrush and pipit as well as Himalayan snowcock, Tibetan partridge, and the common quail (*Cortunix cortunix*)
- Mammals found in the catchment include Pika (*Ochotona royle*), Yellow-throated martin (*Martes flavigula*), Musk deer, and Red panda
- The catchment area is one of the four prime habitats for the Red panda in Langtang National Park (Karki and Zendrovski 2001)
- The endangered Snow leopard has been recorded in the catchment (Chalise and Kyes 2005), along with the Himalayan tahr (*Hemitragus jemlahicus*).

## Panch Pokhari Wetlands

Area 4.01 ha

### Location

Langtang National Park

### Coordinates

Latitude (North)	Longitude (East)	Altitude (metre)
28° 02' 25" – 28° 02' 32"	85° 24' 58" - 85° 43' 15"	4,039 – 4,069

## Background

The 'Panch Pokhari' (Five Lakes) wetlands are a permanent alpine fresh water oligotrophic lake in a small valley surrounded by ridges. They form an important source of water of the Indrawati River, which provides water for the production of electricity at a micro-hydro plant in Tipni Village of Sindhupalchowk district. This area is important for its conservation values related to biodiversity and tourism.

The outlet discharge from Panch Pokhari to Indrawati River is 0.25 m<sup>3</sup>/second. Hydrological function and values of the wetlands are high for groundwater recharge, flood control, and sediment trapping. It also provides water for wildlife and livestock grazing in the catchment area.

The cultural and religious use of the area is mainly reflected during the Janai Purnima festival in August, when approximately 10,000 pilgrims visit this otherwise deserted site. The temple at Panch Pokhari is revered by all communities and groups. Nomadic groups also depend on the wetlands for drinking water and grazing.

Major threats to the wetland include:

- Over-exploitation of timber, fuel wood and nontimber forest products (NTFPs);

- Poaching of endangered species;
- Water pollution and pollution caused by unmanaged waste;
- Overgrazing leading to changes in floral and faunal composition, and disrupting the natural succession process.

The Langtang National Park under the DNPWC/MFSC is the legal authority of the area as governed by the National Parks and Wildlife Conservation Act 1973, and the 1980 Himalayan National Parks Regulations. Use of NTFPs is permitted for domestic and traditional uses, but banned for commerce. The Park authority is responsible for monitoring the conservation and management of the catchment area. The area fulfills the Ramsar 2006 criteria for inclusion in the list of high altitude wetlands.

## Significance

### Flora

- Most of the lakes here have no aquatic vegetation except for phytoplankton and some algae
- About 35 plants were recorded in the Panch Pokhari area, with four endemic species
- Catchment vegetation is represented by an alpine pasture meadow and Dwarf rhododendron scrub
- The vegetation is associated with a number of medicinal and aromatic plants; some endemic and threatened species such as the *Meconopsis dhowji*, *Berberis mucrifolia* (barberry), *Carum carvi* (caraway seeds, a Himalayan spice), *Corydalis megacalyx* (Himalayan garden plants), and *Cremanthodium nepalense*, *Dactylorhiza hatagirea* (a perennial Himalayan herb with erect leafy stem) have been recorded in the lakes
- Of these species, *Dactylorhiza hatagirea* is a government-protected species

### Fauna

- Invertebrates are more numerous in the small ponds near Panch Pokhari
- Of the 345 bird species recorded in Langtang National Park (Karki and Thapa 2001), seven are wetland-dependent

This site is a good habitat for migratory and residential birds and other wildlife species as it is among the less disturbed remote areas; the main species include the White-winged Redstart (*Phoenicurus erythrogaster*), Ibisbill

(*Ibidorhyncha struthersii*), Yellow-billed Chough (*Pyrrhocorax graculus*), Tibetan snowcock (*Tetraogallus tibetanus*), Brandt's Mountain Finch (*Leucosticte brandti*), amongst others

- The area is home to endangered species such as the Musk deer (*Moschus chrysogaster*), Snow leopard (*Uncia uncia*), and Red panda (*Ailurus fulgens*)

## Gokyo Wetland Series

**Area** 42.69ha

**Location** Sagarmatha National park

Coordinates

Latitude (North)	Longitude (East)	Altitude (metre)
27° 57' 12"	86° 41' 35"	4700 - 5000

## Background

Gokyo is an oligotrophic lake series in the Khumbu region. Partially fed by Ngozumpa glacier, it lies at the head of the Dudh Koshi River which descends from the world's 7<sup>th</sup> highest mountain peak, Cho Oyo, creating a unique and representative wetland in the world's highest freshwater lake system. There are six main lakes in the Gokyo series, of which Thonak Lake (4834m) is the largest, followed by Gokyo. Dudh Koshi is a sub-basin of the Koshi River in Nepal, which feeds the Ganges River basin, safeguarding the livelihood of millions of people downstream.

Gokyo Lake is a sacred site for both Hindus and Buddhists. During Janai Purnima, over 500 Hindus take a dip in the holy waters of the Lake. The site is worshipped as the residing place of 'Nag Devata' (Snake God); a temple of the Hindu deities, Lords Vishnu and Shiva, is situated at the western corner of the lake. The belief that birds and wildlife in the area should not be harmed has traditionally protected fauna.

Gokyo is among the most popular tourist destinations leading towards the Sagarmatha base camp and other areas. Over 7,000 visitors on average visit Gokyo every year.

Gokyo wetland series falls within the Sagarmatha National Park area, and is managed by DNPWC. A buffer zone management committee and user committees and groups have been formed under the buffer



zone programme. Local lodge owners and trekking agencies focus on the site for ecotourism activities.

## Significance

### Flora

- Over 80 species of flowering plants are recorded from the Gokyo catchment
- The catchment also hosts four endemic species: the *Kobresia fissiglumi* K. *gandakienensis*, *Pedicularis poluninii*, and *P. pseudoregelina*, along with rare and endangered plants, *Neopicrorhiza scrophulariifolia*, *Swertia muticaulis*, *Saussurea gossipiphora*, and *Meconopsis horridula*; most of these species are also local to Nepal and the Himalayan region and have no English equivalent common names

### Fauna

- Wetland birds found in Gokyo include the Brahminy (*Tadorna ferruginea*), Eurasian wigeon (*Anas Penelope*), Northern pintail (*Anas acuta*), common pochard (*Aythya ferina*), common coot (*Fulica atra*), Wood snipe (*Gallinago nemoricola*), Eurasian woodcock (*Scolopax rusticola*), and Great crested-grebe (*Podiceps cristatus*)
- The area is also a breeding site of at least six pairs of Brahminy ducks; the lower catchment is the winter habitat of the musk deer

## Singjema Wetland Series

**Area** 25.23 ha

**Location** Kangchenjunga Conservation Area

Coordinates

Latitude (North)	Longitude (East)	Altitude (metre)
27° 45' 26"	87° 46' 49"	4,671

## Background

Singjema Lake, within which believers claim to see a reflection of their own future and fortune, is an alpine fresh water, oligotrophic lake 835m long, with steep slopes creating a unique and representative wetland in the high Eastern Himalayan eco-region complex. It is an important source of freshwater for the Tamor River, one of the tributaries of the Koshi River in Nepal that feeds into the Gangatic River basin.

Local communities and herders from Tibet attribute Singjema Lake with powers to fulfill wishes. Unmarried women offer prayers to the

Lake in the hope of finding a good husband. Local folklore holds that animal slaughter within the vicinity of the lake angers the deity of the Lake. Hunting is therefore traditionally forbidden in the area, and hunting musk deer in particular is believed to result in loss of social status and property. The Lake is also a source of freshwater for cattle herders and communities downstream.

The Lake falls within the Kangchenjunga Conservation Area (KCA). The KCA Management Council and its associated institutions have been empowered to manage their conservation area. The KCA Management Council has also applied to the Government through the Ministry of Forest and Soil Conservation for community management of KCA. Currently, the Management Council together with user groups, mothers' groups, and sub-committees including the Snow Leopard Conservation Committee, are actively managing the conservation area.

## Significance

### Flora

- About 32 species of flowering plants have been recorded from the Singjema catchment, including three endemic species of rare, endangered and vulnerable plants; potential endemic plants found in the area include the *Aconitum staintonii* Lauener, Klotz, (*Cotoneaster staintonii*), and Kitam (*Cremanthodium nepalense*)
- Other threatened species according to the IUCN category are *Nardostachys grandiflora* (Vulnerable), *Neopicrorhiza scrophulariifolia* (Vulnerable), *Rheum australe* or Himalayan rhubarb (Vulnerable), and *Swertia multicaulis* (Data Deficit); most of the plants are local to Nepal and the Himalayan region and many have no equivalent English common names yet

### Fauna

- The Brahminy duck and common Pochard (*Aythya ferina*) have been recorded from the wetlands of Kangchenjunga Conservation Area, but require further observation in Singjema
- Other birds recorded in the catchment area are the Snow pigeon, White-capped redstart, and finches; the catchment is a Snow leopard habitat; the lower section of the catchment is the winter habitat of the Red panda and Musk deer



Lumbini World Heritage Site  
(Prajna Regmi)