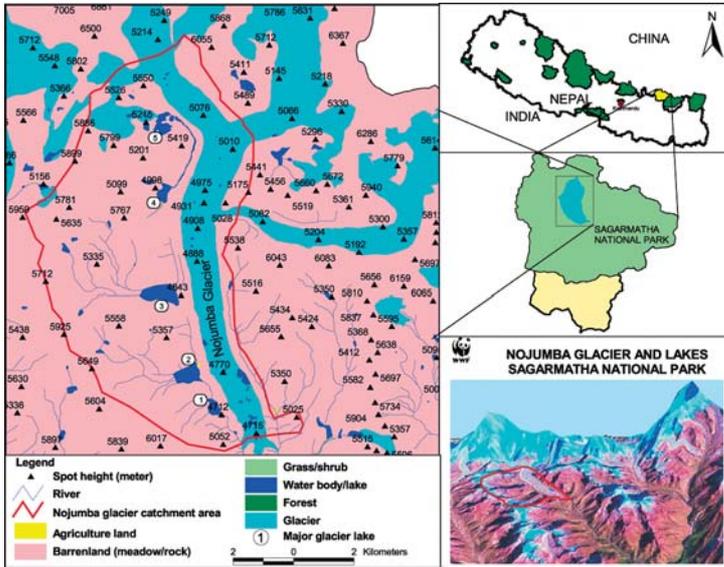


Gokyo Wetland Series Sagarmatha National Park



unique and representative wetland in the world's highest freshwater lake system. There are 6 main lakes in Gokyo series, out of which Thonak lake is the largest lake at 4834m followed by Gokyo. Dudh koshi is a sub-basin of Koshi River in Nepal, which feeds the Ganges river basin, safeguarding the livelihood of millions of people downstream.

■ BIODIVERSITY VALUES:

Flora: Above 80 species of flowering plants have been recorded from the Gokyo catchment. It also holds 4 endemic species of plants like *Kobresia fissigumis*, *K. gandakiensis*, *Pedicularis poluninii*, *P. pseudoregelina*, along with rare and vulnerable plant species, such as *Neopicrorhiza scrophulariifolia*, *Swertia multicaulis*, *Saussurea gossipiphora*, *Meconopsis horridula*.

Fauna: Wetlands birds found in Gokyo are Brahminy ducks (*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*). It is also a breeding site of the at least 6 pairs of Brahminy Ducks (*Tadorna ferruginea*). The lower catchment is also the winter habitat of musk deer.

Coordinates: 27° 57.02' E
86° 41.58' N

Area: 42.69 ha

Length: 975m

Elevation: 4700- 5000m

■ OVERVIEW:

Gokyo is an oligotrophic lake series in the Everest region. Partially fed by Ngozumpa glacier, it lies on the head of the Dudh Koshi River which descends from world's 7th highest mountain - Cho Oyo creating a





■ SOCIO-CULTURAL AND RELIGIOUS VALUES:

The Gokyo lake is also considered as sacred lake by both Hindu and Buddhist, where about 500 Hindu people take a holy dip during *Janai purnima* (sacred thread festival). The site is worshipped as the residing place of *Naag Devata* (Snake God) and a temple of Hindu deities like Lord Vishnu and Shiva is constructed at the western corner of the lake. The faith of “no harm” to birds in the lake provides shelter to wetland birds.

Gokyo lake, situated at the base of Mt. Everest, is one of the most popular tourist destinations leading to Everest Base Camp in Sagarmatha National Park. Tourism is one of the major sources of income for the local communities. An average of over 7,000 tourists visit Gokyo Lake every year.

■ THREATS:

- Pollution due to visitors and their supporting groups during the peak season
- Over grazing during the summer season
- Over harvesting of Dhupi to be used as firewood during the grazing and tourism seasons
- Potential danger of Glacier Lake Outburst Flood

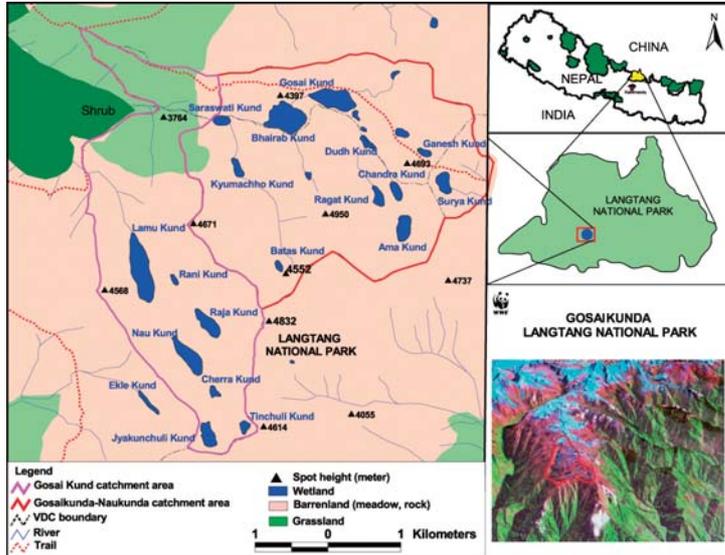


■ CONSERVATION MEASURES:

Gokyo wetland series falls under the Sagarmatha (Mount Everest) National Park and is under the management of the Department of National Parks and Wildlife Conservation of HMG/Nepal. Conservation and management within the Sagarmatha National Park and Buffer Zone is supported by buffer zone user committees, user groups, local NGOs, hotel owners and other conservation partners.



Gosaikunda Wetland Series Langtang National Park



Devighat), on which a large downstream population including that of Kathmandu valley depends.

■ HYDROLOGICAL VALUE:

The water volume is 1.472 million cubic meter and discharge in outlet is 60 Lit/sec whereas the inlet discharge is 35 Lit/sec.

■ BIODIVERSITY VALUES:

Flora: About 100 species of flowering plants have been recorded from the Gosaikunda catchment. It also holds endemic species of plants like *Meconopsis dhwojii*, *M.taylorii*, *Heracleum lallii*, *Primula aureata*, *P.sharmae*, *Pedicularis pseudoregeliana*, *Rhododendron cowanianum*. Other threatened species according to IUCN category are *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), *Swertia multicaulis* (Data Deficit). Gosaikunda is one of the most important sites for collection of type specimens of plants for botanical purpose.

Fauna: Phytoplankton 1,548 units/ml. (6 m. depth) with higher *Merismopedia* sp. followed by *Chlorobotrys* sp., *Ankistrodromus* sp., *Dinobryon* sp., *Glenodium* sp., *Aphanotheca* sp., and *Planktosphaeria* sp.

Zooplankton were found 6.4×10^6 ind./m³ (20 m depth) - *Daphnia* sp. 52%, *Cyclops* sp. 35%, and *Napular larvae of Cyclops* 11%.

Coordinates: 28° 5.00' E
85° 24.96' N
Area: 13.80 ha
Length: 625.55m
Elevation: 4000m-4700m

■ OVERVIEW:

Gosaikunda, relating to saint and wetland, is an alpine freshwater oligotrophic lake series with alpine meadows, bogs, lakes/ponds, streams, wet steep slopes creating a unique and representative wetland in the high Himalayan Paleartic biogeographical region. It is one of the world's highest freshwater lake system, is an important source of water for Trisuli River originating from *trishul dhara* in gosaikunda. It produces 20 MW electricity (from 2 power houses at Trishuli and

HIGH ALTITUDE WETLANDS OF NEPAL





Wetlands birds recorded in Gosaikunda are Brahminy Duck (*Tadorna ferruginea*) and common teal (*Anas crecca*). Potential wetland birds listed on that area are Bar-headed Goose (*Anser indicus*), 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 includes 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 red panda and musk deer.

■ SOCIO-CULTURAL AND RELIGIOUS VALUES:

Hindu mythology mentions Gosaikunda as a residing place of Hindu deities like Lord Shiva and Goddess Gauri. Hindu scriptures like Bhagawat and Bishnu Puran and hindu epics like Ramayan and Mahabharat mentions *Samundra Manthan* (Sea exploring) which is directly related to the origin of Gosaikunda. The holy water of Gosaikunda is used during *Gangadashahara* and *Janai purnima* (sacred thread festival) by thousands of people visiting the place from Nepal and India to celebrate the festival. The meandering river Trishuli is

also significant for economy of the country not only due to hydroelectricity but also for adventure tourism.

■ THREATS:

- Water pollution and waste disposal due to pilgrimage during the festivals and peak tourist seasons
- Over grazing by livestock, sheep and horses
- Over harvesting of NTFPs for domestic use during the grazing and festival period
- Unsustainable use of fuel wood for subsistence and other religious purposes during festive and touristic seasons



■ CONSERVATION MEASURES:

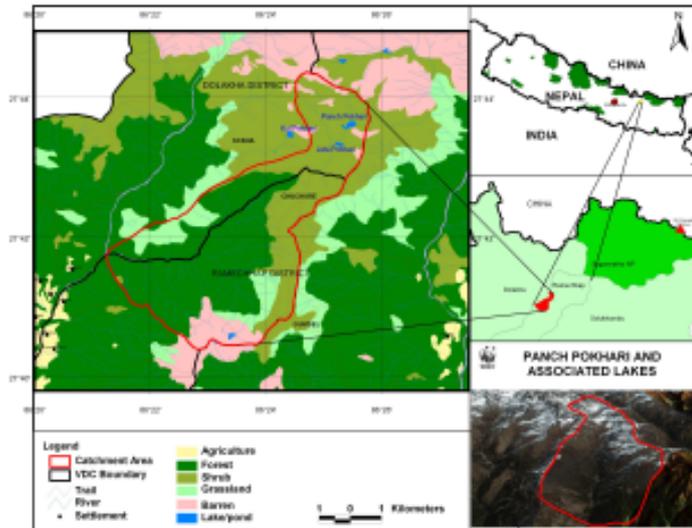
Gosaikunda wetland series falls within Langtang National Park and is under the management of the Department of National Parks and Wildlife Conservation of HMG/Nepal. The Park management has delineated the Gosaikunda area as a religious site. Therefore, animal slaughter and grazing in the upper catchment is prohibited. There is a Gosaikunda Area Management Committee, a registered NGO, for overall development and management during the festivals, under which, sub-committees together with hotel/lodge owners are responsible for tourism management. The Goth (herders) Committees are responsible for management in the lower catchment area of Gosaikunda.





FACTSHEET

Panch Pokhari and Associated Lakes



Coordinates

Panch Pokhari: 27° 43' 30" N
86° 25' 33.9" E

Elevation: 4,510 m

Jata Pokhari: 27° 43' 28.8" N
86° 25' 18.5" E

Elevation: 4,238 m

Area: 11.41 ha

OVERVIEW:

Panch Pokhari, Jata Pokhari and its catchment area are located in the central Himalayan region of Nepal in Ramechhap district. The lake is extended from east to west; where eastern part is slightly narrower than the western side look like roughly oval shape. The lake is fed by enormous amount of water from eastern hill, partially little quantity of water also added from the northern and southern hills. Water of Panch Pokhari Lake flows out from south-west and falls into the Jata Pokhari.

The Lakes around Panch Pokhari series are glacial in origin from Panch Pokhari hills: Batase Danda (Hill) in the east, Kalo Pokhari, Bhut Pokhari danda in the west and Siddikharka danda in the north and outlet is on the southern part of the Panch Pokhari hill.

Jata pokhari lake is below the Panch Pokhari lake. The lake is extended from east to west; where eastern part is slightly narrower than the western side and the lake look like roughly in slipper shape. The lake is fed by water from northern bounded Panch Pokhari and passes out from internal canal about 100 meters down to south-west and mix up into Ghyang Khola, which is a branch of Khimti Khola. Most of the areas around the lake are composed of rock and alpine rangeland.

HYDROLOGICAL VALUE:

Water discharge of Panch Pokhari is 1.0909 m³/s and Jata Pokhari is 1.01818 m³/s.

Selinum Wallichianum



Aconitum Spicatum



Saussurea spp.



Cordyceps Sinensis



■ BIODIVERSITY VALUE:

Flora: The area represents a treeless region with range land interspersed by rocky slopes and alpine pasture. The vegetation is represented by Alpine pasture meadows and Dwarf Rhododendron scrubs. The alpine pasture meadow is dominated by *Potentilla microphylla*, *Rhododendron lepidotum*, *Rhododendron ciliatum*, *Bergenia purpurascens*, *Primula deuteranana*, *Primula atrodentata*, *Bistorta affinis*, *Cassiope fastigiata*, *Aconogonum molle*, *Juniperus recurva* and many other species.

Vegetation of this area is associated with a number of medicinal and aromatic plants. The common medicinal plants are *Bergenia purpurascens*, *Potentilla microphylla*, *Swertia chirayita* and some species of *Aconitum spicatum*, *Selinum Wallichianum*, *Saussurea spp.* *Cordyceps sinensis*, etc. The dwarf Rhododendron scrub is composed with *Rhododendron lepidotum*, and *Rhododendron setosum*, forming an extensive mat of several hectares.

Carex himalaica, *Kobresia fissiglumis*, *Impatiens kharensis* are the endemic plants. The threatened plant species found around the Panch Pokhari and Jata Pokhari area are: *Aconitum gammiei*, *Aconitum spicatum*, *Dactylorhiza hatagirea*, *Meconopsis paniculata*, *Rheum australe*, *Neopicrorhiza scrophulariiflora* and *Usnea longissima*.

Fauna: Most birds commonly sighted around the Jata Pokhari are Brown Dipper *Cinclus pallasii*, White-capped Water Redstart *Chaimarrornis leucocephalus* and Red-billed Chough *Pyrrhocorax pyrrhocorax*. Likewise, the Panch Pokhari Lake has Alpine Accentor *Prunella collards*, Winter Wren *Troglodytes troglodytes* and Himalayan Monal *Lophophorus impejanus* as common species. These lakes and catchments are excellent habitats for forest and residential birds and other wildlife species. Panch Pokhari and Jata Pokhari areas hold significant population of Himalayan Monal pheasant which is the protected species and national bird of Nepal.



The endangered snow leopard (*Uncia uncia*) and Himalayan Thar (*Hemitragus jemlahicus*) roam Panch Pokhari area during winter season. Some threatened species like Musk Deer (*Moschus chrysogaster*), Red Panda (*Ailurus fulgens*), and Assamese Monkey (*Macaca assamensis*) are inhabited in this area.

■ SOCIO-CULTURAL AND RELIGIOUS VALUES:

Nomads are dependent on these wetlands in relation to drinking, grazing etc. The religious importance of the site is high. A couple of thousands of people having Hindu and Buddhist religion go to that place on rainy season during Janai purnima. People of all caste from different places visit this place while going to worship Shiva (God) and Parvati (Goddess). People of downstream depend on water for the domestic use. Pilgrims first visit Jata Pokhari, worship and offer Trident and worship to Panch Pokhari as well. There are thousands of Tridents inside both lakes. Cow milk is found to be offered by Sherpa herders especially in Jata Pokhari.

■ THREATS:

- Over use of fuel wood and NTFPs
- Poaching of wild animals
- Solid waste pollution
- Heavy grazing of alpine meadows

■ CONSERVATION MEASURES:

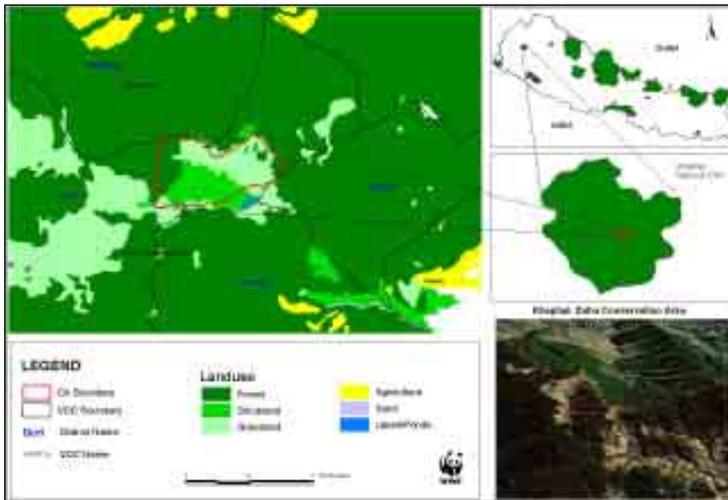
Field visit observations are carried out by the District Forest Office (DFO) personnel. DFO authority takes care of conservation and management of the catchment area. Use of Non Timber Forest Product (NTFP) for domestic purpose and traditional use is permitted in the area. It is needed that proper disposal of garbage is done particularly plastics and bottles disposed by the pilgrims and internal tourists to avoid the pollution of solid waste. It is important to conserve and manage the natural environment of the area for sustainable use.



FACTSHEET



Khaptad Daha & Tribeni Wetland system



Coordinates:

Khaptad daha: 29° 23' North Latitude
81° 10' 05" East Longitude
Tribeni wetland: 29° 22'35" North Latitude
81° 8'15" East Longitude

Area: Khaptad daha: 2.5ha

Elevation: Khaptad daha: 2900m

OVERVIEW:

Khaptad Daha is an important snow-fed freshwater pond situated in the eastern part of the Khaptad plateau. The oval shaped pond has stagnant water as there is no inlet and outlet. The Daha is bordered by Khaptadmando Danda and Ghudekomela Danda in the northern and southern sides respectively, whereas, the western side is bordered by Ballejodi Danda and Daha

patan in the eastern side. The forest litter and cattle defecation have accumulated in the pond thereby causing sedimentation and eutrophic conditions in the pond.

Tribeni wetland system is riverine in nature and is surrounded by the Sailung Khola and Ekle Patan in the south, Khelaune Patan and Kedar Dunga in the north, Lukeshi Khola and Chhedi Patan Khola in the east and Dudali Patan and Ghat Khola in the west.

HYDROLOGICAL VALUE:

The winter snow and monsoon rainfall are the main sources of water to feed the pond and water also percolates from the surrounding forest. Tribeni lies at the confluence of Lukeshi khola, Sailung khola and Chhedi Patan khola which are snow-fed perennial streams.





■ BIODIVERSITY VALUE:

Flora: A total of over 87 and 54 species of flowering plant of pre-monsoon season from Khaptad Daha and Tribeni wetland respectively have been collected. The Khaptad Daha area houses a high number of angiospermic floras in and around the forest, grassland and wetland ecosystems, in comparison to grassland and wetland ecosystems of Tribeni. The dense forest of fir-oak rhododendron surrounds the Khaptad Daha from the north-south and western sides. *Abies spectabilis*, *Quercus semicarpifolia* and *Rhododendron arboreum*, are the dominant species in the forest and associated species include *Taxus wallichiana*, *Sorbus microphylla*, *Sorbus lanata*, *Prunus cornuta*, *Acer caesium*, *A. pectinatum*, etc. The eastern side of the daha is linked with the Daha Patan meadow consisting with *Rumex nepalensis*, *Euphorbia wallichiana*, *Anemone* sp, *Ranunculus* sp, *Berberis* sp, *Potentilla*



sp, *Rosa sericea*, etc. The Tribeni wetland is riverine and marshy area and is dominated by herbaceous vegetation. The top of the hillock lying adjoining the Tribeni area is dominated by *Abies- Quercus* mixed forest. The species composition is more or less similar to Khaptad Daha.

Protected plants

Among the collected species, 4 species occurred around the Khaptad Daha and Tribeni are Government protected species under Forest Act, 1993. Of these, *Dactylorhiza hatagirea* is banned by the Government of

Nepal under the 1993 Forest Act for collection, use, sale, distribution, transport and export, whereas, *Valeriana jatamansii*, *Taxus wallichiana* and *Abies spectabilis* are banned under the same Forest Act for export except when processed with the permission of the Department of Forests.

Economic plants

The Khaptad Daha and Tribeni area house several species of economically important plants including medicinal and aromatic (*Fritillaria cirrhosa*, *Dactylorhiza hatagirea*, *Parmelia* sp, *Bergenia ciliata*, *Taxus wallichiana*, *Selinium tenuifolium*, *Valeriana jatamansii*, *Angelica glauca*, *Skimmia angueticum* etc), wild edibles (*Arisaema* sp, *Allium wallichii*, *Aconogonum molle*, *Rosa serica*, *Angelica glauca*, *Trillidium govanianum*, *Polygonatum verticillatum*, *Smilacina purpurea*, etc) and many other economic plants (*Daphne bholua*, *Thamnocalamus spathiflorus*, etc.).

Fauna: Khaptad National Park houses 23 species of mammals, 287 species of birds and 23 herpeto species. A wide variety of colorful butterflies, moths and insects is also an important feature of the park ecosystem. The wetland area of Khaptad supports over 20 species of wetland dependant birds and 9 species of mammals.

Above 50 species of birds, 2 species of mammals (*Ochotona roylei* and *Semnopithecus entellus*), 2 species of herpeto-fauna; Bajhang frog (*Paa ercepeae*) and Himalayan ground skink (*Asymblepharus himalayanus*) have recently been observed in these wetlands. Among the avian species, 4 species of birds are added in the checklist of the areas such as Short-eared Owl (*Asio flammeus*), Black Drongo (*Dicrurus macrocercus*), Black-faced Laughing thrush (*Garrulax affinis*) and Rufous-vented Yuhina (*Yuhina occipitalis*).



Protected fauna

The government protected mammals found in the area are Grey Wolf (*Canis lupus*) and Musk Deer (*Moschus chrysogaster*). CITES Appendix I includes 4 species such as Hanuman Langur (*Semnopithecus entellus*), Asiatic Black Bear (*Ursus thibetanus*), common Leopard (*Panthera pardus*) and Musk Deer (*Moschus chrysogaster*). Similarly, Appendix II and III include Grey Wolf (*Canis lupus*) and Golden Jackal (*Canis aureus*) respectively. There is also a record of 1 species of *Moschus chrysogaster* endangered and 1 species of vulnerable *Ursus thibetanus* and 3 near threatened species as per the IUCN Red List Categories. Among the birds, the government protected and CITES Appendix I includes species *Lophophorus impejanus* and CITES Appendix II includes 5 species viz. *Asio flammeus*, *Gyps himalayensis*, *Hieraaetus pennatus*, *Neophron percnopterus* and *Falco tinnunculus*.

Endemic fauna

The Bajhang frog (*Paa ercepeae*) is an endemic species which has been found in Khaptad Daha. The species is reported only in the Bajhang district of Nepal. The Khaptad Daha also lies in the same district, therefore, the species is strictly restricted to that area. It is gregarious in nature and the total population is estimated to be approximately 1,000 in the pond.

■ SOCIO-CULTURAL AND RELIGIOUS VALUES:

Khaptad Daha is also considered as a sacred site. A temple of Khaparjagannath (Shiva) is situated along the south east corner of the pond. Many people from Khaparmando village (Bajhang) and adjoining areas visit this temple during Rishitarpani (Janaipurnima) and Annantpurnima to worship Lord Shiva and Parvati (Musarani). The idol of god and goddess is brought to this temple on Rishitarpani from the Khaparmando village and installed there till Annantpurnima (about 1 month) and returned back to Khaparmando village. During the day of Annantpurnima, thousands of people from adjoining districts visit there to take a holy dip and pay homage to the god and goddess. Perhaps, it is the only temple in the country where Dalit (Sarki) perform the first ritual then only Brahmin and other upper caste people take over the worship. But there are two different temples, one for Sarki and other for upper caste people. According to the legend, the ancestor of Ghuite Sarki first enlightens God Shiva in that place. Thereafter, the descendents of Ghuite Sarki have been conducting the first puja (worship) in the temple.

The daha is a source of water for about 3000 cattle (cow, buffalo, horse, and goat) which graze near the





pond and the cattle herders where more than 50 cattle sheds are erected adjoining the pond. Cattle grazing continues for about 4 months (May-August).

The Tribeni wetland is also a most sacred site where thousands of pilgrims visit from the adjoining districts, mainly Doti, Achham, Bajhang and Bajura, during the Ganga Dashara mela (festival) to take holy bath in the river where Sainle Kholra and Kausiya Kholra meet. This festival is usually held during the month of May and over 5000 people gather for the celebration. The festival is also important for cultural exchange between the far west population of Nepal where people enjoy Deuda dance and other cultural activities.

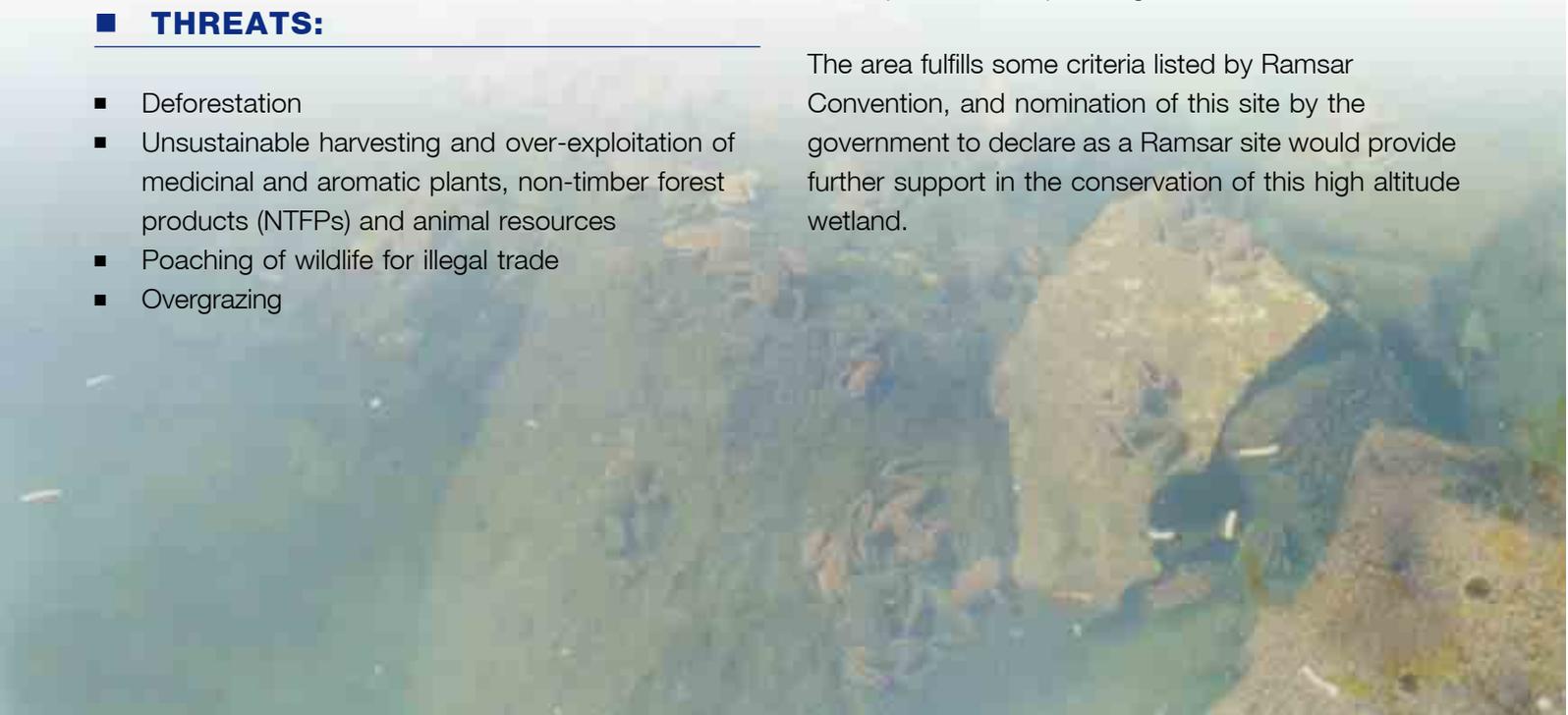
■ THREATS:

- Deforestation
- Unsustainable harvesting and over-exploitation of medicinal and aromatic plants, non-timber forest products (NTFPs) and animal resources
- Poaching of wildlife for illegal trade
- Overgrazing

■ CONSERVATION MEASURES:

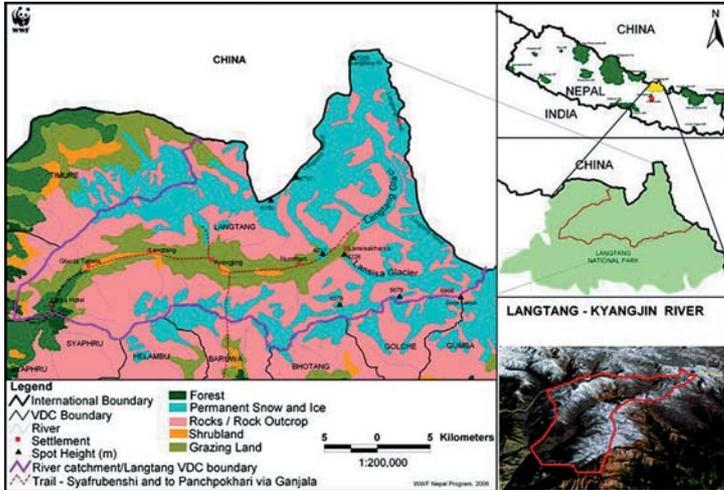
Both the Khaptad Daha and Tribeni area are parts of the Khaptad National Park. The land is owned by the Government of Nepal and the local authority is Khaptad National Park. The territorial jurisdiction is owned by the Ministry of Forests and Soil Conservation and the Department of National Parks and Wildlife Conservation is a management authority. The headquarters of the Khaptad National Park is located in Chhedipatan, Bajura and Conservation Officer is the responsible person of the park. Buffer zone has been declared in the Khaptad National Park. A KNP-BZ management Plan and pre-feasibility report on tourism development in Khaptad region has been drafted.

The area fulfills some criteria listed by Ramsar Convention, and nomination of this site by the government to declare as a Ramsar site would provide further support in the conservation of this high altitude wetland.



FACTSHEET

Kyangjing Wetlands



communities of Langtang and Syafru VDCs but also to the down stream people including the electricity users of the country.

■ BIODIVERSITY VALUE

Flora: Most of the lakes have no aquatic vegetation except phytoplankton and some algae, but pond near Langtang village supports a wide variety of emergent plants. There is some *Salix* scrub in Langtang Khola valley which grows on



riverside gravels and flats. The vegetation is represented by Alpine pasture meadow and Dwarf *Rhododendron* scrub. Vegetation of this area is associated with a number of medicinal and aromatic plants. Of the endemic and threatened species such as *Meconopsis dhwojii*, *Zanthoxylum nepalense*, *Larix potanini* and *Carum carvi*, etc., *Cordyceps sinensis* is government protected. Similarly, several species are considered as threatened species under different categories of CAMP and IUCN Red list. About 78 species of floral species have been recorded from the catchment.

- Coordinates** latitude 28°09'50" E longitude 85°26'00" N
- Area** 47,600 ha, length-52 km, width-10 m, depth-2m
- Altitude** 2550 m

■ OVERVIEW:

The Kyangjing wetland is an alpine fresh water river and is oligotrophic in nutrient content in its upper part. The River is natural in origin and the Langsisa, Langtang glacier are the main sources of water.

■ HYDROLOGICAL VALUE:

The discharge in outlet is 20 m³/Second for Kyangjing River at altitude 3,760 m, latitude 28°12'30" N and longitude 85°33'00" E. The clean, unpolluted and regular supply of water down stream from Kyangjing valley has high significance not only for the local

Fauna: Invertebrates are more numerous at the small ponds near Langtang village and Kyangjing. Of the 345 bird species recorded in Langtang National Park (Karki and Thapa 2001), seven of them are wetland birds. Some water birds those are dependent on water for life recorded includes wagtails and dippers. Other birds recorded during the survey period in the catchment





areas were finches, pigeon, monal, thrush and pipit. Himalayan Snowcock (probably resident but rare), Tibetan Partridge (winter visitor, rare), Common Quail (passage migrant, rare) and any bird that are nationally important and rare at catchment are of importance for our study. Pika (*Ochotona royle*) was abundant in the rocky areas of this valley. Yellow throated martin (*Martes flavigula*) is seen in the area. The eastern section of the catchment is designated as musk deer conservation area that provides the prime habitat of musk deer (*Moschus chrysogaster*). The lower segment of the eastern section is Larix (*Larix himalaica*) conservation area and south side of the eastern segment is red panda (*Ailurus fulgens*) conservation area. The red panda conservation area is one of the four prime habitats of red panda in Langtang National Park (Karki and Zendrovski 2001). The endangered snow leopard (*Uncia uncia*) is recorded from the catchment (Chalise and Kyes 2005) along with Himalayan Thar (*Hemitragus jemlahicus*).

■ SOCIO-CULTURAL AND RELIGIOUS VALUES:

The cultural and religious use of wetland is mainly during the celebration of Lhoshar and other sherpa festivals. The Gumpa at Kyangjin is one of the site of faith by the Lama and Sherpa of Langtang VDC. The Langsisa is taken as a symbol of Mila Repa (Guru Padma Sambhava). It is said that Milarepa is staying here in the

form of bull and one stone of some what bull shape is offered 'puja' for this reason. People from Langtang and surrounding villages visit there during Janaipurnima festival. People are dependent on the daily livelihood directly to the wetland in relation to drinking water, domestic use, grazing and agriculture. The tourism base of the social economy is partly dependent on wetland.

■ THREATS:

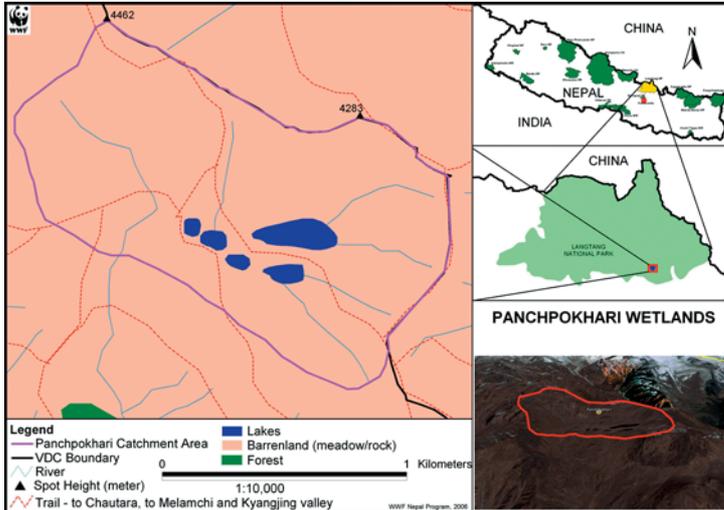
- Over use of timber, fuel wood and Non-timber forest products (NTFPs)
- Physical infrastructure development such as hotels and human induced pollution including from tourism.
- Poaching
- Overgrazing

■ CONSERVATION MEASURES:

The area falls under the ownership of Langtang National Park. The Ministry of Forest and Soil Conservation, Government of Nepal, is the legal authority and the park is governed by the National Parks and Wildlife Conservation Act 2029 BS (1973) and Himali Rastriya Nikunja Niyamawali 2036 BS (Mountain National Parks Regulation 1979). The upper segment of the eastern part of the wetland area was declared as musk deer conservation area and lower segment as Larix conservation area for management purpose to protect the area and regulate use of timber and fuel wood use for large influx of tourists and associated support members (almost 13,000 in 2002) in addition to the domestic pressure of about 84 households. Effort to regularize and control the use of timber has been taken by Park. Permission of timber for only needy people with close monitoring is being tried. Joint monitoring by Nepal Army's Park security personnel, Park staff and sometime participation of local people is being initiated. As this area provides biogeographic criteria listed by Ramsar (2006-2008 Vision), nominating this site by Government to declare as Ramsar would provide further support in the conservation of this high altitude wetlands.



Panch Pokhari Wetlands



■ HYDROLOGICAL VALUE:

The discharge in outlet is 0.25 m³/second from Panch Pokhari to Indrawati River. Hydrological function and Values of wetland is high for ground water recharge, flood control, and sediment trapping. It provides water to wildlife and livestock grazing in the catchment.

■ BIODIVERSITY VALUE

Flora: Most of the lakes have no aquatic vegetation except phytoplankton and some algae. About 35 plants were recorded at the Panch Pokhari area with 4 endemic plant species. The vegetation catchment is represented by Alpine pasture meadow and Dwarf *Rhododendron* scrub. Vegetation of this area associates a number of medicinal and aromatic plants. Some endemic and threatened species such as *Meconopsis dhowji*, *Berberis mucrifolia*, *Carum*

Coordinates 28° 2.41'- 28° 2.54'E Latitude
85° 42.96'-85° 43.25'N Longitude

Area 4.01 ha

Elevation 4,039 m - 4,069m

■ OVERVIEW:

The Panch Pokhari wetland is a permanent alpine fresh water oligotropic lake. As the name implies to the lake system, there are five lakes in a small valley surrounded by ridges in Panch Pokhari. The Panch Pokhari forms one of the important sources of water of Indrawati River, which provides water for production of electricity through micro-hydro at Tipni Village of Sindhupalchowk district. This area is important due to its biodiversity, tourism and catchment conservation values.





carvi, *Corydalis magacalyx* and *Cremanthodium nepalense*, *Dactylorhiza hatagirea* etc are recorded. Out of these species, *Dactylorhiza hatagirea* is the government-protected species.

Fauna: Invertebrates are more numerous at 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 good habitat for migratory and residential birds and other wildlife species and being among the less disturbed remote area, it is home to endangered species such as musk deer (*Moschus chrysogaster*), snow leopard (*Uncia uncia*) and red panda (*Ailurus fulgens*).

■ SOCIO-CULTURAL AND RELIGIOUS VALUES:

The cultural and religious use is mainly reflected during Janaipurnima festival when about 10,000 people from Sindhupalchowk area and around visit .The Temple at Panch Pokhari is one of the sites of faith by the people of all caste from different places. Nomads are dependent on the wetland in relation to drinking, grazing etc. Other people only visit this place during Janaipurnima.

■ THREATS:

- Over-exploitation of timber, fuel wood and Non-timber forest products (NTFPs)
- Poaching of endangered species
- Water pollution and pollution caused by unmanaged waste
- Overgrazing leading to the change in floral and faunal composition and disrupting the natural succession process



■ CONSERVATION MEASURES:

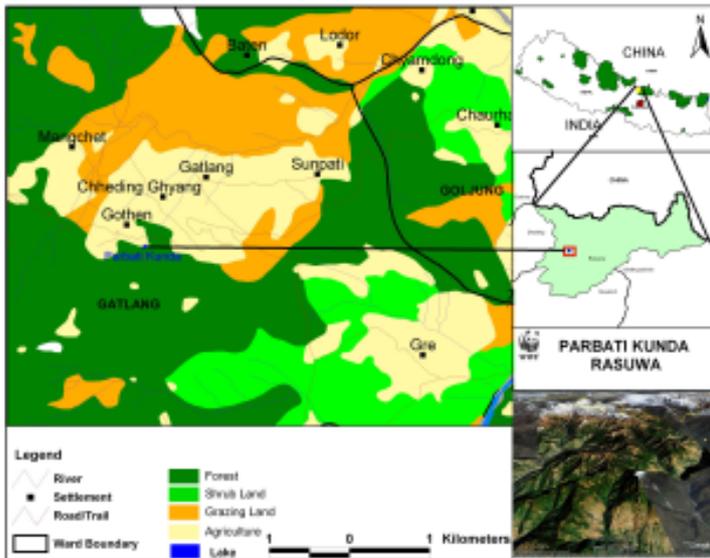
Panch Pokhari Wetland falls under the ownership of Langtang National Park. The Ministry of Forest and Soil Conservation, Government of Nepal, is the legal authority and the park is governed by the National Parks and Wildlife Conservation Act 2029 BS (1973) and Himali Rastriya Nikunja Niyamawali 2036 BS (Mountain National Parks Regulation 1979). NTFPs use for domestic purpose and traditional use is permitted but banned for commercial use. Park authority takes care of conservation and management of the catchment area. As this area fulfills criteria listed by Ramsar 2006, nominating this site by Government to declare as Ramsar would provide further support in the conservation of this high altitude wetland.





FACTSHEET

Parbatikunda



Coordinates: 28° 09' 3" N
85° 15' 8" E

Area: 3.5 ha including marshes

Elevation: 2500 m

OVERVIEW:

Parbatikunda lies in mid-hills region of Rasuwa district, and is surrounded by a stone wall. The Parbatikunda looks like a tigers' paw shaped. The perimeter of the kunda is about 700 m. There is a temple of Shiva (God) and Parbati (Goddess) and a resting plate towards the west of the kunda. About 300 m south-west of the Parbatikunda, a famous monastery of about 300 years old, called as "Chheding Gomba" exists. This is a freshwater wetland which receives water from its underground recharges and seepage from surrounding forests during monsoon. The outflow of the kunda lies in the northern side which flows north-east towards the Gatlang village and joins to Gatlang khola. Major part (about 80%) of the pond is covered with grassy marsh and only about 20% area is under water. The maximum depth of the Parbatikunda is about 3 m. Water of all the lake falls to Chilime river via Gatlang Khola which joins the Trishuli River in the East.

HYDROLOGICAL VALUE:

The discharge is 0.09 m³/s.

BIODIVERSITY VALUE:

Flora: The small marshy area of Parbatikunda lying inside the stone fence harbors several species of flowering plant. The *Acorus calamus* (Bojho/sweet flag) is most dominated species followed by *Juncus* spp., *Eriocaulon* sp., *Cyperus* spp., *Fimbristylis* spp., *Pedicularis* sp., *Polygonum hydropiper*, etc. The *Selaginella* sp. is common in the spongy ground of the pond. Some young stands of *Quercus semicarpifolia*, *Zanthoxylum armatum*, *Lyonia ovalifolia*, *Acer* sp., *Prinsepia utilis*, *Viburnum* spp., etc., can be observed in some drier areas. *Acorus calamus*, *Swertia chirayita*, *Allium wallichii* and *Potentilla fulgens* are the useful plants found around the Parbatikunda.

The mountain oak (*Quercus semicarpifolia*), *Rhododendron arboreum*, Himalayan silver fir (*Abies spectabilis*) and Himalayan hemlock (*Tsuga dumosa*) are important tree species found around the Parbatikunda. The marshy land of Parbatikunda is dominated by herbaceous vegetation.

Fauna: Common wildlife in the catchment area of the Parbatikunda are Wildboar (*Sus scrofa*), Barking deer (*Muntiacus muntjak*), Jackal (*Canis aureus*), Pika (*Ochotona* sp.) and Yellow throated Marten (*Martes falvigula*).

White ducks or wild ducks (Aquatic birds) can be seen in Parbatikunda in spring. Satyr Tragopan (*Tragopan satyra*) and Kalij pheasant (*Lophura leucomelanos*) are rarely seen and Himalayan Monal (*Lophophorous impejanus*) comes down to lower ranges to Parbatikunda from upper Mangchet area during snowfall.

Wetland dependent birds recorded in the catchment area of Parbatikunda are white-capped water redstart, Plumbeous water redstart and Spotted Forktail.



■ SOCIO-CULTURAL AND RELIGIOUS VALUES:

Local people are dependent on the daily livelihood to the wetland for domestic uses and irrigation downstream.

Parbatikunda is believed to be a creation of Shiva (God) for the Parvati (Goddess) and considered a sacred place where a large number of Hindu and Buddhists of nearby places visit and take a holy bath and rituals during Janai Purnima (Full Moon) festival.

The cultural and religious values of Parbatikunda are celebrated mainly during the Janai Purnima and Phagu/Holy Purnima festivals. The traditional healers such as Jhankri, Lama and some skilled people play specific roles. Jhankri and Lama perform separate celebration as per their norms. Many local people gather in a group, making circles and perform cultural dances with duet in the local Tamang language. The marriage arrangement and love affairs also starts during these occasions. Local Sherpa and Tamang people are decorated with gold and silver ornaments and

traditional customs. Lama and Jhankris wear specific dresses.

■ THREATS:

- Overgrazing
- Unsustainable harvesting of resources including NTFPs
- Poaching of wild animals

■ CONSERVATION MEASURES:

Local communities are interested in taking care of the wetland. The community forest user groups and local Community Based Organizations (CBO) are keen to see its conservation and development. District Forest Office is responsible organization for national and community forest along with support from local communities.

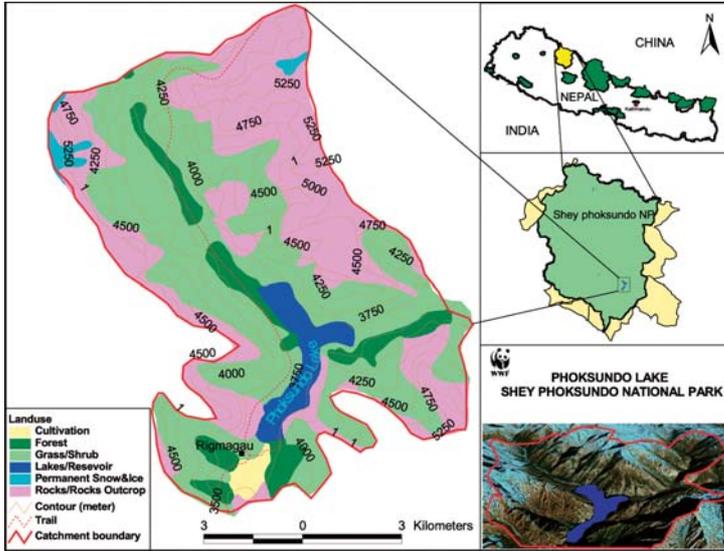
District development committee and village development committees are supporting for the infrastructure development. In past, the TRPAP has supported the tourism related activities and conservation.



FACTSHEET



Phoksundo Wetland Series Shey Phoksundo National Park



south elongated with a slight bend at the southern parts. Fed with glacier and snow melt, the lake has only one outlet on its southern shore, which joins Shuli Gad (river), forming a 170 m high waterfall, one of the highest waterfall in Nepal.

■ HYDROLOGICAL VALUE:

The water volume is 408.599 million cubic meter and discharge is 3715 Lit/sec.

■ BIODIVERSITY VALUES:

Flora: About 155 species of flowering plants have been recorded from the catchment. Other threatened species according to IUCN category are *Neopicrorhiza scrophulariifolia* (Vulnerable), *Dactylorhiza hatagirea* *Dioscorea deltoidea* (CT), *Aconitum spicatum* (Vulnerable), *Nardostachys grandiflora* (Vulnerable), *Podophyllum hexandrum* (Vulnerable), *Megacarpa polyandra* (Vulnerable).

Fauna: Wetlands birds found are Red-crested Pochard (*Rhodonessa rufina*) and Ruddy Shelduck (*Tadorna ferruginea*). Other wetlands birds recorded downstream are Common Moorhen, Common Coot (*Fulcia atra*), Eurasian Wigeon (*Anas Penelope*) and Bar-headed

Coordinates: 29°10'-29°15' E
82°55' - 83°00' N

Area: 494 ha

Length: 5.15 km

Elevation: 3611.5 m

■ OVERVIEW:

Phoksundo, is a y- shaped alpine fresh water oligotrophic lake. The lake is surrounded by steep mountain slopes composed of bedrocks along its eastern northern and western sides. The lake is north-



HIGH ALTITUDE WETLANDS OF NEPAL



Goose (*Anser indicus*). Other birds dependent on water includes Brown dipper (*C. pallasii*), White-throated Dipper (*Cinclus cinclus*) and White-throated Redstart (*Phoenicurus schisticeps*).

The catchment is the winter habitat of snow leopard and musk deer.

■ SOCIO-CULTURAL AND RELIGIOUS VALUES:

Traditional Tibetan culture exists in the Phoksundo area where Bon (Pre-Buddhist) religion is practiced. There are more than 20 *Chortens* (stupa) and one *Gumba* (monastery) in the vicinity of the lake, which are important sites for worship and for reinforcing people's ties with the natural environment. Due to the climatic conditions, the local people practice trans-humance. Tourism used to be the one of the main sources of income in the past. His Majesty's Government of Nepal opened the southern region of Dolpa district including southern part of Shey Phoksundo National Park, to foreign trekkers in

May, 1989. Until 1998, about 400 tourist went to Shey Phoksundo National Park and 80% of them visited Phoksundo Lake.

■ THREATS:

- Domestic pollution and waste
- Over grazing
- Unsustainable collection of NTFPs for their medicinal values and household demands.

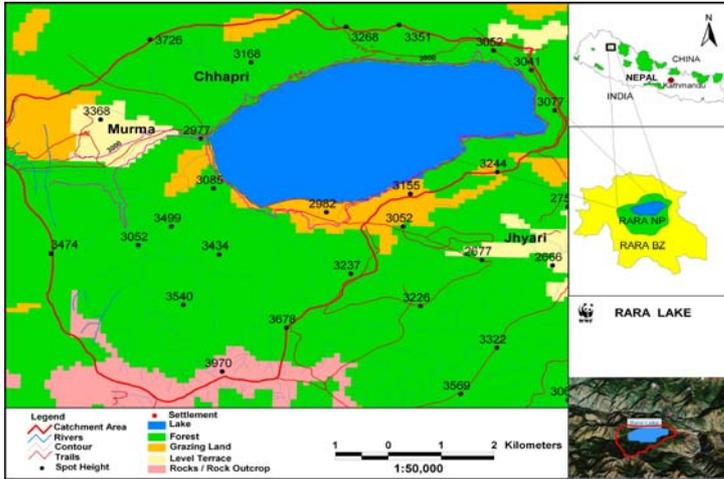


■ CONSERVATION MEASURES:

Phoksundo lake is situated in the Shey Phoksundo National Park and is under the management of the Department of National Parks and Wildlife Conservation of HMG/Nepal. Conservation and management of the park and the buffer zone is supported by the User committees and groups. Amchis (traditional healers) are mobilized for conservation and sustainable use of NTFPs. Local people are managing camping site and lodges to promote sustainable tourism.



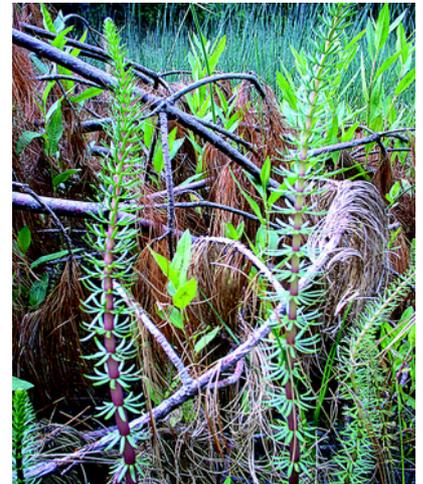
Rara Lake



■ BIODIVERSITY VALUE

Flora: Lake margin is surrounded by reeds (*Phragmites*), bushes (*Juncus*) and sedges (*Fimbristylis*). There are Phytoplanktonic algae and aquatic plants in the Lake water. Leathery leaves of *Polygonum* form oily floating layers and sessile plants (*Myriophyllum*) cover shallow area of Lake. The *Meconopsis regia*, *Primula poluninii* (terrestrial) and *Cirsium flavisquamatum* (Aquatic) are potential endemic species found in the catchments.

Dactyloctenium aegyptium, *Nardostachys grandiflora* and *Neopicrorhiza scrophulariflora* are among the most threatened species found based on the availability and field assessment.



Fauna: Zooplankton is higher in Rara Lake (1.62×10^5 ind/m³) which could support moderate fish population in Lake. Some of the groups of zooplankton recorded are *Chironomid* larvae, aquatic insects, *Diaptomidae*, and mollusk. The lake has a rich invertebrate aquatic fauna, Dytiscid beetle, 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 snow trout and migratory wildfowl.

Coordinates 29° 31'25"-29° 32'47" E Latitude
82° 04'-82° 07'30" N Longitude

Area 1061 ha as water body.

Length 5.1 Km, Width:2.7 Km, Depth:167m

Elevation 2,990 m asl., Shoreline: 14.0 Km.

■ OVERVIEW:

The Rara Lake is an alpine fresh water lake and is rich in nutrient content. Rara is the largest lake system in Nepal and is a unique and rare example of natural wetland type in the high Himalayan biogeographic region.

■ HYDROLOGICAL VALUE:

Water volume is 1.039 Km³. The water has coliforms which indicate that it can not be used for drinking purpose without treating. Suspended solids are higher in the outlet area (263 mg/l) compared to lake (<1.0) but lower than the WHO value (1000 mg/l)





Of the 235 bird species recorded, 49 species are wetland birds and most of them are migratory. Of them Ruddy

Shelduck (*Tadorna ferruginea*) is said to breed in Rara lake. Coot (*Fulica atra*) is plentiful in the lake and several of them stay even for the whole year. Resident wetland birds such as Eurasian Woodcock, Brown Dipper, Little Grebe and Wood Snipe are recorded from here. Great Crested Grebe and Black-necked Grebe are winter visitors and are suspected to be residing all the year round in lake Rara. Common Kingfisher, Crested Kingfisher, Black-crowned Night Heron, Great Cormorant are summer visitors and suspected to breed in the Lake Rara.

It is the habitat and resting site of winter visitor water birds such as Gadwall, Mallard, Northern Shoveler, Common Teal, Tufted Duck, Common Golden eye, Common Merganser, common Coot, and Solitary Snipe. There were records of 50 individuals of Tufted duck, 200 individuals of common coot, 85 individuals of great crested grebe, and 15 individuals of Black-necked Grebe (Scott 1989). 232 individuals of 5 wetland bird species were recorded in Asian waterfowl census 1994. The globally threatened bird cheer pheasant (*Catreus wallichii*) is found in the catchment area (Salleri, Lamichur, Bamichur and Rara) in the southern slope mixed with grassland, shrubs and scattered trees. Similarly, the other globally threatened bird Wood Snipe (*Gallinago nemoricola*) is probably the resident bird of Rara with rare status (5% chance-Giri 2005). Three endemic species of snow trout (*Schizothorax macrophthalmus*, *S.nepalensis*, *S.raraensis*) are reported from the lake out of total 8 endemic fish species of Nepal. Endemic frog *Paa rarica* is also found in abundance here. Smooth otter (*Lutra perspicillata*) is well represented mammal in the Lake. Other endangered mammals in the catchment area are Musk

deer, Red panda and Himalayan black bear. Snow leopard sometime passes through the upper part of the catchment (Chuchemara lake).

■ SOCIO-CULTURAL AND RELIGIOUS VALUES:

Thakur Babas temple is located towards the SE corner of the lakes 500m upwards. There is a belief that Thakur god had thrown an arrow to discharge the water of lake to reduce the potential damage by over flooding/damming. People are not much seen to be dependent on the daily livelihood directly on the lake. The tourism base of the social economy is dependent on wetland. Rara has not received over 200 tourists in any year and their number is going down since 1995.

■ THREATS:

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



■ CONSERVATION MEASURES:

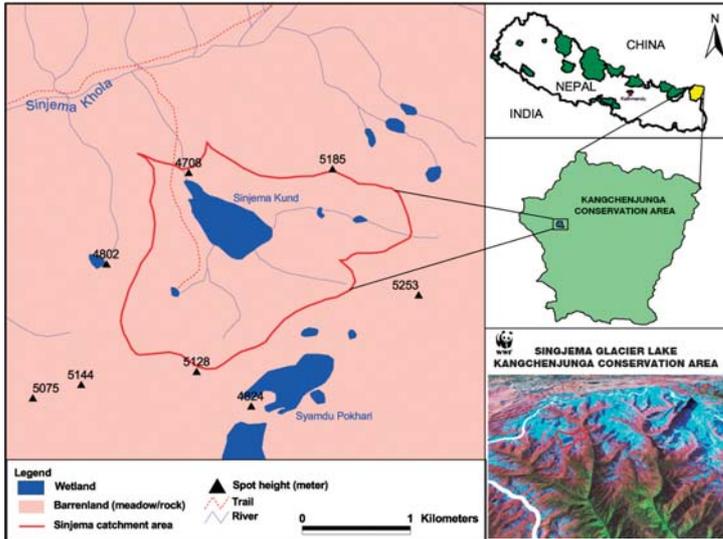
Rara Lake is situated in the Rara National Park and is under the management of Department of National Parks and Wildlife Conservation (DNPWC), Government of Nepal. The Park is protected with the help Nepal army and buffer zone with the help of local communities. As this area provides criteria listed by Ramsar 2006-2008, nominating this site by Government to declare as Ramsar would provide further support in the conservation of this high altitude wetland. The Buffer Zone has been declared and plan preparation is in process.





FACTSHEET

Singjema Wetland Series Kangchenjunga Conservation Area



Himalayan Eco-region complex. It is an important source of freshwater for Tamor River, one of the tributaries of Koshi river in Nepal feeding the Gangetic River basin.

■ BIODIVERSITY VALUES:

Flora: About 32 species of flowering plants have been recorded from the Singjema catchment including 3 endemic species of plants with rare, endangered and vulnerable species. Potential endemic plants found in this area include Lauener (*Aconitum staintonii*), Klotz (*Cotoneaster staintonii*), and Kitam (*Cremanthodium nepalense*). Other threatened species according to IUCN category are *Nardostachys grandiflora* (Vulnerable), *Neopicrorhiza scrophulariifolia* (Vulnerable), *Rheum australe* (Vulnerable), and *Swertia multicaulis* (Data Deficit).

Fauna: Brahminy Duck (*Tadorna ferruginea*) and common Pochard (*Aythya ferina*) have been recorded from the wetlands of Kangchenjunga Conservation Area but needs further observation in Singjema. Other birds recorded in the catchment are snow pigeon, white capped redstart and finches. The catchment is habitat of snow leopard and lower section of the catchment is the winter habitat of red panda and musk deer.

Coordinates: 27°45.44' E
87°46.81' N
Area: 25.23 ha
Length: 835 m
Elevation: 4671 m

■ OVERVIEW:

Singjema lake, where people believe to see the reflection of their own future and fortune, is an alpine freshwater oligotrophic lake with steep slopes creating a unique and representative wetland in the high Eastern





■ SOCIO-CULTURAL AND RELIGIOUS VALUES:

Singjema lake is considered by the local people and herders from Tibet as a wish-fulfilling lake. Unmarried women come to lake to worship in hope that they will get a handsome husband. People believe that slaughtering of animals within the vicinity of the lake angers the deity of the lake. Therefore, hunting is prohibited in the area and hunting musk deer is considered to deplete social status and property. The lake is also a freshwater source for cattle herders and down stream people.

■ THREATS:

- Unsustainable collection of NTFPs for trade
- Over grazing resulting in the growth of unpalatable and toxic plants
- Hunting of wildlife specially musk deer for cross-border trades



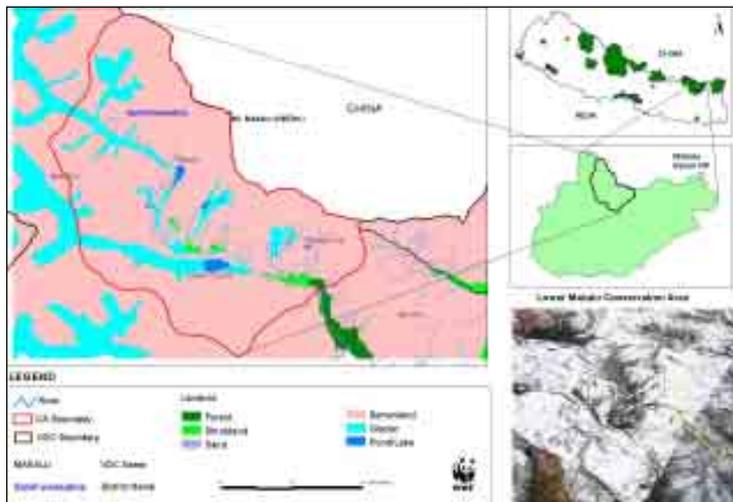
■ CONSERVATION MEASURES:

Singjema 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, mother groups and sub-committees like Snow Leopard Conservation Committee are actively managing the conservation area.



FACTSHEET

Thulo Pokhari & Associated Wetlands



The downstream area of the Thulo Pokhari lies inside the Makalu-Barun National Park and its buffer zone. Ishuwa khola, which mixes with Arun at Ishuwa Dovan is the discharge of Thulo Pokhari. The clean, unpolluted and regular supply of water downstream from Thulo Pokhari has high significance not only to the local communities of nearby villages but also to the downstream people.

■ HYDROLOGICAL VALUE:

The discharge in outlet is 0.355 m³ /second from Thulo Pokhari to Ishuwa Khola. The lakes are fed by glaciers during the winter and water from surrounding hills during the rainy season. Water from Keke and Sipton peaks constitute the main source. The average depth of the Thulo Pokhari is 50m. Hydrological function and values of wetland is high for ground water recharge, flood control, and sediment trapping.

■ BIODIVERSITY VALUE:

Flora: The endemic plants possibly found in Thulo Pokhari area are *Pedicularis pseudoregeliana*, *Carex himalaica*, *Kobresia fessiglumis*, *Ranunculus himalaicus* and *Ranunculus makaulensis*. Similarly, several species are considered as threatened species under different categories of CAMP and IUCN Red list.

Coordinates: 27° 41' 06"- 27° 42' 24" Latitude
87° 13' 15"- 87° 13' 05" Longitude

Area: 16.163 ha

Elevation: 3,900m to 4,210m

■ OVERVIEW:

Thulo Pokhari and other associated wetlands are glacial originated alpine fresh water lakes and are oligotrophic in nutrient content. Thulo Pokhari Lake system forms headwater of Ishuwa Khola, one of the tributaries to the Arun River.





About 56 species of rare and threatened plants have been recorded from the Makalu-Barun National park (MBNP) area by surveys done earlier by MBNP. Some of the potentially threatened plants around Thulo pokhari include *Aconitum gammiei*,

Aconitum spicatum, *Dactylorhiza hatagireia*, *Meconopsis paniculata*, *Rheum australe* and *Neopicrorhiza scrophulariiflora*.

Fauna: Previous studies have shown that among the 421 bird species recorded in Makalu-Barun National park, 3 species are entirely wetland birds and 26 species are wetland dependent. Himalayan Monal (*Lophophorus impejanus*), Olive-backed Pipit (*Anthus hodgsoni*) and Blyth's Pipit (*Anthus godlewskii*) are the bird species found during the direct observation. This site is habitat for migratory and residential birds and other wildlife species. Sheep and Chauri herders confirm the sighting of Snow Leopard and Ghoral etc.

Pika (*Ochotona sp.*) was common in the rocky areas of this valley and scat of Yellow Throated Martin (*Martes flavigula*) was seen in the area. The south section of the catchment is a habitat of Musk Deer (*Moschus chrysogaster*). The endangered Snow Leopard (*Uncia uncia*) is said to be found at the upper part of the catchment along with the Himalayan Thar (*Hemitragus jemlahicus*).

■ SOCIO-CULTURAL AND RELIGIOUS VALUES:

The cultural and religious importance of the wetland is reflected mainly during the rainy season. People from all castes from different places visit this place while going to worship Shiva Dhara and Parbati Cave. Limited people also visit Thulo Pokhari alone for religious purposes except for Janaipurnima. The Thulo Pokhari itself does not produce

fish or fingerlings due to its high altitude climatic condition (4,030m). Due to no public land and buffer zone in the Thulo Pokhari area, the forestry use is limited to few locations for decoration, timber and fuel wood requirement for cattle shed and teashops.

The religious importance of the site is high. Hundreds of people from Hindu and Buddhist religions go to that place on rainy season during Janaipurnima. Nomads are dependent on the wetland in relation to drinking, grazing etc. Other people only visit this place during Janaipurnima and rest of the rainy season. People of downstream depend on water for the domestic use.

■ THREATS:

- Overuse of fuel wood and non-timber forest products (NTFPs)
- Poaching of endangered animal species like musk deer
- Pollution caused by visitors and trekking tourists
- Overgrazing leading to the disruption of the natural succession process and increase in the onset of the invasive, unpalatable species

■ CONSERVATION MEASURES:

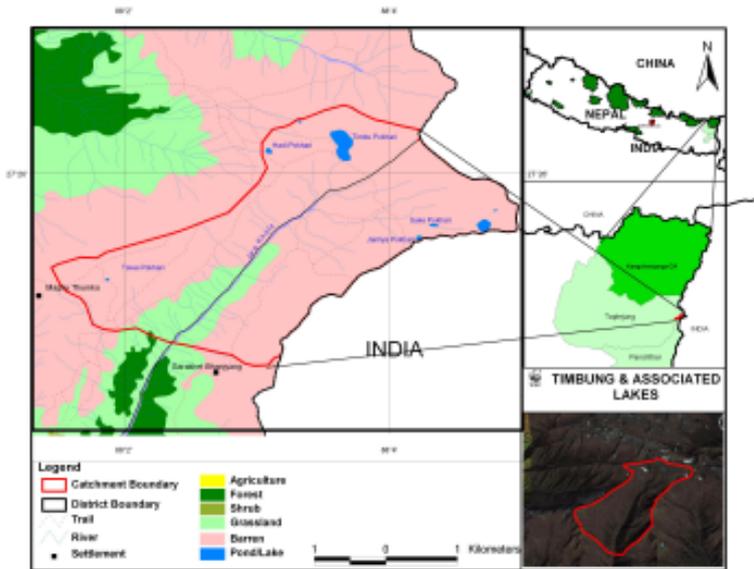
Thulo pokhari falls under the ownership of Makalu Barun National Park. The Ministry of Forests and Soil Conservation, Government of Nepal is the legal authority and the park is governed by the National Parks and Wildlife Conservation Act 2029 BS (1973) and Himali Rastriya Nikunja Niyamawali 2036 BS (Mountain National Parks Regulation 1979). NTFPs use for domestic purpose and traditional use is permitted. National park authority conducts regular field visits and also takes care of conservation and management of the catchment area. As this area provides criteria listed by Ramsar Convention 2006, nominating this site by the government to declare a Ramsar site would provide further support in the conservation of this high altitude wetland.





FACTSHEET

Timbung and Associated Lakes



Coordinates: 27° 26.25' N
88° 03.44' E

Area: 26.73 ha

Elevation: 4,343 m

OVERVIEW:

Timbung Pokhari lake system in Taplejung district is a unique and rare example of natural wetland type in the high Himalayan biogeographic region. It lies in the central Himalaya towards the northeast part of Nepal adjoining Sikkim, India at an altitude of about 4343 m. It provides water to the Kabele River that drains ultimately to Koshi River, one of the four major rivers of the country in Nepal.

Timbung Pokhari is naturally originated lake. The lake is surrounded with steep rock cliffs along the eastern and northern sides. The drian is in the south and worshipping sites in the west. Most of the area is rock and alpine rangeland.

There are six irrigation canals downstream of the lake and drinking water for grazing animals from Iwa river. Temperature may range up to -20 °C. The lake gets frozen for about 3-4 winter months and melts slowly by the end of Feb and early March. The summer is mild with pronounced rain from June to September. The rest of the months are mild cold and are optimum for tourism purpose.

HYDROLOGICAL VALUE:

Water discharge of Timbung Pokhari in monthly basis ranges from 8.77 l/s (April) to 219.23 l/s (August).

The depth of the Timbung Lake is said to be 70 m as per local people and their information is based on a foreign technical team. Water level of Timbung Pokhari rises during snow melting time (April-May), during rainy season (July-August) and decreases from mid September to March.

BIODIVERSITY VALUE:

Flora: About nineteen common species of plants have been recorded in the core area of Timbung Pokhari: *Rheum australe* (VU), *Saussurea tridactyla*, *Androscia spp.*, *Bergenia ligulata*, *Heraclium spp.*, *Rhododendron lepidotum*, *Primula spp.*, *Rhodiola spp.*, *Potentilla spp.*, *Meconopsis regia*, *Meconopsis grandis*, *Neopicorrhiza scrophulariiflora* (VU), *Dactylorhiza hatagirea* (EN), *Lichens*, *Lobelia pyramidalis*, *Laggera alata*, *Aconitum bisma*, *Aconitum spicatum*.

Among them *Rheum australe* and *Neopicorrhiza scrophulariiflora* are vulnerable species and *Dactylorhiza hatagirea* is endangered species.

Saussurea tridactyla



Khokkim (*Rheum australe*)



Padamchal (Rheum nobile)



Heraclium lallii





Fauna: Timbung Pokhari area is the resting site of wetland birds, Common pochard (*Aythya ferina*) and globally threatened Wood snipe (*Gallinago nemoricola*-Vu-IUCN) and many other species.

Twenty seven species of wetland birds excluding Ruddy Shelduck have been suspected to occur from the catchment of Timbung Pokhari. Since 5-6 years, Ruddy Shelduck is not observed in this lake.

Rare and vulnerable species Snow leopard (*Uncia uncia*), Musk Deer (*Moschus chrysogaster*) and Red Panda (*Ailurus fulgens*) are also found. Snow leopard occasionally passes through the upper part of the catchment area. The Musk Deer and Red Panda use the catchment area.

■ SOCIO-CULTURAL AND RELIGIOUS VALUES:

Timbung Pokhari is the sign of hope of people. People are closely tied up with Timbung Pokhari to reduce the unwanted problems and protect from the evils. Similarly, this area provides large amount of water to the people of lower belts including drinking water, irrigation facilities, fishes and material (sand and stone etc).

According to the Hindu ancient religion, Timbung Pokhari is considered as an emblem of Sakshat Bishnu, the god of savior. Normally the purpose of people to visit and worship of Timbung Pokhari is to fulfill their own internal desires that are not easily achievable. People are not allowed to take bath at Timbung pokhari. Pilgrims have to take bath at Kanchhi Dhara, nearby to Timbung Pokhari.

At Timbung Pokhari, normally, pilgrims visits four times in a year at 15 Shraavan (~July 30), Nag Panchami (~18 August), Janai Purnima (~28 August) and at Krishna Astami (~4 September) festivals in a year ranging from 740- 875 pilgrims.

■ THREATS:

- Overgrazing
- Unsustainable harvesting of NTFPs
- Killing of wildlife
- Solid waste pollution
- Unsustainable firewood collection

■ CONSERVATION MEASURES:

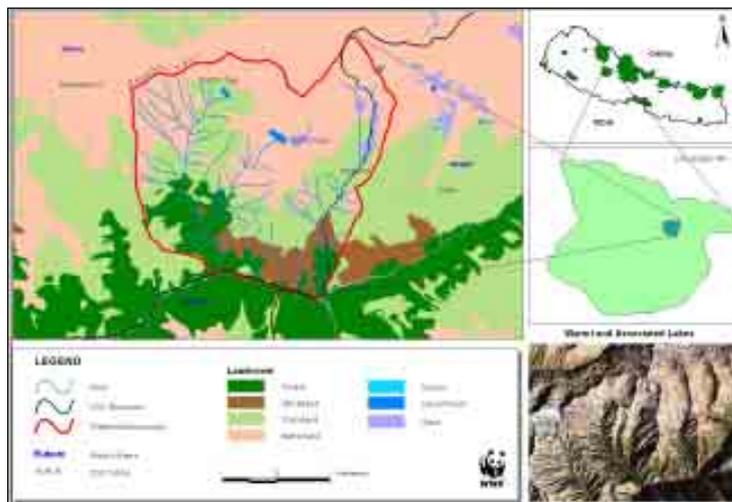
Different user groups and committees have been formed for the conservation and management of the Timbung Pokhari area.

The Mountain Institute (TMI) has established Pastureland management committee to regulate the pastures and management of rangeland. TMI has planned to build an incinerator. A notice board is also erected by an NGO funded by TMI that to aware people not to leave rubbishes elsewhere. Kangchenjunga Users Committee (KUC) is working actively at Yamphudin and its territory. It mobilizes people to control poaching regularly and aware people for the conservation and sustainable utilization of natural resources. At Yamphudin, newly established Timbung Pokhari Community Forestry users group has started to patrol over its area to avoid the illegal collection of NTFPs by outsiders. To reduce the pollution, Pastureland Management Committee (PMC) is trying to manage the cattle's and rangeland. At core area of Timbung Pokhari, about 4 years ago, a people from Surumkhim, named Kishor Rai has started to manage the rubbish of the surrounding area of Timbung pokhari. After his innovative initiation, nowadays 2 herders are managing the rubbishes of core area of Timbung Pokhari, in co-ordination with Kangchenjunga Landscape Concern Group (KCG). KCG has started to raise awareness about Rhododendron and improved cattle farming at their own home for better livelihood option and to protect the fragile Himalayan forest and environment.



FACTSHEET

Warmi Lake System



glaciers of Churen mountain and is fed by Warmi, Parmi and Hepu lake systems. The river forms a steep forested valley from which the high and rugged mountain range Chaluke range rises (Wegge 1976).

■ HYDROLOGICAL VALUE:

The lake has two prominent inlets or glaciers from which the water volume of the lake is maintained. It has only one outlet on its southern shore, which joins Gustung River while passing through rocky cliffs and gorges. The level of water is high in rainy season and after the melting of ice. The water users downstream are few traditional ghatta users and many domestic users who reside distant from Gustung and Warmi River confluence.

■ BIODIVERSITY VALUE:

Flora: The most expensive medicinal plant species *Cordyceps sinensis* is available at the catchments of Warmi Lake. *Primula*, *Potentilla* and *Anemone* species have a large presence in the lake catchments. The genera *Pedicularis*, *Potentilla*, *Primula*, and *Rhododendron* possess the higher number of species. Several threatened plants such as *Cordyceps sinensis*, *Dactylorhiza hatagirea*, *Taxus wallichiana*, *Neopicrorhiza scrophulariflora*, *Abies spectabilis* and *Pinus wallichiana* under IUCN, Government of Nepal and CITES category and number of endemic plants have been recorded from the catchment and lake areas. *Podophyllum hexandrum*, *Nardostachys grandiflora*, *Taxus wallichiana*, *Prunus carmesina* are some of the threatened plants around the Warmi Lake.

Coordinates: 28° 39' 29.9" North Latitude
83° 06' 29.7" East Longitude

Area: 15 ha

Elevation: 4490 m

■ OVERVIEW:

The Warmi lake is a freshwater lake and oligotrophic in nutrient content. The lake is bowl shaped with southern end straight and northern end dentate and lies at the base of Churen mountain. The lake system is composed of three lake series, Hepu, Warmi and Parmi, the drainage from which supplements Gustung river system. Gustung and Monsoon rivers join just below 1 km distance from the Monsoon mela and both form and provide services to the downstream residents. The villagers of Hukam, Maikot, Taksera use the water from the river. The Gustung River originates from the





Fauna: *Satyr tragopan*, Koklas pheasant, Cukor partridge, Blood pheasant, Red and yellow billed cough, Egyptian vulture, Crag martin, House martin, Finches, Upland pipit, Black stork, Wall creeper, Oriental skylark, Danphe (*Lophophorus impejanus*) are important birds of the reserve. Himalayan snow cock (*Tetraogallus himalayensis*) and snow partridge were also observed in this area. *Catreus wallichii* (Cheer) is decreasing by 18.75% in Dhorpatan Hunting Reserve due to the hunting, habitat fragmentation and degradation, predation and inbreeding.

Two wetland birds, Ruddy shelduck (*Tadorna ferruginea*), Shoveler (*Anas clypeata*) are found in the Warmi Lake. Yellow billed chough (*Pyrrhocorax graculus*) and Large billed crow (*Corvus macrorhynchos*) are dominant at Warmi and its catchment areas.

Present study did not find any herpeto fauna in Warmi lake. Fish species were not recorded in the Warmi Lake during the survey which may have been due to the climatic conditions. Faecal matter of snow leopard was abundant around Warmi and Hepu Lake and Monson mela. Foot prints and fresh grazing signs of blue sheep were observed at Warmi Lake.



■ SOCIO-CULTURAL AND RELIGIOUS VALUES:

Warmi Lake is sacred and has a religious importance as a pilgrimage. There was a tradition to pay homage and offer coin to the lake while crossing the area. According to a local belief, a person who sees the lake the first time is called *Panthe* and this person should offer coin to the lake. The research team found a copper coin from late king Prithivi Narayan Shah clearly revealing that the site had sacred and pilgrimage value since very early times.

The water users reside at a distance from Gustung and Monson River confluence. Mainly the users of Hukam, Maikot, Taksera villages consume water for their needs. The traditional usages are mainly for drinking water by human beings and livestock of the villages. A trail along the Warmi and Parmi lakes was reported being used as a trading route to carry salt from Tara Bhot, Charka Bhot and Tibet, but now it is not used after availability of iodinated salt from nearby markets.

■ THREATS:

- Encroachment
- Overgrazing
- Over-exploitation of the non-timber forest products (NTFPs), especially highly threatened species
- Hunting and poaching
- Pollution caused by visitors and trekking tourists
- Overgrazing leading to the disruption of the natural succession process and increase in the onset of the invasive, unpalatable species

■ CONSERVATION MEASURES:

Warmi Lake system falls under the ownership of the Dhorpatan Hunting Reserve. The Ministry of Forests and Soil Conservation, Government of Nepal is the legal authority and the park is governed by the National Parks and Wildlife Conservation Act 2029 BS (1973) and Himali Rastriya Nikunja Niyamawali (Mountain National Parks Regulation) 2036 B.S (1979). Grazing is allowed as traditional right and game hunting is permitted after paying royalty to the government and with community's consent. Collecting timber and non-timber forest products is permitted to locals through the permission of the chief conservation officer and banned for any commercial purpose.