
Brief Document on Wetlands of Sikkim



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Submitted by

**Sikkim State Wetland Authority
Environment & Soil Conservation Circle
Forest & Environment Department
Government of Sikkim**





GOVERNMENT OF SIKKIM



Shri Karma Loday Bhutia
MINISTER
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MESSAGE

Sikkim, nurturing vast expanses of forest cover and an astounding diversity of life forms is a cornerstone of India's rich biodiversity. In recent years, the Himalayas witnessed a series of calamities that impacted the ecosystem and biodiversity, and its communities of which Sikkim is a part. Understanding the current correlation between the Himalayan ecosystem and the climate factors, the National Action Plan on Climate Change (NAPCC) launched the National Mission for Sustaining the Himalayan ecosystem in 2010. The mission successfully provided inputs for Himalayan sustainable development while also addressing the protection of a fragile ecosystem. Under the National Wetland Conservation Programme, Sikkim has been playing a constructive role in contributing to the mission and identified wetlands as crucial for conservation to protect the rich biodiversity surrounding these wetlands. Through the initiatives carried out by the Sikkim State Wetland Authority, our state has been the forefront of protecting the wetlands and has set a successful example for other state with similar topography/ecosystems on sustainable wetlands management practices. The Sikkim State Wetland Authority, Forest and Environment Department has published the "Report on Preparation of Brief Document on Wetlands of Sikkim" enumerating and cataloging biophysical parameters of the Wetlands in the state. I congratulate the relentless efforts of PCCF, Sikkim and his team in bringing out the report and the arduous task of collecting data from inaccessible wetlands. This book while appealing to a wide range of stakeholders, will specifically be useful to the personnel of the Sikkim Forest Department as a field guide for wetlands of Sikkim. To document the state of the wetlands in Sikkim is the first step towards the conservation of biodiversity sustained by these wetlands and I am happy that Forest and Environment Department (FED) have come up with this publication helping our field staff for times to come.

Shri Karma Loday Bhutia, Minister



GOVERNMENT OF SIKKIM

**Shri M.L. Srivastava, IFS
Addl. Chief Secretary-cum-PCCF
Forest and Environment Department
Government of Sikkim**



MESSAGE

Wetlands are critical for human development and have great ecological significance. Sikkim, with its high altitude lakes fed by glaciers and precipitation are considered sacred in local culture. They are a highly productive eco-system that provides home to diverse flora and fauna. Despite their immense cultural and ecological impact, wetlands are under threat from changing climate and weather patterns.

Realizing the importance of wetland to our local communities and biodiversity, the State Wetland Authority, under the auspices of Environment Circle of Forest & Environment Department, have published this report logging bio-physical parameters for all the wetlands in Sikkim. This is the first comprehensive report of wetland parameters setting the ground for future studies in our state. Both in-situ and remote sensing techniques were used to bring forth this report and this represents a significant effort of our department and its officers to bring about clarity of thought and action in further protection and management of the wetlands under our care.

I congratulate the team of officers from the Environment & Soil Conservation Circle of the Forest and Environment Department and the IORA Team, who helped us bring this report to the public. I would also like to thank the field staff and IORA team who helped in this endeavour by faithfully tracking the undulating and tortuous terrain of our state and recording the scientific wetland parameters.

I hope readers will find this report informative and interesting.

M.L. Srivastava, IFS



Ms Urmila Thapa, SFS
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ACKNOWLEDGEMENT

Wetlands play a vital role in maintaining ecological balance and also support numerous social and cultural activities in the state. The Sikkim State Wetland Authority (SSWA) was reconstituted in 2020 for conservation and management of wetlands in the state.

Fostering this perspective and approach, this study summarises the geospatial approaches used for delineating the wetland area, while monitoring the wetlands and identifying the risks to the wetland ecosystems in this region.

This Brief Document of 140 lakes is prepared in accordance with Wetland (Conservation & Management) Rules, 2017. The document elucidates the ecological characteristics of the wetlands like, wetland boundary, zone of influence, land-use and land cover, water regimes, climate settings, biodiversity and other site characteristics. The brief document is an essential tool in the hands of wetland managers as it would equip the managers with all the information of the site, including the areas that need attention. This will help better plan and conserve the wetlands in a holistic manner.

Bringing this extensive report to life would not have been possible without the patronage of many individuals and organisations, and the team sincerely recognizes their support.

We are thankful to the Shri. Karma Loday Bhutia - Hon'ble Minister, Forest and Environment Department, Mines & Geology, Science & Technology Departments, Government of Sikkim, who also being the Chairman of Sikkim State Wetlands Authority (SWA), provided his invaluable time and suggestions throughout the project. The team thanks him for providing with all the necessary permissions for pursuing the work related to this report.

The team also benefited from the various feedback provided by Shri. M. L. Srivastava, IFS ACS -cum- PCCF, Shri N.W. Tamang, IFS, CCF (HQ), Shri B.B. Gurung, IFS, Director Environment and soil conservation, Forest and Environment Department, Government of Sikkim, and therefore acknowledges their contributions towards making this report a success.

Additionally, SSWA also acknowledges the contributions of Sikkim ENVIS Hub and IORA Ecological Solutions in facilitating the technical team, especially their field functionary Dr. Parul Srivastava, Mr. Neeraj Agrawal, Mr. Dharmendra Lamsal and Mr. Ugen Bhutia.

To conclude, we once again wish to thank all the individuals and their respective institutions who contributed their time and expertise towards the realisation of the objectives of this report.

Ms Urmila Thapa, SFS

List of Abbreviations

Acronym	Expansion
ATREE	Ashoka Trust for Research in Ecology and the Environment
CBD	Convention on Biological Diversity
CUS	Central University of Sikkim
DEM	Digital Elevation Model
FEWMD	Forests, Environment & Wildlife Management Department
GBPIHED	G.B. Pant National Institute of Himalayan Environment & Sustainable Development
GLOF	Glacial Lake Outburst Flood
HNBGU	Hemawati Nandan Bahuguna Gharwal University
ICAR	Indian Council of Agricultural Research
ISRO	Indian Space Research Organization
NESAC	North Eastern Space Application Centre
NRCD	National River Conservation Directorate
RS & GIS	Remote Sensing & Geographical Information System

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1. Abstract

Wetlands accommodate rich floral and faunal diversity, regulate nutrient cycling for surrounding ecosystems, filter out suspended solids, and foster carbon sequestration. In addition to the aforementioned ecological and environmental services, high altitude wetlands in particular, play a vital role in water retention, thereby alleviating the effects of extreme weather events on downstream ecosystems and settlements by creating a buffering impact, and providing a natural solution for mitigation of disasters in this region. Natural disasters such as Glacial Lakes Outburst Floods (GLOF) in the Himalayas in particular, pose severe challenges for the communities along with the ecosystem and biodiversity resources in the downstream regions. Therefore, the management of such wetlands is imperative; and it requires a holistic approach including the use of technology and historical data analysis for the preparedness against such disaster events. During the last few decades, the advancement in the domain of remote sensing and geospatial technology, including availability of real-time moderate and high-resolution satellite data, as well as development and utilization of machine learning approaches have fostered mapping and monitoring of high altitude wetlands in the Himalayan region, thus facilitating disaster management substantially. The present study utilizes geospatial approach to delineate the wetland area, along with monitoring the wetlands as well as identifying the risks to the wetland ecosystems in this region.

2. Introduction

Wetlands are amongst the most productive and biologically rich ecosystems that are mostly endangered. Changing climate, anthropogenic factors are increasingly threatening the wetlands. Serious concerns are being voiced among scientists, planners, sociologists, politicians, and economists to conserve and preserve the natural resources of the world. Wetlands are one of the most important and reproductive ecosystems of earth and provides wide array of benefits to mankind. Wetlands include rivers, lakes, reservoirs, etc., are the most precious life sustaining water resources. Besides playing a crucial role in the hydrological cycle, wetlands are the most productive ecosystems of the world and a potential source of carbon sequestration, although they account only for about 4% of the earth's ice-free land surface (Prigent et al. 2001). Wetlands also contribute in the regulation of water quantity and ground water recharge, and regulation of flood. It also helps in erosion control and sediment transport, thereby contributing to land formation and increasing resilience to storms, finally, improving water security, including security from natural hazards and climate change adaptation (CBD, 2015). On the other hand, formation of glacial lakes in the higher altitudes pose threats for downstream areas. Glacial lakes in the Himalaya are known to have mostly formed within the last 5 decades that can be attributed to warming in the Himalayas in the between 0.15°C and 0.60°C per decade (Shrestha et al. 2010). As a result of global warming, the glacial lakes are increasing in number and size. The Glacial Lakes Outburst Floods (GLOF) events have trans-boundary effect resulting in loss of lives, as well as the destruction of houses, bridges, fields, forests, hydro-power stations, roads, etc. Regular monitoring of glaciers and glacial lakes and adaptation measures including early warning systems and mitigation measure are required in areas vulnerable to GLOF (Bajracharya 2006).

In order to conserve and manage wetlands, and also from the view of disaster preparedness from GLOF, an inventory of wetlands and their catchments is necessary. Towards this, digital maps are very powerful inventory tools as they relate the feature to any given geographical location and has a strong visual impact. Maps are thus, essential for monitoring and quantifying change over time scale thereby assisting in decision making. The proposed study is an attempt to map wetlands by using geospatial techniques, ground truthing and habitat assessments (physical, chemical, biodiversity ecosystem services) in conformity with the Wetlands (Conservation and Management), Rules 2017.

The study used both optical (Sentinel 2A; 10m spatial resolution) and Synthetic Aperture Radar (SAR) (Sentinel 1A) satellite to assess the spread of water in the high altitude wetlands as well as analysis of land use and land cover within a 2 km buffer around the lake. The basis for selection of 2 km buffer was to assess the influence of various land use and land cover on

the wetland(s) themselves. The aquatic extent of the wetlands vary greatly between the pre- and post-monsoon season. Therefore, in order to get clarity regarding the spatial extent of the wetland boundary, both pre- and post-monsoon satellite images were utilized for the delineation of boundaries to visualize the seasonal changes in the wetlands. SAR data has also been utilized in order to map high altitude wetlands where cloud-free optical data was not available. For the digital demarcation of the wetland boundary, Normalized difference water index (NDWI, McFeeters 1996) was calculated with optical satellite data of Sentinel 2A where two spectral bands corresponding to green and near infrared wavelengths were used:

$$NDWI = \frac{GREEN - NIR}{GREEN + NIR}$$

NDWI values range between -1 to +1, where values near +1 denote high probability of water pixels. Different threshold values were tested for differentiating between water and non-water pixels, to obtain the maximum accurate extent of water bodies. Finally, a threshold value of 0.21 was used, which was observed to separate water from non-water pixels effectively. A focal majority filter of size 3x3 window was applied on the classified image to remove speckle noises and to get the final extent of the wetlands for the post-monsoon season. The results indicated that the aquatic extent of the wetlands increase during the post-monsoon season in contrast to other wetland types in the country (Bassi et al. 2014). The optical data was further classified using a hybrid approach of classification for the assessment of land use and land cover around the wetland. A total of eight land-covers were identified and classified, followed by verification through post-classification survey within the zone of influence. In addition, SAR images were also used to demarcate the wetland boundary in areas where cloud-free optical data was not available. However, an iterative exercise is required to validate the observations from this mapping. For the present study, the outputs of SAR data were found to be in sync with the results of the optical data analyses.

One more critical aspect in the wetland mapping and assessment was the delineation of the zone of influence around the wetland, to estimate the impact that various land use has on the wetlands. Although any developmental activity in a catchment area affects the wetlands and is considered as the zone of influence for that wetland, any change in the land use in a watershed as small as micro-watershed in the high altitudes can have a direct effect on the downstream. Therefore, the micro-watershed boundary was delineated using ArcGIS hydro-analysis tool and ASTER DEM with 30 m spatial resolution. The wetlands with area >0.5 ha were further surveyed to assess the land use and land cover and other characteristics of the wetlands. A total of 5 micro-watersheds were identified in Sikkim with East District consisting of two micro-watersheds, viz. Dik Chhu and Rangpo Rongli Khola. The total number of

wetlands observed in Sikkim are approximately 534, covering 3325 ha area (SAC 2011). In addition, there are 276 smaller wetlands with small to very small spatial extent (<0.5 ha).

Most of the wetlands in this region are permanent; they regulate the groundwater for the surrounding ecosystem including the catchments in the downstream. In addition, most of the lakes in Sikkim are at an altitude above 4000 m. Although there have been many regulatory efforts made both by the government as well as non-governmental institutions through consultative and collaborative efforts, knowledge regarding the physical environment along with their management for many wetlands is still limited. Some evidence landscape can differ considerably from the functions observed at individual wetland scales. This applies to the provisioning of ecosystem services such as biodiversity support, groundwater level and soil moisture regulation, flood regulation, and contaminant retention, and in such cases, the function or the services arising out of the lakes needs to be assessed individually or at a micro-watershed level.

2.1 Objective

The primary objective of the project is to prepare 'Brief Document' on all the wetlands of the Sikkim State to facilitate implementation of Wetlands (Conservation and Management) Rules, 2017. The 'Brief Document' shall be a comprehensive digital inventory of all Wetlands of the State that shall include:

1. Digital demarcation of wetland boundary and validated by ground truthing;
2. Demarcation of its zone of influence at appropriate scale;
3. Preparation of Land use/Land cover;
4. Accounting of pre-existing rights and privileges;
5. Listing of site-specific activities to be permitted within the wetland and its zone of influence;
6. Listing of site-specific activities to be regulated within the wetland and its zone of influence; and
7. Modalities for enforcement of regulation

2.2 Major Activities and Deliverables

Table 1: Major activities and deliverables list

S. No.	Activities/Deliverables	Expected Outcomes
1.	Demarcation of Wetland Boundary	The mapped boundary of all the wetlands falling in the MMU criterion

2.	Demarcation of Zone of Influence of Identified Wetlands	Maps on wetlands at scale 1:25,000 (area 500ha) and at 1: 10,000 (area <500ha) and generation of statistics
3.	Listing Traditional Rights & Privileges	List of all the existing traditional rights and privileges for all the mapped wetlands
4.	Modalities for Enforcement of Regulation	List of wetlands prioritized for notification with the information on modalities for enforcement & Brief document for all mapped wetlands in compliance with Wetlands (Conservation and Management) Rules, 2017

3. Methodology

3.1: Preparation of Wetlands Sampling Plan

- Sample size calculation was done using Cochran’s formulae.
- Cochran (1977) developed a formula to calculate a representative sample for proportions as :

$$n_0 = Z^2 pq / e^2 \dots\dots\dots \text{Eq. 1}$$

Where, n_0 is the sample size, Z is the selected critical value of desired confidence level, p is the estimated proportion of an attribute that is present in the population, $q = p - 1$ and e is the desired level of precision

- Cochran pointed out that if the population is finite, then the sample size can be reduced slightly. This is due to the fact that a very large population provides proportionally more information than that of a smaller population. He proposed a correction formula to calculate the final sample size in this case which is given below:

$$n = \frac{n_0}{1 + \frac{n_0 - 1}{N}} \dots\dots\dots \text{Eq 2}$$

Where, n_0 is the sample size derived from equation (1) and N is the population size.

- Wetland sample selection was done keeping Z value of 90 percent confidence interval at ± 5 % precision level and assuming maximum variability which is 50 %. This will cover all the characteristic of wetlands.
- Area-weighted simple random sampling technique was used to identify the sample locations.

3.2: Implementation Plan & Inception Workshop/Report

An inception workshop to this effect was held on May 8, 2018 and comments/suggestions given by members were duly addressed. Subsequently, an inception report detailing the methodological approach and implementation plan was prepared and shared with the Forest and Environment Department (FED).

3.3: Field Survey

The team started the field survey from Tsomgo Lake in East District of Sikkim as suggested by the members during inception meeting May 8, 2018. As on date a total of 27 wetlands have been surveyed for assessing the ecological characters (the sum of ecosystem components, processes and services that characterize the wetlands); account of pre-existing rights and privileges (special entitlement granted to restricted group or persons, on a conditional basis that can be revoked); list of site-specific activities to be regulated within the wetland and its zone of influence; and modalities for enforcement of regulation, prioritization and identification of wetlands through Survey and Ground truthing. Few of the lakes in the East district such as Tsomgo Lake was observed to be under anthropogenic pressure (Photo 1a&1b), resulting in inferior water quality of the lake and eventually could also lead to various ecological imbalances like soil erosion & siltation of the lake. The details of the surveyed wetlands is given in Annexure 1 & 2.

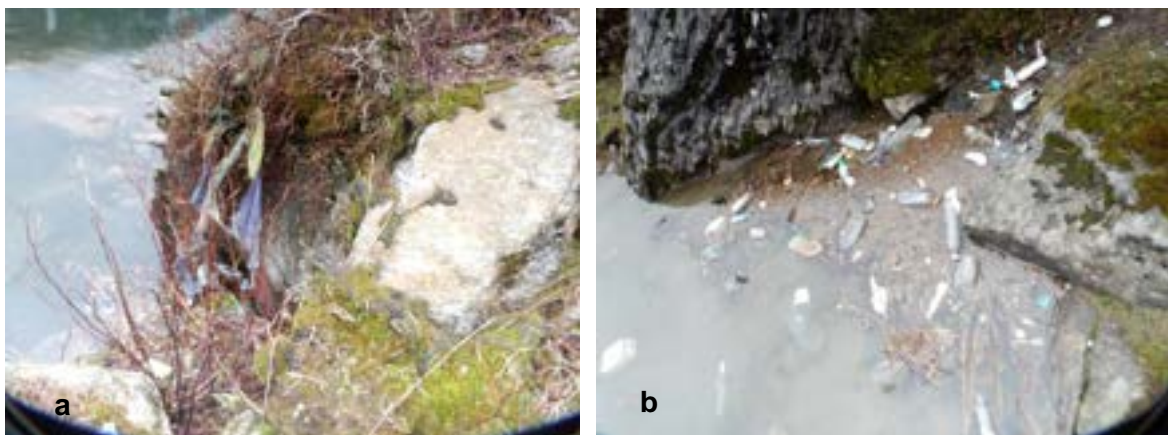


Figure 1: Plastic bottles lying around the Tsomgo lake

East Sikkim Field Description

Initial phase of fieldwork was carried out from Tsomgo Lake in East District of Sikkim as per the suggestions from the members during the inception meeting on May 8, 2018. Till date, we have surveyed a total of 27 wetlands; the survey consisted of

- a. Assessment of ecological characters (the sum of ecosystem components, processes and services that characterize the wetlands),

- b. Accounting of pre-existing rights and privileges (special entitlement granted to restricted group or persons, on a conditional basis that can be revoked),
- c. Recording of site-specific activities to be regulated within the wetland and its zone of influence, and
- d. Finally, analyzing modalities for enforcement of regulation, prioritization and identification of wetlands through survey and ground-truthing.

Similar surveys were also conducted for the wetlands of West and North Sikkim as well. Few of the lakes in the East district such as Tsomgo Lake was observed to be under anthropogenic pressure (Photo 1a&1b); inferior water quality of the lakes could eventually lead to various ecological imbalances, soil erosion as well as siltation of the lakes. The major plant and animal species observed in the east Sikkim wetland include *Primula sp*, *Potentilla arbuscula* (Sanjinee), *Toral*, *Rhododendron fulgens* (Chimal), *Juniperus recurva*, *Pteris subquinata* (Silver fern), *mask plant*, *Jurmura* and *Myophonous caeruleus* (Bird Kalchura), *Blue chip*, *Lophophorus* (Monal), *Dafe*, *Ducula melanochroa* (Black pigeon), *Moschus chrysogaster* (Musk Deer), *Ursus thibetanus* (Himalayan Black Bear), *Barking deer*, *Cuon alpinus* (Feral Dog) and *Vulpes vulpes* (Fox). A detailed list of the 27 wetlands which were surveyed during the field are as follows:

S.No.	Wetland Name	Latitude	Longitude	Area of wetland (ha)
1	Anda Pokhari Lake	27.40774	88.77811	0.77
2	Aritar Lake	27.18617	88.67615	1.24
3	Biren Jheel	27.42000	88.79000	0.51
4	Tsomgo, Changu (Recognized Wetland)	27.37615	88.76710	24.47
5	Dogra Lake	27.39674	88.78852	1.69
6	Gorkha Lake	27.39243	88.77660	0.50
7	L Lake	27.40160	88.79630	0.91
8	Manju Lake (Below Sherathang Mart)	27.38261	88.80900	1.99
9	Memencho Lake	27.34851	88.81940	18.23
10	Nakchuk Lake 2	27.39680	88.77690	0.15
11	Nakchuk Lake	27.39380	88.77830	0.19
12	Pangolakha Wildlife Sanctuary 14	27.37710	88.78370	0.34
13	Parapara Lake	27.41830	88.78240	0.40
14	Phidang Lake	27.33040	88.84610	26.24
15	Stone Lake	27.39390	88.78820	0.45
16	Three Sister One Lake	27.40220	88.76940	6.94
17	Three Sister Two Lake	27.40430	88.76660	1.75
18	Yakla Lake	27.38720	88.80140	7.49
19	Black Lake	27.39700	88.79402	2.26

20	Hangu Lake	27.36761	88.82902	11.44
21	Nathula 1	27.39144	88.81519	1.53
22	Nathula 2	27.38033	88.82297	1.16
23	Gnathang Valley 1	27.30794	88.83947	1.57
24	Gnathang Valley 2	27.30567	88.83414	0.88
25	Gnathang Valley 3	27.28544	88.80936	0.15
26	Elephant Lake2	27.33817	88.83958	0.56
27	Yakla 2	27.38739	88.81158	0.95

West Sikkim Field Description

Second phase of the fieldwork covered the West Sikkim area during the months of September & October for the years 2018 & 2019; presence of numerous wetlands and inaccessible terrain during the rest of the year makes fieldwork almost impossible. We have surveyed a total number of 32 wetlands in this area, investigating the same sets of ecological and environmental parameters as we had surveyed for the wetlands of West Sikkim (East Sikkim Field Description - a, b,c and d). Major lakes covered in West Sikkim are Khecheopalri lake, Samiti Lake, Kathok Lake, Goecha La Lake, Dallay Pokhari, Dudh Pokhari Lake, Lam Pokhari Lake, Laxmi Pokhari Lake, Neer Pokhari Lake, Rathong Chu Lake and Tin Kunay Lake. The major plant and animal species observed in the West Sikkim wetland are *Rhododendron sp*, *Rheum nobile*, *Potentilla sp*, *Primula sikkiminses*, Grasses, *Picrorhiza scrophulariiflora* (Kutki), *Nardostachys jatamansi* (Jatamansi), *Juniper*, *Anaphelis*, *Bistorta affinis*, *Larawa*, *Columba leuconota* (Snow pегion), *Moschus fuscus* (Musk Deer), *Dafay*, *Lophophorus impejanus* (Monal), *Pseudois nayaur* (Blue sheep), *Panthera uncia* (Snow Leopard) and *Ithaginis cruentus* (Blood Pheasant). A list of the 32 wetlands surveyed during the fieldwork have been provided below:

S.No.	Wetland Name	Latitude	Longitude	Area of wetland(ha)
1	Laxmi pokhari2	27.43742	88.08597	12.42
2	Jumlay 2	27.43228	88.09019	0.61
3	Jumlay 1	27.43144	88.08815	1.43
4	Ram Laxuman	27.49369	88.04856	0.32
5	Mazur	27.49119	88.05036	1.22
6	Goru	27.48475	88.05542	0.14
7	Neer2	27.47725	88.05744	8.50
8	Neer1	27.50806	88.19758	3.10
9	Akha	27.49573	88.20217	
10	Ladwa	27.49692	88.19181	0.39

11	Surkey	27.55753	88.189	0.15
12	Samiti	27.56094	88.18769	3.10
13	Dallay	27.48447	88.21647	1.77
14	Goecha la	27.60597	88.18611	0.25
15	Sukhey	27.48264	88.15436	6.89
16	Tinkunay	27.5984	88.18694	0.83
17	Laxmi	27.49921	88.16218	0.99
18	Lam	27.48786	88.21481	6.91
19	Rathong chu	27.55197	88.12644	3.32
20	Doodh	27.56533	88.11608	1.62
21	Bhalay	27.5635	88.12092	10.79
22	Rathong 1	27.55578	88.11981	2.48
23	Rathong 2	27.55642	88.11904	0.44
24	Kanchi	27.42428	88.07694	0.22
25	Dunga	27.42706	88.07472	2.85
26	Hash	27.42175	88.06789	0.47
27	Kala	27.42847	88.08242	0.96
28	Lam 2	27.42272	88.08136	2.46
29	Dallay 2	27.48161	88.05831	1.20
30	Guyam	27.41214	88.08631	0.27
31	Khecheopalri Lake	27.34809	88.18853	15.08
32	Katok Lake	27.56909	88.18707	0.62

North Sikkim Field Description

Final phase of the fieldwork was conducted in the North Sikkim area, during the months of September & October for the years 2018-21; presence of numerous wetlands that needed to be surveyed, inaccessible terrain and inhospitable weather during the rest of the year makes fieldwork in these areas uncondusive. Till date, a total number of 80 wetlands have been surveyed, including ecological and environmental parameters as mentioned in (East Sikkim Field Description - a, b,c and d). Major lakes covered in North Sikkim include Gurudongmar complex Lake, South Lhonak Lake, Tso Lhamo complex Lake, Gayamchona Lake, Tosar Lake, Kishong Lake, Hans Pokhari Lake, Ox Bow Lake, Tsobuk Tso Complex Lake, Kalapathar Lake, Khora Tso Complex Lake, Janak Tso Complex Lake, Gaya Gawn Complex Lake, and Chomijadar Complex Lake. The major plant and animal species encountered in the North Sikkim wetland are *Picrorhiza scrophulariiflora* (Kurki), *Taxus wallichiana* (Sonpati), *Primula spp.*, *Nardostachys jatamansi* (Jatamansi), *Cupressus leylandii* (Shukpa), *Panthera uncia* (Snow leopard) *Pseudois nayaur* (Blue Sheep), *Vulpes vulpes* (red fox), *Canis lupus filchneri* (Tibetan wolf) and *Bos*

North Sikkim wetland are *Picrorhiza scrophulariiflora* (Kurki), *Taxus wallichiana* (Sonpati), *Primula spp.*, *Nardostachys jatamansi* (Jatamansi), *Cupressus leylandii* (Shukpa), *Panthera uncia* (Snow leopard) *Pseudois nayaur* (Blue Sheep), *Vulpes vulpes* (red fox), *Canis lupus filchneri* (Tibetan wolf) and *Bos mutus* (yak) and *Coun alpinus* (feral dog). A list of the 80 wetlands which were surveyed during the fieldwork are as follows:

S.No.	Wetland Name	Latitude	Longitude	Area of wetland (ha)
1	Tsobuk Tso 1	27.91107	88.60169	0.39
2	Tsobuk Tso 2	27.91156	88.60261	0.42
3	Tsobuk Tso 3	27.91006	88.60283	0.15
4	Chomijadar Tso 1	27.93485	88.26346	0.82
5	Chomijadar Tso 2	27.93555	88.26550	8.01
6	Chomijadar Tso 3	27.93904	88.27251	1.46
7	Chomijadar Tso 4	27.94132	88.27248	5.80
8	Chomijadar Tso 5	27.93930	88.27552	1.11
9	Chunguphu Tso	27.90711	88.61336	0.17
10	Dokung	27.03781	88.57293	4.53
11	Em Tso	27.04494	88.70718	0.72
12	Em Tso 2	27.04755	88.70818	3.92
13	Fogay Tso 1	27.91108	88.56924	0.10
14	Fogay Tso 2	27.91108	88.56924	3.26
15	Fogay Tso 3	27.89818	88.57734	1.18
16	Gachang Tso	27.92636	88.60452	2.75
17	Gapzee Tso 1	27.95785	88.59128	0.71
18	Gapzee Tso 2	27.96293	88.59138	1.35
19	Gapzee Tso 3	27.97097	88.59576	9.22
20	Gukul Tso	27.92000	88.49993	0.31
21	Gurudongmar 1	28.02651	88.7106	109.52
22	Gurudongmar 2	28.01708	88.70777	0.57
23	Gurudongmar 3	28.01494	88.70687	0.82
24	Gurudongmar 4	28.01112	88.70543	105.17
25	Gurudongmar 5	28.00888	88.70882	130.60
26	Janak 1 Tso 1	27.88646	88.26721	9.19
27	Janak 1 Tso 2	27.85785	88.24806	1.47
28	Janak 1 Tso 3	27.85806	88.24765	0.29

29	Janak 2 Tso 1	27.88646	88.26721	4.87
30	Janak 2 Tso 2	27.88273	88.25284	14.00
31	Janak 2 Tso 3	27.88152	88.25882	8.56
32	Janak 2 Tso 4	27.88009	88.60069	11.55
33	Kalapatthar Tso 1	27.90251	88.47294	1.05
34	Khora Tso 1	27.94611	88.32205	1.31
35	Khora Tso 2	27.94690	88.33195	60.18
36	Khora Tso 3	27.95527	88.35656	18.13
37	Khora Tso 4	27.94733	88.35124	12.32
38	Khora Tso 5	27.95182	88.35548	21.95
39	Khora Tso	27.88647	88.26721	2.43
40	Lachee Tso 1	27.01039	88.57070	25.31
41	Lachee Tso 2	28.01485	88.56053	26.26
42	Mukuthang Tso	27.87408	88.42940	2.28
43	Ok Tso	27.92573	88.61445	4.79
44	Om Tso	27.90324	88.61386	3.99
45	Setong Tso	27.99032	88.60081	0.23
46	Shaka Tso	27.97098	88.61031	58.57
47	Shechen Ragho 1	27.97427	88.60919	0.18
48	Shechen Ragho	27.99031	88.60069	9.77
49	South Lhonak	27.91605	88.20929	134.15
50	Tso Lhamo	27.99482	88.76262	4.49
51	Tso Lhamo 1	27.02164	88.75635	101.57
52	Tso Lhamo 3	28.06305	88.75432	0.13
53	Tso Lhamo 4	28.00047	88.75074	5.50
54	Yangsaac	27.85348	88.24740	30.77
55	Yum Tso	28.04885	88.70951	2.96
56	Changme Lake 2 (Dry Lake)	27.92656	88.68599	0.04
57	B-Lake	27.92192	88.67497	9.55
58	Donkeya Chu	27.96622	88.76653	1.37
59	Gaya Gawn Lake1 (dry lake)	28.02461	88.60992	1.067
60	Gaya gawn Lake 4	28.04339	88.69953	0.4
61	Gayamchona Lake	28.05653	88.63097	18.03

62	Jadung Lake 1	27.96147	88.76683	3.10
63	Jadung Lake 2	27.96625	88.76642	1.37
64	Unnamed lake 1/singba lake	27.75967	88.72272	7.14
65	Unnamed Lake 2	27.45789	88.76762	1.24
66	Sebu Lake (Changme 1)	27.85553	88.692	1.86
67	Chuba Lake	27.72844	88.75478	0.4
68	Black Lake/Namnasa Lake	27.7146	88.74266	1.93
69	Jachu valley (Ox-bow lake)	27.93047	88.58703	0.5
70	Changme 3	27.92486	88.68461	0.3
71	Yangchen Tso	27.84804	88.86828	5.20
72	Ka- Tso	27.8414	88.87804	4.2
73	Kyee Tso	27.75911	88.72307	7.14
74	Chume- Lham Tso	27.86446	88.86289	13
75	Tembao Lake	27.89452	88.76169	45.4
76	Tosar lake	27.46856	88.74922	19.6
77	Kishong Lake	27.72094	88.45268	13.29
78	Tingchim lake	27.45818	88.52879	0.10
79	Nakuchu Lake	27.44361	88.75527	9.24
80	Thang Cho	27.973610	88.441110	12.91
81	Hans Pokhari Lake	27.43185	88.77062	6.99

3.4: Status of Mapping of Wetlands through Satellite Data

3.4.1.: Procurement/Downloading of Satellite Data:

Downloading of Optical (Sentinel 2A) and SAR (Sentinel 1A) satellite data has been completed. Both pre & post monsoon data are being used for delineation of temporal extent of wetlands. Potential of SAR data is being envisaged in order to map those lakes where cloud free optical data is not available as SAR can penetrate clouds. The details of Sentinel-2A acquired for the study is given in table 2.

Table 2: Optical data specifications

Specification	Pre-Monsoon Image	Post Monsoon Image
Satellite	Sentinel- 2A	Sentinel- 2A
Acquisition date	08-03-2017	11-09-2017
Spatial resolution (metres)	10	10

The Dual polarimetry SAR data (VV+VH) is being used for mapping of wetlands in pre and post monsoon season. Details of SAR data acquisition has been mentioned in table 3.

Table 3: SAR data specifications

Specification	Pre-Monsoon Image	Post Monsoon Image
Acquisition date	08/04/2017	23/09/2017
Imaging Mode	IW	IW
Imaging frequency	C-band	C-band
Polarization	VV-VH	VV-VH
Data format	SLC	SLC

3.4.2.: Processing of Satellite Data:

Pre-processing of optical data and generation of base layers required for wetland mapping and inventory has been completed for 23 wetland locations that has been surveyed.

3.4.3.: Wetland Boundary Delineation through Optical Data:

- The European Space Agency (ESA) Copernicus program Sentinel-2 satellites collect several images at each location on Earth throughout the year. Two images which covered the entire state of Sikkim were downloaded for the period Sep 11, 2017 (post-monsoon season).
- Images were accessed and mosaicked as a grid of slightly overlapping square tiles.
- Normalized difference water index (NDWI) (1) was applied on the mosaicked image where two spectral bands with spatial resolution of 10 metres corresponding to Green and Near Infrared wavelengths were used:

$$NDWI = (Green - NIR) / (Green + NIR) \dots \dots \dots (1)$$

- The above equation generated a continuous raster layer with values -1 to +1 where values near +1 denoted high probability of water pixels.



Figure 2: False Color Composite, 11th September 2017 (Post-Monsoon)

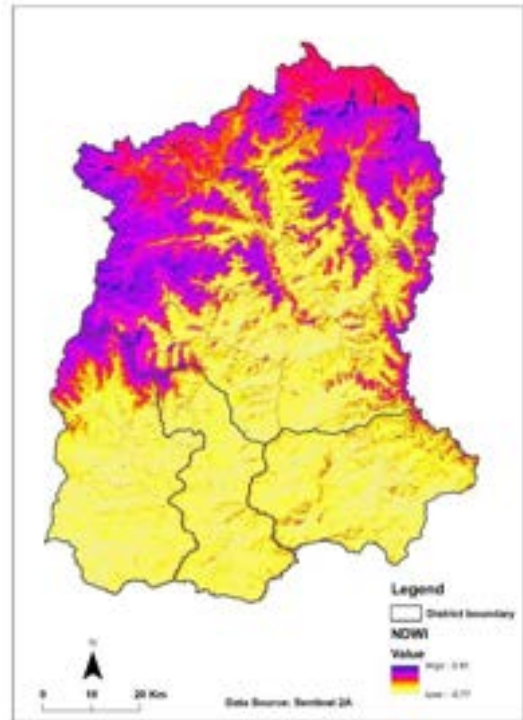


Figure 3: Normalized Difference Water Index, Post Monsoon season

- Different threshold values were analyzed for the above raster to get maximum extent of waterbodies. Finally, a threshold value of 0.21 was used which separated waterbodies from non water class.
- A focal majority filter of size 3*3 window was applied on the classified image to remove speckle noises and to get final extent of the wetlands for the post monsoon season.

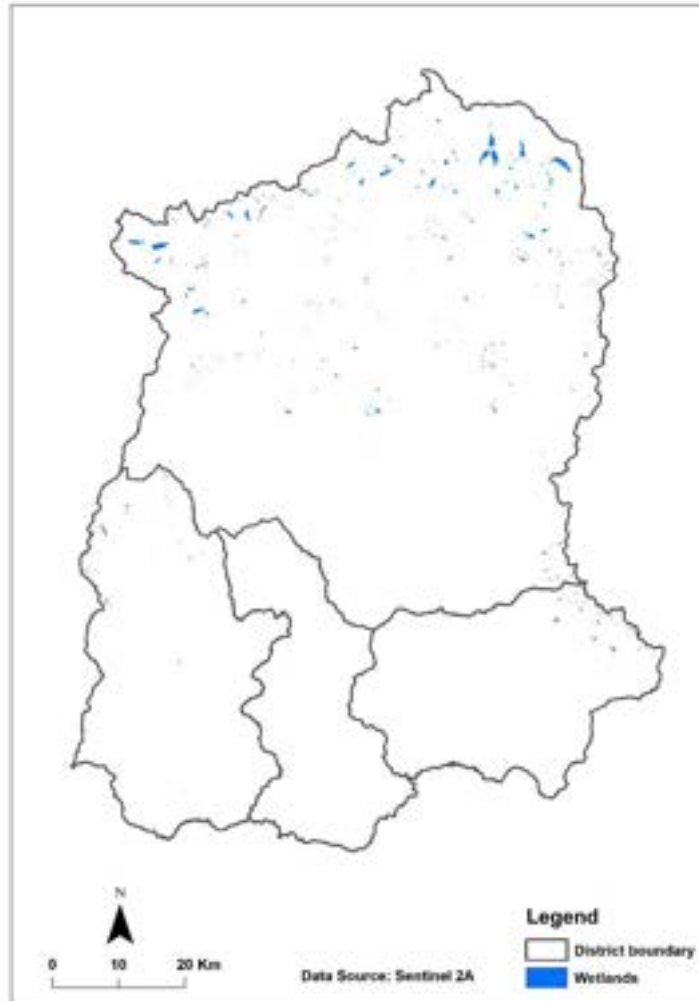


Figure 2: Extent of wetlands, Post-monsoon season

3.4.4.: Wetland Boundary Delineation through SAR Data:

Wetland boundary delineation through SAR data is in progress and involves the following steps:

Orbit File Correction

This step is required to process the Sentinel-1 data, where orbit file is applied to the acquisition scene to provide the precise orbit state vector.

Data Calibration

Calibration is applied to provide imagery in which the pixel values can be directly related to the radar backscatter of the scene. This process converts the pixel data to actual backscattering values.

Thermal Noise Removal

The downloaded data may have the presence of thermal noise, thermal noise has been removed for further processing of data.

Multi-looking and Speckle Filtering

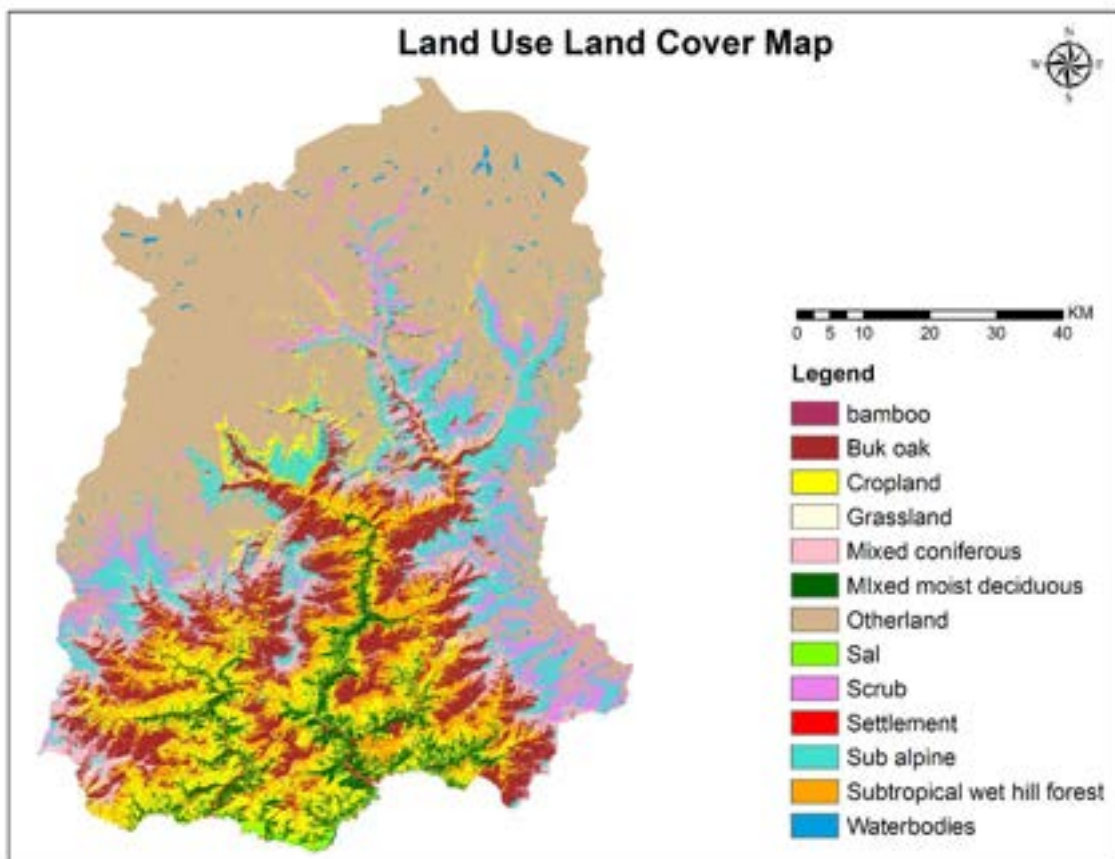
In order to remove salt and pepper noise, speckle filtering is applied. During the filtering process Lee Sigma has been applied. Before and after speckle filtered image for VV and VH polarization are shown in figure 5 (a, b, c, d).

Terrain Correction

Terrain corrections are intended to compensate for distortions so that the geometric representation of the image will be as close as possible to the real world. Here bilinear interpolation technique of terrain correction was used. Terrain corrected product for VH and VV image are shown in figure 5 (d, e).

3.5: Preparation of Land use and Land Cover:

A detailed Land use and Land cover thematic information has been generated using Sentinel 2A satellite data. A total of 13 classes have been generated. Please see the below Map.



Land Use Land Cover Map of Sikkim

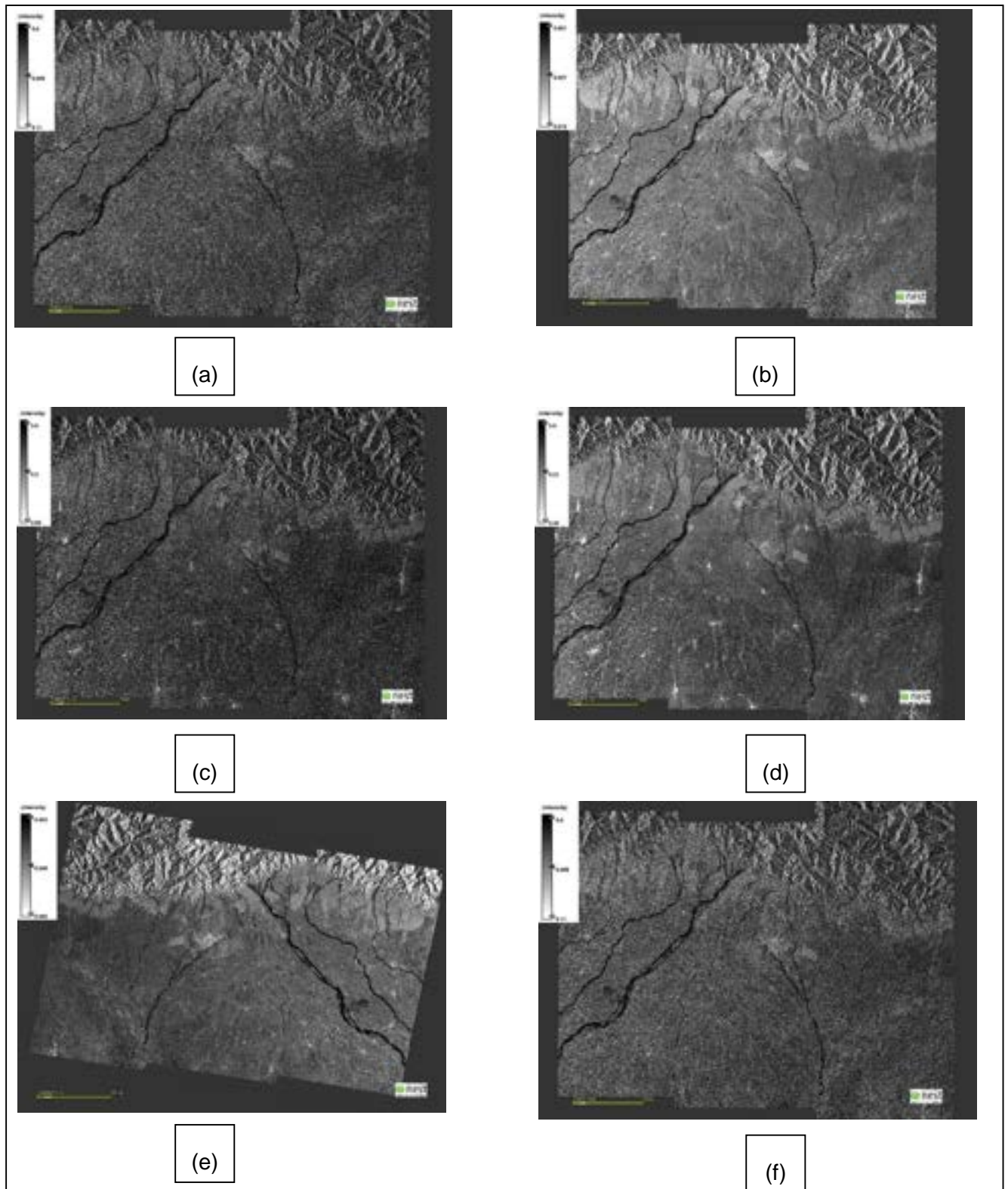


Figure 3: (a) Sigma naught (VH) before speckle filtering; (b) Sigma naught (VH) after speckle filtering; (c) Sigma naught (VV) before speckle filtering; (d) Sigma naught (VV) after speckle filtering; (e) Sigma naught VH image after terrain correction; (f) Sigma

Annexure: 1
Maps of the Surveyed Wetlands
(East Sikkim)

1. Anda Pokhari

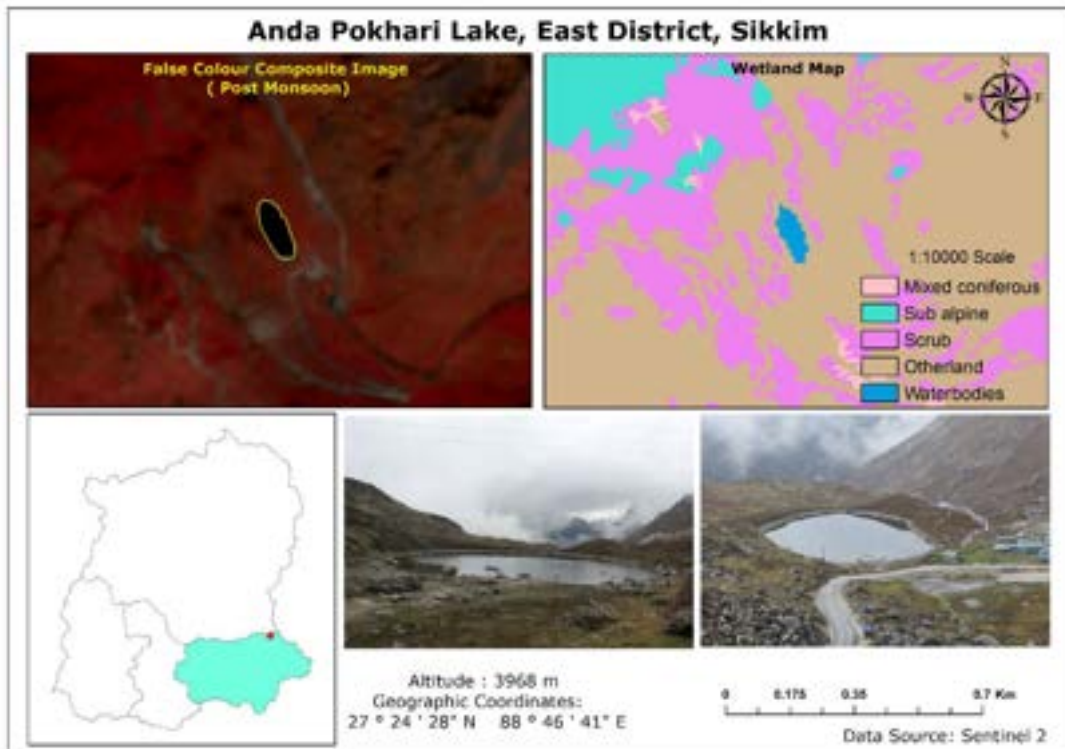


Figure 4: Anda Pokhari Lake

2. Aritar Lake

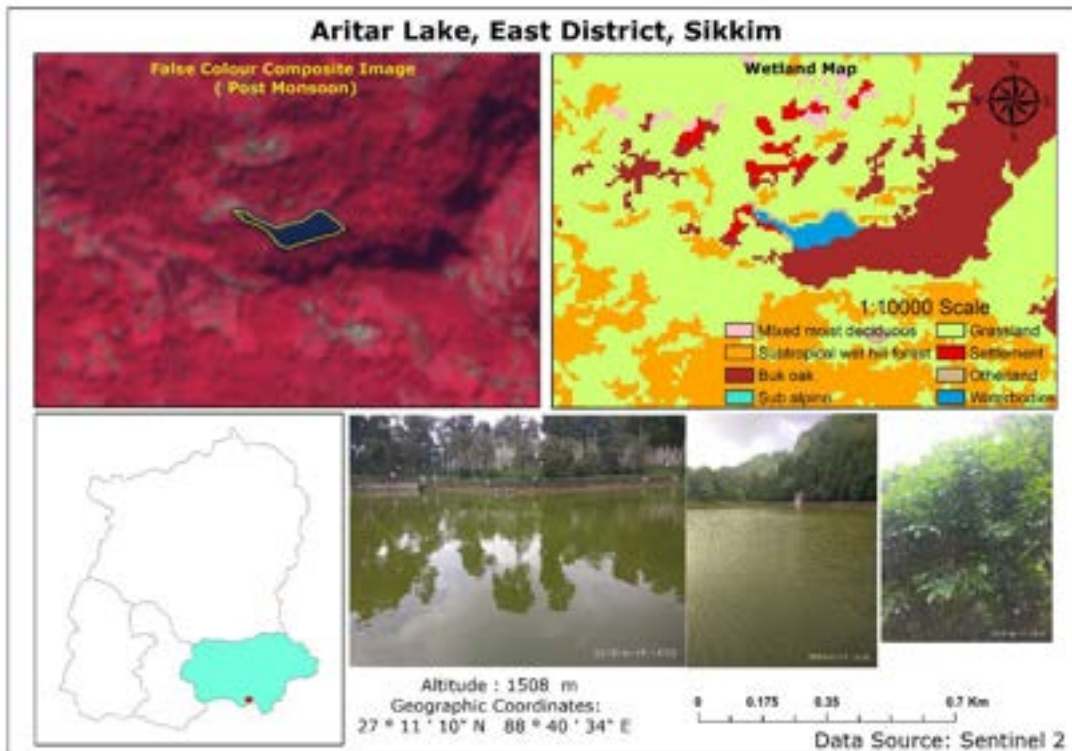


Figure 5: Aritar Lake

3. Biren Jheel

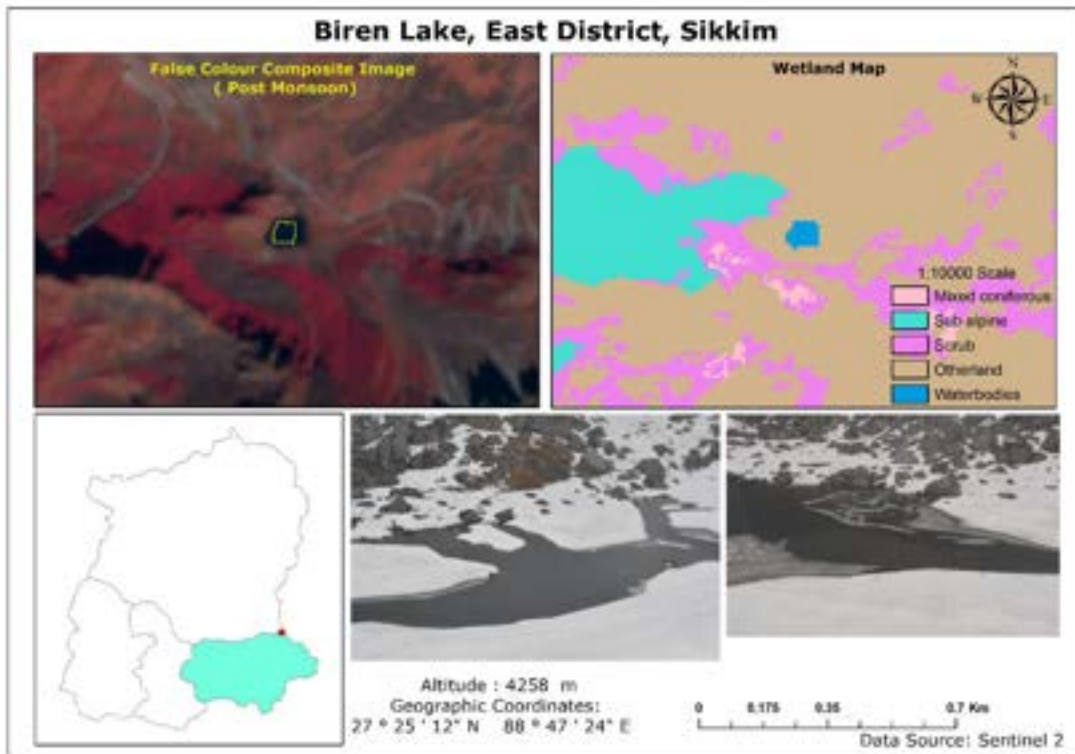


Figure 6: Biren Jheel

4. Tsomgo/Changu Lake

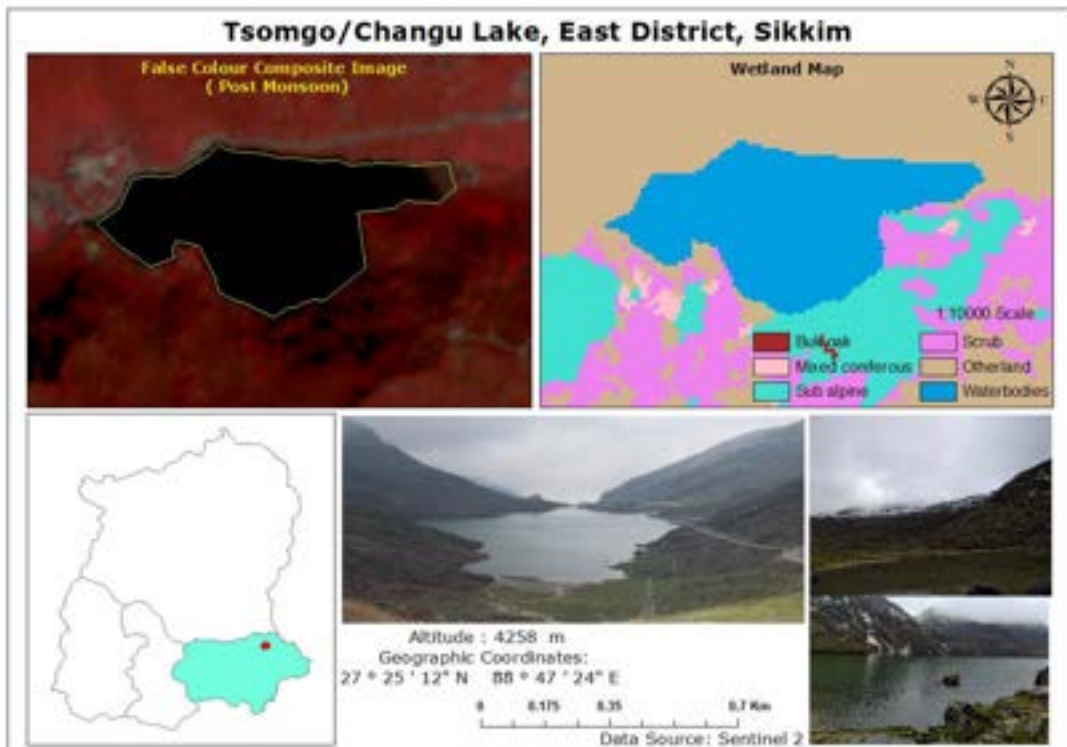


Figure 7: Changu Lake

5. Dogra Lake

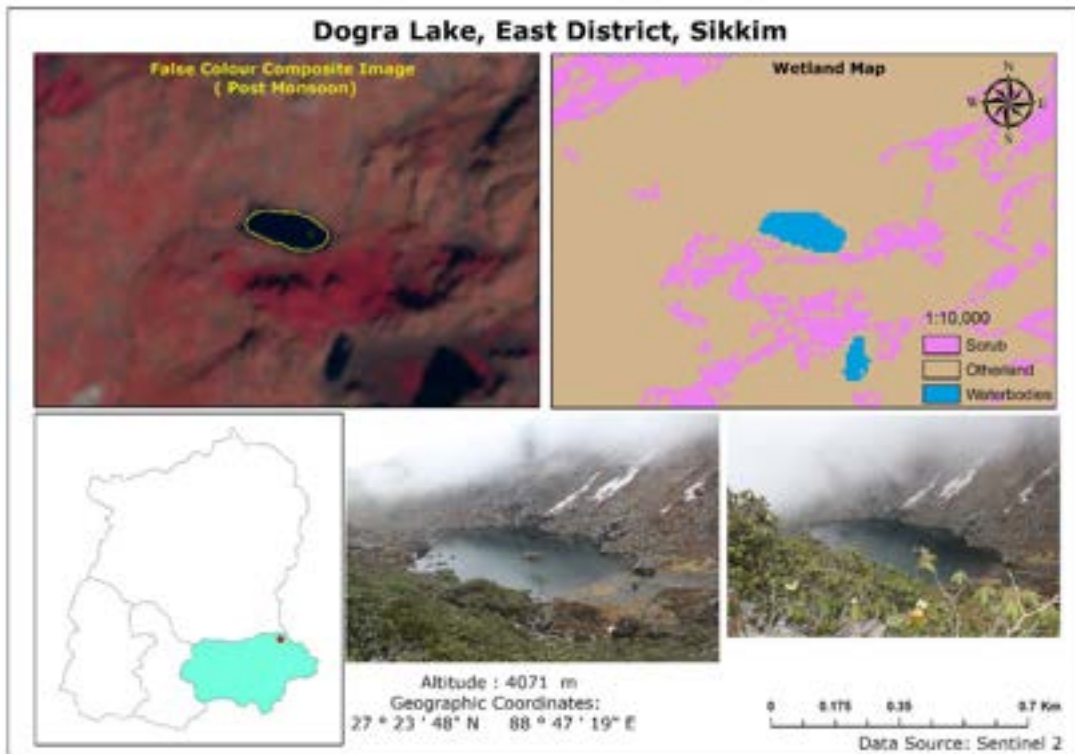


Figure 8: dogra Lake

6. Glacier Lake (Black lake)

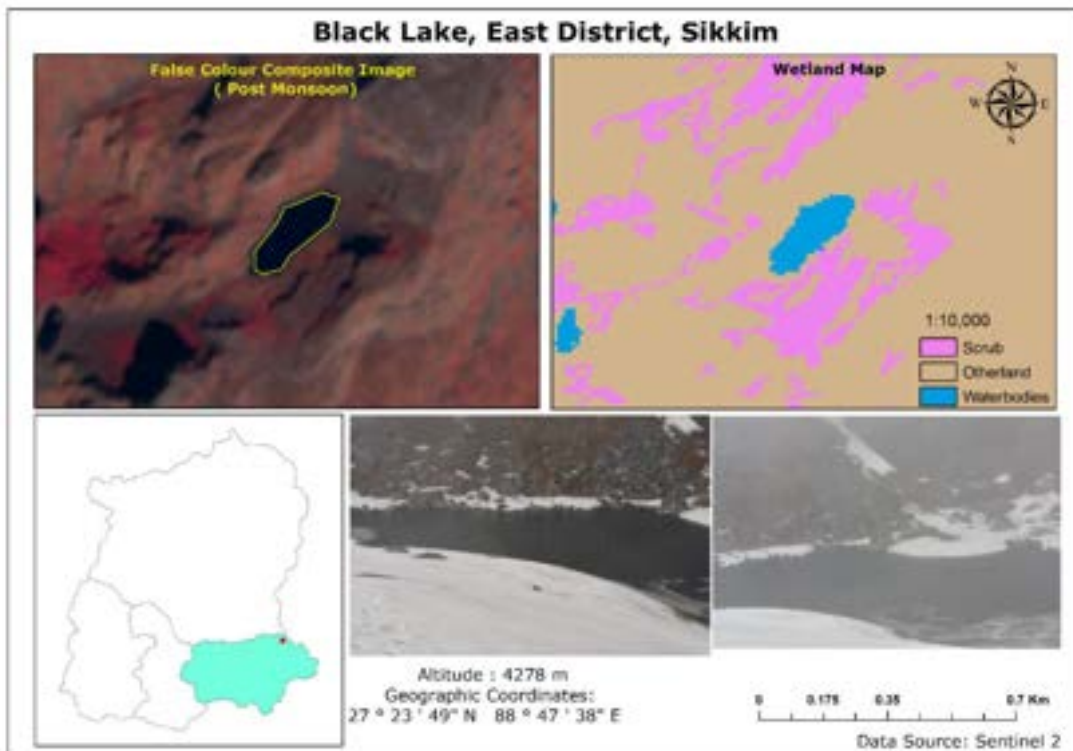


Figure 9: Black lake

7. Gorkha Lake



Figure 10: Gorkha Lake

8. L Lake

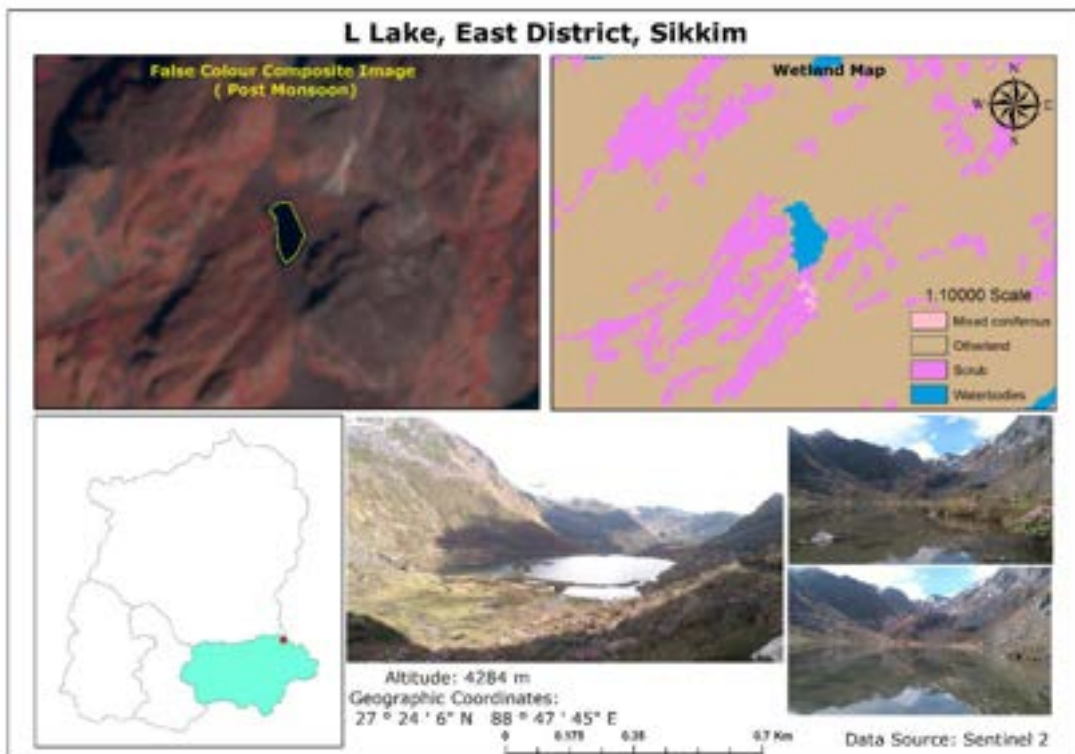


Figure 11: L Lake

9. Manju Lake

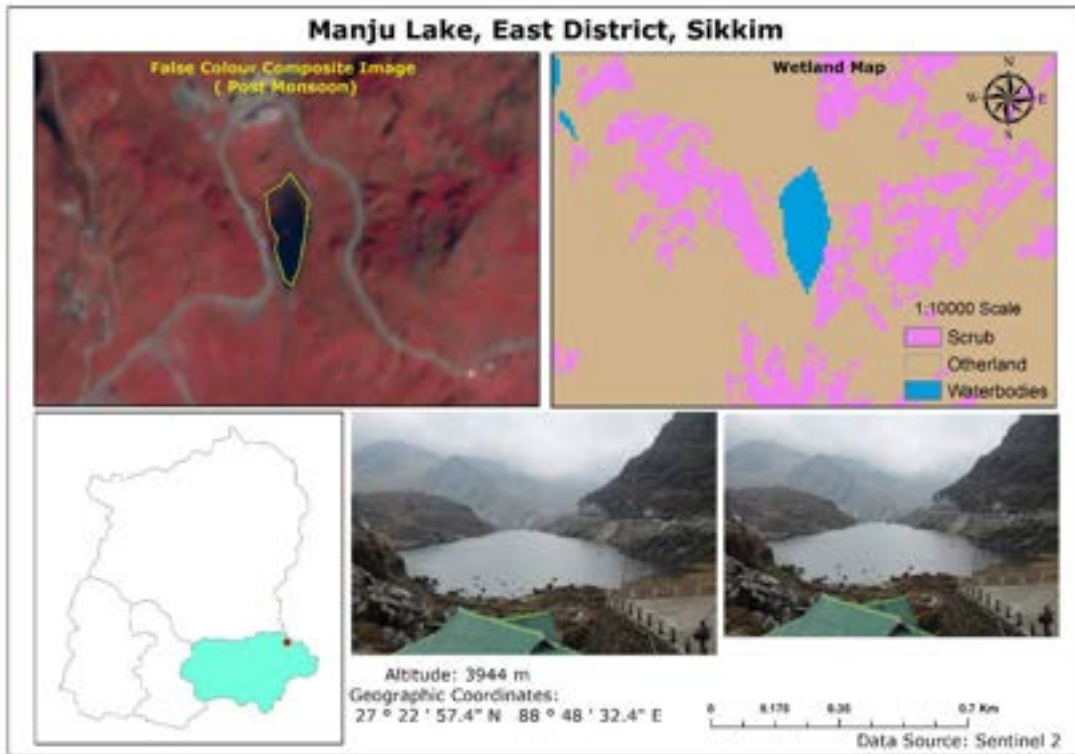


Figure 12: Manju Lake

10. Memencho Lake

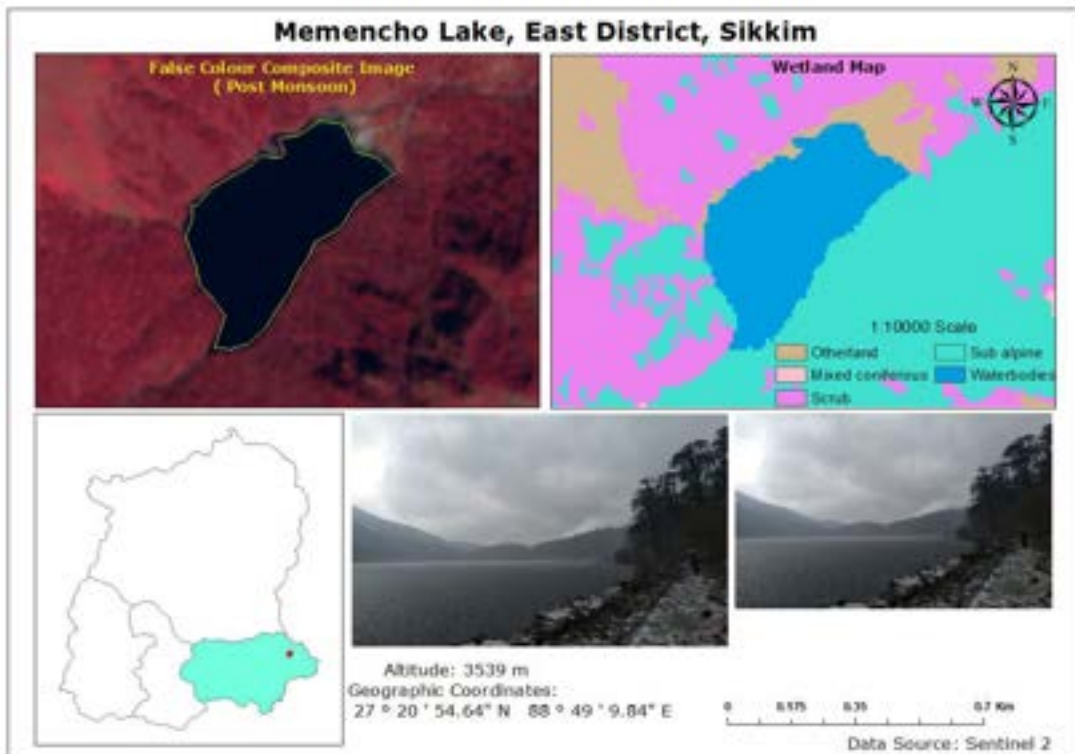


Figure 13: Memencho Lake

11. Nakchuk Complex Lake

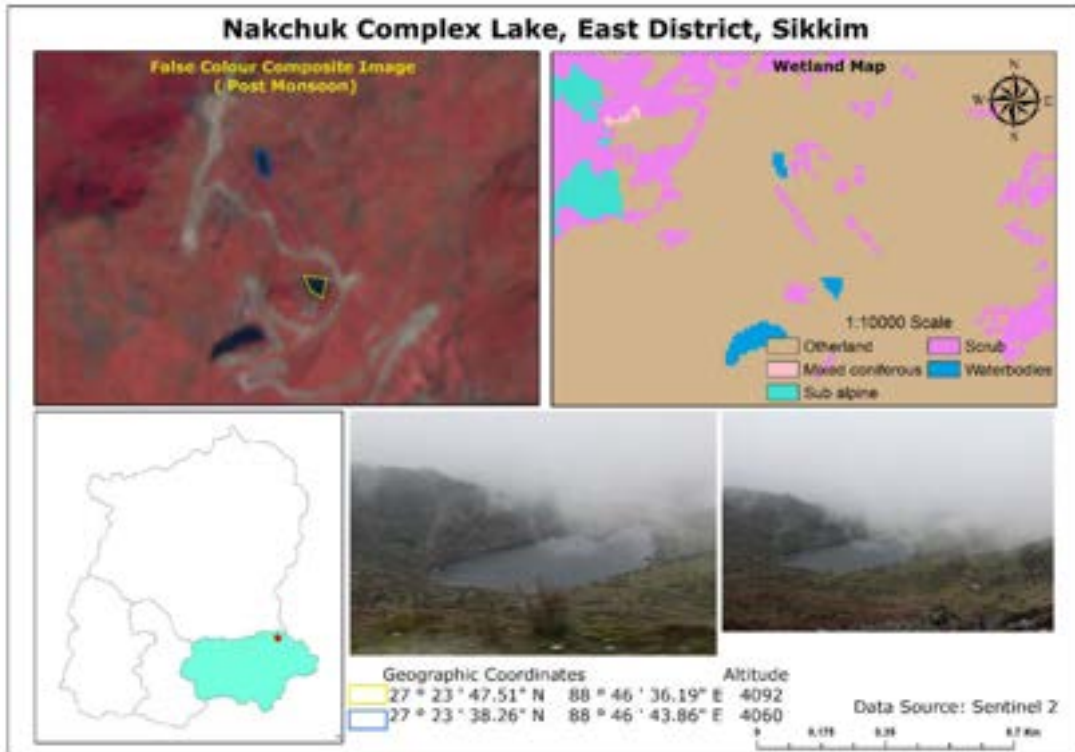


Figure 14: Nakchuk Complex Lake

12. Pangolakha Lake



Figure 15: Pangolakha Lake

13. Parapara Lake

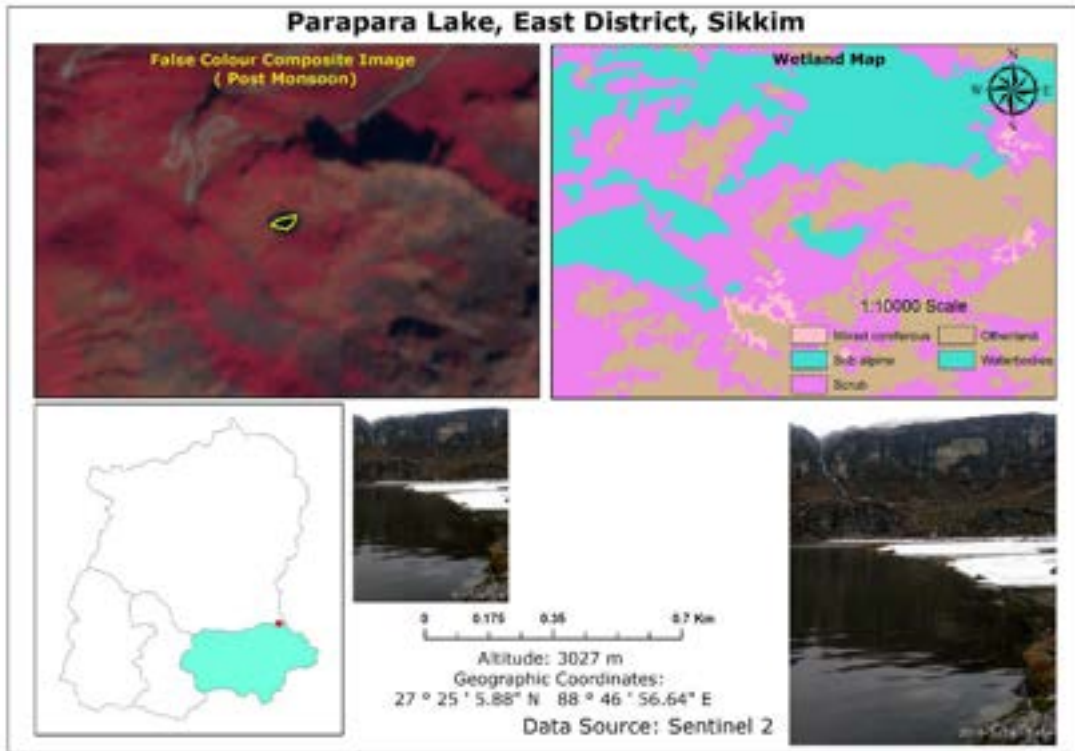


Figure 16: Parapara lake

14. Phidang Lake

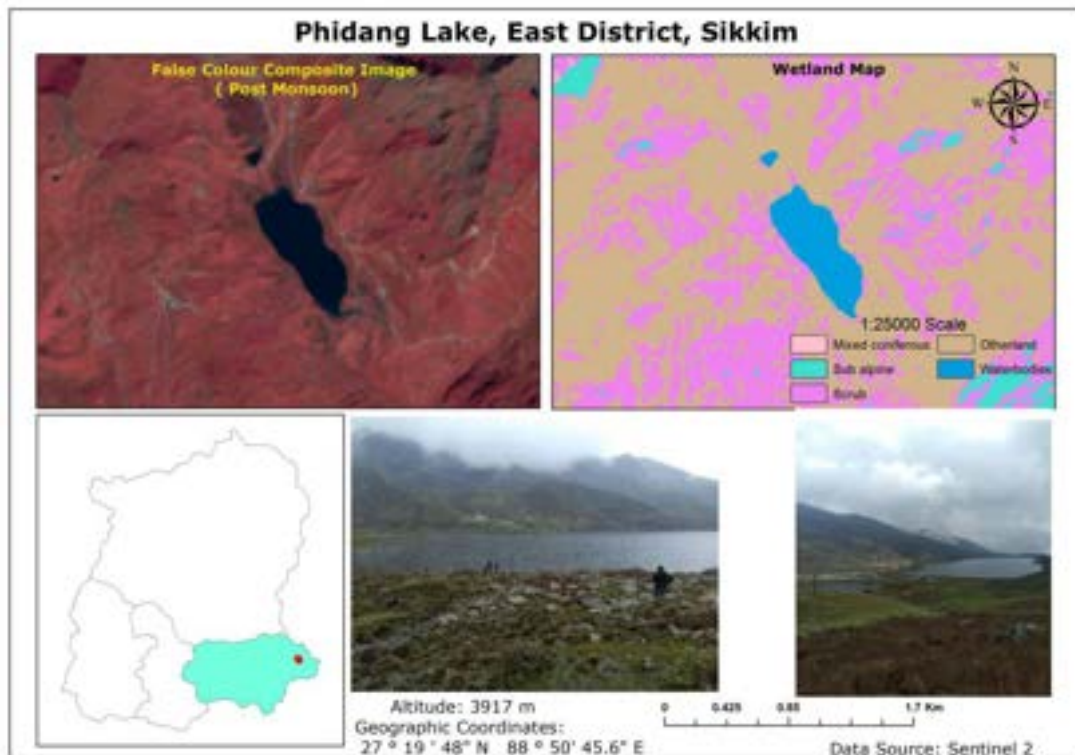


Figure 17: Phidang Lake

15. Stone Lake

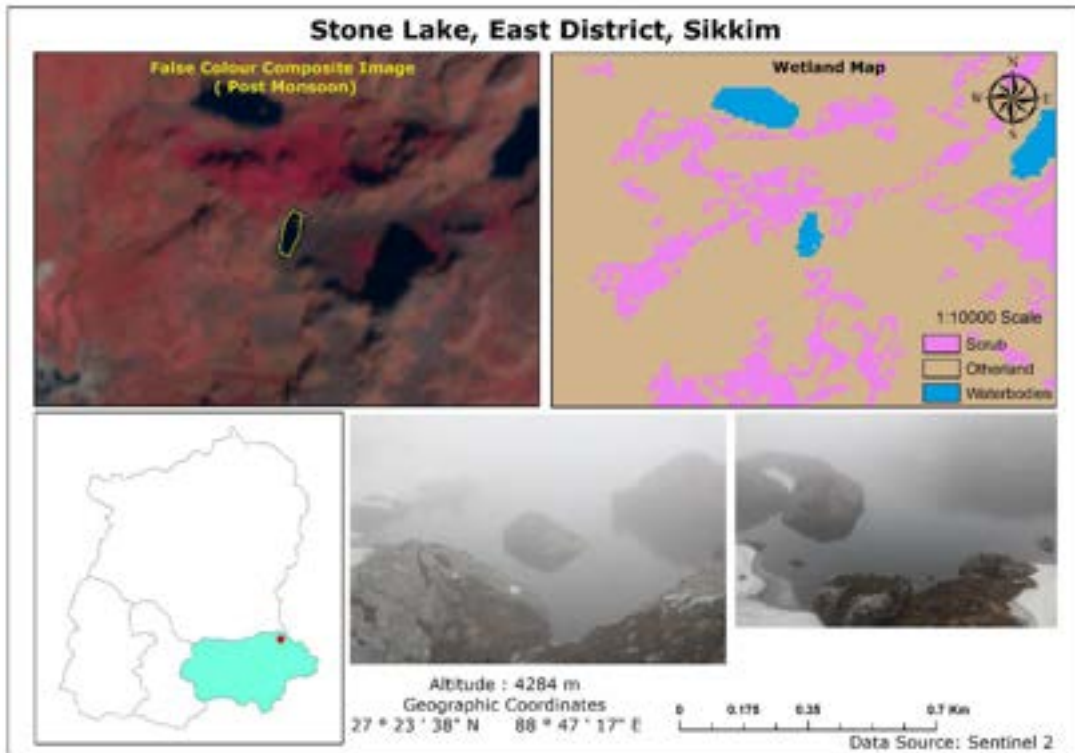


Figure 18: Stone Lake

16. Three sister complex Lake

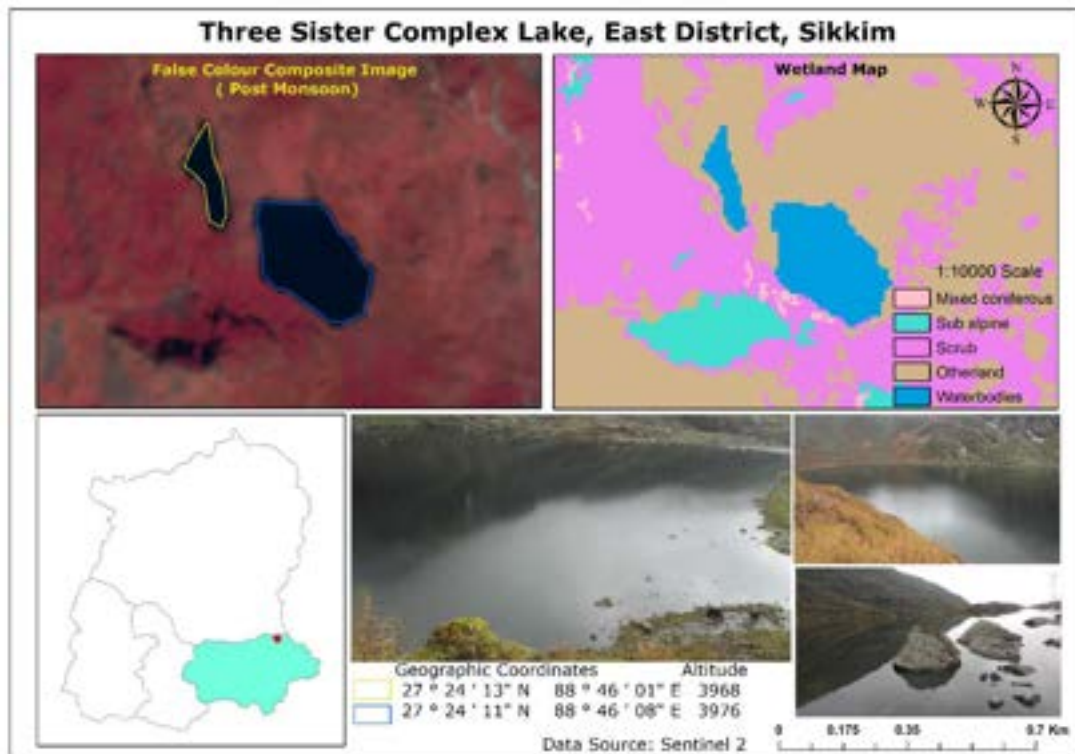


Figure 19: Three sister complex Lake

17. Yakla Lake

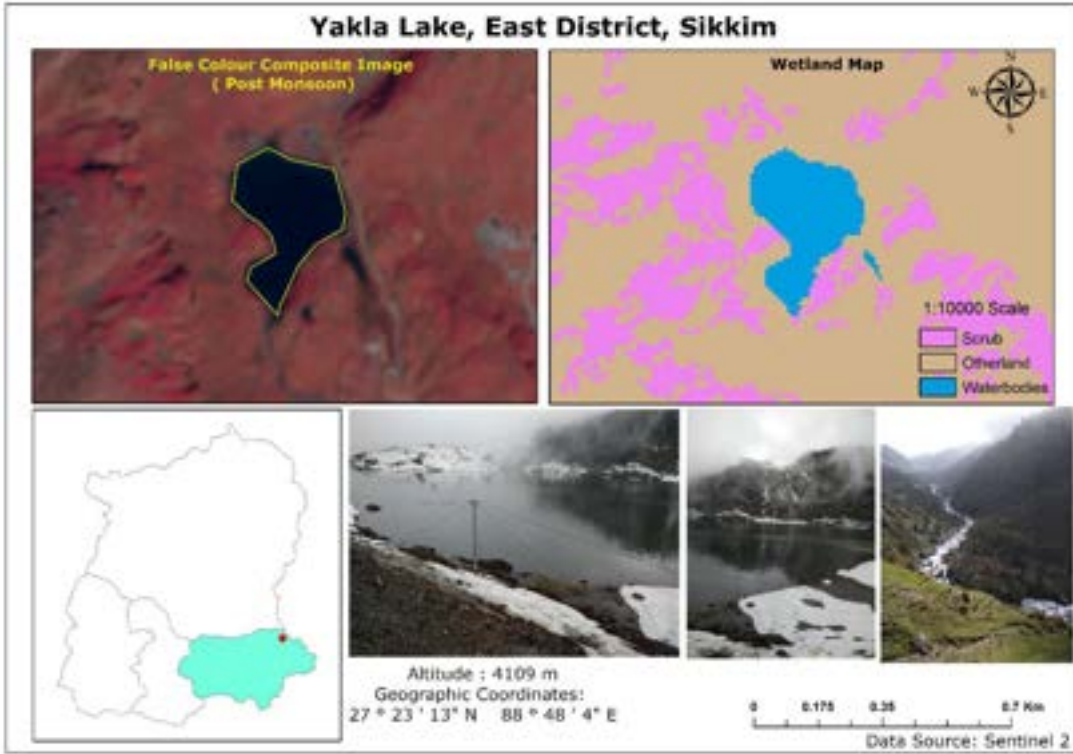


Figure 20: Yakla Lake

18. Hangu Lake

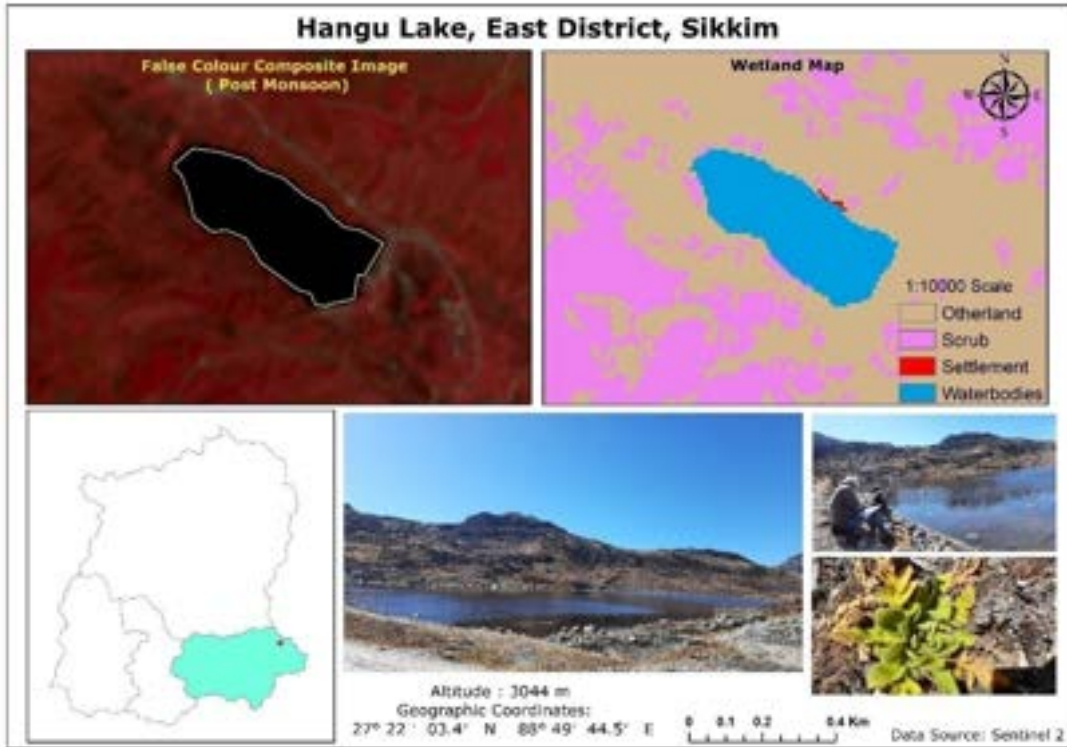


Figure 21: Hangu Lake

19. Elephant Lake 2

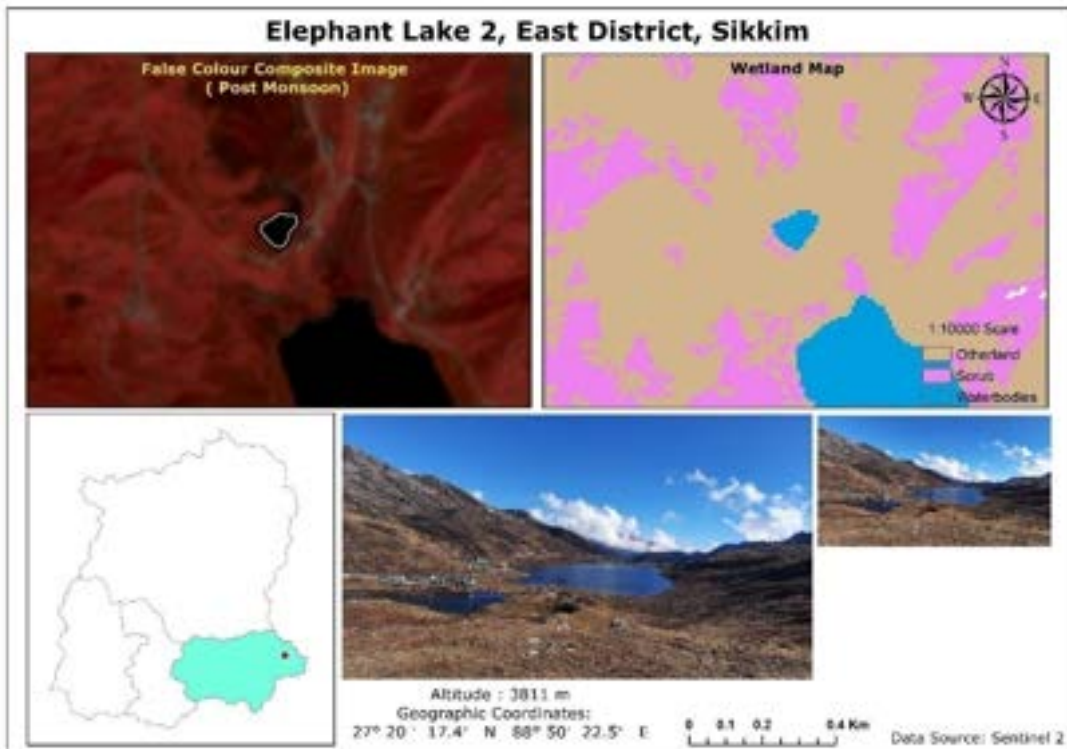


Figure 22 : Elephant Lake 2

20. Nathula Lake 1 (Arnav Lake)

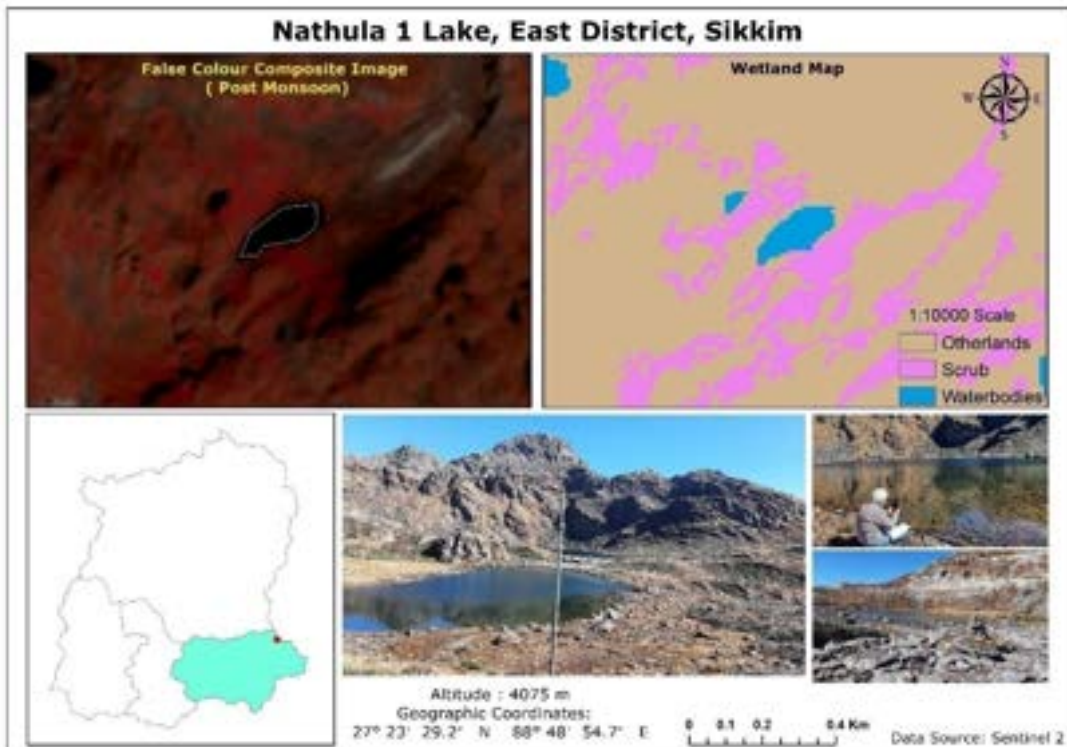


Figure 23: Nathula Lake 1

21. Nathula Lake 2

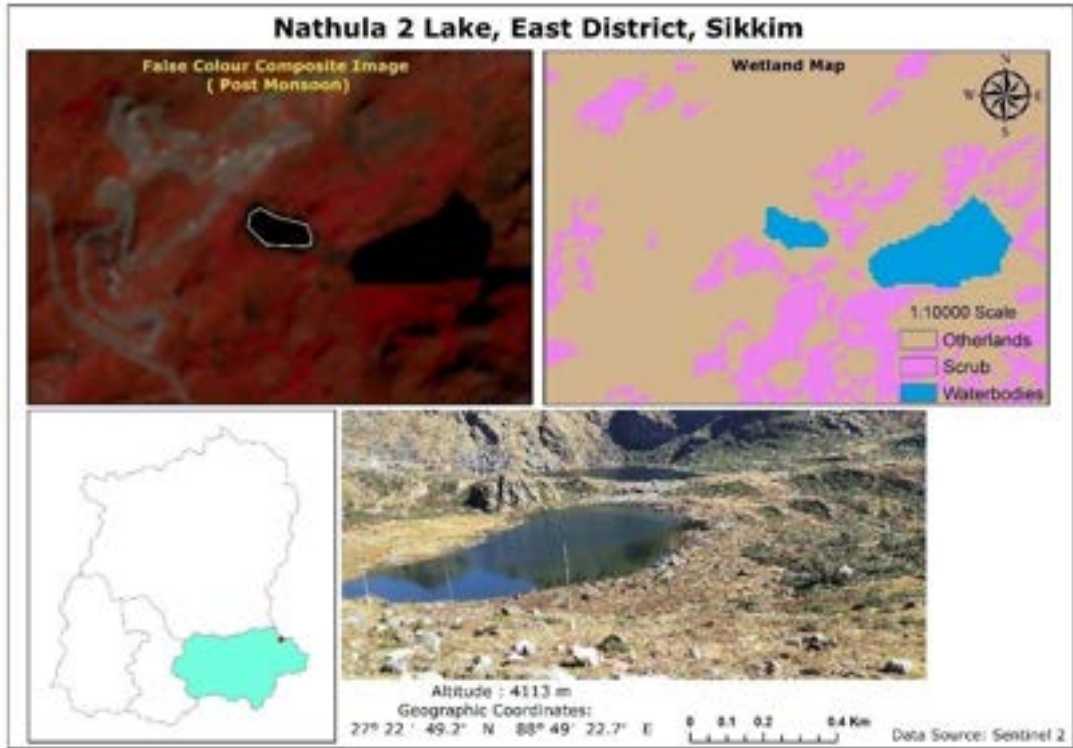


Figure 24: Nathula Lake 2

22. Gnathang Valley 1



Figure 25: Gnathang Valley Lake 1

23. Gnathang Valley 2

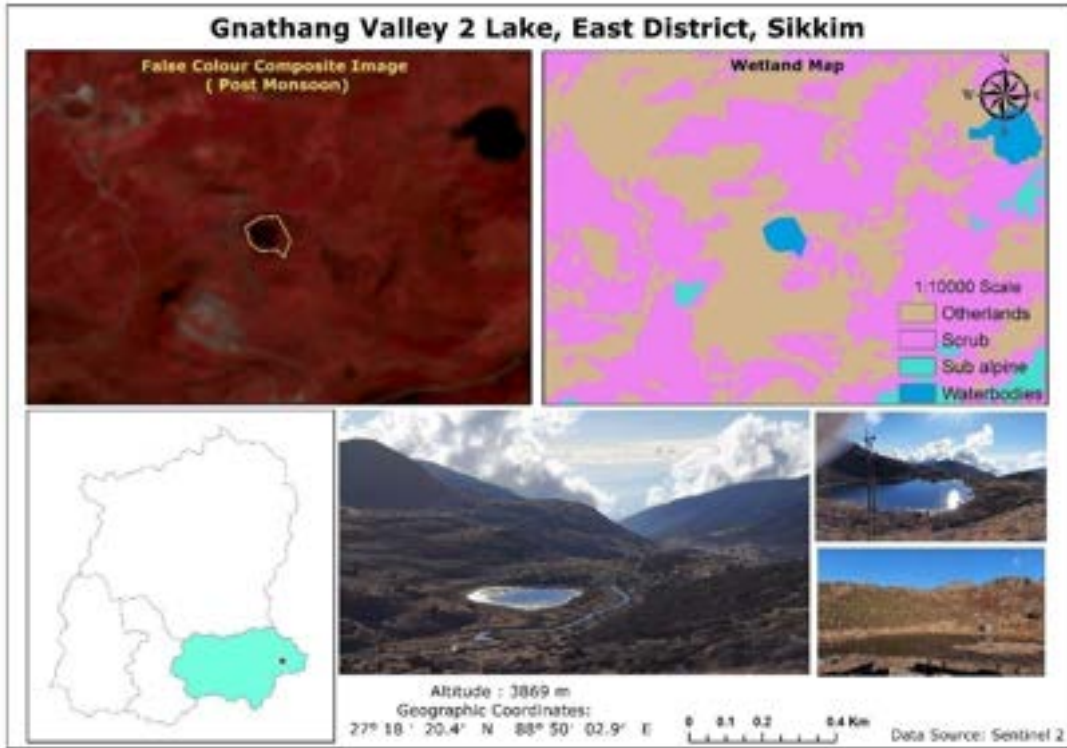


Figure 26: Gnathang Valley Lake 2

24. Gnathang Valley 3

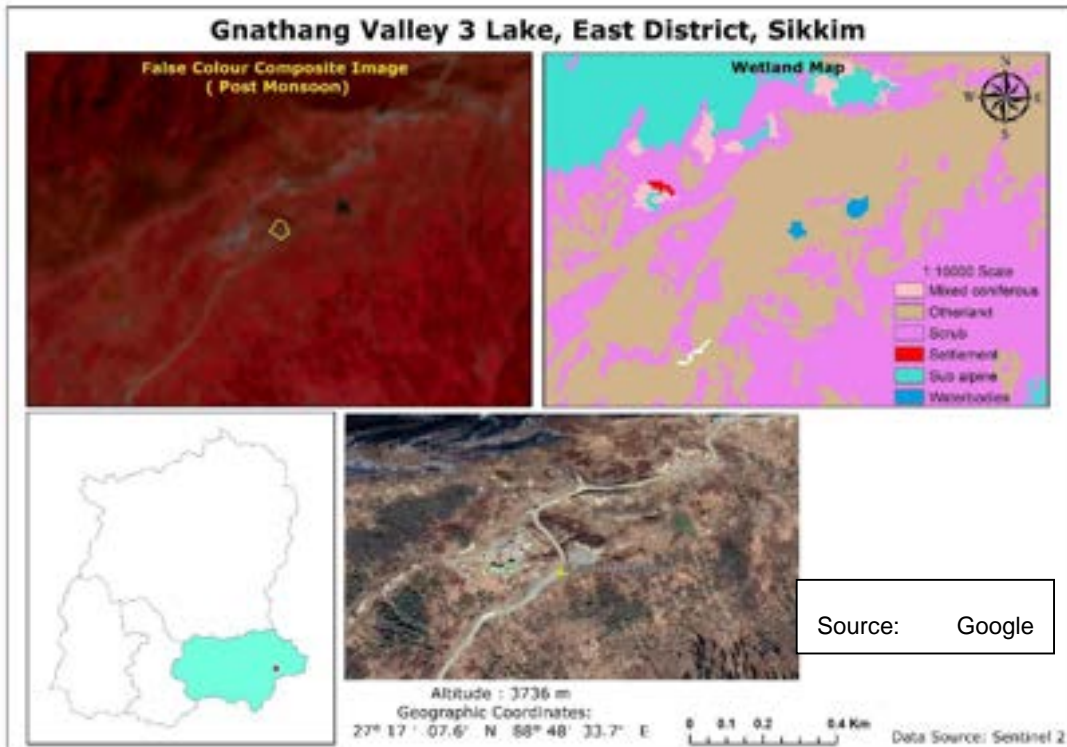


Figure 27: Gnathang Valley Lake 3

25. Yakla Lake 2



Figure 28: Yakla Lake 2

Detailed Documents of the Surveyed Wetlands (East Sikkim)

Wetlands in East Sikkim

Table 1: General and Site Characteristics							
S.No	Wetland Name	Latitude	Longitude	Altitude (m)	Area of Wetland (ha)	Wetland type	Protected area
1	Anda Pokhari Lake	27.40774	88.77811	3968	0.77	Natural – Permanent lakes	Kyongnosla Alpine Sanctuary
2	Aritar Lake	27.18617	88.67615	1508	1.24	Natural – Seasonal/intermittent streams/creeks	NGO
3	Biren Jheel	27.4200	88.79000	4258	0.51	Permanent lakes	Latui RF East
4	Tsomgo, Changu (Recognized Wetland)	27.3578	88.76677	3547/3759	24.47	Natural – Permanent lakes	Latui RF (Near Kyongnosla Alpine Sanctuary)
5	Dogra Lake	27.39674	88.78852	4071	1.69	Natural – Permanent lakes	Latui RF East
6	Gorkha Lake	27.39243	88.77660	3984	0.50	Natural – Permanent lakes	Kyongnosla Alpine Sanctuary
7	L Lake	27.40160	88.79630	4284	0.91	Natural - Permanent lakes	Latui RF East
8	Manju Lake (Below Sherathang Mart)	27.38261	88.80900	3944	1.99	Natural – Permanent lakes	Latui RF East

9	Memenchu Lake	27.34984	88.82671	3669	18.23	Natural – Permanent lakes	Phadamchen RF
10	Nakchuk Lake 2	27.39680	88.77690	4092	0.15	Natural - Permanent lakes	Latui RF - Under Sikkim Govt. (Forest Department)
11	Nakchuk Lake	27.39380	88.77830	4060	0.19	Natural Permanent lakes	Latui RF - Under Sikkim Govt. (Forest Department)
12	Pangolakha Wildlife Sanctuary 14	27.37710	88.78370	3935	0.34	Natural - Permanent lakes	Latui RF East
13	Parapara Lake	27.41830	88.78240	3027	0.40	Natural - Permanent lakes	Latui RF East
14	Phidang Lake	27.33040	88.84610	3917	26.24	Natural - Permanent lakes	Pangolakha WLS
15	Stone Lake	27.39390	88.78820	4285	0.45	Natural - Permanent lakes	Latui RF East
16	Three Sister One Lake	27.40220	88.76940	3976	6.94	Natural - Permanent lakes	Kyongnosla Alpine Sanctuary
17	Three Sister Two Lake	27.40430	88.76660	3976	1.75	Natural - Permanent lakes	Kyongnosla Alpine Sanctuary
18	Yakla Lake	27.38720	88.80140	4108	7.49	Natural - Permanent lakes	Latui RF East
19	Black Lake	27.39700	88.79402	4278	2.26	Natural - Permanent lakes	Latui RF East
20	Hangu Lake	27.36761	88.82902	3044	11.44	Natural - Permanent lakes	Latui RF East

21	Nathula 1	27.39144	88.81519	4075	1.53	Natural - Permanent lakes	Latui RF East
22	Nathula 2	27.38033	88.82297	4113	1.16	Natural - Permanent lakes	Latui RF East
23	Gnathang Valley 1	27.30794	88.83947	3985	1.57	Natural - Permanent lakes	Pangolakha WLS
24	Gnathang Valley 2	27.30567	88.83414	3869	0.88	Natural - Permanent lakes	Pangolakha WLS
25	Gnathang Valley 3	27.28544	88.80936	3736	0.15	Natural - Permanent lakes	Pangolakha WLS
26	Elephant Lake2	27.33817	88.83958	3811	0.56	Natural - Permanent lakes	Phadamchen RF
27	Yakla 2	27.38739	88.81158	4112	0.95	Natural - Permanent lakes	Latui RF East

Table 2: Water Regime

Wetland Name	Main source of water	Water Permanence	Destination of water from wetland	pH	Water salinity	Nutrients in water	Probable source of Nutrients
Anda Pokhari Lake	Rainfall and ground water	Mostly permanent	Feeds groundwater	6.8	6	Not Assessed	Not Assessed
Aritar Lake	Rainfall	Mostly permanent	Feeds groundwater	9.1	16	Not Assessed	Not Assessed
Biren Jheel	Rainfall and ground water	Mostly permanent	To downstream catchment	6.7	10	Not Assessed	Not Assessed

Tsomgo, Changu (Recognized Wetland)	Spring water (from Tamzey) and snowfed	Mostly permanent	To river	7.5	16	Not Assessed	Not Assessed
Dogra Lake	Streams and glaciers	Mostly permanent	To downstream catchment	6.2	6	Not Assessed	Not Assessed
Gorkha Lake	Rainfall and Groundwater	Mostly permanent	Feeds Ground water	8.4	25	Not Assessed	Not Assessed
L lake	Streams and Glaciers	Mostly permanent	To river	8.7	5	Not Assessed	Not Assessed
Manju Lake (Below Sherathang Mart)	Snowfed and natural streams	Mostly permanent	To downstream catchment	7.8	13	Not Assessed	Not Assessed
Memenchu Lake	Snowfed	Mostly permanent	To downstream catchment	8.2	12	Not Assessed	Not Assessed
Nakchuk Lake 2	Rainfall and groundwater	Mostly permanent	Feeds groundwater	7.9	20	Not Assessed	Not Assessed
Nakchuk Lake	Rainfall and groundwater	Mostly permanent	Feeds groundwater	7.6	16	Not Assessed	Not Assessed
Pangolakha	Rainfall and groundwater	Mostly permanent	Feeds groundwater	7.6	8	Not Assessed	Not Assessed
Parapara lake	Direct/Indirect inflow from river	Mostly permanent	Feeds groundwater	6.8	13	Not Assessed	Not Assessed
Phidang lake	Snowfed and Phidang river	Mostly permanent	To river	8.3	22	Not Assessed	Not Assessed
Stone lake	Rainfall and Glacier	Mostly permanent	To downstream catchment	7.5	5	Not Assessed	Not Assessed
Three Sister One lake	Groundwater	Mostly permanent	To river	8.4	11	Not Assessed	Not Assessed
Three Sister Two lake	Groundwater	Mostly permanent	To river	8	12	Not Assessed	Not Assessed
Yakla lake	Groundwater	Mostly permanent	To downstream catchment	9.9	10	Not Assessed	Not Assessed
Black Lake	Streams and Glaciers	Mostly Permanent	To downstream catchment	7.2	5	Not Assessed	Not Assessed
Hangu Lake	Rainfall and ground water	Mostly permanent	Feeds Down stream	3.8		Not Assessed	Not Assessed
Nathula 1	Ground water and glacier	Mostly permanent	Feeds river	3.7		Not Assessed	Not Assessed

Nathula 2	Ground water and glacier	Mostly permanent	Feeds Down stream	3.8		Not Assessed	Not Assessed
Gnathang Valley 1	Rainfall and ground water	Mostly permanent	Feeds Down stream	4.9		Not Assessed	Not Assessed
Gnathang Valley 2	Ground water and upstream river	Mostly permanent	Feeds Down stream	4.5		Not Assessed	Not Assessed
Gnathang Valley 3	Ground water and upstream river	Mostly permanent	Feeds Down stream	2.5		Not Assessed	Not Assessed
Elephant Lake2	Upper river rainfall and ground water	Mostly permanent	Feeds Down stream	3.7		Not Assessed	Not Assessed
Yakla 2	Ground water rainfall and upper river	Mostly permanent	Feeds Down stream	3.6		Not Assessed	Not Assessed

Table 3: Climate Setting

S.No.	Wetland Name	Annual Rainfall (in mm)	Temp (in degrees Celsius)	Humidity(g/kg)	Major Land use (in percentage)					
				(Giovanni data and 10km resolution)	Forest	Grassland	Cropland	Built-up	Other land	Waterbodies
1	Anda Pokhari Lake	134.09	2.77	5.86	18.17	26.36	0.19	0.19	53.50	1.60
2	Aritar Lake	163.79	18.59	12.03	62.80	0.01	34.85	1.36	0.24	0.74
3	Biren Jheel	134.09	2.77	5.86	14.13	23.61	0.15	0.16	60.26	1.70
4	Tsomgo, Changu (Recognized Wetland)	144.80	6.12	6.89	28.69	35.02	0.52	0.39	34.55	0.77
5	Dogra Lake	144.80	6.12	6.89	17.26	29.91	0.19	0.28	50.72	1.65
6	Gorkha Lake	144.80	6.12	6.89	20.90	31.76	0.19	0.26	45.57	1.31

7	L Lake	134.09	2.77	5.86	13.77	27.92	0.15	0.28	55.94	1.94
8	Manju Lake (Below Sherathang Mart)	141.09	1.93	5.58	12.50	31.18	0.11	0.32	54.00	1.89
9	Memencho Lake	141.09	1.93	5.58	22.45	34.05	0.05	0.23	43.37	1.18
10	Nakchuk Lake 2	144.80	6.12	6.89	19.49	30.65	0.19	0.23	48.10	1.36
11	Nakchuk Lake	144.80	6.12	6.89	20.23	31.21	0.18	0.26	46.77	1.36
12	Pangolakha	144.80	6.12	6.89	21.02	33.48	0.15	0.32	43.56	1.46
13	Parapara Lake	134.09	2.77	5.86	17.08	24.47	0.20	0.17	56.60	1.49
14	Phidang Lake	141.09	1.93	5.58	17.13	38	0.05	0.27	43.37	1.18
15	Stone Lake	144.80	6.12	6.89	17.48	30.13	0.18	0.32	50.21	1.68
16	Three Sister One Lake	134.09	2.77	5.86	20.82	29.40	0.29	0.25	47.88	1.36
17	Three Sister Two Lake	134.09	2.77	5.86	21.29	29.40	0.29	0.25	47.88	1.36
18	Yakla Lake	141.09	1.93	5.58	15.02	31.65	0.12	0.32	51.07	1.83
19	Black Lake	144.80	6.12	6.89	15.30	29.43	0.15	0.33	53.09	1.71
20	Hangu Lake	141.09	1.93	5.57	9.72	38.13	0	0.46	49.93	1.76
21	Nathula 1	141.09	1.93	5.57	2.08	20.21	0	0.49	74.45	2.77
22	Nathula 2	141.09	1.93	5.57	3.69	28.51	0	0.36	64.97	2.48
23	Gnathang Valley 1	141.09	1.93	5.57	10.43	52.07	0	0.34	37	0.16
24	Gnathang Valley 2	141.09	1.93	5.57	8.35	51.88	0	0.29	39.33	0.15
25	Gnathang Valley 3	153.90	9.73	8.10	8.44	51.83	0	0.29	39.29	0.15
26	Elephant Lake2	141.09	1.93	5.57	5.86	31.55	0	0.08	60.37	2.13
27	Yakla 2	141.09	1.93	5.57	3.62	22.47	0	0.52	70.96	2.44

Table 4: Biodiversity

Name of the Wetland	List of plants species present in wetland	List of animal species present in wetland	Species of conservation significance (rare, endangered, threatened, endemic species) -	Major plant invasive alien species and extent of invasion	Major animal invasive alien species and extent of invasion
Anda Pokhari Lake	<i>Rhododendron fulgens</i> (Chimal), <i>Thotna</i> , <i>Heracleum walicchii</i> (Chinfin), <i>Swertia chiraita</i> (Chirito), <i>Michelia excelsa</i> (Sikkim Rani), <i>Rhododendron anthopogon</i> (Sunpatti), <i>Thuja</i> , <i>Rumex nepalensis</i> (chukli), <i>Primula spp</i> , <i>Bergenia ciliata</i> (Pakhanpet), <i>Abies alba</i> (Silver fir)	<i>Horse</i> , <i>Nemorhedus goral</i> (Goral) <i>Moschus chrysogaster</i> (Musk deer), <i>Tickta chara</i> , <i>Vaccura</i> , <i>Fox</i> , <i>Muntiacus muntjak</i> (Barking Deer), <i>Ithaginis cruentus</i> (Blood Pheasant).	<i>Moschus chrysogaster</i> (Musk deer),	Not Noticed	Not Noticed
Aritar Lake	<i>Eupatorium cannabinum</i> (Banmara), <i>Amouom subalatum</i> , <i>Cryptomeria japonica</i> (dhuppi), <i>Michelia champaka</i> (Champa), <i>Cherry</i> , <i>Mallotus nepalensis</i> (Malata), <i>Bucklandia populnea</i> (Pipli), <i>wild walnut</i> , <i>bamboo</i> , <i>Artemisia vulgaris</i> (Titaypati), <i>Poinsettia flower</i> , <i>Ficus nemolaris</i> (dhudhelo), <i>walnut</i> , <i>Areca spp</i> , <i>Erythrina indica</i> (Faledo), <i>Cedrela toona</i> (Tunis), <i>Alnus nepalensis</i> (Uttis), <i>Musa spp</i> .	<i>Anas platyrhynchos domesticus</i> (Domestic ducks), <i>Ctenopharyngodon idella</i> (Grass Carp), <i>Myophonus caeruleus</i> (Blue Wristling bird), <i>Sciuridae</i> (squirrel), <i>Catla catla</i> (Katlae fish), <i>Felis catus</i> and <i>Cyprinus carpio</i> (Common carp)	NA	Not Noticed	Not Noticed

Name of the Wetland	List of plants species present in wetland	List of animal species present in wetland	Species of conservation significance (rare, endangered, threatened, endemic species) -	Major plant invasive alien species and extent of invasion	Major animal invasive alien species and extent of invasion
Biren Jheel	<i>Rhododendron arboretum</i> , <i>Primula spp.</i> , <i>Rhododendron anthopogon</i> (Sunpatti)	<i>Ursus thibetanus</i> (Himalayan Black bear), <i>Aves</i> (Birds), <i>Canis lupus arctos</i> (Snow wolf) and <i>Panthera uncea</i> (Snow leopard)	<i>Panthera uncea</i> (Snow Leopard) (VU)	Not Noticed	Not Noticed
Tsomgo, Changu (Recognized Wetland)	<i>Primula sp.</i> , <i>Potentilla arbuscula</i> (Sanjinee), <i>Toral</i> , <i>Rhododendron fulgens</i> (Chimal), <i>Juniperus recurva</i> , <i>Pteris subquinata</i> (Silver fern), <i>mask plant</i> , <i>Jurmura</i> .	<i>Myophonous caeruleus</i> (Blue Whistling-Thrush), <i>Lophophorus (Monal)</i> , <i>Dafe</i> , <i>Ducula melanochroa</i> (Black pigeon), <i>Moschus chrysogaster</i> (musk deer), <i>Ursus thibetanus</i> (Himalayan black bear), <i>Barking deer</i> , <i>Cuon alpinus</i> (Feral dog), <i>Vulpes vulpes</i> (Fox), <i>Tadorna ferruginea Pallas</i> (Ruddy Shelduck), <i>Mergus merganser</i> Linnaeus (Goosander), <i>Aythya fuligula</i> Linnaeus (Tufted Duck), <i>Anas crecca</i> Linnaeus (Common Teal), <i>Anas acuta</i> Linnaeus (Northern Pintail) and <i>Phalacrocorax carbo</i> Linnaeus (Great Cormorant)	<i>Moschus chrysogaster</i> (Musk Deer), <i>Pseudois nayaur</i> (Blue sheep), <i>Cuon alpinus</i> (Feral dog)	Invasive species present in the waterbody	Not Noticed
Dogra Lake	<i>Rhododendron fulgens</i> , <i>Rhododendron anthopogon</i> (Sunpati), <i>Heracleum wallichii</i>	<i>Moschus chrysogaster</i> (Musk deer), <i>Panthera</i>	NA	Not Noticed	Not Noticed

Name of the Wetland	List of plants species present in wetland	List of animal species present in wetland	Species conservation significance (rare, endangered, threatened, endemic species) -	Major plant invasive alien species and extent of invasion	Major animal invasive alien species and extent of invasion
	(chimpling) (<i>Medicinal</i>), <i>Swertia chiraita</i> (chiraito), <i>Primula spp</i> , <i>Thuja spp</i> .	<i>unceae</i> (Snow leopard) and <i>Ursidae</i> (Bear).			
Gorkha Lake	<i>Rhododendron arboreum</i> , <i>R. barbetum</i> , <i>R. anthopogon</i> (Sunpati), <i>Juniperus recurva</i> (Bhairungpati), <i>Bergeniaciliata</i> (Pakhanpet), <i>Rhododendron hodgsomii</i> .	<i>Anas platyrhynchos</i> (Wild duck), <i>Bos grunniens</i> (Yak), <i>Cuon alpinus</i> (Feral dog), <i>Pseudois nayaur</i> (Blue Sheep) and <i>Ice burg</i> .	NA	Not Noticed	Not Noticed
L Lake	<i>Juniperus recurva</i> (Bhairungpati), <i>Rhododendron anthopogon</i> (Sunpati) and <i>Rhododendronz</i>	<i>Pseudois nayaur</i> (Blue Sheep) and <i>Panthera uncea</i> (Snow leopard)	<i>Panthera uncea</i> (VU)	Not Noticed	Not Noticed
Manju Lake (Below Sherathang Mart)	<i>Rhododendron spp</i> , <i>Juniper spp</i> , <i>Bergenia ciliata</i> (Pakhanpet)	<i>Pseudois nayaur</i> (Blue Sheep), <i>Cuon alpinus</i> (Feral dog)	NA	Invasive species present in the waterbody	Not Noticed
Memencho Lake	<i>Abies alba</i> , <i>Chinphin</i> . <i>Acer laevigatum</i> , <i>A. oblongum</i> , <i>A. cambelli</i> , <i>Acrocarpus fraxinifolius</i> , <i>Cryptomeria japonica</i> , <i>Juniperous pseudosabina</i> , <i>Quercus lanceaefolia</i> , <i>Rhododendron arboretum</i> , <i>Rhododendron barbatum</i> , <i>Taxus baccata</i> , <i>Rhododendron anthopogon</i> , <i>Swertia chiraita</i> , <i>Taxus baccata</i> , <i>Saxifraga spp.</i> ,	<i>Anas platyrhynchos</i> (Duck), <i>Bos Taurus</i> (wild ox) <i>Cuon alpinus</i> (Feral dog), <i>Fox</i> , <i>Muntjak sp.</i> (Yak), <i>Ursidae</i> , <i>Tadorna ferruginea</i> Pallas (Ruddy Shelduck), <i>Phalacrocorax carbo</i> Linnaeus (Great Cormorant), (Bears) and <i>Cervidae</i> (Deer)	NA	Invasive species present in the waterbody	Not Noticed

Name of the Wetland	List of plants species present in wetland	List of animal species present in wetland	Species conservation significance (rare, endangered, threatened, endemic species) - of	Major plant invasive alien species and extent of invasion	Major animal invasive alien species and extent of invasion
Nakchuk Lake 2	<i>Rhododendron spp</i> , <i>Juniperus recurva</i> (Bhairungpati), <i>Rhododendron anthopodon</i> (Sunpati) and <i>Primula spp</i>	<i>Anas platyrhynchos</i> (Wild duck), <i>Cuon alpinus</i> (Feral dog) and <i>Pseudois nayaur</i> (Blue Sheep)	NA	Not Noticed	Not Noticed
Nakchuk Lake	<i>Rhododendron hodgsonii</i> , <i>Juniperus recurva</i> (Bhairungpati), <i>Rhododendron anthopogon</i> (Sunpati)	<i>Anas platyrhynchos</i> (Wild duck), <i>Cuon alpinus</i> (Feral dog) and <i>Pseudois nayaur</i> (Blue Sheep)	NA	Not Noticed	Not Noticed
Pangolakha	<i>Rhododendron spp</i> , <i>Bergenia</i> , <i>Conifers</i> , <i>Rhododendron hodgsonii</i> , <i>Sunpati</i> and <i>Primula spp</i> .	<i>Bos grunniens</i> (Yak), <i>Moschus chrysogaster</i> (Musk deer), <i>Bombus</i> (Bumble bee), <i>jureli</i> , <i>Cuon alpinus</i> (Feral dog)	<i>Moschus chrysogaster</i> (Musk deer) (E)	Not Noticed	Not Noticed
Parapara Lake	<i>Rhododendron</i> , <i>Rockfoil</i> , <i>Rhododendron anthopoon</i> (Sunpati), <i>Abies densa</i> (Silver fir) and <i>Pinus spp</i> .	<i>Trout</i> , <i>Cuon alpinus</i> (Feral dog), <i>Ursus thibetanus</i> (Himalayan black bear), <i>Panthera</i>	NA	Not Noticed	Not Noticed

Name of the Wetland	List of plants species present in wetland	List of animal species present in wetland	Species conservation significance (rare, endangered, threatened, endemic species) - of	Major plant invasive alien species and extent of invasion	Major animal invasive alien species and extent of invasion
		<i>unceae</i> (Snow leopard)			
Phidang (Elephant)Lake	<i>Cryptomeria japonica</i> , <i>Pilea umbrosa</i> , <i>Gleichenia gigantean</i> ,	<i>Tadorna ferruginea</i> Pallas (Ruddy Shelduck), <i>Mergus merganser</i> Linnaeus (Goosander), <i>Aythya fuligula</i> Linnaeus (Tufted Duck), <i>Anas crecca</i> Linnaeus (Common Teal), <i>Anas acuta</i> Linnaeus (Northern Pintail) and <i>Phalacrocorax carbo</i> Linnaeus (Great Cormorant)	NA	Not Noticed	Not Noticed
Stone Lake	<i>Rhododendron anthopogon</i> (Sunpati), <i>Primula spp</i> , <i>Juniperus recurva</i> (Bhairungpati), and Pine	<i>Cuon alpinus</i> (Feral dog), <i>Anas platyrhynchos</i> (Wild duck), <i>Pseudois nayaur</i> (Blue Sheep), <i>Panthera uncea</i> (Snow leopard) and <i>Moschus chrysogaster</i> (Musk deer)	<i>Panthera uncea</i> (Snow leopard) (VU)	Not Noticed	Not Noticed

Name of the Wetland	List of plants species present in wetland	List of animal species present in wetland	Species conservation significance (rare, endangered, threatened, endemic species) -	Major plant invasive alien species and extent of invasion	Major animal invasive alien species and extent of invasion
Three Sister One Lake	<i>Rhododendron anthopogon</i> , <i>Primula</i> , <i>Bergenia ligulata</i> (<i>pakhenbed</i>) and <i>abhijung</i>	<i>Bos grunniens</i> (Yak), <i>Cuon alpinus</i> (Feral dog), <i>Moschus chrysogaster</i> (Musk deer), <i>Pseudois nayaur</i> (Blue Sheep), <i>Schizothorax plagiostomus</i> (trout), <i>Aegithalos concinnus</i> (Black-Throated Bush tit), <i>Myophoneus caeruleus</i> (Blue Whistling Thrush) and <i>Apis dorsata laboriosa</i> (Bumble bee)	<i>Moschus chrysogaster</i> (E)	Not Noticed	Not Noticed
Three Sister Two Lake	<i>Rhododendron anthopogon</i> , <i>Primula spp</i> , <i>Bergenia ligulata</i> (<i>Pakhenbed</i>) and <i>Drymaria cordata</i> (<i>Abhijal</i>)	<i>Bos grunniens</i> (Yak), <i>Cuon alpinus</i> (Feral dog), <i>Moschus chrysogaster</i> (Musk deer), <i>Pseudois nayaur</i> (Blue Sheep), <i>Schizothorax</i>	<i>Moschus chrysogaster</i> (E)	Not Noticed	Not Noticed

Name of the Wetland	List of plants species present in wetland	List of animal species present in wetland	Species of conservation significance (rare, endangered, threatened, endemic species) -	Major plant invasive alien species and extent of invasion	Major animal invasive alien species and extent of invasion
		<i>plagiostomus</i> (trout), <i>Myophoneus caeruleus</i> (Kalchura) and <i>Apis dorsata laboriosa</i> (Bumble bee)			
Yakla Lake	<i>Rhododendron anthopogon</i> , <i>Juniperus recurve</i>	<i>Pseudois nayaur</i> (Blue Sheep)	NA	Not Noticed	Not Noticed
Black Lake	<i>Primula spp</i> , <i>Rhododendron anthopogon</i> (Sunpati), <i>Juniperus recurva</i> (Bhairungpati), <i>Pinus spp</i> .	<i>Pseudois nayaur</i> (Blue Sheep), wild duck, <i>Panthera uncea</i> (Snow Leopard), <i>Streptopelia orientalis</i> (Rufous Turtle Dove), <i>Cuon alpinus</i> (Feral dog), <i>Vulpes vulpes</i> (Red Fox).	<i>Panthera uncea</i> (VU)	Not Noticed	Not Noticed
Hangu Lake	<i>Jancus Sp</i> , <i>Aconogonum Sp</i> , <i>Meconopsis Sp</i> , <i>Potentala sp</i> , <i>Rhododendron sp</i> , <i>Bistorta vivipara</i> , <i>fragaria Sp</i> , <i>Prunela Vulgaris</i>	<i>Oncorhynchus mykiss</i> (Golden Trout), <i>Pseudois nayaur</i> (Blue sheep)	<i>Oncorhynchus mykiss</i> (Golden Trout)	Not Noticed	Not Noticed

Name of the Wetland	List of plants species present in wetland	List of animal species present in wetland	Species of conservation significance (rare, endangered, threatened, endemic species) -	Major plant invasive alien species and extent of invasion	Major animal invasive alien species and extent of invasion
Nathula 1	<i>Rhododendron sp, Bistorta vivipara, buttercup, Primula Denticuleta, Fragaria Sp, Ferns, Rheum Nobile, Aconatum Sp. Meconopsis Sp</i>	<i>Moschus chrysogaster</i> (Musk deer), <i>Columba leuconota</i> (Snow pigeon), <i>Oncorhynchus mykiss</i> (Golden Trout)	<i>Oncorhynchus mykiss</i> (Golden Trout)	Not Noticed	Not Noticed
Nathula 2	<i>Bistorta vivipara, buttercup, Primula Denticuleta, Fragaria Sp, Anaphelis Sp, R. Anthropogan, R. Lapidatum, R. Sitosum, Rheum Nobile, Aconatum Sp. Meconopsis Sp</i>	<i>Moschus chrysogaster</i> (Musk deer), <i>Columba leuconota</i> (Snow pigeon), <i>Oncorhynchus mykiss</i> (Golden Trout)	<i>Oncorhynchus mykiss</i> (Rainbow trout)	Not Noticed	Not Noticed
Gnathang Valley 1	<i>Potentilla sp, Kutki, Jatamansi, Rhododendron Sp, Primula Sikkiminses, Grasses, Ferns, Primula denticulate</i>	<i>Pseudois nayaur</i> (Blue sheep), <i>Oncorhynchus mykiss</i> (Trout Fish), <i>Moschus chrysogaster</i> (Musk deer)	<i>Oncorhynchus mykiss</i> (Trout Fish)	Not Noticed	Not Noticed
Gnathang Valley 2	<i>Rhododendron Sp, Potentilla sp, Fragaria Sp, Prunela Vulgaris, Phlomis Sp, Jancus Sp, Anaphelis Sp, Bistorta Sp.</i>	<i>Columba leuconota</i> (Snow pigeon), <i>Moschus chrysogaster</i> (Musk deer)	<i>Tadorna ferruginea Palas</i> (Ruddy shelduck).	Not Noticed	Not Noticed

Name of the Wetland	List of plants species present in wetland	List of animal species present in wetland	Species conservation significance (rare, endangered, threatened, endemic species) -	Major plant invasive alien species and extent of invasion	Major animal invasive alien species and extent of invasion
		deer) and Tadorna ferruginea Pallas(Ruddy shelduck).			
Gnathang Valley 3	<i>Rhododendron sp, Juniper, Anaphelis Sp, Bistorta Sp,</i>	Blue sheep, <i>Moschus chrysogaster</i> (Musk deer), blood Peasant, Tadorna ferruginea Pallas(Ruddy shelduck).	Tadorna ferruginea Pallas (Ruddy shelduck).	Not Noticed	Not Noticed
Elephant Lake2	<i>Rhododendron sp, Juniper sp, Macanopsis sp, Berginia celita, Barbaris sp, Aconatum sp, Kutki Sp, Primula sikkiminses, Grasses</i>	<i>Moschus chrysogaster</i> (Musk deer), dafay, munal, <i>Oncorhynchus mykiss (Trout Fish)</i>	<i>Oncorhynchus mykiss (Trout Fish)</i>	Not Noticed	Not Noticed
Yakla 2	<i>Bistorta Sp, Aconatum sp, Fragaria Sp, Potentilla sp, Kutki, Jatamansi, Rehum nobile, pach amlay</i>	Blood pesent, <i>Brahminy duck</i> and <i>Oncorhynchus mykiss (Trout Fish)</i>	<i>Brahminy duck, Oncorhynchus mykiss (Trout Fish)</i>	Not Noticed	Not Noticed

*NA – Not Assessed

Table 5: Present and Potential Threats

Name of the Wetland	Changes in water inflow and outflow	Pollution (Sewage/solid waste disposal etc.)	Unsustainable harvest of biological resources	Mining	Siltation/Idol immersion	Estimated rate of siltation	Encroachment	Spread of invasive species	Any other, please list
Anda Pokhari Lake	Low	Medium	Present but at a very Low Level	NA	Low	Low	Low	Low	Nil
Aritar Lake	Low	Low	Present but at a very Low Level	Low	Low	Low	Low	Low	Nil
Biren Jheel	Medium	Low	Present but at a very Low Level	Low	Low	Low	Low	Low	Nil
Tsomgo, Changu (Recognized Wetland)	Low	Medium	Present but at a very Low Level	NA	Low	High	Medium	NA	Nil
Dogra Lake	Low	NA	Present but at a very Low Level	NA	Low	Low	Low	NA	Nil

Name of the Wetland	Changes in water inflow and outflow	Pollution (Sewage/solid waste disposal etc.)	Unsustainable harvest of biological resources	Mining	Siltation/Idol immersion	Estimated rate of siltation	Encroachment	Spread of invasive species	Any other, please list
Gorkha Lake	Low	Medium – Present (Waste products like water bodies, plastic used by civilians (local) and labours as well as porters)	Present but at a very Low Level	NA	Low	Low	Low	Low	NA
L lake	Low	Low	Present but at a very Low Level	NA	Low	Low	NA	Low	NA
Manju Lake (Below Sherathang Mart)	Low	Low level – coming from the Mart	Present but at a very Low Level	NA	Low	High	Medium	Low	NA
Memecho Lake	No	Low – Potential (Defence Establishment but any disposal activity not seen).	Present but at a very Low Level	NA	Medium	Low	No	No	NA
Nakchuk Lake 2	Low	Medium (Plastic & bottles)	Present but at a very Low Level	NA	Medium	Medium	Low	Low	NA

Name of the Wetland	Changes in water inflow and outflow	Pollution (Sewage/solid waste disposal etc.)	Unsustainable harvest of biological resources	Mining	Siltation/Idol immersion	Estimated rate of siltation	Encroachment	Spread of invasive species	Any other, please list
Nakchuk Lake	Medium	Low	Low	NA	Low	Low	Low	Low	NA
Pangolakha	Low	Low	Low	NA	Low	Low	Low	Low	NA
Parapara lake	Low	Low	Low	NA	Low	Low	Low	Low	NA
Phidang lake	Low	Low	Low	NA	Low	Medium	NA	Low	NA
Stone lake	Low	Low	Low	NA	Low	Low	NA	Low	NA

Name of the Wetland	Changes in water inflow and outflow	Pollution (Sewage/solid waste disposal etc.)	Unsustainable harvest of biological resources	Mining	Siltation/Idol immersion	Estimated rate of siltation	Encroachment	Spread of invasive species	Any other, please list
Three Sister One lake	Medium	Low	Low	NA	Low	Low	Low	Low	NA
Three Sister Two lake	Medium	Low	Low	NA	Low	Low	Low	Low	NA
Yakla lake	Low	Low	Low	NA	Low	Low	NA	Low	NA
Black lake	Low	Low	Low	NA	Low	Low	NA	Low	NA
Hangu Lake	Low – Present	NA	Low - Present	NA	Low – Present	Low – Present	Low – Present	NA	NA

Name of the Wetland	Changes in water inflow and outflow	Pollution (Sewage/solid waste disposal etc.)	Unsustainable harvest of biological resources	Mining	Siltation/Idol immersion	Estimated rate of siltation	Encroachment	Spread of invasive species	Any other, please list
Nathula 1	Low – Present	NA	Low - Present	NA	NA	NA	Low – Present	NA	NA
Nathula 2	Low – Present	NA	Low - Present	NA	NA	NA	Low – Present	NA	NA
Gnathang Valley 1	Low – Present	NA	Low - Present	NA	Low – Present	Low – Present	Low – Present	NA	NA
Gnathang Valley 2	Low – Present	NA	Low - Present	NA	Low – Present	Low – Present	Low – Present	NA	NA
Gnathang Valley 3	Low – Present	NA	Low - Present	NA	Low – Present	NA	Low – Present	NA	NA

Name of the Wetland	Changes in water inflow and outflow	Pollution (Sewage/solid waste disposal etc.)	Unsustainable harvest of biological resources	Mining	Siltation/Idol immersion	Estimated rate of siltation	Encroachment	Spread of invasive species	Any other, please list
Elephant Lake1	Low – Present	NA	Low - Present	NA	Low – Present	NA	Low – Present	NA	NA
Yakla 2	Low – Present	NA	Low - Present	NA	Low – Present	Low – Present	Low – Present	NA	NA

Table 6: Ecosystem Services

Name of the Wetland	Source of driving water for people living and around	Source of water for agriculture	Fisheries	Cultivation of aquatic food plants	Medicinal plants	Is recreational site	Buffering communities from extreme events as floods and storms	Groundwater recharge
Anda Pokhari Lake	Yes	No (No agriculture practises done)	NA	NA	Yes (<i>Swertia chiraita</i> (Chirito), Sikkim rani, <i>Heracleum wallichii</i> (chimphing), Dhungdung, Bhota dhaniya, chukli)	NA	Yes	Yes
Aritar Lake	No	No	Yes (Grass crap- to clear the pond)	No	Yes (<i>Artemisia vulgaris</i> (Titaypati) <i>Eupatorium cannabinum</i> (Banmara)	Yes	NA	Yes (Canal System)
Biren Jheel	No	No	NA	No	No	No	Yes	No

Name of the Wetland	Source of drinking water for people living and around	Source of water for agriculture	Fisheries	Cultivation of aquatic food plants	Medicinal plants	Is recreational site	Buffering communities from extreme events as floods and storms	Groundwater recharge
Tsomgo, Changu (Recognized Wetland)	No	No	NA	No	Yes (<i>Picrorhiza scrophulariiflora</i> (Kutki), Bikma, panchmalay, <i>Heracleum wallichii</i> (chimphing), <i>Swertia chiraita</i> (chereato), <i>Nardostachys jatamansi</i> (jatamansi), Dokcha)	Yes	Yes (Landslides)	Yes
Dogra lake	Yes (Army used to have as a drinking water and cooking purpose)	No	NA	No	Yes (<i>Swertia chiraita</i> (Chereto)-used for the curing headache and body pain etc.)	No	Yes	No
Gorkha lake	No	No	NA	No	Yes (<i>Bergenia</i> spp - used to cure body pain, headache, throat pain etc.)	No	Yes	Yes

Name of the Wetland	Source of driving water for people living and around	Source of water for agriculture	Fisheries	Cultivation of aquatic food plants	Medicinal plants	Is recreational site	Buffering communities from extreme events as floods and storms	Groundwater recharge
L lake	No	No	NA	No	No	No	Yes	No
Manju lake (Below Sherathang Mart)	No	No	NA	No	No	No	Yes	No
Memencho lake	Yes (Permanent ground water)	No (No agriculture practices noticed)	Yes	No	Yes <i>Heracleum wallichii</i> (Chimphin)	Yes	Yes	Yes
Nakchuk Lake 2	No	No	NA	No	No	No	Yes	No
Nakchuk Lake	No	No	NA	No	No	No	Yes	No
Pangolakha	No	No	NA	No	Yes (<i>Bergenia</i> sp)	No	Yes	No
Parapara lake	No	No	NA	No	No	No	Yes	No

Name of the Wetland	Source of driving water for people living and around	Source of water for agriculture	Fisheries	Cultivation of aquatic food plants	Medicinal plants	Is recreational site	Buffering communities from extreme events as floods and storms	Groundwater recharge
Phidang lake	No	No	NA	No	No	No	Yes	No
Stone lake	No	No	NA	No	No	No	Yes	No
Three Sister One lake	No	No	NA	No	Yes (Berginia Ciliate (Pakhanbed))	No	Yes	No
Three Sister Two lake	No	No	NA	No	Yes (Bergenia Ciliata (Pakhanbed))	No	Yes	No
Yakla lake	Yes	No	Yes	No	Yes	No	Yes	No
Black lake	Yes	No	Yes	No	NA	No	Yes	
Hangu Lake	Yes For Locals	No	No	No	No	Yes	No	Yes
Nathula 1	Yes for Army	No	No	No	NTFPs	Yes	No	Yes
Nathula 2	Yes for Army	No	No	No	NTFPs	Yes	No	Yes

Name of the Wetland	Source of driving water for people living and around	Source of water for agriculture	Fisheries	Cultivation of aquatic food plants	Medicinal plants	Is recreational site	Buffering communities from extreme events as floods and storms	Groundwater recharge
Gnathang Valley 1	Yes for Locals	No	No	No	NTFPs	Yes	No	Yes
Gnathang Valley 2	Yes for Locals	No	No	No	NTFPs	Yes	No	Yes
Gnathang Valley 3	Yes for Locals	No	No	No	NTFPs	Yes	No	Yes
Elephant Lake1	Yes for Army	No	No	No	NTFPs	Yes	No	Yes
Yakla 2	Yes for Army	No	No	No	NTFPs	Yes	No	Yes

Table 6A: Ecosystem Services

Name of the Wetland	Water purification	Acts as a sink for sediments	Has significant cultural and religious values	Is a site for recreation and aquatic sport	Source/cultivation noteworthy food plants species	Habitat for noteworthy animal species	Habitat for migratory water birds	Supports fisheries/a quaculture	Mining	Any other, please list
Anda Pokhari Lake	Yes	Yes	Yes (People of periphery believe and worship)	No	No	No	No	No	No	No
Aritar Lake	Yes	No	Yes (Buddhist)	Yes	No	No	No	Yes	No	No
Biren Jheel	Yes	Yes	No	No	No	No	No	No	No	No
Tsomgo, Changu (Recognized Wetland)	Yes (Small embankment to stop sewage into lake but needs more action as there is high inflow of tourist)	Yes	Yes (Buddhist-Sukadawa celebration, Hinduism-Sansau Puja and Devi puja)	Yes (No aquatic sports)	No	Yes (Must deer, Blue Sheep, Fox)	Yes (Bar-headed Goose, Gadwall, Ferruginous Duck, Brown-headed Gull)	Yes (<i>Schizothorax spp</i> (Asala), <i>Cooper Mahseer</i> (katley))	No	No

Name of the Wetland	Water purification	Acts as a sink for sediments	Has significant cultural and religious values	Is a site for recreation and aquatic sport	Source/cultivation noteworthy food plants species	Habitat for noteworthy animal species	Habitat for migratory water birds	Supports fisheries/aquaculture	Mining	Any other, please list
Dogra lake	Yes	Yes	Yes (Lake is revered by Buddhist Community)	No	No	No	No	No	No	No
Gorkha lake	Yes	Yes	Yes (Lake is revered by Buddhist Community)	No	No	No	Yes (Black-necked Grebe, Ferruginous Duck)	No	No	No
L lake	Yes	Yes	Yes (Lake is revered by Buddhist Community)	No	No	No	No	No	No	No
Manju lake (Below Sherathang Mart)	Yes	Yes	Yes (Lake is revered by Buddhist Community)	No	No	No	Yes	Yes	No	No

Name of the Wetland	Water purification	Acts as a sink for sediments	Has significant cultural and religious values	Is a site for recreation and aquatic sport	Source/cultivation noteworthy food plants species	Habitat for noteworthy animal species	Habitat for migratory water birds	Supports fisheries/aquaculture	Mining	Any other, please list
Memencholake	Yes	Yes (Minimum through streams)	Yes (Lake is revered by Buddhist Community)	Yes	No	Yes (<i>Pseudois nayaur</i> sp. (Blue Sheep), Deer, Duck, Bear, Fox, Red Panda).	Yes (Ferruginous Duck, Goosander, Tufted Duck, Black-necked Grebe)	Yes (Trout fish culture)	No	No
Nakchuk Lake 2	Yes	Yes	Yes (Lake is revered by Buddhist Community)	No	No	No	Yes (Wild duck)	No	No	No
Nakchuk Lake	Yes	Yes	Yes (Lake is revered by Buddhist Community)	No	No	No	Yes (Wild duck)	No	No	No
Pangolakha	Yes	Yes	Yes (Lake is revered by Buddhist Community)	No	No	No	Yes	Yes	No	No

Name of the Wetland	Water purification	Acts as a sink for sediments	Has significant cultural and religious values	Is a site for recreation and aquatic sport	Source/cultivation noteworthy food plants species	Habitat for noteworthy animal species	Habitat for migratory water birds	Supports fisheries/aquaculture	Mining	Any other, please list
Parapara lake	Yes	Yes	Yes (Lake is revered by Buddhist Community)	No	No	No	No	No	No	No
Phidang lake	Yes	Yes	Yes (Lake is revered by Buddhist Community)	No	No	No	Yes (Black-necked Grebe)	No	No	No
Stone lake	Yes	Yes	Yes (Lake is revered by Buddhist Community)	No	No	No	Yes (Black-necked Grebe and Ferruginous Duck)	No	No	No
Three Sister One lake	Yes	Yes	Yes (Lake is revered by Buddhist Community)	No	No	Yes (Yak is seen grazing)	No	No	No	No
Three Sister Two lake	Yes	Yes	Yes (Lake is revered by Buddhist Community)	No	No	Yes (Yak is seen grazing)	No	No	No	No

Name of the Wetland	Water purification	Acts as a sink for sediments	Has significant cultural and religious values	Is a site for recreation and aquatic sport	Source/cultivation noteworthy food plants species	Habitat for noteworthy animal species	Habitat for migratory water birds	Supports fisheries/aquaculture	Mining	Any other, please list
Yakla lake	Yes	Yes	Yes (Lake is revered by Buddhist Community)	No	No	No	No	No	No	No
Black lake	Yes	Yes	Yes (Lake is revered by Buddhist Community)	No	No	No	No	No	No	No
Hangu Lake	No	Yes	Yes	No	No	Yes	Yes (Bar-headed Goose and Gadwall)	No	No	No
Nathula 1	No	Yes	Yes	No	No	Yes	Yes	No	No	Nil
Nathula 2	No	Yes	Yes	No	No	Yes	Yes	No	No	Nil

Name of the Wetland	Water purification	Acts as a sink for sediments	Has significant cultural and religious values	Is a site for recreation and aquatic sport	Source/cultivation noteworthy food plants species	Habitat for noteworthy animal species	Habitat for migratory water birds	Supports fisheries/aquaculture	Mining	Any other, please list
Gnathang Valley 1	No	Yes	Yes	No	No	Yes	Yes	No	No	Nil
Gnathang Valley 2	No	Yes	Yes	No	No	Yes	Yes	No	No	Nil
Gnathang Valley 3	No	Yes	Yes	No	No	Yes	Yes	No	No	Nil
Elephant Lake1	No	Yes	Yes	No	No	Yes	No	No	No	Nil
Yakla 2	No	Yes	Yes	No	No	Yes	Yes	No	No	Nil

Table 7: Pre-Existing Right and Privileges

Name of the Wetland	Community Fishing (without any leave or permission from government department)	Fishing under lease from government department	Harvest of plants (without any)	Lease permission or from government department	Harvest of plants under lease from government department	Agriculture or horticulture within wetland
Anda Pokhari Lake	No	No	No	No	No	No
Aritar lake	No (There is no fishes)	No	No	No	No	No
Biren Jheel	No	No	No	No	No	No
Tsomgo, Changu (Recognized Wetland)	No	No	No	No	No	No
Dogra lake	No	No	No	No	No	No
Gorkha Lake	No	No	No	No	No	No
L lake	No	No	No	No	No	No
Manju Lake (Below Sherathang Mart)	No	No	No	No	No	No

Name of the Wetland	Community Fishing (without any permission from government department)	Fishing under lease from government department	Harvest of plants (without any)	Lease permission or from government department	Harvest of plants under lease from government department	Agriculture or horticulture within wetland
Memencho Lake	No	Yes (State Fisheries Dept Maintains the breeding of Trout Fish).	No	No	No	No
Nakchuk Lake 2	No	No	No	No	No	No
Nakchuk Lake	No	No	No	No	No	No
Pangolakha	No	No	No	No	No	No
Parapara lake	No	No	No	No	No	No
Phidang lake	No	No	No	No	No	No
Stone lake	No	No	No	No	No	No
Three Sister One lake	No	No	No	No	No	No
Three Sister Two lake	No	No	No	No	No	No

Name of the Wetland	Community Fishing (without any permission government department)	Fishing under lease from government department	Harvest of plants (without any)	Lease permission or from government department	Harvest of plants under lease from government department	Agriculture or horticulture within wetland
Yakla lake	No	No	No	No	No	No
Black lake	No	No	No	No	No	No
Hangu Lake	No	No	NTFP	No	No	No
Nathula 1	No	No	NTFP	No	No	No
Nathula 2	No	No	NTFP	No	No	No
Gnathang Valley 1	No	No	NTFP	No	No	No

Name of the Wetland	Community Fishing (without any permission government department)	Fishing under lease from government department	Harvest of plants (without any)	Lease permission or from government department	Harvest of plants under lease from government department	Agriculture or horticulture within wetland
Gnathang Valley 2	No	No	NTFP	No	No	No
Gnathang Valley 3	No	No	NTFP	No	No	No
Elephant Lake1	No	No	NTFP	No	No	No
Yakla 2	No	No	NTFP	No	No	No

Table 7A: Pre-Existing Right and Privileges

Name of the Wetland	Grazing	Religious practices	Withdrawal of water for domestic use	Withdrawal of water for agriculture or fisheries	Bathing or wallowing of domestic animals (buffalo, elephant etc.)	Drinking water for bovines	Plying of boats	Any other, please list here
Anda Pokhari Lake	No	Yes (Waste products from religious practices affect the place)	No	No	No	No	No	No
Aritar Lake	No	No	No	No	No	No	Yes (Source of income for the communities)	No
Biren Jheel	No	No	No	No	No	No	No	No
Tsomgo, Changu (Recognized Wetland)	No	Yes (Religious practice (Bhadauria Purnima Festival) is for conservation of this lake)	No	No	Yes	Yes	No	No
Dogra lake	No	No	No	No	Yes	Yes	No	No

Name of the Wetland	Grazing	Religious practices	Withdrawal of water for domestic use	Withdrawal of water for agriculture or fisheries	Bathing or wallowing of domestic animals (buffalo, elephant etc.)	Drinking water for bovines	Plying of boats	Any other, please list here
Gorkha lake	Yes (Yak-pollute the water bodies)	No	No	No	No	No	No	No
L lake	No	No	No	No	No	No	No	No
Manju Lake (Below Sherathang Mart)	No	No	No	No	No	No	No	No
Memencho Lake	No	Yes	No	Yes	No	No	Yes (Experimental purpose).	No
Nakchuk Lake 2	Yes (Yak – pollute the water bodies)	No	No	No	No	No	No	No
Nakchuk Lake	No	No	No	No	No	No	No	No
Pangolakha	Yes (Yak)	No	No	No	No	No	No	No

Name of the Wetland	Grazing	Religious practices	Withdrawal of water for domestic use	Withdrawal of water for agriculture or fisheries	Bathing or wallowing of domestic animals (buffalo, elephant etc.)	Drinking water for bovines	Plying of boats	Any other, please list here
Parapara lake	No	No	No	No	No	No	No	No
Phidang lake	No	No	No	No	No	No	No	No
Stone lake	No	No	No	No	No	No	No	No
Three Sister One lake	Yes	Yes	No	No	No	No	No	No
Three Sister Two lake	Yes	Yes	No	No	No	No	No	No
Yakla lake	Yes	Yes	No	No	No	No	No	No
Black lake	Yes	Yes	No	No	No	No	No	No
Hangu Lake	Yes	Yes	Used by Locals	No	No	Yes	No	No
Nathula 1	No	No	Used by Army	No	No	Yes	No	No

Name of the Wetland	Grazing	Religious practices	Withdrawal of water for domestic use	Withdrawal of water for agriculture or fisheries	Bathing or wallowing of domestic animals (buffalo, elephant etc.)	Drinking water for bovines	Plying of boats	Any other, please list here
Nathula 2	No	Yes	Used by Army	No	No	Yes	No	No
Gnathang Valley 1	Yes	Yes	Used by Locals	No	No	Yes	No	No
Gnathang Valley 2	Yes	Yes	Used by Locals	No	No	Yes	No	No
Gnathang Valley 3	Yes	Yes	Used by Locals	No	No	Yes	No	No
Elephant Lake1	Yes	Yes	Used by Army	No	No	Yes	No	No
Yakla 2	Yes	No	Used by Army	No	No	Yes	No	No

Table 8: Activities Proposed to be Prohibited Under Wetlands (Conservation and Management) Rules, 2017

Name of the Wetland	Reclamation/filling up	Setting up of new industries / expansion of existing industries	Handling or storage/disposal of hazardous substances (except port areas)	Solid Waste Dumping	Sink for untreated sewage/industrial effluent	Construction activities (except boat jetties)	Any other, please list
Anda Pokhari Lake	Yes	NA	NA	NA	NA	NA	Nil
Aritar Lake	Yes	NA	NA	NA	NA	NA	Nil
Biren Jheel	Yes	NA	NA	NA	NA	NA	Nil
Tsongo, Changu (Recognized Wetland)	Yes	NA	NA	NA	NA	NA	Nil
Dogra Lake	Yes	NA	NA	NA	NA	NA	Nil
Gorkha Lake	Yes	NA	NA	NA	NA	NA	Nil
L Lake	Yes	NA	NA	NA	NA	NA	Nil
Manju Lake (Below Sherathang Mart)	Yes	NA	NA	NA	NA	NA	Nil

Name of the Wetland	Reclamation/filling up	Setting up of new industries / expansion of existing industries	Handling or storage/disposal of hazardous substances (except port areas)	Solid Waste Dumping	Sink for untreated sewage/industrial effluent	Construction activities (except boat jetties)	Any other, please list
Memencho Lake	Yes	Yes	Yes	Yes	NA	NA	Nil
Nakchuk Lake 2	Yes	NA	Yes	Yes	NA	NA	Nil
Nakchuk Lake	Yes	NA	NA	NA	NA	NA	Nil
Pangolakha	Yes	NA	Yes	NA	NA	NA	Nil
Parapara Lake	Yes	NA	NA	NA	NA	NA	Nil
Phidang Lake	Yes	NA	NA	NA	NA	NA	Nil
Stone Lake	Yes	NA	NA	NA	NA	NA	Nil
Three Sister One Lake	Yes	NA	NA	NA	NA	NA	Nil
Three Sister Two Lake	Yes	NA	NA	NA	NA	NA	Nil
Yakla Lake	Yes	NA	NA	NA	NA	NA	Nil

Name of the Wetland	Reclamation/filling up	Setting up of new industries / expansion of existing industries	Handling or storage/disposal of hazardous substances (except port areas)	Solid Waste Dumping	Sink for untreated sewage/industrial effluent	Construction activities (except boat jetties)	Any other, please list
Black Lake	Yes	NA	NA	NA	NA	NA	Nil
Hangu Lake	Yes	NA	NA	NA	NA	NA	Nil
Nathula 1	Yes	NA	NA	NA	NA	NA	Nil
Nathula 2	Yes	NA	NA	NA	NA	NA	Nil
Gnathang Valley 1	Yes	NA	NA	NA	NA	NA	Nil
Gnathang Valley 2	Yes	NA	NA	NA	NA	NA	Nil
Gnathang Valley 3	Yes	NA	NA	NA	NA	NA	Nil
Elephant Lake1	Yes	NA	NA	NA	NA	NA	Nil
Yakla 2	Yes	NA	NA	NA	NA	NA	Nil

Table 9: Activities Proposed to be Regulated Under Wetlands (Conservation and Management) Rules, 2017

Name of the Wetland	Withdrawal of water/impoundment/diversion or any other hydrological intervention	Harvesting of resources (living / non-living)	Grazing	Discharge of treated sewage / effluent / wastewater	Construction of boat jetties and facilities for temporary use, as pantoon bridges	Aquaculture, agriculture and horticulture activities within the wetland boundaries	Any other, please list
Anda Pokhari Lake	No	No	No	Yes	No	No	Nil
Aritar Lake	No	No	No	NA	NA	NA	Nil
Biren Jheel	No	No	No	NA	No	No	Nil
Tsomgo, Changu (Recognized Wetland)	Check dams at the inlets	No	Yes	No	No	No	Nil
Dogra Lake	No	No	No	NA	NA	NA	Nil
Gorkha Lake	No	No	Yes	NA	NA	NA	Nil
L Lake	No	NA	Yes	NA	NA	NA	Nil
Manju Lake (Below Sherathang Mart)	No	No	Yes	NA	NA	NA	Nil

Name of the Wetland	Withdrawal of water/impoundment/diversion or any other hydrological intervention	Harvesting of resources (living / non-living)	Grazing	Discharge of treated sewage / effluent / wastewater	Construction of boat jetties and facilities for temporary use, as pantoon bridges	Aquaculture, agriculture and horticulture activities within the wetland boundaries	Any other, please list
Memencho Lake	No	No	Yes	NA	NA	NA	Nil
Nakchuk Lake 2	No	NA	Yes	NA	NA	NA	Nil
Nakchuk Lake	No	NA	No	NA	NA	NA	Nil
Pangolakha	No	NA	Yes	NA	NA	Yes	Nil
Parapara Lake	No	NA	NA	NA	NA	NA	Nil
Phidang Lake	No	NA	NA	NA	NA	NA	Nil
Stone Lake	No	NA	NA	NA	NA	NA	Nil
Three Sister One Lake	No	NA	Yes	NA	NA	NA	Nil
Three Sister Two Lake	No	NA	Yes	NA	NA	NA	Nil
Yakla Lake	No	NA	Yes	NA	NA	NA	Nil

Name of the Wetland	Withdrawal of water/impoundment/diversion or any other hydrological intervention	Harvesting of resources (living / non-living)	Grazing	Discharge of treated sewage / effluent / wastewater	Construction of boat jetties and facilities for temporary use, as pantoon bridges	Aquaculture, agriculture and horticulture activities within the wetland boundaries	Any other, please list
Black Lake	No	NA	No	NA	NA	NA	Nil
Hans Pokhari Lake	No	No	Yes (Horses)	NA	No	No	Nil
Hangu Lake	No	NTFPs	Yes	No	No	No	Nil
Nathula 1	No	NTFPs	No	No	No	No	Nil
Nathula 2	No	NTFPs	No	No	No	No	Nil
Gnathang Valley 1	No	NTFPs	Yes	No	No	No	Nil
Gnathang Valley 2	No	NTFPs	Yes	No	No	No	Nil
Gnathang Valley 3	No	NTFPs	Yes	No	No	No	Nil

Name of the Wetland	Withdrawal of water/impoundment/diversion or any other hydrological intervention	Harvesting of resources (living / non-living)	Grazing	Discharge of treated sewage / effluent / wastewater	Construction of boat jetties and facilities for temporary use, as pantoon bridges	Aquaculture, agriculture and horticulture activities within the wetland boundaries	Any other, please list
Elephant Lake1	No	NTFPs	Yes	No	No	No	Religious
Yakla 2	No	N TFPs	No	No	No	No	Nil

10. Notification Category

Name of the Wetland	Included in Ramsar List	Included under National Wetland Conservation Program	Wetland is located in ecologically sensitive and important areas	Wetland is located within a UNESCO World Heritage Site	Wetland is located in religious/cultural site	High altitude wetland or wetland complex with area \geq 5 ha	Below an elevation of 2,500 m above sea level and having area \geq 500 ha	Others
Anda Pokhari Lake	No	No	Yes	No	Yes	No	No	Nil
Aritar Lake	No	No	No	No	Yes	No	No	Nil
Biren Jheel	No	No	Yes	No	No	No	No	Nil

Name of the Wetland	Included in Ramsar List	Included under National Wetland Conservation Program	Wetland is located in ecologically sensitive and important areas	Wetland is located within a UNESCO World Heritage Site	Wetland is located in religious/cultural site	High altitude wetland or wetland complex with area \geq 5 ha	Below an elevation of 2,500 m above sea level and having area \geq 500 ha	Others
Tsomgo, Changu (Recognized Wetland)	Yes	No	Yes	No	Yes	Yes	No	Nil
Dogra Lake	No	No	Yes	No	No	No	No	Nil
Gorkha Lake	No	No	Yes	No	No	No	No	Nil
L Lake	No	No	Yes	No	Yes	No	No	Nil
Manju Lake (Below Sherathang Mart)	No	No	Yes	No	Yes	No	No	Nil
Memenchu Lake	No	No	Yes	No	Yes	Yes	No	Nil
Nakchuk Lake 2	No	No	Yes	No	Yes	No	No	Nil
Nakchuk Lake	No	No	Yes	No	Yes	No	No	Nil
Pangolakha	No	No	Yes	No	Yes	No	No	Nil
Parapara lake	No	No	Yes	No	Yes	No	No	Nil

Name of the Wetland	Included in Ramsar List	Included under National Wetland Conservation Program	Wetland is located in ecologically sensitive and important areas	Wetland is located within a UNESCO World Heritage Site	Wetland is located in religious/cultural site	High altitude wetland or wetland complex with area \geq 5 ha	Below an elevation of 2,500 m above sea level and having area \geq 500 ha	Others
Phidang lake	No	No	Yes	No	Yes	Yes	No	Nil
Stone lake	No	No	Yes	No	Yes	No	No	Nil
Three Sister One lake	No	No	Yes	No	Yes	Yes	No	Nil
Three Sister Two lake	No	No	Yes	No	Yes	No	No	Nil
Yakla lake	No	No	Yes	No	Yes	Yes	No	Nil
Black lake	No	No	Yes	No	No	No	No	Nil
Hangu Lake	No	No	Yes	No	Yes	Yes	No	Nil
Nathula 1	No	No	Yes	No	Yes	Yes	No	Nil
Nathula 2	No	No	Yes	No	Yes	Yes	No	Nil
Gnathang Valley 1	No	No	Yes	No	Yes	Yes	No	Nil
Gnathang Valley 2	No	No	Yes	No	Yes	Yes	No	Nil

Name of the Wetland	Included in Ramsar List	Included under National Wetland Conservation Program	Wetland is located in ecologically sensitive and important areas	Wetland is located within a UNESCO World Heritage Site	Wetland is located in religious/cultural site	High altitude wetland or wetland complex with area \geq 5 ha	Below an elevation of 2,500 m above sea level and having area \geq 500 ha	Others
Gnathang Valley 3	No	No	Yes	No	Yes	Yes	No	Nil
Elephant Lake1	No	No	Yes	No	Yes	Yes	No	Nil
Yakla 2	No	No	Yes	No	Yes	Yes	No	Nil



Tsomgo Lake and *Arisaema speciosum* found around the lake



Juniper spp.



Memencho Lake



Phidang Lake



Primula spp.

Figure 29: Photos from the Field (East Sikkim)

Anda Pokhari Lake



Figure 30: Field Photos of Anda Pokhari Lake

Aritar Lake



Figure 31: Field Photos of Aritar Lake

Biren Jheel



Figure 32: Field Photos of Biren Jheel

Black Lake



Figure 33: Field Photos of Black Lake

Changu Lake



Figure 34: Field Photo of changu Lake

Dogra Lake



Figure 35: Field Photos of Dogra Lake

Gorkha Lake



Figure 37: Field Photo of Gorkha Lake

Stone Lake



Figure 36: Field Photo of Stone Lake

Hans Pokhari Lake



Figure 38: Field Photos of Hans Pokhari Lake

Manju Lake



Figure 40: Field Photo of Manju Lake

Three sister Lake



Figure 39: Field Photo of three sister Lake

Memencho Lake



Figure 42: Field Photo of Memancho Lake

Yakla Lake



Figure 41: Field Photo of Yakla Lake

Nakchuk Lake



Figure 43: Field Photos of Nakchuk lake

Pangolakha Lake



Figure 44: Field Photos of Pangolakha Lake

Parapara Lake



Figure 45: Field Photo of Parapara Lake

Phidang Lake



Figure 46: Field Photos of Phidang Lake

Hangu Lake



Figure 47: Field Photo of Hangu Lake

Nathula Complex Lake



Figure 48: Field Photo of Nathula lake 1 and 2

Gnathang Valley Complex Lake



Figure 49: Field Photo of Gnathang Valley

Elephant Lake



Figure 50: Field Photo of Elephant Lake

Yakla Lake 2

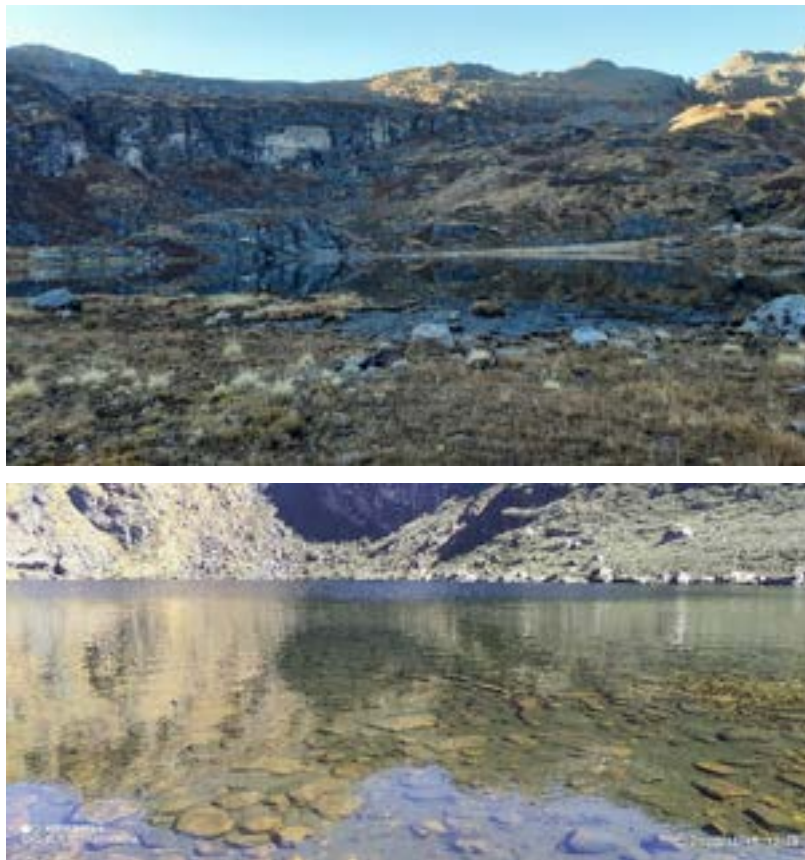


Figure 51: Field Photo of Yakla Lake 2

Annexure: 2
Maps of the Surveyed Wetlands
(North Sikkim)

1. Tsobuk Tso complex Lake

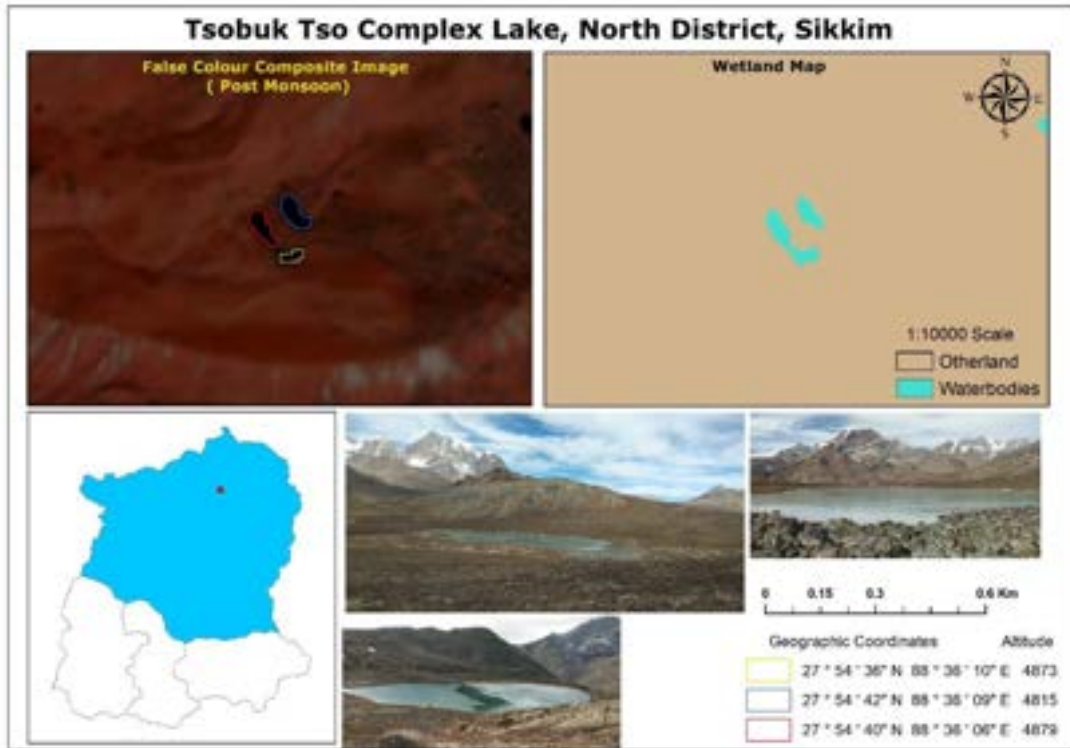


Figure 52: Tsobuk Tso Complex Lake

2. Tso mijadar Tso Complex Lake

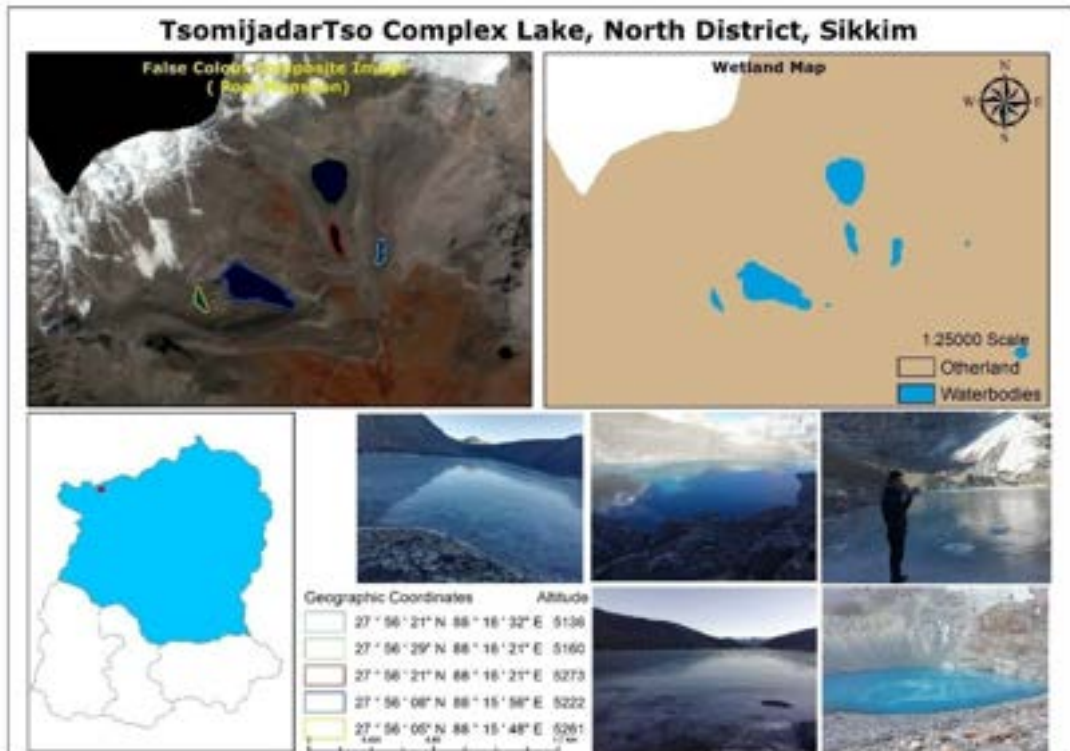


Figure 53: Tso mijadar Tso Complex Lake

3. Chunguphu Tso



Figure 54: Chunguphu Cho Lake

4. Donkung Lake



Figure 55: Donkung Lake

5. EM Tso Complex Lake



Figure 56: EM Tso Complex Lake

6. Fogay Tso 1 lake



Figure 57: Fogay Cho 1 Lake

7. Fogay Tso 2 Lake



Figure 58: Fogay Cho 2 Lake

8. Fogay Tso 3 Lake

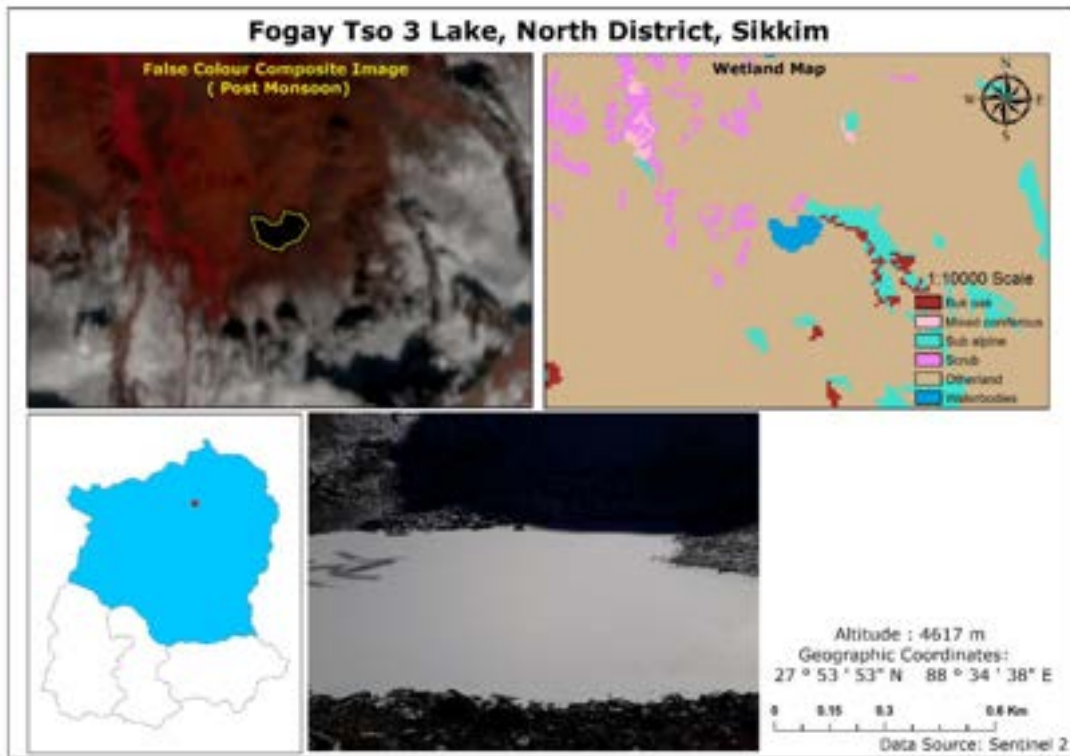


Figure 59: Fogay Cho 3 Lake

9. Gochung Tso



Figure 60: Gochung Tso Lake

10. Gapzee Tso 1



Figure 61: Gapzee Tso 1 Lake

11. Gapzee Tso 2

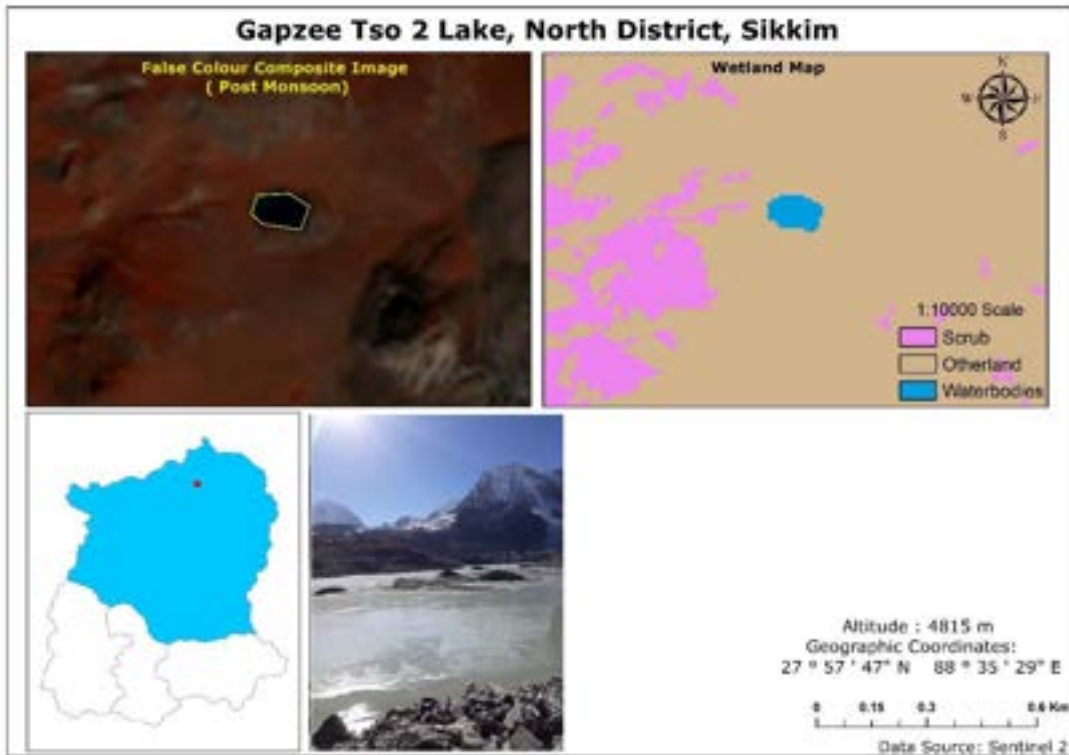


Figure 62: Gapzee Tso 2 Lake

12. Gapzee Tso 3

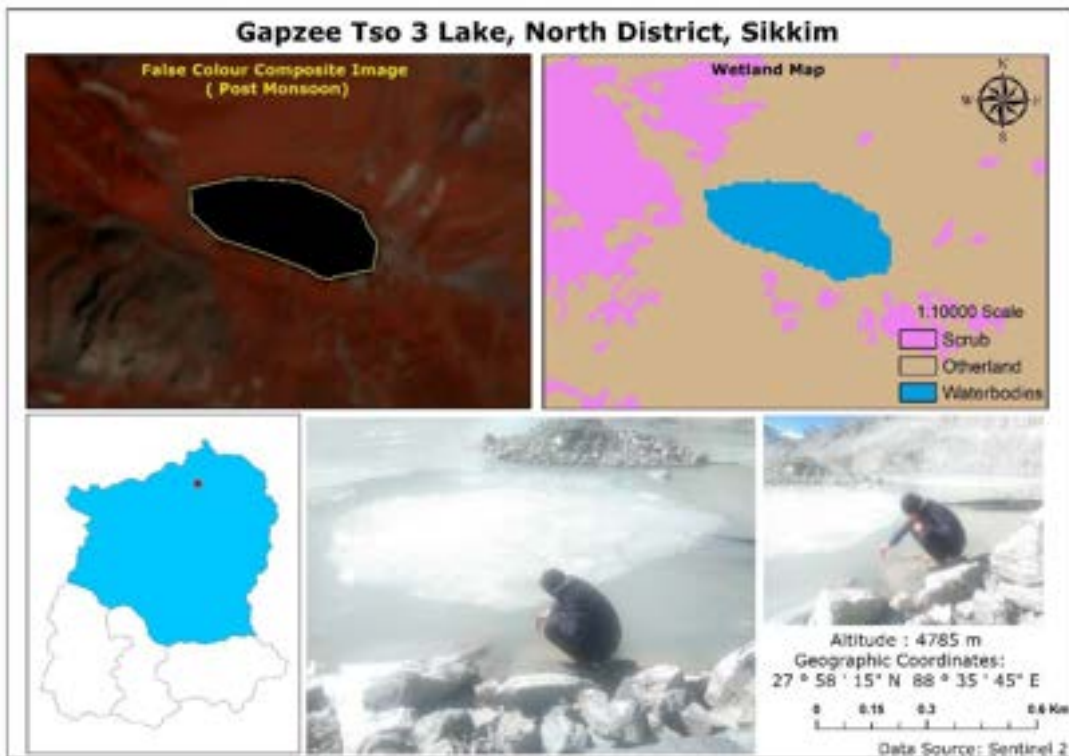


Figure 63: Gapzee Tso 3 Lake

13. Gukul Tso

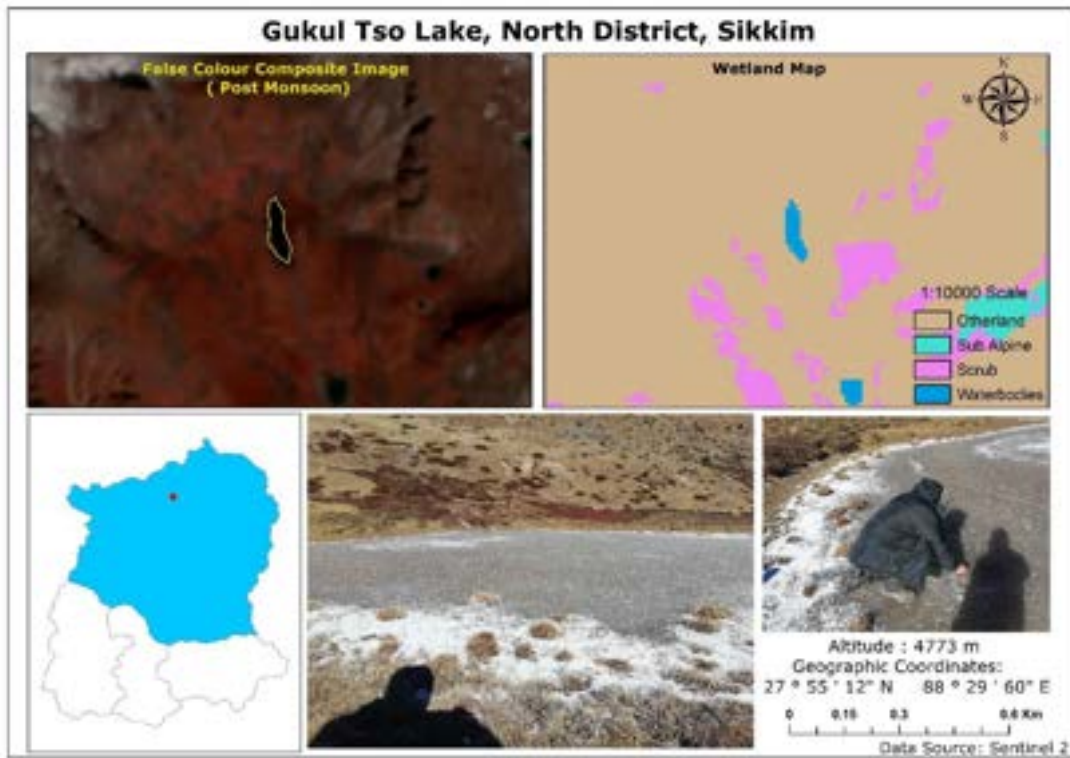


Figure 64: Gukul Tso Lake

14. Gurudongmar Lake 1

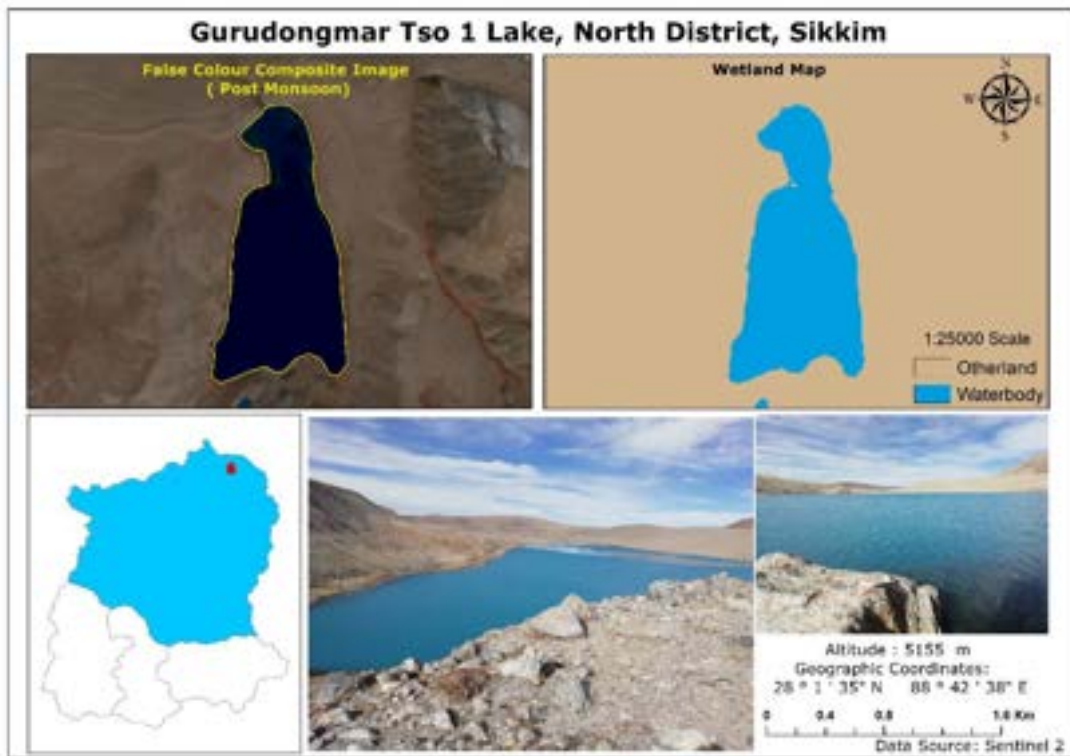


Figure 65: Gurudongmar Lake 1

15. Gurudongmar Lake 2



Figure 66: Gurudongmar Lake 2

16. Gurudongmar Lake 3

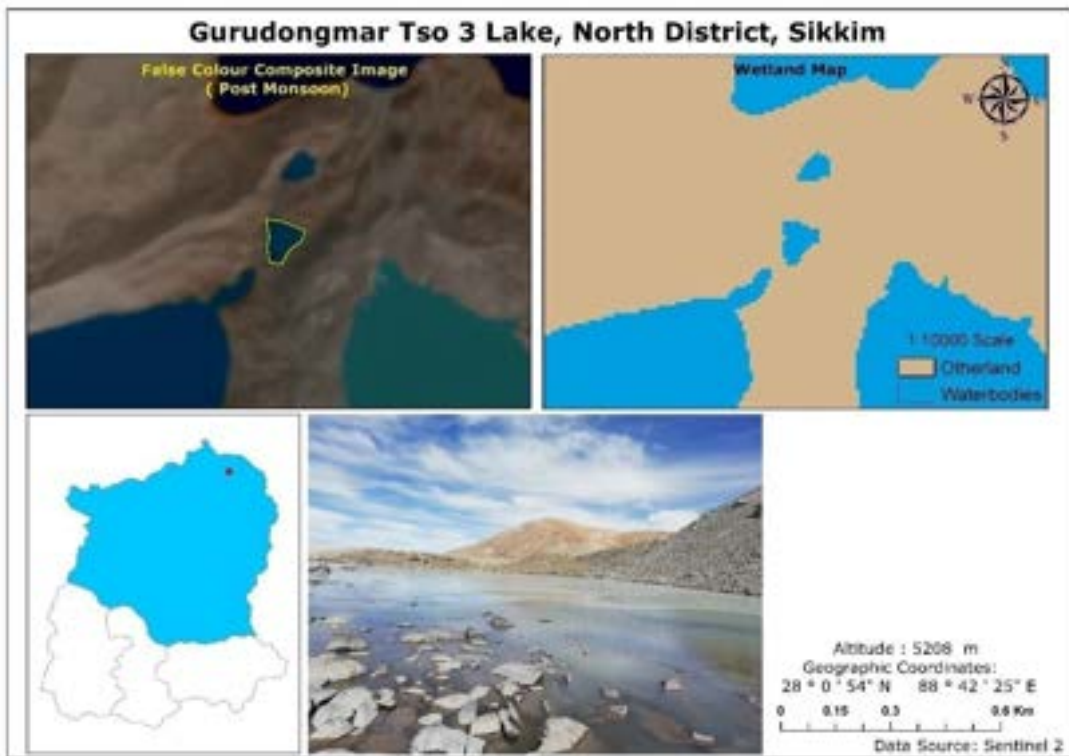


Figure 67: Gurudongmar Lake 3

17. Gurudongmar Lake 4



Figure 68: Gurudongmar Lake 4

18. Gurudongmar Lake 5



Figure 69: Gurudongmar Lake 5

19. Janak Tso 2 lake

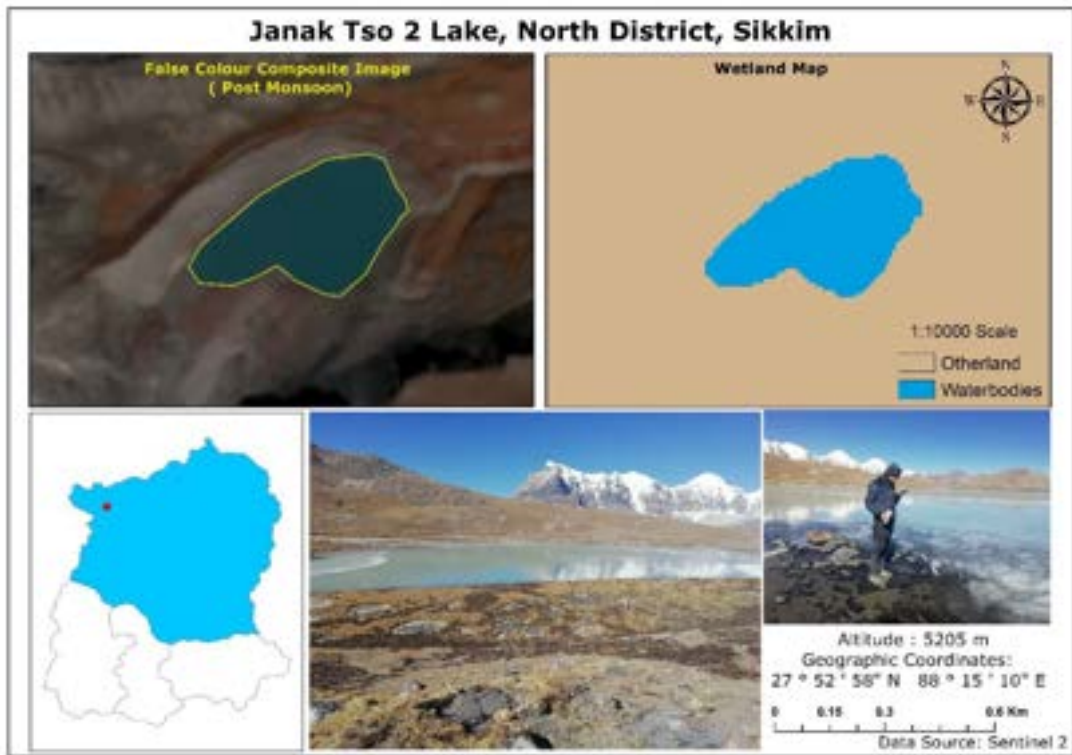


Figure 70: Janak Tso 2 Lake

20. Janak Tso 4 Lake



Figure 71: Janak Tso 4 Lake

21. Janak Tso Complex Lake

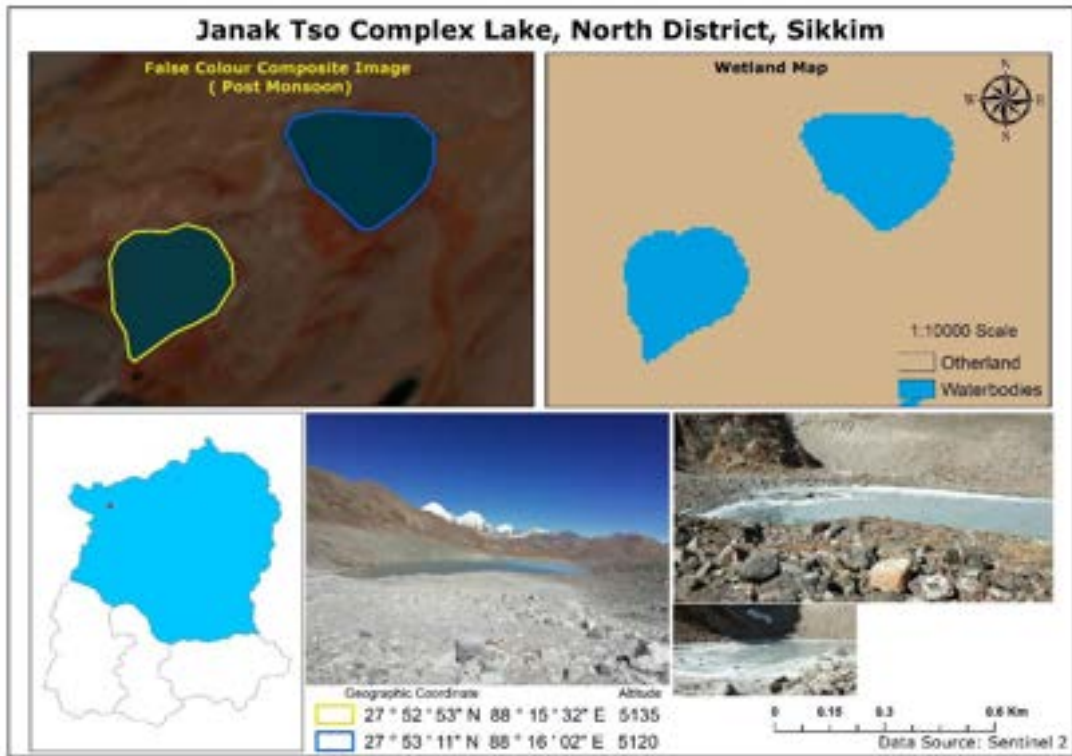


Figure 72: Janak Tso Complex Lake

22. Janak Tso Complex Lake



Figure 73: Janak Tso Complex Lake

23. Khora Tso 1 Lake



Figure 74: Khora Tso 1 Lake

24. Khora Tso 2 Lake



Figure 75: Khora Tso 2 Lake

25. Khora Tso 3 Lake

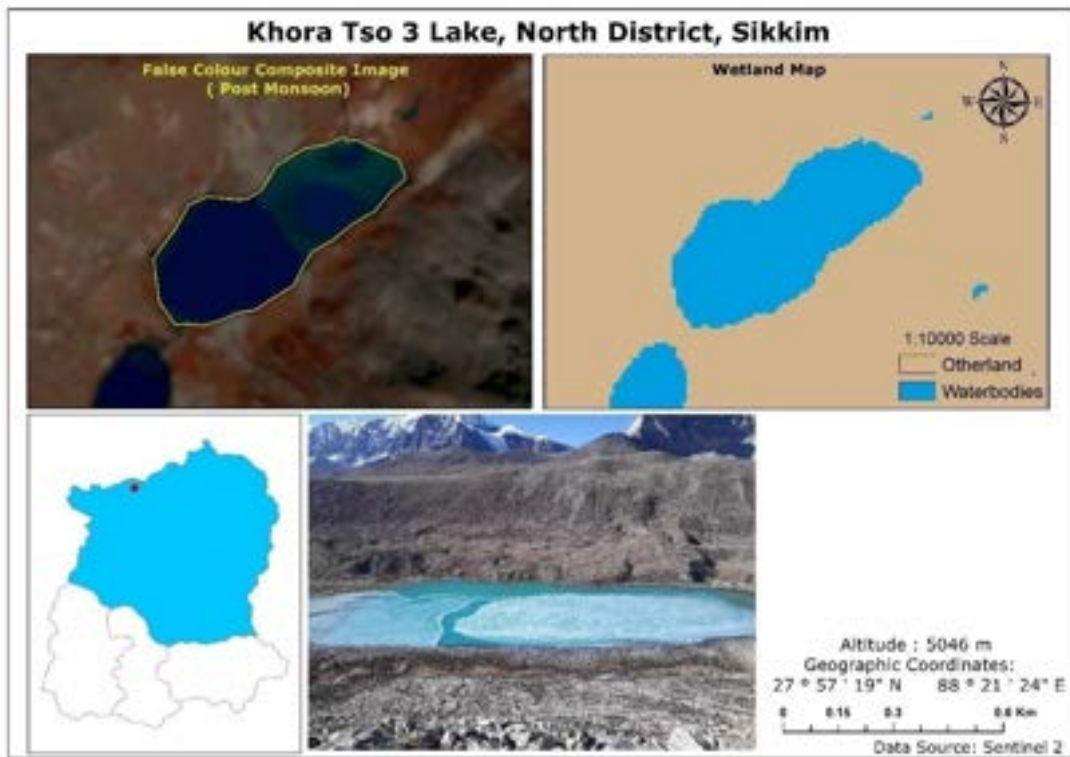


Figure 76: Khora Tso 3 Lake

26. Khora Tso 4 Lake



Figure 77: Khora Tso 4 Lake

27. Khora Tso 5 Lake



Figure 78: Khora Tso 5 Lake

28. Lachee Tso 1 Lake



Figure 79: Lachee Tso 1 Lake

29. Lachee Tso 2 Lake



Figure 80: Lachee Tso 2 Lake

30. LT Tso Lake



Figure 81: LT Tso Lake

31. Mukuthang Tso Lake

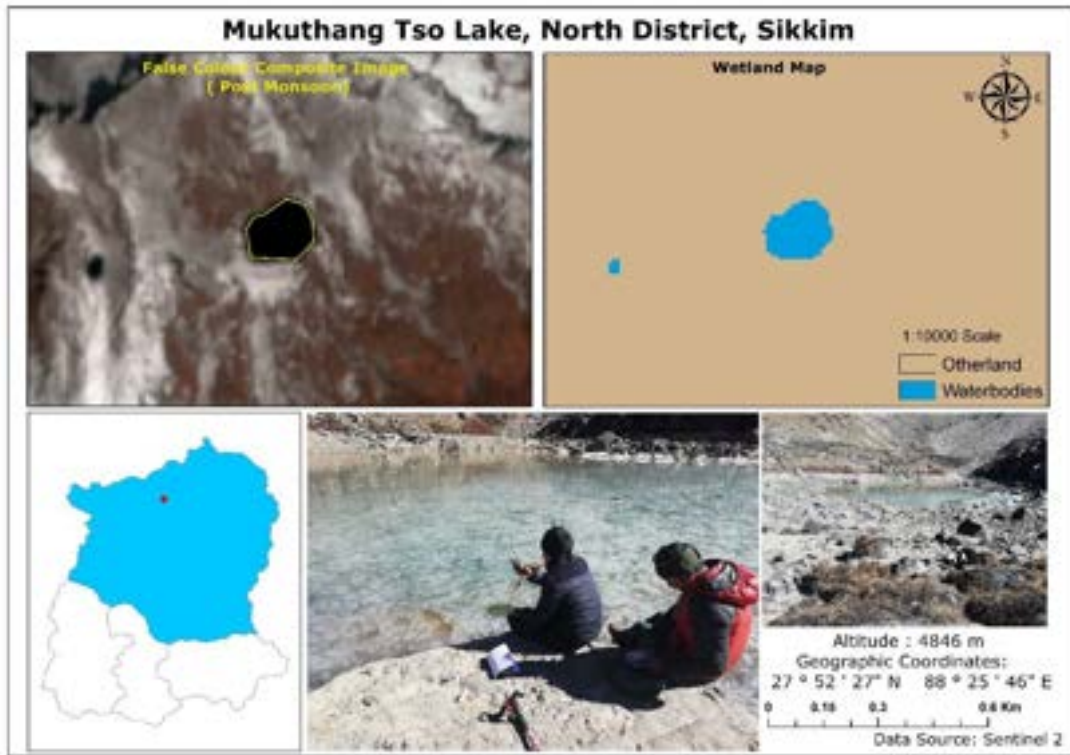


Figure 82: Mukuthang Tso Lake

32. OK Tso Lake



Figure 83: Ok Tso Lake

33. OM Tso Lake

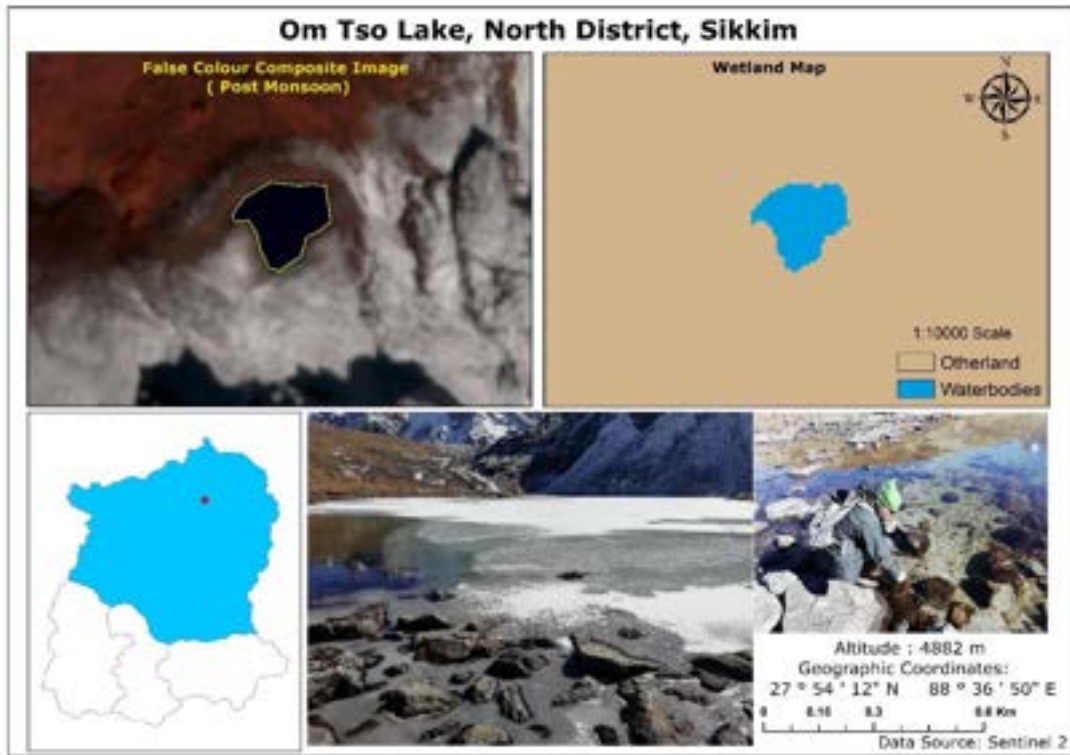


Figure 84: OM Tso Lake

34. Setong Tso Lake

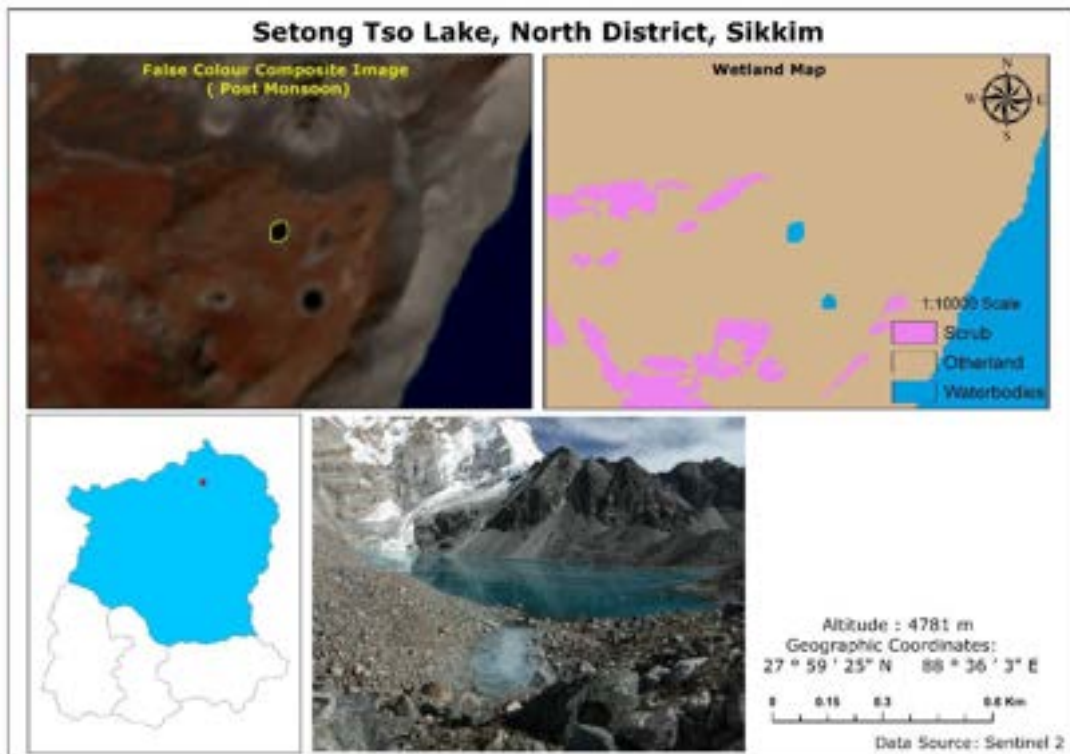


Figure 85: Setong Tso Lake

35. Shaka Tso

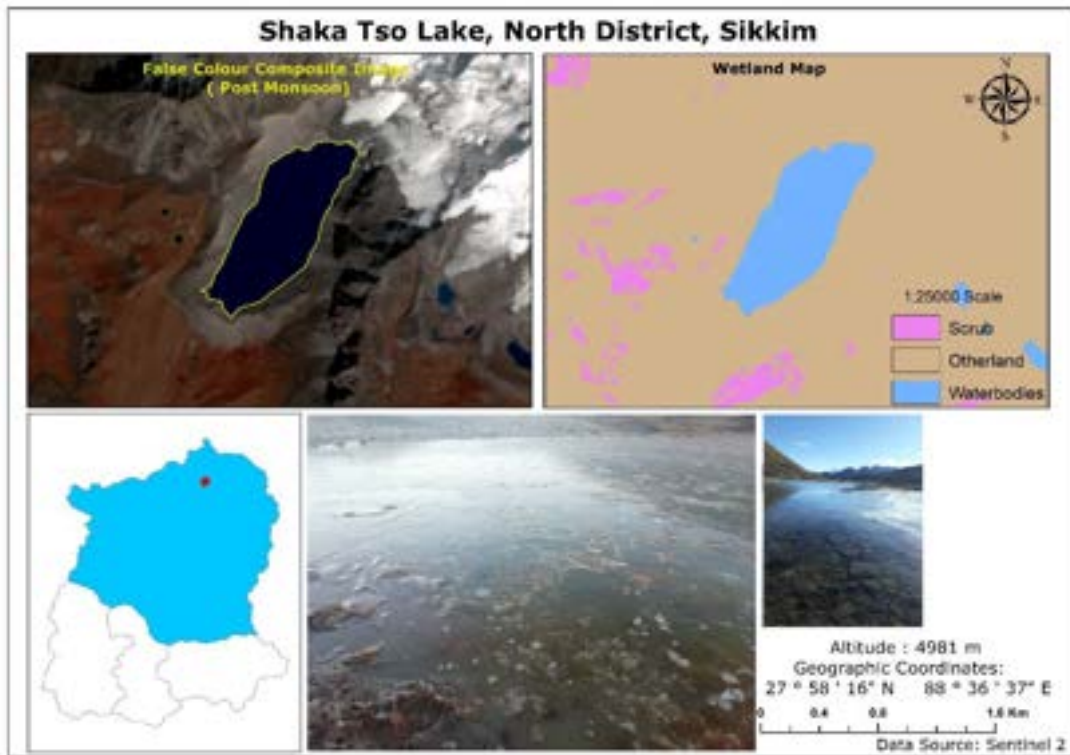


Figure 86: Shaka Tso Lake

36. Shechen Ragho 1 Lake



Figure 87: Shechen Ragho 1 Lake

37. Shechen Ragho Lake

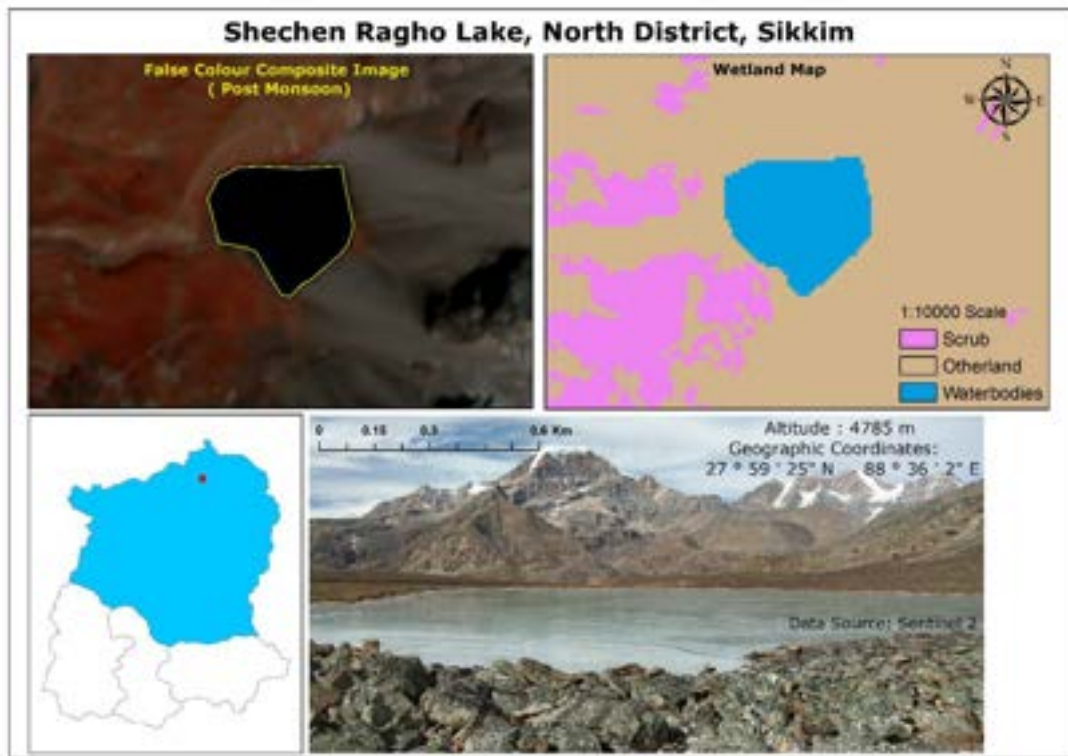


Figure 88: Shechen Ragho Lake

38. South Lhonak Lake

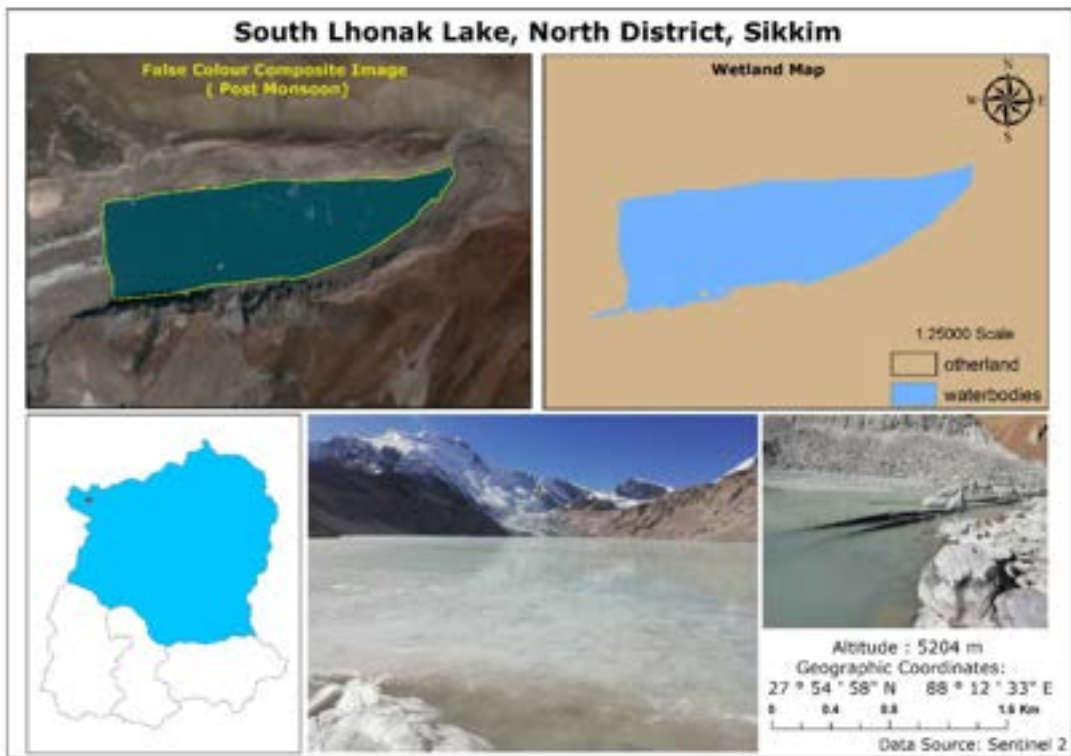


Figure 89: South Lhonak Lake

39. Tso Lhamu 1 Lake



Figure 90: Tso Lhamu 1 Lake

40. Tso Lhamu 3 Lake



Figure 91: Tso Lhamu 3 Lake

41. Tso Lhamu 4 Lake

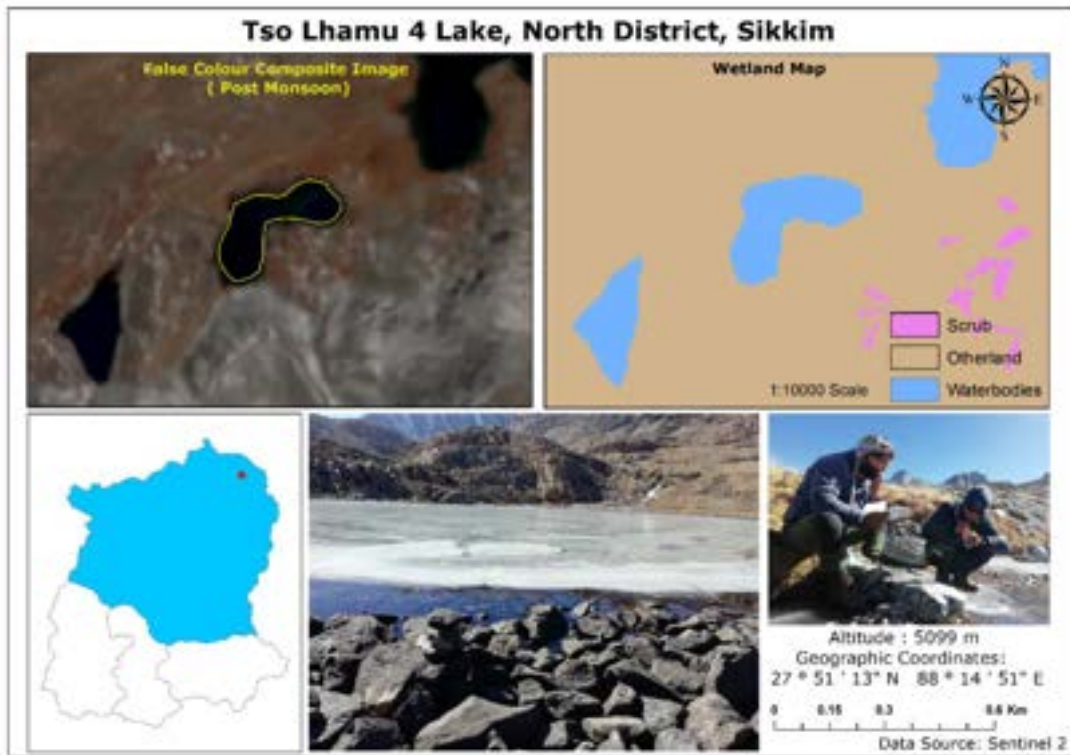


Figure 92: Tso Lhamu 4 Lake

42. Tso Lhamu Lake



Figure 93: Tso Lhamu Lake

43. Yangsaac Tso

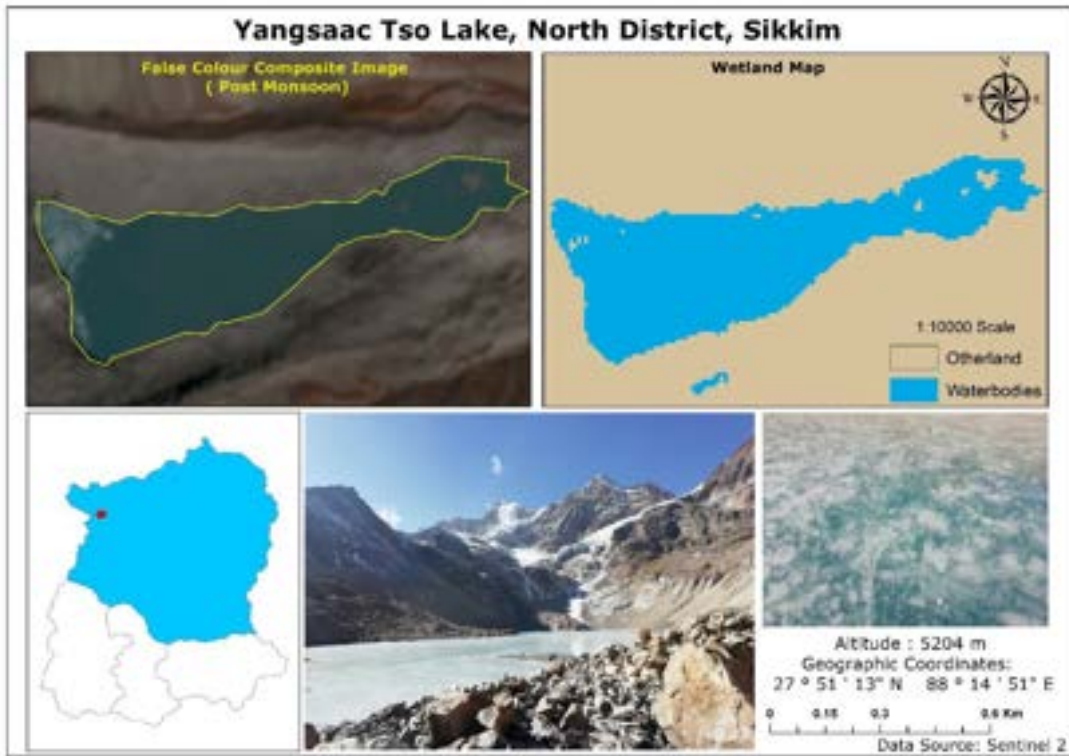


Figure 94: Yangsaac Tso Lake

44. Yum Tso Lake



Figure 95: Yum Tso Lake

45. B Lake

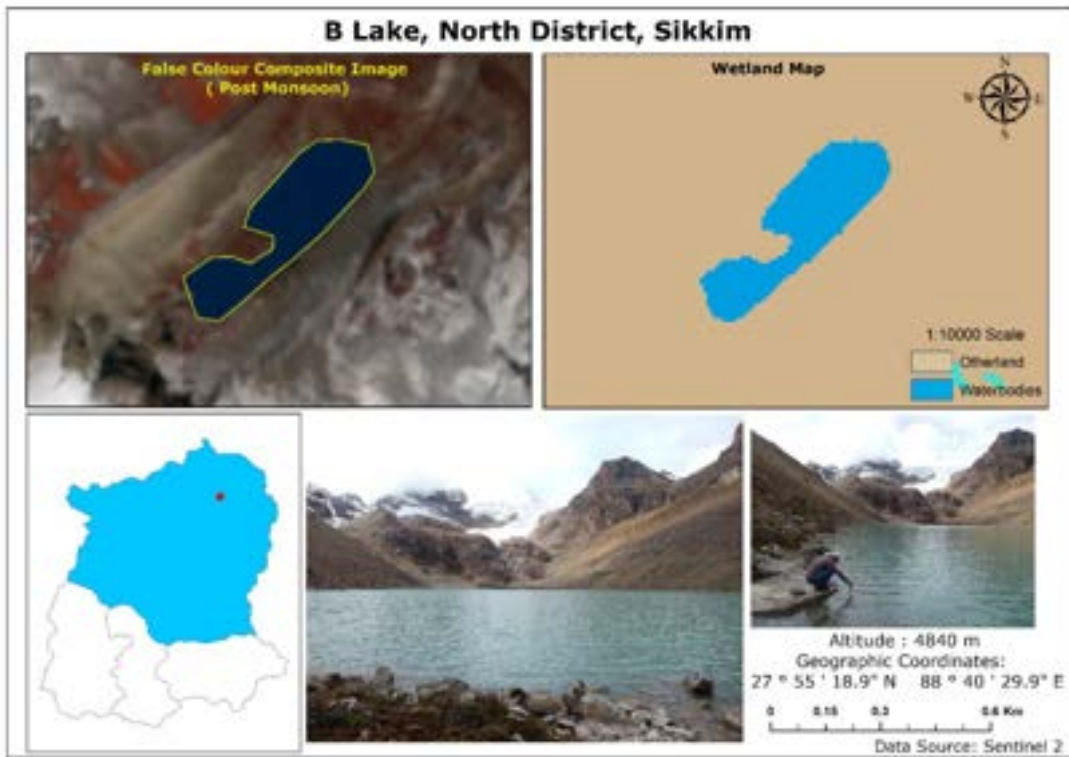


Figure 96: B Lake

46. Changme Lake 2

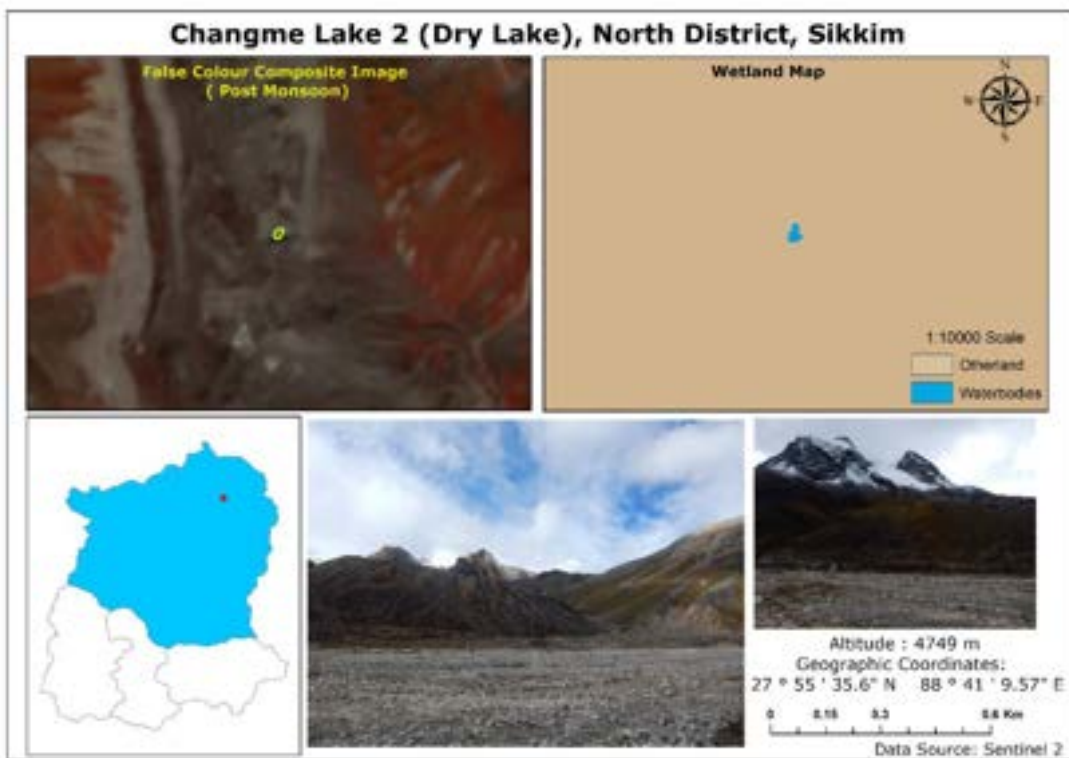


Figure 97: Changme Lake 2

47. Donkeya Chu Lake



Figure 98: Donkeya Chu Lake

48. Jadung Lake 1



Figure 99: Jadung Lake 1

49. Gayamchona Lake

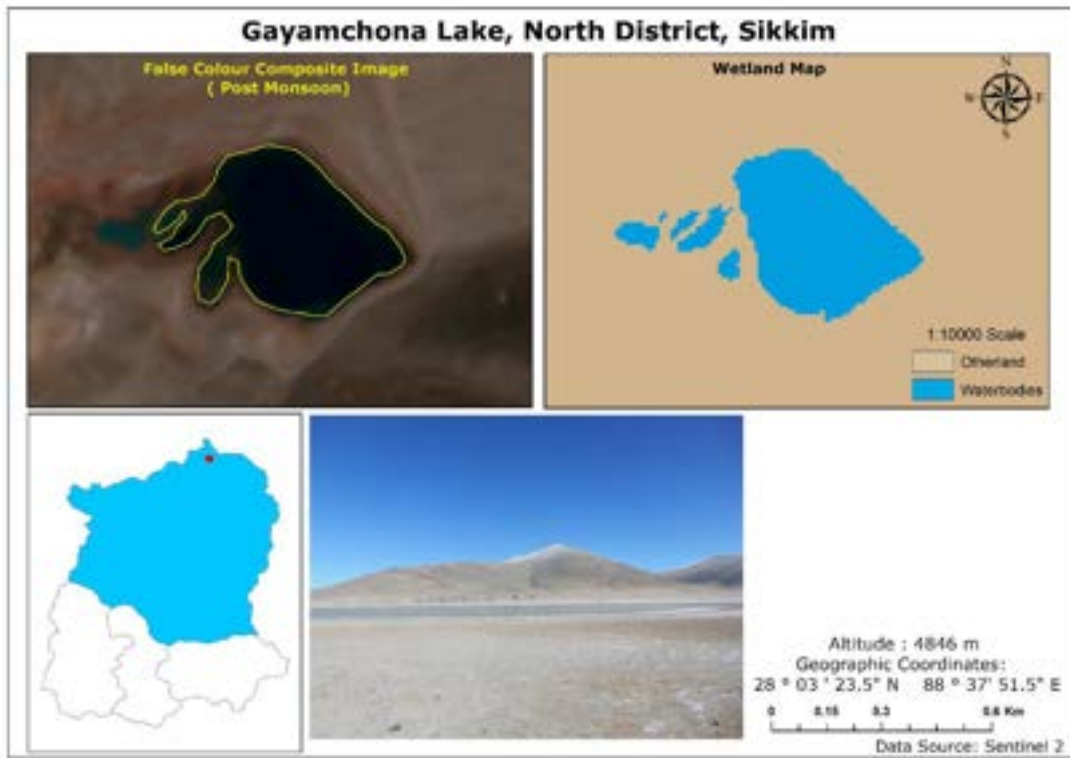


Figure 100: Gayamchona Lake

50. Gaya Gawn Lake1

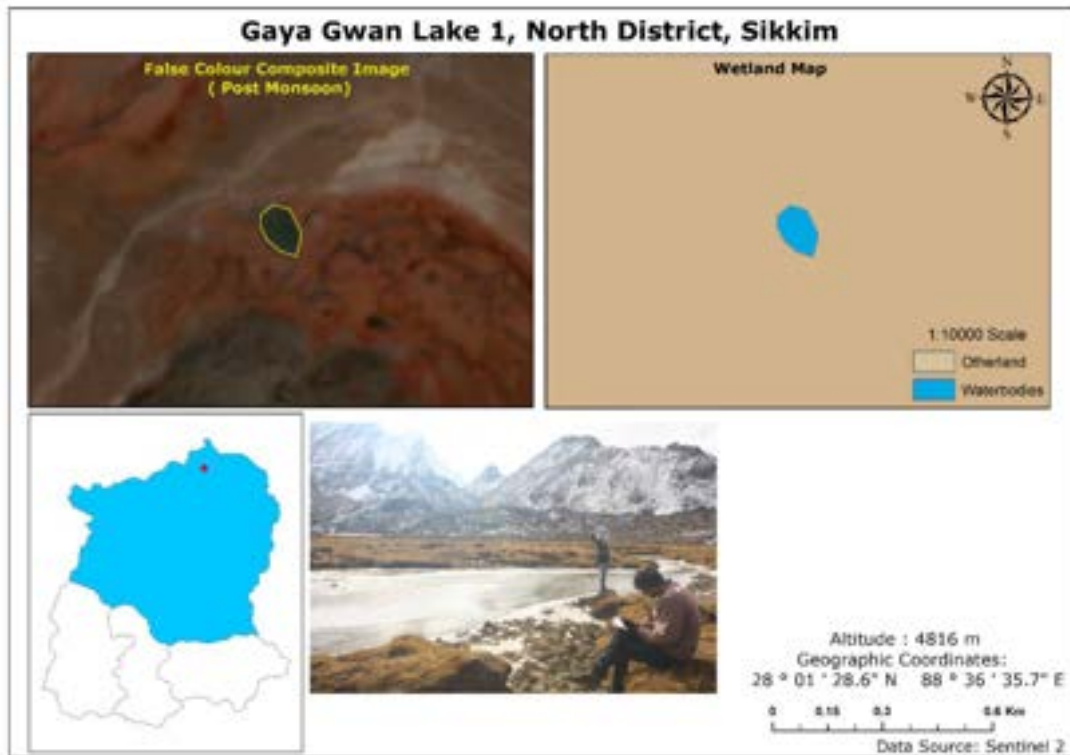


Figure 101: Gaya Gawn Lake 1

53. Sebu Lake (Chnagme 1)

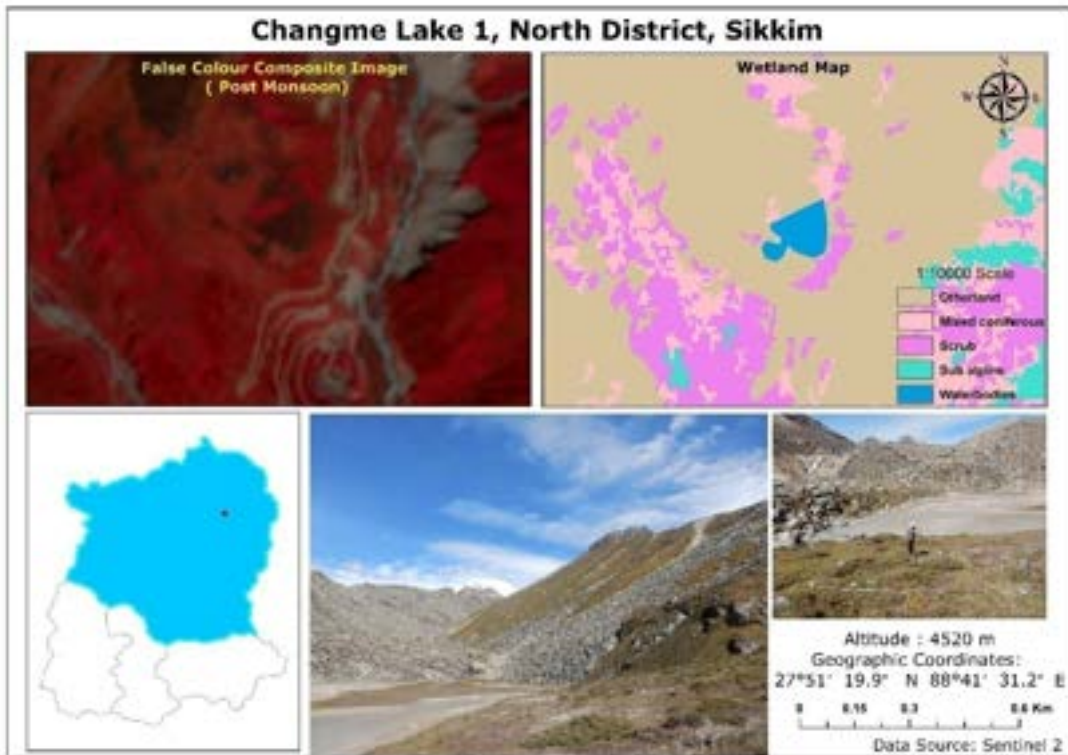


Figure 104: Sebu Lake (Changme 1)

54. Chnagme 3

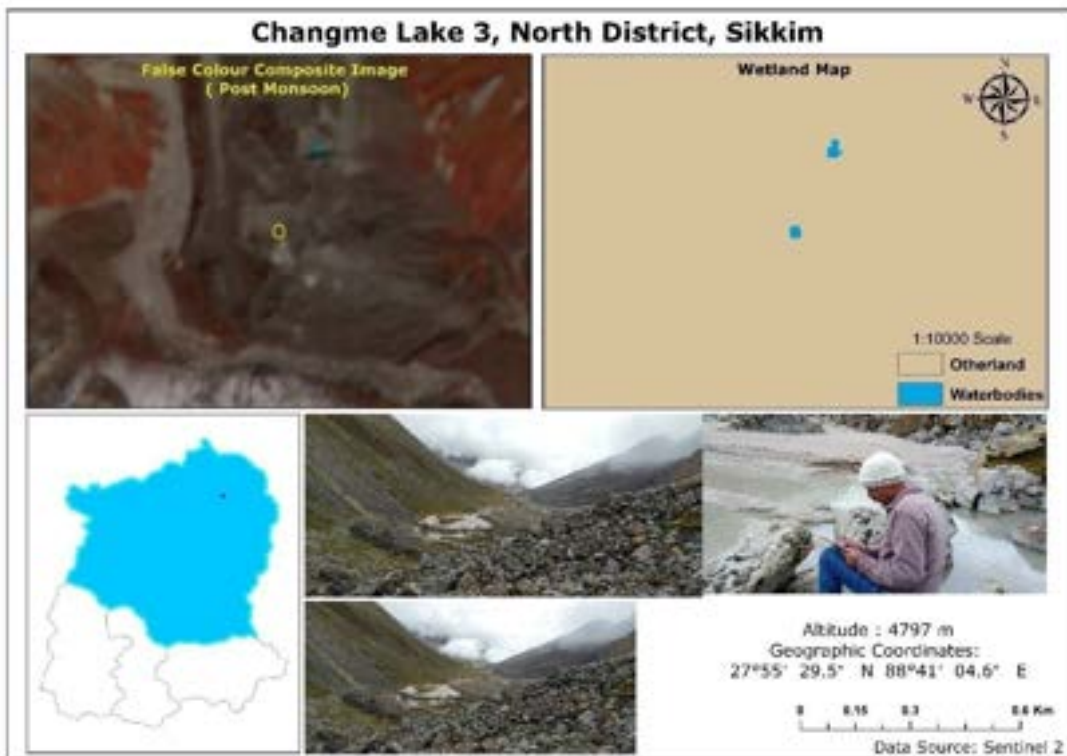


Figure 105: Changme 3

55. Black Lake/Namnasa Lake

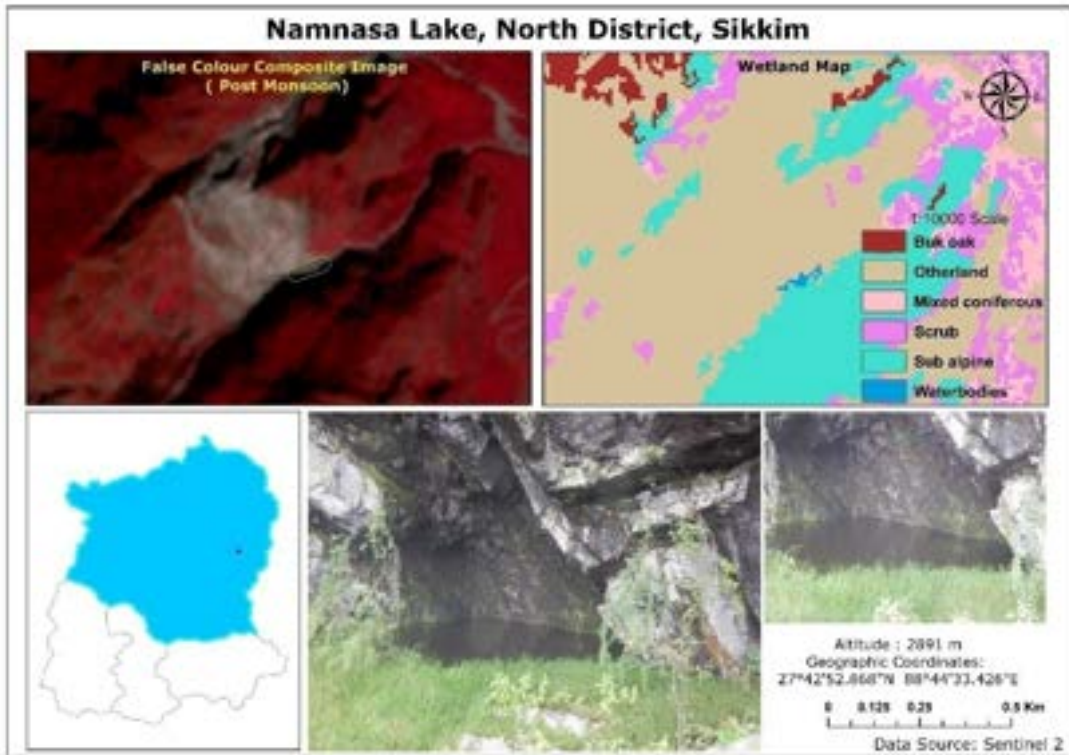


Figure 106: Namnasa Lake

56. Chuba Lake

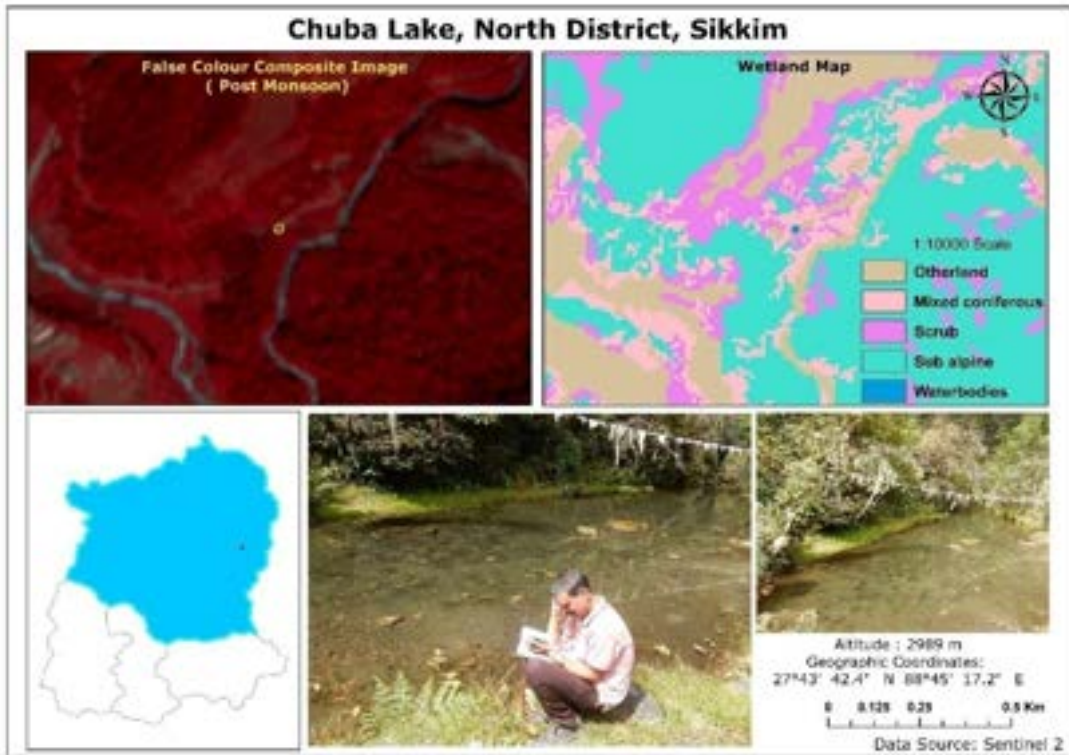


Figure 107: Chuba Lake

57. Unnamed Lake 1/Singba Lake

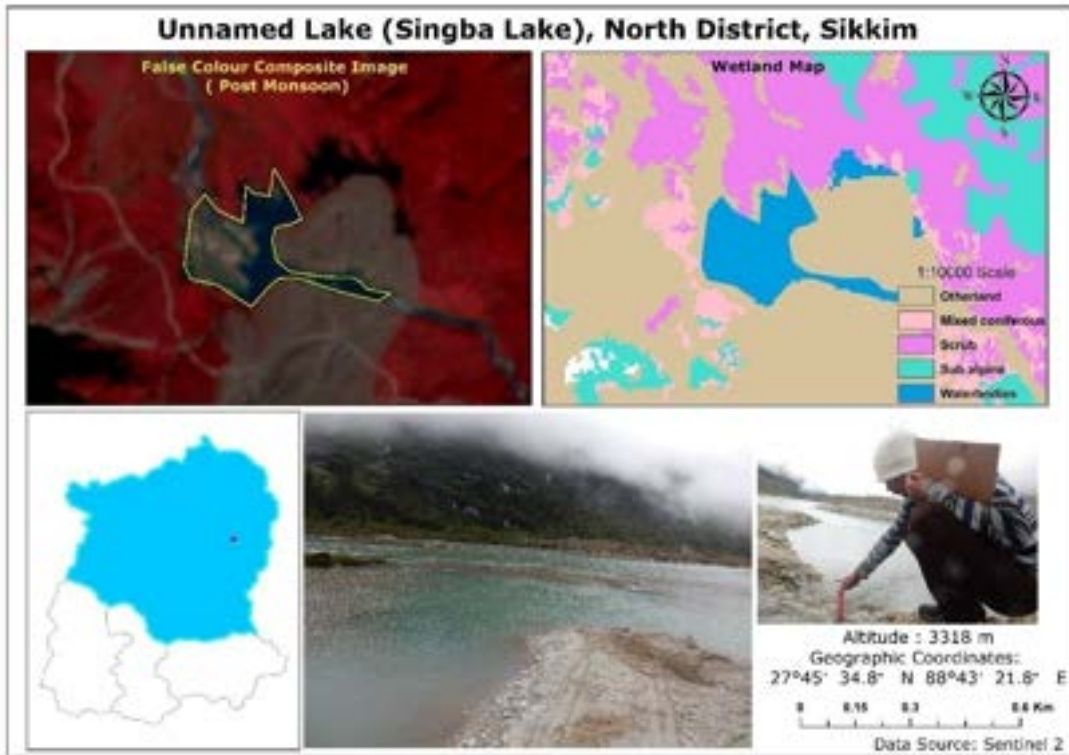


Figure 108: Unnamed Lake/Singba Lake

58. Unnamed Lake 2

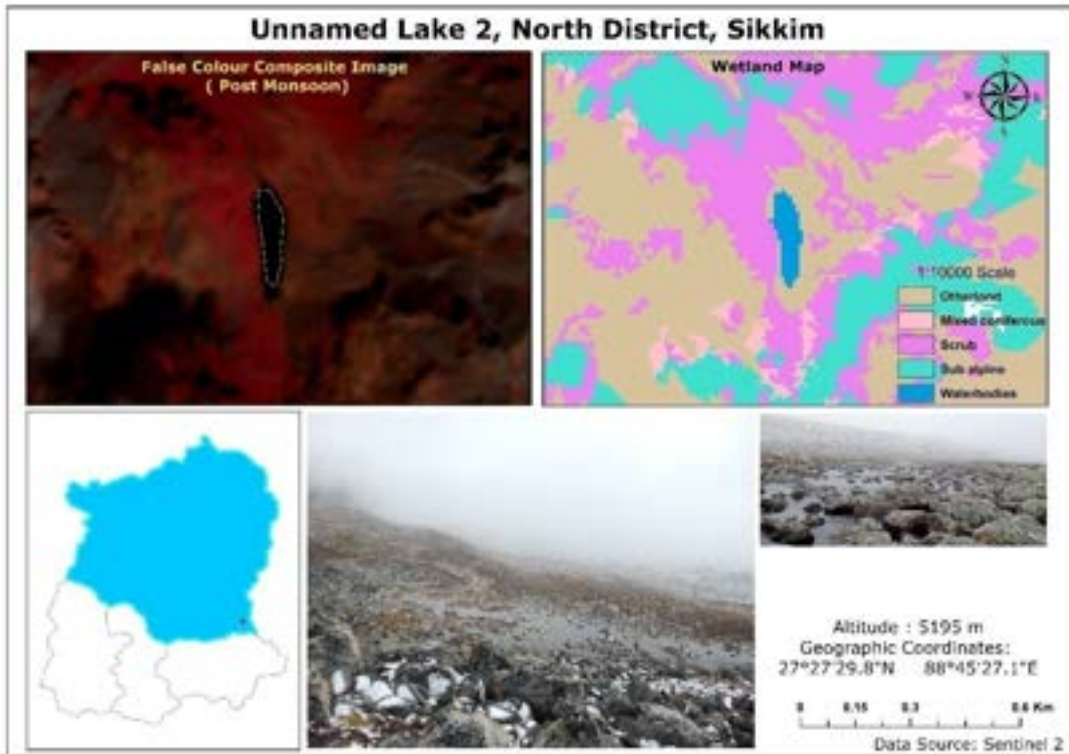


Figure 109: Unnamed Lake 2

59. Jadung Lake 2



Figure 110: Jadung Lake 2

60. Yangchen Tso



Figure 111: Yangchen Tso

61. Ka Tso



Figure 112: Ka Tso

62. Kyeo Tso/Phuni Lake



Figure 113: Kyeo Tso/Phuni Lake

63. Chume – Lham Tso

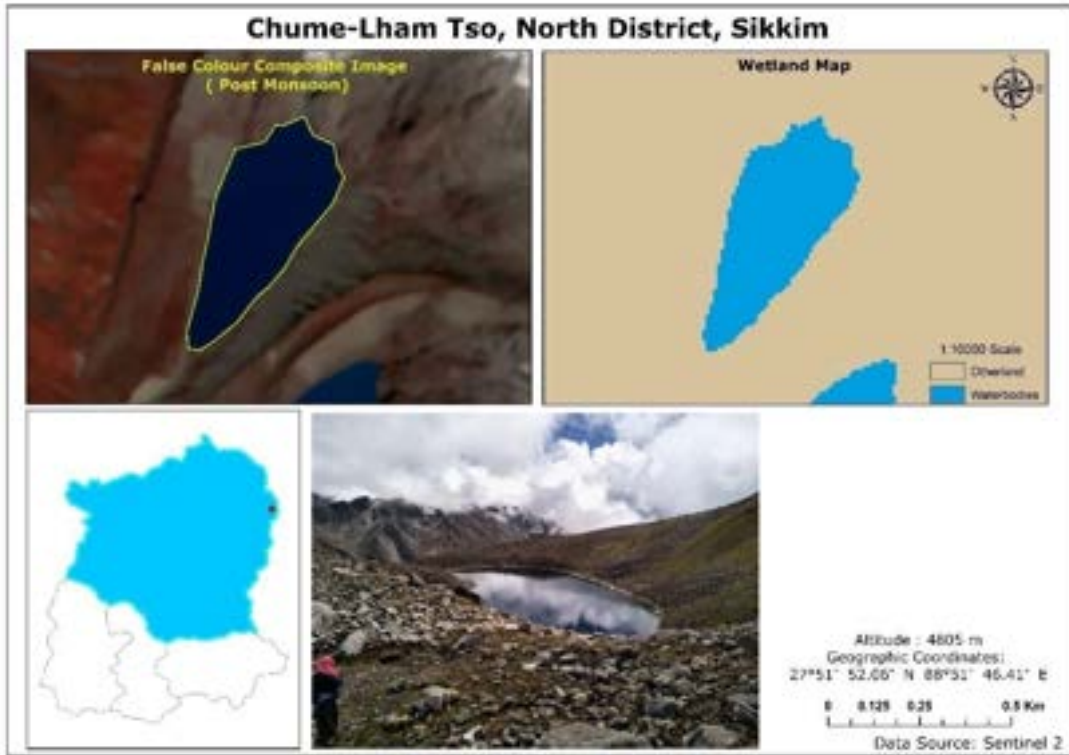


Figure 114: Chume-Lham Tso

64. Tembao Lake

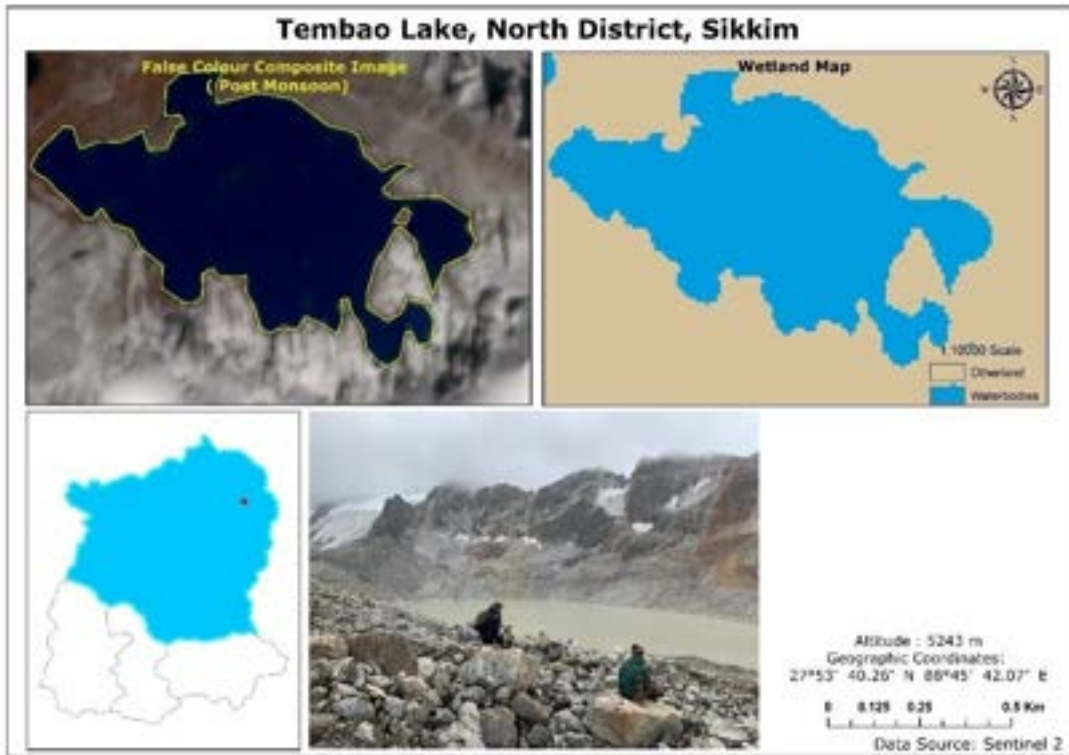


Figure 115: Tembao Lake

65. Tosar Lake

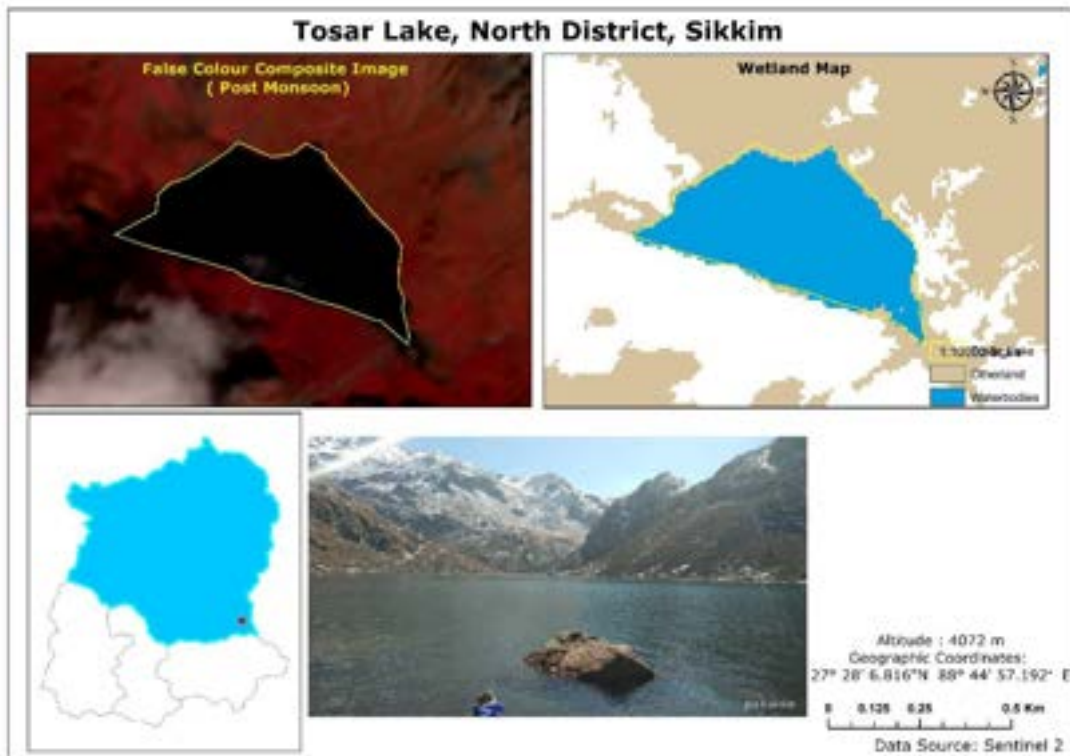


Figure 116: Tosar Lake

66. Kishong Lake

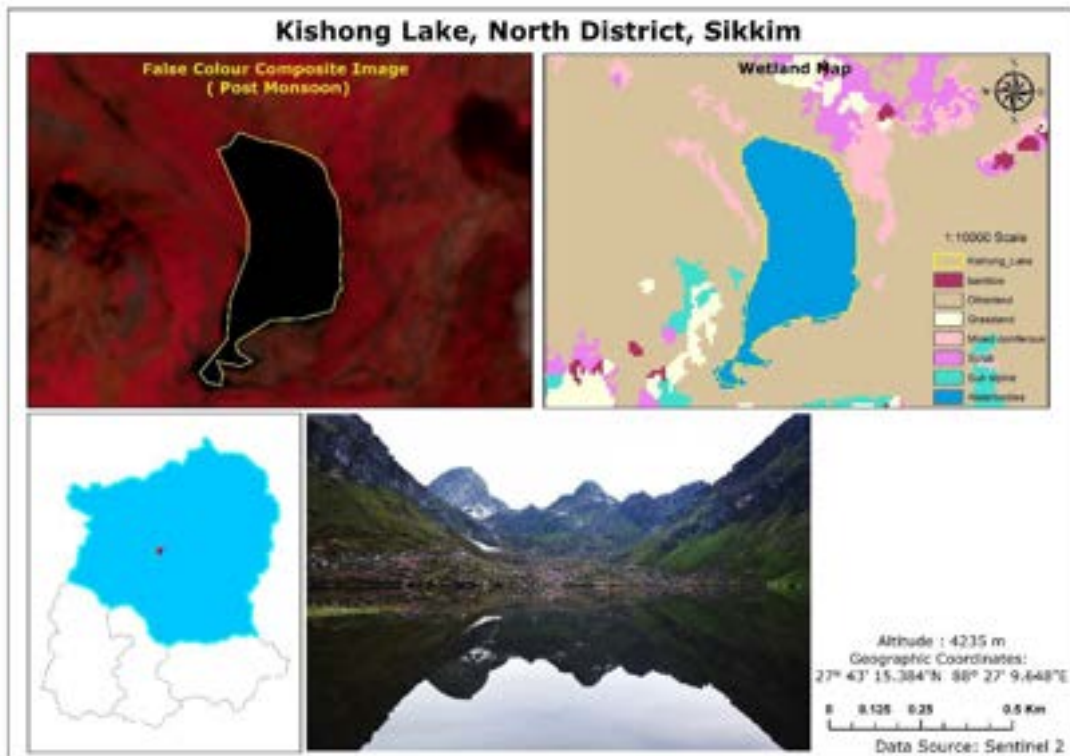


Figure 117: Kishong Lake

67. Tingchim Lake

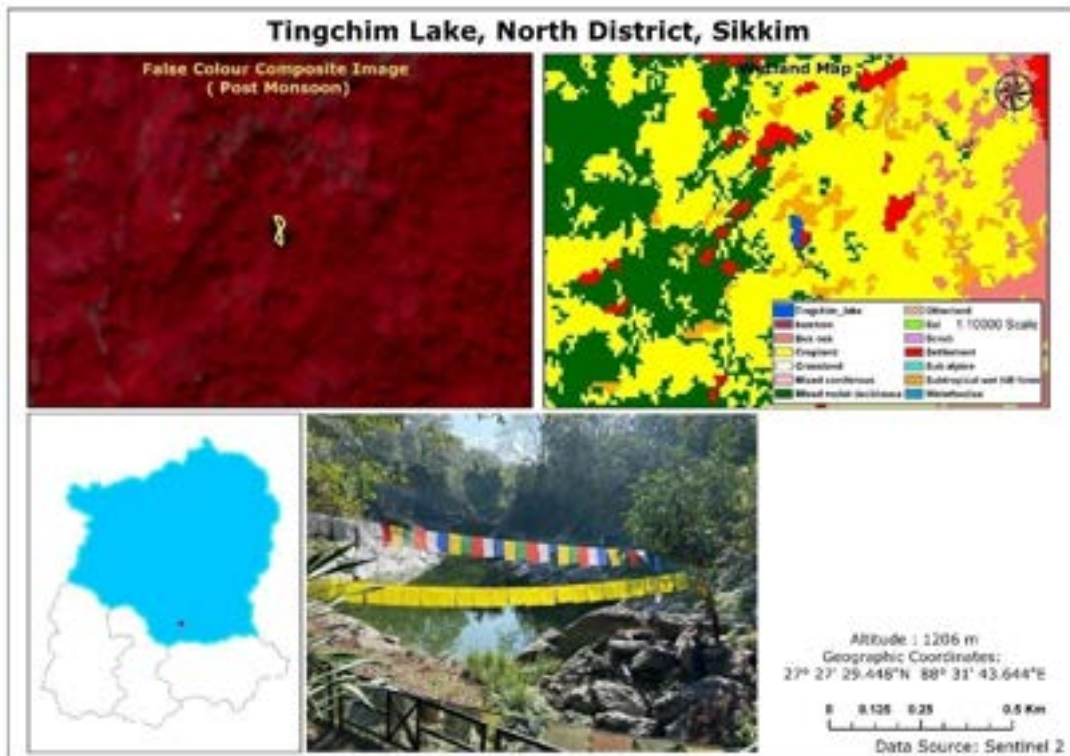


Figure 118: Tingchim Lake

68. Nakuchu Lake

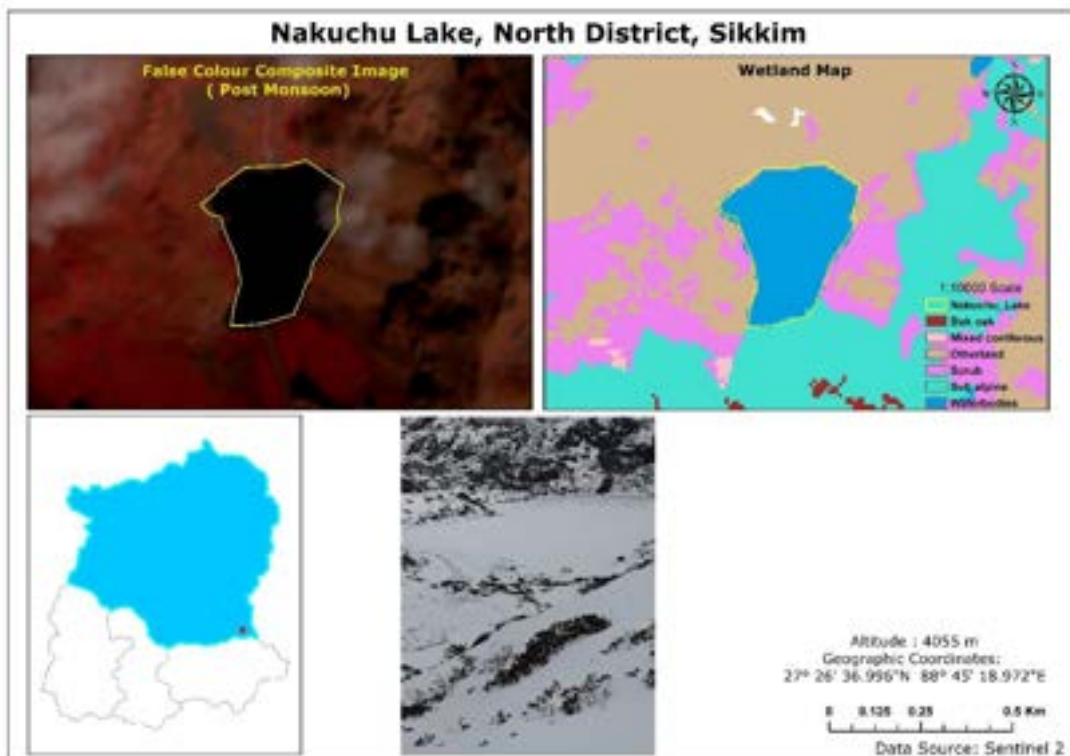


Figure 119: Nakuchu Lake

69. Thang Tso Lake



Figure 120: Thang Tso Lake

70. Hans Pokhari Lake

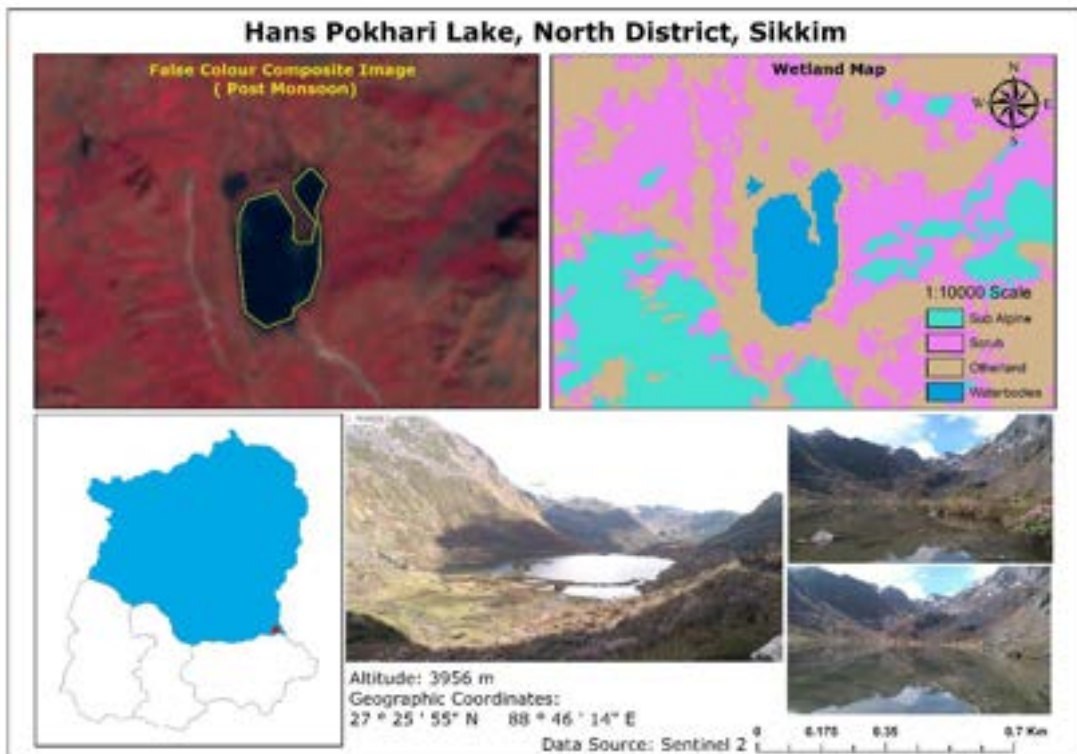


Figure 121: Hans Pokhari Lake

Tsobuk Tso Lake Complex



Figure 122: Field Photo of Tsobuk Tso Lake

Lake Tsobuk Tso lake complex is spread between latitude 27.91107 N and longitude 88.60169 E and at an altitude 4879 m in the North District of Sikkim. The lake falls under the protected area of Kanchendzonga National Park. Due to the oligotrophic nature of the lake which is covered with snow most of the year, supports little life barring few algal blooms that has been noticed during the survey. The probable source of the nutrients is the melting glaciers. The lake also contributes to the groundwater recharge. The vegetation around the lake primarily consists of *Picrorhiza scrophulariiflora* (Kurki), *Taxus wallichiana* (Sonpati) and tuft grasses. The area around the lake considered as the habitat of faunal species like *Pseudois nayaur* (Blue Sheep), *Vulpes vulpes* (red fox) and endangered species like *Panthera uncia* (Snow leopard) (E), *Canis lupus filchneri* (Tibetan wolf) (E). Details of the lakes as in the Annexure 2.

Chomijadar Tso Lake Complex



Figure 123: Field Photos of Chomijadar Lake

Chomijadar Tso lake complex consisting of five small lakes is spread between latitude 27.93485 N and longitude 88.27552 E at an approximate altitude of 5237 m in the North District of Sikkim (Fig.55). The lake falls under the protected area of Kanchendzonga National Park. Chhomijadar lake, also due to the oligotrophic nature and covered with snow during most of the year, supports little life. During field survey since most of the part of the lake was covered with snow, no vegetation could be noticed. Only species noticed

around the lake is *Primula* spp and is well distributed around the lake besides tuft grasses. The faunal species that is known to occur around the lake are -- *Pseudois nayaur* (Blue Sheep), *Cuon alpinus* (feral dog) (E), and *Panthera uncia* (Snow leopard) (E).

Chunguphu Tso



Figure 124: Field Photo of Chunguphu Tso Lake

Chunguphu Tso Lake lies between latitude 27.90711 N and longitude 88.61336 E at an approximate altitude of 4868 m under the protected area of Kanchendzonga National Park in the North District of Sikkim (Fig. 56). The average annual temperature around the lake is as low as 20C and precipitation 93mm as assessed through Giovanni NASA* data. Chunguphu Tso Lake owing to its oligotrophic nature and mostly covered with snow in a year supports little life. During the field survey, the presence of *Nardostachys jatamansi* (Jatamansi) and *Picrorhiza scrophulariiflora* (Kurki) besides tuft grasses have been noticed around the lake. The faunal species that is known to occur around the lake are -- *Pseudois nayaur* (Blue Sheep) and *Panthera uncia* (Snow leopard) (E).

Dokung Lake



Figure 125: Field Photo of Dokung Lake

Dokung Lake lies between latitude 27.03781N and longitude 88.57293E at an approximate altitude of 5192 m under the protected area of Kanchendzonga National Park in the North District of Sikkim (Fig.58). The average annual temperature around the lake is as low as -60C and precipitation 78 mm as assessed through Giovanni NASA* data. Chunguphu Tso lake owing to its oligotrophic nature and very high altitude, it is mostly covered with snow. The area around the lake is mostly devoid of any vegetation. *Pseudois nayaur* (Blue Sheep) is said to have its presence around the lake.

Em Tso Lake Complex



Figure 126: Field Photo of Em Tso Lake

Em Tso Lake complex lies between latitude 27.04494N and longitude 88.70818E at an approximate altitude of 5057 m under the protected area of Kanchendzonga National Park in the North District of Sikkim (Fig.62). The average annual temperature around the lake is as low as -30C and precipitation 70 mm as assessed through Giovanni NASA* data. Em Tso Lake owing to its oligotrophic nature and very high altitude, it is mostly covered with snow. Except for *Primula* spp. The area around the lake is mostly devoid of any vegetation. In case of faunal species, *Pseudois nayaur* (Blue Sheep) is said to have been noticed around the lake. The lake is revered by the Buddhists around the region.

Fogay Tso Lake Complex



Figure 127: Field Photo of Fogay Tso Complex Lake

Fogay Tso Lake complex consisting of three small lakes is spread between latitude 27.91108N and longitude 88.57734E at an approximate altitude of 4617 m under the protected area of Kanchendzonga National Park in the North District of Sikkim (Fig. 66). The lake is permanent and oligotrophic in nature, and the primary source of water is glacier melting. The climatic setting around the lake shows sub-zero temperature and average annual precipitation 96mm. The vegetation around the lake primarily consists of *Taxus wallichiana* (Sunpati), *Nardostachys jatamansi* (Jatamansi), *Cupressus leylandii* (Shukpa) and *Picrorhiza scrophulariiflora* (Kurki). The faunal presence that has been noticed around the lake is *Panthera uncia* (Snow leopard) (E), *Pseudois nayaur* (Blue

Sheep), *Vulpes vulpes* (red fox), *Canis lupus filchneri* (Tibetan wolf) and *Bos mutus* (yak) and *Coun alpinus* (feral dog) (E).

Gachang Tso Lake



Figure 128: Field Photo of Gachang Lake

Gachang Tso Lake lies between latitude 27.92636N and longitude 88.60452E at an approximate altitude of 4715 m covering an area of 2.75 ha under the protected area of Kanchendzonga National Park in the North District of Sikkim (Fig 67). Since the lake lies at a very high altitude, the temperature around the lake generally goes down to sub-zero during most part of the year whereas precipitation is estimated to be around 94mm. The vegetation around the lake mostly consists of *Taxus wallichiana* (Sunpati) and *Picrorhiza scrophulariiflora* (Kurki). The area around the lake is known for *Panthera uncia* (snow leopard) (E) habitat. Other faunal species that are found around the lake are *Pseudois nayaur* (Blue Sheep) and *Bos mutus* (yak), *Cuon alpinus* (feral Dog) (E).

Gapzee Tso Lake



Figure 129: Field Photo of Gapzee Tso Lake

Gapzee Tso Lake complex consisting of three small lakes is spread between latitude 27.95785N and longitude 88.59576E at an approximate altitude of 4815 m under the

protected area of Kanchendzonga National Park in the North District of Sikkim (Fig 72). The lake is permanent and oligotrophic in nature and its source of water is melting the glacier. The lake again falls under snow leopard habitat.

Gokul Tso Lake



Figure 130: Field Photo of Gokul Tso Lake

Gokul Tso Lake lies between latitude 27.92 N and longitude 88.49993E at an approximate altitude of 4773 m under the protected area of Kanchendzonga National Park in the North District of Sikkim (Fig 73). The lake is permanent and oligotrophic in nature that only supports a few algal colonies.

Gurudongmar Lake

Gurudongmar means 'The Red-Faced Guru' and sounds similar to 'Guru Dragmar' which means the red coloured warmthful form of Guru Padmasambhava (Dahal *et al*, 2015). It is located at 28° 02' 07.88" N latitude and 88° 42' 44.36" E longitude at an altitude between 5148 m to 5247m (Altitude as assessed through GPS) in the upper catchment of Teesta (Fig 79, Photo ???). The lake is a combination of three large and two small water bodies (Photo Plate 1). The outlet of the lakes is towards NNW direction. The water from the lake is known to have been the source of river Chhombo Chhu. The lakes have been nourished by a vast névé field and the glaciers descending through Khangchengyao (6,889m), Yulhe Khang (6,405m), Gurudongmar (6,715m) and Sanglaphu (6,078m) mountain peaks into the valley. Owing to climatic amelioration, some of the hanging glaciers feeding the lakes have been completely (Dahal *et al*, 2015) detached.

Gurudongmar Lake has been declared sacred by Government of Sikkim vide Gazette Notification No. 244, in the year 2006. The lake complex is fed by the melting glaciers from the mountain peaks of Khangchengyao (6,889m), Yulhe Khang (6,405m), Gurudongmar (6,715m) and Sanglaphu (6,078m) and is held sacred by Hindus, Sikhs and the Buddhists of Sikkim. The prayer flags fluttering near the lake signify its sanctity. A large number of tourists' flock the lake complex annually owing to its aesthetic beauty and religious significance.

The Gurudongmar wetland complex provides several types of intangible (amenity, recreation, aesthetic) ecosystem services to the region. The wetlands provide regulating, provisioning of water supply like filtering, retention, and storage of fresh water in the lakes, supporting, recreational as well as religious and cultural services to the region. The major threat to the lakes is unregulated tourism, decaying névé field extending through

Khangchengyao (6,889m), Yulhe Khang (6,405m), Gurudongmar (6,715m) and Sanglaphu (6,078m) mountain peaks under the stress of contemporary climate change, as well as offering items used by the pilgrims into the lake. Additionally, fragile geology of the region and its susceptibility to Glacial Lake Outburst Floods (GLOF) make them more vulnerable. The lake in one of the 14 lakes reported being susceptible to GLOF (Mool *et al.*, 2001).

Janak Tso Lake Complex



Figure 131: Field Photo of Janak Tso Complex Lake

Janak Tso Complex Lake consisting of seven small lakes is spread between latitude 27.88646 N and longitude 88.60069E at an approximate altitude between 4120 - 5251 m in the North District of Sikkim (Fig 89). Parts of the lake is found inside the Kanchendzonga National Park. The lake complex is permanent and oligotrophic in nature where its source of water is melting glaciers. The lake falls under snow leopard habitat. The average annual temperature around the lake is sub-zero and precipitation in the form of snow is around 110mm. The around the lake is mostly devoid of vegetation except for few alpine tufts of grasses and *Primula* spp.

Kalapathar Tso Lake



Figure 132: Field Photo of Kalapathar Tso Lake

Kalapathar Tso Lake lies between latitude 27.90251N and longitude 88.47294 E at an approximate altitude of 4736 m under the protected area of Kanchendzonga National Park in the North District of Sikkim (Fig 91). The lake is close to the Gurudongmar Complex Lake and has equal reverence among both Hindu and Buddhist communities. The lake is permanent and oligotrophic. The area around the lake is mostly covered with moraines exposed due to the deglaciation process. Only a few floral species like *Nardostachys jatamansi* (Jatamansi), *Picrorhiza scrophulariiflora* (Kurki) and *Taxus wallichiana* (Sunpati) sparse presence around the lake.

Khora Tso Lake Complex



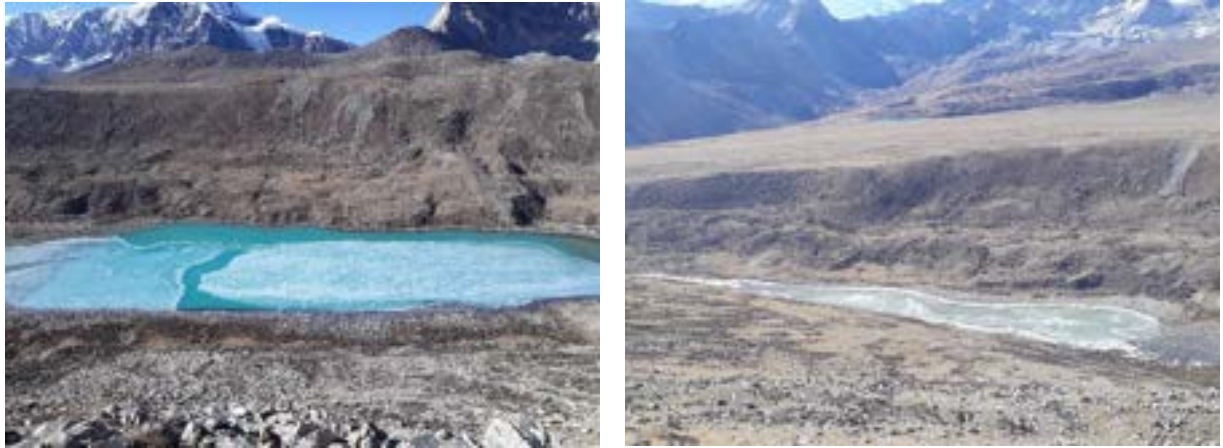


Figure 133: Field Photos of Khora Tso Lake

Khora Tso Lake complex consisting of five small lakes is spread between latitude 27.94611 N and longitude 88.35548E at an approximate altitude between 4933 - 5152 m under Kanchendzonga National Park in the North District of Sikkim (Fig 97). Does not support much of a life except for a few algal growths due to its oligotrophic nature and location. Lake is surrounded by moraines with few floral presences like *Nardostachys grandiflora*, *Piccorhizascrophulariiflora* found sparsely distributed around the lake. Sparse vegetation in the form of alpine grasses and few species of *Nardostachys grandiflora* distributed sparsely. Faunal species that have been noticed around the lake are *Pseudois nayaur* (Blue Sheep), *Cuon alpinus* (feral Dog).

Mukuthang Tso Lake



Figure 134: Field Photo of Mukuthang Tso Lake

Mukuthang Tso Lake lies between latitude 27.87408N and longitude 88.42940E at an approximate altitude 4846 m under Kanchendzonga National Park in the North District of Sikkim (Fig.105). Like other lakes in North Sikkim, Mukuthang Tso is also oligotrophic in nature that supports a few algal growths only. Plant species that were noticed in the areas near the lake -*Castanopsis tribuloides* (Katus), *Michelia cathcartii* (Chap), *Arundineria* spp. (Bamboo) etc.

Lachen Tso Complex Lake



Figure 135: Field Photo of Lachen Tso Complex Lake

Lachen Tso Lake lies between latitude 27.01039N and longitude 88.57070E at an approximate altitude 5013 m under Kanchendzonga National Park in the North District of Sikkim. Around the lake some flora and fauna have been noticed during the field i.e. *Primula Spp* and *Pseudois nayaur* (Blue Sheep), *Cuon alpinus* (feral Dog) and *Bos mutus* (Yak).

OK and Om Tso Lake



Figure 136: Field Photo of OK and OM Tso Lake

OK Tso Lake lies between latitude 27.92573N and longitude 88.61445E at an approximate altitude 4773 m under Kanchendzonga National Park in the North District of Sikkim. Few flora and fauna species like *Premula spp*, *Pseudois nayaur* (Blue Sheep) and *Bos mutus* (Yak) were found around the lake.

Setong Tso Lake



Figure 137: Field Photo of Setong Tso Lake

Setong Tso Lake lies between latitude 27.99032N and longitude 88.60081E at an approximate altitude 4781 m under Kanchendzonga National Park in the North District of Sikkim. This lake is permanent and Oligotrophic lake. Some of plant and animal species like *Nardostachys jatamansi* (Jatamansi), *Cupressus leylandii* (Shukpa) and *Picrorhiza scrophulariiflora* (Kurki), *Pseudois nayaur* (Blue Sheep), *Vulpus vulpus* (red fox), *Cuon alpinus* (feral Dog) and *Bos mutus* (Yak) present in the wetland. Solid waste dumping were present in the wetland.

ShakaTso



Figure 138: Field Photo of Shaka Tso Lake

Shechen Rangho Complex Lake



Figure 139: Field Photo of Shechen Rangho Lake



Figure 141: Field Photos of Shechen rangho 1 Lake

Yangsaac Lake



Figure 142: Field Photos of Yangsaac Lake

South Lhonak Lake



Figure 143: Field Photos of South Lhonak Lake

L.T. Tso Lake



Figure 144: Field Photo of LT Tso Lake

Tso Lhamu Complex Lake

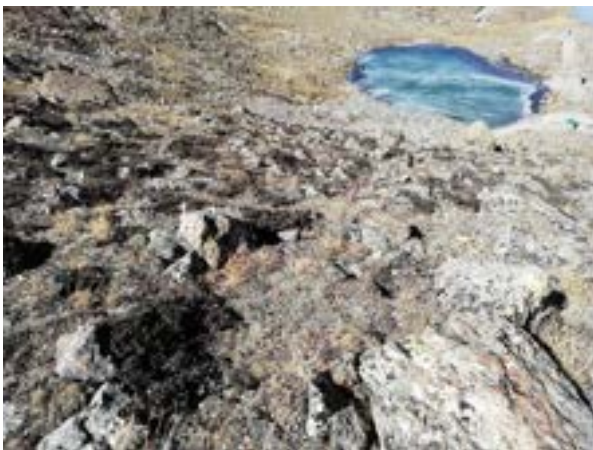


Figure 145: Field Photos of Tso Lhamu Complex Lake

Yum Tso Lake

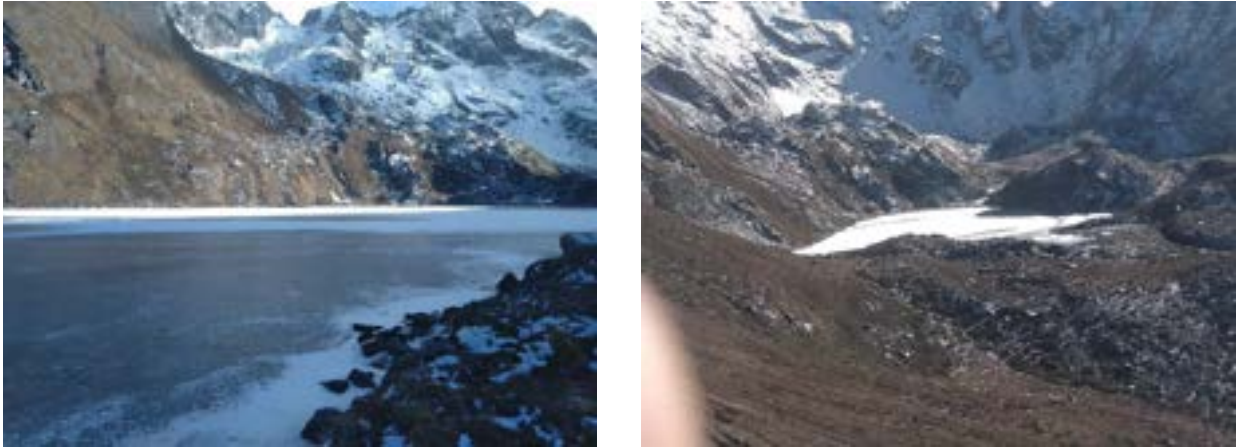


Figure 146: Field Photos of Yum Tso Lake

B Lake



Figure 147: Field Photos of B Lake

Changme Lake 2



Figure 148: Field Photos of Changme Lake 2

Donkeya Chu



Figure 149: Field Photos of Donkeya Chu

Jadung Lake 1



Figure 150: Field Photos of Jadung Lake 1

Gaya gawn Lake



Figure 151: Field Photos of Gaya gawn Lake

Gayamchona Lake



Figure 152: Field Photos of Gayamchona Lake

Yangchen Tso





Figure 153: Field Photos of Yangchen Tso

Ka Tso



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Figure 154: Field Photos of Ka Tso

Kyee Tso/Phuni Lake





Figure 155: Field Photos of Kyee Tso/Phuni Lake

Chume-Lham Lake



Figure 156: Field Photo of Chume-Lham Lake

Tembao Lake



Figure 157: Field Photos of Tembao Lake



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Figure 158: Field visit to wetlands of Lachung areas

Tosar Lake

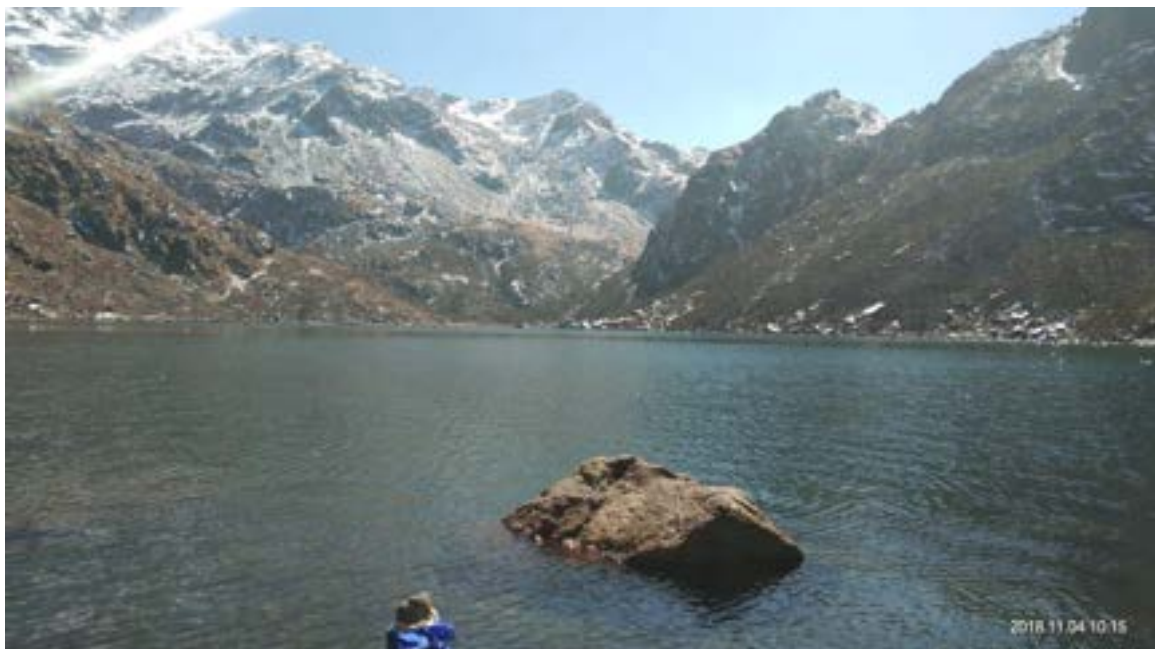


Figure 159 : Field Photo of Tosar Lake

Kishong Lake



Figure 160: Field Photo of Kishong Lake

Tingchim Lake



Figure 161: Field Photo of Tingchim Lake

Nakuchu Lake



Figure 162: Field Photo of Nakuchu Lake

Thang Tso Lake



Figure 163 : Google earth image - Thang Tso Lake

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Figure 164: Gurudongmar Lake Complex

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Detailed Documents of the Surveyed Wetlands (North Sikkim)

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Annexure2

Table 1: General Characteristics							
S.No.	Wetland Name	Latitude	Longitude	Altitude (m)	Area of Wetland (ha)	Wetland type	Protected area
1	Tsobuk Tso 1	27.91107	88.60169	4879	0.39	Natural – Permanent lakes	KNP
2	Tsobuk Tso 2	27.91156	88.60261	4815	0.42	Natural – Permanent lakes	KNP
3	Tsobuk Tso 3	27.91006	88.60283	4873	0.15	Natural – Permanent lakes	KNP
4	Chomijadar Tso 1	27.93485	88.26346	5261	0.82	Natural – Permanent lakes	KNP
5	Chomijadar Tso 2	27.93555	88.26550	5222	8.01	Natural – Permanent lakes	KNP
6	Chomijadar Tso 3	27.93904	88.27251	5237	1.46	Natural – Permanent lakes	KNP
7	Chomijadar Tso 4	27.94132	88.27248	5160	5.80	Natural – Permanent lakes	KNP
8	Chomijadar Tso 5	27.93930	88.27552	5136	1.11	Natural – Permanent lakes	KNP
9	Chunguphu Tso	27.90711	88.61336	4868	0.17	Natural – Permanent lakes	KNP
10	Dokung	27.03781	88.57293	5192	4.53	Natural – Permanent lakes	KNP

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11	Em Tso	27.04494	88.70718	5053	0.72	Natural – Permanent lakes	KNP
12	Em Tso 2	27.04755	88.70818	5057	3.92	Natural – Permanent lakes	KNP
13	Fogay Tso 1	27.91108	88.56924	4446	0.10	Natural – Permanent lakes	KNP
14	Fogay Tso 2	27.91108	88.56924	4446	3.26	Natural – Permanent lakes	KNP
15	Fogay Tso 3	27.89818	88.57734	4617	1.18	Natural – Permanent lakes	KNP
16	Gachang Tso	27.92636	88.60452	4715	2.75	Natural – Permanent lakes	KNP
17	Gapzee Tso 1	27.95785	88.59128	4681	0.71	Natural – Permanent lakes	KNP
18	Gapzee Tso 2	27.96293	88.59138	4815	1.35	Natural – Permanent lakes	KNP
19	Gapzee Tso 3	27.97097	88.59576	4785	9.22	Natural – Permanent lakes	KNP
20	Gukul Tso	27.92000	88.49993	4773	0.31	Natural – Permanent lakes	KNP
21	Gurudongmar 1	28.02651	88.7106	5155	109.52	Natural – Permanent lakes	KNP
22	Gurudongmar 2	28.01708	88.70777	5192	0.57	Natural – Permanent lakes	KNP
23	Gurudongmar 3	28.01494	88.70687	5208	0.82	Natural – Permanent lakes	KNP

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24	Gurudongmar 4	28.01112	88.70543	5201	105.17	Natural – Permanent lakes	KNP
25	Gurudongmar 5	28.00888	88.70882	5247	130.60	Natural – Permanent lakes	KNP
26	Janak 1 Tso 1	27.88646	88.26721	5120	9.19	Natural – Permanent lakes	KNP
27	Janak 1 Tso 2	27.85785	88.24806	5248	1.47	Natural – Permanent lakes	KNP
28	Janak 1 Tso 3	27.85806	88.24765	5251	0.29	Natural – Permanent lakes	KNP
29	Janak 2 Tso 1	27.88646	88.26721	5120	4.87	Natural – Permanent lakes	KNP
30	Janak 2 Tso 2	27.88273	88.25284	5205	14.00	Natural – Permanent lakes	KNP
31	Janak 2 Tso 3	27.88152	88.25882	5135	8.56	Natural – Permanent lakes	KNP
32	Janak 2 Tso 4	27.88009	88.60069	5161	11.55	Natural – Permanent lakes	KNP
33	Kalapatthar Tso 1	27.90251	88.47294	4736	1.05	Natural – Permanent lakes	KNP
34	Khora Tso 1	27.94611	88.32205	5152	1.31	Natural – Permanent lakes	KNP
35	Khora Tso 2	27.94690	88.33195	5046	60.18	Natural – Permanent lakes	KNP
36	Khora Tso 3	27.95527	88.35656	5006	18.13	Natural – Permanent lakes	KNP

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37	Khora Tso 4	27.94733	88.35124	4986	12.32	Natural – Permanent lakes	KNP
38	Khora Tso 5	27.95182	88.35548	4933	21.95	Natural – Permanent lakes	KNP
39	Khora Tso	27.88647	88.26721	5083	2.43	Natural – Permanent lakes	KNP
40	Lachee Tso 1	27.01039	88.57070	5013	25.31	Natural – Permanent lakes	KNP
41	Lachee Tso 2	28.01485	88.56053	5069	26.26	Natural – Permanent lakes	KNP
42	Mukuthang Tso	27.87408	88.42940	4846	2.28	Natural – Permanent lakes	KNP
43	Ok Tso	27.92573	88.61445	4773	4.79	Natural – Permanent lakes	KNP
44	Om Tso	27.90324	88.61386	4882	3.99	Natural – Permanent lakes	KNP
45	Setong Tso	27.99032	88.60081	4781	0.23	Natural – Permanent lakes	KNP
46	Shaka Tso	27.97098	88.61031	4981	58.57	Natural – Permanent lakes	KNP
47	Shechen Ragho 1	27.97427	88.60919	4985	0.18	Natural – Permanent lakes	KNP
48	Shechen Ragho	27.99031	88.60069	4785	9.77	Natural – Permanent lakes	KNP
49	South Lhonak	27.91605	88.20929	5204	134.15	Natural – Permanent lakes	KNP

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50	Tso Lhamo	27.019061	88.759386	5096	4.49	Natural – Permanent lakes	KNP
51	Tso Lhamo 1	27.019061	88.759386	5096	101.57	Natural – Permanent lakes	KNP
52	Tso Lhamo 3	27.019061	88.759386	5096	0.13	Natural – Permanent lakes	KNP
53	Tso Lhamo 4	27.019061	88.759386	5096	5.50	Natural – Permanent lakes	KNP
54	Yangsaac	27.85348	88.24740	5204	30.77	Natural – Permanent lakes	KNP
55	Yum Tso	28.04885	88.70951	5051	2.96	Natural – Permanent lakes	KNP
56	Changme Lake 2 (Dry Lake)	27.92656	88.68599	4749	0.04	Natural-Dry Lake	Changme Glacier
57	B-Lake	27.92192	88.67497	4840	9.55	Natural-Permanent Lake	Sandang Chu
58	Donkeya Chu	27.96622	88.76653	5285	1.37	Natural-Permanent Lake	Yumasamdong
59	Gaya Gawn Lake1 (dry lake)	28.02461	88.60992	4816	1.067	Natural-Seasonal Lake	Lachen RF
60	Gaya gawn Lake 4	28.04339	88.69953	5195	0.4	Natural-Permanent Lake	Lachen RF
61	Gayamchona Lake	28.05653	88.63097	4846	18.03	Natural-Permanent Lake	Kerang (Army camp)
62	Jadung Lake 1	27.96147	88.76683	5221	3.10	Natural-Permanent Lake	Tsholomo Range

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63	Jadung Lake 2	27.96625	88.76642	5224	1.37	Natural-Permanent Lake	Tsholomo Range
64	Unnamed lake 1/singba lake	27.75967	88.72272	3318	7.14	Natural-Permanent Lake	Singba
65	Unnamed Lake 2	27.45789	88.76762	5195	1.24	Natural-Permanent Lake	Tsholomo Range
66	Sebu Lake (Changme 1)	27.85553	88.692	4520	1.86	Natural-Permanent Lake	KBR
67	Chuba Lake	27.72844	88.75478	2989	0.4	Natural-Permanent Lake	Dobang
68	Black Lake/Namnasa Lake	27.7146	88.74266	2891	1.93	Natural-Permanent Lake	Lachen RF
69	Jachu valley (Ox-bow lake)	27.93047	88.58703	4749	0.5	Natural-Permanent Lake	Lachen RF
70	Changme 3	27.92486	88.68461	4797	0.3	Natural-Permanent Lake	Changme Glacier
71	Yangchen Tso	27.84804	88.86828	4937	5.20	Natural-Permanent Lake	Goralla
72	Ka- Tso	27.8414	88.87804	5134	4.2	Natural-Permanent Lake	Goralla
73	Kyee Tso	27.75911	88.72307	3373	7.14	Artificial lake	Shingba Sanctuary
74	Chume- Lham TSo	27.86446	88.86289	4805	13	Natural-Permanent Lake	Goralla
75	Tembao Lake	27.89452	88.76169	5243	45.4	Natural-Permanent Lake	Yumesamdong

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76	Tosar lake	27.46856	88.74922	4072	19.6	Natural-Permanent Lake	Naga RF
77	Kishong Lake	27.72094	88.45268	4235	13.29	Natural-Permanent Lake	KNP
78	Tingchim lake	27.45818	88.52879	1206	0.10	Natural-Permanent Lake	Near Phodong RF
79	Nakuchu Lake	27.44361	88.75527	4055	9.24	Natural-Permanent Lake	Latui RF
80	Thang Tso	27.973610	88.441110	5081	12.91	Natural-Permanent Lake	Thanngu RF
81	Hans Pokhari	27.43185	88.77062	3956	6.99	Natural - Permanent lakes	Indian Army

Table 2: Water Regimes

S.No.	Wetland Name	Main source of water	Water Permanence	Destination of water from wetland	pH	Water salinity	Nutrients in water	Probable source of Nutrients
1	Tsobuk Tso 1	Glacier	Mostly permanent	Feeds groundwater	6.8	7.0	Oligotrophic	Melting Glaciers
2	Tsobuk Tso 2	Glacier	Mostly permanent	Feeds groundwater	7.6	7.0	Oligotrophic	Melting Glaciers
3	Tsobuk Tso 3	Glacier	Mostly permanent	Feeds groundwater	6.9	10.7	Oligotrophic	Melting Glaciers

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4	Chomijadar Tso 1	Glacier	Mostly permanent	Feeds groundwater	7.1	5.3	Oligotrophic	Melting Glaciers
5	Chomijadar Tso 2	Glacier	Mostly permanent	Feeds groundwater	7.6	9.8	Oligotrophic	Melting Glaciers
6	Chomijadar Tso 3	Glacier	Mostly permanent	Feeds groundwater	7.0	7.0	Oligotrophic	Melting Glaciers
7	Chomijadar Tso 4	Glacier	Mostly permanent	Feeds groundwater	6.8	10.3	Oligotrophic	Melting Glaciers
8	Chomijadar Tso 5	Glacier	Mostly permanent	Feeds groundwater	6.9	8.0	Oligotrophic	Melting Glaciers
9	Chunguphu Tso	Glacier	Mostly permanent	Feeds groundwater	7.5	7.0	Oligotrophic	Melting Glaciers
10	Dokung	Glacier	Mostly permanent	Feeds groundwater	7.1	8.8	Oligotrophic	Melting Glaciers
11	Em Tso	Glacier	Mostly permanent	Feeds groundwater	7.3	5.0	Oligotrophic	Melting Glaciers
12	Em Tso 2	Glacier	Mostly permanent	Feeds groundwater	7.4	5.4	Oligotrophic	Melting Glaciers
13	Fogay Tso 1	Glacier	Mostly permanent	Feeds groundwater	6.7	10	Oligotrophic	Melting Glaciers
14	Fogay Tso 2	Glacier	Mostly permanent	Feeds groundwater	7.0	5.2	Oligotrophic	Melting Glaciers
15	Fogay Tso 3	Glacier	Mostly permanent	Feeds groundwater	6.9	4.0	Oligotrophic	Melting Glaciers
16	Gachang Tso	Glacier	Mostly permanent	Feeds groundwater	8.5	5.4	Oligotrophic	Melting Glaciers

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17	Gapzee Tso 1	Glacier	Mostly permanent	Feeds groundwater	6.8	7.0	Oligotrophic	Melting Glaciers
18	Gapzee Tso 2	Glacier	Mostly permanent	To Downstream River	7.4	5.0	Oligotrophic	Melting Glaciers
19	Gapzee Tso 3	Glacier	Mostly permanent	To Downstream River	7.2	4.0	Oligotrophic	Melting Glaciers
20	Gukul Tso	Glacier	Mostly permanent	To Downstream River	8.3	9.2	Oligotrophic	Melting Glaciers
21	Gurudongmar 1	Glacier	Mostly permanent	To Downstream River	7.6	9.0	Oligotrophic	Melting Glaciers
22	Gurudongmar 2	Glacier	Mostly permanent	To Downstream River	7.1	3.4	Not Assessed	Melting Glaciers
23	Gurudongmar 3	Glacier	Mostly permanent	To Downstream River	7.6	5.8	Oligotrophic	Melting Glaciers
24	Gurudongmar 4	Glacier	Mostly permanent	To Downstream River	7.8	6.4	Oligotrophic	Melting Glaciers
25	Gurudongmar 5	Glacier	Mostly permanent	To Downstream River	8.5	3	Oligotrophic	Melting Glaciers
26	Janak 1 Tso 1	Glacier	Mostly permanent	To Downstream River	5.6	4.2	Oligotrophic	Melting Glaciers
27	Janak 1 Tso 2	Glacier	Mostly permanent	To Downstream River	7.4	6	Oligotrophic	Melting Glaciers
28	Janak 1 Tso 3	Glacier	Mostly permanent	To Downstream River	6.3	8	Oligotrophic	Melting Glaciers
29	Janak 2 Tso 1	Glacier	Mostly permanent	To Downstream River	5.6	5.4	Oligotrophic	Melting Glaciers

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30	Janak 2 Tso 2	Glacier	Mostly permanent	To Downstream River	8.3	5.2	Oligotrophic	Melting Glaciers
31	Janak 2 Tso 3	Glacier	Mostly permanent	To Downstream River	7.8	7.4	Oligotrophic	Melting Glaciers
32	Janak 2 Tso 4	Glacier	Mostly permanent	To Downstream River	8.7	4.8	Oligotrophic	Melting Glaciers
33	Kalapathar Tso 1	Glacier	Mostly permanent	To Downstream River	7.9	10.7	Oligotrophic	Melting Glaciers
34	Khora Tso 1	Glacier	Mostly permanent	To Downstream River	6.6	10.2	Oligotrophic	Melting Glaciers
35	Khora Tso 2	Glacier	Mostly permanent	To Downstream River	7	9	Oligotrophic	Melting Glaciers
36	Khora Tso 3	Glacier	Mostly permanent	To Downstream River	7.2	6.3	Oligotrophic	Melting Glaciers
37	Khora Tso 4	Glacier	Mostly permanent	To Downstream River	7.8	7.3	Oligotrophic	Melting Glaciers
38	Khora Tso 5	Glacier	Mostly permanent	To Downstream River	7.1	10	Oligotrophic	Melting Glaciers
39	Khora Tso	Glacier	Mostly permanent	To Downstream River	7.2	6	Oligotrophic	Melting Glaciers
40	Lachee Tso 1	Glacier	Mostly permanent	To Downstream River	8.1	10.3	Oligotrophic	Melting Glaciers
41	Lachee Tso 2	Glacier	Mostly permanent	To Downstream River	8.1	9.9	Oligotrophic	Melting Glaciers
42	Mukuthang Tso	Glacier	Mostly permanent	To Downstream River	6.7	6.3	Oligotrophic	Melting Glaciers

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43	Ok Tso	Glacier	Mostly permanent	To Downstream River	8	4.2	Oligotrophic	Melting Glaciers
44	Om Tso	Glacier	Mostly permanent	To Downstream River	6.8	5	Oligotrophic	Melting Glaciers
45	Setong Tso	Glacier	Mostly permanent	To Downstream River	6.8	7.4	Oligotrophic	Melting Glaciers
46	Shaka Tso	Glacier	Mostly permanent	To Downstream River	7.2	5	Oligotrophic	Melting Glaciers
47	Shechen Ragho 1	Glacier	Mostly permanent	To Downstream River	6.9	9	Oligotrophic	Melting Glaciers
48	Shechen Ragho 2	Glacier	Mostly permanent	Feeds groundwater	6.7	4.6	Oligotrophic	Melting Glaciers
49	South Lhonak	Glacier	Mostly permanent	Feeds groundwater	5.5	6.2	Oligotrophic	Melting Glaciers
50	Tso Lhamo1	Glacier	Mostly permanent	To Downstream River	6.2	6.2	Oligotrophic	Melting Glaciers
51	Tso Lhamo 2	Glacier	Mostly permanent	To Downstream River	8.3	10.6	Oligotrophic	Melting Glaciers
52	Tso Lhamo 3	Glacier	Mostly permanent	To Downstream River	8.3	10.6	Oligotrophic	Melting Glaciers
53	Tso Lhamo 4	Glacier	Mostly permanent	To Downstream River	8	10.3	Oligotrophic	Melting Glaciers
54	Yangsaac	Glacier	Mostly permanent	To Downstream River	7.4	10.3	Oligotrophic	Melting Glaciers
55	Yum Tso	Glacier	Mostly permanent	To Downstream River	7.4	6.4	Oligotrophic	Melting Glaciers

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56	Changme Lake 2 (Dry Lake)	Fed by Changme Khangse Glacier	Seasonal	Feeds Down stream	Dry lake	Dry Lake	Not Assessed	Not Assessed
57	B-Lake	Glacier and rainfall	Mostly permanent	Feeds Down stream	5.5	0.9	Not Assessed	Not Assessed
58	Donkeya Tso	Upstream river and Rainfall	Mostly permanent	Feeds Down stream	3.9	1.1	Not Assessed	Not Assessed
59	Gaya Gawn Lake1 (dry lake)	Upstream river and Rainfall	Seasonal	Feeds Down stream	5.2	2.2	Not Assessed	Not Assessed
60	Gaya gawn Lake 4	Upstream river and Rainfall	Mostly permanent	Feeds Down stream	5.1	1.5	Not Assessed	Not Assessed
61	Gayamchona Lake	Glacier and rainfall	Mostly permanent	Feeds Down stream	5.1	1.9	Not Assessed	Not Assessed
62	Jadung Lake 1	Glacier and rainfall	Mostly permanent	Feeds Down stream	4.2	1.4	Not Assessed	Not Assessed
63	Jadung Lake 2	Glacier and rainfall	Mostly permanent	Feeds Down stream	3.8	1.2	Not Assessed	Not Assessed
64	Unnamed lake 1/singba lake	Glacier and rainfall	Mostly permanent	Feeds Down stream	4.3	1.1	Not Assessed	Not Assessed
65	Unnamed Lake 2	Glacier and rainfall	Mostly permanent	Feeds Down stream	6.3	1.3	Not Assessed	Not Assessed
66	Sebu Lake (Changme 1)	Rainfall and ground water	Mostly permanent	Feeds Down stream	5.8	1.9	Not Assessed	Not Assessed
67	Chuba Lake	Glacier and rainfall	Mostly permanent	Feeds Down stream	4.0	1.2	Not Assessed	Not Assessed
68	Black Lake/Namnasa Lake	Rainfall and ground water	Mostly permanent	Feeds Down stream	6.1	2.1	Not Assessed	Not Assessed

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69	Jachu valley (Ox-bow lake)	Glacier and rainfall	Mostly permanent	Feeds Down stream	4.5	1.3	Not Assessed	Not Assessed
70	Changme 3	Ground water and Rainfall	Mostly permanent	Feeds Down stream	5.4	1.5	Not Assessed	Not Assessed
71	Yangchen Tso	Glacial lake	Mostly permanent	Feeds Down stream	NA	NA	Not Assessed	Not Assessed
72	Ka- Tso	Glacier and rainfall	Mostly permanent	Feeds Down stream	NA	NA	Not Assessed	Not Assessed
73	Kyee Tso	Rainfed/ riverfed	Artificial lake	Feeds Down stream	NA	NA	Not Assessed	Not Assessed
74	Chume- Lham TSo	Glacial lake	Mostly permanent	Feeds Down stream	NA	NA	Not Assessed	Not Assessed
75	Tembao Lake	Glacial lake	Mostly permanent	Feeds Down stream	NA	NA	Not Assessed	Not Assessed
76	Tosar lake	Glacial lake	Mostly permanent	Feeds Down stream	NA	NA	Not Assessed	Not Assessed
77	Kishong Lake	Glacial lake	Mostly permanent	Feeds Down stream	NA	NA	Not Assessed	Not Assessed
78	Tingchim lake	Upstream river and Rainfall	Mostly permanent	Feeds Down stream	NA	NA	Not Assessed	Not Assessed
79	Nakuchu Lake	Glacial lake	Mostly permanent	Feeds Down stream	NA	NA	Not Assessed	Not Assessed
80	Thang Chho	Glacier	Mostly permanent	To Downstream River	NA	NA	Oligotrophic	Melting Glaciers
81	Hans Pokhari	Streams and Glaciers	Mostly Permanent	To downstream catchment	7.9	20	Not Assessed	Not Assessed

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Table 3: Climatic Setting										
S.No	Wetland Name	*Annual Rainfall (in mm)	*Temp (°C)	*Humidity(g/kg)	Major Land use (in percentage)					
					(Giovanni data and 10km resolution)	Forest	Grassland/Scrubland	Cropland	Built-up	Other land
1	Tsobuk Tso 1	93.63	2.15	4.018	3.88	3.57	0.0	0.0	91.66	0.88
2	Tsobuk Tso 2	93.63	2.15	4.018	3.89	3.33	0.0	0.0	91.72	1.05
3	Tsobuk Tso 3	93.63	2.15	4.018	2.88	3.10	0.0	0.0	93.09	0.93
4	Chomijadar Tso 1	101.03	8.44	3.54	0.0	6.31	0.0	0.0	87.79	0.18
5	Chomijadar Tso 2	101.03	8.44	3.54	0.0	0.0	0.0	0.0	98.90	1.10
6	Chomijadar Tso 3	101.03	8.44	3.54	0.0	0.08	0.0	0.0	98.20	1.72
7	Chomijadar Tso 4	101.03	8.44	3.64	0.0	0.08	0.0	0.0	98.12	1.79
8	Chomijadar Tso 5	101.03	8.44	3.54	0.0	0.013	0.0	0.0	98.18	1.68
9	Chunguphu Tso	93.63	2.15	4.01	0.0	0.0	0.0	0.0	97.99	2.01
10	Dokung	77.89	12.24	3.59	0.0	0.0	0.0	0.0	99.42	0.58
11	Em Tso	70.42	13.39	3.97	0.0	0.0	0.0	0.0	96.64	3.36
12	Em Tso 2	70.42	18.38	3.97	0.0	0.0	0.0	0.0	97.62	2.38
13	Fogay Tso 1	96.88	10.03	4.64	9.6	22	0.0	0.0	67.90	0.31

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14	Fogay Tso 2	96.88	10.03	4.64	9.27	16.98	0.0	0.0	73.44	0.30
15	Fogay Tso 3	103.71	3	5.56	9.5	16.07	0.0	0.0	73.99	0.43
16	Gachang Tso	93.63	2.15	4.018	5.38	5.28	0.0	0.0	88.61	0.71
17	Gapzee Tso 1	93.63	2.15	4.018	3.88	3.57	0.0	0.0	91.66	0.88
18	Gapzee Tso 2	96.88	4.38	4.64	0.22	17.23	0.0	0.0	81.74	0.80
19	Gapzee Tso 3	96.88	4.38	4.64	0.04	14.47	0.0	0.0	83.85	2.20
20	Gukul Tso	99.84	7.85	4.37	9.06	10.03	0.0	0.0	80.28	0.26
21	Gurudongmar 1	70.42	13.39	3.97	0.0	0.0	0.0	0.0	87.17	12.83
22	Gurudongmar 2	70.42	13.39	3.97	0.0	0.24	0.0	0.0	76.51	23.25
23	Gurudongmar 3	70.42	13.39	3.97	0.0	0.32	0.0	0.0	76.09	23.58
24	Gurudongmar 4	70.42	13.39	3.97	0.0	0.65	0.0	0.0	88.56	13.98
25	Gurudongmar 5	70.42	13.39	3.97	0.0	0.84	0.0	0.0	84.96	14.19
26	Janak 1 Tso 1	109.64	8.58	3.70	0.0	0.5	0.0	0.0	96.86	2.63
27	Janak 1 Tso 2	109.64	7.94	3.70	0.0	0.0	0.0	0.0	97.33	2.67
28	Janak 1 Tso 3	109.64	7.94	3.70	0.0	0.0	0.0	0.0	97.22	2.78
29	Janak 2 Tso 1	109.64	8.58	3.70	0.0	0.0	0.0	0.0	96.71	2.70
30	Janak 2 Tso 2	109.64	8.58	3.70	0.0	0.45	0.0	0.0	96.91	2.63

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31	Janak 2 Tso 3	109.64	8.58	3.70	0.0	0.52	0.0	0.0	96.84	2.64
32	Janak 2 Tso 4	109.64	2.59	3.70	0.0	0.0	0.0	0.0	96.80	3.20
33	Kalapatthar Tso 1	99.84	7.85	4.37	1.19	2.02	0.0	0.0	96.07	0.30
34	Khora Tso 1	99.44	11.35	3.95	0.0	0.0	0.0	0.0	92.74	7.26
35	Khora Tso 2	99.44	11.35	3.95	0.0	0.0	0.0	0.0	95.66	4.34
36	Khora Tso 3	99.44	2.95	3.95	0.0	0.0	0.0	0.0	96.09	3.91
37	Khora Tso 4	99.44	12.03	3.95	0.0	0.0	0.0	0.0	94.91	5.09
38	Khora Tso 5	99.44	2.95	3.95	0.0	0.0	0.0	0.0	95.11	4.89
39	Khora Tso	99.84	7.85	4.37	0.0	0.0	0.0	0.0	88.05	0.29
40	Lachee Tso 1	77.89	12.24	3.59	0.0	1.31	0.0	0.0	95.21	3.48
41	Lachee Tso 2	77.89	12.24	3.59	0.0	1.31	0.0	0.0	95.21	3.48
42	Mukuthang Tso	99.84	7.85	4.37	0.0	1.68	0.0	0.0	97.68	0.64
43	Ok Tso	93.63	2.15	4.015	3.84	0.75	0.0	0.0	94.09	0.69
44	Om Tso	93.63	2.15	4.018	0.0	0.0	0.0	0.0	98.45	1.55
45	Setong Tso	93.63	-0.71	4.018	0.0	7.85	0.0	0.0	85.82	6.33
46	Shaka Tso	93.63	-0.71	4.018	0.0	3.64	0.0	0.0	92.15	4.20
47	Shechen Ragho 1	93.63	-0.71	4.018	0.0	7.02	0.0	0.0	86.77	6.20
48	Shechen Ragho	93.63	-0.71	4.018	0.0	7.17	0.0	0.0	90.51	2.38
49	South Lhonak	101.03	8.25	3.54	0.0	0.15	0.0	0.0	92.34	7.51
50	Tso Lhamo	88.81	4.21	3.98	0.0	0.62	0.0	0.0	93.32	6.06
51	Tso Lhamo 1	70.42	13.77	3.97	0.0	0.47	0.0	0.0	94.58	4.95

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52	Tso Lhamo 3	70.42	14.84	3.97	0.0	0.0	0.0	0.0	99.99	0.01
53	Tso Lhamo 4	70.42	13.77	3.97	0.0	0.79	0.0	0.0	90.79	8.42
54	Yangsaac	109.64	7.94	3.70	0.0	0.0	0.0	0.0	97.39	2.61
55	Yum Tso	70.42	13.39	3.97	0.0	0.0	0.0	0.0	98.17	1.83
56	Changme Lake 2 (Dry Lake)	93.62	2.54	4.01	0.35	1.34	0.0	0.0	97.21	1.08
57	B-Lake	93.62	2.54	4.01	0.0	0.38	0.0	0.0	98.58	1.03
58	Donkeya Chu	88.80	4.21	3.98	0.0	1.80	0.0	0.0	97.41	0.78
59	Gaya Gawn Lake1 (dry lake)	73.03	11.18	4.07	0.0	1.65	0.0	0.0	98.29	0.04
60	Gaya gawn Lake 4	73.03	11.32	4.07	0.0	0.0	0.0	0.0	97.10	2.89
61	Gayamchona Lake	73.03	16.42	4.07	0.0	0.0	0.0	0.0	98.95	1.04
62	Jadung Lake 1	88.80	4.21	3.98	0.0	1.75	0.0	0.0	97.35	0.88
63	Jadung Lake 2	88.80	4.21	3.98	0.0	1.75	0.0	0.0	97.35	0.88
64	Unnamed lake 1/singba lake	104.22	4.34	6.13	57.3	3.15	0.0	0.0	38.9	0.60
65	Unnamed Lake 2	134.09	2.03	5.86	36.61	0.0	0.0	0.0	60.82	2.55
66	Sebu Lake (Changme 1)	100.28	-1.46	4.57	57.3	3.15	0.0	0.0	38.9	0.60
67	Chuba Lake	104.22	4.34	6.13	78.78	1.74	0.0	0.0	19.06	0.4
68	Black Lake/Namnasa Lake	104.22	4.34	6.13	44.91	4.57	0.0	0.0	50.40	0.09
69	Jachu valley (Ox-bow lake)	93.63	-3.96	4.02	21	0.0	0.0	0.0	78.80	0.18
70	Changme 3	93.63	-3.96	4.02	1.55	0.0	0.0	0.0	97.41	1.03

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71	Yangchen Tso	94.70	4.12	4.37	10.74	0.0	0.0	0.0	86.53	2.72
72	Ka- Tso	94.70	4.12	4.37	9.88	0.0	0.0	0.0	87.99	2.11
73	Kyee Tso	104.21	5.93	6.12	57.31	0.0	0.0	0.0	42.07	0.60
74	Chume- Lham Tso	94.70	0.035	4.37	6.93	0.0	0.0	0.0	90.83	2.23
75	Tembao Lake	96.80	0.59	4.54	1.51	0.0	0.0	0.0	93.34	4.52
76	Tosar Lake	134.09	2.77	5.86	49.30	0.0	0.0	0.0	49.20	1.48
77	Kishong Lake	118.08	2.17	5.35	6.99	1.03	12.76	0	78.36	0.83
78	Tingchim lake	140.60	17.53	12.26	60.82	0.0	31.10	7.18	0.51	0.37
79	Nakuchu Lake	134.09	2.77	5.86	52.26	0.0	0.0	0.0	45.65	2.07
80	Thang Chho	99.84	-1.14	4.37	0.09	4.00	0.0	0.0	92.34	3.55
81	Hans Pokhari	134.09	2.77	5.86	23.67	25.33	0.25	0.06	49.10	1.60

** in the absence of any gauged/stationed data climatic stings were assessed based on the geospatial layers derived from long term climatic assessments*

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Table 4: Biodiversity

Name of the Wetland	List of plants species present in wetland	List of animal species present in wetland	Species of conservation significance (rare, endangered, threatened, endemic species) -	Major plant invasive alien species and extent of invasion	Major animal invasive alien species and extent of invasion
Tsobuk Tso 1	<i>Picrorhiza scrophulariiflora</i> (Kurki), <i>Taxus wallichiana</i> (Sonpati)	<i>Pseudois nayaur</i> (Blue Sheep), <i>Vulpes vulpes</i> (red fox), <i>Canis lupus filchneri</i> (Tibetan wolf) and <i>Bos mutus</i> (Yak)	<i>Canis lupus filchneri</i> (Tibetan wolf)	Not noticed	Not noticed
Tsobuk Tso 2	<i>Picrorhiza scrophulariiflora</i> (Kurki), <i>Taxus wallichiana</i> (Sonpati)	<i>Pseudois nayaur</i> (Blue Sheep), <i>Vulpes vulpes</i> (red fox), <i>Canis lupus filchneri</i> (Tibetan wolf) and <i>Bos mutus</i> (Yak)	<i>Canis lupus filchneri</i> (Tibetan wolf)	Not noticed	Not noticed
Tsobuk Tso 3	<i>Primula spp.</i>	<i>Panthera uncia</i> (snow leopard), <i>Pseudois nayaur</i> (Blue Sheep), <i>Vulpes vulpes</i> (red fox), <i>Canis lupus filchneri</i> (Tibetan wolf) and <i>Bos mutus</i> (yak)	<i>Panthera uncia</i> (Snow leopard)	Not noticed	Not noticed
Chomijadar Tso 1	<i>Primula spp.</i>	<i>Pseudois nayaur</i> (Blue Sheep), <i>Cuon alpinus</i> (feral dog) and <i>Bos mutus</i> (yak)	<i>Cuon alpinus</i> (feral dog)	Not noticed	Not noticed

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Name of the Wetland	List of plants species present in wetland	List of animal species present in wetland	Species of conservation significance (rare, endangered, threatened, endemic species) -	Major plant invasive alien species and extent of invasion	Major animal invasive alien species and extent of invasion
Chomijadar Tso 2	<i>Primula spp.</i>	<i>Pseudois nayaur</i> (Blue Sheep), <i>Cuon alpinus</i> (feral dog), <i>Bos mutus</i> (yak) and <i>Panthera uncia</i> (Snow leopard)	<i>Panthera uncia</i> (Snow leopard)	Not noticed	Not noticed
Chomijadar Tso 3	<i>Primula spp.</i>	<i>Pseudois nayaur</i> (Blue Sheep), <i>Cuon alpinus</i> (feral dog), <i>Bos mutus</i> (yak) and <i>Panthera uncia</i> (Snow leopard)	<i>Panthera uncia</i> (Snow leopard)	Not noticed	Not noticed
Chomijadar Tso 4	<i>Primula spp.</i>	<i>Pseudois nayaur</i> (Blue Sheep), <i>Bos mutus</i> (yak), and <i>Panthera uncia</i> (Snow leopard)	<i>Panthera uncia</i> (Snow leopard)	Not noticed	Not noticed
Chomijadar Tso 5	<i>Primula spp.</i>	<i>Pseudois nayaur</i> (Blue Sheep), <i>Bos mutus</i> (yak), and <i>Panthera uncia</i> (Snow leopard)	<i>Panthera uncia</i> (Snow leopard)	Not noticed	Not noticed
Chunguphu Tso	<i>Nardostachys jatamansi</i> (Jatamansi) and <i>Picrorhiza scrophulariiflora</i> (Kurki)	<i>Pseudois nayaur</i> (Blue Sheep), <i>Bos mutus</i> (yak), and <i>Panthera uncia</i> (Snow leopard)	<i>Panthera uncia</i> (Snow leopard)	Not noticed	Not noticed

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Name of the Wetland	List of plants species present in wetland	List of animal species present in wetland	Species of conservation significance (rare, endangered, threatened, endemic species) -	Major plant invasive alien species and extent of invasion	Major animal invasive alien species and extent of invasion
Dokung	Not noticed	<i>Pseudois nayaur</i> (Blue Sheep) and <i>Bos mutus</i> (yak)	Not noticed	Not noticed	Not noticed
Em Tso	<i>Primula spp.</i>	<i>Pseudois nayaur</i> (Blue Sheep) and <i>Bos mutus</i> (yak)	Not noticed	Not noticed	Not noticed
Em Tso 2	<i>Primula spp.</i>	<i>Pseudois nayaur</i> (Blue Sheep) and <i>Bos mutus</i> (yak)	Not noticed	Not noticed	Not noticed
Fogay Tso 1	<i>Taxus wallichiana</i> (Sunpati), <i>Nardostachys jatamansi</i> (Jatamansi), <i>Cupressus leylandii</i> (Shukpa) and <i>Picrorhiza scrophulariiflora</i> (Kurki)	<i>Panthera uncia</i> (Snow leopard) <i>Pseudois nayaur</i> (Blue Sheep), <i>Vulpes vulpes</i> (red fox), <i>Canis lupus filchneri</i> (Tibetan wolf) and <i>Bos mutus</i> (yak), COUN alpinus (feral dog)	<i>Panthera uncia</i> (Snow leopard), COUN alpinus (feral dog)	Not noticed	Not noticed
Fogay Tso 2	<i>Taxus wallichiana</i> (Sunpati) and <i>Picrorhiza scrophulariiflora</i> (Kurki)	<i>Panthera uncia</i> (snow leopard), <i>Pseudois nayaur</i> (Blue Sheep) and <i>Bos mutus</i> (yak), COUN alpinus (feral dog)	<i>Panthera uncia</i> (snow leopard) and COUN alpinus (feral dog)	Not noticed	Not noticed

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Name of the Wetland	List of plants species present in wetland	List of animal species present in wetland	Species of conservation significance (rare, endangered, threatened, endemic species) -	Major plant invasive alien species and extent of invasion	Major animal invasive alien species and extent of invasion
Fogay Tso 2	<i>Taxus wallichiana</i> (Sunpati) and <i>Picrorhiza scrophulariiflora</i> (Kurki)	<i>Panthera uncia</i> (snow leopard), <i>Pseudois nayaur</i> (Blue Sheep) and <i>Bos mutus</i> (yak), <i>Coun alpinus</i> (feral dog)	<i>Panthera uncia</i> (snow leopard) and <i>Coun alpinus</i> (feral dog)	Not noticed	Not noticed
Gachang Tso	<i>Taxus wallichiana</i> (Sunpati) and <i>Picrorhiza scrophulariiflora</i> (Kurki)	<i>Panthera uncia</i> (snow leopard), <i>Pseudois nayaur</i> (Blue Sheep) and <i>Bos mutus</i> (yak), <i>Coun alpinus</i> (feral dog)	<i>Panthera uncia</i> (snow leopard)	Not noticed	Not noticed
Gapzee Tso 1	<i>Primula spp.</i>	<i>Pseudois nayaur</i> (Blue Sheep), <i>Panthera uncia</i> (Snow leopard) and <i>Bos mutus</i> (Yak)	<i>Panthera uncia</i> (snow leopard)	Not noticed	Not noticed
Gapzee Tso 2	<i>Primula spp.</i>	<i>Pseudois nayaur</i> (Blue Sheep), <i>Panthera uncia</i> (Snow leopard) and <i>Bos mutus</i> (Yak)	<i>Panthera uncia</i> (snow leopard)	Not noticed	Not noticed
Gapzee Tso 3	<i>Primula spp.</i>	<i>Pseudois nayaur</i> (Blue Sheep), <i>Panthera uncia</i> (Snow leopard) and <i>Bos mutus</i> (Yak)	<i>Panthera uncia</i> (snow leopard)	Not noticed	Not noticed

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Gukul Tso	<i>Taxus wlichiana</i> (Sunpati), <i>Picrorhiza scrophulariiflora</i> (Kurki) and <i>Nardostachys jatamansi</i> (Jatamansi)	<i>Pseudois nayaur</i> (Blue Sheep), <i>Panthera uncia</i> (Snow leopard), <i>Vulpus vulpus</i> (red fox) and <i>Bos mutus</i> (Yak)	<i>Panthera uncia</i> (snow leopard)	Not noticed	Not noticed
Gurudongmar1	<i>Primula spp.</i> and few patches of tufted <i>Rhododendron spp.</i>	<i>Pseudois nayaur</i> (Blue Sheep), <i>Cuon alpinus</i> (Feral dog), <i>Vulpus vulpus</i> (red fox) and <i>Bos mutus</i> (Yak).	<i>Cuon alpinus</i> (Feral dog)	Not noticed	Not noticed
Gurudongmar 2	<i>Primula spp.</i> , <i>Rheum nobile</i> , <i>Pedicularis spp.</i>	<i>Pseudois nayaur</i> (Blue Sheep), <i>Cuon alpinus</i> (Feral dog), <i>Vulpus vulpus</i> (red fox) and <i>Bos mutus</i> (Yak)	<i>Cuon alpinus</i> (Feral dog)	Not noticed	Not noticed
Gurudongmar 3	<i>Primula spp.</i>	<i>Pseudois nayaur</i> (Blue Sheep), <i>Cuon alpinus</i> (Feral dog), <i>Vulpus vulpus</i> (red fox) and <i>Bos mutus</i> (Yak)	<i>Cuon alpinus</i> (Feral dog)	Not noticed	Not noticed
Gurudongmar 4	<i>Primula spp.</i>	<i>Pseudois nayaur</i> (Blue Sheep), <i>Cuon alpinus</i> (Feral dog), <i>Vulpus vulpus</i> (red fox) and <i>Bos mutus</i> (Yak)	<i>Cuon alpinus</i> (Feral dog)	Not noticed	Not noticed

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Gurudongmar 5	No	<i>Canis lupus filchneri</i> (Tibetan wolf), <i>Ochotona sikimaria</i> (rabbit), <i>Bos mutus</i> (Yak) and <i>Pseudois nayaur</i> (Blue Sheep)	No	Not noticed	Not noticed
Janak 1 Tso 1	<i>Primula spp.</i>	<i>Pseudois nayaur</i> (Blue Sheep), <i>Cuon alpinus</i> (Feral dog) and <i>Bos mutus</i> (Yak)	<i>Cuon alpinus</i> (Feral dog)	Not noticed	Not noticed
Janak 1 Tso 2	<i>Artimisia nilagirica</i> (Sungma)	<i>Pseudois nayaur</i> (Blue Sheep), <i>Vulpus vulpus</i> (red fox) and <i>Bos mutus</i> (Yak)	Not noticed	Not noticed	Not noticed
Janak 1 Tso 3	Not Noticed	<i>Pseudois nayaur</i> (Blue Sheep), <i>Cuon alpinus</i> (Feral dog) and <i>Bos mutus</i> (Yak)	<i>Cuon alpinus</i> (Feral dog)	Not noticed	Not noticed
Janak 2 Tso 1	<i>Primula spp.</i>	<i>Pseudois nayaur</i> (Blue Sheep), <i>Cuon alpinus</i> (Feral dog) and <i>Bos mutus</i> (Yak)	<i>Cuon alpinus</i> (Feral dog)	Not noticed	Not noticed

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Janak 2 Tso 2	<i>Primula spp.</i>	<i>Pseudois nayaur</i> (Blue Sheep), <i>Cuon alpinus</i> (Feral dog) and <i>Bos mutus</i> (Yak)	<i>Cuon alpinus</i> (Feral dog)	Not noticed	Not noticed
Janak 2 Tso 3	<i>Primula Spp.</i>	<i>Pseudois nayaur</i> (Blue Sheep), <i>Cuon alpinus</i> (Feral dog) and <i>Bos mutus</i> (Yak)	<i>Cuon alpinus</i> (Feral dog)	Not noticed	Not noticed
Janak 2 Tso 4	<i>Primula Spp.</i>	<i>Pseudois nayaur</i> (Blue Sheep), <i>Cuon alpinus</i> (Feral dog) and <i>Bos mutus</i> (Yak)	<i>Cuon alpinus</i> (Feral dog)	Not noticed	Not noticed
Kalapatthar Tso 1	<i>Nardostachys jatamansi</i> (Jatamansi), <i>Picrorhiza scrophulariiflora</i> (Kurki) and <i>Taxus wallichiana</i> (Sunpati)	<i>Pseudois nayaur</i> (Blue Sheep) and <i>Bos mutus</i> (Yak)	Not noticed	Not noticed	Not noticed
Khora Tso 1	<i>Nardostachys jatamansi</i> (Jatamansi)	<i>Pseudois nayaur</i> (Blue Sheep), <i>Cuon alpinus</i> (Feral dog) and <i>Bos mutus</i> (Yak)	<i>Cuon alpinus</i> (Feral dog)	Not noticed	Not noticed

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Khora Tso 2	<i>Nardostachys grandiflora</i> (Jatamansi)	<i>Pseudois nayaur</i> (Blue Sheep), <i>Cuon alpinus</i> (Feral dog) and <i>Bos mutus</i> (Yak)	<i>Cuon alpinus</i> (Feral dog)	Not noticed	Not noticed
Khora Tso 3	<i>Nardostachys grandiflora</i> (Jatamansi) and <i>Picrorhiza scrophulariiflora</i> (kurki)	<i>Pseudois nayaur</i> (Blue Sheep), <i>Cuon alpinus</i> (Feral dog) and <i>Bos mutus</i> (Yak)	Not noticed	Not noticed	Not noticed
Khora Tso 4	<i>Nardostachys grandiflora</i> (Jatamansi)	<i>Pseudois nayaur</i> (Blue Sheep), <i>Cuon alpinus</i> (Feral dog) and <i>Bos mutus</i> (Yak)	<i>Cuon alpinus</i> (Feral dog)	Not noticed	Not noticed
Khora Tso 5	<i>Nardostachys grandiflora</i> (Jatamansi)	<i>Pseudois nayaur</i> (Blue Sheep), <i>Cuon alpinus</i> (Feral dog) and <i>Bos mutus</i> (Yak)	<i>Cuon alpinus</i> (Feral dog)	Not noticed	Not noticed
Khora Tso	<i>Nardostachys grandiflora</i> (Jatamansi), <i>Primula</i> Spp. and <i>Rhododendron anthopogon</i> (Sunpati)	<i>Pseudois nayaur</i> (Blue Sheep), <i>Cuon alpinus</i> (Feral dog) and <i>Bos mutus</i> (Yak)	<i>Cuon alpinus</i> (Feral dog)	Not noticed	Not noticed

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Lachee Tso 1	<i>Primula Spp.</i>	<i>Pseudois nayaur</i> (Blue Sheep), <i>Cuon alpinus</i> (Feral dog) and <i>Bos mutus</i> (Yak)	<i>Cuon alpinus</i> (Feral dog)	Not noticed	Not noticed
Lachee Tso 2	<i>Primula Spp.</i>	<i>Pseudois nayaur</i> (Blue Sheep), <i>Oryctolagus cuniculus</i> (rabbit) <i>Cuon alpinus</i> (Feral dog) and <i>Bos mutus</i> (Yak)	<i>Cuon alpinus</i> (Feral dog)	Not Noticed	Not Noticed
Mukuthang Tso	<i>Castanopsis tribuloides</i> (Katus), <i>Michelia cathcartii</i> (Chap), <i>Arundineria Spp.</i> (Bamboo), <i>Alnus nepalensis</i> (Uttish), <i>Pinus wallichiana</i> (Salla), <i>Rhododendron griffithianum</i> ,	<i>Canis lupus familiaris</i> (Dog), <i>Cervidae</i> (Deer), <i>Ursidae</i> (Bear), <i>Felis silvestris</i> (Wild cat), <i>Moschus fuscus</i> (musk deer)	Not Noticed	Not Noticed	Not Noticed
Ok Tso	<i>Premula spp.</i>	<i>Pseudois nayaur</i> (Blue Sheep) and <i>Bos mutus</i> (Yak)	Not Noticed	Not Noticed	Not Noticed

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Om Tso	<i>Nardostachys grandiflora</i> (Jatamansi) and <i>Picrorhiza scrophulariiflora</i> (kurki)	<i>Pseudois nayaur</i> (Blue Sheep), <i>Panthera uncia</i> (Snow leopard) and <i>Bos mutus</i> (Yak)	<i>Panthera uncia</i> (Snow leopard)	Not Noticed	Not Noticed
Setong Tso	<i>Nardostachys jatamansi</i> (Jatamansi), <i>Cupressus leylandii</i> (Shukpa) and <i>Picrorhiza scrophulariiflora</i> (Kurki)	<i>Pseudois nayaur</i> (Blue Sheep), <i>Vulpus vulpus</i> (red fox), <i>Cuon alpinus</i> (Feral dog) and <i>Bos mutus</i> (Yak).	Not Noticed	Not Noticed	Not Noticed
Shaka Tso	<i>Premula spp.</i>	<i>Pseudois nayaur</i> (Blue Sheep) and <i>Bos mutus</i> (Yak).	Not Noticed	Not Noticed	Not Noticed
Shechen Ragho 1	<i>Premula spp</i>	<i>Bos mutus</i> (Yak), <i>Vulpus vulpus</i> (red fox), <i>Oryctolagus cuniculus</i> (rabbit) and <i>Pseudois nayaur</i> (Blue Sheep)	Not Noticed	Not Noticed	Not Noticed

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Shechen Ragho	<i>Premula spp.</i>	<i>Bos mutus</i> (Yak), <i>Panthera uncia</i> (Snow leopard) and <i>Pseudois nayaur</i> (Blue Sheep)	Not Noticed	Not Noticed	Not Noticed
South Lhonak	Due to the snow cover presence of plant species not noticed	<i>Bos mutus</i> (Yak)	Not Noticed	Not Noticed	Not Noticed
Tso Lhamo	<i>Primula spp</i>	<i>Equus quagga</i> (Zebra), <i>Vulpus vulpus</i> (red fox), <i>Bos mutus</i> (Yak), and <i>Pseudois nayaur</i> (Blue Sheep)	Not Noticed	Not Noticed	Not Noticed
Tso Lhamo 1	<i>Primula spp</i>	<i>Equus quagga</i> (Zebra), <i>Vulpus vulpus</i> (red fox), <i>Canis lupus filchneri</i> (Tibetan wolf), <i>Bos mutus</i> (Yak), <i>Panthera uncia</i> (Snow leopard) and <i>Pseudois nayaur</i> (Blue Sheep)	Not Noticed	Not Noticed	Not Noticed
Tso Lhamo 3	<i>Primula spp.</i>	<i>Equus quagga</i> (Zebra), <i>Vulpus vulpus</i> (red fox), <i>Canis lupus filchneri</i> (Tibetan wolf), <i>Bos mutus</i>	Not Noticed	Not Noticed	Not Noticed

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		(Yak), <i>Panthera uncia</i> (Snow leopard) and <i>Pseudois nayaur</i> (Blue Sheep)			
Tso Lhamo 4	<i>Primula spp.</i>	<i>Equus quagga</i> (Zebra), <i>Vulpus vulpus</i> (red fox), <i>Canis lupus filchneri</i> (Tibetan wolf), <i>Bos mutus</i> (Yak), <i>Panthera uncia</i> (Snow leopard) and <i>Pseudois nayaur</i> (Blue Sheep)	Not Noticed	Not Noticed	Not Noticed
Yangsaac	NA	<i>Bos mutus</i> (Yak), <i>Cuon alpinus</i> (Feral dog) and <i>Pseudois nayaur</i> (Blue Sheep)	Not Noticed	Not Noticed	Not Noticed
Yum Tso	NA	<i>Pseudois nayaur</i> (Blue Sheep), <i>Canis lupus filchneri</i> (Tibetan wolf) and <i>Bos mutus</i> (Yak)	Not Noticed	Not Noticed	Not Noticed
Changme Lake 2 (Dry Lake)	<i>Kanzo</i> , <i>Rhododendron sp</i> , <i>potentala</i> (covered by dead moriens very less greenery)	<i>Larawa</i> , <i>Columba leuconota</i> (snow pigeon), <i>Moschus</i> (Musk deer)	Kanzo	Not Noticed	Not Noticed

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B-Lake	<i>Rhododendron</i> sp, <i>Bistorta vivipara</i> , <i>buttercup</i> , <i>Primula</i> sp, <i>Rheum Nobile</i> , (<i>Dead morines</i> and <i>Glacier</i> around 2km zone)	<i>Panthera uncia</i> (<i>Snow leopard</i>) and <i>Moschus</i> (<i>Musk deer</i>)	<i>Panthera uncia</i> (<i>Snow leopard</i>)	Not Noticed	Not Noticed
Donkeya Chu	<i>Bistorta vivipara</i> , <i>buttercup</i> , <i>Primula</i> sp, <i>Rheum Nobile</i> , <i>Anaphelis</i> , <i>Bistorta vivipara</i> , <i>Fragaria</i> , <i>peducularis</i>	<i>Panthera uncia</i> (<i>Snow leopard</i>), <i>Marmota</i> (<i>Marmot</i>), <i>Lepus oiostolus</i> (<i>Himalayan woolly here</i>), <i>Dafay</i> , <i>Lophophorus impejanus</i> (<i>Munal</i>),	<i>Panthera uncia</i> (<i>Snow leopard</i>)	Not Noticed	Not Noticed
Gaya Gawn Lake1 (dry lake)	<i>Bistorta vivipara</i> , <i>buttercup</i> , <i>Primula</i> sp, <i>Rheum Nobile</i> , <i>Anaphelis</i> , <i>Bistorta vivipara</i> , <i>Fragaria</i> , <i>peducularis</i> , <i>Macanopsis</i> sp,	<i>Panthera uncia</i> (<i>Snow leopard</i>), <i>Marmota</i> (<i>Marmot</i>), <i>Lepus oiostolus</i> (<i>Himalayan woolly here</i>), <i>Dafay</i> , <i>Lophophorus impejanus</i> (<i>Munal</i>), <i>Moschus</i> (<i>Musk deer</i>)	<i>Panthera uncia</i> (<i>Snow leopard</i>)	Not Noticed	Not Noticed
Gaya gawn Lake 4	<i>Rhododendron</i> sp, <i>Bistorta vivipara</i> , <i>buttercup</i> , <i>Primula</i> sp, <i>Rumex Neplainsis</i> , <i>Lithocarpus</i>	<i>Panthera uncia</i> (<i>Snow leopard</i>), <i>Marmota</i> (<i>Marmot</i>), <i>Lepus oiostolus</i> (<i>Himalayan woolly here</i>), <i>Dafay</i> ,	<i>Panthera uncia</i> (<i>Snow leopard</i>)	Not Noticed	Not Noticed

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		<i>Lophophorus impejanus</i> (Munal), <i>pika</i>			
Gayamchona Lake	<i>Bistorta vivipara</i> , <i>buttercup</i> , <i>Primula sp</i> , <i>Rheum Nobile</i> , <i>Rhododendron sp</i> , <i>Rheum nobile</i> , <i>Potentilla sp</i> , <i>Primula</i> , <i>Anaphelis</i> , <i>Bistorta vivipara</i> , <i>Fragaria</i> , <i>peducularis</i>	<i>Panthera uncia</i> (Snow leopard), <i>Marmota</i> (Marmot), <i>Lepus oiostolus</i> (Himalayan woolly here), <i>Dafay</i> , <i>Lophophorus impejanus</i> (Munal)	<i>Panthera uncia</i> (Snow leopard)	The only saline lake found in Sikkim Himalayas	Not Noticed
Jadung Lake 1	<i>Bistorta vivipara</i> , <i>buttercup</i> , <i>Primula sp</i> , <i>Rheum Nobile</i> , <i>Rhododendron sp</i> , <i>Rheum nobile</i> , <i>Potentilla sp</i> , <i>Primula</i> , <i>Anaphelis</i> , <i>Bistorta vivipara</i> , <i>Fragaria</i> , <i>peducularis</i>	<i>Panthera uncia</i> (Snow leopard), <i>Marmota</i> (Marmot), <i>Lepus oiostolus</i> (Himalayan woolly here), <i>Dafay</i> , <i>Lophophorus impejanus</i> (Munal)	<i>Panthera uncia</i> (Snow leopard)	Not Noticed	Not Noticed

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Jadung Lake 2	<i>Kanzo, Rhododendron sp, Potentilla sp, Rehum Nobile, grasses, Persicaria,</i>	<i>Panthera uncia (Snow leopard), Marmot, Lepus oiostolus (Himalayan woolly here), Dafay, Lophophorus impejanus(Munal)</i>	<i>Panthera uncia (Snow leopard)</i>	Not Noticed	Not Noticed
Unnamed lake 1/singba lake	<i>Tshuga demosa, Maple, juniper, Euriasp, Panax Pseudo ginseng</i>	<i>Ursidae (Bear), Red fox, Weasel,</i>	<i>Ursidae (Bear)</i>	Not Noticed	Not Noticed
Unnamed Lake 2	<i>Rhododendron sp,Bistorta vivipara, buttercup, Primula sp, Rumex Neplainsis, Lithocarpus</i>	<i>Marmot, Lepus oiostolus (Himalayan woolly here), pika, Panthera uncia (Snow leopard)</i>	<i>Panthera uncia (Snow leopard)</i>	Not Noticed	Not Noticed
Sebu Lake (Changme 1)	<i>Rhododendron sp, Rheum nobile, Potentilla sp, Primula ,Anaphelis, Bistorta vivipara, Fragaria, peducularis</i>	<i>Moschus fuscus (Musk deer), Pseudois nayaur (Blue Sheep), marmot, Ochotona thibetana (pika), Lepus oiostolus (Himalayan woolly here), Dafay, Lophophorus impejanus(Munal)</i>	<i>Rheum Nobile Lepus oiostolus (Himalayan woolly here)</i>	Aquatic plants found the in and around lake (yet to Identify)	Not Noticed

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Chuba Lake	<i>Rhododendron sp, Potentilla sp, Maple, Anaphelis, Tshuga demosa, Junipher</i>	<i>Ailurus fulgens (Red panda), dafay, Chilmilay</i>	<i>Ailurus fulgens (Red panda)</i>	Not Noticed	Not Noticed
Black Lake/Namnasa Lake	<i>Artemisia vulgaris, Rumex Neplainsis, Lithocarpus, Chiritho, Ratnawlo, Aconogonum molle, Rhododendron grandii</i>	<i>Ursidae (Bear), Assam macaque (Fresh bear habitat found near the Lake)</i>	<i>Ursidae (Bear)</i>	Not Noticed	Not Noticed
Jachu valley (Ox-bow lake)	<i>Kanzo, Rhododendron sp, potentala, Primula sp, Rheum Nobile, macanopsis sp, Percicaria sp,</i>	<i>Larawa, Columba leuconota(snow pigeon), Moschus fuscus (Musk deer), Marmot, Ochotona thibetana (pika),</i>	Kanzo	Not Noticed	Not Noticed
Changme 3	<i>Bistorta vivipara, buttercup, Primula sp, Rheum Nobile, Anaphelis, Bistorta vivipara, Fragaria, peducalaris(Dead morines and Glacier around 2km zone)</i>	<i>Panthera uncia (Snow leopard),Marmot, Lepus oiostolus (Himalayan woolly here),</i>	<i>Panthera uncia (Snow leopard)</i>	Not Noticed	Not Noticed

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Name of the Wetland	List of plants species present in wetland	List of animal species present in wetland	Species of conservation significance (rare, endangered, threatened, endemic species) -	Major plant invasive alien species and extent of invasion	Major animal invasive alien species and extent of invasion
Yangchen Tso	<i>Rhododendron anthopogen</i> , <i>Rheum nobile</i> , <i>Rhododendron lepidotum</i> , <i>Potentilla</i> sps., <i>Primula</i> sps., <i>Bistorta vivipara</i> , <i>Fragaria</i> sps., <i>Cassioppe fastigiata</i> , <i>Ophiocordyceps sinensis</i> .	<i>Panthera uncia</i> , <i>Moschus fuscus</i> (Musk deer), <i>Blue sheep</i> , <i>Ochotona himalayana</i> (Pika), <i>Marmota himalayana</i> (marmot), <i>Lepus oiostolus</i> (Himalayan woolly here), <i>Tetraogallus tibetanus</i> (Snow cock), <i>grandala</i>	<i>Panthera uncia</i> , <i>Moschus fuscus</i> (Musk deer), <i>Ophiocordyceps sinensis</i>	Not Noticed	Not Noticed
Ka- Tso	<i>Rhododendron</i> sp, <i>Potentilla</i> sp, <i>Juncus</i> sps, <i>Carex</i> sps, <i>Cassioppe fastigiata</i> , <i>Bistorta</i> sp, <i>Iris</i> sps., <i>Rheum nobile</i> , <i>Saussarea</i> sps, <i>Meconopsis</i> sps.	Snow leopard, <i>Moschus fuscus</i> (Musk deer), <i>Pseudois nayaur</i> (Blue sheep), <i>Ochotona himalayana</i> (Pika), <i>Marmota himalayana</i> (marmot), <i>Vulpes ferrilata</i> (Tibetan Sand fox), <i>Lepus oiostolus</i> (Woolly hare), <i>Grandala coelicolor</i> (Grandalas), <i>C. leuconota</i> (Snowpigeon).	<i>Panthera uncia</i> (Snow leopard), <i>Moschus fuscus</i> (Musk deer)	Not Noticed	Not Noticed
Kye Tso	<i>Rhododendron thomsonii</i> , <i>Rhododendron grandii</i> , <i>Rhododendron falconerii</i> , <i>Abies</i>	<i>Ailurus fulgens</i> (Red panda), <i>Ursus thibetanus</i> (Himalayan Black bear), <i>Semnopithecus ajax</i> (Himalayan Langur),	<i>Ailurus fulgens</i> (Red panda), <i>Panax ginseng</i> , <i>Paris polyphylla</i>	Not Noticed	Not Noticed

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Name of the Wetland	List of plants species present in wetland	List of animal species present in wetland	Species of conservation significance (rare, endangered, threatened, endemic species) -	Major plant invasive alien species and extent of invasion	Major animal invasive alien species and extent of invasion
	<i>densa, Tsuga demusa, Acer sps, Primula sps, Panax ginseng, Paris polyphylla.</i>	<i>Grandala coelicolor (Grandalas),</i>			
Chume- Lham Tso	<i>Rhododendron anthopogen, Rheum nobile, Rhododendron setosum, Potentilla sps., Primula sps., Bistorta vivipara, Fragaria sps., Cassioppe fastigiata, Ophiocordyceps sinensis.</i>	<i>Panthera uncia, Moschus fuscus (Musk deer), Pseudois nayaur (Blue sheep), Ochotona himalayana (Pika), Marmota himalayana (marmot), Lepus oiostolus (Wooly hare) Tetraogallus himalayensis (Snow cock), grandala, Alpine chough, Gypaetus barbatus</i>	<i>Panthera uncia, Moschus fuscus (Musk deer), Ophiocordeceps sinensis</i>	Not Noticed	Not Noticed
Tembao Lake	<i>Rhododendron anthopogen, Rhododendron setosum, Potentilla sps., Salix sps., Primula sps,</i>	<i>Pseudois nayaur (Blue sheep), Panthera uncia, Marmota himalayana (marmot), Moschus fuscus (Musk deer), Ithaginis cruentus (Blood Pheasant), Tetraogallus himalayensis (Snowcocks), Grandalas.</i>	<i>R. anthopogen, Panthera uncia</i>	Not Noticed	Not Noticed

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Name of the Wetland	List of plants species present in wetland	List of animal species present in wetland	Species of conservation significance (rare, endangered, threatened, endemic species) -	Major plant invasive alien species and extent of invasion	Major animal invasive alien species and extent of invasion
Tosar lake	<i>Rhododendron arboretum</i> ssp <i>arboretum</i> (CB Clarke), <i>R. grande</i> Wight., <i>R. griffithianum</i> Wight., <i>Juniperus recurva</i> (<i>Bhairungpati</i>), <i>Primula</i> spp, <i>Abies densa</i> (silver fir), <i>Bergenia ligulata</i> (pakhanbed), <i>Gleichenia gigantea</i> (Himalayan ferns), <i>Rumex nepalensis</i> (halhalley).	<i>Streptopelia orientalis</i> (Rufous Turtle Dove), <i>Myophonus caeruleus</i> (kalchura), <i>Lophura leucomelana</i> (Khaliz pheasant), <i>Garrulax chrysopterus</i> (Bhyakura), <i>Lycaon pictus</i> (feral dog), Horse, <i>Aegithalos concinnus</i> (fista)	<i>Cuon alpinus</i> (feral dog)	Not Noticed	Not Noticed
Kishong Lake	<i>Rhododendron arboreum</i> , <i>Rhododendron edgeworthii</i> , <i>Rhododendron grande</i> , <i>Rhododendron falconeri</i> , <i>Magnolia campbellii</i> , <i>Rhododendron niveum</i>	<i>Hemitragus jemlahicus</i> (<i>Himalayan Tahr</i>), <i>Moschus fuscus</i> (<i>Musk deer</i>), <i>Vulpes vulpes</i> Linn (<i>Red Fox</i>), <i>Vulpes ferrilata</i> (<i>Tibetan Sand Fox</i>), <i>Ailurus fulgens</i> (<i>Red Panda</i>), <i>Ursus thibetanus</i> (<i>Himalayan Black Bear</i>), <i>Semnopithecus ajax</i> (<i>Himalayan Langur</i>), <i>Ithaginis cruentus</i> (<i>Blood Pheasant</i>), <i>Lophura</i>	<i>Hemitragus jemlahicus</i> (<i>Himalayan Tahr</i>), <i>Moschus fuscus</i> (<i>Musk deer</i>), <i>Vulpes vulpes</i> Linn (<i>Red Fox</i>), <i>Vulpes ferrilata</i> (<i>Tibetan Sand Fox</i>), <i>Ailurus fulgens</i> (<i>Red Panda</i>), <i>Ursus thibetanus</i> (<i>Himalayan Black Bear</i>), <i>Semnopithecus ajax</i> (<i>Himalayan Langur</i>), <i>Ithaginis cruentus</i> (<i>Blood Pheasant</i>), <i>Lophura leucomelanos</i> (<i>Kalij Pheasant</i>)	Not Noticed	Not Noticed

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Name of the Wetland	List of plants species present in wetland	List of animal species present in wetland	Species of conservation significance (rare, endangered, threatened, endemic species) -	Major plant invasive alien species and extent of invasion	Major animal invasive alien species and extent of invasion
		<i>leucomelanos</i> (<i>Kalij Pheasant</i>)			
Tingchim lake	<i>Rhododendron arboreum</i> , <i>Rhododendron edgeworthii</i> , <i>Rhododendron grande</i>	<i>Panthera uncia</i> (<i>Snow leopard</i>), <i>Moschus fuscus</i> (<i>Musk deer</i>)	<i>Panthera uncia</i> (<i>Snow leopard</i>), <i>Moschus fuscus</i> (<i>Musk deer</i>)	Not Noticed	Not Noticed
Nakuchu Lake	<i>Rhododendron arboretum</i> ssp <i>arboretum</i> (CB Clarke), <i>R. grande</i> Wight., <i>R. griffithianum</i> Wight., <i>Juniperus recurva</i> (<i>Bhairungpati</i>), <i>Primula</i> spp, <i>Abies densa</i> (silver fir), <i>Bergenia ligulata</i> (pakhanbed), <i>Gleichenia gigantea</i> (Himalayan ferns), <i>Rumex nepalensis</i> (halhalley).	<i>Streptopelia orientalis</i> (Rufous Turtle Dove), <i>Myophonus caeruleus</i> (kalchura), <i>Lophura leucomelana</i> (Khaliz pheasant), <i>Garrulax chrysopterus</i> (Bhyakura), <i>Lycaon pictus</i> (feral dog), Horse, <i>Aegithalos concinnus</i> (fista)	<i>Cuon alpinus</i> (Feral dog)	Not Noticed	Not Noticed

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Name of the Wetland	List of plants species present in wetland	List of animal species present in wetland	Species of conservation significance (rare, endangered, threatened, endemic species) -	Major plant invasive alien species and extent of invasion	Major animal invasive alien species and extent of invasion
Thang Chho	<i>Nardostachys grandiflora</i> (Jatamansi)	<i>Pseudois nayaur</i> (Blue Sheep), <i>Cuon alpinus</i> (Feral dog) and <i>Bos mutus</i> (Yak)	<i>Cuon alpinus</i> (Feral dog)	Not noticed	Not noticed
Hans Pokhari	<i>Rhododendron arboretum</i> ssp <i>arboretum</i> (CB Clarke), <i>R. grande</i> Wight., <i>R. griffithianum</i> Wight., <i>Juniperus recurva</i> (Bhairungpati), <i>Primula</i> spp, <i>Abies densa</i> (silver fir), <i>Bergenia ligulata</i> (pakhanbed), <i>Gleichenia gigantea</i> (Himalayan ferns), <i>Rumex nepalensis</i> (halhalley).	<i>Streptopelia orientalis</i> (Rufous Turtle Dove), <i>Myophonus caeruleus</i> (kalchura), <i>Lophura leucomelana</i> (Khaliz pheasant), <i>Garrulax chrysopterus</i> (Bhyakura), <i>Lycaon pictus</i> (feral dog), Horse, <i>Aegithalos concinnus</i> (fista)	<i>Cuon alpinus</i> (Feral dog)	Not Noticed	Not Noticed

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Table 5: Present and Potential Threats

Name of the Wetland	Changes in water inflow and outflow	Pollution (Sewage/solid waste disposal etc.)	Unsustainable harvest of biological resources	Mining	Siltation/Idol immersion	Estimated rate of siltation*	Encroachment	Spread of invasive species	Any other, please list
Tsobuk Tso 1	Present but at a Low level	NA	Present but at a Low level	No mining activity since the area falls under protected category	Low category siltation	Not assessed	Low level in the form of grazing and extraction of floral resources	Not noticed	Nil
Tsobuk Tso 2	Present but at a Low level	NA	Present but at a Low level	No mining activity since the area falls under protected category	Low category siltation	Not assessed	Low level in the form of grazing and extraction of floral resources	Low-present	Nil
Tsobuk Tso 3	Present but at a Low level	NA	NA	No mining activity since the area falls under protected category	Low category siltation due to deglaciation	Not assessed	Low level in the form of grazing	Not Noticed	Nil

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Name of the Wetland	Changes in water inflow and outflow	Pollution (Sewage/solid waste disposal etc.)	Unsustainable harvest of biological resources	Mining	Siltation/Idol immersion	Estimated rate of siltation*	Encroachment	Spread of invasive species	Any other, please list
Chomijadar Tso 1	Present but at a Low level	NA	NA	No mining activity since the area falls under protected category	Low category siltation due to deglaciation	Not assessed	Low level in the form of grazing	Not Noticed	Nil
Chomijadar Tso 2	Present but at a Low level	Present but at a Low level (due to Tourism)	NA	No mining activity since the area falls under protected category	Low category siltation due to deglaciation	Not assessed	Low level in the form of grazing	Not Noticed	Nil
Chomijadar Tso 3	Present but at a Low level	NA	NA	No mining activity since the area falls under the protected category	Low category siltation due to deglaciation	Not assessed	Low level in the form of grazing	Not Noticed	Nil

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Name of the Wetland	Changes in water inflow and outflow	Pollution (Sewage/solid waste disposal etc.)	Unsustainable harvest of biological resources	Mining	Siltation/Idol immersion	Estimated rate of siltation*	Encroachment	Spread of invasive species	Any other, please list
Chomijadar Tso 4	Present but at a Low level	NA	NA	No mining activity since the area falls under the protected category	Low category siltation due to deglaciation	Not assessed	Low level in the form of grazing	Not Noticed	Nil
Chomijadar Tso 5	Present but at a Low level	NA	NA	No mining activity since the area falls under the protected category	Low category siltation due to deglaciation	Not assessed	Low level in the form of grazing	Not Noticed	Nil
Chunguphu Tso	Present but at a Low level	NA	NA	No mining activity since the area falls under the protected category	Low category siltation due to deglaciation	Not assessed	Low level in the form of grazing	Not Noticed	Nil

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Name of the Wetland	Changes in water inflow and outflow	Pollution (Sewage/solid waste disposal etc.)	Unsustainable harvest of biological resources	Mining	Siltation/Idol immersion	Estimated rate of siltation*	Encroachment	Spread of invasive species	Any other, please list
Dokung	Present but at a Low level	NA	NA	No mining activity since the area falls under the protected category	Low category siltation due to deglaciation	Not assessed	Low level in the form of grazing	Not Noticed	Nil
Em Tso	Present but at a Low level	NA	NA	No mining activity since the area falls under the protected category	Low category siltation due to deglaciation	Not assessed	Low level in the form of grazing	Not Noticed	Nil
Em Tso 2	Present but at a Low level	NA	NA	No mining activity since the area falls under the protected category	Low category siltation due to deglaciation	Not assessed	Low level in the form of grazing	Not Noticed	Nil

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Name of the Wetland	Changes in water inflow and outflow	Pollution (Sewage/solid waste disposal etc.)	Unsustainable harvest of biological resources	Mining	Siltation/Idol immersion	Estimated rate of siltation*	Encroachment	Spread of invasive species	Any other, please list
Fogay Tso 1	Present but at a Low level	No	No	No mining activity since the area falls under the protected category	Low category siltation due to deglaciation	Not assessed	No	Not Noticed	Nil
Fogay Tso 2	Present but at a Low level	No	No	No mining activity since the area falls under the protected category	Low category siltation due to deglaciation	Not assessed	Low level in the form of grazing and extraction of floral resources	Not Noticed	Nil
Fogay Tso 3	Present but at a Low level	No	No	No mining activity since the area falls under the protected category	Low category siltation due to deglaciation	Not assessed	Low level in the form of grazing and extraction of floral resources	Not Noticed	Nil

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Name of the Wetland	Changes in water inflow and outflow	Pollution (Sewage/solid waste disposal etc.)	Unsustainable harvest of biological resources	Mining	Siltation/Idol immersion	Estimated rate of siltation*	Encroachment	Spread of invasive species	Any other, please list
Gachang Tso	Present but at a Low level	No	No	No mining activity since the area falls under the protected category	Low category siltation due to deglaciation	Not assessed	Low level in the form of grazing and extraction of floral resources	Not Noticed	Nil
Gapzee Tso 1	Present but at a Low level	No	No	No mining activity since the area falls under the protected category	Low category siltation due to deglaciation	Not assessed	Low level in the form of grazing	Not Noticed	Nil
Gapzee Tso 2	Present but at a Low level	No	No	No mining activity since the area falls under the protected category	Low category siltation due to deglaciation	Not assessed	Low level in the form of grazing	Not Noticed	Nil

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Name of the Wetland	Changes in water inflow and outflow	Pollution (Sewage/solid waste disposal etc.)	Unsustainable harvest of biological resources	Mining	Siltation/Idol immersion	Estimated rate of siltation*	Encroachment	Spread of invasive species	Any other, please list
Gapzee Tso 3	Present but at a Low level	No	No	No mining activity since the area falls under the protected category	Low category siltation due to deglaciation	Not assessed	Low level in the form of grazing	Not Noticed	Nil
Gukul Tso	Present but at a Low level	No	No	No mining activity since the area falls under the protected category	Low category siltation due to deglaciation	Not assessed	Low level in the form of grazing	Not Noticed	Nil
Gurudongmar 1	Present but at a Low level	No	No	No mining activity since the area falls under the protected category	Low category siltation due to deglaciation	Not assessed	No	Not Noticed	Nil

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Name of the Wetland	Changes in water inflow and outflow	Pollution (Sewage/solid waste disposal etc.)	Unsustainable harvest of biological resources	Mining	Siltation/Idol immersion	Estimated rate of siltation*	Encroachment	Spread of invasive species	Any other, please list
Gurudongmar 2	Present but at a Low level	No	No	No mining activity since the area falls under the protected category	Low category siltation due to deglaciation	Not assessed	No	Not Noticed	Nil
Gurudongmar 3	Present but at a Low level	No	No	No mining activity since the area falls under the protected category	Low category siltation due to deglaciation	Not assessed	No	Not Noticed	Nil
Gurudongmar 4	Present but at a Low level	Low - Present	No	No mining activity since the area falls under the protected category	Low level of siltation due to deglaciation	Not assessed	No	Not Noticed	Nil

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Name of the Wetland	Changes in water inflow and outflow	Pollution (Sewage/solid waste disposal etc.)	Unsustainable harvest of biological resources	Mining	Siltation/Idol immersion	Estimated rate of siltation*	Encroachment	Spread of invasive species	Any other, please list
Gurudongmar 5	Present but at a Low level	No	No	No mining activity since the area falls under protected category	Low level of siltation due to deglaciation	Not Assessed	No	Not Noticed	Nil
Janak 1 Tso 1	Present but at a Low level	No	No	No mining activity since the area falls under protected category	Low level of siltation due to deglaciation	Not Assessed	No	Not Noticed	Nil
Janak 1 Tso 2	Present but at a Low level	No	No	No mining activity since the area falls under protected category	Low level of siltation due to deglaciation	Not Assessed	No	Not Noticed	Nil

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Name of the Wetland	Changes in water inflow and outflow	Pollution (Sewage/solid waste disposal etc.)	Unsustainable harvest of biological resources	Mining	Siltation/Idol immersion	Estimated rate of siltation*	Encroachment	Spread of invasive species	Any other, please list
Janak 1 Tso 3	Present but at a Low level	No	No	No mining activity since the area falls under protected category	Low level of siltation due to deglaciation	Not Assessed	No	Not Noticed	Nil
Janak 2 Tso 1	Present but at a Low level	No	Low level – Present in the form of grazing	No mining activity since the area falls under protected category	Low level of siltation due to deglaciation	Not Assessed	No	Not Noticed	Nil
Janak 2 Tso 2	Present but at a Low level	No	Low level – Present in the form of grazing	No mining activity since the area falls under protected category	Low level of siltation due to deglaciation	Not Assessed	No	Not Noticed	Nil

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Name of the Wetland	Changes in water inflow and outflow	Pollution (Sewage/solid waste disposal etc.)	Unsustainable harvest of biological resources	Mining	Siltation/Idol immersion	Estimated rate of siltation*	Encroachment	Spread of invasive species	Any other, please list
Janak 2 Tso 3	Present but at a Low level	No	Low level – Present in the form of grazing	No mining activity since the area falls under the protected category	Low level of siltation due to deglaciation	A separate study needed for assessment	No	Not Noticed	Nil
Janak 2 Tso4	Present but at a Low level	No	Low level – Present in the form of grazing	No mining activity since the area falls under protected category	Low level of siltation due to deglaciation	Not Assessed	No	Not Noticed	Nil
Kalapatthar Tso 1	Medium – Present (Due to climate change)	Medium - Present (Company workers and discharge of domestic use water and animal (horse and Yak faecal material from	Low level – Present in the form of grazing	No mining activity since the area falls under the protected category	Low level of siltation due to deglaciation	Not Assessed	No	Not Noticed	Nil

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Name of the Wetland	Changes in water inflow and outflow	Pollution (Sewage/solid waste disposal etc.)	Unsustainable harvest of biological resources	Mining	Siltation/Idol immersion	Estimated rate of siltation*	Encroachment	Spread of invasive species	Any other, please list
		Army establishment)							
Khora Tso 1	Present but at a Low level	No	Low level – Present in the form of grazing	No mining activity since the area falls under the protected category	Low level of siltation due to deglaciation	Not Assessed	No	Not Noticed	Nil
Khora Tso 2	Present but at a Low level	No	Low level – Present in the form of grazing	No mining activity since the area falls under the protected category	Low level of siltation due to deglaciation	Not Assessed	No	Not Noticed	Nil
Khora Tso 3	Present but at a Low level	No	Low level – Present in the form of grazing	No mining activity since the area falls under the	Low level of siltation due to deglaciation	Not Assessed	No	Not Noticed	Nil

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Name of the Wetland	Changes in water inflow and outflow	Pollution (Sewage/solid waste disposal etc.)	Unsustainable harvest of biological resources	Mining	Siltation/Idol immersion	Estimated rate of siltation*	Encroachment	Spread of invasive species	Any other, please list
				protected category					
Khora Tso 4	Present but at a Low level	No	Low level – Present in the form of grazing	No mining activity since the area falls under the protected category	Low level of siltation due to deglaciation	Not Assessed	No	Not Noticed	Nil
Khora Tso 5	Present but at a Low level	No	Low level – Present in the form of grazing	No mining activity since the area falls under the protected category	Siltation due to deglaciation	Not Assessed	No	Not Noticed	Nil
Khora Tso	Present but at a Low level	No	Low level – Present in the form of grazing	No mining activity since the area falls under the	Siltation due to deglaciation	Not Assessed	No	Not Noticed	Nil

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Name of the Wetland	Changes in water inflow and outflow	Pollution (Sewage/solid waste disposal etc.)	Unsustainable harvest of biological resources	Mining	Siltation/Idol immersion	Estimated rate of siltation*	Encroachment	Spread of invasive species	Any other, please list
				protected category					
Lachee Tso 1	Present but at a Low level	No	Low level – Present in the form of grazing	No mining activity since the area falls under the protected category	Siltation due to deglaciation	Not Assessed	No	Not Noticed	Nil
Lachee Tso 2	Present but at a Low level	No	Low level – Present in the form of grazing	No mining activity since the area falls under the protected category	Siltation due to deglaciation	Not assessed	No	Not Noticed	Nil
Mukuthang Tso	Present but at a Low level	No	Low level – Present in the form of grazing	No mining activity since the area falls under the	Siltation due to deglaciation	Not assessed	No	Not Noticed	Nil

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Name of the Wetland	Changes in water inflow and outflow	Pollution (Sewage/solid waste disposal etc.)	Unsustainable harvest of biological resources	Mining	Siltation/Idol immersion	Estimated rate of siltation*	Encroachment	Spread of invasive species	Any other, please list
				protected category					
Ok Tso	Present but at a Low level	No	Low level – Present in the form of grazing	No mining activity since the area falls under the protected category	Siltation due to deglaciation	Not assessed	No	Not Noticed	Nil
Om Tso	Present but at a Low level	No	Low level – Present in the form of grazing	No mining activity since the area falls under the protected category	Not noticed	Not assessed	No	Not Noticed	Nil
Setong Tso	Present but at a Low level	No	Low level – Present in the form of grazing	No mining activity since the area falls under the	Not noticed	Not assessed	No	Not Noticed	Nil

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Name of the Wetland	Changes in water inflow and outflow	Pollution (Sewage/solid waste disposal etc.)	Unsustainable harvest of biological resources	Mining	Siltation/Idol immersion	Estimated rate of siltation*	Encroachment	Spread of invasive species	Any other, please list
				protected category					
Shaka Tso	Present but at a Low level	Low-Present	Low level – Present in the form of grazing	No mining activity since the area falls under the protected category	Siltation due to deglaciation	Not assessed	No	Not Noticed	Nil
Shechen Ragho 1	Present but at a Low level	No	Low level – Present in the form of grazing	No mining activity since the area falls under the protected category	Siltation due to deglaciation	Not assessed	No	Not Noticed	Nil
Shechen Ragho	Present but at a Low level	No	Low level – Present in the form of grazing	No mining activity since the area falls under the	Siltation due to deglaciation	Not assessed	No	Not Noticed	Nil

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Name of the Wetland	Changes in water inflow and outflow	Pollution (Sewage/solid waste disposal etc.)	Unsustainable harvest of biological resources	Mining	Siltation/Idol immersion	Estimated rate of siltation*	Encroachment	Spread of invasive species	Any other, please list
				protected category					
South Lhonak	Present but at a Low level	No	Low level – Present in the form of grazing	No mining activity since the area falls under the protected category	Siltation due to deglaciation	Not assessed	No	Not Noticed	Nil
Tso Lhamo	Present but at a Low level	No	Low level – Present in the form of grazing	No mining activity since the area falls under the protected category	Siltation due to deglaciation	Not assessed	No	Not Noticed	Nil
Tso Lhamo 1	Present but at a Low level	No	Low level – Present in the form of grazing	No mining activity since the area falls under the	Siltation due to deglaciation	Not assessed	No	Not Noticed	Nil

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Name of the Wetland	Changes in water inflow and outflow	Pollution (Sewage/solid waste disposal etc.)	Unsustainable harvest of biological resources	Mining	Siltation/Idol immersion	Estimated rate of siltation*	Encroachment	Spread of invasive species	Any other, please list
				protected category					
Tso Lhamo 3	Present but at a Low level	No	Low level – Present in the form of grazing	No mining activity since the area falls under the protected category	Siltation due to deglaciation	Not assessed	No	Not Noticed	Nil
Tso Lhamo 4	Present but at a Low level	No	Low level – Present in the form of grazing	No mining activity since the area falls under the protected category	Siltation due to deglaciation	Not assessed	No	Not Noticed	Nil
Yangsaac	Present but at a Low level	No	Low level – Present in the form of grazing	No mining activity since the area falls under the	Siltation due to deglaciation	Not assessed	No	Not Noticed	Nil

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Name of the Wetland	Changes in water inflow and outflow	Pollution (Sewage/solid waste disposal etc.)	Unsustainable harvest of biological resources	Mining	Siltation/Idol immersion	Estimated rate of siltation*	Encroachment	Spread of invasive species	Any other, please list
				protected category					
Yum Tso	Present but at a Low level	No	Low level – Present in the form of grazing	No mining activity since the area falls under the protected category	Siltation due to deglaciation	Not assessed	No	Not Noticed	Nil
Changme Lake 2 (Dry Lake)	Low – Present	NA	Low - Present	NA	Low – Present	Low – Present	Low – Present	NA	The lake was permanent till few years back now its dry.
B-Lake	Low – Present	NA	Low - Present	NA	Low – Present	Low – Present	Low – Present	NA	So pristine fed directly by glacier

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Name of the Wetland	Changes in water inflow and outflow	Pollution (Sewage/solid waste disposal etc.)	Unsustainable harvest of biological resources	Mining	Siltation/Idol immersion	Estimated rate of siltation*	Encroachment	Spread of invasive species	Any other, please list
Donkeya Tso	Low – Present	NA	Low - Present	NA	Low – Present	Low – Present	Low – Present	NA	Nil
Gaya Gawn Lake1 (dry lake)	Low – Present	NA	Low - Present	NA	Low – Present	Low – Present	Low – Present	NA	Nil
Gaya gawn Lake 4	Low – Present	NA	Low - Present	NA	Low – Present	Low – Present	Low – Present	NA	Nil
Gayamchona Lake	NA	NA	Low - Present	NA	Low – Present	Low – Present	Low – Present	NA	Nil

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Name of the Wetland	Changes in water inflow and outflow	Pollution (Sewage/solid waste disposal etc.)	Unsustainable harvest of biological resources	Mining	Siltation/Idol immersion	Estimated rate of siltation*	Encroachment	Spread of invasive species	Any other, please list
Jadung Lake 1	Low – Present	NA	Low - Present	NA	Low – Present	Low – Present	Low – Present	NA	Nil
Jadung Lake 2	Low – Present	NA	Low - Present	NA	Low – Present	Low – Present	Low – Present	NA	Nil
Unnamed lake 1/singba lake	Low – Present	NA	Low - Present	Yes Quarry	Low – Present	Low – Present	Low – Present	NA	Nil
Unnamed Lake 2	Low – Present	NA	Low - Present	NA	Low – Present	Low – Present	Low – Present	NA	Nil

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Name of the Wetland	Changes in water inflow and outflow	Pollution (Sewage/solid waste disposal etc.)	Unsustainable harvest of biological resources	Mining	Siltation/Idol immersion	Estimated rate of siltation*	Encroachment	Spread of invasive species	Any other, please list
Sebu Lake (Changme 1)	Low – Present	NA	Low - Present	NA	Low – Present	Low – Present	Low – Present	Present	Lake is drying because of less snow
Chuba Lake	Low – Present	NA	Low - Present	NA	Low – Present	Low – Present	Low – Present	NA	Nil
Black Lake/Namnasa Lake	Low – Present	NA	Low - Present	NA	Low – Present	Low – Present	Low – Present	NA	Habitat for bear
Jachu valley (Ox-bow lake)	NA	NA	Low - Present	NA	Low – Present	Low – Present	Low – Present	NA	One of the potential tourist place

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Name of the Wetland	Changes in water inflow and outflow	Pollution (Sewage/solid waste disposal etc.)	Unsustainable harvest of biological resources	Mining	Siltation/Idol immersion	Estimated rate of siltation*	Encroachment	Spread of invasive species	Any other, please list
Changme 3	Low – Present	NA	Low - Present	NA	Low – Present	Low – Present	Low – Present	NA	Dead moraine lake
Yangchen Tso	Low – Present	NA	Low - Present	NA	Low – Present	Low – Present	Low – Present	Present	-
Ka- Tso	Low – Present	Low- Present (Presence of Army camp nearby wetland.)	Low - Present	NA	Low – Present	Low – Present	Low – Present	NA	Nil
Kyee Tso	Low – Present	Low – Present	Medium- Present	NA	Low – Present	Low – Present	Low – Present	NA	Construction underway

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Name of the Wetland	Changes in water inflow and outflow	Pollution (Sewage/solid waste disposal etc.)	Unsustainable harvest of biological resources	Mining	Siltation/Idol immersion	Estimated rate of siltation*	Encroachment	Spread of invasive species	Any other, please list
Chume- Lham TSo	Low – Present	NA	Low - Present	NA	Low – Present	Low – Present	Low – Present	NA	Sacred lakes
Tembao Lake	Low – Present	NA	Low - Present	NA	Low – Present	Low – Present	Low – Present	NA	Critically important lake
Tosar lake	Low – Present	Low – Present	Low – Present	NA	Low – Present	Low – Present	NA	Low – Present	NA
Kishong Lake	Low – Present	Low – Present	Low – Present	NA	Low – Present	Low – Present	NA	Low – Present	NA

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Name of the Wetland	Changes in water inflow and outflow	Pollution (Sewage/solid waste disposal etc.)	Unsustainable harvest of biological resources	Mining	Siltation/Idol immersion	Estimated rate of siltation*	Encroachment	Spread of invasive species	Any other, please list
Tingchim lake	Low – Present	High – Present	Low – Present	NA	Low – Present	Low – Present	NA	Low – Present	Tingchim lake become polluted due to biotic interference and need awareness and protection of lake
Nakuchu Lake	Low – Present	Low – Present	Low – Present	NA	Low – Present	Low – Present	NA	Low – Present	NA
Thang Chho	Present but at a Low level	No	Low level – Present in the form of grazing	No mining activity since the area falls under the protected category	Siltation due to deglaciation	Not Assessed	No	Not noticed	Nil

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Name of the Wetland	Changes in water inflow and outflow	Pollution (Sewage/solid waste disposal etc.)	Unsustainable harvest of biological resources	Mining	Siltation/Idol immersion	Estimated rate of siltation*	Encroachment	Spread of invasive species	Any other, please list
Hans Pokhari	Low	Low	Low	NA	Low	Low	NA	Low	NA

**NA separate study needed for assessment*

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Table 6: Ecosystem Services

Name of the Wetland	Source of driving water for people living and around	Source of water for agriculture	Fisheries	Cultivation of aquatic food plants	Medicinal plants	Is a recreational site	Buffering communities from extreme events as floods and storms	Groundwater recharge	Water purification
Tsobuk Tso 1	No	No	No	No	No	No	Yes	Yes	Yes
Tsobuk Tso 2	No	No	No	No	No	No	Yes	Yes	Yes
Tsobuk Tso 3	No	No	No	No	No	No	Yes	Yes	Yes
Chomijadar Tso 1	No	No	No	No	Yes (<i>Picrorhiza scrophulariiflora</i> and <i>Nardostachys jata mansi</i>)	No	Yes	Yes	Yes
Chomijadar Tso 2	No	No	No	No	No	No	Yes	Yes	Yes
Chomijadar Tso 3	No	No	No	No	No	No	Yes	Yes	Yes
Chomijadar Tso 4	No	No	No	No	No	No	Yes	Yes	Yes

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Name of the Wetland	Source of driving water for people living and around	Source of water for agriculture	Fisheries	Cultivation of aquatic food plants	Medicinal plants	Is a recreational site	Buffering communities from extreme events as floods and storms	Groundwater recharge	Water purification
Chomijadar Tso 5	No	No	No	No	No	No	Yes	Yes	Yes
Chunguphu Tso	No	No	No	No	No	No	Yes	Yes	Yes
Dokung	No	No	No	No	No	No	Yes	Yes	Yes
Em Tso	No	No	No	No	No	No	Yes	Yes	Yes
Em Tso 2	No	No	No	No	No	No	Yes	Yes	Yes
Fogay Tso 1	No	No	No	No	Yes (<i>Picrorhiza scrophulariiflora</i> & <i>Nardostachys jatamansi</i>)	No	Yes	Yes	Yes
Fogay Tso 2	No	No	No	No	Yes (<i>Picrorhiza scrophulariiflora</i>)	No	Yes	Yes	Yes

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Name of the Wetland	Source of driving water for people living and around	Source of water for agriculture	Fisheries	Cultivation of aquatic food plants	Medicinal plants	Is a recreational site	Buffering communities from extreme events as floods and storms	Groundwater recharge	Water purification
Fogay Tso 3	No	No	No	No	No	No	Yes	Yes	Yes
Gachang Tso	No	No	No	No	Yes (<i>Picrorhiza scrophulariiflora</i>)	No	Yes	Yes	Yes
Gapzee Tso 1	No	No	No	No	No	No	Yes	Yes	Yes
Gapzee Tso 2	No	No	No	No	No	No	Yes	Yes	Yes
Gapzee Tso 3	No	No	No	No	No	No	Yes	Yes	Yes
Gukul Tso	No	No	No	No	Yes	No	Yes	Yes	Yes
Gurudongmar 1	No	No	No	No	Yes (<i>Picrorhiza scrophulariiflora</i> and <i>Nordostachys jatamansi</i>)	Yes	Yes	Yes	Yes
Gurudongmar 2	No	No	No	No	Yes (<i>Picrorhiza scrophulariiflora</i> and <i>Nordostachys jatamansi</i>)	Yes	Yes	Yes	Yes

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Name of the Wetland	Source of driving water for people living and around	Source of water for agriculture	Fisheries	Cultivation of aquatic food plants	Medicinal plants	Is a recreational site	Buffering communities from extreme events as floods and storms	Groundwater recharge	Water purification
Gurudongmar 3	No	No	No	No	No	Yes	Yes	Yes	Yes
Gurudongmar 4	No	No	No	No	No	Yes	Yes	Yes	Yes
Gurudongmar 5	No	No	No	No	No	Yes	Yes	Yes	Yes
Janak 1 Tso 1	No	No	No	No	No	No	Yes	Yes	No
Janak 1 Tso 2	No	No	No	No	No	No	Yes	Yes	No
Janak 1 Tso 3	No	No	No	No	No	No	Yes	Yes	No
Janak 2 Tso 1	No	No	No	No	No	No	Yes	Yes	No
Janak 2 Tso 2	No	No	No	No	No	No	Yes	Yes	NA
Janak 2 Tso 3	No	No	No	No	No	No	Yes	Yes	NA

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Name of the Wetland	Source of driving water for people living and around	Source of water for agriculture	Fisheries	Cultivation of aquatic food plants	Medicinal plants	Is a recreational site	Buffering communities from extreme events as floods and storms	Groundwater recharge	Water purification
Janak 2 Tso 4	No	No	No	No	No	No	Yes	Yes	NA
Kalapathar Tso 1	No	No	No	No	Yes (<i>Nardostachys jatamansi</i> (Jatamansi), kurki and <i>Rhododendron anthopogon</i> (sunpati))	No	Yes	Yes	NA
Khora Tso 1	No	No	No	No	Yes (<i>Nardostachys jatamansi</i> (Jatamansi))	No	Yes	Yes	NA
Khora Tso 2	No	No	No	No	Yes (<i>Nardostachys grandiflora</i> (Jatamansi))	No	Yes	Yes	NA
Khora Tso 3	No	No	No	No	Yes (<i>Nardostachys grandiflora</i> (Jatamansi) and <i>Picrorhiza scrophulariiflora</i> (kurki))	No	Yes	Yes	NA

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Name of the Wetland	Source of driving water for people living and around	Source of water for agriculture	Fisheries	Cultivation of aquatic food plants	Medicinal plants	Is a recreational site	Buffering communities from extreme events as floods and storms	Groundwater recharge	Water purification
Khora Tso 4	No	No	No	No	Yes (Jatamansi)	No	Yes	Yes	NA
Khora Tso 5	No	No	No	No	Yes (<i>Nardostachys jatamansi</i> (Jatamansi))	No	Yes	Yes	NA
L.T. Tso	No	No	No	No	Yes (<i>Nardostachys jatamansi</i> (Jatamansi) and <i>Picrorhiza scrophulariiflora</i> (kutki))	No	Yes	Yes	NA
Lachee Tso 1	No	No	No	No	No	No	Yes	Yes	NA
Lachee Tso 2	No	No	No	No	No	No	Yes	Yes	NA
Mukuthang Tso	No	No	Yes	No	Yes	Yes	Yes	Yes	Yes
Ok Tso	No	No	No	No	No	No	Yes	Yes	Yes

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Name of the Wetland	Source of driving water for people living and around	Source of water for agriculture	Fisheries	Cultivation of aquatic food plants	Medicinal plants	Is a recreational site	Buffering communities from extreme events as floods and storms	Groundwater recharge	Water purification
Om Tso	No	No	No	No	Yes (<i>Nardostachys jatamansi</i> (Jatamansi) and <i>Picrorhiza scrophulariiflora</i> (kutki))	No	Yes	Yes	Yes
Setong Tso	No	No	No	No	Yes (<i>Nardostachys jatamansi</i> (Jatamansi) and <i>Picrorhiza scrophulariiflora</i> (kutki))	No	Yes	Yes	Yes
Shaka Tso	No	No	No	No	No	No	Yes	Yes	Yes
Shechen Ragho 1	No	No	No	No	No	No	Yes	Yes	Yes
Shechen Ragho	No	No	No	No	No	No	Yes	Yes	Yes
South Lhonak lake	No	No	No	No	No	No	Yes	Yes	Yes

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Name of the Wetland	Source of driving water for people living and around	Source of water for agriculture	Fisheries	Cultivation of aquatic food plants	Medicinal plants	Is a recreational site	Buffering communities from extreme events as floods and storms	Groundwater recharge	Water purification
Tso lamu lake	No	No	No	No	No	No	Yes	Yes	Yes
Tso Lhamo 1	No	No	No	No	No	No	Yes	Yes	Yes
Tso Lhamo 3	No	No	No	No	No	No	Yes	Yes	Yes
Tso Lhamo 4	No	No	No	No	No	No	Yes	Yes	Yes
Yangsaac	No	No	No	No	No	No	Yes	Yes	Yes
Yum Tso	No	No	No	No	No	No	Yes	Yes	Yes
Changme Lake 2 (Dry Lake)	Yes for Yak herders	No	No	No	NTFPs	Yes	No	Yes	No
B-Lake	Yes for Yak herders	No	No	No	NTFPs	Yes	No	Yes	No
Donkeya Chu	Yes for Yak herders	No	No	No	NTFPs	Yes	No	Yes	No

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Name of the Wetland	Source of driving water for people living and around	Source of water for agriculture	Fisheries	Cultivation of aquatic food plants	Medicinal plants	Is a recreational site	Buffering communities from extreme events as floods and storms	Groundwater recharge	Water purification
Gaya Gawn Lake1 (dry lake)	Yes for Yak herders	Yakherders	No	No	NTFPs	No	No	Yes	No
Gaya gawn Lake 4	Yes for Yak herders	Yakherders	No	No	NTFPs	No	No	Yes	No
Gayamchona Lake	Yes for Yak herders	Yakherders	No	No	NTFPs	Army area	No	Yes	No
Jadung Lake 1	Yes for Yak herders	No	No	No	NTFPs	Yes	No	Yes	No
Jadung Lake 2	Yes for Yak herders	No	No	No	NTFPs	Yes	No	Yes	No
Unnamed lake 1/singba lake	Yes for Yak herders	No	No	No	NTFPs	Yes	No	Yes	No
Unnamed Lake 2	Yes for Yak herders	No	No	No	NTFPs	Yes	No	Yes	No

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Name of the Wetland	Source of driving water for people living and around	Source of water for agriculture	Fisheries	Cultivation of aquatic food plants	Medicinal plants	Is a recreational site	Buffering communities from extreme events as floods and storms	Groundwater recharge	Water purification
Sebu Lake (Changme 1)	Yak herders ,and tourist	No	No	No	NTFPs	Yes	No	Yes	No
Chuba Lake	Yak herders and tourist	No	No	No	NTFPs	Yes	No	Yes	No
Black Lake/Namnas a Lake	Yes for Yak herders	No	No	No	NTFPs	Yes	No	Yes	No
Jachu valley (Ox-bow lake)	Yes for Yak herders	Yakherders	No	No	NTFPs	Yes	No	Yes	No
Changme 3	Yes for Yak herders	No	No	No	NTFPs	Yes	No	Yes	No
Yangchen Tso	Yes, source of major dependant river.	Downstream	No	No	NTFPs	Yes,	No	Yes	No

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Name of the Wetland	Source of driving water for people living and around	Source of water for agriculture	Fisheries	Cultivation of aquatic food plants	Medicinal plants	Is a recreational site	Buffering communities from extreme events as floods and storms	Groundwater recharge	Water purification
Ka- Tso	Yes	No	No	No	NTFPs	Yes	No	Yes	No
Kyee Tso	Yes	No	No	No	NTFPs	Yes	No	Yes	No
Chume- Lham TSo	Yes	No	No	No	NTFPs	Yes	No	Yes	No
Tembao Lake	Yes	No	No	No	NTFPs	Yes	Glacial outburst	Yes	No
Tosar lake	Yes	NA	NA	NA	Yes	No	No	Yes	Yes
Kishong Lake	Yes	NA	NA	NA	Yes	No	No	Yes	Yes
Tingchim lake	Yes	Yes	Yes	NA	Yes	No	No	Yes	Yes
Nakuchu Lake	Yes	NA	NA	NA	Yes	No	Yes	Yes	Yes
Thang Chho	No	No	No	No	Yes (<i>Nardostachys jatamanshi</i> (Jatamansi))	No	Yes	Yes	NA

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Name of the Wetland	Source of driving water for people living and around	Source of water for agriculture	Fisheries	Cultivation of aquatic food plants	Medicinal plants	Is a recreational site	Buffering communities from extreme events as floods and storms	Groundwater recharge	Water purification
Hans Pokhari	Yes	NA	NA	NA	Yes	No	Yes	No	Yes

* NA- Not Assessed

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Table 6A: Ecosystem Services

Name of the Wetland	Acts as a sink for sediments	Has significant cultural and religious values	Is a site for recreation and aquatic sport	Source/cultivation noteworthy food plants species	Habitat for noteworthy animal species	Habitat for migratory water birds	Supports fisheries/aquaculture	Mining	Any other, please list
Tsobuk Tso 1	Yes	Not significant but is considered as sacred	No	NA	NA	NA	No	No	NA
Tsobuk Tso 2	Yes	Not significant but is considered as sacred	No	NA	NA	NA	No	No	NA
Tsobuk Tso 3	Yes	Not significant but is considered as sacred	No	NA	NA	NA	No	No	NA
Chomijadar Tso 1	Yes	Not significant but is considered as sacred	No	NA	NA	NA	No	No	NA

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Name of the Wetland	Acts as a sink for sediments	Has significant cultural and religious values	Is a site for recreation and aquatic sport	Source/cultivation noteworthy food plants species	Habitat for noteworthy animal species	Habitat for migratory water birds	Supports fisheries/aquaculture	Mining	Any other, please list
Chomijadar Tso 2	Yes	Not significant but is considered as sacred	No	NA	NA	NA	No	No	NA
Chomijadar Tso 3	Yes	Not significant but is considered as sacred	No	NA	NA	NA	No	No	NA
Chomijadar Tso 4	Yes	Not significant but is considered as sacred	No	NA	NA	NA	No	No	NA
Chomijadar Tso 5	Yes	Not significant but is considered as sacred	No	NA	NA	NA	No	No	NA

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Name of the Wetland	Acts as a sink for sediments	Has significant cultural and religious values	Is a site for recreation and aquatic sport	Source/cultivation noteworthy food plants species	Habitat for noteworthy animal species	Habitat for migratory water birds	Supports fisheries/aquaculture	Mining	Any other, please list
Chunguphu Tso	Yes	Not significant but is considered as sacred	No	NA	NA	NA	No	No	NA
Dokung	Yes	Not significant but is considered as sacred	No	NA	NA	NA	No	No	NA
Em Tso	Yes	Not significant but is considered as sacred	No	NA	NA	NA	No	No	NA
Em Tso 2	Yes	Not significant but is considered as sacred	No	NA	NA	NA	No	No	NA

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Name of the Wetland	Acts as a sink for sediments	Has significant cultural and religious values	Is a site for recreation and aquatic sport	Source/cultivation noteworthy food plants species	Habitat for noteworthy animal species	Habitat for migratory water birds	Supports fisheries/aquaculture	Mining	Any other, please list
Fogay Tso 1	Yes	Not significant but is considered as sacred	No	NA	NA	NA	No	No	NA
Fogay Tso 2	Yes	Yes	No	NA	NA	NA	No	No	NA
Fogay Tso 3	Yes	Not significant but is considered as sacred	No	NA	NA	NA	No	No	NA
Gachang Tso	Yes	Yes	No	NA	NA	NA	No	No	NA
Gapzee Tso 1	Yes	Not significant but is considered as sacred	No	NA	NA	NA	No	No	NA
Gapzee Tso 2	Yes	Not significant but is considered as sacred	No	NA	NA	NA	No	No	NA

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Name of the Wetland	Acts as a sink for sediments	Has significant cultural and religious values	Is a site for recreation and aquatic sport	Source/cultivation noteworthy food plants species	Habitat for noteworthy animal species	Habitat for migratory water birds	Supports fisheries/aquaculture	Mining	Any other, please list
Gapzee Tso 3	Yes	Not significant but is considered as sacred	No	NA	NA	NA	No	No	NA
Gukul Tso	Yes	Not significant but is considered as sacred	No	NA	NA	NA	No	No	NA
Gurudongmar 1	Yes	Yes for both Buddhists and Hindu pilgrims it is sacred	Yes	NA	NA	NA	No	No	Variety in natural features with spiritual and historic value
Gurudongmar 2	Yes	Yes for both Buddhists and Hindu pilgrims it is sacred	Yes	NA	NA	NA	No	No	NA

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Name of the Wetland	Acts as a sink for sediments	Has significant cultural and religious values	Is a site for recreation and aquatic sport	Source/cultivation noteworthy food plants species	Habitat for noteworthy animal species	Habitat for migratory water birds	Supports fisheries/aquaculture	Mining	Any other, please list
Gurudongmar 3	Yes	Yes for both Buddhists and Hindu pilgrims it is sacred	Yes	NA	NA	NA	No	No	NA
Gurudongmar 4	Yes	Yes for both Buddhists and Hindu pilgrims it is sacred	Yes	NA	NA	NA	No	No	NA
Gurudongmar 5	Yes	Yes for both Buddhists and Hindu pilgrims it is sacred	Yes	NA	NA	NA	No	No	NA
Janak 1 Tso 1	Yes	Not significant but is considered as sacred	No	NA	NA	NA	No	No	NA

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Name of the Wetland	Acts as a sink for sediments	Has significant cultural and religious values	Is a site for recreation and aquatic sport	Source/cultivation noteworthy food plants species	Habitat for noteworthy animal species	Habitat for migratory water birds	Supports fisheries/aquaculture	Mining	Any other, please list
Janak 1 Tso 2	Yes	Not significant but is considered as sacred	No	NA	NA	NA	No	No	NA
Janak 1 Tso 3	Yes	Not significant but is considered as sacred	No	NA	NA	NA	No	No	NA
Janak 2 Tso 1	Yes	Not significant but is considered as sacred	No	NA	NA	NA	No	No	NA
Janak 2 Tso 2	Yes	Not significant but is considered as sacred	No	NA	NA	NA	No	No	NA

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Name of the Wetland	Acts as a sink for sediments	Has significant cultural and religious values	Is a site for recreation and aquatic sport	Source/cultivation noteworthy food plants species	Habitat for noteworthy animal species	Habitat for migratory water birds	Supports fisheries/aquaculture	Mining	Any other, please list
Janak 2 Tso 3	Yes	Not significant but is considered as sacred	No	NA	No	NA	No	No	NA
Janak 2 Tso 4	Yes	Not significant but is considered as sacred	No	NA	No	NA	No	No	NA
Kalapathar Tso 1	Yes	Not significant but is considered as sacred	No	NA	No	NA	No	No	NA
Khora Tso 1	Yes	Not significant but is considered as sacred	No	NA	No	NA	No	No	NA

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Name of the Wetland	Acts as a sink for sediments	Has significant cultural and religious values	Is a site for recreation and aquatic sport	Source/cultivation noteworthy food plants species	Habitat for noteworthy animal species	Habitat for migratory water birds	Supports fisheries/aquaculture	Mining	Any other, please list
Khora Tso 2	Yes	Not significant but is considered as sacred	No	NA	No	NA	No	No	NA
Khora Tso 3	Yes	Not significant but is considered as sacred	No	NA	No	NA	No	No	NA
Khora Tso 4	Yes	Not significant but is considered as sacred	No	NA	No	NA	No	No	NA
Khora Tso 5	Yes	Not significant but is considered as sacred	No	NA	No	NA	No	No	NA

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Name of the Wetland	Acts as a sink for sediments	Has significant cultural and religious values	Is a site for recreation and aquatic sport	Source/cultivation noteworthy food plants species	Habitat for noteworthy animal species	Habitat for migratory water birds	Supports fisheries/aquaculture	Mining	Any other, please list
L.T. Tso	Yes	Not significant but is considered as sacred	No	NA	No	NA	No	No	NA
Lachee Tso 1	Yes	Not significant but is considered as sacred	No	NA	No	NA	No	No	NA
Lachee Tso 2	Yes	Not significant but is considered as sacred	No	NA	No	NA	No	No	NA
Mukuthang Tso	Yes	Yes considered sacred for Buddhist pilgrim	Yes	NA	No	Yes	Yes	No	NA

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Name of the Wetland	Acts as a sink for sediments	Has significant cultural and religious values	Is a site for recreation and aquatic sport	Source/cultivation noteworthy food plants species	Habitat for noteworthy animal species	Habitat for migratory water birds	Supports fisheries/aquaculture	Mining	Any other, please list
Ok Tso	Yes	Not significant but is considered as sacred	No	NA	No	NA	No	No	NA
Om Tso	Yes	Not significant but is considered as sacred	No	NA	No	NA	No	No	NA
Setong Tso	Yes	Not significant but is considered as sacred	No	NA	No	NA	No	No	NA
Shaka Tso	Yes	Not significant but is considered as sacred	No	NA	No	NA	No	No	NA

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Name of the Wetland	Acts as a sink for sediments	Has significant cultural and religious values	Is a site for recreation and aquatic sport	Source/cultivation noteworthy food plants species	Habitat for noteworthy animal species	Habitat for migratory water birds	Supports fisheries/aquaculture	Mining	Any other, please list
Shechen Ragho 1	Yes	Not significant but is considered as sacred	No	NA	No	NA	No	No	NA
Shechen Ragho	Yes	Not significant but is considered as sacred	No	NA	No	NA	No	No	NA
South Lhonak lake	Yes	Not significant but is considered as sacred	Yes (for trekkers/tourists)	NA	No	NA	No	No	Scientific and Research institutions
Tso lamu lake	Yes	Yes, scared lake for Buddhist pilgrim	Yes, significant site for trekkers	NA	No	NA	No	No	NA
Tso Lhamo 1	Yes	Yes, scared lake for Buddhist pilgrim	Yes, significant site for trekkers	NA	No	NA	No	No	NA

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Name of the Wetland	Acts as a sink for sediments	Has significant cultural and religious values	Is a site for recreation and aquatic sport	Source/cultivation noteworthy food plants species	Habitat for noteworthy animal species	Habitat for migratory water birds	Supports fisheries/aquaculture	Mining	Any other, please list
Tso Lhamo 3	Yes	Yes, scared lake for Buddhist pilgrim	Yes, a significant site for trekkers	NA	No	NA	No	No	NA
Tso Lhamo 4	Yes	Yes, scared lake for Buddhist pilgrim	Yes, a significant site for trekkers	NA	No	NA	No	No	NA
Yangsaac	Yes	Not significant but is considered as sacred	No	NA	No	NA	No	No	NA
Yum Tso	Yes	Not significant but is considered as sacred	No	NA	No	NA	No	No	NA
Changme Lake 2 (Dry Lake)	Yes	Yes	No	No	Yes	No	NO	No	No

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Name of the Wetland	Acts as a sink for sediments	Has significant cultural and religious values	Is a site for recreation and aquatic sport	Source/cultivation noteworthy food plants species	Habitat for noteworthy animal species	Habitat for migratory water birds	Supports fisheries/aquaculture	Mining	Any other, please list
B-Lake	Yes	Yes	No	No	Yes	No	NO	No	No
Donkeya Chu	Yes	Yes	No	No	Yes	No	NO	No	No
Gaya Gawn Lake1 (dry lake)	Yes	NO	No	No	Yes	No	NO	No	No
Gaya gawn Lake 4	Yes	No	No	No	Yes	No	NO	No	No
Gayamchona Lake	Yes	No	No	No	Yes	No	NO	No	No
Jadung Lake 1	Yes	Yes	No	No	Yes	No	NO	No	No

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Name of the Wetland	Acts as a sink for sediments	Has significant cultural and religious values	Is a site for recreation and aquatic sport	Source/cultivation noteworthy food plants species	Habitat for noteworthy animal species	Habitat for migratory water birds	Supports fisheries/aquaculture	Mining	Any other, please list
Jadung Lake 2	Yes	Yes	NO	No	Yes	No	NO	No	No
Unnamed lake 1/singba lake	Yes	Yes	NO	No	Yes	No	NO	No	No
Unnamed Lake 2	Yes	Yes	NO	No	Yes	No	NO	No	No
Sebu Lake (Changme 1)	Yes	NO	NO	No	Yes	No	NO	No	No
Chuba Lake	Yes	No	NO	No	Yes	No	NO	No	Nil
Black Lake/Namnasa Lake	Yes	Yes	NO	No	Yes	No	NO	No	Highly religious

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Name of the Wetland	Acts as a sink for sediments	Has significant cultural and religious values	Is a site for recreation and aquatic sport	Source/cultivation noteworthy food plants species	Habitat for noteworthy animal species	Habitat for migratory water birds	Supports fisheries/aquaculture	Mining	Any other, please list
Jachu valley (Ox-bow lake)	Yes	No	No	No	Yes	No	No	No	No
Changme 3	Yes	Yes	NO	No	Yes	No	NO	No	No
Yangchen Tso	No	yes	NO	No	Yes	Yes	No	No	No
Ka- Tso	No	yes	NO	No	Yes	yes	NO	No	Nil
Kyee Tso	Yes	No	Yes	No	Yes	Yes	Yes	No	No
Chume- Lham TSo	No	Yes	NO	No	Yes	Yes	NO	No	Highly religious

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Name of the Wetland	Acts as a sink for sediments	Has significant cultural and religious values	Is a site for recreation and aquatic sport	Source/cultivation noteworthy food plants species	Habitat for noteworthy animal species	Habitat for migratory water birds	Supports fisheries/aquaculture	Mining	Any other, please list
Tembao Lake	Yes	Yes	NO	No	Yes	yes	NO	No	No
Tosar lake	Yes	Yes (Lake is revered by Buddhist Community)	No	No	No	No	No	No	No
Kishong Lake	Yes	Yes	No	No	Yes	Yes	No	No	No
Tingchim lake	Yes	Yes	No	No	Yes	Yes	No	No	No
Nakuchu Lake	Yes	Yes (Lake is revered by Buddhist Community)	No	No	No	No	No	No	No

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Name of the Wetland	Acts as a sink for sediments	Has significant cultural and religious values	Is a site for recreation and aquatic sport	Source/cultivation noteworthy food plants species	Habitat for noteworthy animal species	Habitat for migratory water birds	Supports fisheries/aquaculture	Mining	Any other, please list
Thang Chho	Yes	Not significant but is considered as sacred	No	NA	No	NA	No	No	NA
Hans Pokhari	Yes	Yes (Lake is revered by Buddhist Community)	No	No	No	No	No	No	No

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Table 7: Pre-Existing Right and Privileges

Name of the Wetland	Community Fishing (without any leave or permission from government department)	Fishing under lease from the government department	Harvest of plants (without any)	Lease or permission from the government department	Harvest of plants under lease from the government department	Agriculture or horticulture within the wetland	Grazing
Tsobuk Tso 1	No fishing rights in the wetland	Not permitted	No	No	No	No	Yes as privilege
Tsobuk Tso 2	No fishing rights in the wetland	Not permitted	No	No	No	No	Yes as privilege
Tsobuk Tso 3	No fishing rights in the wetland	Not permitted	No	No	No	No	Yes as privilege
Chomijadar Tso 1	No fishing rights in the wetland	Not permitted	No	No	No	No	Yes as privilege
Chomijadar Tso 2	No fishing rights in the wetland	Not permitted	No	No	No	No	Yes as privilege
Chomijadar Tso 3	No fishing rights in the wetland	Not permitted	No	No	No	No	Yes (Not a right/privilege)
Chomijadar Tso 4	No fishing rights in the wetland	Not permitted	No	No	No	No	Yes (but not as a right)

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Name of the Wetland	Community Fishing (without any leave or permission from government department)	Fishing under lease from the government department	Harvest of plants (without any)	Lease or permission from the government department	Harvest of plants under lease from the government department	Agriculture or horticulture within the wetland	Grazing
Chomijadar Tso 5	No fishing rights in the wetland	Not permitted	No	No	No	No	Yes (but not as a right)
Chunguphu Tso	No fishing rights in the wetland	Not permitted	No	No	No	No	Yes (but not as a right)
Dokung	No fishing rights in the wetland	Not permitted	No	No	No	No	Yes (but not as a right)
Em Tso	No fishing rights in the wetland	Not permitted	No	No	No	No	Yes (but not as a right)
Em Tso 2	No fishing rights in the wetland	Not permitted	No	No	No	No	Yes (but not as a right)
Fogay Tso 1	No fishing rights in the wetland	Not permitted	No	No	No	No	Yes as privilege
Fogay Tso 2	No fishing rights in the wetland	Not permitted	No	No	No	No	Yes (but not as a right)
Fogay Tso 3	No fishing rights in the wetland	Not permitted	No	No	No	No	Yes (but not as a right)

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Name of the Wetland	Community Fishing (without any leave or permission from government department)	Fishing under lease from the government department	Harvest of plants (without any)	Lease or permission from the government department	Harvest of plants under lease from the government department	Agriculture or horticulture within the wetland	Grazing
Gachang Tso	No fishing rights in the wetland	Not permitted	No	No	No	No	Yes (but not as a right)
Gapzee Tso 1	No fishing rights in the wetland	Not permitted	No	No	No	No	NA
Gapzee Tso 2	No fishing rights in the wetland	Not permitted	No	No	No	No	NA
Gapzee Tso 3	No fishing rights in the wetland	Not permitted	No	No	No	No	NA
Gukul Tso	No fishing rights in the wetland	Not permitted	No	No	No	No	Yes (but not as a right)
Gurudongmar 1	No fishing rights in the wetland	Not permitted	No	No	No	No	Yes (but not as a right)
Gurudongmar 2	No fishing rights in the wetland	Not permitted	No	No	No	No	Yes (but not as a right)
Gurudongmar 3	No fishing rights in the wetland	Not permitted	No	No	No	No	Yes (but not as a right)

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Name of the Wetland	Community Fishing (without any leave or permission from government department)	Fishing under lease from the government department	Harvest of plants (without any)	Lease or permission from the government department	Harvest of plants under lease from the government department	Agriculture or horticulture within the wetland	Grazing
Gurudongmar 4	No fishing rights in the wetland	Not permitted	No	No	No	No	Yes (but not as a right)
Gurudongmar 5	No fishing rights in the wetland	Not permitted	No	No	No	No	Yes (but not as a right)
Janak 1 Tso 1	No fishing rights in the wetland	Not permitted	No	No	No	No	Yes (but not as a right)
Janak 1 Tso 2	No fishing rights in the wetland	Not permitted	No	No	No	No	Yes (but not as a right)
Janak 1 Tso 3	No fishing rights in the wetland	Not permitted	No	No	No	No	Yes (but not as a right)
Janak 2 Tso 1	No fishing rights in the wetland	Not permitted	No	No	No	No	Yes (but not as a right)
Janak 2 Tso 2	No fishing rights in the wetland	Not permitted	No	No	No	No	Yes (but not as a right)
Janak 2 Tso 3	No fishing rights in the wetland	Not permitted	No	No	No	No	Yes (but not as a right)

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Name of the Wetland	Community Fishing (without any leave or permission from government department)	Fishing under lease from the government department	Harvest of plants (without any)	Lease or permission from the government department	Harvest of plants under lease from the government department	Agriculture or horticulture within the wetland	Grazing
Janak 2 Tso 4	No fishing rights in the wetland	Not permitted	No	No	No	No	Yes (but not as a right)
Kalapathar Tso 1	No fishing rights in the wetland	Not permitted	No	No	No	No	Yes (<i>Bos mutus</i> (Yak))
Khora Tso 1	No fishing rights in the wetland	Not permitted	No	No	No	No	Yes (but not as a right)
Khora Tso 2	No fishing rights in the wetland	Not permitted	No	No	No	No	Yes (but not as a right)
Khora Tso 3	No fishing rights in the wetland	Not permitted	No	No	No	No	Yes (but not as a right)
Khora Tso 4	No fishing rights in the wetland	Not permitted	No	No	No	No	Yes (but not as a right)
Khora Tso 5	No fishing rights in the wetland	Not permitted	No	No	No	No	Yes (but not as a right)
L.T. Tso	No fishing rights in the wetland	Not permitted	No	No	No	No	Yes (but not as a right)

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Name of the Wetland	Community Fishing (without any leave or permission from government department)	Fishing under lease from the government department	Harvest of plants (without any)	Lease or permission from the government department	Harvest of plants under lease from the government department	Agriculture or horticulture within the wetland	Grazing
Lachee Tso 1	No fishing rights in the wetland	Not permitted	No	No	No	No	Yes (<i>Bos mutus</i> (Yak))
Lachee Tso 2	No fishing rights in the wetland	Not permitted	No	No	No	No	Yes (but not as a right)
Mukuthang Tso	No fishing rights in the wetland	Not permitted	No	No	No	No	Yes (but not as a right)
Ok Tso	No fishing rights in the wetland	Not permitted	No	No	No	No	Yes (<i>Bos mutus</i> (Yak))
Om Tso	No fishing rights in the wetland	Not permitted	No	No	No	No	Yes (<i>Bos mutus</i> (Yak))
Setong Tso	No fishing rights in the wetland	Not permitted	No	No	No	No	Yes (<i>Bos mutus</i> (Yak))
Shaka Tso	No fishing rights in the wetland	Not permitted	No	No	No	No	Yes (<i>Bos mutus</i> (Yak))
Shechen Ragho 1	No fishing rights in the wetland	Not permitted	No	No	No	No	Yes (<i>Bos mutus</i> (Yak))

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Name of the Wetland	Community Fishing (without any leave or permission from government department)	Fishing under lease from the government department	Harvest of plants (without any)	Lease or permission from the government department	Harvest of plants under lease from the government department	Agriculture or horticulture within the wetland	Grazing
Shechen Ragho	No fishing rights in the wetland	Not permitted	No	No	No	No	Yes (<i>Bos mutus</i> (Yak))
South Lhonak lake	No fishing rights in the wetland	Not permitted	No	No	No	No	Yes (<i>Bos mutus</i> (Yak))
Tso lamu lake	No fishing rights in the wetland	Not permitted	No	No	No	No	Yes (<i>Bos mutus</i> (Yak))
Tso Lhamo 1	No fishing rights in the wetland	Not permitted	No	No	No	No	Yes (<i>Bos mutus</i> (Yak))
Tso Lhamo 3	No fishing rights in the wetland	Not permitted	No	No	No	No	Yes (<i>Bos mutus</i> (Yak))
Tso Lhamo 4	No fishing rights in the wetland	Not permitted	No	No	No	No	Yes (<i>Bos mutus</i> (Yak))
Yangsaac	No fishing rights in the wetland	Not permitted	No	No	No	No	Yes (<i>Bos mutus</i> (Yak))
Yum Tso	No fishing rights in the wetland	Not permitted	No	No	No	No	Yes (<i>Bos mutus</i> (Yak))

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Name of the Wetland	Community Fishing (without any leave or permission from government department)	Fishing under lease from the government department	Harvest of plants (without any)	Lease or permission from the government department	Harvest of plants under lease from the government department	Agriculture or horticulture within the wetland	Grazing
Changme Lake 2 (Dry Lake)	No	No	NTFP	No	No	No	Yes
B-Lake	No	No	NTFP	No	No	No	Yes
Donkeya Chu	No	No	NTFP	No	No	No	Yes
Gaya Gawn Lake1 (dry lake)	No	No	NTFP	No	No	No	Yes
Gaya gawn Lake 4	No	No	NTFP	No	No	No	Yes
Gayamchona Lake	No	No	NTFP	No	No	No	Yes
Jadung Lake 1	No	No	NTFP	No	No	No	Yes
Jadung Lake 2	No	No	NTFP	No	No	No	Yes
Unnamed lake 1/singba lake	No	No	NTFP	No	No	No	Yes
Unnamed Lake 2	No	No	NTFP	No	No	No	Yes

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Name of the Wetland	Community Fishing (without any leave or permission from government department)	Fishing under lease from the government department	Harvest of plants (without any)	Lease or permission from the government department	Harvest of plants under lease from the government department	Agriculture or horticulture within the wetland	Grazing
Sebu Lake (Changme 1)	No	No	NTFP	No	No	No	Yes
Chuba Lake	No	No	NTFP	No	No	No	Yes
Black Lake/Namnasa Lake	No	No	NTFP	No	No	No	Yes
Jachu valley (Ox-bow lake)	No	No	NTFP	No	No	No	Yes
Changme 3	No	No	NTFP	No	No	No	Yes
Yangchen Tso	No	No	NTFP	No	No	No	No
Ka- Tso	No	No	NTFP	No	No	No	No
Kyee Tso	No	No	NTFP	No	No	No	No
Chume- Lham TSo	No	No	NTFP	No	No	No	No
Tembao Lake	No	No	NTFP	No	No	No	No

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Name of the Wetland	Community Fishing (without any leave or permission from government department)	Fishing under lease from the government department	Harvest of plants (without any)	Lease or permission from the government department	Harvest of plants under lease from the government department	Agriculture or horticulture within the wetland	Grazing
Tosar lake	Yes (Army as well as people living near lake used water for cooking & house hold purposes)	No	No	No	Yes, Heracleum wallichii (chimphing)	No	Yes
Kishong Lake	No	No	NTPF	No	No	No	No
Tingchim lake	Yes (Army as well as people living near lake used water for cooking & house hold purposes)	No	No	No	Yes, Heracleum wallichii (chimphing)	No	Yes
Nakuchu Lake	Yes (Army as well as people living near lake used water for cooking & house hold purposes)	No	No	No	Yes, Heracleum wallichii (chimphing)	No	Yes

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Name of the Wetland	Community Fishing (without any leave or permission from government department)	Fishing under lease from the government department	Harvest of plants (without any)	Lease or permission from the government department	Harvest of plants under lease from the government department	Agriculture or horticulture within the wetland	Grazing
Thang Chho	No fishing rights in the wetland	Not permitted	No	No	No	No	Yes (but not as a right)
Hans Pokhari	Yes (Army as well as people living near lake used water for cooking & house hold purposes)	No	No	No	Yes, <i>Heracleum wallichii</i> (chimphing)	No	Yes

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Table 7A: Pre- Existing Rights and Privileges

Name of the Wetland	Religious practices	Withdrawal of water for domestic use	Withdrawal of water for agriculture or fisheries	Bathing or wallowing of domestic animals (buffalo, elephant etc.)	Drinking water for bovines	Plying of boats	Any other, please list here
Tsobuk Tso 1	Yes as privilege	NA	NA	NA	As privilege	Not allowed	NA
Tsobuk Tso 2	Yes as privilege	NA	NA	NA	As privilege	Not allowed	NA
Tsobuk Tso 3	Yes as privilege	NA	NA	NA	As privilege	Not allowed	NA
Chomijadar Tso 1	Yes as privilege	NA	NA	NA	As privilege	Not allowed	NA
Chomijadar Tso 2	Yes as privilege	NA	NA	NA	As privilege	Not allowed	NA
Chomijadar Tso 3	Yes as privilege	NA	NA	NA	As privilege	Not allowed	NA
Chomijadar Tso 4	Yes as privilege	NA	NA	NA	As privilege	Not allowed	NA
Chomijadar Tso 5	Yes as privilege	NA	NA	NA	As privilege	Not allowed	NA
Chunguphu Tso	Yes as privilege	NA	NA	NA	As privilege	Not allowed	NA
Dokung	Yes as privilege	NA	NA	NA	As privilege	Not allowed	NA
Em Tso	Yes as privilege	NA	NA	NA	As privilege	Not allowed	NA

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Name of the Wetland	Religious practices	Withdrawal of water for domestic use	Withdrawal of water for agriculture or fisheries	Bathing or wallowing of domestic animals (buffalo, elephant etc.)	Drinking water for bovines	Plying of boats	Any other, please list here
Em Tso 2	Yes as privilege	NA	NA	NA	As privilege	Not allowed	NA
Fogay Tso 1	No	NA	NA	NA	As privilege	Not allowed	NA
Fogay Tso 2	Yes as privilege	NA	NA	NA	As privilege	Not allowed	NA
Fogay Tso 3	No	NA	NA	NA	As privilege	Not allowed	NA
Gachang Tso	No	NA	NA	NA	As privilege	Not allowed	NA
Gapzee Tso 1	No	NA	NA	NA	As privilege	Not allowed	NA
Gapzee Tso 2	No	NA	NA	NA	As privilege	Not allowed	NA
Gapzee Tso 3	No	NA	NA	NA	As privilege	Not allowed	NA
Gukul Tso	No	NA	NA	NA	As privilege	Not allowed	NA
Gurudongmar 1	Yes as privilege	NA	NA	NA	As privilege	Not allowed	NA
Gurudongmar 2	Yes as privilege	NA	NA	NA	As privilege	Not allowed	NA
Gurudongmar 3	Yes as privilege	NA	NA	NA	As privilege	Not allowed	NA

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Name of the Wetland	Religious practices	Withdrawal of water for domestic use	Withdrawal of water for agriculture or fisheries	Bathing or wallowing of domestic animals (buffalo, elephant etc.)	Drinking water for bovines	Plying of boats	Any other, please list here
Gurudongmar 4	Yes as privilege	NA	NA	NA	As privilege	Not allowed	Nil
Gurudongmar 5	Yes as privilege	NA	NA	NA	As privilege	Not allowed	Nil
Janak 1 Tso 1	No	NA	NA	NA	As privilege	Not allowed	Nil
Janak 1 Tso 2	No	NA	NA	NA	As privilege	Not allowed	Nil
Janak 1 Tso 3	No	NA	NA	NA	As privilege	Not allowed	Nil
Janak 2 Tso 1	No	NA	NA	NA	As privilege	Not allowed	Nil
Janak 2 Tso 2	No	NA	NA	NA	As privilege	Not allowed	Nil
Janak 2 Tso 3	No	NA	NA	NA	As privilege	Not allowed	Nil
Janak 2 Tso 4	No	NA	NA	NA	As privilege	Not allowed	Nil
Kalapathar Tso 1	No	NA	NA	NA	As privilege	Not allowed	Nil
Khora Tso 1	No	NA	NA	NA	As privilege	Not allowed	Nil
Khora Tso 2	No	NA	NA	NA	As privilege	Not allowed	Nil

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Name of the Wetland	Religious practices	Withdrawal of water for domestic use	Withdrawal of water for agriculture or fisheries	Bathing or wallowing of domestic animals (buffalo, elephant etc.)	Drinking water for bovines	Plying of boats	Any other, please list here
Khora Tso 3	No	NA	NA	NA	As privilege	Not allowed	NA
Khora Tso 4	No	NA	NA	NA	As privilege	Not allowed	NA
Khora Tso 5	No	NA	NA	NA	As privilege	Not allowed	NA
L.T. Tso	No	NA	NA	NA	As privilege	Not allowed	NA
Lachee Tso 1	No	NA	NA	NA	As privilege	Not allowed	NA
Lachee Tso 2	No	NA	NA	NA	As privilege	Not allowed	NA
Mukuthang Tso	No	NA	NA	NA	As privilege	Not allowed	NA
Ok Tso	No	NA	NA	NA	As privilege	Not allowed	NA
Om Tso	No	NA	NA	NA	As privilege	Not allowed	NA
Setong Tso	No	NA	NA	NA	As privilege	Not allowed	NA
Shaka Tso	No	NA	NA	NA	As privilege	Not allowed	NA
Shechen Ragho 1	No	NA	NA	NA	As privilege	Not allowed	NA

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Name of the Wetland	Religious practices	Withdrawal of water for domestic use	Withdrawal of water for agriculture or fisheries	Bathing or wallowing of domestic animals (buffalo, elephant etc.)	Drinking water for bovines	Plying of boats	Any other, please list here
Shechen Ragho	No	NA	NA	NA	As privilege	Not allowed	Nil
South Lhonak lake	No	NA	NA	NA	As privilege	Not allowed	Nil
Tso lamu lake	Yes as privilege	NA	NA	NA	As privilege	Not allowed	Nil
Tso Lhamo 1	Yes as privilege	NA	NA	NA	As privilege	Not allowed	Nil
Tso Lhamo 3	Yes as privilege	NA	NA	NA	As privilege	Not allowed	Nil
Tso Lhamo 4	Yes as privilege	NA	NA	NA	As privilege	Not allowed	Nil
Yangsaac	No	NA	NA	NA	As privilege	Not allowed	Nil
Yum Tso	No	NA	NA	NA	As privilege	Not allowed	Nil
Changme Lake 2 (Dry Lake)	No	Used by Herders	NA	Yaks	Yes	Not allowed	Dead Moraine very tuff terrene
B-Lake	Yes	Used by Herders	NA	Yaks	Yes	Not allowed	Good place for tourism development

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Name of the Wetland	Religious practices	Withdrawal of water for domestic use	Withdrawal of water for agriculture or fisheries	Bathing or wallowing of domestic animals (buffalo, elephant etc.)	Drinking water for bovines	Plying of boats	Any other, please list here
Donkeya Chu	No	Used by Herders	NA	Yaks	Yes	Not allowed	Nil
Gaya Gawn Lake1 (dry lake)	No	Used by Herders	NA	Yaks	Yes	Not allowed	Nil
Gaya gawn Lake 4	No	Used by Herders	NA	Yaks	Yes	Not allowed	Nil
Gayamchona Lake	No	Used by Herders	NA	Yaks	Yes	Not allowed	One and only saline Lake in Sikkim
Jadung Lake 1	No	Used by Herders	NA	Yaks	Yes	Not allowed	Good place for tourism development
Jadung Lake 2	No	Used by Herders	No	Yaks	Yes	No	Good place for tourism development
Unnamed lake 1/singba lake	No	Used by Herders	No	Yaks	Yes	No	Mining of sand very High

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Name of the Wetland	Religious practices	Withdrawal of water for domestic use	Withdrawal of water for agriculture or fisheries	Bathing or wallowing of domestic animals (buffalo, elephant etc.)	Drinking water for bovines	Plying of boats	Any other, please list here
Unnamed Lake 2	No	Used by Herders	No	Yaks	Yes	No	The lake is about to be dry less snow
Sebu Lake (Changme 1)	No	Used by Herders	No	Yaks	Yes	No	Invasive plants in and around lake
Chuba Lake	No	Used by Herders	No	Yaks	Yes	No	No
Black Lake/Namnasa Lake	Yes	Used by Herders	No	Yaks	Yes	No	Habitat of Bear
Jachu valley (Ox-bow lake)	No	Used by Herders	No	Yaks	Yes	No	Good place for tourism development
Changme 3	No	Used by Herders	No	Yaks	Yes	No	Dead Moraine very tuff terrene

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Name of the Wetland	Religious practices	Withdrawal of water for domestic use	Withdrawal of water for agriculture or fisheries	Bathing or wallowing of domestic animals (buffalo, elephant etc.)	Drinking water for bovines	Plying of boats	Any other, please list here
Yangchen Tso	Yes	Yes	No	Yaks	Yes	No	Infrastructre developed like footpath, resthouse.
Ka- Tso	Yes	Yes	No	Yaks	Yes	No	Presence of army camp, near Indo China border
Kyee Tso	No	Yes	No	Yaks	Yes	No	Artificial lake good for migratory birds
Chume- Lham TSo	Yes	Yes	No	Yaks	Yes	No	Important pilgrimage site.
Tembao Lake	No	Yes	No	Yaks	Yes	No	Important wetland as per history of glacial outburst.

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Name of the Wetland	Religious practices	Withdrawal of water for domestic use	Withdrawal of water for agriculture or fisheries	Bathing or wallowing of domestic animals (buffalo, elephant etc.)	Drinking water for bovines	Plying of boats	Any other, please list here
Tosar lake	Yes	No	No	Yes (Wild ducks)	No	No (Construction of roads for transportation)	No
Kishong Lake	Yes	Yes	No	Yaks	Yes	No	Important pilgrimage site.
Tingchim lake	Yes	Yes	No	Yaks	Yes	No	Important pilgrimage site.
Nakuchu Lake	Yes	No	No	Yes (Wild ducks)	No	No (Construction of roads for transportation)	No
Thang Chho	No	NA	NA	NA	As privilege	Not allowed	NA
Hans Pokhari	Yes	No	No	Yes (Wild ducks)	No	No (Construction of roads for transportation)	No

*NA- Not Applicable

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Table 8: Activities Proposed to be Prohibited under Wetlands (Conservation and Management) Rules, 2017

Name of the Wetland	Reclamation/filling up	Setting up of new industries / expansion of existing industries	Handling or storage/disposal of hazardous substances (except port areas)	Solid Waste Dumping	Sink for untreated sewage/industrial effluent	Construction activities (except boat jetties)	Any other, please list
Tsobuk Tso 1	Yes	Yes	Yes	Yes	Yes	Yes	Nil
Tsobuk Tso 2	Yes	Yes	Yes	Yes	Yes	Yes	Nil
Tsobuk Tso 3	Yes	Yes	Yes	Yes	Yes	Yes	Nil
Chomijadar Tso 1	Yes	Yes	Yes	Yes	Yes	Yes	Nil
Chomijadar Tso 2	Yes	Yes	Yes	Yes	Yes	Yes	Nil
Chomijadar Tso 3	Yes	Yes	Yes	Yes	Yes	Yes	Nil
Chomijadar Tso 4	Yes	Yes	Yes	Yes	Yes	Yes	Nil
Chomijadar Tso 5	Yes	Yes	Yes	Yes	Yes	Yes	Nil
Chunguphu Tso	Yes	Yes	Yes	Yes	Yes	Yes	Nil
Dokung	Yes	Yes	Yes	Yes	Yes	Yes	Nil

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Name of the Wetland	Reclamation/filling up	Setting up of new industries / expansion of existing industries	Handling or storage/disposal of hazardous substances (except port areas)	Solid Waste Dumping	Sink for untreated sewage/industrial effluent	Construction activities (except boat jetties)	Any other, please list
Em Tso	Yes	Yes	Yes	Yes	Yes	Yes	Nil
Em Tso 2	Yes	Yes	Yes	Yes	Yes	Yes	Nil
Fogay Tso 1	Yes	Yes	Yes	Yes	Yes	Yes	Nil
Fogay Tso 2	Yes	Yes	Yes	Yes	Yes	Yes	Nil
Fogay Tso 3	Yes	Yes	Yes	Yes	Yes	Yes	Nil
Gachang Tso	Yes	Yes	Yes	Yes	Yes	Yes	Nil
Gapzee Tso 1	Yes	Yes	Yes	Yes	Yes	Yes	Nil
Gapzee Tso 2	Yes	Yes	Yes	Yes	Yes	Yes	Nil
Gapzee Tso 3	Yes	Yes	Yes	Yes	Yes	Yes	Nil
Gukul Tso	Yes	Yes	Yes	Yes	Yes	Yes	Nil

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Name of the Wetland	Reclamation/filling up	Setting up of new industries / expansion of existing industries	Handling or storage/disposal of hazardous substances (except port areas)	Solid Waste Dumping	Sink for untreated sewage/industrial effluent	Construction activities (except boat jetties)	Any other, please list
Gurudongmar 1	Yes	Yes	Yes	Yes	NA	Yes	Nil
Gurudongmar 2	Yes	Yes	Yes	Yes	Yes	Yes	Nil
Gurudongmar 3	Yes	Yes	Yes	Yes	Yes	Yes	Nil
Gurudongmar 4	Yes	Yes	Yes	Yes	Yes	Yes	Nil
Gurudongmar 5	Yes	Yes	Yes	Yes	Yes	Yes	Nil
Janak 1 Tso 1	Yes	Yes	Yes	Yes	Yes	Yes	Nil
Janak 1 Tso 2	Yes	Yes	Yes	Yes	Yes	Yes	Nil
Janak 1 Tso 3	Yes	Yes	Yes	Yes	Yes	Yes	Nil
Janak 2 Tso 1	Yes	Yes	Yes	Yes	Yes	Yes	Nil
Janak 2 Tso 2	Yes	Yes	Yes	Yes	Yes	Yes	Nil

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Name of the Wetland	Reclamation/filling up	Setting up of new industries / expansion of existing industries	Handling or storage/disposal of hazardous substances (except port areas)	Solid Waste Dumping	Sink for untreated sewage/industrial effluent	Construction activities (except boat jetties)	Any other, please list
Janak 2 Tso 3	Yes	Yes	Yes	Yes	Yes	Yes	Nil
Janak 2 Tso 4	Yes	Yes	Yes	Yes	Yes	Yes	Nil
Kalapatthar Tso 1	Yes	Yes	Yes	Yes	Yes	Yes	Nil
Khora Tso 1	Yes	Yes	Yes	Yes	Yes	Yes	Nil
Khora Tso 2	Yes	Yes	Yes	Yes	Yes	Yes	Nil
Khora Tso 3	Yes	Yes	Yes	Yes	Yes	Yes	Nil
Khora Tso 4	Yes	Yes	Yes	Yes	Yes	Yes	Nil
Khora Tso 5	Yes	Yes	Yes	Yes	Yes	Yes	Nil
Khora Tso	Yes	Yes	Yes	Yes	Yes	Yes	Nil
Lachee Tso 1	Yes	NA	NA	NA	NA	NA	Nil

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Name of the Wetland	Reclamation/filling up	Setting up of new industries / expansion of existing industries	Handling or storage/disposal of hazardous substances (except port areas)	Solid Waste Dumping	Sink for untreated sewage/industrial effluent	Construction activities (except boat jetties)	Any other, please list
Lachee Tso 2	Yes	NA	NA	NA	NA	NA	Nil
Mukuthang Tso	Yes	NA	NA	NA	NA	NA	Nil
Ok Tso	Yes	NA	NA	NA	NA	NA	Nil
Om Tso	Yes	NA	NA	NA	NA	NA	Nil
Setong Tso	Yes	NA	NA	Yes	Yes	NA	Nil
Shaka Tso	Yes	NA	Yes	Yes	Yes	Yes	Nil
Shechen Ragho 1	NA	NA	NA	NA	NA	NA	Nil
Shechen Ragho	NA	NA	NA	NA	NA	NA	Nil
South Lhonak	Yes	NA	NA	NA	NA	NA	Nil
Tso Lhamo	Yes	NA	NA	NA	NA	NA	Nil

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Name of the Wetland	Reclamation/filling up	Setting up of new industries / expansion of existing industries	Handling or storage/disposal of hazardous substances (except port areas)	Solid Waste Dumping	Sink for untreated sewage/industrial effluent	Construction activities (except boat jetties)	Any other, please list
Tso Lhamo 1	Yes	NA	NA	NA	NA	NA	Nil
Tso Lhamo 3	NA	NA	NA	NA	NA	NA	Nil
Tso Lhamo 4	NA	NA	NA	NA	NA	NA	Nil
Yangsaac	NA	NA	NA	NA	NA	NA	Nil
Yum Tso	NA	NA	NA	NA	NA	NA	Nil
Changme Lake 2 (Dry Lake)	NA	NA	NA	NA	NA	NA	Nil
B-Lake	NA	NA	NA	NA	NA	NA	Nil
Donkeya Chu	NA	NA	NA	NA	NA	NA	Nil
Gaya Gawn Lake1 (dry lake)	NA	NA	NA	NA	NA	NA	Nil
Gaya gawn Lake 4	NA	NA	NA	NA	NA	NA	Nil

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Name of the Wetland	Reclamation/filling up	Setting up of new industries / expansion of existing industries	Handling or storage/disposal of hazardous substances (except port areas)	Solid Waste Dumping	Sink for untreated sewage/industrial effluent	Construction activities (except boat jetties)	Any other, please list
Gayamchona Lake	NA	NA	NA	NA	NA	NA	Defence Land
Jadung Lake 1	NA	NA	NA	NA	NA	NA	Nil
Jadung Lake 2	NA	NA	NA	NA	NA	NA	Nil
Unnamed lake 1/singba lake	NA	NA	NA	NA	NA	NA	Nil
Unnamed Lake 2	NA	NA	NA	NA	NA	NA	Nil
Sebu Lake (Changme 1)	NA	NA	NA	NA	NA	NA	Nil
Chuba Lake	NA	NA	NA	NA	NA	NA	Nil
Black Lake/Namnasa Lake	NA	NA	NA	NA	NA	NA	Nil
Jachu valley (Ox-bow lake)	NA	NA	NA	NA	NA	NA	Nil

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Name of the Wetland	Reclamation/filling up	Setting up of new industries / expansion of existing industries	Handling or storage/disposal of hazardous substances (except port areas)	Solid Waste Dumping	Sink for untreated sewage/industrial effluent	Construction activities (except boat jetties)	Any other, please list
Changme 3	NA	NA	NA	NA	NA	NA	Nil
Yangchen Tso	NA	NA	NA	NA	NA	NA	Nil
Ka- Tso	NA	NA	NA	NA	NA	NA	Nil
Kyee Tso	NA	NA	NA	NA	NA	NA	Nil
Chume- Lham TSo	NA	NA	NA	NA	NA	NA	Nil
Tembao Lake	NA	NA	NA	NA	NA	NA	Nil
Tosar lake	Yes	NA	NA	NA	NA	NA	Nil
Kishong Lake	Yes	NA	NA	NA	NA	NA	Nil
Tingchim lake	Yes	NA	NA	NA	NA	NA	Nil
Nakuchu Lake	Yes	NA	NA	NA	NA	NA	Nil

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Name of the Wetland	Reclamation/filling up	Setting up of new industries / expansion of existing industries	Handling or storage/disposal of hazardous substances (except port areas)	Solid Waste Dumping	Sink for untreated sewage/industrial effluent	Construction activities (except boat jetties)	Any other, please list
Thang Chho	Yes	Yes	Yes	Yes	Yes	Yes	Nil
Hans Pokhari	Yes	NA	NA	NA	NA	NA	Nil

*NA - Not Applicable as such activities are already prohibited through various conservation acts (Wildlife Protection Act 1972 and Forest Conservation Act 1980).

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Table 9: Activities Proposed to be Regulated Under Wetlands (Conservation And Management) Rules, 2017

Name of the Wetland	Withdrawal of water/impoundment/diversion or any other hydrological intervention	Harvesting of resources (living / non-living)	Grazing	Discharge of treated sewage / effluent / wastewater	Construction of boat jetties and facilities for temporary use, as pantoon bridges	Aquaculture, agriculture and horticulture activities within the wetland boundaries	Any other, please list
Tsobuk Tso 1	Yes	Yes	Yes (<i>Bos mutus</i>)	NA	Yes	Yes	Nil
Tsobuk Tso 2	Yes	Yes	Yes (<i>Bos mutus</i>)	NA	Yes	No	Nil
Tsobuk Tso 3	Yes	Yes	Yes (<i>Bos mutus</i>)	Yes (from Army establishment around)	Yes	Yes	Nil
Chomijadar Tso 1	Yes	Yes	Yes (<i>Bos mutus</i>)	Yes	Yes	Yes	Nil
Chomijadar Tso 2	Yes	Yes	Yes (<i>Bos mutus</i>)	Yes	Yes	Yes	Nil
Chomijadar Tso 3	Yes	Yes	Yes (<i>Bos mutus</i>)	Yes	Yes	Yes	Nil
Chomijadar Tso 4	Yes	Yes	Yes (<i>Bos mutus</i>)	Yes	Yes	Yes	Nil
Chomijadar Tso 5	Yes	Yes	Yes (<i>Bos mutus</i>)	Yes	Yes	Yes	Nil

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Name of the Wetland	Withdrawal of water/impoundment/diversion or any other hydrological intervention	Harvesting of resources (living / non-living)	Grazing	Discharge of treated sewage / effluent / wastewater	Construction of boat jetties and facilities for temporary use, as pantoon bridges	Aquaculture, agriculture and horticulture activities within the wetland boundaries	Any other, please list
Chunguphu Tso	Yes	Yes	Yes (<i>Bos mutus</i>)	Yes	Yes	Yes	Nil
Dokung	Yes	Yes	Yes (<i>Bos mutus</i>)	Yes	Yes	Yes	Nil
Em Tso	Yes	Yes	Yes (<i>Bos mutus</i>)	Yes	Yes	Yes	Nil
Em Tso 2	Yes	Yes	Yes (<i>Bos mutus</i>)	Yes	Yes	Yes	Nil
Fogay Tso 1	Yes	Yes	Yes (<i>Bos mutus</i>)	NA	Yes	Yes	Nil
Fogay Tso 2	Yes	Yes	No	NA	Yes	Yes	Nil
Fogay Tso	Yes	Yes	No	NA	Yes	Yes	Nil
Gachang Tso	Yes	Yes	Yes (<i>Bos mutus</i>)	NA	Yes	Yes	Nil
Gapzee Tso 1	Yes	Yes	Yes (<i>Bos mutus</i>)	NA	Yes	Yes	Nil
Gapzee Tso 2	Yes	Yes	Yes (<i>Bos mutus</i>)	NA	Yes	Yes	Nil

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Name of the Wetland	Withdrawal of water/impoundment/diversion or any other hydrological intervention	Harvesting of resources (living / non-living)	Grazing	Discharge of treated sewage / effluent / wastewater	Construction of boat jetties and facilities for temporary use, as pantoon bridges	Aquaculture, agriculture and horticulture activities within the wetland boundaries	Any other, please list
Gapzee Tso 3	Yes	Yes	Yes (<i>Bos mutus</i>)	NA	Yes	Yes	Nil
Gukul Tso	Yes	Yes	Yes (<i>Bos mutus</i>)	NA	Yes	Yes	Nil
Gurudongmar 1	Yes	Yes	Yes (<i>Bos mutus</i>)	NA	Yes	Yes	Nil
Gurudongmar 2	Yes	Yes	Yes (<i>Bos mutus</i>)	NA	Yes	Yes	Nil
Gurudongmar 3	Yes	Yes	Yes (<i>Bos mutus</i>)	NA	Yes	Yes	Nil
Gurudongmar 4	Yes	Yes	Yes	NA	Yes	Yes	Nil
Gurudongmar 5	Yes	Yes	Yes	NA	Yes	Yes	Nil
Janak 1 Tso 1	Yes	Yes	Yes	NA	Yes	Yes	Nil
Janak 1 Tso 2	Yes	Yes	Yes	NA	Yes	Yes	Nil
Janak 1 Tso 3	Yes	Yes	Yes	NA	Yes	Yes	Nil

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Name of the Wetland	Withdrawal of water/impoundment/diversion or any other hydrological intervention	Harvesting of resources (living / non-living)	Grazing	Discharge of treated sewage / effluent / wastewater	Construction of boat jetties and facilities for temporary use, as pantoon bridges	Aquaculture, agriculture and horticulture activities within the wetland boundaries	Any other, please list
Janak 2 Tso 1	Yes	Yes	Yes	NA	Yes	Yes	Nil
Janak 2 Tso 2	Yes	Yes	Yes	NA	Yes	Yes	Nil
Janak 2 Tso 3	Yes	Yes	Yes	NA	Yes	No	Nil
Janak 2 Tso 4	Yes	Yes	Yes	NA	Yes	No	Nil
Kalapatthar Tso 1	Yes	Yes	Yes (<i>Bos mutus</i>)	Yes	Yes	Yes	Nil
Khora Tso 1	Yes	Yes	Yes (<i>Bos mutus</i>)	Yes	Yes	No	Nil
Khora Tso 2	Yes	Yes	Yes (<i>Bos mutus</i>)	NA	Yes	No	Nil
Khora Tso 3	Yes	Yes	Yes (<i>Bos mutus</i>)	NA	Yes	No	Nil
Khora Tso 4	Yes	Yes	Yes (<i>Bos mutus</i>)	NA	Yes	No	Nil
Khora Tso 5	Yes	Yes	NA	NA	Yes	No	Nil

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Name of the Wetland	Withdrawal of water/impoundment/diversion or any other hydrological intervention	Harvesting of resources (living / non-living)	Grazing	Discharge of treated sewage / effluent / wastewater	Construction of boat jetties and facilities for temporary use, as pantoon bridges	Aquaculture, agriculture and horticulture activities within the wetland boundaries	Any other, please list
Khora Tso	Yes	Yes	Yes (<i>Bos mutus</i>)	NA	Yes	No	Nil
Lachee Tso 1	Yes	Yes	Yes (<i>Bos mutus</i>)	NA	Yes	No	Nil
Lachee Tso 2	Yes	Yes	Yes (<i>Bos mutus</i>)	NA	Yes	No	Nil
Mukuthang Tso	Yes	Yes	Yes (<i>Bos mutus</i>)	NA	Yes	No	Nil
Ok Tso	Yes	Yes	Yes (<i>Bos mutus</i>)	NA	Yes	No	Nil
Om Tso	Yes	Yes	Yes (<i>Bos mutus</i>)	NA	Yes	No	Nil
Setong Tso	Yes	Yes	Yes (<i>Bos mutus</i>)	NA	Yes	No	Nil
Shaka Tso	Yes	Yes	Yes (<i>Bos mutus</i>)	Yes	Yes	No	Nil
Shechen Ragho 1	Yes	Yes	Yes (<i>Bos mutus</i>)	NA	Yes	No	Nil
Shechen Ragho	Yes	Yes	Yes (<i>Bos mutus</i>)	NA	Yes	No	Nil

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Name of the Wetland	Withdrawal of water/impoundment/diversion or any other hydrological intervention	Harvesting of resources (living / non-living)	Grazing	Discharge of treated sewage / effluent / wastewater	Construction of boat jetties and facilities for temporary use, as pantoon bridges	Aquaculture, agriculture and horticulture activities within the wetland boundaries	Any other, please list
South Lhonak	Yes	Yes	Yes (<i>Bos mutus</i>)	Yes	Yes	No	Nil
Tso Lhamo	Yes	Yes	Yes (<i>Bos mutus</i>)	NA	Yes	No	Nil
Tso Lhamo 1	Yes	Yes	Yes (<i>Bos mutus</i>)	Yes	Yes	No	Nil
Tso Lhamo 3	Yes	Yes	Yes (<i>Bos mutus</i>)	Yes	Yes	No	Nil
Tso Lhamo 4	Yes	Yes	Yes (<i>Bos mutus</i>)	Yes	Yes	No	Nil
Yangsaac	Yes	Yes	Yes (<i>Bos mutus</i>)	Yes	Yes	No	Nil
Yum Tso	Yes	Yes	Yes (<i>Bos mutus</i>)	Yes	Yes	No	Nil
Changme Lake 2 (Dry Lake)	No	NTFPs	Yes	No	No	No	Nil
B-Lake	No	NTFPs	Yes	No	No	No	Nil
Donkeya Chu	No	NTFPs	Yes	No	No	No	Nil

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Name of the Wetland	Withdrawal of water/impoundment/diversion or any other hydrological intervention	Harvesting of resources (living / non-living)	Grazing	Discharge of treated sewage / effluent / wastewater	Construction of boat jetties and facilities for temporary use, as pantoon bridges	Aquaculture, agriculture and horticulture activities within the wetland boundaries	Any other, please list
Gaya Gawn Lake1 (dry lake)	No	NTFPs	Yes	No	No	No	Nil
Gaya gawn Lake 4	No	NTFPs	Yes	No	No	No	Nil
Gayamchona Lake	No	NTFPs	Yes	No	No	No	Defence Land
Jadung Lake 1	No	NTFPs	Yes	No	No	No	Nil
Jadung Lake 2	No	NTFPs	Yes	No	No	No	Nil
Unnamed lake 1/singba lake	No	NTFPs	Yes	No	No	No	Nil
Unnamed Lake 2	No	NTFPs	Yes	No	No	No	Nil
Sebu Lake (Changme 1)	No	NTFPs	Yes	No	No	No	Nil
Chuba Lake	No	NTFPs	Yes	No	No	No	Nil
Black Lake/Namnasa Lake	No	NTFPs	Yes	No	No	No	Nil

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Name of the Wetland	Withdrawal of water/impoundment/diversion or any other hydrological intervention	Harvesting of resources (living / non-living)	Grazing	Discharge of treated sewage / effluent / wastewater	Construction of boat jetties and facilities for temporary use, as pantoon bridges	Aquaculture, agriculture and horticulture activities within the wetland boundaries	Any other, please list
Jachu valley (Ox-bow lake)	No	NTFPs	Yes	No	No	No	Nil
Changme 3	No	NTFPs	Yes	No	No	No	Nil
Yangchen Tso	No	No	No	No	No	No	Nil
Ka- Tso	No	No	No	No	No	No	Nil
Kyee Tso	No	No	No	No	No	No	Nil
Chume- Lham TSo	No	No	No	No	No	No	Nil
Tembao Lake	Need to access hydrological intervention for GLOF as occurred in past.	No	No	No	No	No	Nil
Tosar lake	No	No	Yes (Horses)	NA	No	No	Nil
Kishong Lake	No	No	No	No	No	No	Nil
Tingchim lake	Yes	Yes	No	No	No	No	Nil

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Name of the Wetland	Withdrawal of water/impoundment/diversion or any other hydrological intervention	Harvesting of resources (living / non-living)	Grazing	Discharge of treated sewage / effluent / wastewater	Construction of boat jetties and facilities for temporary use, as pantoon bridges	Aquaculture, agriculture and horticulture activities within the wetland boundaries	Any other, please list
Nakuchu Lake	No	No	Yes (Horses)	NA	No	No	Nil
Thang Chho	Yes	Yes	NA	NA	Yes	No	Nil
Hans Pokhari	No	No	Yes (Horses)	NA	No	No	Nil

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Table 10: Notification Category

Name of the Wetland	Included in Ramsar List	Included under National Wetland Conservation Program	Wetland is located in ecologically sensitive and important areas	Wetland is located within a UNESCO World Heritage Site	Wetland is located in religious/cultural site	High altitude wetland or wetland complex with area \geq 5 ha	Below an elevation of 2,500 m above sea level and having area \geq 500 ha	Others
Tsobuk Tso 1	No	No	Yes	Yes	No	No	No	Nil
Tsobuk Tso 2	No	No	Yes	Yes	No	No	No	Nil
Tsobuk Tso 3	No	No	Yes	Yes	No	No	No	Nil
Chomijadar Tso 1	No	No	Yes	Yes	No	No	No	Nil
Chomijadar Tso 2	No	No	Yes	Yes	No	Yes	No	Nil
Chomijadar Tso 3	No	No	Yes	Yes	No	No	No	Nil
Chomijadar Tso 4	No	No	Yes	Yes	No	Yes	No	Nil
Chomijadar Tso 5	No	No	Yes	Yes	No	No	No	Nil
Chunguphu Tso	No	No	Yes	Yes	No	No	No	Nil

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Name of the Wetland	Included in Ramsar List	Included under National Wetland Conservation Program	Wetland is located in ecologically sensitive and important areas	Wetland is located within a UNESCO World Heritage Site	Wetland is located in religious/cultural site	High altitude wetland or wetland complex with area \geq 5 ha	Below an elevation of 2,500 m above sea level and having area \geq 500 ha	Others
Dokung	No	No	Yes	Yes	No	No	No	Nil
Em Tso	No	No	Yes	Yes	No	No	No	Nil
Em Tso 2	No	No	Yes	Yes	No	No	No	Nil
Fogay Tso 1	No	No	Yes	Yes	No	No	No	Nil
Fogay Tso 2	No	No	Yes	Yes	No	No	No	Nil
Fogay Tso 3	No	No	Yes	Yes	No	No	No	Nil
Gachang Tso	No	No	Yes	Yes	No	No	No	Nil
Gapzee Tso 1	No	No	Yes	Yes	No	No	No	Nil
Gapzee Tso 2	No	No	Yes	Yes	No	No	No	Nil

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Name of the Wetland	Included in Ramsar List	Included under National Wetland Conservation Program	Wetland is located in ecologically sensitive and important areas	Wetland is located within a UNESCO World Heritage Site	Wetland is located in religious/cultural site	High altitude wetland or wetland complex with area \geq 5 ha	Below an elevation of 2,500 m above sea level and having area \geq 500 ha	Others
Gapzee Tso 3	No	No	Yes	Yes	No	Yes	No	Nil
Gukul Tso	No	No	Yes	Yes	No	No	No	Nil
Gurudongmar 1	No	Yes	Yes	No	Yes	Yes	No	Nil
Gurudongmar 2	No	Yes	Yes	No	Yes	No	No	Nil
Gurudongmar 3	No	Yes	Yes	No	Yes	Yes	No	Nil
Gurudongmar 4	No	Yes	Yes	No	Yes	Yes	No	Nil
Gurudongmar 5	No	Yes	Yes	No	Yes	Yes	No	Nil
Janak 1 Tso 1	No	No	No	No	No	Yes	No	Nil
Janak 1 Tso 2	No	No	No	No	No	No	No	Nil

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Name of the Wetland	Included in Ramsar List	Included under National Wetland Conservation Program	Wetland is located in ecologically sensitive and important areas	Wetland is located within a UNESCO World Heritage Site	Wetland is located in religious/cultural site	High altitude wetland or wetland complex with area \geq 5 ha	Below an elevation of 2,500 m above sea level and having area \geq 500 ha	Others
Janak 1 Tso 3	No	No	No	No	No	No	No	Nil
Janak 2 Tso 1	No	No	No	No	No	No	No	Nil
Janak 2 Tso 2	No	No	No	No	No	No	No	Nil
Janak 2 Tso 3	No	No	No	No	No	No	No	Nil
Janak 2 Tso 4	No	No	No	No	No	No	No	Nil
Kalapathar Tso 1	No	Yes	No	No	No	No	No	Nil
Khora Tso 1	No	Yes	No	No	No	No	No	Nil
Khora Tso 2	No	Yes	No	No	No	No	No	Nil
Khora Tso 3	No	Yes	No	No	No	No	No	Nil

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Name of the Wetland	Included in Ramsar List	Included under National Wetland Conservation Program	Wetland is located in ecologically sensitive and important areas	Wetland is located within a UNESCO World Heritage Site	Wetland is located in religious/cultural site	High altitude wetland or wetland complex with area \geq 5 ha	Below an elevation of 2,500 m above sea level and having area \geq 500 ha	Others
Khora Tso 4	No	Yes	No	No	No	No	No	Nil
Khora Tso 5	No	Yes	No	No	No	No	No	Nil
Khora Tso	No	Yes	No	No	No	No	No	Nil
Lachee Tso 1	No	Yes	No	No	No	No	No	Nil
Lachee Tso 2	No	Yes	No	No	No	No	No	Nil
Mukuthang Tso	No	Yes to be verified	Yes to be verified	No	Yes	Yes	No	Nil
Ok Tso	No	Yes	Yes	No	Yes	Yes	No	Nil
Om Tso	No	Yes	Yes	No	Yes	Yes	No	Nil
Setong Tso	No	Yes	No	No	No	No	No	Nil

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Name of the Wetland	Included in Ramsar List	Included under National Wetland Conservation Program	Wetland is located in ecologically sensitive and important areas	Wetland is located within a UNESCO World Heritage Site	Wetland is located in religious/cultural site	High altitude wetland or wetland complex with area \geq 5 ha	Below an elevation of 2,500 m above sea level and having area \geq 500 ha	Others
Shaka Tso	No	Yes	No	No	No	No	No	Nil
Shechen Ragho 1	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Nil
Shechen Ragho	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Nil
South Lhonak	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Nil
Tso Lhamo	No	Yes	No	No	No	No	No	Nil
Tso Lhamo 1	No	Yes	No	No	No	No	No	Nil
Tso Lhamo 3	No	Yes	No	No	No	No	No	Nil
Tso Lhamo 4	No	Yes	Yes	No	Yes	Yes	No	Nil
Yangsaac	No	No	No	No	No	No	No	Nil

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Name of the Wetland	Included in Ramsar List	Included under National Wetland Conservation Program	Wetland is located in ecologically sensitive and important areas	Wetland is located within a UNESCO World Heritage Site	Wetland is located in religious/cultural site	High altitude wetland or wetland complex with area \geq 5 ha	Below an elevation of 2,500 m above sea level and having area \geq 500 ha	Others
Yum Tso	No	No	No	No	No	No	No	Nil
Changme Lake 2 (Dry Lake)	No	No	Yes	No	Yes	Yes	No	Nil
B-Lake	No	No	Yes	No	Yes	Yes	No	Nil
Donkeya Chu	No	No	Yes	No	Yes	Yes	No	Nil
Gaya Gawn Lake1 (dry lake)	No	No	Yes	No	Yes	Yes	No	Nil
Gaya gawn Lake 4	No	No	Yes	No	Yes	Yes	No	Nil
Gayamchona Lake	No	No	Yes	No	Yes	Yes	No	Nil
Jadung Lake 1	No	No	Yes	No	Yes	Yes	No	Nil
Jadung Lake 2	No	No	Yes	No	Yes	Yes	No	Nil

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Name of the Wetland	Included in Ramsar List	Included under National Wetland Conservation Program	Wetland is located in ecologically sensitive and important areas	Wetland is located within a UNESCO World Heritage Site	Wetland is located in religious/cultural site	High altitude wetland or wetland complex with area \geq 5 ha	Below an elevation of 2,500 m above sea level and having area \geq 500 ha	Others
Unnamed lake 1/singba lake	No	No	Yes	No	Yes	Yes	No	Nil
Unnamed Lake 2	No	No	Yes	No	Yes	Yes	No	Nil
Sebu Lake (Changme 1)	No	No	Yes	No	Yes	Yes	No	Nil
Chuba Lake	No	No	Yes	No	Yes	Yes	No	Nil
Black Lake/Namnasa Lake	No	No	Yes	No	Yes	Yes	No	Nil
Jachu valley (Ox-bow lake)	No	No	Yes	No	Yes	Yes	No	Nil
Changme 3	No	No	Yes	No	Yes	Yes	No	Nil
Yangchen Tso	No	No	Yes	No	Yes	Yes	No	Nil

Preparation of Brief Document on Wetlands of Sikkim

Name of the Wetland	Included in Ramsar List	Included under National Wetland Conservation Program	Wetland is located in ecologically sensitive and important areas	Wetland is located within a UNESCO World Heritage Site	Wetland is located in religious/cultural site	High altitude wetland or wetland complex with area \geq 5 ha	Below an elevation of 2,500 m above sea level and having area \geq 500 ha	Others
Ka- Tso	No	No	Yes	No	Yes	Yes	No	Nil
Kyee Tso	No	No	Yes	No	Yes	Yes	No	Nil
Chume- Lham TSo	No	No	Yes	No	Yes	Yes	No	Nil
Tembao Lake	No	Yes	Yes	No	Yes	Yes	No	Nil
Tosar lake	No	No	Yes	No	No	Yes	No	Nil
Kishong Lake	No	No	Yes	No	No	Yes	No	Nil
Tingchim lake	No	No	Yes	No	No	Yes	No	Nil
Nakuchu Lake	No	No	Yes	No	No	Yes	No	Nil
Thang Chho	No	Yes	No	No	No	No	No	Nil

Preparation of Brief Document on Wetlands of Sikkim

Name of the Wetland	Included in Ramsar List	Included under National Wetland Conservation Program	Wetland is located in ecologically sensitive and important areas	Wetland is located within a UNESCO World Heritage Site	Wetland is located in religious/cultural site	High altitude wetland or wetland complex with area \geq 5 ha	Below an elevation of 2,500 m above sea level and having area \geq 500 ha	Others
Hans Pokhari	No	No	Yes	No	No	Yes	No	Nil

Annexure: 3
Maps of the Surveyed Wetlands
(West Sikkim)

Preparation of Brief Document on Wetlands of Sikkim

1. Khecheolapalri Lake

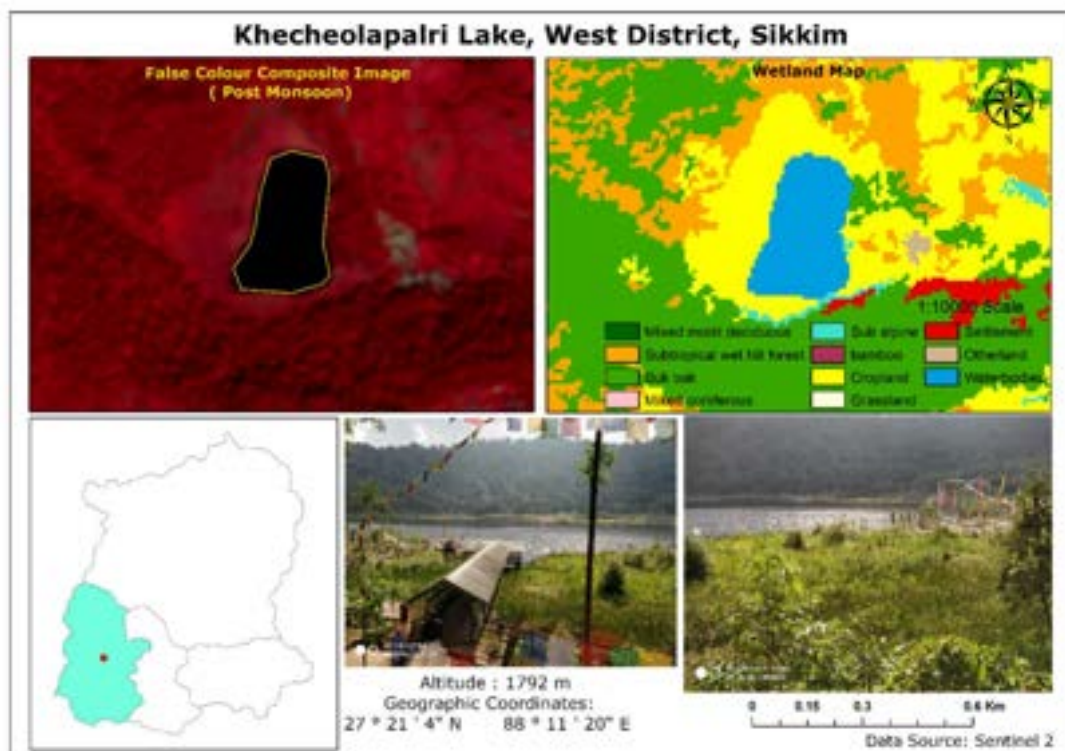


Figure 165: Khecheolapalri Lake

2. Katok Lake

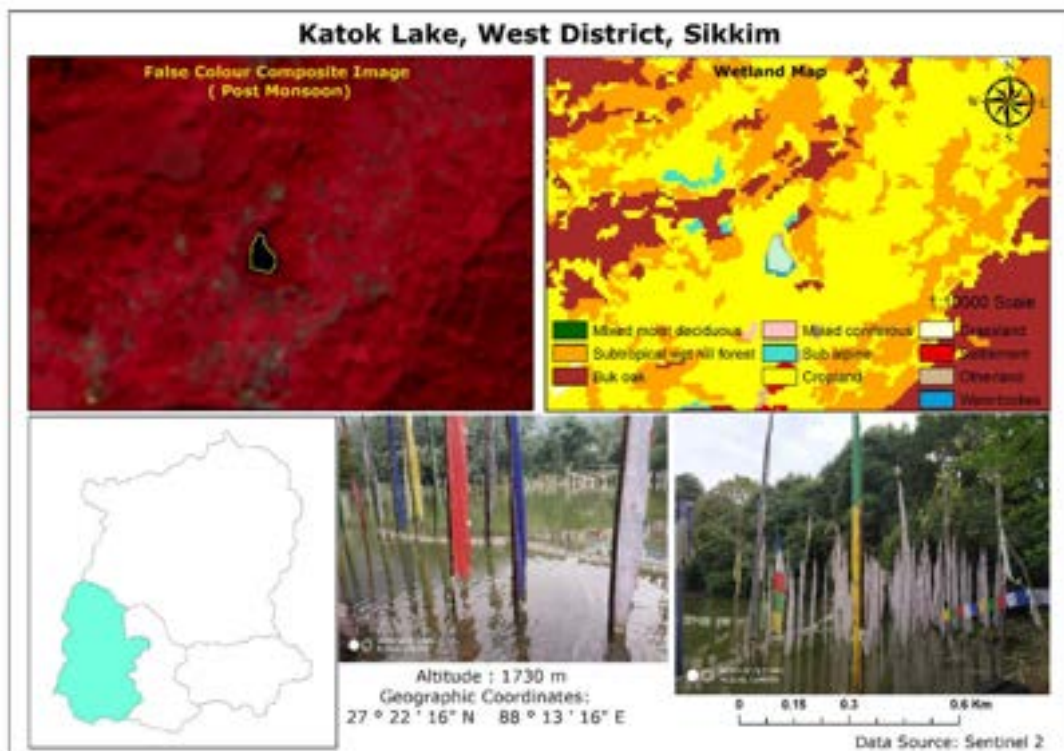


Figure 166: Katok Lake

3. Samiti Lake

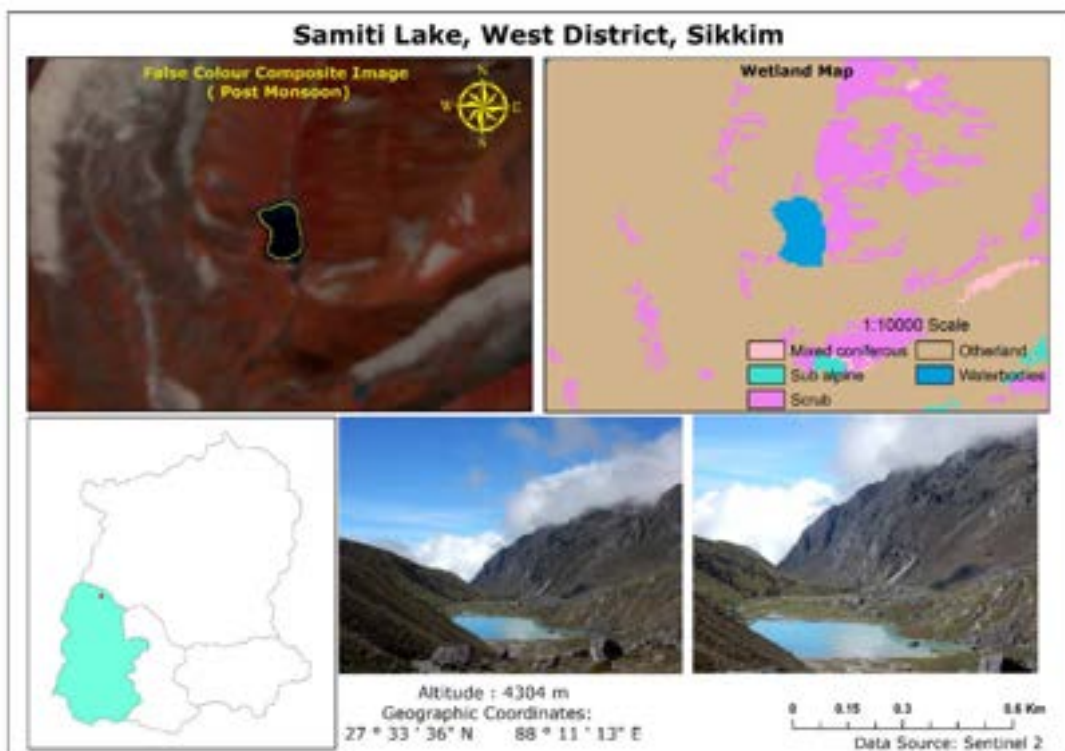


Figure 167: Samiti Lake

4. Goru Lake

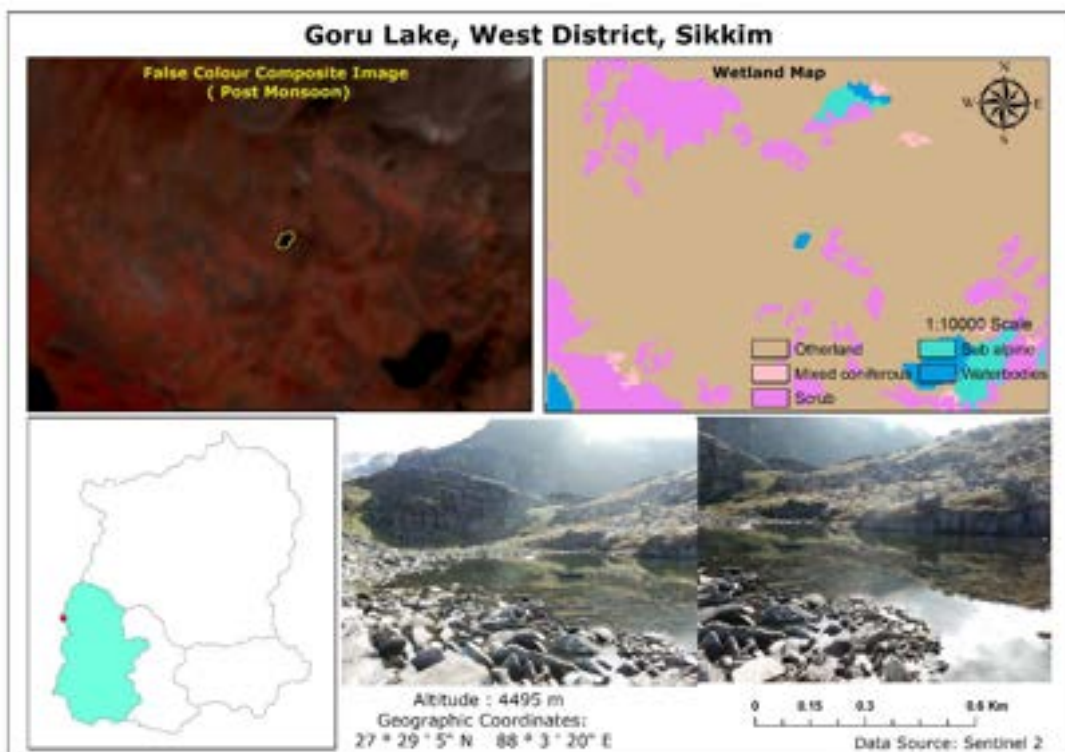


Figure 168: Goru Lake

5. Guyam Lake

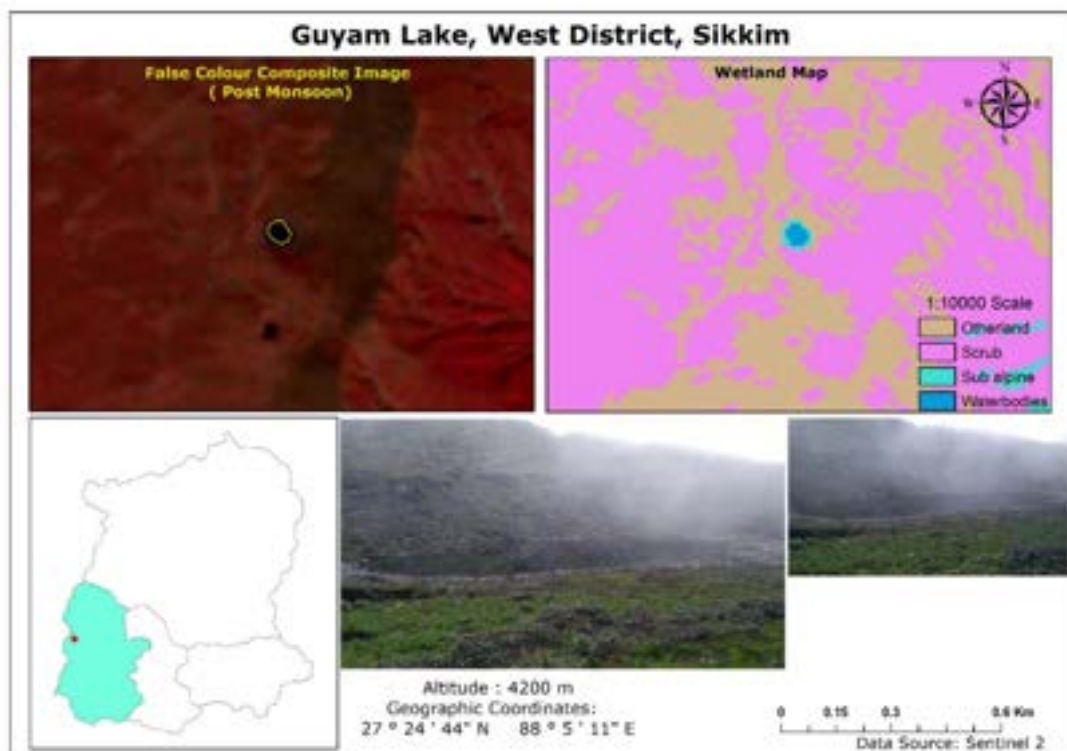


Figure 169: Guyam Lake

6. Hash Lake

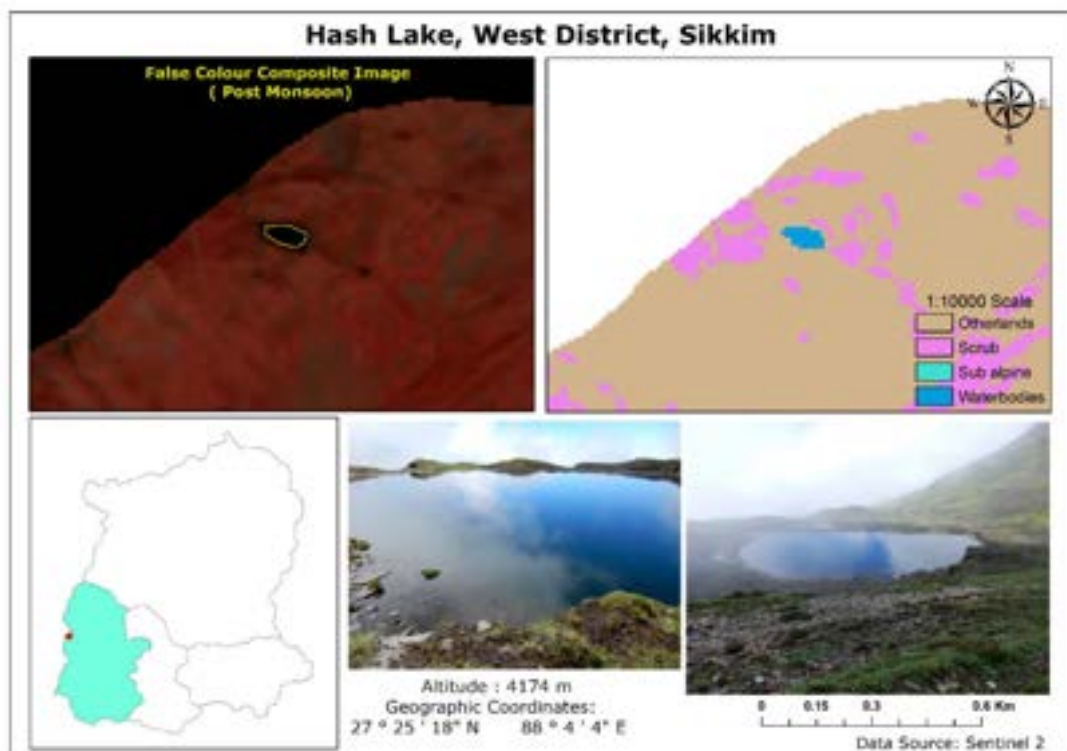


Figure 170: Hash Lake

7. Jumlay Complex Lake

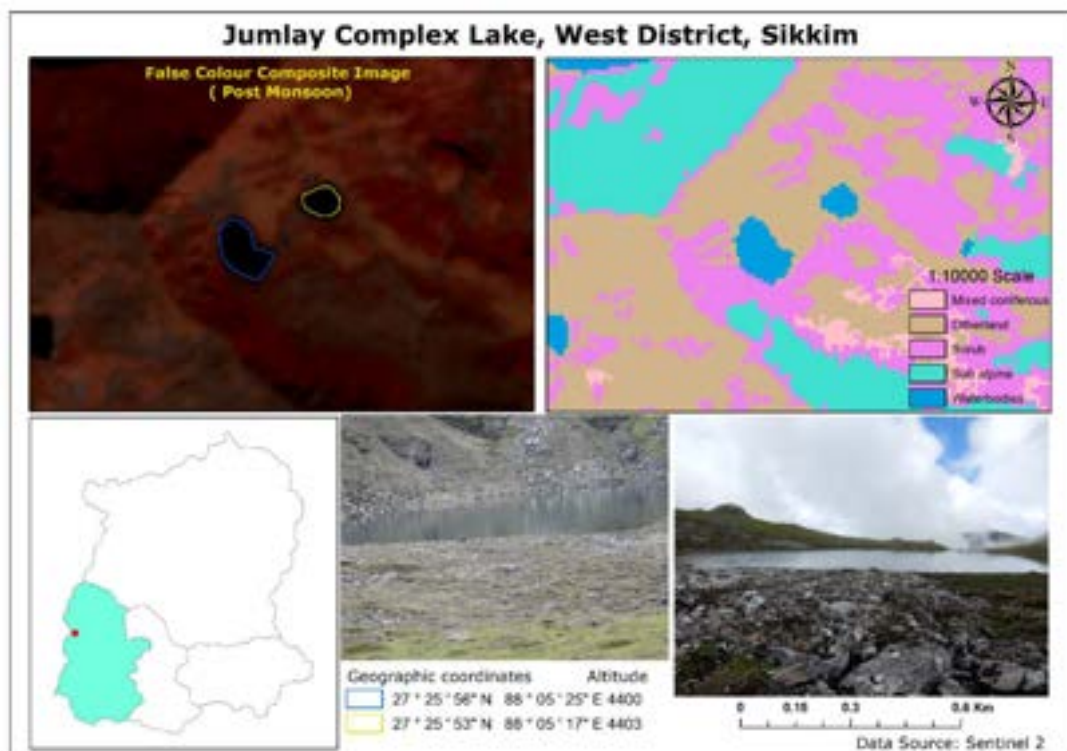


Figure 171: Jumlay Complex Lake

8. Kala Lake

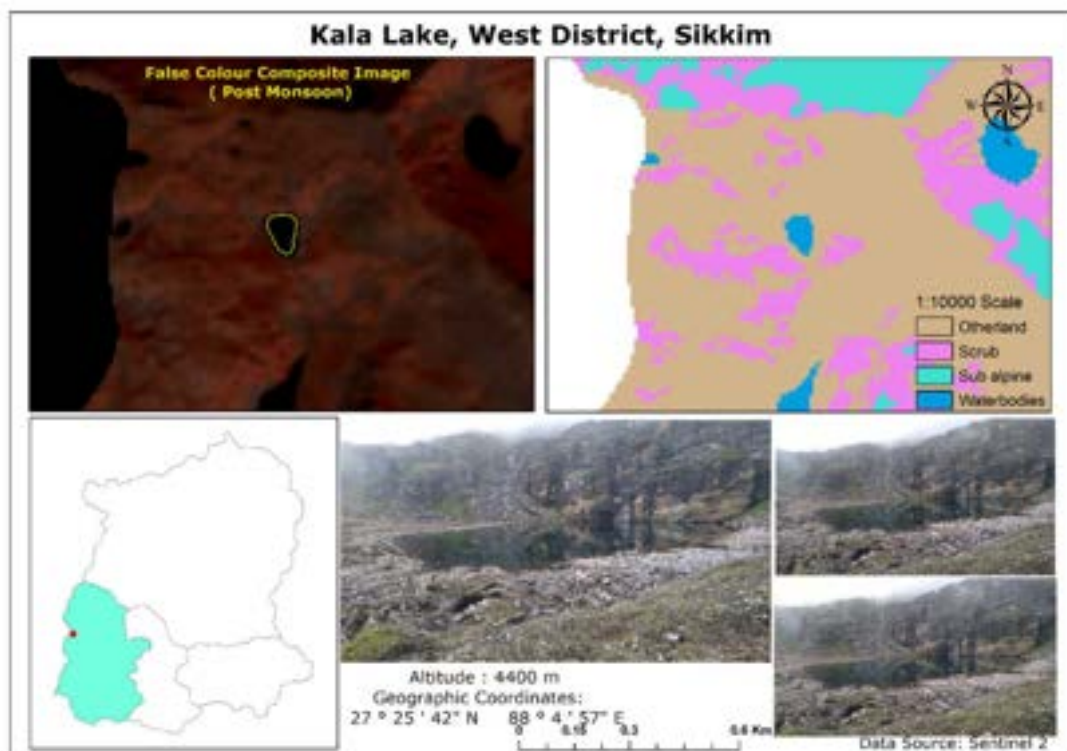


Figure 172: Kala Lake

9. Kanchi Lake

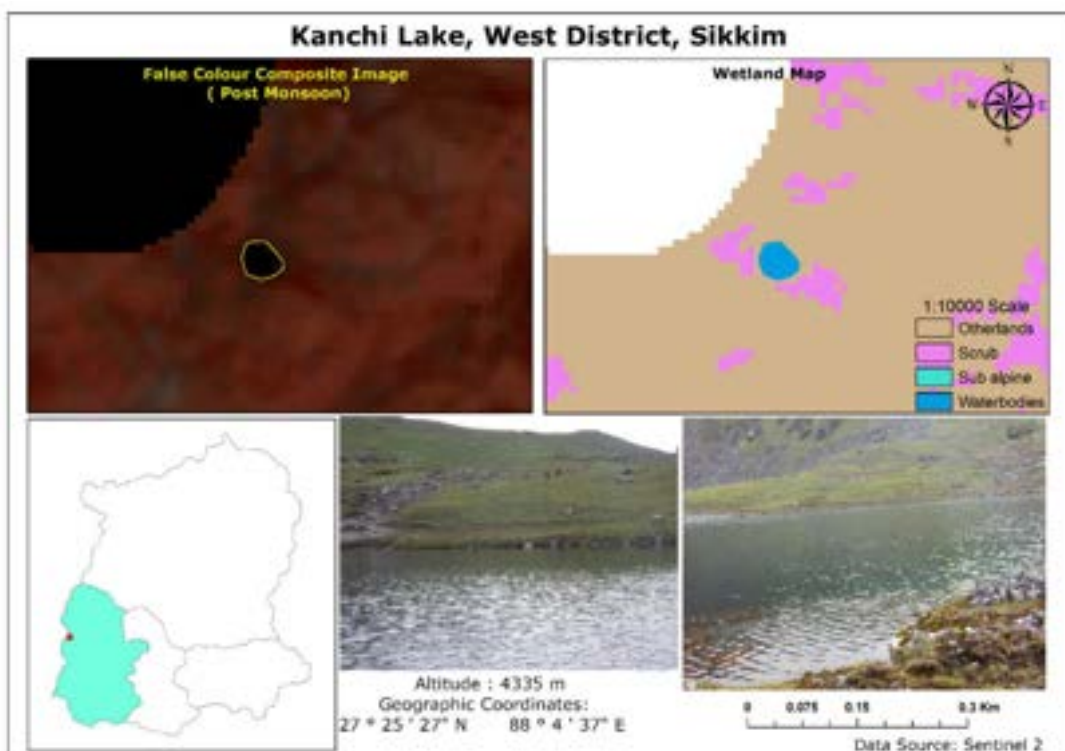


Figure 173: Kanchi Lake

10. Ladua Lake

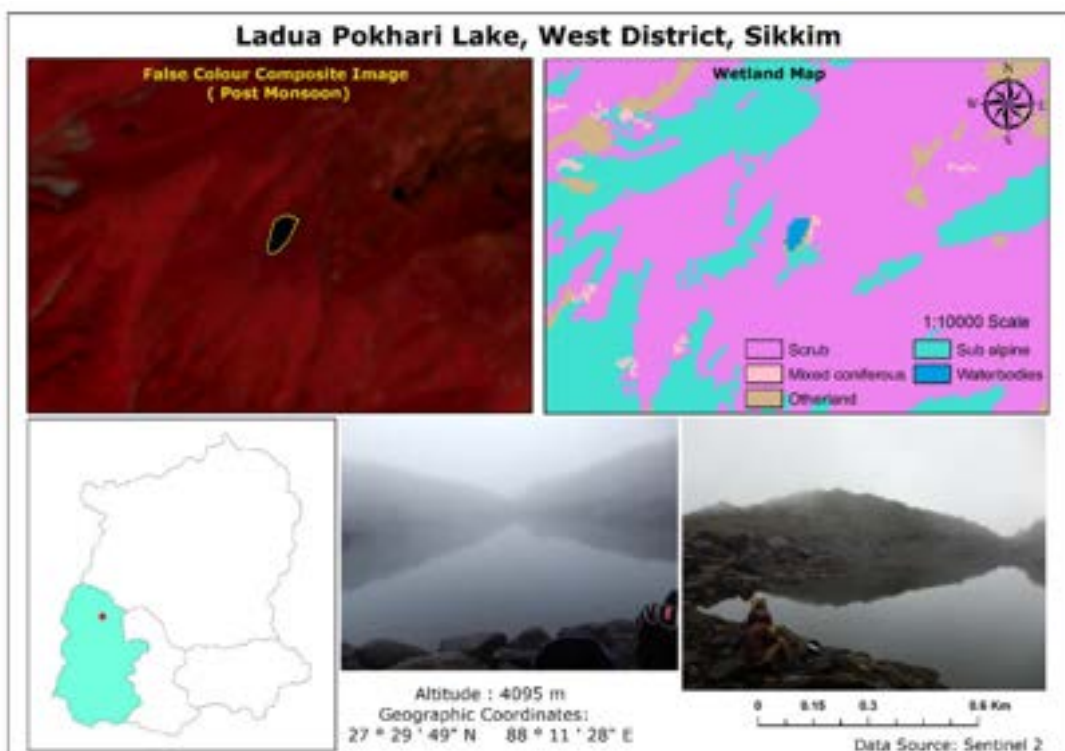


Figure 174: Ladua Lake

11. Lam Pokhari Lake 1

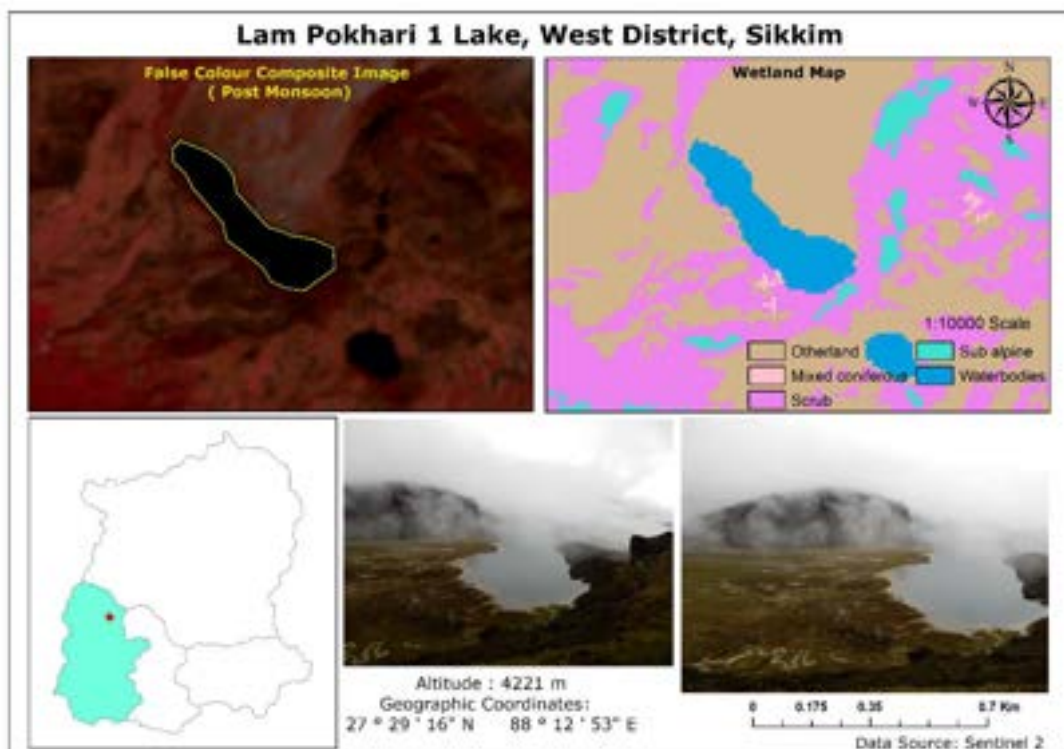


Figure 175: Lam Pokhari Lake 1

12. Lam Pokhari Lake 2

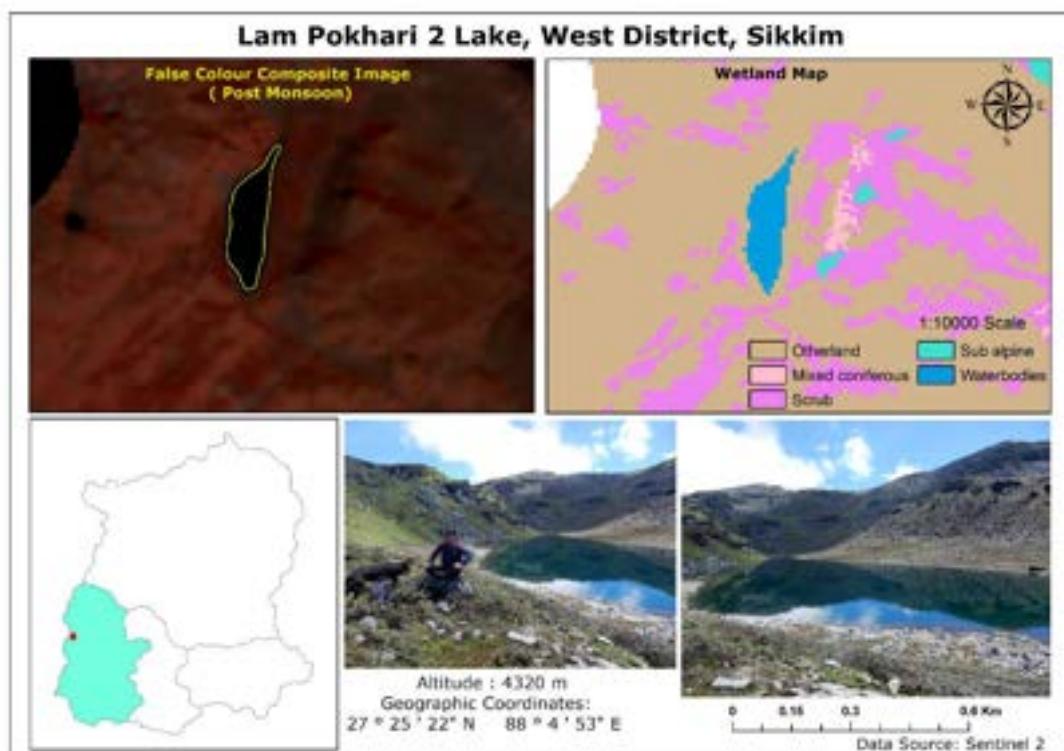


Figure 176: Lam Pokhari Lake 2

13. Laxmi Pokhari Lake 1

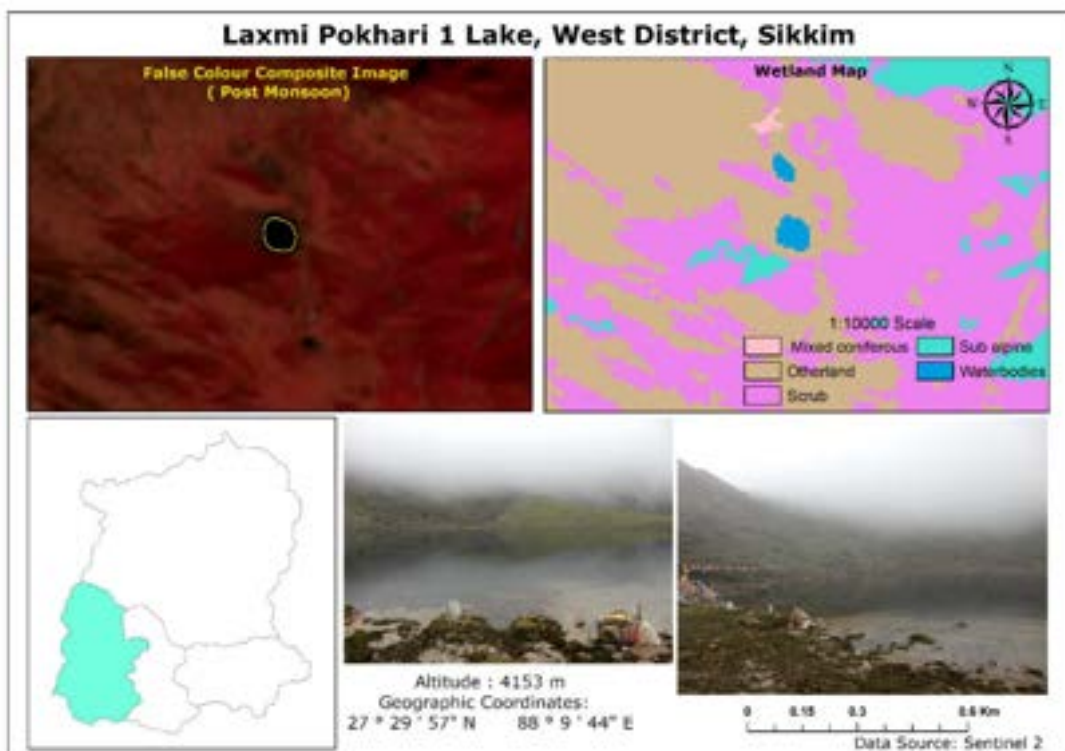


Figure 177: Laxmi Pokhari Lake 1

14. Laxmi Pokhari Lake 2

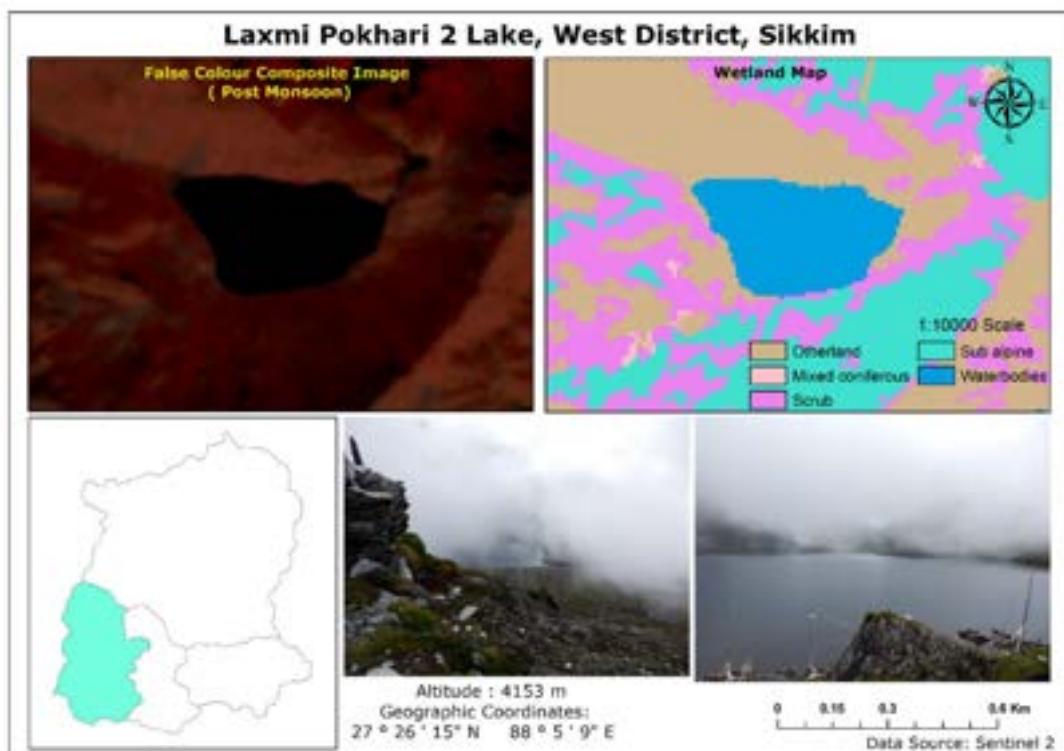


Figure 178: Laxmi Pokhari Lake 2

15. Mazur Lake

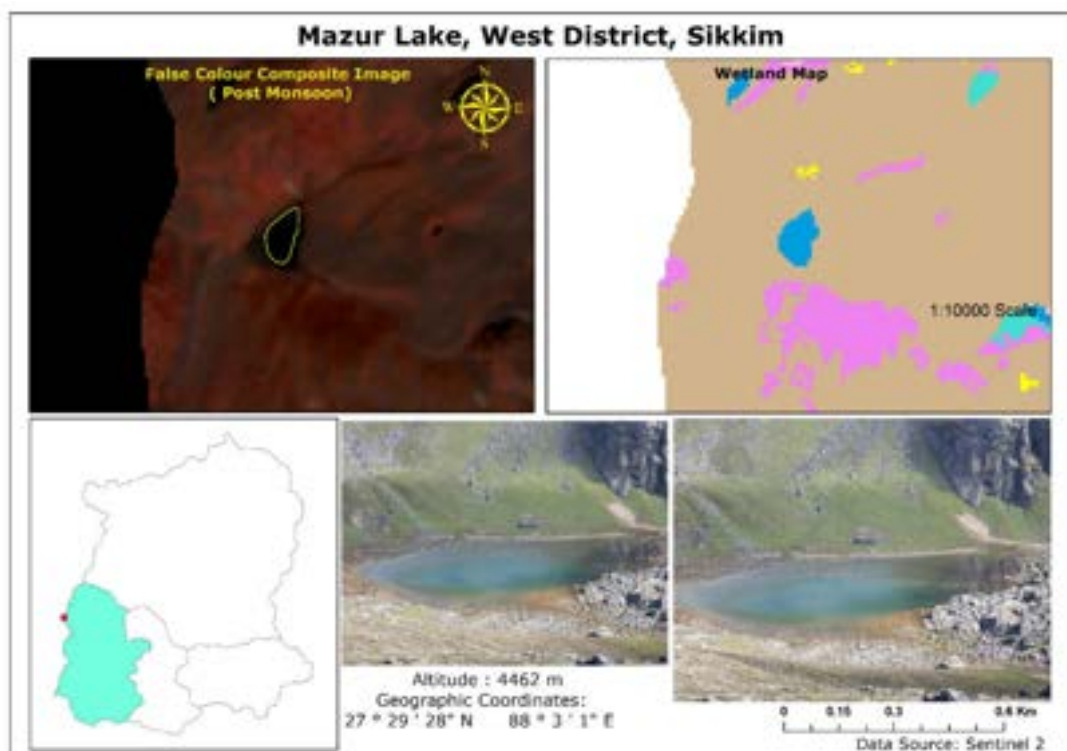


Figure 179: Mazur Lake

16. Neer Pokhari Lake 1

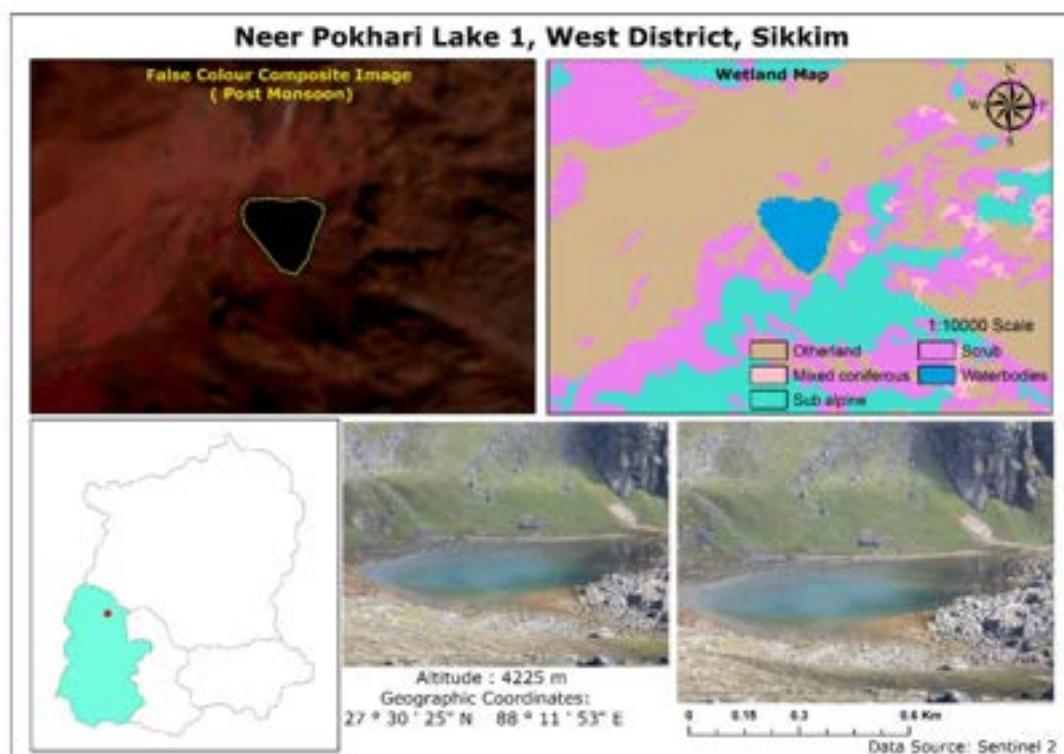


Figure 180: Neer Pokhari Lake 1

17. Neer Pokhari Lake 2

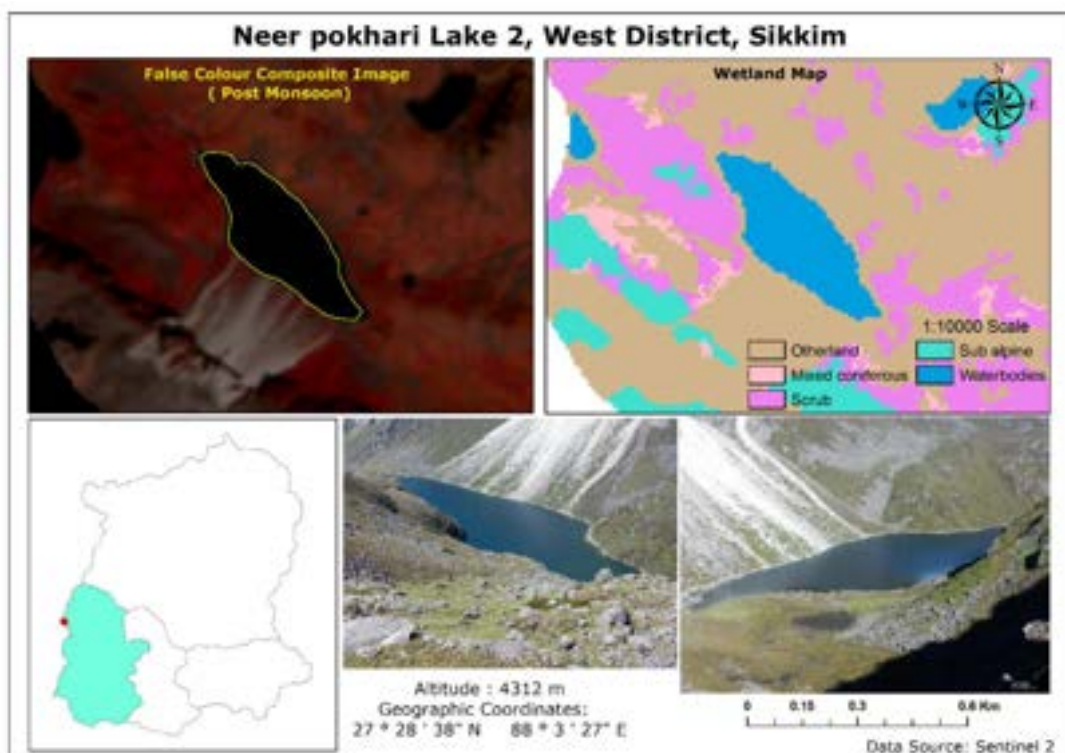


Figure 181: Neer Pokhari Lake 2

18. Ram Laxman Lake

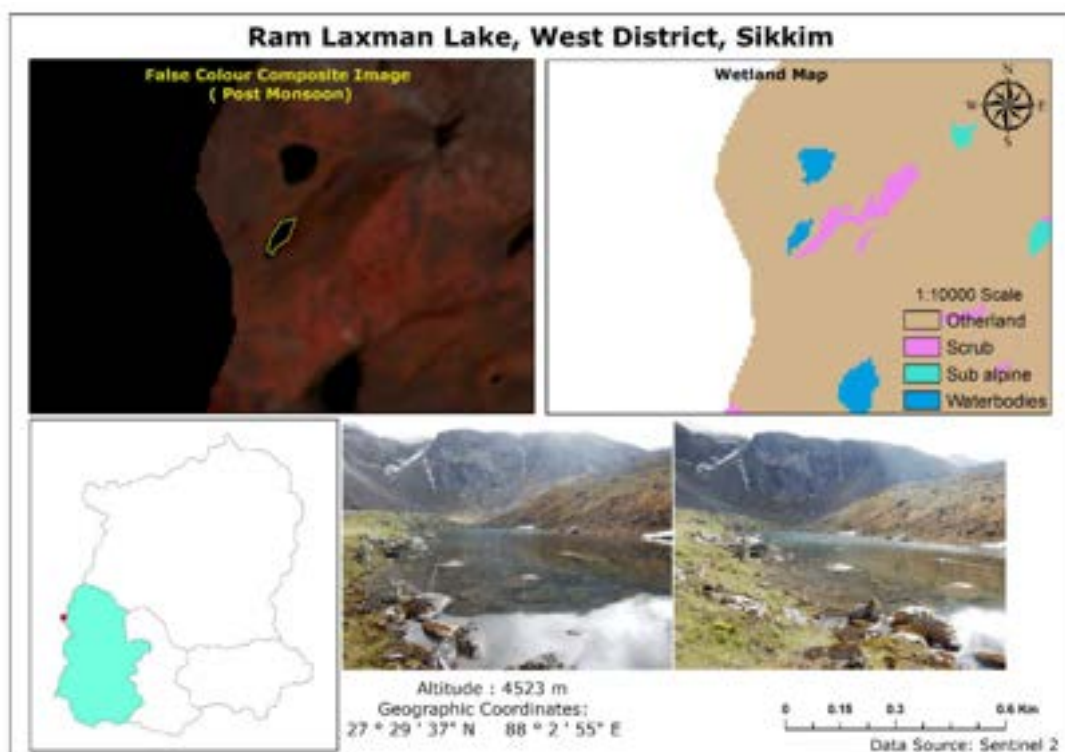


Figure 182: Ram Laxman Lake

19. Rathong complex Lake

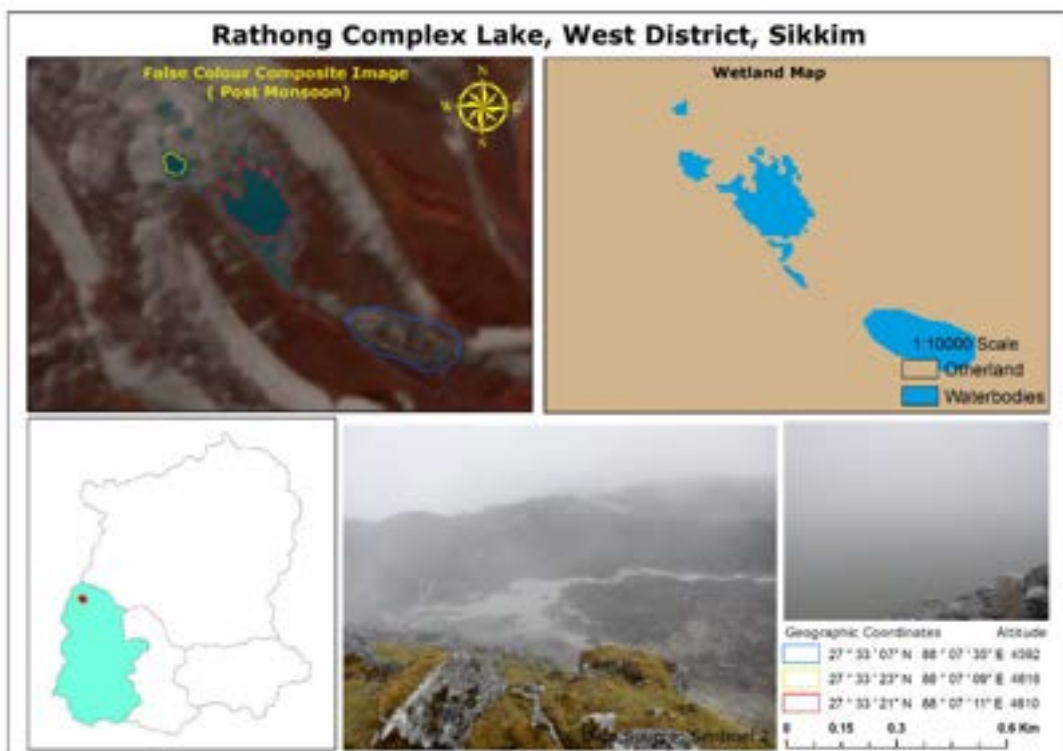


Figure 183: Rathong Complex Lake

20. Sukhe Pokhari Lake

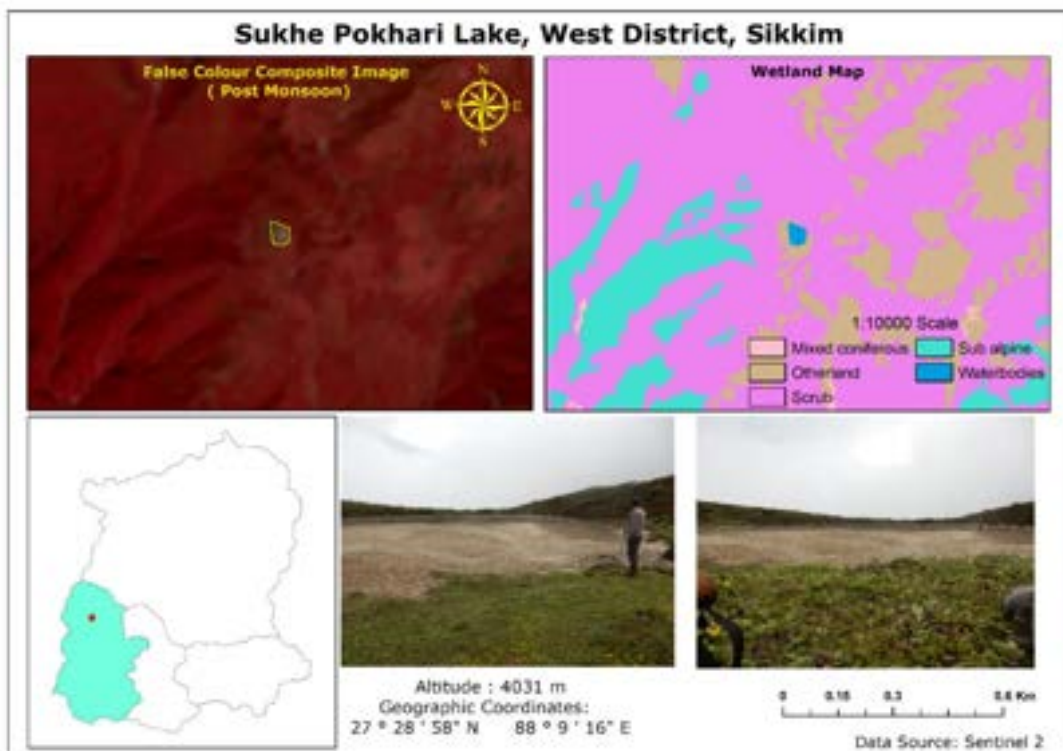


Figure 184: Sukhe Pokhari Lake

21. Surkey Pokhari Lake

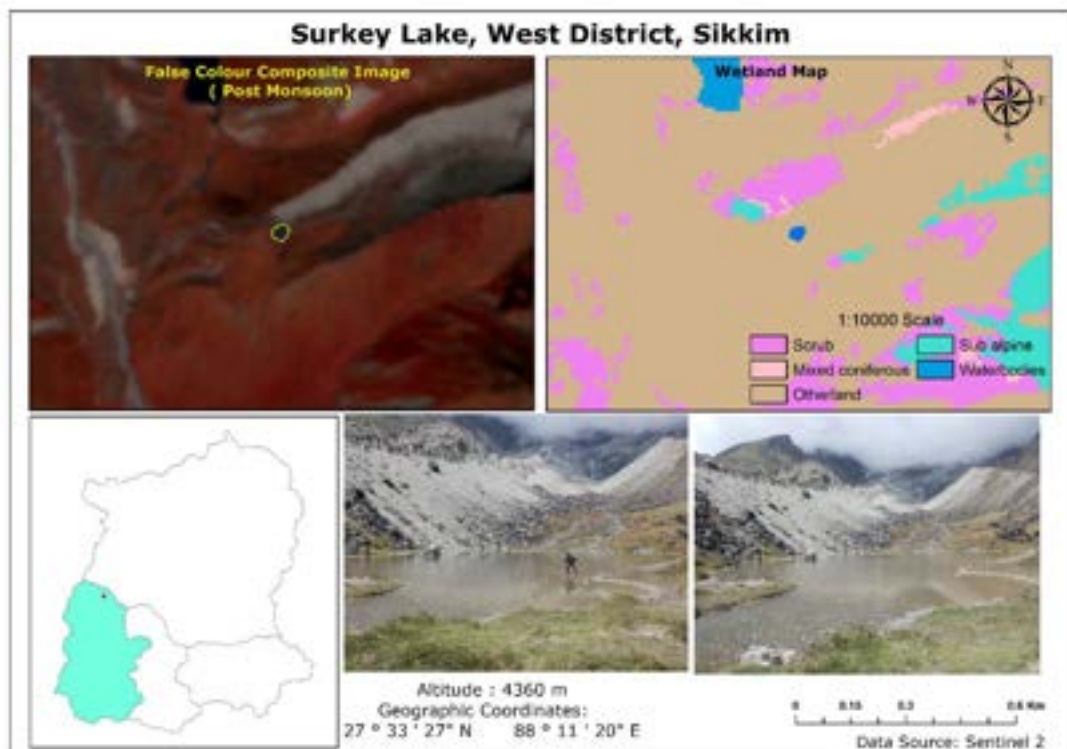


Figure 185: Surkey Lake

22. Tinkunay Lake

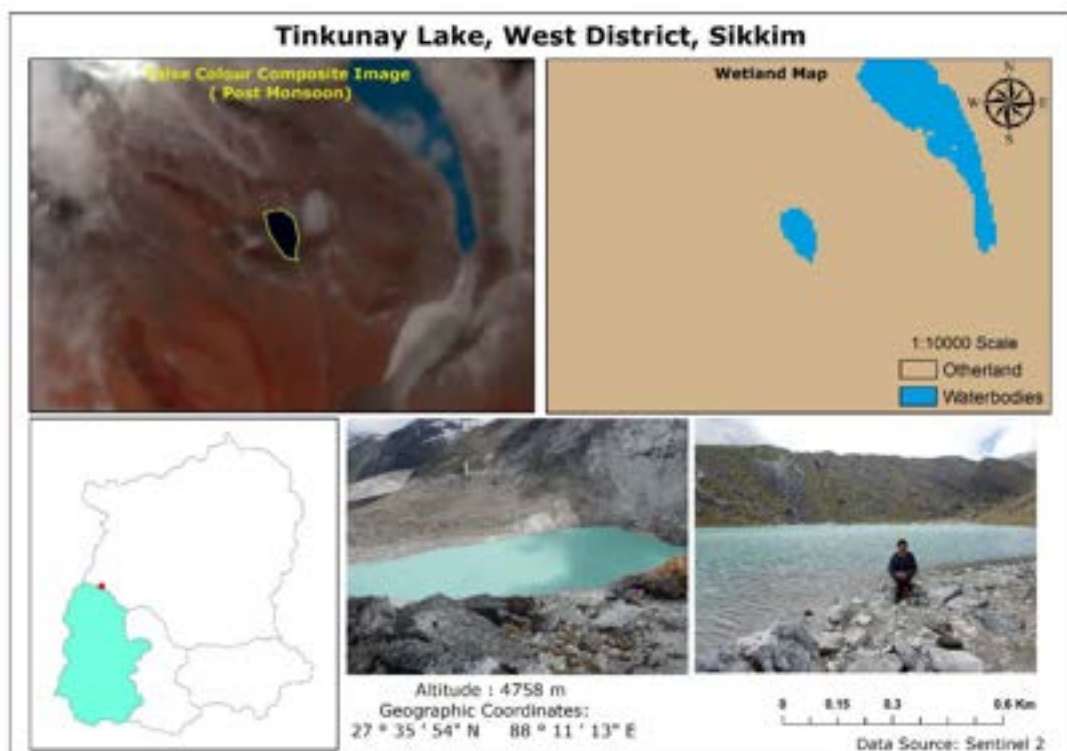


Figure 186: Tinkunay Lake

23. Goe chala Lake

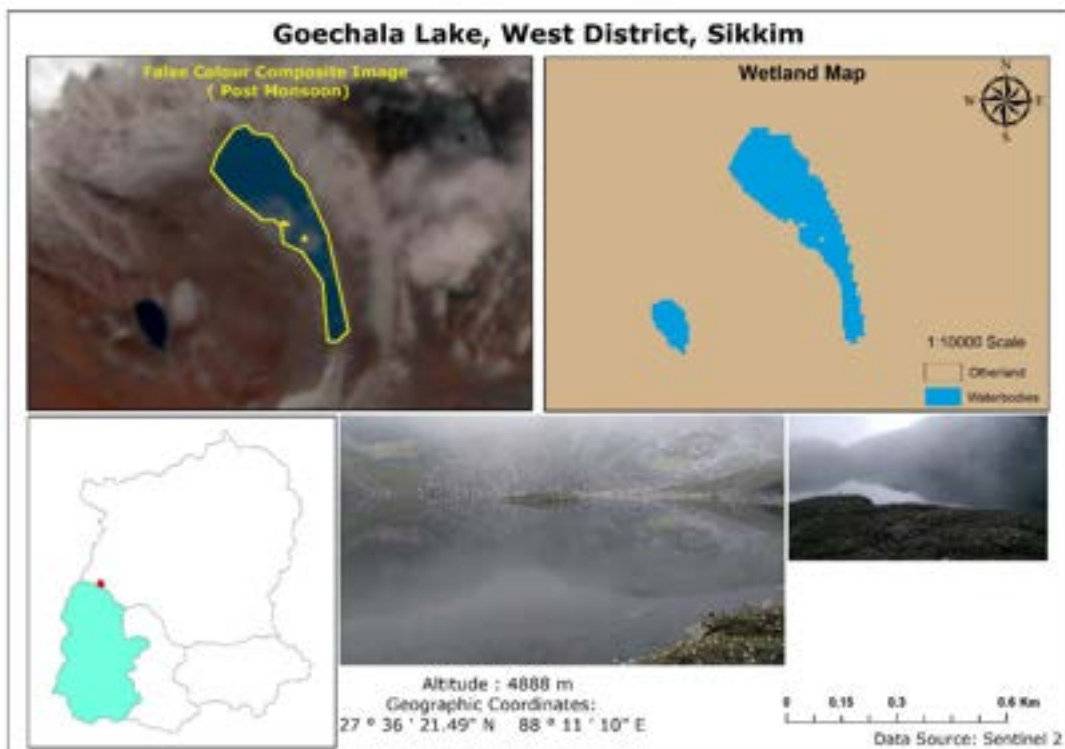


Figure 187: Goe Chala Lake

24. Bhalay Lake



Figure 188: Bhalay Lake

25. Dally Pokhari 1 Lake

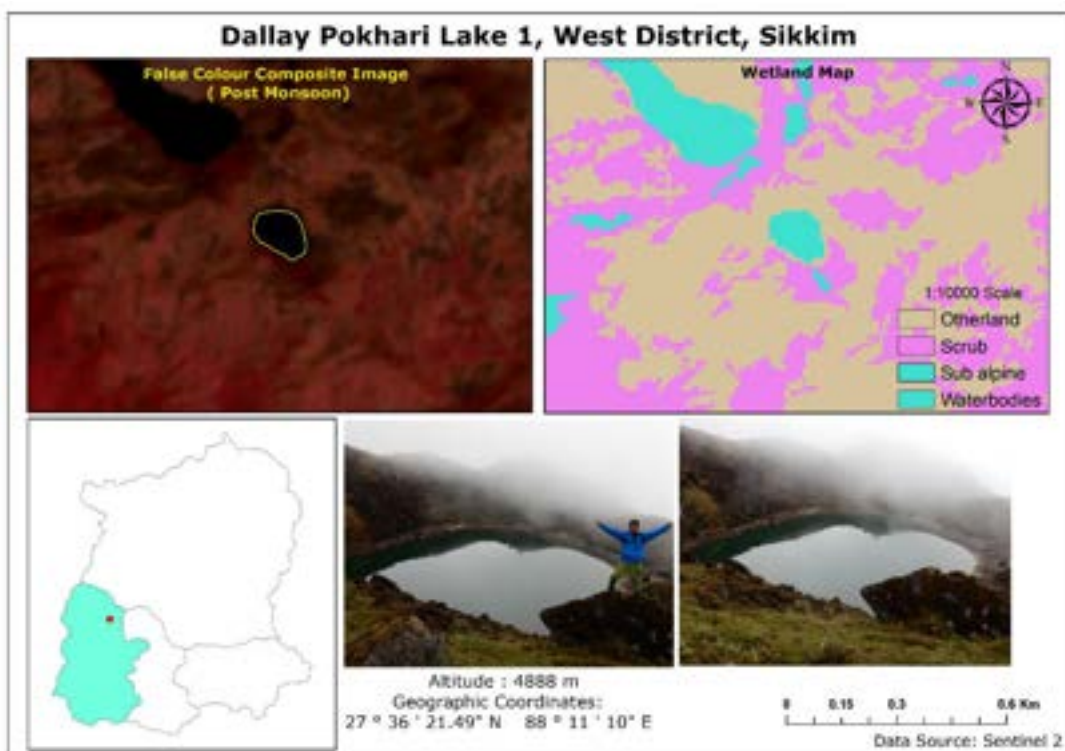


Figure 189: Dally Pokhari Lake 1

26. Dally Pokhari 2 Lake

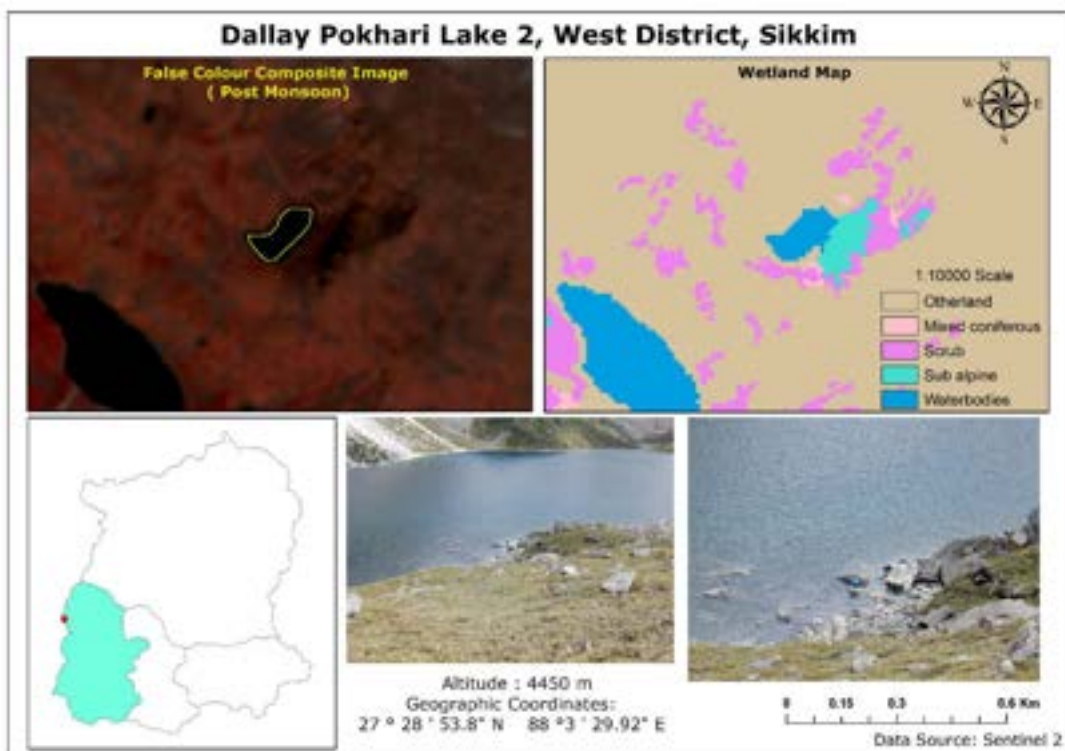


Figure 190: Dally Pokhari Lake 2

27. Dunga Lake

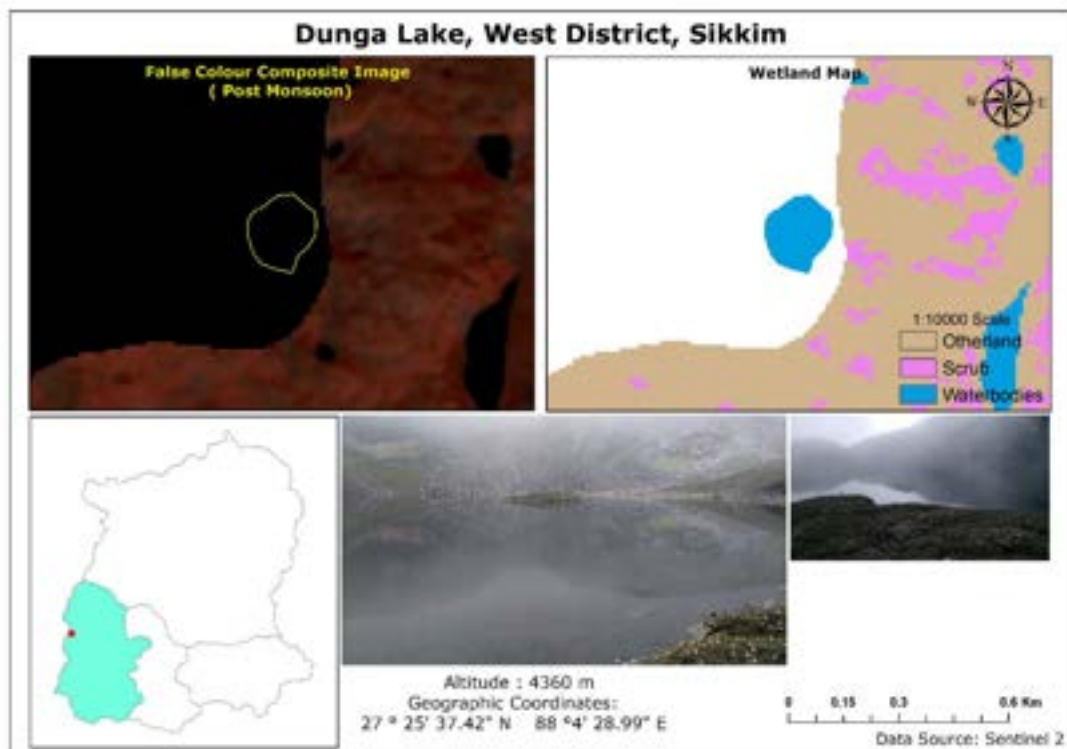


Figure 191: Dunga Lake

28. Akha Lake

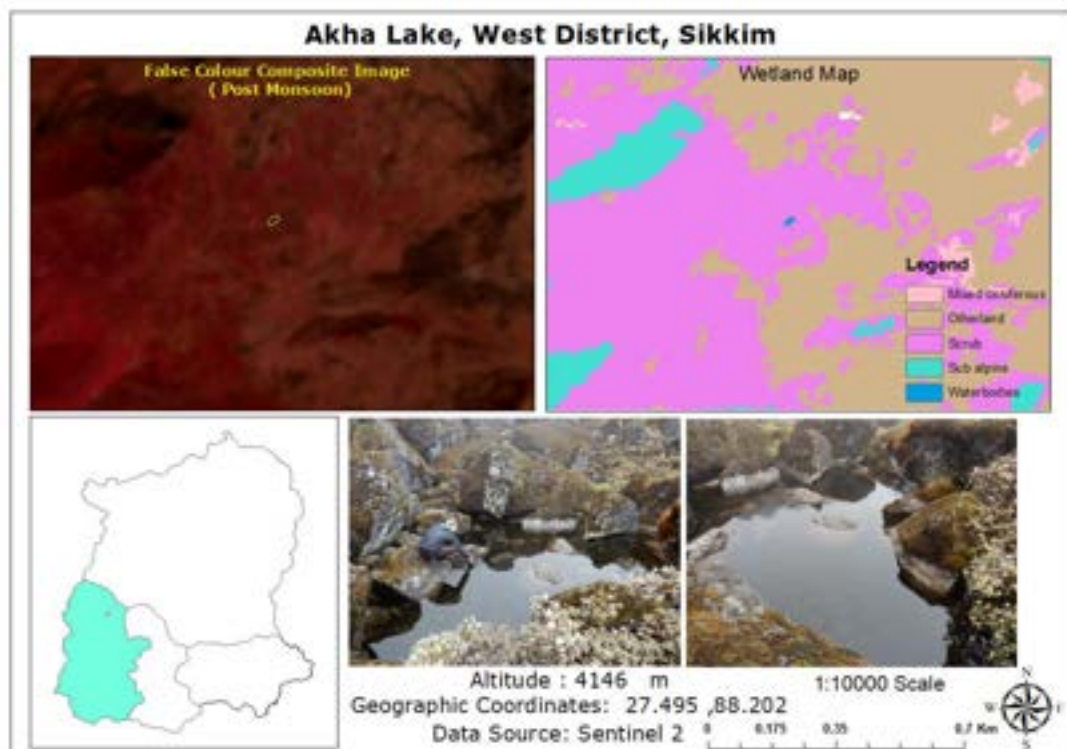


Figure 192: Akha Lake

29. Doodh Pokhari Lake

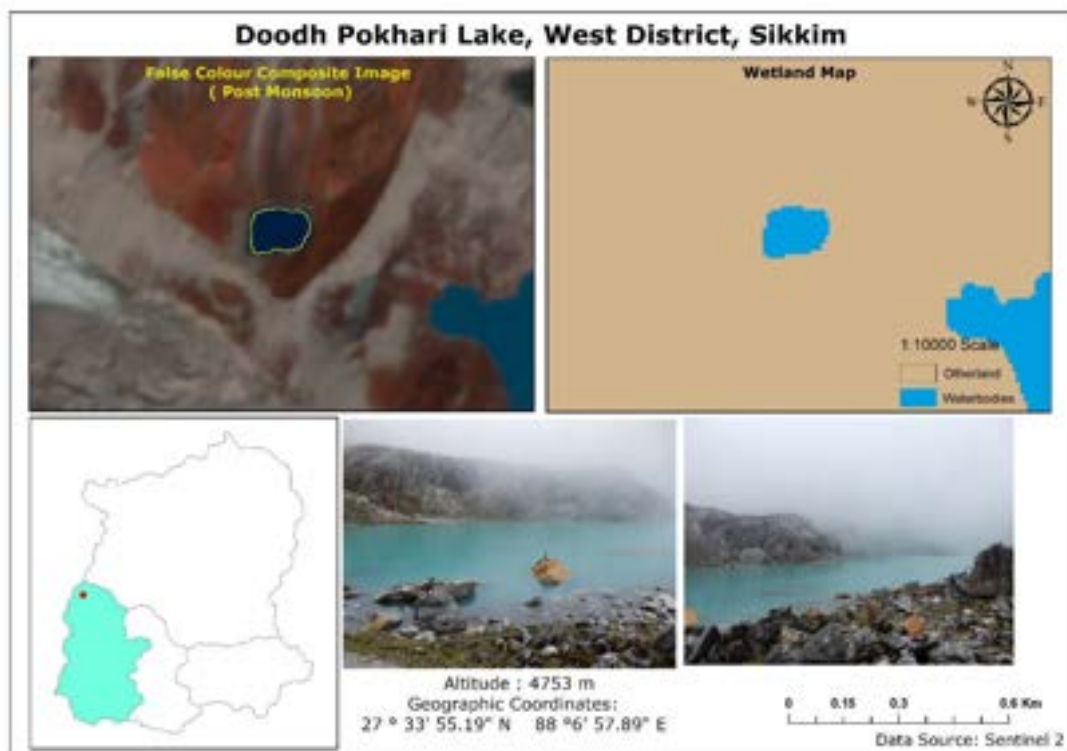


Figure 193: Doodh Pokhari Lake

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KHECHEOPALRI LAKE

Mountains have ecological, aesthetic, and socioeconomic significance. The mountainous region of Sikkim in the Eastern Himalaya is a sacred landscape and is a centre for cultural and spiritual inspiration for Buddhist and Hindu cultural societies. The Khecheopalri Lake one such lake which is regarded as the part of the wider Demazong Cultural Landscape and is situated at 27° 21' 10.13"N and 88° 11' 25.23"E at 1820 m altitude in West Sikkim which is estimated to be more than 3500 years old (Jain et al., 2000). It is protected under the Provisions of the Places of Worship (Special Provision) Act, 1991 and State Government Notification No. 59/Home/98 dated 26.10.1998. The lake represents the original neve region of ancient hanging glaciers, the depression is formed by the scooping action of the glaciers (Raina, 1966). It is surrounded by the densely forested Ramam watershed covering an area of 12 km² and is a repository of biodiversity. It is also the halting place for the Trans Himalayan migratory birds (Jain et al., 2000). The word Demazong also signifies the “valley of rice”, i.e. the rice produced within the vicinity of the Khecheopalri area is believed to sustain the food security and ensure good productivity to the local indigenous communities. The Lake is regarded as holy and wish fulfilling. This lake represents one of the four plexus of the human body namely, the chest; the other three plexes are said to be represented by yoksum (the third eye), pemayangtse (the heart) and Tashiding (head). One of the festivals purely organized by the Monastery Dwiche Committee is Chho-Tsho, while another very important festival is Bumchu. Chho-Tsho is organized to thank the presiding deity of the lake for protection and bestowing food to the local inhabitants. It is a potential source of income generation in the remote hilly areas and employment opportunities to the local community.

The lake is exposed to high influx of tourists. Significant land use cover change during past four decades has resulted in its deterioration¹. Heavy sediment loads have been recorded

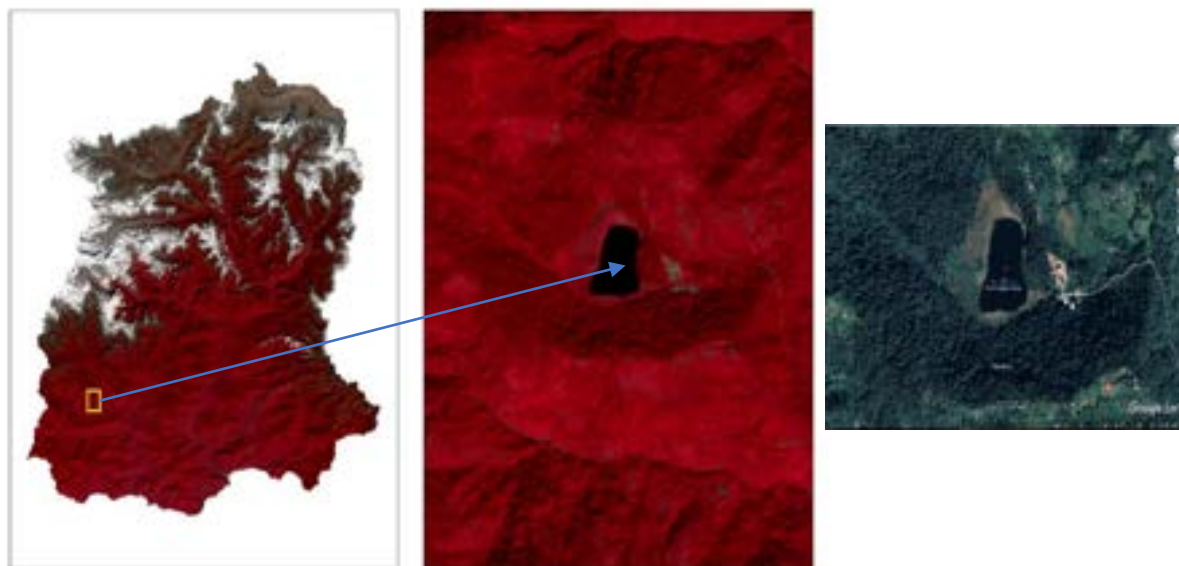


Figure 194: FCC and Google Image of Khecheopalri Lake

¹<http://sikenvis.nic.in/writereaddata/sd35.pdf>

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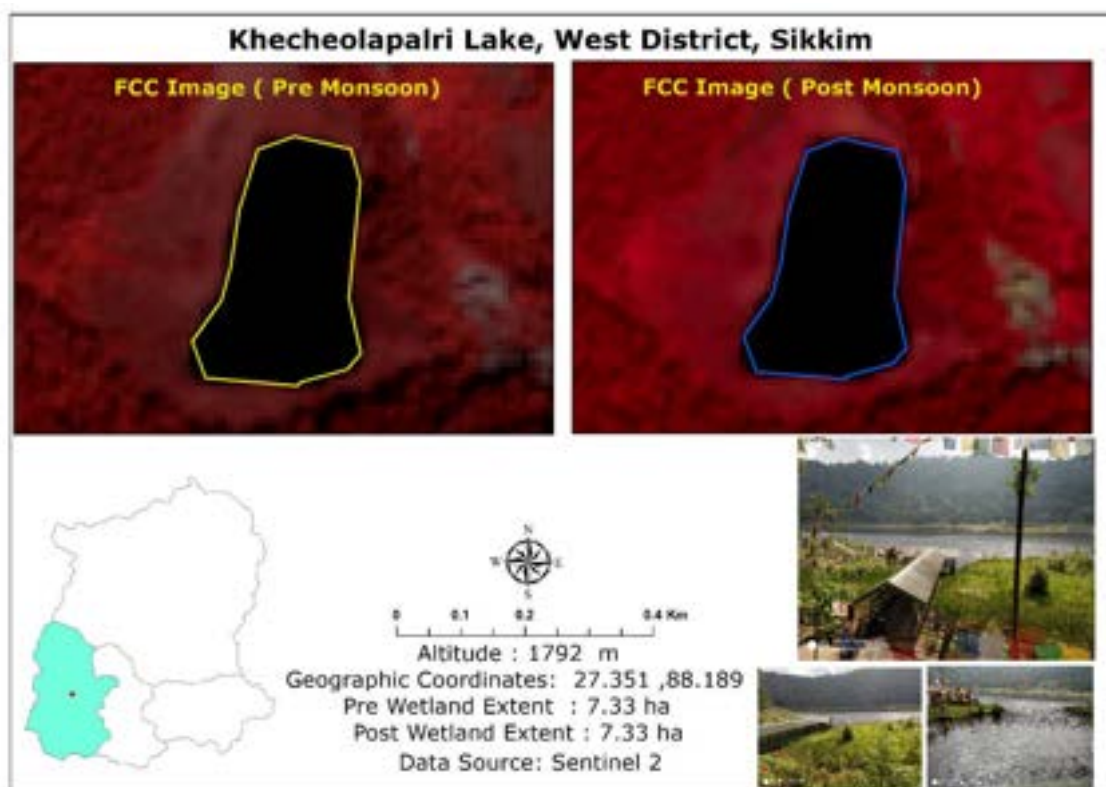


Figure 195: Pre and Post Monsoon coverage of lakes through satellite data

which is posing big threat.² The lake is a resting place for trans-Himalayan migratory birds and supports commercial and recreational tourism. There is a local committee called Khecheopalpri lake welfare committee composed of local people to take care of cleanliness and sanctity of the lake.

The landuse and land cover around the lake shows significant change the last 40years causing threat to long term existence for the lake. The bog area is expanded by 67%, while the area under agriculture land in the lake watershed has grown up by 63% between 1988 and 1997 (Jain et al, 2000)³. The bog formation in the lake is attributed to the decomposed material along with sediments flown down from the upland forests. The single outlet and elevated periphery further restrict the export of the bog, leading to the inundation and colonization regime of the peat/bog. Overland flow has been reported as highest on the bare land (4.77% of the precipitation) and lowest in areas of cardamom-based agro forestry (1.79%). The discharge inlet and outlet into the lake is seasonal leading to seasonal sedimentations.

³<http://lib.icimod.org/record/15343/files/sh1.pdf>

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Field Photo



Figure 196: Field photos of Khcheolapalri Lake

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SAMITI LAKE

It is situated at an altitude of about 4300 meters (15704 feet) and is 149 Kms. from Gangtok, located in the Onglathang valley in the West district of Sikkim. It is located between $27^{\circ}23'39.35'' N$ and $88^{\circ}11'13.45'' E$ and is known as bunmoten Tso in the sikkimese language. It lies *en route* to Goechala pass and Somaytae village. This lake is approximately 21 km from Yuksom in south and is close to the border of Nepal in the west and China in the north. The lake freezes during the winter and melts during the springs allowing the floral bloom



Figure 197: Field Photo of Samiti Lake

of species like *Rhododendron* shrubs and various other species. The valley is well known for its hot springs, which is slightly saline in taste, it is colourless, emits bubbles of sulphated hydrogen gas and the temperature of 106 degrees.

The field survey for data collection was carried out for Samiti lake from October 3rd to 15th, 2018. Based on geospatial assessment together with field survey-based analysis, some major land use identified around 2km buffer of the lake are- forest, grassland/shrubland, agriculture, settlement. Some medicinal plants that have been observed during the field survey - *Picrorhiza scrophulariiflora* (Kurki), *Gymnadenia orchidis* (Panchamley) and *Anemone polyanthes* (bhutkesh). The lake is having been identified as natural and permanent in nature with Palim Glacier is its source for water. The lake attracts a number of tourists/visitors for its greenish blue and transparent watercolour and Thangsing tourist huts are a popular source for food and water in this region for tourists. The lake is also a source of water for the Prek River. Nearby resident farmers and herders, bring their sheep and cattle, especially during the summer months, to allow grazing around the lake and for drinking.

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Sunal



Meconopsis aculeata
(Guruch)



Anaphalis adnata Wall ex
DC (Buki)



Quercus lamellosa Smith
(Buk)



Rhododendron fulgens Hook.f.
(Chimal)



Juniperus recurva
(Vairung)

Figure 198: Flora around Samiti Lake

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NEIL POKHARI LAKE



Figure 199: Field Photo of Neil Pokhari Lake

It is situated at an altitude of about 13862 ft. and is predominantly surrounded by Rhododendron shrubs. This lake is located in the Onglathang valley in West district of Sikkim. It lies *en route* to Gochala pass and Somaytae village.

LADWA POKHARI LAKE



Figure 200: Field Photo of Ladwa Lake

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KATHOK LAKE



Figure 201: Field Photos of Kathok Lake

GOECHA LA LAKE

One of the highest altitude wetland in west Sikkim and It is situated at an altitude of about 15100 ft. This lake is very scenic surrounded by small hills and mountains.

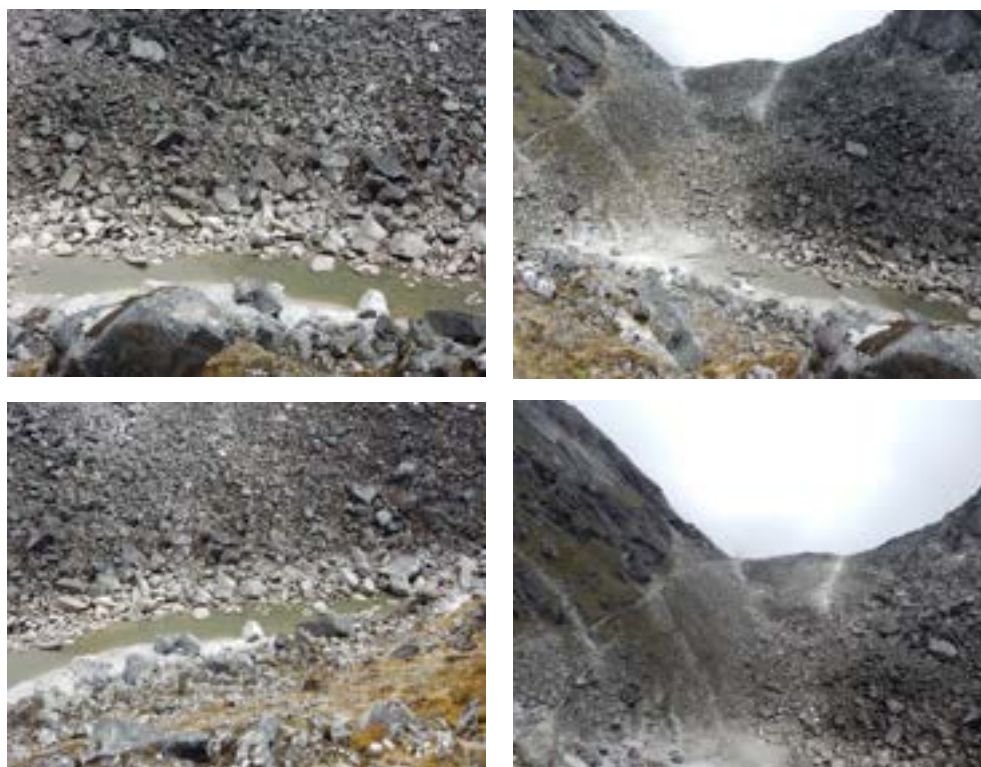


Figure 202: Field Photos of Goecha la Lake

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BHALAY LAKE



Figure 203: Field Photos of Bhalay Lake

DALLAY POKHARI LAKE



Figure 204: Field Photos of Dallay Pokhari Lake

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DUNGA LAKE



Figure 205: Field Photos of Dunga Lake

DUDH POKHARI LAKE



Figure 206: Field Photo of Dudh Pokhari Lake

GORU LAKE



Figure 207: Field Photos of Goru Lake

GUYAM LAKE



Figure 208: Field Photo of Guyam Lake

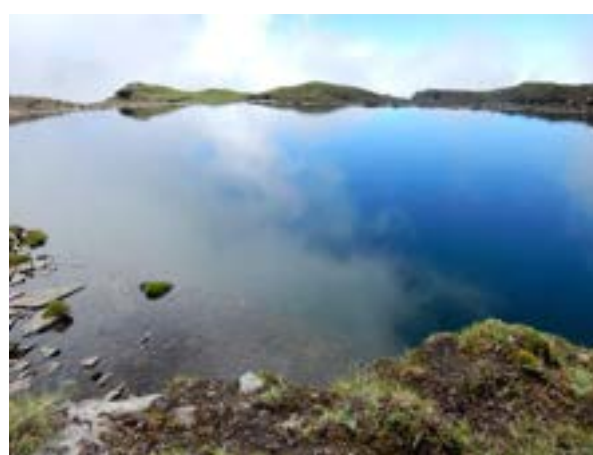


Figure 209: Field Photo of Hash Lake

JUMLAY LAKE



Figure 210: Field Photo of Jumlay Lake

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KALA LAKE



Figure 211: Field Photo of Kala Lake



Figure 212: Field Photo of Kanchi Lake

LEDUA LAKE



Figure 213: Field Photos of Ledua Lake

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LAM POKHARI LAKE



Figure 214: Field Photo of Lam Pokhari Lake



Figure 215: Field Photos of Laxmi Pokhari Lake

MAZUR LAKE



Figure 216: Field Photo of Mazur Lake

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NEER POKHARI LAKE



Figure 217: Field Photo of Neer Pokhari lake

RAM LAXMAN LAKE



Figure 218: Field Photo of Ram Laxman Lake

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RATHONG CHU LAKE



Figure 219: Field Photos of Rathong Chu Lake

SUKH POKHARI LAKE



Figure 220: Field Photos of Sukh Pokhari Lake

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SURKEY LAKE



Figure 221: Field Photos of Surkey Lake

TIN KUNAY LAKE



Figure 222: Field photos of Tin Kunay lake

Detailed Documents of the Surveyed Wetlands (West Sikkim)

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Table 1: General Characteristics

S.No.	Wetland Name	Latitude (DD)	Longitude (DD)	Altitude (m)	Area of wetland(ha)	Wetland type	Protected area
1	Laxmi pokhari2	27.43742	88.08597	4316	12.42	Permanent/Natural	KNP
2	Jumlay 2 pokhari	27.43228	88.09019	4400	0.61	Permanent/Natural	KNP
3	Jumlay 1	27.43144	88.08815	4403	1.43	Permanent/Natural	KNP
4	Ram Laxuman pokhari	27.49369	88.04856	4523	0.32	Permanent/Natural	KNP
5	Mazur pokhari	27.49119	88.05036	4462	1.22	Permanent/Natural	KNP
6	Goru pokhari	27.48475	88.05542	4495	0.14	Permanent/Natural	KNP
7	Neer pokhari 2	27.47725	88.05744	4312	8.50	Permanent/Natural	KNP
8	Neer pokhari 1	27.50806	88.19758	4103	3.10	Permanent/Natural	KNP
9	Akha pokhari	27.49573	88.20217	4146		Permanent/Natural	KNP
10	Ladwa pokhari	27.49692	88.19181	4059	0.39	Permanent/Natural	KNP
11	Surkey pokhari	27.55753	88.189	4360	0.15	Permanent/Natural	KNP
12	Samiti pokhari	27.56094	88.18769	4200	3.10	Permanent/Natural	KNP
13	Dallay pokhari	27.48447	88.21647	4240	1.77	Permanent/Natural	KNP
14	Goecha la	27.60597	88.18611	4888	0.25	Permanent/Natural	KNP
15	Sukhey pokhari	27.48264	88.15436	4031	6.89	Seasonal	KNP
16	Tinkunay pokhari	27.5984	88.18694	4758	0.83	Permanent/Natural	KNP
17	Laxmi pokhari	27.49921	88.16218	4153	0.99	Permanent/Natural	KNP

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18	Lam pokhari 1	27.32946	88.88631	4221	6.91	Permanent/Natural	KNP
19	Rathong chu	27.55197	88.12644	4592	3.32	Permanent/Natural	KNP
20	Doodh pokhari	27.56533	88.11608	4753	1.62	Permanent/Natural	KNP
21	Bhalay pokhari	27.5635	88.12092	4715	10.79	Permanent/Natural	KNP
22	Rathong pokhari 1	27.55578	88.11981	4610	2.48	Permanent/Natural	KNP
23	Rathong pokhari 2	27.55642	88.11904	4616	0.44	Permanent/Natural	KNP
24	Kanchi pokhari	27.42428	88.07694	4335	0.22	Permanent/Natural	KNP
25	Dunga pokhari	27.42706	88.07472	4360	2.85	Permanent/Natural	KNP
26	Hash pokhari	27.42175	88.06789	4174	0.47	Permanent/Natural	KNP
27	Kala pokhari	27.42847	88.08242	4400	0.96	Permanent/Natural	KNP
28	Lam pokhari 2	27.42272	88.08136	4320	2.46	Permanent/Natural	KNP
29	Dallay pokhari 2	27.48161	88.05831	4450	1.20	Permanent/Natural	KNP
30	Guyam pokhari	27.41214	88.08631	4200	0.27	Permanent/Natural	KNP
31	Khecheopalri Lake	27.35281	88.19034	1792	15.08	Permanent/Natural	KNP
32	Katok Lake	27.56909	88.18707	4304	0.62	Permanent/Natural	KNP

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Table 2: Water Regime								
S.No.	Wetland Name	Main source of water	Water Permanence	Destination of water from wetland	pH	Water salinity	Nutrients in water	Probable source of Nutrients
1	Laxami pokhari2	Rainfall and ground water	Mostly permanent	Feeds Down stream	3.5	0.20	Not Assessed	Not Assessed
2	Jumlay pokhari 2	Rainfall	Mostly permanent	Feeds Down stream	4.7	0.40	Not Assessed	Not Assessed
3	Jumlay pokhari 1	Ground water and glacier	Mostly permanent	Feeds river	3.3	0.40	Not Assessed	Not Assessed
4	Ram Laxuman	Ground water and glacier	Mostly permanent	Feeds Down stream	3.5	0.70	Not Assessed	Not Assessed
5	Mazur pokhari	Rainfall and ground water	Mostly permanent	Feeds Down stream	3.7	0.20	Not Assessed	Not Assessed
6	Goru pokhari	Rainfall and ground water	Mostly permanent	Feeds Down stream	4.5	0.20	Not Assessed	Not Assessed
7	Neer pokhari 2	Ground water and glacier	Mostly permanent	Feeds Down stream	4.7	0.40	Not Assessed	Not Assessed
8	Neer pokhari 1	Ground water and glacier	Mostly permanent	Feeds stream Down	5.5	0.67	Not Assessed	Not Assessed
9	Akha pokhari	Upper river rainfall and ground water	Mostly permanent	Feeds stream Down	9.7	0.30	Not Assessed	Not Assessed
10	Ladwa pokhari	Upper river rainfall and ground water	Mostly permanent	Feeds stream Down	9.4	0.30	Not Assessed	Not Assessed

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11	Surkey pokhari	Ground water rainfall and glacier	Mostly permanent	Feeds stream	Down	5.0	0.90	Not Assessed	Not Assessed
12	Samiti pokhari	Ground water rainfall and glacier	Mostly permanent	Feeds stream	Down	4.7	0.20	Not Assessed	Not Assessed
13	Dallay pokhari	Ground water rainfall and glacier	Mostly permanent	Feeds stream	Down	10 10	0.40	Not Assessed	Not Assessed
14	Goecha la	Ground water rainfall and glacier	Mostly permanent	Feeds stream	Down	13. 5	0.20	Not Assessed	Not Assessed
15	Sukhey pokhari	Upper river and rainfall	Seasonal	Feeds stream	Down	NIL	NA	Not Assessed	Not Assessed
16	Tinkunay pokhari	Ground water rainfall and glacier	Mostly permanent	Feeds stream	Down	5.9	0.40	Not Assessed	Not Assessed
17	Laxmi pokhari	Ground water rainfall and glacier	Mostly permanent	Feeds stream	Down	5.5	0.67	Not Assessed	Not Assessed
18	Lam pokhari	Ground water and rainfall	Mostly permanent	Feeds stream	Down	9.8	0.40	Not Assessed	Not Assessed
19	Rathong chu	Ground water rainfall and glacier	Mostly permanent	Feeds stream	Down	5.0	0.75	Not Assessed	Not Assessed
20	Doodh pokhari	Ground water rainfall and glacier	Mostly permanent	Feeds stream	Down	5.3	0.27	Not Assessed	Not Assessed
21	Bhalay pokhari	Ground water rainfall and glacier	Mostly permanent	Feeds stream	Down	5.4	0.50	Not Assessed	Not Assessed
22	Rathong 1	Ground water rainfall and glacier	Mostly permanent	Feeds stream	Down	4.7	0.20	Not Assessed	Not Assessed
23	Rathong 2	Ground water rainfall and glacier	Mostly permanent	Feeds stream	Down	5.1	0.20	Not Assessed	Not Assessed

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24	Kanchi pokhari	Ground water and rainfall	Mostly permanent	Feeds stream	Down	3.2	0.30	Not Assessed	Not Assessed
25	Dunga pokhari	Ground water and rainfall	Mostly permanent	Feeds stream	Down	7.5	1.5	Not Assessed	Not Assessed
26	Hash pokhari	Ground water and rainfall	Mostly permanent	Feeds stream	Down	4.2	0.20	Not Assessed	Not Assessed
27	Kala pokhari	Ground water and rainfall	Mostly permanent	Feeds stream	Down	3.5	0.20	Not Assessed	Not Assessed
28	Lam pokhari 2	Ground water and rainfall	Mostly permanent	Feeds stream	Down	5.7	0.30	Not Assessed	Not Assessed
29	Dallay pokhari 2	Ground water and rainfall	Mostly permanent	Feeds stream	Down	5.0	0.30	Not Assessed	Not Assessed
30	Guyam pokhari	Ground water and rainfall	Mostly permanent	Feeds stream	Down	3.7	0.30	Not Assessed	Not Assessed
31	Khecheolapalri Lake	Direct/indirect inflow from river	Mostly permanent	River		9.9	8.0	Highly turbid during rainy season	Not Assessed
32	Katok pokhari	Ground water	Mostly permanent	Feeds water	Ground	6.3	7	Not Assessed	Not Assessed

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Table 3: Climate Setting										
S.No.	Wetland Name	Annual Rainfall (in mm)	Temp (in degrees Celsius)	Humidity(g/kg) (Giovanni data and 10km resolution)	Major Land use (in percentage)					
					Forest	Grassland/Scrub land	Cropland	Built-up	Other land	Waterbodies
1	Laxami pokhari2	143.80	2.52	5.62	24.15	33.00	0.89	1.78	38.43	1.76
2	Jumlay pokhari 2	143.80	2.52	5.62	14.39	36.20	0.40	1.80	45.61	1.61
3	Jumlay pokhari 1	143.80	2.52	5.62	17.06	35.42	0.34	1.82	43.77	1.59
4	Ram Laxuman	143.80	2.52	5.62	5.07	6.21	0.87	0	84.51	3.35
5	Mazur pokhari	143.80	2.52	5.62	6.66	7.29	0.89	0	82.25	2.92
6	Goru pokhari	143.80	2.52	5.62	7.91	11.51	1.23	0	77.02	2.33
7	Neer pokhari 2	143.80	2.52	5.62	9.71	16.52	1.11	0	70.98	1.68
8	Neer pokhari 1	135.05	4.03	4.75	20.97	22.95	0.43	0	55.40	0.23
9	Akha pokhari	142.19	6.39	6.97	25.19	33.22	0.85	0	39.73	0.99
10	Ladwa pokhari	144.68	5.52	6.70	28	28.85	0.51	0	41.52	0.24
11	Surkey pokhari	135.06	-0.46	4.75	11.05	13.71	0.83	0	74.09	0.33
12	Samiti pokhari	135.05	0.77	4.75	5.7	6.31	0.34	0	87.45	0.18
13	Dallay pokhari	142.19	6.39	6.97	20.13	32.28	0.83	0	45.73	1.03
14	Goecha la	127.25	-13.78	3.64	1.72	2.10	0	0	95.94	0.24

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15	Sukhey pokhari	144.69	5.18	6.70	33.27	46.77	0	0	19.67	0.29
16	Tinkunay pokhari	135.06	-0.46	4.75	1.71	0.98	0.51	0	96.16	0.65
17	Laxmi pokhari	144.69	5.18	6.70	24.55	41.92	0.26	0	33.16	0.08
18	Lam pokhari	142.19	6.39	6.97	19.63	32.23	0.82	0	46.50	0.82
19	Rathong chu	135.06	-0.46	4.75	3.75	7.23	1.38	0	86.41	1.23
20	Doodh pokhari	135.06	-0.46	4.75	2.01	0	0.48	0	96.19	1.32
21	Bhalay pokhari	135.06	-0.46	4.75	1.72	1.28	0.76	0	95.13	1.11
22	Rathong 1	135.06	-0.46	4.75	3.60	3.61	1.19	0	90.35	1.25
23	Rathong 2	135.06	-0.46	4.75	3.84	2.56	1.13	0	91.12	1.35
24	Kanchi pokhari	143.80	2.52	5.62	7.48	37.35	0.60	0	52.49	2.08
25	Dunga pokhari	143.80	2.52	5.62	9.36	36.09	0.54	0	51.88	2.12
26	Hash pokhari	143.80	2.52	5.62	4.81	40.67	0.72	0	53.29	0.51
27	Kala pokhari	143.80	2.52	5.62	11.16	36.78	0.41	0	49.72	1.93
28	Lam pokhari 2	143.80	2.52	5.62	9.00	40.58	0.64	0	48.10	1.68
29	Dallay pokhari 2	143.80	2.52	5.62	8.41	14.17	1.47	0	74.29	1.66
30	Guyam pokhari	143.80	2.52	5.62	9.34	49.52	2.08	0	38.81	0.26
31	Khecheolapalri Lake	145.85	18.38	9.24	72	1.42	23.8	2.43	0.06	0.10
32	Katok pokhari	145.55	16.61	11.54	78.86	1.42	23.83	2.43	0.06	0.10

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Table 4: Biodiversity

Name of the Wetland	List of plants species present in wetland	List of animal species present in wetland	Species of conservation significance (rare, endangered, threatened, endemic species)	Major invasive plant species and extent of invasion	Major animal invasive alien species and extent of invasion
Laxami pokhari2	<i>Rhododendron sp, Rheum nobile, Potentilla sp, Primula sikkiminses, Primula primulina</i>	<i>Moschus fuscus (Musk deer), Pseudois nayaur (Blue sheep), Marmota himalayana (marmot) and Ochotona dauurica (pika)</i>	<i>Rheum nobile</i>	No	No
Jumlay 2	<i>Rhododendron sp, Rheum nobile, Potentilla sp, Primula sikkiminses, Primula primulina, primula glomarata.</i>	<i>Moschus fuscus (Musk deer), Pseudois nayaur (Blue sheep)and Ithaginis cruentus (Blood Pheasant)</i>	<i>Rheum nobile, Moschus fuscus (Musk deer)</i>	No	No
Jumlay 1	<i>Rhododendron sp, Bistorta affinis vivipara, buttercup, Primula sp</i>	<i>Moschus fuscus (Musk deer)and Panthera uncia (Snow leopard)</i>	<i>Panthera uncia (Snow leopard)</i>	No	No
Ram Laxuman	<i>Rhododendron sp, Rheum nobile, Potentilla sp,</i>	<i>Moschus fuscus (Musk deer), Dafay</i>	<i>Rheum nobile,</i>	No	No

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Name of the Wetland	List of plants species present in wetland	List of animal species present in wetland	Species of conservation significance (rare, endangered, threatened, endemic species)	Major invasive plant species and extent of invasion	Major animal invasive alien species and extent of invasion
		<i>and Lophophorus impejanus (Monal)</i>	-		
Mazur	<i>Kanzo, Rhododendron sp, potentala</i>	<i>Larawa, Columba leuconota (snow pегion) and Moschus fuscus (Musk deer)</i>	Kanzo	No	No
Goru	<i>Rhododendron sp, Rheum nobile, Potentilla sp, Primula sikkiminses, Grasses, Picrorhiza scrophulariiflora (Kutki), Nardostachys jatamanshi (Jatamansi)</i>	<i>Dafay, Lophophorus impejanus (Monal) and Pseudois nayaur (Blue sheep).</i>	<i>Picrorhiza scrophulariiflora (Kutki), Nardostachys jatamanshi (Jatamansi)</i>	No	No
Neer2	<i>Rhododendron sp, Rheum nobile, Potentilla sp, yellow lily</i>	<i>Larawa, Columba leuconota (snow pегion) and Moschus fuscus (Musk deer)</i>	<i>Moschus fuscus (Musk deer)</i>	No	No
Neer1	<i>Rhododendron sp, Juniper, Anaphelis, Bistorta affinis</i>	<i>Moschus fuscus (Musk deer), Pseudois nayaur (Blue sheep) and</i>	<i>Moschus fuscus (Musk deer)</i>	No	No

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Name of the Wetland	List of plants species present in wetland	List of animal species present in wetland	Species of conservation significance (rare, endangered, threatened, endemic species)	Major invasive plant species and extent of invasion	Major animal invasive species and extent of invasion
		<i>Ithaginis cruentus</i> (Blood Pheasant)	-		
Akha	Mostly <i>Rhododendron</i> sp with grass under canopy and manganay saag	<i>Moschus fuscus</i> (Musk deer), dafay, <i>Lophophorus impejanus</i> (Monal) and <i>Panthera uncia</i> (Snow leopard)	<i>Panthera uncia</i> (Snow leopard)	No	No
Ladwa	<i>Rhododendron</i> sp, <i>Juniper</i> sp, Rose plant, <i>Rhododendron grandii</i> , <i>Macanopsis</i> sp, <i>berginia celita</i>	<i>Moschus fuscus</i> (Musk deer) and <i>Pseudois nayaur</i> (Blue sheep)	<i>Moschus fuscus</i> (Musk deer)	No	No
Surkey	<i>Rhododendron</i> sp, <i>Rheum nobile</i> , <i>Potentilla</i> sp, <i>Barbaris</i> sp, <i>Aconatum</i> sp, <i>Picrorhiza scrophulariiflora</i> (Kutki)	<i>Moschus fuscus</i> (Musk deer), Larawa, <i>Columba leuconota</i> (snow pегion) and <i>Ithaginis cruentus</i> (Blood Pheasant).	<i>Moschus fuscus</i> (Musk deer)	No	No

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Name of the Wetland	List of plants species present in wetland	List of animal species present in wetland	Species of conservation significance (rare, endangered, threatened, endemic species)	Major invasive plant species and extent of invasion	Major animal invasive species and extent of invasion
Samiti	<i>Potentilla sp, Primula sikkiminses, Grasses, Picrorhiza scrophulariiflora</i> (Kutki), <i>Nardostachys jatamansi</i> (Jatamansi), <i>Rheum nobile, pach amlay</i>	<i>Ithaginis cruentus</i> (Blood Pheasant) and <i>Tadorna ferruginea</i> (Brahminy duck)	<i>Tadorna ferruginea</i> (Brahminy duck)	No	No
Dallay	<i>Barbaris sp, Aconatum sp, Picrorhiza scrophulariiflora</i> (Kutki) <i>Rheum nobile, pach amlay</i>	<i>Moschus fuscus</i> (Musk deer), <i>Dafay, Lophophorus impejanus</i> (Monal) and <i>Panthera uncia</i> (Snow leopard)	<i>Panthera uncia</i> (Snow leopard)	No	No
Gochela	<i>Sharma guru, Anaphalis sp, Picrorhiza scrophulariiflora</i> (Kutki), <i>Bistorta affinis</i>	<i>Moschus fuscus</i> (Musk deer), <i>Dafay, Lophophorus impejanus</i> (Monal), <i>Panthera uncia</i> (Snow leopard) and <i>Ban vera</i> .	<i>Panthera uncia</i> (Snow leopard)	No	No
Sukhey	<i>Rhododendron sp, Rheum nobile, Potentilla sp, Primula sikkiminses, Grasses, Fragaria sp, Bistorta affinis sp, Butter cup sp.</i>	<i>Moschus fuscus</i> (Musk deer), <i>Larawa, Columba leuconota</i> (snow pegion) and	<i>Moschus fuscus</i> (Musk deer)	No	No

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Name of the Wetland	List of plants species present in wetland	List of animal species present in wetland	Species of conservation significance (rare, endangered, threatened, endemic species)	Major invasive plant species and extent of invasion	Major animal invasive species and extent of invasion
		<i>Ithaginis cruentus</i> (Blood Pheasant).	-		
Tinkunay	<i>Rhododendron sp, Rheum nobile, Potentilla sp, Barbaris sp, Aconatum sp, Picrorhiza scrophulariiflora</i> (Kutki)	<i>Columba leuconota</i> (snow pегion), <i>Moschus fuscus</i> (Musk deer) and <i>Ithaginis cruentus</i> (Blood pesent)	<i>Musk deer Moschus fuscus</i> (Musk deer)	No	No
Laxmi	<i>Rhododendron spp, Namlay, Picrorhiza scrophulariiflora</i> (Kutki), <i>Nardostachys jatamanshi</i> (Jatamansi), <i>Bergenia ciliate, Sathpatray</i>	<i>Moschus fuscus</i> (Musk deer), <i>Dafay, Lophophorus impejanus</i> (Monal), <i>Panthera uncia</i> (Snow leopard) and <i>Ban vera.</i>	<i>Panthera uncia</i> (Snow leopard)	No	No
Lam	<i>Rhododendron spp, Picrorhiza scrophulariiflora</i> (Kutki), <i>Nardostachys jatamanshi</i> (Jatamansi), <i>Bergenia ciliate</i>	<i>Moschus moschiferus</i> (Musk deer) and <i>Ithaginis cruentus</i> (Blood pesent)	<i>Moschus fuscus</i> (Musk deer)	No	No
Rathong chu	<i>Rhododendron sp, Picrorhiza scrophulariiflora</i> (Kutki),	<i>Moschus moschiferus</i> (Musk deer) and	<i>Ochotona dauurica</i> (pika)	No	No

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Name of the Wetland	List of plants species present in wetland	List of animal species present in wetland	Species of conservation significance (rare, endangered, threatened, endemic species)	Major invasive plant species and extent of invasion	Major animal invasive species and extent of invasion
	<i>Nardostachys jatamansi</i> (Jatamansi), <i>Bergenia ciliate</i> , grasses, <i>Fragaria</i> spp.	<i>Ochotona dauurica</i> (pika)	-		
Doodh	<i>Macanopsis</i> sp, <i>Saxifraga</i> spp, <i>Anaphelis</i> spp, <i>Bergenia ciliate</i>	<i>Pseudois nayaur</i> (Blue sheep) and <i>Panthera uncia</i> (Snow leopard)	<i>Panthera uncia</i> (Snow leopard)	No	No
Bhalay	<i>Saxifraga</i> , <i>Anaphelis</i> spp, <i>Fragaria</i> , <i>Potentilla</i> sp, Grasses	<i>Ochotona dauurica</i> (pika), <i>Pseudois nayaur</i> (Blue sheep) and <i>Panthera uncia</i> (Snow leopard)	<i>Panthera uncia</i> (Snow leopard)	No	No
Rathong 1	<i>Juniper</i> spp and <i>Rhododendron</i> sp	<i>Ochotona dauurica</i> (pika) and <i>Pseudois nayaur</i> (Blue sheep)	<i>Ochotona dauurica</i> (pika)	No	No
Rathong 2	Mostly Baran Land with dead morines few <i>Juniper</i> and <i>Rhododendron</i> sp	<i>Pseudois nayaur</i> (Blue sheep) and <i>Marmota</i> (marmot)	<i>Pseudois nayaur</i> (Blue sheep)	No	No
Kanchi	<i>Sexifraga</i> , <i>Rhododendron</i> sp, <i>Rheum nobile</i>	<i>Dafay</i> , <i>Lophophorus impejanus</i> (Monal),	<i>Abelmoschus moschatus</i> (Kasturi)	No	No

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Name of the Wetland	List of plants species present in wetland	List of animal species present in wetland	Species of conservation significance (rare, endangered, threatened, endemic species)	Major invasive plant species and extent of invasion	Major animal invasive species and extent of invasion
		<i>Ithaginis cruentus</i> (Blood pésent) and <i>Abelmoschus moschatus</i> (Kasturi)	-		
Dunga	<i>Rheum nobile</i> , <i>Rhododendron sp</i> , Grasses and sedges.	<i>Pseudois nayaur</i> (Blue sheep), <i>Dafay</i> and <i>Lophophorus impejanus</i> (Monal	<i>Rheum nobile</i> , <i>Pseudois nayaur</i> (Blue sheep)	No	No
Hash	<i>Rhododendron sp</i> , <i>Rheum nobile</i> , <i>Potentilla sp</i> , <i>Primula sp</i> , <i>Rheum nobile</i> , <i>Fern sp</i>	<i>Moschus fuscus</i> (Musk deer), <i>Naemorhedus</i> (Goral) and <i>Ochotona dauurica</i> (Pika).	<i>Rheum nobile</i> , <i>Moschus fuscus</i> (Musk deer)	No	No
Kala	<i>Rhododendron sp</i> , <i>Rheum nobile</i> , <i>Bergenia ciliate</i> , grasses, <i>Fragaria sp</i> . <i>Paris polyphylla</i>	<i>Columba leuconota</i> (snow pegin) and <i>Moschus fuscus</i> (Musk deer).	<i>Paris polyphylla</i> and <i>Moschus fuscus</i> (Musk deer)	No	No
Lam 2	<i>Bergenia ciliate</i> , grasses, <i>Fragaria sp</i> . <i>Paris polyphylla</i> <i>Rheum nobile</i> , <i>Rhododendron sp</i> , Grasses and sedges	<i>Ithaginis cruentus</i> (Blood Pheasant), <i>Columba leuconota</i> (snow pegin) and	<i>Moschus moschiferus</i> (Musk deer) <i>Paris polyphylla</i>	No	No

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Name of the Wetland	List of plants species present in wetland	List of animal species present in wetland	Species of conservation significance (rare, endangered, threatened, endemic species)	Major invasive plant species and extent of invasion	Major animal invasive species and extent of invasion
		<i>Moschus fuscus</i> (Musk deer).	-		
Dallay 2	<i>Macanopsis</i> sp, <i>Saxifraga</i> sp, <i>Anaphelis</i> sp, <i>Bergenia ciliate</i> , <i>Paris polyphylla</i> <i>Rheum nobile</i> , <i>Rhododendron</i> sp	<i>Ithaginis cruentus</i> (Blood Pheasant), <i>Columba leuconota</i> (snow pegin) and <i>Moschus fuscus</i> (Musk deer) and <i>Dafay</i> .	<i>Moschus moschiferus</i> (Musk deer) <i>Paris polyphylla</i>	No	No
Guyam	<i>Rhododendron</i> sp, <i>Namlay</i> , <i>Picrorhiza scrophulariiflora</i> (Kutki), <i>Nardostachys jatamanshi</i> (Jatamansi), <i>Bergenia ciliate</i> <i>Anaphelis</i> sp, <i>Bergenia ciliate</i> , <i>Paris polyphylla</i> <i>Rheum nobile</i>	<i>Pseudois nayaur</i> (Blue sheep), <i>Dafay</i> and <i>Lophophorus impejanus</i> (Monal).	<i>Pseudois nayaur</i> (Blue sheep)	No	No
Khecheolapalri	<i>Castanopsis tribuloides</i> (katus), <i>Chap</i> , <i>Pinus spp</i> , <i>Arundinaria hookeriana</i> , <i>Alnus Nepalensis</i> (Uttish), <i>Rhododendron setosum</i> (Salla), <i>Rhododendron anthopogon</i> (Ericaceae), <i>Halenia elliptica</i> , <i>Chirita urticifolia</i> , <i>Carlemannia congesta</i> ,	<i>Canis lupus familiaris</i> (Dog), <i>Cervidae spp</i> (deer), <i>Felis silvestris</i> (wild cat) and <i>Moschus moschiferus</i> (Musk deer), <i>Capricornis</i>	<i>Moschus fuscus</i> (Musk deer), <i>Panthera uncia</i> , <i>Tragopan satyra</i> , <i>Vulpus vulpus</i> (Red fox).	Not any	Not any

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Name of the Wetland	List of plants species present in wetland	List of animal species present in wetland	Species of conservation significance (rare, endangered, threatened, endemic species)	Major plant invasive species and extent of invasion	Major animal invasive species and extent of invasion
	<p><i>Hymenopogen parasiticus, Hedyotis hispida, Clinopodium umbrosum, Lysimachia ramose, Potentilla lineata, Boehmeria clidemioides, Isachne albens, Carex insignis, Pouzolzia sanguinea, Ainsliea latifolia, Tupistra nutans, Perisicaria tenella, Lobelia angulate, Synotis cappa, Ardisia macrophylla, Zephyranthes carinata, Procis cernata, Potentilla sundacia, Fragraria indica, Potentilla polyphylla, Neilla rubiflora, Edgeworthia gardneri, Brugmansia suaveolens, Cestrum nocturnum, Zanthoxylum oxyphyllum, Gnaphalium spp., Plantago major, Plantago erosa, Pilea scripta, Pilea umbrosa, Bidens pilosa, Ganlinsoga parviflora, Chamabainia cuspidate, Persicaria hydropiper, Oplismenus compositus, Cyanotis vaga, Notochaete hamosa, Setaria palmifolia, Girardinia diversifolia, Eupatorium</i></p>	<p><i>thar (Himalayan serow), Muntiacus muntjak, Panthera pardus, Panthera uncia (Panthera uncia (Snow leopard)), Tragopan satyra, Vulpus vulpus (Red fox).</i></p>	-		

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Name of the Wetland	List of plants species present in wetland	List of animal species present in wetland	Species of conservation significance (rare, endangered, threatened, endemic species)	Major invasive plant species and extent of invasion	Major animal invasive species and extent of invasion
	<p><i>adenophorum, Rumex nepalensis, Galium asprellum, Lysimachia dubia, Anaphalis contorta, Swertia bimaculata, Artemisia nigricans, Berberis asiatica, Hydrangea heteromalla, Vaccinium dunaliatum, Paris formosana, Eranthum indicum, Chrysosplenium nepalense, Pilea anissophylla, Hoya linearis, Sambucus adnate, Sambucus adnate, Rhus chinensis, Sambucus wightiana, Camellia sinesis, Glochidion khasicum, Hydrangea aspera, Rhododendron griffithianum, Viburnum cylindricum, Rhododndron dalhousieae, Viburnum erubescens, Eurya acuminata, Symplocos lucida (Thum.) Siebold & Zucc., Saurauia napaulensis DC., Prunus cerasoides D.Don, Castonopsis hystrix Hook.f.& Thomson ex A.DC., Alnus nepalensis D.Don, Tetradium fraxinifolium, Cyathea spinulosa,</i></p>		-		

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Name of the Wetland	List of plants species present in wetland	List of animal species present in wetland	Species of conservation significance (rare, endangered, threatened, endemic species) -	Major invasive plant species and extent of invasion	Major animal invasive species and extent of invasion
	<p><i>Cinnamomum bejolghota, Morus indica, Eurya japonica, Acer campbellii, Acer sikkimense, Brassaiopsis hainla, Engelhardtia spicata, Cryptomeria japonica, Exbucklandia populnea, Schima wallichii, Rhus semiliata, Mallotus philippinensis, Symplocos caudate, Symplocos glomerata, Juglans regia, Eurya cerasifolia, Pyrularia edulis, Lyonia ovalifolia, Quercus lineata, Lithocarpus pachyphyllus, Alcimandra cathcartii, Pentapanax fragrans, Ehretia wallichiana, Nyssa javanica, Magnolia campbellii, Rhododendron arboretum, Prunus nepalensis, Elaeocarpus lanceifolius, Wighita speciosissima, Ficus neriifolia, Ficus roxburghii, Persea fructifera kosterm, Betula alnoides, Evodia fraxinifolia, Litsea citrate, Machilus edulis, Michelia doltsopa, Toona ciliate, Garuga floribunda, Ixora athroantha, Cinnamomum tamala,</i></p>				

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Name of the Wetland	List of plants species present in wetland	List of animal species present in wetland	Species of conservation significance (rare, endangered, threatened, endemic species) -	Major invasive plant species and extent of invasion	Major animal invasive species and extent of invasion
	<p><i>Lithocarpus elegans, Rhus succedanea, Rhus hookeri, Acrocarpus fraxinifolius, Symoplocos dryophila, Cinnamomum impressiner, Hymenodictyon flaccidum, Photinia integrifolia, Hymenodictyon spp., Agrostophyllum callosum, Bulbophyllum cauliflorum, Bulbophyllum leopardinum, Bulbophyllum reptans, Calanthe alismifolia, Coelogyne corymbosa, Coelogyne cristata, Cryptochilus luteus, Cymbidium devonianum, Cymbidium longifolium, Dendrobium hookerianum, Dendrobium ochreatum, Eria coronaria, Eria excavate, Galeola lindleyana, Goodyera schlechtendaliana, Liparis bootanensis, Liparis resupinata, Phaelaenopsis taenialis, Pleione praecox, Spiranthes sinensis, Tainia minor, Vandopsis undulata, Eria spicata, Dendrobium longicornu, Pholidota</i></p>				

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Name of the Wetland	List of plants species present in wetland	List of animal species present in wetland	Species of conservation significance (rare, endangered, threatened, endemic species) -	Major invasive plant species and extent of invasion	Major animal invasive species and extent of invasion
	<p><i>pallida</i>, <i>Calanthe puberula</i>, <i>Phaius tankervilleae</i>, <i>Anthogonium gracile</i>, <i>Goodyera foliosa</i>, <i>Dennstaedtia Scabra</i>, <i>Hypolepis punctate</i>, <i>Plagiogyria pycnophylla</i>, <i>Oleandra wallichii</i>, <i>Lindasaea odorata</i>, <i>Sphenomeris chinensis</i>, <i>Odontosoria chinensis</i>, <i>Pseudophegopteris aurita</i>, <i>Lepisorus scolopendrium</i>, <i>Adiantum incisum</i>, <i>Asplenium normale</i>, <i>Thelypteris flaccida</i>, <i>Asplenium gueinzianum</i>, <i>Vittaria elongate</i>, <i>Nephrolepis cordifolia</i>, <i>Polypodiodes hendersonii</i>, <i>Arthromeris wallichiana</i>, <i>Microsorium membranaceum</i>, <i>Polystichum lentum</i>, <i>Pyrrosia Heteractis</i>, <i>Lepidogrammitis subrostrata</i>, <i>Pteris spinescens</i>, <i>Lycopodium japonicum</i>, <i>Coniogramme procera</i>, <i>Peranema cyatheoides</i>, <i>Polystichum lactum</i>, <i>Belvisia spicata</i>, <i>Pteris vittata</i>, <i>Equisetum diffusum</i>, <i>Botrychium virginianum</i>, <i>Gleichenia longissimi</i>, <i>Vittaria</i></p>				

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Name of the Wetland	List of plants species present in wetland	List of animal species present in wetland	Species of conservation significance (rare, endangered, threatened, endemic species) -	Major invasive plant species and extent of invasion	Major animal invasive alien species and extent of invasion
	<p><i>flexuosa, Selaginella monospora, Polypodales amoena, Dircranopteris taiwansis, Pyrrosia lingua, Diplazium javanicum, Hymenophyllum badium, Asplenium pellucidum, Onychium cryptogrammoides, Athyrium himalaicum, Diplazium doerleinii, Arthromeris lachmanii, Polypodiodes lachnopus, Gleichenia gigantean, Elaphoglossum marginatum, Pteris biurata, Belvisia henryi, Lepisorous loriforms, Pteris scabirigens, Lepisorus sublinearis, Arachniodes coniiifolia, Monachosorum henryi, Monachosorum subdigitatum, Lemmsphyllum rostratum, Kuehneromyces nutabilis, Mucidula mucida, Coprinellus disseminates, Trichocoma paradoxa, Paxillus spp., Lactifluus piperatus, Lactifluus dissitus, Boletellus spp., Russula albonigra, Russula nigricans, Russula dubdiana, Russula</i></p>				

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Name of the Wetland	List of plants species present in wetland	List of animal species present in wetland	Species of conservation significance (rare, endangered, threatened, endemic species)	Major plant invasive alien species and extent of invasion	Major animal invasive alien species and extent of invasion
	<i>senecis, Flammulina velutipes, Lycoperdon perlatum, Helvella elastic, Daldinia concentrica, Coprinellus spp., Cortinarius spp., Thelephora spp., Oudemansiella mucida.</i>		-		
Katok Lake	<i>Castanopsis tribuloides (Katus), Michelia cathcartii (Chap), Arundineria spp (Bamboo), Alnus nepalensis (Uttish), Pinus wallichiana (Salla), Rhododendron griffithianum, Masea rugose, Piper boehmeriifolium, Asplenium nitidum, Betula utilis, Rubus nepalensis, Anaphalis adnats Wall. Ex DC</i>	<i>Vulpes vulpes (Red Fox), Muntiacus muntjak (Barking Deer), Ursidae (Bear), Cuon alpinus (Cuon alpinus (Feral dog)), Moschus fuscus (Musk deer)</i>	<i>Moschus fuscus, Cuon alpinus</i>	Not any	Not any

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Table 5: Present and Potential Threats

Name of the Wetland	Changes in water inflow and outflow	Pollution (Sewage/solid waste disposal etc.)	Unsustainable harvest of biological resources	Mining	Siltation/Idol immersion	Estimated rate of siltation	Encroachment	Spread of invasive species	Any other, please list
Laxami pokhari2	Low – Present	NA	Low - Present	NA	Low – Present	Low – Present	Low – Present	NA	Nil
Jumlay 2	Low – Present	NA	Low - Present	NA	Low – Present	Low – Present	Low – Present	NA	Nil
Jumlay 1	Low – Present	NA	Low - Present	NA	NA	NA	Low – Present	NA	Nil
Ram Laxuman	Low – Present	NA	Low - Present	NA	NA	NA	Low – Present	NA	Nil
Mazur	Low – Present	NA	Low - Present	NA	Low – Present	Low – Present	Low – Present	NA	Nil
Goru	Low – Present	NA	Low - Present	NA	NA	NA	Low – Present	NA	Nil
Neer2	Low – Present	NA	Low - Present	NA	NA	NA	Low – Present	NA	Nil

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Name of the Wetland	Changes in water inflow and outflow	Pollution (Sewage/solid waste disposal etc.)	Unsustainable harvest of biological resources	Mining	Siltation/Idol immersion	Estimated rate of siltation	Encroachment	Spread of invasive species	Any other, please list
Neer1	Low – Present	NA	Low - Present	NA	NA	NA	Low – Present	NA	Nil
Akha	Low – Present	NA	Low - Present	NA	NA	Low present	Low – Present	NA	Nil
Ladwa	Low – Present	NA	Low - Present	NA	NA	Low present	Low – Present	NA	Nil
Surkey	Low – Present	NA	Low - Present	NA	NA	NA	Low – Present	NA	Nil
Samiti	Low – Present	NA	Low - Present	NA	NA	Low present	Low – Present	NA	Nil
Dallay	Low – Present	NA	Low - Present	NA	NA	NA	Low – Present	NA	Nil
Gochela	Low – Present	NA	Low - Present	NA	Medium present	Low present	Low – Present	NA	Nil
Sukhey	Low – Present	NA	Low - Present	NA	NA	Low present	Low – Present	NA	Nil
Tinkunay	Low – Present	NA	Low - Present	NA	Medium Present	Low present	Low – Present	NA	Nil

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Name of the Wetland	Changes in water inflow and outflow	Pollution (Sewage/solid waste disposal etc.)	Unsustainable harvest of biological resources	Mining	Siltation/Idol immersion	Estimated rate of siltation	Encroachment	Spread of invasive species	Any other, please list
Laxmi	Low – Present	NA	Low - Present	NA	NA	NA	Low – Present	NA	Nil
Lam	Low – Present	NA	Low - Present	NA	NA	NA	Low – Present	NA	Nil
Rathong chu	Low – Present	NA	Low - Present	NA	High present	Low present	Low – Present	NA	Nil
Doodh	Low – Present	NA	Low - Present	NA	NA	Low present	Low – Present	NA	Nil
Bhalay	Low – Present	NA	Low - Present	NA	NA	Low present	Low – Present	NA	Nil
Rathong 1	Low – Present	NA	Low - Present	NA	High present	Low present	Low – Present	NA	Nil
Rathong 2	Low – Present	NA	Low - Present	NA	High present	Low present	Low – Present	NA	Nil
Kanchi	Low – Present	NA	Low - Present	NA	NA	NA	Low – Present	NA	Nil
Dunga	Low – Present	NA	Low - Present	NA	NA	NA	Low – Present	NA	Nil

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Name of the Wetland	Changes in water inflow and outflow	Pollution (Sewage/solid waste disposal etc.)	Unsustainable harvest of biological resources	Mining	Siltation/Idol immersion	Estimated rate of siltation	Encroachment	Spread of invasive species	Any other, please list
Hash	Low – Present	NA	Low - Present	NA	NA	NA	Low – Present	NA	Nil
Kala	Low – Present	NA	Low - Present	NA	Low present	Low present	Low – Present	NA	Nil
Lam 2	Low – Present	NA	Low - Present	NA	NA	NA	Low – Present	NA	Nil
Dallay 2	Low – Present	NA	Low - Present	NA	NA	NA	Low – Present	NA	Nil
Guyam	Low – Present	NA	Low - Present	NA	Low present	Low present	Low – Present	NA	Nil
Khecheolaplari	Present at a low threat level	Present at a low threat level	Present at a low threat level	NA	Present at a low threat level	Present at a low threat level	Present at a low threat level	Low present	Nil
Kathok	Low – Present	Low – Present	Present but with low level of harvesting which also needs to be regulated	NA	Low – Present	Low – Present	Low – Present (in the form of grazing)	NA	Nil

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Table 6: Ecosystem Services

Name of the Wetland	Source of driving water for people living and around	Source of water for agriculture	Fisheries	Cultivation of aquatic food plants	Medicinal plants	Is a recreational site	Buffering communities from extreme events as floods and storms	Groundwater recharge
Laxami pokhari ²	Yes for Yak herders and trekkers	NA	NA	No	NTFPs	Yes	No	Yes
Jumlay 2	Yes for Yak herders and trekkers	No	No	No	NTFPs	Yes	No	Yes
Jumlay 1	Yes for Yak herders and trekkers	No	No	No	NTFPs mansi <i>Picrorhiza scrophulariiflora</i> (Kutki) , Jat	Yes	No	Yes
Ram Laxuman	Yes for Yak herders and trekkers	No	No	No	NTFPs Jatmansi <i>Picrorhiza scrophulariiflora</i> (Kutki) ,	Yes	No	Yes
Mazur	Yes for Yak herders and trekkers	No	No	No	NTFPs Jatmansi <i>Picrorhiza scrophulariiflora</i> (Kutki) ,	Yes	No	Yes

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Name of the Wetland	Source of driving water for people living and around	Source of water for agriculture	Fisheries	Cultivation of aquatic food plants	Medicinal plants	Is a recreational site	Buffering communities from extreme events as floods and storms	Groundwater recharge
Goru	Yes for Yak herders and trekkers	No	No	No	NTFPs <i>Rheum nobile</i>	Yes	No	Yes
Neer2	Yes for Yak herders and trekkers	No	No	No	NTFPs Juniper	Yes	No	Yes
Neer1	Yes for Yak herders and trekkers	No	No	No	NTFPs <i>Rhododendron</i> spp and <i>Picrorhiza scrophulariiflora</i> (Kukti)	Yes	No	Yes
Akha	Yes for Yak herders and trekkers	No	No	No	NTFPs <i>Rhododendron</i> spp, <i>Juniper</i> spp	Yes	No	Yes
Ladwa	Yes for Yak herders and trekkers	No	No	No	NTFPs	Yes	No	Yes
Surkey	Yes for Yak herders and trekkers	No	No	No	NTFPs	Yes	No	Yes

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Name of the Wetland	Source of driving water for people living and around	Source of water for agriculture	Fisheries	Cultivation of aquatic food plants	Medicinal plants	Is a recreational site	Buffering communities from extreme events as floods and storms	Groundwater recharge
Samiti	Yes for Yak herders and trekkers	No	No	No	NTFPs	Yes	No	Yes
Dallay	Yes for Yak herders and trekkers	No	No	No	NTFPs	Yes	No	Yes
Gochela	No	No	No	No	No	No	No	Yes
Sukhey	Yes for Yak herders and trekkers	No	No	No	NTFPs	Yes	No	Yes
Tinkunay	No	No	No	No	No	No	No	Yes
Laxmi	Yes for Yak herders and trekkers	No	No	No	NTFPs	Yes	No	Yes
Lam	Yes for Yak herders and trekkers	No	No	No	NTFPs	Yes	No	Yes

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Name of the Wetland	Source of driving water for people living and around	Source of water for agriculture	Fisheries	Cultivation of aquatic food plants	Medicinal plants	Is a recreational site	Buffering communities from extreme events as floods and storms	Groundwater recharge
Rathong chu	No	No	No	No	No	Yes	No	Yes
Dudh	No	No	No	No	No	Yes	No	No
Bhalay	Yes for Yak herders and trekkers	No	No	No	NTFPs	Yes	No	Yes
Rathong 1	No	No	No	No	No	Yes	No	Yes
Rathong 2	No	No	No	No	No	Yes	No	Yes
Kanchi	Yes for Yak herders	No	No	No	NTFPs	Yes	No	Yes
Dunga	Yes for Yak herders	No	No	No	NTFPs	Yes	No	Yes
Hash	Yes for Yak herders	No	No	No	NTFPs	Yes	No	Yes

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Name of the Wetland	Source of driving water for people living and around	Source of water for agriculture	Fisheries	Cultivation of aquatic food plants	Medicinal plants	Is a recreational site	Buffering communities from extreme events as floods and storms	Groundwater recharge
Kala	Yes, for Yak herders	No	No	No	NTFPs	Yes	No	Yes
Lam 2	Yes for Yak herders	No	No	No	NTFPs	Yes	No	Yes
Dallay 2	Yes for Yak herders	No	No	No	NTFPs	Yes	No	Yes
Guyam	Yes for Yak herders	No	No	No	NTFPs	Yes	No	Yes
Khecheolapalri	No	No	Yes. People put fish in the lake as a religious offering and is not cultivated	No	Yes, <i>Usnea himalayana</i> , <i>Betula utilis</i> , <i>Piper longum</i> (at low altitude)	Yes	No	Yes

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Name of the Wetland	Source of driving water for people living and around	Source of water for agriculture	Fisheries	Cultivation of aquatic food plants	Medicinal plants	Is a recreational site	Buffering communities from extreme events as floods and storms	Groundwater recharge
Katok	No	No	Yes. People put fish in the lake as a religious offering and is not cultivated	No	Yes, <i>Usnea himalayana</i> , <i>Betula utilis</i> , <i>Piper longum</i> (at low altitude)	Yes	No	Yes

Table 6A: Ecosystem Services

Name of the Wetland	Water purification	Acts as a sink for sediments	Has significant cultural and religious values	Is a site for recreation and aquatic sport	Source/cultivation noteworthy food plants species	Habitat for noteworthy animal species	Habitat for migratory water birds	Supports fisheries/aquaculture	Mining	Any other, please list
Laxami pokhari2	NA	Yes	Yes	No	No	Yes	Yes	NA	NA	No
Jumlay 2	NA	Yes	Yes	No	No	Yes	Yes	NA	NA	Nil

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Name of the Wetland	Water purification	Acts as a sink for sediments	Has significant cultural and religious values	Is a site for recreation and aquatic sport	Source/cultivation noteworthy food plants species	Habitat for noteworthy animal species	Habitat for migratory water birds	Supports fisheries/aquaculture	Mining	Any other, please list
Jumlay 1	NA	Yes	Yes	No	No	Yes	Yes	NA	NA	Nil
Ram Laxuman	NA	Yes	Yes	No	No	Yes	Yes	NA	NA	Nil
Mazur	NA	No	Yes	No	No	Yes	Yes	NA	NA	Nil
Goru	NA	Yes	Yes	No	No	Yes	Yes	NA	NA	Nil
Neer2	NA	Yes	Yes	No	No	Yes	Yes	NA	NA	Nil
Neer1	NA	Yes	Yes	No	No	Yes	Yes	NA	NA	Nil
Akha	NA	Yes	Yes	No	No	Yes	No	NA	NA	Main water source for round trakkers
Ladwa	NA	Yes	Yes	No	No	Yes	Yes	NA	NA	Nil
Surkey	NA	Yes	Yes	No	No	Yes	Yes	NA	NA	Nil

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Name of the Wetland	Water purification	Acts as a sink for sediments	Has significant cultural and religious values	Is a site for recreation and aquatic sport	Source/cultivation noteworthy food plants species	Habitat for noteworthy animal species	Habitat for migratory water birds	Supports fisheries/aquaculture	Mining	Any other, please list
Samiti	NA	Yes	Yes	No	No	Yes	Yes	NA	NA	Nil
Dallay	NA	Yes	Yes	No	No	Yes	Yes	NA	NA	Nil
Gochela	NA	Yes	Yes	No	No	Yes	Yes	NA	NA	Difficult Terrain to reach
Sukhey	NA	Yes	Yes	No	No	Yes	Yes	NA	NA	Nil
Tinkunay	NA	Yes	Yes	No	No	Yes	Yes	NA	NA	Difficult Terrain to reach
Laxmi	NA	Yes	Yes	No	No	Yes	Yes	NA	NA	Highly religious

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Name of the Wetland	Water purification	Acts as a sink for sediments	Has significant cultural and religious values	Is a site for recreation and aquatic sport	Source/cultivation noteworthy food plants species	Habitat for noteworthy animal species	Habitat for migratory water birds	Supports fisheries/aquaculture	Mining	Any other, please list
Lam	NA	Yes	Yes	No	No	Yes	Yes	NA	NA	Ox bow lakes are found near the lake
Rathong chu	NA	Yes	No	No	No	Yes	Yes	NA	NA	Glacial Lake
Dudh	NA	Yes	Yes	No	No	Yes	Yes	NA	NA	Highly religious
Bhalay	NA	Yes	Yes	No	No	Yes	Yes	NA	NA	Nil
Rathong 1	NA	Yes	Yes	No	No	Yes	Yes	NA	NA	Glacial Lake
Rathong 2	NA	Yes	Yes	No	No	Yes	Yes	NA	NA	Glacial Lake
Kanchi	NA	Yes	Yes	No	No	Yes	Yes	NA	NA	Nil
Dunga	NA	Yes	Yes	No	No	Yes	Yes	NA	NA	Nil

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Name of the Wetland	Water purification	Acts as a sink for sediments	Has significant cultural and religious values	Is a site for recreation and aquatic sport	Source/cultivation noteworthy food plants species	Habitat for noteworthy animal species	Habitat for migratory water birds	Supports fisheries/aquaculture	Mining	Any other, please list
Hash	NA	Yes	Yes	No	No	Yes	Yes	NA	NA	Highly religious
Kala	NA	Yes	Yes	No	No	Yes	Yes	NA	NA	Nil
Lam 2	NA	Yes	Yes	No	No	Yes	Yes	NA	NA	Nil
Dallay 2	NA	Yes	Yes	No	No	Yes	Yes	NA	NA	Nil
Guyam	NA	Yes	No	No	No	Yes	Yes	NA	NA	Nil
Khecheolapari	Yes	Yes	Yes	No	No	No	No	No	No	Nil
Katok	Yes	Yes	Yes	No	No	No	No	No	No	Nil

* NA – Not allowed

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Table 7: Pre-Existing Right and Privileges

Name of the Wetland	Community Fishing (without any leave or permission from government department)	Fishing lease under from government department	Harvest of plants (without any)	Lease permission or from government department	Harvest of plants under lease from government department	Agriculture or horticulture within wetland
Laxami pokhari 2	NA	NA	NTFP	NA	NA	NA
Jumlay 2	NA	NA	NTFP	NA	NA	NA
Jumlay 1	NA	NA	NTFP	NA	NA	NA
Ram Laxuman	NA	NA	NTFP	NA	NA	NA
Mazur	NA	NA	NTFP	NA	NA	NA
Goru	NA	NA	NTFP	NA	NA	NA
Neer 2	NA	NA	NTFP	NA	NA	NA
Neer 1	NA	NA	NTFP	NA	NA	NA
Akha	NA	NA	NTFP	NA	NA	NA
Ladwa	NA	NA	NTFP	NA	NA	NA

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Name of the Wetland	Community Fishing (without any leave or permission from government department)	Fishing under lease from government department	Harvest of plants (without any)	Lease permission or from government department	Harvest of plants under lease from government department	Agriculture or horticulture within wetland
Surkey	NA	NA	NTFP	NA	NA	NA
Samiti	NA	NA	NTFP	NA	NA	NA
Dallay	NA	NA	NTFP	NA	NA	NA
Gochela	NA	NA	NTFP	NA	NA	NA
Sukhey	NA	NA	NTFP	NA	NA	NA
Tinkunay	NA	NA	NTFP	NA	NA	NA
Laxmi	NA	NA	NTFP	NA	NA	NA
Lam	NA	NA	NTFP	NA	NA	NA
Rathong chu	NA	NA	NTFP	NA	NA	NA
Doodh	NA	NA	NTFP	NA	NA	NA
Bhalay	NA	NA	NTFP	NA	NA	NA

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Name of the Wetland	Community Fishing (without any leave or permission from government department)	Fishing under lease from government department	Harvest of plants (without any)	Lease permission or from government department	Harvest of plants under lease from government department	Agriculture or horticulture within wetland
Rathong 1	NA	NA	NTFP	NA	NA	NA
Rathong 2	NA	NA	NTFP	NA	NA	NA
Kanchi	NA	NA	NTFP	NA	NA	NA
Dunga	NA	NA	NTFP	NA	NA	NA
Hash	NA	NA	NTFP	NA	NA	NA
Kala	NA	NA	NTFP	NA	NA	NA
Lam 2	NA	NA	NTFP	NA	NA	NA
Dallay 2	NA	NA	NTFP	NA	NA	NA
Guyam	NA	NA	NTFP	NA	NA	NA
Khecheolapalri	No	No	No	No	No	No
Katok	No	No	No	No	No	No

* NA – Not allowed; NTFP – Non-Timber Forest Product

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Table 7A: Pre-Existing Right and Privileges

Name of the Wetland	Grazing	Religious practices	Withdrawal of water for domestic use	Withdrawal of water for agriculture or fisheries	Bathing or wallowing of domestic animals (buffalo, elephant etc.)	Drinking water for bovines	Plying of boats	Any other, please list here
Laxami pokhari2	Yes (as privilege)	Yes	Used by locals, visitors and trekkers	No	No	Yes	NA	NA
Jumlay 2	Yes (as privilege)	No	Used by locals, visitors and trekkers	No	No	Yes	NA	NA
Jumlay 1	Yes (as privilege)	No	Used by locals, visitors and trekkers	No	No	Yes	NA	NA
Ram Laxuman	Yes (as privilege)	Yes	Used by locals, visitors and trekkers	No	No	Yes	NA	NA

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Name of the Wetland	Grazing	Religious practices	Withdrawal of water for domestic use	Withdrawal of water for agriculture or fisheries	Bathing or wallowing of domestic animals (buffalo, elephant etc.)	Drinking water for bovines	Plying of boats	Any other, please list here
Mazur	Yes (as privilege)	Yes	Used by locals, visitors and trekkers	No	No	Yes	NA	NA
Goru	Yes (as privilege)	Yes	Used by locals, visitors and trekkers	No	No	Yes	NA	NA
Neer2	Yes (as privilege)	Yes	Used by locals, visitors and trekkers	No	No	Yes	NA	NA
Neer1	Yes (as privilege)	Yes	Used by locals, visitors and trekkers	No	No	Yes	NA	NA

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Name of the Wetland	Grazing	Religious practices	Withdrawal of water for domestic use	Withdrawal of water for agriculture or fisheries	Bathing or wallowing of domestic animals (buffalo, elephant etc.)	Drinking water for bovines	Plying of boats	Any other, please list here
Akha	Yes (as privilege)	Yes	Used by locals, visitors and trekkers	No	No	Yes	NA	NA
Ladwa	Yes (as privilege)	No	Used by locals, visitors and trekkers	No	No	Yes	NA	NA
Surkey	Yes (as privilege)	Yes	Used by locals, visitors and trekkers	No	No	Yes	NA	NA
Samiti	Yes (as privilege)	No	Used by locals, visitors and trekkers	No	No	Yes	NA	NA

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Name of the Wetland	Grazing	Religious practices	Withdrawal of water for domestic use	Withdrawal of water for agriculture or fisheries	Bathing or wallowing of domestic animals (buffalo, elephant etc.)	Drinking water for bovines	Plying of boats	Any other, please list here
Dallay	Yes (as privilege)	No	Used by locals, visitors and trekkers	No	No	Yes	NA	NA
Gochela	Yes (as privilege)	No	Used by locals, visitors and trekkers	No	No	Yes	NA	NA
Sukhey	Yes (as privilege)	No	Used by locals, visitors and trekkers	No	No	Yes	NA	NA
Tinkunay	Yes (as privilege)	No	Used by locals, visitors and trekkers	No	No	Yes	NA	NA

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Name of the Wetland	Grazing	Religious practices	Withdrawal of water for domestic use	Withdrawal of water for agriculture or fisheries	Bathing or wallowing of domestic animals (buffalo, elephant etc.)	Drinking water for bovines	Plying of boats	Any other, please list here
Laxmi	Yes (as privilege)	Yes	Used by locals, visitors and trekkers	No	No	Yes	NA	NA
Lam	Yes (as privilege)	Yes	Used by locals, visitors and trekkers	No	No	Yes	NA	NA
Rathong chu	Yes (as privilege)	No	Used by locals, visitors and trekkers	No	No	Yes	NA	NA
Doodh	Yes (as privilege)	Yes	Used by locals, visitors and trekkers	No	No	Yes	NA	NA

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Name of the Wetland	Grazing	Religious practices	Withdrawal of water for domestic use	Withdrawal of water for agriculture or fisheries	Bathing or wallowing of domestic animals (buffalo, elephant etc.)	Drinking water for bovines	Plying of boats	Any other, please list here
Bhalay	Yes (as privilege)	No	Used by locals, visitors and trekkers	No	No	Yes	NA	NA
Rathong 1	Yes (as privilege)	No	Used by locals, visitors and trekkers	No	No	Yes	NA	NA
Rathong 2	Yes (as privilege)	No	Used by locals, visitors and trekkers	No	No	Yes	NA	NA
Kanchi	Yes (as privilege)	Yes	Used by locals, visitors and trekkers	No	No	Yes	NA	NA

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Name of the Wetland	Grazing	Religious practices	Withdrawal of water for domestic use	Withdrawal of water for agriculture or fisheries	Bathing or wallowing of domestic animals (buffalo, elephant etc.)	Drinking water for bovines	Plying of boats	Any other, please list here
Dunga	Yes (as privilege)	Yes	Used by locals, visitors and trekkers	No	No	Yes	NA	NA
Hash	Yes (as privilege)	Yes	Used by locals, visitors and trekkers	No	No	Yes	NA	NA
Kala	Yes (as privilege)	Yes	Used by locals, visitors and trekkers	No	No	Yes	NA	NA
Lam 2	Yes (as privilege)	Yes	Used by locals, visitors and trekkers	No	No	Yes	NA	NA

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Name of the Wetland	Grazing	Religious practices	Withdrawal of water for domestic use	Withdrawal of water for agriculture or fisheries	Bathing or wallowing of domestic animals (buffalo, elephant etc.)	Drinking water for bovines	Plying of boats	Any other, please list here
Dallay 2	Yes (as privilege)	Yes	Used by locals, visitors and trekkers	No	No	Yes	NA	NA
Guyam	Yes (as privilege)	No	Used by locals, visitors and trekkers	No	No	Yes	NA	NA
Khecheolapalri	No	Yes	No	No	No	No	No	No
Katok	No	Yes	No	No	No	No	No	No

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Table 8: ACTIVITIES PROPOSED TO BE PROHIBITED UNDER WETLANDS (CONSERVATION AND MANGEMENT) RULES'17

Name of the Wetland	Reclamation/filling up	Setting up of new industries / expansion of existing industries	Handling or storage/disposal of hazardous substances (except port areas)	Solid Waste Dumping	Sink for untreated sewage/industrial effluent	Construction activities (except boat jetties)	Any other, please list
Laxami pokhari2	NA	NA	NA	NA	NA	NA	Nil
Jumlay 2	NA	NA	NA	NA	NA	NA	Nil
Jumlay 1	NA	NA	NA	NA	NA	NA	Nil
Ram Laxuman	NA	NA	NA	NA	NA	NA	Nil
Mazur	NA	NA	NA	NA	NA	NA	Nil
Goru	NA	NA	NA	NA	NA	NA	Nil
Neer2	NA	NA	NA	NA	NA	NA	Nil
Neer1	NA	NA	NA	NA	NA	NA	Nil
Akha	NA	NA	NA	NA	NA	NA	Nil

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Name of the Wetland	Reclamation/filling up	Setting up of new industries / expansion of existing industries	Handling or storage/disposal of hazardous substances (except port areas)	Solid Waste Dumping	Sink for untreated sewage/industrial effluent	Construction activities (except boat jetties)	Any other, please list
Ladwa	NA	NA	NA	NA	NA	NA	Nil
Surkey	NA	NA	NA	NA	NA	NA	Nil
Samiti	NA	NA	NA	NA	NA	NA	Nil
Dallay	NA	NA	NA	NA	NA	NA	Nil
Gochela	NA	NA	NA	NA	NA	NA	Nil
Sukhey	NA	NA	NA	NA	NA	NA	Nil
Tinkunay	NA	NA	NA	NA	NA	NA	Nil
Laxmi	NA	NA	NA	NA	NA	NA	Nil
Lam	NA	NA	NA	NA	NA	NA	Nil
Rathong chu	NA	NA	NA	NA	NA	NA	Nil

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Name of the Wetland	Reclamation/filling up	Setting up of new industries / expansion of existing industries	Handling or storage/disposal of hazardous substances (except port areas)	Solid Waste Dumping	Sink for untreated sewage/industrial effluent	Construction activities (except boat jetties)	Any other, please list
Doodh	NA	NA	NA	NA	NA	NA	Nil
Bhalay	NA	NA	NA	NA	NA	NA	Nil
Rathong 1	NA	NA	NA	NA	NA	NA	Nil
Rathong 2	NA	NA	NA	NA	NA	NA	Nil
Kanchi	NA	NA	NA	NA	NA	NA	Nil
Dunga	NA	NA	NA	NA	NA	NA	Nil
Hash	NA	NA	NA	NA	NA	NA	Nil
Kala	NA	NA	NA	NA	NA	NA	Nil
Lam 2	NA	NA	NA	NA	NA	NA	Nil
Dallay 2	NA	NA	NA	NA	NA	NA	Nil

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Name of the Wetland	Reclamation/filling up	Setting up of new industries / expansion of existing industries	Handling or storage/disposal of hazardous substances (except port areas)	Solid Waste Dumping	Sink for untreated sewage/industrial effluent	Construction activities (except boat jetties)	Any other, please list
Guyam	NA	NA	NA	NA	NA	NA	Nil
Khecheolapalri	Yes	Yes	Yes	It should be regulated	Yes	NA	Nil
Kotak	Yes	Yes (Considering the fragile ecosystem, it is suggested that no new industries to be setup around this lake complex	Yes	Yes	Yes	NA	Nil

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Table 9: ACTIVITIES PROPOSED TO BE REGULATED UNDER WETLANDS (CONSERVATION & MANGEMENT) RULES'17

Name of the Wetland	Withdrawal of water/impoundment/diversion or any other hydrological intervention	Harvesting of resources (living / non-living)	Grazing	Discharge of treated sewage / effluent / wastewater	Construction of boat jetties and facilities for temporary use, as pantoon bridges	Aquaculture, agriculture and horticulture activities within the wetland boundaries	Any other, please list
Laxami pokhari ²	No	NTFPs	Yes	No	No	No	Nil
Jumlay 2	No	NTFPs	Yes	No	No	No	Nil
Jumlay 1	No	NTFPs	Yes	No	No	No	Nil
Ram Laxuman	No	NTFPs	Yes	No	No	No	Highly religious
Mazur	No	NTFPs	Yes	No	No	No	Highly religious
Goru	No	NTFPs	Yes	No	No	No	Highly religious
Neer ²	No	NTFPs	Yes	No	No	No	Nil

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Name of the Wetland	Withdrawal of water/impoundment/diversion or any other hydrological intervention	Harvesting of resources (living / non-living)	Grazing	Discharge of treated sewage / effluent / wastewater	Construction of boat jetties and facilities for temporary use, as pantoon bridges	Aquaculture, agriculture and horticulture activities within the wetland boundaries	Any other, please list
Neer1	No	NTFPs	Yes	No	No	No	Nil
Akha	No	NTFPs	Yes	No	No	No	Highly religious
Ladwa	No	NTFPs	Yes	No	No	No	Nil
Surkey	No	NTFPs	Yes	No	No	No	Nil
Samiti	No	NTFPs	Yes	No	No	No	Nil
Dallay	No	NTFPs	Yes	No	No	No	Nil
Gochela	No	NTFPs	Yes	No	No	No	One of rare Lake

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Name of the Wetland	Withdrawal of water/impoundment/diversion or any other hydrological intervention	Harvesting of resources (living / non-living)	Grazing	Discharge of treated sewage / effluent / wastewater	Construction of boat jetties and facilities for temporary use, as pantoon bridges	Aquaculture, agriculture and horticulture activities within the wetland boundaries	Any other, please list
							cant reach
Sukhey	No	NTFPs	Yes	No	No	No	Seasonal Lake
Tinkunay	No	NTFPs	Yes	No	No	No	Filled by dead moraines
Laxmi	No	NTFPs	Yes	No	No	No	Highly religious
Lam	No	NTFPs	Yes	No	No	No	Highly religious
Rathong chu	No	NTFPs	Yes	No	No	No	Filled by dead moraines
Doodh	No	NTFPs	Yes	No	No	No	Nil

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Name of the Wetland	Withdrawal of water/impoundment/diversion or any other hydrological intervention	Harvesting of resources (living / non-living)	Grazing	Discharge of treated sewage / effluent / wastewater	Construction of boat jetties and facilities for temporary use, as pantoon bridges	Aquaculture, agriculture and horticulture activities within the wetland boundaries	Any other, please list
Bhalay	No	NTFPs	Yes	No	No	No	Nil
Rathong 1	No	NTFPs	Yes	No	No	No	Filled by dead moraines
Rathong 2	No	NTFPs	Yes	No	No	No	Filled by dead moraines
Kanchi	No	NTFPs	Yes	No	No	No	Nil
Dunga	No	NTFPs	Yes	No	No	No	Nil
Hash	No	NTFPs	Yes	No	No	No	Highly religious
Kala	No	NTFPs	Yes	No	No	No	Highly religious
Lam 2	No	NTFPs	Yes	No	No	No	Nil

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Name of the Wetland	Withdrawal of water/impoundment/diversion or any other hydrological intervention	Harvesting of resources (living / non-living)	Grazing	Discharge of treated sewage / effluent / wastewater	Construction of boat jetties and facilities for temporary use, as pantoon bridges	Aquaculture, agriculture and horticulture activities within the wetland boundaries	Any other, please list
Dallay 2	No	NTFPs	Yes	No	No	No	Nil
Guyam	No	NTFPs	Yes	No	No	No	Nil
Khecheolapalri	Yes	Alternative livelihood methods to be applied to reduce the pressure on waterbody – Yes	Should be regulated	Yes	No	Yes	Nil
Katok	Any hydrological interventions should be strictly regulated considering the fragile ecosystem	Yes	Should not be allowed around the 2km buffer region of the lake	Yes	Yes	Yes	Nil

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Table 10: NOTIFICATION CATEGORY

Name of the Wetland	Included in Ramsar List	Included under National Wetland Conservation Program	Wetland is located in ecologically sensitive and important areas	Wetland is located within a UNESCO World Heritage Site	Wetland is located in religious/cultural site	High altitude wetland or wetland complex with area \geq 5 ha	Below an elevation of 2,500 m above sea level and having area \geq 500 ha	Others
Laxami pokhari ²	No	No	Yes	Yes	Yes	Yes	No	Nil
Jumlay 2	No	No	Yes	Yes	No	Yes	No	Nil
Jumlay 1	No	No	Yes	Yes	No	Yes	No	Nil
Ram Laxuman	No	No	Yes	Yes	Yes	Yes	No	Nil
Mazur	No	No	Yes	Yes	Yes	Yes	No	Nil
Goru	No	No	Yes	Yes	Yes	Yes	No	Nil
Neer ²	No	No	Yes	Yes	Yes	Yes	No	Nil
Neer ¹	No	No	Yes	Yes	Yes	Yes	No	Nil
Akha	No	No	Yes	Yes	Yes	Yes	No	Nil

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Name of the Wetland	Included in Ramsar List	Included under National Wetland Conservation Program	Wetland is located in ecologically sensitive and important areas	Wetland is located within a UNESCO World Heritage Site	Wetland is located in religious/cultural site	High altitude wetland or wetland complex with area \geq 5 ha	Below an elevation of 2,500 m above sea level and having area \geq 500 ha	Others
Ladwa	No	No	Yes	Yes	No	Yes	No	Nil
Surkey	No	No	Yes	Yes	Yes	Yes	No	Nil
Samiti	No	No	Yes	Yes	Yes	Yes	No	Nil
Dallay	No	No	Yes	Yes	Yes	Yes	No	Nil
Gochela	No	No	Yes	Yes	No	Yes	No	Nil
Sukhey	No	No	Yes	Yes	Yes	No	No	Dry Lake
Tinkunay	No	No	Yes	Yes	No	Yes	No	Nil
Laxmi	No	No	Yes	Yes	Yes	Yes	No	Nil
Lam	No	No	Yes	Yes	Yes	Yes	No	Nil
Rathong chu	No	No	Yes	Yes	No	Yes	No	Glacial Lake

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Name of the Wetland	Included in Ramsar List	Included under National Wetland Conservation Program	Wetland is located in ecologically sensitive and important areas	Wetland is located within a UNESCO World Heritage Site	Wetland is located in religious/cultural site	High altitude wetland or wetland complex with area \geq 5 ha	Below an elevation of 2,500 m above sea level and having area \geq 500 ha	Others
Doodh	No	No	Yes	Yes	Yes	Yes	No	Highly Religious
Bhalay	No	No	Yes	Yes	No	Yes	No	Nil
Rathong 1	No	No	Yes	Yes	No	Yes	No	Glacial Lake
Rathong 2	No	No	Yes	Yes	Yes	Yes	No	Glacial Lake
Kanchi	No	No	Yes	Yes	Yes	Yes	No	Nil
Dunga	No	No	Yes	Yes	Yes	Yes	No	Nil
Hash	No	No	Yes	Yes	Yes	Yes	No	Nil
Kala	No	No	Yes	Yes	Yes	Yes	No	Nil
Lam 2	No	No	Yes	Yes	Yes	Yes	No	Nil
Dallay 2	No	No	Yes	Yes	Yes	Yes	No	Nil

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Name of the Wetland	Included in Ramsar List	Included under National Wetland Conservation Program	Wetland is located in ecologically sensitive and important areas	Wetland is located within a UNESCO World Heritage Site	Wetland is located in religious/cultural site	High altitude wetland or wetland complex with area \geq 5 ha	Below an elevation of 2,500 m above sea level and having area \geq 500 ha	Others
Guyam	No	No	Yes	Yes	Yes	No	No	Nil
Khecheolapalri	No	Yes	Yes	No	Yes	Yes	No	Nil
Katok	No	No	No	No	Yes	No	No	Nil

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Recommendations for the Conservation of the Wetlands in Sikkim

Himalayan wetlands have still not been given a due policy attention or investment. Though The Wetland (Conservation and Management) Rules, 2017 laid down a detailed guideline for the assessment of wetlands and prioritize areas for management and conservation. But the specific needs of High-altitude wetlands do not feature in this revised policy. Climate change is predicted to have a major influence on the Himalayan region. The Himalayas are expected to experience higher levels of precipitation and warming that can lead to faster melting of snow and receding of glaciers. These changes will also have an impact on the vegetation of the region. Some signs are already obvious. There has been an increase in floods, cloudbursts that have impacted the wetlands. Rising temperatures, increase in pollution have also led to the destruction of flora and fauna and also impacted the livelihoods of communities depending on the wetlands in the region. Besides climate change, a number of factors such as land use and land cover changes, urbanisation, increase in tourism industry, the setting of army camps and their interventions in the area, especially in places like Sikkim, are all taking a toll on the wetland ecosystems in the hill state.

Conservation Strategies of the High Altitude Wetlands in Sikkim

- While climate change is a big phenomenon which is likely to affect wetlands in many ways, the thrust of the wetland policy should be directed towards the study of the impact of non-climatic stressors such as land use and land cover changes, urbanisation etc on the wetlands. This will also help to negate the impact of climatic stressors on wetlands in the long run.
- Wetland ecosystems can undergo a number of changes due to climate change and this may give rise to new wetland ecosystems with major changes in biodiversity. It is important to predict such changes and also plan policies that address how communities can adapt to these changing ecosystems in the future.
- While wetland ecosystems are undergoing changes, communities are still in the process of struggling to adapt to these changes. Continuous monitoring of these changes, understanding how communities depend on the wetlands and more research to design adaptation strategies is important.
- There is a need for adopting community-centric adaptation and management strategies. Tsomgo lake in Sikkim is one such examples of how this has been done.

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- Effort should be made to adopt more conservation centric approach for sustainable tourism to save wetlands.
- Through a collaborative effort between the government, tour operators, and communities, activities undertaken for Tsomgo Lake Conservation and Management need to be replicated in other vulnerable areas. It is important that communities are involved in the formulation of the adaptation plans. It is time to stop looking at the community as “beneficiaries”; instead, they need to be involved as promoters of these plans. Preparation of Brief Document on Wetlands of Sikkim 385
- The two important problems with respect to conservation of high-altitude wetlands in Sikkim include defence installations and the unprecedented rise in tourism and problems associated with it.
 - o While the presence of the Army around wetlands near international borders is important from the point of view of national security, army installations pose a number of threats to wetlands and their biodiversity. Many of these installations are not scientifically sited taking into consideration the wetland hydrology and zone of influence.
 - o Another challenge posed by defence establishments around wetlands is the prevalence of free-ranging dogs encouraged by defence personnel. These dogs pose a direct threat to wetland biodiversity, particularly to birds that are resident or migratory.
 - o Fuel spillage at a low scale is also one of the challenges that needs a due consideration.
- Tourism poses an important challenge to wetland conservation in Sikkim. During tourist seasons the population nearly doubles and brings with it large scale plastic pollution, crowding and insensitive behaviour from tourists.

Policy Directions

- Currently, no effective tourism policy exists to address the range of challenges posed by large number of tourists visiting Sikkim. While a state-level policy can provide a broad framework, it would be necessary to develop an operational tourism policy in the State. There is a need to urgently put in place an ecotourism policy at the State level.
- Pastoral communities are key actors in the high-altitude wetlands. It is important to involve them in the process by creating pressure groups, drawing strength from Panchayati Raj institutions to include them in the consultative processes.

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- Have more awareness, advocacy, and sensitisation programmes targeting local government, religious bodies, and the media to create a more inclusive policy environment.
- Ensure better communication between different levels of policy actors and bureaucrats by making information more simple and democratic.
- Indian Army and Indo-Tibetan Border Police have a major presence in the state, their support and cooperation is a must to achieve conservation goals in the region. While the presence of the Army around wetlands near international borders are critical and necessary in the interest of national security, there are a number of Army installations located around wetlands that are far removed from the border that pose a number of threats to wetlands and wetland biodiversity. A major issue is that these installations are not scientifically sited, and factors relating to wetland hydrology and zone of influence are not paid heed to⁴
- Taking the army into confidence and conveying the importance of wetland conservation to them through interactions with the General Officer Commanding (GOC) located in Siliguri. Representations can be made to the Ministry of Defence, especially the Ecology Cell to establish a system in Sikkim.
- Document the impact of military activity on high-altitude wetlands.
- Orientation programmes need to be organised for the armed forces and involve them in the management of the lakes.

Challenges and recommendations for vulnerable wetlands in Sikkim

1. Tsomgo Lake

- Widening of the road due to the opening of the Nathula trade route.
- Army vehicles parked near the lake, leading to accidental leakage of diesel and petrol into the lake.
- Increasing number of tourists and lack of awareness among them and the locals regarding the lake.
- Monitoring and management of increased garbage accumulation due to careless littering.
- Development of adequate infrastructure for functional public toilets and the drainage management.
- Because of the connecting road just at the bank of the lake, it will be difficult to stop vehicular movement but can be limited by the numbers of vehicles to be allowed to ply via Tsomgo route.

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- Coordination with different stakeholders like the Forest Department, Environment and Wildlife Management Department, Department of Tourism, Indian Army and local communities, for the conservation of the lake.
- Periodic water quality analysis in collaboration with the State Pollution Control Board.
- Awareness generation among the local people and visitors about the physical and biological values of the lake.
- Considering the fragility of the lake ecosystem, any kind of land use change like road widening, construction of hotels should be avoided.
- Strengthening and empowerment of the Tsomgo Pokhri Sanrakshan Samiti (TPSS).
- Management of garbage and various conservation measures in and around the lake by the TPSS.
- Building capacity and providing awareness and technical support to TPSS for the protection and conservation of the lake.
- Benefit sharing with the local community by tourism bodies.

2. Gurudongmar Wetland Complex

- Garbage accumulation near the lake due to unregulated tourism.
- Development of adequate infrastructure for functional public toilets.
- Adequate awareness among the locals and visitors about the lake and how to keep it clean.
- Restrictions on business establishments within 100 metres of lakes, and also creating stop-points to ensure that vehicular traffic does not reach the banks of lakes.
- Provision for transportation by yaks, horses, or other means can be considered to cover the last leg of tourist travel to wetland areas.
- Inclusion of Remote Sensing and Field survey based monitoring of Biodiversity and survey of the lake and catchment.
- A water quality analysis needs to be conducted periodically during pre and post monsoon season. Coordination with the Forest Department, Environment and Wildlife Management Department and local communities for the conservation of the lake.
- Need for a continued dialogue with the Dzumsa body (local governing body) on garbage management in and around the lake, awareness-generation

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through workshops and meetings at both local and government levels, and involvement of students in these activities.

- Various education and awareness programmes periodically with a special focus on high altitude wetlands.

3. Khechiopalri Lake

- The lake is subjected to high influx of tourists.
- Heavy sediment loads is posing big threat and that requires catchment area treatment around the lake, clear out encroached areas,
- As the lake is highly revered by both the locals as well as tourists, designate separate areas for religious purposes to save the main water body.
- Plantation of appropriate plant species or mix of species for runoff avoidance.
- Management of garbage and various conservation measures in and around the lake.
- Planning the formation of a Community Based Organisation (CBO) as envisaged under Pokhari Sanrakshan Samiti Notification 2006, which can act as a guardian of the lake while also securing the livelihood of the locals living in nearby villages.
- Alternative livelihood activities to reduce pressure on this water body for people living near the lake.
- A water quality analysis needs to be conducted periodically during pre and post monsoon season. Coordination needed with the Forest and Environment Department and local communities for the conservation of the lake.
- Fish being offered by the locals need a monitoring for a sustainable lake environment.
- More education and awareness programmes needs to be conducted periodically to create awareness about the lake conservation.

4. Tembao Wetland Complex

- This wetland burst out in December 1998 because of which it came in to prominence.
- The biodiversity especially the wildlife in the wetland complex is under a threat of decline.
- Catchment degradation, poor vegetal cover, traditional grazing, rapid formation of marine gullies, and excessive use of hot springs are other challenges which are posing threat to the lake.

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- A proper management and action plans to be made in consultation with experts.
- Army establishment should also be consulted while making the management action plan.
- A water quality analysis needs to be conducted periodically during pre and post monsoon season. Coordination with the Forest Department, Environment and Wildlife Management Department and local communities for the conservation of the lake.
- Need for a periodic dialogue with the Dzumsa body (local governing body) on the management and monitoring of the lake.

5. Menmoitso (Memencho) and Hangu Complex

- Although the lake is not open for the tourists but the area, surrounding the lake has high influx of tourists at the Baba Mandir, the entry point for the lake.
- Monitoring and management of increased garbage accumulation due to careless littering by the tourists.
- A water quality analysis needs to be conducted periodically during pre and post monsoon season in coordination with the Forest and Environment Department, Department of Fisheries, Army, local communities for the conservation of the lake.
- Sedimentation due to the construction activities around the lake need a monitoring.
- Army being one of the stakeholders in this region along with fisheries department should also be consulted while making the management action plan.
- Building capacity and providing awareness and technical support to the army personnel deployed at the Baba Mandir.
- Periodic monitoring of water quality and biodiversity around the lake is much needed considering the lake being habitat to various endemic flora and fauna in Sikkim.

6. Phedang Tso (Kupup) Wetland Complex

It is a source of water for Jalkata power station in Bhutan and is surrounded by defence installations and road networks. Major threats observed are tourism influx, excess field exercises by army and civilians around the lake, grazing, avalanches and shrinkage in Preparation of Brief Document on Wetlands of Sikkim 389 area. Fuel spillage from the

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vehicles parked around the lake is one of the pollution causing agent of besides other solid-waste pollution in the lake. Since it is also a source of domestic water supply to army and nearby local communities, periodic water quality monitoring is needed. Management interventions like catchment area treatment through plantation of high altitude grasses and shrubs to maintain the ecologically healthy lake environment as the lake is nesting ground and transit site for the migratory birds and. This can further be facilitated through geospatial monitoring and mapping of the biodiversity in the catchment of the lake for its conservation. One of the major stakeholders besides community is the Army, their participation in the lake management and pollution abatement is essential.

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