Lakes of Nepal: 5358 - A Map Based Inventory

National Lakes Strategic Plan Preparation

(Report)

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Background

The Government of Nepal has planned to prepare a National Lakes Conservation and Development Strategic Plan (NLCDSP) with an overall objective of refining the mandates and obligations of the National Lakes Conservation Development Committee (NLCDC) within the jurisdiction of the national legislations and scope of the international conventions on conservation. The NLCDSP will result in a five-year work plan with long-term visions within the framework of the country's national development plan and the Nepal Biodiversity Strategy as well as the visions and programs of the Nepal Tourism Year 2011.

The NLCDSP is under preparation with three major streams:

a) Policy & Management (constitution, acts, regulations, policies, strategies, plans, manifestoes, conventions etc)
b) Natural Science (watershed, land use, biodiversity, inlets-outlets, hydrology, meteorology, physical-chemical parameters etc)
c) Social Science (demography, livelihood, culture, traditions, tourism, and resource use such as drinking water, irrigation, energy etc.)

Several partners are involved in the NLCDSP process. They include the International Union for Conservation of Nature (IUCN) Nepal office, the Nepal Academy of Sciences and Technology (NAST), the National Trust for Nature Conservation (NTNC), and the Tribhuvan University, Central Department of Environmental Studies (TU-CDES).

With the primary objective of conserving and developing the country's lakes, NLCDC was established on March 23, 2007 by the 1957 Development Committee Act under the aegis of the Ministry of Tourism and Civil Aviation (MOTCA). NLCDC's scope includes policy advise to the government on lakes conservation and development, program planning and implementation in coordination with the sectoral ministries, developing lakes as tourism destinations, public awareness on the cultural and religious significances of lakes, protecting the lakes from pollution, encroachment and other detrimental activities etc.

Along with the establishment of its own office in Kathmandu, NLCDC has coordinated with government and non-government institutions including the International Lake Environment Committee for Integrated Lake Basin Management, conducted Initial Environmental Evaluation, and supported for the management of over 20 lakes in the country.

According to the DOAD (1992) reports, there are around 5,000 lakes, 1,380 reservoirs, and 5,183 village ponds in the country. According to IUCN inventory (1996), there are 163 wetlands in Terai, and 79 in the hills and mountains. Similarly, 3,252 glaciers and 2,323 glacial lakes have been identified in the high mountain region (Mool et al, 2001). The inventory of glacial lakes was conducted from the perspectives of the potential

Glacial Lakes Outburst Flood (GLOF). There is still no detailed inventory of glaciers and glacial lakes, GLOF sites and events in the Hindu Kush Himalaya region.

There are nine wetlands in Nepal that are globally recognized as Ramsar sites. Four sites situated in the Terai region are the Koshitappu Wildlife Reserve, Beeshazarital in Chitwan National Park, Jagdishpur reservoir in Kapilvastu and Ghodaghodital in Kailali. The four sites located in the mountainous region are Gokyo lake in the Sagarmtha National Park, Phoksundo lake in the Shey Phoksundo National Park, Rara lake in the Rara National Park and Gosaikunda lake in the Langtang Nationalm Park. One site in the hilly region is Mai Pohkari in Ilam. Except for the Jagdishpur reservoir and the Mai Pokhari, the seven sites are situated within the protected areas network of the country.

Inventory Method

The primary step of the strategic planning was to prepare a list of lakes in the country. The listing was initiated using the available maps of the country. The two major types of maps that were referred to were district maps and the topographical sheets.

Initially the district maps (scale of 1:125,000) were considered to be useful to identify major lakes. It was found that the district maps published between 1993 and 2007 are not completely reliable since numerous lakes are not shown on them. For example, the district maps of 20 districts did not mention any lakes, whereas the topographical sheets of the same districts mentioned as many as 1,157 lakes.

There are 706 topographical sheets covering the entire regions of the country. The Terai and mid-mountain regions are covered with 590 sheets of 1:25,000 scale, and the high mountain and Himalayan regions with 116 sheets of 1:50,000 scale. Published between 1992 and 2001, the topographic sheets are the most frequently used base maps for the country.

For the purposes of this study, water bodies indicated in the topographical sheets were considered as lakes although they are less than one hectare in area (**Box 1**). Another criterion that was referred to was the shape of a water body. The water bodies that have natural shapes were considered lakes. The artificial fishery ponds and the water bodies having rectangular shapes were not included in the list (**Figure 1**).

Box 1. Definitions of Lake

One definition of "lake" is a body of water of 2 hectares (5 acres) or more in area, however others have defined lakes as water bodies of 5 hectares (12 acres) and above, or 8 hectares (20 acres) and above. Charles Elton, one of the founders of ecology, regarded lakes as water bodies of 40 hectares (99 acres) or more.
http://www.answers.com/topic/lake
October 29, 2009

The following basic information of the lakes was noted down from the topographical sheets:

1. Name of the lake (where available),
2. District of location
3. Altitude (on the basis of the contour lines)
4. Grids X and Y (instead of latitude and longitude)
5. Topographical sheet number

For each of the lakes an alpha-numerical code number was generated. The first two alphabets indicate the name of a district, and the following numbers indicate the serial number within the district. Thus, the code numbers also indicate the total number of lakes in a district.

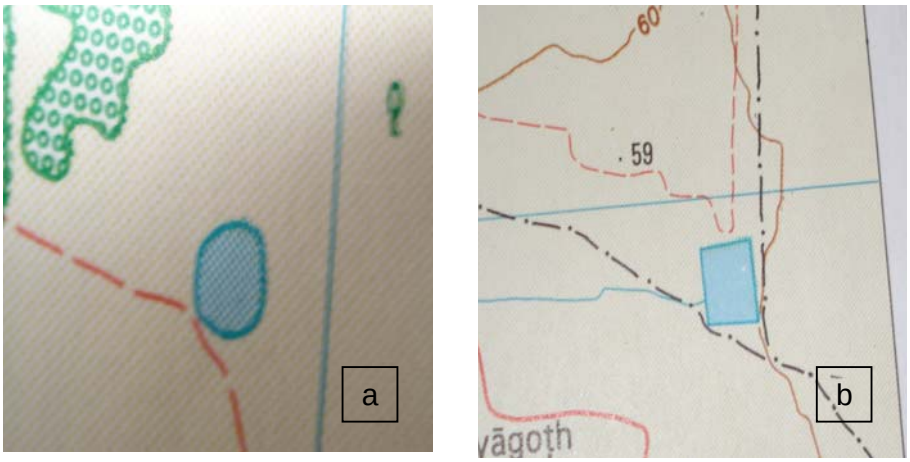


Figure 1. a. Natural shape b, Artificial construction

Upon knowing the location of the lakes, additional information could be collected from the topographical sheets that carry eight layers including administrative boundaries, transportation, settlements, land cover, other hydrographic data, altitude, utility, and designated areas.

The district wise information of the lakes was also verified during field observations and consultations in 49 districts in August through October 2009. The field observations were the part of the strategic planning process. Over 100 persons from NAST, NTNC and TU-CDES were involved. They visited selected lakes during their field works.

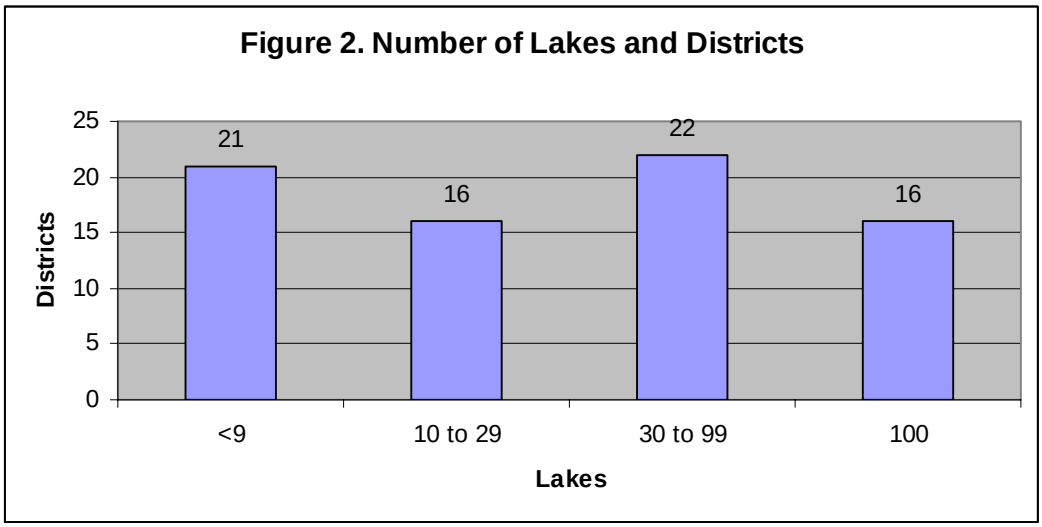
Findings

A list of 5,358 lakes has been prepared using the topographical sheets, whereas only 278 lakes were identified on district maps (**Table 1**).

Table 1. Number of Lakes by Districts, Ecologicaal Zones, and Phytogeographical Regions

Phytogeo Regions	Western (< 83^{0}00'E)			Central (83^{0}00'E-86^{0}30'E)			Eastern (> 86^{0}30'E)		
Ecological Zones		D	T		D	T		D	T
Highlands	Jumla	11	99	Dolakha	5	42	Taplejung	12	380
	Kalikot	-	1	Sindhupalchok	6	75	Sankhuwasabha	15	159
	Mugu	16	125	Rasuwa	5	38	Solukhumbu	32	339
	Humla	2	381	Manang	1	66			
	Bajura	1	57	Mustang	25	78			
	Bajhang	2	25	Dolpa	6	210			
	Darchula	-	19						
	7	*32*	*707*	*6*	*48*	*509*	*3*	*59*	*878*
Mid – Hills	Pyuthan	2	19	Sindhuli	-	9	Panchthar	4	17
	Rolpa	1	16	Ramechhap	4	25	Ilam	5	30
	Rukum	1	70	Kavrepalanchok	-	1	Dhankuta	1	4
	Salyan	2	5	Lalitpur	-	3	Terhathum	5	4
	Surkhet	-	22	Bhaktpur	-	2	Bhojpur	5	7
	Dailekh	-	7	Kathmandu	2	1	Okhaldhunga	2	0
	Jajarkot	-	16	Nuwakot	2	3	Khotang	7	10
	Achham	6	13	Dhading	2	5	Udayapur	3	14
	Doti	1	19	Makwanpur	3	2			
	Dadeldhura	2	2	Gorkha	6	36			
	Baitadi	-	1	Lamjung	7	23			
				Tanahau	2	2			
				Syangja	3	4			
				Kaski	13	29			
				Myagdi	-	33			
				Parbat	2	5			
				Baglung	4	60			
				Gulmi	3	11			
				Palpa	4	12			
				Arghakhanchi	1	3			
	11	*15*	*190*	*20*	*58*	269	*8*	*32*	*86*
Terai – Siwaliks	Kapilbastu	9	351	Dhanusa	-	230	Jhapa	3	136
	Dang	1	38	Mahottari	-	186	Morang	1	184
	Banke	-	243	Sarlahi	-	74	Sunsari	1	69
	Bardiya	3	82	Rautahat	3	85	Saptari	-	46
	Kailali	4	114	Bara	-	93	Siraha	-	140
	Kanchanpur	5	85	Parsa	-	71			
				Chitawan	-	40			
				Nawalparasi	-	163			
				Rupandehi	4	289			
	6	*22*	*913*	*9*	*7*	*1231*	*5*	*5*	*575*
	24	**69**	**1810**	**35**	**113**	**2009**	**16**	**96**	**1539**

Sources: District Maps (D), Topographical Sheets (T)



Of the 75 districts, 74 consist of lakes. Although the district map of Okhaldhunga indicates two lakes, there are none on the topographical sheets. There are 21 districts where there are less than nine lakes, and 16 districts where there are over 100 lakes. Among the rest of the districts, 16 have lakes between 10 and 29, and 22 have between 30 and 99 (**Figure 2**). The eight districts with high number of lakes are Humla (381), Taplejung (380), Kapilbastu (351), Solukhumbu (339), Rupandehi (289), Banke (243), Dhanusa (230), and Dolpa (210).

Altitude wise, over 2,700 lakes (51%) are distributed below 500m, and 2,227 (42%) above 3,000m. Only 419 lakes (<8%) are in the mid hills of altitudinal range between 500m and 2,999m (**Table 2**).

Table 2. Altitudinal Distribution of Lakes in Nepal

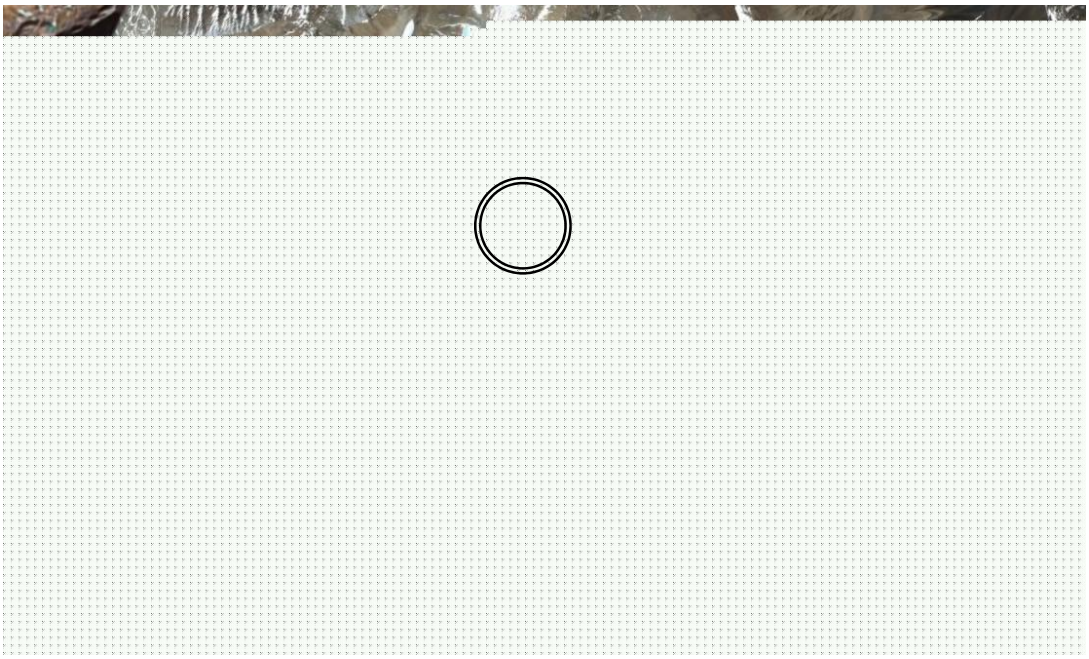
Altitude	Lakes		
		Number	%
Below 100	1270		
100-499	1442	2712	50.62
500-999	77		
1000-1499	69		
1500-1999	125		
2000-2499	114		
2500-2999	34	419	7.82
3000-3499	56		
3500-3999	60		
4000-4499	418		
4500-4999	762		
5000-5499	764		
above 5500	167	2227	41.56
Total	5358	5358	

Among the significant lakes, Rara is the largest one covering an area of 800ha, and Phoksundo is the longest one with its length 5.15km. Similarly, Dhau Dhundhun Tal is the highest placed lake in Mustang at an altitude of 5905m, and an unnamed lake is at 59m altitude in Dhanusha (**Box-Figures 2-5**).

Box-Figure 2. High Altitude Lake

Name of Lake: Dhau Dhundhun Tal

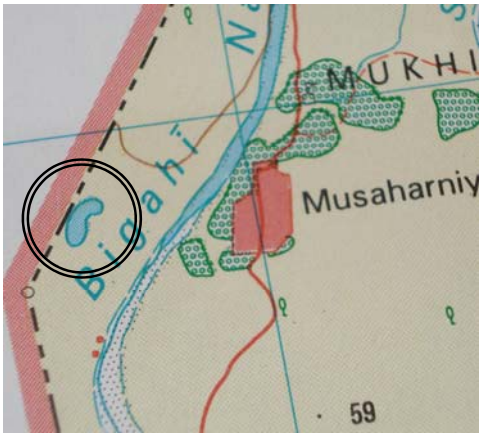
Topo- Sheet no:	2983-16
Code:	MS52
District:	Mustang
VDC:	Charan
Nearby City/Village:	Saukre (20Km)
Area:	4.75ha
Length:	350m
Breadth:	150m
Perimeter:	900m
Altitude:	5905m



Source: Google Earth. 2009

Box 5-Figure. Low Altitude Lake

Name of Lake:	X
(near Boundary Pillar	53)
Topo- Sheet no:	2685-08C
Code:	DS65
District:	Dhanusha
VDC:	Mukhiya Patti
Nearby City/Village:	Musahamiyatol (1.5Km)
Area:	0.5ha
Length:	125m
Breadth:	50m
Perimeter:	425m
Altitude:	59m



Source: Google Earth. 2009

References

Bhandari, B. 1992. The Current Status of Wetlands in Nepal. Country report presented at the Asian Wetland Symposium organised by the Ramsar Centre, 14-20 October 1992, Otsu-Kushiro, Japan.

Bhandari, B., Shrestha, T.B. and McEachern (eds). 1994. Safeguarding Wetlands in Nepal: Proceedings of the National Workshop on Wetlands Management in Nepal. IUCN-Nepal, Kathmandu, Nepal.

Bhuju, Ukesh Raj, PR Shakya, TB Basnet, and S Shresha. 2007. Nepal Biodiversity Resource Book 2007: Protected Areas, Ramsar Sites and World Heritage Sites. Kathmandu: ICIMOD, Ministry of Environment, Science and Technology, Nepal Nature dot Com, UNEP

BPP (Biodiversity Profiles Project). 1995a. Biodiversity Assessment of Terai Wetlands. Biodiversity Profile Project, Publication No. 1, Department of National Parks and Wildlife Conservation, Kathmandu, Nepal.

DOAD. 1992. National Fisheries Development Plan, 1992/93. Fisheries Development Division, Department of Agriculture Development, HMGN, Kathmandu, Nepal.

Google Earth. 2009 http://earth.google.com/index.html

Hollis, G.E., Holland, M.M. and Larson, J.S. 1988. Wise Use of Wetlands. Nature and Resources 24(1):2-13

Hussain, M.Z. 1994. Value and Functions of Wetlands. In Bhandari, B., Shrestha, T.B. and McEachern, J. (eds) *Safeguarding Wetlands in Nepal: Proceedings of the National Workshop on Wetlands Management in Nepal*, 3-5 March 1993, Kathmandu, pp 103-109. IUCN-Nepal, Kathmandu.

IUCN-Nepal. 1996. An Inventory of Nepal's Wetlands. IUCN-Nepal, Kathmandu.

Jha, P.K. and Lacoul, P. 1998. Wetlands in Nepal: Status, Significance and Management. In Majumdar, S.K., Miller, E.W. and Brenner, F.J. (eds) *Ecology of Wetlands and Associated Systems*, pp 648- 669. The Pennsylvania Academy of Science, USA.

MFSC, 2002. Nepal Biodiversity Strategy. Kathmandu: Ministry of Forests and Soil Conservation

Mool, P; Bajracharya, SR and Joshi SP. 2001. Inventory of Glaciers, Glacial Lakes and Glacial Lake Outburst Floods: Monitoring and Early Warning Systems in the Hindu Kush-Himalayan Region – Nepal. Kathmandu: ICIMOD

NARMA. 2004. Poverty Reduction through Sustainable Management of Protected Areas and Wetlands in Nepal: Processes, Modalities, Impacts and Identification of Areas for Future Support (Volumes I and II). NARMA Consultancy Private Limited, Kathmandu

Scott, D.A. (ed) 1989. A Directory of Asian Wetlands. IUCN, Gland.

Survey Department (1993-2007). Districts maps. Kathmandu: Survey Department

Survey Department, 2007. Topographical Sheets field verified during 1992 & 2001 (1:25,000 and 1:50,000 scales). Kathmandu: Survey Department, Government of Nepal *http://www.dos.gov.np/bigmap.html*