



**Lessons from Nepal on Developing a
Strategic Plan for ILBM: The Case of Phewa
Lake**

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COUNTRY DESCRIPTION

NEPAL

Area: 1,47,181 km²
Population: 26 million
Physiography: High Himal, High Mountain Mid-Mountain, Siwalik & Terai (flat land)
Biogeography: Indo-Malayan/Palaearctic
Climate: Subtropical – Temperate
Latitude: 26° 22' - 30° 27' (N)
Longitude: 84° 4' to 88° 12' (E)
Seasons: Spring, summer autumn winter
Avg. Temp: 15° C /yr
(↑ N - ↓ S)
Avg. Rainfall: 1800 mm
(<250 mm - >5000 mm).
Forests: 40% of the land
Agriculture: 27%.of the land
Agri. Role: 65% of popⁿ
38% of GDP`



NEPAL'S BIODIVERSITY: STATISTICS

Area
0.03 % (Globe)
•0.3 % (Asia)

Class	Species No.		Nepal %	Nepal's Endemic (No)
	Global	Nepal		
Flowering plants		>5700	2.7	246
Insects	750,000	5,000	0.06	
Butterflies	15,000	656	4.2	29
Fresh water fishes	>8,500	185	2.2	8
Amphibians	>4,500	43	1.1	9
Reptiles	> 6,500	100	1.5	2
Birds	9,883	844	8.5	2
Mammals	4,327	181	4.2	1

NEPAL'S BIO-DIVERCITY IN PICTURE



NEPAL'S LAKES ...



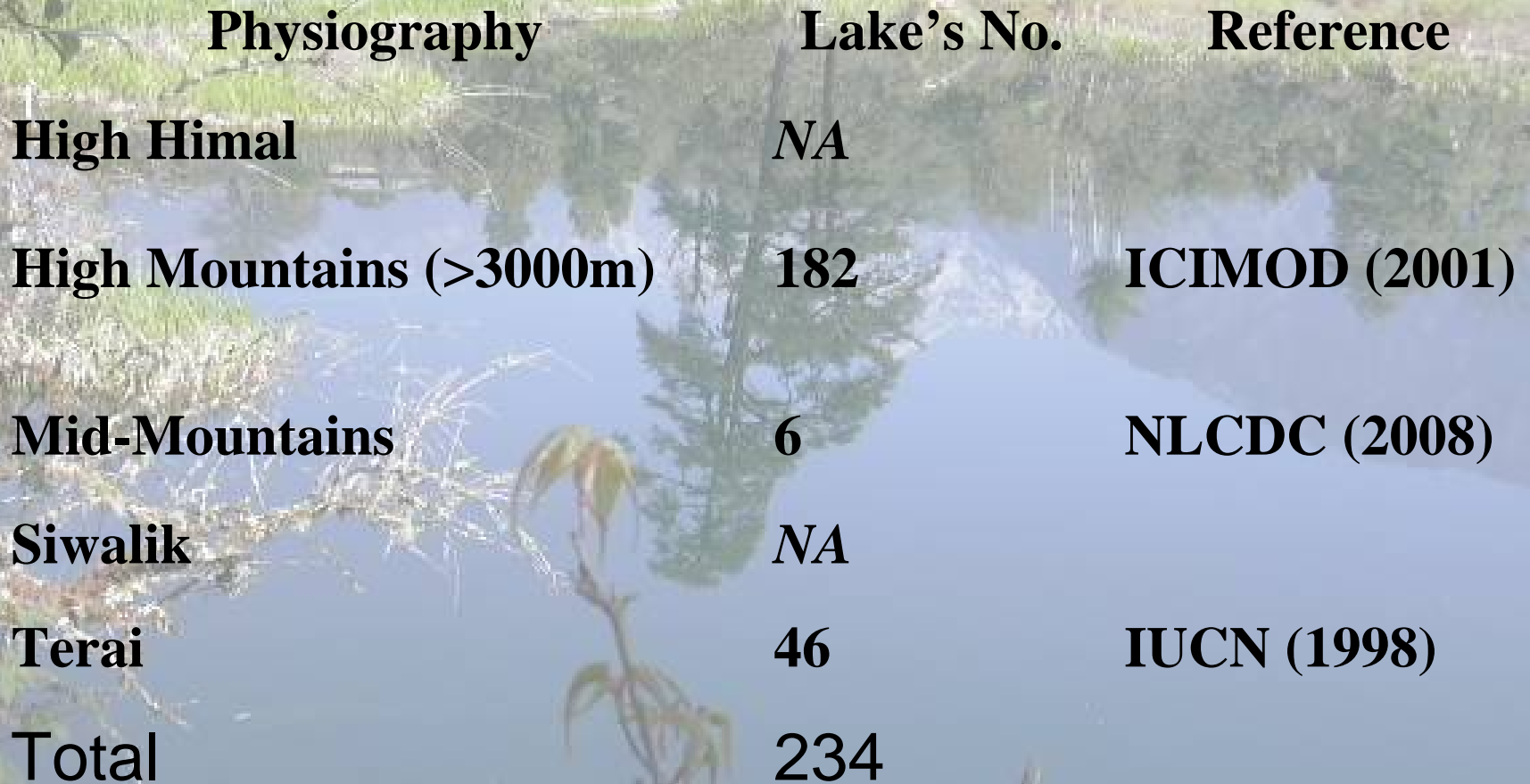
**Lakes hold
3% of
available
water of Nepal.**

NEPAL'S LAKES ...

- 6000 rivers
- 3252 Glaciers
- > 10 Reservoirs
- 234 Lakes (!)
- > 23,000 Ponds
- Marshy lands
- Paddy fields

High Mountain: 182
Mid Hills: 6
Terai: 46

NEPAL'S LAKES ...STATUS STILL UNKNOWN




Physiography	Lake's No.	Reference
High Himal	NA	
High Mountains (>3000m)	182	ICIMOD (2001)
Mid-Mountains	6	NLCDC (2008)
Siwalik	NA	
Terai	46	IUCN (1998)
Total	234	

HIGH-MOUNTAIN LAKES IN NEPAL

Basins	Glaciers		Glacial lakes	
	Number	Area (km ²)	Number	Area (km ²)
Koshi River	779	1,410	1,062	25
Gandaki River	1,025	2,030	338	12
Karnali River	1,361	1,740	907	37.6
Mahakali River	87	143	16	0.4
<i>Total</i>	<i>3,252</i>	<i>5,323</i>	<i>2,323</i>	<i>75</i>

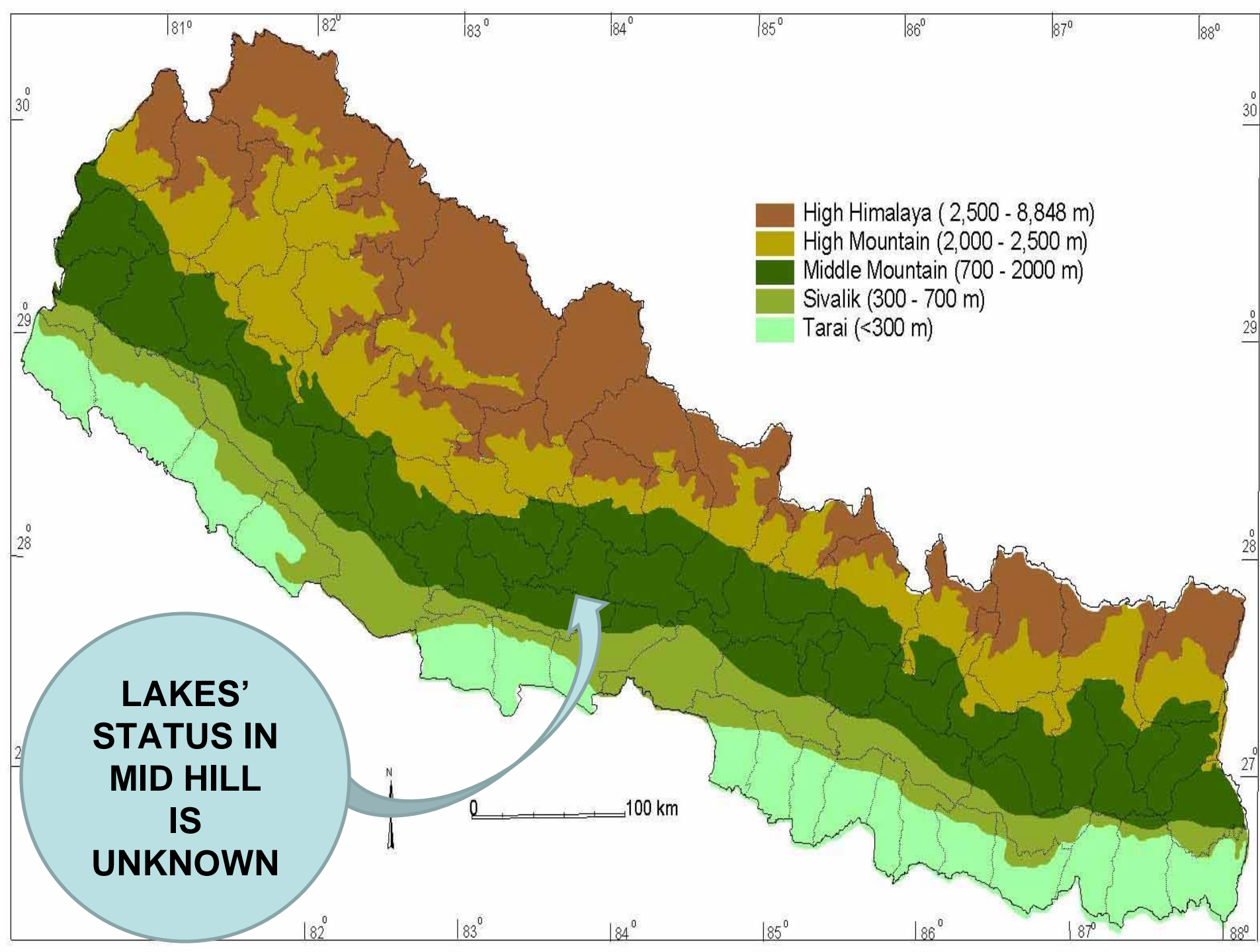
LOW LAND LAKES IN NEPAL



Wetlands Type	Number	Area (ha)	No. %
Lakes & Ponds	78	1616	48
Marshes	13	797	8
Swamps	5		3
Floodplains	53	529,136	33
Canals	8	183,200	5
Total	163	724,257	100

Nepal's Terai wetlands (IUCN Nepal 1998)

Background Photo: Kerung Pond, Ilam



LAKES ARE SPECIAL ...*BIODIVERSITY CONTEXT*

1. Plants:

5% of Nepal's flowering plants (>5700 *sps*)

4.8% of total plant endemics of Nepal (246 *sps*)

About 10% of nationally threatened plants (91 *sps*)

2. Animals

Mammals

(181*sps*):

About 7% as critically endangered, endangered, and threatened

Birds (861*sps*):

22.5% of Nepal's bird

Pisces (185 *sps*):

4 endemic to lakes

Herpetofauna

(143 *sps*):

9 endemic *sps*

Butterflies

(656 *sps*):

> 12% of butterflies

IN NEPAL ... LAKES ARE SPECIAL

Nature

Extremely beautiful due to their glacial and tectonic origin.

Culture

Reflection of Hindu and non-Hindu religio-culture

Economy

28 % of tourist visits lake sites
(60 million US \$ 2006)

Livelihoods

Main stake of livelihoods to Nepal's
10.8% of wetlands dependent ethnic
group

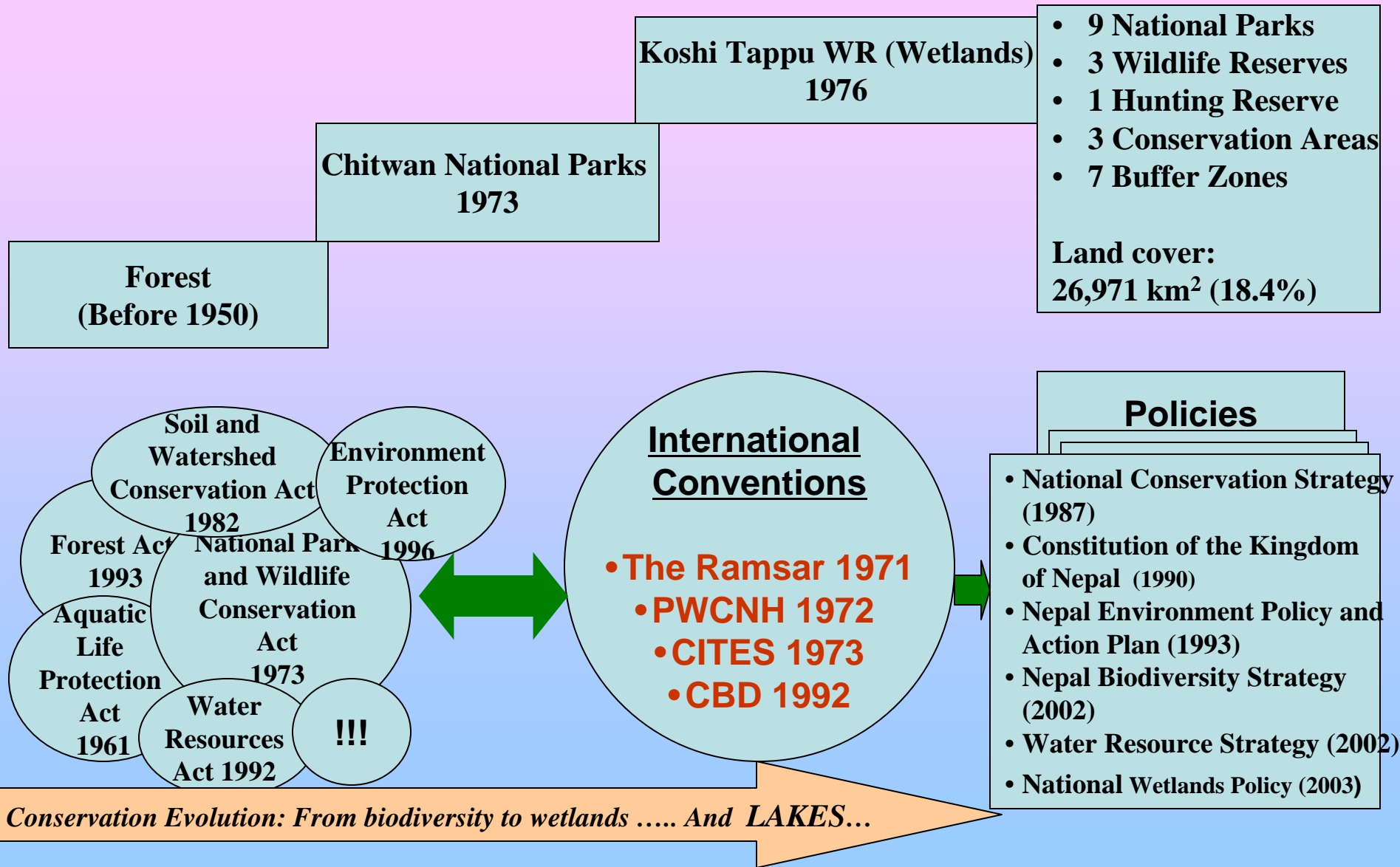
Ethnic Groups	Population	%
<i>Tharu</i>	<i>1,533,879</i>	<i>6.75</i>
<i>Mushar</i>	<i>172,434</i>	<i>0.76</i>
<i>Dusadh/Paswan/Pasi</i>	<i>158,525</i>	<i>0.70</i>
<i>Kewat</i>	<i>136,953</i>	<i>0.60</i>
<i>Mallah</i>	<i>115,986</i>	<i>0.51</i>
<i>Kumal</i>	<i>99,389</i>	<i>0.44</i>
<i>Majhi</i>	<i>71,614</i>	<i>0.32</i>
<i>Danuwar</i>	<i>53,229</i>	<i>0.23</i>
<i>Dhangar/Jhagar</i>	<i>41,764</i>	<i>0.18</i>
<i>Bantar/Sardar</i>	<i>35,839</i>	<i>0.16</i>
<i>Darai</i>	<i>14,859</i>	<i>0.07</i>
<i>Bote</i>	<i>7,969</i>	<i>0.04</i>
<i>Barhamu/Baram</i>	<i>7,383</i>	<i>0.03</i>
Total	2,449,823	10.79

LAKES ARE SPECIAL ...INTERNATIONAL SIGNIFICANCE

- 9 lakes designated as Ramsar sites
- 4 High Mountain lakes, 4 Low Land lake (1 reservoir)
- No lakes designated from Mid-Hills
- 6 lakes under PAs
- 0.05% of total cover of the Ramsar sites (globe)

Lakes	Area (Ha)	Reference
Koshi Tappu	17500	Koshi Tappu WR
Beeshazari Tal	3200	Royal Chitwan NP
Jagdishpur Reservoir	200	Outside PA
Ghodaghodi Tal	2563	Outside PA
Rara Tal	1036	Rara NP
Sheyphoksundo Lake	452	Sheyphok. NP
Gokyo	42.69	Sagarmatha NP
Mai Pokhari	-	Outside PA
Gosainkunda	13.80	Langtang NP
<i>Total</i>	<i>25032.49</i>	

CONSERVATION HISTORY IN NEPAL



RARA LAKE



SEY-PHOKSUNDO LAKE



GOSAIKUNDA



GOKYO LAKE



BEEHAJARI LAKE



JAGDISHPUR RESERVOIR



KOSHI TAPPU



CONSERVATION OF LAKES BEGINS FROM 2006

National Lake Conservation Development Committee (NLCDC) 2006

Objectives

- Policy Recommendation
- National & International Coordination
- Conservation and Development of Lakes (Tourism, Biodiversity & Culture)
- Lake Linked Livelihoods
- Lake Inventory and Database
- Conflict Resolution
- Resource Diversification
- Program identification/implementation
- Partnership building (national/international)

NLCD – ILEC CO-RELATION BEGINS...



Jaypur Conference 2007

Heyderabad Workshop – 2008

ILEC Visit to Nepal 2008

ILBM-G Review Japan, 2009

ILEC VISIT TO NEPAL (DEC. 14-20, 2008)

Objectives

- Rapid assessment of lakes
- Rapport builds up (Government & Non-government institutions)
- Share ILBM learning
- Review of lake-brief
- Explore opportunities for conserving the Himalayan lakes

IMPACTS AFTER ILEC-NLCDC **ILBM JOURNEY BEGINS ...**

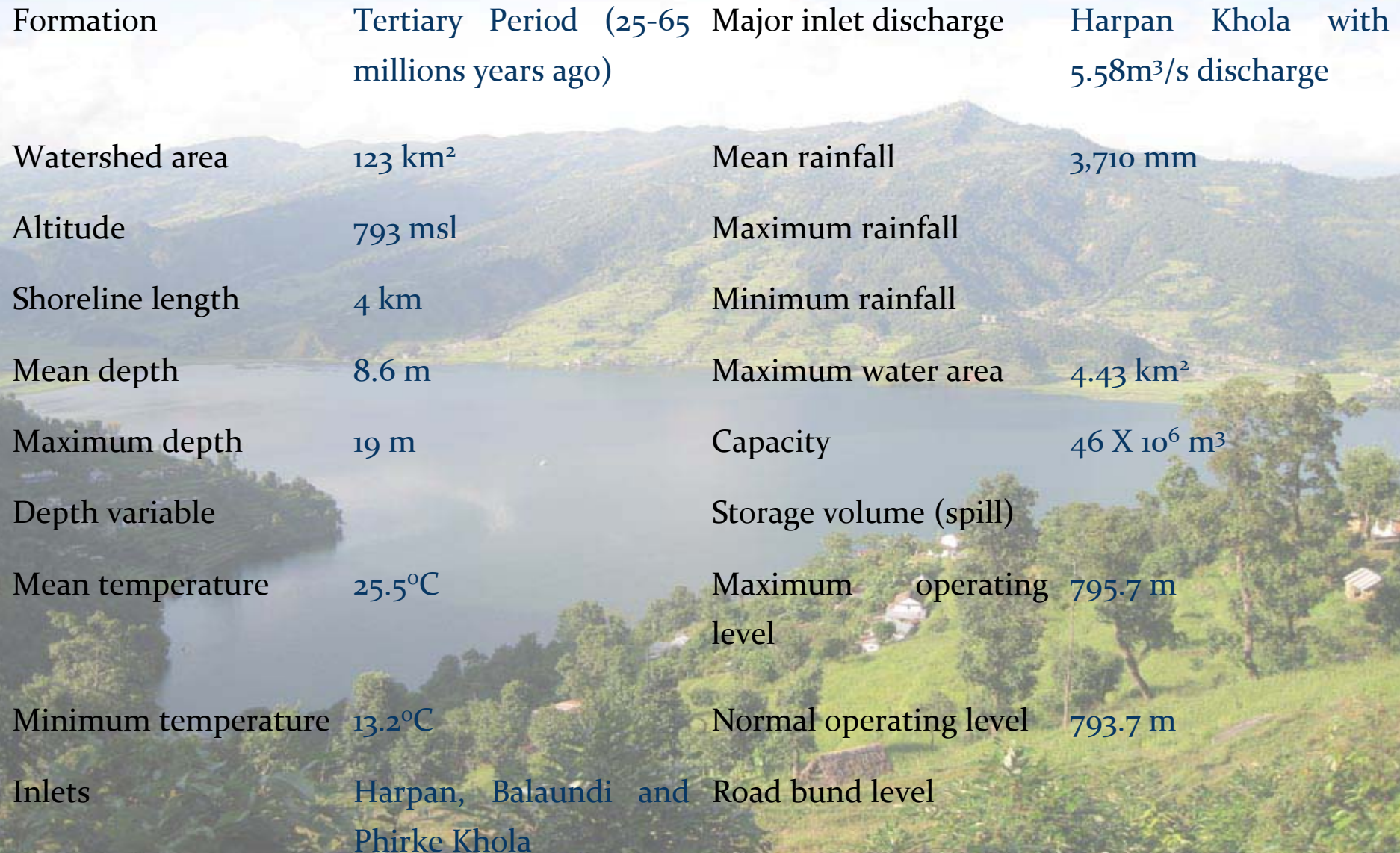
- **Preparation of Draft Lake Brief (Phewa, Rupa and Begnas)**
- **Rapid Assessment of Lake Rupa**
- **Inventory of Lakes of Middle-Hill (Experts' Core Group, 1st consultation, Methodology Development).**
- **Support to 50 Lakes for ILBM Based Conservation**
- **Designation of Lake-Cluster of Pokhara Valley (Proposal Under Ramsar Immediate Funding Status)**
- **Community Safeguarding Lakes of the Pokhara Valley (Proposal signed)**
- **Concept Paper For Lake Conservation Academy Prepared**

Lake Brief of Phewa

Nature	Stream-fed dam regulated, semi-natural freshwater subtropical mountain lake
Latitude - Longitude	28° 7'-28° 12'N-84° 7'-84° 19'E
Administrative Status	DDC Kaski. WDR. Six VDCs (Sarangkot, Kaskikot, Dhikurpokhari, Bhadaure Tamagi, Chapakot & Pumdi Bhumdi), Pokhara Sub-Metropol
Land Use	Forest Land: 44%
	Agriculture Land: 39%
	Urban Area : 5%
	Pasture & Barren: 5%
	Wetlands: 4%
	Shrub Land: 3%
Socio-Economic Feature	<p>Population: 0.14 million Growth Rate: 7.4% Male: 49.7% Female: 51.3%</p> <p>Ethnicity</p> <p>Brahman: about 48% Occupational caste: 27% Gurung: 14% Others :11% Literacy: 50 %.</p>



Lake Brief of Phewa **Physio-graphic Features Of Phewa**



Formation	Tertiary Period (25-65 millions years ago)	Major inlet discharge	Harpan Khola with 5.58m ³ /s discharge
Watershed area	123 km ²	Mean rainfall	3,710 mm
Altitude	793 msl	Maximum rainfall	
Shoreline length	4 km	Minimum rainfall	
Mean depth	8.6 m	Maximum water area	4.43 km ²
Maximum depth	19 m	Capacity	46 X 10 ⁶ m ³
Depth variable		Storage volume (spill)	
Mean temperature	25.5°C	Maximum operating level	795.7 m
Minimum temperature	13.2°C	Normal operating level	793.7 m
Inlets	Harpan, Balaundi and Phirke Khola	Road bund level	

Physico-chemical Features

Parameter	Unit	Surface	3m	5m	10m
Temperature	0°C	27.4	27.0	25.5	24.0
pH		9.3	8.9	8.4	7.8
Dissolve oxygen	mg/lt	5.28	3.25	2.03	4.06
Phenolphthalein alkalinity	mg/lt	A	A	A	A
Total hardness	mg/lt	77.2	88.4	77.4	77.2
Free CO ₂	mg/lt	A	1.956	1.672	0.88
Chloride	mg/lt	12.19	29.21	26.00	31.48
Secchi disc transparency	cm	177			
Clast size and pebbles		Oblate and platy			

Lake Brief of Phewa **Biodiversity**

- **Vegetation Types: 7**
- **Birds: 104 sps. (14 migratory)**
- **Mammal: 34 sps.**
- **Fishes: 16 sps. (4 exotic)**
- **Reptile: 14 sps.**
- **Amphibian: 6 sps.**
- **Aquatic macrophytes: 39 species (23 hydrophytes; 16 helophytes)**

Lake Brief of Phewa **Resource Use Value**

- **Hydroelectricity (1MW)**
- **Irrigation**
- **Fishery**
- **Boating**
- **Tourism**
- **Commercial Zone**

Lake Brief of Phewa **Issues and Problems**

Conflicting Legal Issues	Aquatic Animal Protection Act 1961 (amended first in 1999)
	Forest Act 1993 (amended in 2001)
	National Park and Wildlife Conservation Act
	Forest Act 1993 (amended in 2001)
	Soil and Watershed Conservation Act 1982;
	Electricity Act 1992;
	Water Resources Act 1992;
	Environment Protection Act 1996
	Local Self Governance Act (1999)
	Municipality Act (1991)
Reclamation Encroachment	5.8 km² of area (1981) now is 4.4 km² (2001)
Pollution	Sewerage, solid wastes, clothes washing, agricultural run-off and sediments
Sedimentation	Carrier: Harpan Khola, , Bulanudi and Phirke Khola (1990-'94:175,000-225,000 m³/Yr.
	Decrease Area : From 10 km² (1956/57) - 5.5 km² ('76) and 4.4 km² ('98).
Threats to Biodiversity	
Rapid Urbanization	
Inadequate Institutional Capacity	
No Implementation of Plan	

Lake Brief of Phewa **Strategies and Actions Undertaken**

STRATEGIES AND POLICIES	National Conservation Strategy - 1987
	Environment Policy and Action Plan - 1993
	Biodiversity Strategy - 2002
	Water Resource Strategy - 2002
	National Wetlands Policy - 2003
Conservation Action Plans and Guidelines	
Town Development Plan	
INSTITUTION	
National Planning Commission	Inter-sectoral coordination
Ministry of Forest & Soil Conservation	Works under 4 constituents (Environment Division; DNPWC; DoF; and DSCWM)
Ministry of Population and Environment now Ministry of Environment, Science and Technology	Environment Protection Council (Issues of pollution control, enforcement and monitoring of environmental standards, and environmental impact assessments)
Ministry of Agriculture and Cooperatives	Promotion of aquaculture
Ministry of Local Development has various DDCs, VDCs, Municipalities and Metropolitan Authorities	Manage natural heritage (forest, rivers, wetlands)
Boat Club	
NLCDC	Coordinate national and international bodies, and implement wetlands restoration programs
OTHER ACTIONS	
Pokhara Environment Improvement Project	
Studies on Environmental Conservation of Phewa	
Endowment Trust of Phewa	
Lake Beach Establishment Initiative	

- **Improvement in Physical infrastructure Development**
- **Enhanced Knowledge**
- **Strengthened Capacities**

Lake Brief of Phewa **Lessons Learnt and Ways Ahead**

- **Initiate to Implement Phewa Lake Conservation Action Plans (10 action areas)**
 - ✓ **Consensus development among stakeholders**
 - ✓ **NLCDC should prepare itself as a consortium (Role: financial, technical and managerial).**
- **Strategies To Extend Life Span of Phewa & Maintain Cleanliness**
 - ✓ **Needs an integrated and holistic approach.**
- **Integrate “Hardware” and “Software” Components (Diversion Canal, Check Sediment Load, Habitat Conservation etc)**
- **Integrate Income Generation and Nature Conservation**
- **Interlinking Conservation of Phewa With Other These Lakes.**
- **Review Phewa Lake Conservation Plans and, Phewa Lake Conservation Guidelines.**
- **Revitalize Endowment Trust of Phewa**
- **Adopt ILBM**