

# Background Material for Expression of Interest



**Lake Conservation Authority of Madhya Pradesh**

**JAL TARANG**

**Bhoj Wetland Interpretation Centre**



## **Lake Conservation Authority of Madhya Pradesh**

Lake Conservation Authority of Madhya Pradesh (MPLCA) under Housing & Environment Department, Government of M.P. was constituted on 20th May 2004 to facilitate conservation and management of water resources of the state in environmentally sustainable manner and to generate awareness among the people to conserve these precious water resources.

### **Objectives**

- i. To manage, maintain and conserve lakes, ponds, reservoirs, tanks and other surface & sub surface water resources such as watercourses, rivers, ground water etc in an environmentally sustainable manner.
- ii. To act to regulate and control all types of activities, which are detrimental to the conservation of the lakes and water bodies.
- iii. To generate awareness among the stake holders about the conservation of the lakes and other water resources.

### **Jaltarang**

To create awareness among the people of all walks of life, an Interpretation Centre depicting the origin of Bhoj Wetland, of lake eco-system are under implementation at the shore of Upper lake which is frequented by the people. Lake Conservation Authority has set up Bhoj Wetland (Upper & Lower lakes) Interpretation Center 'Jaltarang' near Boat Club on Van Vihar Road. 'Jaltarang' houses various working models, touch screens, diorama, panel etc. to depict the origin of Bhoj Wetland, ecosystem structure & function, conservation principles, future course of action for the sustainable use and over time changes caused by human interference and conservation efforts made by the Government.

The Interpretation Center has been established with a view to disseminate information for increasing the awareness and sensitivity of the people towards lakes and wetlands, to create awareness about the ecological value and economic importance of wetlands ecosystem and also to educate the visitors about the necessity of conserving wetlands and water resources. A wealth of information and its interpretation has been presented with the help of text, visuals, interactive models, dioramas, computers, touch screens, etc. Thousands of people including school children have visited Jaltarang and appreciated the exhibits.

The exhibits of Interpretation Center were initially designed and developed by the Center for Environment Education (CEE) Ahmadabad. in consultation with professionals of LCA .

## Need for Up-gradation

Ever since the Jal tarang was dedicated to the city of Bhopal about 45,000 people have visited the centre. In the last five years, the visitors have used the exhibits extensively hence there is felt need to upgrade the Centre. Also the technology has also witnessed many advances and more new electronic gadgets have come in the market which can be used for effective delivery of the message. The issues related to water supply and demand side management have also assumed significance. Visitors also expect to see new ideas, exhibits related to above themes. In light of the above, it has become imperative to upgrade the Bhoj Wetland Interpretation Centre Jal Tarang. Following 4 components have been envisaged for the proposed task.

- a) Repairs and Replacements of existing exhibits
- b) New Exhibits
- c) Development of Information and Education Material like Brochure, Posters and Booklets etc.
- d) Annual Maintenance Contract (AMC)

### a) Repairs & Replacements of existing exhibits

1. River system of M.P. Model
2. Cross-section of Lake Model
3. Bhoj Wetland Bird Diorama
4. Lake to Home Diorama (working model)
5. Mural in Auditorium
6. Model of Globe (Children Play Area)
7. Laughing Wall
8. Voting Machine
9. Replacement of all vinyl Photo-text Panels in the Centre
- 10 Replacement of all Touch screen monitors with SAW (Surface Acoustic Wave) technology monitors.
11. Replacement of all lighting system in the Centre with CFL and LED
12. Redesign of reception centre and souvenir shop.



## Bhoj Wetland or the Upper & Lower Lakes of Bhopal

The Upper and Lower Lakes of Bhopal, both man made reservoirs, along with their catchment areas, as a comprehensive system constitute the extent of the Bhoj Wetland.

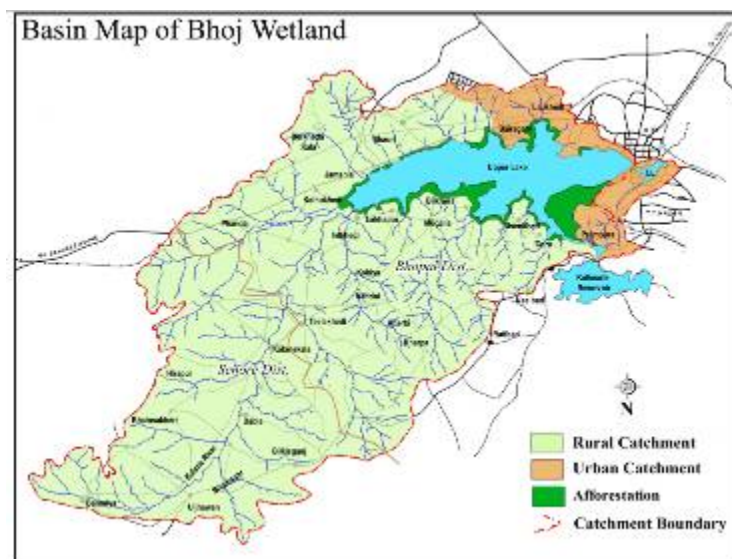
The Upper Lake was created by Raja Bhoj, the King of Dhar in Central India, in the 11th century by constructing an earthen dam across the Kolans River. The Kolans was originally a tributary of the Halali River, which in turn joins Betwa River near Vidisha. With the construction of this earthen dam and a spill channel a major change in the hydrological basins was effected almost about 900 years back, in the sense that the Kolans basin was linked to the Betwa River directly through Kaliasote River. Outflow from the Upper lake which receives water mainly through the Kolans river drains into Kaliasot river and finds its way to Yamuna river through the Betwa river. A waste weir at Bhadbhada, constructed in 1965 to increase the storage capacity of the Upper Lake, now controls the outflow.

The Upper Lake, in a linear east-west alignment, has a catchment area of 361 sq. km & a water spread area of about 31 sq. km. The Upper Lake has a partial Urban component in its catchment on the eastern end while the remainder is Rural.

The Lower lake, locally known as Chhota Talab (Small Lake), is situated towards the east end of Upper lake and is fully surrounded by built-up areas. This lake was created in 1794 AD by Nawab Chhote Khan, Minister of Nawab Hayath Mohammad Khan to add to the beauty of the city. Compared to the Upper lake, it has a small catchment area of 9.60 sq.km. and a water spread of 1.29 sq.km.

Lower lake which receives seepage water from the Upper lake and drainage from several drains outflows into the Patra drain which subsequently joins Halali river, a tributary of Betwa River.

Both the Lakes are separated in a terraced manner by the earthen dam built by King Bhoj in the 11th century and the lowest level of the Upper Lake is just below the highest level of the Lower Lake .



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## Salient Feature of Bhoj Wetland

	Upper Lake	Lower Lake
PERIOD OF CONSTRUCTION	11 <sup>th</sup> Century A.D.	1794
TYPE OF DAM	Earthen	Earthen
LOCATION : Latitude Longitude	23°12' - 23°16' N 77°18' - 77°23' E	23°14' - 23°16' N 77°24' - 77°25' E
CATCHMENT AREA (Sq.km.)	361	9.6
SUBMERGENCE AREA at FTL (Sq.km.)	36.54	0.90
FULL TANK LEVEL (MSL) (m)	508.65	499.88
DEAD STORAGE LEVEL (MSL) (m)	503.53	499.88
STORAGE CAPACITY (Million Cu.m.)	117.05	4.3
MAXIMUM DEPTH (m)	11.7	9.4
DESIGNED FLOOD DISCHARGE (Cu.m./Sec)	2208	-
SOURCE OF WATER	Rain water	Seepage from Upper Lake and Domestic Sewage
MAIN USE OF WATER	Potable water supply	Washing and Boating
INFLOW POINTS (Nos.)	31	28
SEWAGE INFLOW (MLD)	50.47	31.63

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## Land , Geology and Climate:

The city of Bhopal is situated on a series of rolling hills and valleys interspersed in between. The north- eastern, eastern and south- eastern edges of the Upper Lake and the entire Catchment of the Lower Lake is characterized by rolling hills. The western, southern and the north-western parts of the Upper Lake are relatively flat.

The Deccan trap Basalts and Vindhyan Sandstones (Bhander series-Upper Precambrian) are the principal rock formation of the area. Weathering of the volcanic rocks results in a characteristic heavy soil known as Black Cotton soil., which abounds in the lower areas where as the higher grounds are characterized by the rocky strata.

The area has a dry climate except during the south west monsoon season. The period from March to mid June is the summer season with a mean daily max. temperature of 40.7° C, and mean daily min. temperature 26° C. The monsoon season is effective from June to September. After the withdrawal of the monsoon, by the end of September, there is slight increase in the day temperature but nights become progressively colder. Post monsoon period extends upto mid December, and winter season is upto February with January as generally the coldest month with a mean daily max. temperature of 25.7° C and the mean daily minimum temperature of 10.4°C.

The average annual rainfall is about 1100 mm. About 92% of the annual rainfall is received during the monsoon months. On an average there are 53 rainy days during the year.

During the monsoon, relative humidity is usually about 70%. Rest of the year the air is generally dry and the relative humidity is less than 20%. However, in the areas adjacent to the lakes, the relative humidity is about 40%.



## Ecological Features

Bhoj wetland supports a wide variety of flora and fauna. Diverse flora provide ideal habitat in the form of food and shelter for a large number of avifauna. It is rich in biodiversity, principal components being phytoplankton, zooplankton, macrophytes, aquatic insects and avifauna both resident and migratory. Due to biotic interaction and natural selection process a characteristic relationship between vegetation and the avifauna has developed.

The Wetland could be divided into three zones- perennial water covered area, marshy area and submerged cum dry area (transition zones). The transition zone is shallow in nature and thus is exposed gradually from post monsoon period to summer season. The wetland supports mainly 3 types of vegetation consisting of more than 100 terrestrial/marshy plant species and 34 aquatic species. The aquatic species could be categorized as floating forms (10), submerged forms (14) and emergent forms (10).

The Biodiversity range is as follows:

(i)	Macrophytes	106 species (Belonging to 87 genera of 46 families), including 14 rare species.
(ii)	Phytoplankton	208 species comprising of 106 species of Chlorophyceae, 37 species of Cyanophyceae, 34 species of Euglenophyceae, 27 species of Bacilariophyceae and 4 species of Dinophyceae
(iii)	Zooplankton	105 species (Rotifera 41 + Protozoa 10 + Cladocera 14 + Copepoda 5, Ostracoda 9, Coleoptera 11, Diptera 25)
(iv)	Fish fauna	43 species (natural and cultured species)
(v)	Avifauna	27 species
(vi)	Insects	98 species of 10 families.
(vii)	Reptiles and Amphibians	10 species (including 5 species of tortoise)

## Faunal Diversity

Fish Fauna:

UPPER LAKE		LOWER LAKE	
(A)	WEED	FISH	
Barilius	bola,	Chanda	nama,
Cnada	ranga,	Chanda	ranga
Gadusia	chapra,	Esomus	danricus
Osteobrama	cotio,	Neemachilus	botia
Puntius	sarana,	Oxygaster	baicala
Puntius	ticto,	Puntius	sophore
Xenentodon	cancilla	Rashora	daninoconius
(B)	PREDATORY FISH		
Calrias	batrachus,	Channa	gachua,
	Channa	gachuna	
		Channa	punctatus,
		Clarius	batracus,
		Gorra	gotula,
		Glossobobius	giuris,

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Chama leucopunctatus, Channa marulius	Heteropneustes fossils, Mestacembalus
Channa punctatus, Channa striatus	armatus
Glossogobius giuris, Heteropneustes fossilis	Nandus nandus, Notopterus notopterus
Maccognathus aculeatum,	
Mastocembelus armatus	
Mastocembelus pancalus, Mystus aor	
Mystus bleekeri, Mystus cavasius	
Mystus seenghala, Nandus nandus	
Notopterus notopterus, Ompak bimaculatus	

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#### Culturable and other commonly found Fishes

Catla catla, Cirrhinus mrigala, Cyperinus carpio, Labeo rohita, Cirrhinus reba, Labeo bata, Labeo dussumieri, Labeo calbasu, Labeo gonius, Lepulocephalichthys, Trichogaster fasciatus

## Avifauna

Upper lake of Bhopal hosts a large number of birds in its water as well as around it. The total number of species observed in the surroundings of the upper lake of Bhopal exceeds 160. These include the local, local migratory and migratory species. A total of more than 20000 birds have been observed. Some species, which have never shown up or are rare to be seen here, gave evidential sightings. White Stork, Black necked Stork, Barheaded Goose, Spoonbill etc. are some of the species which were rarely or never seen before. The White Stork has no records in the near history of being sighted here.

A very surprising phenomenon is of congregation of more than 121 Sarus Cranes in Bhopal. The largest bird of India, Grus antigone is known for its size, majestic flight and ever lasting partnership. According to Mr. BC Chaudhary of Wildlife Institute of India there are no previous records of such a big congregation of the Sarus Crane in Bhopal.

Similarly, the Bank Mynah, though a common specie North of Bhopal, has recently shown up in the western regions of the upper lake. The Mynah, which can be seen easily in neighboring places, has no previous record in Bhopal.

Even when the maximum temperature is approaching 40°C one can still observe a total of more than 4000 birds of various species. This is a remarkable occurrence as the birds are normally observed and believed to have returned by late March. The flocks can be seen at the western region of the upper lake where the water is receding with high speed. The receding water and shallow waterlogged area provides an ideal feeding ground to birds feeding on fish, molluscs, shoots and weeds.

Recently a heavy congregation of white Scavenger Vultures in the south Eastern buffer of the Upper lake which is a national Park has also been observed. These vultures, also known as Pharaohs chicken or Egyptian vulture seem to have survived.

SCIENTIFIC NAME	COMMON NAME	FAMILY
Phalacrocorax niger	Little cormorant	Phalacrocoracidae
Ardea cineria	Grey heron	Ardeidae
Eqretta gulris	Reef heron	-
Ardeala grayii	Pond heron	Anatidae
Bublecus ibis	Cattle egret	Charadriidae Anhingidae
Egretta garzetta	Little egret	Threskiornithidae
Anas crecca	Common teal	Gruidae
Anas poecilorhynca	Dhoveller	Rallidac
Anas penelope	White eye pochard	Scolopacidae
Anas clypeata	Red crested pochard	Recuvirostridae
Netta rufina	Spot bill	Alccdinidae
Aythya nycrca	Wigeon	-
Podiceps ruficollis	Dabchick	-
Sarkidiornis metanotos	Comb duck	-
Vanellus indicus	Red wettled lapwing	-
Anhinga rufa	Indian darter	-
Threskionis aethiopica	White ibis	-
Grus antiqone	Sarus Crane	-
Porphyrio porphyrio	Purple moorhen	-
Fulica atra	Indian moorhen	-
Gallinago gallinago	Coot	-
Himantopus himantopus	Common spipe	-
Peeryle rudis	Black winged stilt	-
Alcedo atthis	Pied king fisher	-
Halcyon smyrnensis	Small blue king fisher	-
	White breasted King fisher	-