

# Information Sheet on Ramsar Wetlands (RIS)

*Categories approved by Recommendation 4.7 of the Conference of the Contracting Parties*

**Note: It is important that you read the accompanying Explanatory Note and Guidelines document before completing this form.**

1. **Date this sheet was updated:** 19<sup>th</sup> August 2002.
2. **Country:** India
3. **Name of wetland:** THE EAST CALCUTTA WETLANDS
4. **Geographical coordinates:** Lies approximately within latitudes 22°25' to 22° 40' North and longitudes 88° 20' to 88° 35' East
5. **Elevation:** (average and/or maximum and minimum): 2 m (G.T.S.) Global Telecommunications System
6. **Area:** (in hectares): 12500 ha.

7. **Overview:** (general summary, in two or three sentences, of the wetland's principal characteristics)  
 The wetlands to the east of Calcutta are well known over the world for their multiple uses. The resource recovery systems developed by the local people through ages using wastewater from the city is the largest in the world. In the process it treats the wastewater and has saved the city of Calcutta from constructing and maintaining a wastewater treatment plant. It also is the only metropolitan city in the world where the Government has introduced development controls to conserve the water-bodies. These wetlands, however, are under an intense encroachment stress of urban expansion. This task of conservation therefore needs further consolidation.

8. **Wetland Type:** (please circle the applicable codes for wetland types as listed in Annex I of the Explanatory Note and Guidelines document)

<i>marine-coastal:</i>	A	B	C	D	E	F	<input checked="" type="checkbox"/> G	H	I	J	K	Zk(a)
<b>Inland:</b>	L	M	N	O	P	Q	R	Sp	Ss	Tp	Ts	
	U	Va	Vt	W	Xf	Xp	Y	Zg	Zk(b)			
<b>Human-made:</b>	<input checked="" type="checkbox"/> 1	2	3	4	5	6	7	<input checked="" type="checkbox"/> 8	9	Zk(c)		

**Please now rank these wetland types by listing them from the most to the least dominant:**  
 G,1, 8

9. **Ramsar Criteria:** (please circle the applicable criteria; see point 12 below)

1      2      3      4      5      6      7      8

**Please specify the most significant criterion applicable to this site:**

1

10. **Map of site included?** Please tick YES --or-- NO

(Please refer to the *Explanatory Note and Guidelines* document for information regarding desirable map traits.)

Yes

## **11. Name and address of the compiler of this form:**

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Secretariat, 172-B, Lodi Estate  
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## **12. Justification of the Criteria**

### **(i) Criterion 1:**

The Ramsar Bureau selected 17 case study sites from all over the world to demonstrate and understand wetland wise use. In that list the East Calcutta wetlands is the only entry from India and also the only one that is by the side of a city and is largely acclaimed as an urban facility for using the city sewage in traditional practices of fisheries and agriculture. Appreciating this wetland function that core Calcutta has not been provided with any fund for constructing a sewage treatment plants.

The East Calcutta wetlands is an urban facility for treating the Calcutta city's waste water and for utilising the treated water for pisciculture and agriculture, through recovery of waste water nutrients in an efficient manner. In the wetland to the east of Calcutta, wastewater is used in fisheries and agriculture covering an area of about 12,500 hectares which has been designated as conservation area by an order of the Calcutta High Court.

In the fish ponds covering about 4000 hectares, city's wastewater is made to flow through. The wastewater ponds act basically as solar reactors and complete most of their bio-chemical reactions with the help of solar energy. The wetland ecosystem of the east Calcutta is thus one of the rare examples of environmental protection and development management where a complex ecological process has been adopted by the local farmers by mastering the resource recovery activities.

## **13. General Location**

5km from Eastern edge of Calcutta, India

## **14. Physical Features**

Geologically the area forms the southern part of the Indo-Gangetic Basin and lies to the South of the Garo-Rajmahal line which forms a hinge. Basement sediments go down to depths of 5666m to 6666m depth while the depth of alluvium is about 816 m. This thickness of the sediment implies sedimentation along with subsidence. The alluvium is made up of several cycles of sand, silt and clay in varying proportioning. At the surface a lateral facies variation from the in-channel through bar levee to the interdistributary marsh find sand and silt occur in the upper part of the bars, sandy silt and clay occur in the levee top while silty clay and clay occurs in the interdistributary marsh.

Geomorphologically the east Calcutta wetlands (a part of what was previously known as a Salt Lake) form an interdistributary marsh of the Hoogly – Bidyadhari system. This depression covers an area of about 76.0 sq.km. Early records show that even in the middle of the 18<sup>th</sup> century the western margin of the Salt Lake was within 3 km from the river Hooghly. The general slope of this marshy tract is towards south-east. The aquifer in the area is found at 30 m to 90 m depth yielding fresh water. In the same area, aquifer at 125 m to 250 m depth yield slightly brackish water.

The climate of the East Calcutta Wetlands broadly resembles that of Calcutta which being located almost within a degree of the tropic of Cancer with some variation the temperature remains high throughout the year. Three major seasons identified are: (a) cold season, which sets in from the middle of November and lasts till the end of February. The mean temperature in December and January are 20.6 degree centigrade and 20.2 degree centigrade respectively with mean monthly minimum 14.2 degree centigrade and 13.6 degree centigrade respectively. Total rainfall in four months hovers around 76 mm indicating relative humidity around 67 percent. Average wind speed during this season remains at about 2.9 kmph. (b) Hot season starts from March and lasts till mid June with mean monthly temperatures at 30.65 degree centigrade, 31.15 degree centigrade and 30.4 degree centigrade respectively in the months of April, May and June. The temperature however touches as high as 38 degree centigrade to 40.2 degree centigrade during these months on someday. The lowest temperature of the season does not fall below 16.4 degree centigrade (March). Rain occurs more frequently in summer end associated with thunderstorm and nor'westers, with relative humidity varying between 64 percent in March and 79 percent in June. Average wind speed rises to about 7 kmph. (c) Rainy season starts from mid-June and lasts till mid-September, stretching sometimes to October. Average temperature remains quite high in this season. Average rainy days per month are about 16 days. The number however, decreases to 8 days in October. Rainfall in this season hailing from the southwest monsoon is also associated with cyclonic disturbances from the Bay of Bengal. Total rainfall during the monsoon months varies between 1200 mm and 1300 mm. Relative humidity varies between 80 percent and 85 percent, while average wind speed remains at 5 kmph. On the whole, the East Calcutta wetlands have features of a tropical region with ample sunshine and vast water regime.

## 15. Hydrological Values

Depth of water in the water bodies (268 in number) is rarely more than one metre and they will normally have water throughout the year except when these are drained out for the drying of the bed which takes about 3 to 4 weeks time before water is again introduced. The depth of water increases by about 10 to 15 cm during monsoon and the area is now unaffected by the tidal variation. Downstream area is mostly paddy growing with occasional patches of settlements. At present a tannery complex is coming up beyond the eastern boundary of the designated conservation area.

The East Calcutta Wetland area is not efficient in recharging groundwater. This is because of the copious content of organic matters the bottom of the waterbodies are sealed by such fine particles. However the region allows to accumulate flood water which is essentially its own runoff.

This wetland area is particularly efficient in sediment trapping and more importantly trapping of nutrients through an aquatic food chain. In fact it exemplifies shortest route to transport the nutrients which are richly available in wastewater to edible protein in the form of fish.

## 16. Ecological features

The East Calcutta Wetlands basically consists of three components, viz.

- i) The core area which includes the fish pond systems, where waste water treatment (domestic sewage of the city) and fishing activities take place.
- ii) The garbage farming land where different types of seasonal vegetables are cultivated during wastewater irrigation from intermittent ponds where wastewater is settled for purification.
- iii) Paddy cultivation area where paddy cultivation is practiced in regular course.

In the wetlands i.e., the core fishing areas usually the fishermen do not accept any plant other than *Eichhornia crassipes* and naturally developed plankton like algae around (20 species).

There are about 34 families, 68 genera and 104 species in and around east calcutta wetland. These include *Sagittaria montividentis* (colonised in these area but rare elsewhere in the state), *Cryptocoryne ciliata* (a remnants of earlier Salt Lake), *Cyperus spp.* (used by the rural people for making mats), *Acrostichum*

*aureum* (remnants of mangrove habitat), *Ipomoea aquatica* (people cultivate as supplementary vegetables) etc. Biswas (1927) identified three zones of vegetation in the salt lake region. Among these vegetation of embankments and bunds were mostly dominated by *Fimbristylis ferruginea*, *Suaeda maritima*, *Acanthus ilicifolius*, *Excoecaria agallocha*, *Avicennia officinalis*, etc. While salt lake proper was dominated by numerous algal flora, bushes of *Phragmites karka*, *Aegiceras magus*, *Typha elephantina* etc.

### 17. Noteworthy Flora

Floristic diversity of the wetland is mediocre particularly in the core area while the diversity of plants is rather high in the surrounding mesotrophic wetlands. Vegetation cover of the wetland areas is significantly low. *Eichhornia crassipes* and rarely *Alternanthera philoxeroides* are the only acceptable flora of these wetlands in addition to significantly rich population of planktonic algae. *Sagittaria sagittifolia*, *Rumex dentatus*, *Panicum spp*, *Brachiaria mutica* and *Colocasia esculenta* are the dominant flora of the waste water canals. *Cryptocoryne ciliata* and several species of sedges are predominant in waste water canals receiving tidal flush. *Eichhornia crassipes* and *S. sagittifolia* may be considered as the indicator species of these wetlands.

In the core area where netting is done regularly, *Eichhornia crassipes*, *Sagittaria sagittifolia*, *Monochoria hastata*, *Alternanthera philoxeroides*, *Polygonum barbatum*, *Lemna aequinoctialis*, *Spirodela polyrhiza* are among the dominating flora of the core area in hydrophase, while *Alternanthera paranichioides*, *Marsilea minuta* are common in limosal ecophase.

### 18. Noteworthy fauna

Amongst the rare mammals Marsh mongoose (*Herpestes palustris*), small Indian mongoose (*Herpestes auropunctatus*), Palm civet (*Paradocurus hermaphroditus*) and Small Indian civet (*Viverricula indica*) are significant in and around East Calcutta Wetland area. About 20 mammals are reported from this region.

Threatened reptiles like, Indian mud turtle *Lissemys punctata* (locally threatened) is also reported occasionally from the adjacent locality. Among the reptiles significant species are *Xenochorphis* sp., *Enhydrus enhydrus*, *Varamus salvator* and *Cerberus rhynchops* are significant. Among the amphibians *Rana hexadactyla*, *Rana cyanophlyctis*, *Rana tigenna* and *Rana limnocharis* are significant.

Presently more than 40 bird species comprising of both local and migratory types are reported to visit these clusture of wetlands. Among these grebe, coot, darter, shag, cormorant, teals, egrets, jacanas, snipes tern, eagle, sand piper, gulls, rails kingfishers etc. are significant.

### 19. Social and cultural values

The east Calcutta wetlands, in its fish ponds, paddy fields and garbage farms provide three basic securities, which are critical for human living in the third world countries. These are food, sanitation and livelihood.

The following are the highlights of the kind of benefits the city of Calcutta and the city fringe have been drawing:

- The wetland ecosystem provides about 150 tonnes of fresh vegetable everyday reaching the city market with minimum cost of transport (lowering the cost of vegetables as a result).
- It provides about 10,500 tonnes of table fish per year reaching the fish stalls straight from the auction market. In most cases they are picked up by the vendors themselves who sell them at a relatively cheaper price (there is no expense on cold storage or fish feed).
- It can, without requiring any external institutional support in the form of fund/skill, treat 1000 million litters of city sewage by allowing at least 30 days detention time. This can therefore meet strictest standards of fecal coliform removal. Cost of setting up a conventional serwage treatment will require Rs. 400 crores and will further require about Rs. 100 crores in yearly maintenanc.
- The fisheries provide livelihood for about 50,000 persons directly and nearly the same number indirectly. This is comparable to, if not better than, any agricultural field with canal irrigation in the context of providing livelihood to the weaker section of the community.

- About 83 per cent of the farmers and workers in the east Calcutta wetlands belong to the schedule cast and schedule tribe population.
- The east Calcutta wetlands provide a stable urban fringe because of their unique nature of providing symbiotic support to the city life and the fringe area villages.

In addition to the three basic securities which are key to better environment for the poorer parts of the world, the east Calcutta wetlands is the vital component of the friendly water regime that provides ecological security to the Calcutta mega city.

If we add all these together, it is difficult to find another wetland system that has as many benefit streams flowing to the society as this, and as many environmental subsidies for sustaining a 10 million and odd city. Rarely is found such an ecosystem allowing a farmer-centered approach ensuring safe disposal of wastewater, free of cost. This is a wetland that creates about 1,00,000 job opportunities, and regularly provides fish protein and fresh vegetables (300 gm of vegetable and 60 gm fish per day for 5,00,000 people daily, this is more than the total population of Bhopal/Kanpur). Where can we find a better example of wetland wise use that satisfies all the major features and functions underlined in Agenda-21 leading to sustainable living? Where else can we see such a surfeit of positive externalities?

## **20. Land tenure / ownership of site and surrounding area:**

- (a). Site- Wetland- State Government of West Bengal, India
- (b). Surrounding area- Private ownership.

The general ownership pattern in East Calcutta wetlands consists of private holdings. For the fish pond area it is mostly in the form of proprietorship, partnerships and co-operatives. There are only two government controlled fish farms namely the Nalban and the Goltala bheris run by the State Fisheries Department Corporation (SFDC) which are located within the Bidhannagar (South) Police Station. The fish farms run under the co-operative system can be broadly classified into two groups as “formal” and “informal” co-operatives. The formal co-operatives are those units, which are legally constituted associations and are registered with the Government Authorities. The informal cooperatives on the other hand are those bheris, which are run by informal associations of workers under the cooperative mode. For most of the cases these bheris are in fact the ‘ceiling surplus’ agricultural holdings (fish farms) of different entrepreneurs, subsequently vested by the State Government and presently being run and managed by the workers themselves after the same have been distributed to them by the local Panchayat authorities. Though the ‘de-facto’ control now lies with these workers’ cooperatives, their tenurial rights does not have legal sanction as all such take-over by the Government have been disrupted by the original owners in the court of law which are now pending decision.

## **21. Current land use**

- (a). Site. Waste water fisheries.
- (b). Surrounding area- Vegetable farming on garbage substrate & effluent irrigated paddy cultivation.

Also included is the land where most of the farmers and workers live. The present land use pattern is shown in the map. The most important and massive land use change was caused by urbanisation initiated by the government of West Bengal since 1956. The former Calcutta Metropolitan Planning Organisation (CMPO) plan converted the north-western part of the wetlands adjacent to the city into what is now known as Salt Lake City or Bidhannagar. Thus out of 20,000 acres of wetlands recorded in 1945 we now have less than 10,000 acres left as wastewater fish ponds.

Formal urbanisation of wetlands is on hold for quite sometime. Interestingly real estate activity got a boost after the completion of Eastern Metropolitan Bypass, which was formulated within the Basic Development Plan for the Calcutta Metropolitan District in 1966. Remaining changes in land use have essentially resulted from a conflict situation arising out of the land reforms agenda of the State.

## 22. Factors which are adversely affecting the site's ecological character

Three basic factors affecting the ecological characters are as follows:

### a) Site

**Industrial effluent:** A significant change has taken place in the wastewater quality flowing out from the city. This has been on account of a large number of industries making unauthorised connection of their waste water effluent without treatment to the recently laid storm sewers emptying into the city outfall channels flowing eastwards. This has caused substantial amount of metal deposition in the canal sludge and rendered the waste water incapable of ensuring the edible quality of the fish and vegetables grown in East Calcutta Wetlands. Available results from the ongoing studies indicate that the situation which is definitely worrisome, is still manageable and other than Pb remaining depositions can still be reduced and restrained well below permissible limits.

### b) Surrounding area

**Encroachment:** The Department of Environment, Government of West Bengal constituted a high power committee to submit a report on Calcuttas' Canals and Wetlands under the Chairmanship of Mr. C.D. Seshashri, Retired Engineer in Chief as ex-officio Secretary to the Government. It has marked the year 1956 as the beginning to losing stability in these vast wetlands. There had been instances of forcible attempts to take over the right of land by small farmers. Such actions were long overdue. For more than fifty years owners of small parcels of land were systematically and heinously forced to give up their property rights in favour of a few large landowners who clubbed and converted the land into large fisheries. The unfortunate fall-out of that was that after some years when conditions favoured the landless farmers, they retaliated. Fisheries were drained and cultivation of paddy was attempted. Fishery is the most efficient ecosystem for the local farmers who are natural growers of fish rather than paddy, apart from the multiplied benefit that the fishery provided. At present this realization is a growing trend amongst the village people and forcible takeover has been largely on the wane.

However and much more aggressively, the wetlands are under intense stress of urban expansion. There is an active 'promoter-real-estate-developer' lobby waiting to grab this vital open space.

**Disappearing heritage:** The compiler of this form has been visiting the East Calcutta Wetlands since 1980 without any break. Even during the earliest years of going there and although the institutional indifference had already been pronounced by that time, the entire area provided a rich mix of brilliant interventions and wonders of ecological wisdom. A closer look would have always brought out a remarkable assortment of recycling practices and fascinating use of local appurtenances. Today, after decades of sustained apathy for such basic matters like providing wastewater to the fish ponds or allowing hopes of real estate conversion to thrive, it seems that the aggregate effect of this uncertainty has flattened all the diverse crease of creativity and innovation in the East Calcutta Wetlands. The heritage, which we have failed to recognise, is now dying. The situation indeed is in need of a truly enabling governance. A governance that will bring back the confidence of the local people on their own wisdom and cultural practices that they have inherited from their forefathers, who were by all means the world's foremost connoisseurs of wastewater wise use and conservation.

## 23. Conservation measures taken

- The conservation area boundary for the east Calcutta wetlands and waste-recycling region was mapped in 1985 by the State Planning Board, Government of West Bengal.
- This wetland area is protected by order of the Calcutta High Court in 1992, which prohibits change in land use. High Court directed the State government to take recourse to statutory cover, if required, to prevent any private alienation of land. Recently the Director of land and Land Records, Govt. of West Bengal has issued a fresh order informing the prohibition of any conversion of land use within the conservation area boundary and all such conversions, if any such has taken place since 1992, as void.

- Filling up of water bodies in this area is not permissible under West Bengal Town and Country (Planning and Development) Act, 1979 as well as under the West Bengal Inland Fisheries Act, 1984 (with amendment in 1993).

#### **24. Conservation measures suggested but not implemented**

The development of environment of the government of West Bengal is well versed with the problems and potential of the east Calcutta wetlands. According to the understanding of this department these wetlands should be 'basically conserved as an urban facility and demonstrated a rare example of using wetland functions subsidizing the life of one of the biggest cities in the world'. No other wetlands, the department has observed further 'has any record of such organised practice of successively using the waste water from one land use to the other spread over 12500 hectares, comprising vegetable farms (150 tonnes per day), fish ponds (11,000 tonnes per year) and paddy fields (15,000 tonnes of additional paddy per year)".

- The most significant function performed by this wetland area, according to this department, 'is its capability to treat the entire city sewage of about 800 million liters per day'.
- While suggesting conservation measures for the east Calcutta wetlands, the department observed that: 'Form the standpoint of ecosystem stability as well as of social and economic significance the central water area of about 4000 hectares covering the fishponds deserves a priority attention. For the purpose of conservation, therefore, out of this total patch of land the area of about 4000 hectares comprising most of the bheris or water areas need most vigorous land use protection and is described as the Core Area (Zone A). No other economic activities can be introduced to disturb the core area. The area may however allow scientific study and work plans to reduce the risk or enhance the economic viability of the existing practices.'
- 'Accordingly the remainder of about 8000 hectares can be designated as Buffer Area for the interest of conservation and rational accommodation of marginal changes in the existing land use. This buffer Area can be further sub-divided into Inner Buffer Area (Zone-B) and Outer Buffer Area (Zone-C) depending upon the extent of waterbodies such designated area include. Permissible changes in land use will depend upon the category of Buffer Area within which a proposed activity is intended.'

#### **25. Current scientific research and facilities**

Significant amount of research and investigations has been carried out on the east Calcutta wetlands area. 1980 which marks the beginning of such initiatives triggered by a study conducted by the State Planning Board to search for the feasibility of using the wastewater of Calcutta. This study led to the identification of the world's largest wetland area using wastewater to grow fish, vegetables and paddy in successive resource recovery practices developed by the wisdom of local people. Initial task of research was to decipher the oral tradition and understand the local practice. This was difficult because it needed the researcher to gain the faith and confidence of the advanced and knowledgeable farmers who are most reluctant to pass on their know-how to anyone. This was followed by sufficient amount of studies in water quality and bacterial contamination in fishes. In both these set of studies nothing was found to be of any cause of concern. However, since the beginning of 90's the water quality started deteriorating because of unauthorized introduction of untreated effluent from a number of small-scale industries. Extent and cause of damage has been fairly studied since last few years and it should be possible to take remedial action.

Lately extensive study was carried out to understand the existing management system strictly using the Ramsar guidelines and a reliable primary data on this system is now available. Subsequently a detailed study instituted by the Department of Environment, of the hydraulic regime covering about 60 km of drainage network (most of which is constructed by the local people and is not in the record of the State Irrigation Department) has also been completed. Most of these studies have been taken up by the Institute of wetland management and ecological design, various departments of Calcutta University and the Creative Research Group engaged by the department of Environment of the Government of West Bengal. A list of major studies carried out so far is included in the Bibliographical reference that follows.

## 26. Current conservation education

A significant number of students from various parts of the world visit this place. Local school children are also visiting this place in the recent times. However, lot more needs to be done to attract educational trips to this unique ecosystem.

## 27. Current recreation and tourism

Large number of bird watchers visit the place especially during the winter. Important aquatic sports and recreational centers have recently come up along the edge of the city.

## 28. Jurisdiction

The East Calcutta Wetlands is covered by four police stations (Salt Lake, Tiljala, Sonarpur, Bhangar). Calcutta Metropolitan Development Authority is responsible for land use and development control over the entire area.

## 29. Management authority

Calcutta Metropolitan Development Authority

## 30. Bibliographical References

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