

Environmental Studies on East Kolkata Wetland



JOGAMAYA DEVI COLLEGE

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Submitted towards the partial fulfilment of
Calcutta University Undergraduate Course Curriculum

Name : _____

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University Roll No. _____

Stream : _____
(B.A./B.Sc./B.Com & Honours/General)

Major in : _____

Subject Combination: _____

Date of Field Work: _____

INSTRUCTIONS

(Do not print)

Read the instructions carefully before submission of Field report:

- This draft project report on Environmental Studies offers guidelines for students for preparing a final report. The report is compiled by faculties based on field data (collected during field visits of previous years), published reports, unpublished field reports and additional sources.
- **Students are instructed to improve their report with additional data, illustration(s), detailed observations etc. from internet and/or other sources. The draft report, given in the following pages, may be used as a guideline.**
- Students are advised to download the Draft Project Report from the Notice Board of Jogamaya Devi College website between 1st July and 10th July, 2021.

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- Date of submission of final field report:

	Date	Mail ID	Stream
1.	05.07.2021- 12.07.2021	jdcart2020@gmail.com	B.A. General
2.	05.07.2021- 12.07.2021	jdcbcom2020@gmail.com	B.Com. General
3.	05.07.2021- 12.07.2021	jdcbssc2020@gmail.com	B.Sc. General
4.	05.07.2021- 12.07.2021	jdcbssc2020@gmail.com	OLD (1+1+1) Candidate (All streams)
5.	05.07.2021- 12.07.2021	Contact respective Department	B.A., B.SC & B.Com Honours Students

Format for Submission of Field Report

- Your project should be in normal A4 size paper. Write on one side of the page using blue or black pen. You may use other colours as highlighter and/or marker except red.
- Write your name, college and university roll numbers, registration number and other details in the front page of the final report.
- Paste a photocopy of registration certificate just after the cover page.
- Make sure to number your pages on top or corner, clearly and correctly.
- Candidates must upload clear and visible scanned single PDF file as project report in specified e-mail ID. Write your College Roll Number, University Registration No & University Roll Number (whichever is available, separated by comma) in the subject line of the mail.
- Only coloured, high-resolution scanned PDF copies shall be accepted. Size of the project should not exceed 25 MB. Lower file sizes are preferred and that will be appreciated.
- B.A., B.Sc and B.Com General Course Students are to send their project in the specified e-Mail ID given in the above table. Upload project only once. No need to submit the same several times unless and otherwise instructed. You will receive a machine generated acknowledgement slip after 30 minutes of submission. Keep it till the publication of University Result/Score Card.
- Students of Honours Course are instructed to contact your respective honours department for submission and further instruction. They can take the help and guideline from their department for addition, alteration and further illustration of the project.
 - Points like (a) Culturable fishes, (b) socio-economic studies, (c) cooperative systems, (d) life-style of the local people etc. may be incorporated in the report.
- It is mandatory to preserve the hardcopy of the project report and may be submitted to the college office on request.

CONTENT	PAGE
INTRODUCTION	
STUDY AREA	
OBJECTIVE	
OBSERVATION	
DISCUSSION & CONCLUSION	
ACKNOWLEDGEMENT	
REFERENCES	

INTRODUCTION

EAST KOLKATA WETLANDS (EKW) is situated in the vicinity of Kolkata metropolis provides ample opportunity for environmental studies. This wetland forms a part of Sundarban Delta and constitutes a significant ecosystem that supports a diverse fauna at the interface of dry terrestrial and permanent aquatic habitats. EKW occupies a special position for it nurtures the world's largest wastewater fed aquaculture system. In addition to fisheries, this wetland offers a cheap, efficient and eco-friendly operating system of solid waste disposal and sewer treatment for Kolkata metropolis. It partially caters to the growing demand of Kolkata metropolis, for fish protein, vegetables and other commodities. A partially developed self sustaining socio-economic structure may be seen to operate in this ecospace. EKW serves as the kidneys of ailing, urbane Kolkata. It is thus, for our own interest that we take a good care of our own, ever blissful, EKW so that a dynamic equilibrium is restored and maintained in the environment. Accordingly, we need to understand the interactive processes operative here and we need to identify major and minor conflicts intrinsic in the system to suggest probable remedial proposals. Our study in parts of EKW may mark a good initiative towards that direction.

Fortunately, EKW has been declared a RAMSAR site since 2002. To stop further deterioration of the system as also to restore its native state, the East Kolkata Wetlands Management Authority, Department of Environment, Govt. of West Bengal have prepared a comprehensive and Integrated Management Plan in keeping with basic guidelines of the Ramsar Convention (1971), and started implementing it.

Objective assessment of the facts and figures, monitoring of control factors in this system is a dire necessity. Academic Institutions must employ their resources to work in unison with other welfare bodies and Government/NGO authorities towards a good end.

STUDY AREA

The **East Kolkata Wetlands (EKW)**, lying on the eastern fringes of Kolkata city bordering the Salt Lake township on the one hand and the new township at Rajarhat on the other, forms one of the largest assemblages of sewage fed fish ponds. (Fig.1).

Wetlands are areas where water covers the soil, or is present either at or near the surface of the soil all year or for varying periods of time during the year. It is the land or areas (such as marshes or swamps) that are covered often intermittently with shallow water or have soil saturated with moisture. Water table is usually at or near the surface or the land is covered by shallow water. A wetland's water can also come from a nearby river or lake. Wetlands are a critical part of our natural environment. They reduce the impacts of floods, absorb pollutants and improve **water quality**. They provide habitat for animals and plants and many contain a wide diversity of life, supporting plants and animals that are found nowhere else.

The multifunctional EKW ecosystem consists of an area of 12,500 hectares with about 254 sewage fed fisheries, small agricultural plots and solid waste farms. Besides, there are some built up areas also.

EKW supports a diverse fauna (both native and cultured) and bring about myriad benefits to mankind, providing opportunities for cultivation, sewage fed fisheries, urban waste disposal and recreation.

Fig. 1: Location Map of the Study Area around Nalban-1



OBJECTIVE

The environmental study is aimed at achieving the following objectives:

1. To learn the basic approaches and techniques of environment studies, as far as practicable.
2. To record field data (which was collected in the previous years) in a systematic, meaningful way.
3. To develop a basic understanding of the studied wetland system and its significance

Ecological Observations

- Present study attempts to understand the basic tenets of a sustainable ecosystem operative in the sewage fed fisheries around Nalban and in the adjoining areas of EKW.
- The study involves compilation of field data on soil temperature, water salinity, transparency and pH conditions in classified water bodies (feeder canal, sediment settling tanks, fish rearing ponds, partially submerged lands etc.) (Table-1).
- Few field instances of animal activities are recorded for benthic fauna present in the study area.
- A number of culturable fishes and other animal fauna and plant taxa are discussed in the present study.
- Additional information on biochemical parameters of water bodies *vis-a-vis* different types of cultivable fishes in this wetland are collected from published reports, literature and other authentic resources.

Field Data collected from field traverses during Ecological Studies are given in Tables below:

Table-1. Water Quality in different water bodies¹.

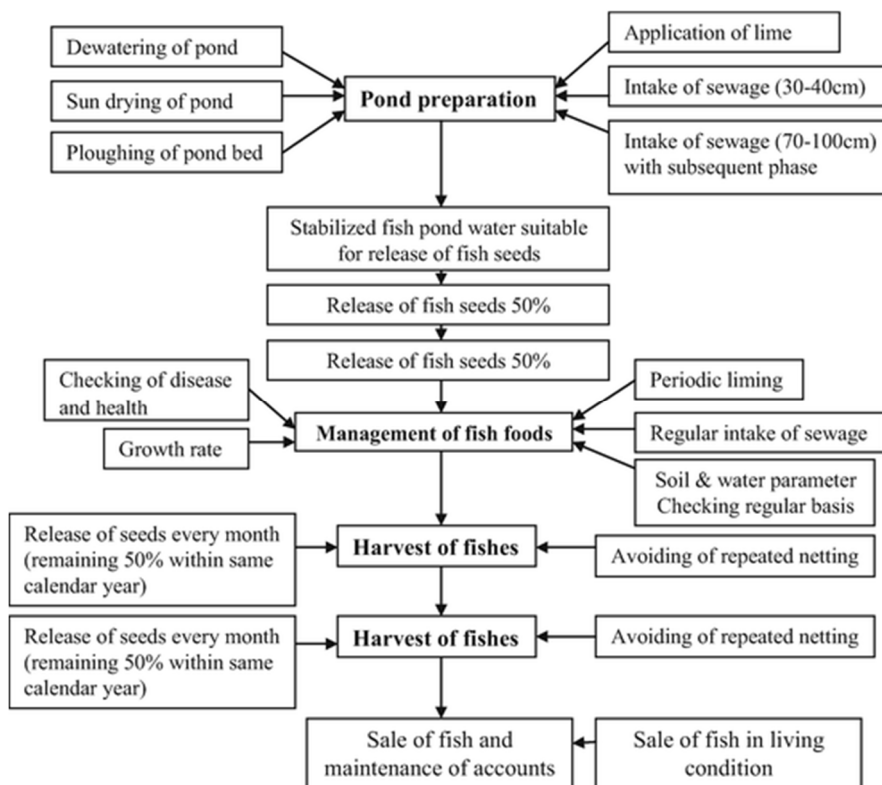
GPS Location	Description	pH	TDS	Transparency (inches)	Water Temp.	Soil Temp.	Salinity
N-01	Feeder Canal	7.6	1043	11.0	22.7	23.7	1
N-02	Pond 1	8.6	833	08.0	23.7	24.7	1
N-03	Feeder Canal	7.5	971	12.0	22.8	24.8	1
N-04	Pond 1	8.9	833	08.5	23.7	24.4	1
N-05	Feeder Canal	7.7	849	10.0	22.6	24.6	1
N-06	Pond 2	8.2	847	10.5	22.4	24.4	1
N-07	Feeder Canal	7.5	965	11.0	21.5	23.5	1
N-08	Pond 1	8.5	773	09.5	22.5	24.2	0
N-09	Feeder Canal	7.6	1039	12.0	20.8	22.8	1
N-10	Pond 1	8.3	760	09.0	23.6	25.3	0
N-11	Feeder Canal	7.6	935	09.0	20.6	22.6	1
N-12	Shallow pond converting to cultivable land	8.2	301	-	24.6	-	1

¹ Data from Nalban-I Cooperative (N22°30'22.75" to N22°31'08.25" and E88°28'50" to E88°29'16") collected in the years 2018-2020.

Basic Aspects of Sewage-Fed Fisheries (SFF)

EKW is an exotic site to observe SFF. The sewage is regarded as turbid liquid, arising mainly from domestic sources as well from hospitals, industries, agriculture etc. SFF uptakes cultivation of fishes that survive in sewage water as well as feed on sewage. SFF is well practiced in EKW.

Sludges and sullages are two important components of SFF. Sullage is the water resulting from household washing (excluding faecal matter and urine), laundry and cleaning of kitchen. Sludge is the solid substance settled at the bottom of water body containing waste. Fresh sludge is muddy or black in colour due to suspended colloidal particles. Activated sludge contains single cell protein (ASCP) contains 39-46% protein. ASCP is obtained by the bio-oxidation of crude domestic sewage, which has been evaluated as the supplementary protein diet of fishes.



Schematic Diagram of sewage fed fisheries in EKW



Ponds under preparation stage



Ponds ready for pisciculture



Bamboo net between feeder canal and pond to prevent fish from escaping



Shallow pond converting to cultivable land (during winter)

STUDY OF BIOINDICATOR SPECIES

The organisms which help to know and monitor the nature of air, water and soil call bio/ecological indicators.

Table-2: List of Bio indicators in Nalban-1² (EKW).

Bio indicator species	Location	Remarks
Lichen	Present on wooden trunk	Indicates non-polluted air, free from automobile exhaust like NO ₂ , SO ₂ , CO etc.
Daphnia & Cyclops	Pond, planktonic	Fairly non-polluted water
<i>Lemna sp.</i>	Pond	Fairly non-polluted water



Lichen in the tree trunk



Lemna minor



Pistia sp.

² Data from Nalban-I Cooperative (N22°30'22.75" to N22°31'08.25" and E88°28'50" to E88°29'16") collected in the years 2018-2020.

CONCLUSION

- The study area reveals human interference on natural fauna.
- Naturally stressed wetland fauna is further challenged with human interferences.
- Water parameters changes rapidly within a short distance, as induced by local input of household waste (all along the main feeder canal). Sewage fed fisheries and integrated farming schedule is also responsible for local variation of water parameters. Such quick changes are unnatural and, as such, inhospitable except for tolerant taxa.
- Natural fauna is represented by benthic invertebrates (dominantly mollusks, Crustaceans, worms and annelids, rare fishes), birds and wetland vegetation (other than cultivated crops).
- Cultured fishes and crops provide partial sustenance to local people and cater the demand of local food market.
- Sewage fed fisheries and associated integrated farming through indigenous method helps improve the quality of water and air in the ambience.

References

- Chakarborty, S., East Calcutta Wetlands - its significant preservation, protection and developments.
- East Calcutta Wetland Management Authority
Link: <http://www.ekwma.com/index.php?view=default&MenuID=20>
- Ghosh, D., 2005. Ecology and Traditional Wetland Practice-Lessons from Wastewater Utilization in the East Calcutta Wetlands. *Worldview*, pp. 120.
- Ghosh, Sasidulal (2018) Wastewater-Fed Aquaculture in East Kolkata Wetlands: State of the Art and Measures to Protect Biodiversity, pp 119-137 in Jana, B. B. R. N. Mandal, P. Jayasankar (eds.) - *Wastewater Management Through Aquaculture*-Springer Singapore.
- Mitra, B., Das, S.K. and Bja, D., 2001. *Wetland Ecosystem Field Guide*.
- Saha, T., *Wise Use of Wetland: East Kolkata Wetland, A case Study*. Departmental Note, Institute of Environmental Studies and Ecological Design, p. 1-8.
- Sarkar, S. et al., 2009. Sewage Treatment in a single pond system at East Kolkata Wetland, India. *Water Science & Technology*, p.2309-2317.
- Z.S.I. Publ., 2006. *Utilization of Waste Water Wetlands and Biological Modules for its Conservation*.