BEFORE THE HON'BLE NATIONAL GREEN TRIBUNAL
EASTERN ZONE BENCH, KOLKATA
ORIGINAL APPLICATION NO. 114 OF 2022 / EZ

IN THE MATTER OF:

Sirin Tammana & Others ...Applicant

VERSUS

State of Odisha & Others ...Respondents

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Sl. No.	Description of the documents	Page Nos.
1.	Additional Affidavit.	
2.	Photocopy of the compliance report to the order dtd.10.11.2022 of the Hon'ble Tribunal by the Chief Environmental Scientist as well as the Senior Environmental Scientist of the Central Laboratory of the R.No.3 Board **(ANNEXURE – R3/4 Colly)**	

SPCB Odisha, R.No.3

Through

Smt Papiya Banerjee Bihani,
Advocates for the Respondent No.3
(State Pollution Control Board, Odisha)
e-mail: pbanerjeebihani@gmail.com
Phone No.:9831493390

Kolkata

Date:

BEFORE THE HON'BLE NATIONAL GREEN TRIBUNAL
EASTERN ZONE BENCH, KOLKATA
ORIGINAL APPLICATION NO. 114 OF 2022 / EZ

03 JAN 2023

IN THE MATTER OF:

Sirin Tammana & Others ...Applicant

VERSUS

State of Odisha & Others ...Respondents

ADDITIONAL AFFIDAVIT ON BEHALF OF STATE POLLUTION CONTROL BOARD, ODISHA, RESPONDENT NO.3 IN COMPLIANCE TO ORDER DTD.10.11.2022 OF THIS HON'BLE TRIBUNAL.

I, Dr. Kailasam Murugesan, IFS, son of late Paramasivam Kailasam aged around 54 years, at present working as Member Secretary, State Pollution Control Board, having my office at Paribesh Bhawan, A/118, Nilakantha Nagar, Unit-VIII, P.O. Nayapalli, Bhubaneswar, Dist – Khurda, Odisha-751012, do hereby solemnly affirm and state as under:

1. That I am the Member Secretary of the Respondent No.3 Board and, as such, am well-acquainted with the facts

MANJULA KUMAR PRADHAN
NOTARY PUBLIC
BHUBANESWAR
REGD. NO. ON-71/2014
PH:-9437627119 (IND)
03/1/23

and circumstances with the case and competent to swear this affidavit.

2. That the Hon'ble Tribunal after taking into consideration the affidavit dtd.31.10.2022 filed by the R.No.3 Board in their order dtd.10.11.2022 has made observation in para-5, 6 and 7 of the order and directed the R.No.3 Board to file a fresh affidavit. For proper appreciation, the para-5, 6 & 7 of the order dtd.10.11.2022 of this Hon'ble Tribunal is given below:

> 5. Along with this Inspection Report, Water Analysis report has also been filed. Annexure-R-3/3 shows dissolved Oxygen (DO) to be 11.0 mg/L whereas Biochemical Oxygen Demand (BOD) is shown as 9.0 mg/L.
>
> 6. In para 8 of the affidavit of the State Pollution Control Board, also it is stated that very high values of dissolved oxygen (11.0 mg/L) have been observed in the analysis result which may be ascribed to eutrophic condition of the pond.
>
> 7. Prima facie we find that the dissolved oxygen cannot be 11.0 mg/L, more so

NOTARY * GOVT. OF ODISHA (INDIA)
M.K. PRADHAN
BHUBANESWAR
REGD. NO
ON 71/09

MANJULA KUMARI PRADHAN
NOTARY PUBLIC
BHUBANESWAR
REGD. NO. ON-71/2009
PH: 9437627088

when the Biochemical Oxygen Demand (BOD) level is shown as 9.0 mg/L. The State Pollution Control Board shall examine this aspect of the matter and file a fresh affidavit.

3. That it is humbly submitted that soon after receipt of the order dtd.10.11.2022, the Chief Environmental Scientist (in charge of Central Laboratory) was asked for a report with regard to the observation of the Hon'ble Tribunal in their order at para-5, 6 & 7 extracted above. It is pertinent to mention here that para-8 of the earlier affidavit dtd.31.10.2022 has been inserted on the basis of the opinion of the Central Laboratory.

The Chief Environmental Scientist as well as the Senior Environmental Scientist of the Central Laboratory have submitted a compliance report to the order of the Hon'ble Tribunal, which is annexed to this affidavit and marked as **ANNEXURE-R3/4 Colly**.

4. That the Respondent No.3 Board craves the leave of this Hon'ble Tribunal to file further affidavit if necessary for proper adjudication of this case.

NOTARY * INDIA * GOVT. OF ODISHA
M. K. PRADHAN
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REGD. NO
ON 71/09

MANJULA KUMAR PRADHAN
NOTARY PUBLIC
BHUBANESWAR
REGD. NO. ON-71/2009
PH:-9437627119

03/1/23

5. That the annexure annexed to the present affidavit is true and correct copy of its original.

6. That the contents of the above paragraphs are true and correct to the best of my knowledge, as derived from the official records, and that nothing material has been concealed therefrom.

DEPONENT
Member Secretary
State Pollution Control Board
Odisha, Bhubaneswar

VERIFICATION:

I, the above named deponent, do hereby verify that the contents of the above affidavit are true and correct to the best of my knowledge, as derived from official records, and that nothing material has been concealed therefrom.

Verified at Bhubaneswar on this the 3rd day of January, 2023.

SWORN BEFORE ME

NOTARY * (INDIA) * GOVT. OF ODISHA
MANJULA KUMAR PRADHAN
BHUBANESWAR
REGD. NO
ON 71/09

DEPONENT
Member Secretary
State Pollution Control Board
Odisha, Bhubaneswar

MANJULA KUMAR PRADHAN
NOTARY PUBLIC
BHUBANESWAR
REGD. NO. ON-71/2009
PH:-9437627119

03/01/23

ANNEXURE-R3/4 Colly

Report of Compliance to the Order dtd. 10.11.2022 of Hon'ble NGT, Eastern Zone Bench, Kolkata vide OA NO. 114/2022/EZ in the matter of Sirin Tamanna vs. State of Odisha & Others.

(1) The test Results of water samples collected from the pond at Baulabandha at Kalapuri Mouza (Panda Colony near Engineering School), Tahasil : Berhampur in Ganjam district, furnished in the Test Report No. **OS/366/10/2022 dated 01.10.2022** is related only to the samples submitted to the Central Laboratory for analysis vide Regional Office, Berhampur letter No. 2905/legal/54/2022 dated 21.9.2022. The said sample has been analyzed in the Central Laboratory and the analysis report was forwarded to the RO, Berhampur vide Lt. No. 18426 dtd. 01.10.2022. Copy of the said letter along with the analysis report is annexed as **Annexure-1**. In the analysis report under the heading "Note (i)" it is indicated that the results stated above relates only to the items tested.

(2) As may be seen from the Field protocol submitted along with the Sample, by the Regional Officer, Berhampur the colour of the pond water is light green-to green. Copy of the letter dtd. 21.09.2022 along with field protocol; is annexed as **Annexure-2**. This indicates the eutrophication/ algal growth in the water body. Further, as the sample has been collected in the day time (i.e.1.30 PM) and from the near-to-surface layer, oxygen concentration in the pond due to photosynthetic activity of the algae will be naturally more. The oxygen concentration in such water bodies during night time will be less due to absence of photosynthetic activity and consumption of oxygen by algae from the water body. This is called diurnal variation of Dissolved oxygen (DO) in an eutrophicated/ algal rich water bodies.

(3) Therefore, there is the possibility of high concentrations of DO in such polluted water bodies where BOD value may be high.

(4) Analysis reports containing of water quality of other pond waters such as Narendra, Markanda, Indradyumna , Swetaganga and Parvati Sagar pond in Puri during January- March, 2022, where DO values are high with BOD values greater than 3.0 mg/L are annexed as **Annexure-3**. Water quality Management Plan of Bindusagar pond prepared by the Board (page. 9 and 10 may be referred) is also annexed as **Annexure-4** where such phenomena are mentioned.

29.12.2022

Dr. (Mrs.) Usharani Patnaik
Senior Environmental Scientist

29/12/2022

Sri Niranjan Mallick
Chief Environmental Scientist

Chief Env. Scientist
Central Laboratory
S.P.C.Board, Odisha

S.P.C.BOARD, ODISHA
Central Laboratory
BHUBANESWAR-24

Annexure -1

FAX : 2562822/2560955
TEL : 2564033/2563294
EPABX : 2561909/2562847
E-mail : paribesh1@ospcboard.org
Website www.ospcboard.org

STATE POLLUTION CONTROL BOARD, ODISHA

[DEPARTMENT OF FOREST, ENVIRONMENT & CLIMATE CHANGE, GOVERNMENT OF ODISHA]
Paribesh Bhawan, A/118, Nilakanthanagar, Unit-VIII,
Bhubaneswar – 751 012
(CENTRAL LABORATORY)

No. 18426 / VI-SC (LEM)Misc 38/2022-23 Dt. 01.10.2022 /

To

Regional Officer,
State Pollution Control Board, Odisha,
Berhampur

Sub: Analysis Report of water sample collected from Baula Bandha

Ref : Your Letter No. 2905/legal/54/2022 dt.21.09.2022

Sir,

With reference to the above cited letter, please find enclosed herewith the analysis report of water sample, submitted to the Central Laboratory on dt.23.09.2022 by your office collected from Baula Bandha, At- Kalapuri Mouza (Panda Colony near Engineering School), Tahasil- Berhampur, Dist- Ganjam. Further this is to inform that parameters like Cu, Cd, Zn, Ni, Pb & Fe could not be analysed as the instrument is not functioning.

Encl : OS/366/10/2022

Yours faithfully,

Sr. Env. Scientist (Lab.)

o/c

CENTRAL LABORATORY
STATE POLLUTION CONTROL BOARD, ODISHA
Plot No. B-59/2 & 59/3, Chandaka Industrial Estate, Patia,
Bhubaneswar - 751 024
E-mail: centrallab@ospcboard.org

IC 9245

TEST REPORT

1. ULR No. : TC924522000000520F
2 (i). Report No. : OS/366/10/2022
3 (i) Date : 01.10.2022
2 (ii). Amendment No ----
3 (ii) Amendment Date : ----
4. Sample Submitted By (Name and address) : Sri D.K. Sahoo, Peon, Regional Office, SPCB, Odisha, Berhampur
5. Reference Letter No. : 2905/legal/54/2022 dt.21.09.2022
6. Date of sample receipt : 23.09.2022
7. Sample Description :

(i) Discipline : Chemical Testing and Biological Testing (Biological Testing, Chemical testing)
(ii) Group : Water (Water/ Pollution and Environment / Atmospheric Pollution)
(iii) Sub Group: Surface water (Surface water/ Ground water/ Wastewater Effluent/ Ambient Air)

8. Analysis Starting Date-Analysis Completion Date : 23.09.2022 – 29.09.2022
9. If uncertainty is desired by Customer : No
10. Analysis Results :

(Attach separate sheet if necessary)

Sl. No.	Parameter, Unit	Standards/ Regulatory Limits		Test Method	Water sample from Baula Bandha, At- Kalapuri Mouza (Panda Colony near Engineering School), Tahasil- Berhampur, Dist- Ganjam
		IS:2296 -1982 *	G.S.R. 742 (E) **		Others/Sept -22/SW/ 1086
					Baula Bandha
					Results
1.	pH	6.5-8.5	6.5-8.5	4500-H+-B, APHA, 23rd Edn., 2017	8.2
2.	Electrical Conductivity (EC), µS/cm	-	-	2510 B, APHA, 23rd Edn., 2017	895.0
3.	Total Dissolved Solids (TDS), mg/L	-	-	2540 C, APHA, 23rd Edn., 2017	632.0
4.	Dissolved Oxygen (DO), mg/L	5 mg/L or more	5 mg/L or more	4500-O-C, APHA, 23rd Edn., 2017	11.0
5.	Biochemical Oxygen Demand (BOD), mg/L	3 mg/L or less	3 mg/L or less	IS 3025 Part 44 (1999)	9.0
6.	Chemical Oxygen Demand (COD), mg/L	-	-	5220 B APHA, 23rd Edn., 2017	40.0
7.	Nitrite Nitrogen as N (NO_2^--N), mg/L	-	-	4500-NO_2^--B, APHA, 23rd Edn., 2017	<0.02
8.	Nitrate Nitrogen as N (NO_3^--N), mg/L	-	-	4500 - NO_3^--E, APHA, 23rd Edn., 2017	<0.3
9.	Ammonical Nitrogen as N (NH_3-N), mg/L	-	-	4500-NH_3-B followed by 4500-NH_3-C, APHA, 23rd Edn., 2017	1.12
10.	Total Kjeldahl Nitrogen (TKN), mg/L	-	-	4500-Norg B, APHA, 23rd Edn., 2017	4.34
11.	Sulphate (SO_4^{2-}), mg/L	-	-	4500-SO_4^{2-}-E, APHA, 23rd Edn., 2017	9.89
12.	Phosphate (PO_4^{3-}-P), mg/L	-	-	4500-P-D, APHA, 23rd Edn., 2017	0.054
13.	Sodium (Na), mg/L	-	-	3500-Na B, APHA, 23rd Edn., 2017	124.93

(Cont..)

Sl. No.	Parameter, Unit	Standards/ Regulatory Limits		Test Method	Water sample from Baula Bandha, At- Kalapuri Mouza (Panda Colony near Engineering School), Tahasil- Berhampur, Dist- Ganjam
		IS:2296 -1982 *	G.S.R. 742 (E) **		Others/Sept -22/SW/ 1086
					Baula Bandha
					Results
14.	Potassium (K), mg/L	-	-	3500 K -B, APHA, 23rd Edn., 2017	17.73
15.	Chloride (Cl), mg/L	-	-	4500 Cl B, APHA, 23rd Edn., 2017	164.9
16.	Hexavalen Chromium (Cr^{+6}), mg/L	0.05	-	3500-Cr-B, APHA, 23rd Edn., 2017	<0.002
17.	Total Coliform (TC), MPN/100 ml	500	-	9221-B APHA, 23rd Edn., 2017	160000
18.	Faecal Coliform (FC), MPN/100 ml	-	500 (Desirable) 2500 (max. Permissible)	9221-E, APHA, 23rd Edn., 2017	54000

*Tolerance limit for inland surface water subject to pollution (IS : 2296–1982), for Class B – organised outdoor bathing.

** MOEF & CC Notification vide GSR No.742 (E) dtd.25.09.2000 for outdoor bathing

11. Deviation from Test Method , if any : No

12. If Sampling Conducted by the Central Laboratory, Yes/ No. No
If Yes,

(a) Date of Sampling : (b) Method Used* :

----------End of Test Report----------

Authorised Signatory (Biological) 01/10/2022

Authorised Signatory (Water/wastewater) 01.10.2022

Board Analyst 1/10

Note :
(i) The results stated above relate only to the items tested.
(ii) This report shall not be reproduced in full or in part without written approval from the In-charge of the Central Laboratory.
(iii) The laboratory is not responsible for the authenticity of photocopied Test Reports.
(iv) The Test Item will not be retained for more than 15 days from the date of issue of Test Report except in case as required by applicable Regulation.

E-mail: rospcb.berhampur@ospcboard.org
Website: www.ospcboard.org

ODISHA

REGIONAL OFFICE OF THE STATE POLLUTION CONTROL BOARD, ODISHA

Annexure-2

[DEPARTMENT OF FOREST & ENVIRONMENT, GOVERNMENT OF ODISHA]
2nd Floor, New Division Office, IDCO, Berhampur Division,
Industrial Estate, Berhampur, Dist- Ganjam - 760008, Odisha, India

No. 2905 / Legal/54 /2022 Dt. 21/09/2022

E-despatch/E-mail

To

The Senior Environmental Scientist,
Central Laboratory,
State Pollution Control Board, Odisha,
Plot No.B-59/2 & 3, Chandaka Industrial Estate, Patia,
Bhubaneswar-751024

Sub: Analysis of collected water samples from Baula Bandha, At- Kalapuri Mouza (Panda Colony,near Engineering School, Tahasil- Berhampur, Dist-Ganjam in the matter of O.A. No. 114/2022/EZ- Sirin Tammmana Vrs. State of Odisha & Others - reg.

Ref: - Head Office letter no. 16351 dtd. 08.09.2022.

Sir,

With reference to the subject cited above, I am submitting 01 no. of water sample collected on 21.09.2022 from Baula Bandha, At- Kalapuri Mouza (Panda Colony,near Engineering School), Tahasil- Berhampur, Dist-Ganjam for analysis of the parameters likes pH, DO, BOD, COD, TDS, EC, NO_2,-N, NO_3,-N Amonical Nitrogen, TKN, Sulphate, Orthophosphate, Na, K, Cl, Cu, Cd, Zn, Ni, Cr(VI). Fe, Pb, Total Coliform and Fecal Coliform Bacteria at Central Laboratory, Bhubaneswar. Sri Dillip Kumar Sahoo, Peon is hereby deputed to submit the collected samples at Central Laboratory on 23.09.2022 for analysis as mentioned above. Further it is requested to submit the analysis report to this office at an early for necessary compliance to the Hon'ble NGT. The detail field protocol is enclosed herewith for ready reference.

This is for your kind information and necessary action

Encl: As above

Yours faithfully,

21/09/2022

REGIONAL OFFICER

Memo no 2906 / Date 21/09/2022

Copy forwarded to the Sr. Law Officer, L-II, State Pollution Control Board, Bhubaneswar for favouf of kind information and necessary action.

21/09/2022

REGIONAL OFFICER

CENTRAL LABORATORY Others (Sept-22/SW/1086
STATE POLLUTION CONTROL BOARD, ODISHA
Plot No D-6972 & 6973, Chandaka Industrial Estate, Patia
Bhubaneswar 751 024 INDIA

FIELD PROTOCOL submitted by Regional Office ...Berhampur

SAMPLING DATE: 21/09/2022 TIME: 1.30 (am/ pm)

A: GENERAL

Name of the Monitoring station Baula Bandha,

Type of Water body : (Please tick)

River / Drain / Canal / Reservoir (Lake / Pond)/ Sea/ Ground water

Name of the water body... Baula bandh Name of River Basin: Rushikulya

Name of Sub basin

Village name Panda Colony Location details Panda colony Berhampur. District Ganjam

B: SURROUNDINGS:

a: Major Polluting Sources :

b. Visible effluent discharge : Yes / No

c Use of Water in downstream (Please tick) :

Irrigation / Industrial / Domestic / Drinking water source / Organized water source / Cultivation / Fishing/ Bathing ghat / others

d. Water intake point if any,

Supply to Owned by:

Distance from sampling point (in meter)

C: FIELD OBSERVATION

a. Weather condition: Sunny / cloudy / windy / rain

b. Temperature in °C: Water.....30

c. Width of main stream (in meter)

d. Approx depth of water body (in meter) . < ½ m / ½ m to 1 m / > 1m / Flood

e. Sampling depth in cm : 10

f. Human activities (Please tick)

Bathing/ Washing/ Cultivation / Fishing/ Boating/ Gardening/ Tourism spot/ Cattle wading / Sand recovery/ Dredging / Others

g. Floating matter

h. Colour (Please tick)

Light brown/ Brown/ Dark brown/ Light green/ Green/ Clear/ other (Specify)

i. Odour (Please tick)

Odour free / Rotten egg / Burnt sugar / Soapy / Fishy / Septic / Aromatic/ Chlorinous / Alcoholic / Unpleasant

j Description of stream flow: Pool / Stack / Riffle / Run / Depositing / Eroding / Canalized

D. SAMPLE BOTTLE NO.

Physico-Chemical parameters	DO	Bacteriological	Other Parameters				
CL-40	26 31	BAM-125					

E. Problems encountered / adaptation made during sampling/ any other observation:

Sample collected by Trilochan Senapati, JA

Signature with Date T. Senapati 21.09.22

Sr. Env. Scientist (Lab) (Central Lab-in-Charge)

Sample received by 23/09

Annexure-3

OSPCB/CNL/F0718

CENTRAL LABORATORY
STATE POLLUTION CONTROL BOARD, ODISHA

Plot No. B-59/2 & 59/3, Chandaka Industrial Estate, Patia,
Bhubaneswar - 751 024
E-mail: centrallab@ospcboard.org

TC-9246

TEST REPORT

1. ULR No. : TC924522000000089F
2 (i). Report No. : NS/53/02/2022 2(ii). Amendment No : ----
3 (i) Date : 10.02.2022 3(ii) Amendment Date : ---
4. Sample Submitted By : Sri S.S. Mohanty, JSA
(Name and address) Central Laboratory, SPCB, Odisha, Bhubaneswar
5. Reference Letter No. 501 Dt. 07.01.2022
6. Date of sample receipt : 13.01.2022
7. Sample Description :
(i) Discipline : Chemical Testing And Biological Testing, (Biological Testing, Chemical testing) (ii) Group : Water (Water/ Pollution and Environment / Atmospheric Pollution) (iii) Sub Group : Surface water (Surface water/ Ground water/ Wastewater Effluent/ Ambient Air)
8. Analysis Starting Date-Analysis Completion Date : 13.01.2022 - 29.01.2022
9. If uncertainty is desired by Customer : No
10. Analysis Results :
(Attach separate sheet if necessary)

Sl. No.	Parameter, Unit	Standards/ Regulatory Limits	Test Method	NS/Jan-22/SW/112	NS/Jan-22/SW/113	NS/Jan-22/SW/114	NS/Jan-22/SW/115	NS/Jan-22/SW/116	NS/Jan-22/SW/117
				Mangala U/s	Mangala D/s	Bhargavi (Chandanpur)	Ratnachira	Satapada	Narendra
1.	pH	-	4500-H⁺-B, APHA, 23rd Edn., 2017	7.3	7.3	7.8	7.3	7.5	8.1
2.	EC, µS/cm	-	2510 B, APHA, 23rd Edn., 2017	1889	2930	311	544	26470	626
3.	DO, mg/L	-	4500-O-C, APHA, 23rd Edn., 2017	10.8	11.2	9.6	4.9	8.1	11
4.	BOD, mg/L	-	IS 3025: Part 44 (1999)	1.8	2.6	1.5	2.4	2.8	6
5.	COD, mg/L	-	5220 B APHA, 23rd Edn., 2017	11	18.4	7.3	11	27.5	44
6.	T.Alk, mg/L	-	2320 B, APHA, 23rd Edn., 2017	132	192	92	140	108	120
7.	P.Alk., mg/L	-		< 5	< 5	< 5	< 5	< 5	< 5
8.	Total Hardness, mg/L	-	2340-C, APHA, 23rd Edn., 2017	180	720	104	132	1080	160
9.	Calcium Hardness, mg/L	-	3500-Ca-B, APHA, 23rd Edn., 2017	100	400	80	96	400	100
10.	Magnesium Hardness, mg/L	-	3500-Mg-B, APHA, 23rd Edn., 2017	80	320	24	36	680	60
11.	Na , mg/L	-	3500-Na B, APHA, 23rd Edn., 2017	441.3	463.9	17.2	60.55	6547.5	59.15
12.	K, mg/L	-	3500 K -B, APHA, 23rd Edn., 2017	98.3	90.45	6.13	22.62	278	21.62
13.	Cl^-, mg/L	-	4500-Cl B, APHA, 23rd Edn., 2017	745.6	898.5	32	116	9991	106
14.	SO_4^{2-}, mg/L	-	4500-SO_4^{2-} E, APHA, 23rd Edn., 2017	67.25	258.75	27.13	17.50	1203.13	65.00

(Cont..)

Pattanaik 10/02/2022 Patnaik 10-2-2022 N. Mallik 10/2

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Sl. No	Parameter, Unit	Standards/ Regulatory Limits	Test Method	NS/Jan-22/SW/112	NS/Jan-22/SW/113	NS/Jan-22/SW/114	NS/Jan-22/SW/115	NS/Jan-22/SW/116	NS/Jan-22/SW/11
				Mangala U/s	Mangala D/s	Bhargavi (Chandanpur)	Ratnachira	Satapada	Narendra
15.	TDS, mg/L	-	2540 C, APHA, 23rd Edn , 2017	NA	NA	NA	NA	NA	NA
16.	TFS, mg/L	-	2540 E, APHA, 23rd Edn , 2017	NA	NA	NA	NA	NA	NA
17.	NH_3-N mg/L	-	4500-NH_3-B followed by 4500-NH_3-C, APHA, 23rd Edn , 2017	2.8	1.12	0.56	1.12	1.12	1.68
18.	TKN, mg/L	-	4500-Norg B, APHA, 23rd Edn., 2017	8.4	5.04	2.24	2.24	2.8	5.04
19.	NO_2^--N, mg/L	-	4500-NO_2^--B, APHA, 23rd Edn. 2017,	0.088	0.059	0.078	< 0.02	< 0.02	< 0.02
20.	PO_4^{3-}-P, mg/L	-	4500-P-D APHA, 23rd Edn , 2017	0.924	0.362	< 0.05	< 0.05	< 0.05	0.931
21.	Turbidity, NTU	-	2130 B, APHA, 23rd Edn., 2017	2.5	6.3	1.4	1.2	3.3	3
22.	F^-, mg/L	-	4500-F-C, APHA, 23rd Edn , 2017	0.456	0.606	0.468	0.474	0.842	0.450
23.	TSS, mg/L	-	2540-D, APHA, 23rd Edn., 2017	15	39	14	19	116	18
24.	B, mg/L	-	4500-B-B APHA, 23rd Edn., 2017	< 0.5	< 0.5	< 0.5	< 0.5	1.776	< 0.5
25.	TC, MPN/100 ml	-	9221-B APHA, 23rd Edn., 2017	1300	2200	2200	490	220	1300
26.	FC, MPN/100 ml	-	9221-E, APHA, 23rd Edn., 2017	130	230	230	130	20	130

Sl. No.	Parameter, Unit	NS/Jan-22/SW/118	NS/Jan-22/SW/119	NS/Jan-22/SW/120	NS/Jan-22/SW/121	NS/Jan-22/SW/122	NS/Jan-22/SW/123	NS/Jan-22/SW/124	
		Markanda	Indradyumna	Parvati Sagar	Swetaganga	Sea, Swargadwara	Sea, Baliapanda	Sea, Bankimuhan	
1.	pH	7.8	7.9	7	7.1	8.1	8.1	8	
2.	EC, µS/cm	613	552	341	529	45240	45350	45560	
3.	DO, mg/L	11.9	10.5	10.9	10.7	9.8	7.9	8.9	
4.	BOD, mg/L	6.3	5.3	5.7	5.3	1.6	1.6	1.8	
5.	COD, mg/L	47.7	36.7	40.4	36.7	36.7	36.7	36.7	
6.	T.Alk, mg/L	160	140	88	108	104	104	108	
7.	P.Alk., mg/L	< 5	< 5	< 5	< 5	< 5	< 5	< 5	
8.	Total Hardness, mg/L	200	116	92	104	6000	6000	6400	
9.	Calcium Hardness, mg/L	120	92	52	80	4400	4400	4800	
10.	Magnesium Hardness, mg/L	80	24	40	24	1600	1600	1600	

(Cont..)

Pattanaik 10/02/2022   Mandu 10.2.2022   W. Hota 10/2

Sl No.	Parameter, Unit	NS/Jan-22/SW/118	NS/Jan-22/SW/119	NS/Jan-22/SW/120	NS/Jan-22/SW/121	NS/Jan-22/SW/122	NS/Jan-22/SW/123	NS/Jan-22/SW/124	
		Markanda	Indradyumna	Parvati Sagar	Swetaganga	Sea, Swargadwara	Sea, Baliapanda	Sea, Bankimuhan	
11.	Na , mg/L	41.26	62.2	30.59	65.45	12330	12545	12555	
12.	K, mg/L	19.57	28.45	13.46	29.13	392	409	398	
13.	Cl, mg/L	66	96	54	116	19986	19986	19986	
14.	SO_4^{2-}, mg/L	55.25	29.63	20.13	30.88	2537.50	2581.25	2656.25	
15.	TDS, mg/L	NA	NA	NA	NA	NA	NA	NA	
16.	TFS, mg/L	NA	NA	NA	NA	NA	NA	NA	
17.	NH_3-N mg/L	1.12	1.68	1.12	1.68	0.56	0.56	1.68	
18.	TKN, mg/L	2.24	3.92	3.36	4.8	2.24	1.68	5.04	
19.	NO_2^--N, mg/L	0.077	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	
20.	PO_4^{3-}-P, mg/L	0.523	0.441	0.364	0.021	< 0.05	< 0.05	< 0.05	
21.	Turbidity, NTU	2.4	1.6	13	5	12	13	4.9	
22.	F, mg/L	0.347	0.342	0.362	0.388	0.763	0.724	0.721	
23.	TSS, mg/L	13	24	32	21	287	324	281	
24.	B, mg/L	< 0.5	< 0.5	< 0.5	0.584	2.602	2.506	2.586	
25.	TC, MPN/100ml	490	790	2200	1400	140	20	1300	
26.	FC, MPN/100ml	20	45	330	230	<1.8	<1.8	78	

NA : Not analysed

11. Deviation from Test Method , if any : No
12. If Sampling Conducted by the Central Laboratory, Yes/ No. Yes
    If Yes,

(a) Date of Sampling : 12.01.2022 & 13.01.2022 (b) Method Used* :

----------End of Test Report----------

10/02/2022
Authorised Signatory
(Biological)

10.2.2022
Authorised Signatory
(Water/wastewater)

Board Analyst 10/2

Note :
(i) The results stated above relate only to the items tested.
(ii) This report shall not be reproduced in full or in part without written approval from the In-charge of the Central Laboratory.
(iii) The laboratory is not responsible for the authenticity of photocopied Test Reports.
(iv) The Test Item will not be retained for more than 15 days from the date of issue of Test Report except in case as required by applicable Regulation.

CENTRAL LABORATORY
STATE POLLUTION CONTROL BOARD, ODISHA
Plot No. B-59/2 & 59/3, Chandaka Industrial Estate, Patia,
Bhubaneswar - 751 024
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TC-9245

TEST REPORT

1. ULR No. : TC924522000000194F
2 (i). Report No. : NS/105/03/2022 — 2(ii). Amendment No : ----
3 (i) Date : 31.03.2022 — 3(ii) Amendment Date : ---
4. Sample Submitted By : Sri S. Dash, JSA
(Name and address) Central Laboratory, SPCB, Odisha, Bhubaneswar
5. Reference Letter No. 3245 Dt. 02.03.2022
6. Date of sample receipt : 09.03.2022
7. Sample Description :
(i) Discipline : Chemical Testing And Biological Testing, (Biological Testing, Chemical testing)
(ii) Group : Water (Water/ Pollution and Environment / Atmospheric Pollution)
(iii) Sub Group : Surface water (Surface water/ Ground water/ Wastewater Effluent/ Ambient Air)
8. Analysis Starting Date-Analysis Completion Date : 09.03.2022 – 22.03.2022
9. If uncertainty is desired by Customer : No
10. Analysis Results :
(Attach separate sheet if necessary)

Sl. No.	Parameter, Unit	Standards/ Regulatory Limits	Test Method	NS/Mar-22/SW/56	NS/Mar-22/SW/57	NS/Mar-22/SW/58	NS/Mar-22/SW/59	NS/Mar-22/SW/60	NS/Mar-22/SW/61
				Mangala U/s	Mangala D/s	Bhargavi (Chandanpur)	Ratnachira	Puri canal at Chandanpur	Satapada
				Results					
1.	pH	-	4500-H⁺-B, APHA, 23rd Edn , 2017	6.7	8.4	8.5	7.8	7.6	7.5
2.	EC, μS/cm	-	2510 B, APHA, 23rd Edn., 2017	248	24830	318	245	238	37980
3.	DO, mg/L	-	4500-O-C, APHA, 23rd Edn., 2017	9.4	7.9	8.6	6.9	6.6	9
4.	BOD, mg/L	-	IS 3025 Part 44 (1999)	1.2	2.6	1.1	1.2	2.3	2
5.	COD, mg/L	-	5220 B APHA, 23rd Edn , 2017	8	20	8	11.9	19.8	39.6
6.	T.Alk, mg/L	-	2320 B, APHA, 23rd Edn., 2017	92	124	100	92	88	112
7.	P.Alk., mg/L	-		< 5	8	12	< 5	< 5	< 5
8.	Total Hardness, mg/L	-	2340-C, APHA, 23rd Edn., 2017	88	3400	124	92	88	4800
9.	Calcium Hardness, mg/L	-	3500-Ca-B, APHA, 23rd Edn , 2017	56	560	80	60	64	1200
10.	Ca, mg/L	-		22.44	224.39	32.06	24.04	25.64	480.84
11.	Magnesium Hardness, mg/L	-	3500-Mg-B, APHA, 23rd Edn., 2017	32	2840	44	32	24	3600
12.	Mg, mg/L	-		7.78	690.26	10.69	7.78	5.83	874.98
13.	Na , mg/L	-	3500-Na B, APHA, 23rd Edn , 2017	17.04	6675	17.53	16.22	15.43	10295
14.	K, mg/L	-	3500 K -B, APHA, 23rd Edn., 2017	3.73	244.25	3.08	2.93	3.34	243.3
15.	Cl^-, mg/L	-	4500-Cl B, APHA, 23rd Edn., 2017	16	10994.5	18	18	16	17991
16.	SO_4^{2-}, mg/L	-	4500-SO_4^{2-} E, APHA, 23rd Edn , 2017	19.43	1978.61	41.00	19.29	19.71	1964.33

(Cont..)

Pattanaik 31/03/2022 — [signature] 31.3.2022 — [signature] 31/3

Sl. No.	Parameter, Unit	Standards/ Regulatory Limits	Test Method	NS/Mar-22/SW/56	NS/Mar-22/SW/57	NS/Mar-22/SW/58	NS/Mar-22/SW/59	NS/Mar-22/SW/60	NS/Mar-22/SW/61
				Mangala U/s	Mangala D/s	Bhargavi (Chandanpur)	Ratnachira	Puri canal at Chandanpur	Satapada
				Results					
17.	TDS, mg/L	-	2540 C, APHA, 23rd Edn., 2017	NA	NA	NA	NA	NA	NA
18.	TFS, mg/L	-	2540 E, APHA, 23rd Edn., 2017	NA	NA	NA	NA	NA	NA
19.	NH_3-N mg/L	-	4500-NH3-B followed by 4500-NH3-C, APHA, 23rd Edn., 2017	0.56	0.56	2.24	1.12	1.12	0.56
20.	TKN, mg/L	-	4500-Norg B, APHA, 23rd Edn., 2017	2.24	1.68	5.04	4.48	5.6	6.16
21.	NO_2^-N, mg/L	-	4500-NO_2^--B, APHA, 23rd Edn. 2017,	< 0.02	0.032	< 0.02	< 0.02	< 0.02	< 0.02
22.	PO_4^{3-}-P, mg/L	-	4500-P-D APHA, 23rd Edn., 2017	< 0.05	0.151	0.118	0.105	0.089	0.052
23.	Turbidity, NTU	-	2130-B, APHA, 23rd Edn., 2017	3.1	5.6	3.2	2.8	3.7	4.9
24.	F, mg/L	-	4500-F-C, APHA, 23rd Edn., 2017	0.447	0.671	0.552	0.489	0.497	0.835
25.	TSS, mg/L	-	2540-D, APHA, 23rd Edn., 2017	136	12	10	17	21	210
26.	B, mg/L	-	4500-B-C APHA, 23rd Edn., 2017	< 0.5	1.955	0.631	< 0.5	< 0.5	< 0.5
27.	TC, MPN/100 ml	-	9221-B APHA, 23rd Edn., 2017	490	220	490	330	2200	130
28.	FC, MPN/100 ml	-	9221-E, APHA, 23rd Edn., 2017	45	78	330	110	490	45

Sl. No.	Parameter, Unit	NS/Mar-22/SW/62	NS/Mar-22/SW/63	NS/Mar-22/SW/64	NS/Mar-22/SW/65	NS/Mar-22/SW/66	NS/Mar-22/SW/67	NS/Mar-22/SW/68	NS/Mar-22/SW/69
		Narendra	Markanda	ndradyumna	Parvati Sagar	Swetaganga	Sea, Swargadwara	Sea, Baliapanda	Sea, Bankimuhan
		Results							
1.	pH	8.8	8.3	8.6	8.7	8.8	8	8	8.1
2.	EC, µS/cm	752	638	502	342	1275	41870	40140	40630
3.	DO, mg/L	10.7	7.8	10.4	8.6	7.3	7.3	8.4	9
4.	BOD, mg/L	6	4.7	3.7	12	5.8	2.1	2.2	2.3
5.	COD, mg/L	31.7	23.8	19.8	55.4	31.7	29.7	29.7	29.7
6.	T.Alk, mg/L	164	160	124	96	208	120	116	112
7.	P.Alk., mg/L	8	8	8	< 5	8	< 5	< 5	< 5
8.	Total Hardness, mg/L	168	188	120	76	200	7800	7800	7800
9.	Calcium Hardness, mg/L	120	132	96	60	108	840	840	800

(Cont..)

Pattanaik 31/03/2022

Patnaik 31-3-2022

31/3

Sl. No.	Parameter, Unit	NS/Mar-22/SW/62	NS/Mar-22/SW/63	NS/Mar-22/SW/64	NS/Mar-22/SW/65	NS/Mar-22/SW/66	NS/Mar-22/SW/67	NS/Mar-22/SW/68	NS/Mar-22/SW/69
		Narendra	Markanda	ndradyumna	Parvati Sagar	Swetaganga	Sea, Swargadwara	Sea, Baliapanda	Sea, Bankimuhan
		Results							
10.	Ca, mg/L	48.08	52.89	38.47	24.04	43.28	336.59	336.59	320.56
11.	Magnesium Hardness, mg/L	48	56	24	16	92	6960	6960	7000
12.	Mg, mg/L	11.67	13.61	5.83	3.89	22.36	1691.63	1691.63	1701.35
13.	Na , mg/L	75.8	43.75	52.9	36.97	179.1	9705	10550	10835
14.	K, mg/L	28.7	33	26.55	16.6	31.2	348	370	341
15.	Cl^-, mg/L	100	70	80	56	279.9	18990.5	19990	19990
16.	SO_4^{2-}, mg/L	80.57	47.43	26.71	13.00	47.43	1957.18	1957.18	2235.76
17.	TDS, mg/L	NA	NA	NA	NA	NA	NA	NA	NA
18.	TFS, mg/L	NA	NA	NA	NA	NA	NA	NA	NA
19.	NH_3-N mg/L	1.12	1.12	0.56	1.68	1.12	0.56	1.12	1.12
20.	TKN, mg/L	5.04	4.48	3.92	5.6	7.84	5.6	8.4	7.84
21.	NO_2^--N, mg/L	< 0.02	0.648	0.031	0.036	0.078	< 0.02	0.022	0.081
22.	PO_4^{3-}-P, mg/L	1.190	1.049	< 0.05	< 0.05	1.068	< 0.05	0.120	< 0.05
23.	Turbidity, NTU	4.3	2.7	3.6	18	5.5	2.8	2.9	4.3
24.	F^-, mg/L	0.348	0.291	0.324	0.312	0.298	0.812	0.889	0.886
25.	TSS, mg/L	16	21	22	27	26	126	132	148
26.	B, mg/L	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	2.532	2.688	2.568
27.	TC, MPN/100ml	4300	45	5400	5400	2200	<1.8	<1.8	40
28.	FC, MPN/100ml	1300	20	1100	700	790	<1.8	<1.8	<1.8

NA : Not analysed

11. Deviation from Test Method , if any : No
12. If Sampling Conducted by the Central Laboratory, Yes/ No. Yes
    If Yes,

(a) Date of Sampling : 08.03.2022 & 09.03.2022 (b) Method Used* :

----------End of Test Report----------

31/03/2022
Authorised Signatory
(Biological)

31.3.2022
Authorised Signatory
(Water/wastewater)

9/13
Board Analyst

Note :
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CENTRAL LABORATORY
STATE POLLUTION CONTROL BOARD, ODISHA

Plot No. B-59/2 & 59/3, Chandaka Industrial Estate, Patia,
Bhubaneswar - 751 024
E-mail: centrallab@ospcboard.org

TC-9245

TEST REPORT

1. ULR No. : TC924522000000156F
2 (i). Report No. : NS/87/03/2022 2(ii). Amendment No : ----
3 (i) Date : 15.03.2022 3(ii) Amendment Date : ---
4. Sample Submitted By : Sri S.S. Mohanty, JSA
(Name and address) Central Laboratory, SPCB, Odisha, Bhubaneswar
5. Reference Letter No. 1666 Dt. 02.02.2022
6. Date of sample receipt : 18.02.2022
7. Sample Description :
(i) Discipline : Chemical Testing And Biological Testing, (Biological Testing, Chemical testing) (ii) Group : Water (Water/ Pollution and Environment / Atmospheric Pollution) (iii) Sub Group : Surface water (Surface water/ Ground water/ Wastewater Effluent/ Ambient Air)
8. Analysis Starting Date-Analysis Completion Date : 18.02.2022 – 02.03.2022
9. If uncertainty is desired by Customer : No
10. Analysis Results :
(Attach separate sheet if necessary)

Sl. No.	Parameter, Unit	Standards/ Regulatory Limits	Test Method	NS/Feb-22/SW/124	NS/Feb-22/SW/125	NS/Feb-22/SW/126	NS/Feb-22/SW/127	NS/Feb-22/SW/128	NS/Feb-22/SW/129
				Mangala U/s	Mangala D/s	Bhargavi (Chandanpur)	Ratnachira	Satapada	Narendra
				Results					
1.	pH	-	4500-H+-B, APHA, 23rd Edn., 2017	7.8	7.4	7.8	7.6	7.9	8.5
2.	EC, µS/cm	-	2510 B, APHA, 23rd Edn , 2017	228	1427	227	278	17160	836
3.	DO, mg/L	-	4500-O-C, APHA, 23rd Edn , 2017	7.6	7.2	8.5	5.4	7.1	10.8
4.	BOD, mg/L	-	IS 3025 Part 44 (1999)	1.6	2.5	1.1	1.2	1.7	5.7
5.	COD, mg/L	-	5220 B APHA, 23rd Edn , 2017	6.7	26.9	6.7	6.7	33.6	26.9
6.	T.Alk, mg/L	-	2320 B, APHA, 23rd Edn., 2017	84	116	88	112	108	196
7.	P.Alk., mg/L	-		< 5	< 5	< 5	< 5	< 5	12
8.	Total Hardness, mg/L	-	2340-C, APHA, 23rd Edn., 2017	92	276	92	100	2800	260
9	Calcium Hardness, mg/L	-	3500-Ca-B, APHA, 23rd Edn , 2017	60	108	60	68	360	168
10.	Ca, mg/L	-		24.04	43.28	24.04	27.25	144.25	67.32
11.	Magnesium Hardness, mg/L	-	3500-Mg-B, APHA, 23rd Edn., 2017	32	168	32	32	2440	92
12.	Mg, mg/L	-		7.78	40.83	7.78	7.78	593.04	22.36
13.	Na , mg/L	-	3500-Na B, APHA, 23rd Edn., 2017	8.56	230	14.08	17.56	4333	62.3
14.	K, mg/L	-	3500 K -B, APHA, 23rd Edn , 2017	2.62	14.1	3.0	3.7	128.75	26.35
15.	Cl , mg/L	-	4500-Cl B, APHA, 23rd Edn., 2017	12	419.8	18	22	7496.3	109.9
16.	SO_4^{2-}, mg/L	-	4500-SO_4^{2-} E, APHA, 23rd Edn , 2017	23.88	98.75	23.25	22.13	1656.25	90.63

(Cont..)

15/03/2022 11.03.2022 15/3

Sl. No.	Parameter, Unit	Standards/ Regulatory Limits	Test Method	NS/Feb-22/SW/124	NS/Feb-22/SW/125	NS/Feb-22/SW/126	NS/Feb-22/SW/127	NS/Feb-22/SW/128	NS/Feb-22/SW/129
				Mangala U/s	Mangala D/s	Bhargavi (Chandanpur)	Ratnachira	Satapada	Narendra
				Results					
17.	TDS, mg/L	-	2540 C, APHA, 23rd Edn., 2017	NA	NA	NA	NA	NA	NA
18.	TFS, mg/L	-	2540 E, APHA, 23rd Edn., 2017	NA	NA	NA	NA	NA	NA
19.	NH_3-N mg/L	-	4500-NH_3-B followed by 4500-NH_3-C, APHA, 23rd Edn., 2017	0.56	1.12	0.56	0.56	0.56	0.56
20.	TKN, mg/L	-	4500-Norg B, APHA, 23rd Edn., 2017	6.72	8.4	2.8	5.04	2.24	4.48
21.	NO_2^-N, mg/L	-	4500-NO_2^--B, APHA, 23rd Edn. 2017.	< 0.02	0.030	0.420	< 0.02	0.065	0.071
22.	PO_4^{3-}-P, mg/L	-	4500-P-D APHA, 23rd Edn., 2017	0.159	0.200	0.168	0.116	0.121	1.273
23.	Turbidity, NTU	-	2130 B, APHA, 23rd Edn., 2017	6.1	8	1.6	1.4	85	25
24.	F, mg/L	-	4500-F-C, APHA, 23rd Edn., 2017	0.487	0.504	0.488	0.520	0.759	0.285
25.	TSS, mg/L	-	2540-D, APHA, 23rd Edn., 2017	24	138	13	14	249	42
26.	B, mg/L	-	4500-B-B APHA, 23rd Edn., 2017	< 0.5	< 0.5	< 0.5	< 0.5	0.624	< 0.5
27.	TC, MPN/100 ml	-	9221-B APHA, 23rd Edn., 2017	3500	3500	2400	230	2800	5400
28.	FC, MPN/100 ml	-	9221-E, APHA, 23rd Edn., 2017	700	940	1300	20	1300	2200

Sl No.	Parameter, Unit	NS/Feb-22/SW/130	NS/Feb-22/SW/131	NS/Feb-22/SW/132	NS/Feb-22/SW/133	NS/Feb-22/SW/134	NS/Feb-22/SW/135	NS/Feb-22/SW/136
		Markanda	Indradyumna	Parvati Sagar	Swetaganga	Sea, Swargadwara	Sea, Baliapanda	Sea, Bankimuhan
		Results						
1	pH	8.2	8.3	7.5	8.2	8.1	8.3	7.9
2.	EC, µS/cm	615	578	456	720	38230	40640	38300
3.	DO, mg/L	12.6	8.4	5.9	11.1	7.3	7.1	7.3
4.	BOD, mg/L	5.3	4	12.5	4.3	1.4	1.6	1.8
5.	COD, mg/L	26.9	20.2	50.4	20.2	33.6	33.6	33.6
6.	T.Alk, mg/L	152	144	104	172	108	116	124
7.	P Alk., mg/L	< 5	8	< 5	< 5	< 5	< 5	< 5
8.	Total Hardness, mg/L	140	120	84	132	6000	5800	5000
9.	Calcium Hardness, mg/L	108	68	48	96	840	800	760

(Cont..)

Pattanaik 15/03/2022

Gaonkar 15-3-2022

N. Mallick 15/3

Sl. No.	Parameter, Unit	NS/Feb-22/SW/130	NS/Feb-22/SW/131	NS/Feb-22/SW/132	NS/Feb-22/SW/133	NS/Feb-22/SW/134	NS/Feb-22/SW/135	NS/Feb-22/SW/136
		Markanda	Indradyumna	Parvati Sagar	Swetaganga	Sea, Swargadwara	Sea, Baliapanda	Sea, Bankimuhan
		Results						
10.	Ca, mg/L	43.28	27.25	19.23	38.47	336.59	320.56	304.53
11.	Magnesium Hardness, mg/L	32	52	36	36	5160	5000	4240
12.	Mg, mg/L	7.78	12.64	8.75	8.75	1254.14	1215.25	1030.53
13.	Na , mg/L	59	76.2	56.1	83.4	10680	11175	10775
14.	K, mg/L	29.65	24.45	14.5	26.15	412	398	356
15.	Cl, mg/L	70	90	70	100	18990.5	19990	18990.5
16.	SO_4^{2-}, mg/L	53.13	42.50	31.88	56.25	1975.00	2012.50	1925.00
17.	TDS, mg/L	NA	NA	NA	NA	NA	NA	NA
18.	TFS, mg/L	NA	NA	NA	NA	NA	NA	NA
19.	NH_3-N mg/L	1.12	1.68	2.24	1.12	0.56	1.12	1.68
20.	TKN, mg/L	3.36	3.92	9.52	2.24	2.8	3.92	3.36
21.	NO_2^--N, mg/L	0.034	0.109	0.043	0.022	0.043	< 0.02	0.022
22.	PO_4^{3-}-P, mg/L	3.692	0.146	0.186	1.310	0.102	0.081	0.141
23.	Turbidity, NTU	17	7.8	14	3.6	3.5	5	7.3
24.	F, mg/L	0.196	0.255	0.267	0.238	0.961	0.996	0.980
25.	TSS, mg/L	53	15	24	17	134	184	256
26.	B, mg/L	< 0.5	< 0.5	< 0.5	< 0.5	1.962	2.716	2.175
27.	TC, MPN/100ml	5400	54000	9200	5400	230	270	330
28.	FC, MPN/100ml	1700	17000	2200	2400	45	68	78

NA : Not analysed

11. Deviation from Test Method , if any : No
12. If Sampling Conducted by the Central Laboratory, Yes/ No. Yes
    If Yes,

(a) Date of Sampling : 17.02.2022 & 18.02.2022 (b) Method Used* :

----------End of Test Report----------

15/03/2022
Authorised Signatory
(Biological)

15-3-2022
Authorised Signatory
(Water/wastewater)

15/3
Board Analyst

Note :
(i) The results stated above relate only to the items tested.
(ii) This report shall not be reproduced in full or in part without written approval from the In-charge of the Central Laboratory.
(iii) The laboratory is not responsible for the authenticity of photocopied Test Reports.
(iv) The Test Item will not be retained for more than 15 days from the date of issue of Test Report except in case as required by applicable Regulation.

Annexure-1

WATER QUALITY MANAGEMENT OF BINDUSAGAR POND

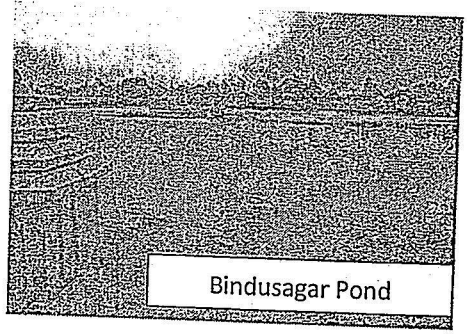
STATE POLLUTION CONTROL BOARD, ORISSA
PARIVESH BHAWAN, A-118, NILAKANTHANAGAR
UNIT-VIII, BHUBANESWAR-751012

2015

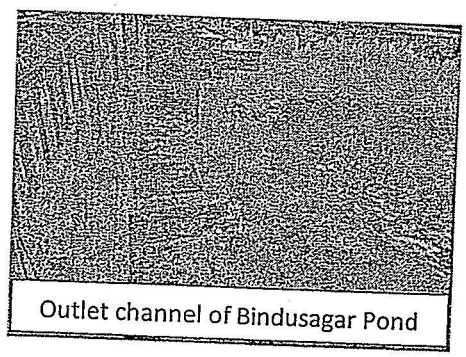
Water Quality Management of Bindusagar Pond

Background

Bindusagar Tank, a famous religious pond in Bhubaneswar city, is located in the right side of the road leading from Kedargouri Chowk to Lingaraja Temple. The tank is surrounded by a series of Shiva shrines which adds the religious importance to the pond. The temple of Ananta Vasudeva stands on the eastern embankment across the road, Mohini temple in southern embankment, Markandesvara temple in south-eastern embankment and Uttaresvara temple in northern embankments. All the rituals of Lord Lingaraja are closely associated with this tank. At the centre of the tank there is a pidha shrine, locally known as Jagati. Chandan Yatra during the month of May and Boita bandana during the month of November are the main functions of the tank. Besides these, large number of people from different corners of the Country flock to Bindusahgar pond throughout the year to offer shradha, tarpanas, or take a holy dip before visiting the Lingaraj temple.


Bindusagar Pond

The pond is rectangular in shape measuring 450 m (1,480 ft) in length, 175 m (574 ft) in breadth and 7 m (23 ft) in depth and covers an area of about 7.4 hectare. The bottom is flat, smooth with laterite bed. The tank is enclosed within a masonry embankment made of dressed laterite blocks. Bathing ghats are provided with steps made of large size laterite blocks in all sides.


Outlet channel of Bindusagar Pond

The pond is fed by a natural spring from the underground. The excess water is discharged through an outlet channel in the south eastern wall, beneath the Talabazar road near Dalmiya Dharmasala. The outlet channel measures 1.18 m (3.9 ft) in height and 1.07 m (3.5 ft) in width. As a result, the water level of the tank remains constant throughout the year. There is a provision for fresh water inflow into the pond near Uttareswara temple. Despite such provisions made in the past to keep the tank water clean and fresh, the pond water is observed to be polluted from the water quality monitoring studies being carried out by the State Pollution Control Board, Odisha since last few years. A comparison of Biochemical oxygen Demand (BOD) values of Bindusagar pond at the bathing ghats on its four sides during the period 2010-2014 is given in

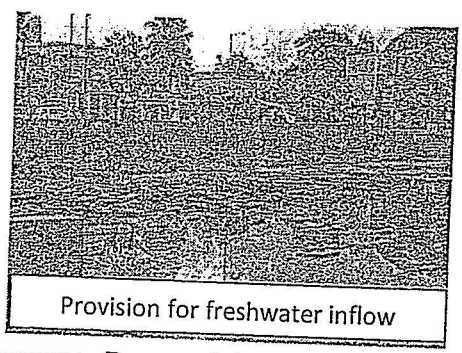

Provision for freshwater inflow

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Table-1. BOD values indicate the biodegradable waste load on the water body and considered as one of the critical parameters to be compared with the tolerance limits prescribed for the designated best use of inland surface water bodies (CPCB).

Table -1 Water quality of Bindusagar pond with respect to BOD during the period 2010-2014

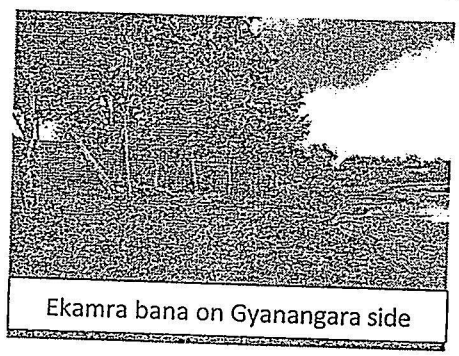
Monitoring Location	Annual Average of BOD values (Range of BOD Values) in mg/l				
	2010	2011	2012	2013	2014
Lingaraj Temple side	9.8 (2.7-18.0)	11.7 (6.2-31.0)	12.3 (4.3-35.0)	9.6 (5.4 – 21.3)	2.6 (1.0 – 4.9)
Ananta Vasudev temple side	12.2 (4.5-25.0)	11.2 (6.0-22.5)	8.8 (4.3-15.7)	9.5 (5.1 – 22.4)	2.8 (1.0 – 4.1)
Near Kedarnath Research Centre	12.4 (6.0-21.5)	10.4 (6.0-23.5)	9.8 (4.5-16.0)	7.6 (5.1 – 9.7)	3.1 (2.0 – 7.8)
Gyananagar side	9.9 (5.5-13.5)	11.0 (5.0-22.0)	8.6 (2.3-15.6)	6.8 (5.0 – 8.7)	2.8 (1.2-4.4)
Tolerance limit for Class B* surface water bodies	3.0 mg/l				

* Class B: Organised Outdoor bathing

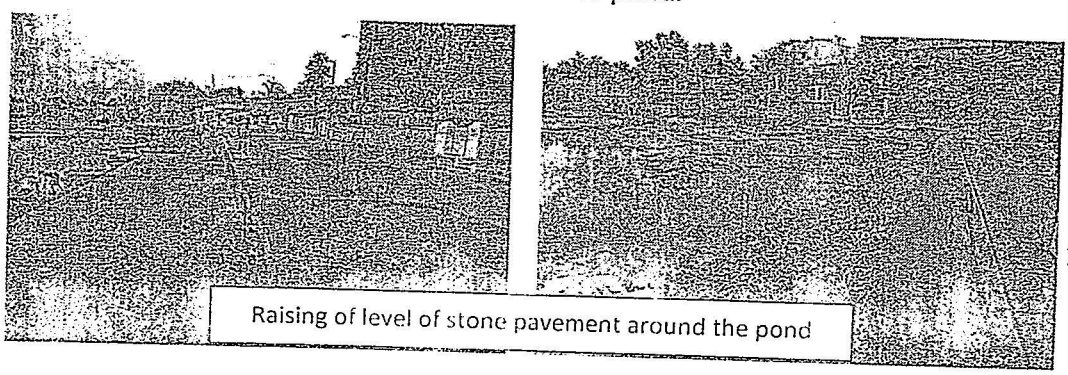
Source: Central Pollution Control Board publication (ADSORBS/3/1978-79)

A decrease in BOD values over the years indicate the improvement in water quality of the pond which had become possible due to following control measures adopted by the Bhubaneswar Municipal Corporation.

- Diversion of domestic wastewater from Gyananagar area to Municipal drain which was earlier being discharged to Bindusagar
- Drained out of water of the pond followed by dredging upto the bottom level of the pond
- Creating Ekamra bana garden on about 1.23-acre land on Gyananagar side which was an open toilet for the people in the nearby areas.
- Provision for regular flushing of the pond water and supply of fresh water.
- Raising the level of stone pavement around the pond to prevent entry of surface run-off into the pond.



Ekamra bana on Gyanangara side



Raising of level of stone pavement around the pond

- Regular cleaning of steps of the bathing ghats and immediate neighbourhood area of the pond.
- Establishment of mechanism for removal of non-biodegradable materials or floatable materials being dumped by the visitors from the pond

Though all such measures have improved the water quality of Bindusagar pond with respect to BOD, frequent observation of BOD values exceeding the tolerance limit is still observed. Religious faith and social practices associated with the increasing tourist add to deterioration of the water quality of the pond. Similarly, bacterial contamination with respect to total coliform (TC) bacteria and fecal coliform (FC) bacteria in pond water is still at alarming level. The contamination level with respect to both the parameters remain most of the time at much higher level than the prescribed limit. A comparison of TC and FC values of Bindusagar pond at the bathing ghats on its four sides during the period 2010-2014 are given in Table-2 and Table-3 respectively.

Table -2 Water quality of Bindusagar pond with respect to Total coliform bacteria (TC) during the period 2010-2014

Monitoring Location	Annual Average TC values (Range of TC Values) in MPN/100 ml				
	2010	2011	2012	2013	2014
Lingaraj Temple side	74217 (270->160000)	36200 (200-160000)	23208 (5800-92000)	37867 (2200 – 160000)	65027 (3300 – 160000)
Ananta Vasudev temple side	82275 (1200->160000)	71740 (140-160000)	22458 (4700-54000)	33489 (3300 – 160000)	52709 (2800 – 160000)
Near Kedarnath Research Centre	103067 (270-1600000)	28556 (170-160000)	23425 (5800-92000)	33663 (1300 – 160000)	39026 (490– 160000)
Gyananagar side	54575 (6300-160000)	32507 (140-160000)	25808 (7900-54000)	34263 (1700 – 160000)	35000 (1300 – 160000)
Tolerance limit for Class B* surface water bodies	500 MPN/ 100 ml				

* Class B : Organised Outdoor bathing

MPN/ 100 ml : most probable number in 100 ml water sample

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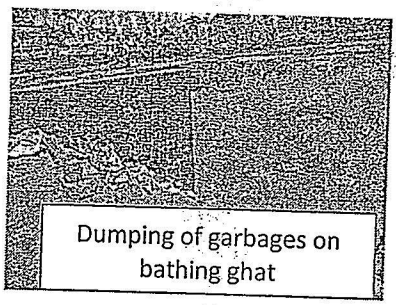
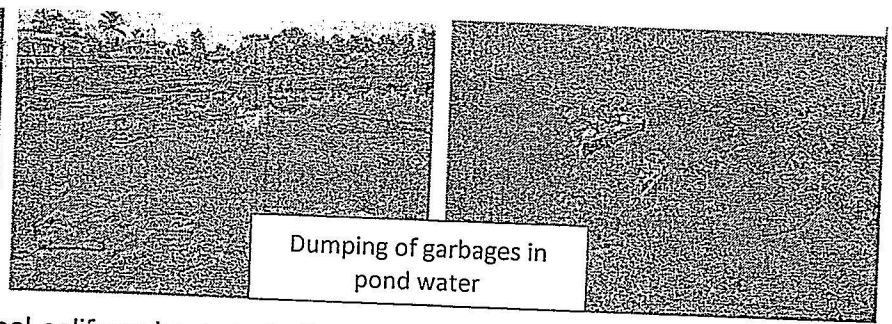
Table -3 Water quality of Bindusagar pond with respect to Fecal coliform bacteria (FC) during the period 2010-2014

Monitoring Location	Annual Average FC values (Range of FC Values) in MPN/100 ml				
	2010	2011	2012	2013	2014
Lingaraj Temple side	49357 (130-160000)	22383 (90-160000)	12608 (2300-35000)	28707 (780 – 160000)	39246 (330 – 160000)
Ananta Vasudev temple side	63910 (940-160000)	41171 (90-160000)	12808 (2700-35000)	25078 (1100 – 160000)	27731 (940 – 160000)
Near Kedarnath Research Centre	67032 (130-160000)	18981 (80-92000)	11742 (2300-24000)	18881 (450 – 92000)	21473 (78–92000)
Gyananagar side	36650 (4600-92000)	9098 (60-35000)	15875 (4900-35000)	26691 (450 – 160000)	25519 (230–160000)
Water quality criteria for bathing water (MOEF Notification G.S.R. No. 742(E) Dt. 25.09.2000)	**2500 MPN/ 100 ml (Maximum Permissible)**				

The high levels of coliform bacteria indicate the presence of a conducive environment for the growth of coliform due to unsanitary condition. Such observations are common in the pond area which is evident form the following photographs.

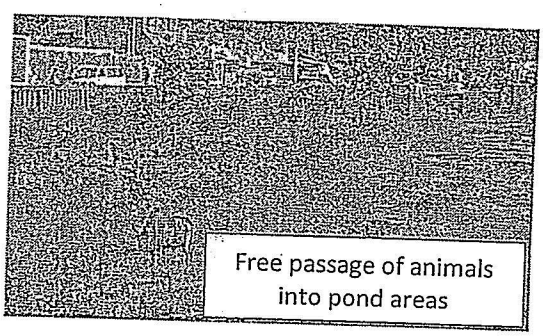


Dumping of garbages on bathing ghat

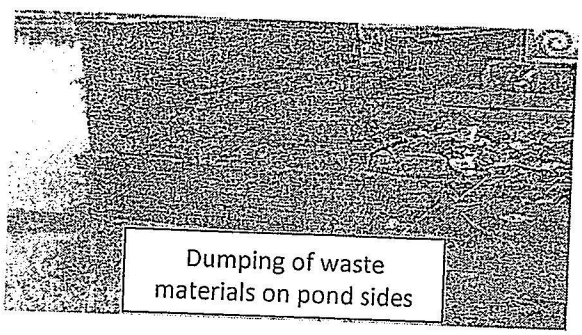


Dumping of garbages in pond water

. The high levels of fecal coliform bacteria indicate the receive of animal wastes from its surrounding areas, human wastes, or any warm blooded animal wastes in the pond.



Free passage of animals into pond areas



Dumping of waste materials on pond sides

Present Study

To have a clear picture of impact of different activities throughout the day on the water quality of the pond, the Board conducted water quality monitoring of Bindusagar on 04.08.2015 and 11.08.2015 and collected water samples at three hour intervals within the period 07.00 AM to 07.00 PM on both the days. Water samples are analysed for pH, Dissolved Oxygen (DO), BOD, Chemical Oxygen Demand (COD), Total suspended solids (TSS), TC and FC. Analytical results of the samples collected on 04.08.2015 and 11.08.2015 are presented in Table-4 and 5 respectively. Variation of these parameters throughout the day at four bathing ghats on both the monitoring periods are compared together and depicted given in Fig.2 - 7 and discussed in detail in following pages.

Table-4 Water quality of Bindusagar on Dt. 04.08.2015

Lingaraj Temple side					
	1st (8AM-9 AM)	2nd (11 AM-12 Noon)	3rd (1 PM-2PM)	4th (4 PM-5 PM)	5th (6 PM-7 PM)
pH	7.64	7.79	8.2	8.72	8.48
TSS	2.4	2.9	4.5	5.0	4.1
DO	6.6	8.7	9.6	9.4	9.35
BOD	1.2	1.4	1.9	1.55	1.2
COD	11.4	13.3	20.95	17.1	15.2
TC	13000	54000	160000	54000	35000
FC	11000	35000	160000	24000	17000
Gyananagar side					
pH	7.49	7.7	8.0	8.25	8.25
TSS	5.4	9.0	10.1	3.1	3.8
DO	4.6	6.1	7.6	7.3	7.3
BOD	2.8	3.2	3.5	3.2	3.1
COD	17.1	19.05	24.8	19.05	19.05
TC	92000	160000	160000	160000	92000
FC	54000	160000	160000	160000	54000
Ananta Vasudeva temple side					
pH	7.38	7.5	7.69	8.98	9.04
TSS	3.9	4.6	5.3	5.4	8.0
DO	3.8	5.2	6.8	7.3	7.2
BOD	1.3	2.6	3.2	3	1.55
COD	15.2	17.1	22.9	17.1	17.1
TC	17000	35000	160000	160000	92000
FC	17000	17000	160000	92000	54000

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	1st (8AM-9 AM)	2nd (11 AM-12 Noon)	3rd (1 PM-2PM)	4th (4 PM-5 PM)	5th (6 PM-7 PM)
Kedarnath Research Centre side					
pH	9.41	9.83	9.86	10.23	9.85
TSS	6.6	6.7	12.4	8.6	7.6
DO	8.4	10.8	11.9	11.7	11.45
BOD	1.75	3.1	3.73	1.9	2.2
COD	17.1	22.9	26.7	17.1	19.05
TC	13000	17000	3900	1300	680
FC	7900	11000	2600	1300	400

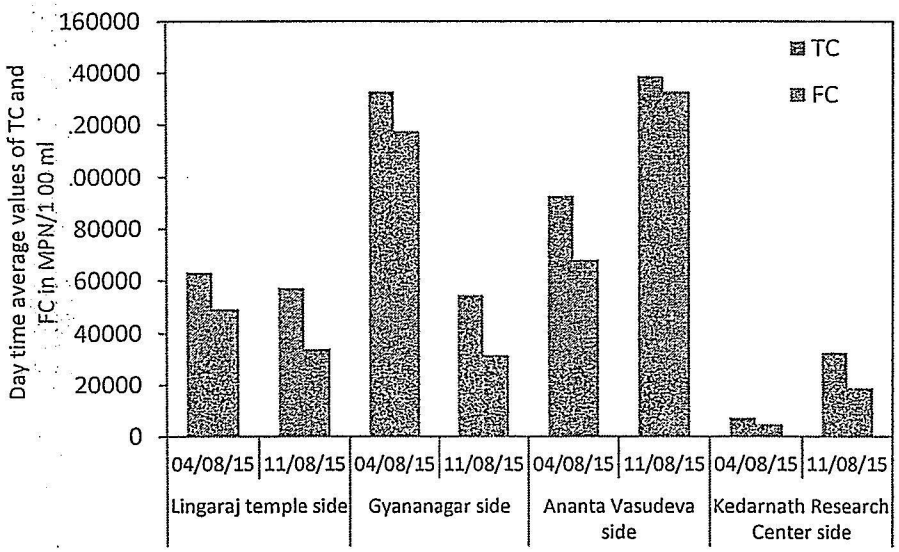
Table-5 Water quality of Bindusagar on 11.08.2015

Lingaraj Temple side					
	1st (8AM-9 AM)	2nd (11 AM-12 Noon)	3rd (1 PM-2PM)	4th (4 PM-5 PM)	5th (6 PM-7 PM)
pH	7.8	8.1	8.3	8.1	7.9
TSS	4.0	6.4	8.0	6.0	4.8
DO	6.2	8.4	8.6	7.6	6.6
BOD	1.4	1.6	2	1.7	1.3
COD	17.85	17.85	21.4	21.4	21.4
TC	4900	13000	160000	54000	54000
FC	3300	4900	92000	35000	35000
Gyananagar side					
pH	7.5	8.0	8.2	8.6	8.5
TSS	7.8	15	19	4.6	5.6
DO	3.0	4.65	6.1	5.9	5.8
BOD	2.6	2.7	3.4	3.1	2.8
COD	16.1	17.85	19.64	14.3	17.85
TC	54000	92000	92000	24000	11000
FC	35000	54000	54000	7900	7900
Ananta Vasudeva temple side					
pH	7.5	7.7	8.3	8.9	8.9
TSS	3.2	3.8	4.2	3.8	5.4
DO	2.8	4.3	6.2	7.1	7.1
BOD	1.5	2.9	3.4	2.5	1.5
COD	17.85	21.4	24.99	21.4	19.64
TC	54000	160000	160000	160000	160000
FC	24000	160000	160000	160000	160000
Kedarnath Research Centre side					
pH	8.4	8.9	9.2	9.3	9.2
TSS	4.5	3.6	5.2	3.2	4.2
DO	4.7	8.4	8.6	7.2	5.1
BOD	1.2	1.0	2.4	1.2	1.8
COD	14.3	17.85	19.6	16.1	16.1
TC	35000	92000	13000	13000	11000
FC	17000	54000	7900	7900	7900

Total Coliform (TC) and Fecal Coliform (FC) bacteria

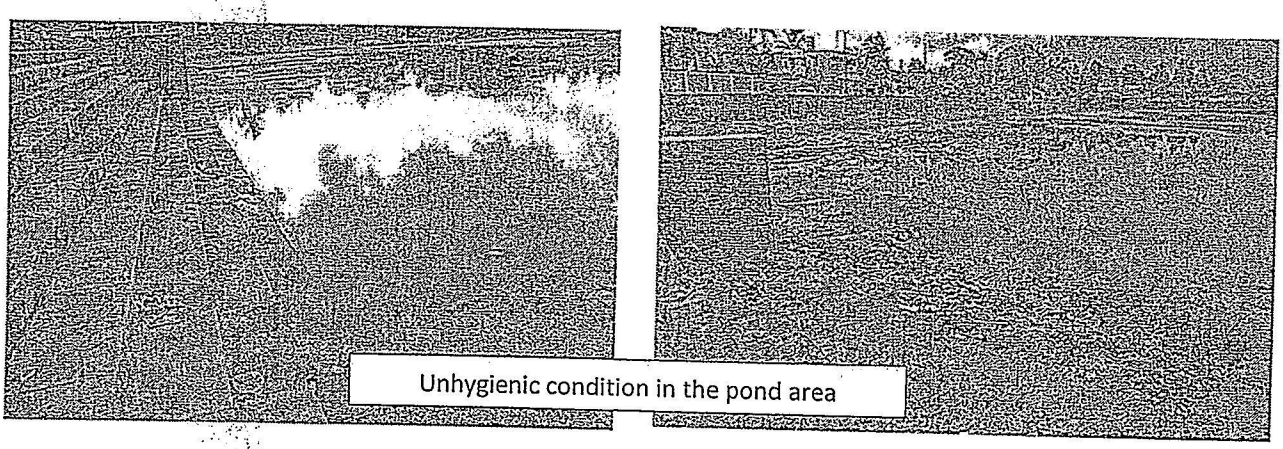
The total coliform bacteria count in pond water at all the four bathing ghats are observed to be beyond the tolerance limit for bathing water quality (50 MPN/ 100 ml) (DBU criteria, CPCB). Total coliform count varies in between 4900 - 1,60,000 MPN/100 ml at Lingaraj temple side, in between 7900 - 1,60,000 MPN/100 ml at Gyananagar side, in between 17,000 - 1,60,000 MPN/100 ml at Ananta Vasudeva temple side and in between 680 - 92,000 MPN/ 100 ml at Kedarnath Research Centre side. Similarly, fecal coliform count at all the four bathing ghats are also observed to be beyond the tolerance limit for bathing water quality (2500 MPN/ 100 ml) (MOEF Notification). Fecal coliform count varies in between 3300 - 1,60,000 MPN/100 ml at Lingaraj temple side, in between 7900 - 1,60,000 MPN/100 ml at Gyananagar side, in between 17,000 - 1,60,000 MPN/100 ml at Ananta Vasudeva temple side and in between 400 - 54,000 MPN/ 100 ml at Kedarnath Research Centre side. A comparison of day-time average values of TC and FC values on 04.08.2015 and 11.08.2015 indicate most of the coliform bacteria are of fecal origin (Fig. 1).

Fig. 1 Comparison of day-time average TC and FC values at four bathing ghats of Bindusagar



Maximum bacterial contamination is observed at Ananta Vasudeva temple side whereas minimum bacterial contamination is observed at Kedarnath Research Centre side. Comparison of day–time fluctuation of TC and FC values at the four ghats on both the monitoring dates are shown in Fig. 2 and 3 respectively. The figure shows that minimum values of TC and FC are observed during morning and evening hours of monitoring. High bacterial

contamination in pond water may be ascribed to the insanitary conditions around the pond, dumping of food materials, human waste, animal excreta etc. Further, to ascertain the possible source of contribution to fecal coliform count, fecal streptococci and E. coli in pond water are also estimated. A ratio of fecal coliform to fecal streptococci greater than 4.1 is considered to be indicative of pollution derived from domestic waste composed of human excrements whereas ratios less that 0.7 suggest pollution due to non-human sources. Ratios between 0.7 and 4.1 usually indicate mixed human and animal sources (APHA, 1989).



Unhygienic condition in the pond area

Fecal coliform, Fecal streptococci, E. coli count and Fecal coliform-Fecal streptococci ratio at the four ghats of the pond are given in Table-6. The ratio between Fecal coliform count and Fecal streptococci count at all the four ghats are above 4.1 which indicates the contamination source derived from domestic waste composed of human excrements. This may be attributed to percolation of coliform bacteria through soils from the malfunctioning septic systems and wastewater drains existing in the vicinity of the pond (Abu-Ashour et al., 1994).

Table-6 Coliform bacterial contamination in Bindusagar pond on Dt. 04.08.2015

Monitoring Location	Total coliform	Fecal coliform	Fecal streptococci	E. coli	Fecal coliform- Fecal streptococci ratio
	in MPN/ 100 ml				
Lingaraj Temple side	63200	49400	49	9400	1008
Gyananagar side	132800	117600	49	28000	2400
Ananta Vasudev temple side	92800	68000	33	17000	2061
Near Kedarnath Research Centre	7176	4640	33	1700	141

pH

pH of the pond water fluctuates widely in a day at all the four bathing ghats. Taking together the observations of pH on both the monitoring days, it has been observed that pH varies in between 7.6 -.8.7 at Lingaraj temple side, in between 7.5 - 8.6 at Gyananagar side, in between 7.4-9.0 at Ananta Vasudev temple side, and in between 8.4-10.2 at Kedarnath Research centre side. Maximum pH in a day has been observed during 3.00 PM – 4.00 PM at all the ghats. This variation in pH throughout the day is mostly due to photosynthesis of aquatic plants and phytoplankton in the pond. Photosynthesis increases as the light intensity increases. This removes more and more carbon dioxide (CO_2) from the water by the plants causing the pH to increase and maximum pH value is reached at late afternoon. (Ref : Tucker and D'Abramo, 2008). After that, as the light intensity starts decreasing, photosynthesis activity is reduced and CO_2 concentration starts increasing which is further added up by the respiration activity of the plants and animals living inside it. This decreases the pH of water which is continued until the sunrise. The next day this cyclic fluctuation of pH starts again. Furthermore, the more plants and phytoplanktons in the pond, the more CO_2 will be replaced by photosynthetic activity during the day time and in night time, plant and animal respiration will be greater, and thus, the daily fluctuation in pH is more. Fig- 4 reveals the day-time fluctuation in pH values on two different days. Abnormally high pH values in the range of 9.0-10.0 is observed at Kedarnath side bathing ghat which indicates the more biomass and increased rate of growth of plants in comparison to other bathing ghats.

Dissolved Oxygen (DO)

DO in water is important to the aquatic organisms for their respiration. Oxygen is also necessary for the self-purification of the water body by oxidative degradation of the waste organic matter in it. Besides the solubility of atmospheric oxygen in pond water, the other major source of dissolved oxygen in ponds is photosynthesis which depends upon the amount of light available to plants and also plant cover in the pond. Therefore, a daily fluctuation in DO level in pond water at all the four bathing ghats is a general phenomenon. Taking together the observations of DO on both the monitoring days, it has been observed that DO varies in between 6.2-9.6 mg/l at Lingaraj temple side, in between 3.0-7.6 mg/l at Gyananagar side, in between 2.8-7.3 mg/l at Ananta vasudev temple side and in between 4.7-11.45 mg/l at Kedarnath Research centre side. Maximum DO content in a day has been observed during 1.00 PM – 2.00 PM at all the ghats except at Ananta vasudeva ghat where it was maximum during

4.00 PM – 5.00 PM. On a clear day, as the intensity of light increases, photosynthesis activity increases the DO level and hence maximum DO is observed during 1.00 PM – 2.00 PM. However, on a cloudy day, oxygen production decreases and therefore, the DO content in pond water is comparatively lower than that in a clear day. A comparison of day-time DO level on both the monitoring dates (Fig. 5) reveals this variation of DO level as the second monitoring day (dt. 11.8.2015) was a cloudy day. Comparing the DO levels at four ghats, it has been observed that maximum DO occurs at Kedarnath Research centre side which indicates the more phytoplankton population in compassion to other bathing ghats.

At night, photosynthesis does not take place and hence respiration by aquatic plants and animals reduces the DO level. Therefore, minimum DO is observed at the early hours of the monitoring period (8 AM-9 AM) at all the bathing ghats. Further, oxygen is also used up in decaying of bidegradable wastes and decay of dead plants in the water. As the quantum of dumping of food materials, puja offerings etc in pond water are more at Ananta Vasudeva temple side in comparison to that at other bathing ghats, and local people activity in pond water is more at Ananta Vasudeva temple side and Gyananagar side, minimum DO values at early hours are observed at these two ghats.

Biochemical Oxygen Demand (BOD)

BOD values indicate the pollution load on the water body. Taking together the observations of BOD on both the monitoring days, it has been observed that BOD varies in between 1.2 - 2.0 mg/l at Lingaraj temple side, in between 2.6 - 3.5 mg/l at Gyananagar side, in between 1.3 – 3.2 mg/l at Ananta Vasudev temple side and in between 1.2 - 3.73 mg/l at Kedarnath Research centre side. Comparison of BOD variation at the four ghats on both the monitoring dates are shown in Fig. 6. The figure reveals the observation of maximum BOD level during 1 PM- 2 PM at which activities of the peoples in the pond water are maximum. However, during other periods, the BOD level remained within the tolerance limit of 3.0 mg/l.

Chemical Oxygen Demand (COD)

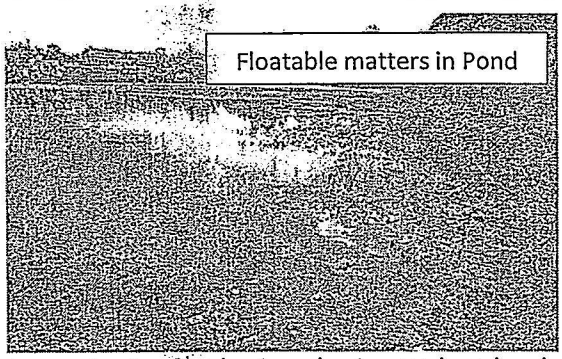
COD values also indicate the pollution load on the water body and has a direct correlation with the BOD values. Taking together the observations of COD on both the monitoring days, it has been observed that COD varies in between 11.4-21.4 mg/l at Lingaraj temple side, in between 16.1-24.1 mg/l at Gyananagar side, in between 15.2-24.99 mg/l at Ananta Vasudev temple side and in between 14.3 – 26.7 mg/l at Kedarnath Research centre side. Comparison of COD variation at the four ghats on both the monitoring dates are shown in

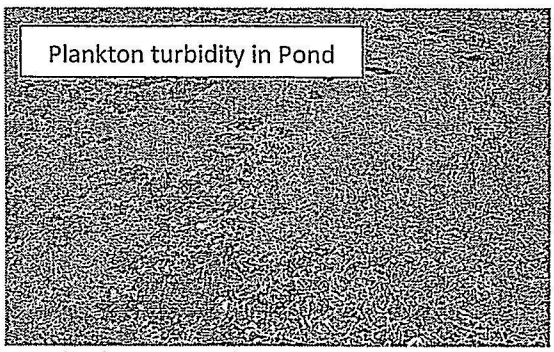
Fig. 7. The figure reveals the observation of maximum COD level during 1 PM- 2 PM at which activities of the peoples in the pond water are maximum. However, a very high COD to BOD ratio indicate the presence of nitrogenous organic matter/ not easily biodegradable organic matter in the pond water.

Total Supended Solids (TSS)

Total suspended solids in pond water at Ananta Vasudeva temple side and Lingaraj Temple side vary in between 2.0- 8.0 mg/l, whereas, it varies in between 4.0 -19.0 mg/l at Gyanangar side and in between 4.0 - 12.0 at Kedarnath Research Centre side. Comparison of day–time fluctuation of TSS values at the four ghats on both the monitoring dates are shown in Fig. 8. The figure shows that fluctuation of TSS values is more significant during 1 PM - 2 PM at all ghats. TSS content shows an increasing trend in the day time at Ananta Vasudeva temple side because of increased activities at this bathing ghat. At the peak hours, different activities in the pond disturbed the suspended solids which were settled earlier or add some new materials which contribute to the suspended solids,

Though the pond water contains low suspended solids, floatable matters in the pond are very high as seen in the following photographs. To add this, plankton turbidity is caused by a





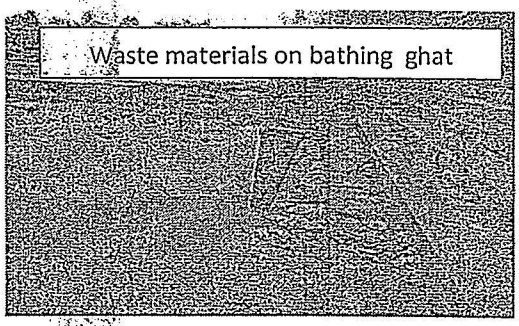
high content of minute plants and animals (phytoplanktons and zooplanktons respectively) which colour the water in various shades of brown, or green depending on the plankton species in it. At some places of the ghat, humic turbidity caused by humus due to the presence of excess organic matter in the pond, turns the water a dark brownish colour.

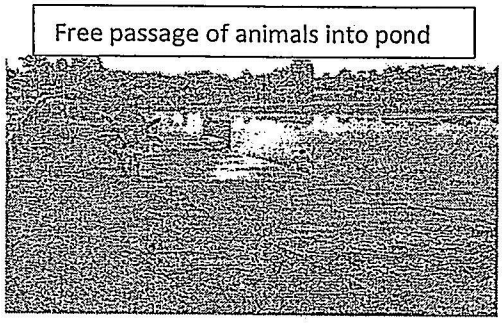
Recommendation for better management of Bindusagar Pond

As Bindusagar pond is a religious pond and people believe it to take a dip in the water is pious, actions need to be taken to preserve its aesthetic value and to maintain water quality in coherence with the tolerance limit laid down for bathing purposes by Central pollution Control

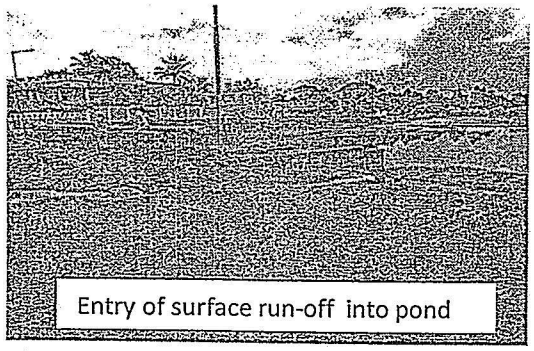
board and Ministry of Environment, forests and Climate Change. Following suggestions are proposed to improve the water quality of the pond.

1. Removal of floating debris from the pond surface in a regular interval.
2. Keeping bathing ghats clean and preventing animals particularly bovine animals to enter the pond area by providing cow catcher, barricade etc.

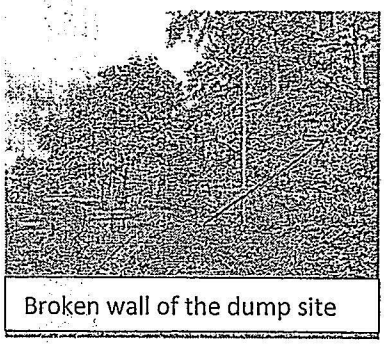

Waste materials on bathing ghat

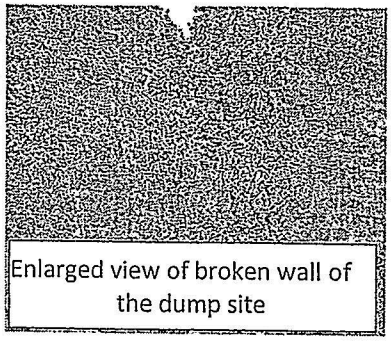

Free passage of animals into pond

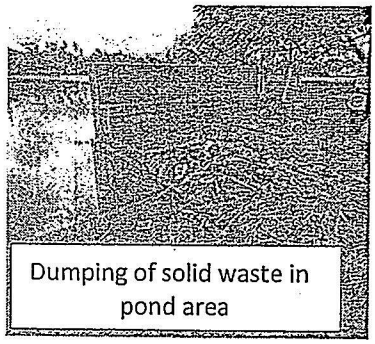
3. Regular recharging and flushing of pond water.
4. Removal of sediments from the bottom of pond in periodic intervals.
5. Prevention of entry of surface run-off into the pond particularly at Kedarnath-Research Centre side.


Entry of surface run-off into pond

6. Prevention of entry of solid waste into the pond by constructing solid barrier around the dump-site depicted in the following photographs .

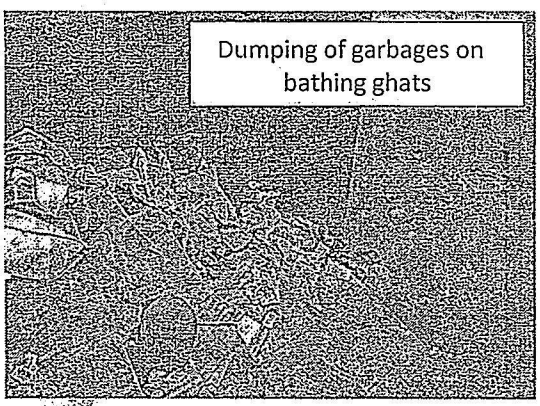

Broken wall of the dump site

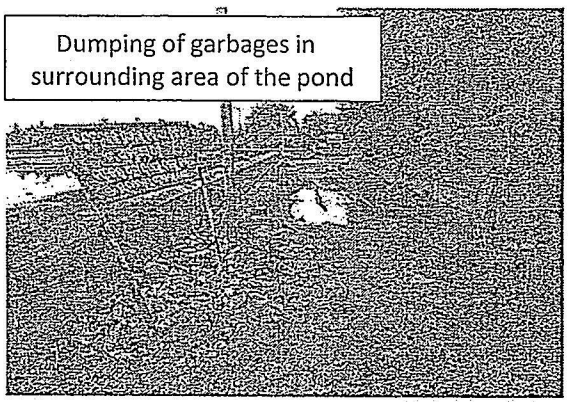

Enlarged view of broken wall of the dump site


Dumping of solid waste in pond area

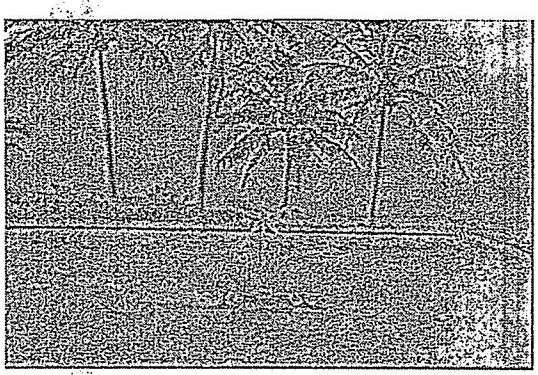
7. Biological control of phytoplankton scum using herbivores (plankton feeding fishes such as silver carp/ grass carp) that reduces the phytoplankton biomass
8. As the pond attracts many gatherings in different of religious occasions, it would be worthwhile to take up awareness programmes in the adjoining areas to safeguard the cleanliness of the pond.

9. As the pond is surrounded by many temples, it should be ensured that no waste materials of any kind be thrown into the pond.

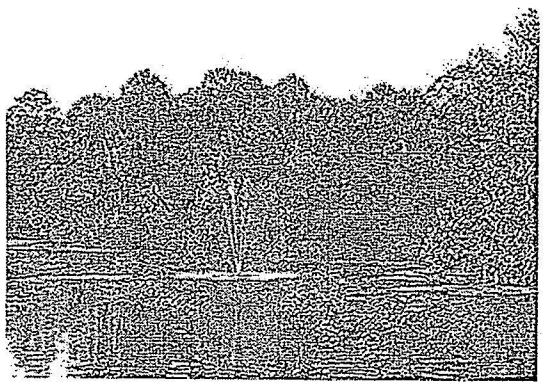




10. Aeration of pond water helps to clean the pond water, reduces build up of algae and weeds, promotes health of aquatic ecosystem. Aeration of pond can be made through Installation of surface aerators operated by wind power, encouraging paddle boating in the pond or installation of fountain spray inside the pond.



aerators operated by wind power



Fountain spray in a pond

11. Microbial bioaugmentation of the pond to reduce coliform bacteria.
12. Chlorination of the pond water to minimize the bacteria level.
13. Regular monitoring of water quality of the pond to ensure no further degradation of water quality takes place.

References :

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