Water Quality of Bindusagar Pond with respect to Criteria parameters during 2016(January- December)

Sl. No	Sampling Location	No. of Obs.	Annual averagevalues (Range of values) Parameters					Frequency of violation (Percent of violation) from designated criteria value					Existing Class	Parameters responsible for downgrading the water quality	Possible Reason
			pH	DO (mg/l)	BOD (mg/l)	TC (MPN/ 100 ml)	FC (MPN/ 100 ml)	pH	DO	BOD	TC	FC			
Bindusagar Pond (Bhubaneswar)															
1.	Lingaraj Temple side	12	8.1 (7.1-8.8)	5.5 (1.5-10.8)	3.2 (1.0-4.8)	52658 (7900->160000)	42108 (3300->160000)	1 (8)	3 (25)	9 (75)	12 (100)	12 (100)	Does not conform to Class B	pH, DO,BOD, TC,FC	Human activities
2.	AnantaVasu dev	12	8.1 (7.1-8.5)	7.0 (4.2-11.7)	3.5 (1.2-8.8)	72658 (7900->160000)	60558 (2700->160000)	0	2 (17)	8 (83)	12 (100)	12 (100)		DO,BOD, TC,FC	
3.	Near Kedarnath Research Centre	12	8.1 (6.9-8.7)	6.8 (3.9-10.1)	3.2 (0.7-4.9)	64325 (7900->160000)	51917 (3300->160000)	1 (8)	4 (33)	9 (75)	12 (100)	12 (100)		pH, DO,BOD, TC,FC	
4.	Gyananagar	12	8.1 (7.3-8.5)	4.6 (2.6-8.1)	3.4 (0.4-4.9)	108750 (17000->160000)	93083 (11000->160000)	0	9 (75)	9 (75)	12 (100)	12 (100)		DO,BOD, TC,FC	
*Class 'B'			6.5-8.5	5 and above	3 or less	500 or less		Outdoor bathing							
Water quality criteria for bathing water (MOEF Notification G.S.R. No. 742(E) Dt. 25.09.2000)			6.5-8.5	5 and above	3 or less		2500 (Maximum Permissible)	Water use for organised outdoor bathing							

*   Tolerance limit for Inland Surface water bodies (IS-2296-1982)

Note : The criteria of non-compliance with respect to TC has been calculated on the following basis:
TC values with more than 5% of samples show more than 20,000 MPN/100 ml and more than 20% of the samples show more than 5000 MPN/ 100 ml.
(Ref : IS 2296-1982 foot note)

Water Quality of Religious Ponds in Puriwith respect to Criteria parameters during 2016 (January- December)

Sl. No	Sampling Location	No. of Obs.	Annual averagevalues (Range of values) Parameters					Frequency of violation (Percent of violation) from designated criteria value					Existing Class	Parameters responsible for downgrading the water quality	Possible Reason
			pH	DO (mg/l)	BOD (mg/l)	TC (MPN/ 100 ml)	FC (MPN/ 100 ml)	pH	DO	BOD	TC	FC			
Ponds (Puri)															
1.	Narendra	12	8.4 (7.4-9.4)	9.8 (3.7-16.6)	6.7 (2.9-10.9)	13400 (330-54000)	7442 (170-35000)	4 (33)	1 (8)	11 (92)	10 (83)	6 (50)		pH, DO, BOD, TC,FC	
2.	Markanda	12	8.3 (7.5-9.2)	14.9 (8.1-20.8)	9.6 (3.7-23.2)	15581 (18-92000)	8384 (18-54000)	5 (42)	0	12 (100)	9 (75)	7 (58)		pH, BOD, TC,FC	
3.	Indradyumna	12	8.2 (7.7-9.1)	8.9 (4.0-11.8)	6.2 (3.2-10.0)	26183 (1400-92000)	15258 (700-54000)	3 (25)	1 (8)	12 (100)	12 (100)	9 (75)	Does not conform to Class B	pH, DO, BOD, TC,FC	Human activities
4.	Swetaganga	12	8.4 (7.9-9.2)	10.4 (4.0-19.6)	7.4 (3.3-12.8)	29108 (170->160000)	21788 (78->160000)	4 (33)	1 (8)	12 (100)	10 (83)	7 (58)		pH, DO, BOD, TC,FC	
5.	Parvatisagar	12	8.1 (7.5-9.5)	8.2 (3.9-17.2)	8.6 (4.1-27.3)	40403 (230-160000)	33628 (230-160000)	2 (17)	4 (33)	12 (100)	11 (92)	10 (83)		pH, DO, BOD, TC,FC	
	*Class 'B'		6.5-8.5	5 and above	3 or less	500 or less	-	Outdoor bathing							
	Water quality criteria for bathing water (MOEF Notification G.S.R. No. 742(E) Dt. 25.09.2000)		6.5-8.5	5 and above	3 or less		2500 (Maximum Permissible)	Water use for organised outdoor bathing							

* Tolerance limit for Inland Surface water bodies (IS-2296-1982)

NB : The criteria of non-compliance with respect to TC has been calculated on the following basis:
TC values with more than 5% of samples show more than 2000 MPN/100 ml and more than 20% of the samples show more than 500 MPN/ 100 ml.
(Ref : IS 2296-1982 foot note)

Water quality of Bindusagarpond with respect to other parameters during 2016(January- December)

Sl. No.	Sampling Location	Physical parameters		Organic pollution Indicators				Mineral constituents							
		\(mg/l\)		\(mg/l\)				\(\mu S/cm\)		\(mg/l\)					
		TSS	Total alkal-inity	COD	NH₄-N	Free NH₃-N	TKN	EC	SAR	B	TDS	TH	Cl	SO₄	F
Bindusagar Pond (Bhubaneswar)															
1.	Lingaraj Temple side	15 (2-80)	112 (92-144)	20.1 (10.6-30.8)	0.177 (0.056-0.392)	0.013 (0.001-0.035)	1.70 (1.12-1.96)	430 (392-492)	1.86 (1.29-2.26)	0.053 (0.003-0.137)	243 (208-302)	91 (78-106)	66.4 (48.9-78.3)	12.2 (7.6-23.6)	0.475 (0.260-0.720)
2.	AnantaVasudev	14 (6-28)	106 (94-152)	20.9 (11.9-36.6)	0.238 (0.056-1.064)	0.016 (0.001-0.043)	1.94 (0.84-3.92)	410 (370-491)	1.83 (1.35-2.37)	0.048 (.003-0.137)	230 (210-265)	84 (72-118)	61.7 (48.9-78.3)	11.1 (4.7-20.5)	0.467 (0.260-0.590)
3.	Near Kedarnath research Centre	14 (7.0-29.0)	102 (78-126)	21.3 (13.9-29.1)	0.215 (0.056-0.504)	0.020 (0-0.074)	1.80 (1.12-2.24)	421 (385-454)	1.91 (1.63-2.30)	0.049 (0.007-0.189)	234 (222-256)	82 (64-114)	64.4 (53.8-68.5)	11.4 (5.7-21.4)	0.482 (0.280-0.580)
4.	Gyananagar	10 (4-17)	113 (92-152)	22.3 (14.2-33.3)	0.247 (0.056-0.672)	0.018 (0.003-0.078)	1.89 (1.40-2.80)	421 (378-475)	1.82 (1.35-2.29)	0.061 (0.003-0.147)	238 (218-265)	91 (72-120)	63.2 (48.9-78.3)	11.7 (8.4-20.1)	0.451 (0.230-0.600)
	*Class 'C'	-	-	-	-	-	-	-	-	-	1500	-	600	400	1.5

*   **Tolerance limit for Inland Surface water bodies (IS-2296-1982)**

Class 'C' : Drinking water source with conventional treatment followed by disinfection

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Sl. No.	Sampling Location	Nutrients		Heavy metals								
				Annual averagevalues (Range of values)								
		NO₃⁻	PO₄³⁻-P	Cr(VI)	T. Cr	Fe	Ni##	Cu##	Zn##	Cd##	Hg	Pb##
		(mg/l)		(mg/l)								
Bindusagar Pond (Bhubaneswar)												
1.	Lingaraj Temple side	6.271 (1.568-18.546)	0.175 (0.016-0.590)	0.009 (<0.002-0.023)	0.029 (0.012-0.054)	0.495 (0.090-1.890)	0.007 (0.002-0.012)	0.003 (0.002-0.005)	0.017 (0.004-0.028)	0.0010 (0.0003-0.0025)	0.00011 (<0.00006-0.00025)	0.009 (0.002-0.018)
2.	AnantaVasudev	3.772 (1.461-10.165)	0.178 (0.018-0.450)	0.010 (<0.002-0.038)	0.031 (0.011-0.060)	0.600 (0.050-2.210)	0.007 (0.004-0.011)	0.003 (0.002-0.004)	0.024 (0.007-0.038)	0.0011 (0.0004-0.0024)	0.00014 (<0.00006-0.00044)	0.008 (0.004-0.017)
3.	Near Kedarnath research Centre	4.017 (1.225-12.717)	0.215 (0.033-0.580)	0.009 (<0.002-0.026)	0.027 (0.012-0.040)	0.800 (0.070-2.000)	0.008 (0.001-0.016)	0.004 (0.002-0.008)	0.020 (0.007-0.034)	0.0011 (0.0003-0.0024)	0.00009 (<0.00006-0.00032)	0.008 (0.003-0.017)
4.	Gyananagar	4.798 (2.257-9.994)	0.163 (0.025-0.600)	0.009 (<0.002-0.021)	0.026 (0.012-0.045)	0.638 (0.060-2.040)	0.007 (0.004-0.013)	0.003 (0.002-0.005)	0.022 (0.005-0.033)	0.0011 (0.0003-0.0023)	0.00012 (<0.00006-0.00051)	0.010 (0.003-0.016)
	*Class 'C'	50	-	0.05	-	50	-	1.5	15.0	0.01	-	0.10

*   Tolerance limit for Inland Surface water bodies (IS-2296-1982)

\##   Data for the period January-December, 2016 excluding May and June, 2016

Class 'C' : Drinking water source with conventional treatment followed by disinfection

Water quality of ponds in Puri with respect to other parameters during 2016(January- December)

Sl. No.	Sampling Location	Physical parameters		Organic pollution Indicators				Mineral constituents							
		Annual average values (Range of values)													
		TSS	Total alkal -inity	COD	NH$_4$-N	Free NH$_3$-N	TKN	EC (µS/cm)	SAR	B	TDS	TH	Cl	SO$_4$	F
		(mg/l)		(mg/l)						(mg/l)					
Ponds (Puri)															
1.	Narendra	18 (7-32)	196 (108-268)	42.2 (21.1-87.3)	0.468 (0.112-0.840)	0.083 (0.004-0.376)	2.64 (1.40-5.04)	920 (788-1104)	3.60 (2.03-4.66)	0.263 (0.137-0.730)	527 (446-716)	165 (116-212)	172.0 (107.6-303.3)	30.7 (9.6-63.7)	0.308 (0.180-0.580)
2.	Markanda	37 (12-87)	210 (164-248)	65.7 (23.5-176.5)	0.719 (0.112-1.400)	0.126 (0.007-0.504)	3.45 (2.24-8.12)	773 (702-916)	2.04 (1.66-3.75)	0.216 (0.102-0.470)	442 (372-590)	188 (146-224)	107.5 (83.2-195.7)	31.9 (23.0-42.3)	0.25 (0.15-0.49)
3.	Indradyumna	24 (7-59)	132 (106-156)	46.1 (19.6-72.4)	0.439 (0.112-1.232)	0.043 (0.010-0.174)	2.45 (1.40-4.20)	609 (471-703)	3.10 (2.06-4.05)	0.150 (0.017-0.588)	342 (258-400)	92 (74-120)	106.0 (78.2-136.9)	16.9 (6.1-32.0)	0.290 (0.180-0.620)
4.	Swetaganga	29 (6-62)	252 (164-316)	52.7 (3.3-12.8)	0.551 (0.112-1.344)	0.085 (0.006-0.208)	2.64 (1.40-3.36)	1066 (565-1530)	2.93 (1.30-4.55)	0.270 (0.162-0.586)	611 (329-840)	233 (168-280)	171.6 (63.6-273.9)	48.2 (33.6-103.2)	0.233 (0.140-0.800)
5.	Parvatisagar	25 (10-42)	149 (96-284)	51.2 (23.1-108.9)	0.742 (0.168-2.632)	0.125 (0.004-1.161)	3.08 (1.68-8.40)	568 (389-1318)	1.80 (1.28-2.76)	0.163 (0.039-0.444)	324 (238-708)	136 (88-260)	79.5 (53.8-166.3)	28.9 (2.7-87.9)	0.261 (0.140-0.780)
	*Class 'C'	-	-	-	-	-	-	-	-	-	1500	-	600	400	1.5

* Tolerance limit for Inland Surface water bodies (IS-2296-1982)
Class 'C' : Drinking water source with conventional treatment followed by disinfection

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Sl. No.	Sampling Location	Nutrients		Heavy metals								
		Annual averagevalues (Range of values)										
		NO$_3^-$	PO$_4^{3-}$-P	Cr(VI)	T. Cr	Fe	Ni##	Cu##	Zn##	Cd##	Hg	Pb##
		(mg/l)		(mg/l)								
Ponds (Puri)												
1.	Narendra	8.508 (0.886-18.613)	0.293 (0.107-0.570)	0.011 (<0.002-0.025)	0.032 (0.013-0.047)	0.256 (0.030-0.490)	0.013 (0.006-0.032)	0.006 (0.002-0.014)	0.019 (0.003-0.036)	0.0012 (0.0004-0.0027)	0.00016 (<0.00006 -0.00070)	0.011 (0.004-0.026)
2.	Markanda	19.574 (0.648-43.071)	0.91 (0.07-2.21)	0.007 (<0.002-0.021)	0.027 (0.018-0.047)	0.372 (0.030-0.750)	0.014 (0.006-0.033)	0.006 (0.002-0.018)	0.021 (0.003-0.032)	0.0011 (0.0003-0.0021)	0.00016 (<0.00006 -0.00044)	0.012 (0.004-0.026)
3.	Indradyumna	11.154 (4.730-36.385)	0.186 (0.027-0.394)	0.010 (<0.002-0.023)	0.028 (0.015-0.044)	0.304 (0.010-0.800)	0.013 (0.001-0.025)	0.007 (0.002-0.016)	0.020 (0.009-0.038)	0.0009 (0.0003-0.0016)	0.00017 (<0.00006 -0.00044)	0.010 (0.005-0.019)
4.	Swetaganga	21.227 (3.626-42.767)	0.709 (0.033-1.569)	0.011 (<0.002-0.025)	0.029 (0.012-0.040)	0.197 (0.070-0.480)	0.015 (0.005-0.030)	0.007 (0.001-0.019)	0.027 (0.009-0.066)	0.0013 (0.0004-0.0026)	0.00012 (<0.00006 -0.00032)	0.012 (0.007-0.035)
5.	Parvatisagar	13.321 (3.189-42.376)	0.184 (0.025-0.698)	0.011 (<0.002-0.025)	0.031 (0.018-0.055)	0.325 (0.040-0.600)	0.012 (0.005-0.039)	0.006 (0.002-0.017)	0.023 (0.004-0.042)	0.0008 (0.0004-0.0016)	0.00017 (<0.00006 -0.00076)	0.009 (0.002-0.019)
	*Class 'C'			0.05	-	50	-	1.5	15.0	0.01	-	0.10

*   Tolerance limit for Inland Surface water bodies (IS-2296-1982)
\#\#   Data for the period January-December, 2016 excluding May and June, 2016

Class 'C' : Drinking water source with conventional treatment followed by disinfection