

Table-1 (a) Water Quality of Ponds with respect to Criteria parameters during 2013 (January-September)

Sl. No	Location	No. of Obs.	Annual average values (Range of values)					Frequency of violation (Percent of violation) from designated criteria value			Existing Class	Parameters responsible for downgrading the water quality	Possible Reason
			Parameters					BOD	TC	FC			
			pH	DO (mg/l)	BOD (mg/l)	TC (MPN/ 100 ml)	FC (MPN/ 100 ml)						
Bindusagar Pond (Bhubaneswar)													
1.	Lingaraj Temple side*	9	8.2 (7.2 – 9.1)	9.4 (1.9 – 14.8)	9.6 (5.4 – 21.3)	37867 (2200 – 160000)	28707 (780 – 160000)	9 (100)	9 (100)	9 (100)	Does not conform to Class B	BOD, TC,FC	Human activities
2.	Ananta Vasudev*	9	8.1 (7.2 – 9.1)	10.2 (6.9 – 13.6)	9.5 (5.1 – 22.4)	33489 (3300 – 160000)	25078 (1100 – 160000)	9 (100)	9 (100)	9 (100)			
3.	Near Kedarnath research Centre**	8	8.2 (7.5 – 9.1)	10.7 (1.0 – 15.5)	7.6 (5.1 – 9.7)	33663 (1300 – 160000)	18881 (450 – 92000)	8 (100)	8 (100)	7 (87)			
4.	Gyananagar**	8	8.3 (7.6 – 9.0)	12.3 (9.4 – 14.9)	6.8 (5.0 – 8.7)	34263 (1700 – 160000)	26691 (450 – 160000)	8 (100)	8 (100)	7 (87)			
***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		500 (Desirable) 2500 (Permissible)				Water use for organised outdoor bathing		

* Data for the period January-September, 2013

** Data for the period January-August, 2013

*** 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 Ponds with respect to Criteria parameters during 2013 (January-October)

Sl. No	Location	No. of Obs.	Annual average values (Range of values)					Frequency of violation (Percent of violation) from designated criteria value			Existing Class	Parameters responsible for downgrading the water quality	Possible Reason
			Parameters					BOD	TC	FC			
			pH	DO (mg/l)	BOD (mg/l)	TC (MPN/ 100 ml)	FC (MPN/ 100 ml)						
Ponds (Puri)													
1.	Narendra	10	8.3 (7.4 – 9.6)	11.4 (4.6 – 17.4)	9.0 (2.8 – 60.0)	38893 (330 – 160000)	23983 (230 – 160000)	9 (90)	9 (90)	9 (90)	Does not conform to Class B	BOD, TC,FC	Human activities
2.	Markanda	10	8.2 (7.3 – 9.4)	14.5 (6.6 – 20.7)	8.8 (3.5 – 24.0)	23760 (1300 – 160000)	13538 (490 – 54000)	10 (100)	10 (100)	9 (90)			
3.	Indradyumna	10	8.1 (7.1 – 9.1)	12.3 (7.3 – 24.0)	8.1 (4.8 – 11.6)	29640 (2300 – 160000)	21407 (780 – 160000)	10 (100)	10 (100)	10 (100)			
4.	Swetaganga	10	8.0 (7.4 – 8.7)	10.7 (4.3 – 15.1)	10.5 (6.1 – 36.0)	33540 (1300 – 160000)	24599 (490 – 160000)	10 (100)	10 (100)	9 (90)			
5.	Parvati sagar	10	7.7 (7.0 – 8.7)	11.1 (3.1 – 15.2)	10.2 (5.2 – 19.5)	57050 (1300 – 160000)	41189 (490 – 160000)	10 (100)	10 (100)	9 (90)			
*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		500 (Desirable) 2500 (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)

Table 2 (a) Water quality of ponds with respect to other parameters during 2013 (January-September)

Sl. No.	Sampling Location	Physical parameters		Organic pollution Indicators				Mineral constituents							
		Annual average values (Range of values)													
		TSS	Total alkalinity	COD	NH ₄ -N	Free NH ₃ -N	TKN	EC	SAR	B	TDS	TH	Cl	SO ₄	F
		(mg/l)		(mg/l)				(μS/cm)	(mg/l)						
Bindusagar Pond (Bhubaneswar)															
1.	Lingaraj Temple side*	54 (28-88)	98 (72-120)	64.1 (24.1-104.1)	0.360 (0.224-0.672)	0.045 (0.005-0.134)	5.10 (1.92-17.9)	466 (408-526)	2.75 (1.93-4.39)	0.212 (0.023-1.224)	293 (265-326)	81 (60-96)	82.7 (65.5-92.6)	15.23 (3.70-39.18)	0.356 (0.334-0.407)
2.	Ananta Vasudev*	51 (32-76)	99 (88-112)	61.5 (25.9-118.0)	0.347 (0.224-0.715)	0.040 (0.004-0.122)	3.98 (0.55-7.28)	459 (425-504)	2.78 (1.90-4.57)	0.213 (0.023-1.375)	286 (261-330)	81 (60-96)	81.6 (63.6-88.4)	11.06 (2.20-33.63)	0.356 (0.331-0.408)
3.	Near Kedarnath research Centre**	64 (28-104)	100 (92-112)	62.7 (35.8-109.1)	0.349 (0.224-0.448)	0.043 (0.007-0.157)	5.99 (1.12-16.80)	459 (409-501)	2.89 (1.85-4.29)	0.193 (0.015-1.201)	287 (266-314)	78 (64-88)	81.8 (69.4-88.6)	10.44 (2.80-34.82)	0.383 (0.329-0.433)
4.	Gyananagar**	59 (30-92)	98 (84-108)	51.7 (37.9-59.4)	0.370 (0.168-0.672)	0.060 (0.005-0.187)	5.78 (2.24-15.10)	456 (420-501)	2.68 (1.94-3.79)	0.207 (0.011-1.171)	285 (254-314)	85 (72-108)	81.5 (65.6-88.6)	8.68 (2.90-31.14)	0.369 (0.333-0.419)
Class 'C'		-	-	-	-	-	-	-	-	-	1500	-	600	400	1.5

* Data for the period January-September, 2013

** Data for the period January-August, 2013

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

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

BDL = Below Detection Limit

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Sl. No.	Sampling Location	Nutrients		Heavy metals								
		Annual average values (Range of values)										
		NO ₃ ⁻ (mg/l)	PO ₄ ³⁻ -P (mg/l)	Cr (VI)	T. Cr	Fe	Ni [#]	Cu [#]	Zn [#]	Cd [#]	Hg [#]	Pb [#]
Bindusagar Pond (Bhubaneswar)												
1.	Lingaraj Temple side*	8.911 (0.867-20.689)	0.148 (0.032-0.420)	0.001 (BDL-0.005)	0.027 (0.003-0.050)	2.587 (0.716-4.849)	0.002	0.003	0.005	0.001	BDL	0.005
2.	Ananta Vasudev*	6.473 (1.627-12.309)	0.134 (0.026-0.320)	0.001 (BDL-0.008)	0.032 (0.011-0.070)	1.312 (0.196-3.705)	0.002	0.003	0.005	0.001	BDL	0.005
3.	Near Kedarnath research Centre**	8.350 (3.866-21.979)	0.094 (0.020-0.362)	0.003 (BDL-0.010)	0.032 (0.010-0.059)	1.922 (0.730-6.270)	0.002	0.003	0.005	0.001	BDL	0.006
4.	Gyananagar**	5.0 (1.2-10.9)	0.079 (0.027-0.158)	0.002 (BDL-0.005)	0.036 (0.008-0.058)	0.931 (0.440-1.770)	0.003	0.005	0.004	0.001	BDL	0.01
Class 'C'		50	-	0.05	-	50	-	1.5	15.0	0.01	-	0.10

* Data for the period June-October, 2013

** Data for the period March-October, 2013

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

Data for the period Feb, 2013

BDL = Below Detection Limit

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

Table 2 (b) Water quality of ponds with respect to other parameters during 2013 (January-October)

Sl. No.	Sampling Location	Physical parameters		Organic pollution Indicators				Mineral constituents							
		Annual average values (Range of values)													
		TSS	Total alkalinity	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	80 (18-246)	189 (118-252)	53.4 (26.6-90.4)	0.302 (0.112-0.560)	0.061 (0.004-0.189)	3.16 (2.24-6.70)	855 (516-1184)	2.64 (1.43-3.64)	0.205 (0.056-0.623)	515 (278-669)	177 (106-236)	146.3 (55.7-225.0)	27.75 (8.08-58.32)	0.236 (0.112-0.371)
2.	Markanda	73 (14-206)	181 (104-232)	47.8 (23.0-105.5)	0.268 (0.112-0.504)	0.056 (0.002-0.227)	3.37 (2.20-8.40)	717 (474-829)	1.72 (1.39-2.26)	0.141 (0.044-0.264)	433 (270-528)	186 (120-228)	106.4 (68.0-198.0)	27.22 (9.20-38.31)	0.103 (0.043-0.195)
3.	Indradyumna	64 (14-148)	127 (104-154)	45.0 (24.2-74.3)	0.324 (0.168-0.560)	0.040 (0.002-0.090)	3.61 (2.80-4.48)	652 (530-860)	3.39 (2.50-4.55)	0.112 (0.030-0.343)	397 (316-526)	91 (68-138)	126.1 (87.2-182.5)	13.55 (8.08-19.90)	0.182 (0.019-0.258)
4.	Swetaganga	83 (18-392)	197 (92-320)	40.9 (12.6-73.6)	0.290 (0.168-0.504)	0.021 (0.006-0.062)	3.78 (1.94-8.40)	1009 (688-1335)	3.37 (2.31-4.52)	0.161 (0.06-0.253)	596 (388-854)	186 (100-276)	178.7 (107.5-231.0)	38.68 (22.50-50.49)	0.083 (0.045-0.133)
5.	Parvati sagar	76 (25-124)	133 (88-288)	55.7 (25.9-85.0)	0.304 (0.168-0.499)	0.018 (0-0.073)	2.95 (1.96-4.50)	679 (272-1345)	2.57 (0.81-3.43)	0.108 (0.03-0.347)	412 (160-789)	131 (82-288)	124.4 (27.8-235.0)	29.58 (11.04-63.18)	0.168 (0.092-0.263)
*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 average values (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	10.147 (3.698-15.615)	0.926 (0.527-1.698)	BDL (BDL-0.002)	0.024 (0.002-0.046)	2.048 (0.065-12.158)	0.003	0.003	0.016	0.002	BDL	0.007
2.	Markanda	24.495 (3.583-43.927)	1.598 (0.920-3.916)	BDL	0.019 (0.005-0.3038)	1.190 (0.089-6.012)	0.003	0.003	0.005	0.002	BDL	0.008
3.	Indradyumna	5.678 (2.017-9.685)	0.083 (0.019-0.202)	0.002 (BDL-0.006)	0.036 (0.002-0.106)	0.530 (0.045-1.385)	0.005	0.003	0.006	0.002	BDL	0.009
4.	Swetaganga	28.022 (7.777-51.225)	1.432 (0.155-3.382)	0.002 (BDL-0.012)	0.032 (0.005-0.053)	0.466 (0.047-1.055)	0.003	0.006	0.019	0.001	BDL	0.007
5.	Parvati sagar	9.556 (0.350-45.276)	0.397 (0.030-1.680)	0.001 (BDL-0.008)	0.031 (0.010-0.091)	0.915 (0.099-4.864)	0.004	0.003	0.019	0.002	BDL	0.005
*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 February, 2013

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

BDL = Below Detection Limit