

**Table – 1 (a) Water Quality of Bindusagar Pond with respect to Criteria parameters during 2014 (February- December)**

| Sl. No   | Sampling Location              | No. of Obs. | Annual average values<br>(Range of values) |                     |                    |                          |                                   | Frequency of violation (Percent of violation) from designated criteria<br>value |           |           |             |            | Existing Class              | Parameters responsible for downgrading the water quality | Possible Reason  |
|--|--------------------------------|-------------|--|---------------------|--------------------|--------------------------|-----------------------------------|---|-----------|-----------|-------------|------------|-----------------------------|--|------------------|
|  |                                |             | Parameters                                 |                     |                    |                          |                                   |   |           |           |             |            |                             |  |                  |
|  |                                |             | pH   | DO (mg/l)           | BOD (mg/l)         | TC (MPN/100 ml)          | FC (MPN/100 ml)                   | pH  | DO        | BOD       | TC          | FC         |                             |  |                  |
| <b>Bindusagar Pond (Bhubaneswar)</b>   |                                |             |  |                     |                    |                          |                                   |   |           |           |             |            |                             |  |                  |
| 1.   | Lingaraj Temple side           | 11          | 7.9<br>(7.1 – 9.6)                         | 6.6<br>(1.4 – 13.4) | 2.6<br>(1.0 – 4.9) | 65027<br>(3300 – 160000) | 39246<br>(330 – 160000)           | 1<br>(9)  | 6<br>(54) | 3<br>(27) | 11<br>(100) | 8<br>(73)  | Does not conform to Class B | DO,BOD, TC,FC  | Human activities |
| 2.   | Ananta Vasudev                 | 11          | 7.9<br>(7.1 – 9.3)                         | 6.6<br>(1.0– 14.9)  | 2.8<br>(1.0 – 4.1) | 52709<br>(2800 – 160000) | 27731<br>(940 – 160000)           | 1<br>(9)  | 4<br>(36) | 5<br>(45) | 11<br>(100) | 10<br>(91) |                             |  |                  |
| 3.   | Near Kedarnath Research Centre | 11          | 7.8<br>(7.2 – 8.5)                         | 6.6<br>(1.8 – 13.1) | 3.1<br>(2.0 – 7.8) | 39026<br>(490– 160000)   | 21473<br>(78– 92000)              | 0   | 4<br>(36) | 3<br>(27) | 10<br>(91)  | 8<br>(73)  |                             |  |                  |
| 4.   | Gyananagar                     | 11          | 7.7<br>(7.2 – 8.2)                         | 5.6<br>(1.6 – 9.3)  | 2.8<br>(1.2-4.4)   | 35000<br>(1300 – 160000) | 25519<br>(230– 160000)            | 0   | 4<br>(36) | 4<br>(36) | 11<br>(100) | 9<br>(82)  |                             |  |                  |
| <b>*Class 'B'</b>  |                                |             | <b>6.5-8.5</b>                             | <b>5 and above</b>  | <b>3 or less</b>   | <b>500 or less</b>       |                                   | <b>Outdoor bathing</b>  |           |           |             |            |                             |  |                  |
| <b>Water quality criteria for bathing water (MOEF Notification G.S.R. No. 742(E) Dt. 25.09.2000)</b> |                                |             | <b>6.5-8.5</b>                             | <b>5 and above</b>  | <b>3 or less</b>   |                          | <b>2500 (Maximum Permissible)</b> | <b>Water use for organised outdoor bathing</b>                                  |           |           |             |            |                             |  |                  |

\* 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 - 1 (b) Water Quality of Religious Ponds in Puri with respect to Criteria parameters during 2014 (February- December)**

| Sl. No   | Sampling 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                              |                      |                      |                        |                                   |  |           |             |             |            |                             |  |                  |
|  |                   |             | pH                                      | DO (mg/l)            | BOD (mg/l)           | TC (MPN/100 ml)        | FC (MPN/100 ml)                   | pH   | DO        | BOD         | TC          | FC         |                             |  |                  |
| <b>Ponds (Puri)</b>  |                   |             |   |                      |                      |                        |                                   |  |           |             |             |            |                             |  |                  |
| 1.   | Narendra          | 11          | 8.7<br>(7.4 – 9.8)                      | 11.2<br>(2.5 – 16.7) | 11.2<br>(4.6 – 21.2) | 6994<br>(230 – 35000)  | 3475<br>(78–24000)                | 7<br>(64)  | 1<br>(91) | 11<br>(100) | 10<br>(91)  | 3<br>(27)  | Does not conform to Class B | pH, DO, BOD, TC,FC                                       | Human activities |
| 2.   | Markanda          | 11          | 8.7<br>(7.6 – 10.4)                     | 12.8<br>(3.9 – 19.2) | 7.2<br>(3.2 – 13.8)  | 14485<br>(230 – 35000) | 7950<br>(45–24000)                | 6<br>(55)  | 1<br>(91) | 11<br>(100) | 10<br>(91)  | 8<br>(73)  |                             |  |                  |
| 3.   | Indradyumna       | 11          | 8.3<br>(8.0-8.7)                        | 7.1<br>(4.6 – 9.2)   | 5.0<br>(2.2 - 8.4)   | 10908<br>(490 – 24000) | 4566<br>(230– 16000)              | 1<br>(91)  | 7<br>(64) | 10<br>(91)  | 10<br>(91)  | 8<br>(73)  |                             |  |                  |
| 4.   | Swetaganga        | 11          | 8.3<br>(7.4 – 8.7)                      | 8.5<br>(1.3 – 19.5)  | 9.4<br>(3.1 – 15.9)  | 8755<br>(210 – 35000)  | 3773<br>(130– 17000)              | 4<br>(36)  | 4<br>(36) | 11<br>(100) | 10<br>(91)  | 4<br>(36)  |                             |  |                  |
| 5.   | Parvati sagar     | 11          | 8.0<br>(7.0 – 8.6)                      | 7.7<br>(2.9– 12.4)   | 13.1<br>(6.0 – 27.8) | 26118<br>(3500– 92000) | 10819<br>(310 – 35000)            | 3<br>(27)  | 4<br>(36) | 11<br>(100) | 11<br>(100) | 10<br>(91) |                             |  |                  |
| <b>*Class 'B'</b>  |                   |             | <b>6.5-8.5</b>                          | <b>5 and above</b>   | <b>3 or less</b>     | <b>500 or less</b>     |                                   | <b>Outdoor bathing</b>   |           |             |             |            |                             |  |                  |
| <b>Water quality criteria for bathing water (MOEF Notification G.S.R. No. 742(E) Dt. 25.09.2000)</b> |                   |             | <b>6.5-8.5</b>                          | <b>5 and above</b>   | <b>3 or less</b>     |                        | <b>2500 (Maximum Permissible)</b> | <b>Water use for organised outdoor bathing</b>                               |           |             |             |            |                             |  |                  |

\* 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 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 2014 (February- December)**

| Sl. No.                              | Sampling Location              | Physical parameters                     |                  | Organic pollution Indicators |                        |                         |                      | Mineral constituents |                     |                        |                  |                |                     |                       |                        |
|--------------------------------------|--------------------------------|---|------------------|------------------------------|------------------------|-------------------------|----------------------|----------------------|---------------------|------------------------|------------------|----------------|---------------------|-----------------------|------------------------|
|                                      |                                | Annual average values (Range of values) |                  |                              |                        |                         |                      |                      |                     |                        |                  |                |                     |                       |                        |
|                                      |                                | TSS                                     | Total alkalinity | COD                          | NH <sub>4</sub> -N     | Free NH <sub>3</sub> -N | TKN                  | EC                   | SAR                 | B                      | TDS              | TH             | Cl                  | SO <sub>4</sub>       | F                      |
|                                      |                                | (mg/l)                                  |                  | (mg/l)                       |                        |                         |                      | (µS/cm)              | (mg/l)              |                        |                  |                |                     |                       |                        |
| <b>Bindusagar Pond (Bhubaneswar)</b> |                                |   |                  |                              |                        |                         |                      |                      |                     |                        |                  |                |                     |                       |                        |
| 1.                                   | Lingaraj Temple side           | 21<br>(9-43)                            | 83<br>(54-120)   | 18.0<br>(5.5-34.3)           | 0.173<br>(0.056-0.336) | 0.028<br>(0.001-0.222)  | 1.56<br>(0.056-3.08) | 397<br>(318-521)     | 1.35<br>(0.96-1.85) | 0.073<br>(0.003-0.189) | 232<br>(172-296) | 89<br>(60-122) | 58.3<br>(31.4-97.9) | 18.54<br>(9.57-28.97) | 0.547<br>(0.384-0.718) |
| 2.                                   | Ananta Vasudev                 | 19<br>(4-41)                            | 88<br>(60-116)   | 16.5<br>(9.2-23.9)           | 0.173<br>(0.056-0.448) | 0.019<br>(0.001-0.143)  | 1.48<br>(0.08-2.80)  | 408<br>(373-517)     | 2.06<br>(1.51-3.18) | 0.060<br>(0.003-0.112) | 238<br>(208-298) | 91<br>(68-122) | 58.1<br>(47.0-78.3) | 17.55<br>(7.96-24.62) | 0.567<br>(0.374-0.750) |
| 3.                                   | Near Kedarnath research Centre | 28<br>(4-54)                            | 86<br>(56-116)   | 17.5<br>(3.7-32.0)           | 0.183<br>(0.112-0.336) | 0.008<br>(0.002-0.018)  | 1.63<br>(0.56-3.36)  | 395<br>(358-464)     | 1.97<br>(1.47-3.17) | 0.060<br>(0.003-0.211) | 231<br>(202-260) | 89<br>(66-118) | 55.7<br>(41.2-78.3) | 17.83<br>(8.95-26.61) | 0.542<br>(0.354-0.681) |
| 4.                                   | Gyananagar                     | 22<br>(4-71)                            | 96<br>(64-148)   | 18.8<br>(7.3-35.8)           | 0.275<br>(0.112-0.784) | 0.009<br>(0.003-0.027)  | 1.88<br>(0.56-3.36)  | 423<br>(338-566)     | 2.13<br>(1.54-4.07) | 0.055<br>(0.006-0.160) | 244<br>(198-310) | 94<br>(78-128) | 60.1<br>(45.1-97.9) | 17.91<br>(8.33-27.73) | 0.551<br>(0.377-0.710) |
| <b>*Class 'C'</b>                    |                                | -                                       | -                | -                            | -                      | -                       | -                    | -                    | -                   | -                      | 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 <sub>3</sub> <sup>-</sup>            | PO <sub>4</sub> <sup>3-</sup> -P | Cr(VI)                  | T. Cr                  | Fe                     | Ni <sup>#</sup>        | Cu <sup>#</sup>        | Zn <sup>#</sup>        | Cd <sup>#</sup>           | Hg                            | Pb <sup>#</sup>        |
|                                      |                                | (mg/l)                                  |                                  | (mg/l)                  |                        |                        |                        |                        |                        |                           |                               |                        |
| <b>Bindusagar Pond (Bhubaneswar)</b> |                                |   |                                  |                         |                        |                        |                        |                        |                        |                           |                               |                        |
| 1.                                   | Lingaraj Temple side           | 7.037<br>(0.372-32.945)                 | 0.130<br>(0.011-0.327)           | 0.010<br>(0.002-0.025)  | 0.037<br>(0.010-0.121) | 0.603<br>(0.015-2.514) | 0.010<br>(0.009-0.012) | 0.011<br>(0.008-0.014) | 0.015<br>(0.006-0.024) | 0.0037<br>(0.0011-0.0064) | 0.00020<br>(<0.00006-0.00076) | 0.010<br>(0.010-0.011) |
| 2.                                   | Ananta Vasudev                 | 8.098<br>(1.076-33.909)                 | 0.105<br>(0.006-0.325)           | 0.010<br>(<0.002-0.025) | 0.049<br>(0.003-0.220) | 0.429<br>(0.082-1.410) | 0.015<br>(0.009-0.021) | 0.011<br>(0.009-0.012) | 0.017<br>(0.006-0.028) | 0.0032<br>(0.0019-0.0045) | 0.00013<br>(<0.00006-0.00038) | 0.014<br>(0.011-0.018) |
| 3.                                   | Near Kedarnath research Centre | 8.755<br>(2.002-32.984)                 | 0.190<br>(0.003-1.052)           | 0.012<br>(<0.002-0.033) | 0.041<br>(0.015-0.080) | 1.309<br>(0.036-8.339) | 0.014<br>(0.013-0.014) | 0.011<br>(0.009-0.014) | 0.011<br>(0.004-0.018) | 0.0035<br>(0.0013-0.0057) | 0.00030<br>(<0.00006-0.00051) | 0.011<br>(0.009-0.014) |
| 4.                                   | Gyananagar                     | 8.787<br>(1.253-29.354)                 | 0.238<br>(0.012-1.316)           | 0.011<br>(<0.002-0.025) | 0.042<br>(0.013-0.091) | 0.459<br>(0.071-0.938) | 0.013<br>(0.011-0.015) | 0.012<br>(0.010-0.015) | 0.014<br>(0.006-0.022) | 0.0040<br>(0.0012-0.0068) | 0.00018<br>(<0.00006-0.00032) | 0.010<br>(0.003-0.016) |
| <b>*Class 'C'</b>                    |                                | 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 February and March, 2014

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

**Table- 2 (b) Water quality of ponds with respect to other parameters during 2014 (February- December)**

| Sl. No.             | Sampling Location | Physical parameters                     |                  | Organic pollution Indicators |                        |                         |                     | Mineral constituents |                     |                        |                  |                  |                        |                        |                        |
|---------------------|-------------------|---|------------------|------------------------------|------------------------|-------------------------|---------------------|----------------------|---------------------|------------------------|------------------|------------------|------------------------|------------------------|------------------------|
|                     |                   | Annual average values (Range of values) |                  |                              |                        |                         |                     |                      |                     |                        |                  |                  |                        |                        |                        |
|                     |                   | TSS                                     | Total alkalinity | COD                          | NH <sub>4</sub> -N     | Free NH <sub>3</sub> -N | TKN                 | EC (µS/cm)           | SAR                 | B                      | TDS              | TH               | Cl                     | SO <sub>4</sub>        | F                      |
|                     |                   | (mg/l)                                  |                  | (mg/l)                       |                        |                         |                     | (mg/l)               |                     |                        |                  |                  |                        |                        |                        |
| <b>Ponds (Puri)</b> |                   |   |                  |                              |                        |                         |                     |                      |                     |                        |                  |                  |                        |                        |                        |
| 1.                  | Narendra          | 46<br>(16-190)                          | 198<br>(80-244)  | 69.2<br>(26.9-127.6)         | 0.463<br>(0.112-1.176) | 0.124<br>(0.011-0.588)  | 3.21<br>(1.40-6.44) | 906<br>(583-1371)    | 2.90<br>(1.29-7.13) | 0.097<br>(0.003-0.266) | 539<br>(312-830) | 180<br>(84-220)  | 169.1<br>(83.3-318.0)  | 27.18<br>(15.67-37.98) | 0.204<br>(0.098-0.430) |
| 2.                  | Markanda          | 21<br>(11-30)                           | 182<br>(112-244) | 43.4<br>(11.4-115.9)         | 0.361<br>(0.112-1.064) | 0.123<br>(0.006-0.448)  | 2.44<br>(1.68-3.36) | 755<br>(545-982)     | 1.63<br>(0.99-2.68) | 0.088<br>(0.003-0.192) | 446<br>(304-602) | 182<br>(80-260)  | 117.5<br>(78.3-220.3)  | 30.39<br>(14.92-48.30) | 0.285<br>(0.047-1.120) |
| 3.                  | Indradyumna       | 18<br>(10-42)                           | 119<br>(106-140) | 33.0<br>(11.4-56.6)          | 0.316<br>(0.112-0.560) | 0.036<br>(0.006-0.070)  | 2.37<br>(1.40-3.64) | 669<br>(498-973)     | 1.64<br>(1.16-2.23) | 0.073<br>(0.039-0.115) | 400<br>(266-618) | 92<br>(76-120)   | 141.0<br>(73.4-244.8)  | 13.03<br>(6.97-31.56)  | 0.192<br>(0.091-0.350) |
| 4.                  | Swetaganga        | 22<br>(10-50)                           | 227<br>(176-272) | 42.2<br>(19.4-77.3)          | 0.789<br>(0.112-2.464) | 0.114<br>(0.012-0.468)  | 3.46<br>(1.96-7.00) | 1229<br>(972-1481)   | 1.66<br>(1.17-2.85) | 0.126<br>(0.071-0.218) | 714<br>(548-896) | 217<br>(140-264) | 239.5<br>(176.8-366.9) | 45.69<br>(29.10-63.68) | 0.126<br>(0.057-0.280) |
| 5.                  | Parvati sagar     | 35<br>(15-118)                          | 101<br>(84-122)  | 79.6<br>(22.8-164.2)         | 0.535<br>(0.168-1.344) | 0.033<br>(0.003-0.128)  | 3.39<br>(1.12-5.88) | 593<br>(371-989)     | 1.56<br>(1.19-2.38) | 0.078<br>(0.032-0.105) | 355<br>(210-610) | 97<br>(84-110)   | 120.6<br>(48.9-269.0)  | 20.12<br>(11.69-29.40) | 0.163<br>(0.085-0.300) |
| <b>*Class 'C'</b>   |                   | -                                       | -                | -                            | -                      | -                       | -                   | -                    | -                   | -                      | 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 <sub>3</sub> <sup>-</sup>            | PO <sub>4</sub> <sup>3-</sup> -P | Cr(VI)                      | T. Cr                      | Fe                          | Ni <sup>#</sup>            | Cu <sup>#</sup>            | Zn <sup>#</sup>            | Cd <sup>#</sup>               | Hg                                | Pb <sup>#</sup>            |
|                     |                   | (mg/l)                                  |                                  | (mg/l)                      |                            |                             |                            |                            |                            |                               |                                   |                            |
| <b>Ponds (Puri)</b> |                   |   |                                  |                             |                            |                             |                            |                            |                            |                               |                                   |                            |
| 1.                  | Narendra          | 9.438<br>(1.718-<br>20.957)             | 0.449<br>(0.020-<br>1.210)       | 0.014<br>(<0.002-<br>0.026) | 0.033<br>(0.011-<br>0.055) | 0.548<br>(<0.005<br>-2.310) | 0.027<br>(0.025-<br>0.028) | 0.026<br>(0.024-<br>0.027) | 0.035<br>(0.025-<br>0.045) | 0.0030<br>(0.0024-<br>0.0036) | 0.00027<br>(<0.00006<br>-0.00057) | 0.009<br>(0.008-<br>0.010) |
| 2.                  | Markanda          | 17.097<br>(1.187-<br>41.487)            | 0.736<br>(0.004-<br>2.319)       | 0.011<br>(<0.002-<br>0.035) | 0.050<br>(0.003-<br>0.273) | 1.108<br>(0.071-<br>9.445)  | 0.021<br>(0.015-<br>0.027) | 0.006<br>(0.004-<br>0.008) | 0.030<br>(0.028-<br>0.032) | 0.0020<br>(0.0016-<br>0.0023) | 0.00035<br>(<0.00006<br>-0.00110) | 0.009<br>(0.009-<br>0.009) |
| 3.                  | Indradyumna       | 5.584<br>(2.241-<br>13.228)             | 0.112<br>(0.011-<br>0.560)       | 0.010<br>(<0.002-<br>0.036) | 0.033<br>(0.003-<br>0.070) | 1.233<br>(<0.005-<br>6.060) | 0.020<br>(0.014-<br>0.026) | 0.004<br>(0.002-<br>0.006) | 0.062<br>(0.045-<br>0.078) | 0.0019<br>(0.0010-<br>0.0028) | 0.00023<br>(<0.00006<br>-0.00064) | 0.011<br>(0.010-<br>0.012) |
| 4.                  | Swetaganga        | 22.690<br>(1.457-<br>35.699)            | 0.439<br>(0.004-<br>1.040)       | 0.009<br>(<0.002-<br>0.035) | 0.042<br>(0.003-<br>0.111) | 0.619<br>(0.020-<br>4.682)  | 0.021<br>(0.015-<br>0.027) | 0.005<br>(0.001-<br>0.009) | 0.014<br>(0.011-<br>0.016) | 0.0026<br>(0.0025-<br>0.0027) | 0.00026<br>(<0.00006<br>-0.00093) | 0.004<br>(0.002-<br>0.007) |
| 5.                  | Parvati sagar     | 8.145<br>(2.161-<br>16.209)             | 0.112<br>(0.006-<br>0.298)       | 0.009<br>(<0.002-<br>0.020) | 0.038<br>(0.003-<br>0.070) | 0.509<br>(<0.005-<br>3.917) | 0.017<br>(0.015-<br>0.018) | 0.008<br>(0.002-<br>0.015) | 0.029<br>(0.024-<br>0.034) | 0.0013<br>(0.0012-<br>0.0013) | 0.00038<br>(<0.00006<br>-0.00076) | 0.007<br>(0.005-<br>0.009) |
| <b>*Class 'C'</b>   |                   |   |                                  | 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 and March, 2014

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